

20 SEPTEMBER 1972

PHONETYPE TERMINAL UNIT - MARK III, ACOUSTIC COUPLER, for use to operate teletypewriter, using a regular telephone. Highly reliable circuitry, thousands in use by deaf people nationwide. Automatic power switch, visual monitor light, self-contained unit ready to drive keyboard, magnet, and motor lines. \$134.50 FOB. Send for brochure. R.H. Weitbrecht, W6NRM, APPLIED COMMUNICATIONS CORP., P.O. Box 555, Belmont, Calif. 94002.

WANTED - FOR USE BY DEAF PEOPLE - TELETYPE MACHINES Model 15-19-26-28-32. Must be in reasonable condition, complete with keyboards. Can pick up anywhere. Send information to R.H. Weitbrecht, W6NRM, P.O. Box 555, Belmont, Calif. 94002.

TTL SELCAL DRILLED FIBERGLASS P.C. Board. See RTTY JOURNAL December 1971, double sided, solder coated. Instructions included. \$15.00 each. K7WJC, Louis Staalberg, 7234 East Papago Dr., Scottsdale, AR. 85257.

SALE; SYNCHRONOUS MOTORS for Mite teletypewriter: unused 115AC.60 Hz, 1 ph. \$20.00 Each. For model 28ASR LMU 12, used excellent, \$13.50 each. Parts, unused, for model 14, 15, 19, 28 Kleinschmidt and Mite parts, also gears. Model 14 typing reperforator complete with retakner and end of line indicator, keyboard, cover and synchronous motor, Excellent, \$35.00 each. Atlantic Surplus Sales, 580 3rd Ave., Brooklyn, N.Y. 11215.

NORTHERN RADIO EQUIPMENT, Never Used. For Sale: Tone Keyers, Master crystal oscillators-multipliers, Fax converters, Frequency meters, Dual frequency shift tone converters and keyers, NBFM receivers, Multiplexers, Demultiplexers, much more. Write: Janis Brownrigg Company, 3 Washington Square Village, New York, N.Y. 10012.

ADDITIONAL CLASSIFIED ON PAGE 7

RTTY JOURNAL

HAL COMMUNICATIONS CORP: Announces the revolutionary new RVD-1002 and RKB-1 solid state RTTY system. Provides the ultimate in noiseless, reliable reception and transmission of Baudot coded TTY. The RVD-1002 visual display system receives demodulated TTY pulses from the ST-6 and provides video output to a video monitor, or modified TV set. One thousand (1000) characters are displayed in a 20 line, 50 character per line format, at 60, 66, 75, and 100 WPM if your TU will copy it. The RKB-1 combines reliable TTL circuitry, a high quality commercial keyboard, and a rugged case to provide the best Baudot TTY keyboard available. The electronics is arranged so that you type as if you were using a typewriter. See them on display at the Peoria, Findlay, and Cincinnati hamfests. Get the details from HAL Communications Corp., Box 365RJ, Urbana, IL 61801. Phone 217-359-7373.

TECHNICAL MANUAL for Model 14 TeeDee, that long searched for complete description, adjustment, lubrication and parts book all in one for only \$2.25 Postpaid. BVE Enterprises, "Communications Equipment, Supplies and Information for the Radio Amateur", POB 73, Paramus, NJ 07652. (Send for free list of other goodies.)

MAKE YOUR OWN CIRCUIT BOARDS; at last, a new, simple, inexpensive photo resist technique which uses plastic sheets of photo resist that you laminate onto the board yourself with a household iron and develop in an inexpensive, hardware-store liquid. Send \$4.75 for experimenters kit, price list, and complete details; kit includes glass epoxy circuit boards, plastic pattern sheets, DIP and Transistor patterns, over 1 sq. ft. of photo resist sheets, and instructions. Postpaid U.S.: MNH - Applied Electronics, P. O BOX 1208, Landover, Maryland 20785.

RTTY

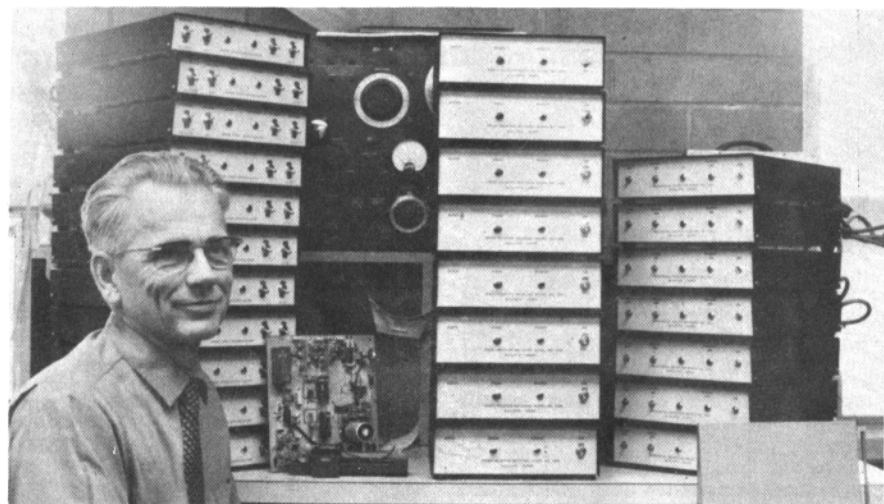
September 1972

JOURNAL

EXCLUSIVELY AMATEUR RADIO TELETYPE

VOLUME 20 No. 7

30 Cents



Larry Walrod, VE7BRK/4, shown in front of a stack of Selcals (right) Solid Stae RTTY Receivers (center) and Demodulators (left) that he recently built for the JAAR radioteletype network. Larry was the author of a "Simple Test Jig" for circuit boards in last months issue.

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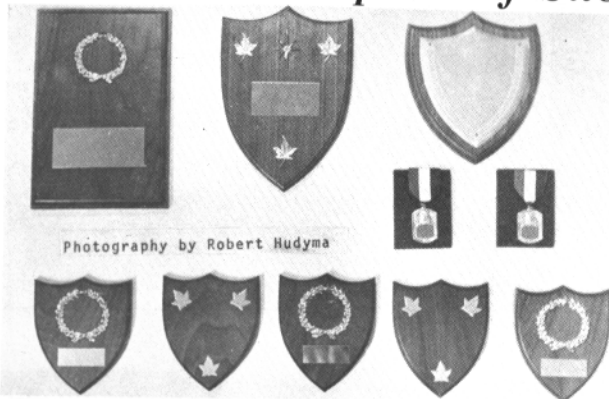
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Address Correction Requested
RTTY JOURNAL
P O Box 837
Royal Oak, Mich. 48068

VIA AIR MAIL
FIRST CLASS MAIL



CARTG 12th RTTY 'Maple Leaf' Sweepstakes-



Photography by Robert Hudyma

PLAQUES - MEDALLIONS - CERTIFICATES - OCT. 14-16

AWARDS

1. Plaque - "C.A.R.T.G."
2. Plaque - "RTTY JOURNAL"
3. Plaque - "C.A.R.T.G."
4. Plaque - "RTTY JOURNAL"
5. Plaque - "C.A.R.T.G."
6. Plaque - "C.A.R.T.G."
7. Plaque - "RTTY JOURNAL"
8. Plaque - "C.A.R.T.G."
9. Plaque - "RTTY JOURNAL"
10. Plaque - "C.A.R.T.G."
11. High Score U.S.A. - Gold Medallion & Ribbon - "RTTY JOURNAL"
12. High Canadian Score - Gold Medallion & Ribbon - Canadian Director's Award
13. High Score for Low Power (Under 100 w.) Plaque - "RTTY JOURNAL"
14. High Score for "Green RTTYer" (never participated in previous RTTY contest). Sidney Burnett Memorial Plaque.
15. SWL Printer High Score. Plaque - "C.A.R.T.G."
16. High Score for 10 meter operation Plaque - "C.A.R.T.G."
17. High Score for Multi-operated stations (one transmitter). Plaque - "RTTY JOURNAL"

Certificates for top scores in each U.S.A. and Canadian District, and each Country.

1. CONTEST DATES

Saturday - October 14th 0200 GMT to Monday - October 16th 0200 GMT. Total Contest period is 48 hours, but no more than 36 hours of operation is permitted. Time spent in listening counts as operating time. The 12-hour non-operating period can be taken at any time during the test, but summary of times on and off must be included with Log and Score Sheets.

2. BANDS

Contest will be conducted on 3.5, 7, 14, 21 and 28 MHz amateur bands.

3. COUNTRY STATUS

ARRL Country List, except KL7, KH 6 and VO considered separate countries.

4. MESSAGES

- (a) Message number, Time GMT
- (b) Zone and Country

5. EXCHANGE POINTS

- (a) All two-way contacts with stations in one's own zone - 2 Points.
- (b) All other two-way contacts will receive points listed in Zone Chart (same chart as used other years).

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(3) Stations may not be contacted more than once on any one band.

Additional contacts may be made with same station on different bands.

6. BONUS POINTS

100 additional bonus points to be added for each VE or VO station contacted on all bands. Bonus Points to be added to final score.

7. CLASSIFICATIONS

(a) Single operated stations (one transmitter)
() Multi-operated stations, (one transmitter). Individual operators of multi-operated stations can submit their logs singly and compete as single operators instead of submitting a Group Log, if desired.

8. MULTIPLIERS

A multiple of one is given for each country worked including one's own on each band. e.g. If one country is worked on 3 bands, then 3 multipliers given.

9. LOG SHEETS

Separate page for each band. "CARTG" Log Sheets available for SAE or IRC's. Logs to contain Band, Exchange numbers, Times GMT, Station Calls, Zones, Countries, Exchange Points and power input. Logs must be received not later than December 1st, 1972.

SCORING

Total Exchange Points multiplied by number of Countries worked, multiplied by number of Continents (maximum 6). Canadian Bonus Points added finally.

Scoring Example

Exchange Points	2020
Countries -		
3.5 MHz - 5		
7 MHz - 4		
14 MHz - 18		
21 MHz - 10		
28 MHz - 3		
		40
Continents	5
Score - 2020 x 40 x 5 equals		404,000 Pts.
Bonus - 6 VE's x 100 equals		600 Pts.
TOTAL SCORE		404,600 Pts.

Send Logs to:

Canadian Amateur Radio Teletype Group
85 Fifehire Road
Willowdale, Ontario, Canada VE3RTT

RTTY JOURNAL

AUTOSTART

Monitoring Receiver - -

BERT KELLEY, K4EEU
2307 S. Clark St.
TAMPA, FLA. 33609

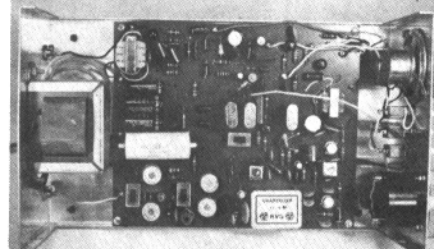
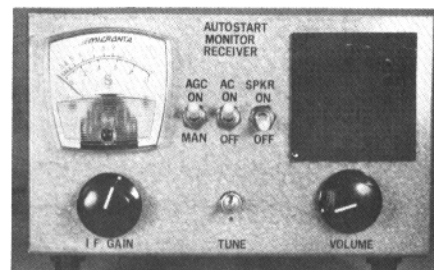
This receiver was designed for monitoring teletype nets on 3.5, 7 or 14 mhz bands using 170 shift. It uses readily available parts including an excellent 500 cycle filter and the performance is equal to, or better than, most any receiver you would compare it with. The frequency stability is excellent. It can be left on the 14,075 khz autostart frequency for days with no tuning necessary.

Direct conversion receivers are popular but fall short in the selectivity characteristic. The best place to put the selectivity is as far toward the front end as possible and the most practical location is still the old reliable superhet's IF stage. KVG makes a variety of crystal filters and one was used in this receiver. If you use 850 shift, you would want to select a filter with a wider bandwidth. It is important to select the right crystal frequencies because not much gets past the filter, and because the tuning range of the VXO is limited. It would be possible to extend the turning range out to several hundred cycles at the expense of stability.

It will be assumed that the builder has, or has access to, a digital counter if it becomes necessary to check the frequency of one of the crystals or check frequency drift. Ordinarily it would not be needed. Be sure to use good quality crystals. International's HA type crystals were used because they are much more stable than the usual garden variety crystal, and the predictable drift characteristics make it possible to use effective temperature compensation. If a digital counter is used to check the frequency of the individual oscillators, it is suggested that a simple emitter follower stage be temporarily tacked onto the circuit using a HEP50 NPN with collector connected to plus 10, base connected to the junction of the capacitors at the emitter of the oscillator transistor, and the emitter connected to the digital counter with a 1,000 ohm load resistor to ground. This will isolate the counter from the oscillator (Q3 or Q5).

The front end coils are wound on

RTTY JOURNAL



VIEW OF FINISHED RECEIVER
INSIDE VIEW LOOKING DOWN.

T-50-2 toroidal forms (Amidon Associates). They are grid dipped to frequency outside the receiver and peaked up later with small trimmer capacitors soldered to the circuit board. Note that there are two back-to-back silicon diodes used in the front end. Normally these diodes do not conduct and are used to protect the MOSFET transistors from high incoming RF. The trap shown on the drain of Q1 is tuned to the 9 mhz IF frequency. The IF coils used on this receiver are salvaged from a portable Japanese transistor FM receiver but Miller makes a suitable transformer, or, the IF transformers may be wound on toroidal forms smaller to the front end coils.

The Motorola MC1550G makes a fine IF amplifier and product detector. It has good AGC action but the voltage is not effective until it is between 5 and 8 volts and this is the reason for the unconventional S meter and AGC circuit. The S meter could be eliminated if costs must be cut but it has been found to be an aid in both operation and tuning up. If not used, Q4 and the S meter are omitted, and the arm of the manual IF gain control connected to pin 5 of the MC1550G.

The receiver's parts are mounted on a 6-7/8" X 5-1/2" home-etched circuit board mounted on spacers inside a

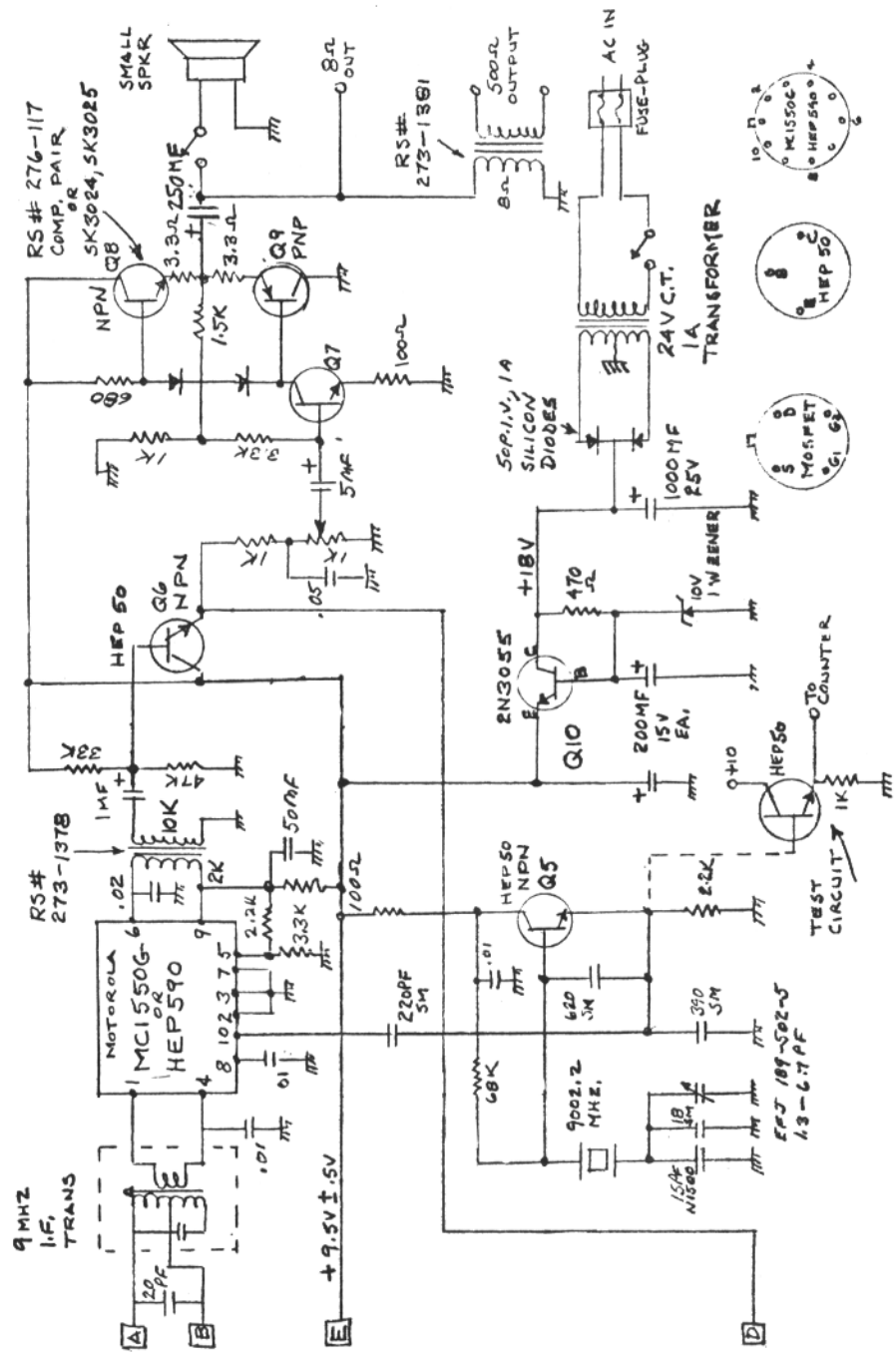
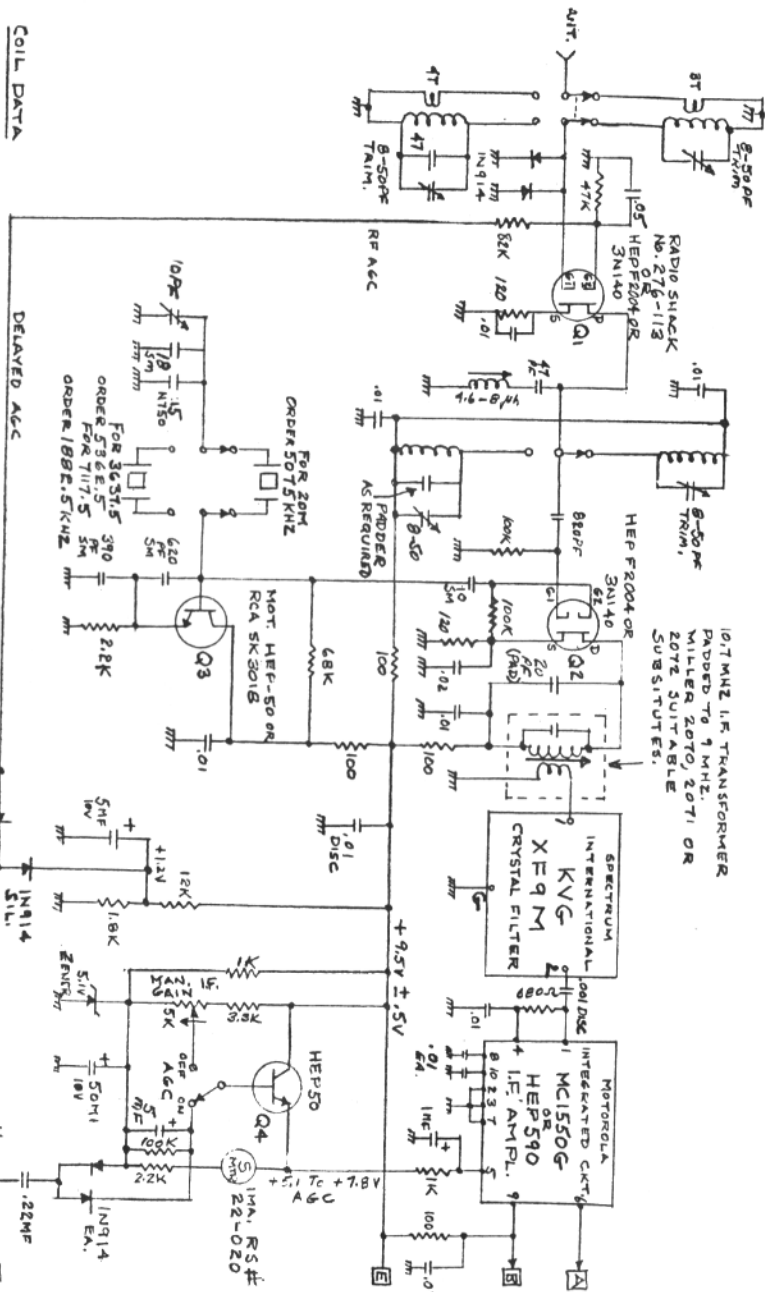
SEPTEMBER 1972 3

10 X 6 X 3-1/2" minibox. Amidon etching materials were used.
The author wishes to thank W4ZAG

for suggestions during receiver development. A more detailed account will appear later in "HAM RADIO" magazine.

COIL DATA
ON T-50-2 FORMS
80M = 40" # 30E
40M = 29" # 26E
20M = 13" # 24E

47PF PADDER
NO PADDER
NO PADDER
1.5" TRANSFORMERS MAY BE WOUND ON T-50-2 FORMS, USE TRIMMER ON PRIMARY (8-50PF) AND TURN SEC.



Using the T.D. for CW Identification - -

CAL SONDERGOTH, W9ZTK
800 Fifth Ave.
MENDOTA, ILL. 61342

One of the thorns in the side of the RTTY operator is the need for cw identification of the transmitting station. Possibly the easiest way to meet this requirement is to use a hand key mounted near the keyboard so that the call letters may be inserted at the beginning and end of a transmission. Recently the digital cw "machines" have become popular, although considerable logic is involved for the simple function generated. It is hoped that this paper will present some new ideas for a somewhat simpler approach.

The scheme to be described is not new, and was described in the literature some time ago. It requires very little additional gear for automatic cs other than the station T.D. and a surplus polar relay. (We've all gotten rid of those by now!) The modifications to the T.D. in no way alter its operation for normal RTTY transmission, but if a single T.D. is to be used, some provision must be made for switching back and forth between cw and RTTY as needed. Ideally, a separate T.D. and D.C. power source could be used for the cw T.D., activating it only for the cw identification.

The diagram shows how the two windings of the polar relay are wired into the T.D. Break the lines going to the distributor stator that connect to the "1" and "5" information bits for a standard 60 wpm unit with 31 msec stop pulse. For Western Union machines with the shorter

stop pulse, connect the second winding to the line going to bit "4".

Depending upon the direction of current flow in the T.D. contacts and the relay windings, they must be connected so that a current flow during the first TTY bit closes the relay, and current flow during the fifth bit will open it. This will generate near perfect cw.

With the polar relay connected as shown, it can be seen that any RTTY character containing bit "1" will close the relay, and it will stay closed until the T.D. sends a character which contains bit "5" at which time it will open. A character containing bits "1" and "5" will send a series of dots if it is punched consecutively on a tape. Thus, the characters B, Q, W, X, Y, Z, Ltrs and Figs will program dots when punched on the cw tape. With a standard 60 wpm T.D., the dots will have an on time of 88 milliseconds and an off time of 75 milliseconds. This would seem like considerable distortion for the cw, but the output sounds like a well adjusted electronic keyer.

For dashes, the T.D. rotor is allowed to make two revolutions, starting the dash on the "1" bit of the first revolution and ending it on the "5" bit of the second revolution. This produces dashes with an on time of 251 milliseconds, and an off time of 75 milliseconds. Again some slight distortion, but not detectable to the ear. For dashes, any of the characters A, D, E, F, J, K, S or U may be punched to start the dash. To end it (second character) use any of the characters listed for dots as they contain the fifth bit, and the first bit has no effect after the dash has been started. In addition, the characters G, H, L, M, O, P, T or V

can be used to end a dash.

Spacing between words and letters is accomplished by punching "Blank" keys on the tape; one blank for spaces between letters, and three blanks for spaces between words. The blank key contains no information bits and so does not operate either relay winding. Other characters which do not contain bits "1" or "5" are C, I, N, R, Car Ret, Line Feed and Space Bar, and these could be used for letter and word spacings as well.

If the printer is active and in the same loop as the T.D. while it is sending the cw I.D., the copy will be garble during this cw. By a careful selection of characters punched on the cw tape, the printer can be made to type out a short end of transmission message for local copy anyway. The Ltrs and Figs functions can be used for both dots and dashes, and so much unnecessary hammer striking can be eliminated by using these along with the space bar and even Car Ret and Line Feed.

This particular application of cw with the T.D. is especially useful for the cw I.D. on an unattended autostart WRU

tape. In such a case, the T.D. is simply left running during the entire WRU message and a "CW" relay is activated which automatically shifts the station over to CW work and then back to RTTY after the cw is completed for automatic turn off of the T.D. and transmitter. The WRU tape is punched with the RTTY message as well as the characters necessary to send the station call in cw.

If the T.D. remains in the teletype loop which generates the FSK voltage for the transmitter, some means of disabling this FSK during the cw I.D. must be provided. In my station, one set of contacts on the CW relay connects the polar relay contacts to the narrow shift I.D. circuit and the second set of contacts grounds the input to my FSK generator. Unless the cw contacts are disconnected when trying to use the T.D. for RTTY work, the FSK is upset by the constant opening and closing of the relay as the RTTY tape goes out.

1) Hall -- Perfect Morse Code From Teletype Tape - Inexpensively QST - November 1969 - page 40.

CLASSIFIED ADS

SEE ALSO PAGES 18-19-20

FOR SALE: MODEL 15 WITH TABLE. \$90.00 Darrell Heiselman, Box 426, HoHon, Kansas. (913) 364-3973.

FOR SALE: FREDERICKS MODEL 1200 Terminal Unit, 170 Hz shift, excellent condition with manual and prints. \$407. Model 28KSR. \$250. Spectrum analyzers SB88(S125) and SB15A (\$250). Wanted: Clean Model 33ASR(s), BRPE-18 (6 level, advanced feed-hole) High Speed Punches, and two Sprocket to Friction-feed conversion kits for Model 28. Hank, W6SKC, 1015 Fremont Avenue, South Pasadena, Calif. 91030, 213-799-5886.

HAL COMMUNICATIONS CORP: HEADQUARTERS for MAINLINE Solid State RTTY equipment. You can do no better than the ST-6 demodulator at any price. Screened, punched cabinets for the ST-6 now available. For budget TTY, its the ST-5 for HF or VHF. And the best in AFSK is provided by the AK-1. Our new model 1550 electronic keyer, or the MKB-1 Morse Keyboard, will automatically identify your RTTY station at the push of a button. The extra values are available from HAL Communications Corp., Box 365RJ, Urbana, IL 61801. Phone: 217-359-7373.

WANTED--TELETYPEWRITERS--All makes, all models, any condition. Cash available. Vardon & Associates, 930 N. Beltline, Suite 140, Irving, Texas 75062. (214)252-7502.

FAA CCG-2 CHECK GENERATOR converted for SELCAL. Recognizes six sequential 5-level RTTY characters for motor turn-on; three for turn-off; all speeds; built-in P.S. all solid-state. \$59.95 P.P. K0GCJ, 4322 Blauvelt Road, Grand Island, Nebr. 68801.

AUDIO FILTER, F-98U, excellent cw/rtty filter far superior to others, 14 toroids yield 80 db attenuation. NEW. \$7.50 postpaid US48, instructions included; R-257 1st IF plug-in, NEW 3-5678s, \$4.00 postpaid US48; D.R. Kelley, 1490 Yaqui Dr., Florissant, Mo. 63031.

DIGITAL COMPUTER EQUIPMENT: Integrated Circuits by the thousands, TTY-DIGITAL interface electronics, connectors, multiple conductor flat cable, computer display panels, computer hardware, circuit boards, photo resist, wire wrap equipment, very low prices; send 50c for catalog; MNH - Applied Electronics, P.O. Box 1208, Landover, Maryland 20785.

5/16" MESSAGE TAPE is hard to find. Do you have any? Need for WU tape printer. Gummed or not. Stan WB6WFI, 248 San Gabriel Court, Sierra Madre CA 91024.

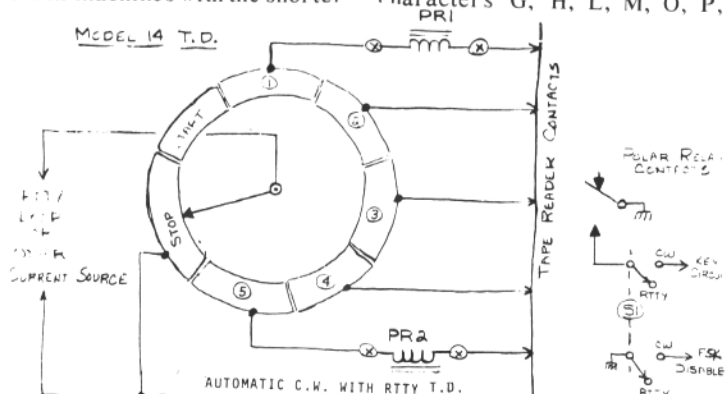
START PACKING! Plane or R.R. tickets, roadmaps. Got 'em? Then you're ready to take off for the gala ARRL Hudson Division Convention, Oct. 21-22, Hilton Motor Inn, Tarrytown, N.Y. Plenty of Free Parking. Exhibits, 2-meter FM, RTTY, lectures, contests, YL-XYL events, gabfests, N.Y. City sight-seeing, Prominent Banquet Speaker. All ya need to know from Dave Popkin, WA2CCF, 303 Tenafly Road, Englewood, N.J. 07631. Free gifts for early registrants.

TELETYPE: M15KSR, Stand & PS plus Tee-Dee M14, Both Excellent Cond. Extra: Typing Unit, Tee-Dee & 100 WPM Gears, Pwr Sup, incl. for parts. Pick-up only, Price \$80 Firm. K4KOE (703)596-7100.

TTL HIGH SPEED FLIP FLOPS: Gated-D type, 4 gates plus clock inputs, up to 60 MHz, logic tested and guaranteed; D-1*2*3 5*6*7 13*14 12*Q in DIP-14 PKG, 4 - 5V, 10 - GND, 8 - CLK, 9 - Q, 11 - Q; ideal for multiple input, high-speed registers; thousands available, immediate shipment; incredible 34c each; min. order \$5.10, postpaid U.S.; MNH - Applied Electronics, P.O. Box 1208, Landover, Maryland 20785.

SELL: MODEL 28ASR. Mark 111 keyboard and typing unit, with communication keyboard and type box. LPE perforator, LXD-TD, 60 wpm gears. Ed Wagner, 208 S. Monroe, St.oughton, Wis. 53589 (608) 873-9620.

WANTED: R220 in Excellent Condition, John Raymond, Superior Plating Co., 2500 Post Road, Fairfield, Connecticut 06430.



Crystal Controlled AFSK -

EDITORS NOTE----

This article and the following one were received about the same time from two different authors. As they are on the same subject we decided to run them both in one issue so that anyone interested could compare ideas.

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

The RTL version of this generator was first presented in RTTY Journal in June 1970 by WB8AAK. Since this time, the price of TTL logic devices has dropped so much that it was worthwhile to redesign the circuit to use TTL instead of the original RTL. The two 7400 gates may be obtained new for as little as 22¢ each and the 7490 decade counters are available for about 90¢ making the total cost of the logic \$3.14. The entire generator with crystals may be constructed for about \$10. Since this is a fraction of the cost quoted in the original article, information is given on construction.

This generator has several inherent advantages. No counter or frequency standard is needed for calibration or setup. Even the cheapest crystals will be adequate and shift may be changed by switching or plugging in a new crystal. The original article outlines the features in detail, and should be referred to for further information. Differences in the logic will be reviewed here for use in the event trouble shooting becomes necessary.

The 7400 is four separate gates, each with two inputs. Two are used, one as the mark oscillator, the other as the space oscillator. The remaining sections of each IC are used to gate the output of the oscillators into the decade dividers. Input pin 2 of the circuit board is connected to pins 1, 2, and 13 of the "space" 7400 and mark is considered zero voltage and space about 3.3V positive. The inputs of TTL gates are positive unless externally pulled to ground, therefore you may short this pin to ground for mark test, and open it for a spacing condition. Usually a transistor is used to adapt the logic to the outside.

If input pin 2 on the board is low, an inverted high appears on pin 3 of the space IC which is connected to pin 1 of

the mark oscillators IC. Pin 2 of this gate then passes the output of the mark oscillator and the inverted output appears on pin 3 and pin 12. Pin 13 is at logic 1 and the output appears at pin 11 where it is connected to the decade dividers. When the input to the board goes into the space condition, the spacing oscillator gates are enabled and the marking oscillator gates are inhibited. The basic TTL gate used here normally has a positive output and is at logic zero if, and only if, both inputs are at logic 1. If a varying voltage, such as from a crystal oscillator is applied to one input pin, the gate will pass the oscillator when the other input pin is at logic 1 and will block it when the control pin is at logic zero. The action of the gates maintains proper phasing and amplitude during keying transients and prevents transients.

The decade dividers are connected to first divide by five then by two so that the output is a square wave to make filtering easier.

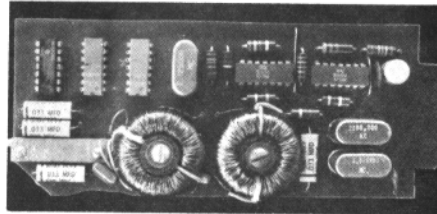


PHOTO of BOARD LAYOUT

The logic requires 5V at about 90 ma. The LM309K regulator requires no adjustments and will handle any input voltage from about 8V up to 30. The unregulated might be available from the existing tuning unit, but if this is not available it could be easily constructed from a filament transformer with a ten or twelve volt secondary. A 1,000 mfd capacitor should be used to smooth the ripple before it is applied to the LM309K.

An input circuit is shown for use with a ST-5 or ST-6 demodulator. If you use a different keying method, it should not be difficult to work out your own circuit to adapt to the TTL devices. At least one input transistor is suggested to pull the TTL logic inputs, which are normally high, to low or ground for mark hold. Another might be

CONTINUED ON PAGE 12
RTTY JOURNAL

WB8AAK Crystal Controlled AFSK Generator 'Up-Dated' - -

H.W. (Bill) CRAIG, WB4FPK
P.O. Box 947
GRAYSON, FLA. 41143

Back in the June issue of "RTTY JOURNAL", Bernard Stuecker (WB8AAK) presented a novel AFSK generator of considerable merit. It has no stability problems, no tuning requirements, and is virtually fool-proof to construct. At the time Mr. Stuecker designed the unit, Motorola had not as yet introduced their decade divider IC package, and consequently, dual J-K flip-flops were employed, along with the appropriate gating to provide the necessary decade division ratios.

About a year and a half later, this author became interested in the possibilities of 2-meter FM RTTY, and recalled the article mentioned. Having a large quantity of a different family of logic on hand, it was decided to see how easily this logic could be adapted to the original design. The logic family that we desired to use was the readily available "TTL" type, (The original design used "RTL") and is obtainable from many different sources for very nominal sums.

The actual circuit changes were minimal, requiring only the addition of one resistor to each of the oscillator circuits to provide reliable operation with this family of logic. However, we were able to delete the original discrete transistor buffer stage, as the output levels of TTL logic are considerably higher than the RTL devices.

For those not having access to the original article, a brief description of the circuit follows: IC1-A and IC1-B form a crystal controlled multivibrator, operating at the crystal frequency of 2125 Khz; IC1-C and IC1-D is wired in the same configuration, but operates at either 2295 or 2975 Khz, depending upon the shift desired. The keying circuit as shown, was intended to be operated by a relay in the local loop circuit, which has its contacts closed on "mark" (if you wished to use the reverse of this you would merely reverse the crystals in the two oscillators) and can be wired up in several other ways, to make it compatible with most of the popular modern TU keying outputs, such as is used in the

ST-3, 4, 5, 6, TT/L2, etc. Some alternate input circuits are shown in the accompanying diagrams.

IC2-A-D determines which of the two crystal oscillators drive the decade dividers, depending upon whether the inputs of IC2-A and IC2-C are "0" or "1" (corresponding to "mark" and "space" respectively). Decade dividers D1, 2 and 3 provide a total division ratio of 1000, which produces an output in the audio range at 2125 Hz and 2295 Hz (or 2975 Hz) which is at this stage a square wave. A simple low pass filter follows which restores the wave shape to a fairly good sine wave, quite suitable for modulating any AM or FM transmitter. The output level can be controlled by R3, and is approximately 1.5 V P-P (open circuit) and should be more than adequate for any transmitter.

CONSTRUCTION NOTES:

The entire unit can be built on either the usual P.C. board, or hand wired on "Vector" board as it's not at all critical as to component layout. It's about an evenings work to build using hand wiring techniques, but it is suggested that if you elect to hand wire that you use IC sockets to prevent accidental damage to the IC's during soldering. All resistors are 1/4 watt, 20 percent types. C1-3 should be 10 percent types such as the Sprague "Orange-Drops". The two capacitors in the oscillator circuits marked "S.M." should be silver mica types. All other capacitors can be disc ceramics. The crystals can be most any types, such as the inexpensive surplus "FT-243" types and should be cut for parallel resonance with 32 pf load capacitance. (I used inexpensive HC6 type crystals obtained from JAN Crystals, as they were smaller and much easier to mount.) You can mount two or more crystals, with suitable switching for the space oscillator generator, and this way have several shifts available.

This unit makes a dandy "test set" for tuning TU's, especially if you don't have a frequency counter. The accuracy of the output frequency error was on the order of less than 0.5 Hz without any trimming to the crystals at all, and it will stay there day after day, week after week! Try that with your conventional high quality "audio frequency gen-

RTTY-DX

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



* 100 DXCC WINNERS *

NR. 1	ON4BX	111	Confirmed
NR. 2	W3KV	106	Confirmed
NR. 3	11KG	100	Confirmed
NR. 4	ON4CK	102	Confirmed

DX HONOR ROLL

1. FG7XT	110/102	16. K8QLO	68/62
2. W8CQ	93/85	17. DJ8BT	65/62
3. K8YEK	87/85	18. CR6CA	64/62
4. DK3CU	89/81	19. W1GKJ	70/61
5. W4YG	86/80	20. G6JF	82/59
6. W5QCH	82/80	21. VE3AYL	63/59
7. W5EUN	79/75	22. WB6RXM	68/58
8. WA3IKK	83/71	23. WA2YVK	66/58
9. W2LFL	79/71	24. W3ISE	63/57
10. WA6WGL	72/69	25. DL8VX	65/55
11. F9RC	76/68	26. W9AE	59/55
12. ZS3B	73/67	27. K4VDM	56/55
13. W4EGY	71/66	28. I1ROL	63/54
14. W5VJP	67/63	29. SV0WO	61/54
15. KL7GRF	70/62	30. SM5BO	60/52

DX Listing-

1. K8JTT	51/49	27. VK3NR	51/33
2. WA0TLT	57/47	28. HB9ADM	43/33
3. EI5BH	54/46	29. I6CGE	42/33
4. ZS6BBL	53/45	30. W9BT	40/33
5. OK1MP	49/45	31. VE4BJ	33/33
6. K6YUI	57/44	32. ON4CZ	60/31
7. HA5FE	50/44	33. WB6QFE	37/31
8. XE1YJ	48/42	34. K3SWZ	36/31
9. SM00Y	45/40	35. K9BJM	32/30
10. I1CAQ	43/40	36. HB9ACQ	40/29
11. W8CAT	41/40	37. W2IDX	50/28
12. KH6AG	53/39	38. WA2EXP	34/27
13. LX2BQ	45/39	39. W0HAH	51/25
14. VESLG	46/38	40. G3IYG	33/25
15. VK3DM	44/38	41. G3LDI	53/23
16. EA7PZ	55/37	42. HK3SO	28/22
17. ZL2ALW	48/37	43. 9J2ED	36/21
18. HB9AKA	48/36	44. K1SGU	33/21
19. I5CLC	53/35	45. WB2NRU	23/21
20. PY2CBS	51/35	46. 4X4MR	34/20
21. W3CIX	43/35	47. W2PLQ	34/20
22. 9Q5BG	37/35	48. OZ6OB	33/19
23. CE3EX	43/34	49. DL3NO	21/19
24. I1WT	43/34	50. WB6TLA	24/16
25. VE4FG	35/34	51. WA0WST	32/15
26. SM4CMG	60/33	52. 9Y4VU	25/15

The next listing of the RTTY - DX HONOR ROLL will be in the January 1973 issue. Please have your up-dated totals to me by December 1st, 1972.

14 SEPTEMBER 1972

Hello there

It all started out innocently enough. A contact on SSB; an expressed interest in RTTY; and pretty soon John, KL7GRF, had a Model 15 machine crated up and on its way to George, VK9GG, in Madang, Territory of New Guinea. That was about this time a year ago. Following the most direct surface route it arrived at Seattle for reloading on a ship bound for New Guinea. Unfortunately it was caught up in a dock strike and just set there on the dock until the strike was resolved. When things got moving again there were literally millions of tons of higher priority cargo and not enough ships to move it causing further delays. In the meantime George got a ST-5 going but when the machine arrived and things were all connected there were further problems which most everyone has when first starting on RTTY and the boys had to resolve these via SSB schedules. Then Georges rig went bad with no readily available parts in that remote area. Then there was a fast trip to the hospital where, as George puts it, he had a rolling stone removed from between his "radiator and engine". Another six weeks delay. Also, John does not have what might be called a "9 to 5" type job. As the skipper of a Coast Guard vessel in Alaskan waters he is often the only contact outlying communities have with the rest of the world particularly in emergencies, so John is often away for days or weeks at a time. In spite of all the traversity, and in the true Ham spirit, the boys did not let these minor irritations prevent them from putting New Guinea on RTTY. The week end of July 22nd came and there was George, VK9GG, with a beautiful narrow shift signal on 14 mhz. He is very active, particularly on weekends and is already in the log of many of the RTTY-DX boys. All QSL's go via KL7GRF, and we repeat, with SASE and/or IRC's for a fast return. QTH is

John E. Fail
P.O. Box 1196
Petersburg, Alaska 99833
Since the last issue the following
RTTY JOURNAL

stations have been issued the WAC certificate. Congratulations are extended to all.

- Nr. 187 Robin Addie G8LT
- Nr. 188 John Chandler K4VDM
- Nr. 189 Club Station, Andris, UQ2IF, operator UK2GAX
- Nr. 190 Anders Larsson SM4CNN
- Nr. 191 Don Beattie G3OZF
- Nr. 192 Nolen Griffith K5ARH
- Nr. 193 John Miller K8ILL
- Nr. 194 Paul Leite PY1DCB
- Nr. 195 Johan Jensen OZ2CJ
- Nr. 196 Vern Dillaplain W5E00
- Nr. 197 Doug Williamson WA8NGJ

Really quite an impressive list and we might add that all but the last two stations were confirmed through the efforts of Ted Double, G8CDW, Contest and Awards Manager of the BARTG. The Contest logs that Ted received were cross checked and if you made a request to Ted at the time you sent in your log and if you were also in the log of each of the six continents that submitted Contest Logs you were fully qualified for the WAC Award. Ted also up-dated the QCA Award standings where appropriate, based on the Contest logs. This is quite an additional load of paper work and attention to detail and we all thank Ted for his efforts. We also point out that a similar arrangement is available with Bo, SM4CMG, Contest Manager for the SARTG. This Contest will have just finished when you receive this so make a note of it when you send in your log.

Before leaving the subject of Awards we wish to acknowledge the fact that Ronnie, W5QCH, sent in confirmations for WAS-RTTY. Unfortunately, we must say that the Journal does not issue a WAS Award or certificate. A few years ago Dusty issued a handsome plaque for making WAS in a one year period but due to the lack of interest the plan was dropped after the first plaque was issued to W5VJP.

There were quite a few RTTY-DXers visiting Stateside this Summer. For us it was indeed a pleasure to be able to personally deliver the WAC certificate to Robin, G8LT, while he was in New York City and an even greater pleasure to have been able to spend a few hours together one evening in June. Ariel, 4X4MR, was in the big town also in early July before heading toward Chicago. In mid July Paul, PY1DCB, had a great visit with Bud, W2LFL, and Knobby, W2PLQ, in that megatropolis called New York. Henry, CE3EX, was on the West coast in late June but unfortunately a planned visit with Stan, WB6QFE, and

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some of the boys out there was missed due to a mix-up on the dates.

After Cliff, SV0WO, left Greece in May we assumed that it would be the end of RTTY from that country for some time to come. Not so. In the past several weeks there has been more activity than ever with some excellent signals coming from SV1BH, SV1CX, and SV1MO, all Greek nationals. Only one QTH is available at the moment and that is

Nick Valanos, SV1MO
Mavrothalassa
Serres, Greece

E15BH and ON4BX have reported some strange looking calls recently on RTTY. S21AB, S21EW, S21UH, and S21YC are the calls to be on the look out for and we understand that they are operated by the Red Cross in Dacca, Pakistan.

Jo, CR6CA, informs us that RTTY activity from Portugal may not be long in coming. CT1ON has a machine and is building a demodulator and CT1ED may be a close second to operate from that country.

The boys at KS4BH, Swan Island, voice an interest in RTTY on the ham bands. They apparently have the machinery and Bob, W5VJP is trying to get info to them as to how to get it all together.

As mentioned previously, KG6SV was QRV with the equipment used by Paul on his trip through there. However, contrary to our first impression it was a very brief operation and we are informed that he is now back in the States. His last known QTH follows for those of you hunting his QSL

John Leekly, KG6SV
Box 168, Capitol Hill
Saipan, Marianas Islands 96905

Phil, VS6DR, was QRV with a good signal for about two weeks and then went QRT for a trip to Japan and a visit with Gin, JA1ACB. We have not had any reports on his activity since his return to Hong Kong.

Irv, W6FFC, passes word that Singapore may soon be active again on RTTY. 9V1QG is all set with a machine and TU and is working on the FSK. So watch for this rare one.

Dusty recently received word from 4S7WP in Ceylon that he is interested in getting going, and how to go about it. Needless to say, this call area is on everyone's "most wanted" list so we will keep our fingers crossed for future activity from there.

That potent signal coming from KZ5-

CONTINUED ON PAGE 17

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For some time we have felt guilty about begging for articles for the magazine. Obviously we cannot pay any amount that would equal the time and effort necessary to prepare an article for publication. We certainly appreciate the contributions that have been made and are proud of the outstanding ideas that have first appeared in the JOURNAL. Amateurs like to help others and this has certainly been true with our authors.

However we feel that some small token, besides ours and the readers thanks, might express our appreciation and at least pay for the postage, paper and ink used in preparing an article.

Starting with this issue we will extend, or enter a new one year subscription for any article published of two pages or more. For the prolific authors who have several years paid in advance the subscription can be sent to anyone of your choice.

For many reasons we cannot make this retroactive and some problems may appear in the future, but we want to make some kind of a start. It isn't much but we don't want to cause any inflation or get in trouble with the wage and price board.

Printed log sheets for the CARTG DX Sweepstakes are available from the CARTG, 85 Fifeshire Rd. Willowdale 431, Ontario, Canada. Please enclose a self addressed envelope and IRCs for return postage. (1 IRC for about each 6 log sheets) (Air mail 3 IRC for each 6 sheets.) Each band should be entered on a separate sheet. There are 25 lines on each sheet and the use of these prepared sheets will make it much easier to keep your log as well as easier to check results.

A note and a net bulletin from Jerry Hale, KOPIV/4, manager of the Virginia RTTY net says things are slow due to summer doldrums and high static at times. Many out of state stations are checking in and welcomed but Jerry

wonders where all the Virginia stations are hiding. The net meets daily at 3625 at 8 PM, EDST.

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 30c 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. 30c each.

1966-Oct.-Nov.-Dec.- [3]

1967-None.

1968-March-May-[2]

1969-Oct.-Nov.-Dec.-[3]

1970-None

1971-Jan.-May-June-July-Sept.-
Oct.-Nov.-Dec.-[8]

1972-Jan.-Feb.-March-April-May-
July- [6]

[May-June] -[July-August] are
combined issues.

RTTY JOURNAL

Box 837

Royal Oak, Mich. 48068

Editor & Publisher - 'Dusty' Dunn, W8CQ

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Air Mail - - - All Other Countries - \$6.00

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VHF cont.--

CONTINUED FROM PAGE 13

crystal oscillators, relative importance of temperature, supply voltage, and loading on frequency drift, effect of crystal aging, etc. A related topic would be frequency standards reception of WWVB and use of the color subcarrier.

"All of these topics have been covered in the ARRL Handbook and other places, but not with the RTTYer in mind."

Do any of the readers have practical experience with stable RF signal sources?

We recently received some Great Circle Bearing Charts from Bill Johnston, WB5CBC, 1808 Pomona Drive, Las Cruces, NM 88001. The charts are nicely done with bearing in degrees from true North from your location to selected cities within each prefix area for all foreign prefixes and also for many cities in the U.S. listed by state and then city. There are 660 listings. In addition to the beam heading, the distance in both miles and kilometers and the beam heading from the distant station to your QTH are also given.

While on the subject of beam headings, we would like to mention that as of this writing, the DX conditions on the VHF bands have been quite disappointing so far this summer. Usually, there is one good opening on 2 meters. So far none has occurred. We have had some of the "extended ground wave" or mirage effects on 2 meters that usually occur during the summer, but even that has been disappointing.

That's it for this month. Let's have some news items and topics for technical discussions. Again, a list of receivers suitable for HF RTTY work and information on stable signal sources for FSK work would be appreciated.

73, ES CUL, RG.

DX cont.-- ***

CONTINUED FROM PAGE 15

BH is none other than Bill Hemingway, formerly HP1XHG. Bill is real active on the bands and can be reached at ...
Box 724

Curundu, Panama C.Z.

Larry, K1LPS, KG6NAA, has been really moving around for the past year or so. He is now located in Naples, Italy and will no doubt be there for some time as he has his family with him. Old friends can reach him at

L.L. Filby

USNAF Box 80

FPO New York, N.Y. 09520

We recently received a set of "Great Circle Bearing Charts" for this location

RTTY JOURNAL

to some 660 locations all over the world. They give the true bearing, the reverse bearing, and the distance in miles and Km. to each location. As it is a non profit venture with the nominal cost covering reproduction and postage we bring it to your attention in case you would be interested in obtaining a set for your location. You must furnish the following information. 1. Your QTH. 2. If population is less than 10,000 or a rural area, include latitude and longitude in degrees and minutes. 3. Otherwise the name of the city or town for which you want the chart is sufficient. The cost is, Surface mail, \$1.00 (or 7 IRC). Airmail, \$1.75 (or 12 IRC). Also is included is a fact sheet on "how to use"

Great Circle

1808 Pomona Drive

Las Cruces, New Mexico 88001

which is also Bill Johnston, WB5CBC.

The big Contest coming up is the CARTG Maple Leaf Sweepstakes. See the rules and prizes to be awarded in this issue. Official log sheets are available, send IRC's to cover postage. The log sheets make logging much easier and makes the Contest Committee have an easier job computing the scores.

73 de John

We have limited information, but notice in the report of the IARU, Region 1 conference held last May that;

"The band plan was modified with suggested center frequencies for RTTY to be - 3600-7040-1490-21100-28100" This is apparently suggested for European use but although very similar to frequencies presently used in the states the "center frequency" in some cases is what we usually assume as the "top" frequency.

During DX operation it may pay to tune a little higher than usual.

WORLD RTTY DX WINNERS-

1. IICAQ	94	17. WA6WGL	32
2. IICGE	92	18. VK2FZ	30
3. IICG	82	19. PY7CRS	28
4. VE7UBC	70	20. WB6SCH	28
5. IT1ZWS	69	21. ON4BX	27
6. W3KV	66	22. SM4CNN	27
7. WA2YVK	65	23. WIGKJ	27
8. KZ5LF	61	24. CR6CA	25
9. DL1VR	59	25. EA7PZ	24
10. WA3KEG	57	26. KH6AG	24
11. I1MPK	48	27. DL8VX	23
12. KL7GRF	45	28. F9RC	23
13. DJ8BT	42	29. FO8BO	23
14. K3NSS	36	30. HA5KBF	23
15. ON4CK	34	31. JA1ACB	22
16. UK4FAD	33	32. SM4CMG	22

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

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

NEW HAM MAGAZINE!! Interested in public services, humanitarian actions and international friendship? Sample issue free. Published every three weeks. Worldradio, 2509 Donner Way, Sacramento, Calif. 95818 WB6AUH

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

BACK ISSUES - RTTY JOURNAL - Have all issues from Vol. 1, No. 1, will reproduce any issue for \$1.00 PP. John Isaacs, 3175 Val Verde Ave. Long Beach, Cal. 90808.

28ASR, LIKE NEW, 3 SPEED shift, sync motor, LPE, LXD, tape loop bin, Cabinet refinished. TT/L-2 TU. Six manuals. Pick-up only. \$1,100 for complete lot. Henry Rainville WB2QXX 106 S. Cornwall Ave., Ventnor, N.J. 08406.

"RTTY SPEED CONVERTER" A drilled, fiberglass 4" x 6-1/2" printed circuit board now available for the WA6JYJ speed converter in the DEC 71 issue of HAM RADIO. \$6.00 postpaid. Complete parts kit including PCB, \$40.00, postpaid. P & M Electronics, 519 South Austin, Seattle, WA 98108. (41 words)

WANTED-COLLINS 399C-1 PTO Console. 32W-1 exciter. National HRO-7 receiver. All in any condition. G.S. Naniwada, JAIACB. 3-4-8, Izumi, Hoya, Tokyo 188, Japan.

TYPEWRITER RIBBON RE-INKER; Hand operated model now only \$3.50. K575 or K764 ink available at all National Cash Register Stores. 75¢ per tube. Walter Nettles, W7ARS, 8355 Tanque Verde Rd. Tucson, AR. 85715.

BUYING? SELLING? TRADING? Don't make a move until you've seen our new publication. Free sample copy! Six issues \$1. HAM ADS, P.O. BOX 46-653J, L.A., Cal. 90046.

WANTED: TELETYPE #28, 32, 33, 35 page printers, keyboards, cabinets, covers for 28 Reperforators. Cash, or trade for new Drake equipment. Sell LRX #28 typing reperforator-transmitter with two 3 speed gear shifts. \$100. checked out \$145. LRP #28 Typing reperforator without cover \$49. checked out \$69. Alltronic - Howard Co., Box 19, Boston, Mass. 02101 (617-742-0048).

SALE; SYNCHRONOUS MOTOR for Mite teletypewriter, 115 VAC, 60 Hz, 1 ph. unused, excellent \$27.50 ea. Parts for Mite teletypewriter such as selector magnets, arms, cams, level assembly, latch assembly, blocks, modification kits, surtches, platens, pinions, etc. Unused excellent - send us your requirements. Reperforator, TT16/FG includes tape perforator, typing unit, range finder, tape reel, sync motor in metal square cabinet, used good, \$35.00 ea. Atlantic Surplus Sales, 580 3rd Ave., Brooklyn, N.Y. 11215.

WANTED, BACK ISSUES RTTY from 1957 through 1967. John Nagle, 12330 Lawyers, Herndon, VA. 22070.

GOING OUT OF BUSINESS; Loads and loads of teletype and electronic "steals". Bring your truck or station wagon, wheelbarrow or lug it on your back; but come out. Facsimile machines, Deskfax units for sending and receiving. Loaded with tubes, optics, motors, relays, switches, etc. Operable and ONLY \$9.00 each cash and carry - COME & GET EM WHILE THEY LAST. C.B. GOODMAN & CO. 5826 South Western Avenue, Chicago, Illinois 60636. Phone: 312-476-8200.

WANTED - FOR USE BY DEAF PEOPLE - TELETYPE MACHINES Model 15-19-26-28-32. Must be in reasonable condition, complete with keyboards. Can pick up anywhere. Send information to R.H. Weibrecht, W6NRM, PO Box 555, Belmont, CA. 94002. Phone numbers - 213-793-4780 - 415-592-1622.

TYPEWRITING NEEDS YOUR unused surplus teletype parts. M 14-15- & 19 as well as M 28 and later. Please write what you have and asking price, cash or trade, to Fred Schmidt, W4NYF, Typetronics, Box 8873, Ft. Lauderdale, FL. 33310.

SALE; MODEL 14 TYPING REPERFS - send receive, complete with cover, sync motor, keyboard, end of line indicator, excellent \$37.50 Model 14 transmitter - distributor, complete with cover, sync motor, excellent \$20. ea. Model 28 type box, complete, excellent \$15. Platen for model 15 teletypewriter rubber covered, unused, \$4.00 Tuning Fork (speed indicator) 96.19 V.P.S. with instructions sheet for using tuning fork to set motor speed of teletype equipment to operate at speeds of 368 O.P.M. and 404 O.P.M. Unused \$2. ea.-3 for \$5. Drum, facsimile, key design 12-1/2" long, 6" dia, unused \$8. ea. Atlantic Surplus Sales, 580 3rd Ave., Brooklyn, N.Y. 11215.

SALE; MODEL 14 TD & RO Typing Reperf set, 60 wpm, excellent. \$75. 77070, 7.42 distributor, disc for Model 14TD, \$4 ea. Model 15's, Model 28 parts. URA-8A terminal unit, \$95. 2-freq HT-200, univ. with 6/12 volt vehicular charger, \$350 both units. SASE for complete list RTTY equip for sale. Larry Pfefer, W275 S3286 Burnell Dr., Rt. 1, Waukesha, Wisc. 53186.

ESSCO COMMUNICATIONS INC. announces availability of a phone-TTY modem...an acoustical coupler ATC-3 which when connected to a teleprinter and an ordinary telephone enables you to communicate with the printed words with another similar coupler. Used by deaf people nationwide. Compatible with other modems in deaf network. ESSCO ATC-3 is only \$129.95 FOB. ESSCO Communications Inc., 150 Marlton Ave., Camden, N.J. 08105. Phone 609-365-6171.

MODEL 28 MOTORS; Complete and checked out. LMU-3 for KSR, etc. \$12.00 LMU-12 for ASR \$15.00, plus postage for 12 lbs. F.K. McGinnis, 4304 McFarlin Blvd, Dallas, TX. 75205. (214-528-4499)

WANTED; TELETYPE MACHINES - Model 15 and 32 in large quantities. In good condition for use by deaf people. Will accept donations or pay fair prices. Can be picked up anywhere - Lee Brody, N.Y.-N.J. phone TTY for the Deaf, 201-796-5414 evenings. 15-06 Radburn Rd., Fair Lawn, N.J. 07410.

SALE; MODEL 28 Typing Reperforator (RT) mounted on a tape handling stand which includes large tape take-up spool and supply reels as well, as an intermediate storage bin. OA/dimensions 36" high, 20" long, 8-1/2" wide. Both LAXD transmitter distributor and LPR typing reperf come equipped with three speed gear shift. Allowing down as well as up speed conversion. Synchronous motor LMU-12. Excellent \$150.00. ea. Atlantic Surplus Sales, 580 3rd Ave. Brooklyn, N.Y. 11215.

GEAR SETS; for model 14 TDs. Sync 1800 RPM, 60WPM felt clutch, unused \$5.00 set. Gear set, (2) for model 14 reperforator, sync 1800 RPM 60 WPM, used excellent \$4.50 per set. Teletype sprocket wrench 5/16 with 12" long handle unused \$1.00 each. Tuning fork; 120VPS unused, \$2.00 each. Atlantic Surplus Sales, 580 3rd Ave., Brooklyn, N.Y. 11215.

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SALE; KEYBOARD FOR MODEL 15, with 'here is Answer Back Attachments' 21 characters to set up identifications, complete with all key tops, springs and gear - excellent \$11.00 each. FRXD-10 Combo; combining typing reperforator, a reader and distributor, on one base. The unit can be used separately or together, synchronous motor, no tape container or cover, used good, \$20.00 each. Parts for most teletypewriters also gears and motors including Mite teletypewriter parts. Atlantic Surplus Sales, 580 3rd Ave., Brooklyn, N.Y. 11215.

ELECTRONIC TELEPRINTER SPEED CONTROL.

Four position front panel switch permits instant selection of 60-67-75-100 WPM operation of any Model 28, 32, 33, 34 or 35 teleprinter (KSR, ASR or RO) equipped with the standard LMU-3 or LMU-12 (60 CPS Synchronous) or similar motor. Teleprinter should be equipped with 100 WPM gears. Second front panel control provides (1) Electronic range finding for improved copy of weak or badly distorted signals, (2) Exact synchronization of teleprinter's speed to the speed of the incoming signal from an improperly adjusted teleprinter, and (3) Copy of any speed between 50 and 150 WPM, including Navy speeds of 65, 71 and 106 WPM. Third front panel control permits direct operation of teleprinter from power mains. Controller may also be used with typing reperforators, auxiliary reperfs, Tee-Dees, BRPE tape punches, etc., equipped with the above noted motors and gears. Transformer coupled output provides electrical isolation between teleprinter and power mains offering additional protection to equipment and operator. May be used on any line frequency between 40 and 400 CPS. May be used on AC or DC mains. 25 CPS operation available on special order. Power requirements: 110 volts, 3 amps. Size: 8" W x 8" H x 11" D. Weight: 40 lbs. Delivery: 30 days or sooner after receipt of order. Specify preferred method of shipment. UPS available to most eastern states. Commercial accounts: Net 30 days. Individual accounts: Cash with order. Price: \$129.50 FOB South. Pasadena, California residents add \$4.98 sales tax. DOVETRON, 1015 Fremont Avenue (PO Box 267), South Pasadena, California, 91030.

SALE MODEL 28 Synchronous MOTOR PD67/U, code LMU-12 1/12 hp. 3600 rpm, 115 VAC 60 cycle, 1 phase, used excellent, \$18.50 ea. TT334/UG model 28 transmitter - distributor, high speed, 8 level, adaptable to 5 level code LBDX-9, used excellent, \$40.00 ea. TT315/UG model 28 typing reperforator, code LPR35BWA part of an/UG-13 (M28ASR) used, excellent \$40.00 ea. Atlantic Surplus Sales, 580 3rd Ave., Brooklyn, N.Y. 11215.

FOR SALE; TT/1 that has been converted to TT/L-2. Built-in two inch scope, TV filters, also commercial filters - Northern for narrow or wide shift. Can be seen working. No shipping, must be picked up. \$50.00 firm, or will trade for radio-TV test equipment. Ralph McQuade, W8WRL, 887 Lenore Ave. Columbus, OH. 43224.

TT/4A/TG PORTABLE KSR; 60 and 100 wpm speed. Used, good. \$48. plus \$10. shipping west of -20.00. east of Miss. TT-100 KSR \$125.00. FGC-25 ASR \$175.00. TT-109 TR \$50.00. All FOB. TT-71/UG printer - projector unused, complete \$75.00. Local only. Mark/Space Systems Co 3563 Conquista, Long Beach, Ca. 90808 (213-429-5821).

COMPUTER TYPEWRITER on stand, with 8 level tape punch and reader, \$100.00. Warren, WA31Y1, 2828 S. Simpson St., Philadelphia, PA. 19142. Phone: 215-SA 9-2576.

11/16" PERFORATOR TAPE, 40 roll case - \$7.95. Sprocket feed paper, \$3 per box (FOB). "Teletype Equipment, Supplies and Information for the Radio Amateur." FREE LIST. BVE, POB 73-R, Paramus, NJ 07652.

RTTY FOR SALE: Model 15, sync, 60 wpm, \$70; Model 14 TD & Typing Reperf Set, 60 wpm, sync, \$75; Model 28KSR, 60 wpm, floor console, \$300; 28KSR floor cabinets, \$50 ea.; Model 28ASR, skin-light, table top, with external TD, 60 wpm, \$600; Model 35ASR cabinet (new) \$200. Write for full list other RTTY items. Send SASE. L. Pfefer, K9WJB, 15000 W. Cleveland Ave., Apt. 225, New Berlin, Wisc. 53151.

PROTEST; PICKET! Write your congressman! Let nothing prevent you from attending the ARRL Hudson Division Convention, Oct. 21-22, Hilton Motor Inn, Tarrytown, N.Y. Exhibits, 2-meter FM, RTTY, lectures, contests, gabfests, banquet, N.Y. City sightseeing. Fun! Free gifts for early registrants. Plenty of free parking. Write Dave Popkin, WA2CCF, 303 Tenafly Road, Englewood, N.J. 07631.

"AFSK GENERATOR" - PCB and all components except input output jacks, power supply and chassis. \$6.60. P & M Electronics, Inc. 519 South Austin, Seattle, WA 98108 (23 words)

R-390 A/URR EXCELLENT CONDITION \$95. Will consider #28 or #33 Teletype in part trade. Alltronic-Howard Co. Box 19, Boston, Mass. 02101. (617-742-0048)

TOROIDS: 88 or 44mhz. 30/\$10. POSTPAID (5/2.50). Ribbons for 14,15,19,28,32,33, Mite, Lorenz-black nylon 12/\$3.50 postpaid. 60 speed gears for model 15-19 (74912-74913) \$3.50/set. 11/16" tape-fresh - \$8/case/40 rolls. Sprocket feed paper for all models \$5.00/box. Single copy roll paper (8-1/2") NEW \$12.50/roll/12. Late model 28 typing units, excellent \$175. New cover for model 14 reperf \$10. DESKFAK 6500 Tranceiver \$15 (2/\$25.) plus paper \$3/pkg. Manual for TXC-1 FAX \$7.50 postpaid. Stamp for picture catalog. Van's W2DLT Electronics 302R Passaic, Stirling, N.J. 07980.

FOR SALE - WESTERN ELECTRIC 164C1 teletype transmission measuring set Military TS-785A/GG new with manual. Reads distortion and bias on scope 60 - 75 - 100 speed and 60 - 20 ma or polar operation 5 or 6 level code. Complete with cords in original box, price \$35.00 FOB. Charles V. Berlin W6J CZ, 713 Trevethan Avenue, Santa Cruz, Calif. 95060.

FOR SALE: TELETYPE MODIFICATION KIT 159417. Three speed gear shift (60-75-100) for single shaft Model 28 reperforator (typing or non-typing). This is the type that mounts in the small, separate one foot square box. It can also be used to convert the Navy Model T-192 Reperforator from 65-71-106 WPM to standard speeds: \$50.00. I also have single shaft reperforator assembly with the selector assembly and range finder missing. The typing mechanism can be removed and installed on the standard non-typing perforator in the 28ASR to permit printing on the tape as it is punched. \$25.00 Briefcase telephone. Free installation in automobile of Southern California buyer. Cost \$1700 two years ago. \$450. Tektronix 541A with CA Plug-in: \$595. Singermetrics Spectrum Analyzer SB-15: \$295. Panoramic Radio SB-8B Spectrum Analyzer: \$125. Hank Scharf, W6SKC, 1015 Fremont Avenue, South Pasadena, California 91030. 213-799-5886 or 213-682-3705.

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TOROIDS, 88mm. UNCASSED - 5/\$1.50pp. W9FTE, Dick Sanborn, 8800 W. Cloverbrook Ct., Milwaukee, Wisc. 53224.