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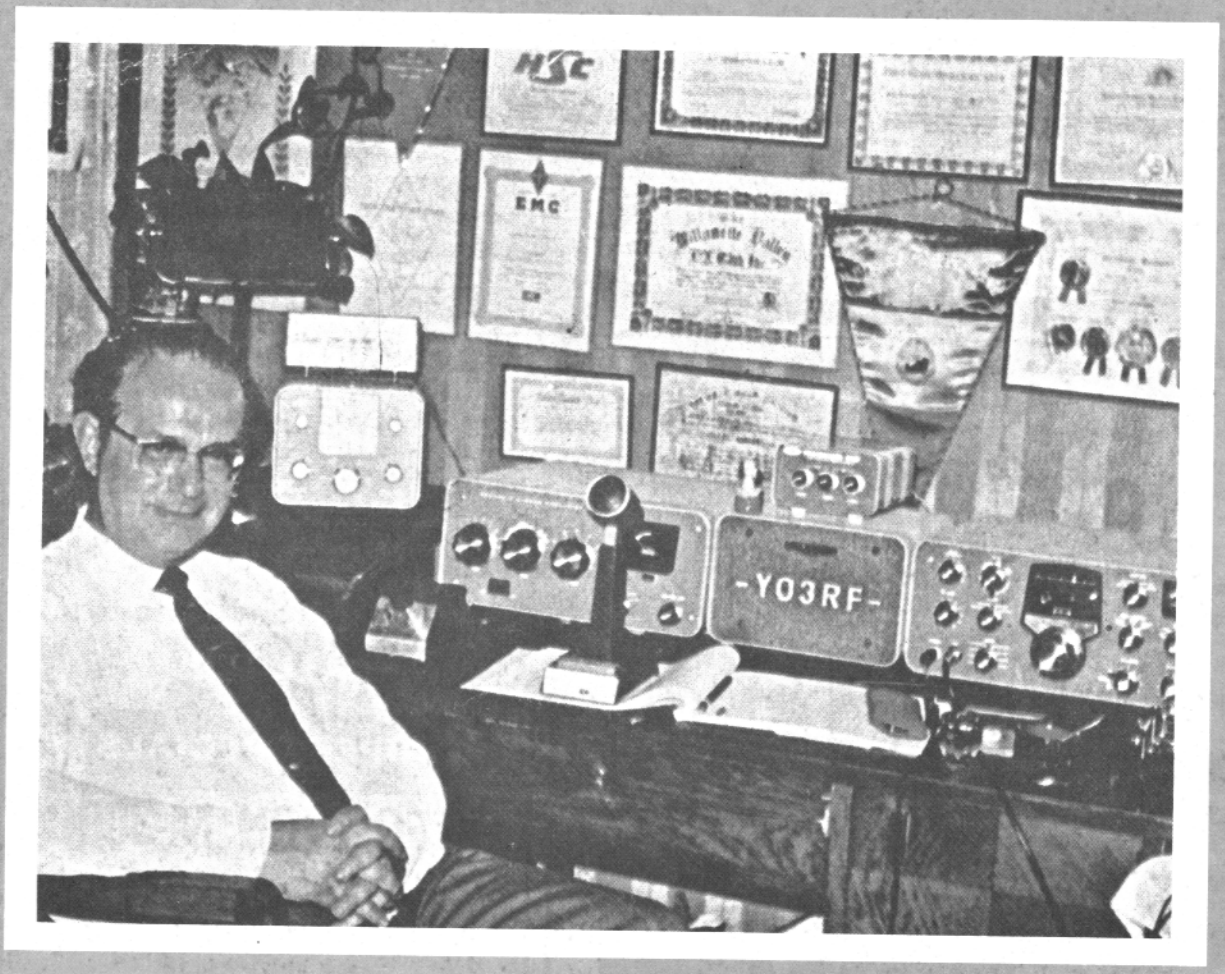

GEORGE CRAIU, YO3RF
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AMTOR, An Improved, Error-Free RTTY System

BY J. P. Martinez, G3PLX

NOTE: this article first appeared in the RTTY JOURNAL in December 1980. Because of so many requests for copies and even a letter asking us to "get modern" by having something on AMTOR, we are reprinting it now.

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 receivers to correctly reconstruct the original data in the event of some erroneous bits. This proved promising being about 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 to this system in 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 synchronized 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, so to avoid confusion with the commercial equipment, the name AMTOR has been devised to refer to 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 has 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 communications 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 a 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 complicated 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 Figure 1, with some of the possibilities for errors. Note that the two stations do not behave exactly identical 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 continously shifts in received bits until 21 consecutive bits correspond exactly with the expected 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 suprisingly, 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 interuption 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 70 ms, 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 85ms

AMTOR CONTINUED

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 300km separating the two stations. Thus to make this slave reply not be obliterated by the next master transmission, on long distance 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 definate yes. Many stations in the UK have Amtor working using a program written for the 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 specialiazed MPU know-how is needed to construct this unit, and it is available from various sources. 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. 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 hope that radio Amateurs in other countries will join us in the UK. 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 flowchart are refered 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 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 (no publication date)

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	line feed		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 100% signal case.

column 1	column 2	column 3	column 4
100	100	0.0	1.00
90	99.9	0.2	1.25
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	98.9	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	20.0
1	22.7	185.5	100.0

J. P. Martinez, G3PLX, 11 Marchwood Ct. Broadsands Dr., Gosport, Hants, United Kingdom.

ARRL Bulletin #16 of February 3, 1983 said: "AMTOR, a digital teleprinter operation that produces copy less prone to errors, is now permitted in the Amateur HF bands from 3 to 30 mHz." The new rules became effective with their publication in the February 22, 1983 Federal Register.

MICROLOG is ready with AMTOR! Give them a "chirp" at 18713 Mooney Drive, Gaithersburg, MD 20879. 301-258-8400.

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NEW FEATURES OF MPT3100:

- Automatic storage of all received text in files separated by the standard "NNNN" terminator (TRO-REC mode)
- Full editing capability of all files stored by mailbox (MSO) or by TRO storage
- Editor allows insertion or deletion of text in any part of a stored message - 15 keyboard edit commands
- Editor may be used even while receiving, transmitting, or storing messages - even when MSO mailbox is in use
- Files may be renamed, created in the editor, cut into smaller files, and deleted with keyboard commands
- Message files may be transmitted singly or in batches
- Transmitted messages may be serial-numbered automatically
- The full format requirements for NAV MAR COR MARS NTP-8(A) are supported
- New TRO commands include: RXON, RXOFF, DIR, SEND, STOP, RESUME, RESTART, EDIT, CUT, CREATE, QUIT, RENAME, DELETE
- On-screen status indicators show: TRO mode; bytes of memory remaining; file names being recorded, transmitted, and edited
- MSO mailbox .SDIR directory command revised to shorten time required for transmission
- New .DIR [filematch] and .SDIR [filematch] mailbox commands give listing of only file names that include [filematch]
- Programmable "header ID" for each mailbox transmission

MSO Mailbox Features:

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- Mailbox may be controlled by external station to store message files, read files, delete files, and list the file directory
- DS3100 operator may perform all MSO operations on the keyboard without transmitting
- Mailbox transmissions include user-prompting and automatic CW and RTTY indentification
- HELP messages are provided to assist the new user in operation of the mailbox
- All mailbox messages stored may also be edited, renamed, and transmitted using TRO commands
- MSO commands are: .DELETE, .DIR, .DIR [filematch], .ENDFILE, .FILEHELP, .HELP, .KY1ON/OFF, .KY2ON/OFF, .PRINTON/OFF, .QBF, .READ, .RYS, .SDIR, .SDIR [filematch], .WRITE

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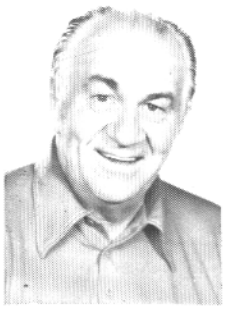
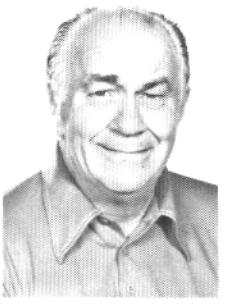


DX RTTY

BY BILL



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"THE SOLAR FLUX IS RISING!"

All of my mail this month contained one or more paragraphs about poor propagation conditions. So I am not alone in complaining about low flux and high geomagnetic indices. The net effect of these punk conditions was to cut off my information pipelines to the DX world. My usual sources of rumors and facts were absorbed somewhere in the ionosphere, I guess. But here goes!

There are only three basic propagation conditions for DXing--short-path, long-path and no-damn-path-at-all! In North Dakota we have had too much of the latter in the last few weeks, and it is going to get worse! Just think...in seven years it will be back to where it is today-- so cheer up gang and enjoy what you can work now!

The BARTG contest is one of the best RTTY contests we have. Ted Double runs a mighty good competition, and it is one of my favorites. But I think that this year the scores will be way down from last year, due, of course, to band conditions. Carl, K6WZ, sent along some of his statistics to back up my theory:

	1982	1983
QSO's	166	142
Hours	29	25
Multipliers	79	48
Score	223,570	124,224

Bands 10 thru 40 15, 20. Carl made WAC both times, but he reports he heard nothing on either 40 or 10 meters. He also says he likes pile-ups calling him, it keeps him from smoking!

WB4UBD, Jim, summarized contest propagation as "El Stinko!" Other than that, Jim says he had a good time, his equipment survived the ordeal, and his wife is still with him. The only exotic thing he heard during the test was TN8CC on both 10 and 15. Jim also had some comments on the ethics of other Amateurs calling the TN8. Apparently the Congo station does not like to have his QSO's interrupted by people trying to call between syllables and he said so on the air. (Who does?) Nevertheless some continued to interrupt, so the rare one went off the air.

Jim concludes his letter by saying he doesn't have a QSL from YV land, but he does have confirmation from ST2SA and KG4AH.

KØJH/4, Jerry, a neighbor of Jim's in Virginia, also heard TN8CC say that he would like to work a lot more North American stations, but the greedy ones spoiled it for him. To conteract the QRM from NA, he simply turned his beam to Europe and ignored the statesiders.

W5HEZ, Jack, worked XT2AW on both 40 and 20 during the contest. Jack cautions everyone to check ten meters now and then during any contest, for when he thought the band was dead, he discovered TN8CC merrily buzzing along. By the way, we owe Jack an apology for mixing his Honor Roll score up with another Baton Rouge Ham. Jack's should have been 126/126 and the other, KA5CQJ 91/60.

WA3ZKZ, Crawford, writes that his last radio activity of the winter was putting up a new "inverted vee two element rotary beam, if your imagination will stretch to such a beast." The beam accomodates two bands, 15 and 20, and Crawford succeeded in giving A22BW a Delaware QSO the day before an ice storm took it half down. He also used the "bedraggled and woebegone" beam in the BARTG for 49 contacts. Crawford lists a good batch of heard/worked stations, some new, some old: HZ1AB, YB2NL, G4GNG, G3ZRS, G4MKO, GI4AHP, GW3EHN, GM3ZXL, GW3AOH, OK1AWC, OH2AA, IK5AAX, LZ2KRR Y25DL, SM6ASD, YU7AM, YU3FX, EA7CLH, OX3FG, VE8CM, 8P6PC and OA4BR.

"BUT THE A INDEX HAS QUADRUPLED!"

Crawford also needs the QTH for LX1ED and ZC4AU. Anyone with valid addresses? Crawford further advises that Mike, KG4AH, is destined to move back to the states in June from Guantanamo Bay.

W8GE, Dewey, had a 14MHz QSO with FRØGGL at 0400Z. According to Dewey, the QSL address for the DX station is Via Box 386, Reunion Island, via France.

W3KV, John, (and for you newcomers, the former editor of this column) reports a personal visit to his shack by Bob, ON4CK. I'll bet that was a high level DX discussion, with Bob rating number 2 on the Honor Roll and John just a few behind! John included his recent heard/worked list: T12JFP, EA6GV, 5T5RY, GU5TU, 9Y4HM, KA2PYD/CN8, and PJ2MI. PJ2MI, Jose, was on some years ago as PJ7MI from St. Maartin. Jose now is active from Curacao. He also says his QSL address is okay in the callbook.

KB2VO, George, has a very unique way of soliciting a QSL. After he and I QSO'd in the RTTY JOURNAL WORLD CHAMPIONSHIP CONTEST, he sent me a certificate printed in Olde English, and suitable for framing, attesting to the contact. If that doesn't work on the tough ones nothing will! George has some feelings about the ARRL endorsing RTTY DXCC certificates, he thinks it is about time they do it. (And so do a lot of other Hams, George. ARRL seems to ignore RTTY most of the time.) He further suggests that RTTY be included in the

routine QSO parties. (We did that in the last two North Dakota QSO parties, but only because I was chairman of the event.)

George listed four new ones from the JOURNAL/73 contest: C53EE, XT2AU, HZ1AB and A22BW.

N1BNK, Bert, sends along a nice list of goodies: 5Z4NN, FRØGGL, 5B4CV SV1IW, HA1TS and DU1REX. Bert received his QSL from KG4AH but has given up on CR9AN and a few others. Another sad note from Bert is about the recent brush fire that destroyed Macedon, Australia. Macedon is the home of **VK3BUS**, Clive, and **VK3OK**, Erik. Erik was completely wiped out and saved only his family and the clothes they were wearing. Clive lost his tractor, sheds, boat, but fortunately his house is still intact with all his RTTY gear. Clive said the worst part of the fire was the wind which gusted up to 60 miles per hour. This blew roofs away and let sparks ignite the interior. When the disastrous fire was over, more homes were burned to the ground than were left standing.

K9POU, Vern, and a number of others have written asking how I like my TS-930s rig. Well, I'll put it this way: I liked my TS-180s rig, but I love my 930. I've had my troubles with it: the metering circuit had a bad transistor in it, and the drivers went up in smoke, but they were fixed in jig-time by the dealer. I use my 930 with AFSK, while some of the others I know use the FSK mode in order to take advantage of the 500 cycle filter lash-up. The monitor circuit for SSB makes it easy to tape record the outgoing RTTY signal along with the incoming. I am hoping that the full break-in circuit will work with AMTOR. Although I don't have it, I understand there is a temperature-controlled mod available for dealer installation; and also a simple change in wiring will add another digit to the tuning read-out. For my money, the 930 stability is suberb without these modifications; you see I remember those tube days in 1953 when I had to constantly retune my receiver during every contact.

News from the DX front has been pretty sparse this last month as conditions and travelling have wiped out a lot of my overseas contacts. For example, **F8XT**, Jean, who covers the European side of the ocean, and I have not been able to make our usual Monday sked. So Jean, who writes a column in a French Ham Magazine sent along his column with an English translation. In it he tells of SV1IW, Manos, attempting to get permission for Mount Athos DXpedition sometime in August or September. The group will consist of SV1IW, SV1DC, W3HNK, KA1SP and W3GSM. Apparently no women are allowed on Mount Athos as it is an Orthodox church holy community, so the leader cannot take his wife along to help out. Manos will be in charge of CW and RTTY, according to the article.

K7BV, MAC, has been hospitalized for major surgery and is now recovering at home. Just prior to entering the hospital Mac worked TN8CC, a station he had been after for a long time. (When you have 210 worked, new ones are a little hard to find.) And here, in Mac's own words, is how he did it:

"As you know I have been chasing TN8CC for many months. During this time I have been able to come up with the "modus operandi" of the station. He would come on, make one QSO and then QRT. Large pile-ups would ensue but no answers to calls for him. I also established that his activity was largely confined to weekends about 1600 to 1700Z. He is at GMT plus one hour, so this looks like he tunes around just before his dinner time in Africa. I also heard him at 2200Z working the west coast of the USA.

"Considering that he is the rare bird and doesn't have to call CQ, the alternative is to call him and catch him tuning around. I tried this ploy on Friday (2200Z) with no results. However, on Saturday at 1600Z, or thereabouts, I called him with six lines, waited a few minutes and then repeated the call. Then he called me! That opened the Pandora's box. After a couple of other contacts the pileup was terrible and because of the CB lack of manners, the TN8 went QRT!

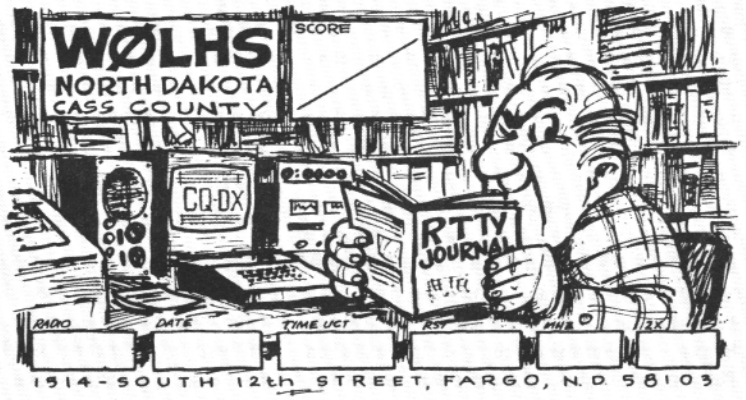
"So, DXing is like handicapping horses. Past record, modus operandi, timing, deciding on a long/short path a little experience and a hell of a lot of luck is all it takes!"

"It couldn't have been a better pre-hospitalization present."

Recently I went to the funeral of **WØTSN**, Dos, who from 1952 to 1962 was the fourth President of ARRL. Many of you old timers will remember Dos, for during his term of office he spoke to many conventions and hamfests around the world. He also served as the president of the IARU. Equally as famous as Dos is his second wife Mary, W5DEW, known far and wide as the "Texas Dewdrop." In businesss Dos was a lawyer and a judge. He had a lot to do with shaping the League and Ham radio during those post-war years. We are going to miss him.

EAVESDROPPINGS: "I have a hunting mule -- he points out birds."..... "I run my amp full bore to punch MSO commands thru the QRM."....."98 messages using 28890 bytes 3378 bytes remain."...."I like RTTY except for the typing."...."I live here in Florida permanently, I am not retired."...."Here no QSL, just rag chew, Harrrrr."...."I work in a panty hose factory."...."The noise was mighty heavy and no one in the house loved my RTTY machine but me."..... "Using a windmill generator, a steam-driven printer and a spring-wound demodulator."...."there is nothing like staking out a frequency in a contest, working ten stations one after another, and then finding out you are 'welcome to the mailbox.'"

The calling of CQ on RTTY has its own musical sound, which is quite recognizable, and the same holds true for RYRYRY. So, I would like to suggest that operators do not "pretty up" the printed CQ with things like this: CQ=CQ=CQ=CQ=CQ+CQ+CQ+CQ ETC. Doing so destroys the musical sound. Another suggestion is to insert your call sign frequently when calling CQ. Recently I saw ten lines of nothing but CQ before the operator signed his call. Keep calls short and listen carefully. It will help keep the QRM down.



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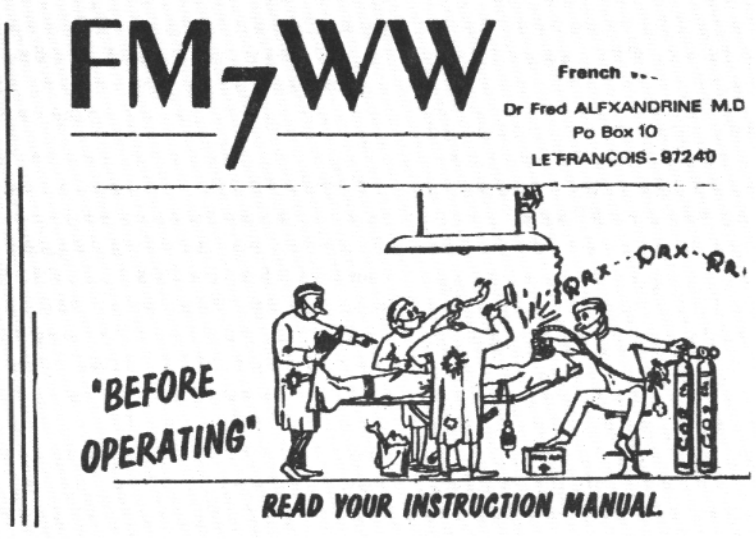

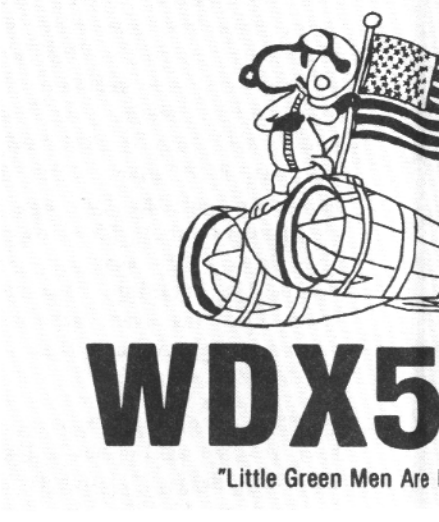

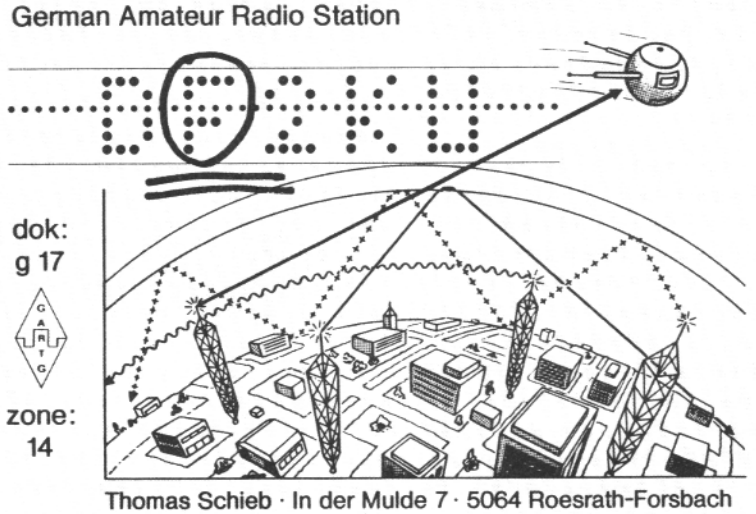

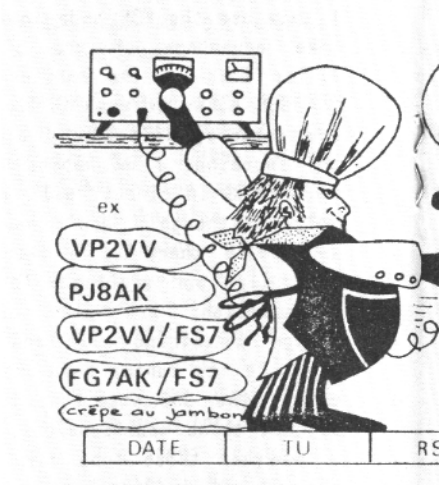

F THE MORE ZANIER
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5LGM

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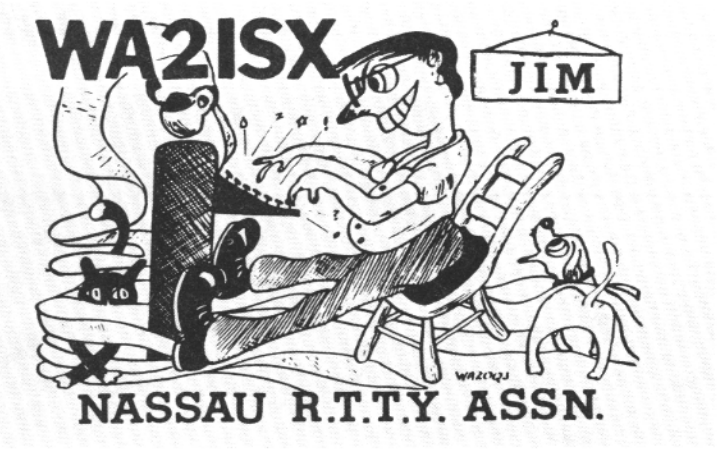

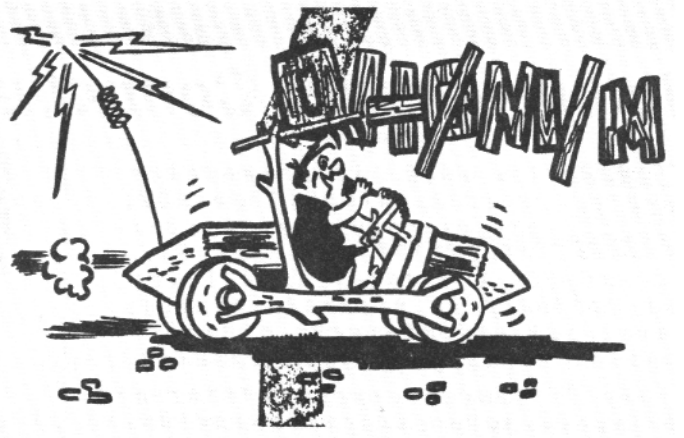

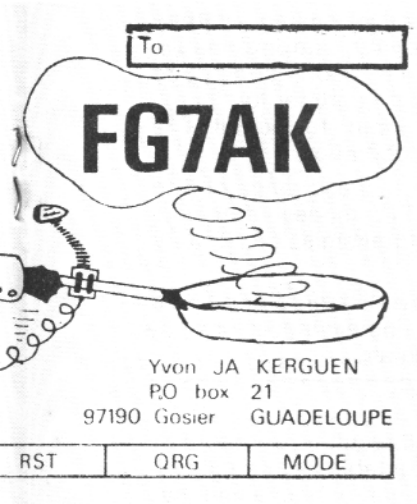

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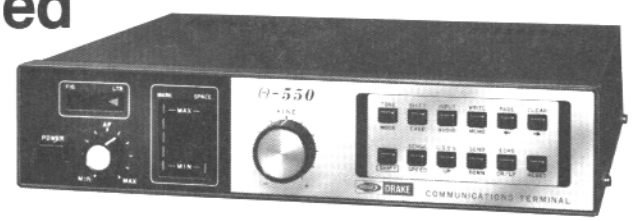
Microprocessor Controlled

DRAKE Theta 9000E

The ultimate in communications versatility, the **Drake Theta 9000E** provides complete transceive capability of CW (Morse Code), RTTY (Baudot), and ASCII. A full computer RS232 interface, cassette tape storage port, selective calling feature with answer-back, light pen graphics, printer interface and word processing software are all standard.

Seven large 256 character memories are backed up with battery power so there is no need to reload information with each use. Memories may also be partitioned providing up to 29 separate storage locations. A type-ahead buffer of 3120 characters makes it easy to compose your response while still receiving. Operator controlled scrolling permits review of up to 10,720 previously received characters. Line length is selectable at 40 or 80 characters, your choice, and all mode and speed indicators are displayed on the screen for instant status recognition. The 9000E has 3 tone groups and 3 shifts which are all keyboard selected.

You won't buy any other communications terminal once you have studied all the advanced operating convenience built into the **Drake Theta 9000E**. It's complete.



DRAKE Theta 550

The **Drake Theta 550** is a compact receive-only communications terminal and is designed to demodulate and display the three most popular over-the-air modes of data communications: CW (Morse Code), RTTY (Baudot), and ASCII. Any standard TV monitor can be used.

A full-featured microprocessor controlled unit, the Drake Theta 550 has selective calling, battery backed-up memory, audio monitor, and informative L.E.D. tuning indicators. There is also interfacing to permit the addition of a dot matrix printer for "hard" copy and a keyer paddle input to permit CW transmission with full iambic operation.

CW automatically tracks over a speed range of 5 to 50 words per minute and RTTY modes offer nine selectable standard speeds of transmission. 12 volts DC is required.

This unit is ideal for shortwave listeners and hams who have been missing the increasing volume of data communications over the air.

LA7 Line Amplifier

Line output, input levels as low as 15 mV rms (47 kilohm) will result in an output of 1 mW nominal into a 600 ohm balanced line. Output level adjustable by internal preset level control. Interfaces low level audio to RTTY terminal unit or phone line that requires a 600 ohm balanced/unbalanced input. One 36″ phono to phono cable supplied.

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GOLD MINE

PR Docket # 83-28 was adopted on January, 20,1983. Released February, 1,1983 by the Federal Communications Commission. No single item in my memory has created such a stir in Amateur Radio. I suppose incentive licensing runs it a close second. Let's examine this new found Gold Mine in depth.

The Commission is proposing to establish an Amateur Radio operator license class which an individual may obtain without first demonstrating a proficiency in the International Morse Code.

The Amateur community is expected to select (1) Elimination of the five-word-per-minute Morse code examination element from the existing Technician Class License. The operator license will still be called the Technician Class License. (2) Digital (or) experimenter class license. This form looks strangely like the Canadian Digital Class License. This license requires an examination in radio regulation, radio theory and digital techniques.

The technician class license, without the five-word-per-minute code requirement would still be called the technician class license under the current system. Technicians passing the code requirement would have full novice privileges. Technicians passing only the theory portion of the examination would have no privileges below 30 MHz., but would have full privileges above 30 MHz.

The 1979 World Administrative Radio Conference lowered the code requirement to 30 MHz. This was the forerunner of the no code proposal. The FCC recognizes the importance of the code requirement, but as the United States is a signatory of the 1959, and hopefully, soon the 1979 World Administrative Radio Conference (WARC). One is left with the positive feeling that the importance of code, to the FCC, is only obligatory to what the law prescribes and in future WARC conferences will strive to see this lowered to below 30 MHz.

The Technician Class License, it appears, would be the likely choice for the FCC. They would benefit from an administrative point of view. The lack of logic clearly demonstrated by the FCC, incentive licensing, changing of call signs etc., puts my money on the experimenter license.

The Novice License was established as the entry level license. Then comes the Technician class license all with code requirements. The Amateur is given a logical progression to start with and also to increase their privileges. The one-upmanship with each change of administration promotes an endless tinkering with the Amateur license structure.

The FCC constantly proclaims deregulation and lets the Amateur govern and call the shots. The FCC recognizes that the no code license is an extremely controversial subject. I feel that the only controversy is that...We don't want it but they do!!

The American Radio Relay League hired Florida State University's Institute of Social Research to survey Amateurs on a variety of subjects. The US Amateur's responding to this survey overwhelmingly (83%) believed that a Morse code requirement is essential or important for operator privileges below 30 MHz. While 64% believed it is essential or important for operator privileges above 30 MHz.

The FCC states that it has been considering a code free license for a decade and that any further delay cannot be warranted. Although the FCC and the ARRL both recognize the fact the license examination of potential candidates is a large job. The ARRL requested a delay in the establishment of a code free license until the nuts and bolts of the volunteer program could be worked out. The FCC stated that the ARRL invited this burden of the examination of Amateur Operator License candidate on the Amateur community. The FCC further stated that it is not forcing this burden upon the Amateur community.

The FCC will not listen to surveys and what the ARRL i.e. the Amateur community desires. While the FCC considers the code free license an entry level license. I feel it contains rather generous entry level privileges. What would be the incentive to upgrade? or has that suddenly been dropped as the game plan? The need to upgrade appears to be passe. What do you think?

The big money boys will have their way for the FCC has the bit in their teeth and the code free license will become a reality. The replay of the citizen band mess will be the Amateurs reward. I feel that for some it will be a gold mine, but for the Amateur and the ARRL, it will be the shaft.

So long for now..George, WA6CQW.....

BRAG TAPE

Len is the name.
Ham Radio's the game.
Miami is the home,
From where our signals roam.

Where we used to plant the flower,
now stands my forty foot tower,
my equipment is enhanced,
by my ticket that's advanced.

My RTTY gear is the Vic-Twenny,
which didn't cost much money,
and with the Kantronics software,
we'll soon see our signals compare.

The rig's a Yaesu FT107,
which works like it was made in heaven
There's a 4 element tri-bander high
atop my tower,
that's sending you my signal-barefoot
power.

For the VHF RTTY its the SBE 144,
and that's not all my gear..I could
surely list more,
so back to you my "new friend"
For this transmission has come to an
end...Len Waldman KA4MGH "BRAG TAPE"

NEW UNIVERSAL M-600
MULTI-MODE, CRYPTO-DECODER

UNIVERSAL M-600 RTTY CODE RECEIVER

THE ONLY RTTY UNIT THAT DECODES —

- **BIT INVERSION-**method used for security and privacy by governments, business, press and others, automatic system opens up a new world of RTTY listening. Now you can copy those stations that defied copy on standard RTTY units.

- **TOR-SITOR-**Both ARQ and FEC modes used by Marine, telegraph, World Press, Coastal Stations and Government Services. This approaches error-free copy.

- **NON STANDARD SHIFTS-** Used by RTTY services to effect a form of security to their transmissions by the use of non standard shift of RTTY signals, quite common in commerical RTTY. The M-600 has a continuously variable shift capability over a wide frequency range.

- **WEATHER FORMAT-** Allows reception in straight text of many weather stations with the use of standard weather map symbols in everyday use around the world. This is very interesting to copy.

PLUS — All speeds of BAUDOT, ASCII and MORSE (CW). M-300 keyboard plug-in for transmit. BAUDOT, ASCII, CW.

★ AMTOR when approved.

Partial List of Features of the New Revolutionary UNIVERSAL M-600

BIT INVERSION-5 level security bit inversion for baudot decoding from key pad. Decodes any combination of bit inversion being used for security.

TOR-SITOR-Both ARQ and FEC modes with full receive only function on these codes. Amtor when approved.

WEATHER TEXT-Weather Bureau symbols, arrows and other weather type uses. Key pad Controlled.

SHIFTS-Key pad selectable shift selection, 170, 425 850 plus variable space channel allows copy on mnay non-standard shifts being used as security mode. There is a separate demodulator for 150 through 1200 baud rate high speed RTTY.

ASCII-110, 150, 300, 600, and 1200 baud rates

BAUDOT—60, 66, 75, 100 and 132 WPM

MORSE-CW-AUTO-RANGE up to 60 WPM

SPEED READOUT-ASCII and BAUDOT

MULTIPLE SCROLL INHIBIT

UN-SHIFT ON SPACE

SELF-TEST SYSTEM-Allows check out of M-600 operation.

AUDIO INPUTS-4 to 600 OHMS .25V.P-P.

VIDEO OUTPUT-Composite video. 1.5V.P-P., negative sync.

PRINTER DRIVER-Isolated loop, Mil-188 or RS232 and optional parallel ASCII. All with handshaking available. Baud rates of 45, 50, 57, and 74 in baudot and 110, 150, and 300 in ASCII. The M-600 will drive almost any printer available at any of the input modes.

PRINTER MODE-Baudot 60, 66, 75, and 100 WPM.

PRINTER SPEEDS-ASCII 110-150 and 300-parallel ASCII.

PRINTER BUFFER—A 2K printer buffer allows reasonable down conversion and handshaking of printer.

LOOP SUPPLY-60MA/20MA auto adjusting loop supply available as an option.

STATUS LINE

OPTIONS-Built-in loop supply /parallel printer output

WARRANTY-115/230V 50/60Hz 25 watts

SIZE-16 3/8 x 3-1/2 x 10-3/4 in. deep.

WEIGHT-9 pounds - shipping weight 12 pounds.

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FOR SALE: INFO-TECH M300C + 200F also digital tape unit (DLU-1) with 50 mag. tapes containing about 800 RTTY pix. Comes with new Radio Shack cassette player. Cables, manuals, all excellent $750. Info-Tech-Universal Electronics M-600 code converter with loop supply + rack mount, new $600. Dovetron MPC 1000R Mark II terminal unit, solid state display-speed conversion-rack mount etc. one owner $1200. M28 ASR + 28 reperf with gear shift (pick up only). Drake TR-7, PS-7, MS-7, 3 filters, 2 fans, service manual, dust covers-mint- $1150. Heath SB221 amp $400. Palomar tuner with noise bridge $150. KB0WY-Bill Loop, 4610 Hwy 2 West, Grand Rapids, MN 55744, 218-328-6198.

FOR SALE: SIGNALMAN MARK I modems (direct connect)(please write for info spec sheet on this modem if interested.)0-300 baud orig & ans modes RS232 $92. Paper bond-14 7/8 x 11 blister pack 500 forms $7. Paper bond 9½ x 11 tear away perfs $36 per case of 3,000 forms. Paper bond 9½ x 11 blister pack 500 forms $7.25. Paper TTY G/W roll-friction single ply $1.50 per roll. Paper TTY bond roll friction single ply $2.50 per roll. Cable ties 5" (strong nylon) 100 for $1.75. TTY ribbons heavy ink, nylon double spool $1 each. M-33 schematic sets $11 each (new original sets) M-33 manuals 3 vol set 1, 2, & parts $25 each. RS232 cables (specify male to female etc.) 15 ft. 25 pin through put $25 each. RS232 Teletype interface for M-33 &32, installs easily on Ucc 6 or 5, complete with cable. (please specify 33 or 32) $129 each. 8 level or 5 level tape $1 per roll. TRAM TELETYPEWRITER SERVICE 50-0 Corbin Ave., BatShore, NY 11706. (516)-242-5011.All items presently in stock (subject to prior sale). Certified check or money orders. Shipment on day of receipt. Personal checks must clear. All orders over $20 shipping paid continental USA). All others ship costs COD.

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RTTY-MARS-RTTY-MARS-RTTY-MARS-RTTY-Have you heard about the new HAL "message Processing Terminal" software for the DS-3100ASR? Throw away your paper tape and roll paper! Complete in-memory message and traffic handling. Call or write Dick, KØVKH Dialta Amateur Radio Supply. 212-48th St., Rapid City, SD 57701. (605)-343-6127. For all of your Hal and Info Tech equipment needs. Our prices can not be beat!

RTTY PC BOARD SPECIAL-Some quantities limited. The famous UT4D speed converter PC board was $22.94 now $12.95 The UT2 Regen/speed converter board was $14.95, now $10.95. XB6 xtal clock PC board for above was $8.95 now $4.95. RTTY ID PC board was &6.95 now $1.95. Send 2 stamps for our free flyer of over 1200 items or send $1 for our catalog (refundable on purchase) Add $1.75 shipping to orders. DAYTAPRO ELECTRONICS, 3029 N. Wilshire Ln, Arlington Hts, IL 60004.

FOR SALE: KNWD VFO-520 $100. Kantronics FD-2 CW/ASCII/RTTY reader, $250. MFJ 496 super kybd with AFSK $200. N6EGY. 805-964-8340. Make offer

MODEL 33 RO's (receive only) $110. KSR (keyboard send-receive) $125. Units are less stands with standard private line electronics (UCC 6) 20 MA loop. All units sold as is but have been fully tested line & local prior to shipment and checked for any visable wear. Used stands for above and M32-33 series complete with hardware $15 each, with casters $25 each. Lambda power supplies (some are like new) LMB12 12 v at 2.5 amps (adj) $15 each. A great bargain for a supply of this grade, approx. 30 units left. Partial list of 33 & 32 parts (make your mutant complete) *N=New *G/U= good used. 182036 copy holder G/U $6.50, N $35. 182965 Chad box G/U $3, N $6. 181420 100wpm OP gears G/U $6, N $16. 181411 motor gears G/U $6, N $15. 181043 paper spindle G/U $1, N $2. 182918 tape spindle G/U $0.50, N $1.180502 print hammer N $1. 181039 platten knob G/U $.75, N $1.50.185-877 plattens-resurfaced (like new) $16. Ucc 8 (drivers) G/U $35. Ucc 6 call controls G/U tested $40. 182241 or 181870 motors G/U $25 (fully tested mounts checked). M33 &32 reader power supplies G/U fully tested manual $15, auto $20. Most parts are in stock or available. Please contact us reference your needs. 6 ft. copperweld grounding rods. Nice commercial rods (not many of these left, hurry on this one) $8.50 ea. New CP Clare high speed mercury relays HGS-5202 $2ea. Clare 5 level Strip printers (wooden box) as is-appears to be in excellent condition. As is $25 ea. New dust covers for M32 &33 heavy gauge $15 ea. Video recording tape boxed,used but good $5 per 7" reel. Top makes 3M-Ampex Etc.All items subject to prior sale. N.Y. residents add applicable sales tax. All items FOB BayShore, NY. COD orders are excepted. When enclosing payment with order, please inclose exact amt. for

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ITEMS. Shipping costs will be COD best (cheapest way) unless otherwise stated in your order. please reference AD 275P when ordering from this list. Thank YOU. TRAM Teletypewriter Service 50-0 Corbin Ave. BayShore, NY 11706. Telex 645-890.

IBM PERSONAL COMPUTER RTTY program. "PC/RTTY" program to send and receive RTTY Baudot or ASCII using your own PC and tuning unit. Features include: split screen receive and type ahead, up to 1200 Baud continuous speed coverage, five one-line message buffers, auto FIGS/LTRS, built-in CQ, RYRY, CW-ID, Clock, Signoff message and Brag tape. Disc save and send text, status line and buffered keyboard features are included. Requires minimum 48K memory, one disk drive, 80 column monitor, asynchronous communications adapter, and your own EIA level RS-232C compatible tuning unit. Furnished on single-sided disc with user manual. Price $19.95. AMPWARE, POB 30279, Cincinnati, OH 45230.

MICROLOG AVR-1 RTTY/CW demodulator/video generator, excellent $200. Microlog-Sanyo VM-12 12" monitor, excellent $75; MFJ-496 super keyboard w/ AFSK installed, mint $200; Hallicrafter SR-400, AC/P-500 excellent $200; Tempo-One, AC-One excellent $250. Ship UPS or PP collect WAØKCP, Box 25292, KC,MO 64119. 816-452-4113.

BUMPER STICKER --"MY FAVORITE RADIO STATION IS (your call sign here)." Display on car, in shack, anywhere! Great gift for Ham radio friends. $3. Arpress, 380-R, Wilbanks, Rome, GA 30161.

NEWS-NEWS-NEWS-Amateur Radio's Newspaper "WORLDRADIO". Year subscription is $9.00. Send to Worldradio, 2509 -F Donner Way., Sacramento, CA 95818.

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'MECHANICAL' RTTY'ers-Tuning forks 87.6VPS, 96.19, 120, 180.New w/sheath $5.50 ea., 4/$20; stainless steel Tension Scales 0-100-0-1,000 grams w/lbs, 0-32 oz.w/lbs., 0-64 oz.w/lbs. 0-12 lbs. $7 ea., 10/$60; Quan. Available. Add $1 per order USA PPD ship. Dan, 390 Lincoln Ave-RJ, Nwk, NJ 07104.

TELETYPE EQUIPMENT AND PARTS. Complete line of Model 28 machines available. RO-$80; KSR-$125; ASR-$150 selected ASR $100. Most parts for 14, 15, 19, 28, 33, 35. Model 28 friction feed conversion kit $35; with recovered platen $45. Gear shift mod for ROTR $40. New nylon gear shift mod for LXD stand alone TD $65. Roll paper $26 per case (12). Ribbon $8.50 per doz. SASE for list. Poul Andersen 37249 Hebel Rd., Richmond, MI 48062. 313-727-1964.

COMMODORE VIC 20 OWNERS: At last! CW/RTTY send-receive software by RAK Electronics with schematics for simple homebrew interfaces. Will work with popular TU's also. Low, low prices. SASE for information on these and many other cassette programs for games, finance, education, Ham radio. Amateur Accessories, 6 Harvest Ct., RD 7 Dept R, Flemington, NJ 08822. 201-782-1551.

SELL-COLLECTION OF 35 Years, new boxed receiving tubes, only one dollar each. Send list of your needs for availability. Wanted Vibroplex Presentation, Electronic keyer and paddle. W5QJT, POB 13151, Ep, TX 79913 Coronado Station.

FOR SALE: IRL 1000 demodulator. Used very little. Justowriters (pair of the little jewels); addressograph machine--the old--run like a top--forever kind. Smith-Corona typewriter geared just right to make the addressograph cards you will want for the addressograph machine mentioned above. The irl 1000 we will talk to you about, no reasonable offer would be refused. The rest--should go to a happy home with a tax excempt organization somewhere near Southern California. Anyone knowing of a home for these priceless (antiques??) is aasked to write, telephone, wire or send an executioner to put them out of their misery.
The RTTY JOURNAL, POB RY, Cardiff-by-the-Sea, CA 92007. 619-753-5647.....

ANYONE WITH info regarding RTTY modifications to a TS820 contact J. D. Benson, KC4YF, Rte. 3, Holiday Forest Lynchburg, VA 24504.

ANY INFO, manuals, drawings anything I can use in getting an old Western Union Teleprinter Model 1034 C on the air with RTTY would be appreciated. Lew Caporali, KA3IUA, 121 Ford City Road, Freeport, PA 16229.

DX COLUMN CONTINUED

RTTY BITS: CX8BZ 0000Z on 15 meters FM7BB, POB 10, Trois Ilets, Martinique; 8P6JA 2240Z on 20 meters; ZS6UY 2300Z on 20 meters: KP5YD, Carlos in Puerto Rico, 1300Z on Sunday, 20 meters: 5T5RY 2300Z on 20, 1800Z on 15; FK8AU 0220Z on 15; V2AW 0000Z on 20.

Had a nice contact with Mike, YBØADI, in Jakarta, who is using an ICOM 730 driven by an Apple computer. He has a Yagi antenna up 85 feet. QSL is via WA2DWE.

K4VDM, John, recently asked another John, VK3JW, to switch from 20 to 30 meters for a DX QSO. Although the signals were not too strong, they were successful. The Australian station was using dipole and about 125 watts. Copy was good both ways.

A couple of stations have asked I plead with RTTY stations to avoid the 14100 beacon frequency. One person said there was a RTTY net operating on that frequency. The beacoms are on 24 hours a day, and serve a useful purpose, so please avoid that QRG. Thank you.

Had a nice QSO with Walther, **OX3FG**, on 20 meters recently. He still is the only RTTY station in Greenland.

With the beam turned south, I worked CE3VM, Steve in Santiago. He can be QSL'd Box 13360. Also had a couple of nice contacts with German, CE3CBG, and Carmen, CE3CEW. Carmen was off the air during a visit to Spain. I understand from her that the QSL cards for the Juan Fernandez expedition have been mailed, but I have not received mine at this writing.

The BARTG contest at our house was pretty poor also. Did renew aquaintances with GI4AHP, ON4UN, PY2ERA, HR3NBG, FM7BB, HP1XUL, VY1AD, PT2BW, PY9ASA and VK2SG. I only had a chance to work the first day, but I guess I didn't miss much the second day. I did listen a bit that day, but conditions were nearly blanked out.

In addition to those Hams memtioned above, I would like to thank W5HEZ, W1GKJ, K9POU, F8XT, WDØHXQ and all those I eavesdropped on.

73 de Bill, WØLHS. dit dit.....

THE RTTY JOURNAL/73 MAGAZINE

SECOND ANNUAL

WORLD CHAMPIONSHIP CONTEST

RESULTS

#	name	call	points	x	score
1.	Peter Rodmell	G3ZRS	164	96	15,744
2.	Bo Sternberg	SM6ASD	167	92	15,364
3.	Enno Bussmann	XT2AU	163	85	13,855
4.	Gabriele Bergani,	I4JXE	158	84	13,272
5.	John B. Johnston,	W3BE	163	66	10,758
6.	Barry Gardner	W3FV	147	73	10,731
7.	Jan Palmquist	SM5FUG	123	74	9,102
8.	Enea Alessandro,	IT9EAI	101	87	8,787
9.	Leo J. Small	K4AGC	118	66	7,788
10.	Serge Soulet	TO6AUS	101	62	6,262
11.	M. Toussaint	N7AKQ	139	45	6,255
12.	Ray Lowes	G4NJW	96	58	5,568
13.	C. Steavenson	K6WZ	89	55	4,895
14.	Bruce Frahm	KØBJ	88	55	4,840
15.	S. Rumfelt	AE5H	80	55	4,400
16.	Bill Snyder	WØLHS	80	40	3,200
17.	A. Terraneo	I2DJX	76	38	2,888
18.	G.L.Kjellgren	SM7LSU	68	38	2,584
19.	Masao Kosaka	JA1BYL	61	41	2,501
20.	Stan Goldin	W2DNO	61	40	2,440
21.	S. Michetti	I6YPK	64	38	2,432
22.	"Arden" Fant Jr.,	N5DSK	62	46	2,352
23.	J.O.Thomas	GW3EHN	64	36	2,304
24.	John Pike	NN6F	52	44	2,288
25.	Jan Pettersson	SM3EZD	72	31	2,232
26.	Gunnar Unger	SM5AAY	63	34	2,142
27.	Perozzo Etienne,	ON7EP	55	37	2,035
28.	Denis Mahoney	VE3ZX	52	39	2,028
29.	James Cox	K4JAF	51	37	1,887
30.	Pierre Louche	TO6HKR	45	38	1,710
31.	Dusil Miroslav	OK1AWC	51	24	1,224
32.	T.H. Holtby	VE7VP	42	28	1,176
33.	Byron Roberts	W7CBY	36	30	1,080
33.	J. M. Swan	VK2BQS	40	17	1,080
35.	Jorge Pastor	TI2DO	45	22	990
36.	L. Bjureblad	SM6AEN	35	27	945
37.	Roger Thering	KE6T	31	27	837
38.	Paul Winchester,	G4KHX	40	17	680
39.	Victor Holyoake,	G4OJJ	34	12	408
40.	Frank Novak	KJ2N	15	14	210
41.	J. Kedzierski	LU3DSU	13	9	117
42.	Anders Weiss	SM3GI	27	4	108
43.	L. Yanto	YB3ON	41	1	41

SINGLE OPERATOR ---20 METERS

1.	Philip Janke	KJ8N	71	35	2,485
2.	Niko Indarto	YB2BLI	65	22	1,430
3.	Graeme Phanco	GM4KHE	54	22	1,188
4.	Helio Sento Se	PY6ACP	43	27	1,161

SINGLE OPERATOR ---15 METERS

1.	Dean Norris	K7NO	141	59	8,319
2.	Kari Syrjanen	OH5YW	83	24	1,992
3.	Yoh-ichi Murakami	JA3EOP	50	28	1,400
4.	Maria Grazia Doni	I5AZX	58	17	986
5.	George Craiu	YO3RF	26	12	312

SINGLE OPERATOR---28 METERS

1.	Ilkka Yrjola	OH5IY	10	10	100

MULTI-OPERATOR---ALL BANDS

1.	Oulun Teekkarien RC	OH8TA	143	70	10,010
2.	Kentucky Amateurs	KA4MKG	113	57	6,441
3.	Cuyahoga Falls ARC	W8UPU	69	39	2,628
4.	A.R. Wemyss &VE3IXB	VE3NEX	52	37	1,924
5.	Radioklub Zväzarmu	OK3KGI	57	29	1,653
6.	Radioklub pri ODPM	OK3RJB	48	27	1,296
7.	Radioklub "Merkur"	OK3RMW	45	22	990
8.	Radioklub OK1OAZ	OK1OAZ	26	23	598
9.	Radioklub "Junior"	OK3KII	34	21	522
10.	Radioklub "Matodor"	OK3KXM	11	8	88

MULTI-OPERATORS - ALL ON - 20 METERS

1.	K8EX et al	K8EX	195	62	12,210
2.	Soedermanslands Regiment	SL5AR	78	29	2,262

CHECK LOGS

DL1VR-Herbert Alfke; W6JOX, Chuck Prindle; OZ6SM, S. K. Mogensen; N6ELP, Dee Crumpton.

Thanks to all participants.

comments

Spent a lot of time watching endless rows of RYRYRY, wonder what people think they achieve that way? They lose people like me.A number of state-side stations would not answer calls from here. OZ6SM.....My age is 17 and I am Ham since January 10,1983. Excuse me for any possible mistake being this my first contest (he did very well) IT9EIA.....My first RTTY contest! I was on RTTY for only 2 weeks before the contest. Got a lot of fun. Regards to all my RTTY partners! YO3RF.....This is the first time I participated in a contest. Wx was not the best. No activity here on 40 and 80 meters. Sign me for next year. LU3DSU....The contest was a lot of fun. In fact the first ever on any mode for me. Asked the family to spend the weekend in a hotel and they accepted. The only draw-back was a broken rotator. It got stuck in the direction of the USA.Confirmed TN8CC....What started out Friday evening as an extra multiplier for a couple of others, became a most enjoyable 2 hours carried over to 7½ hours on Saturday, and I'm not a contest fan, but certainly enjoyed this one....Enjoyed the contest immensely. This was our first RTTY contest and the contacts seemed far between. Enjoyed freedom from total concentration & looking at the scope.Look for us next year. K8EX et al....A very hard contest for VK as most N. Hemisphere stations only seem to expect signals from the north. Hard to break through QRM in Europe on 20. Learned about propagation. VK2BQS....Good time had. Propagation was fair for me but not good enough for the excellent European openings. They were heard, but I couldn't get to as many as I would have liked. N7AKQ.... See you all next year.N6ELP?

CONTESTS*CONTESTS*CONTESTS* CONTINUED

42.SM6BUV	51	77	34	4,352
43.WB4UBD	34	53	46	4,002
44.EA9JZ	67	0	57	3,819
45.W3AOH	75	0	50	3,750
46.LU3DSU	51	0	73	3,723
47.EA7BBK	74	0	42	3,108
48.SM5BRG	40	101	18	2,538
49.EA3DMP	49	0	45	2,205
50.DL8CX	44	0	46	2,024
51.VK2BQS	20	41	30	1,830
52.DK5KJ	30	25	26	1,430
53.Y33UO	37	11	28	1,344
54.YO8FR	48	0	27	1,296
55.Y22UL	22	40	18	1,116
56.Y33TA	21	39	13	780
57.DK4IS	23	0	12	276
58.VK8BE	13	0	20	260
59.YJ8TT	13	0	18	234
60.JA7KM	4	0	8	32

MULTI-OPERATOR

1. LK1KDP	367	742	196	217,364
2. I2DMI	329	576	209	189,145
3. OH2AA	327	519	188	159,048
4. G3UUP	272	497	188	144,572
5. HG5A	257	508	178	136,170
6. OH8TA	274	428	160	112,320
7. EB1BM	310	10	310	99,200
8. YO3KPA	209	306	108	55,620
9. UK4LAM	136	169	58	17,690
10.YO5KLK	157	0	79	12,403
11.DKØOW	49	86	50	6,750
12.OK3RJB	79	25	63	6,552
13.JA2YKA	34	20	44	2,376
14.JA6YDH	5	10	2	30

SWL

1.S. Kahr	302	469	180	138,780
Yurchenko	283	440	165	119,295
Waterstraat	207	226	189	81,837
4. Ludwig	209	236	174	77,430
5. Cesak	166	148	143	44,902
OOstenbrugge	111	86	79	15,563
7.Marisler	140	47	71	13,277
8. Bozek	82	76	19	3,002
Yermolenko	35	41	24	1,824

Checklogs: DE1KWD, DE4TTY, DL1VR, OK3JFK, K8CV, PE1HQR, Y43WK, Y55ZF, and SWL-W8 John Mathews.

HAM HELPS

Ralph Held, K6QS, a newcomer to the RTTY JOURNAL, is looking for operators using the Drake 7000E keyboard. Phone 619-435-8483 or 437-5877 office. Address: 850 Country Club, Coronado, CA 92118.

CANADIAN AMATEUR RADIO TELETYPE GROUP (VE3RTT)
22nd ANNUAL RTTY DX 'BIG SMOKE' SWEEPSTAKES

SINGLE OPERATORS SCORES

*1. JA6GIJ	2,538,634	*33.KM5D	99,408
*2. YU7AM	2,379,648	34.VE5RC	90,268
*3. W3FV	2,205,018	35.AE5H	87,120
*4. VK2SG	2,063,824	36.DF7FB	82,520
*5. SM6ASD	2,032,302	37.VE7BDQ	59,470
*6. K4AGC	1,791,296	38.VE7EJ	55,908
*7. IØUIQ	1,582,788	39.OK2SPS	48,344
*8. I1TXD	1,577,880	40.DJ1XT	45,120
*9. DJ6JC	1,484,808	41.VE5WZ	39,688
*10.ISØVSA	1,356,578	42.JR6AG	29,072
*11.ON7EP	1,351,568	43.KE6T	28,804
*12.I4JXE	1,270,702	44.ABØY/4	27,080
*13.KØJH	1,218,006	45.HB9BZZ	23,940
*14.VE2AXO	945,600	46.K8CV	21,110
*15.WB5HBR	924,038	47.WB4UBD	20,740
16.K1LPS	868,955	48.KØBJ	14,840
*17.K6WZ	700,720	49.HK9BQL	14,760
*18.VE7YB	663,484	50.DK5KJ	11,468
*19.VE8CM	640,062	51.DF6ZY	9,780
20.VE2JR	630,496	52.LA2IJ	9,521
21.W6JOX	536,720	53.SM7ABL	9,260
22.DL1VR	511,360	54.DF5BX	8,772
23.VE7CIM	481,340	55.OZ1GRF	7,195
24.W7MI	395,600	56.SM6EKP	4,032
25.GW3EHN	294,000	57.SM5HQN	1,260
26.HZ1AB	242,790	58.Y37UF	640
27.PA3BLU	212,480	59.W8TCO	500
28.VE7VP	189,500	60.SM5AAY	174
29.TI2DO	160,560	61.DK4IS	132
30.WDØFSJ	139,330		
31.DJ9IR	114,980		
32.WA6WGL	100,992		

* denotes WAC

MULTI-OP SCORES

*1. LZ1KDP	3,845,966	*1.OZ-DR2135	1,439,492
*2. OH2TI	1,396,738	2.DE1GMH	380,470
3. VE3UR	241.415	3.NK-4483	180,120
4. KC4AAA	236,216	4.DE4TTY	134,490
5. OK3KII	211,008		
6. OK1OAZ	98,870		
7. OH8TA	79,300		

SWL PRINTERS

Check Logs: SM6AEN DF9XI

Congratulations to (top Ten) winners of engraved plaques sponsored by the "RTTY JOURNAL" and "C.A.R.T.G."

Canadian High Score - VE2AXO with 945,600 points.
Green RTTYer (First RTTY Contest) - ISØVSA with 1,356,576 points.
Station contacting the most Canadian stations won by VE2JR with 34 stations.
All awards are plaques engraved with winner call-sign.

A total of 78 countries were contacted.
Propagation reports ranged from poor to fair, and as usual, South America and Africa were the 'hard' ones to get. Some outstanding scores were obtained

CONTESTS*CONTESTS*CONTESTS*CONTESTS*

17th ALESSANDRO VOLTA RTTY DX CONTEST

The SSB & RTTY Club of Como and the Associazione Radiomatori Italiani have the pleasure in announcing details of the 17th "A. Volta RTTY DX Contest." This contest is organized in order to increase interest in the RTTY mode as used by Radio Amateurs and to honor the Italian discoverer of electricity, Alessandro Volta.

TEST PERIOD: Saturday, July 2nd, 12:00Z to Sun., July 3,1983, 12:00Z

BANDS: 3.5, 7, 14, 21, and 28 MHZ.

CLASSES: A. Single oerator
B. Multi-op, single transmitter (list all callsigns and names of operators involved.)
C. SWL.

EXCHANGE POINTS: Contacts between stations of the same country are not valid (count as zero exchange points, zero multiplier and zero QSO.) All two way RTTY contacts will count for points in accordance with the Exchange Points Table. The two-way RTTY contacts, with stations outside one's own Continent, made on 3.5 or 28MHZ are worth double.

CONTACTS: Stations may not be worked more than once on any band. Additional contacts may be made with the same station if a different band is used.

MULTIPLIERS: A multiplier of one is given for each country contacted. The same Country may be claimed for extra multiplier if a different band is used. An Additional multiplier for each Intercontinental Country worked at least in 4 bands. Contact with a station which would count as a multiplier must be found in at least 4 other logs, or contest log from multiplier station must be received in order to be valid.

SCORING: Total exchange points times the total number of multipliers times the total number of QSOs'.

COUNTRY LIST: ARRL Country List plus each USA, Canadian and Australian call area (1 through 10) will be considered a separate Country.

MESSAGE: RST, QSO nr. and Zone nr.

LOGS AND SCORE SHEETS: Use one log per band. Logs must be received by September 10,1983 to qualify. The logs must contain:band/date/time Z/ call-sign/exchange sent/exchange received/points/multipliers. Enclose a summary score sheet with a list of multipliers worked. Comments will be very much appreciated. Send logs to contest manager: I2DMI, Francesco Di Michele, POB 55-I, 22063 Cantu, Italy.

SWL's: The same rules for scoring, but based on stations and message copied.

AWARDS: Trophy to the top stations in each class; Certificates to top score in each USA, Canadian and Australian call area and each Country; Commemorative Prize to all contestants.

16th Alessandro Volta RTTY DX Contest

RESULTS

SINGLE OPERATORS-POINTS- QSO'S-X-SCORE

1. OZ1CRL	2,824	146	56	23,089,024
2. I2OLW	2,794	146	56	22,843,744
3. I1HUH	2,181	120	53	13,871,160
4. I1TXD	2,224	108	53	12,730,176
5. VK2SG	2,723	64	39	6,796,608
6. YJ8TT	3,705	61	30	6,780,150
7. I8JRA	1,147	91	50	5,218,850
8. LU4E	3,202	55	19	3,346,090
9. K4VDM	1,128	55	34	2,109,360
10.IØWQP	1,015	61	30	1,857,450
11.JA1MIN	1,482	43	22	1,401,972
12.VO1EE	714	50	25	892,500
13.DL1VR	632	30	21	398,160
14.Y53VA	534	37	19	375,402
15.I5AZX	366	39	24	342,576
16.WB5QBV	627	29	16	290,928
17.EA4KR	483	35	15	253,575
18.WØLHS	557	24	15	200,520
19.EA3AZX	405	23	14	130,410
20.W8KV	414	20	11	91,080
21.DL8QP	279	22	14	85,932
22.F6BIQ	170	38	13	83,980
23.Y53UA	204	28	13	74,256
24.W2KHQ	400	20	9	72,000
25.OK1KRY	90	27	11	26,730
26.SM5AAY	65	17	9	9,945
27.Y33TA	34	10	3	1,020
28.W8TCO	82	4	2	656

MULTI-OPERATORS

1. HA5KBM	1,886	145	59	16,134,730
2. OK1KPU	1,560	87	44	5,971,680
3. LZ1KDP	396	33	16	209,088

CHECK LOGS: Y27NN/A, SM5EIT, WA6WGL , I2JIN.....

RESULTS OF THE 15th RTTY WAEDC

CALL	QSO	QTC	MULTI	SCORE
1. Y39XO	298	561	222	190,698
2. I1TXD	253	467	195	140,400
3. DK8NG	245	328	245	140,385
4. IT9ZWS	265	461	174	126,324
5. SM6ASD	243	441	184	125,856
6. W3FV	196	324	209	108,680
7. IC8POF	229	417	152	98,192
8. OH1IJ	248	418	147	97,902
9. DJ2YA	160	386	172	93,912
10.4Z4KB	176	150	191	62,266
11.I8JRA	139	280	124	51,956
12.KB2VO	173	109	131	36,942
13.YO3AC	123	265	94	36,472
14.OE2SNL	123	174	117	34,749
15.DJ6QT	106	89	171	33,345
16.Y79XN	143	254	89	30,966
17.4N7NS	111	230	76	25,916
18.HC5EA	137	61	122	24,156
19.ON7KK	154	0	154	23,716
19.UV3FD	168	140	77	23,716
21.EA3BLQ	107	244	65	22,815
22.EA3OL	247	0	82	20,254
23.YV1GU	126	0	138	17,388
24.DL8QP	73	168	69	16,629
25.EA1AEB	154	0	101	15,554
26.DJ9IR	79	152	54	12,474
27.DJ1XT	78	136	56	11,984
28.EA8ZZ	73	84	75	11,775
29.K1LPS	73	27	94	9,400
30.KJ2N	67	88	60	9,300
31.OK2BJT	74	127	46	9,246
32.DF1LX	61	113	52	9,048
33.OK2SPS	83	147	35	8,050
34.K6WZ	60	54	65	7,410
35.DF6AI	66	98	41	6,724
36.DJ2YE	90	0	70	6,300
37.DF6ZY	52	123	35	6,125
38.F6DBY	71	0	82	5,822
39.Y23VB	76	50	46	5,796
40.KP4BJD	66	0	77	5,082
41.EA5CVR	73	0	67	4,352

RTTY Journal

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