

DECEMBER 1980

RTTY

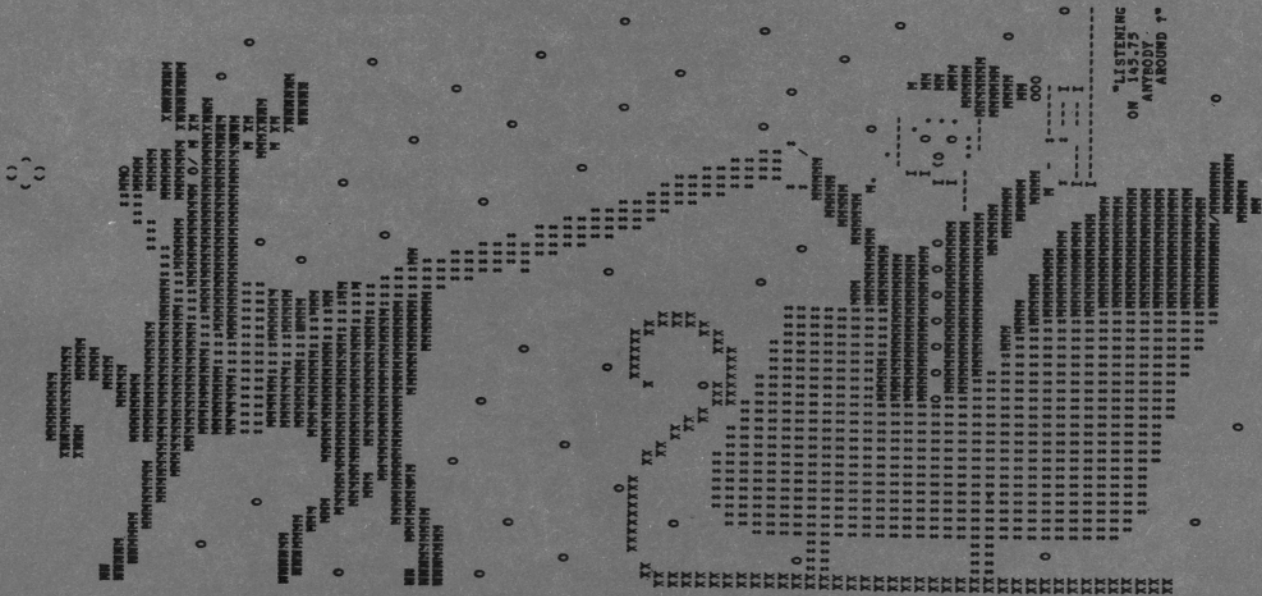
Journal

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Along with announcing that they have changed their manufacturing location, and corporate name, the "INFO-TECH" gang has also announced a super new product for the RTTY, CW and ASCII enthusiast! Now known as Digital Electronic Systems, Inc., and located in Englewood, Florida, they will still be serving up the best in digital electronic equipment, under the trade name of "Info-Tech".

The new "Info-Tech" Model M-200-F, tri-mode Converter, was announced in late April 1980, and it has so many outstanding features, I only hope that I can tell you about the more important ones! This demodulator is designed to accept audio from your station receiver, and convert it to video, in RTTY, CW or ASCII formats. It will also drive your favorite page printer, line printer etc., and provide you with Autostart operation, should you desire it. It will copy most anything on the Ham bands today, and with the addition of the new "variable space filter" arrangement, you can now copy all of those "weird" shifts you see being used by commercial and press stations! It will demodulate anything from 5 words-per-minute CW, to 300 Baud ASCII, including speeds of 60, 66, 75, 100 and 132 WPM Baudot, 110 and 300 Baud ASCII, and 5 to 60 WPM Morse Code (higher speeds are user adjustable). These speeds are user selectable by a front panel switch. Three standard shifts are front panel selectable, 170, 425 and 850 hertz, and if you run into a shift someplace in between, the "variable space filter" may be selected for tuning a range of 2000 to 3000 hertz! It works, and it works without a lot of hassle and fiddling.

The output to your video monitor is user selectable in several very nice formats. You may select 16 lines of 32 characters, 25 lines of 32 characters, 16 lines of 72 characters, or 25 lines of 72 characters. The vertical refresh rate is user selectable, as is the use (or non-use) of an active cursor. The video is negative synch, 5X& matrix information,

and provides for clear sharp characters.

In addition to the video output, the M-200F has been thoughtfully designed to provide data outputs in several different modes, allowing the user to drive almost any serial input peripheral device available today. For instance, it has TTL level output from the demodulator, 20 or 60 ma loop outputs, RS-232 output, audio output (to drive a small speaker), oscilloscope output (for monitoring incoming RTTY/ASCII tones), and an Auto start output. It will interface directly with most of the serial input page printers available on the market today., whether driven directly (like RS-232C), or driven through the traditional loop circuit. Consequently, you have the best of two worlds, both quiet video, (keeps the XYL happy!), or hard copy from your page/line printer.

For those of you who would like to exchange computer programs via ASCII, or really draw some intricate pictures for transmission using ASCII symbols, the M-200F does a good job of demodulating 110 and 300 baud ASCII. The bandwidth of the demodulator front-end is controllable via a "narrow/wide" switch on the front panel, allowing the user to compensate for the wider bandwidths associated with the increased baud rates. If you think that 100 WPM Baudot will spit out the data, you ought to see 300 Baud ASCII tripping across a screen!!

A most welcome addition to the demodulator is the CW "bandwidth" control. It allows the user to narrow or widen the demodulator CW front-end allowing for greater operating convenience, particularly when bands are crowded. It was found to be effective and generally the M-200F does a superior job of handling CW, whether at low speeds, or humming along at 60 WP.!!

A unique and very effective tuning aid has been included in this unit. It consists of a LED Indicator Array, which quickly spells out the status of the unit, and defines how to tune an incoming signal. It has two LED's that indicate reception of the Mark and Space tones. A second LED indicates when the 40 character buffer is full (used for a small amount of down

speed conversion). Another LED indicates when the power is "on", while another LED indicates the correct tuning and reception of CW signals. A separate LED shows when the Autostart circuit is functioning. It also contains a "bar graph" indicator, consisting of several LED's, which allows the user to properly tune an incoming signal, much as one would use an "S" meter on a receiver. The Indicator Array system was found to be very informative, and easy to use.

The operating manual supplied with the M-200F contains clear, concise and easily understood instructions for installing and utilizing this demodulator. It has several examples of ways to set it up within your system and/or equipment. But best of all it has not only a complete schematic diagram of the unit, but a complete parts list as well! (Have you ever tried to troubleshoot a piece of digital equipment when only a "block diagram" was included????)

RTTY/CW/ASCII operations become a very enjoyable, relaxing and informal modes, when the M-200F is included in your operation. Its well thought out design, coupled with its micro-processor based system, make for a lot of fun and performance, without the associated problems of some systems. I am sure that I have neglected to comment on some of the various features of this unit. But, I hope that I have provided enough of a review to whet your appetite. I will be more than happy to attempt an answer to your questions concerning the M-200F. In order that my postage bill not resemble the National Debt, a SASE would be appreciated. Phone calls, as well, are welcome (605-343-6127). See you on RTTY!!.



ASCII RTTY EXPERIMENTS

BY CLAYTON W. ABRAMS, K6AEP

1758 Comstock Lane
San Jose, CA 95124

Since permission has been granted for RTTY ASCII transmission a whole new world is open to Radio Amateurs. My involvement with RTTY is a short one. I found it difficult to get interested in RTTY in the BC days (Before computer). The thought of a mechanical monster banging away in the Ham shack left me cold. Approximately 3 years ago, I developed my first RTTY package for a 6800 microprocessor. However, with the FCC ASCII permission, my enthusiasm for RTTY was revised. ASCII transmission allows Amateurs to explore different modes of data transmission. My first thought was to develop a software package which will allow software sources to be exchanged over the air.

Since 1971, I have been running schedules with Amateurs in Australia. Most of our experimentation to date, has been SSTV. In 1977 I encouraged a few hearty Hams down under to obtain 6800 systems. I provided a few SSTV software packages to them and our experimentation continued.

In early 1980 I embarked on the 1st ASCII RTTY package. I decided to place in the program (RTTY5) disk linkages to and from my FLEX 2 disk operating system. This would allow me to place received data directly on disk, edit it, and then print it with my word processing software. After a few attempts I had the program functional by transmitting to and from a tape recorder. My testing with the tape recorder indicated that my off the shelf demodulator functioned error free at all speeds including 300 baud. I spoke with Doug McArthur, VK3UM on our weekly schedule and offered him a copy of the software if he agreed to conduct some experiments over the air.

Since our computer systems and software were similar, the results obtained would be a function of propagation. The system configurations are

HARDWARE

1. 6800 system, 48K RAM, 5.25" disks.
2. SWTPC CI-82 Terminal
3. Xmitter (K6AEP), 1KW PEP, ATB-34 beam at 50 feet.
4. RTTY AFSK-standard 60 WPM tones (170Khz shift)
5. RTTY Demodulator-Flesher DM-170.

At the time the software was developed no standard or convention exists for the transmission format of ASCII. I decided upon the following format for experiments:

ASCII FORMATS

1. Seven bit ASCII, no parity 2 stop bits.
2. Eight bit ASCII, no parity 2 stop bits.

We started our experiments on May 17, 1980 on 21 Mhzs., and continued to early August 1980. They were interrupted for a 3 week business trip. We decided to transmit a standard message of approximately 200 letters in upper and lower case. The text consisted of RY's and the "Quick brown fox.." message. We would start at 60WPM Baudot and gradually increase the speed to 300 Baud ASCII. In most cases my signal varied for S5 to S8 at Doug's house. All experiments were conducted on 21 Mhz.

CONCLUSIONS

The following graph summarizes our results to date. Each data point on the graph is an average of all data points for the data pattern and speed. Obviously, it is difficult to draw conclusions from such a small amount of data, however, it can be summarized as follows:

1. ASCII appears to produce less errors than Baudot. Most errors in ASCII result in lower case letters printing as upper case. In Baudot the loss of a shift caused most of the data errors.
2. A baud rate of 110 baud ASCII produces the highest error rate of any speed. We suspect that this is due to some sort of multipath fading between California and Australia. This condition was verified by Bob, VK4XV, when we attached an oscilloscope to his demodulator while receiving my signal. He could see bit drop outs on 110 baud RTTY.
3. Seven bit ASCII produces error rates slightly lower than eight bit ASCII.
4. Standard off the shelf components, like the Flesher DM-170 function well at up to and including 300 baud ASCII

THE FUTURE

Obviously, it's too early to draw firm conclusions. I plan to conduct further experiments with Eric, HP1XAW. I'm sure the propagation path between Panama and California will be different, and could produce different re-

sults.

However, it looks as if 300 baud ASCII is an excellent speed for data transmission on HF frequencies, and my early results indicate the performance to be equal to or better than 60 WPM Baudot.

If you wish to follow the sequel of our RTTY experiments, tune in on our 6800.6809 net on Sundays 01:00/02:00 GMT on or near 14250 Khz.

See graph on page 7

~~~~~

FROM TELEPRINTER CORPORATION VIA NEIL K9WRL-UPDATE ON MODEL 32 WIRING CONNECTION IN NOVEMBER JOURNAL

"The unit you describe as a "TELEX" call control is also known as a "UCC-9" or "UCC-2" call control unit. While the unit most usable for amateur "private line" service is the UCC-5. We still have a series of machine in which we use the UCC-2 or UCC-9 and have about 40 of the UCC-5 type unit.

I'd propose to supply a good checked UCC-5, wired appropriately for 60 ma dc loop, ready to plug in and operate with wiring diagram for reference, postpaid in US in exchange for a complete UCC-2 or UCC-9 and \$20 to cover testing, handling and postpaid delivery."

Teleprinter Corporation further states that they can supply other parts for all Teletype models. Their address is : Teleprinter Corporation, 550 Springfield Avenue, Berkeley Heights, New Jersey, 07922. Thanks Neil for sharing your letter with our readers.

~~~~~

HELP*HELP*HELP*HELP*HELP*HELP*HELP*

The JOURNAL is in need of articles (what's new?) This is your magazine Amateurs, send us your home-brew type what you did to it article, as well as innovative ideas for equipment that you would like to share with others. Don't be bashful your article need not be in perfect English (who uses perfect English now-a-days). A few pointers: any schematic should be in the blackest ink possible, same thing regarding pictures, black & white are best as the camera does not see red and most yellow as anything but black some pictures in color look "good" but not to the camera. Hope to hear from you perhaps with only a black & white pix of you and your shack?DEE

UNSURPASSED RTTY

No other RTTY terminal made gives you ALL the features of our new DS3100 ASR:



- TX/RX operation with 3 codes: Baudot RTTY, Morse Code, ASCII RTTY
- Storage buffers for 150 lines of RX storage and 50 lines of TX storage
- The HAL "original" split screen shows both RX and TX buffers or whole screen for RX
- Ten programmable "Here Is" messages can be chained from one to next
- The EAROM allows power-off storage of 2 "Here Is" messages and terminal operating conditions
- Programmable WRU answer-back and selective-call features
- Separate CW identification key for RTTY operations
- Automatic TX/RX control with KOS plus 4 keyboard controlled accessory switches
- Internal real time clock keeps 24 hour time plus date
- Newly developed CW receive circuitry and programs give superior CW reception
- New green, P31 phosphor display screen gives clear, eye-easing viewing
- On-screen status indicators give continuous display of terminal operating conditions
- Word-Wrap-Around prevents splitting of words at end of display line
- Continuous, line, and word modes offer flexibility in editing transmit text
- Attractive streamlined metal cabinet gives effective RFI shielding from transmitters

Here Are More DS3100 ASR Specifications that Give You State-of-the-Art RTTY Operation:

QBF and RY test messages ■ Loop and RS 232 RTTY I/O ■ Plus or minus CW key output ■ 25 pin EIA modem connector ■ Half or full duplex ■ Upper-lower case ASCII ■ All ASCII control codes ■ Optional line printer for all codes ■ Selectable ASCII parity ■ 110 to 9600 baud ASCII ■ 45 to 100 baud Baudot ■ 1 to 175 WPM Morse receive and transmit ■ UnShift on space for Baudot ■ SYNC idle for RTTY and Morse ■ Break key for RTTY ■ Tune key for Morse ■ Automatic CR-LF ■ 120/240 v, 50/60 Hz power ■ Custom labeled key tops show control operation ■ Copy receive text into transmit buffer ■ TX flags allow segmenting of TX buffer ■ One year warranty ■ Price \$1995.00



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• RTTY-DX •

Skip Prinsen, WB6CYA-3611 Merrimac, San Diego, CA 92117. (714)276-3182

SEASONS GREETINGS TO ALL.....

I sure hope that everyone has a nice Holiday season as we move into another year. It hardly seems that the year is about to pass us up. Time sure has a way of getting out of hand on us.

I have received my QSL card from the VP5AH operation and with it a nice note from Al, WA4DRU. He states that the propagation was not too good but he did manage to make quite a few contacts before and after the CQ WNDX contest, the reason that he went there in the first place. Al did promise that in the future he will let us know what he is doing so that we can be on the lookout. He has also operated from VP1AH maybe someone can talk him into going there again with his RTTY gear.

CARFNET—the Canadian Amateur Radio Federation's 20 meter teletype traffic net has added a mid-week session which will meet on Thursdays at 0030Z. That corresponds to Wednesday evening across Canada. The frequency is 14.078 Mhz. and those stations using five level Murray code are welcome. CARFNET also meets on sundays at 2000Z on 14.078 Mhz.

The WAEDC is now past history and was definately a well operated contest with a few exceptions of some of the entrants. For the most part I was proud of the Amateur Service as a whole. Though there were several that need to reflect on what Amateur radio is and that it is a fun hobby and not a dueling ground. On several occasions I had people jump right into the middle of a QSO for fear that they would miss the BIG one. I will not mention names or call signs and I am sure for the most part that I do not have to as many operators will know who I am referring to. Enuff said about that.

I was able to work three new countries during the contest and was very pleased to be able to get over the hump on at working over 100 countries. I never thought I would get there. Now the painful wait for the cards to come in. In light of that,

the DX HONOR ROLL will be printed in the next issue of the JOURNAL. So now is the time to get the updates in the mail so I will have them in time for January's issue. I need the number that you have worked and the number that you have confirmed ie 101/97.

Here is a listing of some of the stations that have been active during the past month or two:

A22PS
EA6HH Paco, POB 352, Palma de Mallorca, Balearic Island.
8P6AY, 8P6JG
3B8RS via DJ6QT
OD5MR 10 meters 1600Z.
VU2ABV 10 meters 1600Z
UAOCBQ 10 meters 0200Z.
VP5AH via WA4DRU.
DK5BD/ST2
ST2SA 20 meters.
SV8C5 box 564 Athens Greece SV1LH Jim Athens.
SVOAP Crete Via WB7NCF
CN8BI Morroco via IOUWG, Box 29, Frosinone 03100 Italy WB3JRL/CN8
VKOKH Ken Via VK5WV
A7XD
ZF1GC 20 meters 0100Z ZF1HJ Jack using robot all low bands.
OE3PHA 10 meters 1500Z.
OX3ZZ 10 meters 2230Z.
PY2DNR
CE6AFK CE3CEW.
9J1BX
KP4ANG
NP4AR
HL9UD
FP8DF
VS5TX 20 meters 1500Z Bruinei
9H1FA Mario 9H1GC
EA8FO EA9FK
UT5RP UV3FD
EL2AD.MM
XT2AW via KN1DPS
GJ3FKW Ken
FM7BW Bob via WB4IWW
5Z4RT-5Z4YV, Mel via JA2AJA; 5Z4AA
ZP5COG Pedro
ZS1HF
TG9GI QSL via K8HV.
TU2JJ 20 meter 0200Z.
F08FN
DU1POL 20 meters
Thats all for this month folks, so til next time best to you and yours SKIP.

HAM HELPS

Richard Pade RR2, Indian River, Ontario, Canada KOL 2B0, Richard writes that he is an SWL and is looking for an RTTY reader at a small price. Has anyone got one that they are willing to part with and help a fellow out?

Ken Moody, K6SAD/KH2, 22288 McMillen Dr., NAVSTA Guam, San Francisco, CA 96630. Ken is in dire need of a good terminal unit. He now has one on the air but it is very marginal and can't print many stations due to the shape of his TU. He would like beg, borrow or steal an ST6 or DT600 or equivalent.

George Hopkins, VE3KZY, 106 Elmer Ave, Toronto, Ontario M4L 3R8 Canada.

George writes that he has just gotten started with a Utec teletype and would like to get some information on it? Can anyone help him out?

Don MacDonald, VE7AKW, 1216 E. 22nd Ave, Burnaby Canada V5G 1W8. Don asks for drawings on a video display unit Model #872 by Leland Associates, a company long defunct. Does anyone have the schematic for this unit that can give Don a hand?

AWARDS SECTION

DXCC STICKER # 140 to Reg Wigg, G6JF.
DXCC # 48 3 November 1980 to Syd Mollen VK2SG.

DXCC # 49 3 November 1980 to George Dansen, W2IUC.

DXCC # 50 10 November 1980 to Bruce Frahm, K0BJ.

Worked All States to Giuseppe Loreti, IOAOF.

Worked All Continents to Andrei Giurgea, YO3AC.

I would like to note that Andrei YO3AC earned his w.a.c. in the time span of 5½ hours, can anyone match that one???? Super job Andrei.

KONTEST KORNER

Volta	Dec. 1980	no info
Australia-Oceania and		
Asia Flash	24-25 Jan. 1981	Dec. 1980
BARTG	21-22 Mar. 1981	Dec. 1980
North & South America		
Giant Flash	28-29 Mar. 1981	Dec. 1980
Europe & Africa Giant		
Flash	23-24 May 1981	Dec. 1980
Vk/ZL/Oceania	June 1981	Coming
SARTG	August 1981	Coming

HITS & MISSES

George Hammon WA6CQW
 14215 Pecan Park Lane SP 73
 El Cajon, CA 92021

FROM
 THE
 MAILBAG



CAICOS ISLAND

Allen Harbach, WA4DRU sent me a short note and QSL card for his operation as VP5AH. To my knowledge this is the first time VP5 has been on the air on RTTY. Allen went there to take part in the CQ WW DX contest. The equipment he used was TR-7 to all band diploe. He used home made electronic type with video display. Allen plans on future DX locations with RTTY.

COMPUTER HAM RADIO NETS

TYPE	DAY & TIME	FREQ.
Apple	Sun. 0200	14329
Apple E Coast	Sat. 1300 GMT	7260
Apple Boston	Wed. 0100	144.65/ 145.25
Atari	Mon. 0100 GMT	14329
Digital Group	-sat. 1600	14281
" "	Sat. 2200	7190
SWTP-6800	Sun. 0200	14250
TRS-80	Sun. 2000	14342
" "	Sun. 2300	14342

APPLE SOFT CONTEST

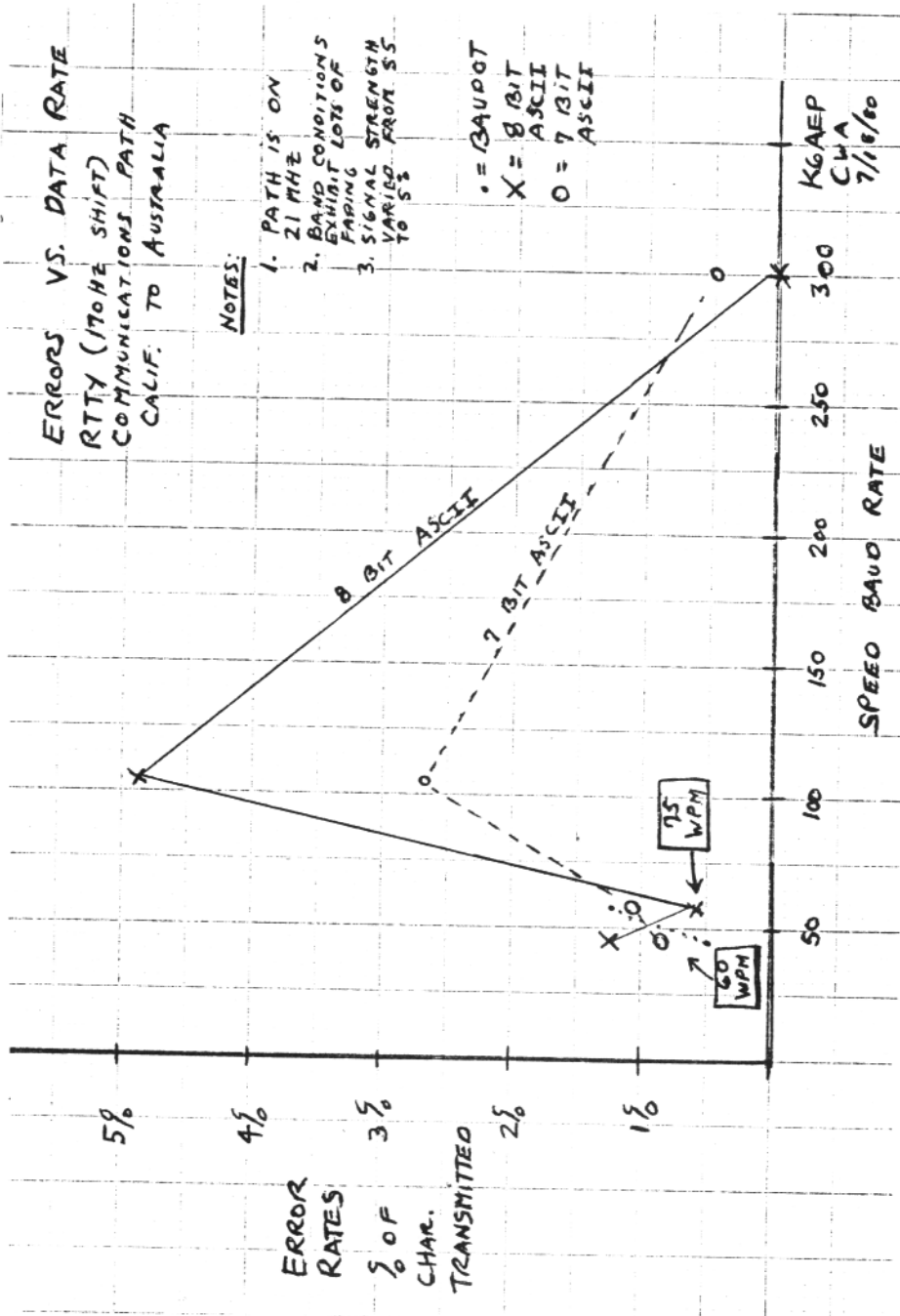
Al Jensen, WA7TIB, 1911 First Ave., Seattle, WA, has an Apple program called "Contest", cost \$14.95 on cassette, \$19.95 on diskette. This program not only logs Amateur contacts but also checks to see if you worked a particular station before.

FCC REFUND

Just another reminder on FCC refunds. Amateurs paying fees of \$20.00 or less, but more than \$4.00 for licenses between August 1, 1970 and February 28, 1975 may be able to get a partial refund.

I wish everyone a nice Thanksgiving Holiday. The year has passed so fast. I had hoped to get DXCC this year but I guess I will have to make that my New Years resolution. I wish to thank all of you enclosing a photo with your QSL. I will turn them in to Dee for publication in the JOURNAL as space permits. (Black & white photos are best). So long for now.

GEORGE, WA6CQW



CONTESTS**CONTESTS**CONTESTS**CONTESTS**CONTESTS**CONTESTS**CONTESTS**CONTESTS**CONTESTS**

RESULTS OF THE 1ST DARC+CORONA+RTTY CONTEST OF 15th MARCH.....

CALL	SCORE
1. YU2RQX	2745
2. G3UUP	2640
3. I5FZI	2255
4. HB9LP	1872
5. WA6WGL	1540
6. SM5EIT	1380
7. DK8FS	1260
8. I5CBF	1204
9. OK1WEQ	1008
10. OZ9GA	770
11. DFØHX	756
12. DL1VR	700
13. DL2FAR	476
14. EA3BLQ	228
15. DJ1XT	220
16. DL4GJ	198
17. DJ9IR	170
18. DLØHV	135
19. DF6ZY	126
20. I5YNQ	56
21. G3HJC	18
22. YU2CB	8
23. G4HYD	2

GROUP B

1. Ballenberger	1998
-----------------	------

Check log: OK3VSZ/P

RESULTS OF THE 3RD DARC+CORONA+RTTY CONTEST OF 27th September 1980

CLASS A:

CALL	SCORE
1. N8ES	2340
2. DL5GAS	1739
3. WB2UEF	1548
4. OZ1CRL	1209
5. DF6ZV/A	1120
6. WA6WGL	962
7. ADØV	945
8. G3HJC	851
8. I5CBF	851
10. SL5AR	828
11. EA3BQQ	608
12. IØWBX	580
13. OK3KII	400
14. OK1WEQ	375
15. DL4GJ	364
16. G4HYD	325
17. EA3BLQ	322
18. DF8FD	231
19. W5TZB	84
20. DF6ZY	63
21. LA2IJ	50
22. LA7QM	25
23. Y3Z2F	18
24. Y53UA	2

CLASS B:

1. Ballenberger	972
2. Werner Ludwig	580
3. OK1-20677	252
4. Y2-7111/A	144

B.A.R.T.G. SPRING RTTY CONTEST 1981

When- 0200 GMT Saturday March 21st until 0200 GMT Monday March 23rd 1981
The total contest period is 48 hours but not more than 30 hours of operation is permitted. Time spent listening counts as operating time. The 18 hour non-operating period can be taken at any time during the contest but off periods may not be less than 3 hours at a time. Times on the air must be summarised on the Summary sheet.

WHO-There will be separate categories for Single Operator, Multi Operator and Short Wave Listener Stations.
BANDS- 3.5, 7.0, 14.0, 21.0, and 28.0 Mhz. Amateur Bands.

STATIONS- Stations may not be contacted more than once on any one band but additional contacts may be made with the same station if a different band is used.

COUNTRIES- The ARRL COUNTRIES LIST will be used and in addition each W/K, VE/VO and VK call area will be counted as a separate country. Note: W/K, VE/VO and VK count once only for QCA purposes.

MESSAGES-Messages exchanged will consist of: a. Time GMT. This must consist of a full four figure group and the use of the expression "Same" or "Same as yours" will not be acceptable. b. RST and Message #. The message must consist of a three figure group starting with 001 for the first contact made.

POINTS- Points can be claimed as follows: a. All two-way RTTY contacts with other stations within one's own country will earn two points. b. All two-way RTTY contacts with other stations outside one's own country will earn ten points. c. All stations can claim a BONUS of 200 points for each country worked, including their own. Note that any one country may be counted again if worked on a different band but continents are counted once only. Note: Proof of contact will be required in cases where the station worked does not appear in any other contest log received or the

station worked does not submit a check log.

SCORING-a. two-way contact points times total of countries worked. b. Total country points times 200 times number of continents worked. c. Add a and b together to obtain your final score.

LOGS AND SCORE SHEETS- Use a separate sheet for each band and indicate all times on the air. Logs to contain: Date, Time GMT, Callsign of station worked, RST and message # sent, Time RST and number received and points claimed. NOTE: Logs received from short wave listeners MUST contain both the full report sent and received by the station logged. Incomplete loggings are not eligible for scoring. The summary sheet should show the full scoring, the times ON the air and in the case of multi operator stations, the names and callsigns of all operators involved with the operation of the station. ALL LOGS MUST BE RECEIVED BY MAY 31st, 1981 IN ORDER TO QUALIFY.

SUMMARY AND LOG SHEETS- are available from the Contest Manager at the address shown below as follows: In the UK on receipt of a large stamped addressed envelope of at least 9" x 6". All other countries require 2 IRC's to cover cost of postage.

Send your contest or check log to: Ted Double, G8CDW, 89 Linden Gardens, Enfield, Middlesex, England EN14DX. The judge's decision will be final and no correspondence can be entered into in respect to incorrect or late entries and all logs submitted will remain property of the BARTG.

Certificates will be awarded to the leading stations in each of the three classes, the top station on each continent and to the top station in each W/K, VE/VO, and VK call area.

Additional notes-If a contestant manages to contact 25 or more different countries on 2-way RTTY during the contest a claim may be made for the Quarter Century Award for which a charge of 3 dollars US or 15 IRC's is made. Send with your log.

If contestant manages contact with each of the six continents and BARTG has received a contest or check log from them you may claim WAC Award from THE RTTY JOURNAL.

THE BIT-BYTER CONTINUED

FROM NOVEMBER'S HITS & MISSES COLUMN.

The connector from the Bit-Byter uses the "screen Printer" port when connected to the expansion interface.

General information for machine code programmers. This device has a port address "0F" in hex. Loop control is on the do bit. Relays are on the D1 and D2 bits.

Level II Basic Statements: Out 15,0 turns off both relays and closes the loop. Out 15,1 opens the loop. Out 15,2 operates one relay. Out 15,4 operates the other relay.

ading: Level I loads with the load command. Level II Loads in the system mode with the file name RTY-80.

If you later purchase a disk drive, you may easily put this program on disk with a program "DCV" from small system software in CA. or a program "LMOFFSET" which is part of Newdos+ from Apparat in Denver, Colorado.

The program will come up in the receive mode. Copy off the air should scroll across the bottom of the screen. You may now preload your transmission into the buffer while in the receive mode.

The counter on the screen will display the amount of buffer used and will decrement as each character is transmitted.

Your call letters are customized into the software. Shift "I" sends DE XXXXX in Baudot. Shift "D" sends de XXXXX to the CW ID relay.

Automatic return to the receive mode...When shift "R" followed by at least one space is found in the buffer (typically after shift "I" and shift "D"), the program will return to the "receive" mode automatically and resume printing from your radio.

Shift "Q" sends one line of CQ CQ. Shift "Y" sends one line of RYRYRY. Shift "T" sends "The quick brown fox" etc.

When the buffer is empty and you are still in the transmit mode, each new word is transmitted only after the space bar is hit. This allows for error correction with the backspace key.

Any time the buffer is empty you will transmit a "diddle". Shift "*" (asterisk) changes to the transmit mode. Shift "=" (equal) changes to the receive mode.

The "clear" key clears the buffer.

If the buffer is not cleared then its contents may be re-transmitted by going to the receive mode and then back to the transmit mode. Do not be alarmed about the counter going negative in this case, since there was nothing to increment the counter.

Speed selection: 60 WPM=shift "S" for slow. 100 WPM=shift "F" for fast.

Software features.

1. Split-screen operation..Received information is scrolled across the bottom two-thirds of the screen and the transmit buffer is scrolled across the top third of the screen with a status banner separating them.

2. Works equally well with a level 1 or level 2 computer.

3. Automatic station operation..PTT and CW ID under software control. Automatic return to the receive mode at end of transmission from keyboard command.

4. Your call..customized into the software to provide" Shift "I" sends de XXXXX in Baudot."Shift "D" sends de XXXXX to the CW ID relay. New. Shift "Q" sends a line of CQs. "Shift "Y" sends a line of RYs."Shift "T" sends the quick brown fox. "Shift "R" automatic return to receive.

5. Speed control, Keyboard selection (receive or transmit) of 60 or 100 WPM.

6. On screen status: Counter shows amount of transmit buffer used. Mode shows 'transmit' or 'receive'. Speed selected is displayed I.E. 60 WPM or 100 WPM.

7. Word edit.transmits a word when space bar is depressed..Mistakes in a word can be edited prior to transmission.

8. Automatic carriage return.

9. Buffer size..The software "Discovers" how much MEMORY you have. 4K greater than 1,400 characters available, 16K greater than 14,000 characters available.

Hardware features

1. Simple installation.Just put in series with your 60 MA loop.

2. Completely shielded. This cannot be overemphasized.

3. Complete loop isolation through optp-isolators.

4. CW ID relay sends required CW ID.

5. PTT relay controls transmitter status.Can be used with external diodes to control TU Also.

6. Interface unit keys loop from computer and reads loop into the computer. It is essential that your AFSK

unit be keyed from the loop.

7. Self-contained regulated power supply.

8. Assembled and tested.

9. Metal cabinet matches your TRS-80.

10. Specify name, address, call letters and level 1 or level 2.

The cost is \$129.00. See classified ad in November.

HAL ST-6 MODIFICATION...

BY J.L. KOFRON, K7GW
2038 Palm Street 225
Riviera Vegas Park
Las Vegas, NV 89104

Here is a simple modification for the HAL ST-6, that should be of value to those using electronic keyboards.

On our two meter auto-call net, I plug my tape recorder into the 120 volt jack on the ST-6, and feed the RTTY tones from the 20 MV AFSK jack into the mike jack of the recorder. Whenever I receive RTTY tones, the ST-6 will turn on the recorder and record the message for later play back.

The five second turn on is too long using this method. By removing the wire between the "slow/fast" switch and the "auto/motor" switch you can get one second turn on, with the switch in the "fast" position. With both switches in the up position you have normal "slow" action. Both switches down you have normal "fast" action. So, with this mod. you lose nothing and gain better control over your terminal unit.

The above mod. is usable for both a video terminal and a page printer. If you use only a video terminal, the thirty second turn off can be reduced to three seconds by paralleling R-431, 1 Meg ohm (on board #4) with a 100K ohm resistor. The value of the resistor can be changed for the turn off time you desire. The smaller the resistor the quicker the turn off, and the larger the longer the turn off time.

Use a current limiting resistor, if it is not built into the LED assembly.

The ST-6000 may take this mod also. 73's Joe.....

Since getting a microprocessor-based "home computer" working at G3-PLX, some time has been spent using it to perform many of the functions of conventional RTTY equipment. However, the flexibility of the MPU also made it possible to experiment with techniques other than the well known stop-start RTTY code. In the UK we are permitted to carry on experiments of this sort on 2 meters and above, and so no time was lost in trying out synchronous systems, where no start or stop bits are sent, and the clocking of data is done by accurate frequency standards at both ends. Some "forward-error-correction" codes were tried, where additional checkbits sent with the data enable the receiver to correctly reconstruct the original data in the event of some erroneous bits. The proved promising, being about the 6db better than conventional RTTY. Another area explored was the "ARQ" technique where errors at the receiving end are detected by the use of extra "parity" bits, and an Automatic Request for the repeat of the bad character is made by the receiving station. One such system, which needed both stations to operate in duplex mode, gave spectacular results via OSCAR satellites, being completely immune to fading, interference, and errors associated with keeping the receiver on tune. Loss of signal merely caused temporary pauses in the traffic. Adapting this system to everyday Amateur operating practice proved difficult, until the "discovery" of an "ARQ" system already in use in the maritime service for telex traffic. This system can be used by two stations in simplex communications on the same frequency, by working in a synchronised quick-break fashion. The results with this system on the air were similar to those of the duplex technique, and so it became clear that it would be very useful to Amateurs, not only on VHF, but also on the HF bands. Since this system is already an international standard (CCIR recommendation 476) and is in worldwide use, we had no difficulty in gaining permission for its use on HF by UK Amateurs. Commercially this system is known by various trade names such as Sitor, Spector, and Microtor, and so to avoid confusion with the commercial equipment, the name Amtor has

been devised to refer any Amateur use of the system described in CCIR 476. The remainder of this article is a description of how Amtor works, and I hope to show that this ingenious system could have a lot to offer., and that it can be readily implemented by modern MPU techniques, using either a "home computer" or a purpose-built unit,

FIRST PRINCIPLES:

Imagine two stations, A and B, in simplex communication on SSB, who wish to exchange messages reliably under poor conditions. If A sends, say, three words, then B replies with "Roger" or "say again". A then goes on to the next three words or repeats the last three. However, if A cannot tell whether B said "Roger" or "say again", then he will have to say, instead of three words, something like "please repeat", and B says "say again", then A gets completely confused and doesn't know what to say! This may sound trivial, but if we are to automate this verbal system ARQ system, a better system must be found

In Amtor, A sends three characters in a burst of synchronous frequency-shift data, with B sending the acknowledgement signals in the reverse direction as a single character. The solution to the above problem is to encode the acknowledgement signals differentially, using two control characters, called C1 and C2. When B is copying correctly, he replies with C1, and C2 alternately after each block, and if a bad block is received he repeats the same control code as last time. If A sends a "please repeat" block, then B repeats the same control code as last time. This B's reply is the same to a "please repeat" block as to an error, and so it doesn't matter if the bad block was a "please repeat" block.

In the SSB example, B knows when errors have occurred because he cannot recognize a word. This works because the number of recognizable words is a lot smaller than the number of different sounds, or put another way, language contains redundancy. The only errors that will pass undetected are those which transform one word onto another, and this can be minimized by careful choice of words. In a teleprinter system there are 32 "recognizable" characters,

normally transmitted by the 32 combinations of 5 data bits. If 5 data bits are used, any bit error will transform one character into another, and the error will pass undetected. In Amtor, 7 data bits are used, giving 128 combinations, of which only 32 are defined as "recognizable". Careful choice of which 32 are used minimizes the possibility of an undetected error. One would not, for example, have chosen two codes that only differed by one bit. In fact only those codes with three 0's and four 1's are used, making it easy to check for errors at the receiving end. There are 35 such codes, and so the three spares are available for control purposes. One, called the RQ characters, is used by the transmitting station to signal "please repeat", one is the idle character, known as beta, and the third, alpha, is explained later. The C1 and C2 codes, and another one, C3, explained shortly, are also 7 bit characters from the same set, but since they are always sent only in the reverse direction, they are never confused with the others. Conversion from Amtor code to standard teleprinter characters is shown in table 1. Note that this code is designed to translate easily to and from murray code.

The change-over in the direction of transmission is not left to the operators, who may get it wrong if the link fades out just before the expected end of an "over". The change over is signalled either by sending his over with the two character sequence +? or by the receiving station pressing a transmit button on his equipment. This, or the reception of +? causes the receiving station to stop replying with C1 or C2, but with C3. On receiving this, the sending station sends the block beta-alpha-beta. On receiving this, the receiving station changes to transmit, sending first an RQ character. On receiving this as a control code, the transmitting station changes to receive. The timing of the bursts of data from each station is such that even if, momentarily, both are transmitting blocks, each can still receive one character of the other's block in the position expected to be a control code, and the apparently

AMTOR CONTINUED

complicated process just described ensures that no matter what, the change-over process just described ensures that no matter what, the change-over proceeds in an orderly manner and cannot get stuck. The timing of the various signals is shown in fig.1, with some of the possibilities for errors. Note that the two stations do not behave exactly identically in their timing. One is called the master station, and the other the slave, for reasons which will become apparent shortly.

Performance:

Although Amtor, in common with any ARQ system, eliminates virtually all errors due to the radio link, it is worthwhile pausing to see exactly how good it is. A simple analysis can be made by supposing that the radio link alternates between perfect copy and perfect random noise. With only noise in the receiver, all 128 7 bit patterns are likely to be received, with 34 of these being acceptable (the RQ character is treated the same as an error). Thus the chances of a whole block of three being accepted by mistake is $(34/128)^3$, or about 1.9%. Thus, with no signal, the receiving printer will be idle for 98.1% of the time while the system is asking for repeats, and will be printing garble for 1.9%. This compares with 100% correct copy when the signal is good. From this it is possible to calculate the proportion of garble to good copy for various proportions of good signal to bad. A similar analysis for the reverse path shows that when there is no signal in this direction, 0.8 (1/128) of the message is unwittingly lost into thin air. The combined effect of these factors is shown in table 2

Synchronization:

Since Amtor is a synchronous system with no start and stop bits, the timing at both ends must be quite stable. Some means must be found to get the two stations in step, and to keep them that way over a period of time even if the two clocks are only slightly different in speed. The synchronization procedure starts with the first station (the master) sending a special sync. block repeatedly. The slave station continuously shifts in received bits until 21 consecutive bits correspond exactly with the ex-

pected sync. pattern. The slave then starts to reply in the gaps, sending back one of the control codes. The master station meanwhile, has been shifting in received data bits during the gaps in its transmissions, and when it recognizes 2 consecutive control codes it stops sending sync. blocks and changes to send traffic. In fact, to guard against the possibility of the slave station getting the sync. pattern right by chance, the master sends two different sync. blocks alternately, and the slave must get them both right to lock on. The first of these blocks has an Rq in the 2nd character, with 2 alphabet characters in the other two positions while the second block has two more alphabet characters in the first two positions, with an RQ in the 3rd. The RQ characters prevent the four alphabet characters from printing out at the slave station. These four characters can be chosen by the users, but must be agreed beforehand by the two stations concerned. In the commercial maritime service, these characters form a selective-calling code, but for amateur use, the four character group suggested for all random QSO's is, perhaps not surprisingly, CQCQ, so that the two sync. blocks are C, rq, Q and C, Q rq. Alternately, for "sked" QSO's, where random reply might be unwelcome, the letters can be made from, say, the last four letters in the called station's call-sign.

To take care of any slow drift between the two stations' timing after initial contact, the slave station monitors the timing of the data transmissions received from the master. If these tend to drift away from the optimum point, that is half way between the adjacent sampling instants, then the local clock is shifted to correct this. Thus the slave timing follows exactly that of the master. The master uses the same technique to make sure it is sampling the signal from the slave at the optimum instants.

Resynchronization:

The drift correction is very slow action, and so is not easily disturbed by short periods of interference. However, if contact is lost completely for some time, then both stations must re-establish the correct timing. This can be done by operator intervention to start again

as if commencing a new QSO, but the usual procedure is that when both stations have been receiving errors or requests for repeat for 32 blocks, then they both automatically drop back to the synchronization procedure with the sending station retaining any unsent message in a buffer. A remarkable feature of the system is that it "remembers" which station was sending before the interruption and when back in sync. again, a change of direction is made automatically if required, and the remainder of the interrupted message is then sent, with no gaps or errors.

Timing Considerations:

CCIR recommendation 476 specifies the block repetition rate at 2,222 per second, and the data rate within bursts at 100 bits per second. Thus a block of three characters takes 210 ms, and a control 70ms, leaving 170 ms in which neither station is transmitting. Although at first it might seem a good idea to allow the biggest margin of time for delays in antenna change-over relays etc. and arrange the slave station to replay 85 ms after the end of the master's transmission, the effects of distance between the two stations cannot be ignored, at least not for intercontinental QSO's. The velocity of radio waves is 300km/ms and so the slave will receive his signal from the master delayed, and the resultant reply will be received late at the master station by 2ms for every 300 km separating the two stations. Thus to make this slave reply not be obliterated by the next master transmission, on long distant QSO's, the slave must reply as soon as possible after receiving the master. With practical equipment, and taking into account delays through various filters in the equipment, it looks as 20,000 km is about the maximum range that Amtor could achieve, which will just about cover the world on HF, but rule out some satellite possibilities, and of course rule out moonbounce.

Amtor in Practice:

So much for the theory, but is it really practical? From our experience in the UK, the answer is a definite yes. Many stations in the UK have Amtor working using a program written for 6800-based MPU machines, and a special purpose unit has also been designed, essentially a small MPU

system, which will allow any station with conventional RTTY equipment to extend his capabilities to Amtor. No specialized MPU know-how is needed to construct this unit, and it is available in the UK in kit form for 76 pounds. Most stations have found that their existing equipment will change-over from transmit to receive and vice-versa in less than 10ms, and only minor modifications have been needed in other equipment. If anything, performance has been better than table suggests: in one QSO recently where a comparison was made between conventional RTTY and Amtor, with hard copy from both ends to check the errors, G3PLX and G3RSP/MM, working 50 watts ERP over a 10,000km path on 20 meters, conventional RTTY was barely 20% copy while Amtor showed an impressive 99.3% good copy, although slowed down by QRM to 25 WPM. Amtor has also been on non-optical VHF paths to send such sensitive data as MPU machine code instructions for updating the Amtor program itself as the project developed.

Conclusion:

- I believe that the Amtor system described is ideally suited to Amateur radio operation, and I hope that radio-amateurs in other countries can join us in the UK who have been using this mode so far. In spite of it's complexity, Amtor can be implemented using modern microprocessor techniques which have become available recently. Readers interested in further information on MPU program flow-chart are referred to ref.1, while further information on the special purpose unit mentioned is available in ref.2. Microprocessor enthusiasts with 6800 based machines are invited to contact me for further information about the software which I have written.

References:

1. Amtor, an improved RTTY system, using a microprocessor, Radio Communication (RSGB) August 1979
2. Amtor, the easy way, Radio Communication (not published as yet).

MURRAY CODE	LTRS.	FIGS.	AMTOR CODE
11000	A	-	1110001
10011	B	?	0100111
01110	C	:	1011100
10010	D		1100101
10000	E	3	0110101
10110	F		1101100
01011	G		1010110

00101	H		1001011
01100	I	8	1011001
11010	J	BELL	1110100
11110	K	(0111100
01001	L)	1010011
00111	M	.	1001110
00110	N	,	1001101
00011	O	9	1000111
01101	P	Ø	1011010
11101	Q	1	0111010
01010	R	4	1010101
10100	S	'	1101001
00001	T	5	0010111
11100	U	7	0111001
01111	V	=	0011110
11001	W	2	1110010
10111	X	/	0101110
10101	Y	6	1101010
10001	Z	+	1100011
00010		carriage return	0001111
01000		linefeed	0011011
11111		letters	0101101
11011		figures	0110110
00100		space	0011101
00000			0101011
	RQ		0110011
	beta		1100110
	alpha		1111000
	control 1		1010011
	control 2		0101011
	control 3		1001101

Table 1 Conversion between Amtor code and Murray code. The codes are transmitted left to right, and 1 represents the higher frequency of the fsk signal.

Table 2 Amtor performance, using the assumption that the signals in both directions alternate between perfectly good and perfectly bad.

Column #1-percent of time that signal is unusable.
 Column # 2-percent of transmit message received correctly.
 Column #3-Number of spurious characters printed as percentage of transmitted length.
 Column #4-time taken as multiple of the 100% signal case.

column 1	column 2	column 3	column 4
100	100	0.0	1.00
90	99.9	0.2	1.11
80	99.8	0.5	1.25
70	99.7	0.8	1.42
60	99.5	1.2	1.66
50	99.2	1.9	2.00
40	98.8	2.8	2.50
30	98.2	4.4	3.30
20	96.8	7.5	5.00
10	93.0	16.9	10.0

5	85.2	35.6	20.0
2	61.7	91.8	50.0
1	22.7	185.5	100.0

J.P. Martinez, G3PLX -11 Marchwood Ct
 Broadsands Dr, Gosport, Hants, UK.
 WANTED: PTO FOR R-390A RECEIVER. Would consider a junk R-390A if PTO and all shaft couplings are present. State cond. and price for PTO and shaft couplings. Levy Belcher, 112 Sheila Dr., Glasgow, KY 42141.

TELETYPE MODEL 28. Printer, tape punch and reader all in one nice looking floor unit. Clean-like new with loop power supply \$150. Pick-up only or meet you half-way up to 100 miles. J.R. Doak, 45 Allen Dr, Woodstock, NY 12498.

ABOUT THE COVER PICTURE-

TAMMY, K8BQH submitted the timely pic on our cover this month. This young miss does very well for herself. Remember if you like pix enter the RTTY Art contest by SCATS there is still time to join the fray. Send pix to Norman Koch, K6ZDL c/o SCATTER 5772 Garden Grove #415, Westminster, CA 92683.

BIBLIOGRAPHY OF RTTY IS NOW AVAILABLE Send \$1.00 plus SASE (large with 41¢ postage) to THE RTTY JOURNAL. The Bibliography is a listing of all the articles published by the JOURNAL, with as many of the other magazines listing that could be obtained.

CLASSIFIED ADS

30 WORDS \$3.00, ADDITIONAL WORDS 5¢ EACH CASH WITH COPY--DEADLINE 1st of month for following month.

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FOR SALE: 5th edition of the "LIST OF RTTY STATIONS IN FREQUENCY ORDER", now contains more than 1200 frequencies monitored in 1979-1980 of commercial stations like press, aeronautical, weather, telex, military, diplo, maritime, etc., on shortwave. Schedules of around 70 news agency stations, and more than 180 special abbreviations are also included. This offset printed list is airmailed to you for \$16.00 or 39 IRC from Joerg Klingenfuss, Panoramastrasse 81, D-7400 Tuebingen 7, West Germany.

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genfuss; Panoramastrasse 81; D-7400 Tuebingen 7, West Germany.

TELETYPE EQUIPMENT & SUPPLIES. New gear shift mod kit for LX-D TD \$100. Paper & punch tape. SASE for 1980 list P. Andersen, 115 Boyhen Rd., Rochester, MI 48063. 313-652-3060.

WANTED: Teletypewriter parts and assemblies for Teletype, Kleinschmidt & Mite Corp., machines. Phil, W4LHW, POB 70, Morrisonville, NY 12962.

MODEL 28 GEARS, GEARSHIFTS, parts and supplies for all machines. 2 matching metal pieces for M28 stand-alone TD's \$37 PP; auto CR-LF kits (with instructions) for M28 printers \$22 PP; wiring diagram packets for 33ASR with 101C modem, \$6.50 PP; M28 motorized paper winders \$77 PP; underdome typing reperforator for 28ASR, single-speed complete, \$280 PP. Model 28 keyboard typing reperforator, stand-alone TD's, triple TD's, answerbacks, Model 33 & 35 machines. Send SASE for complete list & prices. Lawrence R. Pfleger, K9WJB, 2600 S. 14th St., St. Cloud, MN 56301.

KITS & PARTS FOR THE RTTY AMATEUR, featuring the famous MEG-1 Demodulator, ID-1 CW ID'er and IPT-1 Interface Power Supply and Timer. These units available as kits, or fully assembled, plus a wide selection of quality new components, make the Midnight Engineering Group well worth checking out. And don't forget our carbide drill bits, now more sizes available. Send 15¢ stamp for catalog. Midnight Engineering Group, POB 349, Galesburg, IL 61401.

INFO-TECH N-200E, RTTY, ASCII, MORSE demodulator, like new \$300. N-70 speed/code converter w/buffer & cassette I/O new, never used \$150. N-300C tri-mode keyboard, like new \$350. Ball 9" monitor as new \$170. Lots of RTTY at low prices. Mod 28, 33, 35 etc., prefer local pick-ups. Write for list. DAITHA CH-720 \$125, DEC 15 volt 15 amp power supplies \$40. Japanese 12" x-y scope lab grade, great tune indicator, solid state \$125. Robert Danato, POB 295, Sci-tuate, MA 02066. 617-545-3753.

RTTY89 FOR THE Heath H89 or H8/HI9/H17 offers full disk I/O, disk auto-start, dynamic video graphics, split screen, ASCII or Baudot operation. 70 page comprehensive user's manual and prompt card included plus much more. Write for free brochure. Price only \$100PPD. California residents add 6.5% sales tax, 665 Maybell Ave., Palo Alto, CA 94306. (415) 493-2104.

"LIST OF RADIOTELETYPE STATIONS" second edition. Press, agency, commercial, etc. Frequency in kHz, call sign etc., \$4.00, Pierre Gagnon, CP 511, Stn-St. Laurent, Ville St-Laurent, Queb., Canada
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NEWS-NEWS-NEWS-NEWS-Amateur Radio's Newspaper, "WORLD RADIO", trial subscription-Two Issues for one dollar. "WORLD RADIO", 2509-F Donner Way, Sacramento, California 95818.

FOR SALE MODEL 35ASR Teletype machine excellent condition. \$400. Skip Prinsen 3611 Merrimac Ave., San Diego, CA 92117 714-276-3122.

WE "SPECIALIZE" IN RTTY Equipment and supplies. Authorized dealer for the fabulous "INFO-TECH" RTTY/CW/ASCII equipment, including models: N-100E, video converter: N-300C super tri-mode keyboard; N-200F tri-mode video converter: N-70 code & speed converter: magnetic tape interface. Also HF transceivers, amplifiers, antennas and other general Ham Radio equipment. Call or write Dick, KUVKH, DIALTA AMATEUR RADIO SUPPLY, 212-43rd St., Rapid City, SD, 57701 (605) 343-6127. Special quotes for special people!

HAL DS-2000 KEYBOARD with CW Board, still in warranty. HAL ST 5000 demodulator-one month new-all original as new. Cost \$900 sell for \$675 plus shipping. Howard N6CPP, 5727 Sunnyslope Ave., Van Nuys, CA 91401. 213-997-0167. WANTED-TELETYPE "CALL CONTROL UNIT" Bell 103 modem for 33ASR. Touch Tone Dialer preferred. R. Dyruff, W6POU, 1188 Summit Road, Santa Barbara, CA 93108. Tele: 805-969-3073.

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SOURCE FOR THE 33512 FIFO-Considerable interest is still being shown in the UT-4 and similar projects which use the Fairchild 33512 FIFO. Since Discontinuance of my UT-4 component project there has been no ready source for these. Now, thanks to Paul Schuett, WA6CPP, there is such a source. Hamilton Electro Sales, 10912 W. Washington Blvd., Culver City, CA 90230 will furnish them at \$12.00 each. Furthermore they will take phone orders at 213-558-2121 and send them out COD. Pete, W6KS.

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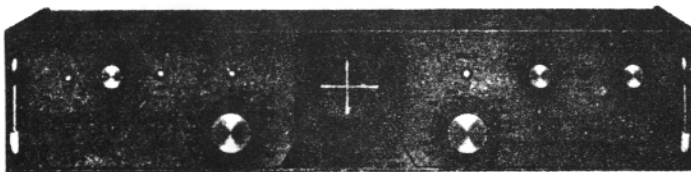
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DOVETRON

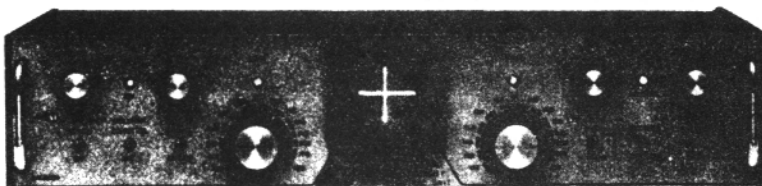


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