

**Additional ads on page 15**

FOR SALE; MODEL 32ASR, \$225; Parts for 5 digit 20mhz counter, includes nixies, ICs, sockets, cabinet, control PCB \$80. SASE for more info. Charles Copp, W2ZSD, 6 Northfield Lane, Westbury, N.Y. 11590

RTTY ASSOCIATES - RA SERIES, SOLID STATE DEMODULATORS RA-170 (170Hz shift), RA-850 (850Hz shift) Standard unit includes: basic demodulator with RA floating discriminator, autoprnt, loop supply, regulated +/-12v supply, sensitivity better than -60dbm, \$75.00. Options available: 01 Motor Control \$10.00, 02 Anti-Space \$10.00, 03 AFSK Generator \$15.00, 04 Active Input Band Pass Filter \$20.00. All units wired and tested, 30 day money back guaranty. Delivery stock to 30 days, shipping included up to 300 miles. \$2.50 additional over 300 miles. Options may be added at later date. RTTY Associates, 7503 Cedar Hollow Dr. Fern Creek, Ky., 40291

FOR SALE - 28 LBXD with cabinet, like new - \$85.00, W8DLT, 736 Great Oaks, Rochester, Mich. 48063 Tel #313-652-0233.

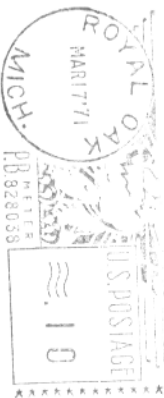
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Address Correction Requested  
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POTTING COMPOUND FOR TOROIDS, etc. 1/2 pint kit includes dispensing tube, actuator, mixing tools. Hardens in a few hours 35c per kit. Amplifier Modulator AM879/FRC contains tubes, trans, pots, coils etc. Best buy on the market. Large quantity in stock only \$3.00 postpaid. Over 10,000 items in stock, write - all inquiries answered. Bob - Frank Electronics. 407 Ritter Rd., Harrisburg, Pa. 17109

WANTED PROFESSIONALLY BUILT ST-6 demodulator. VE3XF, Len Humphries, 41 Kildonan Drive, Scarborough, Ontario, Canada

FOR SALE: MODEL @\* ASR. Equipment set up for amateur use and in excellent condition. Ed. Wagner, WA9SZH, 6307 East Gate Rd. Monona, Wisc. 53716. Phone 608-222-9689

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

SB-401 w/crystals, SB-301 w/cw filter, \$500 for pair. Will sell separately. Very nice TT/L-2. Model 15 printer, 2 model 14 reperfs, model 14TD all on custom table with super station control. Many other non-RTTY items. S.A.S.E. for complete description. WB4RKA, R. Wanat, 443 Atlas Drive, Madison, Alabama 35758

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FOR SALE: MODEL 15, \$70. 14 Typing reperf, \$45. 14 Tape Dist. - \$40. All with sync motors and manuals. Electrocom FSC 250 converter with manual \$150.00. Jack Lippincott, WBYH, 458 Hawthorne, Webster Grove, Mo. 63119

**RTTY JOURNAL** APRIL 1971

EXCLUSIVELY AMATEUR RADIO TELETYPE

Volume 19 No. 4

30 Cents

**ARRL Favors Unrestricted RTTY Speeds**

COMMENTS OF THE AMERICAN RADIO RELAY LEAGUE

The American Radio Relay League, Incorporated, by its General Counsel, submits the following comments and counter-proposal in response to the Notice of Proposed Rule Making released December 17, 1970 (FCC 70-1308, 35 Fed. Reg. 19524), to the proposed amendment of Section 97.69 of the Rules relating to the transmitting speed of radio teletypewriter signals.

1. The rules and regulations of the Commission traditionally have avoided rigid specifications of characteristics of amateur equipment. This policy has provided the greatest freedom to experiment and develop new techniques, equipment and practices. The only significant exception to this policy is Section 97.69 relating to radio teletypewriter transmissions.

2. When Section 97.69 was adopted in 1953, the equipment available to radio amateurs for radio teletypewriter use was rather limited as to operating characteristics and to a lesser extent as to numbers. The limitations imposed in subsection (a) concerning codes, in subsection (b) concerning keying speeds, in subsection (c) concerning frequency deviation of frequency shift keying, and in subsection (d) concerning audio frequencies of audio shift keying represented, to a very large extent, the state of the art at that time. Over the last eighteen years, however, so many new techniques and equipments have been developed in the radio teletypewriter service that the provisions in subsections (a) and (b) are or soon may be outdated. The proposed amendment of subsection (b) recognizes some of the developments in recent years.

3. The time has come when specifications of codes

**WARNING--NO CHANGE** in the rules permitting other than 60 wpm RTTY Speed has yet been approved by the FCC. If and when any changes are authorized they will be on the W1AW bulletins.

and keying rates are far less necessary or desirable. In recent years, techniques and equipments have been developed utilizing more extensive and flexible codes as well as higher keying speeds. Such equipment is becoming available both as used (or surplus) and new equipment. Monitoring equipment and techniques now are available which are adaptable to the ever increasing number of codes and variations in speeds.

4. For these reasons, the Commission is urged to reexamine its proposed amendment of subsection (b), which would add keying speeds of 75 (56.25 bauds) and 100 (75 bauds) words per minute to the present 60 (45 bauds) words per minute of subsection (b), so as to eliminate all references to keying speeds. The Commission also is requested to eliminate the specification of any particular codes in subsection (a) of Section 97.69. By so doing, the Commission will be following its long established policy of encouraging and permitting amateurs to experiment with, develop and use new and improved techniques, equipment and practices.

Wherefore, the premises considered, the Commission is respectfully requested to amend Section 97.69 of its Rules to the extent discussed herein.

Respectfully submitted,  
 The American Radio Relay League, Incorporated

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## TAPE HANDLING and STORAGE --

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ENCINO, CAL. 91316

For those who want to keep, store and retrieve tape, there seems to be several problems that are encountered. Having had these same problems for several years with about 250 RTTY picture tapes, a few tips may be in order.

Of the two types of punches, I prefer the chad type. Even though the little chads do get into things, the tapes are easier to wind, store, and to feed into the TD. But then, most of the punches are the chadless type so will try to cover both situations.

There are several types of commercial winders that are available. I have two of them -- both motor driven. One is used for winding from the TD or reperf and the other for the necessary unwinding. On a long tape, I put the loose tape from the unwinder in a large waste basket below the TD and forget it, as it comes out fine. Chadless tapes may catch on themselves and require a bit of watching. In the absence of a winder, you can learn to wind the tape in a figure eight about your thumb and little finger with the start at the beginning of the bundle. In this way, the tape will not be twisted and will pull off the tape bundle with but a little help from you. To keep the ends free and windable, I usually pull about a foot of blank tape from the reperf at both ends. If you are thinking of building a winder, try to keep the center hub at least three inches in diameter as too tightly wound tape re-sets the chads in the chadless type back where they were and will not permit it to run properly in the TD. If you use the figure eight wind, tuck the free end into the bundle loop. With rolls from the winders, I like to use a small bit of solder to hold the roll together. If you have trouble learning to figure eight wind, get a local commercial teletype gal to show you the simple technique.

Storage and retrieval are the real problems. I separate the tapes into subjects and store them in large plastic bags with ten or fifteen tapes to a bag. This keeps the tapes from drying out and

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lets me find any one tape without too much time. The title or the material on the tape, marked on the lead end with a heavy marking pen, also helps to speed identification. Making and keeping a list of the tapes in the same order as stored also helps and can be used to tell the others what you may have on hand that may be of interest to them. The marking pens will also write on the plastic bags that can then be stored in a drawer or cabinet.

Sometimes when making a tape or reperfing, your supply roll will run out; or you may have a break or tear in a tape. The simple side tear problems are easily fixed with a bit of Scotch tape trimmed to the edge of the tape. Otherwise, you may need a splice or patch. These are not the best solutions and you should make a copy tape with the repaired portion but a fairly good splice may be made with white glue to add a fresh roll to one that is running out. Overlap about an inch or so. Be sure the glue is dry (I use my lighter carefully to hasten drying.) You can also punch a short piece of tape with the same characters and splice a bad spot in the middle of the tape. With the chadless types, they may be merely run together in the TD to hold the splice. But if you want to keep the tape for any time, take the time to make a new one.

When running a long tape on the air, don't forget the need to ID at least every ten minutes. If you have the narrow shift CW ID facility, that is fine and will lock up most of the machines. In the absence of the narrow shift (about 100 cycles), stop the TD and let the steady mark tone stay for a few seconds, then CW ID and repeat the steady tone to permit the other fella to hit his standby switch and not interrupt his print. When making tapes, do make them as short as possible and leave out all those lines across the paper that are in some brag tapes, the "CW ID follows" bit and similar unnecessary characters or language.

So get all that tape off the floor men. You may even find something you lost long ago.

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RTTY JOURNAL

## A TTL RTTY SPEED CONVERTER --

The article on Electronic Speed conversion in last months issue by WA6JYJ has had a lot of good comments. Too late to include last month we received another interesting article on about the same subject. This one from far away Africa must prove that RTTY experimenters are pretty much the same world around. We are publishing it this month with the thought that some of you may find ideas to supplement your own ideas or those of WA6JYJ. The author is a Chief of Police and the QTH sure sounds romantic.

J. A. McElvenney, 7Q7JO,  
Malawi Police Headquarters,  
P.O. Box 41,  
ZOMBA, Malawi, Africa

Speed differentials have been with us for a long time. What follows is the writers attempt to resolve this problem the electronic way. The design revolves around two SN7496 TTL 5 bit shift registers. These appeared on the U.K. surplus scene at \$2.88 each, making a speed converter a practical as well as a financial possibility. The cost, excluding power supply, is around \$15. Regeneration of the signal occurs during processing, so the unit performs a dual function.

In a practical set-up, the printer is geared to the highest speed that will be encountered and the incoming signal is up-converted. Down conversion is also possible as long as the input is not at a higher character rate than the receiving printer is geared for.

### Method of operation

First of all a few of the ground rules. The converter consists mainly of TTL elements. It is not intended to go into the operation of this type of logic because it has been adequately described elsewhere. Suffice to say that the gates are of the positive-nand type, the jk flip-flops trigger on a negative edge (in truth these are level, not edge, sensitive but the steepness of the waveforms clouds over this distinction) and the registers shift on a positive edge. At the input/output, mark is around +3.5 and space around 0.2 volts. The input must not be raised to a level higher than 5 volts and, if in doubt, a zener diode should be used to hold it down. Some forms of TTL have their inputs protected in this way and should these be used, the zeners in the circuit may be replaced by 4700 ohm resistors.

In the quiescent state, Q1 and 5 are saturated and both clocks are stopped. Arrival of the start pulse at the input causes flip-flop 1A/B to change state and put a low on the base of Q1 starting

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the clock. The output from the clock, Q2 and 3, is in the form of steep negative pulses at twice the baud rate. These are fed into the divide by 16 counter 2A/B and 3A/B. Due to the method of interconnection, on clock pulse 14 a negative edge appears on Q of 3B. This is differentiated and used to stop the clock, through 1A, and clear 2B. This happens half an element into the stop pulse. By rearranging connections it is possible to stop on pulse 15 and give more protection to the input flip-flop against spurious start pulses. However the clock rate has then to be set with a much greater degree of accuracy to prevent loss of synchronisation.

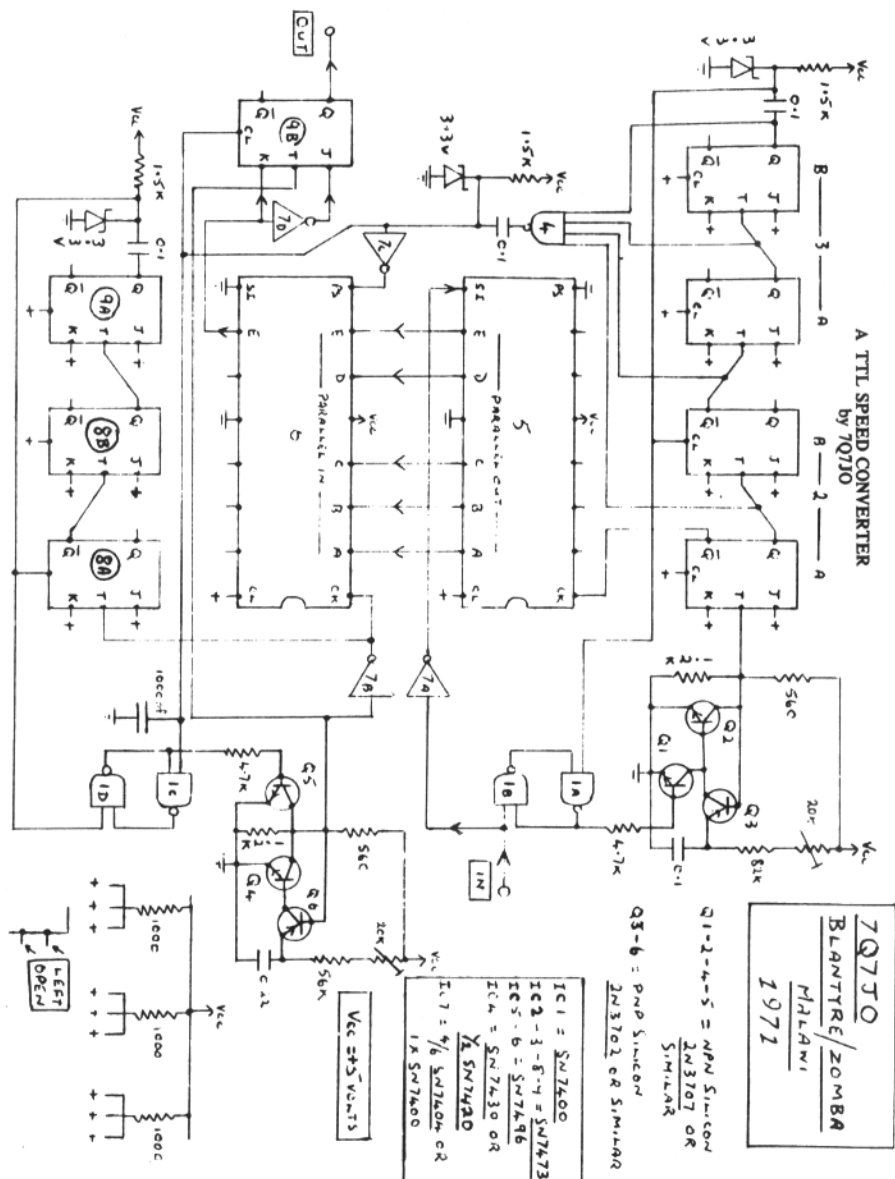
Every second pulse produces a positive edge at not-Q of 2A in coincidence with the centre of each element. This is applied to the clock input of register 5. Input to output signal flow is shown with the aid of arrowheads. The input data in inverted form is applied to the serial input of 5. Thus, on every second pulse, it is sampled and shifted in. On pulse 12 the five elements are stored; the start element being shifted out the end. Gate 4 recognizes state 13 of the counter and produces a negative edge at the output. This is differentiated and used for three purposes.

1. It is inverted by 7C and applied to the preset terminal of register 6. This causes the internal and-gates to transfer data from 5 to 6 along the five parallel input wires.
2. It starts the output clock through 1C/D. The 1000 pf at the input of 1C is to filter out switching transients caused by the input counter.
3. It clears the output flip-flop to space.

The low on the base of Q5, due to the action of 1C/D, allows the collector to rise to around 3.5 volts. This is inverted in 7B and fed to the divide by 8 circuit 8A/B and 9A. After one unit length, at the output baud rate, the clock produces negative going pulses in the same way as the input clock. Every positive going edge, inverted in 7B, clocks the counter but not the register or the output flip-flop. Due to the method of interconnection, a negative edge appears on Q of 9A after the sixth pulse (seventh positive edge). This is differentiated and used to clear 8A and stop the clock via 1C/D.

The first negative edge shifts the register via 7B and the output flip-flop

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directly. Thus the data already read into 6 is shifted element by element out to the terminals of 9B. The inverter 7D is used to provide the necessary inverted data to the j terminal. The serial input of 6 is at ground potential and together with the manner in which the data inputs to 9B are connected, self-clears register 6.

The operation of the converter is analogous to the operation of the overlap cam mechanism in a mod. 15 printer. There the input code is set up on the selector mechanism and vanes. Afterwards the next act of cams print the character at a faster pace and during the period that the next one is being set up. In this converter, once the transfer command from gate 4 is received by the output register, no connection exists between the input and output sections.

**Setting up.**  
Short the input to ground and measuring the pulse length at Q of 8A, set

the output clock to give a period of twice the output element length. In the same way, the output from 2A is set by adjusting the input clock to give a period equal to the input element length.

Down conversion is performed in exactly the same manner but with the provision that the character rate does not exceed that which the output printer is capable of handling. This could be arranged by holding the keyboard of the input printer locked for a longer period. Possibly timing signals from the counters could be used to do this via a flip-flop and an electromagnet.

The rc constants on the bases of Q3 and Q6, which determine the clock rate, are shown for a 45.45 to 50 baud up-conversion. Any combination may be used here but it was found that if the resistors are dropped much below 30K, then lock-up would occur. I should be happy to answer any questions on this device.

## Modifying the Model 28 Teletype

### Part 8

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This article will explain how to put the "Zero" code bar in a 28KSR Mouse machine that does not already have one installed. To determine this, check the method shown in Article 1, February RTTY JOURNAL 1970.

### HOW IT WILL BE DONE

In general, we shall have to (1) remove the front panel, (2) remove the code bar assembly, (3) dismantle it, (4) add the "Zero" code bar, (5) reassemble the code bars, (6) replace the code bar assembly, and (7) replace the front plate.

### REMOVING THE FRONT PLATE

Although we already covered this for normal circumstances in Article 7, it will be necessary to use a different technique prior to removing the front plate in this case. Otherwise the track upon which the type-box rolls (150824) will not be lifted high enough to allow the code bar assembly to be pulled out of the typing unit properly.

Since when the machine is shut off, the internal loop voltage stops, and the line shunt relay isolates from the external loop of the "TU" or "demodulator". Thus we shall have to pull a few

minor "tricks" to fool the machine into thinking it is still "on". We shall do this by disconnecting the motor. Now to proceed.

1. Remove the typing unit from the keyboard base. This has been discussed before. It involves four large bolts, one at each corner of the typing unit, and disconnecting the cable about 5" to the rear of the right ribbon spool.

2. Find the motor on the keyboard base. About 4" to the left of the left edge of the motor is another cable connector. Directly in front of that about an inch is a terminal block with fiber cover.

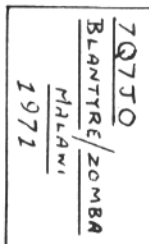
3. Remove that fiber cover, and disconnect one or both of the heavy motor lines. Either place where they will not touch anything, or just tape, temporarily.

4. Now replace the typing unit on the base temporarily (no bolts needed) and connect the cable once more to the rear of the right ribbon spool.

5. Turn the power switch back on. The motor will not run as it has been disconnected, but everything else will be normal.

6. Type a "K" on the keyboard, and with your finger, turn the motor counter-clockwise (as viewed from the right side of the cabinet) until the hammer is about to strike the type-box.

7. Now remove the typing unit once



- IC1 = SN7400
- IC2-3-6-7 = SN7473
- IC5-6 = SN7496
- IC4 = SN7430 OR SN7490
- IC7 = 74 SN7404 OR 1A SN7400

- Q3-6 = PNP Silicon 2N3702 OR SIMILAR
- Q1-2-4-5 = NPN Silicon 2N3707 OR SIMILAR

more, of course disconnecting the cable first.

8. With your fingers push the type-box as far right as it will conveniently go.

9. You should now review "RE-MOVING THE FRONT PLATE" from Article 7, as from here, everything is the same as in that article.

10. You will get the details from Article 7, but you will remove the "C" retaining ring from the bail arm that holds the type-box to the printhead carriage wire, you will remove the two "underneath bolts" from the rocker shaft, and the four large bolts that hold the front plate to the typing unit.

11. The front plate may now be set aside as it will not be used for any further purpose at this time. You first might wish to return the print hammer carriage to the left margin stop. You can do this by holding the right spacing drum with your fingers, while "picking off" the feed pawl fingers that advance the spacing drum and holding them out of the way while you slowly allow the spacing drum to rotate counterclockwise to the left margin stop. Watch the bail arm that you disconnected from the type-box to make sure it doesn't get caught on anything in the process.

12. You will notice the code bar assembly running the width of the typing unit, and in about the middle, vertically. You can see this assembly to some modest extent in Fig. 1 of the Feb. issue 1970.

13. This code bar assembly is held between the two main frame plates of the typing unit that also hold the paper spool at each end. Look at the right end of the code bar assembly and you will see the transfer system that operates the code bars. You will see the arms that connect to the code bars to move them. From directly in front of the selector magnets, go left 2" and notice on the code bar assembly a triangular shaped plate (150301) that is held to the base of the code bar assembly with two bolts. Remove this triangular plate. Now note that there are two types of bars that connect the code bars themselves to the transfer mechanism in front of the selector magnets. Note that three of them are fairly short and hook directly in front of the piece you just removed, while three others are longer and hook (with springs) about 1-3/4" further to the left. Remove all six of these bars, the ones with the springs just push on and you can pry them off, you can remove the springs after the bars are off, or nearly so.

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14. Now you are about ready to remove the code bar housing itself. Look at the left side of the typing unit. Find the ends of the code bars, then look about one inch to the left of the center of the code bars and you will find two bolts, one above the other on the left frame of the typing unit. Remove both of them.

15. Now look in a similar position on the right side of the typing unit, and you will find two more that hold the right end of the code bar housing to the typing unit frame. Remove those two.

16. Now the entire code bar housing should pull right out of the typing unit.

17. From here on in, there isn't too much we can help you with via the printed word. First, remove the 6" piece (bracket) (154380) from the top of the housing. Use a large enough table you can put these items on the table as you take them off, in their relative position.

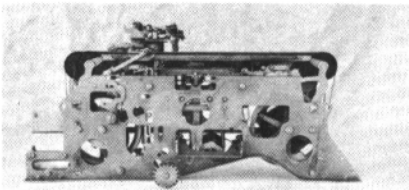


FIGURE 18  
Rear of the front plate after removal from the typing unit.

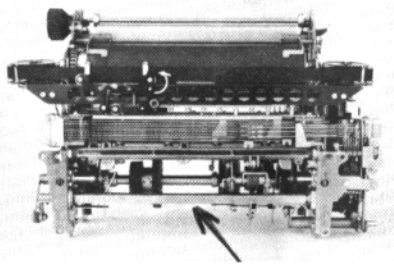


FIGURE 19  
Typing unit after front plate has been removed. Arrow points to the square rocker shaft. Two bolts are removed from the middle of this shaft as part of the front plate removal procedure. The code bar housing can be clearly seen a few inches above this rocker shaft.

18. Next, remove the top piece that is held on with two quarter-inch bolts 9-5/8" apart. To do this you first have to remove the two small bolts about in

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the middle of this "tie bracket" (153321). Those two small bolts hold the center "guide bracket" (150304) which keeps the various code bars spaced vertically.

19. You will want now to remove the left-hand assembly. First you will notice on the front left-hand side, two plates side-by-side. Each has two bolts holding it in place. Remove the right-hand plate first and pull off. Then remove the left-hand plate, keeping in mind there are a total of 7 springs and ball bearings beneath this plate. They will not pop out if you are even moderately careful.

20. When the plate is removed, take out the springs and all the ball bearings that want to come, by turning the unit upside down, while catching these items. Write down the positions of the springs before you take them out. If you forget, we'll remind you in the reassembly instructions where they go.

21. Do the same for the rear side of the left end, where again you will find 7 springs and 7 ball bearings under the plate.

**NOTE: THIS IS A GOOD TIME TO INFORM YOU THAT THERE ARE NO ADDITIONAL SPRINGS OR BALL-BEARINGS FOR THE "ZERO" CODE BAR, SO DO NOT EXPECT TO FIND ANY. THE NEW CODE BAR IS OPERATED BY THE BELLCRANK ON THE FRONT-PLATED WHICH ITSELF IS SPRING-LOADED.**

22. From here the only thing to watch very carefully is the removal of the two long vertical pins (studs) (152089) about a half-inch closer to the center from the bolts you removed to take off the top bracket. These two pins (studs) are about 9" apart. They appear to be screwed down, but do not try to unscrew them! They actually have a hole drilled clear through their side, near the bottom and are "pinned" in place.

23. On the rear, near the bottom of these stud pins, there is a bolt that runs through the bottom of them. Remove each of these small bolts. On the rear of the stud pin on the right-hand side, there may be a second bolt near the top -- be sure to remove that one also.

24. From here on in, it's merely a matter of putting the new "Zero" code bar in place, once all the other items have been removed, such as the vertical post that connects to the bottom FIGS-LTRS code bar. Then reassemble the entire unit like it was. This will be time-consuming, but should not be particularly difficult.

25. Put the code bar assembly back  
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in the typing unit, and install with the two bolts at either end.

26. Put the three shorter bars in the right end, then the three longer bars, and hook up the springs. Replace the little triangular plate in front of the code bars once more, and you should be all finished with this modification.

27. Replace the front plate, again watching for the items mentioned in Article 7:

1. That the bellcrank engages the slot in the new "Zero" code bar.
2. That the FIGS-LTRS code bar is engaged by its lever.
3. That the two small bellcranks at the top of the front plate (about the middle horizontally) engage the code bars normally.
4. That the circular plate at the bottom of the spacing drum feed pawls lines up with the notch on the front feed pawl.

Then put the bolts back in place on the front plate including the two on the bottom rocker shaft, connect the bail arm to the type-box, and you are all finished.

#### YOU HAVE AUTO CR-LF

Assuming you already installed the parts in the stunt box (Article 6), and have installed the bellcrank and rear margin ring on the right spacing drum (Article 7), you should now be all set for auto CR-LF. As you now approach the right margin, the tab on the rear of the new margin ring should collide with the new bellcrank, causing it to tilt. As the top of the bellcrank is in the slot of the new "Zero" code bar, this should pull the code bar to the "in" position (spacing, or "non-select") which then allows the function bars in slots 4 and 39 to operate on anything next typed or received. This in turn will send the carriage back and turn up a new line, while of course returning the right spacing drum to the left margin, allowing the new "Zero" code bar to return to the "out" or marking position (select).

#### SETTING THE MARGINS

With auto CR-LF you may wish to reset the right margin stop. This was discussed somewhat in Article 6, if you wish to review those comments. To summarize, if you DO NOT HAVE SIMPLE NON-OVERLINE (why not? See Article 4), you would want to get a 7-character line, and trip off the auto CR-LF system on the 73rd character

Continued on page 9

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# RTTY theory & applications.

RON 'RG' GUENTZLER, W8BBB  
Route 1 Box 30  
ADA OHIO, 45810



## RECEIVING A RTTY SIGNAL

Last month we described, briefly, how to make a teleprinter give local copy - that is, how to connect a machine so that something could be "typed" on it. This month, we are going to discuss how to copy a signal off the air.

You will need a terminal unit (TU or demodulator) to connect between the teleprinter and the receiver. There have been many TUs described in amateur publications and there are many "commercial" units offered for sale.

There are two principal types of TUs: 1) IF units that are connected into the IF system on the receiver, and 2) Audio TUs that are connected to the audio output (speaker terminals or headphone jack). The audio TUs are by far the most common.

Of the audio TUs, two different classifications can be made: 1) Those that have a loop supply built into the TU, and 2) Those that require an external loop supply. Whether the loop supply is internal or external is not particularly important, other than to be aware that you may or may not need a loop supply when using the unit. However, you should pay close attention to the loop supply voltage called for or provided. Avoid any TU that has an internal loop supply (or requires an external loop supply) of less than 100 volts dc. If the TU has an option where either 20 or 60 mA operation is possible, use the 60 mA option and make sure that the teleprinter is wired for 60 mA operation.

Connect the input of the TU to the audio output of the receiver. You can use either the speaker terminals, the 600-ohm output, or the headphone output. Most TUs require only a small audio voltage, so the speaker terminals usually are the best choice.

If there is a loop supply in the TU, connect the selector magnets (or the selector magnets in series with the keyboard contacts) to the output of the TU. In some cases, you may have to place a resistor in series. It is a good idea to place a milliammeter in series with the selector magnets to determine

the current flowing; it should be 60 mA dc.

If there is no internal loop supply, connect a 130 V dc (or higher) supply, the teleprinter, a resistor, and a millimeter in series. Adjust the resistor to give 60 mA dc. On some units, an adjustment is available within the TU to adjust the loop current and the external resistor may not be necessary.

Tune the receiver to a RTTY signal. If you are working on the HF bands (or with FSK in any case) use one of the SSB settings on the receiver or use the BFO. For AFSK reception, the BFO is not required. As the receiver is tuned, the selector magnets on the printer should chatter when the signal is turned correctly. With AFSK, just tune for maximum signal as you would with a voice signal. When tuning an FSK signal, you have to tune more carefully that you do when tuning for a voice SSB signal. If you have a millimeter in the loop, it should "vibrate" in the vicinity of 30 mA when the signal is approximately tuned (note - this is not a reliable tuning method - just a rough indicator that something is working). Turn on the motor in the teleprinter - hopefully, the machine will print something.

If just garble is coming out, slowly tune the receiver, and see if good (or any) copy can be obtained. If not, flip the reversing switch in the TU (if there is one), and try again. If no reversing switch is present and you are trying to receive an FSK signal, use the other sideband position on the receiver. If you still can't get copy, at least two things could be wrong: 1) The signal is not a RTTY signal, or 2) It is a RTTY signal but it is running at the "wrong" speed or using a completely different code (ASCII instead of Baudot). The latter two possibilities are not possible on the ham bands (yet).

If you are having trouble receiving, and a tuneable audio oscillator is available, connect the audio oscillator to the input of the TU. Tune the oscillator and find at what frequency the output loop

current flows; normally, this will be at 2125 Hz. Vary the oscillator output frequency and find at what frequency the output loop opens. In some of the more complex TUs, the test with the audio oscillator may not be too definitive because the TU may have "anti-space" or some other arrangement that is designed to prevent the loop from remaining open for more than a short period of time. On very simple TUs, a steady 2125 Hz tone will close the loop and a steady 2975 Hz tone will open the loop.

One "good" possibility for troubles results from the TU being built to handle the "standard" 2125 - 2975 Hz (M and S) tone combination but the receiver won't handle the 2975 Hz space tone.

If you do not have a TU and want to get one, you have so many possible ways to go that it is difficult to give the "correct" advice. Probably, the best overall advice is to build, or get already built, the ST-6. You could build one of the simpler units, but, except of use on VHF, they tend to be very unsatisfactory except under good receiving conditions. Usually there are some TUs available at hamfests, and one obtained cheaply would at least get you receiving, but a simple unit can give such poor results that it might discourage you into giving up RTTY before you really even start.

That's all for this month. How about some VHF news?

73 ES CUL, RG

\*\*\*

## USING the TX4B

Robert R. Smith, WB60DR  
13209 Idyl Dr.  
Lakeside, Cal. 92040

Here is a circuit that is being used with good success in a Drake T4X-B. One thing about this circuit and operation that we like is the way it is keyed. We like to have everything in series along with a relay (255 or 314) (or what have you with proper current limiting and shunting) and take from the relay a ground and send it to the FSK circuit. See figure 2.

This circuit does work well on the Drake T4XB, just why maybe someone else can explain, but it does work.

\*\*\*

RTTY JOURNAL

## 28 MODIFICATIONS--

Continued from page 7

typed. WITH THE NON-OVERLINE SYSTEM, ONE EXTRA CHARACTER IS NEEDED FOR NORMAL OPERATION. Thus WITH NON-OVERLINE, you would want to respond to the 74th character to automatically return the carriage and turn up a new line.

### WHERE ARE WE NOW?

Now everybody should be up to complete amateur RTTY standard, having communications keyboard, communications type, downshift-on-space, non-overline, a "blank key" on the keyboard, and auto CR-LF.

### WHERE NEXT

Basically we have finished with the basic set of articles for putting your Mouse 28KRS into normal configuration for RTTY. At the same time you should have learned a bit more about your machine. You should be at least somewhat familiar now with the stunt box, its operation and a bit of its potential.

About all that remains will fall into the "I'd like to do that with the stunt box" category. To this extent we shall concentrate on the remaining articles on some of the things the stunt box can offer and how to do it. It is a bit like setting up a computer since such a vast variety of things "may be programmed". Thus most of the suggestions will be "ideas" which you can incorporate if you wish.

\*\*\*

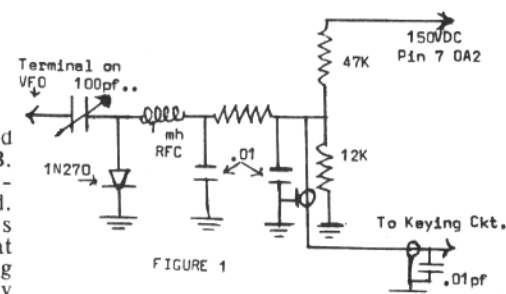


FIGURE 1

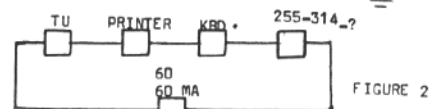


FIGURE 2

# RTTY-DX

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



Hello there. . .

Well, as the saying goes, it is either "feast or famine". After what appeared to be quite a long period of famine with no new DX countries showing up on the bands you fellows are enjoying the feast while.

Arthur, ON4BX and Bob, ON4CK really have a thing going over there in Belgium and their printers jump up and take notice at the first sign of a new RTTY station. Here are a few of the latest new countries to be entered in their logs. Early in February, the first RTTY operation from South West Africa was initiated by Gerhard, ZS3B. His excellent signal comes from the Collins 'S' Line plus a TH-6 beam. The machine is a very old Creed and Gerhard is plagued with a slipping clutch on the receiving end from time to time. However his transmitted signal is of excellent quality. He has been real active and many of you have had a QSO by this time. W9ZQK was his first stateside contact. Showing up at the same time but a little more elusive is YBQAAO in Djakarta. Fred is a German National there for a temporary period. He is on mainly over week-ends and it takes good propagation to hear this part of the world. Don't overlook 15 Meters as he operates this band also. Just before this went to press, Bob ON4CK had a contact with the first station to operate RTTY from Israel, 4X4RM. This chap is on 50 baud only so this will present a bit of a problem to some of you running sync motors at 45 baud. You can get around this in a satisfactory manner however if those of you using 45 baud machines adjust your "range" setting toward the zero end of the scale and the fellow using 50 baud adjusts his "range" toward the high end of the scale. We have done this with very good results in the past but it is necessary that both parties are aware of what to do. Here in the States we are not permitted to transmit on 50 baud while most other countries allow both speeds. The above simple "adjustments" will allow both parties on different baud rates to have a good QSO. It seems we

have gone a little off the subject of this column but it is very frustrating to know that rare DX is on the frequency and all you are printing is garble.

Jo, CR6CA informs us that he had completed and tested out the ST-5 terminal unit for his friend Henry, CR7DB and at the next visit of Henry to Angola he will return home with the TU all ready to go on RTTY. He has very possibly been creating pile-ups by the time you read this. Jo is also getting ready to activate two more stations in CR6 land so things will really be booming out of Africa in very short order.

Those of you that were frantically trying to find a Utah station for Uli, DK3CU to get his W A S can rest easy now. Uli did catch Utah in early February and made all 50 on RTTY. Over here in the States Mark, W5EUN, in Houston, Texas got his 50th State confirmed at just about the same time. I believe I can speak for all of us when I say, "congratulations to you both on making WAS-RTTY, it is indeed a difficult accomplishment". As far as we know, the ARRL is the only organization that issues a W A S Certificate indorsed for RTTY. Those of you that are looking for Utah can find WA7MBC, located in Logan, Utah on 14 mhz. most evenings at about 0100z. Jeff puts out a very good signal too.

Pierre, FY7YQ, unfortunately had an auto accident in December that put him in the hospital over Christmas. The injuries to Pierre were slight, and we were certainly glad to hear that. The injuries to the car were a bit more serious and it was in the "hospital" for a much longer time. Pierre says that a new station will soon be active from Guyana. Dick, FY7YR has a machine on receive only at the moment and hopes to FSK the transmitter real soon. Dick also has a machine that is destined for PZ5RK so the hoped for Surinam operation may come off in the near future.

Uli, DK3CU reports that all the "red-tape" at the customs in YO land has finally been cut and that Eugen, YO2AFB now has the machine in his possession.

Uli is now attempting to get him squared away via the SSB route so there should be some activity from this new country pretty soon. Uli has also been in frequent contact with HL9KA in Seoul. They have the machine and at the moment are getting together a TU, so here is another rare one that should be showing up in the very near future. Wait, there's more. Uli was in contact with a German national in Teheran and this fellow will soon be QRV. It seems that he was active on RTTY in Germany and at the moment is awaiting a commercial TU to get going again from this rare spot.

We had been wondering where Jean, FG7XT has been all these months since the CARTG Contest. In the recent ARRL DX Contest we were tuning around the fone portion of 14 mhz and as we passed thru 14230 khz., the SSTV frequency we happened to hear Jean checking out some problems with his Slow Scan TV set-up. On the "listening end" the SSTV signals make funny noises similar to RTTY but I suppose the read-out comes out in "blacks and whites" on the screen. In far off Angola, Jo, CR6CA recently completed setting up a "live" TV net in Luanda using the full wide band stuff up in the 420 kmz region.

Congratulations are in order this month to the following station for W.A.C. Nr. 153 George Haller W4BQ. You no doubt noticed the cover picture of George and his neat station in the January issue. When he is not using W4BQ down in Florida George signs a W4AHX at "Hounds Ears" up in North Carolina.

From out the Pacific way, Arthur, ON4BX reports a contact with KG6NAA on Guam. I'm sure that Larry, K1LPS, who originally activated this station will be happy to hear that they are still active on RTTY.

In the May issue we will publish the RTTY-DX totals again and in view of the recent increase in new countries becoming available there should be some real surprises at this listing. We have been posting these listings in the January, May, and September issues. Cards are not required, just send me two numbers, Countries Wkd/cfmd. So send in your totals and join in the fun. I am sure there are some "sleepers" around who have never submitted totals and would surprise us all if they did. Let me have them by March 30th and many thanks to those who have already updated theirs. BARTG Contest just over, WAE Contest coming up so don't turn the machines off.

(Editors note) We understand that the RTTY Bulletin, of PO Box 6047, Daytona Beach, Fla. 32022 also offer a Certificate for WAS on RTTY. We are not sure of the particulars but would assume that \$1.00 to cover mailing expenses and the usual QSL cards are about all that is necessary. So far not many have been issued and this is a chance to get a low number certificate.

## VOLTA Contest Results -

1) iIKG	167.160	43) WA8CVK	8.834
2) WA2YVK	114.162	44) W0MT	8.685
3) iICAQ	103.439	45) K1LPS	8.619
4) iICGE	100.485	46) JA1ACB	8.283
5) DK3CU	79.606	47) DL9VD	8.100
6) W3ABT	76.196	48) XE1YJ	8.050
7)* VU2KV	66.378	49) DM0DM	7.072
8) SM4CMG	64.141	50)* LX2BQ	6.710
9) K3NSS	63.498		
10) F08BS	61.440	51)* DL8CX	6.272
		52)* SM09Y	5.896
11) W4YG	56.823	53) SK5AA	5.795
12) iIIZWS	52.056	54) OK1MP	5.640
13) SVQWO	51.120	55) OZ60B	5.250
14) VK3DM	47.346	56) VESLG	5.135
15) WA2JVW	45.764	57)* G3VQT	4.896
16) W6LDF	42.904	58) W9HHX	4.686
17) DJ6CU	42.840	59) i1THB	4.144
18) W7TZL	42.084	60) W1BFS	3.216
19)* i1EVK	41.680		
20) KZ5LF	39.491	61) i1HD	3.144
		62)* ZM3RN	3.141
21) W5JJP	38.850	63) DL8RW	3.060
22) W1KJL	38.250	64) K9WJL	2.385
23) i1CWX	36.593	65) SM3AVQ	2.197
24)* F5RC	35.673	66) PY2CYK	2.088
25) K8ILL	30.850	67)* W0HAH	1.872
26) HA5KBF	30.657	68) ONSWG	1.705
27) W9AE	29.540	69) W6AEE	1.680
28) W3KV	29.116	70) DL3II	1.665
29)* DJ8BT	28.140		
30)* OZ4FF	26.400	71) K8KAG	1.617
		72) i1LCL	1.480
31) W7RSJ	22.308	73)* K9BJM	1.260
32) VK3KF	20.272	74)* K9MNF	1.148
33) CE3EX	17.952	75) K2RYI	840
34) K6EQV	16.226	76) W2HAJ	772
35) WA6WGL	16.036	77) i1CBZ	702
36) DL8KS	15.092	78)* HA6KNB	553
37)* SM4CNN	14.552	79) W6FFY	300
38) G3LDI	13.780	80) i1FZX	286
39) i1RHE	11.592		
40) UK6FAD	10.056	81) LA60I	282
41) WA2JUP	9.422	82) K8QLO	102
42) ON4BX	9.144	83)* W8TCO	62
		84) W6BHZH	2

\*100 Watts or less.

1) V.D. Hoeven PA-12247	58.380
2) A.T. Morton England	54.050
3) Dick Coates England	46.215
4) Paul Menadier USA	26.271
5) E. Goricsnigg HA 5-164	23.828
6) H. Helmut i1-13301	10.164

\*\*\*

## FOR SINGLE MALE HAMS

Have you wondered about the benefits of having an xyl (besides the obvious)? I have found one. As a bachelor, when the article said "lock the screw with nail polish" or "mark with bright red nail polish" I was finished. Now that I have an xyl, the only problem is "What shade."

WB2CZL

73 de John


\*\*\*

RTTY JOURNAL

April 1971 11

# HITS & MISSES

From The Editor and his Mail



If everything goes as planned Cry and I will be on our way to Florida about the time you receive this mailing. We are driving this year and will be operating mobile during our stay. Mail will be collected but have to pile up until our return so be patient on any replays.

\*\*\*

Don't forget the Dayton Hamvention, week end of April 23-24th. From all we hear there will be more RTTY fans than ever. Be looking for you at the Journal suite at the Sheraton Dayton.

\*\*\*

Through the courtesy of the ARRL we received and published in January, 1970 an index of all articles relating to RTTY that have appeared in QST.

If anyone has a lot of ambition and files of the other ham magazines maybe they would like to compile a similar index of one or more of the other magazines??

\*\*\*

By the time you read this the proposed changes in frequencies on the amateur bands will be hashed and re-hashed. Shades of the incentive license donnybrook all over again. At least it affords a new topic for discussion. (If it is a discussion).

\*\*\*

## WAE DX Contest --

Continued from page 14

each band. Enclose a summary sheet showing the scoring, rest period, classification, your name and address in **BLOCK LETTERS!**

14. Deadline: June 10th, 1971.

15. The decisions of the Contest-Committee are final.

WAE Country List CT 1 - CT 2 - DL/DJ/DK/DM - EA - EA 6 - EL - F - FC - G - GC - GD - GI - GM - GM Shetland Isl. - GW - HA - HB/4 U 1 ITU - HB 0 - HV - I - IS - IT - LA - LA/Bear Island - JX - JW - LX - LZ - M 1/9 A - OE - OH - OH 0 - OK - ON - OY - OZ - PA/PI - PX - SM/SL/SK - SP - SV - SV/Crete - SV/Rhodos - TA/European part - TF - UA/UV/JW 1 thru 6 - UB/UT/JY - UC - UN - UO - UP - UQ - UR - UA/Franz Josef Land - YO - YU - ZA - ZB 2 - 3 A - 9 H.

The Contest-Committee of the DARC DX Bureau new address WAEDC-Committee  
D-8950 Kaufbeuren  
P.O. B. 262  
GERMANY

\*\*\*

12 April 1971

We just received back from the post office about 16 assorted back issues held together with a rubber band. Apparently they had broken out the envelope and the envelope lost so were returned to us from the Fort Worth, Texas postoffice. If the missing owner reads this please let us know. They might not have been for Fort Worth, just stopped there on the disastrous trip.

\*\*\*

## BACK ISSUES---

The only back issues available are listed below. Copies are 30¢ each.

1966-Aug., Sept., Oct., Nov., Dec. (5)

1967-None

1968-Mar., May., June., Sept. (4)

1969-Jan., Feb., April., May., June, July, August, Sept., Oct., Nov., Dec. (10)

1970-Jan., Feb., Mar., June (4)

1971-Jan., Feb., Mar. (3)

New subscriptions and classified ads are cash in advance as we have no method of billing. New subscriptions will be started with the current issue and one back issue if requested. Please do not ask us to start any further back that this. If available, back issues may be ordered at 30¢ each at time of subscription. The Journal is mailed about the 20th of the month preceding the dated month.

## RTTY JOURNAL

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

'DUSTY' DUNN - W8CQ

Editor and Publisher

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RTTY JOURNAL

## Variable Speed Teletype Without Gears --

John Chandler K4VDM  
809 Lincoln  
Johnson City, Tenn. 37601

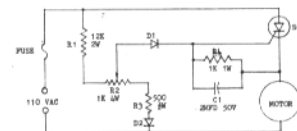
Now that the regulation for RTTY speed has been amended, for the better or worse, we can now dig out the hash-making, series wound, governor motors from the junk box. This circuit lifted from Navy MARS is a modification of a basic SCR circuit. It not only eliminates the hash, but makes it possible to have variable speed up to 100 WPM, without a gearshift or without changing gears.

Start by completely removing the governor off the back of the motor, including the sparking contacts, resistors and capacitors. All that is left are the two motor leads which are connected into the SCR circuit as shown.

The diodes used were 500 ma, 400 PIV, but any diodes that will handle the small current of the voltage divider, about 10 ma (D2), and one that will handle the charging current of the gate circuit, about 100 ma (D1), can be used. The SCR can be anything that will take the current of the motor and have a PIV of 200 volts.

We used a 2N1774. An SCR rated at 7 Amps at 200 PIV is available from Poly Pak for 50¢ each.

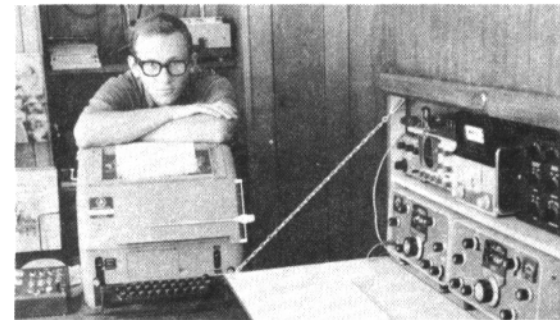
R1, R2, R3, and D2 is the voltage divider that controls the time that capacitor C1 takes to charge up through the motor to enough voltage to turn on the gate of the SCR. Once the gate is on, voltage is removed from the divider network as it will conduct through the SCR. The SCR will stay open until the charge on C1 falls below the turn-on level. When this happens and the voltage on the SCR returns to zero the SCR turns off. Voltage is now once again across the divider network and the capacitor will begin to charge thru D1 and the motor. R2 controls the frequency at which this happens. Using this circuit you can control the speed of the motor from near standstill up to about 4,000 RPM.



\*\*\*\*\*

## Evolution of A RTTY Station

Richard Wanat, WB4RKA  
443 Atlas Dr.  
Madison, Ala. 35758



The objectives I wanted in my new station were performance, convenience and a good appearance. I procured items for over two years in preparation for the new RTTY station. Also during this time I began marking items in RTTY Journal that I wanted to incorporate into the station. So when time came for beginning construction, I did not have a simple job but a very complex station to put together.

One thing I did not want was a maze of wires all over the room, so the components of the station are joined by use of prepared cables and connectors. A common point for all connections is the utility chassis under the printer. On this chassis is the automatic code sending wheel, auxiliary power supply and relay station.

controls proposed by WA6PIR in May 1969 RTTY Journal. Also on this chassis is a relay that is latched when the TD clutch is in operation and unlatched by a normally closed micro switch on the printer signal bell. This operation was proposed by WB2FPT in April 1969 RTTY Journal. Along with the controls on the control box, this is a beautiful way to operate the TD clutch. I had the end of line counter of VE3CTP (October 1969 RTTY Journal) on this chassis but the loop transients fouled up the counter.

The control box, located next to the printer, is a compact collection of controls and is the nicest looking piece of gear I ever put together. There are two loop current meters, one for the demod

RTTY JOURNAL

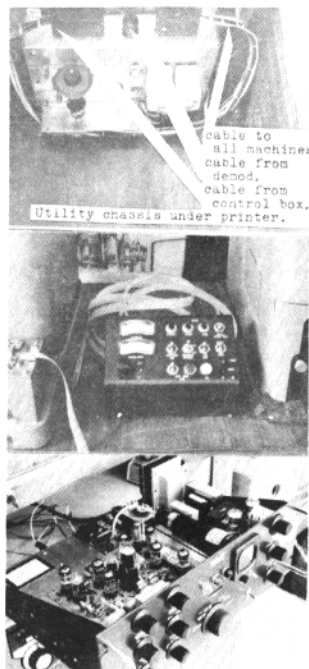
April 1971 13

loop and one for the auxiliary loop. Below the meters is the switch controlling combined machine operation per WA6PIR. The top row of switches latches and unlatches the TD control relay, jogs the tape one letter at a time and overrides the micro switch on the printer signal bell. The reperf AC and loop current is easily switched from the 60WPM machine to the 75 WPM machine for wire service copy. The TD and reperfs are switched from the control box. The "Transmit-Receive-ID" switch operates per the May 1969 RTTY article by WA6PIR.

The machines are located on a castered wood table. The table may be moved out of the way when not in use. The electronic components are housed in an identically finished (red antique) cabinet, the desk of which may be rotated up and locked to protect equipment and provide more room when the station is not in use.

The demod is the Mainline TT/L-2 with the addition of a scope (RTTY Journal, July-August 1969), TT/O and audio monitor. Later we will put in the channel filters and perhaps an AFSK generator.

As you can see, I owe RTTY Journal a debt of gratitude for supplying me with some good ideas to use in the station. Thanks!



\*\*\*\*\*

## WAE RTTY DX CONTEST

The Deutscher Amateur Radio Club (DARC), the sponsor of the WAEDC for CW and SSB, has the honour to invite RTTY Amateurs all over the world to participate in the 3rd RTTY WAEDC 1971. This contest is always held on the last weekend of April.

1. **Contest period:** April 24, 0000 GMT to April 25, 2400 GMT (cf. also 5 : rest period)

2. **Contest call:** CQ WAE de ....

3. **Bands:** All bands 3.5 thru 28 MHz

4. **Classifications:** Single operator, single transmitter. Multi operator, single transmitter

5. **Rest period** Only 36 hours of operation out of the 48 hours are permitted for single operator stations. The 12 hours of non operation may be taken in one, but not more than 3 periods anytime during the contest. The periods need not be equal but must total a minimum of 12 hours and be clearly indicated in the log.

6. **Exchange:** a) QSO-Nr. b) RST

7. **Points:** Each two way RTTY contact with stations within one's own continent will count 1 point, with stations outside one's own continent 3 points. Contacts of non-European stations with European stations will count 5 points for non-Europeans but 3 points for Europeans. Each station may be worked once per band. Each QTC (cf. also 10: QTC-Traffic) - given or received - will count 1 point.

8. **Multiplier:** The multiplier is determined by the number of countries worked on each band. The WAE country list and the latest ARRL country list will be used. In addition each call area in the following countries will be considered a multiplier: JA, PY, VE, VO, VK, W/K, ZL, ZS, UA 9, UA 0.

9. **Scoring:** The final score is the total QSO points plus QTC points multiplied by the sum total countries from all bands.

14 April 1971

10. **QTC-Traffic:** Additional point credit can be realized by making use of the QTC traffic feature. A QTC is a report of a confirmed QSO that has taken place earlier in the contest and later sent back to another station. The general idea being that after a number of stations has been worked, a list of these stations can be reported back during a QSO with another station. An additional 1 point credit can be claimed for each station reported.

a) A QTC contains time, call and QSO number of the station being reported, i.e.: 1300-DJ3KR-50. This means that at 1300 GMT you worked DJ3KR and received number 50. b) A QSO can be reported only once and not back to the originating station. c) Only a maximum of 5 QTCs to a station per band is permitted. You may work the same station several times to complete this quota. Only the original contact, however, has QSO point value. Keep a uniform list of QTCs sent and that 5 QSOs are reported.

11. **Contest Awards and classifications of winners:** There are two classifications: a) up to 200 watts D.C. input more than 200 watts D.C. input. Certificates to the highest scorer in each classification in each country and call area mentioned above. Continental leaders will be honored and 2nd and 3rd place certificates will be given in areas of sufficient participation. There is no minimum of operation time, but a reasonable score is required for an award.

12. **Disqualification:** violation of the rules of the contest, or unsportsmanlike conduct, or taking credit for excessive duplicate contacts will be deemed sufficient cause for disqualification.

13. **Logs:** Logs must contain: bands, exchanges sent, call signs, exchanges received, QTCs sent and received, points, multipliers. Use a separate log for

Continued on page 11

RTTY JOURNAL

## CLASSIFIED ADS Rates-\$1.- 30words. ADDITIONAL Words 3¢ ea.

CLOSING DATE FOR ADS- 1st of month.....

**MAINLINE TT/L-2** custom built per May 1969 QST, complete with 850/170 shifts, with or without scope indicator, available with low tones. J & J Electronics, Canterbury, Conn. 06331

**WILL TRADE MODEL 28** typing unit, mint condition, for a model 28 keyboard or model 28 Cabinet and Lesu. George Cherney, WA8TND 4986 Leavitt Rd., Lorain, Ohio. 44053

**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

**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

**THE 20th ANNIVERSARY DAYTON HAMVENTION** will be held on April 24, 1971 at Wampler's Dayton Hara Arena. Technical sessions, exhibits, hidden transmitter hunt, an interesting program for the XYL, awards and banquet. For information write Dayton Hamvention, Dept. R, Box 44, Dayton, Ohio 45401.

**TELETYPEWRITER: KLEINSCHMIDT TYPE TT 271/FG,** 60-75 100 wpm printer with std. comm. kba. English characters. It is capable of 60 wpm operation, friction and sprocket feed. Used good, \$65 each. Teletypewriter Receiver: Kleinschmidt model 155R, teleprinter speed 60, 100 or 115 wpm. 1/20 HP synchronous motor. With table and power supply, used good, \$70. each. TT268/UG Distr. Xmitter, Reperf; % automatic TTY perf (made by Soroban Engineering) and a TTY reader (made by Teletype Corp. Model 28 typw) mounted on a common panel and housed in a common electrical equipment cabinet. It can be operated rack or table mounted, used, good. \$90.00 each. Model 28 Apparatus Cabinet (LBAC) - Monitoring; housing s'ix typing reparator units, tape winders and motors multiple mounted, used good, \$480.00 each. Send us your requirements on teletype equipment. Atlantic Surplus Sales, 580 3rd Ave., Brooklyn, N.Y. 11215

**TOROIDS: LOWEST PRICE ANYWHERE.** 40/\$10. POSTPAID. (5/\$2.00) 44 or 88 mhy center tapped. 32KSR Page printer, reconditioned, perfect; \$225. MITE UGC41KSR Page printer, perfect; \$250. Mod28 Sprocket to Friction Kit \$25. 28LBXD TD \$70. 28LPR reperf with gear shift; \$170. 33 parity Keyboard with cables, excellent; \$38. Model 15KSR, reconditioned; \$65. Matching RA87 P.S., Unused; \$7. Lorenz 15KSR, newest, many features; \$75. Sync motors \$7. GEARS for most machines: List for stamp. 14TD \$20. DPE tape punch \$14. HP200CD Audio Oscillator \$95. R390URR receiver \$550. 11/16" tape; 40rolls/\$10.00. 33ASR, complete, excellent; \$700. Stamp for complete listing. Van W2DLT 302R Passaic Stirling, N.J. 07980

**AVAILABLE NOW THE AK-1 AFSK generator** with low or high tones, revised circuitry, higher output, low distortion level control, power supply, neat, compact. J. & J. Electronics, Canterbury, Conn. 06331

**RCA RTTY DIVERSITY SYSTEM** consisting of two CV/URR converters and one CV/14 URR comparator in desk top rack. 10 to 1000 Hz. shift. \$200.00. W6JX, 14945 Dickens St. Sherman Oaks, CA. 91403

RTTY JOURNAL

**CHANNEL FILTERS FOR TWO-TONE/TU.** Brand new Northern Radio 85hz bandwidth. For 170hz shift: 2125 and 2295 .hz filters, \$6.95/set. Include postage for six pounds. Laurence H. Laitinen, 217 Orchard Rd., Felton, Calif. 95018.

**TYPEWRITER RIBBON REINKER.** Hand operated model now only \$3.00. K575 or K764 ink available at all National Cash Register Co. stores at 75¢ per tube. Walter Nettles W7ARS-8355 Tanque Verde Rd, Tucson, Ariz. 85715.

**RCA FSK CONVERTER-COMPARATOR group AN/URA-6 (Navy),** excellent condition, includes CV-57/URR frequency shift converter, CM-14/URR comparator, Original instruction book. Requires 395 to 470 Khz receiver IF. \$70. Stanley Coutant, WB6WFI, 248 San Gabriel Ct., Sierra Madre, Ca. 91024

**SALE: URR-13 UHF RECEIVING set,** tunable 200-400 mHz, ideal for UHF ham bands and monitoring air force and astronaut frequencies, A2, A3 type of emission received. Provided with 115/230 V power supply for 60 cycle AC. Also provided with panadaptor jacks for an I.F. of 18.6 Mz allowing scanning of a 600 Kz bandwidth. Superhetrodyne crystal controlled O/A dimensions 8x17x19, used good - \$45.00 each. Model 14 reperformer, synchronous motor, rec. only, used good, \$28.00 each. Catalog available no charge. 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.

**SALE-TELETYPEWRITER CONTROL GROUP:** SN-260/FRA-42 synchronizer, electrical, and AM 2304/FRA-42 amplifier power supply both units mfg. by Sylvania Electric, 115 volts, 1 phase 60 cycle. Used, good both units for \$120.00. Model 14 transmitter-distributor, sync. motor, used, good \$20.00 each. 60 WPM set of gear new included. Reader; high speed, Ferranti model Mark III, used good \$30.00 each. Atlantic Surplus Sales, 580 3rd Ave., Brooklyn, N.Y. 11215.

**SPACE/ONE DELUXE RTTY DEMODULATOR,** solid state, 850/170 shifts, anti-space, lowpass filters, motor control, auto start, meter tuning mark & space indicator lamps, loop supply, regulated power supply, desk type cabinet or rack mounted. \$250.00 FOB. J & J Electronics, Canterbury, Conn. 06331

**MODEL 14 Transmitter-Distributor,** synchronous motor, 60 WPM, used, good, \$20.00 each. Model 14 reperformer, receive only, synchronous motor, 60 WPM. Receive only, used, good, \$30. each. Synchronous motor for model 14 TD, reperformer or model 15, used, good \$7.50 each. Atlantic Surplus Sales, 580 3rd Ave., Brooklyn, N.Y. 11215

**IMPOVERISHED STUDENT and green RTTY'er** needs cheap TU. One of you guys must have an old dust-collector in the closet. How about it? Bob Hahn, 311 11th St. Apt E, Seal Beach, Calif. 90740

**WANTED: M28 KSR Keyboard base** without motor in poor condx, in fact any condx except bent chassis. Low price important W. Gieckel W2OWH at West Holly Drive, Sayville NY 11782

**Additional Classified on NEXT PAGE**

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