

Additional Classified on Page 15

MAINLINE TT/L-2 FSK Demodulator for sale. One month old. Professionally wired, 850 and 170 cycle band pass and discriminator plug-in filters. Simpson meter. 60-75-100 WPM selection. Standard rack panel and Bud cabinet, \$220.00. Ed Brackin, W8VAS, 3390 Higley Road, Rocky River, Ohio 44116.

TOROID 88 or 44 mhy. Center-tapped, never potted, 4/\$2 POSTPAID. Fresh 11/16" oiled perf tape \$3/box/10, \$10/case/40. Model 32KSR pedestal mounted page printer, 60 or 100 speed, complete \$200. Lorenz, German page printer (slightly larger than 15 but has built-in perf and TD units) with table \$100. (Send stamp for photo or see Florida RTTY Bulletin for Nov.) FRXD 60 speed typing reperf with TD base \$25. Gears for most machines \$6/set POSTPAID. RCA CV-57/URR terminal unit \$85. FACSIMILE paper. .12x19" sheets, fresh. 250 sheet package for TNC-1 or cupt it up. \$3. Model 28 typing units good condition \$90. Stamp for list. Van W2DLT 302R Passaic Ave., Stirling, N.J. 07980

TTL/2 PRINTED CIRCUIT BOARD (QST, MAY 69) and two-frequency Discriminator/Filter Circuit Board (QST June 69, 6x9 inches, highest quality material, either board, \$6.00 postpaid, USA. Also, single Discriminator board or Filter board (QST, June 69), \$2.00 each. Jim Salter, K5BQA, 11040 Creekmere, Dallas, Texas, 75218.

WANTED: #28,32,33,35 ASR & KSP page printers, complete or parts. We pay cash and freight, or trade for new ham equipment. All-ronics-Howard Co. Box 19, Boston, Mass. 02101. (Tel: 617-742-0048)

TELETYPE TEST SET I-193 C. Ideal source of perfect teletype elements for testing keyers, T.U.'s, etc. More accurate than keyboard. See RTTY Journal, April, 1965; September, 1967. Cost U.S. Gov't. over \$600.00. Reconditioned, like new. \$14.95, F.O.B. Harrisburg, Pa. Telemethods International, Box 18161, Cleveland, Ohio 44118.

STELMA TDA-2 distortion analyzer \$35. Motorized paper rewind reel \$15. John Christy, 14945 Dickens St. Sherman Oaks, Cal. 91403.

RTTY JOURNAL
P O Box 837
Royal Oak, Mich. 48068

First Class Mail --



RTTY

FEBRUARY 1970

JOURNAL

EXCLUSIVELY AMATEUR RADIO TELETYPE

Volume 18 No. 2

30 Cents

CARTG MEDALLION WINNERS

Gold Medal Winners

ON4BX

VE7UBC
(no photo)

W3KV



MEDALLION AWARDS

1.	ON4BX	Belgium	756,360	Gold "Achievement" Medallion & Ribbon - "C.A.R.T.G."
2.	W3KV	U.S.A.	415,765	Silver Medallion & Ribbon - "RTTY JOURNAL"
3.	W4YG	U.S.A.	367,540	Bronze Medallion & Ribbon - "C.A.R.T.G."
4.	W3ABT	U.S.A.	364,752	Bronze Medallion - "C.A.R.T.G."
5.	W9HHX	U.S.A.	362,480	Bronze Medallion - "RTTY JOURNAL"
6.	G3MWI	England	357,416	Bronze Medallion - "C.A.R.T.G."
7.	WA3HXR/YV5	Venezuela	306,072	Bronze Medallion - "RTTY JOURNAL"
8.	VK5DM	Australia	304,640	Bronze Medallion - "C.A.R.T.G."
9.	W1BZT	U.S.A.	284,200	Bronze Medallion - "RTTY JOURNAL"
10.	W8CQ	U.S.A.	280,060	Bronze Medallion - "C.A.R.T.G."
	W3KV	U.S.A.	415,765	Gold Medallion & Ribbon (High Score U.S.A.) "RTTY JOURNAL"
	VE7UBC	Canada	94,930	Gold Medallion & Ribbon (High Score - Canada) CANADIAN DIRECTOR'S ARRL AWARD

Complete Results on Next Pages

Complete Results and Comments of 1969 CARTG RTTY Sweepstakes-

The sequel to any DX RTTY Sweepstakes is almost always the story of propagation -- Conditions -- and this year, as contrasted to last year, they were... FAIR. Activity throughout the world is picking up, especially in America, judging by the number of stations and amount of QRM. Suffice it to say, the Sweepstakes was a big success again. The number of Stateside stations participating in the Contest this year was many times greater than other years, approximately 8 to 1 ratio when compared to the foreign stations in the test.

There were 39 countries worked, 3 stations contacted all six Continents. Venkat-VU2KV, India, supplied the Asian contact, and one contact was recorded with ZS6OY - south Africa. But more had luck with TU2AK on the Ivory Coast. KC4ADD - Antarctica was popular on 20 and 15 meters, plus EL2BD - Liberia on 20 meters. We certainly missed Skipper, W2RUI and his Log. Nice hearing from Sandy Morion, Millport, Isle of Cumbræ, Scotland who sent in a log from GB3RS the Exhibition station at the International Radio Communication Exhibition in London, England. "It possibly isn't the biggest log which you will receive, but the contacts in it were possibly watched by more people". G3NTT was the operator. Most logs were well written -- well above average. Using one sheet for each band simplified the preliminary checking, etc. Approximately 75% used low power, 500 w. or less. More activity on 29 MC/s with 227 contacts made, but 28 MC/s, with one exception - was DEAD.

While propagation was not good, 15 meters was a very popular band, and 20 had it's moments. I must again point out that the Contest was originally set up to encourage more Canadian-USA participation, and it would seem that this has been accomplished. Stateside stations built up their exchange points by working each other during periods when DX stations were not available due to conditions. Narrow shift (170 cps.) signals, although in the minority, proved their ability to cope with such QRM conditions.

Approximately 8% of the logs submitted did not come up to Rule 6 requirements, and in odd cases the time or rest periods were not properly adhered to - Rule 1. Observations made on the logs re-

ceived, showed that many logs, both DX and Stateside with high and low scores, were not even submitted, which at times made cross-checking very difficult - if not impossible. The Logs have all been programmed for computerization, but many errors were spotted on receipt, and we found it necessary to individually check and correct before programming. Many requests have been made for a complete summary of the activity of the Contest. Such information and complete statistics are available, and can be obtained by sending a large envelope 9 x 12" with an International Reply Coupon to cover postage. This is a "RTTY FIRST" and may answer your many questions. If nothing else it will make a good souvenir of the Sweepstakes, or show how the winners did achieve the "goodies".

The (12) Medallions are presently being hand-engraved. The Certificates are about ready to be mailed, and we are making a big effort to have them away before the New Year, if humanly possible. Not forgetting to say "THANKS" to Mr. Len Hudyma and "C.A.R.T.G." member Robert Hudyma, and the Midland Collegiate Institute, Scarborough, Ontario for the programming and computerization of the logs received. Also thanks to "RTTY JOURNAL", "QST", "RTTY BULLETIN, Florida", "CQ", B.A.R.T.G., England, SSB & RTTY PRESS, Como, Italy, "DARC" - Germany, "Edizioai C-D", Italy, the Canadian Director ARRL - Noel B. Eaton, VE3CJ, and many others who contributed so much to make the 9th World-Wide RTTY DX "Medallion" Sweepstakes a success.

"C.A.R.T.G."
85 Fifeshire

Willowdale, Ontario, Canada

On the following page are the scores of all stations submitting logs. Many people do not realize the work that makes these contests and the complete reports possible. The RTTY JOURNAL again extends its compliments and thanks to the CARTG and especially Sid Burnette, VE3GK, for such an excellent job.

*Rule 13 - "C.A.R.T.G." Certificates for high score in each U.S.A. and Canadian District and each Country.
**VE3RTT listed for record purposes only, and not eligible for any award.

11. *W7TZL	275,570	46. *VE2HL	48,360	81. *SVOWA	5,434.
12. *HP1XHG	251,392	47. *CE3EX	43,008	82. F3PI	5,130
13. YV5AVW	237,650	48. DL8VX	42,054	83. W1BFS	4,860
14. *HICGE	226,484	49. HICWX	40,600	84. HA5KFB	4,674
15. HICAQ	225,992	50. K8ILL	36,790	85. *EL2BD	3,564
16. *SM4CMG	209,120	51. H1KFL	33,422	86. VE2AXO	3,552
17. K7MNZ	202,440	52. DL8CX	32,500	87. W0TFP	3,000
18. H1CLC	200,096	53. **VE3RTT	30,624	88. K7JGM	2,618
19. W3PYW	198,932	54. W2DIZ	29,448	89. W0ITU	2,430
20. *DJ6JC	191,216	55. VE5LG	27,180	90. K2YEQ	2,340
21. *HB9P	190,476	56. WB6QFE	24,795	91. VE3FJB	2,338
22. *WA2YVK	132,000	57. HA5FE	20,538	92. VE7LL	2,280
23. H1EVK	129,760	58. *F9RC	20,032	93. W7VKO	2,152
24. G6JF	115,248	59. *VE6MM	19,136	94. *E15BH	1,968
25. WB2JBH	115,220	60. W2FAN	18,411	95. ON5WG	1,800
26. *WA6WGL	113,568	61. WA4VYL	17,280	96. VE7BWL	1,750
27. W3ILZ	109,944	62. W6FFY	16,002	97. WB2UYD.	1,472
28. K4VDM	109,080	63. K9BJM	15,888	98. GB3RS	1,368
29. WB6JSY	108,836	64. W2HAJ	15,435	99. W6AEE	1,352
30. *XE1YJ	104,928	65. WA6TLA	15,408	100. WA1HOL	1,200
31. WB6RXM	102,344	66. K0JHE	14,544	101. VE5DO	936
32. ON4CK	100,068	67. K4GJW	14,520	102. VE7AFJ	580
33. *VE7UBC	94,930	68. K6LFM	13,257	103. W7CBB	450
34. *HK3SO	92,488	69. *VE3FBP	13,146	104. K8QLO	432
35. *ZM2ALW/	91,840	70. *VO1EE	12,930	105. VE7CZ	384
36. DL1VR	91,476	71. *KH6GLU	11,670	106. *OK1MP	210
37. *HA5KBF	89,100	72. K8KAG	10,968	107. *OZ6OB	174
38. W8CAT	89,088	73. K2RYI	10,584	108. DJ5JK	150
39. W6JOX	86,268	74. H1YRK	10,317	109. VE3RH	84
40. K2LGJ	73,500	75. K4AT	9,040	110. W8TCO	36
41. H1ROL	66,120	76. SM3BHT	8,505	111. K9WJB	8
42. K6NCG	61,992	77. *VE4FG	7,788	112. VE3AFK	2
43. *VE5DR	60,060	78. *PJ2CR	6,480		
44. *WA0GEE	57,035	79. WA0GYQ	6,024		
45. W0DDW.	50,048	80. K0IBB	5,697		

CONTEST COMMENTS

ON4BX - Without doubt this is the best DX Contest of the year. Propagation was very bad here. Rest period of 12 hours is excellent.

VE7BWL - Had a good time and learned a lot. Many thanks to "C.A.R.T.G." from the "Valley of the Green Keys".

OZ6OB - I returned from travel abroad on Sunday 5th, and just wanted to show the flag!

VE4FG - Propagation seemed to be very poor. A very enjoyable contest. Thanks - Good Job!

K9BJM - I think the C.A.R.T.G. is the best and most fun contest going. Keep up the good work and we'll see you next year.

K7MNZ - My congrats to CARTG for a contest well done. It seems they get better each year although I did miss Africa and Asia this year.

ZM2ALW/ZM2 - There were many more narrow shift stations on, and sure this made things easier as the band was not so "jammed up".

VE3FJB - 170 and 850 shift used on all bands. HB9P - It was a very good contest and conditions were excellent. I was astonished to see so few narrow shift stations, only six contacts out of 84 were 170 Hertz shift.

VK3DM - The contest was to me the best yet. I wish you every success with the arduous paper work.

WA2YVK - As always I enjoyed the contest. I feel too many of the boys neglect 10 meters. I guess that we all missed Skipper this year.

WA3HNR/YV5 - Thoroughly enjoyed participating in your contest as a newcomer.

*** **

RTTY Contest Calendar

GIANT RTTY FLASH CONTEST

1st 1500-2300 GMT February 14th 1970

2nd 1500-2300 GMT February 21st 1970, giving a total Contest time of 16 hours.

Complete Rules In Last Months Issue.

RTTY JOURNAL

B.A.R.T.G. SPRING RTTY CONTEST Rules in this issue.

DARA WAE RTTY Contest - last week end of April 1970

Rules in next months issue

The "MOUSE" Machines --

IRVIN HOFF, W6FFC

The October 1969 RTTY JOURNAL carried the announcement of a large number of 28KSR machines which the Northern California Amateur Radio-teletype-writer Society, Inc. was making available. Within a matter of only a few days, the entire group of machines was spoken for and within 10 days, some \$40,000 had been sent to NCARTS. Original negotiations had indicated there might be as many as 200 machines, but the final figure was 160. Of these, 120 were overhauled by Western Electric, and 40 were designated as "non-repaired". George Hutchison and myself visited Western Electric offices and personally inspected several of the machines. We could find no discernable differences between the two categories, as they all looked like "never have been used" condition.

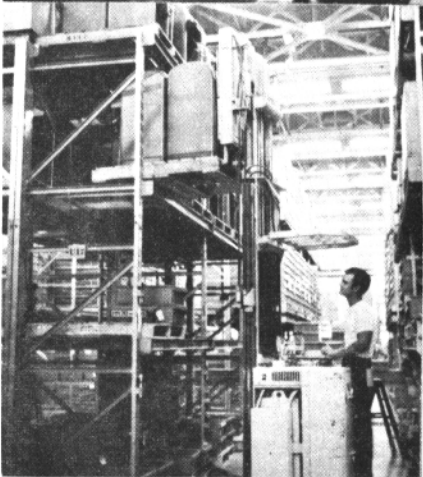
On Friday 17, October, a check for the entire 160 machines was presented to Western Electric officials, and on the following Tuesday, the machines were picked up by National Van Lines representatives. Within the next several weeks, they had been delivered to various parts of the country, and at a total cost of no more than \$150 to anybody. The overhauled machines cost the buyer \$115 less shipping costs, and the non-repaired were \$26 cheaper.

This was the first time that any model 28 equipment was officially made available to amateurs, and it was also the largest (by some margin) group of machines ever made available as well as the largest amount of money transacted in such an undertaking.

The "timing" on the project seems to have been flawless and indeed everything worked out about as ideally as it could have. A large number of people co-operated to make this possible including Pacific Telephone officials, Western Electric people, NCARTS board members and moving company representatives.

There were over 350 requests for the 160 machines many of which had to be returned with an apology that the demand had far exceeded the supply. An effort was made to distribute the machines in an equitable manner, following first choice by California enthusiasts. Machines went to: California, Oregon, Washington, Utah, Nevada, Colorado, South Dakota. Minne-

sota, Iowa, Illinois, Wisconsin, Michigan, Ohio, New York, New Hampshire, Maine, Massachusetts, Maryland, Virginia, Florida, Tennessee, Alabama and Louisiana.



Top - Stack of mail and checks.
Center - Irv Hoff, W6FFC hands check to Chuck Wood of Western Electric for 160 'Mouse' machines.

Bottom - Moving a 'Mouse' down from the storage shelves.

Letters were received from every state in the USA except Rhode Island, and several letters arrived from Canada.

Continued on page 13

RTTY JOURNAL

"Mouse" Modifications -Part 1

IRVIN HOFF, W6FFC

12130 Foothill Lane.

Los Altos Hills, Cal. 94022

This series of articles will enable you to buy the parts needed to convert a "mouse machine" (28KSR) to amateur communications standard, as well as later on, offer various possible stunt box combinations to do various automatic features such as station control, automatic reperforator turn-on and turn-off, automatic cr-lf, automatic non-overline, and many other helpful little things which will become more evident as we get into the machine further.

A model 28 is one of the early types of computers. In fact a Teletype machine itself is actually an early form of computer. The first thing we want to do is change the keypallets and keylevers to communications instead of business type having fractions. This first article then, will be primarily an "order form" with which you can determine the parts you will need to put the machine into suitable configuration for amateur reception.

Since Bell System machines do not normally need or use auto CR-LF, about 30% of the machines delivered need some major modifications to enable this to be added; the other 60% fortunately need almost no changes at all to the machine itself. In either case, the stunt box needs some parts added.

We suggest first of all you look at the left end of the printing unit, just below the left ribbon spool. See Fig. 1 -- we have tried to show with an arrow (of sorts) where the code bars for the printer stick out the left end. At the right of that housing are numbers for each of the code bars. You will have either 8 or 9 code bars, if you have all 9 including the next to the bottom one marked "O", you are all set and only need the 157514 mod kit to complete the auto CR-LF set-up to the machine proper. If you do not find any code bar there, you will need the 152348 mod. kit.

Now look in Fig. 2 -- this is a photo of the new bellcrank that should be in the machine if it has all 9 code bars. If you are missing the "O" bar, you will most likely not have any bellcrank at this position at all. You can also determine this quickly. If there is no bellcrank, it will be included in the 152348 kit with the "O" code bar, etc.

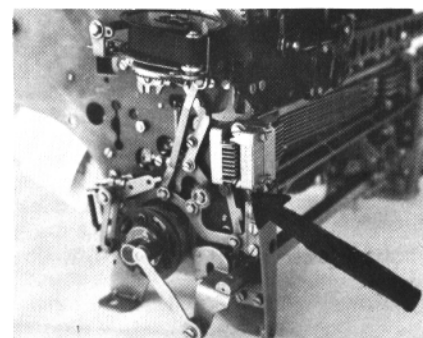


Fig. 1
-- Left end of typing unit (the front part has been removed to show the entire code bar lengths) which shows the ends of the code bars. See Text.

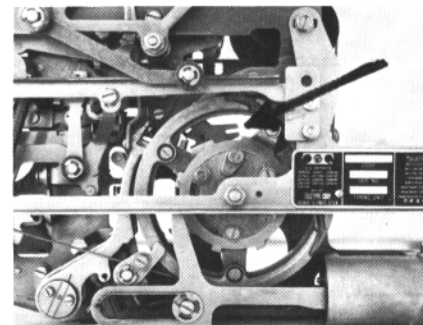


Fig. 2
-- Late-model bell-crank for auto cr-lf. Your machine should have this if it has the "O" code bar, if no "O" code bar, probably no bellcrank either.

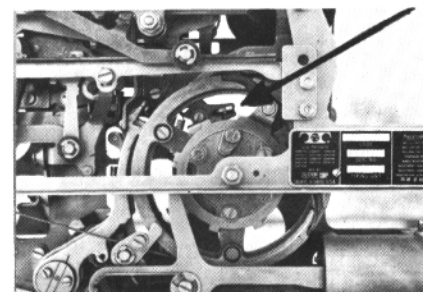


Fig. 3
-- Showing the 157514 mod. kit mounted on the bell-crank of Fig. 2.

RTTY JOURNAL

FSKing The HEATH SB 401

J. R. 'Don' DonCarlos, W01TU
 Colorado Springs, Col.

This article describes a method of FSKing the heathkit SB-401 which permits any shift from 0 to over the legal limit and which remains the same regardless of the band being used. Provision can be made to allow for quick changeover from RTTY to other modes (they do exist, you know!) with one switch. A minimum of obvious wiring changes and no new holes are required in the SB-401. This system has been in use since February of 1967 at DL5PQ and W01TU, and operates directly from a 60 ma. loop.

Looking at the schematic of the SB-401 you will discover that the "MODE" switch actually shorts out the negative and positive LMO bias supply lines when switching from TUNE, CW or USB to LSB. This is to shift the passband of the crystal filter to the "other side" of the signal being generated. This shorting out leaves about 50 volts positive on the diode inside the sealed LMO when the "MODE" switch is in the LSB position. The pertinent portion of the schematic is shown in figure 1, which includes an annotation of the points to which we will connect the shifter.

Attach the completed shifter to the SB-401 by connecting two wires from terminal board #2 (see page 140 of the SB-401 manual dated 8-12-66, there may be continued on page 14

Fig. 3 shows the 157514 mod. kit installed in the bellcrank -- this is merely a bracket that attaches through the slot shown in Fig. 2 via a bolt just to the left of the slot.

Thus we come to what to order and how to order it.

PARTS NEEDED

If you have the "O" bar and the bellcrank shown in Fig. 2, you need the 157514 mod kit for \$0.77. If you are missing either or both of these items, you will need the 152348 mod kit for \$4.10. In any event, you will need all or nearly all of the following items:

GEARS:

161293 60-WPM Nylon Gear set .\$.4.80

AUTO CR-LF

(either the 157514 or 152348 mod kit, not both)

152671 Function Bar .\$.1.20

152671 Function Bar (total of two needed) .\$.1.20

153916 Set of parts for one stunt box slot .\$.1.00

153916 Set of parts for one stunt box slot .\$.1.00

TYPE-PALLETS:

157635 0 (slant zero) .\$.25

157639 ' apostrophe .\$.25

157640 ; semi-colon .\$.25

157641 : colon .\$.25

157644 ? question mark .\$.25

157645) right parenthesis .\$.25

157646 (left parenthesis .\$.25

157647 ! exclamation mark .\$.25

157659 # figures H "numbers" symbol .\$.25

KEYLEVERS:

151305 F ! exclamation mark .\$.26

151308 J ' apostrophe .\$.26

151309 K (left parenthesis .\$.26

151310 L) right parenthesis .\$.26

151315 C : colon .\$.26

151316 V ; semi-colon .\$.26

151317 B ? question mark .\$.26

151318 N , comma .\$.26

152009 H # upper H "numbers" symbol .\$.26

EXTRA KEYLEVERS NEEDED OR DESIRED:

151302 P 0 slant zero .\$.26

151322 (blank with no printing, for "blank") .\$.26

TYPE PALLET SPRINGS 157238

100 for \$2.35, order 10 for \$0.24

Order from:

Teletype Corporation
 5555 Touhy Avenue
 Skokie, Illinois 60076
 Attn: Parts order

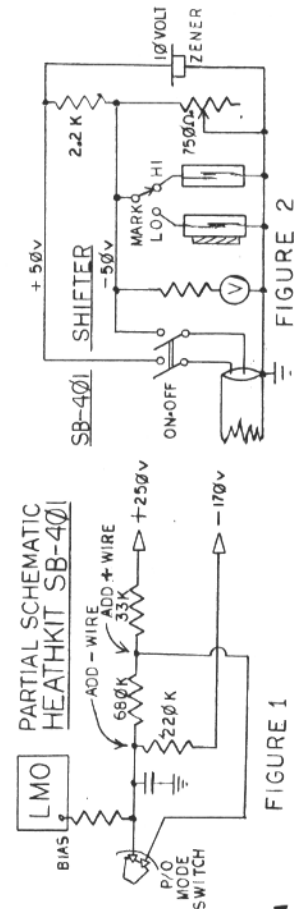
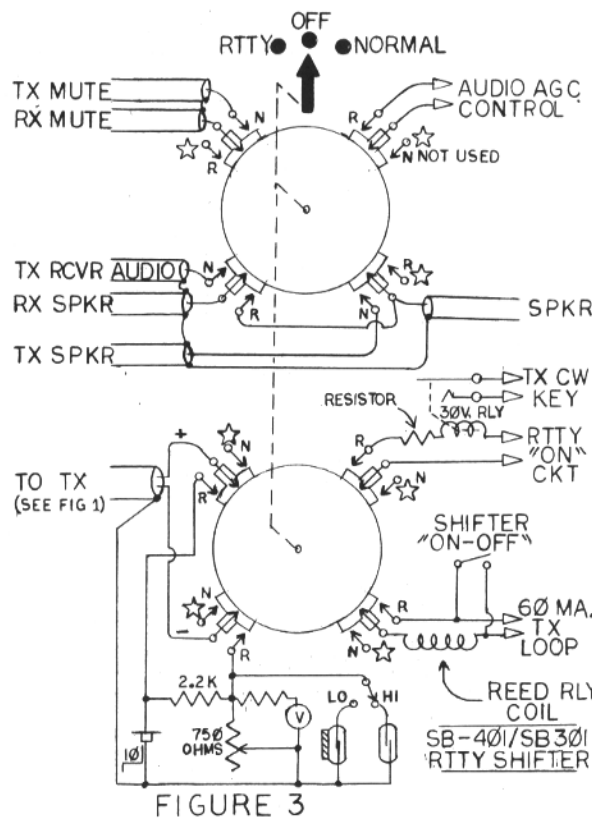
Keep in mind they will only send C.O.D. so do not send them any money. Include a statement that you are willing to accept current prices if they should differ. It is also to your benefit to ask them to not back-order any items whose total cost is less than say \$1, or else the C.O.D. charges on small back-ordered items can be out of proportion to their value. You can instead ask them to notify you when the parts become available.

You will notice we included the cost of some typepallet springs.

You can salvage the springs already in the type-box and use them again, or you can just rip them out and install the new springs, if you order some. Some fellows have already gotten the type-pallets and did not order any springs, then found themselves one spring short, for the "figs H" numbers sign (#) which was not in the machine originally. Also you will notice there is already a comma in the type box, but it is over the "J" on upper case. You can later move it over the "N", but do not need to order a new one.

When ordering anything listed in the parts catalog as a "per 100" cost, be certain you include the "per 100" cost and then show you do not want 100, but a fraction of that, and list the price of the quantity you are ordering. If you are not careful, they may think you want say 10 of the item, which comes in 100's in the stock bin, and send you 1,000 total instead of only 10 pieces of the "per 100" item.

We have not listed the prices of the instruction books as yet. As of this date I still have not received the new books even though they were ordered in late October. There are some Navy manuals that are reputed to be much better than the normal TTY Corp. manuals, and these are also available through the TTY Corp. I have also ordered one each of those, and was waiting to see which I thought would be most beneficial before suggesting which you purchase. Typical price is \$4 each, you would need the parts manual, the adjustments and lubrication manual and perhaps the general theory manual, which is somewhat cheaper. The next article will assume you have gotten the type-pallets and keylevers and will show you how to install those.



VHF RTTY NEWS

RON GUENTZLER, W8BBB Editor
Route 1, Box 30
Ada, Ohio 45810



Frank J. Wisniewski, Jr., W2LXC, has sent along more information regarding activity in the N.Y.C. area. Most of the stations in that area operate with AFSK on AM using horizontal polarization. The stations using beams usually keep them pointed South or Southwest when on auto-start. The following stations are members of the Tu-Boro Radio Club and operate on 145.620 MHz: W2LXC, WA2MXB, WA2PMW, WB2IPO, K2HGR, WA2PWP, WA2SOX, W2YSM, WA2IUU, and W2VZQ. "We also have many visitors that check into the Tu-Boro Net such as: WB2NVJ, W2JIA, W2LKS, W2NCA, WB2SUQ, and W2IHW. W2LXC and WA2MXB monitor the net frequency of 145.620 MHz 24 hours per day, and WA2PMW, K2HGR, and WA2IUU monitor on a regular basis. WA2PMW had his A/S operated by W4VZR, but he was not present at that time and could not make a QSO.

Frank continues with: "Maybe with more publicity regarding auto-net frequencies on VHF, we will find more RTTY activity particularly in the case of band openings, but even without band openings, if there were a list available, maybe we could wake up some activity." Yes indeed! Here comes the commercial: The only way we can publicize information is by having someone let us know about it. Frank has been doing a good job. How about someone else?

We received the following from Ted Double, G8CDW, B.A.R.T.G. Contest and Awards Manager: "I am enclosing a copy of the rules of the first VHF RTTY contest to be organized by the British Amateur Radio Teleprinter Group which takes place this coming week-end (1969 SEP 13 and 14) and I thought that this might be of some interest to you.

"It was decided to limit the area of this pilot scheme mainly due to the difficulties of computing the scores which you will see are based on distances worked and as the QCA system of notation is widely accepted in Western Europe we are

using this system.

"... We are hoping the idea will catch on over here as there are now an increasing number of G licenses being issued in the G8--series. These calls are issued to allow operation on frequencies of 144 MHz and higher. These licenses are probably similar to your own Technicians Class in that there is no requirement for a CW test in order to qualify although the full Theoretical Exam has to be taken."

The contest was limited to amateur stations within Zones 14 and 15 who are permitted to use RTTY. The bands were: 144 MHz, 432 MHz, and 70 MHz for U.K. stations. Band multipliers were: 70 MHz and 144 MHz, X1; 432 MHz, X10. Points for distance were divided into 100 km intervals with approximately 4 points per 100 km, with the upper limit of 38 points for a distance of 900 to 1000 km. Tex, G8CDW, supplied the results and some comments. Follow:

"As you can see the number of Stations that took part was rather small but we are not too dismayed as this was the first time that we have run a Contest on the VHF Bands and it takes time for the idea to catch on, but we will run it again next year and I will make a point of letting you know the details as soon as they are to hand."

Ron Finger, W4VZR, has the following VHF News: "... I am happy to say that interest in VHF RTTY is really picking up here in the Washington area. As I reported before, K4OHW, K4KCX and myself are on auto-start on 146.7 MHz. In addition, we now have W3SFY, W3HSP, W4CTT, W4CSR, and K4GCM. There are a lot of other stations getting ready to get on (they say) and interest is really coming up. ... Everybody is on 146.7 MHz with standard 2125/2975 tones. The FM is mostly wide band and all stations are vertically polarized." Thanks for the additional information, Ron.

In November a group of twenty amateurs with Teletype facilities gathered to

formalize a constitution for the - Radio Teleprinter Society of Northern Indiana. These amateurs are using 146.700MHz for RTTY and mobile operation. Most of these will probably expand their VHF band facility. The following amateurs were present at this organization meeting. W9EZZ, WA9GAA, WA9VIM, W9FSA, WA9EJR, K9MNF, W9ZGC, WA9OKC, WA9OLQ, K9EIJ, W9NAR, W9EPT, K9DOF, W9OJQ, K9WFF, W9BRM, W9JCF, WA9DAP, K9DMM. K9EZZ is the president.

The remainder of the "news" is the result of observation here.

On October 4, we experienced the best two meter opening we have ever "seen". How extensive the opening was we just don't know because a repeater in Buffalo, N.Y. on 146.940 babbled incessantly for 24 hours and covered up everything else on that frequency. However, the RTTY group was active in their own way. Perry, W8VYU, in Massillon, OH, gave us a call and got us on the air. (He is now on 146.700 MHz with 40F2.) Unfortunately, we could not get back to him, but that started the activity - guess it rattled some "cages", or was it machines?

Jack, K9AHX, in Lafayette, IN, states that he and one other station monitor .700 (40F2, vert.) 24 hours/day. The five active stations in Lafayette, IN, are: K9AHX, K9KRE, WA9PJV, K9LYA, and W9GDS. He expects several other stations to be on the air there soon, including W9YB the Purdue Radio Club.

Dave, K9VUX, in Griffith, IN, and George, W9ONC, in Northbrook, IL, (both in the general vicinity of Chicago) were putting in beautiful signals here and we talked with each for about an hour.

That same evening we had a long QSO with Bill, W9BRM, in Mishawaka, IN (South Bend). He reports that he and three other stations are active on 146.700 MHz, 40F2, vertical. He says that he has, upon occasion, worked into Detroit.

We understand that Don, K8EIW, in Cuyahoga Falls, OH (Akron) is finally back on 146.700 MHz using "amateur standard" tones of 2125 - 2975 Hz instead of the "Ma Bell standard" tones. It is nice to have him "rattle" our machine with something that will rattle it.

While speaking of "rattling", ever heard "Jingle Bells" on a WU machine when the tape was made for a Bell Machine? (Bell on upper case S versus, J, or is it the other way?) Seems that Jim,

K8LMN, and Phil, WA8MJL, have been getting the Christmas Spirit (or is it the other way around) and have been sending "cards", pictures, and music via the green keys. Anyway, it's nice to have the activity in Mendon and St. Mary's, OH, on 146.700 MHz. (You should see a picture when received on a strip-printer!)

A few more stations that have been heard here, but not necessarily worked, are as follows: W8HYG in Cleveland; K8ACC in Detroit; K3SVO in New Bedford, PA, W8VYU in Massillon, WA8DCE in New Philadelphia, K8WLQ, somewhere in the vicinity of W8VYU and WA8DCE; WA8MJL AND K8LMN in (or near) St. Mary's, OH; K8OEF in Fraser, MI, has been heard here many times while having a QSO with K8AIZ. All these stations were heard/worked on 146.700 MHz using AFSK on FM (40F2 or less) with 2125/2975 Hz tones. One interesting aspect of 24-hour/day autostart is that "you" are always listening. Several of the above stations we have "heard" many times, but never while awake or in the shack! K3SVO seems to prefer 4 AM for most of his RTTY activity!!!

Well, that's it for this month. If a few more readers became writers, we could have this much info every month!!!

--73 ES CUL, RG

TAPE STORAGE --

Here is a hint from Philip Ernst, W7RPV. Brag Tapes are always a problem in storage. Keeping them rolled up, clean and accessible is always a problem. I have found one answer that seems to work beautifully. These new QSL display holders that hold 20 cards in transparent plastic are just the thing. Roll your tape up around your fingers and slip it into one of the pockets. You can take a 3 x 5 card and make an index on it and slip the card in the pocket in front of the tape. The pockets will take over 10 minutes of tape easily and keep it dust free and ready to use at any time.

Auto Start

Crystals for Drake R4B

FOR 3637.5 KHZ -
CRYSTAL FREQ 9284.625
FOR 7137.5 KHZ -
CRYSTAL FREQ 127.84.625
FOR 14075 KHZ -
CRYSTAL FREQ 9861.0625
73, Ron, W4VAR
Ronald J. Finger

RTTY-DX

JOHN POSSEHL - W3KV
Box 73 Blue Bell, Pa., 19422



Hello there. . .

We returned home on the first day of the New Year after a night of Good Cheer and while the coffee pot was brewing we tuned over the band to see what was available at the unusual hour (for us) of Three A.M. local time. There was not a signal to be heard. However, a short CQ brought an immediate response from Noel, VK3NR, for the first contact of the new decade; the Seventies. In the shack with Noel were Jim, VK3DM, and Deane, VK3TX, and the boys were enjoying a few cold "807's" on a Summer afternoon down that way. We were amazed at the speed with which our fingers flew over the keys as we are normally a plodder in the typing department. However, Noel was complaining of some garble on each transmission so perhaps the fingers were a bit too well oiled. Noel also used his "new" call of AX3NR. To commemorate the 200th anniversary of the discovery of Australia by Captain Cook the VK boys, at their option, are permitted to use the prefix "AX" for the year 1970.

Since becoming QRV from KG6NAA, Larry has certainly been active and Guam is being scratched off the list of many RTTY'ers. Larry QSLs within a day or two after the contact, and direct where possible. He was active in the Volta Contest and made an excellent showing for the first time out. Most all QSLs for the contest went via the bureau so it might pay to check with your QSL manager to see if your confirmation from Guam has arrived. In the meantime, Larry is still Qrp with the final rapidly nearing completion. He is apparently hearing many more stations than are hearing him so switch in the sharp filters and dig down a few layers and you will perhaps come up with a new country. He has also worked Sam, 9V1PG, whose presence we noted last month, which now puts this rare spot on the active list. He has also heard Jim, VK3DM in test with an XW8 station, although further details are lacking at this writing. Larry also sent some copy from Venkat regarding the

Maldivian operation. The calls are 8QAWR and 8QAYL, and although now active on SSB they will not be on RTTY until a better antenna is put up. A Quad is in the making so watch for this station. At this QTH we have heard 8QAYL on SSB but so extremely weak that it would be negative copy on RTTY.

The Volta Contest showed quite a bit of activity although at this end 14 khz did not seem up to its usual standards. From reports on hand it seems that all Continents except Africa were accounted for, although in the Volta Contest Continents are not a multiplier factor. I would suppose that the big surprise was the activity of Herbert (DL1VR) from Madrid as EA4AH. He was only on Fifteen Meters for a few hours but had an excellent signal here in the States.

Earlier in the year we made mention of LG5LG as being in Morokulien, Scandinavia, and indeed it is an independent State of either Norway or Sweden. A corrected QTH follows, and your QSL and three IRC will get a return QSL (if you worked them of course). P.O. Box 1

N. 2242/S 67044

Morokulien, Scandinavia

In addition, for the equivalent of \$4.00 U.S. you will be issued a letter of "Citizen of Permanent Standing" with all Citizen rights including availability of overnight facilities when visiting. All money goes into a fund to provide education and radio equipment for blind and physically handicapped hams.

Here are a couple of RTTY contacts we have heard about for the first time. Peter, K8Yek has had a QSO/QSL with CT2AA in the Azores and Pierre, XE1YJ has had a QSO/QSL with KB6EPN, on Canton Island. We do not know when the contacts took place but if the boys will furnish more details we will be glad to pass on the information.

A few months ago we made a listing of the prefixes that had been printed up to that time that would perhaps assist those

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working toward the "Annual PX Award". As this is being written, shortly after the close of the year, we thought it might be in order to bring the list up to date. The following calls are in addition to those that appeared in the October column.

C31BT	EI2THF	LA7MC	UP2CG
DJ6JC	FB8ZZ	OE2SI	VK6VK
DL4JS	G4RS	OZ7T	VP9BY
DL7GE	HP1XHG	PD3GKO	VU0KV
DL0FF	I0IIC	PJ91DX	VU1QB
DM4PL	KR6MH	PY1NBF	ZM2ALW
EA4AH	LA3UI	SV0WO	9V1PG
	LA40	TU2AK	

This adds 30 to the previous list of approximately 140 for a total of about 170 including all possible state-side prefixes. We repeat our earlier reminder that you have until March 31 to collect the evidence and we will be expecting to hear from you on the subject shortly after that date. In fact, and in anticipation, we have reserved warehouse space for the expected influx of mail.

We are very pleased this month to announce the awarding of the W. A. C. Certificate to the following station--

Nr. 123 Zoli Kovacs HA5FE

Zoli is no stranger to the RTTY DX'ers as he is very active, particularly in Contests, Zoli is always there to give the "HA" multiplier. Zoli is the first station in Hungary to get the Award and perhaps even more important, the first in Eastern Europe. HA5FE is a QRP station using a trap dipole antenna and the machine is a very old Lorenz pageprinter with a home made transistorized T.U. Zoli is an engineer by profession and you can QSL to -

Z. Kovacs, HA5FE
VIII Jozsef-krt 2
Budapest, Hungary

Word from Paul, EI5BH, sets us straight on the EI2THF call that Paul had been using for about a week early in the Fall. The occasion was the Tuam Harvest Festival, an annual event there in Ireland and this year Paul set up a RTTY station on the grounds. Paul also says that the main reason for the low activity in EI land is the lack of equipment. Apparently there are plenty of fellows interested if the stuff was available. Paul is also set-up on 2 Meters and recently made the first RTTY EI to G QSO with G6CW on that band. As of this writing, EI7AF is preparing to get on RTTY.

I am also sorry to say that several listings for the RTTY-DX HONOR ROLL

RTTY JOURNAL

arrived a bit too late to be included last month. The next listing will be in April and remember that I must have any information you wish printed by the FIRST of the MONTH preceding publication. For example, for the April issue I would need the information by the 1st of March.

73 de John

MERRILL SWAN, W6AEE

WINS CARTG MERIT AWARD -



Presentation of CARTG Award to Merrill Swan. Left to right - WB6QFE, K6DDQ, WA6LBU, Merrill, W6AEE, W6LDF, WA6WGL.

It is with great and profound respect that the Merit Award Committee of the Canadian Amateur Radio Teletype Group, C.A.R.T.G., announces the individual who has been selected for the Merit Award for 1969. As the outstanding Amateur Radio Teletypewriter operator the recipient of the Award is:

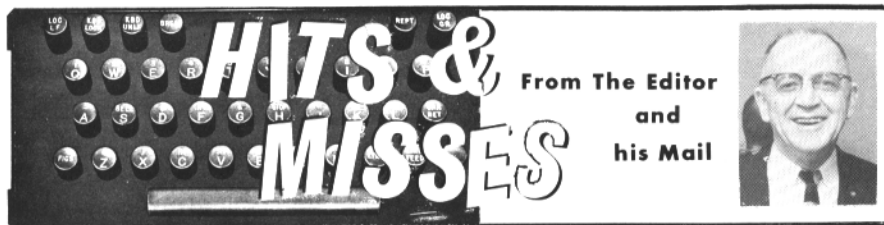
W6AEE, Merrill Swan

Merrill Swan is a pioneer in the field of Amateur Radio Teletypewriter operations. After starting "RTTY" Magazine Merrill provided the guidance and most of the work for fourteen years. He has provided advice and assistance to innumerable operators to begin their teletypewriter operations and improve their facilities and techniques. At all times Merrill has represented the highest standards of gentlemanly conduct and mature wisdom. Amateur Radio has been made much richer because of the efforts of Merrill Swan.

Alan E.H. Venning
Chairman, Merit Award Comm.
Canadian Amateur
Radio Teletype Group

BROAD MINDED

USE NARROW SHIFT



Three FREE KoolAde parties was just too much for us to resist. We plan on being at the SAROC Hamfest in Las Vegas February 4-8th. We have wanted to attend this famous hamfest for several years but could never get away in January, the change in dates to February suited us fine. Crys is sewing zippers with locks on all my pockets, we will be sure and get round trip plane tickets, with these precautions I am sure it will be a fine hamfest, we will have lots of fun, hopefully meet some of the RTTY fans from the west and still get home without any mortgages. Its at the Stardust Hotel, we don't know our room but look us up

From the frying pan into the fire-- except this time the fire feels good--it is below zero as we write this. For the first time we have more good articles than we have room for. We sorta dislike saying this as we soon use it up and don't want to discourage further articles. We do appreciate material we have received and will use it as fast as possible. The ADT-TDC reprint will be in a near future issue but it is long, and as we like to offer an assortment of articles, have postponed the re-run temporarily.

Al Lauttamus, WA8AGC, 2011 Charles St. Wellsburg, W. Va. is a teletype repair man with the C & P Telephone Co. He writes the following - (can anybody help out?)

Our used model 28 machines are being sent to Virginia and are being junked. Is there anyway I can be of help trying to get the company to release the machines to amateurs?

Also, if any of the machines that are out have a 101. A-B-C or E date set, these can be converted to a very nice 850 hz shift terminal unit with very little effort and no extra parts. With two capacitors and switch either 170 or 850 shift may be used

From The Editor
and
his Mail



RTTY BINDERS

Gold Stamped

Hold 1 Volume

\$2.50 pp.

Canada \$3.00 (No foreign)

TT/L-MKT DRAWINGS

We have received a very limited supply of the TT/L-MKT drawings. There are 12 letter size Xeroxs - available for \$1.50 pp.

BACK ISSUES —

The ONLY back issues available are:

July through December 1966. No issues of 1967. All issues of 1968 except January and November. All issues of 1969. (July-August is one issue.) Copies are 30¢ each. RTTY JOURNAL binders are \$2.50 each in the USA and \$3.00 in Canada.

Our last copies of the TT/L-2 reprints are exhausted. Since this article has been reprinted in the May and June 1969 issues of QST we have no plans for more reprints.

RTTY JOURNAL

P.O. Box 837 Royal Oak, Mich. 48068

"Dusty" Dunn — W8CQ

Editor & Publisher

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BARTG RTTY CONTEST RULES

0200 GMT Saturday, March 21st until
0200 GMT Monday, March 23rd, 1970.

The total Contest period is 48 hours but not more than 36 hours of operation is permitted. Times spent in listening periods count as operating time. The 12 hour non-operating period can be taken at any time during the Contest, but off-periods may not be less than two hours at a time. Times on and off the air must be summarized on the Log and Score sheets.

BANDS

2.5, 7, 14, 21 and 28 Mhz. Amateur Bands.

STATIONS

Stations may not be contacted more than once on any one Band, but additional contacts may be made with the same Station if a different Band is used.

COUNTRY STATUS

APRIL Countries List, except KL7, KH6 and VO to be considered as separate Countries.

MESSAGES

Messages exchanged will consist of:
(A) Time GMT.
(B) Message Number and RST.

POINTS

- All two-way RTTY contacts with Stations within one's own Country will earn TWO points.
- All two-way RTTY contacts with Stations outside one's own Country will earn TEN points.
- All Stations will receive a bonus of 200 points per Country worked including their own. ONLY any one Country may be counted again if worked on another Band but Continents are counted once only.

SCORING

- Two way exchange points times total Countries worked.
- Total Country points times number of Continents worked.
- Add (A) and (B) together to obtain your final score.

Sample Score:

- Exchange points (302) x Countries (10) equal 3020
- Country points (2000) x Continents (3) equal 6000
- (a) and (b) added to give a score of 9020

LOGS AND SCORE SHEETS

Use one log for each Band and indicate any rest periods. Logs to contain: Band, Time GMT, Message and RST Numbers sent and received and exchange points claimed. All Logs must be received by May 25th 1970 to qualify.

AWARDS

Certificates will be awarded to: The two top scorers in each Country. The final positions in the Results Table will be valid for entry in the "World Champion of RTTY" Championship. Send your Contest Logs to:

Ted Double G8CDW
B.A.R.T.G. Contest Manager,
33b, Windmill Hill,
ENFIELD,
Middlesex, England

MOUSE--

Continued from page 4

A large number of letters were sent registered special delivery air mail, and for over a week every new mail arrival in town meant another knock at the door! Even with an unlisted phone number, many people managed somehow to get through. Family relations were strained for awhile, and I am certain many of you can sympathize with the problems that were involved.

This then is an introduction to the forthcoming group of articles involving the model 28 machines in general, and the "mouse machines" in particular.

A final word here -- many people have speculated as to why this was called "project mouse". It's hardly worth going into, but after I had promised my wife I would have nothing to do with the project and then became deeply involved with it, she remarked the letters reminded her of a bunch of mice running after a big cheese, etc. Since the military call their version of "RTTY" --- "RATT", it seemed to fall into place. These particular machines are now known as "mouse machines" to merely indicate they are part of the group made available through NCARTS in mid-October 1969.

There were too many people involved to personally recognize them all, but Roy Nelson W6GHW played a most instrumental part with his liaison with Pacific Telephone; other board members of NCARTS are: Fred Heward, Lee Marks, Bepp Costa, Charlie Thompson and myself. George Hutchison was most helpful as well.

HEATH SB401

Continued from page 7

be a slight difference in other manuals) to terminal #18 (with existing violet wire) and #20 (with existing white-violet wire) and a ground from the ground lug between terminals #1 and 16 (it is convenient to use two-wire shielded, with a plastic cover); dress the wires in thru the back of the chassis thru extra holes of socket "BG" (the accessory socket.) Later you may want to order the extra pins for the accessory socket from Heath--they cost less than the postage involved, about nine cents each!

These two wires will have about negative fifty and positive fifty volts to ground when the "MODE" switch is in any position except "LSB", and when shorted together about fifty volts positive to ground. A check of current will show about 7 ma. for the positive wire and about 0.5 ma. for the negative wire, both measured to ground. This is a double-check on the wiring of your particular SB-401.

The shifter is straightforward with only a few comments necessary. Ensure that you do not forget the on-off switch must open both hot wires. The voltmeter is not really necessary, but makes a convenient way of knowing the amount of shift in use. Calibration of the "SHIFT METER" (voltmeter to you) will disclose that the shift is NOT linear near the zero shift/zero voltage point, which will cause no trouble as long as you know and expect it. The GORDOS brand type MR-306 reed relay capsule (Newark stock #60F3401 at \$1.05 each was used for the switches. The coil used had a bobbin with a half-inch square core hole with about 1500 turns, taken from an old relay--TAKE OUT THE CORE! Adjust the position of the reed capsules so that they both close at about 28 to 32 ma. thru the coil with at least three quarters of the reed capsule inside the coil. If the switches close with less current thru the coil then you may shunt the coil with a suitable resistor or take some turns off the coil. Position the reeds so that they are as far apart as the inside dimensions of the coil will permit. Position the 1/16 x 1/16 x 1/2" bias magnet until it causes ONLY ONE of the reeds to close with NO current thru the coil and to OPEN with 28 to 32 ma. Magnet adjustment is easier if it is epoxied to a toothpick beforehand. After the reeds, bias magnet and coil current have been

adjusted (slight mark and space keying bias can be compensated for by position adjustment), secure them permanently with model cement. Of course, you could use a GOOD polar relay instead of the home made reed relay, but the reeds switch in less than two microseconds (including bounce) and have not required adjustment since first installed at DL5PQ. Figure 2 depicts the remainder of the parts required. The 750-ohm pot allows for shift ranging from nothing to about 1200 Hz and is a 4-watt unit, possibly a smaller rating could be used. The Zener is a surplus unit rated at 1/4 watt. The Shift Meter is a 200-microampere movement with an appropriate series resistor, ensure that the meter you use requires no more than 500 microamperes. Slide switches are used for the "ON-OFF" and "MARK HI-LO" switches.

Operation of the completed shifter requires that the SB-401 be in the CW position, UNLOCKED, shifter switch "ON" and the cw key closed; position the "MARK HI-LO" as required and adjust the shift pot as you like it. May I suggest mark HI and 170 Hz?

The completed unit is about the size of the HEATHKIT SWR METER HM-15 with the "RTTY-NORMAL" switch, "MARK HI-LO", "SHIFT METER", "SHIFT ON-OFF" (this is an additional switch, see figure 3) and the "SHIFT ADJUST" pot left to right on the front panel. As you will see, there are quite a few cables extending from the back of the unit, each one of which I feel is necessary for ease of operation. These cables, for the most part, terminate at the far end with phono plugs to fit the SB-401/SB-301 combination that is in use at this station. The RTTY "ON" circuit and the 60 ma. loop are connected via a barrier strip mounted on the rear. Note that this shifter box contains a relay that is operated by remote means that keys the SB-401 only when the "RTTY-NORMAL" switch is in the "RTTY" position. It is also connected so that the transmit loop is open (and the printer "runs wild") unless the switch is in the "RTTY" position. The Mute and Speaker connections are set up to permit "off-the-air" monitoring while in the RTTY mode only. The Audio AGC connection switches on a delayed AGC used for RTTY only and maintains a preset audio output level regardless of signal strength as long as the signal is at least \$1.

RTTY JOURNAL

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CLASSIFIED ADS Rates \$1. '30 words - Additional words 2¢ Closing date 1st of month.

NO GLARE WINDOWS for Model 15 & 19 Printers. Cadmium plated & Gold Iridite finish. \$12.50 P.P. Check or M.O. Bud WA6UEF, 17114 Sunderland Dr., Granada Hills, Calif. 91344.

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TELETYPE PICTURES for sale. 50 for \$1.00. Perforated and audio tapes available. Pictures for Vol. 2 needed. W9DGV, 2210-30 St. Rock Island, Ill. 61201

LAST CALL! Only 150 Handy RTTY Logs left! Every RTTY station needs one. Mail 50¢ today for yours. W5APM, Box 2309, San Marcos, Texas 78666

SAROC NEW QTH Stardust Hotel new QTR February 4-8. 1970. Cocktail parties hosted by Ham Radio Magazine, SWAN and GALAXY. Additional information and Stardust Hotel special SAROC room rate card QSP SASE SAROC, Box 73 Boulder City, Nevada 89005.

TERMINAL UNIT: RCA CV-71 (50 kc if version of CV-57 for Drake, Hallicrafters, etc.) Perfectly Reconditioned with cables, cabinet, manual, spare keyer section, etc. Laboratory aligned. \$80. Drake 2B and 2BQ. \$180. Both \$250. Gonset G-50 \$165. RCA Carbone base. 146.94, preamp, etc., \$65. Bill Handel, K8SSY, 95 Murwood Drive, Chagrin Falls Ohio 44022

#28 COMM. TYPEBOXES, \$6, also other types. Sixty wpm, other gears. \$4.50 set. Other TTY goodies. G. White, 5716 N. King's Highway, Alexandria, Va. 22303

J & J ELECTRONICS is presently specializing in the custom building of the Mainline TT/L-2 FSK demodulator for the RTTY enthusiast. Contact John F. Roche, W1SOG, Windham Rd., Canterbury, Conn. 06331 for full details.

WANTED: Teletype Models 28, 32, 33, and 35 and accessories, printers, etc. We pay highest prices - and freight. Cash or trade. AMBER INDUSTRIAL CORPORATION, P.O. Box 2129, South Station, Newark, N.J. Tel: 201-824-1244.

PUT A NICE NEW resilient platen roller on your #28, #29, (#35 or #37 Teletype machine, friction or sprocket type; \$7.50 postpaid with your old platen, immediate return. Excellent model 32KSR; \$200. Also wanted, #28, #35 material. G.E. White, 5716 N. Kings Highway, Alexandria, Va. 22303

WANTED ANY INFORMATION on a model 103 printer made for Western Union. Am new in RTTY game and need all kinds of information. Don Heringhaus, W4SRZ, Rte 1, Box 77, Ottawa, Ohio 45875

TOROIDS 88mhy, center tapped - not potted 5/1.50 Postpaid. John Dilks III, Rte. 1, Box 218, Mays Landing, N.J. 08330

19 TT EXCELLENT STK keyboard, trade on 75A4. TTLers, few Jan 2" nickoloi CR tube shields, \$2.00 ea plus 50¢ shipping. R.N. Hayes, W8CL 218 11th St. SE. Massillon, Ohio 44646. 216-832-7678.

WANTED: MITE TTG-14 keyboards. Write or call K5BQA, see address in TTL/2 ad this issue. Also have Mite for trade. Need good receiver.

MODEL 32KSR Teletypewriter; complete with answer back keyboard, to set up identification, with console and technical manual, operating condition, excellent \$150.00 ea. Model 15KSR Teletypewriter; complete with synchronous motor, keyboard, cover excellent \$50.00 each. Model LO-15KSR Teletypewriter, German model 15, complete keyboard, cover most parts interchangeable with model 15, excellent \$50.00 each. LC15ASR on same base, excellent \$90.00. Model 19ASR, complete sync motor, with page printer, trans-dist, perforator-keyboard, power supply and steel table \$110.00, if you pick it up \$90.00 each. FRXD-10 Combo: reperforator and trans-dist, sync, motor, on one base, excellent \$30.00 each, without tape retainer \$20.00 each. TT100B/FG Teletypewriter: Kleinschmidt excellent \$70.00 each. Trans-Dist, model 14 with synchronous motor excellent \$18.00 each. TT63A/FG Regenerative-Repeater: accepts TTY signals for transmission. Has self contained power supply complete with tubes, wetted relay and cable excellent \$22.00 each. Synchronous motor: for T.D. Model 14, 15, 19 excellent \$8.00 each. Send for free catalog. Moved to larger quarters. Atlantic Surplus Sales--580 3rd Ave. Brooklyn, N.Y. 11215.

ADDITIONAL CLASSIFIED on NEXT PAGE