Dec., 1990

Price $2.00

DIGITAL JOURNAL

SEASONS GREETINGS

IN THIS ISSUE

Happy New Year!

Jay, WS7I and Betsy, WV7Y Townsend share their "harmonics" with us. Top photo is "CQ", middle photo is "RTTY", and bottom photo is "DX"

RTTY JOURNAL

Dale S. Sinner, W6IWO
Owner, Publisher, Editor

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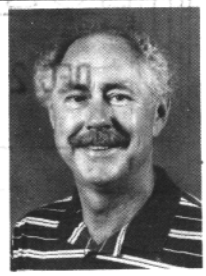


HITS & MISSES

Dale Sinner, W6IWO
9085 La Casita Ave.
Fountain Valley, CA 92708

Thanks for the mail!

My plea the last two months for input in the form of suggestions, letters to columnists, and articles has paid off. Although I can't speak for all the columnists, I, for one, did receive a lot mail. If you recall, last month I mentioned the lack of back-up material for the Journal. Well, thanks to all the input I received, for the first time since I took over the Journal, I have a small back-log of articles. Keep them coming! Even if an article may seem short to you, send it anyway. I'll try to find a way to make it fit, or better still, if you have a picture to go with it, send it along.

I have featured many stations over the past four years and I'm going to do more. So if you want to toot your horn, write up a short one on yourself, include a couple of pictures and send it to me. Before you know it, you'll be famous around the world, with your call recognized every time you transmit.

Price increase again.

I'm sorry to have to make this announcement but, if the Journal is to stay solvent, I must again raise the subscription rate. However, let me justify this increase. I know you're probably saying, "You raised the rate just last year." You're right I did make a modest increase last year. At the time, I debated with myself and others about the small increase, knowing that in 1991 the U.S. Postal Service was again going to raise it's rates. However, I opted for a small increase over 2 years rather than one big increase last year.

Since there is only a small amount of profit in publishing the Journal, I must keep a close eye on all expenditures. My XYL doesn't mind me being the publisher, but she takes a very dim view of this business when the P & L starts approaching the red ink area. Nothing wrong with her thinking, no one can afford to operate a business in the "red" except maybe a government who controls the printing of money.

On the brighter side, the Journal will not be sacrificed in quality or number of pages. It will still contain as much material as I can cram into each issue. So hang in here with me. I think it is still the best buy around for the content received, even with the basic cost, now at $15.00 per year.

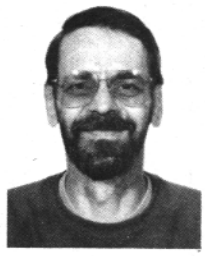
IRDXA

There has been some mail recently asking about the IRDXA and what they are doing. Probably these inquiries came about because IRDXA had planned to continue their news bulletin by submitting it to the Journal for insertion. But they have changed their plans slightly. Instead of publishing their bulletin once or twice a year, they opted to forward all the information and announcements to John Troost, TG9VT. John would then disseminate the infomation on a monthly basis in his column. So those of you wishing up to date reports on IRDXA are directed to the DX NEWS column and the DX Comings column each month. There you will find all the late breaking events associated with IRDXA. Finally, IRDXA is alive and well but can always use a few dollars more to help in furthering the cause of the digital modes in far off places. See John's column this issue for more on IRDXA.

ANOTHER YEAR HAS PASSED

They say time flies quickly when you are having fun. I must being having fun because my year has certainly dissappeared on me. As I close out the year, let me give thanks to all who have assisted me throughout this year. This includes all the columnists, my XYL, Faye, Don Royer, WA6PIR my Assistant Editor, and all those who submitted material during the year. Seasons Greetings to all and may you all have a very properous 1991.

de **Dale, W6IWO** ■



AMTOR

Eddie Schneider, W6/G0AZT
1826 Van Ness.
San Pablo, CA 94806

Christmas is nearly upon us and once again it's turkey time. After the American celebration of Thanksgiving (November 22), I am not sure that I could face more turkey with all the trimmings, but I will try my best.

MAILBOX

I received an interesting letter from Bo, SM4CMG, Awards and Contest Manager of the S.A.R.T.G. announcing the first ever, AMTOR only contest. Here's what he has to say:

"In an attempt to support the SARTG's policy of stimulating AMTOR activity ahead of Packet Radio on the HF bands, SARTG has decided to organize an annual Worldwide AMTOR CONTEST which will take place on April 20-21, 1991.

"The main reason for organizing an exclusive AMTOR contest, came up after SARTG included all digital modes in their 1989 and 1990 WW RTTY Contests. After checking the entries submitted for those two years, it was discovered that only a handful of contest contacts were made, using FEC or ARQ.

"Initially, we (SARTG), planned on having a separate AMTOR category in our 1990 WW RTTY Contest, but after some discussions for and against, we finally decided to take a full step forward and become the very first club to organize an exclusive, annual World-Wide AMTOR Contest, totally separate from our annual RTTY contests in August of each year.

"We realize that the number of stations participating in the AMTOR contest will be much lower than for ordinary Baudot contests. However, this first attempt was not intended to be a "contest" in the strict sense, more like an International QSO-party, in order to stimulate activity on the great AMTOR mode. So, feel free to "ragchew" in this one!

"With a great deal of excitement and anticipation, we look forward to see how this SARTG initiative will be adopted around the world. ALL YOUR support will be very much needed, if this effort is going to succeed."

Rules for the First SARTG Worldwide AMTOR Contest 1991, in a forthcoming issue of the RTTY Journal.

Comments by yours truly:

Firstly, I must congratulate the SARTG contest committee for being the first club to sponsor such a bold venture, and I wish them every success. Having read the rules, I can foresee some problems in establishing an ARQ link if one has a "pile-up." After the rules are published, watch this space for my recommended "modis operandi!"

Secondly, more "kudos" to them for publishing a neat package of information, that included rules for the AMTOR contest, the 1991 RTTY Contest, their awards program and the RESULTS of the 1990 SARTG RTTY Contest that was held in August! Now, if only the other RTTY Contest organizers would be so prompt with their results!

Thirdly, the SARTG Contest certificate is a really nice piece of wall-paper and worthy of a place on the shack wall. Maybe Betsy, WV7Y, RTTY Journal Awards boss, will publish the SARTG Awards program in one of her future articles?

ALLIGATORS

An alligator or crocodile, depending upon which part of the world you live in, is defined in the Amateur Radio Dictionary, as someone who has a very inefficient, almost deaf receiver and a big and powerful transmitter.

In last month's DX News article, John, TG9VT made reference to QRM on a frequency that was already in use. This practice is becoming increasingly apparent and I cannot figure out the reason why someone would want to call up a mailbox if it is already in use. Unlike Baudot, that has only one signal on a frequency at a time, AMTOR ARQ chirps should be "heard" from at least ONE of the stations linked in QSO, no matter how weak that signal may be at your QTH, especially on 20m.

Whatever happened to the practice of using those two appendages, one on each side of our head, called EARS. There is no better way to establish whether a frequency is in use or not, than to use your ears and LISTEN. If you hear anything that sounds like a "chirp," no matter how weak it is, assume that the frequency is in use and either wait your turn to get into your favorite mailbox, or move to another frequency. But remember, listen before transmitting! If someone has hearing difficulties, then an oscilloscope may be a necessary addition to the ham shack (ask Santa for assistance).

ARM CHAIR COPY

Check out an article in November, 1990 CQ Magazine called "AMTOR for Beginners" by Bill Henry, K9GWT. Another article in November, 1990 QST, written by N2HOS, Jim Mortensen, called "A Beginner's Tour to and Through AMTOR." Both articles are "must" reading, for the newcomer and expert.

APLINK V4.19

Vic Poor, W5SMM, author of APLINK is keeping me on my toes. Version V4.19 has a few minor command changes and a few different prompts. When you access ANY of the AMTOR mailboxes, read what comes up on your screen in the way of prompts!

Note: commands and text in this article are in quotation marks (") for clarity reasons and should not be used in the actual commands when linked to the mailbox.

To leave a message to someone, you still type "SP (callsign)" the box comes back with a confirmation query: "SP GOAZT YES/no." Naturally, if you want to leave a message to me, you just type: "YES." If "YES" is accepted, the box will return with a message number, "NRxxx to GOAZT GA SUBJ." You then give a

short title or header, the box comes back with "MSG GA", and you can then send your message and end with "NNNN" on a new line. Do not forget that you can use EITHER the +? or CR after each command, but not both.

New commands are as follows: V4.19

- **LTO.....Lists all messages to you**
- **LFM.....Lists all messages from you.**
- **LTO ALL...Lists general interest bulletins.**
- **LTO DX....Lists DX bulletins (only available on some systems).**

At TG9VT, if you only wish to read the latest DX happenings, i.e., who was on where and at what time, QSL info and juicy tid-bits of planned "rare" ones, type "R 3000" and look for RTTY DX Notes for weekending xxxx. This procedure saves you having to read through all the bulletins with a heading of DX, and also saves access time into the mailbox.

TRIVIA DEPARTMENT

It is not advisable to use the CW abbreviation for "see you later," when you sign off with a French speaking Ham. Apparently it means an uncomplimentary version of backside, rear-end, behind or "#!*@$". OOPS! (courtesy of N4LIH).

A U.S. dollar (GS) will probably not cover AIRMAIL return postage to the U.S.A. from the following countries: Austria, Belgium, Germany, Italy and Spain. This is assuming that the envelope contains a QSL card and a return S.A.E. (self addressed envelope). On the other hand, ONE QSL card in an envelope from any of the mentioned countries should be covered by a GS, unless you know different?

Thank YOU Department

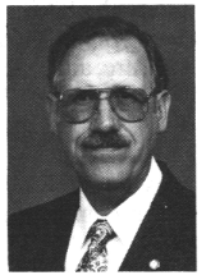
In this Season of Goodwill and more Turkey, I would like to thank all of you who have written to me with ideas, requests for rig modifications, made complimentary comments over the air and so on. It has been my pleasure to write this column and I hope that at least some of you, have gained some new knowledge regarding the capabilities of AMTOR. For 1991, I, like most of the other columnist, would like to continue to hear more from you, the readers. I hope the increase in the subscription rate for next year, (see Hits and Misses), will not deter any of you from renewing your subscriptions. Let's face it, where else could you get such a wealth of information on a variety of "digital" subjects? ONLY in the RTTY JOURNAL!

Thanks also to the Editor, for blowing each columnist's trumpet in the November issue. It saves us doing it! Hi.

Prettige Kerstdagen en Gelukkig Niew Jaar. Frohe Weihnacht. Buon Natale. Joyeux Noel. Feliz Navidad. Happy Chanukah. God Juloch and last but not least, Merry Christmas and, a Happy, Healthy and Prosperous 1991.
73 GL and DX
de **Eddie,W6/GOAZT** ■

Farewell, Dear Friend

Gaylord & Louise Crawley
WB8ICL & WB8JUB - Dayton 1989
(see story below)



MSO

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

Hi Gang! I hope that everyone is getting geared up for the Holiday Season. Its just around the corner now, and its important to get the Kenwood TS-950SD on the appropriate "wish list!" MSO traffic seems to be on the increase recently, with some new faces showing up on the National Autostart Frequency (14 085 625 Hz, "Mark" frequency).

Its always enjoyable to see new folks learn and use the various digitals modes, and I hope that those of you who may be a little hesitant about trying the MSO's, will bite the bullet and give them a try. The MSO's are designed to be relatively bullet-proof, meaning that you can't hurt them. So use them all you want.

GAYLORD CRAWLEY, WB8ICL, IS SILENT KEY

Its always an unpleasant chore to pass bad news along, and it's doubly unpleasant in this case. Gaylord Crawley, WB8ICL, (see photo above), became a Silent Key on Tuesday, November 6, 1990. Gaylord fought a heroic battle with cancer, but finally succumbed after giving it his best. All of the Amateur fraternity extends its sympathy and condolences to Louise Crawley, WB8JIB, and family members.

Gaylord was one of the founders of the National Autostart Frequency on 20 Meters, being the very first person on that frequency to utilize a CBMS (computer based mailbox system), starting in the 1978 time period. Gaylord's desire to maintain and provide mailbox services for others to utilize was evident by the sophistication of the systems he operated. He not only maintained a MSO on 20 Meters, but operated a very viable Packet network on VHF, and an AMTOR system. He was active in RTTY traffic nets, and kept abreast of the changing technology of our times. He constructed and flew his own ultralight aircraft, and enjoyed camping and fishing.

Gaylord was always willing to help. It

didn't matter who, what, when or where, he was willing to take his time to help others to learn to enjoy the various digital modes. He was a dedicated Amateur Radio operator, and he will be missed on the bands. Most of all, Gaylord was a friend. He asked nothing, but gave a lot, and those kinds of folk are hard to find these days. God speed Gaylord!

NATIONAL AUTOSTART FREQUENCY MSO OPERATING SCHEDULES

As promised in the November 1990 issue of the "MSO Column," here's some information on where to find the National Autostart Frequency, what the operating hours are of the various MSO's, and where their antennas are pointed.

The National Autostart Frequency has been in operation since the 1978 time period. It is located on 14 085 625 Hz, and at the present time, has seven automated systems on that frequency. There are times when other MSOs are active on the frequency, but the following list only depicts those that can regularly be found active.

Each of the MSO's has its own distinctive "access code," so that, hopefully, only one system is active at a time. It's important to "close" a MSO when you are through using it, to preclude having more than one MSO active at a time. Active stations are:

- **N1API, Sysop Al; QTH is Meridan, CT; Operating hours, daily, 0600 to 1730 EST; MSO is not active on weekends; Al's antenna favors the West and Central U.S.**

- **K4KOZ, Sysop Frank; QTH is Boca Raton, FL; Operating hours, daily, 0730 to 1900 EST; MSO is active on weekends; Frank's antenna is pointed to the Northwest.**

- **K5FL, Sysop Brownie; QTH is Denton, TX; Operating hours, daily, 0730 to 2000 CST; MSO is active on weekends; Brownie's antenna is pointed North, Northeast.**

- **W5QXK, Sysop Don; QTH is Kaufmann, TX; Operating hours, daily, 0900 to 1200 CST, and weekends from 0800 to 1900. Don's antenna is pointed North.**

- **W6ZRR, Sysop Ernie; QTH is San Luis Obispo, CA; Operating hours, daily, 0700 to 1900 PST. MSO is active on weekends; Ernie's antenna is pointed East.**

- **K0VKH, Sysop Dick; QTH is Rapid City, SD; Operating hours daily, 0730 to 1730 MST; MSO is not normally active on weekends. Dick's antenna is pointed East.**

- **KA0JRQ, Sysop Larry; QTH is Glenwood, IA; Operating hours daily, 0800 to 2330 CST. MSO is active on weekends. Larry uses an omnidirectional antenna system.**

- **KB0ATQ, Sysop Jay; QTH is Rapid City, SD; MSO operates 24 hours a day. Jay's antenna is pointed East.**

MSO's are many things to many users. They are a reliable way of leaving and retrieving messages to and from acquaintances and friends. They provide a method of "delayed QSOs," in that a strict operating schedule is not required. Drop a note to a friend on one of the MSOs, and he can pick it up and answer it at a later date. MSO's contain technical information, current DX information, helpful operating hints and suggestions, amusing stories, and just about anything else that interests Amateur Radio operators. In fact, they are what you, the remote user, make them.

For example, if your interests are in Astronomy, then you'll most likely find someone else who has that same interest, and the MSO's provide an excellent and reliable way of exchanging information concerning your interests. MSO's are conversational, friendly, easy to use and above all useful to the Amateur community. Try one, you'll like it!

HOW TO FIND THE NATIONAL AUTOSTART FREQUENCY

When you start talking about transceiver digital frequency displays, you may as well be talking about fish in the ocean. There's a dozen ways of portraying frequency information, and each Amateur Radio equipment manufacturer seems to have his own way of providing it. But, once you understand what frequency is depicted on your favorite transceiver, then it's just a matter of a little arithmetic to find your favorite RTTY frequency. Here's a few hints:

Think of your AFSK tones, (or FSK shift), as having three important points. They are the "carrier" (or zero) frequency, the "mark" tone, and the "space" tone. When your transceiver is in Lower Sideband, the "mark" tone is 2125 Hertz lower than the "carrier" frequency. And, the "space" tone is another 170 Hertz lower than the "mark" tone, (or 2295 Hertz below the "carrier" frequency). Now let's apply this information to two transceivers.

The Kenwood TS-940S digital display, while in the "FSK" mode, reads the "space" frequency. If the National Autostart Frequency is at 14 085 625 Hertz, ("mark" tone frequency), then you must subtract 170 from 14 085 625, to calculate the "space" frequency, (14 085 455). If you then dial in 14 085 455 Hz on your TS-940S, you'll find that MSO frequency without difficulty. (Yes, I know that the TS-940S only has a seven digit readout.)

The Kenwood TS-820S and TS-440S digital displays show the "carrier" frequency, (TS-820S in LSB, and TS-440S in FSK modes). If you are again attempting to find the National Autostart Frequency, and know that it is located on 14 085 625 Hertz "mark" frequency, you then must add 2125 Hertz to the "mark" frequency, to determine the "carrier" frequency, (14 087 750 Hz). Dial in 14 087 750 on either of these transceivers, and again you'll find the MSO's without any difficulty.

I should hedge my bet just a little here, and stipulate that the digital frequency readout on your favorite transceiver is only as accurate as its calibration is. Some rigs need frequent calibration. Others, like the TS-940S drift only very slightly on a yearly basis, and can come close most of the time. But, before you find fault with the figures listed above, please insure that you've recently calibrated your transceiver.

Now that you've found the National Autostart Frequency, you'll need some information on the command structure used to operate the system. That command structure, and some MSO etiquette, will be the subject of next months "MSO Column." I should point out that each of the MSOs has it's own "Help" feature (accessed by sending .HELP), so, if you're itching to give it a try, you can download the Help file very easily.

HY-GAIN DX-88 MULTI-BAND VERTICAL ANTENNA

Thinking about using the new Hy-Gain DX-88 vertical antenna with high power on RTTY? You might want to visit with Larry, KA0JRQ, before you do. He can give you some first hand information on his experience with this system. Larry's MSO may be found on the National Autostart Frequency.

That's it for this month Gang! I hope that each of you have a very Merry Christmas, and a Healthy, Happy and Prosperous New Year. See you in 1991! 73

de **Dick, K0VKH** ■

PACKET

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Whittier, CA 90602

RECEIVED COMMENTS

For some time now, courtesy of Pete, K6JRR, et al, I have been receiving feedback from INTERNET. This feedback has been relayed to me via Packet radio. Some of the mail that I have received has dealt with earthquakes, packet radio, TCP/IP, NOS, and other subjects.

What is interesting to me, is that many people post mail to the INTERNET concerning problems with software that they are presently using. A comment that struck me was from one commentator who voiced his concern over NET/NOS and its ever increasing size. When I first started using NET, the program was about 220K in size and left about 250K free for shell operations from within the program. The present NOS version that I have from PA0GRI is about 420K in size and leaves about 60K for shell operation. I realize that the program can be compiled to different sizes, if one has a compiler to use.

I do not want to appear to be down on the program because of the size, it is just that there has to be a way found to keep the resident portion small. This is because the program does multi-task in a small way. When you shell out of PA0GRI 900917, you have a DOS shell running with the NOS program still running in the background.

An idea that I have concerning this memory problem, is to use an idea that I learned about in college years ago and is just now being supported in the PC compiler field. Programs should use overlays and just keep the core routines in memory and bring in the other routines when needed. This would allow more free memory to be available for shell routines and also keep the maximum memory requirements down, allowing for more features to be incorporated into the program without making the whole thing into one big memory hog. This should alleviate the complaints from people who want to set aside their old XTs strictly for TCP/IP service.

Also the TTYLINK session is great because of the split screen operation feature. One of the biggest problems with running a TELNET session has been the lack of any kind of flow control for the screen. I know that the PE1CHL implementation has flow control, but NOS does not. It would be great if either flow control or split screen could be extended to AX.25 connects too.

Another subject that I have seen flying around has been addressing the BBS program MSYS. The biggest complaint I have seen is that you can't access the BBS via TELNET. It would be a big help but I do not see why a person running NET/NOS could not execute the connect to an MSYS box by issuing an AX.25 connect from the NET/NOS prompt. That would allow someone to access the BBS with NET/NOS. Another way would be to integrate a POP server into MSYS so that a TCP/IP node running POP can interrogate the BBS for any mail that the BBS may be holding. There have been several other complaints concerning MSYS and it's implementation. The basic concensus is that the concept is good and that there are several people wishing that the source would be made available to the public so others could get at it and improve upon it, much like the way NET has grown into NOS and the additions thereof.

One complaint that I have about the current implementation of PA0GRI 900917 involves TELNET sessions. If someone sends a TELNET to me and logs in under GUEST and proceeds to set up a Chat with me, I see the request as a session from GUEST, not the persons call. My first response is "Who are you?" I am not the only one voicing comments about this "feature."

REVIEW

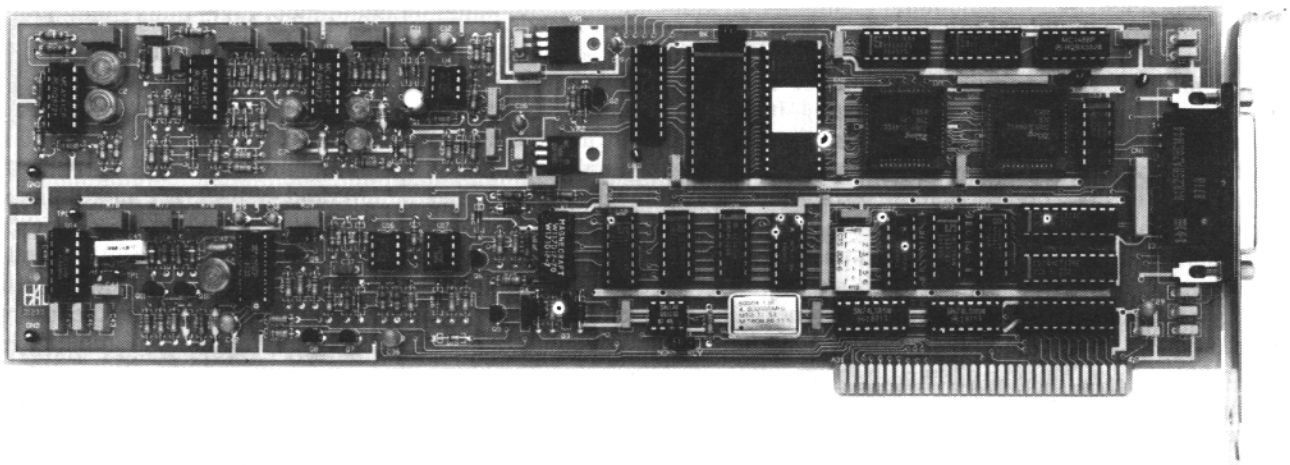
Continuing on with the review of the Kantronics Data Engine Combination, this month I will be discussing the 9600 baud G3RUH compatible modem that the Data Engine uses.

The modem itself is a card that takes up half of the board area of the Data Engine main board. It is a plug-in, double sided board in design and can only fit in the case one way. This required some packaging and parts layout considerations when designing the 9600 baud modem because of the case's internal construction. The ICs are all bypassed and socketed. The jumpers are all labeled along with the ICs and parts.

The basic function of the 9600 baud modem is to convert the packet data into a form that the radio can send out and receive. Since the data rate is so high, you can't send audio tones of the necessary frequency using a normal radio. So, in order to carry information at the 9600 baud speed, Frequexcy Shift Keying (FSK) is used.

What happens with FSK is that the frequency of the radio is directly manipulated to carry the information. One discrete frequency represents a mark and another discrete frequency represents the space. The TX signal, if you look at it on a scope, looks like a string of variable duty cycle square waves, that are bandwidth limited, but follow no apparent pattern because of the imbedded randomized information. Because the information is sent as raw data, and not

A Winning Combination . . .
The PCI-3000 and SPT-2 from HAL!



The HAL PCI-3000/PC-AMTOR system is designed to put your PC on the HF bands with outstanding performance at an affordable price. Amtor allows you to get through when other methods fail. If you've ever been DX-ing with someone on Amtor when 20 meters dies out in the evening, you know what we mean. Things may slow down, but you can usually keep up the QSO!

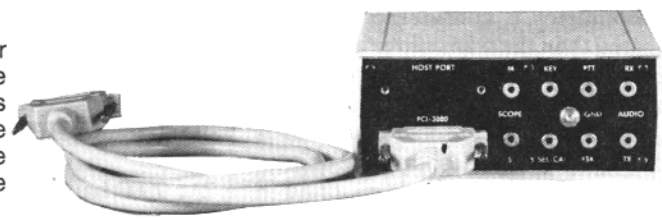
The PCI-3000 doesn't limit you to Amtor. You also get high-performance Baudot and ASCII RTTY, CW, and Search Mode. Search Mode lets you simply tune in the signal—we take it from there. The PCI-3000 automatically finds the correct code, speed, and polarity. No more guessing!

If you want to communicate on HF, do it right with the PCI-3000! Call HAL Communications—your AMTOR source—and put your PC on the air today!

SPT-2 Spectra-Tune:

For ease of tuning your PCI-3000, add the SPT-2 Spectra-Tune. The Spectra-Tune lets you tune in CW and RTTY signals quickly and accurately with a calibrated linear 30-segment bar graph. The bar graph represents a 600 Hz range of the audio spectrum, centered at 2210 Hz for RTTY and AMTOR, and 800 Hz for CW. Calibrated marks indicate the proper frequency for AMTOR, RTTY, and CW tuning.

A cable is included with the SPT-2 for providing power and control from the PCI-3000. The rear panel of the SPT-2 provides convenient "RCA" phono connectors for all radio connections. This avoids having to make radio connections directly to the PCI-3000. Enhance your PCI-3000 system with the SPT-2 Spectra-Tune Today!



HAL Communications Corp.
P.O. Box 365
Urbana, IL 61801
Phone (217) 367-7373
FAX (217) 367-1701

PCI-3000/PC-AMTOR with software **$395.**
SPT-2 Spectra-Tune with cable **$169.**
FIL-1 Amtor/RTTY filter (installs in SPT-2) **$69.**

(Low tone export models available.)

as tones, the data has to be extracted as a digital voltage at the detector of the reciever.

The type of radio to use should have a discriminator type receiver. This is because a well designed discriminator will pass DC. Another type of detector that could be used is a PLL FM decoder. A ratio detector may not work because it responds to the rate of change of the signal and a fixed frequency signal will not give a discrete voltage. The signal can't be recovered as audio because it would sound and act like bandwidth-limited white noise.

But getting back to the modem itself. The design is full duplex, unlike the K9NG modem that is half duplex. This can allow for a full duplex link using two discrete radio frequencies to increase throughput. The modem board has its own onboard clock for transmit and also regenerates the RX clock and RX data on the board.

The transmit side design is interesting, from my point of view. Let's go through the whole process. The raw input data is latched in and controlled by the on-board clock. This data is then massaged through a DIGITAL modulator. I say that it is digital because a signal out of the modulator side is generated with a D-to-A convertor. This allows for generating various waveforms to compensate for nonlinearities in the radio's modulator. The output from the DAC is filtered to smooth the signal and provide for adjustment of the output level to the modulator.

The board also has a watchdog timer for the PTT line. The watchdog timer is there just in case the system hangs up the radio in TX. This way the radio will not tie up the channel in case of a problem.

The demodulator is considerably more complicated than the transmitter and the K9NG setup. The demodulator provides RX data, DCD, and RX clock outputs. The RX clock is digitally generated from a DAC setup. From the design of the unit, it appears that the DCD line is qualified by using the RX clock and RX data lines. In comparison, the K9NG modem that I have falses here in the presence of all of the hash that I have in this area. However, this demodulator does not false at the rate the K9NG modem does. I watched it for about 3 hours while attached to the DVR 2-2 radio on the outside antenna and I saw the unit false twice in that time period and both times were for a brief instant only. Considering the amount of RF GARBAGE around here, that is a great falsing rate. Ideally, it should not false at all but it is much superior to the K9NG board operation.

In terms of testing of the modem, you have several options. The board has a jumper for onboard analog loopback testing. It also has a facility for Bit Error Rate Testing. You can force the unit to send either all "ones" or all "zeroes" for testing of the transmission system. That is a big help for the people who homebrew their own equipment. There is also a jumper for disabling the watchdog timer when testing.

One nice feature of the board, and I have not tried this, is that it looks like you could use the modem separately without the use of the Data Engine. All you need to feed it is, +12, ground, TX data, PTT, and the board gives you DCD, RX data, and RX clock.

If you want to experiment with 9600 baud, I would suggest using this board instead of the K9NG board. If you wanted to, with a couple of trace changes and parts changes, the board could possibly operate at a data rate of 78.6 KB. That would move data faster than 56 KB for a 37% increase in throughput. An interesting idea. I haven't tried the modification but it looks to be feasible.

Unfortunately, I can't give you a report on how it works yet. We still do not have a 9600 baud 2M frequency here in the Los Angeles area. I do not see a 9600 baud frequency being opened here by June, 1991 at the earliest.

END OF THE YEAR

Trying to figure out what has transpired throughout the year is a hard task. HF Packet is still wasting spectrum on a medium that is known for its ups and downs. We will concede that APLINK works better here for HF than Packet. Los Angeles is still in the stone age by not having a 2M 9600 baud frequency up and running. There has been a proposal submitted for a change in the AMTOR specification to fix up the sync loss on FEC and increase the throughput on ARQ by going to 9 characters transmitted when the band is good and falling back to 3 characters sent when the band isn't so good.

Predictions: Amateur Radio is dying a forced death. The WARC conferences will see Amateur Radio lose spectrum to the commercial interests who can utilize it more efficiently than we can. They can prove the need and utilization; we can't on the same level. Witness the loss of the 220 to 222 MHz band in the U.S. It was lost because we could not prove that the band was being used to its full capacity. So, it was given to the commercial services that would use it fully. I have a statement as to why. I operate on 10M, 2M, and 440 MHz. I have no interest in 220 MHz, 1296 MHz or higher except for 10 GHz down the road. HF operation for me would be an occasional ragchew on voice and some real good conversations using RTTY and AMTOR. I do have an urge to upgrade to General, but from what I see of the attitudes and operating courtesy (did I say COURTESY.....what courtesy?) of the hams on the rest of the HF bands, I now have second thoughts. Too bad, I can't work all the bands that we have 24 hours a day, 7 days a week. That is an impossibility but that is what it would take everyone of us out there to keep what we have. Even though I may be a ham, if I was with the FCC and a proposal was given to me to use part of a ham band for commercial purposes, I would allow or disallow the request based on which group could use it to the fullest extent. Enough said!

I hope that all of you out there have a wonderful holiday season with both Christmas and Hanukah this month.

Peace de **Richard, N6NKO** ■

DX NEWS

John Troost, TG9VT
444 Brickell Ave, Suite 51-265
Miami, FL 33131-2492

This month, I am afraid, will be rather short Column. There just is not a lot of solid information about any interesting Happenings for the next months.

ANOTHER YEAR GOES BY

Yes, 1990 has been an outstanding year for RTTY DX, with many new ones coming on the air, and most often doing an outstanding job. But what will happen in 1991 is kind of uncertain at this time. Also, some of the Expeditions come up as surprises, with very little advance notice; at least I don't have much solid to go on. The good ones I know for December, like XU1DK, KAMPUCHEA and KH7/KD7P, KURE ISLAND, will be long gone by the time you receive this issue of the Journal. XU1DK finished his short trip to CAMBODIA as I write this. Hope you worked them.

The first 11 months of 1990 saw such very successful operations as 3Y5X, BOUVET ISLAND, where Jacky Calvot showed he is not just a good CW man; A51JS, BHUTAN, by VK9NS; A61AD, U.A.E. by WB2DND; VK9LI, LORD HOWE by VK2SG; YV0AA, AVES ISLAND; 1S0XV, SPRATLY ISLAND; CE0ZZZ, JUAN FERNANDEZ ISLAND; HK0TU, MALPELO; AH3C/HK5J, JARVIS ISLAND (subject to ARRL approval); ZS9Z/ZS1, PENGUIN ISLANDS (also subject to ARRL approval); XW8KPL, LOAS (a little short, that one); ZK3KY, TOKELAU ISLAND; CY9CF, ST. PAUL ISLAND; XU1DK, CAMBODIA, plus quite a few new operators from places like SOLOMON ISLANDS, CHAGOS, ZIMBABWE, 4U1UN, TRISTAN DA CUNHA, WALVIS BAY, RODRIGUEZ ISLAND (for a very few lucky ones only), RWANDA, TOKELAU and really too many to name. If 1991 is going to be anything like this, it will make a lot of DXers happy as larks.

All RTTY DXers can thank the Good Lord and pray that we will see another year as good as 1990 in our lifetime.

NOVEMBER HAPPENINGS

Though there was a slight hangover after the CW WW CW Contest, November saw mediocre propagation, but still a lot of good DX. The MALPELO Expedition, HK0TU, was outstanding, for it's control of the pile-ups, plus gave us an All Time New One on RTTY, as was CE0ZZZ from JUAN FERNANDEZ. Martti, of course, did his usual good job from ZS9Z/ZS1, PENGUIN ISLANDS; let us all hope that the documentation is good enough to win endorsement for New Country Status from the DXAC.

Then we saw such goodies as ZK1AP, PJ2/OH2BGD, UC2OF, UD6DM, UG7GWG, UH8EA, UH2E/UA9TZ, UI9ABV, UI9WK, UL7PCZ, UM8FMU, ZB2IY, 5Z4BI, UQ2HO, ZD9BV, and ZD9CO, 9Q5UN, 9Q5TE, V51P, J88BP, JX7DFA, 3X1SG, TR8JH, J73WA, VP8BFH, 9J2BO, KP2BH, P29BT, SV0CR, SV5TS, LY2WW, RL1P, JY9SR, TY1PS, OX3EW, BV4QH, BV4VB, BZ4DAB, BZ4RC, 3B9FR, (unfortunately not often enough), 6W1HF, 6W6JX, C56/6W6JX, V85EB, 5V7DP, 9X5LJ, V31AR, YN1CB, TF3J, VK9NS, CO2CB, YS1JBL, HP1ML, FK8BK, J6LNN, Z21EZ, FW1FM plus many not listed here. So it would seem that you could have worked DXCC in November alone, if you had been on all bands simultaneously, 24 hours per day, though 20 seems to close down kind of early.

Lorraine, ZD9CO told me that she and Andy, ZD9BV will be (or were, when you read this) married on 6 December 90. God Bless a marriage made in RTTY.

With great regret, I heard that on 7 November 90, my friend GAYLORD CRAWLEY, WB8ICL, made the big QSY and is now QRT in this world forever. We will miss Gaylord, who ran an AMTOR Mailbox on 14,074 and an RTTY MSO on the National Autostart Frequency and was always ready to distribute the Latest RTTY DX News. Our condolences go to his XYL, Louise.

HF PACKET RACKET

We had some interesting mail on this subject this month, from both Rich, NT6V and Mike, N2ETH. Both seem mildly upset (understatement) with what is happening in the RTTY segments of our bands and particularly on 20 Meters. Rich's three page letter draws attention to the fact that only seventy-two Amateurs, handpicked, were given STA (Special Temporary Authority) to operate unattended HF Packet with less than 250 watts, within the agreed Packet portions of the Bands. The ARRL was assigned responsibility by the FCC to maintain control over these "Temporary Operations." In fact, all the ARRL has done is insisting to the FCC that the "STA" should be renewed over and over again, without ever submitting to the FCC a technical report of the results of the "tests" being conducted.

In this respect, the multiple and simultaneous use of a particular frequency is a serious drawback. You would not have much success if you had to share a single voice frequency with a dozen or more other Hams, each trying to maintain a separate QSO (Did I hear some one say "CB."

Rich goes on to say that, being desperate for Frequencies, these Packet BBSs took orders from two ARRL staffers, who "authorized" them to leave the Packet frequencies above .100 by persuading them to occupy the less used RTTY segments, where there would be more opportunities for unattended BBS operation. It then finally dawned on the ARRL that only the FCC can authorize frequency usage, and thus, in late 1989 made its ill-fated petition, RM-7248. This petition was fortunately withdrawn, thanks to the efforts of many of us who knew that these Packet BBSs would eliminate frequency sharing with any mode that is not compatible with it, i.e., only Packet.

Well, to come to the point, regardless of the withdrawal of RM- 7248, the Packet BBSs are taking over the RTTY bands, pushing us into the CW portion of the

bands. Packet BBSs are now established as low as 14,091.

What Rich suggests is that it is a case of "either use it or lose it." Instead of Calling CQ on 14,085, use 14,098, as was normal not more than 14 months ago. "What about moving some of the autostart operations in the upper half of the subbands?," asks Rich. And he may be right on that; it sure would clear more space for RTTY DX and Rag-chewing. Not too many years ago, Dick, K0VKH, was talking of moving the National Autostart Frequency to around 14,098? That leaves plenty of room for the NCDXF beacons on .100 and for the W1AW on .095 (nominally). In any event it would set a boundary line below which Packet is not welcome, nor able to live except thru "eternal time-outs."

And Mike, N2ETH, tells about his experiences during the WAE RTTY Contest. Not being a Contester by nature, and looking for a quiet ragchew, he decided to go to 40 Meters and find someone similarly inclined. So, he writes: "Well, the RTTY band on 40 was wall to wall with Packet Mailboxes."

On 40 Meters, Why? Could the traffic not be moved easier and more efficiently on VHF? Maybe those Packeteers have a different mentality than we Radio Hams? As Mike writes: "There is absolutely no law and order on the Ham Bands, and it is getting worse."

The real problem is: where is the Sheriff? Neither the ARRL (oh yes, I am a member) nor the FCC seem to be willing to take on that job. Do I hear any volunteers? Well, if we do not find someone in a responsible position with at least some degree of authority soon, we will be in a real mess during the next WARC Conference and everyone may end up loosing including HF Packet.

AMTOR DX AND MAIL

AMTOR is a great mode. There is lots of DX and some of it very good. It is also an excellent mode to run traffic error free. As you know, I run an APlink Mailbox and that way I get a lot of the DX information that I am able to place in this Column. I have daily access from stations such as OD5NG (for six years now), FK8BK and many others. But it does cut into my DX time, especially the recent H/W traffic from the Middle East, that can amount to 50 QTCs in and out per day.

When the box is clicking away on one band, I cannot very well work DX on that same band, even though the APlink station is completely separate from my normal DX gear. At night that gets to be a problem, with 10 and 15 closed and the great lack of activity on 40 and 80 RTTY. Recent nice articles in QST and CQ Magazines have made more people aware of the wealth of information available in the AMTOR Mailboxes and thus creates a greater demand for all APlink boxes. Anyway, maybe I am taking to much on my fork, as it is impossible to do a good job on DX, Mailbox Maintenance, writing this Column, plus having the battle of the office, as yes, I work also and am no-where near retired. Just wanted to share this thought with you and am looking for solutions (stop working would help...hi!).

HAPPY 1991

I better QRT. Have said about all I dare to say in the Christmas month. Besides, if I don't keep my big mouth shut, Dale will not be too happy and I don't want to give him the excuse of editing the Column, which should be about DX only and not my personal opinions and those of others on Packet and HF.

One of the first things I am planning for the next year is a 1991 "Most Needed Country Survey." I have learned something from last year and hope that with Dale's approval, I can present a better survey form. Anyway the Survey last year was a help, and convinced such as Martti Laine to activate more countries on RTTY, including M.V. Island in March/April.

My gratitude to the many who made this column possible with input, including, but not limited to W6PQS, VK2SG, JA1ACB, OD5NG, I5FLN, OH2BH, AA6BB, K6WZ, N2ETH, NT6V, VU6JX, UT5RP, and W2JGR; without you, there would be no column.

I wish you all the best for 1991, may the Lord, Our God, bless you with health and prosperity, a new piece of gear here and there and of course lots of good DX and excellent propagation, and may some order be created in the Chaos on the RTTY bands.

Best 73/88 and hope I have some strength left next year to keep giving you advance information on what is about to happen in this wonderful world of DX/Radio Sport.

de John, TG9VT, on the fiery volcanos of Guatemala.

WV7Y QSL ROUTES

These QSL routes were gleaned from the WS7I/PacketCluster but, for the most part, come from the DX1 reports. Special thanks goes to Danny, WB4ETY and Frank, N2FF, for their help this month.

73 and 99, **de Betsy, WV7Y**

4K2OIL QSL UA9MA PO BOX 341, Omsk 99 USSR

5N0ETP via N6LQL

9Q5TE via SM0BFJ

9X5LJ and 9X5AB via Box 81, Kigali, Rwanda

CE0ZZZ QSL Box 13312 Santiago, Chile

CN15AMV via Box 299, Rabat, Morocco

HF0POL via SP3HLM

J73WA 1430 Rodney St., Portsmouth, Commonwealth Of Dominica, West Indies

JX7DFA qsl to 13 Jan Mayen, via Norway

OX3EW to P.O. Box 1308, APO NY, NY 09023

P29BT via N5FTR

UC2OCJ via Box 68, Gomel, Byelorussia 246027 USSR

UH8EA via W5BWA

V51P via Box 9080, Windhoek, Namibia

V73BN QSL P.O. Box 8147, APO SF 96557

ZS9Z/ZS1 via OH2BH

9600 BAUD DFSK PACKET DEMYSTIFIED

by Phil Anderson, WOXI

Over the last twelve months, a smattering of 9600 bits-per-second (BPS) packet stations have begun to appear in the USA and Europe. Prior to that a handful of stations were occasionally on the air, experimenting with various methods for 9600 baud transmission, and a few network groups developed and used/are using ad-hoc systems. However, no official standard has come along, allowing clubs, sysops, end users and manufacturers to use matched equipment. To our knowledge, no standard has been adopted by any ad-hoc committee or league-sponsored committee either.

Of the systems used, the one adopted most often so far is a PC board kit compiled by G3RUH, James Miller, England. His method, similar to that described earlier by K9NG, Steve Goode[1], utilizes a direct frequency shift key (DFSK) form of modulation. This is also the form adopted by Kantronics for their DE9600 modem board, which plugs into the Kantronics DataEngine.

At the same time, some Japanese amateurs have experimented with using telco chips at 9600 baud, and about 100 systems have been reported to be operational in Tokyo. The advantage of using telco chips, perhaps, is that some off-the-shelf transceivers may be utilized. The down side appears to be that long TXDs may be required in addition to other problems.

The advantage of using the DFSK approach is that it is simple and works well, including short TX delays. The down side for DFSK is that, with few exceptions, the FM transceivers must be modified. It is necessary to gain access to the varicap or frequency modulation section of the transmitter and to pick off reception at the product detector or discriminator of the receiver. Traditional audio processing must be avoided, bypassed! So far a few new transceivers have appeared on the market that provide for these functions, in particular the Kantronics DVR2-2. In addition, some surplus transceivers have been available.

With the number of DFSK systems installed and with the current TX delays too long using telco chips, it appears that DFSK may be approaching a de facto standard for 9600 BPS systems for 2-meters and 70-cm for the amateur service. With this in mind, we thought it appropriate to present the essential elements of this modulation form. Details on circuitry and implementation can be found in the manual for the DE9600 Kantronics board[2], or other sources.

To present the essence of DFSK, it shall be necessary for us first to review a number of topics, non-return-to-zero data (used in AX.25 packets), FCC rules regarding allowed bandwidths for FM amateur channels and FM modulation theory. Once we've re-examined these topics, the design just "falls out." This is as it should be; after all, if the radios are ready for high speed data, the modems ought not to be complicated. Let's start our adventure with a look at the non-return-to-zero data format (NRZI).

NRZI DATA FORMAT

AX.25 packets are coded in the NRZI format as shown in Figure l. Sample binary data is shown at the top, the basic return- to-zero (RZ) digital format next, followed by the NRZI format. Note that with NRZI, a change in level occurs only when the next bit of data is a ZERO. Alternatively, change with a ONE could have been used.

The immediate effect of using NRZI is to halve the data rate required compared to RZ, saving spectrum. The fastest square wave for 9600 bits per second, sending all zeroes using NRZI, would be 4800 Hertz! Data with a mix of ONES and ZEROES, as shown in the Figure 1, spreads transitions out even further.

A secondary effect of using NRZI or some other formats is to add a varying DC component to the data. This would be true of the basic RZ format also but not for codes such as Manchester, shown last in Figure 1. Basically, one trades off reduced required spectrum for more difficulty in recovering a receive clock for the data. Another way of saying this is that one can design a system with reduced bandwidth requirements but more circuit complexity.

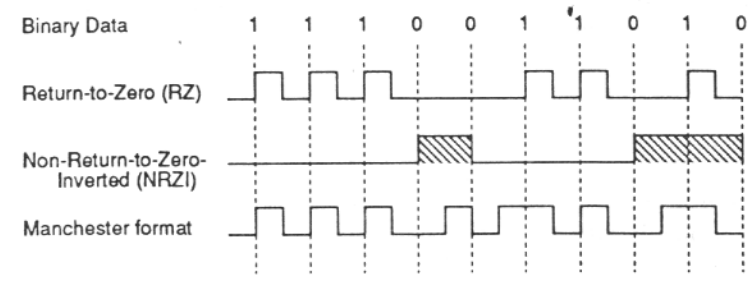
So how can NRZI help us with our 9600 BPS packet system? How much bandwidth will our NRZI scheme need? Perhaps most important, what bandwidth will the FCC allow? Let's look at that first.

THE FCC RULES ON SPECTRUM

While the rules have been rewritten, we assume that the section on digital communications regarding bandwidth has not been relaxed; hence my old copy of the rules states:

- 97.69(c) (2): The bandwidth of an emission from a station using such digital codes shall not exceed the following: (i) 20 Khz on frequencies between 50 and 220 MHz: (ii) 100 Khz on frequencies between 220 and 902 Mhz, where for this purpose the bandwidth is defined as the width of the fre-

Figure 1 – Data Formats



quency band, outside of which the mean power of any emission is attenuated by at least 26 decibels below the mean power of the total emission.

Hence, with FM packet on 2-meters for example, our equipment must limit emissions to 26 dB below the total outside of the typical 20 Khz channel. Another way to say this is that emissions must be down at least 26 dB plus or minus 10 Khz off our packet frequency on FM.

SPECTRUM OF A 9600 BPS PACKET SIGNAL ON 2-METER FM

Fortunately, if we shape the data going to our FM transmitter carefully, we have sufficient bandwidth. To see how this works out we must re-examine the spectrum generated by a narrow band FM transmitter.

RF Spectrum on an FM Signal:
To keep our example simple, let's assume that we wish to modulate the FM transmitter with a pure audio tone, say 1 Khz. As you may recall the resulting FM signal will consist of a number of components, a carrier plus sidebands, spaced apart at multiples of the 1 kHz tone. In general, the spacing of the sidebands is dictated by the frequency of the modulating signal. However, the amplitude of these sidebands is proportional to the ratio of the amplitude to the frequency of the modulating signal. This ratio is called the MODULATION INDEX of an FM signal.

To say it another way, let's consider frequency deviation of the carrier by the modulating signal. Deviation of the FM signal (actually the RF carrier) is determined by the amplitude of the modulating signal. In our case, the peak voltage of our audio tone determines the frequency deviation of our RF carrier, producing an FM signal. Then, the ratio of the peak deviation in frequency at RF to the frequency of our modulating signal is defined as the MODULATION INDEX.

Let's calculate a few examples. Let's assume that our 1 Khz signal has a 200 mv peak-to-peak signal and that the resulting FM signal deviates from the RF carrier by plus and minus 3Khz. Then, let's assume that our 4800 Hertz NRZI square wave also has a peak-to-peak value of 200 mv; hence, it too will cause the carrier to deviate plus and minus 3 Khz. However, these two signals will generate different FM spectra. First, the 1 Khz tone will generate sidebands at multiples of 1 Khz of the FM carrier. For the square wave, each of the Fourier components making up that square wave will generate additional FM sidebands of their own, generating many sidebands.

The key to reducing the sidebands is to limit the modulation index! In other words, the way to limit the 2nd, 3rd, and 4th multiples of the 1 Khz tone is to limit the deviation of the FM carrier relative to 1 Khz. Roughly, a ratio of one or less will limit the sidebands of an FM signal to just one on each side of the carrier. Another way to say this is that by limiting the MODULATION INDEX, one can limit the spectrum of an FM signal. Still further, such a signal is, by definition, called a narrow band FM signal. Additionally, curiously, an FM signal limited in this way looks much like an AM signal with carrier and just two sidebands!

For more detail, if you wish, consult any number of engineering texts that derive the above results and generally provide a table or graph of Bessel functions, used to calculate sideband amplitudes. The math is out of place for this tutorial.[3&4]

Therefore, to stay within the limits offered by the FCC, our 9600 BPS system must limit the deviation of our carrier to somewhat less than plus or minus 4800 Khz. Recall that the maximum square wave (data stream) possible with 9600 Buad NRZI is 4800 Hertz. As it turns out, a deviation of plus and minus 3,000 Hertz works well.

Second, the frequency content of our modulating signal must be kept low in order to generate no more than the fundamental sideband on FM. If the edges of the data are allowed to be too steep, the resulting frequency components will generate additional FM spectra.

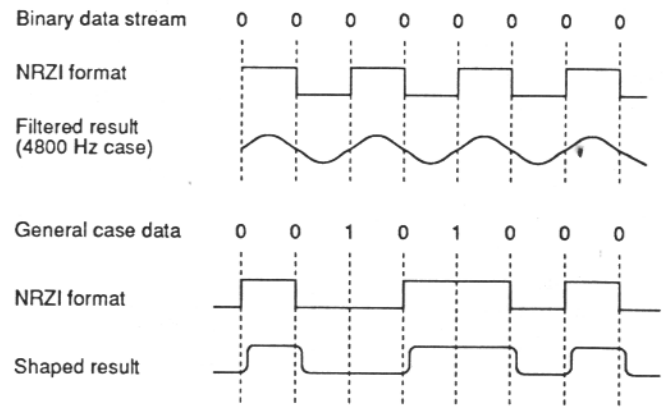
RESULTING TRANSMIT/MODULATION DESIGN

Hence, it would appear that we cannot allow the pure 9600 baud NRZI signal to modulate the FM transmitter directly. A large spectrum would result, particularly if the modulation index were large for some components of the audio signal! So, our next option is to shape our modulation signals like those shown in Figure 2.

The first data stream is the simplest, that of continuous data ZEROES, resulting in an NRZI square wave. We could simply limit the audio frequencies of the square wave to the fundamental only, hence a sine wave at 4800 hertz! A simple method would be to pass the NRZI signal through a very sharp low-pass filter.

For the more "general data case" shown second, the modulating signal should be smoothed as shown. This can be accomplished by use of a good filter or by using EPROMS and a digital-to- analog con-

Figure 2



Kantronics**KAM**

If you're looking for a flexible all-mode, if you're looking for a TNC to operate both HF and VHF digital modes, if you'd like one unit to operate RTTY, AMTOR, WEFAX, CW and Packet on HF, yet be keystroke switchable to VHF for packet, then you've found it, the Kantronics All Mode (KAM). Just ask a user!

It's the most flexible and evolutionary all-mode on the market! Since its first appearance in 1986, we've generated four major firmware upgrades, adding new capabilities each time. With release 3.0, in August of 1990, we added software carrier detect for squelch-free operation, reverse personal bulletin board forwarding, the new AMTOR 625, NAVTEX/AMTEX, a command to restore parameters and more!

And the KAM is tops in flexibility. The HF demodulator is user programmable, allowing keystroke selection of tone pairs. You can select any of the standard shifts (170, 425 or 850 Hertz - handy for MARS ops!) or you can set the MARK SPACE tones to any desired value within the unit's range, in one Hertz steps! You can program baud rate too, allowing for the operation or listening to off-rate baudot or other HF digital transmissions.

On CW we stand head-and-shoulders above the rest. You can program CW-filter bandwidth and center frequency to match receiver needs. If your HF rig doesn't have a CW filter, you can 'close it down' by decreasing the KAM's CW filter bandwidth! Better yet, you can match the KAM's CW demodulator filter to your particular receiver CW filter.

On packet you can operate on both HF and VHF simultaneously, enabling a host of new possible modes of operation. For example, you could have a QSO on HF packet while leaving your VHF channel available for mail or connect. Or, you could set your station up as a gateway, allowing other stations to digipeat from VHF to HF or vice-versa. Or, you could have an RTTY QSO while leaving your VHF packet mailbox active. And more, with firmware update 3.0, your personal packet mailbox (PBBS) is enabled to allow reverse forwarding of messages to a larger BBS, such as RLI. And on and on!

And the unit is PC or C-64 friendly: an internal jumper allows TTL or RS-232 serial port operation without the additional need for a TTL/RS-232 adaptor for the C-64 serial port, saving you money.

The three-manual set is outstanding too, consisting of installation, operation and commands. All are indexed and cross referenced to each other for quick access to related information. The Operation's Manual contains information for beginners too.

Specs: size 1-3/4" by 6" by 9", weight 2-1/2 lbs, power requirements nominally 12 VDC at 300 ma. Input sensitivity 20 mvpp (FM), 100 mvpp (AM). Audio drive jumper selectable from 100 mv to 1.6 vpp.

Options: a 2400 baud QPSK modem for VHF/UHF operation, an MSK modem for advanced HF use, and a battery backup or SmartWatch for preserving mailbox contents/time during a power interruption.

Modes: CW, RTTY, ASCII, ARQ, FEC, WEFAX, AMTOR-625, NAVTEX/AMTEX and PACKET.

So there you have it, the flexible and evolutionary all-mode. For a detailed specification sheet contact Kantronics. The KAM, the all-mode that evolves with the state-of-the-art.

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verter, generating exactly the shape desired given the input data stream! In this way, the spectrum of the resulting FM signal can be controlled and kept within specifications.

Then, with proper clock recovery and demodulation, the waveforms shown would be easily recovered.

RECEPTION OF DFSK OR SHAPED FM

Without going into detail, the biggest problem in recovering data from a stream such as that shown in Figure 2 is to recover a clock from the data first. Assuming that a scrambler has been added to each end of the link (for other reasons too), there are plenty of reversals in the data allowing for the use of a digital or other phase lock loop to recover the clock. Once the clock has been recovered, the data is lined up and can be sampled easily.

While carrier detect is important too, for channel access purposed in our packet system, we'll leave that subject for another time.

SUMMARY

So, the real problems all along for 9600 BPS systems for 2-meter FM have been the availability of appropriate radios[5] and a way to limit the FM spectra to stay within the bandwidth rules. We see that given the ability to deviate an FM transmitter by a desired amount and by tailoring the shape of our modulating signal, that we can indeed run 9600 BPS within the allowed limits.

The challenge now is to find additional radios that can be modified to control deviation, that can be switched quickly between transmit and receive and that provide for direct (unprocessed) detector output, or to design the radio decks desired[6]. At present there are no off-the-shelf transceivers for 440 Mhz that match FCC allowed bandwidths (100 Khz).

References:

(1) "Modifying the Hamtronics FM-5 for 9600 BPS Packet Operation," Steve Goode K9NG, Fourth ARRL Amateur Radio Computer Networking Conference, March, 30, 1985 San, Francisco, CA. pp 4.45-4.51.

(2) Kantronics INC, 1202 E. 23rd. St. Lawrence, KS 66046. Ask for DE9600 manual.

(3) Introduction to Communication Systems, by Stremler, pages 290-292.

(4) Vacuum-Tube Circuits and Transistors, by Arguimbau, pages 504-509.

(5) Kantronics INC, 1202 E. 23rd St., Lawrence, KS 66046. Ask for DVR2-2 manual.

(6) J.R. Miller "9600 Baud Packet Modem Design," 7th ARRL Computer Networking Conference, 1988, pp 135-140.

CONTESTING

Hal Blegen, WA7EGA
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Spangle, WA 99031

Doug, K7KNW and I argued CW, once. Why, I asked him, would anyone use a mode with a practical upper limit (at least for me) of about 40 wpm to carry on a conversation painstakingly paddled forth in dots and dashes when you could type on a screen, edit the copy into meaningful, finished text and then effortlessly send it forth at 60 wpm on RTTY? His explanation left me shaking my head. "It's the ART of doing it that counts," he said. "If I had only wanted conversation I could have used the phone."

Now Bo Ohlsson, SM4CMG, has done it to me again! April 20, 1991 the Scandinavian Amateur Radio Teleprinter Group is sponsoring the first SARTG Worldwide AMTOR Contest! The rules, which our editor advises will be published next issue, are similar to the SARTG RTTY contest except CQ's will be called in FEC (mode B) and the exchange (CALLSIGN, RST, QSO#, Name and QTH) must take place in ARQ (mode A).

If ever there was a contest steeped in the art of technology, this is it. I will be surprised if the QSO totals or the final scores approach those of the SARTG RTTY but what a wonderful idea! Contesting, after all, is only done for the art of doing it.

For those, like myself, who have little experience on AMTOR but would like to be part of a first-time-ever contest, I can recommend Don Huff's article in QST on page 26 of November 1989 to get you on your feet.

For those of you who can still remember wishing an RTTY Merry Christmas on green keys, it is somehow not the same these days without the marching cadence of the MODEL-15 chugging away with the bell ringing out the rhythm of "Jingle Bells". Although CTRL-G just doesn't cut it, I'm still gonna wish you all a Merry Christmas and may your holidays be filled with cheer. See you in the ARRL RTTY ROUNDUP on the first, full weekend in January. See page for Rules. de **Hal, WA7EGA** ■

RTTY JOURNAL

DXCC RANKINGS DECEMBER 1990

	Confirmed	Worked
JA1ACB	310	312
I5FLN	292	
WA6PJR	265	268
W0HAH	261	268
TG9VT	260	269
K6WZ	258	269
W6JOX	242	252
I5IGQ	240	259
I5ICY	240	257
OH2LU	228	238
W2JGR	228	234
I5WT	226	
I8AA	225	
W0LHS	218	230
N3UN	218	229
JA3EOP	216	
W3KV	210	
K7BV	210	
WS7I	208	217
KA9PJZ	204	
ON4BX	200	

3rd ARRL RTTY Roundup Contest

Packet, RTTY, AMTOR, ASCII

1. Object: Contact and exchange QSO information with as many stations as possible on digital modes. Any station may work any other station.

2. Contest Period: First full weekend of January. Begins 1800 UTC Saturday, January 5, and ends 2400 UTC Sunday January 6, 1991. Operate no more than 24 hours. Two rest periods (for a combined total of six hours) must be taken in two single blocks of time, clearly marked in the log.

3. Modes: Baudot RTTY, ASCII, AMTOR and Packet (attended operation only!).

4. Bands: All amateur bands 3.5 to 30 MHz (excluding 10, 18 and 24 MHz).

5. Entry Categories:

A) Single Operator, multiband – One person performs all operating and logging functions. Use of spotting nets (operating arrangements involving assistance through DX-alerting nets, etc.) is not permitted. Single operator stations are allowed only one transmitted signal at any given time.

1)less than 150 W output

2)150 W output or more

B) Multioperator, single transmitter only - More than one person operates, checks for duplicates, keeps the log, etc. Once the station has begun operation on a given band, it must remain on that band for at least 10 minutes; listening time counts as operating time. Multioperator stations are allowed only one transmitted signal at any given time.

6. Exchange:

United States: Signal report and State.

Canada: Signal report and Province.

DX: Signal report and serial number, starting with 001. Note: Both stations must receive and acknowledge the complete exchange for the contact to count.

7. Scoring:

A) QSO Points: Count one point for each completed QSO (anyone can work anyone). A station may be worked once per band for QSO credit (but not for additional multipliers).

B) Multiplier: Count only once (not once per band), each US state (except KH6 and KL7), each VE province (plus VE8 and VY1) and each DXCC country. KH6 and KL7 count only as separate DXCC countries. The US and Canada do not count as DXCC countries.

8. Miscellaneous:

A) Crossband and crossmode contacts are not permitted. Packet radio contacts made through digipeaters or gateways are not permitted.

B) The use of non-Amateur Radio means of communication (e.g. telephone) for the purpose of soliciting a contact (or contacts) during the contest period is inconsistent with the spirit and intent of this announcement.

9. Reporting:

A) Entries must be postmarked no later than 30 days after the end of the contest (Feb. 6, 1991). Any entry making more than 200 total QSOs must submit duplicate check sheets (an alphabetical listing of stations worked). No late entries can be accepted. Use ARRL RTTY Roundup forms, a reasonable facsimile or submit entry on diskette.

1) Official entry forms are available from ARRL HQ for an SASE with two units of First-Class Postage.

2) You may submit your contest entry on diskette in lieu of paper logs. The floppy diskette must be IBM-compatible, MS-DOS formatted, 3 1/2 or 5 1/4 inch (40 or 80 track). The log information must be in an ASCII file, following the ARRL Suggested Standard File Format, and contain all log exchange information (band, mode, date, on and off times, time in UTC, call sign of station worked, exchange sent, exchange received, multipliers (marked the first time worked) and QSO points). One entry per diskette. An official summary sheet or reasonable facsimile with a signed contest participation disclaimer is required with all entries.

10. AWARDS: Distinctive certificates will be awarded to : Top high-power and low-power Single-operator and Multioperator scorers in each ARRL/CRRL Section; Top high-power and low-power Single-operator and Multi- operator scorers in each DXCC country (other than W/VE); each Novice and Technician entrant; each entrant making at least 50 QSOs.

11. Conditions of Entry: Each entrant agrees to be bound by the provisions and the intent of this announcement, the regulations of his/her licensing authority and the decisions of the ARRL Awards Committee.

12. Disqualifications: For excess duplicate contacts and call sign or exchange errors. See January QST for complete details.

ED: *These rules taken from the December 1990 issue of QST, with permission.*

Recommended HF Digital Operating Frequencies (kHz)

North and South America	Europe/Africa
3590 RTTY DX 3605-3645	3580-3620
7040 RTTY DX 7080-7100	7035-7045
14,070-14,099.5	14,070-14,099
21,070-21,100	21,080-21,120
28,070-28,150	28,050-28,150

Recommended Novice Digital Operating Frequencies (kHz)

10 meters: 28100-28150*

Suggested simplex packet radio frequencies:
28102.3
28104.3

*Authorized power output 200-watts maximum for Novices/Techs only in the 10-meter Novice subband.

Starting/Ending Time Conversion

UTC	*EST*	*CST*	*MST*	*PST*
Starts 1800 Sat, Jan 5, 1991	1 PM	12 PM	11 AM	10 AM
Ends 2400 Sun, Jan 6, 1991	7 PM	6 PM	5 PM	4 PM

Canadian Multipliers

Prefix	*Province*
VO1/VO2	NFLD/LAB
VE1	NB
VE1	NS
VE1/VY2	PEI
VE2	PQ
VE3	ON
VE4	MB
VE5	SK
VE6	AB
VE7	BC
VE8	NWT
VY1	YUKON

SOFTWARE

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

MAIL TIME

The mailbag brought in some fun stuff this last month. First, SSC announced their PC HF Facsimile Version 5.0 with a bunch of resolution improvements up to 400 percent leading the feature list (See September 90 Software Column), WZ7I dropped a note with a couple of questions. Read on Wes. And IMHO which, by the way stands for "In My Humble Opinion," the state of RTTY demodulators has stood rather still since the old ST-6000 for 45 baud 170 Hz shift RTTY. But the multi-mode and the new DSP will bring lots of excitement back into the digital world. But, as I sit here listening to ZS9Z/ZS1 working a pile-up, our digital world, it appears, is constantly in flux which is exciting. Wes, I think you need a Dovetron MPC-1000R, or a Hal Communications ST-8000. Either would be fun to put in line and play with!

Bob, WA4LYH, had a couple of questions about shareware. Well, most of the shareware comes from the BBS systems around the country. I regularly use a modem and access a bunch of BBS's around town and indeed a couple long distance ones. Software like TELIX, that is the phone modem program I use, is shareware. It is used with the express consent of the authors and, after a period of time, you send in money and register your copy. Usually this is $10 to $25 dollars and entitles you to certain things. Most shareware you use for 30 days and send money if you like it. Bob, an example of this is the QQSL program I reviewed last month. You get it first, then send in the money. It allows those of us using programs to try before buying.

N2KXT sent a note via packet which took 9 days from NY to Spokane on my PacketCluster DX Node. I have a suggestion for his trouble with the battery situation in the PK-232. Upgrade your ROM's via A.E.A. The new version lets you have a battery and still use it !

N4BPP, Paul, hit me with a question about using the KAM and contesting and I just got the answer for Paul. Aries-2 has arrived for review and, while I haven't done anything but read the documentation, it looks like it will fill the ticket for you, Paul.

Harold, KL7PG, writes in about using an Apple IIe with the PK-232 and I think that I need YOUR help out there. Anyone got a good program with type ahead buffers, etc., for that combination? If so, drop Harold or me a line. I think Bob, KE8DM (ex 7J6CAS), can help and will try and find him for some information.

Just finished reading an article on computer software and hardware reviews. In my occupation (Micro Computers) I read several PC magazines on a regular basis and my favorite is InfoWorld.

A Review is not a News Story!

The point that the editorial expressed was to STOP the Review Hype! After a year or so of reviewing software for the RTTY Journal, I wonder if the reviews I have done have any VALUE. The author stated that "a review is not a news story. It should be a detailed justification of an expert's recommendation to buy one product instead of another. It should be a critical evaluation driven by consumer advocacy."

Well I am not sure that I agree, and you, as the reader, will have to make your own judgment. Ham radio software and digital devices are just like computers and computer software; the differences are subtle, often mis-leading, and generally subject to each persons wants, desires, and prejudices. And I am certainly very, very prejudiced. Now, as far as being an expert, all I can state is that over a number of years I have tried a lot of hardware and software in the digital world. But I find that most of the equipment and software are good values with very subtle differences. I can assure you that A.E.A., Dovetron, Hal Communications, Kantronics and others all make quality products each with features, bells & whistles, and options that they hope puts them into a unique niche of the marketplace.

Those features and differences, subjective and objectively, are the things I hope to cover in doing reviews. Let me know how YOU think I am doing (?).

PK-232 REVIEW (in depth)

This month I want to start a fairly long and detailed look at the A.E.A. PK-232 and associated software. The PK-232 is a multi-mode controller which does Packet, Amtor, RTTY, Ascii, NavText, Fax and has many, many features. It is a unit that I have used on occasion during contests, but haven't ever owned or used one over an extended time period. The PK232 is loved, maligned, and desired by many in the digital world; 45,000 units sold...amazing.

We requested from A.E.A. a PK-232MBX, the PakRatt with Fax software and the new PakRatt II software which has just been announced. I will do a detailed examination of the PK-232 as well as the A.E.A. software which can run the PK to its full abilities.

Good news and bad news. The good news is that the box arrived about two weeks ago from Lynnwood. Bad news is that the new release of the PK-232 software was not included. A follow-up phone call with A.E.A. brought the response that version 2 would be shipped to me ASAP. So I would expect that we will have a look at it in the January issue.

Upon taking the PK-232 out of it's box I discovered three things. First, like the one I made cables for in Ecuador just prior to the HC5J effort, only to have the logging/sending software fail, it is a royal pain to interface this unit. The PK-232 uses 6 different types of plugs. Most are included.

Second discovery was that there is no universal coding on the power cables! I have 2 PK-232 power cables and each has a line with a white stripe. Now the one I use to charge batteries for my HT has the white stripe for ground and on the most recent from A.E.A. the white stripe goes

OVER 45,000 PK-232s SOLD!

The AEA PK-232 multi-mode data controller remains the most widely used radio data controller **anywhere.** More hams own the PK-232 than *any other* radio data controller. And AEA's hard-earned reputation for quality and service keeps them coming back. The '232 gained its popularity with features like these:

STATE-OF-THE-ART TECHNOLOGY.

Since its introduction in 1986, the PK-232 has been updated **six times** to continue bringing you the breakthroughs. Six updates in four years! And even the very first PK-232 is upgradable to the latest model, with a relatively inexpensive user-installed kit. If you want a state-of-the-art multimode controller, you want the PK-232 MBX.

SUPERIOR FILTERING

The 8-pole Chebyshev filter in the PK-232 was designed from the ground up to work on HF **and** VHF. We didn't just add some firmware to a Packet modem to create our multi-mode. Our modem was **proven** superior by tests in Packet Radio Magazine over *all the others tested.* Read the fine print! You just can't beat the PK-232 for performance, quality and integrity. 45,000 PK-232 owners can't be wrong!

INNOVATION

The PK-232 has been the one to follow for technology advances. It was the *first* radio data controller with weather-fax, the *first* with Host mode, the *first* with NAVTEX, the *first* with Signal Identification, the *first* with TDM, the *first* with AMTOR v.625, the *first* with a WHYNOT command, etc, etc. AEA has always strived to "Bring You The Breakthrough," and while others have tried to imitate, only one can be the best.

The only data controller **designed from the ground up** to be a true multi-mode, the PK-232's tuning and status indicators work in all modes, not just packet. Make sure the multi-mode you buy isn't just a converted Packet TNC. There's only one number 1!

HOST MODE

Many superior programs have been written specifically for the PK-232 in Host mode language: **NEW** PC-Pakratt II for IBMs and compatibles, updated MacRATT for Apple Macintosh, and ComPakratt for Commodore C-64 and C-128 computers.

ALL DIGITAL OPERATING MODES.

The PK-232 MBX includes all authorized amateur digital modes available today...Packet, Baudot, ASCII, AMTOR/SITOR (including the **new** 625 recommendation) and Morse code, as well as WEFAX (receive and transmit). Other features include the PakMail 18K byte maildrop system with automatic normal and **reverse** forwarding, NAVTEX reception, KISS protocol support, binary file transfers and more. Also included is the TDM (Time Division Multiplex) mode for SWLing that few others have. No other multi-mode has all these features.

SIGNAL ANALYSIS.

The first multi-mode to offer SIAM (Signal Identification and Acquisition Mode) was, of course, the PK-232MBX. Indispensible to SWLers, SIAM automatically identifies Baudot, ASCII, AMTOR/SITOR (ARQ and FEC) and TDM signals, then measures baud rate and polarity. Once the PK-232MBX is "locked on" to the signal, a simple "OK" command switches to the recognized mode and starts the data display. You're even ready to transmit in that mode if applicable.
The PK-232MBX makes SWLing easy and fun, not difficult and frustrating.

REPUTATION

The PK-232MBX has helped AEA establish its hard-earned reputation for producing high quality amateur radio products. Anyone can **say** they have a good reputation, so it pays to ask around. Listen on the HF bands and see which multi-mode is getting *used*. You owe it to yourself to get the best possible value for your money. Don't settle for less!

Watch for the DSP-1232 and 2232 coming soon!

AEA Brings You a Better Experience.

Advanced Electronic Applications, Inc.
2006-196th St. S.W./P.O. Box C2160 Lynnwood, WA 98036 (206)775-7373.

Prices and specifications subject to change without notice or obligation.

to +13 volts. Best advice here is to use your Ohm meter and check which wire goes where. The manual is very, very clear on the center pin going to positive voltage, just be careful! The third and final discovery was that I was tired of hooking stuff up to my ICOM 751 and needed to develop a better way to do it. We have been using lock out boxes, when contesting for a long time, which lock out the Push-To-Talk line, and we usually interface FSK and PTT through these. Since I only run single operator in contests from my QTH, I didn't have one. Well, after looking at all the requirements for the PK-232, I made one. I take the two inputs from the PK-232 (the small 5 pin flat has the PTT and the 5 Pin DIN has FSK and Scope) and feed them into a box which outputs everything to standard RCA jacks for the scope, and ICOM 751.

Next chalange was, where to obtain the 13 volts to run the thing. The manufacturer doesn't provide a 12 volt transformer and therefore the user must obtain power elsewhere. This can cause problems becuase those external plug in the wall units that most use on their PK-232 probably can't handle the requirement for 1 amp DC at 13 volts. This I think leads to all sorts of problems and is why we have seen all the strange fixes for power on the PK-232. Since I wasn't about to buy a separate plug in the wall unit to power this unit, I had to rearrange the shack a bit and move my rack so that I could access the ASTRON 35 amp supply.

Now I know that all of you "old timers" out there have all gone through this process, but for the sake of some of the newer folks, I felt I had to go over this process. The RS-232 hookup is simple and straight forward, simply connect the cable between your computer and the PK-232.

In this review of the A.E.A. PK-232, I will spend several issues looking at some of the lesser known features and specifically at three software programs and how they function with this multi-mode controller. The programs are A.E.A.'s Pakratt, their newly announced Pakratt II, and Ashton ITC's ARIES-2 program. This latter program (ARIES-2) will also work with the Kantronics KAM, as well as "RS-232" terminal units. We will attempt to discover just what this last statement means (ST-6000; Flesher TU 300, 400; PCI-3000 ???). The discussion will also encompass a high level contest program known as Scotchlog, which sends CW and RTTY, but requires separate receive demodulation (decoding).

As noted above, one of the major improvements in the PK-232MBX is that the new lithium battery can be left in all the time. After my first test, it became apparent to me that the world of multi-mode controllers can be a little frustrating. I fired up the PK-232 and was running the Pakratt software during the recent 10 meter CQWW contest. It worked great and now I know why I have so much trouble in those CW contests....NL7G at 28.000.5 was running 52 WPM !!! Then I loaded up the Scotchlog program which logs and sends CW, but requires the operator to do the copying. It also worked great. In order to establish communications with it, I used the new autobaud routine and set it to ON. Command is AutoB ON. I then re-booted the computer and ran a couple of hours using Scotchlog. Got bored with CW and decided to chase a little AMTOR DX, shut things down and re-fired the PakRatt program....guess what ? No communications !!! Seems that the old Pakratt program requires AutoBaud to be off, which took about a hour to discover. You then have to access the PK-232's ROM with a program of some sort (Modem program I use, Telix). What if you don't have another program? Good question.

LATEST FIRMWARE

The July 1990 firmware (Programable Read Only Memory), which is the program that runs the PK-232, contains a NAVTEX mode. NAVTEX is an international system which stands for Navigational Telex. It is a reception system that prints navigation and meteorological warnings and other important data to ships. We landlocked folks (Spokane is 350 plus miles from the coast) can't really use this feature. Thus, I haven't really tried it. NAVTEX messages have a preface and a preamble. Sort of like the ARRL bulletins ZCZC. AA99 is the example A.E.A. uses. This feature of the PK-232 is very useful in setting up monitoring of the NAVTEX messages and it has been modified and enhanced several times in firmware releases for the PK-232. You can set the NAVMSG command to permit monitoring or rejection of up to 10 categories of messages. Like search and rescue, DECCA (beats me what it is too!), Loran-C, Ice reports, etc. NAVTEX stations are found on 518 KHz and, if you are along a coastal region, you should be able to use this nice mode of the PK-232. By the way, the version of the PK-232 manual I have is Revision H 1/90 which has a supplement of 7/90 also included. As the A.E.A. brochure indicates, all old models/versions can be brought up to current standards.

This concludes the first segment of what will probably turn out to be a marathon look at this multi-mode controller and its software. For as I pointed out in a recent discussion of the Eastern Washington Amateur Radio Group, the software that drives the controller may well be more important than the controller itself. A true test of a controller may require the same brand name software. That's why hooking up a brand XX to a brand ZZ software package may result in less than perfect or acceptable copy and this, I think, is probably no more apparent than in the old style conversational mode of RTTY. By the way, the EWARG is open to new members and is not a local group, but rather, is national and indeed international in scope, with its goals being digital and digital contesting! Drop me a note and I will send you some details (ARRL affiliated Club).

Soooo Long 1990

1990 brought me some special things.....a couple of new Single Operator Digital contest titles....a new Cat (RTTY)!.....a few new countries.... and a few new friends on the airways....Hope that 1991 will bring to each and everyone of you that which you aspire, desire and hope. Peace and good will to all. 73

de **Jay,Ws7i** ■

Letter from Will Brown, N5PQE:

Just wanted to drop you (and the rest of the staff) a note, as I renew my subscription. As a newcomer to the Digital modes (and Ham Radio), I want to tell you all how much I enjoy the Journal.

I worked the CQ/RTTY Journal WW RTTY DX Contest this year (on 10 Meters) and had a great time! I worked 6 new countries (to bad more contesters didn't come up to the Novice part of the band.) Only a few stalwarts worked the whole weekend. I worked FJ1ADJ/JD1 ten minutes after the contest started. A couple of weeks before that, he was my first DX RTTY contact. Thanks, guys and gals and keep up the good work. 73

CONNECTIONS

Cole Ellsworth, W6OXP
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Garden Grove, CA 92640

Happy Holidays and a Prosperous New Year to all our wonderful readers. In this, the closing month of 1990, I thank all of our readers who wrote with their most valuable suggestions, their requests for information, and their contributions to the Journal. The "Connections" Column has been enriched by your suggestions and article contributions. For those who have been thinking of submitting an article, or just a technical (or not so technical) tidbit, cease your procrastination and send it in to me or Dale or to one of our other columnists. Believe me, we need all the help we can obtain.

FROM THE MAIL

One of our readers wrote to Dale with some suggestions on topics for future columns and articles. These suggestions were posed as questions looking for answers. I am not sure if he wanted to be quoted so I will not mention his name or call but it is indeed a thought-provoking letter. So much so that I am going to go through some of the questions and append my comments to each. This is being done with the hope that someone, either other RTTY Journal columnists or our readers, will provide additional comment, rebuttal, or clarification of the subjects under discussion.

1. This reader would like to see a review of the Aries-2 software package, particularly from the RTTY user's viewpoint. This package has both a logging capability for stations worked, but also queries the radio for mode and frequency. Perhaps Jay could look into this or, one of our readers who uses the software - could we persuade you to write a review?

2. HF packet operators have been asked why they don't use something like Vic Poor's APLink (Amtor Packet Link) software for HF traffic forwarding instead of packet. The reply is that APLink is not very compatible with message format used in packet. The question comes to mind - Why is it not compatible? What in the present format is causing the problem? Can the format be changed to be compatible and still pass through the VHF link final terminations? For Vic: *"Can APLink be modified to handle the required format? Would this be acceptable to current APLink users?"* Or, do we all have to wait for that promised but still elusive "More Robust HF Packet Protocol" that some of our packet Gurus are working on? Almost anything would be better than those interminable repeats and time outs that clog the HF packet frequencies. Richard, perhaps this might give you some ideas for your packet column. Any other volunteers? Send your data to Richard, the RTTY Journal's packet columnist, or perhaps to Eddie, our AMTOR columnist. Would some brave soul out there like to do a full communications system analysis on the subject? Would make a great digital communications major thesis or term paper if you wanted to keep it a bit more concise. But if you do it, don't forget to send it to the Journal for world-wide distribution.

3. Our reader asks *"has the state of the art in RTTY demodulators stood still for fifteen years? Are there any boxes out there that do a significantly better job than the old ST-6000?"* My biased answer to that question is NO, there are not. This may not sit well with our esteemed friends in the communications industry but, from my point of view, there have been no SIGNIFICANTLY better boxes from the standpoint of HF RTTY operations. In fact, there have been no significant improvements for 25 years or since the advent of the TTL-2. So what do we mean by "significant?" One has always been able to get good RTTY copy when signals are strong, or even weak if the atmospherics and man-made noise are very low. And don't forget multi-path propagation and auroral flutter also have to be absent to achieve good copy. In fact multi-path and auroral effects will cut up even very strong signals under the proper conditions.

I have used everything from the AN/FGC-1 signal corps terminal unit way back in 1950, to the W2JAV TU, the AN/URA-8 navy unit with built-in scope, the TTL-2, the ST-6, the Dovetron, and the PK-232. As time progressed, there were small improvements from box to box, but mostly from the standpoint of operating convenience and rejection of strong adjacent-channel interference. But, when it came down to digging that weak signal out of the mud, or trying to eliminate multi-path effects, the boxes are not significantly different. Sure, the Dovetron may show, if set up properly, at least statistically better copy under multi-path conditions than an ST-6 but, in my opinion, it is not significantly better. Now I am not the only one who has tried a number of different demodulators over the years. Jerry, WB6WPX, has used many of the more sophisticated (and expensive!) demodulators including several versions of the well-known Fredricks commercial units with basically similar results. Most of his experiments have been side-by-side comparisons so they are about as valid as they can be without conducting tests under rigid laboratory conditions.

What hope do I hold for the future? It has to be DSP (Digital Signal Processing) Not only will it provide the convenience of programmable digital filtering, with a wide range of shifts and filter/data rate bandwidths, but, more importantly, the capability of finally being able to dig out the signals in the noise by means of autocorrelation and other signal reconstruction techniques. I know that a number of our demodulator/terminal unit/multimode controller manufacturers are in the process of releasing their first DSP boxes that have the programmable shifts and filters. Whether or not these first units will have signal reconstruction capabilities, I do not know.

You folks who build these boxes, now is your chance to enlighten us with all the tricks you can do with DSP. I am sure that Dale would be happy to accept dissertations on what your DSP box can do now and what it may be able to do in the future. DSP just might provide a really SIGNIFICANT advance in the state of the art.

As may be of interest, DSP is not really new, as it has been used in some form for

years in RADAR signal processing and military MODEMS but it was a very expensive process. However, since ASICs (Application Specific Integrated Circuits) became relatively easy to design and manufacture, what used to take large racks of hardware can now be done with integrated circuits especially designed for digital signal processing. While still more expensive than the present analog demodulators, it is the ASIC that makes DSP available to our use for less than a thousand dollars. By the way, the DSP chips available from TI and Motorola are very complex ASICs, containing specialized microprocessors and microcode.

4. Our reader asks about digital telephony and if this technology would provide significant advantages for HF use? A very good question indeed! (Writers frequently use this expression when they find themselves on shaky ground.) DSP should be a good technique if DSP can operate at adequate speeds. Digitized Voice is a real time mode that requires analog to digital conversion, something that DSP excels in doing. Once it becomes digitized, it can be handled, processed, and reconstructed just like any other digital signal. Seems to me if we can dig signals out of the noise in a DSP box, all we would need in addition would be the digitized voice-to-analog voice converter and we would have digital telephony. I have not done any calculations, but the only problem I can think of, offhand, is bandwidth requirements. It may be just too broad for HF use under current FCC regulations. I recall using a digitized voice link at Bell Labs in 1970 to talk half around the world through a microwave and satellite medium. I think the microwave link was TelPak A which is a 56 kilobaud digital link. (1970??, gad!, that was twenty years ago.) Why don't we hams use it now? Probably due to bandwidth requirements and, until now, cost. Personally, I would rather type than talk.

5. Our reader mentioned that he found W7GHM,Ray Petit's experiments with "Cloverleaf" modulation for digital HF communication very interesting. I have read Ray's article on this mode in QEX (The ARRL experimenters monthly journal) and was quite fascinated by it. The adaptive data rate signaling described is an excellent idea for communication under variable or difficult conditions. I hope to see further experimentation and development in this area. Just think what this method could mean to DX types! Is anyone using or experimenting with the Cloverleaf modulation method? Please drop us a line if you are.

And now I address our reader who sent in these questions. Thank you and Bless You, Sir, for providing me with column material, and for providing me with the incentive to get up on my soapbox and stick my neck out. I hope I have provided at least some of the discussion you were seeking and hopefully others will provide additional comments. I dare say that if our readers do not agree with me, we will both soon know why.

Have a wonderful Holiday season and a happy, healthy 1991. 73

de Cole, W6OXP ■

DX COMINGS

by JOHN TROOST, TG9VT

The greatest news this month is that Romeo, 3W3RR will be active at month end from AFGHANISTAN, YA0RR. He has a valid license in hand and will put this rare one of the air now, by postponing his trip to Spratly. Possibly, by the time this reaches you, he may already be active. contributions, please, $28,000 is needed, via Ed Kritski, NT2X, POB 715, Brooklyn, NY 11230, USA. Seems some one in the U.S. donated to him a complete set of RTTY gear and he plans to be active on all modes. Would think that this is a great beginning for the new year. Also, IRDXA has donated a complete RTTY set-up that is now on the way to Japan for pickup. He plans to be active on all bands

Martti Laine, OH2BH, (in Walvis Bay as I write this), and Boris Stepanov, UW3AX, are still on schedule with the MALYI VYSOTSKIJ operation for March/April 91. At this stage of the game, it is a guess who the RTTY operator will be, as it appears that only Finnish or USSR nationals are permitted to participate in this Expedition.

I had a nice note from Tony Deprato, WA4JQS, Expedition Team Leader for the SOUTH SANDWICH Expedition, to tell me that the expedition was not cancelled, just postponed till late 1991, in fact, for one year, in the hope that the fuel crisis will abate and reduce the cost of the ocean transport, or that sufficient money will be collected to cover the new fuel prices.

Sorry, but I must re-emphasize my note of last month; 3B9FR, RODRIGUEZ ISLAND, has been spotted once on RTTY in November with his new IRDXA gear. Nor has he been seen much on any other mode. Please if you spot him, ask him to come around a little more often with this nice new gear, so that he can test it out properly. Weekends would be the best time to give it a good burn-in.

BANGLADESH seems still to be "go" for both Jim Smith, VK9NS, and for K5VT, Vince Thompson, as S2VT late February. Maybe this will take that country off the Most Wanted List in any mode. Gear for S2VT is furnished by IRDXA, but we hope that Vince will spend a little more time on RTTY there, than he did on his recent D68VT trip. The VK9NS trip might turn out to be a Christmas present, and he always has RTTY.

Had mail from VU6JX, who told me that the Bangalore DX Group is now well ahead with their plans for a major expedition to BHUTAN, A51JX. No time set as yet, due to the slow progress of the paper work.

Many thanks to those who heeded my call for help to IRDXA (International RTTY DX Association). As a result IRDXA is now solvent, at least nearly so, and has been able to arrange for shipment of RTTY gear to 7Q7LA in MALAWI, a deal arranged by W8SEY, Wayne. So we will see another new one on RTTY. Hope he will be active late January for the next year at least. PLEASE CONTINUE SUPPORT OF IRDXA with contributions to 356 Hillcrest St, El Segundo, CA 90245, USA.

KD7P will be QRV from KURE ISLAND, WH7/KS7P from 12 to 21 December, all modes, but it may well have finished by the time this issue of the Journal reaches you.

And then the RUMOR DEPARTMENT: by now I don't know how many percent true a rumor is; the sure one, T33, BANABA was never reported on RTTY, with the capable crowd they had there. But the rumors about RTTY soon from ANGOLA keep cropping up; guess it is a "keep your toes crossed" proposition. On the other hand, the XU, CAMBODIA rumor came thru; still a good betting average. Another one for the Department is that The French DX Foundation, with Florence, F6FYF, is planning two Great DXpeditions for the first quarter of 91; but she did not say where to. And then Gin, JA1ACB said that he heard testing on RTTY from TN, CONGO on 15 Meters. And WA2FUT is still in BURKINO FASO as XT2BW, but attempts to get RTTY gear to him have not been successful.. to date.

Alex, UL7PCZ of the RL8PYL RTTY Group, has all kinds of plans for 1991, including operations from AFGANISTAN, NORTH KOREA and possibly also CAMBODIA. I must sound like a broken record, but he needs your financial help, at the UL7PCZ Call Book address. If the operation to North Korea comes off, it is sure to be a New Country as it has it's own International Call Sign Allocation.

So, 1991 seems to be promising for RTTY and I would not be surprised if ALBANIA and some other hidden spots, like MOUNT ATHOS (where some of the monks are licensed now), ANGOLA and MOZANBIQUE came on the air this year, but that is pure conjecture.

Gl de John, TG9VT

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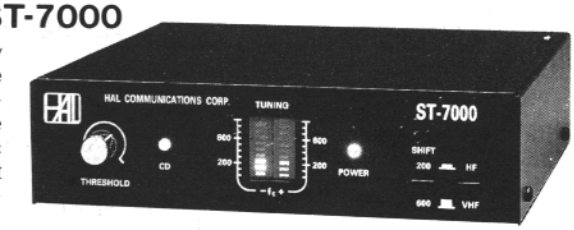

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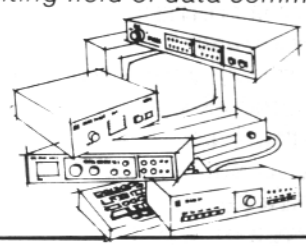

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