



"John" W3KV "Ed" VP9EG

\*\*\*\*\*



"Claude" F9LC "Dick" W2QFR

\*\*\*\*\*

# RTTY

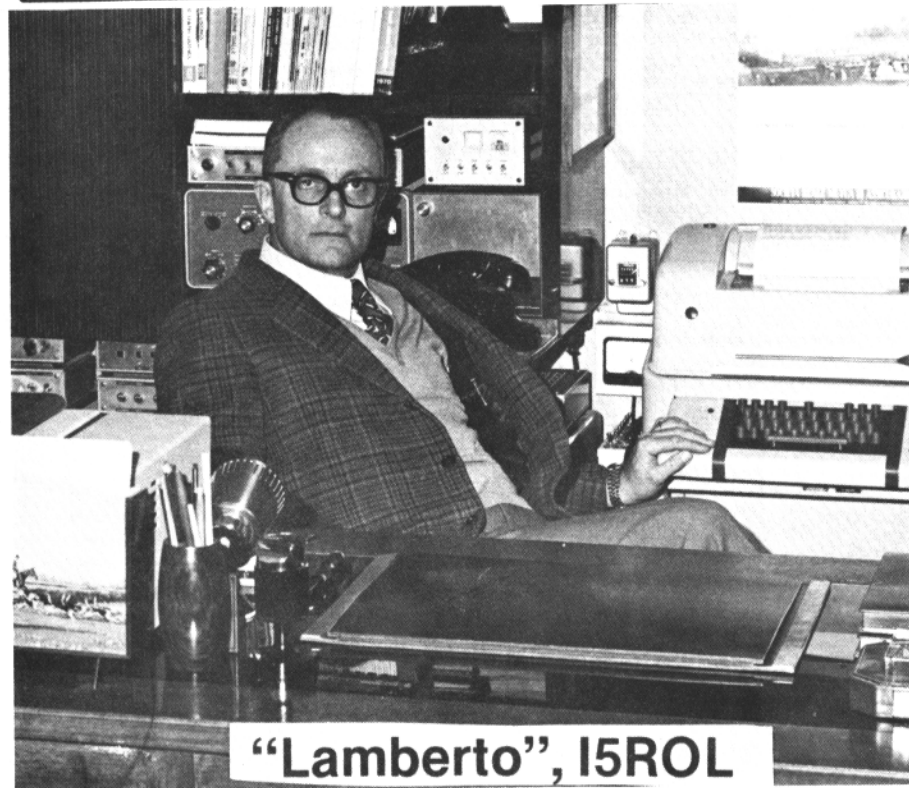
 NOVEMBER 1976  

## JOURNAL

EXCLUSIVELY AMATEUR RADIO TELETYPE

Volume 24 No. 9

35 Cents

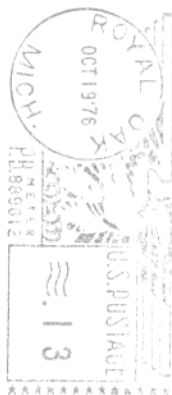


"Lamberto", I5ROL

### CONTENTS-

WAEDC DX RTTY CONTEST	- - - - -	2
TROUBLE SHOOTING THE UART-PART 2	-----	3
THEORY & APPLICATIONS	- - - - -	7
DX NEWS	- - - - -	8
CHEAP CRT REPLACEMENT FOR SB 610 SCOPE	-	9
MAKING CONTINUOUS TAPES	- - - - -	11
HOMEBREW PAPER WINDER	- - - - -	12

FIRST CLASS MAIL



RTTY JOURNAL

P.O. Box 837

Royal Oak, MI. 48068

# WAEDC DX RTTY CONTEST.

0000GMT Saturday November 13  
to 2400 GMT Sunday November 14

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

3. **Classifications:** Single operator - all band; Multi operator - Single transmitter

4. **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 three periods anytime during the contest.

5. **Exchange:** A contest QSO can only be established between a non-European and a European station. The usual five or six digit serial number RST/RS report plus a progressive QSO number starting with 001.

6. **Points:** Each QSO will count 1 point. A station may be worked once per band. Each confirmed QTC - given or received - counts 1 point (See below).

7. **Multipliers:** The multiplier for non-European stations is determined by the number of European countries worked on each band. Europeans will use the last ARRL countries list. In addition each call area in the following countries will be considered a multiplier: JA, PY, VE, VO, VK, W/K, ZL, ZS, UA90.

The multiplier on	3.5 MHz may be multiplied by four.
The multiplier on	7 MHz may be multiplied by three.
The multiplier on	14/21/28 MHz may be multiplied by two.

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

9. **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 a European station. It can only be sent from a non-European station to a European station. The general idea being that after a number of European stations have 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. (Note special regulation for RTTY see 13.)

a) A QTC contains the time, call and QSO number of the station being reported. ie: 1300/DA1AA/134. This means that at 1300 GMT you worked DA1AA and received number 134.

b) A QSO can be reported only once and not back to the originating station.

c) Only a maximum of 10 QTCs to a station is permitted. You may work the same station several times to complete this quota Only the original contact, however, has QSO point value.

d) Keep a uniform list of QTCs sent. QTC 3/7 indicates that this is the 3rd series of QTCs sent and that 7 QSOs are reported. Europeans may keep the list of the received QTCs on a separate sheet if they clearly indicate the station who sent the QTCs.

10. **Contest Awards:** Certificates to highest scorer in each classification in each country, reasonable score provided. Continental leaders will be honored. Certificates will also be given to stations with at least half the score of the continental leader.

11. **Disqualification:** Violation of the rules of this contest, or unsportsmenlike conduct, or taking credit for excessive duplicate contacts will be deemed sufficient cause for disqualification. The decisions of the Contest-Committee are final.

12. **Logs:** It is suggested to use the log sheets of the DARC or equivalent. Send large size S.A.S.E. to get the wanted number of log- and summary sheets (40 QSOs or QTCs per sheet).

13. **Special regulations for RTTY** in the RTTY-Section of the EUROPEAN DX-CONTEST also contacts between all continents and also one's own continent are permitted and count 1 point per QSO. Multipliers will be counted according to the EUROPEAN and ARRL - countries List. QTC-traffic is allowed between all stations (sent and received), but not between stations in the same country. SWL-Logs are appreciated for according rules.

14. **Deadline:** CW: September 15th, Phone: October 15th, RTTY: December 1st.

## EUROPEAN COUNTRY List

C31 - CT1 - CT2 - DL - DM - EA - EA6 - EI - F - FC - G - GC Guer - GC Jer - GD - GI - GM - GM Shetland  
GW - HA - HB9 - HB0 - HV - I - IS - IT - JW Bear - JW - JX - LA - LX - LZ - M1 - OE - OH - OH0 - OJ0 - OK  
ON - OY - PA - SM - SP - SV - SV Crete - SV Rhodes - SV Athos - TA - TF - UA1346 - UA2 - UB5 - UC2 - UN1  
UO5 - UP2 - UO2 - UR2 - UA Franz Josef Land - YO - YU - ZA - ZB2 - 3A - 4U1 - 9H1.

## Criteria for the awarding of certificates and trophies in the WAEDC.

1. **Minimal requirements** for a certificate or a trophy are 100 QSOs or 10 000 points. In addition at least one of the following conditions must be fulfilled:

### 2. Certificates

- Top score in a country resp. district.
- In countries or districts with high participation an additional certificate will be given for each full block of ten participants.
- Members of the Top Ten or Top Six (multi op.) lists
- Continental winners.
- Stations with at least half the score of their continental winner.
- Participants with at least 250 000 points.

### 3. Trophies

- Continental winners in the single operator category are awarded a plaque.
- Continental winners in the multi operator category will be awarded a plaque if they have at least 100 000 points or at least the score of the winner in the single operator category in their continent.
- A station may receive a plaque in the same category only once within a three year period.
- Special plaques will be presented to all members of the Top Ten/Six if they have been in this list for at least five times.
- The WAEDC-Committee reserves the right to honour outstanding achievements in the contest by additional plaques.

Mailing Address: **WAEDC-Committee  
Postbox 262  
D - 895 Kaufbeuren  
GERMANY**

North American residents may send their applications, logs to:  
Hartwin E. Weiss, WA3KWD, 323 North St., Millersburg, PA. 17061 USA

# Laymans Guide to trouble shoot the UT-4

No. 2 in a series of Articles.

RONALD LIGHT, WB0NSR/4  
621 SW 70th Ave.  
PEMBROKE PINES, FL. 33023

Last issue we covered the operation of the Nand Gate and learned that the Nand Gate can be used as an inverter, an enabler, and an inhibitor. The Nand Gate is used extensively in computer and digital logic circuits, and several are used in the UT-4. Let's take a look now at the UT-4 and see where a couple of these Nand Gates are and a little of what they do.

In illustration one, we have a couple of the circuits of the UT-4. Before we continue, you will notice on several of the leads in the circuitry, a resistor that connects one or two of the leads to plus 5 volts. This is called a "pull-up" resistor and its function is to ensure that the lead ASSUMES a valid high, when there is nothing attached to that lead or when the lead IS NOT low. For example, on pin 13 of IC number 1C you will notice a 4.7K and a switch (S7) to ground. When the switch is closed, it grounds pin 13, and when it's open, five volts is provided to pin 13 via that 4.7K. The resistor is high enough in value so that when S7 is closed, only 1ma flows through the resistor.

Let's now take a look at one part of the UT-4. The input transistor is the first item we will look into because its function is the simplest. Here we have our old friend the inverter. The input to this transistor comes from the output of the slicer in the TU, and the slicer provides a positive voltage during mark and a negative voltage (or in some TU's no voltage) during space. The resistor on the input ensures that the voltage and current reaching this input transistor won't exceed the limits of the transistor, and the diode to ground prevents any negative voltage from reaching the transistor. So, we have a simple inverter that will provide a high during space and a low during mark on its output.

We will see where this incoming signal goes further on, but for the moment, let's move on to illustration two and take a look at a couple of Nand gates and how they operate. In illustration two you will notice IC-4B. Here we have a nand gate with both of its input leads tied together (pins 9 and 10). With the two input leads tied together, we have our old friend the inverter again, and whenever the input goes low, the output goes high and vice versa. A transistor could have just as easily been placed here, but it is common practice to use up all existing gates of a chip before

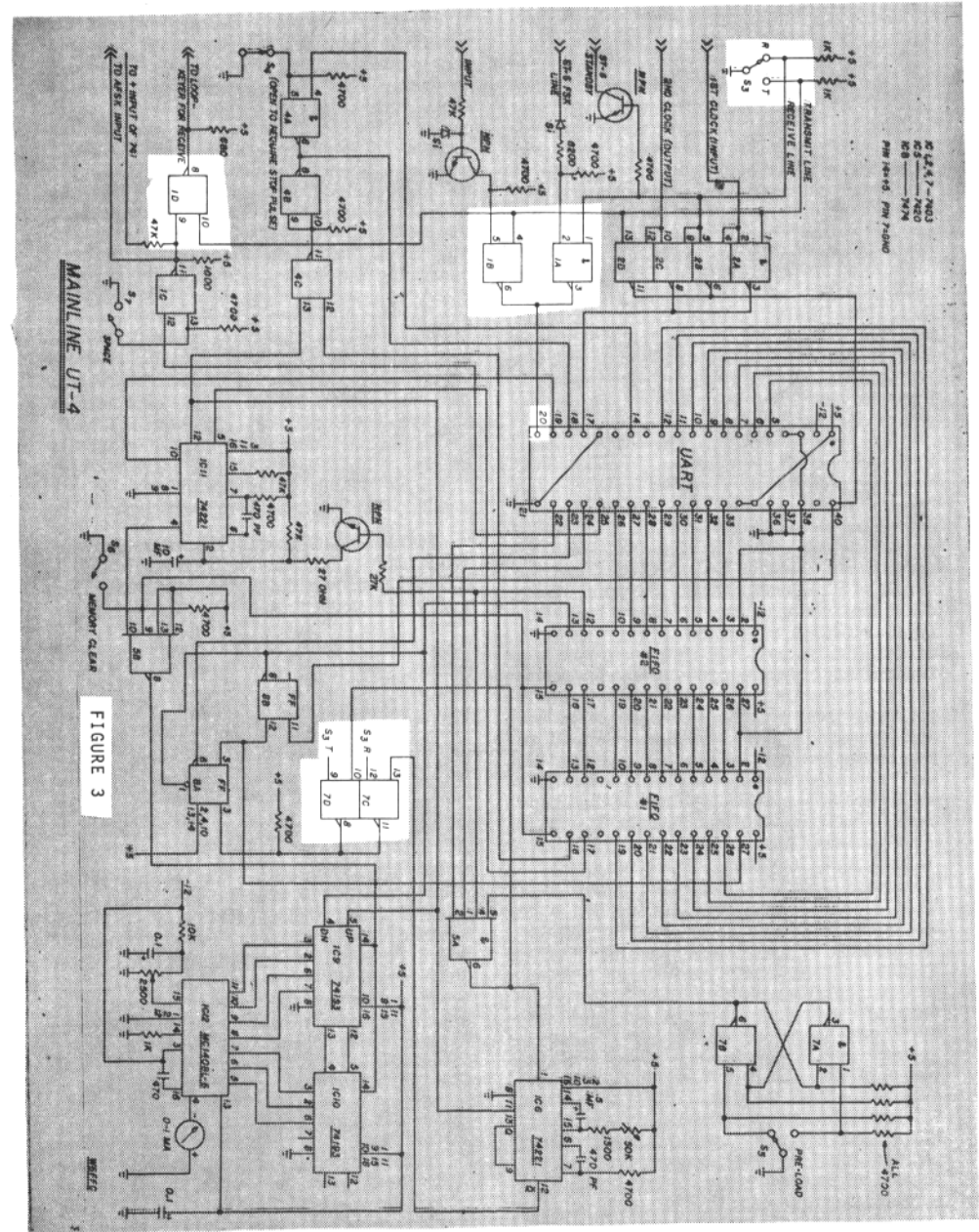
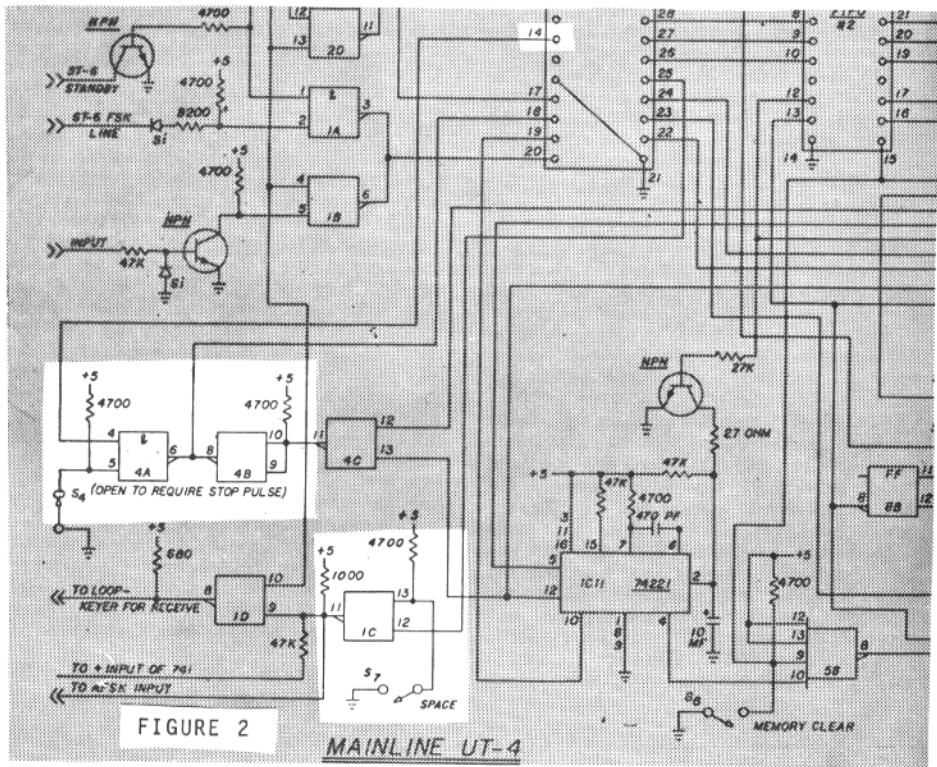
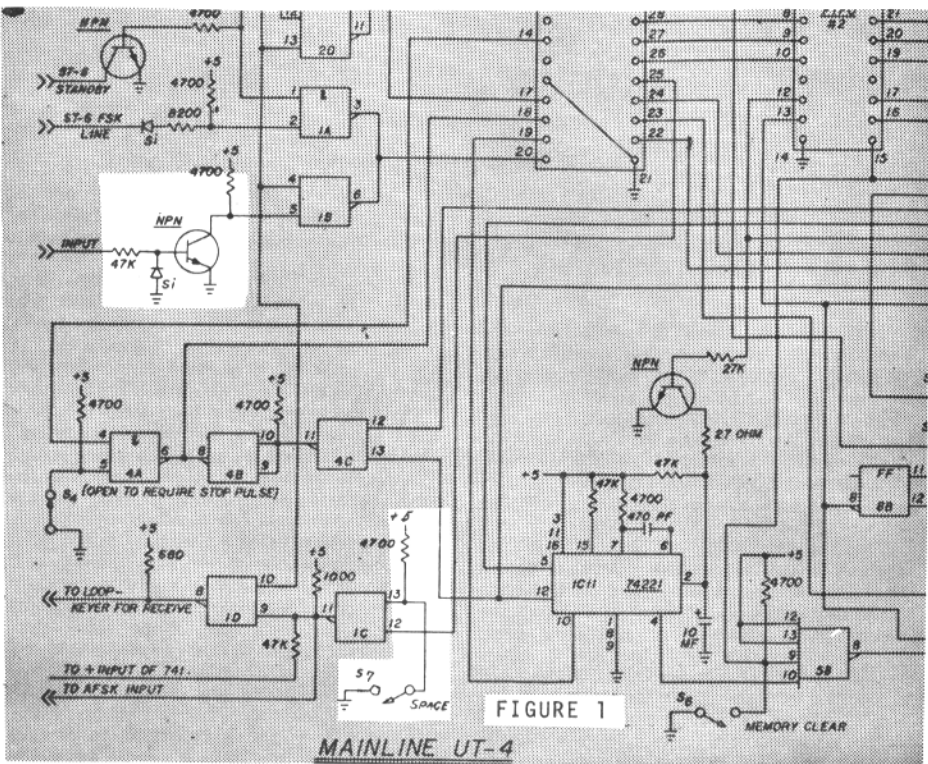
resorting to discrete components. In the reality of this chip there are four such independent nand gates in one chip package.

Turning to IC-4A we see that one of its inputs goes to a switch and the other input goes to pin 14 of the UART chip. Pin 14 of the UART is an output called a "flag". A flag is sort of like the little red area of a circuit breaker letting you know which circuit breaker has tripped. In the case of pin 14, it normally is low, but if for some reason the teleprinter is low, stop pulse is missing from the incoming signal. This flag goes high and stays there until the next character is received, at which time it returns to its normal low position.

So now we have a practical usage of a NAND gate as follows. Pin 5 of IC-4A is held low by stiwch 4. So, no matter what happens to the stop pulse flag, the output of IC-4A is going to remain high. But should we open this switch, it allows the output of IC-4A to respond to this flag. This output will now produce a low everytime the UART recognizes that a valid stop pulse is missing. When this occurs, it will inhibit the UART and that particular character will be ignored. So we now have a method of choosing whether we would like to recognize a loss of stop pulse or allowing the circuit to work regardless of whether the stop pulse is present or not.

In IC-LC we have a similar arrangement. Here the switch is open and so this nand gate will respond to whatever is on its other input. In this case the other input is tied to pin 25 of the UART. Pin 25 is the character output of the entire system in serial form. Serial simply means that the individual pulses of the character are in series, or one followed by another. The output of all teletype machines is in serial form for an example. So once the character has gone through all of the system, it is outputted at pin 25 and thus to IC-LC. As the character's pulses change from high to low to high to low, back and forth depending on the particular character being sent, the output of IC-LC will contain the same information only inverted of course. This output is fed to either the loop keyer or the AFSK (FSK) depending on whether you are transmitting or receiving at the time. A low on the output of IC-LC produces a mark and a high produces a space. If we, now close switch 7, we will produce a constant high on the output of IC-LC and it will no longer respond to pin 25 of the UART. This high of course will give a steady space for the purpose of setting the space frequency of the AFSK (FSK).

I hope at this point you are fully  
NOVEMBER 1976 3





understanding the operation of how a nand gate operates and can see how we have used it in a couple of actual circuits of the UT-4. Next we will get into additional nand gate circuits and see what they do.

We have covered some of the simpler nand gates used in the UT-4 and saw how they worked and for the most part, what they did. This time we're going to take a look at a few more NAND gates and explore them some. It would be wise to review parts one and two before beginning this part. If you feel that you are not sure about NAND gates or may have forgotten some of the past parts.

Turning to illustration number 3, we see several NAND gates emphasized and like the others we have covered that have used switches to control the gates, these gates use switches as well. But in this case, they ALL use the same switch. The transmit/receive switch. Don't let this throw you however, as we are still working with basic circuits.

Let's start with the simplest of these gates, IC-ID, and see how it functions. You will notice that pin 10 of that IC, is run to the line called transmit line or simply T line. You may ignore everything else on this line as it will not affect pin 10. When switch 3 is in the RECEIVE position, pin 10 will be high and this allows the output of IC-ID to respond to the mark/space character changes appearing on its other input, supplied by IC-LC which we covered earlier. The output of IC-ID goes to the loop keyer which in turn supplies these characters to your printer. But, if we now put switch 3 in the TRANSMIT position, it brings pin 10 low and now IC-ID will no longer respond to information fed to it. This in turn prevents the loop from being keyed from the TU or the UT-4 as you are now going to type rather than copy signals. So it more or less puts the TU into a mark hold condition.

Turning to IC-LA and LB we see a similar arrangement. Let's examine them one at a time. You will notice that IC-LB has one of its inputs also tied to the T line. Its other input is fed from the TU's slicer which is first inverted by the NPN transistor which we covered earlier. The output of this IC is tied to pin 20 of the UART which is the serial INPUT to the UART and the entire system.

With switch three in the RECEIVE position, pin 4 of the IC-LB will be high and the information from the output of the TU's slicer will be allowed to enter the input of the UART. If we again place the switch in the transmit position, pin 4 will then become low and the slicer's information will no longer be allowed to reach the input of the UART.

IC-LA works very similar to this. You will notice that one of its inputs, pin 1, is tied to the RECEIVE line. The other input is fed from the FSK line of the loop and is presented with information that appears on the loop. When

switch 3 is in the RECEIVE position, it applies a low to pin 1 input of IC-LA, which inhibits this IC and so no information appears on its output. However, if we place the switch into the TRANSMIT position, it brings pin 1 high and now allows anything on the loop to show up on the output of IC-LA. You will notice that the output of IC-LA is also tied to the system input, pin 20 of the UART, and so now we have two methods of feeding characters into the UART and system. When we place switch 3 into the RECEIVE position, information is fed from the TU's slicer through the transistor and IC-LB to the system input, and when switched to the TRANSMIT position, information from the loop, containing the keyboard etc., is fed through IC-LA to the system input. Also, IC-LD puts the loop keyer into a sort of mark hold and thus prevents the loop from being keyed from some extraneous source. So by the setting of switch 3 we can now choose what source we want to feed the system, the TU or the keyboard. It should be mentioned that IC-LA and LB, a 7403, has been chosen that allow the two outputs to be tied together as they are, for REGULAR TYPES of NAND gates would destroy one another if their outputs were tied together.

Turning to IC-7C and 7D we see a very similar set-up as was with IC-LA and LB. IC-7C and 7D are used in the timing chain of the UT-4 and we will cover that a little later. But for the moment you will notice that one input of each NAND gate runs to the receive/transmit switch. Here again when in RECEIVE IC-7C is held low and 7D is held high and so the timing pulses fed to 7D are enabled and allowed to be used. By flipping the switch to TRANSMIT we will now place a low on 7D inhibiting it, and a high on 7C enabling the pulses fed to it. So again we have a very simple method of controlling which timing pulses we will be using, all with a single switch.

We have covered a lot of ground at this point. There is a lot to digest so far, and much more to come. I might suggest that if you have a working UT-4, at this stage you might want to take a VTVM and look at some of these inputs and outputs we have covered thus far. The better you understand these circuits as we go along, the easier it will be to fix the UT-4 when it does break down. One note, the timing pulses of IC-7C and 7D are much too fast to be seen by a VTVM or for that matter a non-storage type scope, so don't expect a lot when you look at these points.

\*  
\*  
\*  
\*  
\*

\*\*\*\*\*

# RTTY theory & applications.

Ron Guentzler, W8BBB, Editor  
212 Grandview Blvd.  
Ada, OH.45810



## RTTY SIGNAL BANDWIDTH

### Part 1 - AC CIRCUIT CONSIDERATIONS

#### Introduction

This month we are beginning a series of articles that will explain some of the characteristics of telegraph signals. We are especially interested in the bandwidth required by a RTTY signal because of the "Bandwidth Docket". In order to give a complete picture of the bandwidth requirements, it is necessary to discuss Fourier Series, and they, in turn, need to be related to AC circuit calculations.

#### AC Circuit Calculations Limitations

When making calculations (or measurements) in AC circuits, several things are ordinarily assumed: 1) The signal (voltage or current) has been present for a while, 2) The signal is a pure sinusoid, and 3) The elements in the circuit are linear. A brief explanation of the necessity for these requirements follows:

1. If a circuit contains an energy-storage element such as an inductor or capacitor, the initial energization of the circuit (i.e., turning on the switch) will result in transients that are relatively difficult to handle mathematically. So long as the circuit does not contain negative resistance, these transients will eventually disappear; once they have disappeared, the circuit is said to be operating in the steady-state. The calculations and measurements usually made in AC circuits are for the steady-state. In many cases the transient may be short-lived, and it is therefore considered to be of no interest. For example, when a light is turned on, quite a bit happens within the circuit during the interval between the time the switch is operated and the light coming from the lamp is at normal output. However, this interval is so short that the transient is ignored. If, for example, you wanted to measure the current drawn by the lamp, you would deenergize the circuit, insert an ammeter, and then reenergize the circuit. Once the switch is operated you would look at the meter to see what value of current is flowing. By the time you look at the meter, the transient is gone and the meter reads steady-state current.

There are cases where the transient is

quite long. For example, if an uncharged 100 uF capacitor, a 1 megohm resistor, and a DC power supply are connected in series, the capacitor will take several minutes to charge. This is a rather long transient interval. The end of the transient interval and the beginning of steady-state is marked by the time when the capacitor is fully charged. (Although this is a DC situation, it is illustrative of what we are discussing.) Upon several occasions, we have discussed time constants in telegraph loops; in these cases, the transient interval may be only 1 milli-second long, but compared with the time interval of one bit, a millisecond is long, especially when operating at 100 WPM or higher.

2. When an AC circuit is analyzed, the "laws" governing AC circuits that are ordinarily used for calculation (i.e.,  $V = IZ$ ,  $V = IX$ , etc.) require that only a pure sinusoid is present. (Most AC meters are accurate when only pure sinusoids are present.) In fact, impedance and reactance are not even defined for non-sinusoidal currents and voltages! Textbooks covering AC circuits normally discuss only circuits containing pure sinusoids. For example, the AC circuits discussed in Chapter 2, "Electrical Laws and Circuits," of the RADIO AMATEUR'S HANDBOOK (A.R.R.L.) assume a single sinusoidal voltage or current present in the circuits.

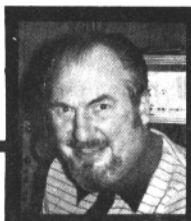
3. If the elements within the circuit are not linear, calculation becomes difficult. A linear element is one that obeys Ohm's law ( $R = V/I$ ) independent of the value of V or I. (There are further, more general linearity definitions including differentiation and integration, but they can be redefined in terms of Ohm's law.) Unfortunately, all linear devices can become nonlinear if "pushed too far". For example, an ordinary 1/2W carbon resistor is linear, meaning that the ratio of voltage to current (i.e., resistance, R) remains constant over a wide range of voltages and currents unless the voltage becomes too large. For instance, if you were to apply 100 volts to a 10-ohm, 1/2W carbon resistor it would probably explode! This is, perhaps, an extreme example of non-linearity, but it should illustrate the point.

Some devices are considered to be

CONTINUED ON PAGE 9

# RTTY-DX

**John Possehl, W3KV, Editor**  
**P.O. Box 73, Blue Bell, PA, 19422**



## Hello There . . .

Last known RTTY activity from Costa Rica took place back in 1971 when TI2CAH was on from time to time. Many of you are already aware of the present activity by TI2AM which commenced in early September and has given the newcomer to RTTY-DX an opportunity to contact this rare prefix. Arnaldo has been active on both 15 and 20 Meters and while his signal has not been too strong with the present inverted vee antenna, he hopes to improve things with a beam real soon. QSL's can go directly to — Arnaldo Muller

P.O. Box 1875  
 San Jose, Costa Rica

Carl, K6WZ, reports print from WA6QFN/KM6 on Midway Island at the 75 baud speed and it is also rumored that KM6EA is also active but only on the MARS frequencies and also at the 100 wpm speed. Perhaps some of the Stateside boys active on the MARS channels can persuade them to slide into the amateur bands occasionally.

We are very pleased to report a "first" on RTTY.

W.A.C. All on 80 Meters

M.I.T. Radio Society W1MX

While W1MX is the call sign of the University station, some of the boys at the keyboard and responsible for their all band activity particularly during Contests are: W2QHØ, WB2MZE, WA4TTG, and WAØUCU. The following choice of antennas on 80 Meters could possibly account for their potent signal on that band. 80 Meter dipole at 60 feet, 320 Meter long dipole with apex at 300 feet, full wave vertical loop with apex at 200 feet!

Another "first" is the Bicentennial W.A.S. by Bruce, VE2QO, and as far as we know, the first Canadian station ever to make W.A.S. in the RTTY mode.

Also something of a record and deserves high marks for a novice at the game, Al, WA4HLP, received his General Class license on 18 March '76 and completed RTTY W.A.S. on 18 July '76, and all on 20 Meters.

The first RTTY transmissions from Baja California Norte took place on 10 September with signals coming from XE2EBE at Rancho Sordo Mudo, an orphanage and school for deaf children run by Ed and Margeret Everett, XE2EBE and XE2MRE. Hank, W6SKC, set up

the station with a 28 KSR and Dovetron TU brought down from the States. The RTTY operation got going just at about the time hurricane Kathleen started acting up, which as you know, played havoc in the Southwest USA and Northern Mexico. What with road wash-outs and extensive flooding, Hank had quite a time returning to the States but fortunately made it without any major problems. Should you contact either Ed or Margeret you can QSL to - Aptado Postal 1468

Ensenada, B.C.  
 Mexico

At this time we would like to bring to your attention details of an Award for proficiency in RTTY-DX that many of the newcomers to the mode may not be aware of.

The Quarter Century Award (QCA) is issued by the British Amateur Radio Teleprinter Group (BARTG) upon submission of satisfactory proof of Two Way communication with 25 different countries.

Measuring 10" by 13" and printed in Red and Green, the certificate makes an attractive addition to any amateur station. Endorsement stickers are available for each additional 25 Countries.

Application for the Award may be made by any of the following methods.

1. Submission of QSL cards for the countries being claimed. Cards are returned after checking. Alternatively, submission of photo copies of QSL cards is acceptable. This type of claim must be witnessed and signed by TWO other licensed amateurs.

2. Claims will be accepted based on a check list of call signs with details of date of contact and band used. This type of claim must be witnessed and signed as accurate by TWO officers of a recognized Radio Club or National Amateur Radio Society.

3. Claims may be accepted based on a Contest Log submitted for any RTTY Contest sponsored by the BARTG. The claim should be made at the same time as the Contest Log is submitted.

Cost of certificate is - U.K. - 50 p  
 - Overseas, 3 dollars US or 15 IRC's  
 Cost of additional stickers - U.K. - 20 p  
 - Overseas, 2 IRC's plus 50 p (UK) or 5 IRC's  
 if QSL's are to be returned.

Send claims to - Ted Double, G8CDW  
 BARTG Contest and  
 Awards Manager  
 89 Linden Gardens  
 Endfield, Middlesex  
 EN1 4DX England

The 1976 QCA Honor Roll follows -- call followed by countries confirmed.

ON4BX	150	DL8VX	44	CT1EQ	27
ON4CK	135	I1CAQ	44	DL1TV	27
G6JF	115	I6NO	44	DL8QP	27
I1ROL	103	SMØCBC	41	G3ZWW	27
I1WT	103	DJ1QT	40	K8MYF	27
K8YEK	101	G3OZF	39	OZ9JB	27
W1GKJ	101	VE7UBC	38	SM7BGE	27
W3KV	91	VU2KV	38	W2RUI	27
DK8BT	85	WA3IKK	38	W3CIX	27
DL1VR	76	WB6ADY	38	WØMT	27
OK1MP	76	Reynolds	38	DK3CU	26
G8LT	75	VK3DM	37	DJ9XBA	26
OZ4FF	70	HB9AVK	36	I1CWX	26
SMØOY	68	JH1TFF	36	K5ARH	26
WA6WGL	68	VK6PG	36	XE1LL	26
W6AEE	64	FG7XT	35	9Y4RB	26
SM4CMG	58	I1COB	35	DK2YE	25
I5KG	57	PY1DCB	35	DK2XV	25
G3MWI	55	KX6LA	34	G3CQE	25
DJ6XBA	54	HA5FE	33	G3IYG	25
K4VDM	54	WB6QFE	33	I5ORS	25
ON5WG	54	G2HIO	32	IT9ZWS	25
ZL2ALW	54	I1PXC	32	JH1SF	25
W5QCH	53	WA2YVK	32	KG6NAA	25
I4 14707	53	BRS27239	32	OK3KFF	25
EI5BH	51	W6CG	31	VE3AYL	25
OZ7RD	51	BRS25676	31	VE3IR	25
SL5AR	51	I1YTL	30	VE4BJ	25
SM5BO	51	W8GPB	30	VP2KH	25
K3SWZ	50	WØCJZ	30	WIMX	25
K6YUI	50	DK1AQ	29	W2UGM	25
W8CQ	50	G3YDR	29	W5VJP	25
K6WZ	47	IØZAN	29	W8CAT	25
SM6AEN	47	DL8CX	28	WA8BOT	25
PY2CYK	46	W5TZZ	28		
I3 13018	45	4U1ITU	28		

Earlier in the year we indicated that the older IRC certificates would be made obsolete at the end of this year and become worthless. We now understand that this cannot be done without an International agreement of all parties involved that are members of the Postal Union. As this has not been accomplished to date, it appears that all existing IRC's will continue to be honored at least for the present.

With the CARTG Contest in the record books, we hope to have a review of the activity in next issue.

We would also like to alert you to the RTTY portion of the WAE Contest which will take place this year on 13/14 November 0000z Saturday to 2400z Sunday. Rules the same as last year and take note of the bonus multiplier for 40/80 Meter activity.

73 de John

\*\*\*

## CHEAP CRT TUBE FOR SB610 SCOPE

For those using the SB610 monitor scope and having a tired 3RP1 CRT and discovering that a new one costs over forty dollars, here's a way out. Fair Radio Sales of Lima, Ohio has the 3BPL CRT for \$9.50 plus \$2.00 for a fourteen pin socket to fit. Pin connections are slightly different and you have to make a new bracket to hold the neck of the tube, but you can't beat the price. I left the shield off the CRT and it didn't seem to make any difference here. Conversion took about an hour and a half. Hal Beebe, W9RY/W9OEQ, 20035 Burr Oak Lane, Mokena, IL. 60448.

\*\*\*

## THEORY & APPLIC. -

CONTINUED FROM PAGE 7

non-linear at all values of current or voltage. Diodes are a prime example.

(Under certain conditions diodes are actually quite linear, at least mathematically, but under most conditions they can be considered non-linear.)

Therefore, Ohm's law cannot be applied to circuits containing diodes unless certain restrictions are met. The only way to solve circuits containing diodes is by means of a graphical technique.

To review what has been said to this point: AC circuit calculations are relatively straightforward so long as the elements within the circuit are linear, the transient has died out, and the voltage applied to the circuit is a pure sinusoid.

Next month we will begin to deal with steady-state, non-sinusoidal voltages.

## VHF NEWS---

The following was sent by Dick Peters, WA1 Practically World Famous: "Since the announcement of our 2 meter RTTY net in the June issue, things have really been happening. As we anticipated, there is a great desire for VHF RTTY activity in this area and the increase in check-ins each week bears this out. We still met each Wednesday at 8 P.M. on 147.69-.09 (WR1ABN-Walpole, MA) and our discussions run the gamut from today's WX to tomorrow's computers. When time permits, we run some clever picture tapes for the artists in our audience. In short, the net is flourishing.

Thanks for giving us the news to spread!  
 73, ES CUL RG.

\*\*\*

NOVEMBER 1976 9



From The Editor  
and  
his Mail

Periodically we go begging. With Halloween coming up now seems a good time - we need more articles. Long, short and medium size but especially the medium type.

We do have a couple in the file but frankly they are in all capital letters, (teletype) and we seem to lack the ambition to retype them, especially the longer ones. Articles should be typewritten if possible and any drawings should be in black on white paper. Unlike the regular ham magazines we have no draftsman to redraw originals. However, if the figures and lettering are solid black and not too small it will be legible and that is the important thing.

Methods of AFSK or FSK for popular excitors are always welcome. Two meter RTTY is popular - have you some hint or kink that others might like to know? Since you are a reader of the JOURNAL, you know which articles have appealed to you - can you offer something to help others? Have you used one of the popular two meter transceivers (FM) on RTTY - How did you do it? Sophisticated solid state (or unsophisticated) is always popular. If you have never tried being an author - try it - You'll like it.

\*\*\*

We have received two publications on RTTY in the past month. The first is a publication from the R.S.G.B. titled "RTTY The Easy Way". A handbook explaining the basics of RTTY but also containing a number of circuits for TU's and other equipment including PC board layouts and components. Most of the information on printers is for the Creed machines but easily adapted to other printers. Price pp to any country is 85p (English) or about \$1.50 U.S. Available from RSGB, 234 Gillingham Road, Gillingham, Kent, England. ME7 4QT.

The other is a club bulletin of the Southern California Amateur Teleprinters Society. It is a 12 page magazine about the size of the Journal. Containing mostly club news and some technical information, it is a dandy for an individual club to publish. Further information from "SCATTER" 1312 Micheltorena St., Los Angeles, CA. 90026.

\*\*\*

One port where we completely missed the boat is with back issues. Since 1973 the circulation of the Journal has increased steadily, although we have increased the print

10 NOVEMBER 1976

order almost monthly new subscribers asking for back issues has kept our supply depleted. We now have 2710 subscribers and new subscriptions are still exceeding expirations. We are printing more copies but even so some issues of 76 are out or in small supply. We hate to turn down orders for past issues but after missing the boat for so long, we have concluded that we are just a poor sailor.

## Beginners RTTY Handbook.

Price \$2.50 pp.

### BACK ISSUES -

New subscriptions and classified ads are cash in advance as we have no method for 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 than this. Back issues - if available - may be ordered at 35 cents each at time of subscription. The JOURNAL is mailed about the 20th of the month preceding the dated month. May and June are a combined issue and July-August is a combined issue.

The ONLY back issues available are listed below. 35 cents each.

1972-OCT.-NOV.-DEC.-[3]  
1973-JAN.-FEB.-MAR.-MAY.-JUL.-  
SEPT.-NOV.-[7]  
1976-FEB.-APR.-JUL.-SEPT.-  
OCT.-[5]

RTTY JOURNAL BINDERS-\$4.00

## Subscription Rates RTTY JOURNAL

Editor & Publisher "Dusty" Dunn, W8CQ  
Box 837- Royal Oak, MI 48068

U.S. Canada, Mexico, 1st Class	\$3.50
Canada, Mexico, Air Mail	4.00
Surface Mail	4.00
Other Countries - Air Mail	8.00

## Making Continuous RTTY TAPES

IRWIN M. HOFF, W6FFC  
12130 Foothill Lane  
LOS ALTOS HILLS, CA. 94022

One of the advantages in owning a tape reader (often called a T.D. which is short for Terminal Distributor) is that the RTTY operator can prepare short tapes for continuous play. Such tapes are often used for calling "CQ" automatically; for test purposes such as: RYRYRYRYRY or THE QUICK BROWN FOX, etc., and for various other purposes.

Making the tapes is usually quite simple, but joining them together properly at the ends so they will pass through the gate of the tape reader satisfactorily is sometimes troublesome.

Another problem that often besets those who run such continuous tapes lies in their method of joining the ends together -- they wind up with 8-10-12 "letters" characters at the end of each tape, so whenever the end of the tape comes around, the machine sits there doing nothing for that period of time. Such things can be easily avoided. In fact, a clever operator can join the ends of the tape together in such a manner that even an astute observer will be unable to tell at which point the tape actually was ended -- this is especially true for those (like the author) who prefer to make "one-liners".

To make a continuous tape, a typing reperf such as a model 14 should be used, as these are normally of the "chadless" variety. The model 19 on the other hand punches the "chads" completely out of the tape and joining the ends together then becomes a matter of gluing the ends properly -- a messy job to say the least. The chadless tape, on the other hand will easily interlock with itself in a manner that will last indefinitely, as far as the splice is concerned. (The tape will "wear out" eventually just from heavy use, but in this case a new one can be made in a few moments.)

The standard line of TTY copy consists of 72 characters maximum. Before bothering to cut a final tape, type up the proposed text or else write it out by hand, in order to best utilize the available space. There is nothing that says you need to use the entire 72 characters, but on the other hand it does save paper for the other person, and makes a neater appearance --

Reprinted from RTTY JOURNAL  
Hit a half-dozen or so "blanks" keys so you will be able to quickly and easily tell where you started making the actual tape to be used. If you have no "blank" key, just hit the "space bar" a half-dozen times instead. Then hit 12-15 letters keys. This provides the means by which the ends of the tape will eventually be locked together. Then hit the usual "carriage return, line feed and letters" keys. Now comes the text you have decided upon. You can make the text one line or two lines or three lines, but often just one line endlessly repeated makes the neatest appearance on the page. One full line is easy to work with on the continuous tapes, but anything much shorter gets a bit awkward.

At the end of the text type one "letters" key and then enough "blanks" (or "space bar") characters to bring the tape out of the reperforator.

Now comes the part that would be so much easier to look at via "on-the-job-training" than it is to tell about. It will be easier to follow from here if you take a piece of tape and try to imitate the description.

At the beginning the 12-15 "letters" characters will be seen. At the first of these, bend the tape sharply and cut or tear off. At the end of the text the solitary "letters" character will be seen just prior to the string of "blanks" (or "spaces"). Bend on this "letters" character and cut or tear off.

Now make your loop putting the beginning INSIDE the end. Thus the printing will be on the inside of the tape loop. Carefully insert the end of the tape into the first character typed at the beginning of the tape (the "carriage return" character). This will leave the 12-15 "letters" characters extending inside the loop of tape. Now either take a sharp pencil and punch the holes through the two portions of the tape that are adjacent to each other, or else while carefully holding the tape insert it into the tape reader (T.D.) and let it run around. Presto, you are finished. When the tape comes to the end, it will immediately start over, and there will be no annoying superfluous characters at all.

\*\*\*

NOVEMBER 1976 11

# HOME BREW PAPER WINDER

Wm. SHERWOOD, W6FBY  
501 Loring St.  
Los Angeles, CA. 90024

Reprinted from RTTY JOURNAL Dec. 1969

## PAPER WINDER FOR USE ON UNATTENDED AUTOSTART

When your machine has been printing all weekend, and there is paper piled on the floor, did you ever wish you had a paper winder? Here is an easy solution, a handful of parts, a few hours of time and PRESTO, paper winder.

### Needed:

Paper roll holder shaft, salvaged from model 15 or 19. Display motor, or barbeque motor. Available from Olsen Radio, induction motor with gears, speed not important, anything from 2 to 12 RPM is ok. 2 pulleys, available from salvaged movie projector or Hobby shop, 1 to 2 inches in diameter. Approximately 12 inches of spring type belting, available from the salvaged movie projector, or can be purchased at your nearest camera repair shop. If purchased at the repair shop, be sure to get the couplings that fasten the spring belt together. U shaped bracket (you will have to make this one) to hold the paper takeup spool, and the motor. 2 plastic lids from 2 pound coffee cans.

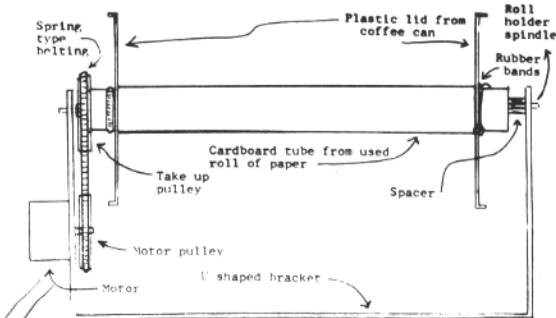
### How to make it:

Eyeball several pulleys and try to estimate what size on the motor and what size on the takeup spool will end up giving you approximately 4 RPM take-up motion. The exact speed is not very important. Drill out the center of the motor pulley to fit over the motor shaft. Drill out the center of the takeup spool pulley to fit over the takeup spool

shaft. Fasten both pulleys with the set screws that come with them, to the proper shafts. The U bracket should be formed with a width that allows the takeup spool spindles to go through holes you will drill near the top of the bracket. The spindle on the motor side will protrude through the pulley, allowing the takeup spool to be mounted by flexing the sides of the bracket outward and letting it spring back with the two spindles in the matching holes. The motor is mounted on the side of the bracket that has the pulley mounted to the takeup spool. Align the two pulleys so that the belt will run vertically from one pulley to the others. Make up a spring type belt just a little shorter than the real distance around both pulleys. Be careful that the final rotation of the takeup spool allows the paper when being wound to go over the top, and not under it. Cut holes in the center of the coffee can lids, the same size as the wooden part of the take up spool. One lid is held in place by the cardboard center tube pressing against the wire spring on one end of the spool. The other lid is held in place by several rubber bands. These lids keep the paper winding up neatly, acting as end pieces for the paper.

### How it works:

With the motor, in parallel with the printer motor, the winder starts when the printer motor starts. If there is no paper to wind, the belt merely slips. When there is paper coming out of the printer, the winder will take it up.



\*\*\*

## CLASSIFIED ADS-- 30 words \$2. Additional words 4¢ ea.

Cash with copy, Deadline 1st of Month.

**MORE RTTY! ONLY HAM RADIO MAGAZINE** consistently brings you more RTTY articles and better RTTY articles than any other general amateur magazine. You need RTTY Journal, but you need HAM RADIO also. \$10.00 per year, \$20.00 for 3 years. Ham Radio, Greenville, NH 03048.

**HAL COMMUNICATIONS CORP:** Headquarters for electronic RTTY equipment. In demodulators, choose from the incomparable ST-6 or, for a low cost beginning in RTTY, the ST-5. Tailor either to your requirements by selecting the 425 Hz press discriminator, the XTK-100 or AK-1 AFSK oscillators and the ST-5AS autostart for the ST-5. Full details available in our current catalog. Compare before you buy. BankAmericard and Master Charge plans available. HAL COMMUNICATIONS CORP., Box 365RJ, Urbana, Illinois 61801. Phone 217-367-7373.

**HAVE FULL SET OF RTTY JOURNALS.** Will duplicate any issue \$1.00 PP. Also duplicate of all 4 UART articles with large drawings. \$2.00 PP. U.S., Canada, Mexico. Other countries 25 cents extra. R. Wilson, WB0ESF, 4011 Clearview Dr., Cedar Falls, IA. 50613.

**FOR SALE:** 1 - CV/89 FSK Converter, 1 - Model 15 printer with keyboard, 1 - Table, 1 - Loop supply, 1 - Tape Punch. All in good shape and all works fine. W.D. Collins, WBOMJM, Gainesville, MO. 417-679-4495 after 5:00 P.M.

**DOVETRON MPC-1000R (E Series) REGENERATIVE RTTY TERMINAL UNIT** retains all the features of the MPC-1000/MPC-1000C Terminal Units plus the benefits of the TSR-100 Teleprinter Speed Converter-Regenerator. Front panel controls permit signal speed selection (60, 67, 75, 100 WPM Baudot and 110 Baud ASCII), Memory Functions (Unload, Reset, Preload and Recirculate), and Character Rate Over-ride. Two front panel LEDs indicate the status of the Memory Section (Full or Empty) and the state of the TD inhibit line. The latter is controlled by a unique automatic memory unload circuit that prevents character over-runs even when pulling tape. The BLANK middle character is generated by the tri-state mode of the UART regenerator and prevents a signal time-delay or first character error on the outputted signal. MPC-1000R: Commercial: \$995.00. Amateur: \$745.00. Shipping and Insurance: \$9.50 Continental USA. Delivery: 30 days ARO. DOVETRON, 627 Fremont Avenue, South Pasadena, California, 91030. 213-682-3705.

**MINI-MANUALS ON FOLLOWING EQUIPMENT,** \$2.95 each -- M15/19 Wiring Hints and Diagrams. CV-89/URA-8 FSK Converter. IDA-2 Stelma Teletype Distortion Analyzer. AN/SGC-1 FSK Converter. Teletype Gear Guide for all Teletype Corp. equipment. SASE for surplus list. Jim Cooper W2BVE. POB 73, Paramus, NJ 07652.

**FOR SALE OR TRADE:** Model 28 ASR's, excellent condition with perf or reper, your choice of gears. Will deliver in New England. Anywhere else by Mayflower or your choice. Trade - or \$450.00. George Rancourt, K1ANX, White Loaf Rd. Southampton, MA. 01073. (413) 527-4304.

**HAL RVD1002 VIDEO DISPLAY \$375.00** Assembled and operating UT-4 in cabinet with Heath HO-IO scope \$150. Icom IC230 with AC power supply \$425. 50' self-supporting tower \$200. CES100 programmable frequency display \$200. Bill Davis, W0MZN, 306 Center St., Winona, MN. 55987. 507-452-3468.

**NEWS-NEWS-NEWS**—Amateur Radio's Newspaper, "Worldradio", Trial subscription — Two issues for one dollar. "Worldradio" 2509-F Donner Way, Sacramento, Calif. 95818

**R4B / T4XB / AC4 / MS4 MINT \$850.00.** SB-303 / 401 / 600. MINT \$600.00. DX60B with xtal shifter \$70.00. HW-8 \$120.00. UPS PAID WB01QK - 605-342-4190.

**HAL COMMUNICATIONS CORP.** announces the ST-6000 RTTY Demodulator/Keyer. The ST-6000 is ideally suited for amateur or commercial service offering fixed 850, 425, and 170 Hz shifts for ease of tuning. Standard low and high tone frequency pairs are available, and active filter design allows the use of any set of tone pairs between 1200-3000 Hz. Crystal controlled tone keyer for stability. Self-contained loop supply RS-232C, and MIL-188-C levels for I/O. Scope or meter tuning. Keyboard operated switch. Selectable ATC, and new DTH (decision threshold hysteresis) circuitry allows optimum performance under the most demanding conditions. Complete flexibility in the interconnection of the demodulator and tone keyer allows separate, half duplex, or full duplex operation. Usable at all data rates up to 110 baud ASCII in standard form. The ST-6000 carries the usual HAL one-year warranty, and is an ideal companion to our new DS-3000 KSR microprocessor based communications terminal. Write today for full details. HAL Communications Corp., Box 365RJ, Urbana, Ill. 61801. Phone 217-367-7373.

**BACK ISSUES OF RTTY JOURNAL.** Years of 1961, 1962, 1968 are complete. September 1970 to September 1976 complete. Also five odd issues. All \$25.00. W8UPG, 651 Sanford Ave., Akron, OH. 44305.

**R4B. EXCELLENT RTTY RECEIVER** with 400 Hz filter, notch filter, and passband tuning. Excellent shape. \$320. W.R. Nelson, 425 Spencer Creek Road, Kalama, WA. 98625 (Phone 206-673-3625).

**HAL COMMUNICATIONS CORP.** announces the DS-3000 and DS-4000 series of KSR Video Display Terminals for Baudot and/or ASCII code. Offering error correction capability, multi-speed operation, and 16 lines of 72 characters per line, these terminals employ the 8080 microprocessor in what we believe is the first microprocessor based product offered to the amateur radio communications market. Request data sheet for full information. HAL COMMUNICATIONS CORP., Box 365RJ, Urbana, IL 61801. Phone 217-367-7373.

**TELETYPEWRITER PARTS:** Gears, manuals, tools, paper, tape, Mod. kits, Gear shifts, ribbons, cranks, keytops, pallets, toroids. SASE for list. Typetronics, Box 8873, Ft. Lauderdale, FL. 33310. Buy unused parts, late machines.

**THRU-HOLE PLATED UT-4 PC BOARDS** - Commercially made. Set of four thru-hole plated, solder coated, G-10 epoxy glass boards. 2-7/8" X 7" with provisions for 12 pin edge connectors. Boards include XB-6 Dual Clock, Two UT-4 boards, and power supply board including plus 5 volts, minus 12 volts, and plus 12 volts. All boards two sided with the exception of the power supply. Boards ready for immediate shipment. \$22.50 Postpaid in U.S. Clyde Keenan K7WTQ, Rte. 1 Box 309, Lakebay, Washington 98349 1-206-884-3838.

**Additional Classified  
See Next Page -**



**ST-5's WITH AUTO-START, AK-1** and manuals. HAL-kits, ready-to-run in lettered cabinet. \$185 or \$25, balance UPS COD. David Tancig, 618 W. White St., Champaign, IL 61820

**DATAPoint 3300 ASCII CRT TERMINAL**, excellent condition, \$636; Mite TT-299B/UG teleprinter, excellent condition, \$165. Ron Ott, 528 Bonita Avenue, Pleasanton, CA. 94566 (415-846-1459).

**PRINTED CIRCUIT BOARDS: RTTY SELCAL** with TTL logic, (73 magazine November 72, \$12.00. ST-5 W/PS, 2 boards, \$6.25. AK-1, \$4.25; CW ID'er, (Feb 73, 73 magazine) \$4.75. Logic probe (Dec. 74 Magazine) \$1.00. Autostart RTTY encoder and decoder (Jan. 67, 73 Magazine, \$11.00) Instructions and parts list included. Walter Zalewski, 29307 Red Cedar Dr. Flat Rock, MI. 48134. (313) 782-9316.

**NS-1A PLL TU** (Journal 1/76 Ham Radio 8/76) Wired/tested \$29.95 ppd. Board \$4.75 ppd. Parts only \$15.00 ppd. SASE for info. Nat Stinnette Electronics, Tavares, FL. 32778

**TELETYPE: WANT M32/M33** teleprinters — complete or incomplete. Good prices paid for your old and used equipment. Will buy "as is". Bruher Teletype Service, P.O. Box 247, Dumont, N.J. 07628.

**FOR SALE OR TRADE** — for HAL VIDEO readout - Robot slow scan monitor and Camera with macro lens. Joe Mazzeo, WA8WMQ, 5288 N. Pebble Creek Rd. West Bloomfield, MI. 48033.

**MODEL 28 ASR's** — KSR's, Repurfs - Keyboards, TD's - Printers, Parts - All priced for Hams. All in excellent condition. A.D.M. Communications, Inc., 1322 Industrial Avenue, Escondido, Ca. 92025. (714) 747-0374

**TELETYPE EQUIPMENT: MODEL 28 ASR's**, sprocket feed, \$300.00 UP. U.W. desk FAX's, W.U. model 2B's, Model 14 & 15 parts. Model 28 parts, polar relays. ESU's, perforators, typing reperforators, T.D.'s, etc. G.W. Hemphill, 132 Scott Swamp Rd. Farmington, CT. 06032. Tel. PM only, (203) 677-0678.

**TELETYPE EQUIPMENT** — Summer is over and now is the time to get back to hamming and TTY. A good selection of machines are available now in the model 28 series. Some test equipment and 14-15 series also. Service, parts and supplies. Fresh ribbons \$1.20 pp. Parallel punch (5 level LARP) with tape holder and synchronus motor \$30.00. Ideal for use with UARTS. 20 RO (sprokets) \$120.00. SASE for new list - New Address - P. Anderson, 115 Boyken Rd., Rochester, MI. 48063. (313) 652-3060.

**SALE: MODEL 28 LPR RECEIVE ONLY** Typing Reperf. On stand alone base complete with 3 speed gear shift (60-75-100). AC Syn Motor, and cover. Good condition \$165; Model 28 LXN Transmitter Distributor, stand alone type, complete with AC Syn Motor and cover. Good condition \$125.00; Model 28 RO Base complete with 115 V AC Syn motor, and intermediate gear assembly. Good condition \$69.00; Model 28 RO Table Top Cover, Good condition \$39.00; Model 28 LP Stuntbox Mark 111 with stunt bars still in place, \$24.00; LPW paper winder 300, Good Condition \$39.00; Model 28ASR machines complete with Reperforator and T.D. \$495.00. Other machines available so let us know what you need. WE ALSO BUY MACHINES, PARTS, MANUALS: ATLANTIC SURPLUS SALES, 3730 Nautilus Ave., Brooklyn, New York, 11224. Tel.: (212) 372-0349.

**28ASR EXCELLENT CONDITION** - 3 volume set of manuals included, \$600. Ron Spaniol, WA8AWK, 313-474-3861.

**DOVETRON MPC-1000 (E Series) MULTIPATH-DIVERSITY RTTY TERMINAL UNIT.** The new E Series represents the sixth generation and adds Automatic CRT Intensity Control, Keyboard Actuated Autostart, Automatic Threshold Control for unattended operation, Fast-Slow Autostart, and Autostart Delayed-Timeout to the MPC's MULTIPATH CORRECTOR, IN-BAND DIVERSITY MODES, and the continuously variable Mark and Space channels. All IC's, transistors and Cmos logic elements are mounted in low-profile sockets for ease of servicing and maintenance. Interfacing to the TSR-100 or UT-4 speed converter/regenerator is accomplished by removing two jumpers at the rear panel. Your QSL brings full specifications. MPC-1000 (Amateur) \$495.00. MPC-1000C (Commercial) \$795.00. Shipping and Insurance: \$7.50 Continental USA. Delivery: 30 days or less. DOVETRON, 627 Fremont Avenue, South Pasadena, California, 91030. 213-682-3705.

**MODEL 15 MACHINE WITH TABLE & character counter.** Model 14-G typing reperf & TD with rectifier, All \$100.00. U pick up. E. Kopp, 9101 So. Massasoit, Oak Lawn, IL. 60453. 312-422-0921.

**COMPLETE BIBLIOGRAPHY OF RTTY JOURNAL** from January 1959 to and including December 1975. Over 800 listings under 55 headings. Available now in same size as RTTY JOURNAL, 20 pages. \$1.00 postpaid anywhere in world. Gary Buda, Apt. 301A, 5621 Quebec Ave. North, New Hope, MN. 55428.

**UT-4 COMPONENTS.** Uart's, Fifo's, MC3408L D/A, JAN crystals, TTL kits. Edge connectors and PCB socket sets for K7WTQ boards. Most others. Return first class mail. See prices prior ads. Peter Bertelli, W6KS, 5262 Yost Place, San Diego, CA. 92109. 714-274-7060.

**WANTED:** Used oscilloscope for ST-6. A.F. Susen, 3600 Forbes Avenue, Pittsburgh, Pennsylvania, 15213.

**FOR SALE: 100 ROLLS 5/16** gummed tape for model 14 strip printer, \$20.00 plus shipping. Edmond Roy, 29 Grove St., Homer, N.Y. 13077.

**MOD-U-LINE CABINET CLOSEOUT.** Limited quantities of the ST-6 style MCP 3-17-12 gray cabinet left. \$27.97 each, plus \$1.00 shipping. 24 hour shipping. UT-2 and UT-4 parts available. Send stamp for our New Catalog. NuData Electronics, Dept. B, 104 N. Emerson St., Mt. Prospect, IL. 60056.

**RTTY PICTURE PERF TAPES:** Over 575 different available. Special for Christmas - Three \$5.00 gift packs - each over three hours running time. No. 1 Religious - Madonna, Wise men, Angels, etc. No. 2 general - traditional - Santa, banner, reindeer, Xmas bells, etc. No. 3. General popular - March of the Elves - Charlie and Lucy, etc. Send for free catalog to Al Perkins, 217 N. Cedar St., Galesburg, IL. 61401.

**TECH MANUALS** - \$6.50 each: TT-63A/FGC, CV-591A/URR, TS-2/TG; following manuals \$8.50 each: R-388/URR, TH-5/TG, USM-50; other manuals - TGC-14/14A, \$12.50. TT-298A/B, TT-299A/B, UGC-38, 40, 41 - \$15.00. Model 14 TD manuals, \$3.00 each. All manuals mostly new, unused. Thousands more in stock. Send 50 cents (coin) for large 22-page listing. W3IHD, 7218 Roanne Drive, Washington, D.C. 20021.

**MODEL 28 KSR'S, FRICTION-FEED** XTelco units in good condition, crated ready for shipment. Quantities available. \$200 each FOB N.H. Satrak Telemetry, Martin Geisler WA6TIC, 11300 Hartland St., North Hollywood, CA 91605.

**RTTY PICTURE PERF TAPES.** Hundreds, including nudes, cartoons, animals, works of art, landscapes, all of the RTTY Art Contests entries. Chad type (fully punched, no lids) 11/16 inch standard Amateur 5-level paper tape. Guaranteed COMPLETELY error-free. Run times from 2 minutes to 10 hours. Listing and info free if request typed on 5-level printer, otherwise send 24 cents in STAMPS. For "Intro Pack" of ten picture tapes of the best, various subjects, various lengths (total run time - 2 hours 12 minutes), send \$6.00, immediate delivery, POST-PAID, listing included. Due to popularity of above, "Intro Pack Deluxe" now offered, run time 12 hours 44 minutes, \$30.00, shipped PRIORITY mail in USA, surface postpaid overseas. Joe Dickens, WA9UGE, 601 S. Dodson, Urbana, IL 61801.

**MOD-U-LINE CABINETS,** ST-6 style MCP 3-17-12 \$27.97. Now shipping gray color in 24 hours. All Sizes available, but some not stocked. 1 day to 6 weeks delivery on some special sizes in tan or blue. Special sizes in gray or black 2-6 weeks. UT2 and UT4 Components available. Send stamp for our free catalog. NuData Electronics, Dept. B, 104 N. Emerson St., Mt. Prospect, IL 60056.

**HAL COMMUNICATIONS CORP.** announces the MCEM-8080 microcomputer. The MCEM-8080 is a complete operating system on a single PC board, including serial I/O at RS-232C levels or 20-60 ma current loop, 3 parallel I/O ports, 1024 bytes of RAM, 1024 bytes of ROM containing the system monitor program, and switches and indicators to manually control all bus and control lines. The powerful 8080A CPU and its family of chips are used. The system monitor allows the use of either Baudot or ASCII terminals, and enables the user to load hex files, dump or display memory, insert data in memory and transfer program control to a specific location. Whether you are a RTTY operator turned computer hobbyist, or a computer hobbyist turning to RTTY for a communications link, the MCEM-8080 should be your choice. Write today for full details. HAL Communications Corp., Box 365RJ, Urbana, Ill. 61801. Phone 217-367-7373.

**DOVETRON TSR-100 TELEPRINTER SPEED CONVERTER-REGENERATOR** is a 6" by 7" PC card designed to mount inside of any MPC Series Terminal Unit and is intended to provide signal regeneration and UP-DOWN speed conversion. The 18 socket-mounted CMOS devices include a Uart, two FIFO Ripple Memories (80 characters), a programmable crystal-controlled Dual-Clock, and a bilateral steering section that permits solid-state switching between Transmit and Receive. All Uart functions including Parity are switch-selectable. Both sections of the Dual-Clock are programmable for 60, 67, 75, 100 WPM Baudot and 110 Baud ASCII codes. All 8 parallel data lines are available at the output of the Memory section. The TSR-100 also offers Variable Character Rate, BLANK Diddle and memory functions of Preload, Recirculate and Reset. The BLANK Diddle is Uart-generated (Tri-state mode) and does not contribute time delay or first character errors. A unique Memory Unload circuit prevents character over-runs and provides a TD Inhibit. A pair of LEDs indicate Memory status. All signal input and output ports are fully buffered for easy interface to other terminal units. Power requirements: +5/+15 volts at 85 mls and -12/-15 volts at 10 mls. TSR-100: \$195.00. POSTPAID Continental USA. Delivery: 30 days or less. DOVETRON, 627 Fremont Avenue, South Pasadena, California, 91030. 213-682-3705.

**WANTED: NEW ELECTRONIC SPEED CONTROL** for Model 28 ASR. Bunge, Box 4099, Tucson, AZ. 85717.

**AUTOMATIC CW ID UNITS.** Programs up to 32 dots, dashes, or spaces, easily programmed. All on one board. Less supply, kit \$12.95; wired and tested \$17.95 (your call must be supplied.) Interface for above for ST5 or ST6, AFSK or FSK, Kit \$4.50, wired and tested \$5.50. 10 minute automatic resettable timer for ID unit, kit \$8.95, wired and tested, \$11.95. 5V 1A fully regulated, short proof TTL supply, with transformer and plug in or hard wired board, kit \$12.69, wired and tested \$16.69. SAVE on all four units, package of above reg. \$39.09, kits sale price \$35.95. Reg. wired and tested price, \$51.09, sale price \$47.00. Cabinet for above, unpunched (Dozy E box) \$7.25 each. NuData Electronics, 104 N. Emerson St., Mt. Prospect, IL. 60056.

**DOVETRON TELEPRINTER IDENTIFIER TID-100.** Mounts inside of all Dovetron MPC Series (and ST-6) terminal units. CMOS circuitry requires less than 1 mil standby and 8 mls functioning. May be programmed for CW, Baudot or ASCII. 128 bit capacity. Two LEDs indicate CLOCK RUNNING and CODED OUTPUT for easy visual verification of programmed code. All four CMOS chips are socket-mounted and programming instructions are etched right on the circuit board. Includes 50 programming diodes: \$34.95 postpaid. Factory programmed with DE and your call: \$39.95 postpaid. DOVETRON, 627 Fremont Avenue, South Pasadena, California, 91030 213-682-3705.

**SALE: BLACK NYLON RIBBONS** for all your Teletype machines; Box of 12 for \$5.90; Red and Black nylon ribbons, Box of 12 for \$9.75; Ribbon Re-Inkers for your Model 14, 15, 19 and Kleinschmidt machines; Print nice and dark and stop straining your eyes for only \$3.90 a Kit. (Specify for which machine.) White Roll paper for \$2.25 per Roll. Toroids, 88 millihenry, center tapped, never potted, 5 for \$4.00; Female jack panels containing 144 jacks on a 19" panel \$16.00; Female jack panel containing 24 jacks, Fahnestock type 218A on a 19 inch panel \$6.50. Also available Machines, Parts, and Supplies. Write stating your needs. Atlantic Surplus Sales 3730 Nautilus Ave., Brooklyn, New York 11224. Tel: (212) 372-0349.

**GIVE YOUR KEYBOARD, KEYPAD, AND SUPPORT** electronics a handsome home with the UNIVUE keyboard and instrumentation enclosure. Only \$32.95 plus shipping on 17 lbs. Stamp brings additional information. ADS, P.O. drawer 1147, Marion, OH 43302. (614) 382-7917.

**EXPERT REPAIR WORK.** Any Teletype Corp. model. Repair work \$15.00 plus parts no matter how long it takes. Rebuilding by estimate. Write K9WRL or phone (312) 392-2358, ask for Neil. Chicago Area.

**STILL TIME to qualify for**

**RTTY JOURNAL Bi-Centennial**

**"Worked all States" Certificate.**