DIGITAL Journal

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IN THIS ISSUE

Remember how we used to send graphics? For more RTTY nostalgia turn to page 20. For the complete picture and identity of the above, please turn to page 27.

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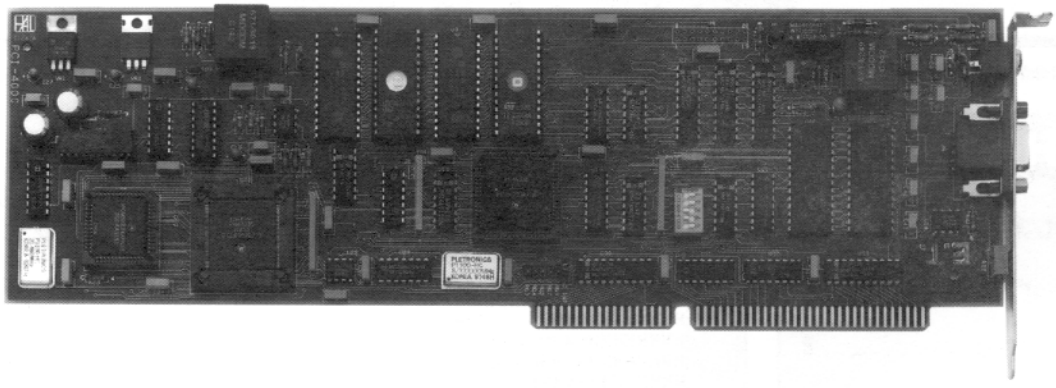

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Pactor II - Part III

The New Dimension in Data Transmission Technology

by Dr. Tom Rink, DL2FAK and Hans-Peter Helpert, DL6MAA

SCS Communications • Röntgenstraße 36 • D-63454 Hanau • Germany

This is the third of a series of articles that describes the PACTOR-II system and the ideas behind it. In this third chapter we present a short description of the PACTOR-II Protocol. Finally, in the April issue, we will answer questions on the system that have accumulated at the ADRS offices. Please send your questions to ADRS at the Goldenrod, FL address.

I. Introduction

All new modes should provide significant improvements over existing systems, which must not only refer to the maximum throughput and the robustness. Other basic attributes, like signal bandwidth, required frequency accuracy and compatibility to existing standards also have to be taken into consideration.

Modulation and encoding methods that supply high throughput rates, e.g. 16-DPSK, normally suffer from a lack of robustness. On the other hand, systems distinguished by a high robustness, e.g. DBPSK combined with a rate 1/2 convolutional code, only provide a low maximum throughput. Therefore adaptive digital modes have to be used, that apply different modulation and encoding methods depending on the channel quality. Just changing the symbol rate however, leads to only little adaptivity and additionally results in variations of the bandwidth. In order to prevent any spillover in adjacent channels, the bandwidth should ideally always remain the same, regardless of whether a robust or a fast data transmission is performed. As 500 Hz CW filters are very commonly used and due to the usual spacing of the mailbox frequencies on short wave, a maximum bandwidth of 500 Hz should not be exceeded. In addition, there should not be too high a demand placed on the transceiver used, regarding its frequency adjustment and stability. For optimum results, maximum frequency deviations similar to FSK modes should be tolerated. This forces the use of powerful tracking methods, which allow a link also to be established if the deviation is up to +/- 80 Hz. Further, a new mode should be backwards compatible to an existing standard, preferably with automatic switching, in order to prevent a deficiency of QSO partners in the early stage.

PACTOR-II meets all the above mentioned requirements. It is fully backwards compatible with the current PACTOR standard, as the initial link setup is still done in FSK. If both stations are capable of Level II, an automatic switching is performed. The PACTOR-II protocol basically uses a two-tone DPSK system with raised cosine pulse shaping, which reduces the required bandwidth to less than 500 Hz. The maximum absolute transfer rate is 800 bits per second. Due to the improved on-line data compression, maximum effective throughput rates of more than 1200 bits per second can be obtained. PACTOR-II is thus the fastest short-wave digital mode. Very efficient error control coding using a convolutional code with a constraint length of 9 and a real Viterbi decoder with soft decision is applied at all speed levels, in addition to analog Memory-ARQ. PACTOR-II is also therefore, by far the most robust digital mode, which allows a link to be established and achieve a reasonable throughput in such poor propagation conditions that all other modes fail. In comparison with the current FSK PACTOR standard including analog Memory-ARQ, which had been the most robust digital mode until the release of PACTOR-II, a further gain of robustness of around 7 dB could be obtained. The following chapters describe some details of the PACTOR-II protocol.

II. Structure and Timing of the PACTOR-II Frames

Similar to the current FSK PACTOR standard, PACTOR-II is also a half-duplex synchronous ARQ system without any mark/space convention. It may thus be operated in USB as well as LSB position of the transceiver. The initial link setup is still performed using the FSK (PACTOR-I) protocol, in order to achieve compatibility to the previous level. If both stations are capable of PACTOR-II, an automatic switching to the higher level is performed. The basic PACTOR-II frame structure is similar to PACTOR-I. It consists of a header, a variable data field, the status byte and the CRC. The standard cycle duration does not differ from FSK PACTOR and is still 1.25 seconds, which is one of the requirements to obtain easy compatibility to Level I. Longer Control Signals (CS) had to be applied to achieve a higher robustness for the acknowledgment signal, required due to the greater robustness of the data channel. The entire length of the standard packet had to be shortened to 0.8 seconds in order not to shorten the maximum possible propagation delay, which is thus still 170 milliseconds. The requirements to operate PACTOR-II regarding the transmit delay and the receiver recovery time of the used equipment therefore remain unchanged in comparison with Level I.

Due to the signal propagation delay, and equipment switching delays, PACTOR-II as well as PACTOR-I has in the standard mode a maximum range for ARQ contacts of around 20,000 km. As with PACTOR-I, a long path option is available also for PACTOR-II, enabling contacts up to 40,000 km. The sending station calls the partner station in 'Long Path Mode'. Initial contact is established using the PACTOR-I FSK protocol as previously mentioned, but with a cycle time of 1.4 seconds instead of 1.25. This longer cycle time allows for the much greater propagation delays found on 'Long Path' contacts. The link then automatically switches to PACTOR-II, with the same cycle duration. In the new data mode (see above), timing is also automatically adjusted to obtain longer receiving gaps.

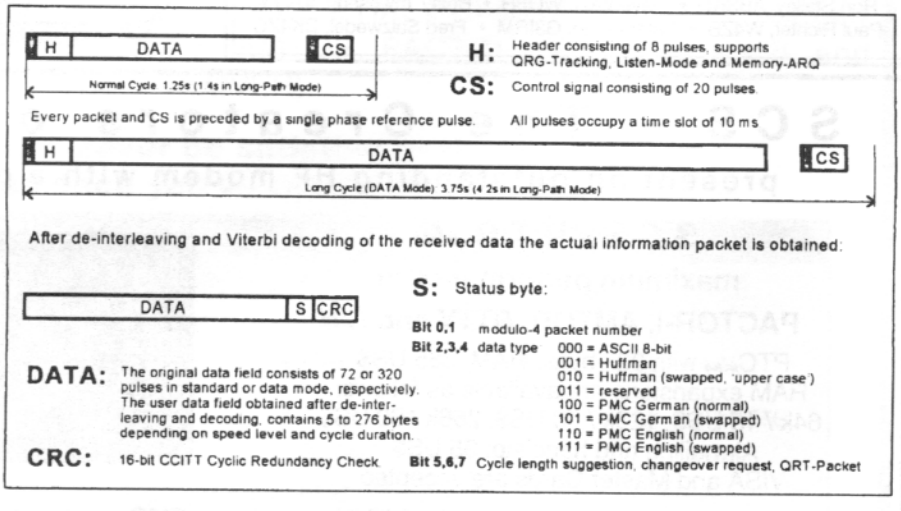


Figure 1: Structure and timing of the PACTOR-II frames

Unlike the previous level, PACTOR-II additionally switches to longer packets if the data blocks are not filled up with idles, (i.e. if the transmitter buffer indicates that more information has to be transferred than fitting into the standard packets). If the information sending station (ISS) prefers to use long packets, it sets the long cycle flag in the status word. The information receiving station (IRS) then finally can accept the proposed change of the cycle duration by sending a CS6. This situation, for exam-

ple, occurs when reading longer files out of mailboxes. The long packets are basically made up like the short ones, but consist of a larger data field, which may contain up to 2208 bits of usable information. The length of these data packets is 3.28 seconds, which leads to an entire cycle duration of 3.75 seconds in this so-called data mode. Figure 1 shows the PACTOR-II cycle duration and the packet construction in the standard mode as well as in the data mode.

When entering text manually in QSO traffic from operator to operator, the maximum throughput of the standard mode is normally not used up, thus the required higher flexibility of the system is still available due to the short packets. The efficient use of longer data packets on short wave is generally only possible, if powerful error control coding, with full frame interleaving is applied to cancel out error bursts or short fading periods. As already mentioned, PACTOR-II uses a convolutional code with a constraint length of 9, a real Viterbi decoder and soft decision, in addition to analog Memory-ARQ. Due to the high coding gain and the resulting capacity of error correction without requesting a repetition of the entire packet, a significant increase in the effective throughput could be obtained. Proceeding from average bit error rates on short wave channels, simple block codes are usually unable to provide enough coding gain. This often leads to a decrease in speed when using longer data strings, as repetitions often cannot be avoided. For more details on these technical foundations, see the first part of this series.

PACTOR-II uses six different CS, each consisting of 40 bits, all having exactly the maximum possible mutual hamming distance of 24 bits to each other. They thus reach exactly the Plotkin boundary and also represent a perfect code. This allows the advantageous use of the Cross Correlation method for decoding, which is also a kind of soft decision, leading to the correct detection of even inaudible CS. This checking is not only confined to a simple binary principle. A complex analog test procedure is applied, using the fine detail data from the DSP, to evaluate the single CS received, as well as the information summed up in the Memory-ARQ buffer. Similar to Level I, CS1 and CS2 are used to acknowledge/request packets and CS3 forces a break-in. CS4 and CS5 handle the speed changes, and CS6 is a toggle for the packet length. All CS are always sent in DBPSK in order to obtain a maximum of robustness.

III. Speed Levels and Error Control Coding

As mentioned in the introduction, PACTOR-II uses a two-tone DPSK modulation system. Due to the raised cosine pulse shaping, the maximum required bandwidth is only around 450 Hz at minus 50 dB. ASK, which was also tested in the early stage, provided poorer results in weak conditions compared with a higher DPSK modulation, as different amplitude levels are more difficult to distinguish in noisy channels than more phase levels. Additionally, ASK increases the Crest Factor of the signal. For these reasons, it is not used in the final PACTOR-II protocol. Basic information on these items can also be found in the first part of this series.

PACTOR-II uses instead, different DPSK modulation schemes and various code rates. The Crest Factor of the PACTOR-II signal is therefore only 1.45. The basic code used is an optimum rate 1/2 convolutional code with a constraint length of 9. Codes with higher rates, e.g. rate 2/3 and rate 7/8, can be derived from that code by so-called puncturing. Prior to the transmission, certain of the symbols of the rate 1/2 encoded stream are 'punctured' or deleted, and not transmitted. At the receiving end, the punctured encoded bits are replaced with 'null' symbols prior to decoding with the rate 1/2 decoder. The decoder treats these null symbols neither as a received '1' nor as '0', but as an exactly intermediate value. No information is thus conveyed by that symbol that may influence the decoding process. The coding performance of 'punctured' code operation nearly matches the coding performance of the best known classic rate 2/3 or 7/8 codes with a comparable constraint length, provided that the puncture pattern is chosen carefully. The major advantage of this approach is that a single code rate decoder (in our case a rate 1/2 decoder) can implement a wide range of codes.

In the PTC-II, the Viterbi algorithm is implemented for decoding of the convolutional code. Nevertheless, as already indicated in the first part, there are several different methods to decode the PACTOR-II signal, which require less processing power, but in return for this, also provide less coding gain. However, these methods at least allow compatibility to the PACTOR-II standard and may therefore be applied in cheaper hardware.

The most robust PACTOR-II speed level employs DBPSK with rate 1/2 coding, which per cycle allows an absolute throughput of 5 bytes in the standard mode and 36 bytes in the data mode respectively. In the next step, DQPSK with rate 1/2 coding is applied, which leads to an absolute throughput of 14 bytes in the standard mode and 76 bytes in the data mode. This is followed by 8-DPSK with a rate 2/3 coding, providing a throughput of 32 and 156 bytes per packet, respectively. Finally, in best propagation conditions, PACTOR-II applies 16-DPSK with a rate 7/8 coding, which allows the maximum throughput of 59 bytes in a short packet and 276 bytes in the data mode. The mentioned transfer rates are all net rates referring to 8-bit ASCII, which are calculated after the error control coding and all other protocol overhead. As data compression is usually active, these throughput rates must be multiplied by the compression factor. The effective speed is therefore considerably higher in practice. All throughput rates and the corresponding modulation and encoding methods are summarized in table 1. The speed levels are automatically chosen by the PTC-II, considering the link statistics and the actual channel quality, thus no user intervention is required.

Cycle	Modulation type	Code rate	Data bytes/packet (no compression)	Data bytes/sec (with PMC, f=1.9)
standard	DBPSK	1/2	5	7.6
data	DBPSK	1/2	36	18.2
standard	DQPSK	1/2	14	21.3
data	DQPSK	1/2	76	38.5
standard	8-DPSK	2/3	32	48.6
data	8-DPSK	2/3	156	79.0
standard	16-DPSK	7/8	59	89.7
data	16-DPSK	7/8	276	139.8

Table 1: PACTOR-II speed and encoding levels with the resulting throughput rates (all throughput rates are net rates referring to 8-bit ASCII)

IV. On-line Data Compression

Like in the previous FSK PACTOR system, automatic on-line Huffman data compression is applied. Additionally, PACTOR-II uses run-length encoding and, as a further novelty, Pseudo-Markov Compression (PMC, see below). Compared to 8-bit ASCII (plain text) PMC yields a compression factor of around 1.9, which leads to an effective speed of about 600 bits per second in average propagation conditions in data mode. PACTOR-II is already around 3 times faster than PACTOR-I and 15 times faster than AMTOR on average channels. However, the maximum effective speed in good conditions can exceed 1200 bits per second. As the PTC-II firmware automatically checks, whether PMC, Huffman encoding or the original ASCII code is the best choice, which depends on the probability of occurrence of the characters, there is no risk of losing throughput capacity. PACTOR-II is of course still able to transfer any given binary information, e.g. programs or picture- and voice files. In these cases the on-line data compression is automatically switched off.

Ordinary Huffman compression exploits the 'one-dimensional' probability distribution of the characters in plain texts. The more frequently a character occurs, the shorter has to be the Huffman symbol that is assigned to the actual character. On the other hand, Markov compression

(cont'd on page 7)

Packet Power

Tips for the new and seasoned packet user

©1995 by Dave Wolf, WO5H dba Maingate Resources
P.O. Box 189, Burleson TX 76097-0189 / CompuServe ID: 73427,2246

Forget You Ever Learned the "L" Command

Most new packet users figure out how to log on to a BBS and get listing of bulletins. they also figure out how to send and receive personal e-mail. This requires knowing the L, R and S commands. About 99% of the users don't go any farther than this! The result - lots of channel congestion as stations get listings of bulletins that they never read. Even worse, stations with marginal paths lose their connection to the BBS before they get the whole listing. A tremendous waste of time and channel resources...

There's a smarter way to get bulletin listings, and it only takes learning a little more than those L, R and S commands. First, UNlearn the habit of typing L when you log on to a packet BBS. I know most BBSs give this little signon message that tells you how many unlisted new messages you have waiting for you. this doesn't mean you are OBLIGATED to list them all!

Instead of a shotgun (using the L command), how about using a rifle? With a "rifle" you can list only those bulletins that might be worth reading. There are several commands that all BBSs have that allow you to list bulletins by KEY WORDS. These key words can be searched for in the TO, AT and SUBJECT fields.

Take orbital satellite data, for example. Most orbital element bulletins are addressed to KEPS. It's easy to filter out only those bulletins with the command L> KEPS.

For a listing of all AMSAT bulletins, enter L @ AMSAT.

Finding sale items is a bit more complicated. First, try L> *SALE. The asterisk before 'SALE' is a wildcard character. It represents none to a ton of possible characters that clever folks add in front of SALE. The wildcard will pass FORSALE, 4SALE and any similar expression, as long as it has the word SALE in it.

DISGUISED BULLETINS

People sometimes disguise 'for sale' bulletins by sending them to 'ALL.' You can look for the key word 'sale' that usually is included in the subject line, by entering the command: LS *sale* ...the wildcard characters on either side of the word 'sale' will permit any bulletin containing 'sale' in the subject to be included. LS is a great command to focus on bulletins with keywords that are almost guaranteed to be included in the subject line. Here are some nifty examples:

LS *want* LS *Yaesu* LS*mod*

Remember to use the asterisk around the key word when you use the LS command.

The LL command is useful for obtaining a listing of the most recent bulletins to arrive on the board. LL by itself is the same as LL 1. It will give you the absolute most recent bulletin to be posted on the board (or the latest P-type message if it is from or to you). LL 20 will display the 20 freshest gems to arrive on the board.

OVER 70% OF THE BULLETINS ARE NEVER READ

If you never use the 'L' command again, you will be doing yourself and your fellow packeteers a tremendous favor. Thousands of bulletins will be posted on bulletin boards today, and over 70% of them will never be read. That is the latest statistic by sysops who use special software to analyze their system logs! With the average BBS retaining from 300 to 1000 bulletins at any one time, that's a lot of listing time that is a true waste. With packet squeezed into less than a dozen two-meter frequencies in most metro areas and the vast majority of systems running at 1200 bps, we can't afford the inefficiency of the L command anymore.

What can individual ops do to increase the likelihood that any bulletin they send out will be read? You could give it a phony controversial title; that will surely attract some attention. I never pass up anything about Socks the First Cat. This will also create a flamefest, and probably get your call sign locked out of dozens of boards around the world, so a phony title isn't worth it.

The best way to get your bulletin read is to start with an honest title. If you have a 'for sale' item, post it 'SALE @ .....' or 'FOR-SALE @ .....' - whatever your local customary for sale title is. And post it for your local area for a couple of weeks. Whether they have been posted for jokes or not, I have seen tower sections for sale clear across the country. There is no legitimate reason to ever post a tower or antenna or any similar item '4SALE @ ALLUS.' If you like to practice your political debate skills, be honest with the title of your bulletin and honest with the subject matter. Some sysops filter out such bulletins from the systems, and this is their prerogative. If you are honest in the title of your bulletin, you might not win a convert to your viewpoint, but you might win respect for being honest.

SYSOPS HAVE A SECRET WEAPON

Most packet BBS sysops have quite an investment in hardware. Even a modest system has a computer, a radio, a TNC and all of the support hardware sitting there on a 7 x 24 basis doing nothing else but providing BBS service for folks. Any reasonable person would be hard pressed to justify such an investment if it used for hosting bulletins that no one reads. Many sysops have adopted the practice of allowing only local 'for sale' items on their systems. They don't accept such messages from other BBSs.

Most sysops filter out the most controversial ranting and raving from a handful of anarchists around the country who feel that amateur packet is their personal soapbox. The sysops employ their 'secret weapon, ' the LID LIST. Known by various other names, it is a list of call signs of chronic turkeys. Any message from a habitual LID gets trapped for the sysop's review. Busy sysops don't even spend the time reviewing such traffic - they don't even permit other boards to forward such material to them to begin with! By the way, when sysops get together, they will often swap such lid lists along with their system files.

The way to avoid getting on the LID list 'Hall of Shame" is to exercise responsibility when originating bulletins. Ask yourself if you would drive across the country for a tower section? Would you trust buying a piece of equipment sight-unseen from someone you don't even know? Would you mind for your grade-school daughter or granddaughter to read some political commentary or flame on another amateur? These are the kinds of yardsticks I employ when deciding which bulletins stay or go from my system. I'm no Pollyanna, but I think of those kids in classrooms whose teachers give them access to packet equipment as part of their science studies. There are several that use my board and this pleases me greatly. Maybe one or two of the children will get smitten with science the way I was when I was in grade school. I will gladly add a station or two to my LID list if it means being able to have those kids access the BBS.

HOW TO BE A BETTER USER

Being a better user requires that you educate yourself as to the capability of the bulletin board system that you call 'home.' There are user docs for all of the BBS software. This documentation will tell you all of the commands that are available.

Use some of the more sophisticated search features and you will be a better user. If your sysop is like me, he/she will be happy to share these user docs with you. I print out a copy if someone will send a stamped, self-addressed envelope to me. I'll transfer them to disk if someone sends a blank diskette and stamped mailer. If your sysop doesn't do this already, suggest they make this service available. I consider it to be an extension of my on-air activities and enjoy the frequent short notes I get from users when they send in for the documentation. I receive, on average, one a week, so the burden on the printer and my time is not a problem at all. I can watch the users log on and can spot those that have sent for the docs and read them. They are using the extended L commands and zeroing in on those bulletins that are of most interest to them.

THE FUTURE OF INTELLIGENT BULLETIN LISTING

There is a user companion to the F6FBB BBS software, which gives us a hint as to how BBS software might look in the future. It is the TPK bulletin-grabbing software program. It works in cooperation with FBB to automatically give the user a listing of the latest bulletins to arrive on their BBS. The user can choose which bulletins they wish to download and the software will take care of it for them automatically. All P-type messages are transferred between user and BBS automatically with TPK. This is a cousin to what is called client-server software. Our next Packet Power column will look more closely at TPK and explain how its use can drastically reduce the amount of congestion that currently takes the fun out of packet for many users.

Until next time, let me hear from you. Packet Power will answer the most interesting packet-related questions. Drop a note to Packet Power, P.O. Box 189, Burleson, TX 76097-1089. Or fax them to (817) 295-6232. CompuServe address: 73427, 2246. Not all can be answered due to the shear crush of mail, but all are most certainly appreciated. ❑

NEW ADRS DIRECTORS PROPOSED

The ADRS President, Warren Sinsheimer W2NRE, announced that two new directors were proposed for election at the annual meeting in Dayton (see the formal meeting notification elsewhere in this issue of the Digital Journal).

Jules W2JGR needs no introduction! He is a distinguished DX-er, now closing in on Honor-roll status. A long time resident of Long Island, NY, fully retired, Jules now makes his home in Minneapolis. There are few callsigns on the digital bands as familiar as his, and there are few amateurs anywhere who have as many friends around the world. Jules produces the DX column for the Digital Journal, a task he performs with style and substance. ADRS is fortunate to have the support of such a talented and dedicated individual.

Barry VE3CDX lives in Middleport, Ontario, about 60 miles southwest of Toronto where he runs the Transmission Department of CHCH TV. This position keeps him in the forefront of digital technology. He is also very involved in the Ontario-Western NY Packet Advisory Group, where he is chairman of the spectrum management committee. Barry devotes spare time to network design using very high speed (19.2K) backbones, and runs a DX-Cluster and packet BBS as well. As mentioned last month, he is also busily engaged in rewriting the DX Cluster software. A special welcome to our first Canadian director!

Be at the Radisson on April 28th and both Jules and Barry during the Dayton membership meeting.

(Pactor-II -- cont'd from page 5)

can be considered as a ´double´ Huffman compression, since it not only makes use of the simple probability distribution, but of the ´two-dimensional´ probability. For each preceding character, a probability distribution of the very next character can be calculated. For example, if the actual character is ´e´, it is very likely that ´i´ or ´s´ occurs next, but extremely unlikely that an ´X´ follows. The resulting probability distributions are much sharper than the simple one-dimensional distribution and thus lead to a considerably better compression. Unfortunately, there are two drawbacks: Since for each ASCII character a separate coding table is required, the entire Markov coding table becomes impracticably large. Additionally, the two-dimensional distribution and thus also the achievable compression factor depends much more on the kind of text than the simple character distribution.

We have therefore chosen a slightly modified approach which we called Pseudo-Markov Compression, because it can be considered as a hybrid between Markov- and Huffman encoding. In this variant, the Markov encoding is limited to the 16 most frequent ´preceding´ characters. All other characters trigger normal Huffman compression of the very next character. This reduces the Markov coding table to a reasonable size and also makes the character probabilities less critical, since especially the less frequent characters tend to have unstable probability distributions. Nevertheless, for optimum compression, two different tables for English and German texts are defined in the PACTOR-II protocol and automatically chosen by the PTC-II.

V. Some Practical Aspects

Similar to Level I, the tones of the PACTOR-II signal are spaced at 200 Hz. Their frequency may be defined freely in steps of 1 Hz by software command, as long as the shift remains 200 Hz. Thus you can easily switch between high- and low-tones, and also adjust any additionally required tone pair. This allows the utilizing of narrow CW filters in all transceivers that provide the option of activating the corresponding filters in the SSB mode.

In the PACTOR-II system, the transferred information is swapped from one channel (tone) to the other in every cycle. Unlike FSK systems, the link is thus not blocked when strong narrow band QRM completely overpowers one channel (e.g. CW or carriers), but only its maximum speed is reduced. Usual FSK systems with a mark/space convention and without Memory-ARQ have to fail in such cases, because even if a so-called 'space-only' mode is applied, the strongest signal is automatically chosen. This always leads to a break-down of the link, as the QRM is stronger than the useful signal in the proposed case.

PACTOR-II provides a comprehensive Listen-Mode, which is much more robust than known from PACTOR-I, because just the short header has to be received correctly, then the powerful error control coding can be fully utilized. Burst errors may be corrected also by monitoring stations and thus virtually do not affect the performance. The Unproto-Mode in PACTOR-II allows to choose between all the above mentioned speed and encoding levels. On the receiving side, the correct mode is detected automatically and therefore needs no user-adjustment. For example, a fast and very robust QTC mode can thus be achieved, when a message is transmitted in the Unproto-Mode using DBPSK with rate 1/2 coding.

(Note 1: If you wish to order a PTC-II, just send a fax message or a letter to SCS - Special Communications Systems, Roentgenstr. 36, 63454 Hanau, Germany, Fax: +49 6181 23368. The price for the basic unit with 512k static RAM is 950$ (USD) plus 35$ shipping (airmail outside Europe). VISA and Master cards are accepted. The next series of units will be available in April).

(Note 2: This concludes the presentation of Pactor-II. The Question and Answer article, originally scheduled for the April issue, will now appear in May. This will allow more time to assemble the necessary material. Please send your questions and/or comments direct to SCS or to the ADRS at Goldenrod, FL).

The Contest Chair

Hints, Tips & Inspiration for Better Scores

by Ron Stailey, AB5KD • 504 Dove Haven Dr • Round Rock, TX 78664
Internet: ron481@austin,relay.ucm.org

Hello Contesters/DXers. It's March and time for the BARTG Contest. This has been a favorite of many of us for a long time. It will most likely be the last good contest before conditions start to fall, or until August or September. Lets all get in there and give it the old college try!

This month I think I have something you're going to like. Last year I heard Jay WX0B talk at Ham-Com in Arlington, Texas. I decided at that time I should try and get Jay to do at least one article in the Digital Journal, possibly more. He is a specialist in single tower contest stations, and I'm sure Jay can help improve you contest scores and assist with your DX count.

Jay has a BSEE from the University of Toledo. First licensed in 1962 as WN8OLL, when he was 12 years old, Jay now lives in Sunnyvale, TX. He has been active in contesting for only five years and is new to RTTY, but not CW and SSB. Most of his operation has been M/S. He has scored a lot of points and is now looking to do the same in the RTTY world.

His wins:

1st SS CW M/S in '89
1st N.A. All Asian CW '89
1st CQWW SSB M/M @ PJ1B-(Team 1989)
2nd SS SSB M/S '93
4th SS CW M/S '93
5th ARRL DX / 1st Div SSB Multi/Two '93
1st SS SSB M/S '94
2nd SS CW M/S '94
10th CQWW SSB '94

A Single Tower Contest Station

Part-1

by Jay Terleski WX0B

When Ron asked me to write about digital contesting, I asked him "What in the world do I know about that?" I had played around in the CQWW RTTY tests during the last two years. But I am not one who can tell the digital contesters anything they need to know. I'm still trying to figure that out myself. But he saw my presentation on my contest station at Hamcom and thought it would make an interesting article for the Digital Journal. It then occurred to me that yes, I do know one or two things that could help single tower RTTY stations become a lot more competitive. I had to develop a system for myself in order to take advantage of "stacking gain" on all bands with only a single tower. And if this goes over well with the digital contest community maybe Ron will ask me to write about some of the other things I've done in my station.

Several years ago when I was laying out the design for a single tower contest station, I found out that I was looking at a complex-array switching and feeding problem. Namely, how to feed equal power to one, two, or three beams; and be able to switch them easily into any configuration of upper, middle, lower, upper-two, lower-two, upper-and-lower, or all three. Searching the literature turned up many kinds of switching matrixes with quarter wavelength coaxial transformers, but no really easy-to-build solutions for three antennas. None of them had the full flexibility I wanted. What does this have to do with a standard city lot with a tri-bander on a 50 foot tower? Everything! Read on, my friend.

I had seen Dr. Jerry Sevick's book on transmission line transformers *("Transmission Line Transformers" by Jerry Sevick W2FMI)* but didn't pay much attention. Then I realized that what I was searching for was a widget that could transform impedances in a small package which I could surround with a simple relay matrix. I studied the book, and then started calling Dr. Sevick with my ideas. To my surprise, I found him to be very supportive and helpful. And I would like to thank him for the help, encouragement, and friendship we now have.

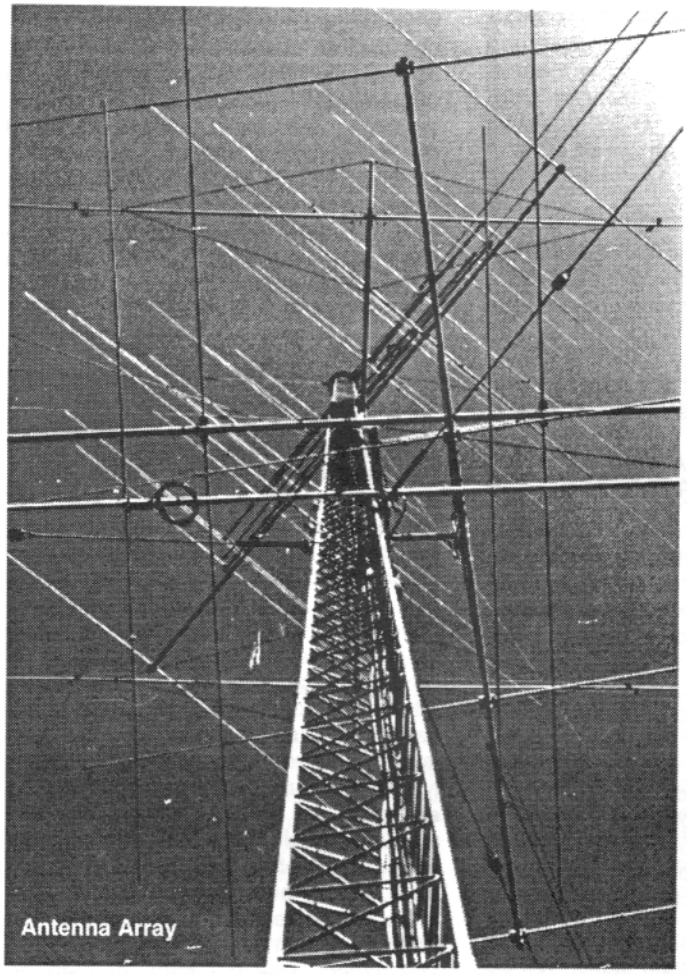
DEFINITION OF THE PROBLEM

Looking at the tower diagram (fig 1 and picture) I stacked 4 element mono-bander antennas 4/4/4 on 10, 15, 20 meters, and two 2 element mono-banders on 40 meters. I desired to feed them in all possible combinations as well as make them "splitable" as to direction. I built the top section so it would rotate from 85 feet to 155 using the RTS Inc. (K5IU) guy wire bearings. I mounted the antennas below that on their own rotating side mounts, except for the lower 40m beam which is fixed on Europe. The problem of how to feed and switch them to the above criteria still remained. A look at some of the "classical" feeding solutions is helpful.

CLASSICAL FEEDING SCHEMES

Fig 2 shows the usual way of matching a two high stack using 1/4 wavelength 75 ohm coax transformers. If this stack is to be made switchable one has to switch out the 1/4 wave sections. There have been several ways devised to do this which have been published in the ham literature, I have cited some of the articles in the reference section.

Fig 3 shows the more complicated method to feed a three stack with equal power. If you think of the switching matrix it would require to make this system flexible enough to feed all purtabations of three antennas plus create the 35 ohm and 75 ohm 1/4 coaxial transformers, you would give up before starting such a thing. You would settle for a compromise which is much easier to construct such as Ref 2.



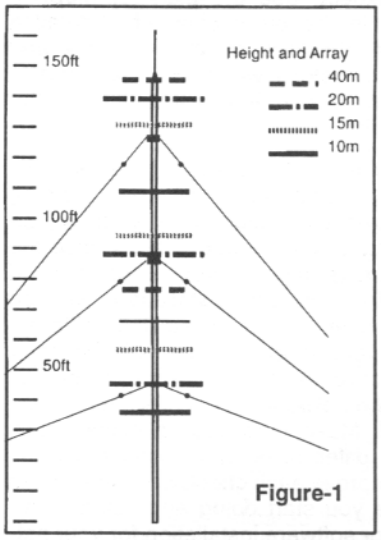
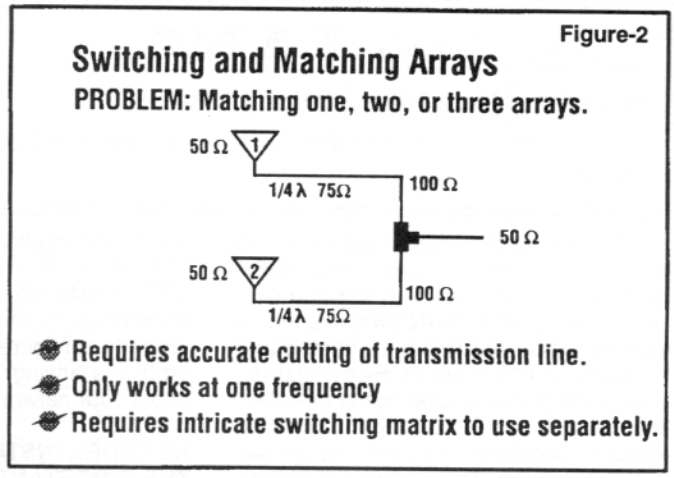
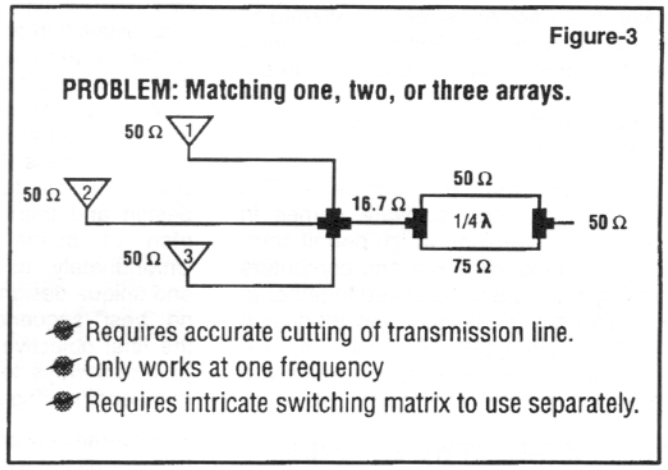
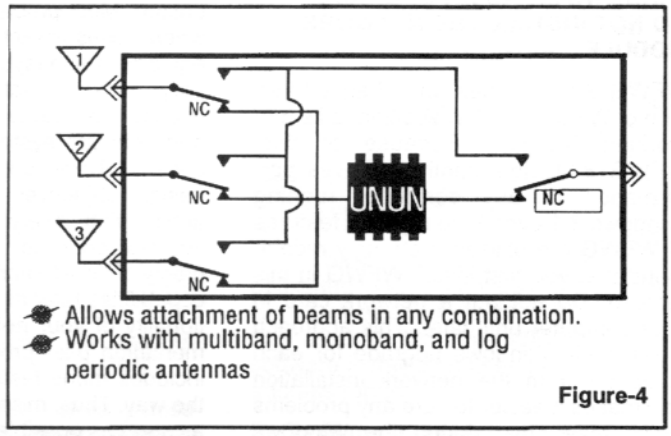


Figure-1

Fig 4 demonstrates another compromise of feeding a three stack. Here we are feeding the upper antenna with 1/2 the total power and tee-ing in the lower two which both split the remaining half of the power. It has been purported to magically lower the take off angle due to the unequal power split. But my use of antenna modeling software shows no lowering of the angle, but it does reduce the gain slightly Vs an equal power split-array at the same height. I don't recommend this method.







USING TRANSMISSION LINE TRANSFORMERS

The UN-UN *(Unbalanced to Unbalanced transmission line transformer, word coined by Dr. Jerry Sevick)* is a wide band device which allows various transformations of impedances. One of its powerful characteristics is that it is small. This allows us to design a relay matrix around it such as in fig 5 (also picture).

This small package doesn't require cutting of various lengths of coax and since its transformation ratios hold over a large bandwidth it is now possible to stack multi-banders, log-periodics, multi-quads, or even multi-band dipoles all with a single equal length 50 ohm feedline.

Now you don't have to be a big gun station to have a stack of HF beams. You can stack two TH7's, TH6's, A3's, KT34's or what ever type of tri-bander you have on the tower and double your signal strength on receive and transmit. This is probably the most effective upgrade you can do for your contest station even above buying a mongo amplifier! And you can transmit in two directions at the same time if you need too.

DEVELOPING THE STACK MATCHER

If we look at fig 2 again and instead feed the two 50 ohm antennas with equal 50 ohm transmission lines the resultant parallel impedance is 25 ohms where we "Tee" them together. The "+/- j" factor will be ignored for this discussion assuming all antennas are well matched and at resonance.

When we feed three 50 ohm antennas (fig 3) with equal 50 ohm transmission lines the summed impedance is 16.7 ohms. We could create two Un-Un transformers one being 3:1 to feed all three beams, and one being 2:1 when feeding two beams. But with a little

(cont'd on page 12)

Computer LANS

In Digital Mode Ham Stations - Part III

by Paul Richter, W4ZB • PO Box 19190 • Washington, DC 20036-9190
CompuServe ID: 70743-3517

The first two parts of this article appeared in the Dec. 1994 and Jan. 1995 Digital Journal. They showed that the use of a local area network ("LAN") within a single modern digital mode ham station could be used to link multiple PCs together. Such arrangements offer many possibilities for maximizing the computer resources available to service the operating needs of the station. This article provides those additional details needed to get your Ethernet Network Interface Cards (NICs) installed and configured, and to get a "thin" Ethernet Windows for Workgroup ("WFWG") LAN up and running in your hamshack.

Let's begin with the software. The WFWG networking software comes in two different versions which permit computers running Windows and computers running MS-DOS to be linked together in a single network. If your network design includes both types of machines, use both versions of the software which are packaged together at a modest price.

FIRST INSTALL WFWG 3.11 OVER WINDOWS 3.1 AS AN UPGRADE. DO NOT INSTALL THE NETWORK MODULE.

WFWG 3.11 includes an enhanced version of Windows 3.1 in addition to its networking facilities. Because of this, WFWG 3.11 significantly improves performance of any computer running Windows 3.1 even if no network features of WFWG are utilized. I strongly recommend that you first install WFWG in this manner. Do not put a network card in your computer until later. This approach isolates the Windows upgrade for each computer from the network installation and makes it easier to cure any problems which may arise during the Windows upgrade itself. Once the upgrade portion of WFWG has been installed, you should test it thoroughly with all of your hamshack application software to be sure that all of its functionality is present and working properly. Use prudent procedures before upgrading: make sure you have a bootable DOS diskette ready for each computer which will receive the upgrade, and make back up copies of all *.INI files used with the existing installation of Windows 3.1. The bootable DOS diskette will permit you to start over if a major problem (such as a power interruption) occurs during the upgrade installation. The *.INI files will permit you to reinstall the prior version of Windows 3.1 if necessary without having to also reinstall the related applications referred to in the *.INI files. If everything goes right, WFWG installs the upgrade and uses the information in the existing *.INI files to properly configure itself without any new problems arising. You are now ready to begin your network installation.

NETWORK INSTALLATION: THE IMPORTANT FIRST STEPS

The installation of a network is a relatively complicated undertaking. It requires that a sequence of interrelated steps be carefully performed to fulfill the network design. Fortunately, no single step in the overall process is particularly difficult. But, it is best to develop a "good" network design and then to organize a careful plan of action for implementation. Unfortunately, as in most complicated and unique design undertakings, there is no "best" sequence of steps leading to the final objective. There are, however, preferred ways to proceed based upon good engineering practice and judgment.

The overall network setup which you plan for your digital mode ham station will be unique. Most probably, no one else anywhere uses exactly the same station equipment and layout as you do; and it is very unlikely that anyone else uses exactly the same computer hardware and software systems as you. Put reasonable limits on your initial network design objectives. You don't have to accomplish everything possible when you first bring up your network. There's plenty of time to enhance and improve its capabilities later as you master the functionality of your network. A good implementation plan proceeds in stages and includes many testing procedures along the way. Thus, missteps can be identified as soon as possible after they occur during implementation.

Whenever a problem is identified during implementation, make an effort to understand why it occurred in addition to figuring out how to work around or avoid the problem. Careful advance design will minimize but cannot eliminate problems during implementation of a complex system. Many of the complex interactions between hardware and software which lead to design or implementation problems in a network setting are unique. They are subtle and extremely difficult to predict, partly because the hardware and software documentation is unavailable or incomplete. In a more flexible approach the designer uses a hands-on approach, a general plan moving toward the objective until an unsolvable problem occurs. At that point, the designer backs up and implements along another path. Hopefully, this will move to the final design objective without encountering other unsolvable problems. Because it is certain that specific problems will be encountered by you during implementation which you did not anticipate, you may be required to revise you initial plan. Stay flexible in your thinking!

The following guidelines which, if followed, will keep you in moving in the right direction!

1) Draw a detailed plan (and map) of the proposed network layout which shows each computer to be used on the network before doing anything else. This should be done no matter how "obvious" or simple the installation appears to you at the outset. Do it even if you are only going to have two computers on your network in your hamshack! The plan should show how each computer on the network will interact with other equipment in your digital mode ham station. Once you have your initial plan on paper, study it carefully to make sure that it will do what you expect. Read the installation guides and manuals which come with the network interface adapters and the WFWG software. Modify and rework your plan until there are no reasons why your planned network design should not perform as you expect. Use the plan (or map) to assist in the preparation of a detailed written checklist of all (hardware and software) steps which you will need to perform during implementation of the network.

The plan and checklist should identify which computers will be running Windows applications and which will be running only DOS applications once the network is implemented. Keep in mind that the software installations will be quite different for these two different types of computers as will be their respective abilities to share resources over the network once it has been established. Make sure your planning takes these differences into account. Revise and improve each checklist several times before you start doing any actual hardware or software installation for your network. Itemize the checklist down to each distinct hardware and software step which will be needed for each computer, and to connect the separate computers. The checklist should include "testing" steps each time any significant installation step has been made. This will help you to identify mistakes or design errors at an early point—before they are compounded and made more difficult to diagnose and solve.

2) Choose a "name" for each computer. It will be used on your network to identify it

uniquely on the network. Preferably, one which is short but descriptive of its function or location within your station setup. These can be changed later, but you should write them down now. Examples of computer names which might be appropriate depending on the details of your station setup: HF, PKT, SAT. As will be seen, the computer "names" will be used to identify and refer to the specific named computers over the network using network, DOS and Windows commands and calling conventions.

3. Determine which resources on each computer are to be shared with other computers on the network. Pick meaningful and descriptive "sharenames" to identify the shared resources associated with each named computer on your network. With the WFWG networking software, it is possible to assign "sharenames" and to share a) entire disk drives, b) specific subdirectories on a given disk drive, c) CD-ROM drives, and d) parallel (printer) port resources on each named computer. For example, if the D: drive the computer named "HF" is a CD-ROM drive, that drive might be assigned a sharename: BUCK (e.g. because the Buckmaster database CD is usually used in the CD-ROM drive). Another computer on the network could then access that CD-ROM drive by connecting over the network to \\HF\BUCK .

4)After you take the cover off of each computer, but before you begin to install any hardware network interface cards, create a document identifying each computer: a) by type (e.g. 286, 386, math coprocessor present, etc.) of each computer and its basic hardware configurations, b) by MS-DOS operating system version in use on the computer, c) by amounts of RAM and other memory installed in the computer, d) by memory manager, if any, used in the computer and how such memory manager is configured, e) by contents of the AUTOEXEC.BAT and CONFIG.SYS files, f) by type of video display adapter installed in the computer, g) by non-network adapter card already installed in the computer, including the type and purpose of each card, address ranges used by the card, the software and special drivers used, and the IRQ lines dedicated to the card, and h) include the *.INI files for Windows 3.1 if already installed on the computer.

5) Perform appropriate tests to make sure that all hardware devices and software in each computer function properly before you begin the hardware installation of any network interface card and network software. As noted earlier, we recommend that you install the Windows upgrade, non-network portion of WFWG before proceeding with the installation of the network portion of WFWG. The reason for this testing should be obvious! If any part of one computer system in your hamshack is not working properly before you begin a network installation, I guarantee it will not work properly during or after network installation. Indeed, the problems which already exist are most likely to be more difficult to diagnose and remedy later. Fix them before continuing further!

6) Remember that MS-DOS 3.3 or later is required for each computer in your WFWG network. If any computer to be used on the network uses an earlier version of MS-DOS, upgrade the operating system to at least MS-DOS Ver. 3.3. You may want to upgrade the network to the same level (e.g. all computers to use MS-DOS Ver. 6.2). This is not required, and there are reasons why you may not want to do this for your older computers which operate well with earlier MS-DOS versions. Remember, too, the older versions of MS-DOS require less memory and disk space. However, if all operating systems are moved to the same revision level, certain subtle operating system problems will be avoided.

7) Once you have the cover off your computers in preparation for installation of network interface cards, you may be tempted to do some additional computer "upgrading" which you somehow haven't gotten around to doing: e.g. installing an additional disk drive, a CD-ROM drive or that higher speed internal modem which has been sitting around in your hamshack waiting to be installed. There is no problem in now doing such upgrades, but be sure that each installation is tested thoroughly with the related application software on each computer involved before proceeding further with any aspect of network installation.

INSTALLING THE ETHERNET NETWORK ADAPTER DEVICES

Once the above steps have been completed, you are ready to install your hardware Ethernet network adapter devices. Do this in accordance with the installation instructions provided by the NIC manufacturer before continuing with the network software installation of WFWG.

1) First, be sure you have already documented all other non-network adapters (IRQs, addresses, etc.) used in each computer. If you have not, go back and do it now before continuing. Run IRQ-checking software as described in an earlier part of this series, and then select an unused IRQ line for the network interface card. Consult the installation manuals for existing hardware devices in order to determine this information accurately. Diagnostic software which can assist in accomplishing these essential steps is on the ADRS BBS.

2) For each computer, physically install an NIC card in an open ISA (or other) slot on the motherboard.

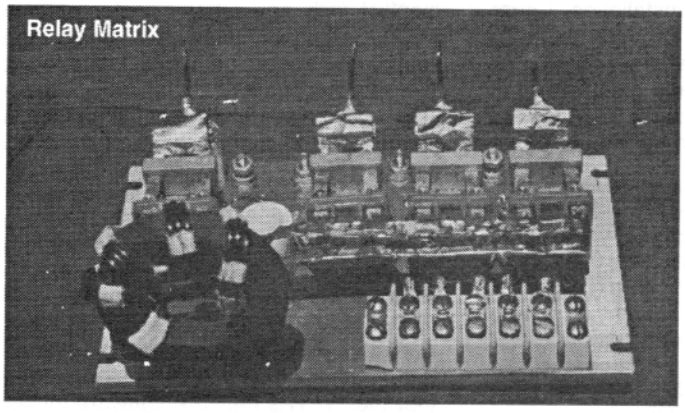
3) Select an IRQ line for your NIC card during the installation which does not conflict with any other adapter card in your computer. Some NIC cards use hardware jumpers on the NIC card to set the address and IRQ parameters. Others use special installation software which permits the choice of those parameters under software control. Watch out especially for any IRQ3 "default" setting which is used by many NICs. This address must be changed if you want to use the COM2 serial port which also uses IRQ3. Write down for each computer the IRQ line dedicated to that particular NIC card during hardware installation. You need this information so you can make certain that the WFWG network software installation uses the appropriate IRQ line in each computer. In the network which I set up, I used a number of SMC EtherCard Elite Ultra Adapter Type 8216C - 16 bit Ethernet "combo" cards which have BNC, AUI and 10BaseT type cable connectors. Those cards fit into a standard 16-bit ISA slot on any AT type motherboard, and are configurable by hardware jumper or under software control. The hardware jumper configuration was less flexible so I configured each NIC card with software. As will be explained below, WFWG does not provide a software driver specifically for this SMC Ethernet card, and, in fact, mis-identifies the SMC Type 8216C card as a SMC 8 bit Ethernet card during automatic adapter identification during network software installation.

4) Chose a base address range on the NIC card during hardware installation which does not conflict with any other adapter card in your computer. As noted above, this may be done with hardware jumpers or under software control, depending upon the specific NIC card which you use. As in the case of the IRQ lines, write down for each computer which base address you selected and dedicated to your particular NIC card during hardware installation. This information assures that the WFWG network software installation uses the same base address range.

5) Configure a network adapter memory range in the upper memory block range which does not conflict with other devices (e.g. video adapters). Your memory management software provides facilities to check and verify which ranges of memory are available for this purpose. If necessary, reconfigure the memory manager to exclude conflicting address space usage. (QEMM, EMM386, etc. provide documentation explaining how to do this.) Make a record of the network adapter address space selected during NIC installation so the WFWG network software installation uses the same upper address range. If you need to reconfigure your memory manager on a

(cont'd on page 16)

(Contest Chair - cont'd from page 9)



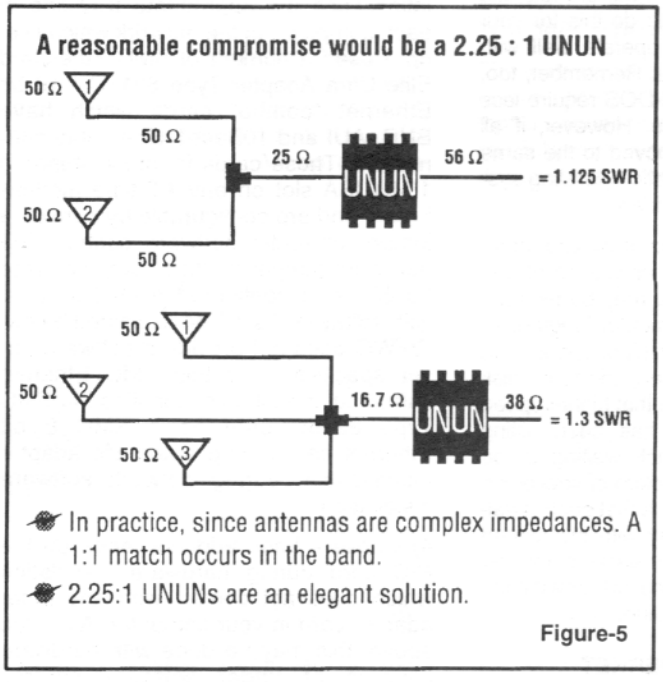


Figure-5

engineering and common sense, we can pick an intermediate ratio and obtain a very livable compromise. It turns out that a 2.25:1 UN-UN is very easy to build, doesn't require any taps, and can be made to handle large amounts of power. When it is employed in matching two or three antennas, one still obtains a 1:1 match of SWR at almost the same frequency that the single antennas had done individually.

Now all we need to do is mount the UN-UN in a weather-proof box half way between the Tri-banders (or mono-banders) and feed the antennas with equal lengths of 50 ohm coax. If you want to get real clever you can build a relay matrix around them like I do and switch between them from the shack.

MAKING THE UN-UN

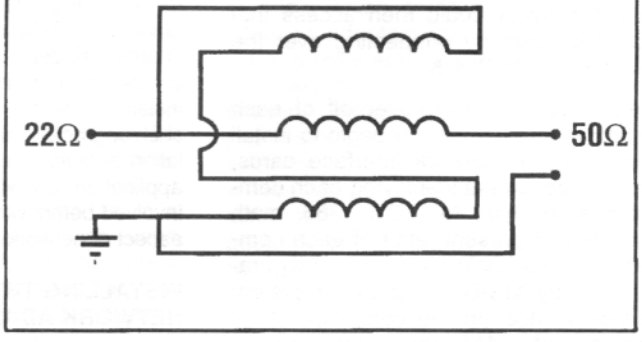
I made and still am making, more UN-UNs for high power and possible hot switching environments. There is a trade-off between bandwidth, turns required, and permeability. There is also a small trade-off in permeability, and efficiency. But the efficiencies are so high that using ferrite cores of 125 permeability or lower will yield 99.7+ efficiencies. I think I have more loss in all my connectors then in the transformers. All of my UN-UN's are the 2.4 inch 125 permeability ferrite torroids supplied by Amidon Associates. They are inexpensive and readily available off the shelf.

The windings are tri-filar 12 gauge wire. I tried smaller gauges with some heating at high power in the wires, not the core. I feel that for casual DXing 14 gauge wire would be fine, along with smaller cores, but for a contesting environment the heavier materials add some additional safety factor. How much? I have only been able to try them at 3 KW at 2:1 SWR into dummy loads for long periods of steady power with no heating. I think that they will handle 8-10 KW easily.

I use five turns around the cores. This gives a very wide bandwidth and can be used at 1.8 and 3.5 Mhz as well. I feed a couple of 80 meter vertical dipoles with great success. I first cut three 18 inches of three 12 gauge wires. I strap them together into a ribbon with 3M #27 tape. I separate the tape straps about 1 inch from each other. This will hold them tightly together as you wrap them around the core. A vise helps hold them together. Wrap five turns around the core and bend the ends to make connections as in Fig 6. Strip the ends with a knife and solder the appropriate connections.

Always test the unit into a 25 or 16.7 ohm Dummy load made with 50 ohm dummy loads attached to the output ports of the unit. I cannot stress the importance of being certain that you have a good test set-up since I have been fooled many times by SWR meters, bad cabling set-ups, bad ground connections, etc. Remember that if your test readings are indicating that something is wrong, first suspect your test set-up. I have also used a noise-bridge to test these units with success, but the ultimate test set is a network analyzer which I used to verify my design. For those who do not wish to build it yourself, Dunestar Systems is now manufacturing the unit with all relays, box, etc. *(Dunestar Systems, PO Box 37, St. Helens, OR 97051 (503) 397-2918)*

Figure-6



CONCLUSION

Stacking Yagis is the most effective single thing I can recommend to improve your signal. With the UN-UN technique you can stack Tri-banders and use a single feed line to each beam making it a simple way, and fairly inexpensive for the average contester to achieve a much improved signal.

THE POSSIBILITIES

Not only have I stacked yagis with the Stack Match, but am using it to stack two vertical dipoles sloping off my tower on 80 meters. This gives me a 12 degree takeoff angle to Europe when I feed them in phase as a broadside array. I can also switch between them to cover the Caribbean and Japan as well. When you feed them with a .42 wavelength feedline you actually make the un-powered dipole a reflector. This is because the open feedline becomes a stub of +j75 ohms, or simply stated it acts like a coil which lengthens the now parasitic dipole about 5% longer then the driven dipole. Not a bad beam for 80 meters. For smaller towers this can work for you on 40 meters, or using 1/4 wave slopers on 80 meters as well. Pretty cool little device isn't it?

I hope this gives many of you the spark to try stacking a couple of Tri-banders to improve your DXing or contesting signal. Possibly for Sweepstakes to spray your signal in two different directions. And remember, you don't have to have all the antennas mounted on the

same tower, or even use identical antennas to take advantage of two different directions. A lot of experimenting can be done with modest station set-ups say a tri-bander and a vertical fed in phase, and switching between them or combining them for best diversity reception.

As a guideline to stacking Tri-band or multi-band beams, I would recommend a stacking distance of 1/2 wavelength at the lowest frequency. For instance, 20/15/10 Tri-banders stacked 1/2 wavelength apart at 20 meters would be 3/4 wavelength apart at 15 meters and 1 wavelength apart at 10 meters. This would be a very good compromise for the HF bands.

The following is a letter received from famed contester Ralph Bowen N5RZ.

"Hi Jay,

I received the first kit version of this unit, which is a broadband HF Un-Un with relays to mix, match & switch any 1, 2 or 3 antennas. I understand it can be used for mixing two or three dissimilar antennas, but I was intrigued at the possibility of effectively stacking tri-banders, which is accomplished by using identical feedlines & identical antennas.

The kit consists of a pre-etched circuit board, 4 relays, an Un-Un, enclosure & connectors. The construction is rather easy, which is good, because the assembly instructions are a bit vague in areas - not too bad for a first cut, but the instructions need some refinement. The control box is not included, so one can be customized for unique configurations. However, a generic type switching schematic is included, which I built out of the junk box (a rotary switch, diodes, wire, 12V supply & enclosure). My particular configuration is a pair of TH6DXX tri-banders at 105'/60', the top one rotary & the bottom fixed on Europe.

Care was taken to make sure the feedlines & coiled coaxial baluns for each antenna were identical; both antennas were rebuilt side by side to insure all elements & spacings were correct & identical. Andrews 1/2" heliax is used to feed the box from the shack & RG213 is used from the box to the antennas. The Coaxial baluns were constructed per the TH6DXX instructions.

The other two antennas I have for comparison are a KT34XA at 75', and a 204BA at 65', each on it's own tower. My Stackmatch switching is set up to switch to select both TH6DXX's, or either one. After the tri-banders were installed on the tower, I ran SWR checks on each antenna, completely bypassing the Stackmatch. The antenna SWR characteristics were virtually identical - guess I have a good ruler!!! The box was then hooked up & I tried each antenna by itself though the match. The SWR was exactly the same as without the box!!! Now for "both" - YEAHH!! essentially no change in SWR!! I only made mental notes, but here is what I have observed:
20M: Both antennas almost always better than either antenna, or the two comparison antennas into Europe, sometimes as much as 2 s-units, but usually 2-6 dB depending on QSB. To the Northeast stateside stations, the 204BA and KT34XA are almost always better than the stack - which really didn't surprise me. When feeding both I turn the top TH6 to other directions, the mix is very good; I see a very consistent 3 dB drop on a signal when I switch in the other antenna.
15M: I basically see the same results except for the fact that the domestic signals to the Northeast are slightly louder on the stack than on the KT34XA. In fact, the stacking gain into Europe, especially early or late in the band opening, is tremendous - many times the difference between solid copy & no copy at all.
10M: SWR is good - no openings to determine stacking gain.

I was out of the country for CQWW SSB, so the first contest I used the array in was CW SS. I did all my CQing for 15M & 20M on the "both" position, with the high antenna at about 300 degrees (330 degrees on Sunday in hopes of getting a VY1). It was great to be able to fire both ways, then, if necessary, switch to the appropriate antenna to dig out the weak ones in the desired direction. The switch easily handled the full legal limit with a heavy duty cycle. I am really looking forward to CQWW!!

This is probably the best money I have spent in a long time. I highly recommend the unit because it is simple and reliable and it works!!!! I'm saving my pennies for a 3rd TH6DXX, so I can go 105/70/35, with the bottom 2 on the east coast/EU (I even built a 3rd coaxial balun & feedline assembly just in case!!).

Ralph, N5RZ "

As another possibility for restricted antenna ordinances this device can feed an array of 1/4 or 1/8 wave (at the lowest frequency) spaced multi-band verticals in a triangular pattern. Feed them with equal lengths of 50 ohm coax from the stack matcher and control the feeding of two verticals simultaneously from the switch box you make. This will deliver a broadside pattern in six directions. A nice way to get some gain and directivity without violating a tower ordinance.

I have included some charts and graphs of my stacks derived by using some of the popular antenna modeling software. Figure 7 is a summary of all the stacks on the tower. Everything should be self explanatory in the chart except for the 3db angle. This indicates the wide lobe that is achievable stacking antennas and the numbers indicate the lower 3db angle and upper 3db angle of the lobe. For instance, when I use the 20 meter stack configuration all pointed in the same direction the chart shows that my signal is 18.7db at an angle of 10 degrees above the horizon, and 11degrees wide from 4 to 15 degrees at the 3db down points.

I hope to hear from readers interested in this technology, please let me know of your applications and successes.

73, Jay Terleski WX0B (214) 203-8810 WX0B&aol.com

Figure-7

BAND	HEIGHT FEET	HEIGHT WAVE LENGTH	SEP WAVE LENGTH	TAKE OFF ANGLE	GAIN dbi	3db ANGLE
40	140	1.00	.50	14	12.0	6-21
	74	.50	.50	28	11.7	13-45
	STACK			17	13.9	8-27
20	134	1.90	.70	7	15.7	3-12
	85	1.21	.60	12	15.2	6-18
	44	.63		21	14.8	10-33
	STACK			10	18.7	4-15
	126	2.66	.75	5	15.7	3-9
15	90	1.91	.75	7	15.7	4-12
	54	1.15		12	15.5	6-18
	STACK			7	19.4	3-10
	105	3.00	1.00	5	15.9	3-7
	70	2.00	1.00	7	15.9	3-10
10	35	1.00		14	15.7	6-21
	STACK			6	19.9	3-9

References:
1. DX Magazine Jan 90 "All About Stacking" by Ken Wolff K1EA
2. NCJ May/June 1991 " A Simple System for Switching Three or Four Antennas"
3. NCJ Jan/Feb 1992 "Switching Stacked Antennas"
4. NCJ July/Aug, Sept/Oct, Nov/Dec 1990, and Jan/Feb 1991 " Stacks and Conclusion" R.Dean Straw
5. Amidon Associates Inc. P.O. Box 956 Torrance, CA. 90508

Next month we will have Part-2. We will take a look at his station switching, grounding, bandpass filters and stubs, contest software (RTTY by WF1B) and some other things you may want to hear about, like his Insurance Policy... ...hi hi!!

Until next time, 73's . . . de Ron AB5KD

"Remember . . . Big antennas high in the sky
work better than little ones close to the ground..."

Have you checked your mailing label lately?
If the ***Expiration 03/95*** appears next to your name, it means your **ADRS** membership, and subscription to the ***Digital Journal,*** expires with this issue.
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Contesting

Coming Events and Awards

by Rich Lawton, N6GG • 14395 Bevers Way • Pioneer, CA 95666

RTTY Contests - Coming Events

Date:	Contest:
FEB 18-19	DARC HF RTTY Part I (German)
MAR 5	DARC CORONA 10M Digital (German)
MAR 18-20	BARTG SPRING RTTY (English)
APR 1-2	EA WW RTTY (Spanish)
APR 15-16	SARTG WW AMTOR (Swedish)

— — REMINDERS: — —

ADRS WW Digital WPX (February '95) log entries must be postmarked no later than 30 days after the end of the contest (March 7, 1995) Mail entry (logs or disk) to:

JAY TOWNSEND, WS7I
P.O. BOX 644
SPOKANE, WA 99210-0644
-or-
via The Internet: jayt@comtch.iea.com

DARC HF RTTY Part I (February '95) log entry deadline is May 1, 1995. Mail entry to:

WERNER LUDWIG, DF5BX
P.O. BOX 12 70
D-49110 Georgsmarienhutte
GERMANY

DARC CORONA 10M Digital (March '95) log entry deadline is May 5, 1995. Mail to **DF5BX** as above.

— — COMING UP: — —

DARC CORONA 10M Digital Contest
March 5, 1995
Sponsored by Deutscher Amateur-Radio-Club e.V. (DARC)

CONTEST PERIOD: Sunday, March 6, from 1100Z to 1700Z (6 hours)
NOTE: Contest will take place on the first Sunday of March, July, September, and November of each year.

MODES: RTTY, AMTOR, PACTOR, and CLOVER

BANDS: 10M ONLY

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

CONTEST CALL:
for RTTY: **"CQ CORONA TEST DE ....."**
for AMTOR/PACTOR: **use FEC (mode B) for "CQ CORONA TEST de sellcall XXXX"**
Use ARQ (mode A) for answering and contest exchange. Contest exchange in any other mode is subject to disqualification.

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

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

MULTIPLIERS: Each DXCC/WAE country, and each USA state, and each call district in JA,VE,and VK, (NOT USA). Count only the first QSO with a USA station as a DXCC/WAE country multiplier.
QSO POINTS: Count 1 point for each completed QSO.

FINAL SCORE: Total QSOs x total multipliers.

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

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

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

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

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

BARTG SPRING RTTY CONTEST
March 18-19, 1995
Sponsored by British Amateur Radio Teledata Group.

Contest Period: From 0200Z Saturday to 0200Z Monday (48 hours) Maximum operating time allowed: 30 hours for single op and SWL entries. Multi-operator stations may operate the full 48 hours. The 18 hours of rest periods may not be less than 3 hours each.

MODE: RTTY only

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

CATEGORIES:
1) Single op, all band
2) Single op, single band
3) Multi-op, all band
4) Multi-op, Multi-transmitter
5) Short Wave Listener

NOTE: Categories 1, 2, and 3 may not transmit on two or more bands at the same time. No station may enter more than one category.

EXCHANGE: Send: RST + QSO number + Time in UTC.

MULTIPLIERS: Each DXCC country, including first QSO with W, VE and VK, counts as a multiplier on each band. Each call district in W, VE, and VK will count as an additional multliplier on each band. Also, each continent (6) will count once, not once per band.

QSO POINTS: Count 1 point per QSO. Same station may be worked on other bands. Duplicate contacts on same band receive zero points and must be clearly marked in the log.

FINAL SCORE: Total QSOs x total multipliers x number of continents (max 6)

LOGS: Use separate logsheets for each band. Logs must show: BAND, DATE and TIME (UTC), CALLSIGN, MESSAGE Sent and Received, COUNTRIES and POINTS claimed. Summary sheet must show full scoring, times of operation, and address for correspondence. Include names and callsigns of all multi-op station operators. Computer generated logs containing all specified info are welcome.

DEADLINE: **ALL LOGS MUST BE RECEIVED BY 31 MAY 1995 TO QUALIFY.**
Please send your contest or check logs to:

JOHN BARBER G4SKA
PO BOX 8
TIVERTON, DEVON
EX16 5YU, ENGLAND

AWARDS: Certificates will be awarded to the top 3 stations in each category, the top 5 single operators in each continent, and to the top single operator in each W/VE/VK call area.

Your comments on the contest would be much appreciated. Please include them with your log.

COMMENTS: This is a 48 hour contest, but only 30 hours operating time allowed for single ops. The time off periods must be 3 hours minimum length and listed in the summary sheet. This contest gets great activity from all over the world. Try to plan your off times to be during the least productive time of day, such as when propagation does not favor your area. The fact that W/VE/VK call areas count as separate countries on each band means that CQing should be the most productive way to make a good score for the W/VE/VK ops. Also, band multipliers helps to alleviate the QRM on the high bands, by spreading out the CQers to other bands. Don't forget the WAC bonus of six multipliers. Rules are the same as last year.

EA WW RTTY Contest
April 1-2, 1995

Sponsored by Seccion Territorial Comarcal De Aranda De Duero.

Contest now occurs on the first full weekend in April.
(Previously was in February)

CONTEST PERIOD: From 1600Z Saturday to 1600Z Sunday. (24 hours)

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

CLASSES: A) Single op, all band C) Multi-op, all band
B) Single op, single band D) SWL.

EXCHANGE: EA stations send RST + Prefix of province.
All others: sent RST + CQ Zone

MULTIPLIERS: Each DXCC Country and Spanish Province on each band. Spanish Provinces are: A, AB, AL, AV, B, BA, BI, BU, C, CA, CC, CE, CO, CR, CS, CU, GC, GE, GR, GU, H, HU, J, L, LE, LO, LU, M, MA, ML, MU, NA, O, OR, P, PM, PO, S, SA, SE, SG, SO, SS, T, TE, TF, TO, V, VA, VI, Z, ZA. (There are 52 EA provinces)

NOTES:

1) All multipliers count once per band (Band Multipliers).

2) First QSO with EA station on each band counts as an additional multiplier, along with province.

3) CQ Zones do NOT count as multipliers.

4) QSOs with stations in your own country are valid for multiplier credit but have ZERO QSO point value.

QSO POINTS: On 20, 15, and 10M: Count 1 point for each QSO on your own continent, and 2 points for for the rest. On 80 and 40M: Count 3 points for each QSO on your own continent, and 6 points for the rest.

FINAL SCORE: Total QSO points x total multipliers.

AWARDS: Plate to winner in each class. Certificate to winner in each DXCC country in each class. (Must have 50 or more QSOs.)

LOGS: Use separate logsheets for each band. Include a Summary sheet to show scoring and other essential information.

DEADLINE: Mailing deadline is June 9, 1995. Mail entry to:

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

COMMENTS: This is a 24 hour contest. Note the date change. It used to be on the 2nd full weekend of February, but now is 1st full weekend in April. The exchange includes sending your CQ Zone, but there is no additional multiplier credit given, even for EA stations. Point bonuses encourage low band operation. This contest uses band multipliers - work the same country on different band gives new multiplier. **QSOs with stations in your own country are valid for multiplier credit but have ZERO QSO point value.** Use separate dupesheets and multiplier sheets for each band. **Handy tip:** make an alphabetical checkoff list of EA Provinces for each band, as they do get confusing when changing bands.

...The Dilemma of Wind-Powered Beam Rotators...

Every year it happens - the dreaded strong and gusty wind time, that is. And every year it becomes a time of nail-biting uneasiness. The predicament? Concern about my HF yagi becoming a massive, free-wheeling wind vane - a wild, swinging-and-swaying yagi. I'm certain I'm not alone in my crisis.

It's a daunting feeling to look up at that beam swinging around where it darn well pleases... with those massive wind bursts blowing the boom thither and yon (whatever that direction that is). Will it go around twice and snap the coax?

You don't dare climb the tower during this period. You could get blown off. Or, the tower could blow down *with you on it.* Furthermore, what could you possibly do up there in that cold, howling, swirling wind, often with accompaning rain, besides hanging on for dear life?

Well, what should be done *before* the blustery wind time arrives? Good question, but not many good answers. Depending on the manufacturer's recommendations, you should point the beam: a) into, or with the wind, or b) point the beam so that the elements are parallel to the wind direction. But this is only a partial answer. Read on, there's more.

Some years back (around 1980), at the Visalia DX Convention I asked KLM beam designer Mike Staal, K6MYC, what direction should a beam be pointed during high winds. He said he recommends *pointing the beam with the wind.* Mike explained that the center support of the boom should be the balanced weight center, but that is not necessarily the "wind balance point" because the elements have different spacings and lengths. He also said that Hy-Gain recommends pointing the *elements* parallel to the wind. When I asked him why the difference he said that evidently Hy-Gain is more concerned with the elements bending or breaking off than stress of the randomly oscillating boom breaking the gears in the rotator. I also asked him specifically about KLM's 5 element 20M yagi with the 42 foot boom. If it were on a 100 foot tower on top of a hill and the beam pointed with the wind, what would be the maximum wind strength before destruction occurred. He said that at around 80 MPH or so, the boom would most likely fold over on top of itself. He recommended their boom truss kit ($35) for that situation. I bought that beam with the kit and it has performed flawlessly ever since.

But the big question still remains: even if you point the beam correctly, how should the beam's mast be fastened to the rotator so that, during those high, swirling, wind gusts, the rotator's gears are not stripped? Rotator manufacturers have their own designs for mast clamping and pinning to protect their product's gears, which is certainly understandable. So it boils down to the set-pin or shearpin. That's the design dilemma. The pin should break before the gears break, but how does one determine that point?

And that's what I was forced to face as I got clobbered by a huge storm that took me out of the ARRL Roundup in January. The shearpin broke, and the beam swung away from USA. Southeast gale-like winds forced the beam to point to Japan! (Hm-m-m. I'm using a Japanese rotator system... You don't suppose that it knows exactly where it came from, and wanted...? Well...? Nah.)

During a pause in the series of storms that hit the West Coast I climbed the 100 foot tower and replaced the snapped shearpin. Fixed - I thought. Six days later, and another big storm, it broke again. Sonoma Beach! (That's an endearing California expression) Next step? Go up the tower and put in a bigger shearpin. Old one was 5/16 inch diameter. New one is 3/8 inch. Had to ream the holes bigger. ***My hypothesis****: gradually enlarge the shearpin size while having pitty on those rotator gears.* Does it work? It does for now, but...?

((73)) -- See you in the pileups,

Rich, N6GG

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

(LANS - cont'd from page 11)

particular computer to free up a suitable upper memory range, it is essential that you reboot that computer and retest the operation of that computer before continuing with the network installation.

6) In the network which I set up, I also used a Xircom Pocket Ethernet Adapter II (acquired at a hamfest) which plugs into any standard computer parallel port. The Xircom adapter includes a BNC connector for connection to "thin" Ethernet cabling.During software installation, WFWG provides a software driver for the Xircom. I use this with a laptop computer. The Xircom adapter can be left connected to the network through its BNC connector even when the adapter has been disconnected from the parallel port on the laptop.

7) Once you have completed the hardware installation of all of the Ethernet adapters needed for your network, install the "thin" Ethernet cabling. RG-58 cabling with BNC connectors installed on each end is readily available at very low cost due to the current popularity of thin Ethernet. Put a BNC "T" connector onto each BNC connector on each NIC. Connect the cabling between the "T" connectors to form a continuous line of cabling. Use BNC 50 ohm cable end terminators on the two "T" connectors at the respective ends of the Ethernet line (bus) to prevent signal reflections from the ends of the thin Ethernet bus.

8) If everything has gone well, the network software installation comes next. Certain NIC manufacturers provide diagnostic and testing software to verify proper hardware operation of the network adapter cards and the related cabling. If any communications problems are encountered between the installed NICs, you should run such diagnostic software to isolate and identify any problem. Remedy the problem before continuing with network software installation.

WFWG NETWORK SOFTWARE INSTALLATION AND INITIAL CONFIGURATION

You are now ready to install the WFWG networking software which will interact with the Ethernet adapters on each computer to create your WFWG network.

1) You need to keep in mind that there are two distinct flavors of the WFWG software requiring separate installation procedures depending upon the environment on the computer on which it is to be installed. First, there is the WFWG networking software running under Windows (WFWG) operating in the 386 enhanced mode. Second, the WFWG networking software which runs on computers operating solely under the MS-DOS operating system or which will run Windows not in 386 enhanced mode (e.g. the old XTs, 286s, 386s without sufficient resources).

2) If you have gotten to this point, the WFWG network software installation should now be straight forward if you have at least 4 Mb (or more) of RAM and are running under 386 Enhanced mode. For those computers, reinstall WFWG, keeping in mind that this time you will also install WFWG's networking facilities. For the other computers (those not running in Enhanced 386 mode) install the WFWG Add-On for MS-DOS. Once the networking software installation is completed, you will be able to link all computers together on the network.

3) Before proceeding, make sure you have the bootable DOS diskette ready for each computer receiving the networking software installation. Sometimes the network installation modifies your CONFIG.SYS and AUTOEXEC.BAT files in ways which will cause your computer to fail to boot properly or to "lock up" during initial startup. If this happens, you will need to use a bootable DOS diskette to restart the computer so you can then manually edit out the lines in the CONFIG.SYS and/or AUTOEXEC.BAT files on the hard disk which are causing the problems.

4) The SETUP in WFWG attempts to identify the network adapter card in use on the computer on which the installation is being performed. This requires your careful attention in several respects during installation. First, if SETUP identifies a network adapter type which you know to be incorrect during the installation procedure (e.g. if SETUP recognizes your 16-bit Ethernet card only as an 8-bit card), delete the reference to the misidentified network adapter before proceeding further with the installation. (I experienced this misidentification problem with the SMC type 8216C adapters.) Then, manually select an installation for the specific adapter type which your computer is using, if available. If your specific adapter type is not available, you should try using the NE1000 compatible type for 8-bit Ethernet cards or the NE2000 compatible type for 16-bit Ethernet cards. If these do not work, try re-installing with an adapter type which you think is most "similar" to your specific hardware. If that does not work, you should contact the tech support BBS for the NIC manufacturer or seek "help" from the experts on Compuserve's MSWRKGRP forum.

5) In addition, make sure that SETUP knows the actual IRQ line dedicated to your NIC adapter, the base addresses and the UMB memory ranges for which you have configured your NIC adapter. You wrote this information down earlier and you must use it now!

6) During the WFWG network software installation, I recommend not installing the Microsoft Mail, Chat, Popup E-mail or Scheduler application options unless you specifically need such capabilities on your hamshack network. These take up disk space and add complexity which serves little purpose in a typical hamshack environment. You can always install these programs later if you need them.

7) After completing the installation you need to reboot the computer. This is the "smoke" test—hope that your computer will reboot successfully! If it does you are then ready to proceed with initial configuration of your network. But if it doesn't, you need to boot from the emergency disk and manually edit (i.e. REM out) the last changes made during the installation to your CONFIG.SYS and AUTOEXEC.BAT files. (Remember, you copied those files before you began!!) In a typical installation, notice that your AUTOEXEC.BAT file has been modified to load SHARE.EXE (a TSR needed for file sharing in a network environment) and to run NET.EXE START which attempts to start the networking software upon initial bootup. Examine carefully the new PROTOCOL.INI file which contains specific NIC parameters. If the parameters in PROTOCOL.INI are not right, the bootup may fail or your network will not start. If rebooting failed, try to figure out what went wrong, and then try again.

8) Each computer on your network was assigned a specific name. Sharenames for the resources to were set up as well. This is done differently for the full Windows version (using Windows' File Manager) as compare to the MS-DOS Add-On Version, but the principles for the name assignments are the same.

9) Now, finally, start using and experimenting with the operation of your hamshack WFWG LAN.

10) Once everything works, I recommend you create batch files to automate the network startup and logon procedures after booting. This eliminates the use of logon passwords which serve no purpose in the hamshack. I also recommend that you configure the network software on each computer so that it runs and automatically re-establishes (or attempts to re-establish) all predefined network connections following initial startup (bootup). Your network then starts up automatically and expands to include each new computer as they are booted up and "join" the network.

ADVANCED FUNCTIONS WHICH ARE EASILY IMPLEMENTED

While a WFWG network has limitations, this kind of network opens a broad range of new possibilities to automate hamshack operations under either manual or automatic operator control. Many such procedures can be implemented as very simple *.BAT files or with customized Visual Basic or C programs. For exam-

ple, 1) You can access, read, modify and copy files residing anywhere on any computer on the network, manually or automatically, 2) perform manual backup over the network or automate virtually any aspect of file backups between different hard drives on different computers over the network, 3) execute applications residing on other computers on the computer you are actually using (manually or as an automated procedure), 4) establish procedures to cause application programs residing on other computers on the network to be executed on the "home" computer, 5) set up procedures to perform unattended (or infrequently attended) hamshack tasks automatically on computers connected to the network, with the results of the unattended operation being communicated over the network automatically to the operator. If there is sufficient interest, we can provide specific examples of how to create simple software to implement such automated operations in a digital mode ham station LAN environment.

WFWG NETWORK PROBLEMS AND LIMITATIONS . . . AND CONCLUDING THOUGHTS

1) WFWG network crashes. Windows (WFWG) runs on top of the DOS operating system and is subject occasionally to "crashes" in a manner well known to all Windows users. When such a "crash" occurs, the shared resources on the "crashing" computer abruptly become unavailable, and unsaved results in open applications which depended upon those shared resources are lost. With proper configuration, the "crashing" of a single computer on the network will not bring down the entire network. A very promising way to avoid this problem in critical environments is provided by Windows NT. It operates in a protected mode independent of the application programs which are executing. Thus the "crash" of any application cannot affect the network. A WFWG network may be connected to an NT network, by the way.

2) Access to serial ports. Microsoft offers a software product known as WFWG Gateway which allows a single serial port gateway to be accessed from any computer on a WFWG network. (I have not tried that product.) The latest version of LapLinkPro (Ver. 6) is supposed to work over a WFWG network and provides access to all drives and ports. (I have not tested it either.) The remote control and file transfer softwares (Close Up, Carbon Copy for Windows and PC Anywhere were described in articles in the Digital Journal in 1994) can be run on any computer on a WFWG network to provide modem access to the network through any serial port on the network.

3) TCP/IP networks. There are a number of ways to connect a WFWG network to a TCP/IP network, (including to Unix based computers) a subject of increasing importance. Windows 95, now scheduled to be released in August, 1995, supposedly includes improved networking capabilities, including TCP/IP and WFWG network connectivity. Windows NT, mentioned above, provides WFWG and TCP/IP connectivity now.

CONCLUSION

This short series on hamshack LANs has tried to provide a simple introduction to the future for ham station automation and computing. Windows users with two or more computers in the hamshack should try setting up a LAN in their digital mode ham stations! Please contact me on CIS if you have any questions or observations that might be of general interest. Good luck!

ADRS ADDS A SECOND BIG DINNER AT DAYTON!

Friday night, April 28th, the first annual DX/Contester dinner will take place at the Radisson. Famous speakers, slide-shows, contest awards... you'll find them all at this very special event. The price, including tip, is $19. Send your reservations in now to Ron Stailey ABSKD 504 Dove Haven Rd, Round Rock, TX 78664. Take a friend, but be sure to order now so Ron can make the necessary arrangements. And if you want to get a plaque at the dinner, get your WPX score in now!

DX News

The latest digi-doings from around the globe

by Jules Freundlich, W2JGR • 825 Summit Ave., Apt. 1401 • Minneapolis, MN 55403

A voluntary partial band plan seems to be evolving for Pactor operations on 20 meters.

In the DX DOINGS below, Pactor operations by 16 DX stations are noted. You will notice that these on-the-air reports show ALL of those stations operating that mode within the 14069-14080 khz slot.

It is apparent that we are seeing part of a voluntary band plan in action. Now, if stateside stations would follow the lead of their DX brethern we would be on our way to making some order out of chaos. A little consideration goes a long way.

When I first started RTTY, in 1983, using an AEA CP-1 with a TI-99/4A computer and a Kantronics Hamsoft cartridge, the CP-1 documentation, as brief as it was, took the newcomer by the hand and told him the frequencies where RTTY activity could be found.

In those days, life was simpler as we did not suffer(?) the multiplicity of digital modes we have today. Current suppliers of digital equipment could well provide guidance for newcomers, in their introductory documentation, as to where the various modes congregate. First impressions are often the most lasting. The risk is that unless the various manufacturers offer coordinated information, spectrum occupancy conflicts will tend to be perpetuated, if not worsened. Clearly, there is a leadership vacuum.

Those of us who have the hardware (PCI-4000) and software (PC-COMM or Express) to operate Clover know that it is a great facility for enjoyable keyboard conversations.

The fact is that it is essentially a full duplex mode, meaning that both ends of the contact can talk (key) at the same time, as on a telephone or in direct personal conversation. There is no "over", "BTU", or +? required. Even though the sent and received text may be interleaved on your screen, it is very easy to keep them distinct by one station using Caps, the other Lower Case. Otherwise, depending upon which program you are using, you may distinguish sent text from received text by one being bright, and the other dimmed. Alternatively, if your program provides for separate areas on the screen for RX and TX text, there will be no ambiguity. So let's make more frequent use of this neat feature. Suggested frequencies for keyboard-to-keyboard QSOs on Clover are 21065.5, 14065.5, 10136.5, 7065.5, and 3565.5 khz LSB. By the way, if you send CQ on 14065.5, when propagation permits, the chances are that you will raise Ray, W7GHM, who seems to park there all the time! See you on Clover.

Speaking of the PCI-4000/M, just before press time, I received my copy of Jim Jennings' new RagChew software. RagChew operates under Windows and is used for keyboarding on "all four FSK modes available on the PCI-4000/M" e.g. RTTY, Amtor, Pactor, and ASCII. It also features a Pactor mailbox compatible with Winlink Pactor mailboxes.

I have not yet given it a complete checkout, but was anxious to give it a quick try on RTTY. After figuring out how to get the transmitter tones modulated (see below), I came across NL7WM/VP9 fighting a mild pileup, and waded in. The result? RagChew did its job well.

A cursory first examination of the program's features shows it to be winner. One click of the mouse takes you from one mode to any other. If you want to operate Clover, you have to exit RagChew and go to your Clover program. It does seem to have a few anomalies that I will bring to the attention of KE5HE. Further to my discussion here last month regarding digital frequencies, this program only added to my confusion. The documentation and the screen clearly reference FSK for these modes. With my Omni VI set to FSK, I could not get my transmitted signal to modulate. After five hours of looking for a solution, I pressed the LSB button on the transceiver, (as is required for Clover) and the transmitter was keyed with the proper tones. So what is meant here by "FSK"? It is is mildly reminiscent of when Kenwood included a key on the TS-440S labeled "FSK". I will leave a thorough review of RagChew to others.

DX DOINGS

(Signals are 45.5 Baud RTTY unless noted.)

Note that the DX Doings below include activity as reported from world-wide sources. Therefore, some stations may not be seen, in your particular part of the world, at the hours indicated. To make best use of the data given, couple it with your knowledge of propagation paths to your QTH. For help in this regard, see the monthly propagation charts in QST, and listen to the hourly propagation forecasts at 18 minutes past each hour on WWV. Good luck!

ANTARCTICA, VI,VK - Eddie, VI0ANT has been busy filling the needs for this country. He has been reported on 20 meters around 0100Z and between 1400z and 1700Z. Eddie will be there until the end of March. QSL to Mina DeYoung, 131 Plantain Road, Shailer Park 4128, QLD, Australia. VK0FPS works 20 meters around 1100Z. QSL via VK3MA.

BALEARIC ISLANDS, EA6 - EA6BH and EA6PZ are active on 20 meters between 1330Z and 1600Z. QSL routes are needed for both.

BANGLADESH, S2 - Andrew, S21YE, whose home call is G4VLV is active from Dhaka a dipole at 30 feet. Andrew is relatively new on digital modes, and does not care for unruly pileups. So please restrain your anxiety by using acceptable operating procedures, such as listening before transmitting, and inserting your call a few times at the appropriate times. Endless calling without stopping to listen, is a self-defeating proposition. QSL to Terry, G0EHX.

BARBADOS, 8P - 8P6QA plays Pactor on 14071 khz around 1930Z. QSL via KU9C.

BRAZIL, PP-PY - PP2ZDX can be found on Pactor on 14074 khz around 2230Z. QSL route is needed.

CANARY ISLANDS, EA8 - Rafael, EA8PDT is on 20 meters generally between 1630Z and 2030Z. QSL route is needed. EA8AFJ operates Pactor on 14074 khz around 0400Z. QSL via EA8AM.

CEUTA and MELILLA, EA9 - EA9TQ operates On 15 meters around 1500Z. QSL via EA5OL.

CENTRAL AFRICA, TL - TL8MS is a regular on Pactor on 14069 khz between 0700Z and 1200Z. QSL via DL6NW.

CHAGOS I., VQ9 - Jim, VQ9TN. advised that all QSL cards received for his operation from September to November 1994 have been answered. Jim will be returning to VQ9 the last week in March for about two months. He hopes to work more stations that need VQ9 for DXCC credit. QSL via K5TNP.

COMOROS, D6 - If you worked Wolfgang, DK7UY while he was on Grand Comore Island during the month of February. you are guaranteed a QSL card via the bureau. There will be no direct QSLing for that operation.

CONWAY REEF, 3D2 - A Dxpedition to Conway Reef will take place between 24 March and 3 April. Operators will be Mats, SM7PKK, Pekka, OH1RY, Nils, SM6CAS, and Garry, NI6T. They plan to use three 1 KW stations, of which two will be on the air at all times. There will be beams for all higher bands, including 12 and 17 meters, with verticals for the lower bands. Emphasis will be on the low bands (including 160 meters), the WARC bands, and RTTY. RTTY frequencies will be 7030/7082, 10120, 14082, 18100, 21082, 28082 khz. They will always listen up. RTTY QSLs will go to SM7PKK. As of the end of January no callsigns had yet been received. Contributions are being solicited, and should be sent to: Mats Peterson, SM7PKK, Zenithgaten 24 # 5, S-212 14 Malmo,Sweden.

DJIBOUTI, J2 - If you worked the DXpedition to Muscali Island (AF-053) during late January, QSL to Patrick LaBeaume, 38 Chemin du Plateau, 67500 Haguenau, France, or to ARAD-RC, Box 1076, Djibouti.

DOMINICAN REPUBLIC, HI - HI8BG now operates Pactor and can be found on 14078 khz around 1300Z, or on 14080 around 1945Z. QSL to Bienvenido Guzman P., P.O. Box 163-9, Santo Domingo, Dominican Republic.

EGYPT, SU - Look for SU1MB on 20 meters around 1530Z. QSL via GBA. For a Pactor contact, you will find SU1CR on 14069 khz between 0630Z and 1430Z. QSL to Mohamed Shafie Reda, 50 Khidr Al-Touni, Nasr City, Cairo, Egypt.

INDIA, VU - For Pactor stations in India, you may find VU2DLX on 14069 khz around 1530Z, or VU2RAK on 14075 khz around 1100Z. QSL routes are needed.

IRAQ, YI - YI1BGD occaisionally shows up on 20 meters around 1400Z. QSL via DF3NZ.

JORDAN, JY - JY9VC works Pactor on 14073 khz around 0845Z. QSL via DK9VC.

KALININGRAD, UA2 - After a long absence, this isolated pocket of a country is again back on RTTY. Look for RA2FB on 20 meters around 1345Z. QSL to Alexander V. Melnikov, Box 261, 238700 Sovetsk, Kaliningrad.

LEBANON, OD - OD5PL has been active on 20 meters as early as 0930Z, and and as late as 1700Z. He may also be found on Pactor around 1530Z on 14069 khz. QSL via HB9CRV.

MACAO, XX9 - XX9AS now operates 20 meters around 1445Z. QSL to KU9C.

MADEIRA ISL, CT3 - CT3AR works Pactor on 14080 khz around 1230Z and G-Tor on 14081 khz around 1530Z. QSL route is needed.

MALTA, 9H - Look for 9H4AC on Pactor on 14074 khz around 1230Z. QSL route is needed.

OMAN, A4 - Max, A45ZX now has a 75/80 meters inverted Vee erected, so look for him from time to time on that band. Max appears on 20 meters pretty regularly between 1330Z and 1600Z. For QSL route see the DJ, Dec. 1994, p. 19.Also active from Oman, on 20 meters around the same time, are A41LS, and A45XC. Look for A41KT earlier in the UTC day between 0730Z and 1400Z. QSL routes for these last three are needed.

PAGALU ISLAND, 3C - A station signing 3C0N/D2SA was worked earlier this year by Erik, SM5EIT, Ken, SM4EMO, and some in the U.S.A. on 20 meter SSB, CW and RTTY. The station came up unannounced using what appears to be an incorrect 3C0N prefix. Antoine, F6FNU, QSL manager for the genuine D2SA has stated that that station was a pirate. Save your green stamps.

PANAMA, HP - HP1XBH is very active on 20 meters between 1800Z and 2200Z. QSL via W4YC. HP1KZ operates Pactor on 14071 khz around 2115Z. QSL route is needed.

PARAGUAY, ZP - ZP6CC and ZP6EM are both active on 20 meters between 2100Z and 2400Z. For Pactor, look for ZP5OB on 14079 khz around 0030Z. QSL routes are needed.

QATAR, A7 - Chris, A71EY now comes on 20 meters as early as 0330Z. For QSL route see the DJ, January 1995, p.19.

SOUTH AFRICA, ZS - ZS6YA operates both RTTY and Amtor on 20 meters around 2000Z. QSL route is needed.

SOUTH SHETLAND IS., VP8 - Waiting for the South Shetlands to come up on RTTY has taken on some aspects of a comic opera. Last fall, the International RTTY DX Association (IRDXA) shipped a HAL Telereader to the antarctic supply base at Puenta Arenas, Chile. It was to been picked up by Andy, SP2GOW, on his way to HF0POL at the Polish Arctowski Base on King George Island. Apparently the pickup was never made. However, Andy did show up with a vengeance on CW on 40 and 80 meters as VP8CQS. Inquiries as to RTTY operation brought a terse response of "not yet".

In the meantime word was received in mid January that Tom, DL7VTS was on his way back to Chile, from the German base, to collect his ham radio equipment. When that occurred, DP1KGI (DP0KGI?) from Ardley Base on Ardley Isl. was to be QRV on SSB, CW and Pactor/Amtor. Digital frequencies were given as 21076, 14076, and 7036 (USB!) QSL via DL7VTS. As of this writing in early February, no digital sightings have been reported. Tom will be there until the end of March.

SUDAN, ST - Lou, ST2AA continues to be very active on Pactor, from Khartoum, on 14069 khz, starting as early as 0630Z and as late as 1400Z. QSL via WB2RAJ.

SVALBARD, JW - JW0I, operated by Henry, SP3ASN is very active, on 20 meters, from the Polish Polar Station-Hornsund on Spitzbergen. Look for him between 1515Z and 1700Z. QSL to P.O. Box 280115, 13441 Berlin, Germany.

SWAZILAND, 3DA - Jon, 3DA0CA, tired of hassling the postal service, now gets his cards through a manager, W4DR. 15 meters is still his favorite band, where he appears between 1300Z and 1500Z. However, look for him later, around 2000Z on 20 meters. Jon will QSY from 15 to 17 meters if asked.

TANZANIA - 5H - 5H3MS is quite active on Pactor on 14069 khz. Look for him early in the UTC day beween 0600Z and 0830Z. QSL route is needed.

TRISTAN DE CUNHA, ZD9 - ZD9BV is sometimes found on 20 meters around 2230Z. QSL via W4FRU.

TUNISIA, 3V - 3V8BB was reported on 20 meters around 1600Z in mid-January. There have been no recent sightings of Mohammad. QSL via JF2EZA and KYFC.

TURKEY, TA - TA2II is very active on 20 meters between 1130Z and 1630Z most any day of the week. QSL via TA2DV.

TURKMENISTAN, EZ - EZ8AX operates 20 meters around 0930Z. QSL route is needed.

INTERNET

The weekly VK2SG RTTY DX Notes, in addition to receiving world wide distribution via the Aplink/Winlink and VHF BBS networks on radio, are now available to all on the Internet, courtesy of N5UXT. The address via Telnet or FTP is ab6z.amp.org. The directory is called \rttynote. These notes, now labelled "RTDXmmdd RTTY DX", wherever you may find them, are your best source of current, as well as late breaking news, of digital DX actvities.

We have received word from Jukka, OH2BUH, that DX spots, announcements, and WWV information retrieved from some PacketClusters is now available at: World Wide Web, URL http://www.clinet.fi/~jukka/

The information is not true real-time, and the update interval varies from one half hour to an hour. Information as of the end of January was being posted from one cluster in the USA and one in Europe. I would be interested in hearing from users as to the usefulness of these postings, especially from those who do not have access to a VHF/UHF cluster.

TIDBIT

I received a nice note from Jean, J28JJ, promising to tell us of planned operations from Yemen and Eritrea. We wish you luck with these, Jean, especially Yemen.

OOPS!

The listing of the contributors to the DJ Digital Needed DXCC Countries List Survey inadvertently omitted DF5BX, N2FF, and N0FAC. Please accept my thanks for your input, and my apologies for this belated recognition.

HAVE DX NEWS?

Leave a message in the W5KSI Amtor mailbox (1), find me on RTTY, or via any of the following:
Packet: W2JGR @ WB0GDB.#STP.MN.USA.NOAM
Amtor: WJGR MBX on 14070 khz.
Telephone: (612) 377 7269
FAX: (612) 374 8161 (mark for my attention) or use my CBA.

THANKS - Thanks to the following for all your information:
3DA0CA, DK7UY, DL5EBE, I5FLN, J28JJ, KE6XJ, K0RC, N5UXT, NI6T, NJ0M, OH2BUH, SM3EMO, SM5EIT, JW0I/SP3ASN, VQ9TN/K5TNP, W5KSI, W6PQS, WB2CJL, W9ZRX, ZS5S, and DXNL.

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

PAX....73 de Jules W2JGR

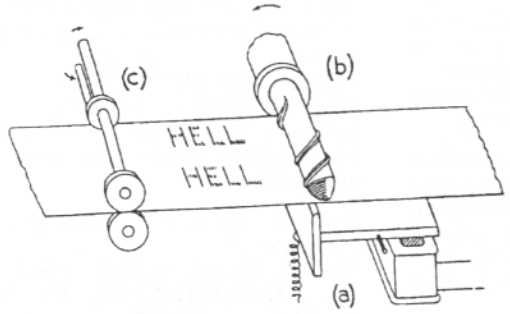
Footnote: W5KSI scans 7069, 7071, 7075.5, 7076, 14068, 14070, 14073.5, 14074, 14079, 21074, 21075, and 21079 khz.

A Bit O' History

A Wireless Printing Telegraph - Part 3

by Crawford MacKeand, WA3ZKZ

115 South Spring Valley Road • Wilmington, DE 19807



THE RECEIVING ELEMENTS.

Let's pick up where we left off, with the magic box, which as I told you, really was capable of doing some quite decent stuff. Looking at the picture of the front panel I can see the two knobs on the top that set the baud rates — two of them because I had to set it for the station side as well as for the QSO side. Maybe I'd better explain that. The QSO side is the same today, and I could work with incoming 45, 50, 57, 74, 75 and 100 Baud signals. (The choice of 74 and 75 was a minor oddity of the UT-4, more of which later). But I still had to set the rate for my own machine. Usually the Siemens was in circuit, and it was a 50 Baud machine, but sometimes I ran the 28KSR which was normal 45 Baud. I never had machines at the other speeds, though some guys did. Now, over on the left was another bunch of switches etc.

The topmost, a potentiometer, varied the output speed. Not the Baud rate, that was the switches, but spacing between characters. It sounded better that way if you were a slow typist. Next the system T/R switch, followed by receive invert. Even today such a switch comes in handy when a newcomer, or one of us struggling with a new rig, finds himself with his feet up in the air, sending upside-down. Pass over the next one — my recollection is too thin, but it did something to the T.U. — but the one below it activated a homebrew down shift on space circuit. There were all of 100 characters or so of memory in the UT-4 for incoming or outgoing signals, and it could be preloaded, but I never found the next switch for the preload function to be super useful. Then finally I could tell the meter up top that I wanted to use it as a tuning meter, or to see how much was in that little memory.

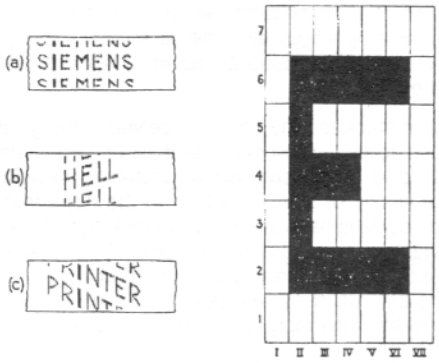
At the bottom is a printer on/off, run/standby and then auto/manual. Remember I mentioned that speed pot up above? Well the auto position used the memory fill level signal to set the speed (the inter-character space setting), and so the fuller the type-ahead memory got, the faster came the copy. It was one way to get away from the dreadful jerky copy that us two-finger artists perpetrate on a keyboardkeyboard QSO. When the memory filled up it rattled on at the standard 45 Baud, and if the typing slowed down, then it gradually slowed the outgoing copy, much like Farnsworth spacing on CW for novice code. It was neat to hear, but less than a technical breakthrough! What else? Memory clear, two buttons that sent specific letter combinations to the electronic stunt box for control from the keyboard and I see an ASCII/Baudot switch. The UT-4 was designed for Baudot, but it was not too difficult to extend operation to ASCII. When we were first allowed to use the 'new' code, and before we discovered what a poor bargain it was on HF, this was for a short time a useful feature. Irv Hoff W6FFC originally designed the UT-4, and several people sold kits. Mine came from Pete Bertelli W6KS who organized supplies of the none too common chips and other hardware and boards. I have mentioned the stunt-box, and there was no end to the wonderful things that it would do. Most people used it to scan the incoming code, but I found it more fun as a station control from the outgoing signals — but enough of this hardware. Software makes it all so easy now, and I for one am very happy about that.

As all this whizz bang digital stuff was happening, so the writing appeared plainly on the wall for the demise of the mechanical TTY machines when CRT based Baudot terminals were readily available. HAL's All Electronic Teletypewriter had appeared in early 1972 and they had sold a RTTY/Morse keyboard for some time - the updated DKB-2010 was featured on the cover of the April 1974 Journal, and it was one of several available - but they announced their DS-3000 KSR system in the April 1976 RTTY Journal. It used 'the powerful 8080A microprocessor' and soon there were comparable devices out from Robot and others, and internationally the Japanese Tono seemed to be ubiquitous.

As usual I went a different route. The Xitex was one of the fairly common Baudot KSRs, but an almost identical board from Netronics in Connecticut was much more economical and handled several speeds and ASCII too. I find that I had this system up and half way running in May of 81. For a few weeks I seem to have put up with a peculiar arrangement whereby I used the video for receive and still used the Siemens for transmit. But when I think about it, I remember a hamfest keyboard, which was one of the few ham projects where I have found it useful to attack the electronics with a saber saw! And also that the keyboard chip's character set was not what Don Lancaster's famous 'TV Typewriter Cookbook' claimed it would be. Anyway, after a few such vicissitudes and much modification, the Netronics board and the old family black/white 19 inch TV, together made quite an effective system. One hazard was the direct connection of the TV chassis to the power line, and as those with taste and discrimination took their video composite signals direct to the video amplifier stage of the TV, complete with DC restoration, a hefty power frequency isolation transformer was a must. The dreadful alternative was an RF game adaptor — not good form at all. But even more technical was the huge Honeywell monitor that I lugged home from the Trenton Computerfest, and that and the Netronics played till 1984, when they were replaced by a Heath H-19 terminal and an AEA AMT-1. And the AMT-1 still exists in back-up and an H-19 in the back forty could too at a pinch.

Signals could still only be recorded on paper tape, and one of the advantages that the mechanical ASR still had briefly was its ability to send messages or even pictures from a library of tapes. Handling paper tape was an art in itself — several articles detailed the correct way to wind it on the fingers in a figure eight mode for safe storage. And woe betide the ham who left tape in the wrong domestic location. It was too easy to forget that the innocuous looking paper was in fact saturated in oil to lubricate the tape punches. The picture business spawned a whole cottage industry — and picture tapes, some of them very good indeed, were sold by many. Joe Dickens WA9UGE was maybe the best known vendor, but John K2AGI and Don WA6PIR were in the thick of it. Don's copy of the Rembrandt "Danae" made the cover of the November 74 Journal. He noted that he used 14 rolls of paper tape and 133,000 characters - six hours plus at 60 WPM! And over 250 hours of work. The anonymous 'Winter Wonderland' was one of my favorites. Many will also remember the pix art contests; the one announced in September 1974 was the first. Popularity was such that the 1978 event was the subject of the cover on the December 1977 Journal.

But a sad cover it was too ... a flash announced that Don Crumpton W6KCW had just passed away, only a few months after taking over ownership of the Journal from Dusty Dunn W8CQ. Dusty had himself in 1967 succeeded Merrill Swan W6AEE who was the founding father back in December 1952, when the Journal was the 'Bulletin' of the RTTY Society of Southern California. But the very same flash said 'The Journal will continue', and so next month the mast head carried Dee Crumpton's name with no call — she was still unlicensed. But continue she did for the next nine years, first becoming KA6NYW and then N6ELP, with the Journal in a new large format,



until Dale W6IWO took up the leadership in mid 1986 and carried the banner through to ADRS days.

Taking the history back to 1952 like this, let's have a quick look at the earliest days of ham RTTY. I have a notion that I can't recall the source for, that one QSO with some sort of printing telegraph was made on HF in England in the 1920s, but nothing really began until very soon after WW2 in the USA. It started on 2 meters, almost simultaneously on the East and West Coasts, typically using simple modulated oscillators and super-regenerative receivers. Initial HF work was on 80 and 40 meters using make/break CW keying, as FSK was not yet authorised there by the FCC. It was permitted on the 11 meter band and some important early work was done there. A monthly RTTY column started in CQ by Byron Kretzman W2JTP was continued by Wayne Green W2NSD, and he and W6AEE led a drive to petition FCC for the HF use of FSK. The historic Docket 10073 amended our regulations, and with effect from February 20th 1953 F1 FSK was allowed in the 20, 40 and 80 meter bands in the non-voice sectors, using ITA #2 code, 60 speed (60 WPM or 45 Baud) and 850 Hz shift. Also we had to identify in Morse at the beginning and end of each transmission. The susceptibility of this wide shift to selective fading soon became clear, and unlike commercial practice, diversity reception was not a real practicality for most hams, though it was tried and pronounced excellent. Therefore in 1956 a further amendment, which was petitioned through ARRL, permitted the use of any shift less than 900 Hz (and yes, we still called it 900 cycles/sec back then!). But we were well into the 70s before narrow shift became standard and many different shifts were tried before we settled at 170 Hz. One good technical reason for 170 was also that our HF signals were a good fit in the 500 Hz crystal filters which were becoming commonplace.

Now why did these oddball frequencies of 850 Hz etc come about? A tube, or later transistor, driven tuning fork was the normal audio frequency standard from the 1920s through about 1970, and commercial RTTY was based on a 425 Hz fork. There were harmonics at 2125 Hz, 2550 Hz and 2975 Hz. We used 2125 mark and 2975 space, and the commercials used either that or the 2125/2550 Hz combination for 425 shift, which many of them still prefer. Narrow shift was also based on 2125 mark, but shifts anywhere from 160 to 200 Hz were common at first. The present day 170 seems to be a legacy of its common use in commercial equipment, and as I mentioned earlier, it really took over from 850 in the late 1970s. More recently, especially on the packet side of the house, we have also seen 200 Hz, which was a Bell System standard. One of the universal early problems was getting the filter frequencies right, as the tuning forks were rare and never cheap, and counters would not be inexpensive ham gear for some years to come. A quite inconvenient and common answer was a table printed by RTTY Journal and others, showing a range of resonant frequencies for 88 mH toroids and good tolerance capacitors. One difficult method used Lissajou's figures, and if you are not already shuddering, don't even ask. One attraction of 160 Hz shift was that this is the difference between the two standard audio modulation frequencies which were used on WWV, 440 and 600 Hz!

Meanwhile our friends overseas had not been idle. The Germans did a lot of work mainly on 80 meters after 1960 with the Hellschreiber system, which was like a very low definition mini-fax, with input from precut letter cams and very resistant to QRM. Good copy could be eyeballed from the paper tape printout even in spectacularly bad conditions, and my reference says in 1946, 'may well become the standard telegraph system for radio working'. Well, it didn't, in spite of its superb QRM beating characteristics, because it needs a fairly wide bandwidth and also the output is not digital in the true sense and has to be transcribed for onward transmission. My reference also says that Hell was an engineer for Siemens, but the literal translation of Hellschreiber as 'clear writer' is so appropriate that I wonder if Dr. Hell only existed in the English author's imagination? But back in conventional RTTY, machines were possibly even harder to obtain than in the USA. The British Amateur Teleprinter Group (BARTG) was formed at about the beginning of 1960 and was instrumental in helping to sort out some uncertainties in the legality of RTTY under UK licenses, organizing equipment sources, and dealing with a certain amount of prejudice in amateur ranks about this new mode. The first European QSOs took place towards the end of 1959 between Peter Carnochan G3IAO in Lowestoft on the East Coast and W.M. Brennan G3CQE in Norwich some 40 miles inland, using FSK with 850 Hz shift on the 80 meter band. A demonstration at the 1959 Radio Hobbies Exhibition in England with a TU from Arthur Gee G2UK, sparked the interest of Jan Adama PA0FB who had obtained a Siemens machine, and international RTTY was underway from G2UK to Holland. Meanwhile G3CQE had made successful contact with stations in the USA, Canada and Australia, and later in 1960 Hans DL1GP became active from Flensburg in Germany.

RTTY DX became popular quite early, but if it was difficult to find the equipment in Europe and the USA, how much more so in the remoter parts of the world. Dusty Dunn originated the first RTTY DXCC certificates based on the ARRL country listings, and the Journal's Honor Roll in January 1972 showed ON4BX leading with 106 confirmed and FG7XT with 102. Then followed I1KG at 102 and W3KV John Possehl, who ran the RTTY-DX column, with 100. By September though, John had upset the applecart and was running second with 106 to ON4BX's 111. The Honor Roll went all the way down to 25 confirmed at that time. The ARRL followed suit in November 1976. BARTG's popular QCA or Quarter Century Award had something for many of us when RTTY countries were much scarcer, as you could get paper on the wall having only 25 countries confirmed, with further endorsements in 25 country increments up to the magic 100. And WAC was a popular award too. I know I was very happy to make WAC and QCA in 1981!

I mentioned prejudice by other hams and surprise, surprise, that was not unknown in the US either. Our friendly beedlebeedle was known to some as the 'jingle bells' and initial opposition from CW operators was strong. (We always have our conservatives, and maybe no bad thing. Makes the adventurous think harder about what should come next.) AMTOR when it first appeared in 1978 provoked some similar thoughts and packet and automatic operation are still doing the same. Since the development of the TOR modes is recent enough in my book to be current affairs rather than history, I bring this short series to a stop at this point. But if you would like to know more about the historical aspects of RTTY and its predecessors and successors, the following articles and books are good places to start.

73 Crawford WA3ZKZ

•All of the back issues of RTTY Journal and Digital Journal, and Datacom and its predecessor, BARTG Newsletter.

•Modern Telegraph Systems and Equipment; W.T. Perkins Newnes, London 1946

•Transactions of the American Institute of Electrical Engineers Vol 71, Pt 1 November 1952

•The First 50 Years of International Radio Communication; Haraden Pratt

•The Impress of Enterprise on Telegraphy's First Century
I.S. Coggeshall —- with a long bibliography

•Electronic Engineering June 1954 London (This issue was devoted to HF Communications and has 8 articles on RTTY techniques of the period.)

•Amateur Teleprinting; A.C. Gee G2UK Wireless World 4/61

•The New RTTY Handbook; Byron Kretzman W2JTP CQ 1962

•RTTY from A to Z; Durward J. Tucker W5VU CQ 1970

•The Teleprinter Handbook; D.J. Goacher G3LLZ and
J.G. Denny G3NTT RSGB London 1973

•History of AMTOR Peter Martinez G3PLX BARTG Newsletter Winter 1983

•Short History of Telegraphy; Alan G Hobbs G8GOJ and Sam Hallas G8EXV BARTG Datacom Spring 1989

Coherent CW

Another Digital Mode!

by Peter Lumb, G3IRM
2 Briarwood Ave, Bury St. Edmunds, Suffolk, England

Let me introduce myself and this new column. I was born in 1922 and in 1932 passed the examination to go to my local Grammar School. One day I was looking through the books in the school library and came across one entitled "Wireless For Beginners." I borrowed it and read it from cover to cover. There were articles on building wireless receivers and I remember that one was a simple crystal set built from a cigar box, cardboard and wire. In addition a small piece of rock was required which had to be bought by mail from one of the big London stores. This rock arrived wrapped in cotton wool and in a beautiful little metal box together with a tiny coil of wire—the cat's whisker. The set worked well and I was able to listen to both the local and national stations. I then decided that I no longer had any interest in model railways and stamp collecting, that wireless would be my hobby.

The last chapter in the book was about radio amateurs, people who were able to communicate with other amateurs around the world. This was magic. Unfortunately I was too young to apply for what was then known as an experimental license. And, by the time I was approaching the required age, World War II was upon us and all experimental licenses were withdrawn for the duration of the conflict. In 1940 I joined the Royal Air Force and trained as a meteorologist spending most of the war in the deserts of the Middle East. Believe me, weather forecasting in that part of the world is one of the easiest jobs there is apart, that is, from the occasional unpredictable sand storm. It proved to be very different when I returned to the United Kingdom.

During my time in the forces I learned enough radio theory to exempt me from the amateur examination when the war ended. It was no longer necessary to invent a reason for wanting an experimental license. It had been decided that the new amateur radio licenses would be available to all who passed a technical examination and a Morse test at 12 WPM. I passed the Morse test to become G3IRM in 1952 and have held this call sign ever since.

In 1977 I noticed a couple of articles in CQ Magazine describing what was claimed to be a revolutionary new method of sending and receiving Morse code. It was called Coherent CW (CCW) and was developed by Ray Petit W7GHM. Very high frequency stability was needed in all oscillators and precise timing was required. The basic element was fixed at 100 msecs for the length of a dot, giving a speed of about 12 WPM. This has been used as the standard ever since. I will not go in to the theory of CCW as it is hoped that this will form the subject of the next column in another two months.

I must, however, mention the practical side of building equipment for CCW. The original design required a very stable oscillator as the basis for all timing operations, and it was suggested that this oscillator should be stable to within Hz in 10 Mhz. This was difficult to achieve in 1977. As both stations in contact operated with such precise timing it was possible to determine, at the receiving end, exactly when a dot or dash should appear. This was done by sending a string of dots for about half a minute, giving the receiving operator time to adjust a phasing control in his CCW filter. Once the dots were synchronized, all following dots, dashes and spaces were automatically synchronized—provided that adequately stabilized oscillators were employed. The timing had to be accurate and the transmitter and receiver oscillators had to be very stable as well.

In addition to the need for stability, it was also necessary to build the Petit hardware filter which consisted of a large number of digital devices. The bandwidth of the filter was only about 10Hz, which was achieved by the use of sample and dump circuits. The response of the filter was such that there were nulls every 10 hz on each side of the main response so that, provided every station used frequencies which were multiples of 10 hz, all stations apart from the one required fell in or other of the nulls. And, in theory at least, would not be heard. This short explanation gives you some idea of the problems involved in putting a CCW station on the air nearly 20 years ago. Apart from building the filter, it was also necessary to stabilize the transmitter and receiver since no commercial equipment was available at a reasonable price. As a result the early experimenters used low power, which proved how effective CCW could be.

I built the filter and stabilized my rig and received nothing—there were simply no stations active. I did at one time think I heard a string of sync pulses but that could have been almost anything. Somewhat disillusioned I put the whole lot away in a box, in the hope that someday someone would decide to have another try at making CCW work. It was not until about eight years ago that a letter written by Bert Arnold G3RHI appeared in one of our magazines. Bert wondered if anyone was interested in reviving the CCW system described many years before by Ray Petit. He received one reply, and you can guess who it was from! Me.

Out came my box of bits for a rebuild, and Bert started building as well. We decided we would try for as much publicity as we could get, and wrote letters to magazine around the world. We wrote articles for magazines and, in the end, we collected a list of about 80 amateurs who were interested in giving CCW a try. It turned out that many of these had already tried in 1977 and some of them had built the equipment needed. Why, I wondered, did I not hear of them in 1977? It was then I started to write a two page newsletter and sent it out to those on my list. It was free but contributions to the cost were always gratefully accepted. Several stations got on the air and a few contacts were made. I actually worked four countries.

Since then, progress has been very slow. However, a couple of years ago, I decided that computers were becoming very popular with amateurs and they were being used for CW and RTTY. Why shouldn't they be used for CCW, if someone would write a suitable program? I launched the idea in the newsletter and, to my delight and amazement, within a couple of weeks I received a computer disk from Bell de Carle VE3OBE (now VE2IQ) with a program called COHERENT. It appeared Bill had written the program some time before for his own amusement. In the meantime he had written an article for QST describing an audio spectral analyzer which used a small interface called a sigma-delta circuit, one that would convert the incoming audio into digital pulses to pass the computer. Adding this interface to the CCW program was the answer.

The program has had many revisions since and is now available from Bill or it may be downloaded from his BBS. Apart from the sigma-delta board and the program, all you need to operate CCW is a reasonable stable transceiver and an IBM compatible computer. Here are the prices for Bill's products: circuit board only $24; full kit of parts including the board $65; all the above fully assembled and tested $95; COHERENT program disk (state size) $20. Postage is $5 and all is shipped airmail anywhere in the world postpaid. The spectral analyzer disk can also be obtained for $20, if you are interested. His address: Bill de Carle VE2IQ, 29 Sommet Vert, St-Adolphe d'Howard, Qc J0T 2B0, Canada.

With Bill's agreement a new program called PCW should be released in the near future. This is written by Ernst Schroder DJ7HS and closely resembles COHERENT. What all is said and done it serves the same purpose so it would be expected to be very similar. It is a bit more user-friendly and has been written with the operator in mind, whereas the original program tends more towards the experimenter. COHERENT is becoming popular with LOWFER operators as it now includes BPSK, which is not included in PCW. On the other hand, PCW includes more than one bandwidth and a Morse decode to the screen whereas the output from COHERENT is via the computer loudspeaker. PCW is not available at the time of writing this but we hope to include it on the ADRS BBS in due course. Arrangements for the distribution of the program other than in the states will be announced later. It is expected to be shareware so copying will be allowed.

I hope I have interested you in CCW and that you will give it a try. All we need is lots of activity on the HF bands to show how much better CCW is that CW. Let me have comments and news. As always columns of this sort cannot be run without feedback from the readers.

Please note that both CCW programs will operate only when used with the VE2IQ interface. There is very little activity on the HF bands at the moment, but keep a lookout 20 KHZ from the bottom of each band with 14020 being the most likely.

73, de Peter G3IRM

Hits & Misses

by Dale Sinner, W6IWO • 1904 Carolton Ln • Fallbrook, CA 92028
CompuServe ID: 73074,435

13,000 STRONG

Hams invaded the fair grounds in Miami to attend the Tropical Hamboree over the weekend of February 4, 1995. The throng filled the aisles where they found their favorite vendor waiting to sell his/her wares. Whether you were interested in Internet, transceivers, antennas, Ham radio accessories, food, or just plain everyday junk, the Tropical Hamboree had something for everyone.

As mentioned last month Jim, N2HOS, Al, W2TKU, Paul, W4ZB and myself met the multitudes in the ADRS booth. Even though the ADRS WPX contest was in full swing this weekend, our booth enjoyed lots of action. We were not turning big rates but many who stopped by joined our ranks. We had a good weekend for the ADRS thanks to our excellent sales force. Our thanks also to those who joined the ADRS.

The ADRS will man a booth at the Orlando Hamvention also and I challenge that team to meet the goals set by the Miami team. I'm betting our Miami team is the "A" team.

Our thanks to Bill Henry, K9GWT, for his presentation at the "Digital Digest" forum. Even though Murphy struck and tried his best to hamper Bill's presentation, he was undaunted and like the trouper he is, clearly held the attention of those in attendance.

If you live in Florida and missed the Miami show, I hope you were able to attend the Orlando event. Either show will find the ADRS present to meet with you and answer your digital questions. No doubt, ADRS will be back again next year.

MY EMPTY MAIL BOX

Since the journal is no longer produced at my location and my job assignment has changed slightly, I find my mail box pretty empty these days. If I am going to continue to write a column each month I could sure use some input from the membership. I don't want to end up being a lonesome old, semi-retired Editor. I still have a pen full of ink and I'm willing to expound on any Ham related topic you toss my way. I realize that leaves the door wide open but that's better than sitting here looking at the walls. Without food for thought I might wither away to a frazzle of myself. Hi!

COMING TO DAYTON

As each new month brings me closer to the Dayton Hamvention, I get a little more excited. This is the premier event of the year for me and many others. As children have visions of sugar plums at Christmas time, we Hams have visions of miles of flea market, hours to survey what's new in gear, and those steamy hot dogs that give us heart burn. Where else in this world could we find such a large concentration of Hams and Ham products? If you have never been to Dayton for a Hamvention, then your Ham dreams have not all been fulfilled. Come join those of us who make this trek each year, you will not be disappointed. Your venture will be beyond your wildest dreams. **It will be reality!** Not virtual reality.

Last month I mentioned the programs and events the ADRS has planned for this year. This month I can tell you that the topic for the "Digital Digest" forum will be "Plug and Play." Assisting me this year will be Paul Newland, AD7I. Paul is a member of the ARRL Digital committee like myself and has done extensive work on Plug and Play. Plug and Play is not a new idea, in fact, work has been in process for over a year in the Amateur arena. Recently there has also been great emphasis placed on this subject in the computer industry.

Plug and Play is simply a name for the need to standardize the interfacing of radios to other devices, be they a modem, radio or computer. For many years the journal has received countless inquiries from Hams who have had trouble hooking up their newly purchased equipment. There was even a monthly column devoted to connections for well over one year. Also, each manufacturer has spent thousands of hours providing technical support for their products over these years and still to this day receive many hook up inquiries. Standardization could reduce such inquires considerably. Much has been accomplished but each manufacturer still has his own approach for interfacing. It is time for some reasonable agreement on how standardization should be implemented. This year's Digital Digest forum will address these issues.

The forum will consist of a panel of experts from the radio and modem industries. Audience participation will also be encouraged. If you are going to attend Dayton this year, be sure to attend this important forum. The time slot is Saturday from 11:15 A.M. to 12:45 P.M. in room number five (5). Room 5 is much larger than the room we previously used so seating will not be a problem any longer.

Just a few words about the sessions planned for Friday morning at the hotel. At this writing, they have not all been firmed up, so please standby. Hopefully, next month we can announce that schedule. Not to be forgotten is the very popular Saturday night dinner. This year the Digital Journal dinner will be hosted by Jim, N2HOS, and he has a short program lined up for the group. See the ad on this page to obtain tickets for the dinner. Sign up now, for great food is promised and the atmosphere will be festive.

Note: I still have a few rooms left to allocate. If you have just decided to attend the Hamvention, get in touch with me immediately. I can be reached via phone/FAX at (619) 723-3838 or leave me a note on CompuServ at 73074,435. Time is fleeting, make a decision today and come join us for Dayton 95.

All for now.

73, de Dale W6IWO

DIGITAL DIGEST

News, Views, Tips & Reviews

Edited by Tom Arvo, WA8DXD • 4340 Watermill Ave • Orlando, FL 32817
CompuServe ID: 73330,1335

OPINION

Letter to the Publisher . . .

Dear Jim,

In the October, 1994 and January, 1995 issues of the Digital Journal you make several statements that deserve comment about use of 14.080 - 14.095 MHz.

First, you rightly note that Packet has taken a large chunk of this frequency segment despite the fact that there is ample unused space above 14.095 for Packet and, more importantly in my view, that Packet "has no place on HF regardless" of the space available. I agree entirely. However, the logic of your statement is we should persuade (or in my opinion legislate) Packet operators to move up the band—if not off HF altogether. Instead, you suggest that other burst/error correcting modes --- the "TORs" --- unilaterally occupy this space, apparently to stymie further Packet occupation, because you claim "the band is empty" there and that elsewhere in the traditional digital segments the band is "all noise" (presumably QRM).

I disagree. You implicitly assume that the absence (in your view) of RTTY signals in the .080 - .090 segment amounts to an invitation ("use it or lose it") to Packeteers (and now TOR) to move in. I believe this assumption is fundamentally wrong. Not only for the reasons mentioned by Don, W6PQS (who I called for a copy of his letter which you did not publish) and Eddie, W6/G0AZT, but also because the essential technical fact is that the TOR modes and Packet can go anywhere they want. RTTY is incapable of defending its own turf against these modes (ignoring FCC regulations and operating ethics against deliberate interference, both of which seem to be honored more in the breach than in practice). When a TOR station calls CQ on 14.082 or 14.085, on top of an ongoing RTTY QSO, the RTTY QSO will inevitably end. Nothing short of sheer overwhelming countervailing power output will persuade the determined TOR operator that his endless retries will not prevail over the puny non-error-correcting RTTY mode. And this fact will remain true no matter how much RTTY activity may exist from .080 to .090.

You refer in your January Column to "all the noise below 14.080 and above 14.090." Is that a Florida phenomenon? If "noise" refers to digital QRM or even intense activity, it certainly is an extraordinarily rare occurrence in San Francisco. Instead, I hear plenty of unused frequencies in those TOR and Packet areas. Indeed you might want to review the TY1PS spectrum usage charts that you published in the October issue. What I find is that if a RTTY operator dares to operate below .080 or above .090, he will very often be (intentionally?) QRM'd by a TOR station which suddenly decides it must call CQ on that very frequency or by an unattended Packet station firing up in response to some unheard call. In the last few years I have been repeatedly forced to move when operating RTTY from T32RA, NH6T, 8R1TT (all in contests when the band was very full of RTTY signals) and from YK0A (on 14.082!) by TOR operators who simply started calling CQ on top of me. Again, ignoring FCC regulations and ethics, I had no way on RTTY to defend my frequency. I could not even argue with these operators about who was there first, as I can in contests on SSB and CW. Accordingly, I moved. Other digital modes "mov[ing] right in" to an allegedly under utilized portion of the band? They have already done that and more, without regard to the existence of other digital mode (particularly RTTY) activity. Pious admonitions of ADRS ("listen first, then transmit"—RTTY Digital Journal, April 1994) have little, if any effect on that fact. In the end, your position is simply a corollary of a "fundamental" element of the ADRS "philosophy": no bandplan.

If digital dxing and contesting are to survive, they will be in the RTTY mode as you implicitly concede. The readers of the new Digital Journal may not know the background of your earlier critics. W6PQS, the president of IRDEXA, is one of the world's premier RTTY DXers, with more than 314 countries confirmed; W6/G0AZT, the former AMTOR editor of the RTTY journal, is the world-record holder in the CQWW RTTY Contest (still co-sponsored by your journal?), as well as the world' s most active RTTY dxpeditioner. While you have little in substance to say in response to their points about the nature of dxing and contesting, you repeatedly assert in effect that the Packet and TOR incursions into traditional RTTY frequencies are the inevitable result of insufficient activity by RTTY operators themselves, not a result of the frequency dominating nature of the TOR and Packet modes themselves. Again, I disagree.

RTTY cannot survive against TOR and Packet QRM. Encouraging the use of these modes in the traditional RTTY band area will only serve to drive out RTTY. Your comments in the January 1995 issue (specifically the paragraph beginning "Eddie claims...") make clear that you have little or no interest in digital (meaning RTTY) dxing and contesting. It is also obviously no accident that even after Dale Sinner changed the venerable name of the RTTY Journal to the RTTY Digital Journal (in preparation of selling it to you?), you subsequently changed the name of the journal simply to the Digital Journal (August 1994). If your views do not necessarily reflect those of the ADRS board, as your January column suggests ("...did the board write that column? I thought I did"), I would certainly be glad to hear their views. As did Eddie, W6/G0AZT, I examined the contacts from my most recent dxpedition (YK0A) and found that of thirteen "Directors/Officers" of ADRS, I worked only 3, and of an additional thirteen Digital Journal staffers, I worked only 1. I will now start looking at the annual ARRL DXCC listings to see how many of this group are even marginally dxers, and at the scores for the RTTY contests to see how many of this group of 26 are interested in contesting. Perhaps, as you say, "the board and the staff pretty well match the membership of the ADRS in terms of experience" (what of in terms of interest?). If so, the question for digital dxers and contestors well become whether the ADRS, which claims to represent the entire digital community, adequately represents their interests.

73, Glenn Vinson W6OTC

SOFTWARE UPDATES

All the latest releases to software provided through ADRS are now available on our BBS for download.

ADRS BBS #
(813) 922-5904

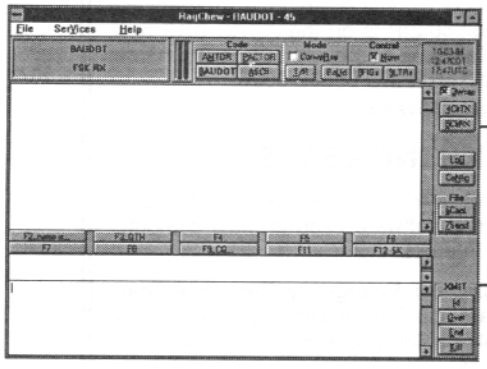
Software currently includes Ragchew, Snap, Express, and PakTERM

Please note:
All the software is licensed and you must still be a registered user to take advantage of this service.

SOFTWARE & BOOKS

Your Digital Information Center

ADRS • P.O. Box 2550 • Goldenrod, FL 32733-2550



Ragchew - Windows software for your HAL card

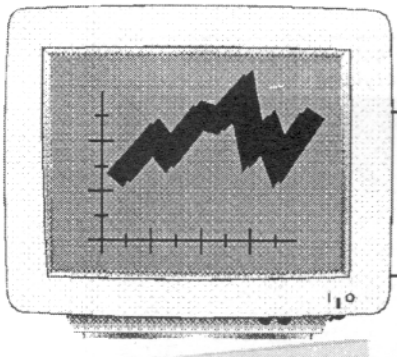
Jim Jennings, KE5HE developed this exciting multi-mode Windows software for your new HAL card. Send RTTY, AMTOR, and PACTOR from the same easy-to-use and friendly interface. Available in station-license form, only from ADRS. $25, postpaid anywhere in the world, for members. $50 for non-members.

EXPRESS 2.0 - Software for Clover

EXPRESS 2.0 Software for Clover (requires HAL PCI4000). Send stunning full color graphics, digitized voice, run a full Clover BBS; all while using the best keyboard QSO software available anywhere. Available exclusively from ADRS. $25 to ADRS members, $50 all others.

PakTERM - Software for PacComm PTC

PakTERM takes your PacComm PTC to its limits while making your life easier with an assortment of automated features. You simply won't find a better DOS based PTC terminal program anywhere!. Only $30 + $5 s/h. Callsign and disk size required with order.



SNAP - Software makes DX propagation prediction easy

Propagation Prediction? With this new DOS utility it's a "SNAP." Instead of guessing if a radio path is open at a specific time/frequency, just call up SNAP and you'll quickly know where and when to make that QSO. Written by Crawford Mackeand, WA3ZKZ exclusively for ADRS. $15 for members. $30 for non-members. Postage paid anywhere in the world.

RS232C & Com Ports Booklet

If you are using a computer in conjunction with ham radio, you will find this booklet an invaluable tool to have in your shack. The booklet contains information about COM ports 1,2,3,4 as well as RS-232C. Cost $5.00 postage paid.

Basic Packet Radio (2nd Edition)

New in the 2nd edition — updated information based on the comments and suggestions of readers including a chapter on operations via Internet Wormholes and & LAN-LINK 2.30 documentation. What packet radio is. What it takes to use it. The Local Area Network (LAN). The Packet Bulletin Board System (PBBS) and how to use it. How to Send and Receive Messages & Bulletins. The distributed LAN. Extending your range via Nodes. Packet Clusters. Servers: Dumb and smart. ELMER The ham's expert system. LANLINK manual and evaluation disk. Price: $29.95 + $2.00 s/h. State disk size.

ADRS ADDS TO SOFTWARE LIBRARY

Bob Lewis AA4PB announced that the ADRS will assume full marketing and distribution for PakTERM, a product of Intelligent Software Solutions. This software is professionally designed to enhance the use of the PacComm Controller (PTC). IBM compatible, it offers a menu driven interface so there are no confusing commands to remember. There is a 65k buffer, enough for several hours of received data; a logging function keeps a record of Pactor, Amtor and RTTY contacts (including band and operator's name). Ample buffers, hot keys, automatic CQ function, file management, type-ahead buffer, split screen display—all can be found in PakTERM. A complete manual is contained on the distribution disk (in Word Perfect and ASCII formats). PakTERM comes on a single 3 1/2 inch 1.4 meg disk.

The price is $30 in US funds, postpaid anywhere in the world. Send your order to ADRS Box 2550, Goldenrod, FL 32733-2550.

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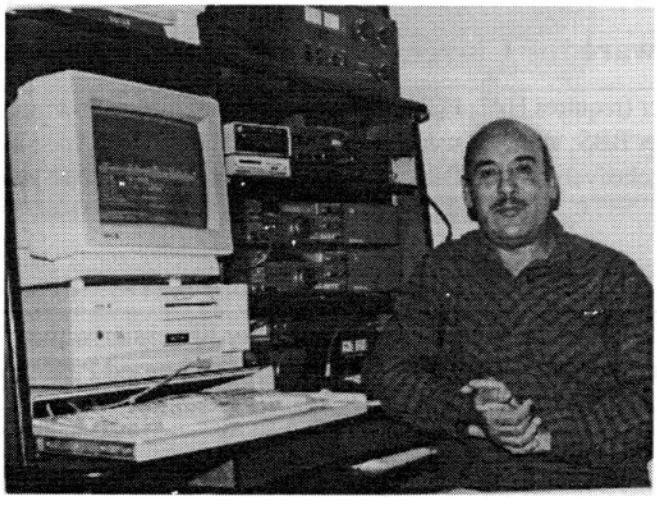

That handsome face above belongs to Ezzat SU1ER. He is a very active digital amateur and operates from Heliopolis in Cairo, Egypt, and runs a very sophisticated mailbox. Ezzat is President of EAWC the Egypt Amateurs Wireless Club (over 40 members!). His station contains two Kenwood transceivers, a Collins amplifier, PCI-3000/4000's, SSTV/FAX modem, a 3 element tribander and an inverted "V" for 40/80. Given a break with propagation, you don't need to search for Ezzat. His station continually scans 14070 and 14072 MARK frequencies for Amtor and 14066 and 14072.12 LSB for Pactor and Clover. Give him a call. By this time he should be using EXPRESS for his Clover operation, so drop off your picture when you link.

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UNIQUE MUSEUM IN BALTIMORE

The Historical Electronics Museum, Inc. Is the latest addition to our mailing list. They will receive a copy of the Digital Journal in honor of Crawford WA3ZKZ, a regular at the museum and a very regular in the Journal. Founded in 1973, is open weekdays from 9-3PMand the first Saturday of each month from 10-2PM. HEM is located near the BWI airport (right next to the Marriott hotel) in Baltimore and is only minutes away from downtown's Inner Harbor center. Do stop by to visit this very active display. Send and receive CW, encode a message on WWII's famous Enigma machine, or just look at the historic pieces of gear like the SCR-270 radar which detected the incoming aircrafft at Pearl Harbor on December 7, 1941. This is a special place for children (of all ages) and for anyone with a genuine interest in technology. Their phone number is410-765-3803.

VERSION 5.6 OF QQSL RELEASED

Bill, AA4M shipped the new version to registered users in late December. This program is a dedicated QSL card label maker with a reputation second to none. If you send any amount of QSL cards to build up your DXCC or County scores, this program is a must. The trial version QQSL56.ZIP is on the ADRS BBS now. Download it and see why QQSL is so popular. Or, order it from Bill Mullin, 9980 Allen Road, Graff, MO 65660-9320.

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HACKER ATTACKS INCREASE

There's been a recent increase in hacker attacks through long-standing flaws in fundamental software used in most computer networks connected to the Internet.

The federally financed Computer Emergency Response Team Coordination Center at Carnegie Mellon University warns that tools that exploit these vulnerabilities are widely available and being used by several groups.

The attacks are aimed at the Network File System, better known as NFS, which is widely used to link computers on local computer networks. In the worst cases, intruders can gain total control over the system through the flaws.

For information on how to protect your network, use the File Transfer Protocol tool (best known as FTP) to get to INFO.CERT.ORG. GO to the directory/pub/cert advisories and look for CERT Advisory CA-94:15.N FS. Vulnerabilities.

—Excerpt from the "ON-LINE" column
as published in The Chronicle of Higher Education 01/96/95.

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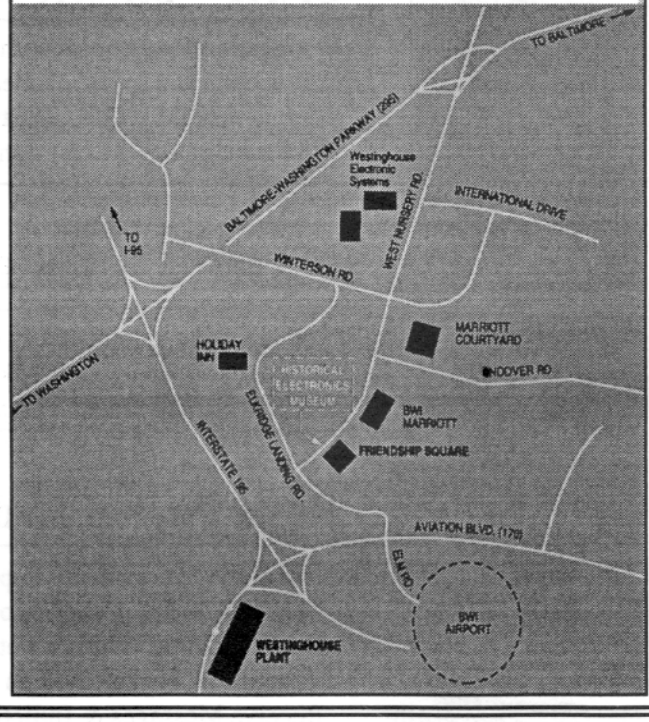
ADRS NOTICE OF BOARD MEETING

Notice is hereby given that the annual meeting of the American Digital Radio Society will be held at the Radisson Inn (North), 2401 Needmore Road, Dayton, Ohio on Friday, April 28, 1995.

Location of the Historical Electronics Museum in Baltimore, Maryland



ADRS WPX
HIgh Claimed Scores

Multi/Multi

Call	Qso's	Mults	Score
WS7I	1163	329	648,130
Ops: WS7I, WA7EGA, WB7AVD			

Single/Op High Power All Band

AB5KD	1044	321	606,369
KF3P	849	296	509,712
KN6DV	653	219	250,755
VE7SAY	468	200	239,800
AA9JY	420	180	195,500
VE6JY	435	175	184,450
EA2IA	281	174	137,634
K3WW	341	176	122,672
S56A	202	132	99,132
VS6BG	211	125	76,000
W6OTC	537	110	59,070
WA6SDM	236	125	58,375
JH7QXJ	152	99	40,887

Single/Op Low Power All Band

AA5AU	739	234	305,838
KA4RRU	438	200	256,300
CJ6V	379	169	140,608 (VE6JAV)
G0AZT/WQ6	371	156	109,512
VA6A	313	143	97,955 (VE6WQ)
N0FMR	382	149	95,807
K5ED	355	150	87,300 21.5 hrs
N9CKC	313	141	77,409 17 hrs
VE6ZX	222	108	54,216
PA3EVY	105	82	24,108
AA6TY	165	77	20,636
N5XUS	66	44	11,484 6.3 hrs
WF1B	40	33	4,224- 80m Sloper on all bands
VE8EV	52	40	3,800

20m Single Band

NA4M	381	213	115,872
VE7OR	302	169	105,118
K0BX	118	81	11,664

40m Single Band

W2UP	244	142	81,508
N6GG	197	125	78,436

80m Single Band

K1IU	224	140	83,440

Send all H.C. Scores to AB5KD, all scores will be posted.
73's . . .
de Ron AB5KD <ron481@austin.relay.ucm.org>
<AB5KD @ W5SYT.#AUS.USA.NA>

Limited number of hotel rooms for Dayton '95 still available!

If you plan to attend the Dayton Hamvention in 1995 and will need a room, the ADRS has reserved a block for your convenience. These rooms are at the Radisson Inn (north). This is where the digital gang stays. This is where special events will be held. Forums, hospitality suite, and the Digital dinner will are take place right here. Stay where all the action is - reserve a room today.

The rooms will accommodate from one to four people. The room rates are $86.00 per night. The hotel will need a deposit of $80.00 per room. We must know if you need a room NOW. We do not need your deposit money at this time, only your request. You will be advised later on when to send your deposit money.

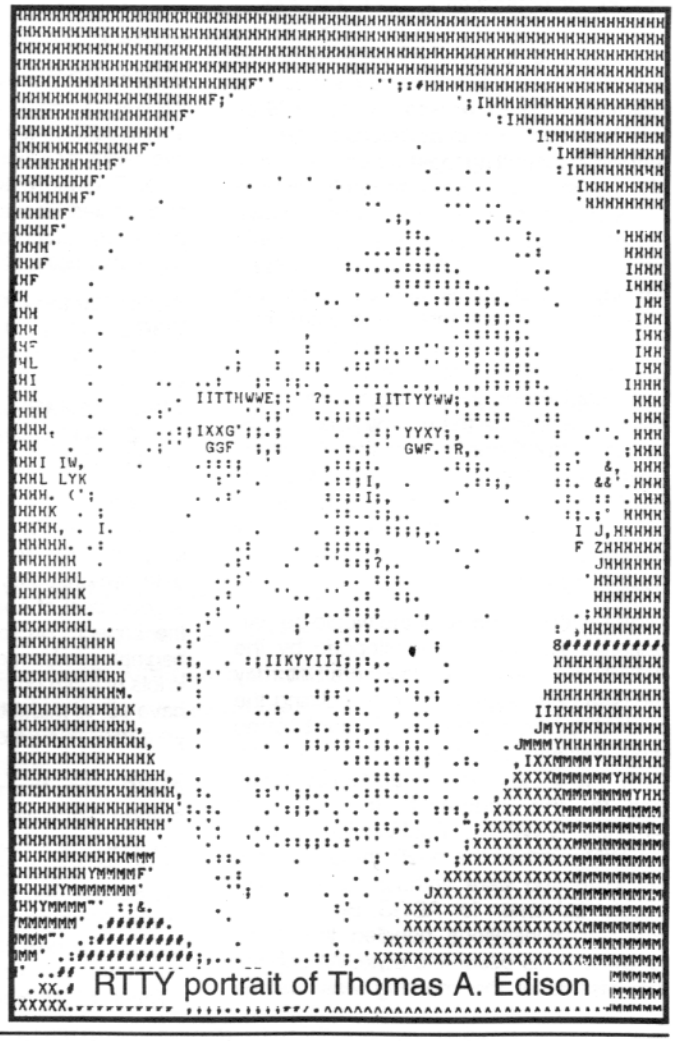
To reserve a room, contact Dale Sinner, W61WO via one of the following methods.

Phone/FAX (619) 723-3838

Mail to: 1904 Carolton Lane, Fallbrook, CA 92028

CompuServ: 73074,435

Dayton Hamvention dates are:
April 28-30. 1995



RTTY portrait of Thomas A. Edison

The Last Word

from the Publisher

Jim Mortensen, N2HOS • PO Box 328 • Indian Rocks Beach, FL 34635
CompuServe ID: 71573,1077

ADRS WPX "BLASTS" OFF!! If there were any doubts of the need for and the support of a new RTTY contest, they were dispelled about 0002Z Saturday February 4, 1995. WPX jumped off to a fast start and never lingered. *"The WPX was a blast. Thanks for organizing it," said Kok AA6TY in a E-Mail to WS7I."* And, he added, *"Made 160+ Q's and 70+ prefixes with the 12 foot vertical on the balcony outside my third floor apartment. I even worked my first VS6 on RTTY, yahoo!"* Congratulations to AB5KD and WS7I for putting together a sure winner. My participation was severely limited because of both work and fun (see below), but the sheer volume of participants amazed me. The QSO serial numbers flashing across the screen confirmed the high volume of entrants. And word from TY1PS agrees. "Heavy participation in Europe and all around the globe, including VP8" said Peter. When I got home from Miami and fired up the rig, my second contact at 2345Z Saturday was the ubiquitous Chiru JA3DLE/1 on a "dead" 15 meter band. And, since it was too windy here to put up the tower, I relied on the trusty R-7 for the contact. It seemed like old times. Let's design another one!

Miami claimed many of the would-be participants. Almost all who stopped by the ADRS booth during my stay there Saturday morning commented about "sacrificing the contest for the big hamfest." I can't blame them because this major show is the first large one of the new year, and an important one for the southeast US and Latin America. Al W2TKU, Paul W4ZB and Dale W6IWO manned the booth throughout the weekend and were enthusiastic and successful salesmen for ADRS. Bill Henry of Hal Communications handled the digital forum with his usual fine style. Among the first visitors of the morning was George KB2VO. While he won't make it to Dayton, nothing could keep him from driving down from Deerfield Beach to see old friends and to make new ones.

Welcome Peter G3IRM—and the readers of his newsletter. CCW (Coherent Continuos Wave) is a fascinating story, and it is as basic to the digital modes as middle "C" is to the keyboard (hey, I mean piano not computer keyboard!). Peter begins the tour through the history and technology in his first column this month. This every-other-month contribution is a fine addition to our pages. CCW, a primitive ARQ mode, is alive and well but is in need of more activity. Join in. While the action now seems to cluster around 14020, I might suggest a change. In the US that is "Extra" territory and it would be a shame to exclude those Advanced or General-class amateurs who have an interest. Why not move it up to 1426.5 or some such QRG? There is surely no worry about being close to the band edge with this mode. All the Stateside gang can join in. Maybe we will see the day when we have CCW pileups!

Winlink BBS' move up the band on 20M. Here is an update on the ADRS sponsored shift of BBS frequency utilization. The objective called for a significant shift of semi-automatic BBS traffic away from the keyboarder frequencies, above the FCC proposed subbands for automatic operation. Here are some examples of what has happened:

Amtor/Pactor—KC4JX 14112.5 14118. **W3GL** 14118 14122.5. **W9MR** 14112.5 14118. **WA1URA** 14112.5 14118. **WB8NWQ** 14118 **Clover—K4CJX** 14110 14116. **W2NRE** 14110 14116. **WA1URA** 14110 14116. **WB8NWQ** 14110 14116. **WX4J** 14110 14116 (NTS only).

The above information is courtesy of Craig WA8DRZ in San Francisco via K4CJX. I suspect it may be a little out of date, but the data demonstrates two things. First, there is a good deal of cooperation out there. And the impact on the 14066-14080 area is beginning to be measurable. Second, there is lots of room up there for those of you who have yet to make the move. Drop a note to your BBS and urge the shift on 20. It helps.

ADRS joins the stampede to the information highway. Among his other talents, Jay WS7I is a tough negotiator. Turns out he made a deal too good to turn down, so the Society becomes a full-fledged "Page" on the "Web on Internet." A full tutorial follows in the next issue. For now, note that our address will be Internet: @adrs.iea.com - *There will be more, much more.*

PCI-4000/M users should note that there are updated files available on the ADRS and HAL BBS'. Potential buyers will be interested to hear that "all current production" of the cards now include the FSK module. This makes RagChew (by Jim KE5HE and available only from ADRS) an even more valuable piece of software. I joined the ranks of enthusiasts a few days ago. My PCI-4000/M card came back from Urbana about the same day I received the latest version of RagChew. All I can say is this—"RagChew is to RTTY, AMTOR and PACTOR what Express 2.0 is to Clover." In other words, don't miss out! The two programs in tandem form an enviable keyboarder communication potential. Incidentally, Express 3.0 (a major upgrade) will be available about Dayton time.

Internet security is a problem. Six months ago, the media (and I mean everything from computer magazines to the television network news and gossip magazines) thrived on plugging the Internet as the "best, the only way to survive and prosper in the next decade and beyond." It's growth mushroomed and the media hype surely contributed. Now, among the more responsible publications—and I include the Wall Street Journal and The Economist among them—words of caution emerge. And we should listen. The hackers are one problem, but I don't worry too much about being invaded by the horde of folks who wish to disable or infect my computer. Pornography is a widespread vice and is not limited to the Web (I read today that the Dutch museum who has the world's foremost collection of pornography closed its doors to the information highway crowd). But I worry when the "C" word is mentioned. Crime, I mean. The old adage, "Where there is money, crime follows," best be heeded. No, I am not too worried about my credit card being abused (I would never, ever, order anything from a vendor on Internet and show my number for all to see). What concerns me is that the mere presence of the criminal element will soon destroy one of the great creations of mankind—a cooperative, world-wide, free, open, uninhibited, unsurpassed communications vehicle. It is threatened on the one hand by crime, and on the other by governmental intervention and control to "control" the crime. I remain uncertain as to which is the more dire threat.

John N0FAC had the audacity to ask whether or not the Digital Journal was interested in unsolicited manuscripts. Having designed a nifty new Quad for 30 and 40 meter RTTY (in something of an emergency) he wanted to tell the digital world about it. Yes, we assured him, every script is welcome. While we don't publish "hate mail" (those letters attacking individuals or groups in language not fit for these pages) under the banner of OPINION, we are urgently and constantly in need of articles, regardless of length, about the craft of digital radio. So, please, whatever your interest, if you have an opinion, a design, a secret

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technique, a new antenna or a favorite piece of hardware or software, our readers are interested in hearing about it. Send the articles to me or to Tom WA8DXD. We prefer to have the submissions on 3.5" disks, but we can handle anything including hand-written notes on the back of an envelope. Content, not form, counts. And yes, we like pictures and drawings.

Don't miss the April Digital Journal. Noted contributors from around the world lend their thoughts to the subject "Digital Communications—What Comes Next?" In a world of change, digital communication renews itself about as fast as anything except designer fashions. Most everyone responded to the invitation and we should have a lively discussion concerning our future. We thank them in advance. And, even though the April issue goes in the mail before "Fools Day," it will be our Dayton issue, one widely distributed on the scene in Hara Arena.

Way back in 1989 or 1990, about the time I racked up my first 100 countries on RTTY, and about the time Eddie W6/G0AZT beat me out of RTTY WAZ #54 (I got #55 because he mailed his stuff in three days ahead of me), I happened to contact TU2BB one sunny afternoon. Felix's command of English was then somewhat limited (though considerably stronger than my "street French" acquired in 1944-45), but we communicated rather well and soon became fast friends. Contacts were a regular thing, often several times a week, either direct or via Aplink. I soon became his QSL manager. I sort of volunteered, I guess, but learned from yet another DX station that Felix had put out the word long before he told me. Hi! TU was a hot ticket in those days so lots of cards went through my hands over the years . . . and a few still do.

We kept in touch and in good propagation and bad, continued the dialog. During those dark months of 1991 when my wife was seriously ill, he was one of those exceptional friends who sustained my spirit. I am in his debt for his messages that often came to me after returning from the hospital in the middle of the night. He endowed those words with unusual care and warmth, a gift I shan't forget.

About a year ago, Felix threatened to come see us (and the USA) for the first time). I halfway expected to see him at Dayton in 1994, but the trip couldn't materialize last year. The rumbles started once again last December. I didn't take it too seriously because I assumed he would not come until April. And, even though one message said he would arrive in January and again in April, I still didn't make any hotel reservations. Until, that is, Felix faxed me in January. It was a one-liner but made it sound like it would happen for sure. Several days of silence followed until he called from New York and said he would be "right down." Well, not quite. He arrived three days later, at about 0045 local. But the wee hours failed to diminish the warmth of this first meeting.

When I picked him up at 0730 the next morning (for the Saturday morning ham breakfast) he claimed to have been up since 0530. Not me! I was not quite there until after the third cup of coffee. But I was wide awake when we arrived at the house a couple of hours later. You see, Gen and Felix were old friends within minutes of meeting each other. And speaking French! She has been listening to audio tapes for months and, as it turned out, Felix is a great teacher. They had a ball the whole four days. We all did. He is a fascinating, emotional and wise man, and fun to be with. It was a memorable experience, a "DX contact" worth lots of QSL cards. We can't wait until he returns.

We did, quite naturally, discuss radio and what has happened to it over the years. He told me how he began, how he built his first 4 watt transmitter with nothing but an old book of theory as a guide! And I recalled how he made his move into the big time. One day he sent a bank draft for a few hundred thousand CFA and asked me buy a PK-232 for him. He had been using a dumb terminal since getting on the air and he wanted to make the upgrade. I put the draft in the bank and, tired of waiting for it to clear, ordered, received and shipped the TNC to the Cote D'Ivoire. It arrived in about ten days in perfect condition and was soon on the air. He tried everything, RTTY, HF packet, AMTOR . . . and switched to AMTOR. Then the Pactor upgrade arrived and switched again, never to return to the other modes. He suffered through the same kind of progress afflicting so many of us, and in the process, changed the scenery on the bands. By the way he also added, much later, a PCI4000 and can be found on 14064 LSB about 2130Z from the east coast.

I reluctantly took him to the airport the 30th of January. The "bad moment" had come, said he. And we parted, but this time with the knowledge that he would soon return. Neither Gen nor I can wait.

I went home, put up the tower, switched to Pactor because there was no RTTY on 20 meters. And there was a TU5 calling CQ. I told him I had just put a fellow TU on the plane and he responded, *"Felix is my best friend."* We had quite a chat. I signed because I had to migrate to the kitchen chores and thought, "My God, DX is a wonderful obsession, one deserving great effort, one to be cherished—long after the original contact."

Two new directors coming up! Jules W2JGR and Barry VE3CDX bring a great deal of strength to the director's table. Additions of such a caliber deserve a celebration. Come to Dayton and give them a big welcome.

Remember the Friday morning mini-forums at the Radisson. It will be a full morning.

73, de Jim N2HOS sk.

ARRL'95 RTTY Roundup
High Claimed Scores(update)

Single Op High Power

Call	QSO's	Mults		Score
N9ITX	993	89		88377
N5RZ	962	87		83694
WB7AVD	922	89		82058
VY2SS	731	71		6521
NN2G	659	99		64582
AA5ZQ	768	84		64512
KN6DV	820	78		63960
KB4GID	753	83		62499
WE9V	642	89	57138 @ KS9K	18 hrs
KK4DK	???	??		52000
NA4M	666	75		49950
N2DL	515	94		48410
AA9JY	634	74		46916
KF3P	449	72		32328
NA2M	366	75		27450
N2FF	352	70		24640
K3WW	287	81		23247
WF5E	232	71	16472	5 hrs
W6OTC	217	71		15470
W6IWO	208	73		15184
KB9ATR	346	34		11764
WD6L	180	65		11700
VE6JY	128	54		6912
WB5VZL	55	37	2035	2 hrs
VI0ANT	48	21	1008	3 hrs

Single Op Low Power

AA5AU	989	95	93955 (New Low Power Record)	
KA4RRU	752	87		65424
K0BX	564	86		47940
N9CKC	516	75	38700	20 hrs
N1JAC	426	79		33654
WA6SDM	455	??		32305
K5ED	451	69	31119	18 hr
WK5M	476	63	29988	21 hrs
N3UN	328	75	24600	16 hrs
WY2E	338	67		22646
VE6ZX	330	65		21450
N9BHH	328	72		21320
VE6WQ	305	68		20740
W6/G0AZT	270	69		18630
WW1Y	284	64		18176
N7UJJ	290	61		17690
N3II	175	65		11375
N5XUS	194	57		11058
WA6ILT	201	55	11055	20 hrs
N2HOS	159	23		10902
VE6JAV	153	55		8415
AB5VC	138	46	6348	11 hrs
KD0AV	122	44	5368	5 hrs
WB9VGO	103	49	5047	6 hrs
WU1F	100	46	4600	8 hrs
VS6BG	120	37		4440
NY3C	85	46		3910
VE6LB	91	41		3690
N3BDA	63	39		2457
VE4GN	67	29	1943	7 hrs
N2ALE/6	40	21		840

Multi/Single High Power

AB5KD	1318	112		147616
-Ops: AB5KD & WS7I(@ W5KFT)(New M/S Record)				
K1IU	1012	111		112332
-Ops: K1IU & WF1B				
KP2N	1077	94		101238
-Ops: KP2N & KP2E				
W4AQL	58	100		95800
-Ops: N9HZQ, N7FYT, KE4HAH, KC4QFR				
WX0B	862	99		85338
-Ops: WX0B & N5OAO				
AA6KX	798	78		62224

Multi/Single Low Power

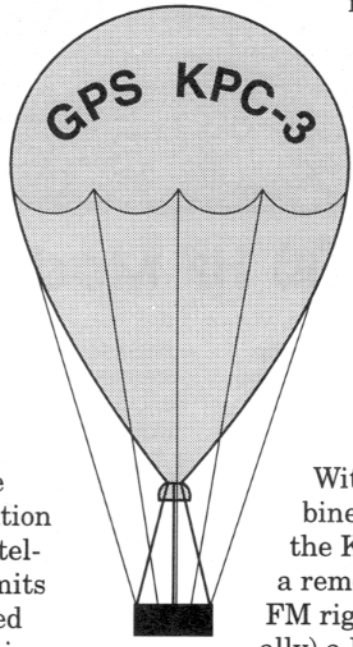
WA2UKP	633	86		54438
-Ops: WA2UKP & WA2JQK				
WS1E	551	93		51243
KQ4QM	555	85		47175
-Ops: ????				
V31RY	520	70		36400
-Ops: AE0Q, AA0KL, WN0B				
KS5V	452	71		31992
-Ops: KS5V, N5XTJ				20 hrs
W1BYN	398	69		27462
-Ops: ????				

73's, de Ron AB5KD

What Fun: GPS and the KPC-3!

by Phil Anderson, WØXI

I can't remember when I've had so much fun with a piece of new technology! A few months ago, I ordered a Magellan Global Positioning System (GPS) Trailblazer™, just to try it out. (By the way, they already cost less today than they did when I bought mine.) The Trailblazer is one of a growing number of hand-held GPS units and is advertised as ideal for hunting, scouting, hiking, fishing, orienteering, boating, and more. I'm looking forward to using mine with amateur radio activities: balloon launches, tracking races, skunk hunts, and mapping my own travel with my KPC-3 and laptop PC.



The GPS was developed for military use by the U.S. Department of Defense to provide worldwide positioning and navigation information for our military forces. GPS also has a broad range of civilian and commercial applications as mentioned above. All GPS units use the most accurate and sophisticated navigation system available – the 24 NAVSTAR satellites. Each satellite continuously transmits positioning information which is received by GPS units and used to compute location and provide navigational information.

For many amateur applications, such as tracking vehicles or balloons remotely, **packet** and **GPS** technology combine effectively for fun as well as for serious uses. The keys to success are the National Marine Electronics Association (NMEA) 0183 interfacing standard and low power required by the TNC. That means my low power KPC-3 (only 14 mA required) with the 'Version 6.0 EPROM Upgrade' (NMEA compatible) is a great mate for my GPS hand-held. And although I upgraded mine, all KPC-3s now shipping from the factory include GPS capability.

Kantronics took time to develop GPS compatibility for the KPC-3, resulting in a very flexible GPS – KPC-3 interface. With eight new commands, you can take advantage of these features:

- power up in GPS mode
- power up in converse or transparent mode
- send an initialization sentence to your GPS unit
- store GPS sentences in a large tracking buffer in the KPC-3 for retrieval in 'connected' mode later
- save and beacon up to four separate GPS NMEA messages and control beacon intervals
- 'slot' beacon transmissions, thus allowing multiple GPS stations to report without collision
- access the GPS unit remotely (by SYSOP) to reconfigure
- use the KPC-3's satellite updated clock

With these features, you'll be able to combine any NMEA compatible GPS unit and the KPC-3 to do all sorts of things. To make a remote station trackable, just combine an FM rig, the KPC-3, a GPS unit, and (optionally) a PC or laptop. Cable the FM rig and KPC-3 together as usual, route NMEA data from the GPS data port to the serial port of the KPC-3, configure the KPC-3 for 'GPS mode,' and let 'em rip! You'll be able to configure the KPC-3 to transmit selected unproto 'GPS' beacons and/or to store the GPS satellite data in the large LTRACK buffer. From there, let your imagination flow; the sky's the limit. By the way, although most new units have it now, make sure your GPS unit features the NMEA interfacing standard!

For the tens of thousands of KPC-3 owners out there, the 'Version 6.0 EPROM Upgrade' (adds GPS) is available now from the factory for $19.95. Contact Kantronics, 1202 E. 23rd Street, Lawrence, Kansas 66046. 913-842-7745, fax 913-842-2031.

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