CLASSIFIED cont. from page 19

SALE: MODIFICATION KITS. Reinker for Model 14 typing reperforator. Consists of the following: Mounting bracket; Inkwells (2); nylon ribbon; Replacement felt pads (24); plastic tool; stainless steel tool. All packaged in plastic case. $1.60 ea. postpaid in cont. U.S. W. H. Craig, Box 947, Grayson, Ky. 41143

TELETYPE PICTURES FOR SALE. Vol 1 $1.00. Vol 2 $2.00. Vol 3 $1.50. All for $4.00. Perforated tapes available. 200 different pictures. W9DGV-a. 2210-30th Street, Rock Island, Illinois 61201.

RTTY PAPER - 12 rolls per case, double copy, $4.00 per case plus shipping. For more information SASE to WAQPYW, W.H. Schler, 5345 N. Woodland, Kansas City, Missouri. 64118

28KSR, NEWLY PAINTED Beige Cabinet looks like new. Reconditioned (100 wpm checkout) auto CR/LF, Manuals, extras. $350.00 Kermit Slob, W9BT 1605 Oakwood Rd. Northbrook, Ill. 60062 312-272-1223.

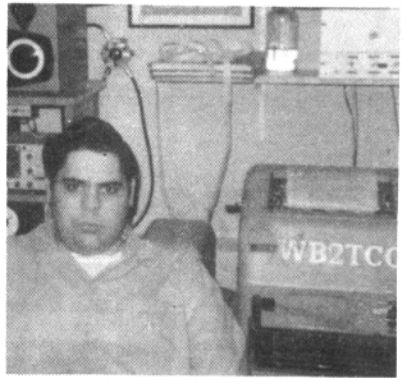
W3CIX IS ALIVE AND WELL: I now QSL 100% with new special RTTY cards mailed to all contacts since Jan. 1st. If I missed you, I need your address. QSL to Elmer Mooring, 9318 Millbrook Rd. Ellicott City, Md. 21043

SELL; HQ-180, CLEAN, READY TO USE. Want CV-116 and PP-712 power supply for CV-182/GRC-26A. Must be clean and operating. Bill Neil, 5628 Anita St. Dallas, TX. 75206.

RTTY JOURNAL

MITE; TT-298 B/UG TELETYPEWRITER with TT-318 B/UG (6 contact) keyboard. 'working and in good condition, less power connector. $200. plus shipping, Byron Young, Jr. PO Box 18, Marlin. TX, 76661

SEL; ST-6, $160. Essco TU-7 $60. HB TU-6 (Ham Radio June 69) $20. James Jacobus, WA9WGX, Box 65, Cortland, Ill. 60112



'Rick' WB2TCC

******

Address Correction Requested

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

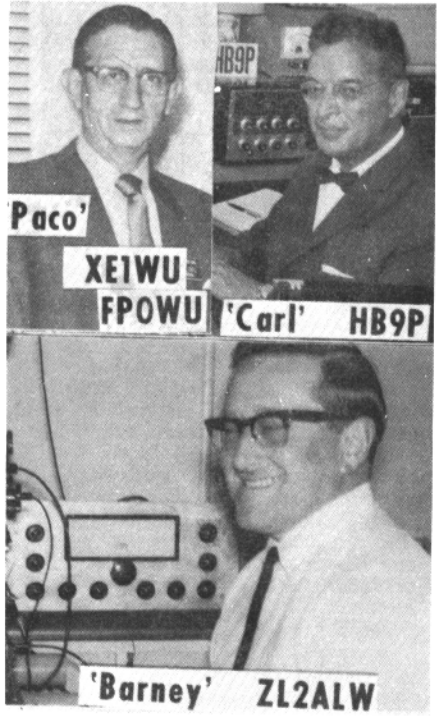
VIA AIR MAIL
First Class Mail

RTTY JOURNAL

September 1971

EXCLUSIVELY AMATEUR RADIO TELETYPE

Volume 19, No. 8 — 30 Cents



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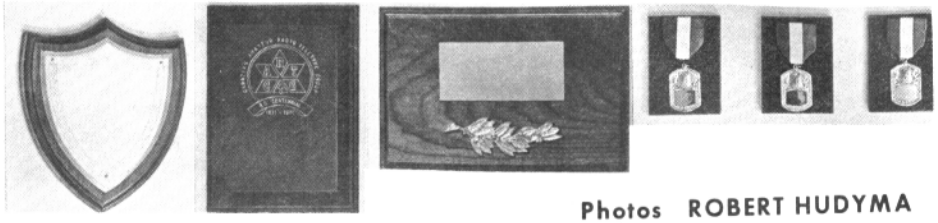
C.A.R.T.G RTTY DX SWEEPSTAKES
honors British Columbia Centennial.-



Photos ROBERT HUDYMA

The oldest and most active of all RTTY contests the 11th RTTY Sweepstakes sponsored by the C. A. R. T. G. this year Honors the "British Columbia Centennial" with beautiful awards of plaques and medals as well as many certificates. Rules are very similar to past years with the addition of multi-operated station class. Extra points will be awarded for working British Columbian (VE7) stations. Mark the dates, Oct. 16-18 on the calendar now and start planning for a big week end. Don't forget ten meters, a special award is given for that band and it is an easy place to get extra multipliers. Check just above or below 28100 for contacts.

1. **CONTEST DATES**
   Commencing at 0200 GMT Saturday October 16th and ending at 0200 GMT Monday October 18th, 1971. Total contest period is 48 hours but no more than 36 hours of operation is permitted. Time spent in listening counts as operating time. The 12 hour non-operation period can be taken at any time during the test but times on and off must be summarized on Log and Score Sheets.
2. **BANDS**
   The contest will be conducted on 3.5, 7, 14, 21 and 28 MHz amateur bands.
3. **COUNTRY STATUS**
   ARRL Country List, except KL7, KH6, and VO to be considered as separate countries.
4. **MESSAGES**
   Messages to consist of: -
   (a) Message number, Time GMT,
   (b) Zone and Country
5. **EXCHANGE POINTS**
   (a) All two-way contacts with stations in one's own zone -- 2 points.
   (b) All two-way contacts with stations outside one's own zone will receive points listed in Zone Chart. (same chart as used for last year's test).

AWARDS

1. Plaque - British Columbia Amateur Radio Association (BCARA)
2. Plaque - "RTTY JOURNAL"
3. Plaque - B. C. A. R. A.
4. Plaque - "RTTY JOURNAL"
5. Plaque - B. C. A. R. A.
6. Plaque - B. C. A. R. A.
7. Plaque - "RTTY JOURNAL"
8. Plaque - B. C. A. R. A.
9. Plaque - B. C. A. R. A.
10. Plaque - "RTTY JOURNAL"
11. High Score U.S.A. - Gold Medallion & Ribbon - "RTTY JOURNAL"
12. High Canadian Score - Gold Medallion & Ribbon - Canadian Director's Award.
13. "Green RTTYer" High Score (never participated in any RTTY Contest) Plaque - B. C. A. R. A.
14. 10 Meter High Score - Silver Medallion & Ribbon - "RTTY JOURNAL"
15. High Score for Low Power stations (under 100 w. input) - Plaque B. C. A. R. A.
16. SWL Printer High Score - Plaque B. C. A. R. A.
17. High Score for Narrow Shift Contacts Sidney Burnett Memorial Plaque.
18. High Score Multi-operated stations
    1. Plaque - B.C.A.R.A.
    2. Plaque - "RTTY JOURNAL"
    3. Plaque - B. C. A. R. A.
21. Certificates for top scores in each U.S.A. and Canadian District and in each country.

***

(c) Stations may not be contacted more than once on any one band. Addititional contacts may be made with same station if different band used for each contact.

6. **The British Columbia Amateur Radio Association honors B. C. Centennial**
   Bonus points of 100 to be added for every VE and VO station contacted. Total Bonus Exchange Points to be Multiplied by number of VE7's (B.C.) worked. Bonus Points to be added to total score at the end.
7. **CLASSIFICATIONS**
   (a) Single operated stations
   (b) Multi-operated stations
   Individual operators of multi-operated stations can submit their Logs singly and compete as single operators, instead of submitting a Group Log. Logs from multi-operated stations, or Group Logs must compete for multi-operated station awards.
8. **MULTIPLIERS**
   A multiple of one is given for each country worked including one's own on each band. e.g. If one country is worked on 3 bands, 3 multipliers given.
9. **LOG SHEETS**
   Separate page for each band. CARTG Log Sheets available for SAE or IRC's. Logs to contain band, Exchange numbers, Times GMT, Station calls, zones, countries, exchange points and power.
10. **SCORING**
    Total Exchange Points multiplied by number of Countries worked, multiplied by number of Continents (maximum 6). Finally "B.C. Centennial" Bonus Points added.

Scoring Example

Exchange Points. 2020
Countries:-
3.5 Mhz - 5
7 Mhz - 4
14 Mhz - 18
21 Mhz - 10
28 Mhz - 3
40
Continents. 5
Score - 2020 x 40 x 5 equals 404,000 Pts.
Bonus:-
6 VE Contacts equal 600 Pts.
2 VE7's included - 600 x 2 1,200 Pts.
TOTAL SCORE . 405,200 Pts.

Logs must be received not later than December 1, 1971.

Send Logs to
85 Fifeshire Road,
Willowdale, Ontario, Canada.

*****

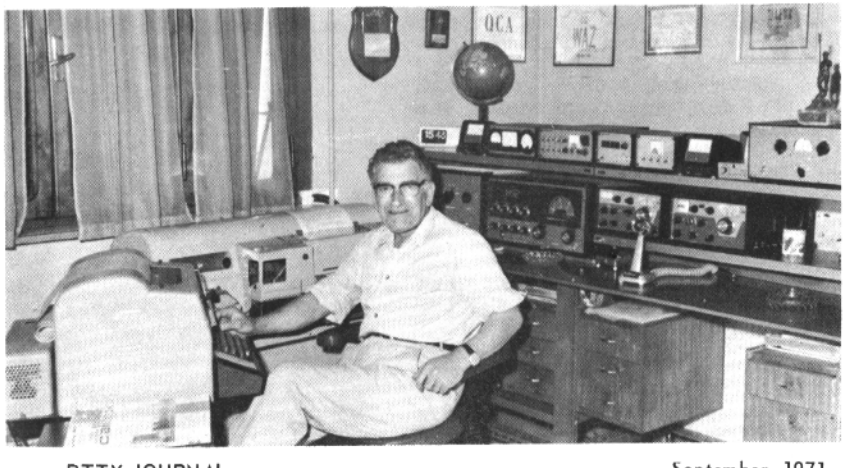
-Worlds RTTY Contest -Winners -

The British Amateur Radio Teleprinter Group, (BARTG) was responsible for the scoring and handling of the "Worlds Campionship of RTTY for the past year. They have announced the winner as Giovani Guidette, I1KG.

"Guiavani", I1KG, was the winner of the "Worlds DX Contest", determined by the best scores in all the RTTY contests held in the past year. He is also among the leaders in the DX Honor roll and has assisted in many DXpeditions offering new countries for RTTY. For an outstanding signal and operating excellence we congratulate Guiavani on his accomplishments.

The top ten finishers are listed below and it is interesting to note that only 3 of the first ten are from the states. RTTY has really become an international mode of communication.

1. I1KG	120	6. W4YG . . .	60
2. VK2FZ. . .	80	7. VE7UBC	59
3. I1CGE . . .	73	8. VK3DM.	55
4. I1CAQ . . .	69	9. VE2LO/W6 . .	44
5. WA2YVK. .	64	10. FO8BS	41



The ICARUS - ID.

Versatile Station Identifier.

Dr. FRANK E. STEWART - K5ANS
Bldg. 8 Box 815
Cooke County Jr. College
Gainesville, TX. 76240

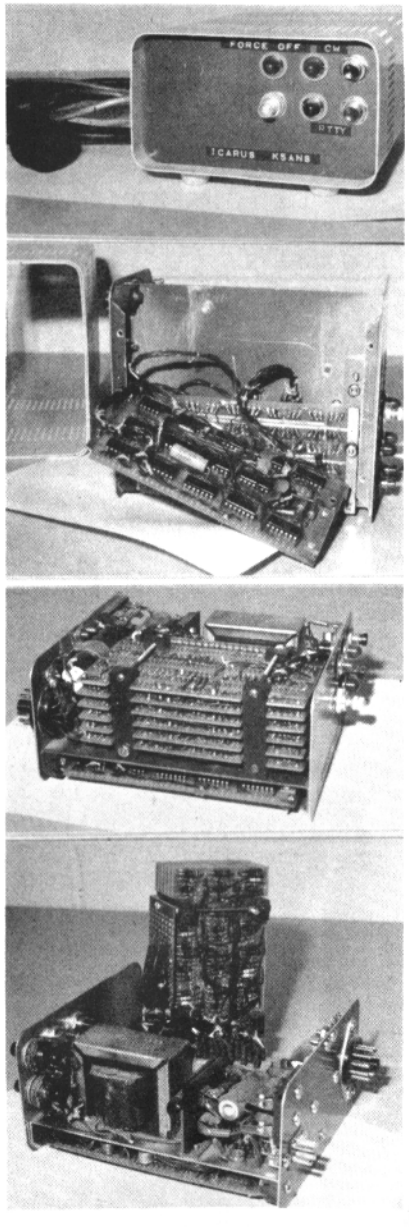
Introduction

ICARUS - ID is an acronym for Integrated Code and RTTY Unit for Station Identification. Should the FCC abolish the CW-ID requirement, perhaps Integrated Circuit Automatic RTTY Unit for Station Identification would be appropriate. With his ICARUS, the author can send his station identification in either RTTY or CW separately. In addition he can push one button and his ICARUS will automatically send three things; his station ID in RTTY, then in CW, and finally "Figs.-Blank-H" which turns his transmitter off the air!

Except for one important modification, ICARUS uses the classic Binary Counter-Diode Matrix approach for generating either RTTY or CW characters. This approach has been recently described in detail in QST (1,2). Other I.C. methods exist (3, 4) but they are limited to generating either CW only, or short repeating groups of RTTY characters such as RY and CQ. With the diode matrix approach, one can send an arbitrary text of any length.

To send a RTTY message of any appreciable length, one usually requires a very large diode matrix which is quite tedious to program (assuming one must do it manually, with only the aid of a Karnaugh map. Instructions for designing diode matrices by Karnaugh mapping are available from the ARRL for one dollar. Each RTTY character is eight bits long; to send only a call sign (K Figs. 5 LTRS A N S Space) requires at least a 64-bit matrix. Matrices are powers-of-two in size. It is trivial to program an 8, 16, or 32 bit matrix; a 64-bit matrix can be programmed relatively easily. To program the 128-bit size is moderately difficult, and for those above 256 bits, it is agonizing. To send one's name, call, location, and a string of N's can easily require a matrix almost a thousand bits in size.

In ICARUS, the desired message is divided into several 64-bit parts and a separate diode matrix is programmed for each. Almost any number of these can be used and yet only a single six-



stage, divide-by-64 binary counter is required. With ICARUS, it is relatively easy to program very long texts. The author's ICARUS uses eight 64-bit matrices. Each can be rewired at any time without affecting the others, a very important consideration when one is tracking down possible wiring errors, or when one wants to change part of the overall message. If a single 512-bit matrix were used, to make even a small change anywhere in the message could well require a complete reprogramming of the entire matrix, a fact somewhat difficult to understand by one not familiar with matrix programming.

The Clock and Binary Counter

A unijunction transistor serving as a relaxation oscillator (see Fig. 1) generates a short pulse every 22 ms (45.45 Hz). The 27K resistor may be changed to either a 22K or a 33K if the 10K pot has insufficient range. The time intervals between successive clock pulses are called bits.

The clock drives a six-stage binary counter whose 12 outputs serve as the counter inputs to the diode matrices. All counter outputs are buffered with an inverter so there is no danger of loading down any stage of the counter with the diode matrices. The two outputs of each stage are complimentary; that is, if one is low, the other is high, and **vice versa.** They are never both high or both low simultaneously.

Following each clock pulse, there will be a unique combination of high (greater than one volt) and low (less than 0.3 volts) voltages on these 12 lines. Such a combination prepresents a particular counter state. The counter will remain in a given state for one bit of time (22 ms), or until the next clock pulse. It is the job of a diode matrix to decode the various counter states; the output of the diode matrix should be high only for those bits during which one desires RTTY or CW keying.

In designing a diode matrix it is important that one know which counter outputs are all high during any particular bit. Figure 2, called a 64-bit Karnaugh map, allows one to quickly determine this. For example, during the second bit, the following counter states are all high: 1-Not Q, 2Q, 4-Not Q, 8-Not Q, 16-Not Q, and 32 - Not Q. During the tenth bit, the following counter states are all high; 1-Not Q, 2Q, 4-Not Q, 8Q, 16-Not Q, and 32-Not Q.

Initially the counter is in the zero state; all six Q outputs are low and all six not-Q outputs (indicated by a bar drawn over the Q) are high. The counter will be in an identical state 64 bits later as the counting of the clock pulses continues; the 65th counter state is identical to the first counter state, etc. Thus, the counter recycles after every 64 bits.

The Bucket Brigade

There must be some scheme for automatically switching out a diode matrix and switching in a new one after every 64 bits; otherwise, the same information Would be sent over and over as the binary counter recycles. The bucket brigade, described in Chapter 5 of the **RTL Cookbook** (5) solves this problem by acting as an electronic stepping relay. ICARUS has two such circuits: one for the RTTY diode matrices and one for the CW diode matrices. While ICARUS is sending RTTY, the output of RY-1 is high only for bits 0-63; that of RY-2 is high only for bits 64-127; etc. The output of each of these gates turns on-and-off a different diode matrix. Each brigade may in principle contain as many flip flops as desired. A single toggle buffer (RY-T or CW-T) should not be called upon to toggle more than ten-to-twelve, however.

The Diode Matrix

The purpose of a diode matrix is to decode various bits; that is, its output is high only while the binary counter is in one or more particular states. There are at least 14 connections to each 64-bit diode matrix: 12 to the binary counter, one plus 3.6V input or "IN" line, and one keying or "OUT" line. In addition, there may be one-or more special purpose outputs not used for RTTY or CW keying but rather for terminating the transmission or readout of a message.

A diode matrix is built up of various AND gates similar to that of Fig. 3a. This one is designed to decode the second bit. The output is high only when all counter inputs as shown are high, and this occurs only during the second bit, as one can readily verify by consulting the Karnaugh map. Even if only one counter input is low, a diode cathode will be almost grounded (less than 0.3 volts) and that diode will conduct. Thus, during all bits except the second, the anodes of all the diodes will be at a low potential, usually less than 0.5 volts. This is not enough to cause conduction through the final diode and the amplifier circuit it drives, and the matrix output will be low (very close to zero volts).

Fig. 3b illustrates how a diode matrix is usually drawn. All 12 counter lines are drawn vertically and diodes are simply

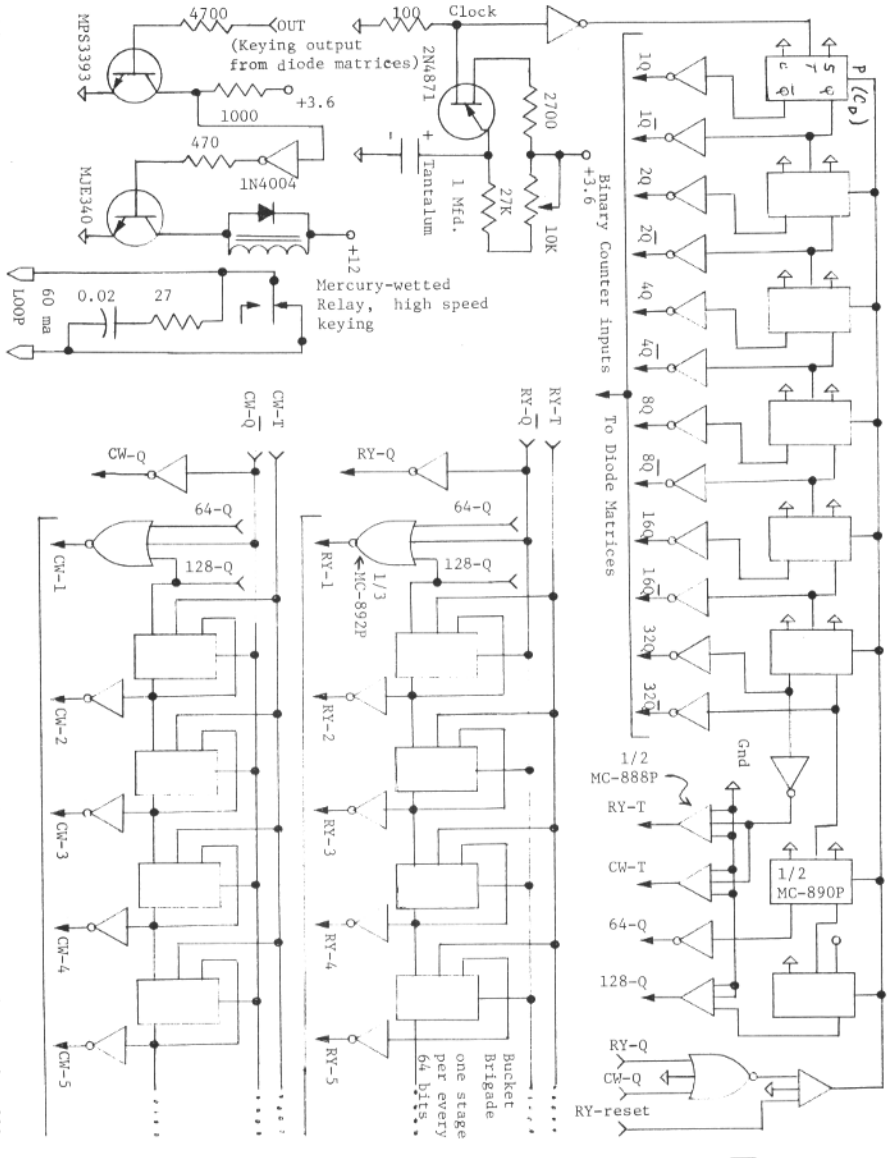


Fig. 1. Clock, Binary Counter, Bucket Brigade and Keying. 1-MC892P, 2-MC888P, 4 (or more)-MC889P, 7 (or more)-MC890P.

	$\overline{16},32$			
	$\overline{1,2}$	$1,\overline{2}$	$1,2$	$\overline{1,2}$
$\overline{4,8}$	0	1	3	2
$4,\overline{8}$	4	5	7	6
$4,8$	12	13	15	14
$\overline{4,8}$	8	9	11	10

	$\overline{16},32$			
	$\overline{1,2}$	$1,\overline{2}$	$1,2$	$\overline{1,2}$
$\overline{4,8}$	16	17	19	18
$4,\overline{8}$	20	21	23	22
$4,8$	28	29	31	30
$\overline{4,8}$	24	25	27	26

	16,32			
	$\overline{1,2}$	$1,\overline{2}$	$1,2$	$\overline{1,2}$
$\overline{4,8}$	48	49	51	50
$4,\overline{8}$	52	53	55	54
$4,8$	60	61	63	62
$\overline{4,8}$	56	57	59	58

	$\overline{16},32$			
	$\overline{1,2}$	$1,\overline{2}$	$1,2$	$\overline{1,2}$
$\overline{4,8}$	32	33	35	34
$4,\overline{8}$	36	37	39	38
$4,8$	44	45	47	46
$\overline{4,8}$	40	41	43	42

Fig. 2. A 64-bit Karnaugh map, showing some work in decoding "Figures-Blank-H" (in RTTY). All bits to be decoded are underlined. "Don't care" bits are checked or crossed out.

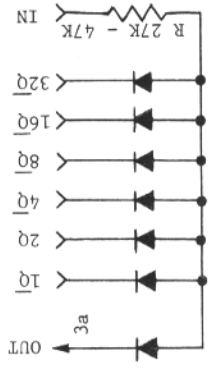


Fig. 3a. An AND gate decoding the second bit only. To construct his matrices, the author mounted his diodes and resistors as shown above on Universal Logic Boards designed for 14, or 16 pin DIP (dual in line plastic) I.C. Packages.

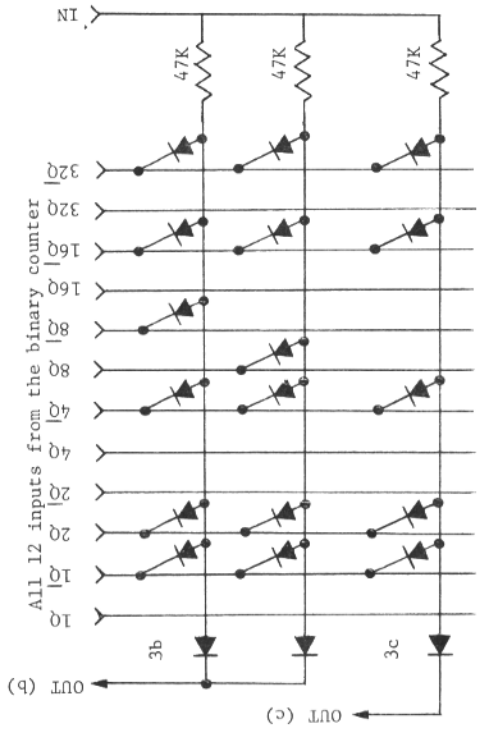


Fig. 3b. A 2-input OR gate which decodes either the second or the tenth bit; 3c is electrically identical to (b),but requires seven fewer diodes.

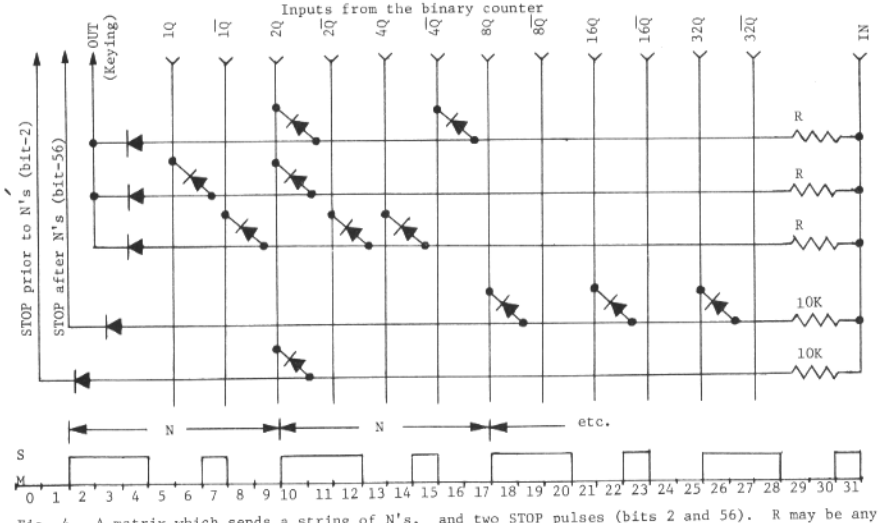


Fig. 4. A matrix which sends a string of N's, and two STOP pulses (bits 2 and 56). R may be any value from 27K to 51K. Also shown is the mark-and-space keying for the first 32 bits.

connected to them as needed. The upper AND gate is electrically identical to that of Fig. 3a. The lower one is programmed to decode the tenth bit. The matrix output will be high for either the second or the tenth bit. Fig. 3b represents two 6-inputs AND gates and one 2-input OR gate.

Small signal silicon diodes would be better than those of germanium because of their much higher back-resistance. Large quantities of germanium diodes are available from surplus sources, however, for less than two cents each. The author used silicon diodes for the OR gates and germanium diodes for the AND gates, but rejected those diodes which had a back resistance of less than 300K as measured with a VOM. Only germaniums diodes, and of a considerable better quality than this, may be used in the matrices described in QST (1, 2) because the unit in which they are used (the Digital Message Generator) has no buffering between the binary counter and the diode matrix.

A complete 64-bit diode matrix could be built up of several AND gates, each decoding a single bit; however, if fewer than six AND gate diodes are used, a single AND gate will decode more than one bit. The AND gate of Fig. 3c will decode both the second and tenth bit; it will do the same job as that of Fig. 3b and at a savings of seven diodes.

The matrix shown in Fig. 4 will send a string of eight N's in RTTY. The remainder of this section discusses this matrix in some detail and explains the author's procedure in designing matrices.

The RTTY information code for an N is SSMS. The complete set of eight bits representing an N, including the spacing start pulse and the marking stop pulse (of two bits duration) is SSSMMSMM. Since the author, for reasons discussed earlier (6), wants to send his CW-ID on the RTTY space frequency rather than that of the mark, he decided to decode RTTY spacing bits rather than marking bits. In addition, the author decided that the RTTY start pulse should occur during the second, tenth, sixteenth, etc., bit rather than during the first, ninth, fifteenth, etc., because generally fewer diodes would be required. Therefore, to send an N, the keying output should be high for counter states 2, 3, 4, and 7, and low for all others. If a string of eight N's is to be sent, the above sequence of eight bits (zero through seven) should be repeated eight times throughout the entire 64-bit matrix. Therefore the counter states (2, 3, 4, 7), (10, 11, 12, 15) (18, 19, 20, 23), etc., should be decoded; that is the keying line should be high during the time interval (22 ms) the counter is in each of these states.

The output of the first AND gate in Fig. 4 will be high whenever 2Q is high and 4Q is low. This occurs during counter states 2, 3, 10, 11, 18, 19, 26, 27, 50, 51, 58, 59, 34, 35, 42 and 43. The first AND gate decodes those 16 bits. Again, this can be readily verified by consulting the Karnaugh map. Similarly, the second AND gate decodes bits 3, 7, 11, 15, 19, 23, 27, 31, 51, 55, 59, 63, 35, 39, 43, and 47; the third AND gate decodes the remaining eight bits 4, 12, 20, 28, 52, 60, 36 and 44. Eight bits are decoded twice; that does not matter and indeed, doing so results in a savings of diodes. A total of seven "AND gate diodes" are required.

Each of the AND gate outputs go to an input of a four-input OR gate, whose output (the matrix keying line) is high whenever any of its inputs are high. Three "OR gate diodes" are required.

As an illustration, a stop gate (another AND gate) has been connected to decode the 56th bit. In this example the eighth N will never get sent because the binary counter will revert back to the zero state immediately after the 55th bit. A second stop gate has been added to decode the second bit; it might be used if one wanted to terminate a RTTY message prior to the N's.

It is relatively easy to see why Fig. 4 is a possible solution to the problem of generating a string of "N" characters. To arrive at the solution initially is somewhat more involved, and is discussed further in the Appendix.

Loop Keying Circuit

The output lines of all the diode matrices should be connected together. During marking, matrix outputs are low. During spacing, matrix outputs are high, but generally not sufficiently high to reliably drive a low-gain transistor switch or an I.C. logic gate; therefore, the matrix outputs are first amplified. For actually keying the RTTY loop, the author prefers to use a high-speed keying relay with a set of normally-closed contacts. This method isolates the loop from the logic. The relay contacts may be connected in series with the loop anywhere somewhat as a set of keyboard contacts or as a reperforator. The author uses a surplus mercury-wetted relay obtained from H.A.L. Devices. The arc suppressing filter consisting of a 0.02 mf capacitor and a 27 ohm resistor in series should be mounted in parallel with the relay contacts and as close to them as possible.

The RTTY-CW Control Circuit

The only major circuit remaining to be described is one used for turning on-and-off the bucket brigades and for preclearing the binary counter. It is this circuit that determines whether ICARUS sends RTTY or CW. Figure 5 shows a suitable circuit. It is so designed that it cannot send both RTTY and CW simultaneously. Normally both RY-Not Q and CW-Not Q are high and the binary counter remains in the zero state. The RTTY message can be started by pressing push-button B2; RY-Not Q immediately swings low and the RTTY message programmed into the RTTY diode matrices will be printed out.

Soon after the conclusion of the RTTY message some convenient bit should be decoded with a stop gate. If one wanted his message to continuously repeat, he should replace the push-button with a closed switch; the stop gate should not be omitted, or the counter would not preclear and start over properly.

If S2 is the "Automatic" position, the CW message will be sent immediately after the conclusion of the RTTY message. Thus, at the conclusion of a transmission, one can send his station identification in both RTTY and CW by pushing only one button.

The RTTY and CW messages can also be started by an Electronic Stunt Box (ESB). The author can simply type Figs. Blank-Carret or Figs.-Blank-Linefeed on his printer keyboard to begin either the RTTY or the CW message, respectively. The author's ESB generates short positive pulses whenever he types certain sequences of RTTY characters. If one does not have an ESB, he should simply ground the ESB inputs in Fig. 5 and use only the two pushbuttons to start messages.

The four 1K resistors are contained within the dual-buffer I.C. packages (MC899P) and need not be added externally as discrete components. If the

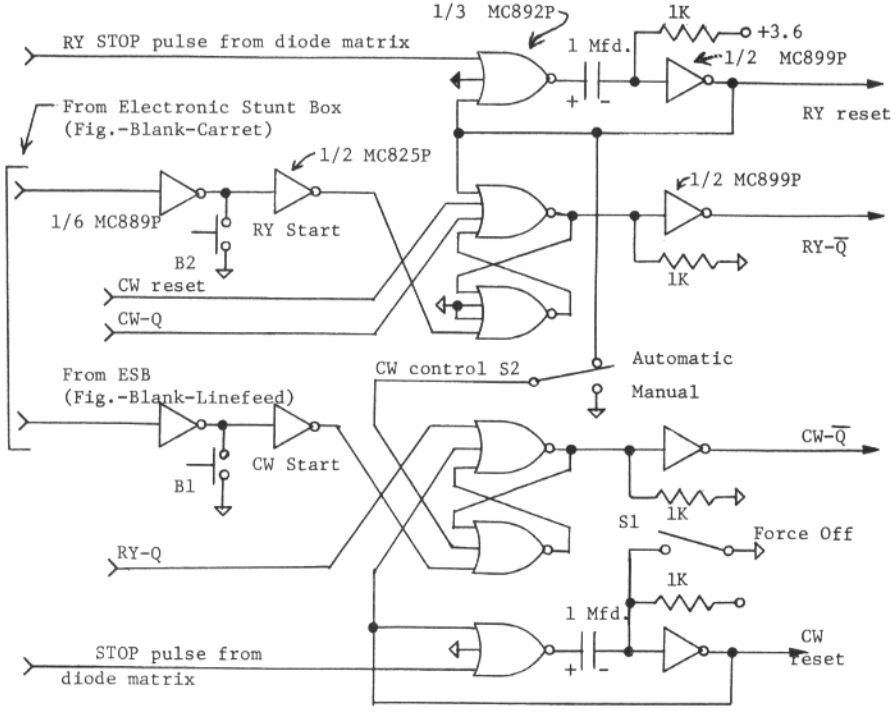


Fig. 5. A suitable RTTY-CW Control Circuit, but of limited versatility. The 1K resistors are part of the dual-buffer (MC899P) packages; one need not add them externally as discrete components. In lieu of an Electronic Stunt Box (ESB) one should ground the two ESB inputs.

force-off switch S1 is closed, it is impossible for ICARUS to send anything.

The control circuit of Fig. 6 provides for a considerable amount of versatility in sending one's station identification - almost all one could want. In addition, it demonstrates that the usefulness of the basic ICARUS circuit of Fig. 1 is limited only by the imagination of the reader.

By typing Figs.-Blank-Linefeed, or by pressing B1, the author can begin his station ID in CW;this would be done at the beginning of a transmission. After typing the call letters of the station to which the transmission is addressed, the author could type Figs.-Blank-Carret, or press B2, and ICARUS would send his station ID in RTTY - an obvious convenience.

After finishing the typing of the transmission, the author is ready for ICARUS to give its most impressive performance of all. If Figs.-Blank-M is typed, or if B3 is pressed, ICARUS sends:

(a) the station ID in RTTY
(b) a string of seven N's (NNNNNNN)
(c) the station ID in CW
(d) Figs-Blank-H in RTTY

The N's are sent after virtually every transmission on autostart nets to turn off Selcals and lock up other printers into mark-hold, or non-print. Many people type Figs.-Blank-H to turn their transmitters off the air. This convenience requires proper stunt box programming which is beyond the scope of this article. The author lets ICARUS effectively type Figs-Blank-H for him.

The diode matrix used to send the N's (Fig. 4) is turned on by an appropriate flip-flop in the RY-Bucket Brigade. The diode Matrix used to send Figs.-Blank-H, along with two stop pulses, is turned on by an appropriate flip-flop in the CW-Bucket Brigade. Its programming is shown in Fig. 7. The author uses the output of Cw-5, but the reader may want to use CW-4 or CW-6, depending on the Morse Code length of his own call.

The choice of Figs.-Blank-Linefeed, Carret and M are historical in nature, and need not be discussed here. Again, in lieu of an electronic stunt box, or a Selcal properly programmed, one would simply ground the various inverter inputs shown in Figs. 5 and 6.

DISCUSSION

ICARUS does not represent a minimum I.C. package design to accomplish a given specific objective. Rather, it was designed for versatility and trouble-free service. For example, if the messages are reasonably short and if only germanium diodes of the best quality were used, inverter-buffers between the JK-Flip Flops (MC890P) and the diode matrices would not be required. A JK-flip flop has rather stringent toggle requirements. Too much stray capacitance on its toggle input would lead to erratic operation and could easily prevent the flip flop from toggling at all. Thus, the author feels the extra three-or-four hex inverter packages (MC889P) are well worth their cost ($1.35/package of 6

A hex inverter package is also used in the RTTY-CW control circuit to isolate the sensitive R-S flip flops from noisy outside world signals and excessive input voltages from the ESB or elsewhere.

The logic requires about 900 ma at 3.6 volts, well regulated. An excellent power supply has been published elsewhere (5,7).

At this writing, no P.C. boards designed specifically for ICARUS are available. The author used 15-package Universal Logic boards and made all connections with No. 30-7/38 extruded teflon wire ($6.05/100 ft). Cheaper wire could be used but teflon-covered wire is not overly expensive and is practically impervious to soldering iron damage. It is almost impossible, however, to use this wire without a pair of hand strippers such as the Ideal Custom Stripmaster ($21.50).

ICARUS uses the same clock frequency (22 ms bit length) to generate both RTTY and CW. If dots and dashes were one and three bits long, the resulting Morse code would be too fast. To generate CW at 15-to-20 WPM, dots should be at least three bits long (66 ms). The author's dots and dashes are two and six bits long, respectively, but to slow down the CW, he uses the trick of putting in extra space (twelve bits rather than six) between Morse letters.

Part two of this article will conclude in the October issue.

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1. QST, June, 1970, p11.
2. QST, April, 1971, p14.
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4. **Ham Radio Magazine**, March, 1971, p23.
5. **RTL Cookbook**, Donald E. Lancaster Howard W. Sams and Co., Publication 20715 Indianapolis, Ind. 46206
6. **RTTY Journal**, April, 1970, p2
7. **RTTY Journal**, Nov. 1970, p3

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VHF RTTY NEWS

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

This month we have several items of news and views.

The BARTG VHF RTTY CONTEST 1971 will be held 1700-2300 GMT Saturday, September 11 and 0600-1200 GMT Sunday, September 19. Licensed amateur radio stations within Zones 14 and 15 are permitted to use RTTY as a mode of operation. Portable operation will be permitted, but must be from one location for the duration of the contest. Short wave listeners may also enter.

Operation will be in the 144 MHz and 432 MHz amateur bands. The 70 MHz amateur band will be permitted for United Kingdom stations (this will be considered as a separate contest during the same period). Stations may not be contacted more than once on any one band. Additional points can be claimed from the same station if a different band is used.

Messages will consist of:

a. Message Number.
b. Time GMT.
c. RST Report.
d. QRA Locator (Standard 5 Symbol Locator) on QTH given either as a town or as a bearing and distance in Km from a town. The town MUST be identifiable on a normal tourist road map.

Points:

a. All two-way RTTY contacts will score in accordance with the distance chart below.
b. All stations will receive a bonus of 200 points per country worked including their own.
c. Bank multipliers as follows: 70 MHz and 144 MHz band score X 1, 432, MHz band score x 10.

Distance:

0-50 km scores	1 point
50-100 km scores	3 points
100-200 km scores	6 points
200-300 km scores	10 points
300-400 km scores	14 points
400-500 km scores	18 points
500-600 km scores	22 points
600-700 km scores	26 points
700-800 km scores	30 points
800-900 km scores	34 points
900-1000km scores	38 points.

Scoring:

a. 2 way exchange points X countries worked per band.
b. Country points X Band Multiplier.
c. Total score equals a + b.

Use one log per band. Logs to contain: Message Number, Time GMT, Call sign of station worked, RST of his signals, QRA or QTH received. Estimated distance and points claimed.

All logs must be received by 21 OCTOBER 1971 to qualify.

Certificates will be awarded to the top scorers, fixed and portable, on each band in each country. The Judge's decision will be final and no correspondence can be entered into in respect of incorrect entries.

Send your logs to:
Ted Double, G8CDW
BARTG Contest Manager
89 Linden Gardens Enfield
Middlesex England.

Many thanks to Ted for providing this information early enough for its inclusion here before the contest!

The following information was received from Bob Hale, WB6APU:

"Thought that you would be interested in some of our VHF activity on RTTY in San Diego. . . . a number of TTY enthusiasts in San Diego County gathered together to form a TTY club. We were all interested in operating strictly VHF in order to avoid the congestion and noise of lower frequencies. After due consideration, we decided that a TTY repeater for the San Diego area would be a valuable thing.

"We had enough initial support from eight initial pledges to obtain a used commercial repeater. Two questions came up - what frequencies to use, and how to guarantee that it would be a TTY only repeater (we had already observed that voice operation tended to squeeze out all other modes on any given channel).

"The two meter technician segment is extremely heavily used in Southern California, so rather than clobber anything already in use on 2 M, we decided on the 420-450 band. The Southern Cal-

ifornia area has a gentlemen's agreement that operation in the 440-450 segment of the band be confined to a particular set of frequencies listed for each user. This vastly simplifies the situation and helps tremendously in avoiding interference. Obtaining a pair of frequencies for our repeater was easy, as we did not care what part of the band they were in.

"The problem of building a TTY only repeater was resolved by installing a bandpass filter between the receiver and transmitter at the repeater. The filter response is from 2100 to 3100 Hz. . . that turned out to have over 60 dB attenuation at 1 kHz and below, which completely destroys any voice that is put into it.

"We obtained a site at Mt. Palomar . . .in June of 1970 we installed the repeater. Since then, we have used it (WA6ZOP) from Oceanside-Vista all the way to the Mexican border with good results. We still have only 8 or 9 members, probably due to the fairly stiff initiation. Our aim is to eventually provide an efficient traffic distribution system for the San Diego County area. . . it makes a great rag-chew net since everyone is on autostart.

"We would welcome inquiries from anyone that is genuinely interested in our organization."

Bob, Hale, WB6APU, Box 616, Rancho Santa Fe, CA 92067.

We have some further information from WB6APU, part of which follows:

"Here is some more information on our Southern California frequency coordination. We have one amateur, who very generously donates his time without compensation, that maintains a complete file of frequencies, users, and user locations in the 420-450 MHz band for FM operations. This is Robin Critchell, WA6CDR. . .

"Most of the 440-450 MHz section of the band is already assigned on standard channel increments (50 kHz). The usage is so heavy that the popular parts of this segment are being assigned split channels at 25 kHz intervals. . .To obtain a channel or pair merely involves sending a written request to the frequency coordinator (WA6CDR), either asking if a particular frequency is available, or if any frequency in a particular part of the band is available. You must also include information as to what kind of antenna pattern you will use, the location of the receiver(s), and if you are willing to share the channel with other users.

"We have one community repeater in San Diego that operates its receiver on 445.250 MHz and its transmitter on 449.500 MHz. Spacings between transmit and receive for most systems are 4 to 5 MHz to ease the problems of desensitization, both at the repeater and at the individual user's station (if he runs duplex, which he should). The frequency of 446.000 MHz is recommended for simplex voice operations, much the same as 146.940 MHz is used."

Thanks again, Bob. This should give some idea of how full the VHF and UHF bands are becoming in some areas, and how popular FM has become.

While speaking about repeaters and such things, the ARRL released a repeater directory in July. It can be obtained by sending an SASE (#10 envelope, or larger) to: American Radio Relay League, Newington, CT 96111. There is one RTTY repeater listed: New York City Repeater Association, WA2YYQ, input 449.25 MHz, output 146.700 MHz.

Some additional information on the AFSK on AM net operating on 50.7 MHz in the Cleveland area has been sent in by K8NQW (see this "col" 1971 JUN Issue):

"Several new stations on: W8DXW, K8OHX, and K8OXO. K8ZYX in Grafton, OH, retransmits the W1AW RTTY bulletins on 50.7 MHz every evening. K8ZYX requests that all stations operating on 50.7 MHz give time and date of transmissions. This helps him to know when the transmissions were received because he operates unattended autostart." (This is an excellent request - RG.)

"It has been noted over the past few months that RTTY activity is increasing on 6 meters, along with this has been an interest by many to get together for a meeting. In line with this thought the few RTTY operators who still call themselves 'The Lake Erie Auto-Starters' would like to hold a meeting which is tentatively set for mid-September. This will give all interested and active RTTY operators a chance to meet each other, with the hope of forming an active RTTY Club for this area.

"To help select a day that will make it possible to get the best attendance, all interested stations are asked to contact K8ZYX or K8VPM of Grafton, OH, noting which day or days of the week you CAN NOT make it to a meeting. We will attempt to select a day that is best for the majority of operators. Those stations that check in will be notified of the final date."

Thank you, Sandy, K8NQW, for relaying the above information to us.

That's it for this month. Let's have some more info.

73 ES CUL, RG.

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RTTY-DX

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

Hello there. . .

Should a history of RTTY ever be written, the months of June and July 1971 will go down in the books as a period of unprecedented activity in the world of RTTY-DX. Not just ordinary DX mind you, but the real rare stuff. At this location it was not at all unusual to turn on the rig at around 2300z and print PZ5RK, EA8CI, CP5AD, 9J2ED, VP7NH, 9Q5BG, 4Z4MR, and 9Y4VU, all on 20 Meters, and ALL AT THE SAME TIME! Then if you stayed up late, or got up early, as the case may be, you could also find KX6IT, JA1FFX, and FO8BO at anywhere from 0600 to 1300z.

Perhaps it would be better if we slowed down a bit and review what really did happen during that hectic period.

Early June marked the arrival of Guy, 9Q5BG, on RTTY and he has been very active ever since. He is presently engaged in the installation of microwave links in the Congo and expects to be there for quite some time. A very unusual thing about Guy's station is that he frequently operates "Mobile" from his Land Rover while out on the job. It is equipped with a 500 watt convertor 12D.C/220A.C., a whip antenna, and he has been very successful in making many contacts. His first Stateside contact with this set-up was with WA8SNJ who was a very surprised fellow indeed. Although Guy did not say, we cannot imagine these periods of operation are "in motion"!!! SSB, OK. CW, well perhaps. But RTTY, Oh, no!!! QSL's can go as follows. . .

Guy Baron, 9Q5BG
P.O. Box 5202
Kinshasa, Rep. of Congo

At about the same time Bill, VP7NH really created some massive pileups from Nassau in the Bahama Islands. Bill is using the Heath SB Line into a six element beam and puts a potent signal into the States. He can usually be found on 14 mhz. at around 2300z or later and on 15 meters on week ends from about 1800z. Bill had just about gotten started when it was necessary to go on a trip for a couple of weeks, however, at this writing he is back in full swing again and you should have no trouble finding him. His QTH is. . .

Bill Thompson
P.O. Box 86
Nassau, Bahama Islands

Although his initial activity was reported some time ago, early June also found Juan, CP5AD very active and with a real rock crushing signal from down Bolivia way. QSL's are very promptly

DX HONOR ROLL

1.	FG7XT 110/102	39.	SM5BO 44/36
2.	ON4BX 108/98	40.	VE5LG 44/35
3.	I1KG 104/94	41.	DL8VX 42/35
4.	W3KV 103/91	42.	ZS3B 53/34
5.	ON4CK 97/87	43.	WB6RXM 44/34
6.	K8YEK 80/78	44.	CE3EX 43/34
7.	W8CQ 84/75	45.	I1WT 43/34
8.	W5QCH 75/70	46.	SM5CMG 60/33
9.	W4YG 72/66	47.	VK3NR 51/33
10.	DK3CU 71/65	48.	HB9ADM 43/33
11.	W2LFL 70/63	49.	I1CGE 42/33
12.	K8QLO 68/62	50.	VE4BJ 33/33
13.	G6JF 82/59	51.	WB6QFE 37/31
14.	VE4AYL 63/59	52.	W9BT 37/30
15.	W1GKJ 66/58	53.	K9BJM 32/30
16.	W3ISE 63/57	54.	EA7PZ 51/29
17.	DJ6ZBA 75/55	55.	HB9AKA 40/29
18.	WA6WGL 65/55	56.	VE4FG 34/28
19.	I1ROL 60/51	57.	ZL2ALW 37/27
20.	W4EGY 57/51	58.	WA3EXP 34/27
21.	K8JTT 51/49	59.	G3IYG 33/25
22.	K4VDM 48/47	60.	K6YUI 30/25
23.	CR6CA 52/46	61.	FY7YQ 29/25
24.	DJ8BT 51/46	62.	ON5WG 28/24
25.	WA2YVK 60/45	63.	KH3SO 28/23
26.	ZS6BBL 53/45	64.	W2IDX 42/21
27.	HA5FE 50/44	65.	SM0OY 36/21
28.	SV0WO 50/43	66.	W1KQY 32/21
29.	EI5BH 49/42	67.	OZ60B 33/19
30.	W9AE 47/42	68.	DL3NO 20/17
31.	W5EUN 51/41	69.	WB6TLA 24/16
32.	W5VJP 42/41	70.	WA0WST 32/15
33.	I1CAQ 43/40	71.	I1THB 22/15
34.	W8CAT 41/40	72.	KL7GRF 27/12
35.	LX2BQ 45/39	73.	K1LPS 25/12
36.	VK3DMz44/38	74.	9Y4VU 25/4
37.	EX1YJ 41/37	75.	WA8SNJ 15/4
38.	WA3IKK 50/36	76.	W3CIX 30/2

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answered if you send yours to. . .

Juan Grecu, CP5AD
P.O. Box 1190
Cochabamba. Bolivia

Cole, KX61T has been putting an excellent signal into the States at about 0600z on week ends. You may have previously missed him if you do not tune low enough in the band as he monitors the Auto-Start frequency of 14075 khz. It is possible that he may get your call on the page even though he may not be in the shack at the time. At least it is worth a try making a sked for a later date and then you will be the most surprised guy in the world if it works out and Cole is there at the appointed hour. Mail reaches him at. . .

Cole Ellsworth, KX6IT
Box 1043
APO San Francisco, Ca. 96555

Mid June brought on activity from Beirut, Lebanon with Stan at the controls of OD5GQ. Stan signs VE4ECN when at home, which isn't often, as he has been on the Asian Continent for some seven years, off and on. He was signing VU4FN for a while but with no RTTY activity as equipment was not readily available at the time. Stan can be reached at . . .

Canadian Embassy
c/o Stan Dabrowski P.O.Box 2300
Beirut, Lebanon

For the balance of June relative calm prevailed on the bands. There were brief flurries of activity when much sought after stations like VP9GR, CR6CA, YO 2AFB, 3A2CQ, LX1SW, 4X4MR, 9Y4VU, let out with a short CQ.

Jean, FG7XT tells us that we can expect a lot of RTTY activity from the many French possessions around the world in the near future. It seems that the commercial and government installations at these locations are converting to faster and more modern equipment making the existing machines available to the local hams. Jean points out that in many places the available machines will exceed the ham population, which is something of a turnabout from recent years when machines were practically unobtainable.

Henry, CR7DB is active again on a limited basis. Severe QRN from adjacent neon signs forces him to limit his operating to before 1800z until the problem can be cleared up. Jo, CR6CA is QSL manager for Henry. The QSL's for all of Henrys prior contacts have now been distributed by Jo.

Early in July we were quite startled to print a tremendous signal signing PZ5RK. Rudolph commenced operations on about the 11th and his first contact was with 9Y4VU. We imagine that he has filled at least one log book by now at the rate he has been making contacts. Rudolph is in Surinam for a while on business and when he is at home in Guyana he signs as 8R1W. He promises to put this even more rare prefix to work on RTTY when he returns home again at some future date. QSL's go to. . .

Rudolph King, PZ5RK
P.O. Box 1439
Paramaribo, Surinam

We had hardly recovered from this surprise when a few days later we were pleased to make contact with Manuel, EA8CI, the very first RTTY station on the Canary Islands. As mentioned in previous columns, we had a remote idea that this operation was pending and Rene, EA7PZ was very active in getting this rare location QRV on RTTY. Rene did a terrific job and the quality of the signal put out by EA8CI is proof of that. We might point out that if you can speak Spanish by all means do as Manuel is quite limited in English. Also, his printer gets locked up rather quickly when a dozen stations are all calling at the same time on his frequency. So a bit of patience and understanding is needed too. Send your card to. . .

Manuel Cabrera Rivero
P.O. Box 804
Las Palmas de Gran
Canary Islands Africa

Quite early in July Gerhard, ZS3B passed word that 9J2ED in Zambia was receiving RTTY and would be QRV very shortly. Several of you fellows had cross mode contacts with Ed before the big day arrived for his first all RTTY transmissions, July 26. One of his first contacts was with ON4CK, quickly followed by W2LFL, EI5BH, and most of the RTTY world by this time. Ed is certainly starting out right by using narrow shift exclusively and is copied very well here from about 2200z short path and long path at 1200z. Ed uses Yaesu equipment, a TA-33 beam and a Siemans machine. QTH is. . .

Ed Thompson, 9J2ED
P.O. Box 252
Lusaka, Zambia

Sick, WB2TCC was recently tuning the SSB portion of 14 mhz and copied FR7ZX requesting someone to make some RTTY checks with him. Dick complied and it seems that Mike on Reunion Island has a machine and TU and is receiving only at the moment. After some slight problems are overcome mainly in getting the machine to run at a constant speed Mike should be setting the world on fire as a new one from a real rare location.

Frank 9Y4VU sends word that 9Y4VT has a machine and will soon be active, and also Yvon, VP2VV on the British Virgin Islands is building a ST-6 and has a machine all set to go. Jean FG7XT may fly up there to get Yvon started. Frank wants to inform the gang that the delay in his QSL's has been due to an unfortunate loss of his logs while enroute to his QSL manager. By the time you read this the problem will have been resolved and cards should have been received for all RTTY contacts. His QSL Manager is. . .

Roger Causse, W3EVW
313 Pontiac St.
Lester, Pa. 19113

To get a quick return a SASE or IRC's are requested. It may be well to point out that this procedure should be followed in all exchanges of cards if you wish a direct reply. Otherwise they are usually sent via the bureau with the inevitable delays.

The W A C roster has had a considerable increase in the past two months and we are pleased to extend congratulations to the following stations to whom the Award was issued.

Nr.159	James A. Smith	DL4JS
Nr.160	Georges Wirts	ON4WG
Nr.161	Henri Coste	FO8BS
Nr.162	Paul Blankmann	KH6AG

As you perhaps know, Henri, FO8BS left Tahiti in mid July and after a holiday in France, where is is F9SO, he will travel to Argentina where his work will keep him for the next few years. Henri has definite plans to obtain a reciprocal license and we will no doubt be hearing him again on the RTTY bands with a brand new call. Anyone needing a QSL for his Tahiti operation can now find him at. . .

Henri Coste
c/o Thomson-CSF Argentina
S Armiento 1967
OF 29 Buenos Aires, Argentina

Phil, FO8BO has already filled in the gap left by Henri and will soon be joined by FO8BY, FO8DS, and FO8CN.

I see that we are running out of allotted space (quite unusual) and we hope to have a report on the SARTG Contest next. It should be a good change of pace for the Summer season.

Zoli, HA5FE, tells us that he has had a QSO with YA1OS and that this station was to be in the Contest. The operator is Bob, and his call at home is SM5BGK. Also we hear that Fred YBØAAO was due back on the band in early August. So it looks like there will be no end to the rare DX.

During a QSO with Dusty he said he had just worked Ven VU2KV for over an hour with S8 Signals each way at about 0200 GMT, although they both stood by for breakers not a single station was heard. However, Ven said that it was quite possible that he would be going to AC3 and AC5 land and would take RTTY equipment for sure. A couple of rare ones on any mode.

In closing a final word of appreciation to all you RTTY DX'ers for all the mail and info passed through here this summer. Instead of a usually dull period it seems that it was the most active ever.

P.S. Just as we were closing this out we were pleased to copy FPØWU, with fb signals from ST. Pierre et Miquelon. Paco, XE1WU, was on a DX pedition but was called home due to illness in the family. He promises that we will be hearing more of him from exotic places in the near future. QSL's can reach Paco at Box 400, Satelite City, Mexico.

73 de John

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"Gin", JA1ACB, who is connected with the Yaseu Company in Tokyo, is shown to the right of JA1MP who is the president of the company. "Gin" has been active in many contests and at other times when the band is open and given Asia and a new country to many RTTY stations. He reports increased RTTY activity in Japan with several stations about to get on the air.

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HITS & MISSES

From The Editor and his Mail

DXCC on RTTY not many years ago was as far fetched as putting a man on the moon. We now know of at least 4 that have over a hundred stations worked including W3KV, the first from the states, and many more that are climbing up fast. With new countries showing up all over the world on RTTY DXCC is no longer impossible. The following correspondence is self explanatory.

= = = =

Mr. Robert White
ARRL DX Awards
Newington, Conn.

Dear Mr. White:

I have been informed (second hand) that the ARRL will not issue a DXCC award endorsed for RTTY operation. If so it is difficult for me to understand the reasoning.

WAS is awarded with RTTY endorsement.

DXCC is awarded with either phone or CW endorsement.

Certainly RTTY is as distinctive a mode as phone or CW. W1AW listing all three modes in their schedule.

It is certainly harder, takes a longer time and a lot of operating patience and skill to work and confirm 100 countries. On other modes it is often done in one week-end under contest conditions. To date only two stations have accomplished it on teletype but quite a few are close and many are half way or more.

What you may not be aware of is the greatly increased interest and operation on teletype among other countries. Italy, England, Germany and the Scandinavian countries all have active teletype groups, usually working within the framework of their own national societies, conducting contests, offering special information and awards for teletype operation. The RSGB offers an award for working 25 countries with endorsements for additional 25 countries.

However the ARRL has long been the standard for DXCC and it is hard to understand their attitude in refusing one for teletype.

There may be circumstances that I am unaware of for this policy. In any event I would appreciate a letter from you or the proper authority in the ARRL, that I may publish in the RTTY JOURNAL explaining the ARRL stand on this matter.

Maybe I have the wrong information and you DO issue such an award, I hope so.

Sincerely

"Dusty Dunn, W8CQ
Publisher

= = = =

Mr. Franklin M. Dunn, W8CQ
P.O. Box 837
Royal Oak, Michigan 48068

Dear OM:

Thank you for your letter of June 23 concerning an RTTY DXCC Award.

Our DXCC is an Award for those people interested in working DX and its purpose is a "yardstick" by which those people interested in "DXing" can have a measure to judge their particular abilities in the "DXing" phase of Amateur Radio.

We issue two types of DXCC. One is a general type Award for which credits can be given for operation by all types of legal emission. The second type is an Award for which credits can be given for operation which has been done by voice operation, i.e. "Phone." We do not "endorse" either of the two types of DXCC for any particular mode or band of operation.

Over the past 24 years, the ARRL has issued over 17,600 of its DXCC Award. Over the past several years the new applications, alone, for our DXCC Award have run over 1000 per year. In addition to the basic Award, we also give endorsements toward the Award for additional credits over the 100 mark. Applications for the endorsements run over 3000 per year.

In addition to our DXCC Award, we also issue our 5BDXCC Award, an Award which was made at the direction of our Board of Directors in 1968, to be issued starting in January, 1969. Since January, 1969, we have issued 106 of the 5BDXCC.

The number of credits which have been given toward our DXCC Award since 1947 now run over 3,000,000. The number of cards which are submitted each year towards the DXCC Awards has been running over 180,000. This, plus the cards which are submitted for the 5BDXCC Award, ran the total number of cards submitted in 1970 to over 200,000. We do not expect there will be a significant drop, if any, during 1971 in either the number of new applications or endorsements.

At the present time it is taking the full time of two people just to process and administer our DXCC and 5BDXCC Awards (plus all the overtime that one person is able to put in).

While it is correct to say that we do not issue an RTTY DXCC, it is also correct to say that we do not issue the DXCC for AM, NBFM, SSB, DSB, CW, FSK, TV, SSTV or Mobile. Nor do we issue the DXCC Award for operation on any single band. The operation by specialized modes and bands all have their interested groups who would be just as entitled to the same consideration as the RTTY interested group if we were to consider our DXCC Award as something other than an Award for the purpose of a yardstick for DXing.

We will be glad to issue a DXCC Award to anyone that made the 100 countries by RTTY but at the present time it is not feasible further to expand specialized DX Awards.

73-DX,

R. L. White, W1CW
Ass't Communications Manager

= = = =

So the answer is NO. It is a little difficult to pin point the exact reason but between the lines the answer seems to be "we have work enough as it is without taking on any more. . ."

The excuse of having to give an award for many types of operation seems weak, FM, NBFM, Mobile are all phone and as such have an award. If anyone ever works DXCC on TV or even SSTV they certainly deserve an award. RTTY is a separate mode and whether it is AFSK, FSK, wide or narrow shift has no bearing, it is all RTTY, and as different as CW and phone. If a DXCC award is to recognize achievement in working DX certainly at present a RTTY DXCC is the hardest and rarest of all accomplishments and deserves recognition.

We know from experience that the ARRL does a thorough job of checking all QSL cards, an award from them is recognized as authentic. Since they do offer to check cards and issues a regular DXCC certificate for RTTY contacts an endorsement for RTTY with separate numbering series could not add much to the work load. A rubber stamp would do the job and we will be glad to supply the rubber stamp.

Certainly there is no great demand at present for an award for RTTY. No letters will be written to directors nor will anyone threaten to cancel subscriptions, nor should they. International RTTY is growing fast. DXCC on teletype will be easier and more common in the future, we just feel that it would be nice if the ARRL could have recognized the early pioneers for a really outstanding performance.

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BACK ISSUES---

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1970 - Jan. - Feb. - (2)
1971 - Jan. - Feb. - April - May - June July (6)

RTTY JOURNAL
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PARTS - ALL MACHINES - fast service on all machines from 14s thru 35s. SASE for list. Sell Fred your surplus TTY for highest cash or trade. Typetronics, Box 8873, Ft. Lauderdale, Fla. 33310 W4NYF

MODEL 19ASR, TD, Table, power supply, excellent condition. $90. or offer. Pick up only in New Iberia, La. W2EDB, Rev. Lawrence Mallette, Box 293, Newcomb, N.Y. 12852 Phone (518) 582-3671

WANTED; MANUAL For Navy OCT-2 (3) RF monitor. This is the unit described in RTTY from A to Z. R. Kurtz, WA6MZX, 147 Glenhaven Way. Chula Vista, CA. 92011

MORE RTTY! THAT'S RIGHT. In 1970 there were more feature RTTY articles in HAM RADIO Magazine than any other general amateur magazine. You need RTTY Journal, but you need HAM RADIO also. $6.00 per year; $12.00, 3 years. Ham Radio, Greenville, N.H. 03048

SALE; MITE TELETYPEWRITER SET. Send, receive, miniaturized self contained printer with standard commercial keyboard, english characters 76 characters per line and friction feed. For general purpose use, power supplied, line sensors, heating elements and carrying case. Keyboard may be slid into storage or operating position, or removed completely, by addition of power pack, it may be operated independently as a self-powered unit or receive during power from the page printer. Contains electrical "receive/send-receive" switch; by addition of a key it may also provide parallel baudot output. Used, good, $140. ea. Atlantic Surplus Sales, 580 3rd Ave. Brooklyn N.Y. 11215

TYPEWRITER RIBBON REINKER, Hand operated model now only $3.50. K575 or K764 Ink available at all National Cash Register Co. stores at 75c per tube. Walter Nettles W7ARS-8355 Tanque Verde Rd. Tucson, Ariz. 85715

HAL DEVICES-RTTY EQUIPMENT. MAINLINE is the DESIGN, and HAL has boards and parts for the ST-6, ST-5, and the AK-1. The ST-6 kit, both shifts, auto-start, 120/240,50/60 Hz power supply, only $135.00. Screened, undrilled, table or rack cabinet $26.00. Wired units available. Write for quote. ST-5 kit, all parts, excluding cabinet, $50.00. AK-1 kit, all parts including 15 turn pots for precise adjustment of the low distortion tones, $27.50. For VHF AFSK, the HAL RT-1 at $45.00 provides excellent performance and value. RT-1 cabinet, $6.50. The new HAL 1550 electronic keyer provides automatic identification for your RTTY station, as well as the most versatile keyer available. Only $89.95, or $64.95 less ID. Detailed information on the HAL RTTY Visual Display System will be available soon. See it operating at Peoria, Findlay, and Cincinnati. Our catalog provides information on the above products and others, and lists components and solid state devices available. We have recently reduced prices on NEW TTL IC's, and they are all in stock. Catalog 24c in stamps, or free via 3rd Class mail. We would like the opportunity to serve you. Write. or give us a call at 217-359-7373. HAL DEVICES, BOX 365RJ, Urbana, Illinois 61801

FOR SALE: CV89A/URA-8A FREQUENCY Shift converter, audio type, built-in scope. A popular converter, used, good, $90.00 ea. AN/SRR-13A receiver; 2 mHZ to 32mHZ in 5 bands, reception capabilities A1, A2, A3, F2, & F4. Power requirements 115 V AC, 60 and 400 cps, single phase 75 watts, used good, $225.00 each. Atlantic Surplus Sales, 580 3rd Ave., Brooklyn, N.Y. 11215.

EPOXY DIODES - 1000 Volt PIV at 1.5 Amp. 24c each ppd. 88 Mhy Centertapped unpotted toroids.$1.50 for 5 ppd. Send stamp for list. M. WEINSCHENKER BOX 353 IRWIN, PA 15642.

PERFORATOR TAPE, 11/16" wide, 8 dia., 2" core, buff, $8.00 percase of 40 rolls. Paul Davis, 1830 Toepfer Rd. Akron, OH. 44312.

SELLING OUT WAREHOUSE FULL of teletype & facsimile machines, parts and equipment. Loads of electronic equipment and computers. No fair and reasonable offer refused. No list or catalog available. Saturday or Sunday by appointment. Week days 10-4. Goodman, 5826 S. Western Ave., Chicago, Ill. 60636. (312) GR 6-8200.

TWO MODEL 19's, 85.00 and 75.00 ea. including TTY, TD and Table. Three Model 14's, typing reperforator, $40.00 ea. Three projection TTY, $48.00. ea. contains 2 TTY's. lenses, cabinet, etc. SASE for complete list. Paul Davis, 1830 Toepfer Rd., Akron, Ohio 44312.

SALE: RL216/UG REELING MACHINE - tape motor driven, has model 28 sync motor, teletype part #173937, model 5KH14FG57B MHP, 35. 60-50 Hz 1 ph. 1725/1425 RPM. Triple reels, used excellent, $75.00. ea. Atlantic Surplus Sales. 580 3rd Ave., Brooklyn, N.Y. 11215

SAROC SEVENTH ANNIVERSARY January 6-9, 1972. Advance Registration $9.00 per person entitles registrant to SAROC Special room rate $12.00 per night plus room tax, single or double occupancy, effective January 4 thru 12, 1972; tickets for admission to technical seminars, HAM RADIO MAGAZINE and SAROC Happy Hour Thursday, SWAN ELECTRONICS and SAROC Social Hour Friday, HY-GAIN/GALAXY ELECTRONICS and SAROC Champagne Party Saturday, Buffet Hunt Breakfast, Sunday. Ladies who register will receive transportation for shopping tour, luncheon and Crazy Hat program at the New Union Plaza Hotel downtown Las Vegas, Saturday, Advance Registration, with Flamingo Hotel mid-night show, two drinks, $14.50. Advance Registration, with Flamingo Hotel Dinner Show (entrees Brisket of Beef or Turkey) no drinks, $17.50. Tax and Gratuity included except for room. Frontier Airlines SAROC group flight package planned from Chicago, St. Louis, Omaha, Denver, send for details. Fifth National FM Conference, ARRL, WCARS-7255, WPSS-3952, MARS, meetings and technical sessions scheduled. Accommodations request to Flamingo Hotel, Las Vegas, Nevada before 15th. December. Advance Registration to SAROC, Southern Nevada ARC, Inc., Box 73, Boulder City, Nevada 89005, before 31st. December.

SALE: MODIFICATION KIT - MAINTENANCE of re-inker. For model 15 and 19, consists of one case, plastic, one bracket for teletype ribbon, two inkwells, one teletype ribbon nylon black, one plastic bottle ink-2 oz. one plastic tool, one stainless steel tool. 24 pads felt, unused, excellent, $1.50 per kit. Distributor - Block Assy. Kleinschmidt KL 58602A, unused excellent $3.50 ea. Tuning Fork; 120 VPS, F.S.N. 5815-412-9066, unused excellent $3.00 ea. Atlantic Surplus Sales, 580 3rd Ave., Brooklyn, N.Y. 11215

AUTO-CR-LF KIT, MIS-19, $27.50; Tape winder (windup) $12.50, gears galore (shifts, too). Quantity discounts on above - also 74913, 78509-10, 80165, 91287, many more. SASE for list. Wanted LXDs, any condition; all parts, Model 32-33. Typetronics, Box 8873, Ft. Lauderdale, Fla. 33310 W4NYF.

MODEL 28 COMPACT KSR with 3-speed gearshift (externally selectable while machine is running) with auto CR-LF and non-overline, in premium condition and very high serial number (S/N279651), includes complete set of manuals - $395.00 FOB; Model 28KTR (typing reperf) with Mark 3 keyboard and character counter, excellent condition with complete set of manuals - $165.00 FOB; Collins 75S-1 receiver (S/N 10553) in absolutely mint condition with original carton and manual - $315.00 FOB; Heathkit HP-23A power supply, never used - $39.00; R-274/URR receiver in exceptionally clean, excellent condition with manual - $295.00 FOB. Further details and photographs if desired for SASE. Write Ronald Ott, 2320 C Parker Street, Berkeley, California 94704

TT107b/FG REPERF, TTY 60-75-100 WPM. For automatic typing and reperforating of TTY mags. from 60 cycle power source. 7/8" chad tape, synchronous motor, Kleinschmidt model 112, used, excellent, $50.00 each. TT100B/FG page printer, send receive. Kleinschmidt model 150, friction or sprocket feed, keyboard, syncronous motor, Auto carriage return, 60-75-100 wmp. used, excellent $75 each. Atlantic Surplus Sales, 580 3rd Ave. Brooklyn, N.Y. 11215

COMPLETE STATION, $150.00 Mod 19, consists of 15 printer w/Perf-transmitter keyboard, Mod 15 table and loop supply and Mod 14 TD. Mod 15 printer, works, needs attention, two spare keyboards, one with perf-transmitter. Allsync motors, two spare sync motors and misc., spare parts, ribbons, paper, and tape. Home built gear with prints: VE3BAD TU, transistorized AFSK unit metered loop supply with polar relay, phase shift tuning scope with 3" crt and patch panel. TT-63 repeater, partly disassembled, and KY-65 auto ID keyer. WA5ODU, Pat Simmons 601 Newport Blvd. League City, Texas 77573 1-713-932-4303

CLEARANCE: HP-512A frequency converters with HP-525A manual in good, clean condition (checked out) - $42.00 FOB; Collins 618S-1 HF transceiver with spare plug-in modules - $75.00 FOB. Write Ronald Ott, 2320 C Parker Street, Berkeley, California 04704

TELETYPE PARTS, COMPONENTS; gears; Smith-Corona fieldata teleprinter terminal, with solid-state data set, less cables $100.00. Telecommunications, Box 4117, Alexahdria, Va. 22303

WHEATSTONE PERF; NEW $100. FOB Harrisburg Pa. Perf tape 11/16 case of 40 rolls $10. PP. 3/8 gummed teletype tape 10 rolls for $1.50 PP. Fan fold paper, sprocket or friction feed $6. PP. Beckman/Berkley counter model 17060R, like new $75.00 L.F. Carbaugh, WA30JF, PO Box 398. New Cumberland, PA. 17070

ASSORTED #28 MANUALS on hand plus 25 years experience in repair and overhaul TTY eqpt. Can I help? Bill Gieckel, W2OWH, 14 West Holly Drive, Sayville, N.Y. 11782

TOROID COILS, 88 mh UNCASED. 5 for $2.00 postpaid U.S. H. R. Fasold, PO Box 375, Apple Valley, Cal. 92307

UTA-8A FREQUENCY SHIFT CONVERTER. Consists of two CV-89's and one CM-22 comparator. With manual, rack mount panels, and new spare modules. $225.00 FOB. Will sell CV-89's separately. Write for further information and pictures. Model 15 Page Printer with table. Recently painted. Completely cleaned and lubricated. Auto carriage return and line feed. Missing 6 keytops. $50.00 FOB WA7HJR, 4819 So. Fife, Tacoma, Wash. 98409

WANTED: 100 WPM PAGE PRINTER/ For Sale: Kleinschmidt TT-230/FG typing reperf. (100 wpm) $50 or will trade for 100 wpm printer. Mac Robbins, WA3KDJ/NQQRA, 339 Vernon Drive, West Newton, PA 15089

MAINLINER TTL/2 with built in 2" scope, 850 normal and sharp filters and 170 filters. Built in BUD cabinet #C999. $150.00 Anthony Sperduti WB2MPZ 4740 Newton Road Hamburg, N.Y. 14075

SALE; COLLINS R390A/URR; Good. $1,000. 11/16" tape; 40 rolls-$5.00 huge quantities. Yaesu FT 101; Mint: $390. G.S. Naniwada, JA1ACB, 3-4-8 Izumi - Hoya, Tokyo 188, Japan.

MAINLINE TT/L-2 Better than ever with high or low tones. J & J's deluxe AFSK generator, high output, low distortion, with high or low tones. Space/One deluxe RTTY demodulator completely solid state, 850/425/170 shifts. All latest features, can be supplied with high or low tones. J & J Electronics, Canterbury, Conn. 06331

FOR SALE; MODEL 28ASR and 28KSR. Equipment in excellent condition. Wanted 60-75-100- gearshift for 28KSR and self contained model 28 TD. Ed. Wagner 4421 Marie St. Corpus Christi, TX. 78411

MODEL 15 WITH TABLE. plugs and loop supply, 60 wpm. $45.00. Model 28 RO 100 wpm, needs type box, with cabinet $95.00. Model 32 KSR with stand, here is, and loop supply $150.00 Model 35 R.O. sprocket feed, write for price and description. No shipping on machines, pick up only. Stelma Data scan scope, make offer or trade. Scope kits excellent for cross display, -3BPI tube, socket, solid state P.S. on board, transformer and schematic, all new-$14.00 plus $2. shipping Complete CRT quote units with keyboard, ramp generator and schematic, $30.00 plus pp shipping on 30 lbs. New mod 35 keyboard 8 level $25.00. New Model 33 or 35 cabinet $25.00. Many types of relays, reed, polar, mercury wetted, at reasonable prices. Name your needs. Parker mod 525/2-1/2" two hole mounting 500-0-500 microammeters, new $3.00 plus 75c postage. Many new and used meters, various high current diodes, transformers etc. Ken Spaulding, 15 Minivale Rd. Stamford, Conn. 06907 KIZXH.

ELECTRONICS BOOKS - DIRECT CURRENT CIRCUIT ANALYSIS THROUGH EXPERIMENTATION ($4.95) - ALTERNATING CURRENT CIRCUIT ANALYSIS THROUGH EXPERIMENTATION ($4.95)-SOLID STATE CIRCUIT ANALYSIS THROUGH EXPERIMENTATION ($6.60). These popular and outstanding works by Ken Fiske (WA6SSO) and Jim Harter (WA6SQE) are currently meeting with such tremendous success, in colleges and trade schools nationwide, that EDUTRONICS felt that the amateur fraternity would also appreciate the opportunity to purchase them. The unique manner in which the authors have combined a text and laboratory manual to give the reader an unparalled number of detailed examples, complete with clear concise illustrations, makes them a natural for the ham library. So thoroughly has each subject been covered that the Solid State manual alone has been accepted as a practical designer's handbook. Both discrete and integrated circuit components have been used in the design of power supplies, amplifiers, oscillators, etc. These publications are suitable for both beginners and advanced alike. Order the complete set for $13.00 or order individually but please hurry since the publisher has only released a limited number. Add $0.25 for postage and handling fees for each book ordered. Calif. residents add 5% sales tax. Please allow 3 to 4 weeks for delivery. Send check or money order (No C.O.D.'s) to EDUTRONICS BOX 487 LOMITA, CA 90717.

WANTED: COMPLETE UNITS, parts and manuals for R-1051/URR receiver, T-827/URT transmitter, RT-618/URC transceiver, AM-3007/URT amplifier and CU-937/UR antenna coupler in any condition. Write Ronald Ott, 2320 C Parker Street, Berkeley, California 94704

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