RTTY for Beginners cont.-

CONTINUED FROM PAGE 13

of R9, C6, and R10 can be changed if more diode current is required or if the time constant is considered too long. In the circuit shown, the total switching time is approximately 8 cycles at 2125 Hz or about 4 ms. If the 1N482 is used, the network is optimum.

The "filter" network composed of R12, L3, C7, and R11 is tuned to resonate at approximately 2550 Hz. The best turning procedure is to adjust the size of C7 so that the mark and space tones appear at the output at equal levels when R4 and R5 are wide open. The Q of the L3-C7 circuit is kept low by using the 50K potentiometer (R11) and the coupling resistor R12. This filter serves several purposes: 1) It cleans up any harmonics from the oscillators, 2) It removes the harmonics generated by the diodes during the switching interval when the diodes are partially-conducting, and 3) It helps remove the low frequency transients caused by the DC used to switch the diodes.

The 24 V power supply should be "stiff" so that the loop keying does not affect the keyer in a manner other than the desired one.

When wiring the unit, it is advisable to separate the wiring in the loop circuit from the remainder of the unit. This is desirable because "spikes" may be present in the loop due to bouncing contacts, etc., and these "spikes" could get into the output and into the transmitter.

One note of caution: As is the usual case, too many selector magnets in the loop will cause spacing bias on the transmitted signal. The spacing bias can be reduced by decreasing the size of R8. The best way to eliminate the bias is to prevent it; i.e., don't put selector magnets in the keyboard loop!

CONCLUSION

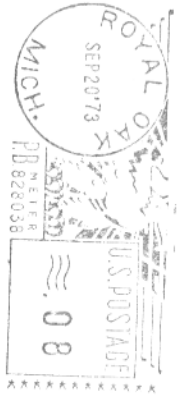
We have just described a good AFSK keyer. It is slightly different from most others described elsewhere in that it uses two separate oscillators and the output from these oscillators is gated by means of two diodes.

We have had one of these units running 24-hours/day for over a year now and there has been no sign of deterioration in performance. (About 50,000 hours of continuous operation!)

***** 73 ES CUL, RG

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

FIRST CLASS MAIL



RTTY JOURNAL
October 1973
EXCLUSIVELY AMATEUR RADIO TELETYPE
VOLUME 21 No. 8 30 Cents

NEW Teletype 40 System

CONTENTS

VOLTA RTTY DX CONTEST--

VOLTA CONTEST

RULES

1) **TEST PERIOD:** 14.00 GMT December 1st to 20.00 GMT December 2nd, 1973.
2) **BANDS:** All Amateur Bands 3.5; 7; 14; 21 and 28 MHz.
3) **EXCHANGE POINTS:** All two-way RTTY contacts with stations in one's own Zone will count for two points. All two-way RTTY contacts with stations outside one's own Zone will count for points in accordance with the Exchange Points Table.
4) **CONTACTS:** Stations may not be worked more than once on any one Band.
   Additional contacts may be made with the same station if a different Band is used.
5) **MULTIPLIERS:** A multiplier of one is given for each Country contacted. The same Country may be claimed for extra multipliers if a different Band is used. The operators own Country does not qualify for a multiplier and count zero point.
6) **SCORING:** Total exchange points times the total number of multipliers times the total number of QSO.
7) **COUNTRY STATUS:** A.R.R.L. Country List except that the W Call areas from WØ to W9 and the VE Call areas from VO to VE7 will be considered as separate Countries.
8) **MESSAGES:** Stations will exchange messages consisting of Call sign, RST and Zone number. Example: i3 AAA 599-15.
9) **LOGS AND SCORE SHEETS:** Use one log per Band. Log forms, score sheets and Exchange points tables are available free of charge from SSB & RTTY Club, P.O. Box 144, 22100 Como, Italy. These logs sheets are not obligatory. Logs should contain (in order) Band, Date, Time GMT, Call sign of station worked, messages, numbers sent and received (RST and Zone), Country multiplier and exchange points.
   Any log not submitted in accordance with the Contest Rules or with incomplete or erroneous entries or without a completed score sheet will render the entry invalid for any competitive listings or Awards. All entries become the property of the SSB & RTTY Club of Como and cannot be returned.
10) **SWL ENTRIES:** This Contest is open to SWL RTTYers. The same rules apply as are used for transmitting stations and a separate results table will be made for these entries. Logs must contain: Band, Date, Time GMT, Call sign of station heard, RST and number sent by that station and the exchange point. The same station is only valid once on each Band.
11) **DEADLINE:** Logs and Score sheets should be sent to:
    A.V. RTTY CONTEST MANAGER
    Dr. Franco Fanti
    Via A. Dallolio 19
    40139 Bologna, Italy
    Entries must be received not later than 15th January 1974 to qualify.
12) **DISQUALIFICATION:** Failure to comply with the Rules of the Contest will constitute grounds for disqualification. In all questions of dispute, the decision of the Committee of the SSB & RTTY Club of Como shall be final.
13) **AWARDS:** Silver Plaque "Antonio Pessina il LCJ Memorial" to the winner. Certificates will be awarded to: 1) The top scorer in each Country, W/K and VE/VO Call district. 2) The two top scoring SWL entries.
14) **WORLD RTTY CHAMPIONSHIP:** Points and positions achieved in this Contest will be valid for inclusion in the "World Championship" for 1973.

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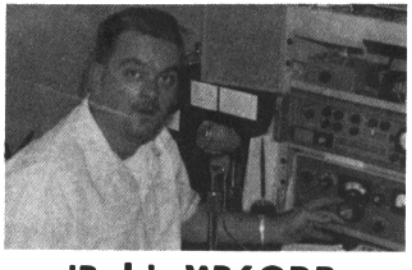
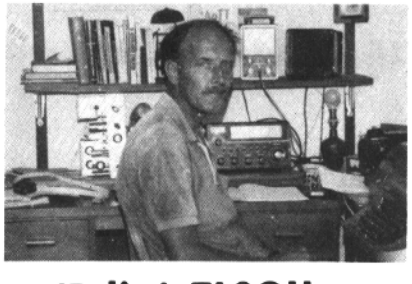
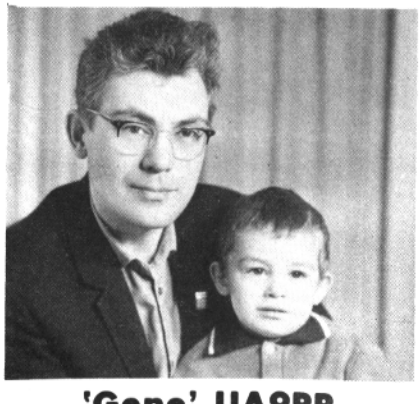


'Bob' WB6ODR



'Felix' ZL3OH

'Bob' HI8 XRM



'Gene' UA9PP

Variable Speed RTTY Motor Control

KEITH SUEKER, W3VF
110 Garlow Drive
PITTSBURG, PA. 15235

In a rash moment, I decided to invest in a governor-motor Kleinschmidt TT271 KSR page printer to get high speed operation. The prospect of 60-100 WPM operation for $40 was just too good to pass up. Much to my pleasant surprise, the governor worked perfectly and the machine generated no RF interference in my receiver. With 100 WPM gears and various governor adjustments it would run from 67 WPM to over 100 WPM and copy was fine at each standard speed. I then decided to design and build a solid-state motor drive to replace the governor and permit speed control from a console knob.

The first problem was to sense motor speed. For this, I made a pulse wheel from .032 aluminum sheet and fastened it to the motor shaft after removing the governor mechanism. The motor shaft had a hole which accepted a small machine screw tap and allowed the pulse wheel to be bolted directly to the end of the shaft. A General Electric H13A1 optical coupler completed the picture. This unit, consisting of a spaced light-emitting diode (emitter) and phototransistor (detector) in a plastic housing, is designed for pulse wheel operation. The emitter is excited continuously and the pulse wheel teeth allowed to interrupt the beam to the detector. The general arrangement is shown in Fig. 1. I used a 33 tooth wheel with slots made by sawing 1/4" radial cuts with a coping saw. Fortunately, this need not be a precision operation.

The electronics are shown schematically in Fig. 2. Pulses from the tachometer are squared up by Q1 and then used to trigger a monostable multivibrator consisting of Q2 and Q3. The monostable converts the tachometer output signal to a series of constant amplitude, constant width pulses with repetition rate proportional to motor speed. The average voltage resulting from this pulse train is also proportional to motor speed and serves as a highly accurate dc tachometer.

Operational amplifier U1 forms a three-pole Butterworth active filter which develops the required dc voltage from the pulse train. This filter configuration was chosen to give good ripple suppression with minimum time delay. Positive dc output current from U1, proportional to motor speed, is compared to a negative reference current derived from the speed switch and adjusting pots. Op-amp U2 switches sharply from "on" (positive output) to "off" (negative output) when the tach-derived current exceeds the reference current. It serves as a highly sensitive speed detector and is used to drive another optical coupler - this time an H15A1. This unit is similar to the H13A1 but without the mechanical gap. Sensitivity is much higher. Output from the coupler switches transistor Q4 in the gate circuit of a triac which, at long last, turns the motor on and off. The second optical coupler isolates control circuits from the 120 volt line.

Operation of this circuit is directly analogous to that of the governor. The motor voltage is either on or off and is not phase modulated continuously. This arrangement permits a considerable simplification in gating circuitry and provides all the sensitivity needed for this application. The cycling rate is somewhat slower than that of the governor, however, due probably to the minimum "on" time limitations of a triac on a 60 Hz line. After working with control circuitry for a while, one cannot help but admire the simple, rugged and sensitive mechanical governor with which these machines were equipped.

Resistors and pots in the speed reference network permit adjustment to each of the standard speeds of 60, 67, 75 and 100 WPM which correspond to band rates of 45.45, 50.00, 56.88 and 74.20 (NAVSHIPS 0967-255-0010 "Principles of Telegraphy - Teletypewriter"). Baud rates determine the precise speed ratios

and a frequency counter can be used to set the speeds. In the Kleinschmidt, the motor shaft revolves at 3600 RPM for operation at the WPM speeds marked on the gears. Speeds may also be set by trial and error copy and that is how I did the job. Operation over the range 60-100 WPM is possible with 100 WPM gears installed; however, the speed stability at 60 WPM leaves something to be desired. I am using 67 WPM gearing and running the motor up to 5400 RPM for 100 WPM copy. This seems to pose no particular problem for the motor since it will run much faster yet at full voltage - even under full load. I doubt that the additional bearing or brush wear is significant in amateur service. The 67 WPM gearing results in nearly normal shaft speed (roughly 3240 RPM) at 60 WPM. Motor momentum serves to smooth out speed fluctuations caused by the rapidly clutched load.

Some comments on adjustments are

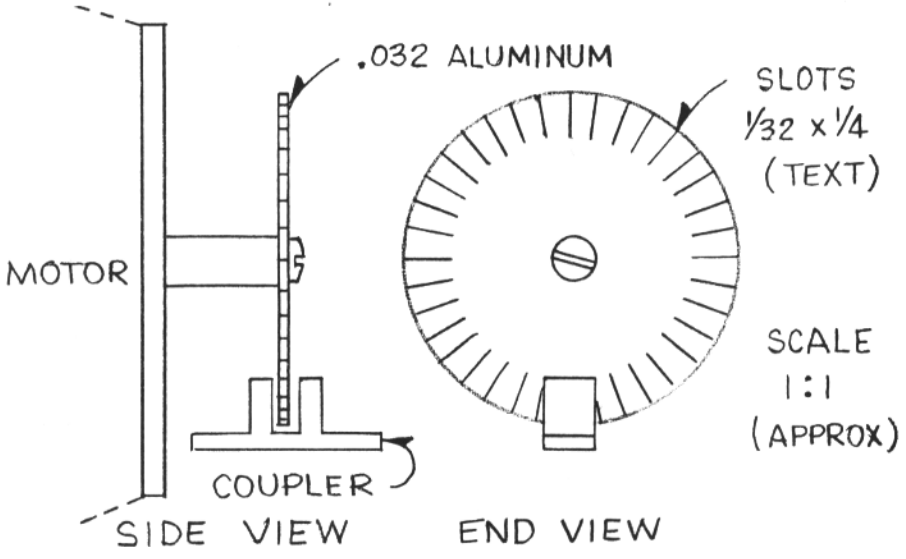


FIG. 1 PULSE TACHOMETER

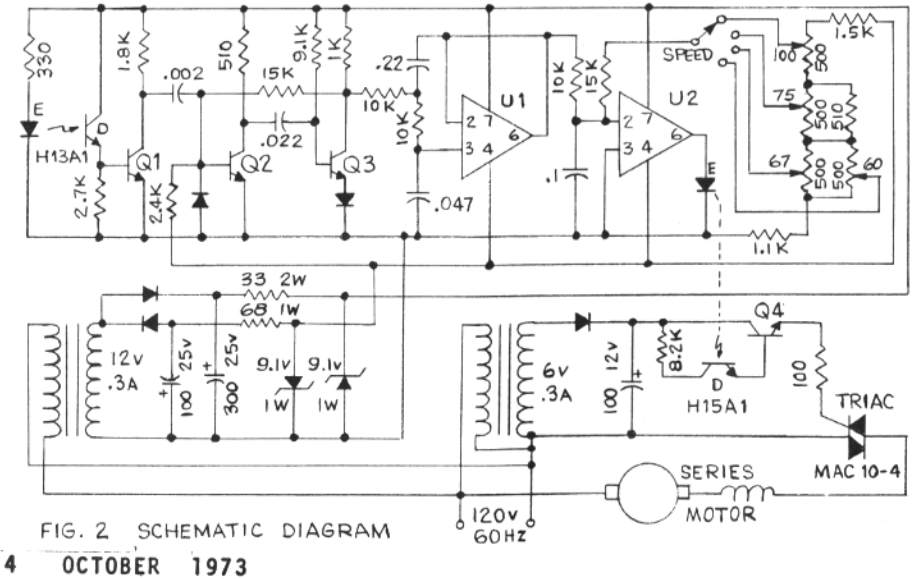
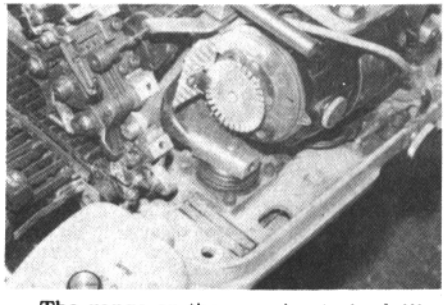


FIG. 2 SCHEMATIC DIAGRAM

in order since no two pulse wheels or photo couplers will be identical. The 330 ohm LED dropping resistor and the 2.7K resistor in the base of Q1 may be changed, if necessary, to produce clean, steady trigger pulses at the base of Q2. The 15K feedback resistor may be disconnected for this test. With the 15K resistor in place, the monostable pulses at the collector of Q3 must not overlap at the maximum pulse wheel speed. This may be checked with a scope or by observing the dc voltage at the collector of Q2. The voltage should be **proportional** to pulse wheel speed over the desired speed range. Further, the voltage should be about 3 volts at maximum speed. Decreasing the .022 timing capacitor or decreasing the 9.1K timing resistor will narrow the pulses and reduce the average voltage. The best combination is that which permits the maximum voltage while maintaining linearity to 100 WPM.



The range on the speed pots is deliberately restricted to make adjustments easier. The values shown, together with the 1.1K resistor to ground, allow exact **speed ratios** to be set. Exact **speed** settings, however, may require changing the 1.5K upper divider resistor or the 15K op-amp input resistor to compensate for zener diode tolerances, resistor tolerances or gearing different from that described.

One precaution should be observed on the triac: do not connect a capacitor, even a small one, directly across the triac or load. The surge current at turn-on can destroy the triac instantly. A resistor of at least 22 ohms should be inserted in series with any capacitor which may be present or added for noise suppression. My unit caused some receiver hash while on the bench but quieted down completely when installed in the machine and connected to the built-in RF filter. The MAC10-4 triac is mounted to the chassis with the insulating hardware supplied and should handle loads to at least 3 amperes. Higher current triacs or better heat sinking will permit the use of this control with larger motors. Remember that the triac must supply 5-10 times normal current while the motor is accelerating from zero speed at turn-on. Also, additional gate drive may be required and a boost in gate power supply.

None of the components used is critical except the timing resistor and capacitor should be stable types. Metal film and polycarbonate or polystyrene are suitable. If the GE photocouplers are not readily available, separate LED's and phototransistors may be used. Nearly any type NPN transistor is suitable for Q1-Q4 (I used 2N3414) and the same is true for the diodes. Signal type silicon diodes should be used in the transistor circuits and lead mount power diodes of at least 50V in the power supplies. The op-amps may be individual 741 units or the 747 dual 741/741. Pin numbers are shown for the "TO" type 741. Surplus units are available at attractive prices from various suppliers. The 6V and 12V power transformers are available from Radio Shack for about $1.50. Cost of parts should not exceed $25 even if most are bought new. I am not yet an "expert" on the Teletype Corporation machines except to note that the older ones, at least through the Model 26, have 1800 RPM synchronous motors and the governor motors are in the same general range. This would suggest the use of a pulse wheel with at least 60 slots to get the tach frequency up near the design value. With that one change, the unit should be suitable for Teletype machines with series governor type motors. It is **not** recommended for synchronous motors. Replacement series motors are available from advertisers in **RTTY Journal** and **Ham Radio** for about $10.

In summary, my variable speed Kleinschmidt has now been on the air for several months. Those patient hams who have coped with my typing, have reported no speed problems and the copy has been excellent on my end. Commercial stations have been copied at all four speeds with perfect results as far as speed is concerned. Reworking surplus machines and building controls of this sort may be viewed by some as an unrewarding chore, but the pleasure of twisting a little knob for instant speed change makes it all worthwhile for me. Now for that FRXD20 in the corner. . . . .

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New Teletype Model 40 System-

See Photo - Page 1

The Teletype Corp. Model 40 System has just been publicly announced. "Our new model 40 is a complete, versatile, reliable terminal system designed to deliver maximum efficiency for entering, displaying, editing, printing, storing, sending and receiving data in communication systems. Some of the significant features of the model 40 system are speed, easy data preparation and editing, quiet operation, and extremely low maintenance."

The Model 40 consists of four basic units: Display Monitor, Impact Printer, Keyboard (Operator Console), and Terminal Logic.

Some of the arrangements possible are: 1) Keyboard Display Printer (KDP) with the Display mounted above the Keyboard, and the Printer, a separate unit, located up to 50 feet (12 meters) away. 2) Keyboard Display (KD) with just the video Display mounted above the Keyboard. 3) Keyboard Display Printer (KDP) with the Display mounted above a combined unit which contains both the Keyboard and the Printer. 4) Receive Only (RO) Printer.

The video Display Monitor has a screen capacity of 1920 characters arranged in 24 lines of 80 characters each. All 127 ASCII characters are available. The characters are formed by a 7x9 dot matrix. A Scrolling Memory Option is available permitting up to 72 lines of data storage (only 24 of which can be displayed on the screen at one time); by depressing a scrolling key, the stored data can be moved up or down a line at a time, and by depressing the display advance key, 24 lines can be moved at a time.

The Printer delivers hard copies of data stored in the display memory or of data received directly from a communication line. The Printer speed is 314 lines per minute (monocase) or 220 lines per minute (full ASCII). The Printer will be available in friction and sprocket feed versions both of which will deliver sharp multiple copies.

The Operator Console (Keyboard) has the standard arrangement necessary to deliver all ASCII code characters. In addition, there are six cursor positioning keys, five editing controls, and keys for Send, Receive, Local and optional control functions.

Some of the technical details are: The system has serial interface operating at 105 or 120 CPS (characters per second); 120 CPS equals 20 words/second or 1200 WPM! Transmission is serial by bit and character, operating asynchronously (1 start bit, 7 information bits, 1 stop bit, 1 parity bit) using 1968 ASCII. It operates in a half duplex mode into the switched network at 105 or 120 CPS using Bell System Data Sets 202C, 202R, or equivalent, with other speeds optional. Even vertical parity detection is used on received data with a substitute character printed for odd parity characters. The Keyboard generates even vertical parity. Power requirements are 117 V, 60 Hz.

***

VOLTA CONTEST RESULTS

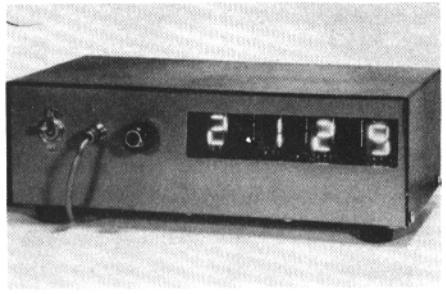
1	WA3IKK	152.810	19	i1EVK	44.884
2	W3VJP	106.848	20	FO8BO	44.154
3	i5MPK	103.232	21	i5CW	42.107
4	i1BAY	95.004	22	i1CZW	35.475
5	DL2AK	86.485	23	SM6AEN	30.381
6	W1GKJ	76.275	24	VP9GE	29.986
7	W3KV	74.152	25	WA8GVK	29.652
8	i6CGE	72.610	26	PY1DCB	29.532
9	G3MWI	68.770	27	WØNP	27.948
10	VP7NH	65.135	28	PY2CBS	27.434
11	W4CQI	61.600	29	WØHAH	27.094
12	iZ9ZWS	59.532	30	K4VIM	26.443
13	WA2YVK	55.022	31	F9RC	25.710
14	VK6PG	54.652	32	G3LDI	21.866
15	XE1WU	54.465	33	UK4FAD	17.997
16	W4EGY	51.299	34	SM3DKL	17.824
17	K6WZ	47.249	35	ZL2ALW	17.719
18	iS1AOV	45.908			

***

"Freeman",KH6AX, with Mary Pickford.(Not a recent photo)

Low Cost RTTY Counter--

BERT KELLEY, K4EEU
2307 S. Clark Ave.
TAMPA, FL. 33609



THE RTTY COUNTER

With most digital counters costing at least $150, it may be difficult for the occasional user to justify this investment. If simple construction is used and the deluxe features omitted, it is possible to build an excellent counter for about $50.

The frequency range is limited to the audio range, or a maximum reading of 9,999. Though there are ways of increasing this, to be explained later, actually this is not a great disadvantage as it is in the range most useful for bench work when building demodulators, adjusting AFSK's, or checking shifts. If the counter is attached to the audio output of the receiver, it can be used to check shifts of incoming stations. The counter uses a simple time base derived from the AC power line. Tests show that the counter will measure within three hertz at the maximum input of 9,999 hertz; with the error decreasing with frequency to plus or minus a maximum of 1 hz at 3,333 hz. This means there is no significant error at the teletype frequencies of 2125, 2295,, or 2975 hz.

Except for these concessions to economy, the counter has many of the features of the expensive instruments, including zero's blanking, bright non-blinking readout, a precision regulated power supply, and the same TTL circuitry that in other counters will operate to at least 18 or 20 mHz. The design is expandable and the counter module can be lifted, intact, and used at a future date to make a more sophisticated eight digit counter by simply adding another module.

It is a good project to experiment with TTL because cost is low, it's easy to build, a very handy instrument results, and the original investment is not lost if you decide to improve it later. First, the construction of the basic model.

The main assembly is a 4 x 4 3/4" epoxy circuit board which contains the four readout tubes and 17 integrated circuits. The circuit is similar to the W7TX frequency counter (1) with the exception of the use of RCA Numitron readout tubes, and minor changes in pin designations to facilitate printed circuit layout. The board has been designed specifically to make construction easy so it has all the circuits for TTL level-conditioning, timing, RF gating, transfer, and reset. Further technical data on the circuit can be obtained from the article referenced. Numitron tubes are used because they will operate from the same power supply as the logic, which of course almost halves power supply costs. The tubes require about 100 ma. per digit, at about 4 volts.

The decoder for the Numitrons, the 7447, has a clever zero's blanking circuit which turns off tubes not involved in the count. This feature becomes more significant in an eight digit instrument where left-hand unused zeros would be dark when not needed. The circuit is activated by grounding the number five pin on the decoder, when jumpers are installed where indicated. If the five pin is left floating, the blanking feature is disabled, and the tubes will always display something while the instrument is on, even if it is a row of zeros.

INPUT CIRCUIT

While it would be unsatisfactory for HF or VHF use, the simple potentiometer input level control circuit gives both low circuit loading and excellent protection against high input levels, and is a good choice for the audio range in which we are interested. The two transistor source-emitter follower circuit is used in a commercial counter (2) and can be wired direct by the leads or a small circuit board used as shown. The circuit has high sensitivity and several of the local broadcast stations could be tuned in and read on the counter with the aid of a single selective circuit. The 7404 TTL level conditioning IC is part of the input circuit, and is included on the etched circuit board so that different front circuits can be used, or bypassed entirely if not required.

TIME BASE

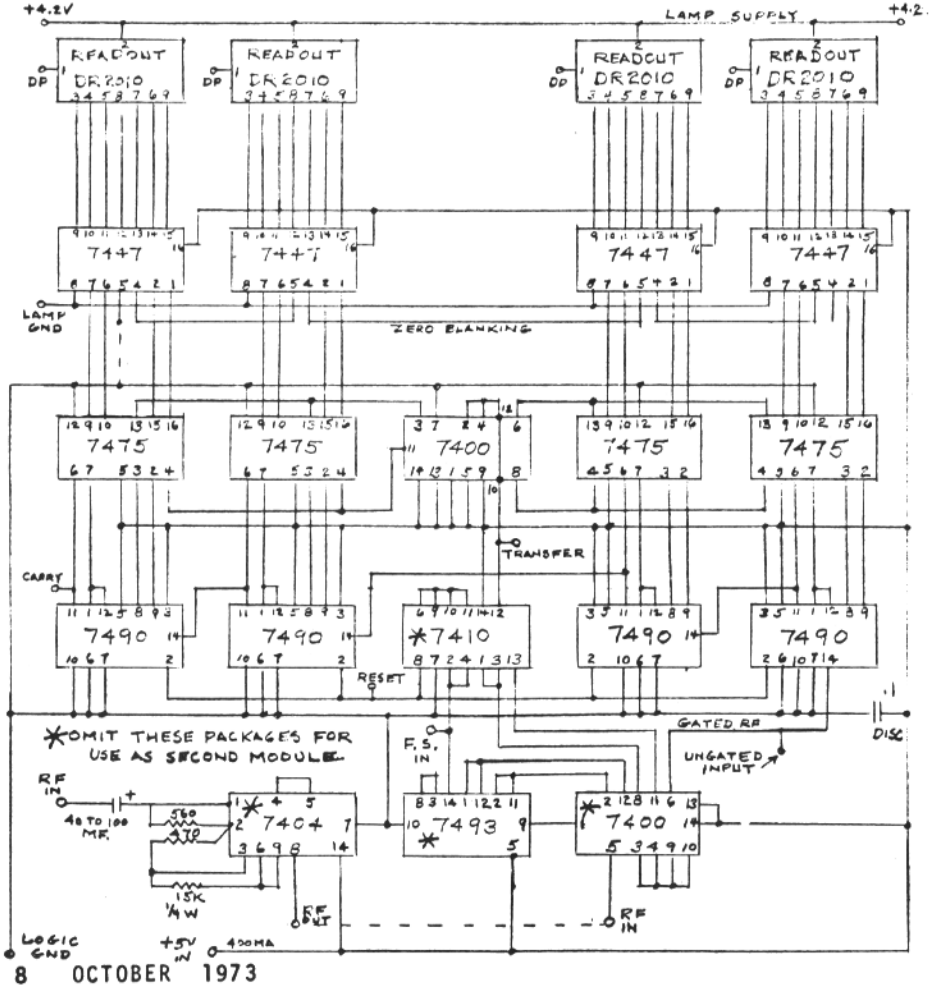
The timing circuit requires a ten hertz input for a one second counting interval. The input terminal is marked

"FS" on the board and is connected to an optional switch so either external, or the internal AC line derived time base may be used. There is little justification for a "better" time base than that obtained from the power line while measuring audio. The 60 hz AC wave is filtered to remove spikes and then drives a transistor-IC combination which is actually a decade counter strapped so that it resets itself at the sixth count. The few parts required are mounted on a small etched or perf board at the back.

POWER SUPPLY

A LM 309K is used for the regulated 5 volts at 800 milliamperes and makes the simplest power supply available. The case of the regulator is directly bolted to the chassis, but this is not enough heat sink if the unregulated is 18 volts. Therefore a larger heat sink should be mounted under the regulator, or the voltage reduced, as was done in this unit. A 5 ohm resistor dropped the unregulated to ten volts. This should be checked with a meter to determine the unregulated is at least eight volts, preferably more.

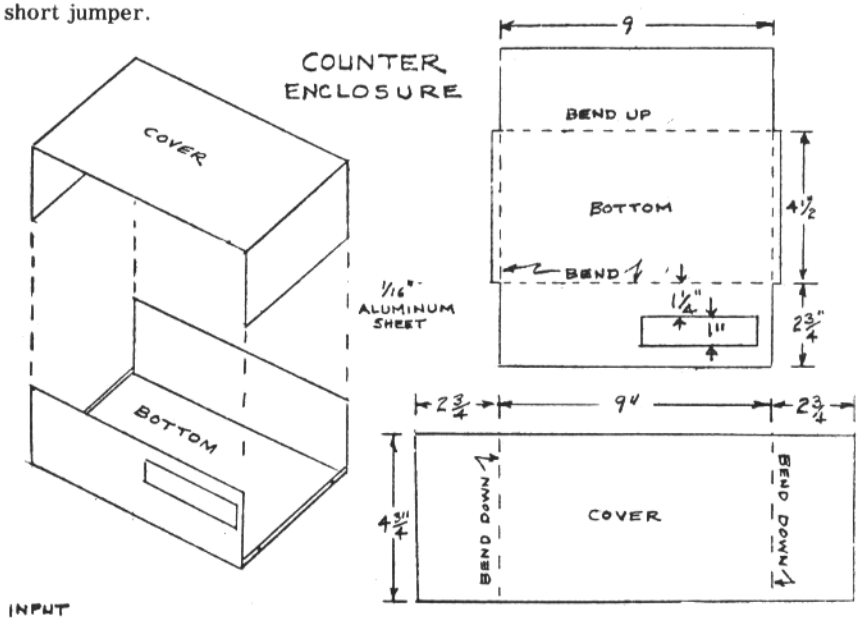
The 3,000 mfd capacitor is the minimum value. Also note the ceramic disc capacitor which is recommended by the IC manufacturer to prevent RF oscillations. The readouts operate at a slightly reduced voltage obtained by wiring a 1 amp power diode in series with the lamp supply lead. Be sure to run separate wires from the power supply to the lamp and logic supply terminals on the board. Also run separate ground leads. Terminals are provided on the circuit board. If this is not done, there may be some slight problems caused by voltage regulation. The tip off is a indicated count of a few cycles with no input, or sometimes a slightly high count, from a known accurate source. In this unit, this was corrected by the separate supply leads, and using only three stages of the 7404. There is a question that the four cascaded stages of the original circuit (2) is not too much gain on a single IC chip. It is recommended that the output be taken from pin 6 of the 7404, leaving the last inverter connected. This can be done with a short jumper.

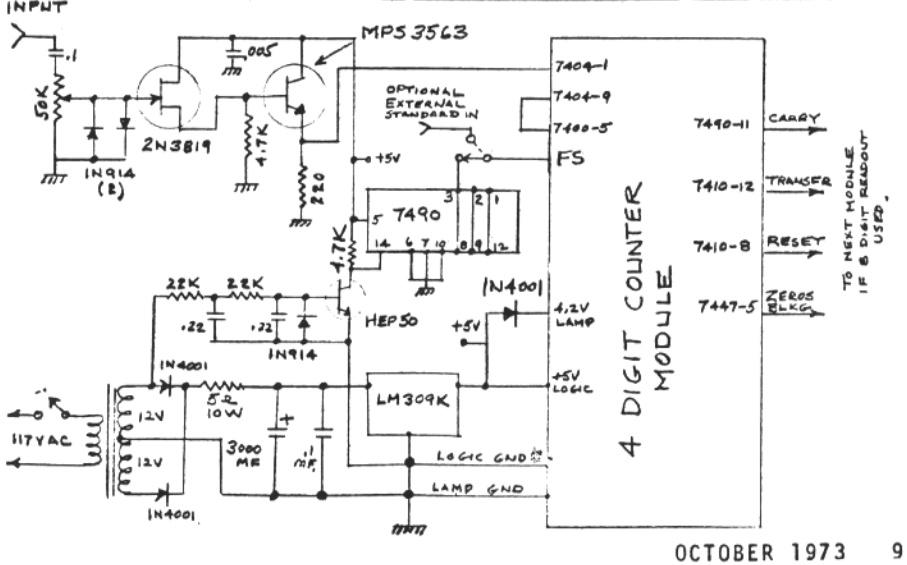


CONSTRUCTION

The counter enclosure was bent on a vise using scrap aluminum obtained from an old chassis. Square bends can be made by extending the effective width of the vise with short lengths of angle iron clamped in the jaws. Then, after bending edges are finished with a hammer by holding another small aluminum piece over the work and using light blows to prevent dents. The home-built cabinet has better access, and does not

CONTINUED ON PAGE 17





List of RTTY Awards--

There have been many Awards made available to the RTTY amateur over the years and what we have tried to do here is gather them all together in one place for handy reference. The collection may not be complete but are all those we are aware of at this time. As others become known or made available to the RTTY'er we will add to the list at some future date.

We would also like to make you aware of the many fine Awards made available by the sponsors of the RTTY Contests that take place every year. They range from beautifully engraved Plaques, to gold, silver and bronze medals, down to really fine certificates for call area winners. Give it a try, you may be surprised how easily you may win one of them.

100 - DXCC - RTTY
"100 DX Countries Confirmed on RTTY"

The RTTY Journal will present the 100 - DXCC - RTTY Award to any amateur that produces proof of two-way radioteletype contact with 100 different countries. The ARRL Country List will be the final authority as to what constitutes a country for amateur radio purposes and we would advise that those interested obtain a copy of "Operating Aid Nr. 7", which is available from the ARRL.

There is no charge for the Award and it is in the form of an attractive engraved Plaque that any amateur would be proud to display. Once the Award is obtained additional "endorsements", to be attached to the Plaque will be awarded for additional countries confirmed, in multiples of Ten (10).

Application for the Award is to be made in the following way:

1. Submission of 100 or more QSL cards along with a list of the countries claimed. These are to be sent to - DX - Editor, RTTY Journal, P.O. Box 73, Blue Bell, Pa. 19422. Registered mail should be used and sufficient return postage in the form of U.S. funds or IRC should be included to have the cards returned in a like manner.
2. Less than 100 QSL cards with the balance of confirmations to be as follows. The Journal will accept written transcripts from any valid RTTY Contest Log when properly authenticated by the Contest Committee of the Society or Group running the contest, provided of course that both parties concerned submitted logs for the Contest concerned. Only contests held after January 1, 1972 will apply and it would be advisable to make such requests as soon as possible after the particular contest results are published, as we doubt that such records are held for more than a year.

The following 100 - DXCC - RTTY Awards have been issued

Nr. 1	Arthur Blave	ON4BX
Nr. 2	John Possehl	W3KV
Nr. 3	Giovanni Guidetti	11KG
Nr. 4	Robert Deseck	ON4CK
Nr. 5	Charley Latham	W5QCH
Nr. 6	Dusty Dunn	W8CQ

QUARTER CENTURY AWARD

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

Measuring 10" by 13" and printed in Red and Green the Certificate makes an attractive addition to any Amateur Radio Station. Endorsement stickers are available for each additional 25 countries.

Application for the Award may be made by the following methods:

1. Submission of QSL Cards for the countries being claimed. These cards are returned to the owner after checking. Alternatively, submission of Photostat copies or clear photographs of the cards. Such copies should clearly show the call sign of the Amateur making the claim and also establish the fact that the contact was made using RTTY as the mode of communication. This type of claim must be witnessed and signed as accurate by TWO other licensed Amateurs.
2. Claims may also be accepted based on a Contest Log submitted for any Contest sponsored by the British Amateur Radio Teleprinter Group. The claim for the QCA Certificate should be made at the same time as the contest log is submitted.

The cost of the certificate is 2 Dollars U.S. or 8 IRC.

Send your claims to:
Ted Double G8CDW
BARTG Contest & Awards Manager
89 Linden Gardens
Endfield, Middlesex, England.

ADDITIONAL NOTE: Holders of existing QCA Awards will automatically have any new additional countries added to their records when they submit Logs for any BARTG RTTY Contest.

W A S AWARD

WAS means "Worked All States". An Amateur, anywhere in the world, who succeeds in getting confirmed contacts with all fifty U.S. states and sends them in for examination, may receive this Award from The American Radio Relay League, 225 Main Street, Newington, Conn. 06111. There is a nominal service charge to those amateurs located within the League's operating territory (U.S., possessions, Puerto Rico, and Canada) who are not ARRL members. For others there is NO charge, except postage which is expected to accompany the cards.

You may make the contacts over any period of time and on any or all amateur bands. You may have your WAS Award issued for some special way in which you made it, in this case, ALL RTTY, - only provided that all cards submitted plainly show that the contacts took place "2 x RTTY".

Before you send your cards, drop the ARRL a line requesting a copy of the rules and an application blank.

ALL STATE RTTY AWARD

The Florida RTTY Society issues an "ALL STATES AWARD" which is awarded to any RTTY operator for two way RTTY contact with all 50 States.

QSL cards confirming contacts must be sent to the Secretary by registered mail and sufficient postage must be included to return the cards by the same class of mail. There is no other fee involved. The ASA certificate is one you will be proud to own, and if you can qualify you are urged to submit to the Florida RTTY Society, Inc., 3039 Mango Tree Drive, Edgewater, Florida 32032.

WORLD RTTY CHAMPIONSHIP

This Award which is sponsored by the Italian Magazine "CQ Electronica" is organized in order to promote greater interest for the RTTY'er taking part in the various Contests during the period of one year.

At the present time the Contests which provide scoring points towards this Award are as follows:

BARTG SPRING CONTEST
DARC WAE CONTEST
SARTG RTTY CONTEST
CARTG WORLD-WIDE RTTY SWEEPSTAKES
A. VOLTA RTTY DX CONTEST
GIANT FLASH RTTY CONTEST

The task of administering the CHAMPIONSHIP is shared between several of the RTTY Groups.

In order to arrive at the final score and to decide the winner, the following point system is used for each Contest: 30 points to the winner, 25 points for 2nd place, 22 points for 3rd place, 20 points for 4th place, 18 points for 5th place, 17 points for 6th place, 16 points for 7th place, and with one point less for each place to 22 for which 1 point is awarded and all other entrants will also be credited with one point.

For the final score each year, only the best 4 scores (out of a possible 6) of each operator will be used.

In order to take part in this Award it is not necessary for entrants to send in a claim as the entries of all competitors in all six Contests will be automatically included.

WORKED SCANDINAVIA RTTY AWARD
W S R Y

This is a very attractive Award and the first of a series issued by the Scandinavian Amateur Radio Teleprinter Group, S.A.R.T.G.

Any station that has worked the following number of Scandinavians on TWO-WAY RTTY can apply for the "WSRY" Award.

For Scandinavians:	25 QSO's needed
For Europeans (non-Scandinavians)	16 QSO's needed
For Non-Europeans:	8 QSO's needed

All contacts are to be after May 1st, 1970. All Amateur bands may be used. Send a list of the contacts, (no QSL's needed) with all information, date, time (GMT), and band, along with $1.00 U.S. SKR 5, or 10 IRC, to:

S.A.R.T.G. Contest and Awards Manager
Bo V. Ohlsson, SM4CMG
Box 1258
S - 71041 Fellingsbro, Sweden

The countries/prefixes used in Scandinavia are: LA (Norway), JW (Swalbard), JX (Jan Mayen), OH (Finland, OHØ (Aland Island), OX (Greenland), OY (Faeroes), OZ (Denmark), SK/SL/SM (Sweden), TF (Iceland). All of these prefixes are not geographically in Scandinavia but they are all considered for the Award.

E U R D

The Deutscher Amateur Radio Club (DARC) issues the "Europaeisches RTTY Diplom" (EURD) to promote amateur RTTY activities. The Award is managed by the Deutsche Amateur Fernschreib Gruppe (DAFG). The Award is available for all radio amateurs and club stations holding an official RTTY license. It is based on two way RTTY contacts with different European contries and prefixes.

1. The EURD will be issued in 3 classes: EURD III, EURD II, EURD I.
2. The EURD III requires written confirmations (QSL) from at least 20 different countries (regardless of the band used) and a minimum of 100 prefix points.
   A. The European countries are determined by the European Country List.
   B. Each official European prefix counts one (1) prefix point PER BAND.

EURD II: 150 prefix-points in 30 countries.
EURD I: 200 prefix-points in 40 countries.

3. All amateur bands (incl. VHF) may be used.
4. All WSLs must confirm "Two Way RTTY" or "RTTY" and be dated after January 1st, 1965. Any altered or forged confirmation will result in disqualification of the applicant.
5. Contacts during the RTTY WAE DX Contest (RTTY WAEDC) can be used for EURD endorsements provided the log of the requested station is also received. Therefore, claims should not be made before publication of contest results. Such requests must be made within two years after the contest.
6. The fee for each certificate is DM 5, or 8 IRC.
7. Send application, QSLs, and fee to:
   DAFG, Award Manager
   Postbox 1663
   D-4140 Rheinhausen, West Germany.

European Country List - C31 - CT1 - DL,DM - EA - EA6 - EI- F - FC - G - GC Guer - GC Jer - GD - GI - GM - GM Shetland - GW - HA - HB9 - HBØ - HV - I - IS - IT - JW - JW Baer - JX - LA - LX - LZ - MI - OE - OH - OHØ - OK - ON - OY - OZ - PA - SM - SP - SV - SV Crete - SV Rhodes - TA1 - TF - UA 1346 - UA 2 - UB5 - UC2 - UO5 - UN1 - UP2 - UQ2 - UR2 - UA Franz Josef Land - YO - YU - ZA - ZB2 - 3A - 4U1 - 9H1.

D R D

The Deutsche Amateur Fernschreib Gruppe (DAFG) issues the "Deutsches RTTY Diplom" (DRD) to promote amateur RTTY activity. The Award is issued each year (Jan. 1st to Dec. 31).

1. The DRD requires 25 points for stations outside Germany and 50 points for German stations (only 26 for holders of "C" license).
2. Each QSO with a German RTTY station counts 1 point on shortwave and 2 points on UHF/VHF.
3. Bands:
   for stations outside Germany: all bands 3.5 thru 432 Mhz.
   for German stations: 3.5, 7, 144, 432 Mhz bands.
4. No QSLs are needed. Send summary of your log confirmed by two radio amateurs or your radio club.
5. The fee is 5 DM, or 8 IRC.
6. Send summary, application and fee to:
   DAFG Award Manager
   P.O. Box 1663
   D-4140 Rheinhausen
   West Germany

W A C - R T T Y

This Certificate was originally conceived by the RTTY Society of Southern California and issued by the RTTY Magazine, predecessor to the RTTY Journal. It is presently issued by the DX Editor of the RTTY Journal and all requests should be sent to - P.O. Box 73, Blue Bell, Pa. 19422.

In Physical appearance it is very similar to the regular WAC Certificate as issued by the IARU, both as to size and format. The requirements are that you submit proof of two-way RTTY contact with the six Continents - North America, South America, Europe, Africa, Oceania, and Asia. There is no charge for the certificate and it is forwarded via 1st Class mail. Postage to cover mailing and return of your cards is very much appreciated.

To make it somewhat easier for Amateurs in remote areas to receive the Award and to minimize loss of cards in the mails we have at the present time a working arrangement with the Contest and Awards Managers of BARTG and SARTG for verification of WAC-RTTY. If you enter one of the annual Contests sponsored by the above Groups you may, at the same time you submit your log for the Contest, put in a claim for WAC if this had been accomplished in the course of the Contest. If the other stations submitted logs and the claim is verified by the Contest Committee I will be notified in writing and the Certificate will be issued. This service is not retroactive and must be done at the time the Contest log is submitted.

RTTY theory & applications.

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

RTTY for Beginners- Part 6

An AFSK Keyer

Last month we described the two principal methods used to transmit a RTTY signal: 1) Frequency shift keying (FSK), and 2) Audio Frequency Shift Keying (AFSK). It was shown that they are in some ways quite similar in that the frequency of an oscillator is shifted between two different frequencies as the contacts on the keyboard of a teleprinter open and close. In the case of frequency shift keying, the frequency of the oscillator within the transmitter is shifted. This is usually accomplished by slightly modifying the oscillator circuit within the transmitter. Consequently, no circuit for a frequency shift keyer was given because the actual circuit depends upon the specific make and model of transmitter being used.

In the case of audio frequency shift keying, the frequency of an audio oscillator is varied between two different frequencies as the keyboard contacts open and close. The output of the audio frequency shift keyer is connected to the microphone input of a voice transmitter (AM or FM). Because the AFSK keyer is not built into the transmitter, essentially any AFSK keyer can be used with any voice transmitter. (Of course, the input impedance of and level required by the transmitter will have some effect upon the specific requirements of the AFSK keyer, but the restriction can be considered minor.)

This month we are going the present a circuit for a simple but quite good AFSK keyer. This is essentially the same keyer presented in this "column" about a year ago; the only noticeable difference is that a positive 24-volt supply is required this time and the transistors are the 2N3819 which is cheaper than the one used previously.

THE AFSK KEYER

Although an AFSK keyer can be built with a single oscillator and a capacitor placed across its turned circuit to shift the frequency, more versatility and reduced keying transients can be obtained by using two separate continuously-running oscillators whose outputs are "gated" by the opening and closing of the keyboard. The two major advantages of separate oscillators (one for mark and one for space) are:

1) The frequency of each oscillator can be adjusted independently of the other, and
2) The levels of mark and space tones can be independently adjusted.

The circuit will be described briefly and then various portions of the circuit will be described in some detail.

The oscillators use the familar Hartley circuit consisting of an 88 mH toroid shunted by the proper amount of capacitance to give the required 2125 and 2975 Hz resonant frequency. The values shown for C3 and C4 are the approximate values required. The exact values should be determined by measuring the output frequency and adjusting the capacitors until the frequency is proper. The capacitors can be "varied" by shunting small mica capacitors across C3 and C4 or by using Arco mica trimmers.

The oscillator transistors are TI 2N3819's. These are N-channel junction field effect transistors. The resistors R1 and R2 and the capacitors C1, C2, and C5 are for decoupling. R1 and R2 can be used to measure the drain current on the transistors. It should be from 4 to 8 mA.

The keyboard is connected into a "loop" composed of R6, R7, and R8; the loop is fed from 130 V or higher. R6 is adjusted to give a loop current of 60 mA. (Actually, R6 is not really necessary and the loop current does not have to be set to 60 mA unless a selector is also put into the loop. The selector is undesirable for reasons described later, but "force of habit" or good telegraph practice indicate that 60 mA is desirable.)

Assuming that R6 is present and it has been adjusted to give 60 mA loop current, during marking condition from the keyboard (contacts closed and 60 mA flowing in the loop) the potential at point "A" is approximately +48 volts; during the spacing condition (no loop current), the potential at point "A" is approximately 0 volts. This variable potential is coupled into the diodes D1 and D2 thru a delay network composed of R9, C6, and R10. The varying potential at point "A" causes one or the other of the diodes to conduct. For example, during a mark the potential at point "A" is 48 volts; this voltage causes diode D2 to conduct or gate the output from the mark oscillator into the output amplifier Q3. The output from the space oscillator will be blocked from Q3 because D1 is reverse biased.

During a space, the voltage at point "A" is approximately 0 volts causing D1 to conduct and D2 to open. Therefore, during a space the output from the space oscillator is connected to Q3 via D1 and the output from the mark oscillator is blocked from Q3 by non-conducting diode D2.

R4 and R5 control, independently, the levels from the two oscillators while R11 controls both levels simultaneously.

The network composed of R12, L3, and C7 is essentially a "simple-minded" band pass filter. The output stage is a common-source amplifier transformer coupled to the transmitter audio input circuit.

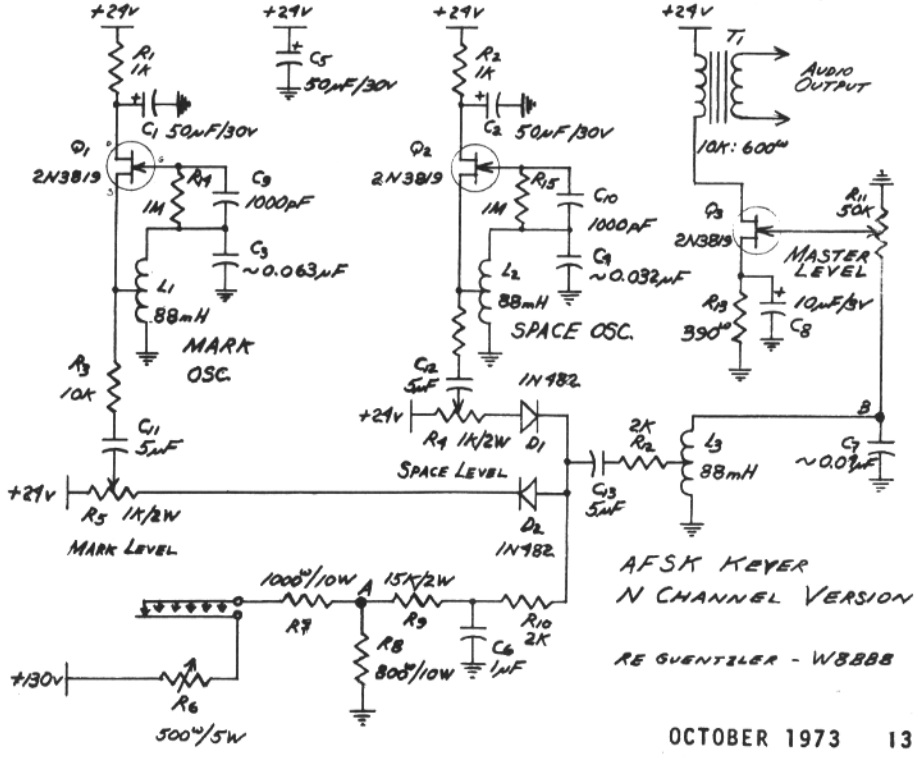
Capacitors C1 and C2 can be any value greater than 1 uF. C5 should be as large as possible.

It was found that the frequency of the oscillators changed less than 1 Hz when the supply voltage was varied from 18 to 26 volts. With stability that good, no regulation is required.

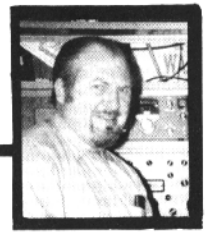
The diodes should be silicon junction diodes. This is desirable in order to get a good forward to backward resistance ratio with the magnitudes of oscillator and switching voltages available. We used the 1N482 because it was (and is) readily available. (Allied Cat. No. 49 C 12 1N482-SYL at $0.66 each.) (Insidentally, that makes the total cost of transistors and diodes $4.02, which isn't too bad!)

The switching delay network composed

CONTINUED ON PAGE 20



RTTY-DX



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

Hello there . . .

We doubt that anyone who took part in the SARTG Contest in mid August can deny that the conditions were excellent and activity at a high level. The new rules with three eight hour operating periods and eight hour rest periods in between worked out very well and made the usual contest mayhem very relaxing indeed. The operating sessions spaced out as they were gave all areas of the world an equal advantage of propagation conditions. As usual, Twenty meters bore the brunt of activity and with the progressive decline in sun spot activity Ten was practically written off as lost except for some ground wave activity to pick up a few multipliers. Fifteen had a few sporadic openings of short duration but you had to be there at the right moment or they were gone. Forty was very active as a DX band and should be increasingly so in future contests. Summer static played havoc with Eighty in the northern latitude for much DX work but many took advantage of the local multipliers available on that band. Perhaps North America could have been better represented with each call area in the U.S. and Canada a separate multiplier and perhaps many did not realize that three contacts within W or VE was equal to a rare DX contact for points. Some of the rare DX reported active would do justice to any contest in any mode. Many of you worked, and some of you missed, such goodies as VU2KV, OH2BZ/BW, EP2WB, ZS3B, ZS6BBK/BBL, YU2CAL, DU1PT, ZD9GC, ZS2Mi, HG5A, LX1JW, OK2OP, VP2KH, YA1OS, ZL2ALW, VK6KR, KZ5LF, XE1YJ, OE9ERI, CE3EX, HK3SO, UA9PP, OA4LM, KJ6BZ, KH6AG, JA1BLV, KG4AA, HM1BB, this being only a partial list of what the contest had to offer.

Joe, 7Q7JO, has been on the band again fairly regular and has been coming thru quite well in these parts at around 11-1200z long path. Joe suggests that the T part of the RST report is quite meaningless on RTTY and it could perhaps be put to better use as an indicator of the quality and correctness of the RTTY signal being received. Some suggested indications could be as follows--

T1-Heavily space biased with too wide a shift.
T2-Heavily mark biased with too wide a shift.
--
--
T6- Shift good but your AFSK not properly adjusted
T8-Keying good, shift good but inverted.
T9-Keying good, shift good, excellent signal.

If you fellows would care to submit suggestions on a 1-9 scale we will be glad to put them all in a box, shake it up, and try to come up with a workable plan.

That severe tropical disturbance you might have heard one evening early in August turned out to be Rudy, 8R1W, making one of his rare appearances on the mode. The pile-up was fantastic and again the main topic of discussion being about QSL cards for prior contacts. All were again assured that the cards have been sent out and it is merely a matter of "wait and see."

James, YJ8JS, has an improved antenna system and his signal is now booming into the East Coast U.S.A. W2LFL was first to make contact with James from this area with quite a few "breaking and entering" when Bud was finished.

Bud scored another first in early August with a contact with John, 5T5LO, a new station in Mauritania, While the honors for the first RTTY activity from this country go to Alban, 5T5AD back in 1967 it sure is a rare entry to put in anyones log. Contacts were progressing nicely when his keyboard went bad forcing a QRT. John promised to be QRV again as soon as repairs are made. If you had a QSO the QSL can go via his manager, who is-- Mas Seo, K9KXA
6430 N. Lakewood Ave.
Chicago, Ill. 60626

Another keyboard malfunction forced early shut-down of the DX-pedition to Bonin Island. Mac, JD1AII, fired up on 3August but only a few contacts were made before the breakdown which was not repairable on the island. Gin says that the location will be activated again in the future so that those that missed him will have another opportunity. At about the same time that JD1AII showed all ears were sharply tuned for some bands from JD1AGZ on Marcus Island. At this writing the latest word is that they are still waiting for the RTTY license from Japan and activity could commence at any moment as the station is all set to go.

The next RTTY Contest coming up is the CARTG and we are pleased to announce that a new country will be active on RTTY during the Contest period on all bands. Hans, DJ8BT, and a group of German hams including Ralf, DC1ZI, and Hans, DK1HP, will put the International Telecommunications Union station 4U1iTU on RTTY for the first time. QSL with IRC's go to--

Hans Juergen, DK8BT
Heddernheimer Landstr. 254
6000 Frankfurt/Main 50
West Germany

Some exciting news from OZ4FF, President of the SARTG. Two Olivetti machines and parts for a ST-5 have been sent to the Faeroes "OY". A station should be active from there in about a month. A machine is also available for Iceland "TF," where they already have a ST-5. A local airline will deliver the machine free when space is available so there should also be activity from here very soon if it has not happened already.

Sid, VP2KH, sends word that there are machines available in the Caribbean area FREE except for shipping and crating charges. The machines are located on Trinidad and are Creed Model 7B, 220 volt. Anyone in the area that is interested should contact--

International Airadio
Attn. Mr. Lockyer
P.O. Box 1255
Port of Spain, Trinidad

This month the WAC Award went to-
Nr.211 Bo Lindgren YA1OS

We had noticed in the past several months many of the applications for WAC included YA1OS for the Asian contact and now it is Bo's turn to get the Award himself. A political coup took place in Afghanistan in July and Bo was not sure he would make the Contest. Apparently things got back to normal as Bo was right in there during the Test.

This bit of information should have been added to the previous paragraph. Sid, VP2KH, says that the only delay now for his trip to VP2M is further instructions from the UK regarding the project and the license for Montserrat. In a QSO as this was being written Sid was getting things nailed down in anticipation of hurricane Christine. We hope that she was not in a bad mood.

The boys in the Netherlands were able to use the prefix PA25 for a few weeks this Summer. Gerard PA25GKO was very active during that time and the occasion was to commemorate the 25th year of the reign of Queen Juliana.

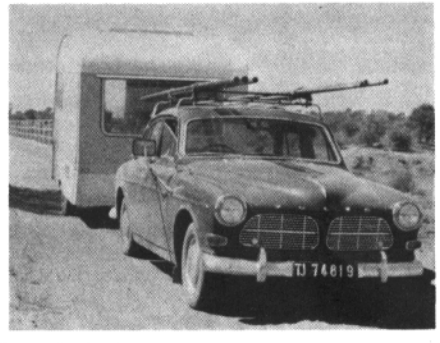
RTTY-DX October 1963

FG7XT has a Model 28 printer, a 14 Reperf, and a 14 TD and hopes to be QRV before the end of the year. F9RY/FC expects to be QRV shortly. In Denmark OZ5EL, OZ5JT, OZ7OU, OZ8US, and OZ9DR are active.

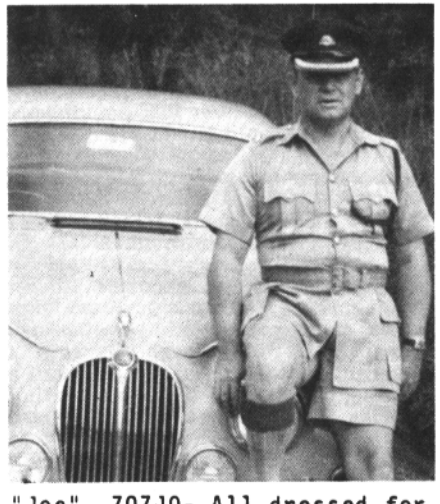
In addition to above credits thanks to W3DJZ. W5EUN, and K6WZ for making this thing easier to write.

73 de John

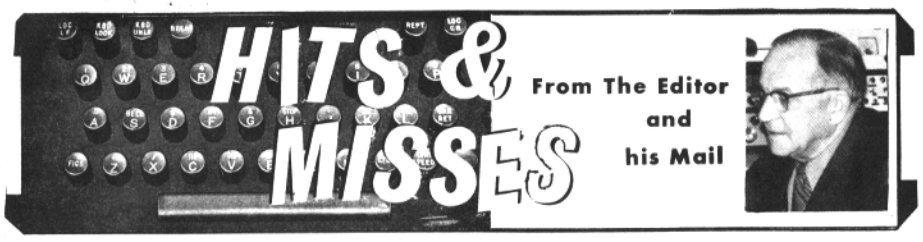
***



"Jan" ZS6BBK on way to BOTSWANA A2CAK...



"Joe", 7Q7JO- All dressed for work in MALAWI.



After a summer of low RTTY activity and poor band conditions it was a pleasant surprise to find so much activity during the SARTG contest. Band conditions were excellent, at least from the states, during all three periods of the contest. It makes you wonder if conditions are often good but everybody is listening. One good thing about the contests is bringing everybody out of the woodwork for at least a couple of days.

***

It won't be long after you read this until the CARTG contest takes place. This has always been the leader in entries and action of all DX contests. (See last months Journal for rules). For those of you new at RTTY, or anyone interested, this is an excellent chance to add extra countries - or compete for some of the awards listed in this issue. It would be nice also to find some action on 80 meters statewise and not only pick up extra points but maybe work some new states or Canadian providences. Check John's DX column, several new countries should be represented also.

***

Several times we have had JOURNAL subscribers send some extra money with instructions to send a subscription to some foreign amateur that would appreciate it, but unable to subscribe. This is in no way a plea for similar donations, frankly the number of possible recipients we KNOW of are limited, but if any readers want to suggest someone we will be happy to keep them in mind.

***

A nice note from Bruce, ZLIWB, who was our first RTTY contact from "down under" many years ago, says he has made contact on RTTY through "Oscar 6" to several stations in Australia as well as printing other stations from time to time. Wonder who else has made contact on RTTY with the satellite. Bruce says 850 shift is being used exclusively. He uses a SCR522 converted into a transverter and another SCR 522 provides 117.6 mHz injection. This drives a 4CX250 final. A corner reflector and a tri-band beam take care of the antennas. A 75A2 is used with a Marconi HSR1 adaptor for receiving.

***

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 30¢ 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. 30¢ each.

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1969-Oct.-Nov.-Dec.- [3]
1971-May -June -July-Sept.-
Nov.- Dec.- [6]
1972-Feb.-Apr.-May -July-Sept.
Oct.-Nov.-Dec.- [8].
1973-Jan.-Feb.-Mar.-Apr.-May -
July- Sept.- [7]

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Box 837
Royal Oak, Mich. 48068
Editor & Publisher 'Dusty' Dunn, W8CQ

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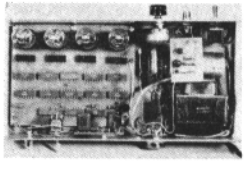
AirMail South-Central America		$5.50
Air Mail	All Other Countries	$6.00

RTTY COUNTER-

CONTINUED FROM PAGE 9

take long to make. A 5 x 10 x 3" aluminum chassis would also be suitable, if you can locate one.

An undrilled plated epoxy circuit board is available from the author for $6 or two for $10 post-paid in U.S. This speeds construction because all the time consuming layout work has been done. It remains to drill the holes with a #60 drill, install jumpers and IC's in designated locations. A photo is furnished with each board which shows these details. The Numitron tubes require a nine pin-printed circuit socket, Cinch Jones 9PCB1, Newark Stock #29F608 @ 15¢ each. The completed board can be mounted on half-inch spacers or on 3/4" long 4-40 machine screws.



CONSTRUCTION COSTS

With all IC's and transistors obtained from firms advertising in the ham magazines, cost for the solid state devices should not exceed $27. The tubes can be obtained at prices ranging from a high of $9 per digit to a low of $3 (B & F Enterprises) but it should be noted here that the B & F tubes had inoperative decimal points. This is of no importance for this model of the counter, but would be a factor if a decimal point were needed. Babylon Electronics also has Numitrons at $4 each in quantities of five, and all samples were in good condition. There is nothing critical about the two input transistors, and substitutes can be found at Radio Shack or Olsen stores. Weinschenker is a good source of the other parts such as transformers and electrolytics.

ADDING OPTIONS

A simple way to improve the counter would be the addition of a "range switch" and a crystal controlled time base, such as the FS-1 or the author's Universal Standard. The two pole range switch would be wired to select typical gating frequencys of 100 kHz, 1 kHz, and 10 hz for readings in megacycles, khz, and hz. The remaining section of the switch grounds the correct decimal points on the Numitrons as needed. If the counter is to be used at high frequencys, it would be desirable to install an IC socket for the 7490 counter that counts the least significant number -- the right numeral, so different brands of IC's could be tested to find the one that would count to the highest frequency. This also would be advisable for the 7400 gate.

A high value input potentiometer acts as a low pass filter at RF frequencys so this must be either reduced in value or eliminated. Otherwise, the basic input circuit frequency response is equivalent to the TTL devices, if good high frequency transistors are used.

The addition of a second module for eight digit display requires additional power for both readouts and logic. One way to do this is to use a single LM309K for the logic supply of 5V, and use a separate NPN power transistor such as the 2N3055 for the lamp supply. The collector of this transistor is connected to the unregulated, the base is connected to the 5V reference, and the emitter will then supply about 4.2V for the lamps, without the use of the voltage dropping diode. A heat sink for the two regulators would be necessary.

The second board is somewhat simpler than the first, though the board layout is identical. Only thirteen IC's are installed because the functions of gating, reset, and timing are already generated on the first board. It is necessary to include a 7400 for the transfer pulses and jumper reset, transfer, zero's blanking, and carry pulses between boards.

The eight digit model can also be used as a rec/counter (3). It is also possible to extend the upper frequency range by installing a single 95H90 prescaler IC. (4).

REFERENCES

(1) Macleish, A Frequency Counter for the Amateur Station, QST October 1970, page 15.
(2) Recent Equipment, QST April 1972, page 60. See also Notes on the Amateur Station Counter, Blakeslee, QST June 1972, page 31.
(3) Macleish, The Rec/Counter, QST May 1971, page 11.
(4) Emerson, Advanced Divide by ten Frequency Scaler, Ham Radio, September 1972, page 41.

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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. $7.00 per year, $14.00 for 3 years. Ham Radio, Greenville, NH 03048.

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KLEINSCHMIDT TT-4A/TG printer, keyboard, used, good, $60.00 with 60-100 gears. Freight $20. east of Miss. $10. west of Miss. Also have ASR, KSR typing punches. Mark/Space Systems Co. 3563 Conquista, Long Beach, CA. 90808. (213) 429-5821.

WANTED: Model 33 & 35 equipment. Complete or partial units, any quantity. Will pay shipping. Terminal Systems, Inc., 11300 Hartland St., North Hollywood, CA 91605 (213) 769-6772.

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TELETYPE MANUALS: TT-76, TT-98, TT-99, TT-100, TT-107, TT-109, TT-4, $6.50 each; TT-117, TT-118, TT-119, TT-178, TT-179, TT-181, TT-250, $8.50 each; TT-122A, TT-123, TS-2/TG, $4.50 each; TG-7, CV-116/URR, $5.50 each; Model 14 TD's $2.50. Thousands of other manuals in stock covering military surplus receivers, transmitters, test sets, teletype, radar, etc. Send 50¢ (coin) for large list. W3IHD, 7218 Roanne Drive, Washington, DC 20021.

BAUDOT LOOP TO ASCII CONVERTER connects right into your loop and delivers 8-level or 6-level ASCII for electronic readouts or ASCII-coded c.r.t. display systems. Loop interface features bridge rectifier and opto-isolator: connects anywhere in your loop trouble-free. Internal latch recognizes LTRS and FIGS codes for correct translation of all RTTY symbols; unshift on space available with one jumper wire on p.c. board. Wired and tested, complete except for 5 volt power supply and one potentiometer, on one 4X6 inch circuit board: $120. Petit Logic Systems, P.O. Box 51, Oak Harbor, Wa. 98277.

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DOVETRON TELEPRINTER SPEED CONTROLLER - The DOVETRON TSC-1000 Teleprinter Speed Controller is an all electronic, solid-state motor controller that functions as an electronic gear shift. for any teleprinter equipped with 100 WPM gears and a 50/60 Hz synchronous motor. Speed control is accomplished by varying both the frequency and amplitude of the power supplied to the motor. A five position front panel switch allows selection of 60-67-75-90-100 WPM operation. The keyboard automatically sends at the same speed as the receiving speed of the typing unit. No buffer storage is required and printer maintenance is reduced to a minimum, because the feleprinter runs only as fast as the received signal. A front panel Range control permits copy of any speed between 50 and 110 WPM with no loss of mechanical range. Copy is greatly improved on weak DX-type signals, and under severe conditions of selective fading, multi-path propagation and keyboard distortion by "synching" to the incoming signal. This Range control also permits answering a station running at a non-standard speed, giving him better copy of your signals. The AUTOSTART circuit provides remote turn-on/turn-off capability and current limiting protection for the terminal unit's autostart components. May be used with any character unit code (7.0, 7.42, 8.0, etc.). Operates directly from 110vac ±10%, 40 to 400 Hz. Since the output of the TSC is not affected by line frequency variations at the input, stable speed control is provided for Field Day and other locations where portable or emergency power supplies exhibit line frequency instability under changing load. Attractively packaged in an 8 x 8 x 11 inch custom enclosure. 15 pounds. (21 pounds shipping). $129.50 FOB. (Calif. residents: $6.50 sales tax). DOVETRON, 1015 Fremont Avenue (PO Box 267), South Pasadena, Calif., 91030. 213-682-3705.

WANTED: INFORMATION ON FULL & part-time teletype repairman or organization able to work on subcontract basis. Contact Terminal Systems, Inc., 11300 Hartland St., North Hollywood, CA 91605 (213) 769-6772.

SUPPLIES: Standard 11/16" perforator tape, good unused condition, 10 rolls per box at $3.95 or case of 40 rolls for only $14. Fanfold page paper at $3.75 per box (500 sheets, 4 copy). FREE LIST. BVE Enterprises, POB73, Paramus, N.Y. 07652.

DESK-FAX TELEFAX TRANSCEIVERS: Several machines, $14 each, shipping collect. Desk-Fax Western Union shop manual, $3.80 each postpaid. Bill Johnston, 1808 Pomona Drive, Las Cruces, New Mexico 88001.

WANTED - 33ASR, B. A. THUNMAN, W8ISG, 71 McCollum Street, Galesburg, Michigan 49053. Phone 616 665-7071 or 731-5164.

7/8" PERFORATOR TAPE, BUFF COLOR, 8" diameter with 2" core. 8 rolls for $4.00, (FOB). Shipping weight, 12 pounds. Gary Gardens Electronics, 9551 Antigo Drive, St. Louis, Mo. 63123.

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WESTERN UNION DESK-FAX TELEFAX TRANSCEIVER MANUAL: Complete theory of operation, adjustment, lubrication, preventive maintenance, troubleshooting, parts list. Includes all schematics and mechanical parts drawings. $3.80 postpaid. Bill Johnston, 1808 Pomona Drive, Las Cruces, New Mexico 88001.

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