

A Dedicated Digital Publication Since 1953

Volume 42, Number 7, September 1993

### ADRS Founding Members Formally Establish New Digital Organization

See Hits & Misses



Founding members of ADRS present at July meeting. L. to R. Frank Moore, WA1URA, Jim Mortensen, N2HOS, Warren Sinsheimer, W2NRE, Allen Matlick, W2TKU, and Jim Jennings, KE5HE. Photo provided by David, KB1PJ

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# HITS & MISSES

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## 40 Years of Service

For over forty years this publication has been serving the digital community. In the beginning it was small but so were our ranks (See page 29). That picture has changed dramatically in the last few years, largely due to the proliferation of computers. To keep pace with state-of-the-art changes the RDJ has made every effort to bring you the latest information on the different phases of our digital hobby.

RDJ columnists search and prepare their columns with unselfish pride so that you can be kept abreast of our ever changing phase of the hobby. I'm very proud of each one of them as you should be. It is no easy task to prepare for each issue. It takes lots of time and lots of digging to stay up front with progress. To keep pace manufacturers have been very cooperative with us by providing their products for review and evaluation. Hardware and software reviews are handled from an operators viewpoint. How do you hook it up or operate a piece of software is important to anyone with a new piece of gear or software. But, this is not new, the RDJ has always brought forward the latest in changes or new ideas. Those of you who have been subscribers for many years probably still have copies of issues that describe how to build a TU or adjust a TTY machine.

This is your magazine. It is produced for our phase of the hobby only. In this issue you will find articles that have been submitted by subscribers who have something to share with all of us. You have probably noticed that the RDJ has expanded to 32 pages recently. This has been necessary to keep pace with the times. Columnists now have the space to expand on their topics where before brevity was the norm. There is now room to publish more stand alone articles which I encourage.

Now, how about a couple of favors from you the reader! If you have questions or comments to share, please write to the columnist who could best address your input. If you are uncertain about who to write to, then send your input to me and I will forward it on or address it here. Stand alone articles are welcome, however, please keep them directed to the digital community. Also, the next time you purchase a piece of gear or have contact with an equipment manufacturer, please mention the RDJ as your source of information and guide for purchases.

It a fun time to be in the digital modes what with new hardware, modes of operation and lots of new software. So, by golly, *Stay Tuned*, we are in for another exciting year.

## ADRS Update

In July the founding board members of the American Digital Radio Society met to discuss the future of the organization and prepare a slate of directors for election (see front cover). Secretary, Jim Mortensen, N2HOS, was instructed to prepare and mail ballots to all members. This was accomplished and the votes have now been tallied. The new slate of directors are as follows:

To serve until second annual meeting

K4CJX, Steve Waterman  
WA1URA, Frank Moore  
W2FG, Ted Marks

To serve until third annual meeting

N2HOS, Jim Mortensen  
N4SS, Nick Zorn  
W2TKU, Al Matlick

To serve until fourth annual meeting

KE5HE, Jim Jennings  
W2NRE, Warren Sinsheimer  
WS7I, Jay Townsend

The board also appointed 9 members to an advisory board. These appointees will service an undetermined time. The ADRS is American in stature but its scope is really worldwide and therefore input is solicited from the world community via the advisory board. Those appointed follows:

TY1PS, Peter Schulze (Chairman)  
K9GWT, Bill Henry  
W9CD, Clark Constant  
WF1B, Ray Ortgiesen  
W0RLJ, Hank Oredson  
W6IWO, Dale Sinner  
W5SMM, Vic Poor  
W3/G3ZCZ, Joe Kasser  
KB1PJ, David Speltz

For a new organization, this is an impressive list of digital hams. Good representation from any group is welcome as we expand our digital arena. Your support of all organizations that give us support and guidance cannot be over emphasized.

All for now. 73

de Dale, W6IWO ■



# CLOVER

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Greetings from the warm Southern California coast where I prepare this article. Betsy and I are enjoying the hospitality of Dale "Baja" Sinner and his lovely XYL, Faye. First, let's take a look at the mailbag which is pretty empty this month. Rory, VQ9CR reports in from the African coast with a few questions. His first question was whether you can use 500 Hz filters with Hal Communications Clover system. The answer is yes, with careful adjustment of the passband tuning to center the four signals. A 750 Hz filter would be ideal, but good success can be achieved with 500 Hz filters. WA7SJM and I have been exchanging a lot of mail on 40 meters and I'd like to report that I can work him in the evenings with good results across the state (300 miles) with about 50 mills of power. It is exciting this digital QRP!

## AEA PK-900 REVIEW

This month I depart a bit in the column and bring you the long awaited review of the new A.E.A. PK-900 system. As you might remember, I have been beta testing the PAKRATT for Windows program with the PK-900 for some months. Like all Beta testers I am unable to make any specific comments until the product ships.

The combination of Windows, Pc PakRatt, and the new A.E.A. PK-900 controller has brought some new dimensions to ham radio. First of all, contrary to all of the other reviews on the PK-900, I'd like to report that the manual supplied with the controller is quite wonderful: you don't need to read it because the wiring setup was so simple and the rest is handled by Windows. I didn't even read the manual. On the back of the new controller are clearly marked Din plugs that indicate which signal goes where. They are the typical 5 pin din plugs that are easy to wire. If you are running FSK I might suggest getting a couple of plugs from the local "shack" and running a single multi conductor wire of 15 - 20 lines. This type of wire is a lot nicer looking than multiple wires.

## Windows and the 900

The PK-900 with the windows software is a revolutionary departure from the days of old. Now the amateur is presented

with a complete package that is plug-n-play. At your finger tips is everything from Baudot to 9600 Packet. The display is very informative and the unit functions in the fine manner that we have come to expect from A.E.A. Digital software is no longer a mystery of commands, setups, and parameters that most of us don't really understand, but is replaced with an easy push-button windows application. The testing that went into the program is apparent, and the folks at AEA are to be congratulated for their efforts. I am sure that when the hordes get ahold of the product some "bugs" will be found, but it works!

The above functions of the PK-900 are fast and effortless. Two data channels allow the flexibility that active hams now require. Push button changes from "Rtty" to Pactor at a click of the mouse is fun. If you hear a signal and you are not sure what mode it is click the mouse on the option button a few times and you'll find data copying on the screen.

My overall evaluation of the PK-900 includes hours and hours of Packet, RTTY, some RTTY DXing, Pactor, and some Fax work. The unit I received for evaluation had all the available options to include the 9600 Baud Packet option. This option alone gets a special "hats off" award as this system is actually the only one I have ever received that plugged in and played. Easy, easy, easy, is the story of this unit without exception. The ability to run 9600 baud on VHF Packet is beginning to be important and for the average ham the complicated methods that all others have to make it work, is beyond their typical attention span and shouldn't be necessary. With the "900" its there in a flash. Installing 9600 baud is about as hard as plugging a filter into your typical transceiver.

When you are reviewing these multi-mode boxes the first thing that I asked is "how good are the filters". Well the PK-900 has very good filters and seems to me to work somewhat better than the PK-232. This must indicate that they are of similar design with perhaps some improvements over the years. I must admit that you don't get much technical information with the unit and most of the design remains pretty much unknown to

me. This is perhaps one of the things that I never have liked about A.E.A. products and one that they should work on. I remember Hal, WA7EGA, getting the "secret" book of the fancy AT 1200 years ago with markings of proprietary information and such. It seemed a bit much to me, but after all in these days of law suits, software squabbles about "look and feel" perhaps its necessary.

The filter question brings up the biggest drawback that I found in the PK-900 and that's the inability to attach external modems to it. Perhaps it can be done, but if so it's not very apparent to this reviewer. But as I stated earlier I still haven't read the manual. That's RTFM (read the factory manual) which would sure save most of our vendors some trouble and a lot of technical support time.

I tried the PK-900 with a couple of other simple shareware software packages and I didn't like them. They reminded me a lot of driving with blinders on and a hollering wife in the co-pilot seat.

## A Test Drive

Lets run through a typical hour of operation at my shack on the PK-900. The Packet port was hooked up to VHF using an Icom 28H which just plugged in and worked with an old plug that I was using on a PacComm TNC. The unit came up running VHF Packet because I started it that way. I usually log into the local PacketCluster as WS7I-7 and then click on the other port and start up RTTY.

A quick scan of the band located a pile-up on 14.085 and I waded into it. A short time later there was a 9G in the log and I looked around the band. Hearing a signal at 14.081 I checked it out by dialing up Amtor on the little pull down menu. But, it wasn't Amtor. Fooled again by Pactor, I clicked a couple of times and started copying the Pactor QSO that was taking place. I monitored for a while and then over the Packetcluster window came a spot of 4X6UO so I drifted back down to chat with Arie. I logged him using the log function of the PakRatt software and then went down and checked into a Winlink BBS on Amtor. What is most apparent is the lack of delay when switching from mode-to-mode. Switching is positive and very quick. With DSP and all the processors that the unit has I think it will be able to handle most of the new modes and many of the modes like Pactor II that appear on the horizon.

The Pk-900 with the new Pc PakRatt software is a very good choice for a complete modern plug-n-play digital unit.

## BREAKING CLOVER NEWS

This month on the Clover front brought a new release of the software that is still

being implemented around the country. There was a subsequent S28 release which fixed a minor problem that had to do with BBS usage and that update is available on the Hal Communications BBS.

I encountered a couple of problems while visiting Dale here in California which I might discuss. First, it looks like some people are using audio hardwired in the radio so that the volume control (AF Gain) doesn't function. I am not sure that's the best method, but if you are doing it make sure that you have the proper levels set on your tuning bars. This will probably require using the RF gain control or in certain cases the attenuator control to not exceed the maximum level on the bar scale. I find that about 2/3 scale to 3/4 is about right.

The next hint would be to balance the four bars using the passband tuning so that they have equal amplitude. On some bands this is pretty difficult. Perhaps the most careful tuning needs to be done on frequency. I find that you must be within 6 or 8 cycles to get good results. The closer you get to zero the better the transfer of data. For a quick message or two with a BBS getting within 10 Hz seems to be fine, but as you do compressed file transfers the accuracy of the two rigs is very important. What is also becoming apparent to me is that different radios react very differently on the bands and that the ability to copy in "listen mode" is connected in a large extent on how good the stability of a given radio is in performance. I am getting 40 to 60 SCREAMING rates running the Yeasu FT1000 on data transfers and I believe others are reporting up to 130. The CLOVER SYSTEM really flies.

The latest software news in CLOVER comes from the ADRS and they are announcing EXPRESS 2.0 for CLOVER. This product is yours for \$50 postpaid and available from N2NOS, Box 328, Indian Rocks Beach FL 34635. See Jim's article in this issue.

Late breaking news from a Hal Communications spokesperson indicates that Amateur Net on the CLOVER system has dropped to \$895. If you have been waiting to buy it now may be the time. Its also important to note that the CLOVER system includes a PC board which is the DSP CLOVER system, the SOFTWARE that you need to run CLOVER, and very professional service from a top notch digital company. This includes system software updates which are released on disk or on the Hal Communications BBS.

## NEXT MONTH

Next month I will have some detailed comments on Clover and the changes

that were made in this new software release. Hal Communications foresight on transferring upgrades from disk to firmware on the PCI 4000 board, as you start CLOVER has proven to be a tremendous value and makes software changes very easy. Comments I've received claim that my keyboard Clover frequency is a little low so I await some suggestions from you CLOVER gurus. One suggestion which I heartily support is that we KEYBOARDERS use the splits on 500 Hz segments which separate the data channels. So for example, 7.064.5 which is in the middle of two active traffic channels would be a good choice. The same would be an effective use of spectrum on 20 meters also. Yesterday, we tested this with a pretty big file transfer of 64K while WA7SJM was passing traffic to N6IYA on 7.064 and 7.065 was active with K4CJX doing his robust traffic mov-

ing. We had no problem at 7.064.5 having a QSO with Ray W7GHM and then doing the data transfer.

73, from the Spa at the Sinners Lime Farm in sunny California. I hope to see each and everyone of you in CQWW/RTTY Contest at the end of the month. Just another hint, mention the RDJ when making a digital purchase and support the advertisers who support YOUR magazine.

de Jay, Ws7i ■

Fidonet: 1:346/3.0

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# THE LINK

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## Getting Started With the PK-232

The PK-232MBX multi-mode data controller by AEA, Inc. is one of the more popular units available. This month I would like to go through the steps of setting up the PK-232 and describe a simple terminal program for using the PK-232 on the air with AMTOR and PacTOR. I will assume that you have a radio capable of meeting the switching requirements of AMTOR and that you have installed the PacTOR ROM's (available directly from AEA) in your PK-232. Most modern transceivers will meet the switching requirement. In addition, you will need an IBM compatible computer with WINDOWS 3.1 (or 3.0) installed to use the Terminal program.

The PK-232 OPERATING MANUAL has very complete computer and radio installation chapters. Read and follow those instructions carefully. Of particular importance is that you use a regulated 13.6 volt power supply of at least 1 amp capacity if you do not use the AEA AC-4 and that you use the included RS-232 cable to connect the computer to the PK-232. If your computer has a DB-9 instead of a DB-25 on the serial port that you plan to use, you will also need a DB-9F/DB-25M adapter (available from Radio Shack or your favorite computer store).

The PK-232 has a Lithium battery backed memory so that operating parameters will be saved even if you remove power from the unit. You may want to use this feature if you use the same software all the time, and if the instructions to the software suggest that you use that feature. I do not use this feature since I run different programs (WinLink and the WINDOWS Terminal program) and prefer to set these parameters as required for each program. Place the Berg jumper mentioned at the bottom of page 2-2 of the PK-232 Manual over ONE post only. That is to say, the two posts are not shorted. This disconnects the Lithium battery from the circuit and the memory of the PK-232 will be lost when the unit is turned off.

## Applying Power to the PK-232

Connect only the PK-232 power cable for the time being and turn on the unit by pushing the ON button in. Confirm that initially the four LEDs on the left come on for about 1 second and then the BAUDOT LED comes on and stays on. This is an indication that the Z80 CPU of the PK-232 has booted up. If the BAUDOT LED does not come on (the four LEDs are on), the most likely problem is that the power supply voltage at the PK-232 is not high enough. Make sure that your power supply has at least

1 amp capability. I prefer to use separate power supplies for the PK-232 and radio to help cut down RFI and provide better regulation for the PK-232.

### Connecting Your Computer

Turn OFF the PK-232 and Computer before connecting the serial cable provided with the PK-232 to the computer. Connect the cable to an unused serial port of the computer. Make a note of which serial port is being used. You will probably have a mouse on one of the serial ports. I will leave it to you to make sure that you have no internal devices (modem, etc.) which will conflict with the serial port used for the PK-232.

### Setting Up Your Terminal Program

I will describe the use of the terminal program supplied with WINDOWS 3.1. I am a proponent of WINDOWS, although I have not always been so. The biggest disadvantage of WINDOWS I think is that it requires more computer horsepower (at least a 386SX with 4 Meg RAM and a hard drive). However, once you have a reasonable selection of WINDOWS software I think you have a very powerful system. My experience has been that if you run primarily DOS programs, you will not be happy with WINDOWS. However, once you convert to WINDOWS programs and use the DOS programs only occasionally, you will be pleased with the result. It is sometimes difficult for us to give up all our favorite TSRs, but I find WINDOWS very stable and fast if you stick with WINDOWS software.

Start your computer and bring up WINDOWS. From the ACCESSORIES Group, bring up TERMINAL. In TERMINAL, click on Settings, and then click on Communications in order to set the communications parameters between the Computer and the PK-232. In the Communications Window, set the Baud Rate at 1200, Data Bits at 7, Stop Bits at 1, Parity at Even, Flow Control at XON/XOFF, and Connector at the appropriate COM Port. I do not check the two bottom boxes for parity check and carrier detect. TERMINAL has a very good ONLINE Help if you need it.

Click OK to clear the Communications Window. Click on Settings and then Terminal Preferences. In the Terminal Preferences Window set Line Wrap to ON, Sound to ON, Columns to 80, Cursor as you desire, Fixedsys Font, and Translations to None. Put an "X" in Show Scroll Bars box, but do not put an "X" in the Use Function, Arrow, and Ctrl Keys for Windows box. (We want to reserve the Ctrl Keys to be sent to the PK-232 as we will show later). Set the Buffer Lines to 100. (This will keep a 100 line scroll back buffer). From File Select SAVE-AS and at the prompt type "PK.TRM" as the name of the configuration file for the PK-232. Click

OK to save the file in the WINDOWS directory and then close the TERMINAL program. Reopen the TERMINAL program from the ACCESSORIES Group. Then from File select OPEN. Click on PK.TRM to load the previously saved configuration for the PK-232.

### Turn the PK-232 ON

You should see the four LEDs on the left hand side light up for about 1 second then the BAUDOT LED will come on. If you have disconnected you should see the PK-232 "autobaud" message:

Please type a star (\*) for auto-baud routine.

At this point, type a star (shift-8). The PK-232 should respond with a message similar to the following:

```
PK-232M is using default values.
AEA PK-232M Data Controller
Copyright (C) 1986-1993 by
Advanced Electronic Applications, Inc.
Release 05.MAR.93'
PACTOR S/N 03098
```

cmd:

At this point your computer is properly talking to the PK-232 and the CMD and PKT LEDs should be ON on the PK-232 indicating that the PK-232 is in Packet mode. Since you have disconnected the Lithium battery from the backup circuit, all parameters will be set at the default values. If you do not get the PACTOR line as shown above on the sign-on message, then you do not have the PACTOR ROMs and will not be able to operate PACTOR.

### Setting the PK-232 Parameters From a File

Bring up NOTEPAD from the ACCESSORIES Group and type in the following information, substituting your call for KE5HE:

```
*myptcall KE5HE
myptcall KE5HE
aab de KE5HE
myselcal KE5HE
myident KE5HE
mycall KE5HE
```

Save this file in the WINDOWS directory as "PK.TXT". Notice that the first line is the star which does the autobaud routine. The next line is repeated because the PK-232 has to have time to initialize before it will accept commands. These parameters set your call in the PK-232 for PACTOR, AMTOR, and Packet. In addition, the auto answer back memory is set so that your PK-232 will respond properly to the WRU command when checking into a WinLink or APLink station.

### Loading the Parameter File into the PK-232

To load the above file into the PK-232, simply use the Transfer feature of the

TERMINAL program. Click on Transfer, and then click on Send Text File. Double-Click on PK.TXT from the file list and the file will be sent to the PK-232. Having done the above steps you will have your computer talking, through the TERMINAL program, to the PK-232. At this point you will have to communicate to the PK-232 using the basic PK-232 Commands. It is possible to set up "FUNCTIONBUTTONS" within the TERMINAL program to make life a little easier for PACTOR and AMTOR. (I will let you figure out how to do it for Packet as it is not difficult to do).

### Setting Up Function Buttons

The TERMINAL program has a very nice feature in that you can customize some "FUNCTIONBUTTON" so that the more complex commands may be easily sent to the PK-232. Each command can be up to 41 characters long. In order to set these buttons, from within TERMINAL click on Settings and then on Function Key Keys which brings up the Function Key table. Notice that you have a total of 32 keys that you can set. There are 4 levels and each level has 8 keys. To start with, I will indicate how to set level 1 up for AMTOR communications. Use the following as a guide, I am sure that most of you who try this will tailor the function keys to your own needs. Make sure that you put an "X" in the Keys Visible box.

#### Level 1 (AMTOR)

Key	Key Name	Command
F1	de KE5HE	de KE5HE^M
F2	RECEIVE	^CR^M
F3	FEC	^CFEC^M
F4	AList	^CAL^M
F5	OVER	+?^M
F6	END	SK^M^D^M
F7	BREAK	^CACHG^M
F8	AMTOR	^CAM^M

#### Level 2 (PACTOR)

F1	de KE5HE	de KE5HE^M
F2	RECEIVE	^CR^M
F3	PTSend	^CPTS^M
F4	PTList	^CPTL^M
F5	OVER	?^Z^M
F6	END	^D^M
F7	BREAK	^CACHG^M
F8	PACTOR	^CPT^M

#### Level 3 (Other)

F1	name is	name is Jim
F2	QTH	QTH is .....
F3	Station info	Rig is.. , antenna etc..
F4	LETTERS	^CL^M

After you enter the Function Key information, be sure to Save your configuration from the File menu. To decipher the commands shown above, the "^letter" is the equivalent of CTRL-letter and therefore sends the CTRL character to the PK-232. ^M sends a carriage return to the PK-232, ^C puts the PK-232 in the command mode, etc. Now when you bring

TERMINAL up and load PK.TRM, all the Function Buttons will be programmed. As I have mentioned you could also set up a Level for Packet to get into your handy Packet BBS.

#### Connecting the Radios

I prefer using FSK for HF digital, therefore I use the 5 pin DIN plug to obtain the necessary FSK signal on the PK-232 instead of using pin 2 (AFSK) on the little flat 5 pin plug on the PK-232. I set my TS-850 for 170 Hz shift even though 200 Hz is the standard for PACTOR. I cannot see that this causes any problem. In that way I have the preferred 170 Hz shift for AMTOR. If you prefer to use AFSK, then use pin 2 of the little flat plug. Notice that the shield of the cable on the little flat plug is grounded on the radio end. On later Kenwood radios all of the connections can be made on the 13 pin DIN plug on the back of the radio. If you use AFSK, I have found it advantageous to put a resistor in series with the MIC lead at the radio end. Use 10K to 50K ohms. You will have to crank up the AFSK Output Level (page 3-10 PK-232 Manual) to compensate for the resistor. This increases the audio level in the cable and makes the system a little less receptive to RFI. By using FSK on HF and AFSK on VHF, then you can set the audio level for the VHF transmitter and set the XMIT level on HF with the CARRIER control on your transmitter.

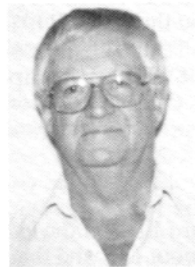
#### Using TERMINAL on the Air

Using the program on the air is straight forward, but there are a couple of catches. First, there is no "type-ahead" buffer. Therefore, you have to wait until the other guy stops sending before you start typing or sending a file. Also, you cannot scroll back to view what has been sent while the other station is sending, only when you are sending. Second I did not put the ARQ or PTC commands in the FUNCTION BUTTONS simply because you have to put the SELCAL (or CALL) of the other station in after the command and it is no big deal to type ARQ KE5HE if you want to link with KE5HE on AMTOR or PTC KE5HE if you want to link on PACTOR. There are a few tricks, for example once you have typed W5ABC de KE5HE, you can simply highlight that phrase with the mouse and COPY it. Then whenever you want to ID, you just position the cursor at the proper place and PASTE the phrase with the mouse. The program is no PC-PAKRATT, but then it comes for free if you have WINDOWS. What I am waiting for is the PC-PAKRATT for WINDOWS.

I hope you try these ideas out.

GOD BLESS and 73

de Jim, KE5HE ■



# CONTESTING

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## RTTY Contests - Coming Events

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

Date:	Contest:
SEP 25-26	CQ/RTTY Journal WW RTTY (USA)
OCT 16-17	JARTS WW RTTY (Japan)
NOV 13-14	WAERTTY (Germany)
JAN 8-9 1994	ARRL RTTY Roundup (USA)
FEB 12 -13	EA WW RTTY (Spain)

### --- REMINDER: ---

CQ WW RTTY Contest log entries must be postmarked no later than December 1, 1993. An extension may be given if requested.

#### Mail logs to:

ROY GOULD, KT1N  
CQ WW RTTY DX CONTEST DIRECTOR  
BOX DX  
STOW, MA 01775 USA

### --- COMING UP: ---

#### JARTS WW RTTY Contest

October 16-17, 1993

Sponsored by JARTS (President: JA1ACB)

Supported by Japanese CQ Magazine

**NOTE: New rules about Band Mults, QSO points, and Multi-op exchange.**

**Contest Period: STARTS at 0000 UTC Saturday, October 16th, and ENDS at 2400 UTC Sunday, October 17th, a total of 48 hours. You can operate all 48 hours. (No OFF periods required.)**

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

**BAND JA RTTY SEGMENT**

80M3.520 3.525 MHz note!

40M7.025 7.040 MHz note!

20M14.070 14.112 MHz

15M21.070 -- 21.125 MHz

10M28.070 -- 28.150 MHz

**Mode: Baudot (RTTY) only.**

*Operator Classes: A) Single Operator, All Band*

*B) Multi-Operator, Single Transmitter*

*C) SWL*

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

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

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

*Multiplier: Each DXCC country and JA/VK/W/VE call area count as a multiplier.*

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

*Final Score: Total of QSO points times total of multipliers. (For SWL's, same rules as above.)*

*Awards: First place plaques to top winner in all three classes. First through fifth place will receive certificates, all three classes in each continent. Special award for 12th from last in all three classes. NOTE: Awards will be issued based on participation of 20 or more entries in each class.*

*Logs and Summary: The logs to contain: BAND, DATE/TIME UTC, CALLSIGN, RST/AGE sent and received, MULTIPLIERS, and POINTS claimed. Any entry making more than 200 QSOs must*

submit duplicate checksheet. Use separate logsheets for each band, and include a Summary Sheet showing the scoring, class, your call, name and address. Multi-Op stations please include names and call signs of all operators. Logsheets and Summary sheets are available from Contest Manager, JH1BIH.

**Deadline:** Logs must be received by December 31, 1993. Mail to:

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

**Comments:** This is the 2nd Annual JARTS WWRTTY Contest. The first one was a lot of fun. From the clever "age exchange" we discovered just how young we all are! And who the bashful YL ops are, too! **NOTE:** New rules show that JARTS now has BAND MULTIPLIERS! This should significantly improve participation because it opens up ALL the bands by encouraging additional multipliers. As noted in the above rules, Japanese RTTY bands on 40 and 80M are different than USA/VE. I asked Hiro, JH1BIH, if he would tell us the actual RTTY bands for Japanese operators. Hence the above list. Notice that 80M (3.525 to 3.530 MHz) is only 5 kHz wide, and is way down in the CW band! Also, on 40M, (7.025 to 7.040 MHz) is partially in the RTTY International DX Window. I have worked JA's on RTTY on both of these frequencies, so they are actively being used. These frequencies are legitimate for RTTY for any country in the world, though not the ARRL's choice for USA. Nonetheless, we can, and should, use them, because that is where the DX is. October propagation conditions are usually getting good again, with less low band static and better high band paths, world-wide. The JARTS Contest is probably too new to have RTTY contest logging programs written for it, but I suspect that once the word gets around about JARTS, it won't be long before we'll have one - or two - or more! Regarding the NO-TIME-OFF: there are no time-off periods that must be taken. Just operate until you fall asleep from sheer exhaustion. When you wake up, get a cup of coffee, kick yourself, and hit the CQ button! Seriously though, you're free to pace yourself based on band conditions, and not on running out of time. If conditions are hot, give it a shot, until either conditions - or you - poop out. Then check your crystal ball, set your alarm clock and go hit the sack. If ALL the bands are pretty much dead (are you sure?), try one more CQ on the band most likely to be open. You'll sleep more comfortably if no one answers - won't you? If you don't intend to make a huge score, consider going for the award for 12th from last place in your class. It will require very precise timing and judgement on your

part - and you have to send in your logs to JARTS' Contest Manager, JH1BIH. Only he can decide. This is probably the most difficult award one can ever achieve in Contesting! If that's what can turn you on, go for it! And ah-h-h, Good Luck!

## WAE RTTY CONTEST

November 13-14, 1993

Sponsored by Deutscher ARC (Germany)

**Contest Period:** 1200 UTC Saturday to 2400 UTC Sunday. (36 hours)

**Rest Periods:** Only 30 hours of operation are permitted for Single op stations. The 6 hours of non-operation may be taken in one but not more than 3 periods at any time during the contest, and must be clearly noted in the log.

**Bands:** 80, 40, 20, 15, and 10M. (five bands) Minimum operating time on a band is 15 minutes. A quick band change is allowed only for QSO with new multiplier.

**Modes:** Baudot (RTTY) only.

**Operator Classes:** a) Single op, all bands; b) Multi-op, Single transmitter (only one signal on any band at the same time is permitted); c) Multi-op multi transmitter (no limit to transmitters, but only one signal per band permitted). All HF transmitters must be located within a 500 meter diameter and within the property limits of the station licensee's address. d) SWL.

**Message Exchange:** RST + QSO serial number, starting with 001. USA stations must also give state. (Multi-multi stations must keep serial number by band.) A station may be worked only once per band.

**QSO Points:** Count 1 point for each QSO and 1 point for each QTC (see below).

**Multipliers:** Each DXCC/WAE country counts as a multiplier. Multipliers count only once per band. WAE country list: C3 CT1 CU DL EA EA6 EIF G GD GI GJ GM GM(Shetland) GU GW HA HB HB0 HVI IS IT JW(Bear) JW(Spitsbergen) JX LA LX LZ OE OH OH0 OJ OK ON OY OZ PA SM SP SV SV5(Rhodes) SV9(Crete) SV(Athos) T7 TA1 TF TK UA1,3,4,6 UA2/UZ2F UA1FJL UB UC UN/UA1N/UZ1NUO UP UQURY2YO YU ZA ZB2 1A0 3A 4J1 4U1(Geneva) 4U1(Vienna) 9H1. **MULTIPLIER BONUS:** Each mult on 80M counts as 4 mults; each mult on 40M counts as 3 mults; each mult on 20/15/10M counts as 2 mults.

**QTC Points:** Count 1 point for each QTC reported to any station NOT ON YOUR OWN CONTINENT. Each station may both send and receive QTCs, but the sum of QTCs exchanged between two stations (sent plus received) must not exceed 10. Each QTC (message) will contain: Time, call sign, and QSO number. Example: "QTC: 1307/WA7EGA/131" means that

you worked WA7EGA at 1307 UTC and received his serial number 131. A QSO may be reported only once and not back to the originating station. (You cannot report a QSO with WA7EGA back to WA7EGA for credit.) The same station can be worked several times to complete the quota of 10, but only the original contact has QSO point value. A uniform list of QTCs sent must be kept. QTC 3/7 indicates that this is the 3rd series and that 7 QTCs are now being sent. Record all received QTCs on a separate sheet with a clear indication of the sender. If more than 100 QTCs are claimed, a QTC checklist must show that the maximum quota of 10 QTCs per station has not been exceeded.

**Final Score:** Multiply total number of QSOs + QTCs by total of multipliers.

**Awards:** Certificates will be awarded to highest scorer of the different classifications in each country (a reasonable score provided). Continental leaders will receive a plaque. Each participant with at least half of the score of the continental leader will also receive a certificate.

**Logs and Summary:** Use separate logsheets for each band. Indicate clearly all band changes. Duplicate contacts must be clearly marked in the log. If more than 100 stations have been worked on a band, a separate dupe sheet is required. (Summary sheet, logsheets, dupesheets, and QTC records sheets may be copied from the RTTY Contester's Guide) **NOTE:** Logs violating these rules can be regarded as checklogs.

**Deadline:** Log entries must be received by December 15, 1993. Mail to:

WAEDC CONTEST COMMITTEE

PO BOX 1328

D-8950 KAUFBEUREN

FEDERAL REPUBLIC OF GERMANY

**Comments:** This is the RTTY version of the CW/SSB WAE Contest. While the QTC rules seem complex, one doesn't have to get into the QTC portion of it to enjoy the camaraderie. Besides, there may be a new country or a new state to work, or a DXpedition pileup challenge to undertake. A maximum of 30 hours or operation is allowed. Check out those low band bonuses - especially if you have a good shot to Europe.

--- Hint of the Month ---

*Some computer upgrade considerations*

Prices of computers have been coming down at a rapid rate. Those who are still using less than a 386DX PC should seriously consider upgrading to catch the

wave of all that new technology out there.

But there are problems that go along with faster computers that hams should become more aware of. Namely, the higher the operating frequency of the computer, the more likely it will produce weird RF interference to your radios. It's a fact: High frequency digital equipment has steep rise and fall times (superb squarewave generators), which generate lots of harmonics. To contain this interference, good filtering and shielding, and especially good quality shielded cables, is mandatory.

The FCC has tried to put RF radiation constraints on electronic equipment sold in the USA, but this has only partially contained the onslaught of the problem. There are 2 FCC Classifications: Class B rating is the most strict, and is their approval rating for home use. Class A rating is for commercial use, and has much greater problems around home radios and TV sets.

If you are wondering how strict these FCC rules are, just perform this simple test: borrow your kid's battery-powered AM/FM radio and earphones, tune the radio to the top of the AM dial (or off any AM station), crank up the gain, and hold it near your FCC-approved monitor. Hear that roar? Most of that comes from the 15 kHz flyback transformer. And that's the tip of the iceberg! Hidden under that low frequency noise is the higher frequency harmonics and oscillators that sit there with skimpy shielding, pumping their radiating RF into whatever it can get into. Now try probing around your computer and its cabling. Hear all that loud hissing? That just gives you some idea of the problems that could face you when placing an FCC-Approved Class B fast computer anywhere near your sensitive radios.

Besides RF interference, here are 8 items to seriously consider:

1) A big hard drive (at least 120 Megabytes) and partition it into several additional drives, like D: E: and F:. It's more flexible and works faster when applications can be grouped into smaller drives.

2) A minimum of 4 MB of fast RAM. It's needed for handling larger, future applications, multitasking... and Windows (if you can tolerate the slower speed and enjoy dawdling around with a mouse. Ugh!).

3) A good SVGA monitor with pixel size of not less than .28mm, needed for hi definition with 43 or 50 lines of text on the screen.

4) A quality keyboard, not clacky, with a comfortable feel to it.

5) A mini-tower configuration for computer. Makes for more table space, al-

lows computer to be placed further away from the rig,

allows monitor to rest lower on table behind keyboard for less head nodding, is more convenient for changing floppies, and sucks in less table dust from intake ventholes on the bottom of the computer box.

6) A really *quiet* cooling fan, so you can hear the really weak DX.

7) Two high-density floppy disk drives. One 5 1/4 inch for all those good programs still out there, and one 3 1/4 inch for now and future programs.

8) A minimum of 4 expansion slots for ham needs, such as RTTY, Packet,

AmTOR, Factor, Clover, a co-processor, multimedia, etc..

((73))

See you in the pileups,

de Rich, N6GG ■

P.S.

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



## DX NEWS

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

It seems that every time a new rare station comes on the air, an opportunity is provided to bring out the worst in operating habits. What a pity! Take a recent case. The DX station made a belated appearance on RTTY due to equipment problems, so the whole world was perched, waiting to pounce. Propagation conditions were far from good and copy was marginal in many areas of the U.S.A.

However, every report was RST 599, giving the DX station false confidence that he was being well heard, when in fact he was more like RST 349. He therefore neglected to repeat the callsign of the calling station more than once when responding. And when turning it back, he did not give the callsign at all.

This resulted in two abuses. Time was wasted when a calling station asked "PSE CFM MY CALL". By that time the DX station may have already left the frequency, and was trying to pull out another call from the "split" pileup. This then led to multiple "insurance contacts" made on the same band by many stations, thereby possibly depriving others from at least one contact.

The DX station is usually equally culpable, giving everyone 599. Why do RTTY operators do this? Let's stop kidding ourselves, and the DX station, who in most cases, is trying to satisfy a maximum number of people. If we can get into the habit of giving true reports, the DX station can adjust his operating technique to suit the conditions. Rates will

improve and both sides of the QSO will benefit.

### DX DOINGS

**ALGERIA, 7X - 7X2DS** can occasionally be found on 20 meters around 1830Z. QSL to Box 105, Rouiba City, 35300 Algeria.

**ASCENSION I., ZD8 - ZD8SA** can generally be found on 20 meters between 1615 and 2130Z. QSL Jeff to Ascension Island ARC, P.O. Box 2, Ascension Island, South Atlantic Ocean.

**BAHAMAS, C6A - John, C6A/W9ILY, and Ed, C6A/K2ZDC** will be on the air 17-20 October. RTTY, AMTOR and Packet will sample all bands, 10-80, with a possibility of 160. QSL both to W9ILY, or via the bureau.

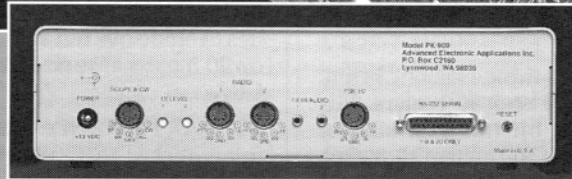
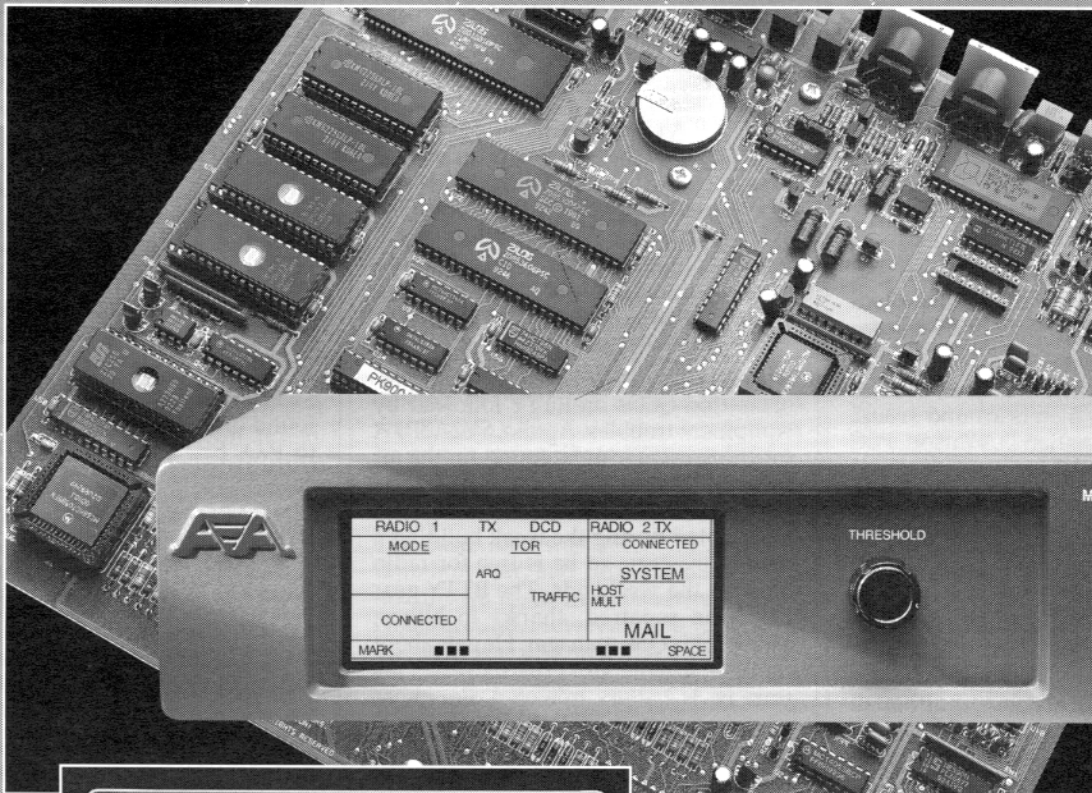
**BURKINO FASSO, XT - Peter, XT2BW** is back, and should be on the bands at this time. QSL to WB2YQH.

**CHINA, BY - Rick, By1QH** continues to be an easy contact on 20 meters almost every day starting as early at 1030Z and continuing until about 1630Z, propagation permitting. Rick is very affable and likes to rag chew.

**ECUADOR, HC - HC7SK, Mats** is a missionary in a small inland village. Look for him on 20 meters around 2000Z. He is a pleasant conversationist. You can QSL via his manager, SM6DYK. Otherwise, if you wish to make the local postmistress happy, (she doesn't receive much mail), you can send your card to P.O. Box 1, Baeza, Ecuador.



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



**IT'S THE NEXT GENERATION  
IN MULTI-MODE CONTROLLERS.**

Now, there's a new standard of excellence in multi-mode digital controllers...the new PK-900 from AEA. It incorporates all of the features which made the PK-232 the most popular multi-mode controller in the industry. But that's just the start. AEA's new PK-900 also features dual port HF or VHF on either port; low cost 9600 baud plug-in option; memory ARQ and VHF DCD state machine circuit; powerful triple processor system; zero crossing detector for the sharpest Gray Scale FAX you've ever seen; and many other new software selectable features.

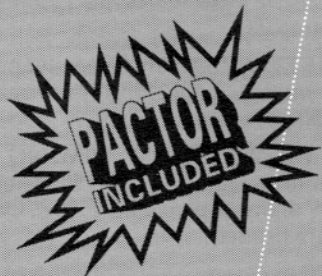
Inside and out, the new PK-900 from AEA is what other multi-mode controllers will now be measured against.

- Processors used: Zilog 64180, Motorola 68HC05C4, Motorola 68HC05B4
- Data rates: 45 to 1200 baud standard, up to 19.2K baud with external modems
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- Power requirements: 12 VDC at 1.1 amps

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Call our literature request line at 1-800-432-8873.

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*Connect with us*

**EGYPT, SU - SU1A** appears frequently on 20 meters between 0300Z and 0400Z. QSL to Hahmed Hassan Ahmed, 40 Al Zahraa Street, Ein-Shams, Cairo.

**ERITREA, E3** - The very successful expedition to this newly activated DXCC country by K5VT, JH1AJT, and DJ9ZB yielded 1500 QSOs on RTTY, and 23000 on other modes. The group left a complete station, and more antennas than they can ever use, to the local club. For those who missed it, due to marginal propagation conditions, Vince, K5VT has promised to return to Eritrea in February or March of 1994. Thanks Vince.

**ETHIOPIA, ET** - Recent reports show Sid, ET3SID, operating on 20 meters around 1930z.

**GIBRALTER, ZB** - Goran, ZB2/SM4DHF, will be active from the Rock 22-28 September, including the CQ/RTTY Journal WWDX Contest. QSL to SM4DHF, Goran Ostman, Wallenstraes V. 54, S-692 36 Kumla, Sweden.

**GUANTANAMO BAY, KG4** - In addition to KG4HG, there has been activity by KG4CW on 20 meters around 1930Z. QSL to S/Sgt. Christian D. Watson, PSC 1005 Box 47, FPO AE 09593-0146.

**HONG KONG, VR2** - Tom, VR2GC continues to show on 20 meters between 1300-1600Z. QSL to HARTS, P.O. Box 541, Hong Kong.

**INDIA, VU** - VU2YK is usually found on 20 meters between 1230Z and 1600Z. VU2RAK comes up a little later, generally between 1630Z and 1830Z, although he sometimes appears around the start of the UTC day. QSL routes are needed.

**IRAQ, YI** - Hafsa, YI1HS, and YI1AL have been appearing earlier in the UTC day from 0800Z on.

**JUAN FERNANDEZ I., CE0** - If he is not yet in your log, look for CE0ZIS on 20 meters around 2300Z. QSL to Eliazar Rojas, P.O. Box 1, Juan Fernandez Island, Chile.

**KAMPUCHEA, XU** - Gerritt, XU3DWC can still be found occasionally around 1215-1500Z on 20 meters. Also be on the lookout for XU3DA around the same time.

**KOREA, HL** - There have been some nice signals out of Korea in the last month, or so. These include HL1KIS, HL9AWS, and HL9KU between 1145Z and 1445Z. HL9KU is at Kunsan Air Base, and QSLs via N7NMR.

**MACEDONIA, Z3** - Z32JA is one of the most active stations from this former Yugoslav Republic. Look on 20 meters between 1300-1700Z. QSL to the CBA of YU5XTC.

**MADAGASCAR, 5R** - If you missed this one last time, try again now. 5R8DG is again active on 20 meters around 0400Z and 1600Z. QSL to F6FNU.

**MELLISH REEF, VK9Z** - This multioperator venture should be on the air as you read this. Plans are to operate all bands and modes until 29 September. If you haven't contributed, send a donation with your QSL card to VK4CRR. At the time of this writing, the callsign has not been announced, but I am sure you will have no difficulty locating them!

**MONGOLIA, JT** - Since returning to RTTY, Bat, JT1CS has been up almost every day like clockwork. Look for him on 20 meters in the 1300-1630Z time frame. He sometimes can be found around 0030Z. QSL via Box 125, Ulan Bator, Mongolia, via Japan.

**MOUNT ATHOS, SV/A** - After all the speculation of the past several months, it now appears that Mt. Athos, and Monk Apollo will be back on the scene. The exact extent of RTTY operation is still somewhat uncertain, however. The following information was passed to Luciano, I5FLN, directly from Nikos, SV2WT, and Apollo.

During August, there were several demonstration QSOs on RTTY followed by equipment troubles. Apollo, SV2ASP / A for the present, can be found on the air only on Friday, Saturday, and Sunday until about 1200Z. With other monks, he is occupied during the week building a new Monastery, so he is free for radio only on the weekends. The RTTY gear has been repaired, thanks to Nikos, SV2WT, his QSL manager. He gets about one hour of generator time: the rest of the time he is battery powered. For those who need him on SSB, check into the 20 meter OE6EEG net in the morning, and on 21205 KHz at 0600Z, Saturday and Sunday.

Apollo is using a three element beam, and dipole for 40 and 80 meters. His shack is situated on the west side of Mount Athos about 500 meters above sea level. To the east is a big hill. So the best chance for the Pacific and Japan is early morning long path.

There is a plan that by April 1994 a new station will be set up at the top of the mountain and there is a promise that Minoru, JA3MNP, after having set up the RTTY equipment for the August demos, will be back with a new tower for the antennas. Nikos is lending a quad. Chances of good activity can then be expected.

Nikos also told Luciano, I5FLN, that Apollo will try for a new callsign in early 1994, as he would like to eliminate the /A. He will ask for SY0A.

A new color QSL card is being printed in Japan, and will include a history of Mt. Athos. It will be a month or two before the new cards are available to Nikos.

In the meantime, questions and support can be addressed to: Nikos Nomikos,

SV2WT, P.O. BOX 10974, GR-54110, Thessaloniki, Greece.

**NAMIBIA, V5** - Gerd, V51GB has lately been operating on 20 meters around 0600Z. QSL to P.O. Box 1165, Tsumeb, Namibia with equivalent of 5 IRC's. His post office does not accept IRC's.

**OMAN, A4** - A45XC has been showing on 20 meters around 1145Z. QSL route needed.

**PETER I L., 3Y** - Ralph, K0IR, leader of the 1994 DX'pedition advises that the logistics planning is moving smoothly and gradually all is shaping up. The final operator complement is still not settled. Ralph promises some previously unavailable goodies will be in place for all to savour, but is minding his tongue for the moment. If you have not done so, send your support of this outstanding effort to Jerry Branson, AA6BB at 93787 Dorsey Lane, Junction City, OR 97448.

**REUNION I., FR** - Herik, FR5DX is very active on 20 meters. between 1230-1530Z. QSL to his CBA.

**SEYCHELLES, S7** - S79PDL can often be found on 20 meters around 2330Z. QSL to P.O. Box 448, Victoria, Republic of Seychelles.

**SINGAPORE, 9V** - Yathe, 9V1JY may be found on 20 meters around 1200-1300Z. QSL to N. Yatheendran, Bukit Batok West Ave 8, #23-349, Singapore 2365.

**SOUTHERN SUDAN, ST0** - John, PA3CXC, who often operates in Southern Sudan was provided a RTTY software program by Arie, 4X6UO, but we still have not seen John using it. KYFC.

**SRI LANKA, 4S** - Ernest, 4S7EA continues to elude me, but he is reported active on 20 meters around 1530Z. QSL via his CBA.

**ST. BARTHELEMY ISLAND, FJ** - An international team of operators will be active from this island in the French West Indies for the CQWW phone contest in October. Several days before and after the test, Charles, N2HIG will operate RTTY. QSL direct to his CBA.

**TROMELIN, FR/T** - For many months we have been told that Jacques, FR5ZU, will give us RTTY during September. As we write this at the end of August, we have no definite information. Keep eyes peeled, and ears perked, for this one.

**UGANDA, 5X** - Mario, 5X1C has been appearing as early in the UTC day as 0040Z, on 20 meters. QSL to P.O. Box 7727, Kampala.

**WALVIS BAY, ZS9** - Ian, ZS9A still prefers 15 meters. Look for him around 1400-1600Z. QSL to ZS1IS.

**WEST MALAYSIA, 9M** - 9M2NQ is often found around 1500Z on 20 meters. 9M2MW shows up around 2130Z. QSL routes are needed.

## PROPAGATION PRIMER

In the ARRL Propagation Forecast Bulletin of August 27, 1993, Tad Cook, KT7H, gave a thumbnail description of the significance of Solar Flux, A Index, and K Index. This represents the shortest crash course I have ever seen on the subject, and is worth bringing to your attention, in case you missed it. He states:

"Most of us wish for a high solar flux. This is an index of energy from the Sun that correlates with the density of ionization in the Ionosphere. Higher flux values in most cases translates to higher Maximum Usable Frequency (MUF) and better HF propagation. Solar flux roughly corresponds to Sunspot Number, which is based on the size and number of sunspots on the visible solar disk.

The A and K indices have to do with geomagnetic disturbances. Higher A and K values correspond to higher absorption of radio waves, rather than reflection. WWV transmits a new K Index every three hours. A typical value is three. When conditions are very stable, the K Index may get as low as one or zero, and when conditions are truly awful, it may reach five, or even seven. A change in one point in the K Index is highly significant.

The A Index is also a measure of geomagnetic stability, but a change of one point is not very significant. It is based on the K Index for the previous 24 hours. When the K Index is three, the A Index might be ten. A change in a point or two in the K Index may send the A Index to 20 or higher. When a severe geomagnetic storm appears and HF bands shut down, the A Index may have reached 35 or more.

High A and K Indices typically are the result of either a Solar Flare, or Coronal Holes on the Sun's surface. Both may shoot protons at the earth, which neutralize the desirable negative ionization of the Ionosphere, cause the geomagnetic field to become unstable, and increase absorption of radio waves.

For more details, see the Radio Frequencies and Propagation chapter of any recent edition of the ARRL Handbook."

## MORE ON VK2SG

In the last issue, I gave a little summary of the usefulness of the weekly on-the-air "VK2SG RTTY DX NOTES." Subsequently I asked Sid, VK2SG, to give us a little more on the historical development of the NOTES. Here is his response.

"I first started RTTY on 22 May 1975. Shortly thereafter Bill, VK2EG, and myself started the New South Wales RTTY Group. With a few local enthusiasts, this group was later reorganized as the Australian National Amateur Radio Teleprinter Society (ANARTS). On the 3rd

September 1976 the first news broadcast was made using the callsign of VK2WIA. A few weeks later the callsign was changed to VK2SG. At this time, the DX Notes were included, mainly because the Editor, VK2SG, just ran out of news for the broadcast. During the following week, a number of requests were received to include the DX Notes as a permanent feature. And so the DX Notes were started and became a permanent feature in the news.

It was realised at that time that the writing of the DX Notes was not a one person effort, and could not be. So several people in the vicinity offered their assistance, which was gladly accepted. But again we were running short of good DX news, such as information from overseas. On the 19th February 1977 the new callsign of VK2TTY was obtained from the Radio Department, and is still in use by ANARTS. When the new callsign was used, the DX Notes were rebroadcast on 21 and 28 Mhz as well as 14 and 7 Mhz. But due to propagation problems, on 21 and 28 Mhz, these broadcasts were later deleted. In their place a direct broadcast was made a day prior to the normal news broadcast, primarily to K7BV and I8AA, both of whom would rebroadcast to the stations in their areas.

The basic idea was excellent. Propagation, however, and time availability did not always assist in transferring the DX Notes around. However from reports received, it was affirmed that the DX information was being received around the world. Of course, during this period the movement of DX information was under continuous surveillance by numerous stations who would report back to VK2SG. He then had the onerous task of collecting the information and editing it into a chronological basis. It proceeded along this line until the middle of the 1980's when the late TG9VT joined the team. John made considerable intelligent suggestions to improve the layout of the Notes, and the forwarding and receiving of the information.

TG9VT was also responsible for the organising of the team that covered U.S.A., Europe, Africa, Asia, South America, and various other areas where DX wandered into at times. This situation continued until John's demise in November 1992.

Since then, the Notes have continued with the remaining reporting team, everyone working hard to keep up the high standards up until early 1993 when VK2SG had to take a period in hospital. He later had to resign from the team due to health problems. He does hope to return to the team one day, but he is still not having much luck with his health.

After 17 years, the DX Notes now cover the world of RTTY DX and is constantly

reported by a team of very keen reporters who spend many hours searching the bands for all the good DX. At the moment they consist of I5FLN, W2JGR, WB2CJL, DJ3IR, ZS5S, and many others. As you can see the Notes are not a one man band. They consist of a team of dedicated DX chasers. I hope to be back with them soon...de VK2SG/DX1.

Oh, a point! Where did the DX1 come from? Well many years ago I was asked if there was a DXCC for RTTY? So I asked about it, and received the first DXCC for RTTY in Australia. So then the DX Notes were written by DX1...de VK2SG/DX1 Syd.

[VIA HF AMTOR]

## RAGCHEWER VS DX

Every once in a while, we hear certain conversations on the air that should not go unnoticed, because they provide a little levity to life's everyday routine. I overheard this one, but I am indebted to John, N0FAC, who saved it on the printer. Names and callsigns have been changed to protect all concerned.

"W8ZZZ W8ZZZ W8ZZZ 599-599-599 DE OH9QQQ

WHERE IS LOWER PODUNK OHIO?

BK WELL LOWER PODUNK IS A SMALL VILLAGE NEAR METROPOLIS AND ONLY ABOUT 5000 PEOPLE IN IT BUT WE HOPE TO BE A BIG CITY SOON. BUT ALL THE LAND IS TAKEN UP NOW AND CANT EXPAND. SO WHERE ARE YOU IN FINLAND? AND PSE UR NAME.

OH0QQQ OH0QQQ OH0QQQ DE W8ZZZ (SAM) IN LOWER PODUNK OHIO PSE K

DE OH0QQQ OK SAM BUT IT WAS SOMEONE ELSE ASKING WHERE LOWER PODUNK IS. MY NAME IS JUKKA. QSL GOES VIA OH9YYY AND MY QTH IS PARTTI..AND I'D RATHER LIKE TO CONTINUE THE PILEUP IF THE FUNNY PEOPLE ONLY LET ME DO SO HI

W8ZZZ DE OH9QQQ BYE CU SK

BK R-R-R-R-R-R-R-R-R-R

OH9QQQ - JUKKA - PARTTI, OH9QQQ - JUKKA - PARTTI.

OK OK JUKKA NICE COPY RST IS 599 599 AND I THINK WE MET LONG AGO AND NICE TO MEET OLD FRIENDS. WOULD LIKE YOUR QSL CARD FROM PARTTI...NOT MANY HAVE THAT ONE I'LL BET... SO JUKKA WHAT'S COOKING OVER YOUR PLACE? NOTHING MUCH IN USA NOW BUT STILL TALKING ABOUT THE PRESIDENT WHO DONT SEEM TO DO WHAT HE IS TELLING US AT ELECTION TIME SO JUKKA BACK TO YOU.

OH9QQQ - JUKKA - PARTTI - W8ZZZ  
(SAM) LOWER PODUNK OHIO PSE K

SAM ARE YOU SERIOUS ABT GETTING MY CARD...73 FER NOW AND CUL DE

OH9QQQ QRZ K

DE W8ZZZ JUKKA WOULD LIKE YOUR CARD ES WILL SEND MINE DIRECT IF POSSIBLE ?? BK

CQ QRZ DE OH9QQQ K

(others start calling the OH station)

BK JUKKA YES WOULD LIKE TO SEND IT DIRECT TO YOU SO CAN YOU GIVE ME THE ADDRESS PLEASE DE W8ZZZ K

OH9QQQ- JUKKA - PARTTI - OH9QQQ - JUKKA - PARTTI SORRY SORRY JUKKA BUT SOME QRM CAME ON TOP OF YOU AND I STILL DIDNT GET YOUR COMPLETE ADDRESS SO CAN YOU GIVE IT TO ME AGAIN? ILL SEND IT DIRECT TO YOU OR IS THERE AN ADDRESS IN THE CALLBOOK? BK

DE N7ZZZ N7ZZZ N7ZZZ KKK

WILL SOMEONE PLEASE GET THIS STATION OUT OF MY NECK 73 N7ZZZ QSL

ES TNX QRZ DE OH9QQQ OH9QQQ OH9QQQ K..."

(Ed. Note. If the shoe fits, wear it.)

## QSL POTPOURRI

Les, KE6XJ was wondering why he has had trouble obtaining a QSL card from Leo, K8PYD, for a contact with HZ1AB back in 1992. A telephone call by Bob, WB2CJL to Leo revealed that Leo has been having problems in not being able to obtain the logs for 1993, as well as partial logs for 1992. Some of the contest logs for RTTY have been contaminated. Leo asks that all be patient as he is trying to straighten things out.

Kudos to Yathe, 9V1JY for a QSL turnaround of only 14 days.

Cards for the N9NS/KH5K Kingman Reef expedition of last March should be in your mailbox soon, if you haven't received them already.

## MISCELLANEA

Tapani, OH2LU, asked us to pass along thanks to K1IU and W6/G0AZT for their help, in bringing the attention of ZK1AJJ/ZK1 in North Cook, to work northern Europe, even though he was barely copiable there.

Kudos to Randy, K0EU, operating RTTY at 9G1XA in mid-August, for a superb style that achieved an almost unbelievable rate in giving the deserving a new

one from Ghana. In spite of excellent propagation (he was truly 599 all over the USA, for several hours at a stretch), he always gave your call three times when first coming back to you, and repeated it again in the final acknowledgement. There was no ambiguity as to who he was working. He also eliminated wasted time by requesting only a signal report...please no name nor QTH. Great work, Randy! QSL Randy to his home CBA.

It seems that the promised Pitcairn Is. Bicentennial Award still has not been resolved. Dr. Gary O'Toole, WB6ISL, now KI7HO, does not seem to respond to follow-up letters. Two addresses for him have been publicized: 7535 Winchester Road, Silver Springs, NV 89429 is the address of record in the latest callbook. Or you may want to try 4745 Hwy 50W, Silver Spring, NV 89429. Anyone wishing to file a "Mail Fraud" claim against Dr. O'Toole may call (818) 405 1200 in the Los Angeles area, or contact your local postmaster, for the claim form. Also see QST, July 1993, page 89, for a letter from Brian Young, VR6BX and Kari Young VR6KY. (Tnx Mike, K6ICS)

## SOLAR CYCLE PLOT PROGRAM

If you like to follow the trend of solar activity, you will find a new program available to assist in watching long and short term changes. Tad, KT7H, the author of the weekly ARRL Propagation Forecast Bulletins recently advised of a free Solar Cycle Graph program by WA4TTK, which is of interest to DXers. I recently sent for it, and received my disk back in about four days, with data current from the previous week. This is a nice piece of graphics. It displays the last few years of this solar cycle, and allows the user to add data from the KT7H weekly bulletin. It displays daily solar flux and sunspot numbers, as well as moving averages for each of these parameters. There is a graph of the "big picture" covering several years of solar activity, as well as a close up "zoom" feature. The time scale of both graphs, and well as the averaging, are easily modified to suit your own interests. As you add data each week, you can observe the continuing gradual decline of Solar Flux and Sunspot Numbers, and perhaps be among the first to spot the next rising trend!

To run it, you will need an MS-DOS PC with VGA or EGA display. It has been posted to a number of bulletin boards around the country, with the file name of SOL24-1.ZIP. It is also available by mail from the author. Send a formatted 3.5 inch or 5.25 inch diskette, high or low density, to Scott Craig, 409 Jessie Drive,

Nashville, TN 37211. Be sure to include a stamped addressed mailer.

## HAVE DX NEWS?

I can be reached directly by dropping mail into my AMTOR PAMS, leaving a message in the APLink box of CE3GDN(1), sending me a packet message addressed to W2JGR @ WB0GDB.MN.USA.NA, finding me on RTTY, telephoning me at (612) 377 7269, or FAXing me at (612) 374 8161. (If you FAX me, please address it with my full name, as that FAX number serves a number of people.) When these high tech approaches fail, the U.S. Postal Service can find me. When I am not chasing DX, my PAMS listens on 14074 khz. (The 15 meter frequency has not been reliable for two months.) Set your chirping to WJGR.

THANKS - Thanks to the following for all your information: I5FLN, K5VT, K6ICS, KE6XJ, KT7H, K8PYD, K0IR, N0AFW, N0FAC, NJ0M, OH2LU, SM4DHF, WA4DAN, WA4TTK, WB2CJL, VK2SG, and 4X6UO. Without you there would be no column.

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

de Jules, W2JGR ■

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

## Attention Contestors

Ron, AB5KD has suggested and all agree that we need to exchange claimed high score information right after the contests.

Look for AB5KD on 3830.0 LSB and submit your claimed scores. Also W57I will be on 14.180 looking for those in Europe and those who can't copy Ron. Scores will be forwarded to the Contest Columnist, N6GG for early printing. They will also be put out over the CQ-CONTEST forum on the Internet.

Spread the word on Ron's idea and see you on 3830 or 14180 SSB.

# ANALOGY - MEMORY ARQ vs DIGITAL MEMORY ARQ

(Is an A/D converter necessary?)

## PRO

Dr. Tom Rink, DL2FAK, explains why he believes analog memory ARQ (ie. using an analog-to-digital converter) is a necessary ingredient of PACTOR:

"In conventional ARQ systems the TX has to repeat a packet until the whole information or at least the bit pattern of major parts of it has been received completely error free. It is evident that the probability of receiving a packet correctly dramatically decreases with lower S/N ratio (Signal to noise ratio, SNR). Some ways to maintain a contact in that case is to shorten the packet length or to apply error correcting codes which in turn will greatly reduce maximum traffic speeds when conditions are good. Another method, known as 'intelligent reconstruction' (sometimes used in AMTOR systems, since real memory ARQ cannot be used in AMTOR due to the missing CRC), combines error free received parts of different transmissions of the same data packet in various ways checking if the result passes the corresponding redundancy test. A similar method, the so called 'digital memory ARQ' reconstructs information by digital addition of several packets. However, a digital converter is only able to emulate a 1-bit ADC (analog to digital converter), thus meaning that there is only a small chance of increasing speed in poor propagations. If the SNR is falling short of a certain 'threshold' and only a few bits are received in a correct pattern with every

transmission period, the line can hardly be improved this way, even with a lot of repetitions. Real memory ARQ always requires an ADC. The method chosen by SCS is to sum up corresponding bit samples of subsequent packets and to test if the mean value (reduced to a 0/1-decision) passes the CRC. To keep quantizing errors small, the samples are taken from the FSK-demodulator low-pass-filter output by means of an 8-bit AD-converter. That means the information (whether a signal is 100mV or only 1mV over the 'converter threshold') is not lost, like in digital systems, but used to reconstruct the data. Assuming white Gaussian noise, this accumulation method will maintain a HF line at a lower SNR than any digital system, because the whole bit pattern of a packet can be obtained using the information of several transmission periods, no correct received parts are needed. Furthermore, since shift levels are toggled with every transmission, even constant interfering signals within the receiver passband will not affect the mean value. Besides that the ADC can be used to emulate adaptive filters and therefore save additional hardware. The PACTOR protocol is especially designed to support memory ARQ. The packet header is inverted with every new information packet to prevent accumulation of old requested packets, thus serving as an RQ indicator (similarity test). So everybody who implements

PACTOR has to use an ADC in order to keep high standard PACTOR."

## CON

Steve Schnedler, AC4IW, offers his opinion that digital memory ARQ does have advantages that rival analog memory ARQ:

"There are other PACTOR systems which implement analog memory ARQ. Which is better, digital or analog memory ARQ, depends on band conditions. When pulling extremely weak signals out of the noise under conditions when multi-path dispersion is not excessive, analog memory ARQ is probably better. However, a

typical band condition is characterized by rapid selective fading and multi-path dispersion. As is well known to RTTYers, such conditions can actually cause the order of bits to be reversed at the receiving end. When a repeat packet is transmitted, individual bits can become overlapped in time from one packet to the next. Analog memory ARQ actually makes the situation worse by attempting to combine a given bit from one packet with an adjacent bit from another packet. Under such conditions, the digital memory ARQ approach ... is superior. On balance, there is little difference between the two. As a loose analogy, it's like asking whether a limiterless AM or a hard-limiting FM demodulator is better for RTTY. It depends."

Submitted by Phil, KB8LUJ

## 1993 SARTG WW AMTOR Contest Results

### • Single Op All Band

01	VP5JM	139125
02	LZ2BE	107085
03	OH2GI	84960
04	OH2LU	51220
05	LZ2PG	44540
06	JA3DLE/1	39480
07	G4ZKJ	38870
08	VE7SAY	33200
09	SM6BSK	32895
10	W1BYH	24990
11	LA3RIA	23310
12	4X6LM	19170
13	DK7FP/P	18315
14	G5LP	17920
15	W1OPI	17680
16	G3XVF	15510
17	VE7VP	14190
18	SMIDUW	13160
19	HB9NL	10270
20	SM0TGG	9990
21	SM4RIK	9900

22	YL2JN	7770
23	OZ4KK	6300
24	UA6LP	5610
25	ZF2UN/ZF85525	
26	LA6VIA	4655
27	LA5RBA	4080
28	DL5SWB	3040
29	SM2EKN	2800
30	SM3BJV	2580
31	SM3ETC	1560
32	DL6SWR	595
33	SM7ABL	

### • 3.5 MHz

01	LA6VIA	350
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### • 7 MHz

01	DL8EDC	3780
02	LA3RIA	3780
03	HB9AON	550
04	ZF2UN/ZF8	420

### • 14MHz

01	OH2GI	31360
02	TA2FT	27600
03	OH2LU	26250
04	SM5EIT	9880
05	HK4OQI	8280
06	DK4EC	7475
07	HK4EGW	6480
08	UA6LP	3360
09	SM4CJY	2145
10	DJ6TK	1815
11	W2JGR	855

12	SP7FQI	525
13	SP4CQU	490

### • Multi Op

01	SK4RY	66030
02	SK7CA	2340

Operators of Multi Op stations:  
SK4RY: SM4CMG, SM5CZD;  
SK7ATL: SM7ATL, SM7ROX

Check Logs: DJ2YE, G0ARF,  
G4SKA, SP4CQU, ZL3GQ

Submitted by BO, SM4CMG



# HARDWARE

Mike Candy, KI7FX  
9111 A Utah Dr  
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Greetings once again from the Great Northwest! They tell me autumn is here, so it's time to do a little antenna work. I guess I must have missed summer, because the weather seems to have gone from spring right into autumn. I don't think the temperature ever got higher than 70 degrees but I better not complain - no air conditioning needed this year.

To make things a little easier this year on the antenna work, I have some help from the folks at AEA with their SWR-121 HF Antenna Analyzer! It's the latest in a line of high quality AEA products and it should be a lot of fun to test. The timing couldn't have been better - it's antenna season!

Since my writing in the RDJ, I have received quite a few letters and messages concerning computer hardware, radio interfacing and just about anything. I welcome your letters and comments and look forward to hearing from you. I am interested in hearing about the things we review here, as well as your technical concerns and problems. Most importantly, I would like to hear what kind of HARDWARE REVIEWS you would like to see.

## COMPUTER HARDWARE QUESTIONS

Many of the questions I receive are about PC's and PC interface related problems. The best way to troubleshoot these problems is to start at the beginning. Remove all disk caches, terminate-and-stay-resident (TSR) programs, and anything else that may cause conflict. You can easily use DOS's REM command to temporarily "remark out" (ignore) certain lines in your config and autoexec files. An "F5" key press at boot up time (with MS-DOS 6) will bypass these two files which sometimes helps too. Then you can start adding your commands back in, one at a time. Eventually, you should be able to see what is causing you grief! There are a lot of computer experts in every town, so don't be afraid to ask on your local repeater, or even on the HF bands. It sure is refreshing to hear people talking about computers on HF - sure beats "How are you, the weather is fine" stuff.

One of the greatest sources for information is on the Landline BBS's. If you are lucky enough to have a HAM related

BBS in your area, please use it! There is a wealth of information on most of them, from technical information in the "discussion" or "conference" areas to the latest in HAM related "try before you buy" shareware. I have been running a BBS for about 7 years and my biggest complaint is lack of use. It may be because of the lack of games and other cutesy stuff on my system, but there are hundreds of local hams with computers and only a handful of them check in to the bbs regularly. It really is a lot of fun, like Ham radio but the right mix of technical information and plain chit-chat to make it a most enjoyable way to learn and communicate. Additionally, most systems have hundreds of shareware files available for free download. My system in particular has almost 2000 Ham related files available for anyone that wants them. I run the mail system primarily for me because I learn more from these computer discussions than just about anywhere else. I welcome others to log in and join in on the fun! We all have computers now, so if you want to be an expert on a particular topic, what better way than to have regular discussions with knowledgeable folks around the world? My system, The Think Tank II BBS can be reached at (509) 244-3511 any time, day or night, at up to 14.4Kbps.

Ok, on to the backyard and time to start tearing into the antennas for the annual winter cleaning and preparation! This year however, our job has been made much easier. I still check out the coax and connectors, and check for tight connections on the aluminum. I even disassembled my vertical and cleaned it up a bit before the winter season this time. I removed and replaced the center connector and it's soldered jumper wire just to make sure it was in good shape and would hold up to another winter. Once all was assembled and looking good (and shiny) I was ready to start testing. I was looking forward to the antenna work this year with the SWR-121.

## AEA SWR-121 HF ANTENNA ANALYZER

The SWR-121 arrived just in time for my antenna work, so I figured this would be a great time to check everything out and make sure my antennas were doing what they were supposed to be doing! Mind

you, I have a very limited selection of antennas at my QTH - A couple of mono-band dipoles, a G5RV and a 20 meter vertical. Not really the best setup to check out such a high tech device, but enough to get me going. After I tested my antennas, I sent it over to be tested on the "big-gun" antennas at Hal's (WA7EGA), Warren's (W7YEM), George's (K7WUW), Marty's (WB7RBJ) and Gary's (K7GS) place. We all came up with similar conclusions and thoughts about the SWR analyzer although we used it on a wide variety of antenna structures and configurations.

My first impression of the SWR-121 is that it is a well built device that I suspect could be run over a few times with the family car or dropped from a 100 foot tower and sustain little or no damage. Although I am sure it is not designed for this abuse, it is very well built and solid. The case is a standard "Fluke" instrument type case with a large 3 x 1.5 inch LCD display. The display is sometimes hard to read, but like any LCDs, moving the device a few inches or tilting a few degrees will usually solve this problem. I suspect the unit is waterproof, although there was no mention of that in the manual. The single layer, plastic overlay keypad entry system is of similar heavy duty construction. It is so heavy duty in fact, that you really have to push hard on the keys and commands you want to enter. Don't worry about hitting a wrong key with this one, it won't happen! The back of the analyzer has a single SO-239 coaxial connector, a power input for 12-16 volts DC and a serial output (mini-stereo plug) for computer input.

The SWR-121 arrived with a 25 page operating manual (including schematics and parts layout). I searched for the external power supply (as I didn't have any AA cells on hand) but couldn't find one - checking the manual lists the AC-1 Wall cube as an option. I read through the manual a couple of times. Only 3 and a half pages were devoted to the operation of the device, 2 on adjustments and self tests, 4 and a half on the optional software program that is available, and the rest on circuit descriptions, warranty, etc. Not much info, so I thought this must be a breeze to operate (most people hate reading the manual anyway). After another re-read through the 3 and a half pages, I was still a bit confused as to what the SWR-121 could really do. Considering the MSRP on the SWR-121, I expected it could do a little bit of everything! I figured that I would be best off to wait until I could save up enough money for the 8 alkaline or Lithium batteries that are required for power.

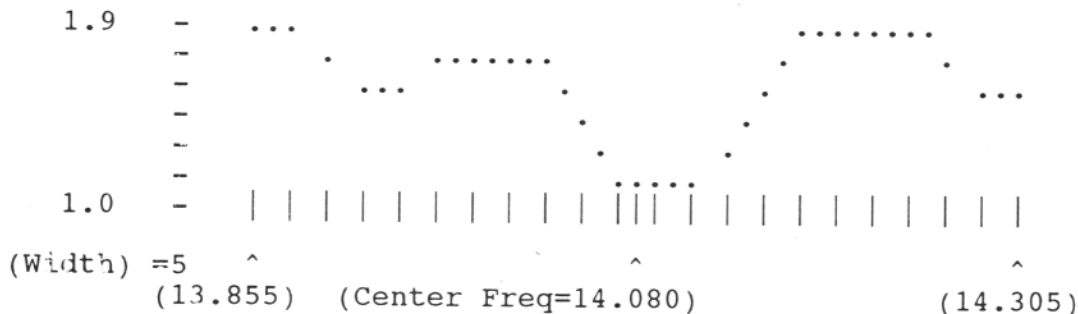
The features of the SWR-121 are pretty straight forward - It is designed as a "Graphical display of SWR as a function of frequency from 1Mhz to 31.999Mhz".

This means it will give you a graph of your SWR, based on the designated frequency so you can adjust or change your antenna for the best SWR at a given frequency - That it does! Under test with many antennas from Yagi's to Quad's to Dipoles, we found it to be very good at graphically plotting SWR curves and indicating the resonant frequency of the antenna. Running the SWR-121 through all of it's different features caused a bit of confusion however. We had a few problems trying to figure out just exactly what all this information meant, as the manual is pretty vague. The display shows a horizontal bandwidth axis with 11 "ticks" on each side of center and a vertical axis with 7 "ticks" to indicate the SWR range. When the calculation is complete, you have a graphic curve to indicate the SWR at the selected frequency. This is where the value of such a device becomes apparent. You can see exactly where the high and low (SWR) points of your antenna are. The actual width of the display (as well as the RF generator sweep - output at 5 Mw) is variable to allow the plots to be as precise or general as you want. Additionally, the analyzer's serial output connector will allow you to connect the device to your computer, using AEA's SWR.COM (optional) program for saving plots to disk, and viewing current and saved images simultaneously.

### SELECTING A FREQUENCY RANGE

We must manually select the desired frequency from the keypad and then tell the SWR-121 how WIDE we want it to scan (and plot the SWR curve). The analyzer has 8 preset widths, indicated by 1, 2, 5, 10, 20, 50, 100 and 200. The manual states that the device will "sweep 55 times the dot width below and above the center frequency for a display of 110 times the width setting. Each division mark on the horizontal frequency axis represents 5 times this setting. For example, when the dot WIDTH is 5 KHz, the display is 550 KHz wide, and each division corresponds to 25 KHz". The display is graphed similar to the drawing below (items in parentheses are added for clarity):

The display is capable of indicating SWR values from 1:1 to 65.5:1 although it will

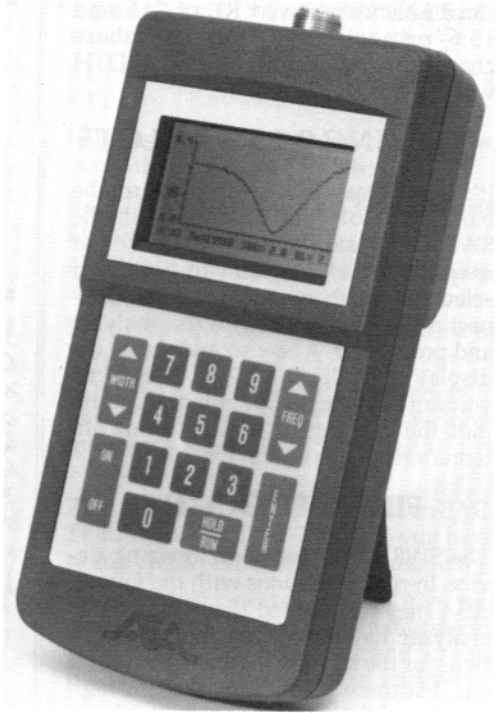


only show a maximum of 9.9 which is a more practical indication. You can select the frequency steps in 1 KHz steps. I guess after all the reading and re-reading of the paragraph about WIDTH, it kind of put me in a state of confusion. If nothing else I would get it to calculate and re-calculate different ranges and frequencies until I understood what the SWR-121 was trying to tell me. I was having problems getting consistent readings from the display. One time it would report a good SWR curve at the selected frequency and another time it would indicate an apparently poor curve for the same selected frequency. It was hard to distinguish between good readings and the sometimes strange response from the analyzer. After quite a few attempts to figure out just exactly what the indication meant, I went into the shack and fired up the HF rig and tested the SWR at 14.080 MHz. Sure enough, my antenna was bonkers. After tearing the 20 meter vertical apart and replacing the soldered center conductor I got back on the air again. Now, I couldn't get my SWR to tune any better than 1.3:1 on the same frequency. Sure enough, the SWR-121 told me the same thing. I often wonder why, on a perfectly good antenna I am motivated to fix it when I know darned well it ain't broke?

An outstanding feature is the internal chirp mode. With the WIDTH set at zero and the frequency selected, the SWR-121 will chirp every 3 seconds at a pitch that is proportional to the SWR. This makes antenna tuning procedures much easier since you don't need to watch the display while tuning. Although the chirp mode works great in the shack, while trying to tune my antennas outside, the chirper wasn't really loud enough to hear. Take a roll of duct tape with you and tape it close to your ear if you are going to use this mode! This ought to really get the neighbors talking.

### AUTOMATIC CENTERING

The SWR-121 can also FIND the frequency which your SWR is the lowest. Once you have any SWR null plotted, you



can center the plot and zoom in on the frequency of the null. For example, if you are showing a frequency of 14.300 and your SWR is a bit high, let the analyzer locate and center the SWR null for you on the band. Just press HOLD, indicate the direction you want the analyzer to sweep (up or down) and it will find the best SWR/ frequency for your antenna. As a side note, the SWR-121 takes about 9 seconds for each plot. This is certainly not an unreasonable time, considering all the work the analyzer is doing, but don't be in too much of a hurry when doing your plots.

### WHAT IS RETURN LOSS?

Another function of the SWR-121 is the ability to calculate "return loss" in dB at the selected center frequency. I must admit that I had a little trouble with this one. First of all, I can't find any reference to "return loss" anywhere, including the manual. I understand return loss as a product of the reflected RF signal that will effect your final SWR reading at the meter - something that must be manually calculated for an accurate reading. I am not sure if the SWR-121 compensates for this

return loss or not, as the manual doesn't really explain this function. I tried different antennas and coax cables to cause change in the return loss but again, I was unsure of what to do with it after I got the calculation. Using a 50 foot RG8X cable and a 50 foot piece of 9913 cable on the

same antenna showed RL of 24.5 and 15.6 respectively. These numbers changed dramatically as the WIDTH was changed.

## MAKING 2:1 SWR PLOTS

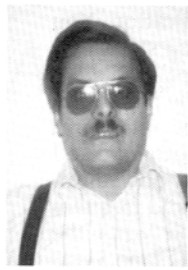
It's a very easy process to measure the bandwidth of your antenna with the SWR-121. Basically, you set the center frequency near the resonant point and select the width you want to view. Connect a 100 Ohm resistor to the analyzer and press enter. A few seconds later, the display will indicate a 2.0 to 1 SWR. Now you can reconnect your antenna and replot the reading to indicate your antenna's response within the 2:1 range.

## FINAL THOUGHTS

The SWR-121 is really an amazing device. In my discussions with the folks at AEA they have stated that sales on this analyzer have exceeded their expectations for the last few months. It is apparent that there is still a market for high quality, no compromise testing and evaluation equipment for the radio amateur. My initial thought is that AEA was really sticking their neck out on the SWR-121 because of its relatively high price tag of \$399.95 suggested retail. But if you are a real antenna buff, and do a lot of building and designing of your own antennas, the SWR-121 (along with the computer software you are probably already using to design your antennas) would make the perfect addition to your workshop. I plan on doing a lot more work with the analyzer over the next few weeks and hope to get my 20 meter vertical working before the CQ/RTTY Journal WW RTTY Contest (I need all the antennas I can get running). Maybe now that cooler weather is on the way, I can get on the air a bit more often and reap the reward of all this antenna work.

In the mean time, I'll try and keep you posted on the latest products to hit the market of interest to Hams. I just received the new KAM Plus and an AEA PK-232 to work with. Next month I'll be comparing the new KAM Plus against the old KAM with the ins installed "enhancement" upgrade. Kantronics has told me that the KAM plus has better digital weak signal filtering, so I expect to find out (with my antennas, everyone is a weak signal). The following month, I will answer the question once and for all - Which is better at HF Digital, the KAM or the PK-232! See you on the bands.

de Mike, KI7FX ■



# PACTOR

Phil Sussman, KB8LUJ  
P.O. BOX 31  
Clayton, OH 45315

## CONNECTED: KB8LUJ

Greetings PACTORIANS! There was some mail in the box this month. Thanks to Glenn, AE0Q; Hans, DJ1IJ; Ian, G4EAN; Gabriele, I4JXE; Jim, N2HOS; Cesar, N2MDE; Max, K4EGZ; Larry, K7LX; and Tim, NZ8J, for the kind words about the column. I will gladly answer questions here; however, if you desire a personal response, an SASE would be appreciated.

Joe Kasser, W3/G3ZCZ, sent a new copy of LAN-LINK with PACTOR added. And an MFJ-1278B, Multi-mode Data Controller (with new built-in PACTOR) arrived from MFJ Enterprises, Mississippi State, MS, for review, courtesy of Jim Shurden, KB5JNZ. So look for reviews of these items in the not too distant future.

Walter, DK9NQ; and Peter, DL6MAA; both advised that some SCS disks distributed at Friedrichshafen (HAM RADIO) had the English version of MT.EXE contaminated by CHUMNITZ virus. I received a copy of Meister-Term 1.6 (for SCS & PacComm PTC) from SCS, and my copy checked clean. If in doubt, run a virus scan program, and remember it's wise to keep clean write protected backups!

Peter, DL6MAA, sent the following from Germany. Work is well underway on PACTOR-2. Here are some basic facts on the new protocol:

- Timing and frames similar to PACTOR-1 (effective half-duplex ARQ)
- Based on a standalone DSP-PTC using 68070 and DSP-56156 (40MHz) chips
- 2-Tone-DQPSK at 75/150 Baud (perhaps 8-PSK at 100 Baud rather than 4-PSK at 150 Baud)
- Bandwidth: less than 500 Hz at -30 db
- Well suited to fluctuating multipath channels
- Maximum Speed: 600 bits/sec (four times faster than PACTOR-1 and 15 times faster than AMTOR)
- Improved adaptivity and Memory ARQ
- Superior weak signal performance (5-8db better than PACTOR-1)
- Independent of employed

sideband (same as PACTOR-1)

- Automatic frequency correction (+/- 70 Hz)
- Downward compatible to PACTOR-1 systems
- Comprehensive listen mode (both PACTOR-1 and PACTOR-2)
- System is not 'over sophisticated' (can be implemented on any DSP controller with enough processing speed)
- A standalone PACTOR-2 controller should be out by the end of 1993

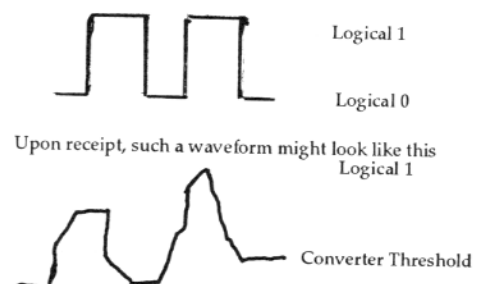
AFSK will be required for PACTOR-2 and that means you must use SSB. What about 500Hz filters? I sent a letter to Peter concerning this matter. Stay in touch with this column for the latest developments.

A writer asked about DSP and DSS. A Digital Signal System (DSS) is one which moves data from point to point. Thus BAUDOT, ASCII, AMTOR, PACTOR, CLOVER, FAX, SSTV, etc (yes, even CW) are all DSS systems. Digital Signal Processing (DSP) is a form of DSS that converts an incoming waveform (digital or analog) into a digital representation. Then by use of mathematic formulas (called ALGORITHMS) DSP analyzes, changes, and reconstitutes the original waveform. This permits audio or video to be restored or enhanced.

## PACTOR BASICS

### Memory ARQ

Memory ARQ, refers to the ability to analyze and restore corrupt data frames. Assuming a square wave represents a digital waveform being transmitted, it has a level that switches from logic 0 to logic 1, and back again.





The ability to measure and save results over threshold (number of bits) offers greater reliability in subsequent reconstructive sums. Original specifications use an analog-to-digital (AD) converter to quantify bits of an incoming defective waveform. A DSP system run by a micro-processor can do the same thing, if the bits are sampled and measured, which requires some type of analog to digital conversion. Is an analog-to-digital converter needed for PACTOR? (SEE SIDEBAR!) What about MEMORY ARQ, ANALOG MEMORY ARQ, DIGITAL MEMORY ARQ, DSS MEMORY ARQ, DSP MEMORY ARQ, TRUE MEMORY ARQ, etc? Every PACTOR TNC (or program) has some type of 'Memory ARQ'. Is one better than another? Can the 'mish-mash' of terminology be untangled?

The term 'Memory ARQ' is not sufficient without a comparison. I propose an empirical PACTOR ARQ reference, called the Sum Under Sequence System factor, or SUSS for short. (Why not? I thought it up!)

$$SUSS = (A + 1) * (C + N)$$

where:

A = the number of analog-to-digital conversions in memory ARQ (either separate hardware or micro-incorporated)

C = the number of reconstructive tests per repeated frame

N = the number of bit samples

The higher the number, the better the reconstruction of MEMORY ARQ under white Gaussian noise conditions. But, this is a NON-linear function which quickly reaches a point of diminished returns. For the math lovers, SUSS effectiveness is tangential (NOTE #2) and approaches a theoretic 100%. It is calculated by:

$$SUSS \text{ Effectiveness (\%)} = \frac{[\tan^{-1}(SUSS)] - 45}{45} \times 100$$

By this measure, factors higher than 5 or 6, show Memory ARQ is more than 80% effective. So, all we need are the numbers A, C, and N. Can any of our readers provide accurate information (or corrections) for various PACTOR products?

### A CONVERSATION with

For	SUSS Factor	SUSS Effectiveness
BAUDOT	1 [ 1 * (0+1) ]	0.0 %
AMTOR	2 [ 1 * (1+1) ]	40.9 %
AMTOR (Intelligent Reconstruction)	3 [ 1 * (2+1) ]	59.0 %
BMK-MULTY (some assumptions made)	6 [ 1 * (4+2) ]	78.9 %
AEA PK-900 (using 8 bit samples)	18 [ 2 * (1+8) ]	92.9 %
SCS PTC using 8 bit converter	20 [ 2 * (2+8) ]	93.6 %

## WA2MFY

Peter Detwiler, WA2MFY, operates one of the largest HF MAILBOX systems in the world. He uses three transceivers to scan 45 frequencies, from a farm in Gladstone, New Jersey, USA, about 50 miles west of New York City. The MAILBOX software was written by Bill Malloch, W8KCCQ, with two German TNC controllers. External scan controls were built by Frank Jaworski, K1FJ.

Kelly Hulse developed the software to interconnect four 386/33 computers to a Novell 3.11 file server. He also wrote software to auto-download WX forecasts three times a day from Compuserve, to program an Alpha 87A linear, and to auto-download the WWV Solar Flex report from 2 meter packet every three hours.

My conversation with Peter revealed he was experienced and well versed in linked protocols. Peter is semi-retired, but always busy on a project. When we spoke, he had just completed expanding his system to include CLOVER.

RDJ: How popular is PACTOR on WA2MFY?

PD: PACTOR is the most popular connect mode to WA2MFY and that popularity has been increasing. Over 95 percent of the connects are now PACTOR.

RDJ: Do you plan to continue to support AMTOR?

PD: Yes, AMTOR is a protocol agreed by internationally treaty (CCIR 476/625) and certain users must use AMTOR.

RDJ: What do you think of CLOVER?

PD: We now have a third transceiver (SSB) on the air dedicated to CLOVER. It is also interfaced to the file server.

RDJ: What do you think the biggest problem is with PACTOR?

PD: Getting a station set up right. Refer to my "PACTOR STATION DESIGN CONCEPTS." (See RDJ JUL/AUG 92 - Vol 40 - No 6 - pp 12-14)

RDJ: Is the WA2MFY BBS kept very busy?

PD: We get many connects during peak periods, but the system is in use about 20 percent of the time. Still we average about 8MB of traffic a month.

RDJ: Do you think there are any connect problems on the HF bands? I mean do

you think semi-automatic stations interfere with keyboards?

PD: No, I think there is room for everyone on HF. Of course, there is some occasional interference, but for the most part at least one party can be moni-

tored in an HF QSO. Careful listening is important.

RDJ: Do you support leaving space for RTTY?

PD: Yes, if you look at the scan list, we avoid the RTTY DX windows.

RDJ: Do you think the digital modes are growing?

PD: No doubt about it, and very rapidly, too.

RDJ: What do you see as the function of WA2MFY?

PD: I see a need for different people to have the ability to exchange personal messages worldwide with regularity with each other.

RDJ: You believe in running FSK on PACTOR. With PACTOR-2 (4-PSK) you have to run AFSK. What are your thoughts?

[NOTE: Most rigs that run FSK give you access to narrow filters only in that mode. AFSK runs in the SSB mode and narrow filters in the SSB mode can be a problem.]

PD: I believe in using 170Hz shift and narrow filters whenever possible. If AFSK is a necessity with PACTOR-2, we'll have to take a serious look at that. Perhaps operating split (RX-FSK TX-SSB) is a possibility.

## MORE UNABASHED PROMOTION

Dale, W6IWO, works hard to provide a periodical dedicated to the digital user. The number of pages has expanded, too. If you are new to the digital modes, or an old timer, whether on HF or VHF, be it known RDJ information is timely and accurate. You will probably read about it here before you see it anywhere else. You also see more than one side of an issue presented. Digital modes can be addictive. If you want to know more and keep up with technology, you ought to be an RTTY Journal subscriber.

Next month we'll look at some PACTOR graphics, and have some more topical information on PACTOR.

Thanks to all our contributors this month. Your efforts are what makes this column possible. Certainly your continued help is needed. Please send what you can. I do want to hear from you. It is all appreciated.

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

Packet Address: KB8LUJ @ WA8ZJWJ or FAX (513) 275-2225

2- Tan -1 refers to arc tangent or 1/tangent  
de Phil, KB8LUJ ■



# SOFTWARE

P.O. BOX 328  
Indian Rocks Bch, FL 34635

## FOREWORD

*Schedules create their own set of unique obstacles.* Several funny and not-so-funny things happened to Express 2.0 on the way to the self-imposed deadline. Bugs cropped up, lousy propagation dominated throughout August and Peter and I had travel and business demands—things like that are part of the plan. But TYIPS, first at bat, blew a power supply and was without his files for almost a week. Not to be outdone, my station got hit by lightning (the insured FT1000D is now back at the factory). To complete the double header, my brand new computer's motherboard failed immediately following the insertion of the Hal PCI-4000. Progress!

Tragedies occur in groups of three so something had to happen. It did, soon. An urgent CompuServe message from Peter said that the price of the fractal compression license had just increased five fold, and would I get in touch with the company right away. Six phone calls, two four page letters, eight faxes, ten days and a signed contract later the ADRS was graciously granted an affordable royalty. Iterated Systems, Inc. of Norcross, GA owns the process and wants very much to be of service to the amateur community. We appreciate their interest and generosity. Without it Express 2.0 would be several times as expensive. That done, the revised Hal software (and the subsequent bug fix) created further pressure. Then, just to keep the string alive, the package missed the connection out of Benin delaying delivery several days. Progress!

August slipped into a bunch of yesterdays and there were at least three reasons to delay delivery for an extended period of time. But not for Peter. On September 8th the DHL courier drove up to the front door and deposited the package containing Express 2.0. This remarkable effort speaks volumes about Peter's tireless effort, enthusiasm, sense of humor, commitment and generosity. The Help file remains to be complete but that should be accomplished as we run extensive tests over the balance of September. Order the program now and expect reasonably prompt delivery. Remember, Express 2.0 comes on two 3/12 inch

disks, is licensed to one specific callsign and costs \$25 if you are a member of ADRS, otherwise \$50. Prices are post-paid worldwide. Order from N2HOS, Box 328, Indian Rocks Beach, FL 34635. Make checks payable to ADRS in US funds (Eurocheques for the correct amount in any European Community currency are also acceptable). Subsequent updates will be available from the ADRS BBS (212 698 2102). Progress!

## THREE DIMENSION Part II

**THE FACTS!** Perhaps this will help you decide for yourself whether or not this new QSO technique is your cup of tea, or whether you want to go back to the 100 word routine, the exchange of brag sheets and other such dull routines. Read on and draw your own conclusions.

Remember, HDQ communications means that you must have a) at least a 386/25 machine running under Win3.1, with 4 megs of memory b) a Hal PCI-4000 card for your computer c) the Hal software installed as directed (including R-6 and the subsequent update) and d) a copy of Express software. Borrow everything else from another machine wherever you might find the help you need. To appreciate the high quality graphics gain access to an SVGA screen capable of a 32K color display. Enjoy the sounds of digitized voice (or record WAV files for later transmission) at that neighbor's shack who has installed a sound card in his computer. Download graphics from a BBS of your choice, find a computer service center or a friend with a scanner, preferably color. BBS photos are lousy substitutes for photos of you, your family, your shack, the papaya tree in the backyard or last summer's vacation with the grandkids!

This program is written in Visual Basic and takes full advantage of the VB tools in the interface; is a Windows 3.1 program and cannot be run in any other environment; runs on top of the Hal software. Understand and use it from the moment you see the first screen. Fourteen function buttons invite you into the power of this program. There are no secrets here. Each function is obvious to

even the beginning beginner. Few programs in my collection of software approach the sheer accessibility of Express. The user is asked for but one thing—the input of the intelligence (words, pictures or sound) necessary to allow the software to execute its chosen task. Neither ask nor demand more of a product than that!

Express requires about two megabytes of space on your hard disk. Be aware though, that the message material you transmit and receive demands lots of disk space. Typical color 4X6 snapshots scanned in 72 lines per inch require 3-500K of space. As you build your library of inbound graphics and your collection for outbound use, your storage usage expands dramatically. DOS 6 provides some help with compression (see Summer Notes last month). WAV files (those used for voice) are in the same league as far as space is concerned and consume 600-800 bytes per second of speech. Be prepared.

Express communicates with any Clover equipped station. But it cannot operate near its potential unless it links with one of its cousins. And it knows that the very moment the link is made. Express works with any Winlink station and can pass and receive traffic, download or upload bulletins, chat with the sysop. The reverse is also true. Express BBS shares a common command structure with most store-and-forward mail boxes, particularly Winlink. Express is also a splendid plain vanilla keyboard QSO device—far and away the best I have seen. In short, you need no other software for Clover, whatever your interest. A version for the PK-900 may someday be available for users of Pactor and Amtor as well.

## THE INTERFACE

To install, place disk #1 in the 3/12" drive on your computer; in Progran go to File/Run and type a(or b):\setup. Everything installs automatically. Place the Express icon in the Startup group if you wish to bring it up as you boot. Click Minimize in File/Properties if you wish to have the icon rest on the desktop after startup.

After you click the Express icon, the loading screen appears. If it finds the PCC.S28 file in C:\PCC (the normal directory for the Hal software), the bar graph at the bottom of the screen scoots up to 100% in no time. If you have it somewhere else, it will ask for directions. Once loaded it progresses at once to the main screen (reduced scale) seen in Figure 1. Click Setup, note that your callsign is already in place. Default parameters suffice, but do click the make of your transceiver. Click okay and go back to the basic QSO screen. Received copy

appears on the large upper segment, outgoing copy in the smaller one below. Your transmit buffer copy changes color and moves to the upper portion of the TX window as each word is sent, so you always know where the conversation stands. No exchange symbol is required in Clover . . . just keep typing and let the transceivers handle the interchange.

The F keys below the TX section of the screen are difficult to handle. Point the mouse at the F key to be edited, click the right button and the edit screen appears. Type in any copy desired and check OK. Done! Fire the F key with the left mouse button. Very complicated! And very convenient. Why you could even store a fine brag sheet in one of those eleven slots, just for old time's sake! F1 is the Help file and F2 is automatically programmed for your call sign. It is an unnecessary adornment for ID is handled by the system at the appropriate time. If needed, you can enable the CW ID box in Setup.

File transfers are as much a part of the Express QSO as the words you type. Select the Files button on the right column. Chose from Picture, Voice or Binary and the entire file tree of your hard disk is available for your convenience. There is no need to move the files to the Express directory prior to the QSO. Selecting and transmitting a text file is simplicity itself. Pick Binary, select the file, highlight with a mouse click and then OK . . . and keep right on chatting over the file transfer for you are now in HDQ! Note that you can set up a list of files for transfer in advance of the QSO as well. The File screen keeps you posted as to transfer progress. The File TX box is visible in the lower right hand corner of the screen. It keeps track of the progress and tells you what portion of the file has been successfully transmitted.

Picture transfers are much the same. Click the Picture button and examine the new screen. Press Load under the left

screen and select the picture file to be transmitted. Note that virtually any image format is acceptable. The image pops up on the left screen within a few seconds. Then on the right screen, select one of the compression choices, pick one of the four quality vs. speed options, click Quick compress and wait for the compressed image to appear on the right screen. Compare the two and if you are satisfied with the compressed version hit the Okay button and away it goes. Adjustments can be made in the rate of compression if needed to get the results you wish. Press okay and, if you are in a linked state, the image is on the way. When you return to the main screen note that the file description has already been sent and the File TX box activated. I remind you that images received by your station will disappoint you unless you have a hi-color system. For perfect images, use 65K colors on a non-interlaced screen. High resolution delivers quality images equal to the origi-

The screenshot displays a radio software interface with the following components:

- RX Window:** A large rectangular area at the top left for receiving text.
- TX Window:** A large rectangular area below the RX window for transmitting text.
- Function Key Grid:** A grid of buttons on the right side, each with an icon and a label:
  - Exit (F1)
  - Setup
  - Capture
  - Mailbox
  - Files
  - Sound
  - Pictures
  - Radio
  - Abort
  - CQ
  - FEC
  - Link
  - End
- Function Key Labels:** A row of labels below the TX window: F2 .de N2HOS, F3, F4, F5, F6, F7, F8, F9, F10, F11, F12.
- Tuner Section:** Located at the bottom left, it includes:
  - A vertical bar graph labeled "Tuner".
  - A display showing "Idle" and the date "14:08 - Sep 09, 1993".
  - Frequency and Modulation (Mod) indicators.
  - Signal-to-Noise Ratio (S/N) and Phase (Phas) indicators.
  - Equalization (ECC) indicators.
  - RX and TX signal level meters.
- File TX and File RX:** Progress indicators on the right side of the tuner section, both showing "0%".

nal for Clover and Express together assure that each and every byte arrives correctly. So, if you do not yet have the needed VGA power, merely put your images on disks and go visit friends who do have it!

Sound transfers seem different mainly because the .WAV files are a new kid on the block. The logic of the structure remains impeccable. Remember, for this one, you must have a sound card on your mother board. Once in the Sound menu, chose Load and the uncompressed previously recorded WAV file is brought up in exactly the same way as before. Now, however, the compression is preset and automatic. The file can be previewed prior to transmission. Or, if you wish to make a new track within Express, click New and record your message. There will be much more about this later.

The Capture button requires two quick clicks of the mouse to get results. On the Capture screen, choose to capture RX or TX then select a destination file. The data can be saved to any directory/file on your disk. You can, for example, put a text file directly into Word Perfect and then manipulate it any way you wish. Changing layout, fonts, editing, etc., become a simple task. Please note that the Capture file need not be used when receiving a file transfer, whether voice, picture or binary. They are automatically saved for you but can be transferred any where you wish upon completion of the transfer.

## TO REVIEW

But, let's go back to the beginning and trace through the opening steps leading to the link and the QSO. Click Radio. Here you will find that you may, if you are running with an RS-232 interface between the computer and transceiver, set the dial setting for the station you wish to call and change your transceiver setting. Return to the basic screen, click Link, select the station you wish to call (or enter it if you have not previously linked), chose the calling method. Normally, use Robust for any DX station and Normal for domestic. (Ignore for the moment the Link and Autoforward option). Hit Return and the menu bar will change from Idle to show the called station. Once linked the bottom of the screen comes to life. Tuning bars light up as well as the boxes that show the Clover mode, S/N ratio, Phase and Error Correction. Of primary interest are the two pieces of intelligence controlling your throughput. They are Signal/Noise ratio and Phase. In ideal circumstances or (for example 1989 propagation) S/N might be 45-55 or higher and Phase about 20 or lower. Those favorable trade winds would move the Clover mode from BPSM (the slowest and therefore today's

most common method of throughput) up the scale through 8PSM all the way to 16 PSM. Given such circumstances the ECC would drift at about 0, which is exactly where you would like to have it. Unfortunately, today's propagation (as I write this the DX Cluster announced SFI 80, A index 30!) delivers something less than optimum, though you must always be prepared for pleasant surprises. A quiet band, despite the propagation numbers, delivers a remarkable result if you cooperate and tinker with filtering, notching, etc. Since May 12th, we have linked every time we tried . . . though, as noted, there were a few times where we chose to give up because of the deplorably slow exchange.

Tuning is critical. While links are normally made in LSB with 2.4Khz filtering, improvements can be made. The first thing to do, if the link is a good one, is to attenuate the front end of your receiver to lower the signal to the Clover card. Strive to get the four tuning bars (lower left hand corner of the screen) equal and leveled at about two thirds the height of the box. We often run with the Front End down 12DB on our Yaesu's, with good results. The notch and shift functions on the FT1000D were almost always in use for they help with the precise tuning required. If you can get the differential indicator near a flat 0, it does make a difference when passing a big file. Patience has its rewards in this case. Use the 500 Hz filter. If there is noise or a CW signal in the pass band, cut the bandwidth. It works!

Yes, you can call CQ. Just click the button and you are on the air and, yes, there are those out there who will respond. And you will find that the FEC button is useful as well. If the band is filled with other signals and you want to punch through a short note to a friend who is waiting to link, try it.

Throughout, intuition rules. No stumbling blocks line your path, no puzzles, nothing but a series of remarkably effective macros available to you with the click of the mouse. No keystrokes need be memorized, no mysterious hard-to-find screens exist, no parameter files need working and reworking, no long drop down menus need to be analyzed . . . for this is programming as it should be. The lucky user owns the program from the moment the interface appears on the screen. Few programs provide such an instant reward.

## BULLETIN!

I am out of space and have yet to get the MailBox button! Nor has the world's first Cloverized voice transmission been described. Sorry, it will have to wait for next month. But I can't finish now be-

cause I just received word of the **Clover price reduction**. The price remains at \$995, but the **Amateur Net drops to \$895** soon. You won't see the ad for another month or so, but give Hal a call and see if you can get the new price now. Their number is 217 367 7373. Have your credit card ready!

-----  
In the pipeline . . . AEA's Packratt for Windows. If you are a user, please drop me a note with your comments, questions or suggestions.

CUL

de Jim, N2HOS SK ■

CompuServe 71573,1077

## COMO SUBSCRIBIRSE A RADIOAFICION MICROCOMPUTACION

Esta revista se publica bimestralmente y en una de las páginas iniciales se indica cómo subscribirse. El precio de la suscripción, seis ejemplares anuales que incluyen la **GUIA DE EQUIPOS y ACCESORIOS** (edición de Noviembre/Diciembre), en sobre cerrado, por vía aérea al domicilio del lector, es de US\$40.00 para todos los países con exclusión de México y Canadá. En razón de las más bajas tarifas postales, para los dos últimos la suscripción anual cuesta US\$20.00. Para los Estados Unidos y Puerto Rico el precio de la suscripción anual es de US\$18.00. Los pagos deben hacerse en moneda norteamericana mediante cheque de cuenta bancaria en los Estados Unidos, cheques de viajero, giro postal u orden de pago internacional a nombre de:

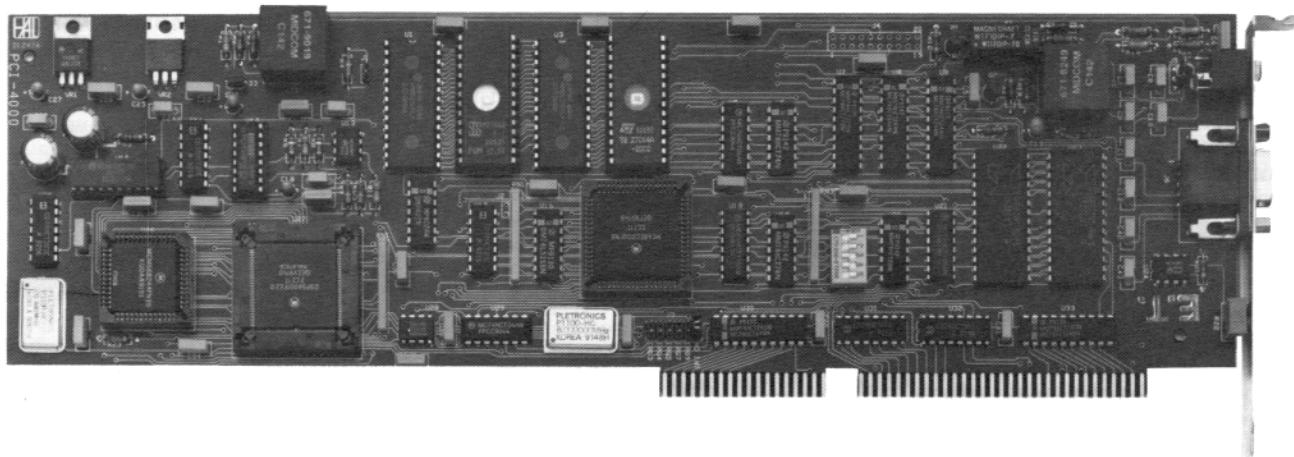
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**NEW!**

# HAL Announces the PCI-4000 PC-CLOVER System

For Fast, Bandwidth-Efficient HF Data



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

## The PCI-4000 PC CLOVER system features:

- ♣ Higher throughput than RTTY, AMTOR, Packet, or PACTOR on similar HF channel
- ♣ Simple pull-down menu operation
- ♣ Signal bandwidth of 500 Hz (@50 dB down)
- ♣ Plugs into your PC (286, 386SX, 386, or 486 machines)
- ♣ Easy interface to your transceiver
- ♣ Automatically adapts to HF band conditions
- ♣ Error correcting using Reed-Solomon error correction

You've read about it in the articles. Now you can operate CLOVER!  
Order your PC-CLOVER system today from HAL Communications Corp.

**PCI-4000 PC-CLOVER System**

**Only \$995.00**



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





# PACKET

Richard Polivka, N6NKO  
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Lakewood, CA 90713

## A RETROSPECTIVE

I have received several letters recently that have addressed my present series of articles in this publication. This response addresses those letters and comments.

In the beginning of radio communication, we used the Morse code. This was the easiest way of sending information over radio waves: just switch the carrier to the transmitter on and off. This mode of transmission is still used today in all forms of endeavor over the radio.

The next development brought audio over the radio sending the human voice instead of code. When the voice mode became popular, the people who wanted to continue using Morse Code put up a fight to keep the bands "pure." Eventually, agreements were made to share Ham radio bands so that voice and code operators could co-exist together. This lasted for some time.

Of course, there were other modes introduced to the amateur realm. These are mainly adaptations of digital modes that are used in commercial radio. We use AMTOR, Packet, BAUDOT, ASCII, FAX, and other combinations of modes. These modes have taxed our sparse resources which are dwindling, slowly and surely.

With all of the growth in amateur radio, our collective pool of knowledge has grown immensely. We have the largest wealth of knowledge available in the technical fields of design, implementation and adaptation for the transmission of data and information.

This phenomenal growth of information management and transmission is the direct response of the availability of processing components, mainly the computer. The computer is capable of processing information almost flawlessly and with amazing speed and adaptability. I can remember running an IBM System 360 Model 30 mainframe when I was in college. This big piece of iron could only run one program at a time and was in a room that was 50' x 50' x 10' and required its own air conditioning system.

Technology has now brought us desktop machines that are more powerful than a

CRAY 1 computer. What is more interesting is that we have these versatile machines and insist on using them like the IBM System 360 Model 30 from my youth. MS-DOS has the capability of managing one program at a time, at the user level. But, there are other operating environments available that allow users to run multiple programs at once. Some of the more popular systems are Windows, and OS/2.

Windows sits on top of the MS-DOS operating system and assigns system resources between one or several programs. The interface between the computer and the user/operator, is the graphic environment, not the character environment. This has allowed programs to be run as a graphical entity and presents many opportunities for interface between the computer and the programs. This requires a minimum of 4 MB of RAM to run and uses the hard drive as a virtual memory extension.

OS/2 is a complete operating system that operates in the graphical environment. There is no need for MS-DOS as OS/2 keeps track of all of the resources and allocates them as needed. Unfortunately, this capability has placed a demand on RAM. To effectively use OS/2, you need a minimum of 8 MB of RAM. There is virtual memory support available, as in Windows, to expand memory capacity past the base memory size and this virtual memory operation can take a couple of forms.

The first is where the whole program is swapped in and out of RAM when needed to be processed. This can take a long time and make the system run real slow because of all of the swapping, since the disk is much slower than RAM. The other form of virtual memory operation involves a process of paging. This works by bringing in a section of code that needs to be executed. This way, you only bring in what is needed and no more. This speeds up execution and minimizes the access time to the hard drive.

Both OS/2 and Windows cost bucks. I have used both and still continue to use Windows. I have OS/2 2.0 and I was not impressed with it. OS/2 was a dog to

start up and looked and acted cluttered. At least that was my impression.

I started to use Interactive UNIX SVR3.2 because of a childhood dream to have a system to use for my very own. Its response on my 386/25 computer with 4 MB of RAM impressed me. My keyboard was able to have eight separate sessions available, which impressed me. I arranged a USENET feed that allowed me to send and receive E-mail via the internet.

Through some digging, I managed to get a copy of NET/NOS that was adapted to UNIX. Now I could send and receive mail over the radio and internet and not have to worry about the whole situation because it was all automatic. My machine could do more than with MS-DOS and Windows. Another big advantage to UNIX is that you do not have the 640k memory limit. UNIX presents a flat memory address space and allows larger programs to be run. I am now running a version of NOS that is 950 KB in compiled size.

From reading the news postings off of the internet, I learned of a program that imitated UNIX without using any of the original source code and works fine. The code was copywrited but was released to the general public without significant cost. This package is called Linux and was originally written by Linus Torvalds in Finland. It has acquired a following and has paralleled the growth of mainline UNIX packages.

Alright, we have covered the historical background, so here is the question that inquiring minds have been screaming, "What does this have to do with packet?" This is very important to packet and the user as a whole. Remember earlier where I was talking about amateur radio growing significantly and was responsible for many achievements in the field of communications technology? Well, over the years, amateur radio operators have become appliance operators (Now he is slamming us again!). I wonder how many hams can be given the manual to their radio, and the appropriate test equipment and align their transmitter to meet FCC requirements. I can virtually guarantee that many out there CAN'T DO THAT! We are placating ourselves and getting into a rut that does not bring change or improvement because that requires work.

We all have talents that can be put to use. Some people can fix a radio with their eyes closed. Some people can send code and receive it with the best. Some people can run a net in their head and use no scratch paper. Probably the best piece of equipment available just sits around waiting for keyboard input, and that is your computer.

The Linux system is a true multi-processing, multi-tasking system. It does not require massive amounts of RAM, like OS/2 and Windows, because it can run with as few as 2 MB of RAM with a swap file but is also comfortable with 4 MB or more. The software for the system is available for nothing. All you have to do is download it. There are no shareware fees or crippleware problems to deal with. The X windows system is more reliable than Windows, IMHO, with a virtual display capability, and lets you use Postscript and display it directly on the screen or send it to your printer.

Admittedly, the above doesn't apply to Packet Radio. But here is what does apply. I could have a system that runs an emergency operations center with all of the needs and logistical services required. For example, old computer terminals are available at swap meets everywhere. They may not be as pretty as a Wyse 50, but they work just fine. Printers have also become quite cheap lately. Let's say that this imaginary EOC has six departments that need to communicate. You equip each department with a terminal and a printer and route them back to the computer. With the appropriate software, one computer can route packet messages and send them to the appropriate printers. The terminals can be used to run any kind of program needed for that department or to send a packet message to a remote site.

In any emergency situation, such as killer hurricanes, communications are imperative. Packet Radio offers the best way to pass lists of information around. Speed and accuracy are the essence of reliable communications and that is a big help in an emergency. Here on the west coast, we have to worry about earthquakes, while the midwest has severe weather and tornados. Everywhere there are disasters waiting to happen.

This whole series is dedicated to presenting a low cost, highly effective communications and usage alternative to the present status quo. There are those who say UNIX is too complex to use on a daily basis. It really isn't. All of the commands may have funny names but they are more powerful than DOS. I am trying to present a view of what is out there. UNIX is out there and it's capabilities are not being presented or given a fair shake within the amateur community. I have discussed the capabilities for Packet Radio and the requirements of the amateur community. Why reinvent the wheel? Let's use what we have available and strengthen the successes of others.

## NEXT MONTH

Probably one of the hottest packet networking programs is offered by WG7J. It

is a variant of the PA0GRI NOS package with some additions. I will also cover the version for Linux, which was modified by KF8NH. The command structure is rich and versatile. We'll start by covering some of the more popular options and how to set them up.

Until then, remember, that if a group becomes stagnant and complacent about

self improving, it will be overrun by another group that is willing to grow and expand!

Happy Packeting!!!!

de Richard, N6NKO ■

packet: n6nko@wb6ymh-2

internet: richardp%owlsnest@swc.uucp

# KENTROL Review

Laszlo Aranyos, N9FMR

The recent trend in HAM transceiver designs points to personal computer solutions, which can greatly enhance the operating power of it's user. However, even though interfaced radio hardware has been with us for some time, adequate software has not been forthcoming to operate such radios with the exception of Ham-Windows and a few off-brand products.

Last year Jim Mortensen, N2HOS, wrote about Brain Gilhuly's (VE3GB) new product KENTROL, and offered to send it to anyone interested in doing a review. I dropped him a line indicating I was interested and received a demo disk. The disk turned out to be corrupted, so I contacted Brain directly. After several disk versions I finally received a working copy for my TS-850. Brain's software is aimed at the Kenwood line of radios as the software name implies.

This remarkable software is based on the ever popular MS Windows environment sporting a multilayered design with separate toolbar and tuning features. Serious contesters and SWL operators will love the superior frequency memory management capabilities. This feature turns out to be the high point of the program, allowing the ability to create memory content files (external to the radio), stuffed with remarks, notes, etc., providing an easier overview of the favorite frequencies.

Kenwood's heralded 1Hz tuning steps are not accessible from the front panel of it's 50 series radios but, through KENTROL and it's ultra-fine tuning mode, 1Hz resolution is not an obstacle.

KENTROL has selectable preset frequency groups, such as BC: International Broadcast, UTC: for all CHU and WWV frequencies, Ham, Air, Sea and UD: for user definable frequency groups.

In any given band, tuning steps of 9/10 KHz in MW broadcast, 5MHz for SW

broadcast, and 3KHz for Aero route and Marine sub-band, and 1KHz elsewhere. All at the click of the mouse button with the SUB. command within and Band service.

On the tool bar there are 3 sources; VFO A, VFO B and MEM. Any of these sources can be tuned from the keyboard direct. One can have a active source, tunable source, or split operation tuning window. At the bottom of the tuner windows, mode selections are: LSB, USB, CW, FM, CWR, and FSKR and in the case of the TS-850 radio, 1st IF, 2nd IF, Hicut and Lowcut filter settings can be adjusted.

The program also has automatic logging facilities. Logs can even be printed for use with other data bases.

However, there were a few rough edges encountered, one of which became apparent as soon as the KENTROL screen comes alive in Windows. It appears the video driver was written to support a 800x600 video format making the window area of the program larger than the screen area should you own a 640x480 VGA format monitor. To overcome this shortcoming, there are scroll buttons and vertical shifting of the video field but, the program becomes a little cumbersome via this method.

The latest version of KENTROL has a terminal program window, allowing the user to monitor RTTY, Packet, or PACKET depending on the TNC employed.

I was impressed with the program and found it to be much more user friendly than any of the existing software I have encountered so far, including Kenwood's Hamwindows. Brain has done a good job bringing us this versatile piece of software. For information on KENTROL contact Brian Gilhuly, VE3GB.

de Laszlo, N9FMR ■

Trnx to Peter, N00ZF for his help with this review.

# REVIEW of BMK-MULTY

by: Phil Sussman, KB8LUJ<sup>1</sup>

PACTOR on a disk; can it be? BMK-MULTY is a computer program for the IBM-PC (and compatibles) by M. J. Kerry, G4BMK. It is an interrupt-driven real time control system which interfaces a terminal unit (modem) between the computer and an HF transceiver. Any conventional RTTY terminal unit (demodulator) can be used, like the AEA CP-1, CP-100, FLESHER TU-170, TU-470, HAL ST-6, ST-5000, ST-6000, HEATHKIT HD-3030, IRL FSK-100, KANTRONICS Interface II, etc. A MULTYTERM TU (Note #1), which plugs into computer COM ports, can also be used.

## INSTALLATION

It helps to be project inclined (or have a friend who is) for the hardware interfacing. This is NOT 'plug and play'. You have to connect your modem to your rig, and your computer to your modem, too. If your TU does not have an RS-232 port, you need a level converter. You may need an N-Channel Power MOSFET for PTT keying. An interface circuit is required to buffer audio to the computer which enables the TUNER, (audio analyzer), FAX, and SSTV modes.

I have a 386 computer and wired it to an AEA, CP-1 modem. My CP-1 was modified for FSK and already had the RS-232 option. I only needed to construct a cable. Hookup information was documented in the manual and I followed the simple and straight forward directions.

I wired the CP-1 for FSK to an ICOM IC-751. Using the RTTY mode allows use of the 500 Hz narrow filter and displays MARK frequency.

## CONTROL FILES

There are several control files on disk where initial parameters are stored. The program limits file size to about 4000 bytes and may be changed to suit your needs with a text editor.

### File NameStores

BMKMULTY.CTL	Program initialization
BMKMULTY.A	Amtor Parameters
BMKMULTY.C	CW Parameters
BMKMULTY.P	PACTOR Parameters
BMKMULTY.R	RTTY Parameters

Parameters for each mode are stored in respective files. As BMK-MULTY

switches modes, the associated file is 'loaded'. Several memos (\A thru \Z, and \0 thru \9) can be defined in each file, like a brag, or a CQ; allowing a separate set of memos for each mode.

These symbols can be used in files or typed during a QSO:

### Symbol Meaning

- \ OVER in PACTOR/AMTOR (same as PAGE-UP)
- \\* DISCONNECT LINK(same as END)
- \; DISCONNECT w/CWID
- \, Contains your callsign
- \. Contains your AMTOR SELCAL
- \\ Contains current RTTY contest-mode QSO number
- \# Contains current captured callsign
- \@ Contains the current time of day
- \\$ Contains current time of day

Some memos are reserved by certain modes. Memos can be nested (8 deep) or automatically repeated until cancelled. To send a memo type the appropriate designator (like \J) in the transmit buffer. During a QSO the TAB key can be substituted for the reverse backslash (\).

## CALIBRATION

Calibration is very important. Make sure that you are NOT operating through windows. In addition, avoid ANY memory resident (TSR) programs.

Transmit and receive sense (RXR and TXR) are important and if not set correctly, BMK-MULTY may be difficult to calibrate. It's a good idea to tune an RTTY BAUDOT signal (RTTY screen) and cycle F6 for readability. If RXR is displayed at the top of the screen, set RXR to 1 (RXR 1) in the BMKMULTY.R and BMKMULTY.A control files. To find the proper setting of TXR another station must help you determine if MARK and SPACE are transmitting in reverse. If so, set TXR to 1 (TXR 1) in the RTTY and AMTOR control files as well, to initialize the program defaults.

For BMK-MULTY AMTOR to function properly, you must enter two parameters, XA and XB, into BMKMULTY.A file. The default is XA = 596, XB = 1011. These parameters set the critical timing between your computer and the program.

The quickest and easiest way to determine XA and XB is to use the built in CALIBRATE function (CONTROL + F8 in AMTOR screen) during an FEC broadcast of more than 30 seconds. I copied the FEC AMTOR bulletin from W1AW, ran CALIBRATE three times, and found my average XA = 596 and XB = 802. These values vary among computers and yours may differ. If your computer timing is too far off

CALIBRATE does not work and you must use another method, see below.

There are two other ways to find XA and XB. First, if you have an accurate frequency counter, use the BMKTEST program on disk. Hook the counter from pin #20 (high) and pin #7 (low) on the computer RS-232 port (25 pin), [#4 High, #5 low, on 9 pin] start the program, and follow the instructions. Otherwise, do a long term drift measurement. You set the DOS clock accurately to WWV, leave the computer on for a while (several days to two weeks), and then read the clock at a known later time. (as WWV marks the minute) This gives a time differential (a gain or loss). Parameters XA and XB are then calculated using a formula. The longer the drift run, the more accurate the results.

PACTOR needs three parameters, XTAL, IRATE, and PINX. They stored in the BMKMULTY.P control file. XTAL may be entered directly as the PC oscillator frequency (ie XTAL 1193180) or calculated from XA and XB. I recommend the three parameter entry system (XTAL 1000/596/802) for the simplicity.

IRATE tells the computer what interrupt rate to use. IRATE can be from 400, for a PC XT with at 4.77MHz; to 2000 for the 386DX/486. The PTEST command sets for the highest usable number. A value less than 800 does not support 200 baud (high speed) PACTOR operation. Default is 1200.

PINX tells the software if an external clock is used. A non-zero PINX value requires an external timing reference for all PACTOR timing. Use PINX 0, which sets internal PC timing (default), unless you supply an external clock.

## GETTING STARTED

BMK-MULTY provides support for AMTOR, CW, FAX, PACTOR, RTTY, TUNER, and SSTV modes. After wiring and testing hardware, deriving calibration parameters, and editing control



files, I concentrated on testing AMTOR, CW, PACTOR, and RTTY. I connected an oscilloscope to the CP-1 to check the tuning bar on the BMK-MULTY screen. Tuning was sharp with a slight delay of about 1/4 second to the screen. Best results were obtained with scope tuning, and fell off sharply to either side. Once set the stability and timing held constant.

## AMTOR

I practiced tuning AMTOR signals. The tuning bar worked fine and F3 (SEARCH) command automatically monitored ARQ and FEC transmissions. SEARCH also looks for your SELCAL to establish a link. To call a station, you need his callsign or AMTOR SELCAL. If you monitor a station calling CQ, BMK-MULTY attempts to 'capture' the call sign and displays it on the right side of the screen on line 18. At the same time, the program derives the four character default SELCAL and shows it to the left of the same line. Depressing F7 locks-in that call, as shown by a star (\*) preceding the callsign. You can manually enter a callsign by typing it on a empty line in the buffer and then depressing ALT-F7. A non-standard SELCAL is set in the same way, but using ALT-F1 rather than ALT-F7. To start a link, depress F1. If you initiate a link, the path delay time (in ms) is displayed ahead of the locked callsign.

To send a CQ, depress F4 which starts FEC transmit, \C (to send the \C memo, the CQ routine), and the END key to return to receive. You need not return to AMTOR STANDBY to receive a call.

BMK AMTOR has many features; ULC (Upper/lower case, NOTE #2), auto repeat CQ calling, a WRU response facility (CTRL-F1), an AMTOR Auto Answer (ANS), DX Mode (CTRL-F7) for DX chat QSO's under difficult conditions, High Reliability Mode (CTRL-F7, cycles with DX and normal, forces every block to repeat), SLOP command (for long DX), Path delay Timing, 200 baud FEC, and clock differential. Some of these features are not available anywhere else!

## CW

At first, I couldn't get CW to tune. Then I remembered to change the filter switch on the CP-1 from 170Hz to CW. How embarrassing. I found the CW mode to be highly sensitive, even with very weak CW signals.

The was the usual short delay in displaying received characters with the best results on machine generated code. The human ear outperforms a computer in the ability to pull a signal out of the mud or resurrect a poor fist. On the other hand BMK-MULTY does fine with a good, properly spaced, signal to over 35 wpm. However, don't always expect perfect copy on CW.

I made several QSO's. BMK-MULTY seemed to have a friendliness on CW that was lacking on other programs. I really enjoyed this mode.

## RTTY

RTTY was a pleasant surprise. The mode was easy to operate and I made several contacts without any difficulty. The sensitivity was extraordinary.

One nice feature is AUTOPRINT (F1 or F3). An RTTY signal must be properly decoded in this mode before text is displayed. If the MARK/SPACE are reversed, no text appears. If no valid characters are decoded for 3 seconds, the mode drops back to STANDBY, waiting for more valid characters.

There is an RTTY Contest Mode with auto QSO numbering. The auto CQ routine and call sign capture also work well on RTTY. When BMK-MULTY detects a garbled character, it prints an underscore rather than a probably wrong character. RTTY operation is quick and easy, rivaling more expensive TNCs.

## PACTOR

Selecting ARQ or FEC monitoring is NOT automatic, as AMTOR. Instead you must manually switch between the two. (F3 or CTRL-F3) Either accepts an incoming call, but I became tired of repeated switching. I was confused by PAGE-UP (over), PAGE-DOWN (break), and END (qtr). Until I got used to the system, which took about a week, I kept hitting the wrong keys.

To initiate a PACTOR FEC transmission, use F4. (like AMTOR) To start an ARQ call, the callsign must appear to the right on line 18. Once captured or entered press F1. (CTRL-F1 for long path)

BMK-MULTY has some interesting PACTOR features. A single x in the tuning bar shows poor signal quality while xxx indicates the link can not support 200 baud. When IDLE, REQ, or DUP are in lower case, BMK-MULTY has deduced this from a received packet, although the whole frame was not correctly received.

Connect frames from other stations are shown in brackets [G4BMK]. Memory

ARQ count is displayed. Auto answer (ANS) works in PACTOR and AMTOR. KAM V6.0 is compatible (PTKAM). German Umlauts are supported (LANG).

You lock in 100 baud with F6, defeat HUFFMAN Compression on TX with F5, switch a capture buffer with F9, or use F10 to write to a log file. Parameters can be defined (MATLEN and MATSTA) for call sign matching, too. I particularly enjoyed Auto CQ and the callsign capture.

I tested PACTOR on all types of signals from weak to strong. Some were buried in QRM. Here are my observations:

- 1. On strong signals, there was little difference between BMK-MULTY and a German SCS PTC.
- 2. When a relatively strong signal gave a slow data rate, a decrease in the RF gain sometimes helped increase data flow. This usually happened when another signal was nearby.
- 3. On interfering signals, the 500Hz narrow filter worked wonders.
- 4. With a quiet band, weak signals were workable if there was no QRM or QSB. Data moved slowly, and speeded up with the narrow filter off.
- 5. Transfer speed falls drastically with QRM or QSB on a weak signal.
- 6. On 40M or 80M, with QRN, the MEM ARQ count ran much higher and faster.

## MANUAL

The manual has 67 pages, plus supplements; one for calibration using the time-of-day clock and another for PACTOR. It has a good table of contents, an index, and a command list as well. Another handy feature is a set of Quick Reference charts (Chapter 10) for each mode. In addition there are 12 DOC files on the diskette with 178KB of text.

The hardware installation documentation was good; but, the manual seemed out of sequence. Calibration, which deserves a chapter of its own, is scattered about AMTOR, PACTOR, and supplements. A numbered outline, illustrating each step of getting 'fired up', would be helpful.

The AMTOR Tutorial (4.20) was great.

Below is a typical line 18 with explanations

```
(a) (b) (c) (d) (e) (f) (g) (h) (i) (j) (k)
-PT----ARQ-TX-IDLE-HUFF--200-- | --xx-- | --1----63-----*WA2MFY--
```

- (a) CALL, CALL-LP, STBY, SEARCH, COPY (Blank during link)
- (b) ARQ, FEC
- (c) TX, RX, (blank if no link)
- (d) IDLE, idle, DUP, dup, ERR, REQ, req
- (e) HUFF (Blank if not decoding HUFFMAN)
- (f) 200 (Blank if 100 baud)
- (g) Tuning Bar
- (h) Timing differential
- (i) Round trip path delay (Ms) (only with IRATE 2000)
- (j) \* indicates call sign locked with F7 (otherwise blank)
- (k) Captured call sign

Another for PACTOR should be included. There should be more about modifications to some terminal units which may be required for optimum PACTOR.

There is no way to add pages to the spiral bound manual; and as usual, I had problems keeping the manual and the supplements together.

### MY WISH LIST

An often voiced concern was the lack of user call sign flexibility. Your call and AMTOR SELCAL are imbedded in the software code and you can't make any changes. As a result, visitors to your station can't use their calls. Contest identifiers, portable operation, special event calls, or upgrading your own call sign require payment of a 'nominal fee.' During QSO's with BMK-MULTY users, this was frequently mentioned. Of course, software piracy is the problem, and I don't have an answer!

The PAGE-UP key confused me and I kept hitting the wrong key. The \2 memo in the BMKMULTY.P control file helps, but I'd like to see CTRL-Y or CTRL-Z dedicated to OVER, too (for uniformity).

PACTOR listen was cumbersome. The two listen modes, ARQ and FEC, had to be selected manually. I was always switching between them. The AMTOR module F3 automatically searches ARQ or FEC receive, but PACTOR does not. That needs improvement.

HUFFMAN Compression had to be switched off manually (F5) when sending graphics, but cut off by itself on .EXE, .COM, or .BIN files. It would be helpful to automatically defeat when transmitting graphic characters as well.

PACTOR (rev: 1.11) did not have the comfortable 'feel' of AMTOR, RTTY, or CW. Steve Schnedler advises a revised PACTOR module will soon be available. I hope we will have the opportunity to test the new one as well.

### ATTA BOY

BMK-MULTY has many novel and interesting features not found in any other software. Once properly set, timing is better than average. Coding for all modes is good. The call sign capture worked very well, often capturing call signs before I had even noticed. The low cost and modularity is a plus. In addition, the CW, AMTOR, and RTTY modules are very user friendly. AMTOR was a real pleasure. It's the mode where BMK-MULTY really shines.

The auto CQ (CQCQ) routine was neat. I used that method often when I heard nothing on a band. With an IRATE of

2000 you can display link path time. It was interesting to note a 114Ms round trip to DK0MHZ.

### OVERALL

Whether to use BMK-MULTY depends on several factors. Older PCs (4.77MHz XT), limit PACTOR to 100 baud or require an external clock. Accuracy depends upon your computer timing stability which may be a problem with older machines. Calibration is important and a 'timing run' may be necessary to achieve superior results.

If you have an old modem or TU, I recommend you review a copy of the manual to check interfacing. Overall quality depends on your modem. Units with sharper and more sensitivity filters will give better results.

Memory ARQ had a SUSS of 6 with an efficiency of 78%. There were few problems on strong links. Data on weaker links took up to 20% longer to move (still error free) with higher Memory ARQ counts. The low pass filter output stage of your TU may need modification to pass 200 baud more effectively.

The price is considerably less than a multimode TNC, so it's a good way to discover if digital modes are for you without a big investment. If you are willing to invest a little time, BMK-MULTY will pay big dividends.

BMK-MULTY is distributed by Grosvenor Software, #2 Beacon Close, SEAFORD, E. Sussex, BN25 2JZ ENGLAND (Ph: 0323 893378); and in the USA by Schnedler Systems, 25 Eastwood Road, P.O. Box 5964, Asheville, NC 28803 (Ph: 704-274-4646). Base version (AMTOR, RTTY, CW, and Audio Analyzer) is advertised for \$95.00US and the Extended version (HF WEFAX and SSTV, added) is \$125.00US. PACTOR is available alone or it can be added to either version for \$50.00US.

Thanks for reading and sharing your time with me.

de Phil, KB8LUJ ■

May God Bless you and yours. -73-

1. [For MULTYTERM TU and BARTG info contact - British Amateur Radio Teleprinting Group, Mak Ashby, G6WRB; (G6WRB @ GB7MSW.GBR.EU), 47 Ryton Close, Luton, Bedfordshire, LU1 5SR, ENGLAND -or- the Radio Society of Great Britain (RSGB) at Lambda House, Cranborne Road; Potter's Bar, Hert. EN6 3JE; ENGLAND.]

2. [For Upper/Lower AMTOR case info, see BARTG DATACOM, AUTUMN 1991 or RJ Jan-92, pg 4]

3. Some modes and features (FAX, SSTV, TUNER) could not be covered due to space limitations.

# ADRS

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# RTTY/AMTOR Program for Microsoft Windows 3.x

by John Kirkham, KC4B<sup>1</sup>

How would you like to have a Microsoft Windows program which allows you to easily use your multimode TNC on RTTY and AMTOR? This article describes a program which has numerous short brag buttons sorted by type of activity e.g. RTTYDX, RTTY rag chew, or AMTOR. It is a true Windows program, not a DOS program running in a window. The best part about it is its cost nothing! The program is the Windows Terminal program which is included with every copy of MS Windows. This article will tell you how to set the program up as an efficient program for your use. You can follow the techniques exactly or use the parts which seem best for your own activities. It will explain how to set the communications parameters, create a separate icon for starting the program, and set the function keys. It also discusses how to use other included windows programs such as Notepad to make the system even more useful.

Terminal is found in the Accessories group that is created when you install Windows. Start Terminal by doubleclicking it. The first thing that you must set up is the connection to your TNC. You should know the COM port and baud rate your TNC needs. Terminal can be set to either COM1 or COM2. (COM3 and COM4 are also available if you have Windows 3.1) It also supports common baud rates from 110 to 19200. To make the settings find the Communications item under the Settings menu. Follow the dialog box to set the baud rate, port, data bits, parity, and stop bits (The most often used settings are 8 data bits, no parity, and one stop bit). Use the settings your TNC requires. At this time you should check your TNC to see if Terminal can communicate with it. You may need to set some other features to insure proper communications between Terminal and the TNC. In many cases you have control of the parameters in both the TNC and Terminal. Make sure that they are both set to the same parameters. Data bits, parity, stop bits and hardware vs. XON/XOFF control are examples of things which you usually can change either place. Another thing to check is the meaning of carriage return (CR). If you get spaces between lines you should change this setting. In Terminal this is set in the Terminal Preferences dialog under the Settings menu.

The next thing you want to set is the buffer size. Choose Terminal Preferences under the Settings menu. In the bottom

right corner you will see a box marked Buffer Lines. Set this to 399. This will give you a 400 line buffer (first line is 0). This is the largest that you can have. You can now save the settings if you have good communications between Terminal and your TNC. Use the Save As dialog under the File menu. Give the file a name which identifies the TNC you use. (I call mine PK232.TRM)

Now you are ready to set up an icon to run your TNC. Go to or make the group from which you want to run your TNC program. Bring up the New dialog box under the File menu in Program Manager. Select New Program Item. In the dialog box under description give the title you want the icon to have. Under Command type: TERMINAL PK232 (or whatever you named your parameter save file above)

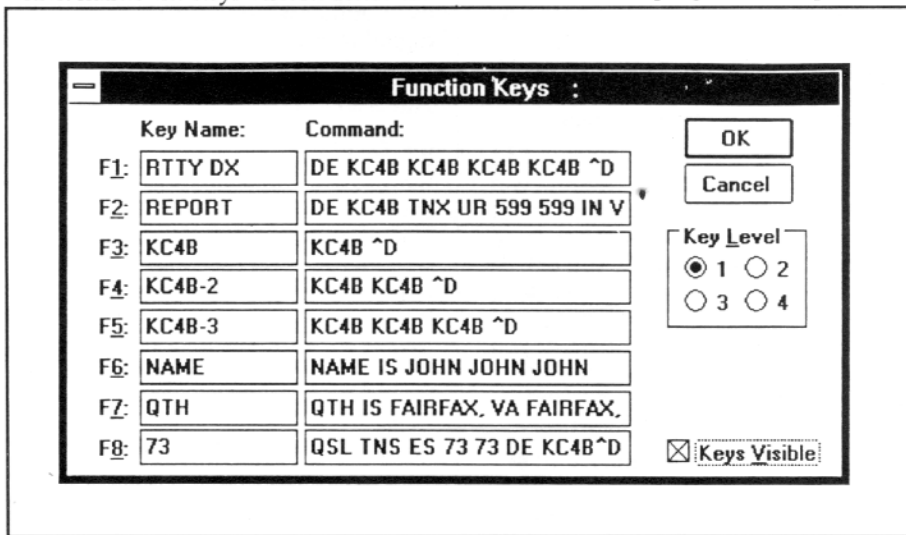
*Note: if the location of Terminal is not in your path you may have to give the directories of Terminal and the parameter save file. You do not have to use the .EXE or .TRM extensions.*

Under the box for Working Directory type the path to the directory where you wish to store your longer brag files. Usually you will say None in the Shortcut Key box. Later you may wish to change the standard icon but for now push OK after you have checked your responses.

Now you are ready to set up your function keys. You choose the Function key option on the Settings menu item. The dialog box asks for a name for each box. These names appear on the buttons at the bottom of the screen when you make the keys visible. You should check the box which makes the keys visible. There are

four levels of function keys. You can use a level for each type of activity in which you engage. To identify each level use the first function key to identify it and have the most used message in it. Messages are limited to 41 characters. For example you could make level 1 RTTY DX. The message could then be "DE KC4B KC4B ^D." This would send your call (if you use it instead of KC4B) twice and stop transmitting with a control D as required by the PK232. (the ^ replaces the control for the next character in the message field.) You can then fill the other function keys with other messages used in DX contacts.. Next choose the radio button for level 2 and select another function such as RTTY RAG. Set up messages for CQs, answers, Name, QTH, Radio, Antenna, Computer. You may want to use two levels for RTTY rag chewing since there are so many subjects you may want to cover. Remember to use repeats for vital information such as Name and QTH for RTTY. If you set up a level for AMTOR you would not need repeats and could get more information in each message. After entering the function key names and messages check OK to leave the dialog box. If you remembered to check the Keys Visible box you should see the key names on buttons across the bottom of the screen. Also at the lower left the time will be displayed. Above the time is a button with the level on it. Click on this button to cycle through the levels.

Since the function messages are limited you cannot have a long brag tape in the function keys. Long messages and type ahead buffers require the use of another Windows basic program, Notepad. You



can either use Notepad to generate or load an ASCII file of the full brag tape information. If you then select the information you wish to send and put it on the clipboard using the Copy item under the Edit Menu in notepad you can then use the Paste item under the Edit menu in terminal to send all the information you selected in notepad. This sounds more complicated than it is. You can type a set of brag items in Notepad, save them to a file (you choose the name you like best), and select only the portions you want to send before copying it to the clipboard. What you need is a quick way to switch between Notepad and Terminal. One way is to size the windows so that both are visible on the same screen. Another is to use the Alt Tab keys. If you are in one active Windows program you can easily switch to any other active program by holding down the Alt Key while tapping the Tab Key. Each time you tap the Tab Key a box will tell you which active program you will select by lifting up the Alt Key. It will always start with the most recently used program so you can easily set it from Notepad to Terminal and then only have to hit Alt Tab once to switch back and forth until you activate a different program. Using the Alt Tab method is useful for long brag messages while separate windows is useful for using Notepad as a type ahead buffer. You can easily see the incoming message in Terminal while you type a response in Notepad. Terminal will still display incoming messages while Notepad is active. SVGA screens are useful for this feature to allow more information on screen.

Another useful practice is to use a separate instance of Terminal for a VHF Packet Cluster. A separate window with the Packet Cluster output is useful for RTTY DXing. The window will remain updated as the information comes in and the bell function will alert you to new DX. Even if you cannot have the Cluster visible because you are using Notepad at the time the bell will still alert you to new DX putouts from the Cluster. You can then use the Alt Tab technique to switch to the Cluster Terminal instance and check it out and switch right back.

If this article gets you started using Terminal as a RTTY/AMTOR program you will find many other variations to fit your own operating habits. After using this free program for a while you will be much better able to assess the value of the features of commercial programs and choose the one you like best, or you may decide to stick with Terminal. I would appreciate any comments and experiences you have about this article.

de John, KC4B ■

1. John Kirkham, KC4B, 10920 Byrd Dr., Fairfax, VA 22030

## BOOK REVIEW

### It's About time ...Almost ... Maybe

by Jim Mortensen, N2HOS<sup>1</sup>

"Your RTTY/AMTOR Companion<sup>2</sup>," brand new from the ARRL, arrived here in an unmarked envelope with no note attached. The sender remains a mystery. But the bright cover of the new volume suggests that the long wait for the beginner's guide to the HF digital world has arrived at last. Long a supporter of the idea, I promptly read the modest-sized volume from beginning to end. Pages of pictures and charts and the liberal use of large type make it a brief trip. After the tour, including the appendix and attachments, satisfaction and frustration surfaced in approximately equal amounts. And I remain ambivalent regarding the net impact this book will have on the information needs of those who want it the most.

The book's author, Steve WB8IMY, strives to accomplish a broad survey of the the history and practice of all the current modes. Six chapters include everything from "What's That Noise In My Radio?" to "RTTY/AMTOR Contesting." And the work succeeds in several dimensions. The brief history of the digital modes is interesting and informative even for the veteran keyboarder. Technical discussions range over FSK, AFSK, mark/space theory, old teletype machines, Pactor and Clover. As I thumb through the book again, it appears to me that these early paragraphs may be the high point of the volume. Such technical clarity makes YRAC a worthy addition to the literature. This book belongs in the library of the digital amateur. Of course the information is available elsewhere in different forms, in bits and pieces. But here we have an organized overview of what our part of the spectrum is all about by an author who is fully involved in the digital world. And it shows.

Unfortunately, the cohesion and clarity falters far too soon. I find the 22 pages of Chapter II ("Building Your RTTY/AMTOR Station") of little help to the beginner. Meandering discussions about computers, MCP or TU, AFSK or FSK, amplifiers, filters, short cables lead us nowhere. And neither pictures of popular TNC's nor guidance on using frequency counters to discover the mark frequency do more than enlighten the few and confuse the many. Perhaps the best advice contained in these pages is to "Read Your Manual," but that scarcely qualifies the book as a primer!

Obvious shortcomings spring to mind. Mark frequency, one of the most common problems for the AMTOR beginner

(even those with 1X2 calls) is not defined in terms of the readouts of the common transceivers in use today. Does the chapter explain the four basic connections (audio in/out, PTT, ground) between computer and TNC? Not a word. An amplifier on AMTOR? For those of us who have grown up thinking that they are an anathema we find that "Yes, its okay but...just make sure you consider every aspect before you spend your money." After skipping over the basics the chapter closes with the cheerful words, "If you have your station up and running there is nothing to do but get on the air..." The remaining 75% of the book is devoted to pages of QSOs, APlink frequencies, protocol and so forth.

Unfortunately, the detailed discussions concentrate on the fun and games of being on the air. The Chapter II tutorial failed, meanwhile, to take the beginner by the hand and lead him anywhere near that magic moment. An additional ten pages of elemental instruction utilizing typical configurations, would have made all the difference in the world. Without it, the beginner well never get out of the blocks, will not have a basic grounding in what the station setup is all about, unless he has a helpful neighbor. Countless letters and phone calls received here attest to this need, and the book neither recognizes nor fills it.

Conversely, the fourteen page love letter to APlink and the lengthy discussion of the MSO's long history, are both interesting and valuable. As in preceding chapters there is perhaps a bit of overkill in the quantity of sample QSOs used to demonstrate the point. Nonetheless, the reader will certainly know how to link with, forward through and benefit from the world wide network.

The Pactor section highlights the uniqueness of the mode, covers on-air QSOs and takes us on a brief tour of software. Clover appears to be just another better, faster mode. The material reads much like a publicity release from Hal. No mention is made of the fact that it is designed for high-density BBS traffic handling, nor that its efficiency and speed is dependent on the length of connect time. The reader might easily mistake Clover as just another way to have a good QSO.

Contesting is given a good treatment thanks in part to material supplied by the RTTY Digital Journal. Any amateur now on the air in RTTY/AMTOR, even if with but a few hours experience could

easily jump in and enjoy the fun of contesting. If the book becomes a best seller we can count on increased participation in next year's major contests. The one weakness is the software section. The list of products is incomplete and in at least one case, misleading. WF1B does indeed support the PCI-3000. But the major omission is the lack of illustrations demonstrating the power of the software. (But that is a weakness throughout the book. Software is given short shrift. Odd, since software is the engine that drives the entire station).

An ample glossary, supplier and resource listings are an excellent conclusion to the volume. There are omissions of interest primarily to those who were omitted . . . BMKMULTY for example. I would be hard put, however, to point any beginner to a better series of lists.

Overall, the book adds much to the beginner's tool chest. While there are serious shortcomings, the positive contributions from the best chapters makes the \$8 purchase very worthwhile. If the appendix included a list of willing "Elmers" in the beginner's neighborhood it would be a complete resource for sure. But we all must exhibit a willingness to fill that role whenever the opportunity arises. The digital community is known for that kind of helpfulness. Let's not tarnish our reputation at this late date. Hopefully, the volume will sell well enough to allow future revisions and additions. If, at that time, the tutorial could be expanded, if software could be more thoroughly explored and minor changes made, this to me could turn into a digital classic. Heaven knows we need one. Thanks, Steve for a worthwhile effort.

de Jim Mortensen, N2HOS ■

1. P.O. BOX 328, Indian Rocks Bch, FL 34635
2. Available for most radio stores or from ARRL, 225 Main St, Newington, CT 06111, price \$8.00

### Correction Notice!

On page 12 of the January issue of the RDJ there is a short note about connecting a PK-232/TS850S for FSK operation. While the connections indicated in the note are correct, they only allow you to key the transmitter on and off. Another connection is needed between pin 1 of the 5 pin Din connector at the rear of the PK-232 and pin 2 of the 13 pin connector at the rear of the transceiver. This connection should be shielded because it controls the frequency shifting.

Incidentally, these connections work with the Kenwood TS450/690S transceivers as well, and is the method I have used on my Kenwood TS690S for the past year. I much prefer this method over AFSK.

Submitted by Henry, AC4AC

# KAM AM/FM Switching Mod

by James Sladek, WB4YBD<sup>1</sup>

## Background

The Kantronics KAM has a front panel switch labeled AM/FM. It is suggested that the switched be placed in the AM position for CW mode and the FM position for RTTY (non-CW modes). What is really happening here is that in the FM position, the input signal is hard limited - a desirable feature for an AFSK input but can be devastating for CW. In the AM position, the input signal is attenuated to the point where a nominal level of CW signal does not force the unit to go into hard limiting.

Since I quite often forget to switch from AM to FM when switching from CW to RTTY, the following modification will automatically "switch" to AM whenever CW mode is activated and "un-switch" to FM for all other modes (the AM/FM switch must be left in the FM position). In non-CW modes, the AM/FM switch will still manually "override" the automatic selection and allow the AM position (no hard limiting) to be selected.

## Modification

### Parts Required

- Qty (1) 4066B Quad Bilateral Switch
- 10 inches of insulated wire wrap wire

1. Bend 4066B pins 1 -5 and 8 -13 into a "U" with the "hook" facing outwards.

2. Mount the 4066B "piggy Back" on U14 and solder pins 6, 7 and 14 to the respective pins on U14.

3. Drill two small holes (to pass insulated wire wrap wire) thru the printed circuit board at a location between S2 and Q10.

4. Connect two lengths of wire to pins 8 and 9 of the 4066B.

5. Pass the wires through the holes drilled in step 3 and connect to S2 normally open contacts (S2 center pins and pins toward the rear of the board).

## Operation

For normal operation, leave the AM/FM switch in the FM position. When CW mode is program selected, the 4066B pins 8 and 9 "close" to set "AM limiting" level. Any non-CW mode selected will "open" pin 8 and 9 and set "FM limiting" level or allow manual selection of AM/FM limiting.

This mod has been in use here at my station for quite some time now and makes operating a lot easier for me. If you are like me and forget to make the switch-over then you will be happy with this mod. Good luck.

de James, WB4UBD ■

1. 215 Delaney Dr., Suffolk, VA 23434

# LOOKING BACK

## 25 +/- Years Ago in RJ

- ✕ After 14 years as editor of "RTTY", Merrill Swan, W6AEE, turns the keys over to Dusty Dunn, W8CQ. Dusty changes the name to RTTY Journal.
- ✕ To encourage the trend toward 170 Hz shift instead of spectrally inefficient 850 Hz, Dusty begins series of sidebars reading, "Broad Minded. Use Narrow shift."
- ✕ DX Editor John Possehl, W3KV begins RTTY DX Honor Roll. Jean, FG7XT, heads the list with 67/54. John follows with 56/50.
- ✕ Simple tuning scope described using 902A CRT available at \$3.50.
- ✕ Irv Hoff, W6FFC, discusses adapting the KWM-2 for RTTY. New BFO crystal for 850 Hz shift is specified but can be changed for 170 Hz.
- ✕ Designation of 7090 KHz as the nominal RTTY slot is suggested by Jerry Hall, K1PLP. The region of 7140 was previously published by QST but inexplicably was suddenly changed to 7040 KHz, popular with CW operators.
- ✕ DL1VR wins seventh annual RTTY sweepstakes (sponsored by CARTG).

Submitted by Carl, K6WZ/0

Next time - 24 years back.

# 1993 BARTG RTTY Contest Results

## Multi-Operator

Nr	Call	QSO	Mul	Con	Pts
01	UZ9CWA	1011	262	6	1589292
02	WA7EGA	704	189	6	798336
03	HG6N	656	198	6	779328
04	V3IRY	646	149	6	577524
05	OK1KQJ	458	133	6	365484
06	WA7FAB	403	130	6	314340
07	N1JEB	278	137	6	228516
08	N1JAC	219	111	6	145854
09	HA0KLL	245	113	5	138425
10	DF0BAU	191	83	5	79264
11	G4V5Z	163	73	6	71394
12	OM3RJB	129	64	5	41280
13	SM4RGD	149	51	5	37995
14	SP6YFU	49	35	5	8575

## Single Operator - All Band

01	HC8J	1141	245	6	1677270
02	KP2N	956	179	6	1026744
03	OH2LU	493	191	6	564978
04	NO2T	505	175	6	530250
05	7Q7XX	572	138	6	473616
06	SM5FUG	433	174	6	452052
07	K0RC/9	428	157	6	403176
08	N6GG	414	150	6	372600
09	G0ATX	468	131	6	367848
10	G0ARF	421	143	6	361218
11	UL9P	430	129	6	332820
12	DJ6JC	369	140	6	309960
13	K8UNP/4	330	156	6	308880
14	I2DMI	359	143	6	308022
15	UB4HQ	415	112	6	278880
16	VE2DRB	363	144	5	261360
17	KA5CQJ	406	107	6	260652
18	JA2IVY	324	132	6	256608
19	ER0F	394	104	6	245856
20	EA7GXX	314	154	5	241780
21	W9KDX	319	125	6	239250
22	SP3SUN	282	139	6	235188
23	A22BW	342	106	6	217512
24	VE7SAY	324	108	6	209952
25	I2UIY	300	137	5	205500
26	N0FMR	283	119	6	202062
27	AH6JF	363	88	6	191664
28	VE2AXO	252	115	6	173880
29	VE6ZX	331	86	6	170796
30	K6WZ/0	273	103	6	168714
31	YU7AM	247	113	6	167466
32	JH7QXJ	290	93	6	161820
33	PT2BW	268	98	6	157584
34	HA8EK	238	106	6	151368
35	5U7M	310	91	5	141050
36	LA7AJ	208	112	6	139776
37	GW4KHQ	206	113	6	139668
38	WA0VQR	230	92	6	126960
39	KI4MI	170	123	6	125460
40	W1VXV	175	117	6	122850
41	DF2MC	227	87	6	118496
42	GM0/WN1G	232	99	5	114840
43	KF0LZ	225	83	6	112050
44	UO4OF	217	85	6	110670
45	WB8YJF	156	100	6	93600
46	DL9GGA	160	97	6	93120
47	IV3UT	147	92	6	81144
48	KE4BM	148	88	6	78144
49	IV3FSG	166	77	6	76692
50	NA2M	171	88	5	75240
51	HZ1AB	165	71	6	70290
52	EA2CNG	126	91	6	68796
53	WB4TDB	116	89	6	61944
54	I2HWI	139	73	6	60882
55	VK2RT	210	57	5	59850
56	VE7BTO	160	72	5	57600

Nr	Call	QSO	Multi	Con	Pts
57	WA6WGL	123	76	6	56088
58	KS4S	138	79	5	54510
59	IK0CNA	140	77	5	53900
60	DK3GI	119	74	6	52836
61	KE9CU	115	75	6	51750
62	VK6GOM	156	55	6	51480
63	W4IF	129	79	5	50955
64	K0BX	105	77	6	48510
65	N3HSH	103	77	6	47586
66	SP4MPH	151	78	4	47112
67	OK1AJN	111	82	5	45510
68	SV2BFN	181	62	4	44888
69	S53AA	143	49	6	42042
70	W2JGR/0	116	58	6	40368
71	VE5SF	105	61	6	38430
72	4M5KWS	161	45	5	36225
73	ND1H	124	57	5	35340
74	LA3YU	109	57	5	31065
75	YL2KF	94	63	5	29610
76	N2CQ	84	70	5	29400
77	KA1CLV	83	69	5	28635
78	EA3BT	95	69	4	26220
79	DF5BX	74	59	6	26196
80	OZ5MJ	78	59	5	23010
81	SM5AAAY	102	44	5	22440
82	IK0PHW	86	52	5	22360
83	DF2UA	67	55	6	22110
84	KC9UU	68	56	5	19040
85	DJ2YE	85	54	4	18360
86	G3HJC	56	49	6	16464
87	IK2KW	54	49	6	15876
88	KA3DSX	81	39	5	15795
89	K8CV	58	51	5	14790
90	EA5FEL	94	39	4	14664
91	WN1E	73	47	4	13724
92	HB9HLE	54	41	6	13284
93	WB6SU	55	40	6	13200
94	K4PF	66	49	4	12936
95	W8VLK	62	41	5	12710
96	WA0WHT	51	33	6	10098
97	DK5KJ	50	39	5	9750
98	IK2NVE	46	40	5	9200
99	DL5JWL	44	39	5	8580
100	JA3LDH	43	38	5	8170
101	WA3RRS	44	34	4	5984
102	DL6NDN	40	36	4	5760
103	DJ6TK	40	35	4	5600
104	YO3CDN	55	30	3	4950
105	VK3JI	25	20	6	3000
106	EA4BNQ	37	27	3	2997
107	SP9LKS	34	25	3	2550
108	RL6P	24	20	5	2400
109	KA8OUT	27	22	4	2376
110	VE3BXA	48	24	2	2304
111	IK7TAJ	35	20	3	2100
112	N7WKG	57	36	1	2052
113	DL6SWR	21	21	4	1764
114	IK1TWC	20	15	2	600
115	UA6LP	15	13	2	390

## Single Operator 10 Meters

01	ZD8LI	509	62	5	157790
02	UT5RP	105	36	6	22680
03	S53MJ	102	34	6	20880
04	HB9BCK	69	21	6	8694
05	JR4GPA	39	21	4	3276
06	SP2UUU	4	4	3	48

## Single Operator 15 Meters

01	NN2G	318	75	6	143100
02	OH2GI	294	61	6	107604

Nr	Call	QSO	Multi	Con	Pts
03	G0ARF	170	50	6	51000
04	IV3KCB	160	51	6	48960
05	JE2UFF	105	50	6	31500
06	HPIAC	119	26	4	15470
07	UB5LBX/QRP17	24	4		11232
08	VE6KKR	96	21	3	6048
09	OM3CPS	38	21	5	3990
10	LA5RBA	26	10	2	520

## Single Operator 20 Meters

01	4M5RY	425	81	6	206550
02	S5IDX	381	73	6	166878
03	G0ARF	183	54	6	59292
04	I2KFW	164	53	6	52152
05	VP5JM	225	37	5	41625
06	VE7RA	149	43	6	38442
07	WF5E	155	36	6	33480
08	SP4CHY	107	45	6	28890
09	RT4UZ	160	36	5	28800
10	VK3EBP	75	46	5	17250
11	GOMBQ	73	33	6	14454
12	HA8AL	82	25	4	8200
13	GM4RGV	67	35	3	7035
14	K9RRB/3	41	28	5	5740
15	YU7AE	60	27	2	3240
16	SP0RTR	43	24	2	2064
17	W3KV	20	17	6	2040
18	SP4OZ	35	17	3	1785
19	JJ1LRD	6	6	2	72

## Single Operator 40 Meters

01	W2UP	116	34	5	20060
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## Single Operator 80 Meters

01	OE2DN	116	42	5	24360
02	LY1BZB	51	18	2	1836

## SWL

01	ONL383	454	179	6	487596
02	G6LAU	214	136	6	174624
03	I1-1169-GE	198	106	6	125928
04	DE0GMH	159	106	6	101124
05	G8CDW	165	82	6	81180
06	BRS27239	170	81	4	55080
07	Thom Fraisl	80	113	6	54240
08	ONL3997	74	54	6	23976
09	17-1237/BA	115	58	3	20010
10	IV3990	56	42	4	9408
11	OM3-27707	43	34	4	5848
12	SP4-208	42	29	3	3654
13	DE1VSP	25	22	4	2200

Check Logs: HH2PK, KC7IV/KH6, G4SKA, URE-102-GC, LA6VIA, SM5APS, VE6KRR, G0EFB, LA4WJ, G4YPN, GD3HDL, SK5PZ, CT1AUR, VK2BQS, SP2UUU, SM6BSK, SM4CJY, SM5EIT, DK7FPT

Countries Active: 5U, ET, 7Q, V3, HH, HZ, VS6, 5R, ZD8, OD, 4X, HC8, ZP, 9K, FG, VP5, KP2, FK

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