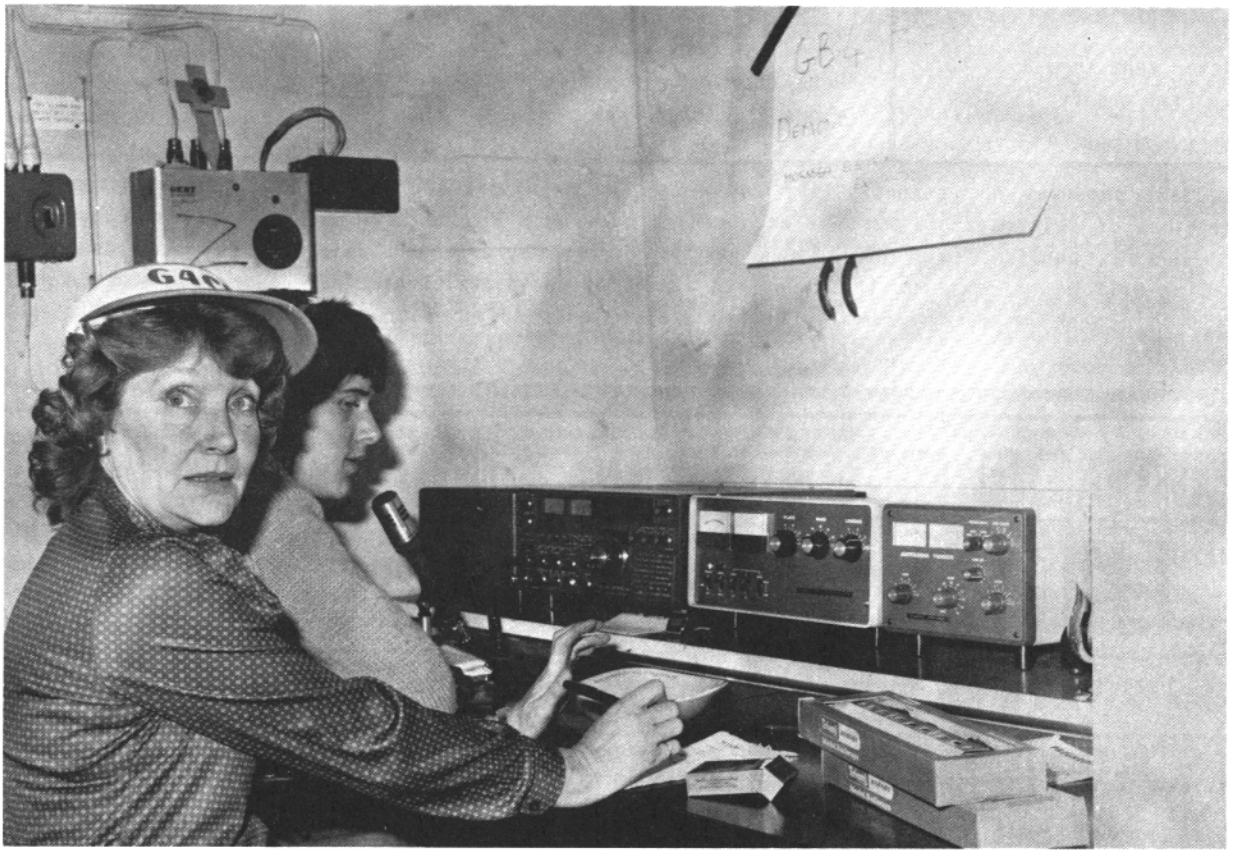
RTTY Journal ©

EXCLUSIVELY AMATEUR RADIOTELETYPE

VOLUME 33 NUMBER 2 FEBRUARY 1985 PRICE $1.50



Pictured is Joan Heathershaw, G4CHH of North Humberside, England Joan has a Creed 444 and is currently President of the British Amateur Radio Club

CONTENTS

ASCII and HF operation

Back to the beginning - additions and omissions

Machine language is easy

AWARDS - RTTY DXCC - WAC - WAS - WAZ - WACOUNTIES LISTINGS

RTTY JOURNAL

DEE CRUMPTON, N6ELP
Owner-Editor -Publisher
Post Office Box RY
Cardiff-by-the-Sea, CA
92007-0179

JOHN P. GOHEEN, KA6NYK
Associate Editor

BUSINESS OFFICE
1155 Arden Drive
Encinitas, CA 92024-5105
Tele: 619-753-5647

Postmaster send form 3579 to:
P.O.B. 179, Cardiff, CA 92007

ISSN:0033 - 7161

SUBSCRIPTION RATES

USA	$10.00 per year
CANADA,MEXICO surf.	$ 9.00 per year
CANADA,MEXICO air	$11.50 per year
FOREIGN Surface	$10.00 per year
FOREIGN airmail	$15.00 per year

All monies to be paid in US funds.

BACK ISSUES
A duplicate of any back issue may be obtained from:Red Wilson, 4011 Clearview Drive, Cedar Falls, IA 50613. $1.50 PPD $ SASE. Reprints of both UART articles $2.00 PPD.

MANAGERS

Dr. Arthur Gee, G2UK
21 Romany Road, Oulton Broad
Lowestoft, Suffolk
NR32 3PJ, England

Kanji Yamamura, JH2FHX
2-42 Umenoki, Izumi-Machi
Toki City, Gifu-Pref.
Japan Mail NO. 509-51

Jean Hurtaud, F8XT
Chillac
16480 Brossac, France

MSO'S

by *Dick Uhrmacher,* K0VKH

INSTALLMENT #13

Hi gang! A "Happy February" to all of you! If we get this next 30 days or so out of the way, we should be well on our way to Spring, with its attendant yard work, thoughts of fishing, flowers and other esoteric items that occupy our Springtime hours. MSO use has really been burgeoning recently, and I hope that you won't mind if I spend a little time on the "soap box" in this issue.

MSO HINT OF THE MONTH

A recent version of the HAL DSK-3100 software, (V.4.4 and later), has a new and very useful feature. The SYSOP now has the ability to "hide" files in their system. The "hidden" files are NOT transmitted as part of a routine "Directory" request by the remote user. However, they can be "read" in the very same manner as other MSO files. The nice thing about these "hidden" files is that they dramatically shorten the MSO "Directory", thus saving long and repetitious "Directory" runs, on-the-air time, transmitter wear and tear, etc. If they are hidden you ask, how do I "find" these files? Most SYSOP's use the technique of "Sub-Directories", that categorize these files by subject. For instance, the K4KOZ MSO has a series of "hidden" files dealing with the Kenwood TS-930S transceiver. However, the Directory only lists "DIR TS930S", a "Sub-directory" that lists the filenames of all of the files which pertain to that subject. Instead of listing each and every file, this technique lists only a few general files, from which the remote user can pick and choose as his interest dictates.

"KERCHUNKING" AN MSO

I've noticed recently that some RTTY stations, who never identify properly, appear on the frequency, gleefully type out the MSO activation code, and then disappear into anonymity! This really isn't new, as we've seen it for years on the 2-Meter FM band. This "kerchunking" seems to satisfy some inner need, to determine if the MSO is "really there", up and running, etc. In the case of the 2-Meter repeater, not a lot of harm is caused, and from a psychological viewpoint, if some "security" is realized by the remote user when they hear the "kerchunk", I guess the local repeater sponsor can add that to their list of "public service" attibutes. However, when it comes to "kerchunking" an MSO, the remote user usually also fails to send the "exit" command, which leaves the MSO armed and ready to respond to EVERY MSO command sent on that frequency. No problem if there's only one MSO parked on that frequency. However, in the case where several MSO's are on that frequency, things degenerate quickly when TWO MSO's are responding to the same commands! The moral of the story is that if you MUST "kerchunk" an MSO, be kind enough to make sure that you also properly "EXIT" the system!

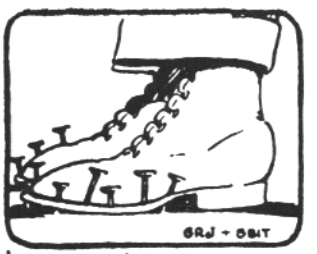
"HIT" OF THE MONTH

In the "reading the mail" not long ago, I saw one of the MSO's output a very interesting tidbit. Band conditions being what they were, the file came across as: A 40-Meter SSB WORLD **'CHUMP'**IONSHIP"! Do you suppose there is something prophetic in the placement of that 'hit'??

PATIENCE IS A VIRTUE

Want to really cause dissention in the ranks, high blood pressure among your peers, and at the same time learn some new four-letter words? Well, recently we've seen an influx of new MSO users, some of whom need to learn some very basic lessons in courtesy and sharing. They jump right in on top of someone that has accessed one of the MSO's, and fire away with their commands! Needless to say this impolite, uncaring and nothing less than rude activity is deplored by all who see it. And significantly, it is truly amazing how easy it is to determine or recognize these less than courteous individuals. Equipment peculiarities, operating habits, etc, all tip off who they are, and the "WRATH OF KAHN" is mild to the expletives used to descrive them. Ham Radio is built upon tradition and, one of the basic traditions is that the use of a frequency is most certainly on a 'first come-first served' basis, and once a station occupies a frequency, it is theirs to use until they are through. Nothing less applies to using an MSO. Once a station determines that the frequency is clear, and has accessed an MSO, it is theirs to use until completion of their activities, picked up their traffic, written messages, etc. In the interests of efficiency alone, a lot less confusion, interference, repeat requests for Directories, files, etc., are generated, when operators respect the right of others to conclude their MSO activities without interuption, not to speak of just common courtesy! Concurrently, when a MSO user does "exit" an MSO, and wishes to access yet another MSO on the frequency, they certainly have

Please turn to page 6



DX

JOE WOOD, AJØX

POB 84

LAUREL, MS 39440

February is upon us and I hope you all are ready for the excitement that is sure to come..... on February 11 to the 15th, Cocos Island starring TI2SK and TI2FPE as TI9TTY. This is promised to be an exclusive RTTY operation and could include some AMTOR as well! For those of you that missed last months mention of this effort, QSLs will go to WB4UBD, James Sladek, 1601 Melrose Parkway, Norfolk VA 23508. Jim wrote to me back in December so that we would have plenty of time to spread the word to all of the deserving Hams and this has been done. If you missed it, you don't read the RTTY JOURNAL! [Are there some Hams out there that don't read the JOURNAL??]

By now you have read the rules governing the up-coming "World RTTY Championship Contest". It should be an excellent chance for each of us to fill some of those blank DXCC log spaces with that elusive country. I can just feel the adrenalin flowing as the searching, calling and (hopefully) working occurs. Do you have your gear in order and a large supply of coffee and pencils on hand? If conditions persist, it will be the low bands that get the play and that will mean high activity levels during the wee hours. Low band work will call for low angle radiation and "sloppers" are the easiest to install. If you have room for a delta loop or a "bob tail curtain" that's even better. But most of us do not have the real estate to mount that kind of effort. Whatever your preference, good luck to each of you on February 23. 1985 0000 to 2400 UTC.

Well, Knights of Malta did not make it! It seems that the station set-up created a great deal of RFI to a security alarm system and the operation was cancelled. IØAOF has sent word that the affected system is undergoing some changes to eliminate the RFI problem. Joe implies that the operation will still take place, but there is no definite time as to when, so patience is the watchword, but not necessarily a virtue for most of us. Keep the faith though, it will happen.

Band conditions continue to decline and the worst is yet to come. All indications are that the present sunspot cycle will not bottom out until the year 1987!! How much worse can it get in the next two years? The recovery after the cycle hits bottom will be more rapid than the decline.. But that is the only good news that we can look forward to.

The American Radio Relay League, in their January mailing of QST, included a polling card to the League members asking for their opinion on a subject that I will not go into here. It was a "pro/con" simple, direct to the point, questionaire. A worthy approach to the membership and what better way to have a voice in helping to decide the direction in which the Directors of the League should move to enhance our activities. I am of the understanding that the response from the members has been excellent in terms of cards returned, so if you haven't returned your card, it is important that you do so. The total response will bear heavily on whether or not this method is used in the future. The individual voice of each member can be heard in this fashion, let's don't blow it!

A review of the DXCC roster in January "QST" left me very disappointed. They did not list RTTY DXCC members! I don't pretend to understand why they did this. But I do feel that they owe us a valid explanation. No doubt, in their order of priorities, RTTY continues to be treated as a step-child.....As a Life member of the League, I find this casual attitude totally unacceptable and will be so advising the Delta Division's Director and DX Advisory Committee representative.

Last month I mentioned my feelings with regard to a possible move of semi and fully automatic operatons (mailboxes and packet) to the region just above 14.100 MHz. I have now found packet operation going full blast above 14.100 MHz!! I didn't predict that, but it "sure as shootin" has happened! That area 14.100 to 14.125 MHz. is virtually unoccupied and if we don't use it, we may lose it. What do you think? Can I hear from each of you on this, please?

As most of you know, I carry the latest RTTY DX bulletin in my MSO (mailbox), and it is read quite often by a number of stations that want to keep abreast of what is going on currently. I have noticed a tendency for some users to jump on frequency, bring up the MSO and request the bulletin without regard for communications that are already in progress on the frequency. Now we all know better than to do something like that so I am humbly requesting that you listen before you leap. And if someone is using the QRG have patience and take your turn when all is clear. The bulletin, originating at this station, is also carried by two other stations N1API (MSOAPI), and W9CD (MS09CD). My MSO access is MSOAJØX and the mark frequency is 14.085.625. The other two stations along with about thirteen others are also located on that frequency.

[Perhaps someone should have the same information on a different frequency] [de Dee, N6ELP]....

Please turn to page 6

HAVE RTTY—WILL TRAVEL

Yes, now you can take it with you! The new **HAL CWR-6850 Telereader** is the smallest RTTY and CW terminal available, complete with CRT display screen. Stay active with your RTTY and CW friends even while traveling. Some of the outstanding features of the CWR-6850 are:

- **Send and receive ASCII, Baudot, and Morse code**
- **RTTY and Morse demodulators are built-in**
- **RTTY speeds of 45, 50, 57, 74, 110, and 300 baud**
- **High or Low RTTY tones**
- **Send and receive CW at 3 to 40 wpm**
- **Built-in 5 inch green CRT display**
- **Four page video screen display**
- **Six programmable HERE IS messages**
- **Pretype up to 15 lines of text**
- **External keyboard included**
- **Runs on +12 VDC @ 1.7 Amperes**
- **Small size (12.75″ × 5″ × 11.5″)**

Write or call for more details. See the CWR-6850 at your favorite HAL dealer.

HAL COMMUNICATIONS CORP.

BOX 365
URBANA, ILLINOIS 61801 **217-367-7373**

HEARD, WORKED, and QSL ROUTES

ZS5QQ	7.084	0322 UTC	CBA (Callbook Address)
ZS1QK	14.090	1935 "	CBA
HC1JX	14.089	1200 "	P.O. Box 691, Quito, Ecuador.
VK3VY	14.088	1425 "	G.P.O. 5325, Melbourne, Australia.
7P8CI	21.092	1535	K8VDE & KA2CDE have been mentioned as QSL managers!
HB9TQ	14.096	1559 "	CBA
KC4USV	14.087	1400 "	CBA
ISØRJ	14.082	1144 "	CBA
EA8YV	14.099	1700 "	P.O.B. 258, Laguna, Tenerife.
OK2KBR	14.088	1700 "	CBA
EA4AWU	21.090	1227 "	CBA
C3ØLBM	14.086	1212 "	Via EA5AGY
EI9CJ	14.092	1142 "	CBA
PZ1DZ	14.093	1312 "	CBA
ISØAWP	14.090	1310 "	CBA
EA6LH	14.099	1302 "	CBA
Y23 WI	14.091	1250 "	CBA
YU8FR	14.086	1244 "	CBA
F6AEV	14.093	1341 "	Via K2HG (QSL Manager).
CE3BBW	21.090	1451 "	CBA
HI8WR	14.085	1521 "	CBA
F5TA	3.592	0620 "	CBA
FM7BK	14.089	2035 "	POB 152, F-97202 Fort de France, Cadex, Martinique.
KL7TC	14.091	2219 "	POB 75252, Fairbanks, AK 99707
HP1AW	14.098	2255 "	CBA
EI9CJ	14.090	1313 "	Buro
GD4FWQ	14.094	1543 "	CBA
UB5MDI	14.088	1319 "	Buro
UZ3AYR	14.092	1316 "	Buro
OA4ZV	21.085	1522 "	CBA
CT1CVK	14.097	1252 "	CBA
JA1SEP	14.082	2304 "	Buro
JA1WVK	14.090	0026 "	Buro
FO8LQ	21.090	1935 "	CBA
G4CHH	14.099	1215 "	Sandalwood,N.Humberside HU18 1EG-UK

This column exists for you "the DXer" and only thrives with your input, just as the RTTY JOURNAL exists only through your articles and pictures etc. So, in order to make this the best column/magazine to be read, pitch in, send along your information/articles, whether it be DX information, operating hints, complaints, pix's or whatever. If it is RTTY it is sure to be of interest to all.Articles and Pix should be sent to Cardiff address and the rest to me in Laurel. This months contributors are as follows: K6SAD/4, W2JGR, WA9SEX, W9CD, TG9VT, W1DA, KA1LBW, KØVKH, VE3FEA, N1API, WB2CJL, WB4UBD and IØAOF. Thanks for your input gentlemen.

I will be looking for you in the upcoming DX activities as well as hearing from you. Until next month, the best to each of you.....73, Joe, AJØX...SK

C O N T E S T S

RTTY JOURNAL/73 4th Annual RTTY World Championship Contest..0000Z to 2400Z February 23, 1985. For contest details see December 1984 issue.

British Amateur Radio Teleprinter Group-0200Z Saturday, 23 March for 48 hours until Monday the 25th. Contest rules in December 1984 issue.

Good luck in the tests to all participants....

MSO COLUMN CONTINUED

that right. Let's all do our part to reduce the blood pressure a couple of notches! ASK if the frequency is in use-respect the other operators right to complete usage of the frequency and MSO's- And remember, the beauty of the MSO system is that the MSO, (including your traffic or area of interest), will still be there in a minute, an hour, day or week. A little courtesy and forethought will pay handsome returns!

**Might make mention here of W1AW. It seems that a lot of Amateurs out there get a little (some more, some less) hot under the collar when W1AW starts transmitting. A typical comment would go like this: " why are we repeatedly told to use courtesy and ASK if the frequency is in use when W1AW just bullies its' way onto the air with never a by your leave." Such comments are thoughtless, for if you will observe the W1AW operation, it is rarely on the exact frequency it is supposed to be on. W1AW does move when it hears someone on "ITS" frequency. BUT, the old adage surely applies here: if you can't hear 'em you can't work 'em. w1AW may be heard by all, but W1AW doesn't necessarily hear all of you before starting a transmission. And let's face it. Who among us does not know where and when W1AW broadcasts? Just think of all of the RTTYers out there waiting to get the latest bulletin from W1AW only to be listening instead to a 'brag' tape from Joe Blow that has been aired repeatedly. So next time you want to critize W1AW... put the brain in gear before the mouth gets in gear. For while there are many things wrong with W1AW, ARRL etc., their intent is not the least suspect..at least not from this point of view.

** de Dee, N6ELP inserted here hope you don't mind Dick.....

NATIONAL AUTOSTART FREQUENCY MSO LISTING

It's been over a year since we've published a list of the MSO's on the National Autostart Frequency, and we get many questions about "who and where" in relation to MSO's. So I think it's time to list them once

PLEASE TURN TO PAGE 8

ENGINEERING MAKES THE DIFFERENCE

Production Expertise And Service Integrity Form The Foundation For Your Long-Term Satisfaction

The fact that the Computer Patch Interface unit by Advanced Electronic Applications, Inc. is known as the best value on the market is no accident. The CP-1 was designed by Al Chandler, K6RFK (PHD-E.E.), an active RTTY user since 1963.

Given a cost per unit budget for the CP-1, Al designed as much performance as possible into the Computer Patch, including a unique new tuning indicator, referred to by one of our customers as the "Dead Eye Dick" tuning indicator. This indicator is ideal for RTTY and CW, in that it is both fast to tune and (within 10 Hz) as accurate as scope tuning. It also performs under poor signal to noise conditions in which other indicators provide no useful data.

Al's variable shift tuning was designed to move the space filter center frequency from 2225 Hz to 3125 Hz without changing the bandwidth (by varying the Q of the filter). All this is accomplished using a precision ganged potentiometer to assure proper tracking of the multiple filter stages. We could have used a pot costing a tenth as much by simply using a two-pole filter design, but we feel the advantage of a sharper filter reduces the noise bandwidth significantly and allows the variable shift control to be used like passband tuning for extra elimination of adjacent channel interference.

Some manufacturers are concerned that amateurs might try calibrating their own equipment and, therefore, have used non-adjustable components, which results in sub-optimal performance. Although more costly, trimpots used in AEA equipment allow factory adjustment for performance to design specifications. Competently designed active filter circuits need not be adjusted after leaving the factory; however, for specialized use the owner can easily change filter parameters.

Mindful of the fact that many of our customers are new to RTTY, Al made the CP-1 tuning as forgiving as possible, while providing the most critical operator a piece of equipment in which he could be proud. Even old "pro's" are surprised at the poor signal conditions under which the CP-1 will still provide good copy.

You can now experience the BEST RTTY, CW, and AMTOR offered. Couple the CP-1 with our new AEASOFT™ software packages designed for the MARS, SWL, or amateur radio operator, and you will feel a pride reminiscent of what "made in U.S.A." brought in years gone by. Please do not hold the low price of the CP-1 against us. This is one case where you get much more than you pay for relative to any of the competitive units. For more information send for our FREE catalog. Better yet, see your favorite dealer.

AEA Brings you the Breakthrough!

Advanced Electronic Applications, Inc.

P.O. BOX C-2160 • LYNNWOOD, WA 98036 • (206) 775-7373 • TELEX; 152579 AEA INTL

MSO COLUMN CONTINUED.....

again. The "carrier frequency", (in many cases the digital readout on your transciever when using AFSK, and in Lower SideBand), is 14 087 750. The MARK frequency is 14 085 625, 2125 lower than the carrier frequency). All communication with an MSO is at 100 WPM, (74 baud), Baudot, and 170 shift. The following is a list of those stations actively operating a MSO on this frequency

ACCESS CODE		QTH	SYSTEM OPERATOR	PHONE NUMBER
MSOICL		Yellow Springs, OH	Gaylord	513-767-1692
MSOVKH		Rapid City, SD	Dick	605-343-6127
MSOKOZ		Boca Raton, FL	Frank	305-994-1242
MSOQXK	*	Richardson, TX	Don	214-235-3960
MSONYA		Midwest City, OK	John	405-737-6963
MSO9CD		Urbana,IL	Clark	217-328-4241
MSOAJØX		Laurel, MS	Joe	601-426-3486
MSOAPI		Meriden,CT	Al	203-634-0430
MSOKUW	**	Kenney, IL	Red	217-935-6173
MSOZRR		San Luis Obispo, CA	Ernie	805-543-7641
MSOMTC		N. Fort Myers, FL	Dick	813-995-0680
MSO5FL		Denton, TX	Brownie	817-382-0351
GUATMAIL		Guatemala City, Guat.	John	001-502-3-01547

* The w5QXK is only active on weekends.
** The K9KUw will be inactive while Red is in Arizona for the winter.

That's it for this month. Please remember that the Dayton HAMVENTION is just around the corner now. If you are planning on attending, and would like to join us for the Annual RTTY Dinner, drop me a note in the mail, in my MSO, or contact Jerry, WA1IUF, via his MSO on 14097.5 KHz. Have fun, enjoy RTTY and let's hear from you! DE: Dick, KØVKH....

ADDITIONS & OMISSIONS CONTINUED..... electronic style printer and has nothing in common with the 33 or 35 except the ASCII code. It will run at either 110 or 300 Baud.

Many computer RTTY operators are NOT aware that they should send a CR/LF at the end of each line. Their video screens do this automatically but no CR/LF signal is sent to the receiving station. The item on line length does not mention this. Even some mailbox systems have this deficiency.
[Thanks Charles for the comments].
From Carl, K6WZ comes the remarks:" Guess I will always keep tape gear around but I like the old model 14 TD and reperf.".....So I guess there are two points of view..I have two M28s. Love them both..De Dee, N6ELP.....

BACK TO THE BEGINNING
ADDITIONS & OMISSIONS

Charles Ring, W3NU
977 Taylor Street NE
Masury, OH 44438

I am writing to correct a number of errors and misleading omissions in your "BACK TO THE BEGINNING" article in the January issue of the RTTY JOURNAL. Most are in the definitions of terms used in RTTY:

ASCII/BAUDOT-Does not mention the Model 34 which uses Baudot, not ASCII. This is a 28 in a 35 cabinet.
FIGS- Calling "ltrs" an upper-case function will cause confusion.
Mark- While the mark signal is transmitted on a higher RF frequency on HF, the audio tone from a receiver adjusted for LSB is the same lower 2125 Hz as on VHF.
Model 12- While a 12 could be made to work today, its separate selector magnets for each of the five Baudot data bits would make interfacing this antique to current equipment impractical.
Model 14- This is an almost generic term covering many pieces of Model 15-type paper tape equipment. It is not a specific machine consisting of a TD and a reperf.
Model 15- Should mention the very similar but unusable Model 20 which uses its own six level code but could be easily mistaken for a 15 by a beginner.
Model 24 and 26- I have never heard of a 24, but would be interested in knowing if there is such a thing. The 26 is rarely used now because it was a light duty machine made long ago and most are worn out by now.
Model 32-This is not a plastic version of the 28. It is more a successor to the 26 and has nothing in common with the 28 except the Baudot code.
Model 35- This is an ASCII version of the 28, not of the 32. The 33 is the ASCII version of the 32. The 35 is a heavy duty machine, though not quite as rugged as the 28 due to greater mechanical complexity (more to break down). I believe the 35ASR can punch tape while receiving.
Model 43-This is a mostly electronic

GO TO

AWARDS

Following is the listing of DXCC Awards given by the RTTY JOURNAL, the dates (early one) are, in some cases, approximate.

DXCC Number	current endorsement	contacts sent	date
1. ON4BX	200	January	1978
2. W3KV	210	February	1978
3. I5KG	120	March	1978
4. ON4CK	150	April	1978
5. W5QCH	130	April	1978
6. W8CQ	120	April	1978
7. WA3IKK	150	April	1978
8. DK3CU	100	April	1978
9. W5EUN	120	April	1978
10. G6JF	140	April	1978
11. W2LFL	200	May	1978
12. I5ROL	100	May	1978
13. W4YG	100	May	1978
14. W3DJZ	150	May	1978
15. JA1ACB	100	May	1978
16. K8YEK/W8US	100	May	1978
17. I5WT	226	May	1978
18. W1GKJ	150	May	1978
19. W4CQI	110	May	1978
20. DL8VX	100	May	1978
21. K6WZ	100	June	1978
22. W3EKT	100	June	1978
23. W8JIN	150	June	1978
24. W4EGY	100	June	1978
25. I8AA	226	June	1978
26. K3SWZ	100	June	1978
27. OK1MP	100	June	1978
28. W5VJP	100	June	1978
29. K4YZV	100	June	1978
30. K7BV*	210	Sept.	1978
31. F6ALL	100	Sept.	1978
32. F5JA	150	October	1978
33. HB9AVK	100	Nov.	1978
34. F8XT	100	1 April	1979
35. OH2HW	100	10 Apr.	1979
36. W9RY	100	16 Apr.	1979
37. DJ8BT	100	24 May	1979
38. DF2KU	100	16 July	1979
39. DL8KS	100	29 Aug.	1979
40. JA8ADQ	100	15 Sep.	1979
41. W3FV	150	1 Sep.	1979
42. VE2QO	100	14 Nov.	1979
43. W7MI	100	1 Dec.	1979
44. DJ3OE	100	10 Feb.	1980
45. I5FLN	208	14 Feb.	1980
46. W6JOX	100	24 July	1980
47. JA1DSI	150	23 Sep.	1980
48. VK2SG	100	3 Nov.	1980
49. W2IUC	100	3 Nov.	1980
50. KØBJ	120	10 Nov.	1980
51. DJ1IJ	100	15 Dec.	1980
52. JA1BK	100	15 Dec.	1980
53. W2PSU	100	21 Feb.	1981
54. SM6AEN	100	25 Feb.	1981
55. IØAOF	100	2 June	1981
56. SM7CLZ	100	2 June	1981
57. DK5WJ	100	2 June	1981
58. ON4WG	105	5 June	1981
59. JA6GIJ	100	21 Sep.	1981
60. JA1JDD	100	12 Oct.	1981
61. WA6WGL	100	2 Nov.	1981
62. GI4AHP	100	10 Nov.	1981
63. SM7CLZ	100	15 Dec.	1981
64. WB6CYA/KG6CM	100	17 Dec.	1981
65. JA1MIN	100	19 Dec.	1981
66. YB2BLI	100	26 Apr.	1982
67. WØHAH	100	6 May	1982
68. K4VDM	100	17 May	1982
69. DK1BX	120	2 July	1982
70. K1NVY/7	100	15 Aug.	1982
71. JA1ZF	100	25 Aug.	1982
72. GM3ZXL	100	25 Sep.	1982
73. WOLHS	100	27 Oct.	1982
74. W8JMG	100	22 Nov.	1982
75. JR2TZL	100	22 Nov.	1982
76. JA3EOP	100	21 Dec.	1982
77. KB9IS	100	5 Jan.	1983
78. K4JAF	100	1 Apr.	1983
79. WB3HAZ	100	1 May	1983
80. K1LPS	100	20 May	1983
81. JR6AG	100	15 June	1983
82. JA2VFW	100	1 July	1983
83. DK4KK	100	10 Sept	1983
84. N1BNK	100	10 Sep	1983
85. XE1M	100	26 Sep.	1983
86. JA1DXV	100	27 Sep.	1983
87. JH1BIH	100	28 Sep.	1983
88. JR2CFD	100	25 Oct.	1983
89. N4FJL	100	2 Nov.	1983
90. SM5EIT	100	4 Nov.	1983
91. KY4I	100	6 Nov.	1983
92.			
93.			
94.			
95.			
96.			
97.			
98.			
99. VE7VP	100	2 Jan.	1984
100. KA7BDB	100	31 Jan.	1984
101. JH2PDS	100	4 April	1984
102. K4AGC	100	20 May	1984
103. WB2VTD	100	1 June	1984
104. HB9HK	100	15 Sept.	1984

The gap from 92 to 98 is there due to a fluke with the trophy dealer. I called and asked which number they were working on and got the wrong answer. My fault, I should have checked it out myself, but guess I had a case of the lazies. I know that a lot of these Amateurs have more than the 100 credited to them, but I have no correspondence on it. So if you wish your update to show up, please send along your listing of any new listing you have, with the appropriate certification, of course. If you need a sticker please indicate that also. I will be publishing a new Honor Roll soon so get your totals there to me also, if you wish to be included. The * indicates the only duplicate of the DXCC listing. #13 was issued and because of his change of callsign he was issued another DXCC award before it was discovered. that he already had one. "Mac" is no longer with us, but he deserved two awards.

DXCC AWARDED TO SWLs

1. G8CDW, Ted Double	8 Nov. 1982
2. Chris Gibbs	6 Nov. 1983
3. JA1-3477 Hajime	31 Dec.1984

That is the end of the DXCC listing as I have it. If you have any corrections or additions, please send them to the RTTY JOURNAL office please.

WORKED ALL CONTINENTS

All on 3.5 MHz - 80 Meters

1. W1MX		1978
2. K6WZ	1 April,	1979

All on 7.0 MHz. - 40 meters

1. DLØTD
2. W1MX

All on 14 MHz - 20 meters

K3SWZ	W5RYA
WØMT	DJ8BT
SL5AR	DK4ZF
JH1TFF	SWL 13-13-018
DJ1QT	W4ZLH
VP2MRW	K4YZV
F6ALL	W7JWI
SM6AEN	W1MX
W9OEQ	K6WZ
G3ZWW	DL8VX
W3EKT	WØJCO
PY2CYK	WB9LUK
WA6WGL	WB4TPU
K4GJW	DL8QP

AWARDS CONTINUED

I8YRK	G3YDR
I1PYS	LA2IJ
JA7ML	G3HJC
W8JMG	K1LPS
WB4VUP	W1GKJ
VE2QO	K4ZS
OHØNI	WAØYDJ/4
K4VDM	G4ALE
GW3IGG	K4JAF/WA9AKT
W6JOX	JA4ONZ
G3IIR	SWL-BRS-18456
N3AI	I5HZZ
I5GZS	I2ULW
I5KPK	SM5EIT
WA8CZS	WA9BOW
B.Niendorf	K4RN
ISØESS	K5GH/W5KHP
HB9AVK	WB6CYA/KG6CM
I2WEG	WB2VTD
WA6CQW	K. Wustner
KØHSC	W8JLN
KA7CYK	VE2JR
LZ1KDP	DL8GO
DJ2YE	DK5WJ
KØPJ	JA1EN
E. Prawalschke SWL	
DJ3OE	WB7BFK
I5FLN	DL6ZB
W2LFL	VE7BTO
I5YTP	PJ5SO
JA1DSI	YO3AC
JR2TZL	K4UDM
KØBJ	YB2BLI
W4MWP	KD4OM
HB9BQL	WB3HAZ
ON7EV	KB2VO
N8AKF	FM7WO
I8JRA	OH5YW
GM4KHE	DF1UO
N4FJL	KA4BDB
KT1N	WA4JJY
WA6VZG	VK5RY
G3KQS	SP2UU
SP2FF	SP2UUU
KE6T	WA6VZG
VK5RY	G3KQS

I did not include numbers on these to save space. They are read downward each has two on a line from left to right. (i.e. WA6VZG comes before VK5-RY and after WA4JJY.

All on the 220 band

WØMT	DJ8VX
SM6AEN	K6WZ
W3EKT	WA6WGL
W6JOX	W4YJ
I5WT	HB9AVK
SM5EIT	

W.A.C. all on 21 MHZ - 15 meters

IØLVA	G3UUP
I5NOD	WB6CYA/KG6CM
DJ3OE	JA1DSI
DK5WJ	K4VDM
G4EJA	EA8RU
ON7EV	JR2TZL
I8JRA	K1LPS
N4FJL	

All on 28 MHz. - 10 meters

FG7XT	WA6WGL
DJ8BT	W1GKJ
W6JOX	HB9AVK
SM5EIT	K3SWZ
W2PLQ	K4YZV
FG7XT	W1GKJ
W4QI	WA8NGJ
W9OEQ	I8AA
DJ3OE	JA1DSI
LZ2KRR	K4VDM
K1LPS	

W.A.C. All (mixed) bands 3.5-28 MHz.

DF7FB	I5TIV
KB9DM	DK7UC
G4FLM	LZ2KRR
W2IUC	G3GGL
9A1ONV	DJØWQ
K4YI	YO3AC
N9BHH	OZ1CRL
EA3BLQ	WØLHS
4X6CV	DH2BAB
DL5MBI	WB5HBR
SM5FUG	OK3CNJ
SM6AAY	GI4KQA
C21BD	YB2BLI
N4FJL	KE6T
G4NYO	G4NJW
C. Gibbs SWL	

WORKED ALL STATES

K3SWZ
W2PLQ
K4YZV
FG7XT
W1GKJ
W4CQI
WA8NGJ
W9OEQ
I8AA
W8JLN (all on 20 meters)
W6JOX

WB6CYA	(on 20)1-2-80	W2IVC	3 Jul-80
K4YI	10-Jun-80	K3TOM	1 Feb 81
W7LLC	12-Mar-81	IØAOF	15 Apr-81
K4VDM	15 Sep 81	I8AA	1 Jun-82
JA1JDD	20 Mar-82	WB2VTD	18-Mar-82

Those are all of the catagories folks, bet some of you didn't know they existed. Here are two new catagories that no one so far has applied for: Worked all Zones....Worked all Counties, the latter one being applicable to the USA only. See December 1984 issue of the RTTY JOURNAL for more information on awards or an SASE to the RTTY JOURNAL office.

ASCII AND HF RTTY OPERATION

BY Hank Scharfe, W6SKC
P.O. Box 267
South Pasadena, California 91030

A few years ago, the FCC granted American Amateurs permission to use Baudot coded RTTY up to 100 WPM. After an initial surge of 100 WPM activity, most Hams went back to 60 WPM.

The failure of 100 WPM operation was often attributed to poor operation of mechanical teleprinters at the higher speed.

In reality, the excessive error rates encountered at 100 WPM were due to the nature of ionospheric propagation and Information Theory.

Multipath distortion will often stretch the 22 ms pulse of a 60 WPM signal by 90%. This same phenomenom will stretch the 13.5 Ms pulse of a 100 WPM signal beyond 100%, which completely confuses most RTTY systems. Since higher speed signals require wider bandwidths, a TU optimized for 60 WPM severly distorts a 100 WPM, often to the point where the teleprinter will only print garble.. If the bandwidth of the TU is opened up for the faster baud rates, the signal to noise ratio is very degraded.

The Amateur's preference for narrow shift also complicates the situation. As the baud rate goes up, the side bands of the Mark and Space pulses spread out and slop into the unwanted channel, confusing the decision making circuits in the terminal unit.

For this reason, a channel that will not support a narrow shift 100 WPM signal will often do quite well if the shift is widened

Please turn to page 15

THE STANDARD OF EXCELLENCE

The world of CW, RTTY, and new DUAL AMTOR is as close as your fingertips with the new brilliantly innovative state-of-the-art microcomputer controlled* EXL-5000E.

Automatic Sender/Receiver: Due to the most up to date computer technology, just a console and keyboard can accomplish complete automatic send/receive of Morse Code (CW), Baudot Code (RTTY), ASCII Code (RTTY) and new ARQ/FEC (AMTOR).
Code: Morse (CW includes Kana), Baudot (RTTY), ASCII (RTTY), JIS (RTTY), ARQ/FEC (AMTOR).
Characters: Alphabet, Figures, Symbols, Special Characters, Kana.
Built-in Monitor: 5" high resolution, delayed persistence green monitor – provides sharp clear image with no jiggle or jitter even under fluorescent lighting. Also has a provision for composite video signal output.
Time Clock: Displays Month, Date, Hour and Minute on the screen.
Time/Transmission/Receiving Feature: The built-in timer enables completely automatic TX/RX without operator's attendance.
Selcal (Selective Calling) System: With this feature, the unit only receives messages following a preset code. Built-in Demodulator for High Performance: Newly designed high speed RTTY demodulator has receiving capability of as fast as 300 Baud. Three-step shifts select either 170Hz, 425Hz or 850Hz shift with manual fine tune control of space channel for odd shifts. HIGH (Mark Frequency 2125Hz)/LOW (Mark Frequency 1275Hz) tone pair select. Mark only or Space only copy capability for selective fading. ARQ/FEC features incorporated.
Crystal Controlled AFSK Modulator: A transceiver without FSK function can transmit in RTTY mode by utilizing the high stability crystal-controlled modulator controlled by the computer.
Photocoupler CW, FSK Keyer built-in: Very high voltage, high current photocoupler keyer is provided for CW, FSK keying.
Convenient ASCII Key Arrangement: The keyboard layout is ASCII arrangement with function keys. Automatic insertion of LTR/FIG code makes operation a breeze.
Battery Back-up Memory: Data in the battery back-up memory, covering 72 characters x 7 channels and 24 characters x 8 channels, is retained even when the external power source is removed. Messages can be recalled from a keyboard instruction and some particular channels can be read out continuously. You can write messages into any channel while receiving.
Large Capacity Display Memory: Covers up to 1,280 characters. Screen Format contains 40 characters x 16 lines x 2 pages.
Screen Display Type-Ahead Buffer Memory: A 160-character buffer memory is displayed on the lower part of the screen. The characters move to the left erasing one by one as soon as they are transmitted. Messages can be written during the receiving state for transmission with battery back-up memory or SEND function.
Function Display System: Each function (mode, channel number, speed, etc.) is displayed on the screen.
Printer Interface: Centronics Para Compatible interface enables easy connection of a low-cost dot printer for hard copy.
Wide Range of Transmitting and Receiving: Morse Code transmitting speed can be set from the keyboard at any rate between 5-100 WPM (every word per minute). AUTOTRACK on receive. For communication in Baudot and ASCII Codes, rate is variable by a keyboard instruction between 12-300 Baud when using RTTY Modem and between 12-600 Baud when using TTL level. The variable speed feature makes the unit ideal for amateur, business and commercial use.
Pre-load Function: The buffer memory can store the messages written from the keyboard instead of sending them immediately. The stored messages can be sent with a keyboard command.
"RUB-OUT" Function: You can correct mistakes while writing messages in the buffer memory. Misspellings can also be erased while the information is still in the buffer memory.
Automatic CR/LF: While transmitting. CR/LF automatically sent every 64, 72 or 80 characters.
WORD MODE operation: Characters can be transmitted by word groupings, not every character, from the buffer memory with keyboard instruction.
LINE MODE operation: Characters can be transmitted by line groupings from the buffer memory.
WORD-WRAP-AROUND operation: In receive mode, WORD-WRAP-AROUND prevents the last word of the line from splitting in two and makes the screen easily read.
"ECHO" Function: With a keyboard instruction, received data can be read and sent out at the same time. This function enables a cassette tape recorder to be used as a back-up memory, and a system can be created just like telex which uses paper tape.
Cursor Control Function: Full cursor control (up/down, left/right) is available from the keyboard. Test Message Function: "RY" and "QBF" test messages can be repeated with this function.
MARK-AND-BREAK (SPACE-AND-BREAK) System: Either mark or space tone can be used to copy RTTY.
Variable CW weights: For CW transmission, weights (ratio of dot to dash) can be changed within the limits of 1:3-1:7.
Audio Monitor Circuit: A built-in audio monitor circuit with an automatic transmit/receive switch enables checking of the transmitting and receiving state. In receive mode, it is possible to check the output of the mark filter, the space filter and AGC amplifier prior to the filters.

CW Practice Function: The unit reads data from the hand key and displays the characters on the screen. CW keying output circuit works according to the key operation.
CW Random Generator: Output of CW random signal can be used as CW reading practice. **Bargraph LED Meter for Tuning:** Tuning of CW and RTTY is very easy with the bargraph LED meter. In addition, provision has been made for attachment of an oscilloscope to aid tuning.
Built-in AC/DC: Power supply is switchable as required; 100-120 VAC; 220-240 VAC/ 50/60Hz + 13:8VDC.
Color: Light grey with dark grey trim – matches most current transceivers. **Dimensions:** 363(W) x 121(H) x 351(D) mm: Terminal Unit.
Warranty: One Year Limited

Specifications Subject to Change

Everything built in – nothing else to buy!

EXCLUSIVE DISTRIBUTOR: DEALER INQUIRIES INVITED
AMATEUR-WHOLESALE ELECTRONICS
8817 S.W. 129th Terrace, Miami, Florida 33176 Telephone (305) 233-3631 Telex: 80-3356

FOR YOUR NEAREST DEALER OR TO ORDER:
TOLL FREE ... 800-327-3102

VISA MasterCard

MANUFACTURER:
TONO CORPORATION
98 Motosoja Machi, Maebashi-Shi, 371, Japan

**Dual Amtor: Commercial quality,* the EXL-5000E incorporates *two completely separate modems* to fully support the amateur Amtor codes and *all* of the CCIR recommendations 476-2 for commercial requirements.

by GEORGE

HITS & MISSES

GEORGE HAMMON, WA6CQW
14215 Pecan Park Lane Space 73
El Cajon, CA 92021

I have written about the 220 MHz band in many columns. The commercial interest in the 220 MHz band is well documented and I have urged many of you to make your thoughts known to the FCC Chairman Mark Fowler.

Senator Barry Goldwater, K7UGA has recently sent the following excerpted letter to the FCC: "More and more I am getting word that the Federal Communications Commission might be considering a rulemaking aimed at reducing the 220 MHz allocation used by Amateurs on a shared basis with the government. Now, this isn't going to set well and I think the commision would be wrong in doing this."

There is an increasing demand for more services to the public that use radiowaves, outside of the Radio Service. And most importantly, some new technologies being developed through experimentation permiting more signals to coexist withing the present bands. I think we especially need to encourage these, but let's not knock down Amateur Radio once again in our efforts. The 220 MHz band is where Amateurs can do a lot of experimentation with the technologies that will benefit all spectrum users. Removing these frequencies from Amateur use is unnecessary and would be shortsighted. " So I ask you to KEEP YOUR HANDS OFF 220. It's needed for continued Amateur experimentation, Like Hams always have done." What the Senator should have added is that the 220 band is utilized in service related work also, such as last summers usage during tne Olympics.

TELETYPE MODEL 39506JC

Joe Morgan, W5PRV, 624 Kerrville So. Drive., Kerrville, TX 78028 needs a schematic diagram or manual for a Teletype Model 39506JC, and associated power supply/electronic unit WE5U00I. Can anyone help Joe?

SCHOLARSHIPS

The ARRL Foundation announces the availability of two scholarship awards for the 1985-86 academic year. Based on high academic standing, financial need and dedication to public service through Amateur Radio, these awards are provided through the generosity of individual sponsors and donors.

The Perry F. Hadlock Memorial Scholarship of $500.00 will be awarded to a student of electrical engineering. It is open to licensed Radio Amateurs of the General or higher, class.

The Paul and Helen Grauer Award of $500.00 will be given to a student of electronics, communications engineering or related fields residing in and attending an accredited college or university in the midwest division of ARRL.

Further information and application forms for these awards may be obtained by writing to the ARRL, in Newington, CT 06111. Address it to "scholarships" at 225 Main Street.

REGION 2 IARU RTTY BULLETIN

We want to remind all our readers of the weekly Region 2 IARU RTTY Bulletins transmitted over W1AW at 2330 UTC Wednesdays at 45.45 Baudot on 3.625, 7.095, 14.095, 21.095 and 28.095 MHz. This bulletin is first transmitted in English and then in Spanish, and brings you region-wide IARU news of interest to all Amateurs and IARU Socities in North and South America.

SPANISH LANGUAGE RTTY JOURNAL

The RTTY JOURNAL is now being written in Spanish. Juan, JU4EGE of P.O. Box 64, 1706 Haedo, Buenos Aires Argentina, has been translating the RTTY JOURNAL into the Spanish language and prints and sends them to Spanish speaking countries. It may be remembered that Dee, N6ELP, our editor-publisher and Juan, LU4EGE started a DX net last year in the hope of attracting more RTTYers from all over the world to one frequency at one time, with no lists etc., to hassle with. Due to some "2 meter" types and the deteriorating band conditions that joint project has been shelved for now. Too bad, it was enjoyable. But if you have a Spanish speaking Amateur Radio Operator for a friend you might have them get in touch with Juan to start off their subscription to the RTTY JOURNAL Spanish edition.

HOUGHTON MICHIGAN

Michigan Technological University ARC and the Copper Country RRA will be operating between 0000Z January 29 and 0000Z February 5,1985 in celebration of their winter carnival. The usual CW and SSB frequencies apply along with the following RTTY frequencies: 3.630, 7.090 and 14.095. Certificates available via Howard Junkin, N8FHF, 106 West South Avenue, Houghton, MI 49931.

PACKET RADIO FREQUENCIES

Annapolis, MD.	10.147
Atlanta, GA	146.13/.73
Baltimore, MD	145.01
Chicago, IL	144.95
Colorado Springs, CO	147.50
Dallas, TX	147.57
Denver, CO	145.70
San Francisco, CA	146.58
St. Louis, MO	147.555
Washington, DC	145.01
EASTNET	145.01
Pacific Northwest	146.55
Southern California	145.36

Please turn to page 15

CLASSIFIED ADS

30 words $3.00, additional words 5 cents each - Cash with copy. Deadline 1st of month for following month.

WANTED-TELETYPE REPAIR PARTS, unused. Any quantity. Send SASE for list of parts, supplies, manuals.TYPETRONICS, Box 8873, Ft. Lauderdale, FL 33310. Phone 305-583-1340 after 9PM EDT. Fred Schmidt, N4TT.

FOR SALE: Leeds and Northrup Model G Speedamax, operates on 1.5 dry cell manual available. Each $50. Model 28 console $49.50. Bill Harmon, Tele:205 592-0835. 5628 10th Ave., S. Birmingham, AL.

HAM RADIO MAGAZINE.The no nonsense state-of-the-art technical magazine. Subscribe now and see for yourself. 1 year $19.50 in USA. Canada and foreign surface $21.50. Europe, Africa & Japan area $28.00 airmail. Ham Publishing Group. Greenville, NH 03048.

NEWS-NEWS-NEWS- Amateur Radio's Newspaper "WORLDRADIO".1 year sibscription ia $9.00. Send to:WORLDRADIO, 2120 28th St., Sacramento, CA 95818.

RTTY DEVICES- Model 28 keyboard typing reperfs, TD's, M-33RO, KSR's, ASR's, modems, M-28KSR's, gears and gearshifts, paperwinders, paper, ST-5 demodulators, video display units, Burroughs mainframe computer, line printer and control console, M-43KSR, several Motorola 2-meter FM radios-Mocom 70, Motrac, Motran w/synthesizers, compa-station. Send SASE for 6-page list and prices. Lawrence R. Pfleger,K9WJB, 2600 S. 14th Street, St.Cloud, MN 56301. PH: 612-255-9794.

FDM RTTY DEMODULATORS.Frederick 1202R series. Useful for AP/UPI news on HF radio, Commodities News Service on FM SCA broadcasts and UPI "one state per channel" satellite FM/SCPC transmissions. Four models available in various conditions, $35 to $350. Call write for full brochure. Electrovalue Industrial Inc., POB 376-RJ, Morris Plains, NJ 07950. 201-267-1117.

MOVING SALE: TELETYPE 28ASR-$90. 2-unused 250TH, 2-unused 250TL, sockets $80. Hy-Gain and Cubex quad components, Cheap! WANTED: Collins 75S-3 with 500Hz filter. Carl, K6WZ, 13638 Sproule, Sylmar, CA 91342.

Carl, K6WZ (see above ad) also wants to know if anyone knows if the Model 32ASR can be equipped with an auto CR/LF? Anyone out there to help Carl?

HAL COMMUNICATIONS STRIKES AGAIN! If you have an IBM-PC Personal Computer, then you want to utilize the new HAL PCI-2000 interface and software to turn it into the ultimate in a computer based RTTY system! Morse, Baudot and ASCII, 103/202 modems, all speeds/shifts, split screen and a host of other features. Write or call Dick, KØVKH, DIALTA Amateur Radio Supply, 212-48th St., Rapid City, SD 57702. 602-343-6127. Our prices can't be beat!

WANTED:M-28RO new or like new condx. Sell like new M-32. George Churpek, N6FL, 839 Cambon Circle, Ojai, CA 93023. Tel: 805-646-5296.

"FANTASTIC DISCOUNTS" ICR-71/A $659.50, Kenwood R-2000 $495.50, R-11 $114.50, Sony 2002 $219.50, Regency HX-1000 $239.50,MX-5000 $385.50 Bearcat BC-250 $255.50,BC-300 $359.50 Radio tap $189.50, Panasonic, MFJ, CW/RTTY Decoders, Antennas, Coax, Rotors, Frequency directories, CBs, Microphones, MUCH MORE! Free UPS Shipping & Insurance to 48 states. 25 page picture catalog $1.00 refundable. GALAXY ELECTRONICS, Box 1202-67 Eber Ave., Akron, OH 44309. 216-376-2402 9-5PM EST.

IBM-PC RTTY ASCCI/BAUDOT RTTY-CW send & receive. All speeds, split screen, buffers and features beaucoup. Version 3 now faster and better than ever! SASE to: Emile Alline, NE5S, 773 Rosa, Metairie, LA 70005.

MAGAZINE BIBLIOGRAPHY RBBS-PC Download bibliographies via remote BBS. Central WashingtonRBBS-PC 509-697-7298..1200/300 baud. Weekdays 9PM -10AM EST Weekends 24 hours. No charge for online service. Computer articles referenced from 9 magazines..PC Magazine, PC World, PC Tech Journal, IBM PC Softalk Infoworld, PC Week, Personal Computing Online today, Cap PC. Amateur articles referenced from 8 magazines..QST, CQ, Ham Radio, 73, CEX, RTTY JOURNAL, Popular Communications, Monitoring Times. For those without modems, bibliography lists can be ordered directly. Please select the magazine type (computer, Amateur or SWL) and enclose $5 for each. Central Washington RBBS-PC, POB 538, Selah, WA 98942.

WANTED: Articles with or without pix or schematics. Long or short, but doubled spaced please (the ole eyes are going). If you include pictures please have them in black and white. If you are in doubt about your colored pictures take them to a printer, he can tell you if they will print well. Subject matter can be on anything pertaining to Amateur Radio-RTTY applicable will be fine. Dxpeditions are good even if they are just to the local shopping mall with your group or on field day. As long as it involves RTTY and Amateur Radio it should be interesting to all. Of course, computer programs for RTTY etc., fix-it and do it yourself are always good.

MACHINE LANGUAGE IS EASY

By Gary Tater, W3HUC

INTRODUCTION

Many Amateurs are hesitant to use microprocessors in place of hard wired logic to perform operations around the Ham shack because they are unfamiliar with machine language. Well, machine language is both easy and fun to learn. Certainly, it's no harder than learning a foreign language in high school.

Once you learn machine language, you'll be able to program your microprocessors to act as timers, pulse generators, calculators, comparators, etc. This fact is what makes microprocessors so powerful. When you build a system using integrated circuits, the circuit can only perform its' intended function, but a microprocessor can be taught to perform many tasks, just by entering a new program.

When you learn a foreign language, you not only learn what the words stand for, but how they fit together. That's true for machine language too. The actual machine instructions work together with the data words and addresses to form a program. This article is too brief to provide an in-depth analysis of machine language, but it will present the basics for a good beginning in learning machine language. While the specific examples in this article use the instruction set of the MCS6502 microprocessor, you'll find that the same principles apply to the 8080, Z80, 6800, F8 and most others.

THE LANGUAGE

A simple definition of machine language is a group of unique words made up of ones and zeros. For example, a simple language of two bit words might look like this:

word	meaning
00	add
01	subtract
10	multiply
11	divide

Obviously, a language using two bits is pretty limited. The popular eight bit microprocessors use 8 bit instructions giving 256 possible instructions. A typical word in this language might be

01101001

This particular word could be an instruction, a piece of data or an address in memory.

MACHINE INSTRUCTIONS

Machine instructions are eight bit words that cause the accumulators, registers, arithmetic logic unit and flags of the microprocessor to perform specific functions. If you examine the list of instructions in Table 1, you will observe that there are fifty-five different operations that can be performed.

Consider the instruction at the top of the list with mnemonic (nickname) ADC. This instruction adds the value of a memory location and a carry to the value of the accumulator and stores the resultant value in the accumulator.

Since 8-bit microprocessors can address 65,000 memory locations, it's a fair question to ask which memory location's value should be added to the accumulator? The answer can be found by a discussion of the addressing modes used. Many of the instructions, such as the ADC instruction, have up to 8 addressing modes. It is this that adds both flexibility and power to the programming capabilities.

An explanation of three of the addressing modes for the ADC instruction should be sufficient to illustrate the flexibility of these modes. A summary of all of the addressing codes for the MCS6502 is provided at appendix 1. The first mode to be covered is the immediate mode. When you use an instruction in the immediate mode, you simply place the value itself in the next memory location in the program listing. For example, if you wanted to add the value five to the accumulator, it would look like this using hexadecimal notation:

01101001	69
00000101	05

If you are unfamiliar with hexadecimal numbers, a conversion to binary and decimal is provided by figure 1. Hexadecimal makes for simple notation as the 8 bit word is divided into two four bit words so only two digits are needed to specify any number up to 256 base 10.

The next addressing mode is called the absolute addressing mode. For this mode you simply list the exact memory location, where the value is, that you want to add to the accumulator. For example, let memory location 1701 hold a value that you wish to add to the accumulator. The OP CODE for adding memory to the accumulator in the absolute mode is 6D. So the program would look like this:

6D
01
17

TABLE 1

ADC Add Memory to Accumulator with Carry
AND "AND" Memory with Accumulator
ASL Shift Left One Bit (Memory or Accumulator)

BCC Branch on Carry Clear
BCS Branch on Carry Set
BEQ Branch on Result Zero
BIT Test Bits in Memory with Accumulator
BMI Branch on Result Minus
BNE Branch on Result not Zero
BPL Branch on Result Plus
BRK Force Break
BVC Branch on Overflow Clear
BVS Branch on Overflow Set

CLC Clear Carry Flag
CLD Clear Decimal Mode
CLI Clear Interrupt Disable Bit
CLV Clear Overflow Flag
CMP Compare Memory and Accumulator
CPX Compare Memory and Index X
CPY Compare Memory and Index Y

DEC Decrement Memory by One
DEX Decrement Index X by One
DEY Decrement Index Y by One

EØR "Exclusive-or" Memory with Accumulator

INC Increment Memory by One
INX Increment X by One
INY Increment Y by One

JMP Jump to New Location
JSR Jump to New Location Saving Return Address

LDA Load Accumulator with Memory
LDX Load Index X with Memory
LDY Load Index Y with Memory
LSR Shift One Bit Right (Memory or Accumulator)

NØP No Operation

ORA "OR" Memory with Accumulator

PHA Push Accumulator on Stack
PHP Push Processor Status on Stack
PLA Pull Accumulator from Stack
PLP Pull Processor Status from Stack

RØL Rotate One Bit Left (Memory or Accumulator)

RTI Return From Interrupt
RTS Return From Subroutine

SBC Subtract Memory from Accumulator with Borrow
SEC Set Carry Flag
SED Set Decimal Mode
SEI Set Interrupt Disable Status
STA Store Accumulator in Memory
STX Store Index X in Memory
STY Store Index Y in Memory

TAX Transfer Accumulator to Index X
TAY Transfer Accumulator to Index Y
TSX Transfer Stack Pointer to Index X
TXA Transfer Index X to Accumulator
TXS Transfer Index X to Stack Pointer
TYA Transfer Index Y to Accumulator

Please turn to page 15

ASCII AND HF RTTY OPERATION CONTINUED

or if the band rate is reduced.

The commercial users of HF RTTY understand these problems very well. since 60 and 66 wPM have essentially the same error rate, they usually use 66 WPM (50 baud), because they can pass 10% more traffic in the same period of time (cost). They also use a shift width greater than 400 Hz. and take full advantage of the fact that the Mark and Space channels fade independently when separated by at least 400 Hz. (Ref: Diversity, reference data for Radio engineers, ITT etc.). This is known as in-band diveristy operation.

Since narrow shift 100 WPM is such a poor performer when compared with a narrow shift 60 WPM signal, it appears that a switch from Baudot to ASCII is a step backwars.

Slow ASCII (110 baud) is still only 100 WPM so no traffic speed advantage has been gained but the 13.5 Ms. bit width has been cut down to 9 Ms, requiring a wider bandwidth in the TU which in return degrades the signal to noise ratio of the TU. Since the ASCII code is a 7 bit code (Baudot is a 5 bit code), the entire system must now handle 40% more character bits to print the same information and the error rate will increase much more than 40%. If your goal is still 110 baud ASCII operation on the HF bands, turn off the limiter, widen the low pass filters about 35% and switch to 850 Hz. shift. If the results are poor, remember that Mother Nature and Information Theory have been working against you.

OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO

HITS AND MISSES COLUMN CONTINUED

RTTY FREQUENCY - GUIDE

3.590 RTTY DX
3.630 - 3.630 RTTY
7.040 RTTY DX
7.080 - 7.100 RTTY
10.140 - 10.150 RTTY
14.080 - 14.100 RTTY
21.080 - 21.100 RTTY
28.080 - 28.100 RTTY
AMTOR just below these frequencies...

I was extremely disappointed with QST this month, when they did not print the DXCC listing of RTTYers. Looks like we RTTYers are still stepchildren of Amateur Radio in the Leagues' eyes. If you are not on 75 SSB you are not included in their activities, but ignored as much as possible. I am included in their listing of mixed and SSB but..... oh well.

I will conclude my column this month. I am beginning to feel better and feel I am on the mend since my accident.

[Ed note: he looks good but walks S L U- O- O- W.]

MACHINE LANGUAGE MADE EASY CONTINUED

Notice that the low order address 01 is looked at first by the microprocessor before it looks at the high order address 17. The processor stores the low order address in an internal register so that the entire address is available when the microprocessor fetches the value from memory.

A handy addressing mode that you can use when you are in memory locations 0000 to 00FF, (the first 256 memory locations) is called zero page addressing. Since the high order addres for all locations below 00FF is zero, the zero page mode allows you to delete the high order address from the program. For instance, if you want to add the value in memory location 15 (000F) to the accumulator, the program would look like this:

65 ADC (zero page)
0F memory location 15

BINARY TO HEXIDECIMAL CONVERSION

Decimal	Binary	Hex
0	0000	0
1	0001	1
2	0010	2
3	0011	3
4	0100	4
5	0101	5
6	0110	6
7	0111	7
8	1000	8
9	1001	9
10	1010	A
11	1011	B
12	1100	C
13	1101	D
14	1110	E
15	1111	F

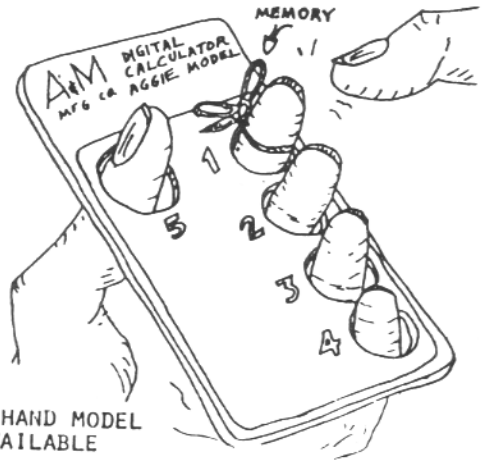
FIGURE 1

ADDRESSES - DATA

You've probably noticed by now that in the first example a piece of data followed the instruction and in the last two examples addresses of 16 bits and 8 bits respectively followed the instruction. Since data and memory addresses are eight bit words, it's fair to ask how does the microprocessor differentiate instructions from data and address? Basically, this function is accomplished in the instruction decoder which recognizes each instruction. When the instruction decoder decodes an instruction, it increments another register in the microprocessor, called the program counter, the correct number of bytes so that the instruction decoder only looks at instructions. For an immediate instruction one byte is skipped. Thus, you can see that position is all important. If, for example, an error in your program causes the instruction decoder to look at a piece of data, the processor will eventually become lost in memory space.

For a simple program utilizing what you have just learned tune in next month. Also we will include Appendix 1, which is a summary of addressing modes for the MCS6502.

In the mean time you might use the digital calculator with memory shown below.



LEFT HAND MODEL AVAILABLE

SEND CHECK OR MONEY ORDER TO: U.R. OFFE, POST OFFICE BOX ZERO-ZERO, AUSTIN, TEXAS, JUST A DOLLAR-TWO NINETY EIGHT,

—From DARA Bulletin

RTTY Journal
EXCLUSIVELY AMATEUR RADIOTELETYPE

P.O. BOX RY
Cardiff by the Sea, CA 92007

SECOND CLASS PERMIT PAID
AT ENCINITAS, CA 92024