DUAL KEYBOARD ?--

Several years ago during a QSO with a friend in Russia we mentioned their machines which have a dual keyboard for both Russian and the Roman alphabets and wondered if we might get a picture of it. About a year later we received a colored slide which is reproduced here but unfortunately no description or details of it's operation. The photo is not too clear but appears to have only roman numerals on the top line but both a Russian character and a Roman character on the other keys. With four lines of keys there must be some method of using them with a five level code. Maybe one of our readers can send us an explanation.

◆◆◆◆◆◆◆◆

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

First Class Mail --

RTTY JOURNAL

September 1969

EXCLUSIVELY AMATEUR RADIO TELETYPE

Volume 17 No. 8 30 Cents

GOLD, SILVER, BRONZE MEDALLIONS *for the* *C.A.R.T.G. D-X RTTY SWEEPSTAKES*

SEE PAGE 4

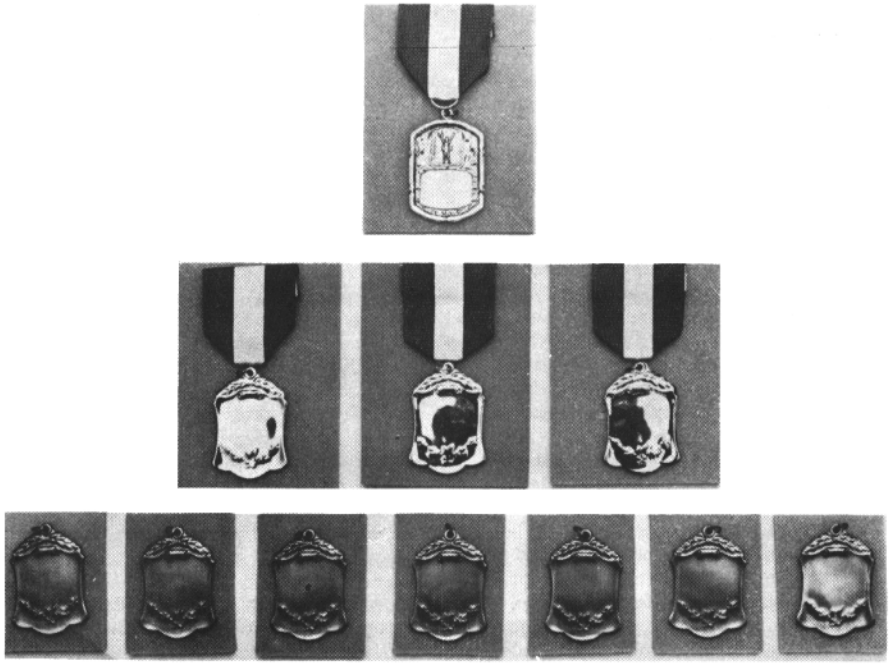


Photo by Robert Hudyma

Herbert Hoover , Jr. W6ZH - 1904 - 1969

Everyone in Amateur Radio lost a true friend and an active supporter with the death of Mr. Herbert Hoover, Jr. Aside from acting as president of the ARRL for a number of years, Mr. Hoover fulfilled a number of other important amateur activities both nationally and internationally.

Not everyone knows of his intense interest in RTTY, however and how he was instrumental in getting amateur RTTY going in the very early days. Merrill Swan who was active in these early pioneer days and published this magazine for 14 years was probably as close to Mr. Hoover as anyone and we asked Merrill to tell us of these early experimental days with W6ZH. His letter follows.

Dear Dusty:

I wish I were able to do justice to preparing an article on Herb, and cover the over thirty-five years I've known him. However, best I can do at this time is to recount some of the items which come to mind.

I first met Herb on twenty meter in the early 1930's. He and W6CIN were operating twenty-five meter voice cross-band, while W5GA and I (W5AEE) were doing same type of experimenting. After many contacts, we met in person in Tulsa, Oklahoma. Late in 1935 he mentioned starting a new geophysical company and offered me a position with this new company he was founding. So in February of 1936, W5AEE qsy'd to California, and a new call sign. Like many other amateurs who move from one part of the country to another, the radio was left behind. Herb offered use of his own station until I was able to get my equipment moved and operative. His was a well-equipped station, home designed and built, with a pair of fine Lazy H antennas for both 20 and 10 meters. He had previously been with Western Air, developing two-way radio for aircraft to ground, and his own station reflected his skill in building radio gear.

Herb had many outside duties besides United Geophysical, such as board member of several companies. One of these was the Southern California Edison Company. Late in the fall of 1947, this company released their model 12 Teletypes and Herb arranged for their purchase for amateur use. At that time we had several two meter stations in the Los Angeles area, and in a shortwhile all twelve of the printers were placed and the spare parts built into another printer. None of the amateurs who bought these used (and I do mean used!) Teletypes had the faintest notion how to go about putting these new pieces of equipment to use, so when time was available at the Lab, we came up with a modification of the Glide/Slope filter units. A goodly portion of the time used to develop this modification came from United's Research Lab time.

His wide group of friends provided an entry which resulted in the release of the phone company's model 26's and later the 15's. During the period in which RTTY, INC., was handling release and delivery of the Teletypes from the various phone companies, some 3,000 model 26's were placed, and a somewhat smaller number of 14, and 15's were placed. Herb provided guidance on formation of RTTY, INC., and setting up the various legal phases of this operation; without his help we probably would not have gone as far. He made available funds to cover costs of purchase of the printers, storage and related costs. The RTTY magazine was an idea of his, which was founded somewhat like this; if two men were standing on a corner and exchanged dollars, each would have only one dollar. However, if they exchanged ideas, each would go away with two ideas, not one. RTTY magazine was originally intended for the local club, but as time went on and more amateurs got interested in RTTY, it was expanded at his suggestion until the mailing list covered a large portion of the amateurs world-wide.

When he became Under Secretary of State, he sold United Geophysical to Union Oil Company. During his State Department duty, he was involved in setting up K6USA at the Biltmore Hotel in downtown Los Angeles. One of the transmitters was set up for Teletype operations, complete with a model 19 (less table) to provide communications for the visiting amateur and other, attending the CCIR meeting at the hotel.

Working for Herb while he owned United, and after his going to Washington, D.C., gave an insight into his interest in amateur radio, and electronics in general. United was formed to develop new types of instruments, and equipments, and with such an active mind, and equipment to find how, why and when things work, it was natural for him to become interested in RTTY. His article on the Heterodyne TU was printed in RTTY, as well as many other short articles from time to time. Many were the discussions at noontime lunch periods regards a better TU or a better FSK keyer.

As you may know, he was president of ARRL from 1962 to 1966. Also later he was president of the Automobile Club of Southern California. In addition he had an active consulting office in Los Angeles until his death.

Dusty, you can see from my ramblings above, I have so many memories of working with Herb over a period of so many years, it's hard for me to know what to write about that would be of interest to RTTY'ers. We jointly have been assigned patents for instruments which were, and are used by United, so it's a real hard thing to try and do. It was a privilege to be associated with him for so many years. Indeed, a close friend will be sadly missed.

73, Merrill Swan W6AEE

Photos from RTTY JOURNAL-1965 to date---

Following is a list of stations and/or OPS in RTTY Journal from 1964 to present (Pictured that is!)

We have not made any consideration for Silent Keys, or fellows that have had new calls issued for one thing or another.

de Stan WB6QFE

DL1IN, Jan 68
Sept. 64 Jan 65
DL1VR, Jan 68
DL9EX, May 65
EL2N, Feb 66
FG7XT, Jan 64
July 65 Feb 66
F8KI, Aug 64
G2HIO, Nov 68
G8LT, Apr 69
HB9XJ/MM, Mar 66
I1RHF, Feb 64
I1ROL, Feb 65 Jul 66
Nov 66 Nov 68
I1LCF, Feb 65
Nov 67
I1ORS, Jan 66
I1RIF, May 66
I1CAQ, Nov 66
I1AMP, Nov 66
JX5CI, Nov 67
JX6XF, Nov 67
K8MYF, Feb 64
K9UTN, Apr 64
K9POU, Aug 64
K9AQJ, Feb 65
K3GIF, Jul 65, May 66
K8QLO, Oct 67
K5OLU, Dec 67
K5BQA, Jul 69
K2DCY, Oct 66
K8YEK, Oct 66
K1PLP, Jan 66
K1LPS, Apr 69
K7MNZ, Jul 66
K5OIM, Feb 68
KL7DRZ, Jan 69
KH6AX, May 65
KW6DS, Feb. 69
ON4BX, Dec. 68 Jan 66
ON4CK Mar 68, May 69
OZ8US, Apr 65
PJ2MI. Jul 65
PY2CQ, Oct 68
SM5KV, Aug 65
VE5ART, May 69
VE3LJ, May 69
VE3RTT, Jan 68
VE3AYL, Apr 67 Oct 65
VE3FJB, Oct 68
VE2EG, Feb 66
VK3KI, Mar 69
VK3DM, Mar 69
VK3NR, Mar 69
VP9BY, Nov 66
VU2KV, May 69
W1BGW, Feb 66
W1CNY, May 68
W2JAV, May 66
WA2YVK, Jul 68
W2UX, Apr 67
W2OKO, Oct 68
W4NZO, Apr 64
WA4MGT, Oct 64
W5QCH, Feb 69
W5FCP, Oct 67
W6AEE, Dec 66 Jan 67
May 67
W6CG, Jun 65 May 66
W6NRM, Jun 65 Dec 66
W6FFC, Oct 67
WA6PIR, May 68
WA6TLA, Jan 69
WA6WGL, Jun 68 Dec 68
WB6QFE, Jul 68 Dec 68
WB6ODR, Jun 69
W7VKO, Mar 65 Jul 68
W7HPH, Apr 65
W7AIN, Apr 66
W7ZNB/6, Oct 66
W7ARS, Oct 66
W7UKO, Jul 68
W7ND, Jun 69
WA7BEU, Jan 69
W8BBB, May 67
W8GUS, Jun 65
W7ETH, Jul-Aug 69
WA8GVK, Jun 65
WA8POU, Feb 66
W8NTZ/VO2, Oct 66
WA8PCK, May 67
W8SDZ, Oct 67
W8CEM, May 68
W8MSG, Jan 69
W8NFD, Jun 69
W9EPT, Apr 67
W9GRW, Apr 68
W9WKC, Jan 69

NEW YORK R T T Y GROUP
May 64

How about a photo of YOU and the rig?---

* * *

CARTG 'Medallion' DX-Sweepstakes

Oct. 4-6 1969

Without doubt the best DX contests have been the recent ones sponsored by the CARTG. (Canadian Amateur Radio Teletype Group) and this year promises no exception.

For the winners and runner-ups will go three Gold, one silver and eight bronze Medallions suitably engraved. C.A.R.T.G. certificates will also be awarded to the highest scorer in each US and Canadian district as well as for each country. Advance publicity has been sent to all known sources to assure as large a turn out of countries as possible. Everyone can help in this by passing the word along to other contacts.

An innovation this year is the scoring of logs by computer. A standard form of log should be used, a sample is printed in this issue but anyone sending IRCs to CARTG - 85 Fifeshire Rd., Willowdale, Ontario, Canada will receive printed log sheets. If the logs are kept with a carbon copy, so that two sheets are filled in, one set can be mailed direct and the other kept for record. It will not be necessary for the individual to compute any other scores if the logs are fully filled in. With the computer checking scores, results will be available faster with much less work. (Don't ask us how they do it) If you make your own logs please follow the layout and columns as per the sample.

Rules are about the same as past years and are printed in full in this issue as well as a zone chart.

A lot of thought, time and money goes into the planning of a contest and we hope that everybody makes a special effort to join in the fun.

AWARDS

1. Gold Achievement Medallion and Ribbon - "CARTG".
2. Silver Medallion and Ribbon "RTTY JOURNAL"
3. Bronze Medallion and Ribbon "C.A.R.T.G."
4. Bronze Medallion - "CARTG"
5. Bronze Medallion - "RTTY JOURNAL"
6. Bronze Medallion - "CARTG"
7. Bronze Medallion - "RTTY JOURNAL"
8. Bronze Medallion - "CARTG"
9. Bronze Medallion - "RTTY JOURNAL"
10. Bronze Medallion - "CARTG"
11. High Score USA, Gold Medallion - "RTTY JOURNAL"
12. Canadian High Score - Gold Medallion - Canadian Director's Award.
13. "C.A.R.T.G." Certificates for high score in each USA and Canadian District and each Country.

1. CONTEST DATES

The contest will commence at 0200 GMT Saturday, October 4th and end at 0200 GMT Monday, October 6, 1969.

The 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 "off periods" may not be less than two hours at a time. Times on and off the air must be summarized on the Log and Score Sheet.

2. BANDS

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

3. COUNTRY STATUS

ARRL Country List - except KL7, KH6, and VO to be considered as separate countries.

4. MESSAGES

Messages to consist of:

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

5. EXCHANGE POINTS

(a) All two way contacts with stations in one's own zone will receive 2 exchange points.

(b) All two way contacts with stations outside one's own zone will receive the points listed in the Exchange Points Table. (Same zone chart as used in last year's test.

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

6. LOG SHEETS

"CARTG" Standard Log Sheets or facsimile of same must be used, with a separate page for each band.

Logs must contain; Bands, Number exchanges and times sent and received GMT, call signs, scores, countries, exchange points and rest periods. Logs must be received not later than November 30, 1969. Send to:

Canadian Amateur Radio Teletype Group
85 Fifeshire Road
Willowdale, Ontario, Canada
VE3RTT. (C.A.R.T.G.)

7. MULTIPLIERS

A multiplier of one is given for each country worked including one's own on each band. e.g. If one country worked on three bands then three points is given.

8. SCORING

Total number of Exchange Points multiplied by number of Countries worked, multiplied by number of Continents contacted (maximum 6).

Scoring Example

Exchange Points . . . .(2020)
Countries. . . . . .
3.5 MHz - 5
7 MHz - 4
14 MHz - 18
21 MHz - 10
28 MHz - 3
Total 40

Continents . . . . . .(5)

2020 x 40 x 5 - 404,000 Pts.

Send large SAE for. . .C.A.R.T.G. standard Log Forms, to facilitate Computer checking.

Canadian Amateur Radio Teletype Group. **C.A.R.T.G.** *Sponsors*

The 9th World-Wide* RTTY DX *"MedalLion" Sweepstakes.

ZONE_____ STATION LOG OF_____

BAND	SENT			STATION	RECEIVED			ZONE	COUNTRY	PTS
	NR	GMT	✓		NR	GMT	Cont			

Sample log to be used in CARTG DX contest. Actual log is 5 1/2 x 7 1/2 inches and ruled for 25 entries on each sheet. Send IRCs and addressed envelope for supply or rule your own in similar form.

DATE _____ SHEET Nº _____

EXCHANGE POINTS..... times MULTIPLIERS.....equals..... (TOTAL ✓ SCORE)

FOR COMPUTER USE ONLY.

I certify, on my honour, that I have observed all competition rules as well as all regulations established for amateur radio in my country, and that my report is correct and true to the best on my belief.

POWER INPUT.....

(USE SEPARATE SHEETS FOR EACH BAND)

.....

(Operator signature and call)

MAINLINE DS-2 Multi-Station Control - -

IRVIN HOFF, W6FFC
12130 FOOTHILL LANE
LOS ALTOS HILLS, CA 94022

Several amatuers have two or more completely independent RTTY stations. One is usually on twenty meters and the other on 40 or 60 meters or VFH. The Mainline DS-2Multicontrol system allows these operators to combine the two stations to allow automatic "retransmit" and/or automatic simulcasting on two bands at one time for general announcements, bulletins, etc. (This is legal and W1AW uses this method daily to transmit on numerous frequencies at one time).

This system gives fantastic versatility, and is extremely easy to use. It will add a tremendous amount of pleasure to your operation. It is particularly useful if attempting to carry on QSO's on both bands at one time, etc. It is also handy to allow someone on one band to talk to somebody on another band they normally cannot work.

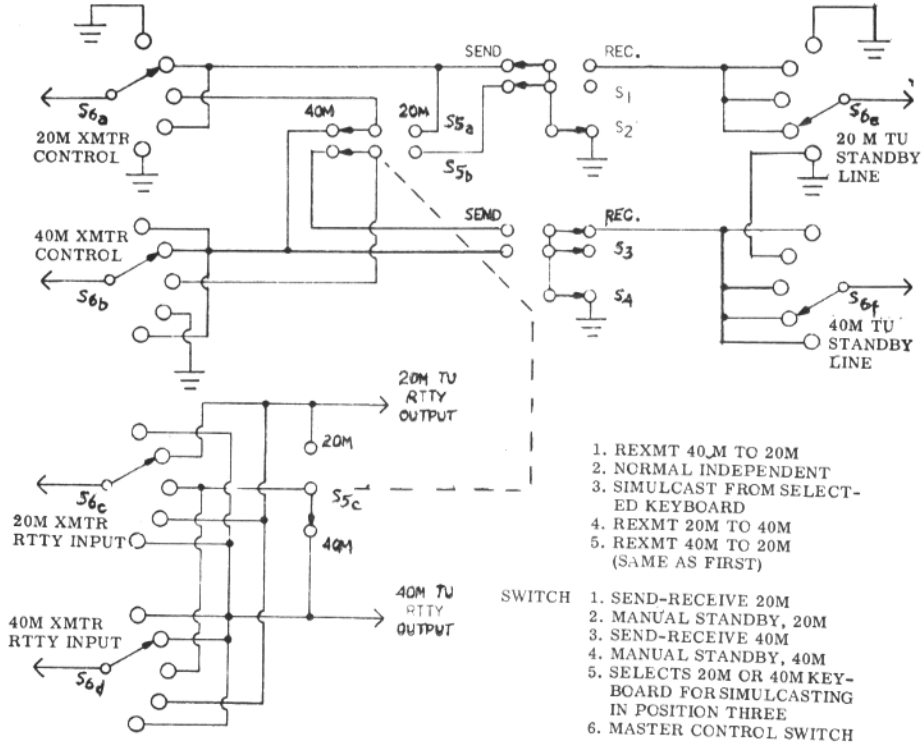
Switch S-1 is the "Send-Receive switch" for one transmitter, S-2 is the manual stand by switch. Both would be located on or near the printer for fingertip control. Switches S-3 and S-4 are similar for the other rig.

Switch-5 selects either keyboard for "simulcasting". This switch could be omitted entirely in which case S-1 and S-3 could be normal spot types. If used, S-5 is a PDT. toggle switch.

Switch S-6 is the master station control. It is a 6 pole - 5 position switch. We recommend the Centralab PA1021 (phenolic) or PA2021 (ceramic).

S-6A and S-6B control the transmitter on and off. If a SSB type of transmitter, it would control the "Push to Talk" line. If a CW transmitter such as the DX60A or Johnson Viking, we have an interesting method to recommend:

On the antenna change over relay, hook



1. REXMT 40M TO 20M
2. NORMAL INDEPENDENT
3. SIMULCAST FROM SELECTED KEYBOARD
4. REXMT 20M TO 40M
5. REXMT 40M TO 20M (SAME AS FIRST)

SWITCH
1. SEND-RECEIVE 20M
2. MANUAL STANDBY, 20M
3. SEND-RECEIVE 40M
4. MANUAL STANDBY, 40M
5. SELECTS 20M OR 40M KEYBOARD FOR SIMULCASTING IN POSITION THREE
6. MASTER CONTROL SWITCH

one side of the relay coil to the wiper arm of S-6A, for instance. The other end connects to the pin in the output plug that puts II10 VAC on it during the 'CW" position or else directly to one side of a wall plug for IIOVAC. If you get no relay action when the S-1 switch is put in "send" reverse the socket in the wall, and of course be sure that S1- has a common ground to the transmitter, etc. The external contacts on the relay short the "CW" jack on the front panel to ground, thus putting out RF whenever the external relay closes. As a result you would normally leave that transmitter in the "CW" position, and would not need to switch anything manually other than S-1 to transmit. This same system may be used on "SSB" transmitters such as the Collins S line where the antenna relay contact on the rear of the transmitter is grounded during transmit.

S-6C andS-6D control the FSK output from the demodulator to the proper transmitter for simulcasting and retransmitting, etc. Be certain your switching is done between the loop and the isolation resistor; that is, the FSK system in the transmitter will always have it's own isolating resistor from the loop.

S-6E and S-6F control the standby line to allow retransmit. This is shown for the TT/L type of standby which is open for normal transmit. This is backwards from most systems such as the ST-3, which must be grounded for transmit and open for receive. In that event S-1 would be changed to a 3PDT and S-2 would be put in parallel, not in series. S6E would be rewired appropriately. If this is a problem write us for help.

Teleprinter Equipment Speed Control Data

L. J. (Barney) Barnett, ZL2ALW
4 Park Way
Wainuiomata, New Zealand

In this country various types of teleprinter equipment has been sold as surplus by Government Agencies, however most of this has been incompatible with Amateur practice when supplied. Those who have purchased this gear are faced with the problem of getting it working at the right speed, and in some cases this has proved to be a frustrating task.

The data below was prepared in the hope that it may help someone who has this problem and is as confused as I was initially!

This data relates only to governed motors. These may be either AC or DC in either series or shunt governed types. The particular machine must of course be fitted with the correct gears for the motor type provided. This point can be confirmed by reference to the Teleprinter Gear Speed Identification Chart which was printed in the July/August 1969 issue of RTTY Journal. (Courtesy TELETYPE Corp.)

The various models of Creed printers were fitted with different gear sets as their design evolved, and for this reason it is difficult to produce a chart which would cover all models. In general, Creed gears are replaced in clusters instead of pairs, and it can be assumed that the set is correct if all gears in that set mate correctly. (If any reader has a specific problem I can supply data or modification instructions for most Creed models).

Assuming that the motor and gear set do match, it is a simple matter to paint the correct number of segments on the governor ring so that a stroboscope can be used to check the motor speed.

The following formula is used to determine the number of segments:--

$$N = \frac{F \times 120}{S}$$

Where

- N number of segments into which circumference of governor should be divided.
- F frequency of fork or strobing source.
- S speed of motor in R.P.M.

The chart fig. 1 sets out data for several popular printer types.

Model 3 Creed
50 Bauds - Using 96.19 vps Tuning Work.
(Teletype part No. 104984).
Motor Speed 2571.4 RPM
Revs per Baud 51.43
Governor Segments 9 White - 9 Black
Segment Size 20 Degrees

45.45 Bauds - Using 87.6 vps Tuning Work.
(Teletype part No. 103628 or 72634).
Motor Speed 2337.3 RPM
Revs per Baud 51.43
Governor Segments 9 White - 9 Black

Segment Size 20 Degrees

Note: Design rate for Creed Model 3 variants A to R was 49 Bauds at 2520 RPM. Model 3 X operated at 50 bauds with a motor speed of 2520 RPM.

Model 7B - 8 - 7TR - 6S Creed

50 Bauds - Using 87.6 vps Tuning Work. (Teletype part No. 103628 or 72634).
Motor Speed 3000 RPM
Revs per Baud 60
Governor Segments 7 White - 7 Black
Segments Size 25.71 Degrees

50 Bauds - Using Neon Flasher on 50 cycles or 125 Cycle Tuning Fork.
Motor Speed 3000 RPM
Revs per Baud 60
Governor Segments 10 White - 10 Black
Segment Size 18 Degrees

45.45 Bauds - Using Neon Flasher on 50 Cycles or 125 Cycle Tuning Fork.
Motor Speed 2727 RPM
Revs per Baud 60
Governor Segments 11 White - 11 Black
Segment Size 16.36 Degrees

Model 14 - 15 - 19 Teletype

50 Bauds - Using 96.19 vps Fork. (Teletype part No. 104984).
Motor Speed 2102.4 RPM (Nominal 2100 motor.)
Revs per Baud 46.2
Governor segments 10 White - 10 Black (Teletype part No. 7105)

45.45 Bauds - Using 87.6 vps Fork. (Teletype part No. 103628 or 72634)
Motor Speed 2308.56 RPM (Nominal 2100 motor)
Revs per Baud 46.2
Governor segments 10 White - 10 Black (Teletype part No. 7105)

Note: 1500 or 1800 Rpm Motors are sometimes fitted along with suitable gear sets so that speed in Bauds remains correct.

It is possible to set the machine speed incorrectly with a stroboscope or tuning fork. This is caused by selection of an odd harmonic of the strobing marks, however once the correct setting is found it is an easy matter to keep your printer on speed.

RTTY MERIT AWARD - --

THE MERIT AWARD COMMITTEE of the C.A.R.T.G. are anxious to receive from clubs or individuals, nominations for consideration for the 1969 C.A.R.T.G. RTTY MERIT AWARD.

The nominators must state fully the reasons why they feel their nominee should be considered by the committee.

Multiple awards may be made in any one year, if the committee considers that two or more nominees equally warrent the award. Nominations should be forwarded to:

Chairman C.A.R.T.G.
Merit Award Committee
VE7LL
ALAN E. H. VENNING
6171 Brantford Ave.,
Burnaby 1. B.C.
Canada

The RUBAYYAT of OMAR the TELETYPIST -

Come, throw the switch.
And let your signal ring!
The sweepstake bird has but a day to flutter
-- Three hours, this opening!

The teleprinter types; and having typed;
Moves on. Not all your toroid art nor wit
shall lure it back to cancel. For you see,
No back space lever can be found on it.

I sometimes think we never find so little noise,
As where some power boy has played;
That all our flawless solid copy joys
Come in a notch some kilowatt has made.

Ah, love! could we with FCC conspire
To graps this sorry spectrum plan entire,
Would not we shatter it to bits -- and then
Give FSK the clear slots we desire!

A teleprinter, and a stein of brau;
A solid copy QSO: and thou
Beside me coiling up the tapes--
- Ah, Teletype were paradise, and how!
Alas to those who go for Morse alone,
And to the rest who follow only phone,
The Muezzin from the green-keyed tower cries,
"Fools! Five level printing is the one!"

Obtained from W4NG via relay from WA6PIR.

Tape Punch Delay - -

Capt. GEORGE HUNT, W4NUT
PO Box N
Fort Lauderdale, Fla 33315

This is a project that might come in handy to many RTTY'ers that cut tape while transmitting.

This describes a TD time delay so that when the TD catches up to your typing it will give you a variable (10 to 15 second) delay and TD stop so that you can again get ahead of the TD. I have found it most useful here and it makes a difference in the smoothness of TD operation.

Open the TD cover and you will note that two wires are connected to the "tight tape arm", disconnect these two wires from the switch that is associated with the arm. The "tight tape switch will be inserted in the 110 volt line at point "B" of the schematic. The two removed wires will be connected at point "A" of the schematic. (This moves a set of normally open relay points in the place of "tight tape switch".

By adjusting the 1500 ohm pot you can vary the time delay from 10 seconds to about twenty five seconds.

Principal of operation:

The DPDT relay at rest closes the points that allow the time delay heater circuit to work. When the tube comes to temperature the normally open points of the time delay close. This activates the DPDT 110 vt AC relay switch which moves into a closed position which in turn closes the tape stop circuit and the TD is now operable and the power is removed from the heater circuit of the time delay tube allowing it to cool off. In the event the TD tape gets too tight raising the arm, the circuit (relay holding the circuit) is broken and the time delay again takes over causing the pre-determined delay to take place through the heating of the relay tube heater. When the points close the DPDT again moves to closed and you are again in a transmitting mode and you have had a chance to again get ahead of the TD with your cutting of tape.

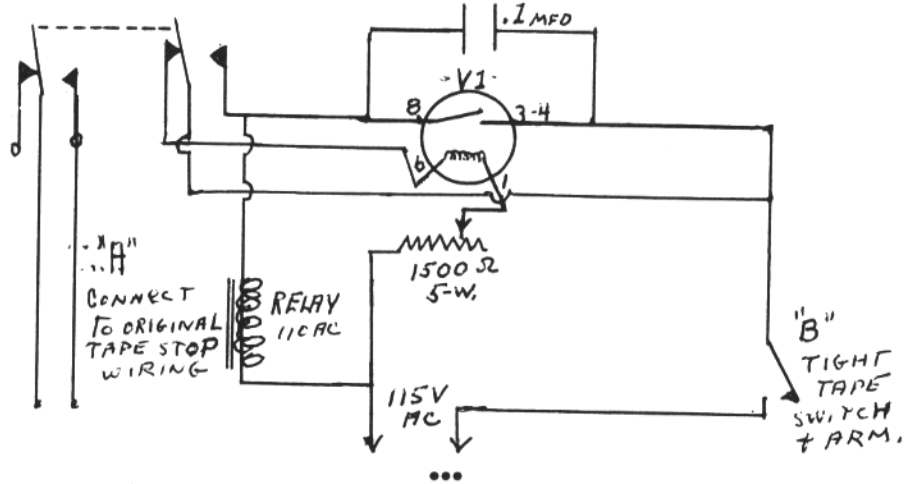
This particular time delay device is used for many applications mostly in delay of high voltage to expensive tubes, radar applications and now to RTTY.

NOTE:
Tube shown is 9 pin miniature
Relay points shown in N.O. position.
Tape Switch shown in "tight position"

Parts:

Relay- Amperite delay relay- 115N010. Burnsten Appleby 20B805. $1.35 this is a 115 vt normally open glass tube relay and comes as a miniature nine tube pin or large octal bases tube.

Double pole Double throw relay, 110V AC.
1500 Ohm five watt potentiometer.
3 x 5 Handy Box.



RTTY theory & applications-

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

RTTY SIGNAL BANDWIDTH

Part 1 - AC CIRCUIT CONSIDERATIONS

Introduction

The generation, transmission, and reception of telegraph signals present some interesting, and, indeed, difficult problems. It is possible for an amateur to successfully operate telegraph equipment with little understanding of the principles involved. However, many times problems arise that are mystifying. At times, there may be serious design faults within a piece of RTTY gear that makes the unit marginal in operation. This occurs most often in the TU (demodulator, or decoder, or whatever you want to call it.)

We have upon several occasions explained some of the theory behind time constants in telegraph loops, because this seems to be the biggest bugaboo in amateur equipment (also in commerically-built equipment for amateur use!).

The marginal operation usually has the following characteristics: Operation under ideal conditions is normal. As soon as some noise gets into the picture or a signal that is otherwise not "perfect" is received, errors appear.

This month we are beginning a series of "articles" that will explain some of the characteristics of a telegraph signal. We are especially interested in the bandwidth required by an RTTY signal. In order to give a complete picture of the bandwidth requirements, it is necessary to review some circuit fundamentals.

AC Circuit Calculation Limitations

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

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

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

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

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

Some devices are considered to be non-linear at all values of current or voltage. Diodes are a prime example. Under certain conditions diodes are actually quite linear, at least mathematically, but under most conditions they can safely be considered non-linear. Therefore, Ohm's law cannot be applied to circuits containing diodes unless certain restrictions are met. The only way to solve circuits containing diodes is by means of a graphical technique.

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

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

Because there are always newcomers to RTTY, and new subscribers, it is worthwhile to periodically review operating "standards". We have been negligent in this respect recently. The following summary is perhaps an over simplified review of VHF RTTY.

The frequency in use by more amateurs than any other VHF frequency that we know of is 146.700 MHz. Most of the operation on this frequency is AFSK on FM (40F2), vertically polarized, using audio frequencies, of 2125 Hz Mark and 2975 Hz Space. In general, AM operation does not appear to be "channelized" the way the FM operation is, but there are specific cases where AFSK on AM is on a specific frequency. A review of this "column" over the last 3 years will give specific details. If you are a new subscriber, and want to operate VHF RTTY, please write and we will be happy to send to you any information we have regarding operating practices in a given area.

VHF OPERATION

Although we did give some VHF information last "month" (actually, JULY-AUG), we have not given too much recently; the main reason for not giving any, is that we have not received any. If you have some information about VHF operation in your area, please send it to us so it can be printed here.

--73 ES CUL, RG

BACK ISSUES —

The only back issues available are: July through December 1966 - A limited number of complete 1968 editions at $3.30 and individual copies of February through October 1968 and January 1969 to date. Individual copies are 30¢ each. The TT/L-2 reprint is 30¢. RTTY JOURNAL Binders will be available by September 1st at $2.50 each in the USA and $3.00 in Canada and Mexico.

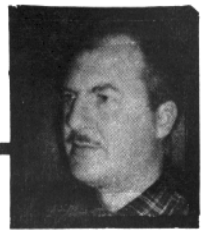
RTTY JOURNAL
P.O. Box 837 Royal Oak, Mich. 48068
"Dusty" Dunn — W8CQ
Editor & Publisher

SUBSCRIPTION - 1 Yr. (11 issues)
U.S. - Possessions - Canada - Mexico

First Class - $3.00
Air Mail - $3.50

All Foreign Countries-1st Class $3.50
Air Mail - South, Central America $5.00
All Others - Air Mail ----- $5.50

RTTY-DX



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

Hello there. . .

Although this year we did not have the frantic RTTY - DX activity such as that generated by the DXpedition of I1BPD last Summer, DX has been showing up from time to time, mostly without any pre-announcement, which in most cases meant that you had to be on the band to get them. Most of these stations will continue to operate however now that they have overcome the main obstacle; getting the RTTY gear on the air.

The RTTY population of Luxembourg increased a few hundred percent recently with activity from LX1SD, LX1RM. LX1GM, and LX1RG. All are putting out good signals so you should have no trouble working them.

There is re-newed activity from the USSR with a fb signal from George, UW1DK, in Leningrad. We haven't heard of any signals from this area for quite a while so let's hope that George is the forerunner of increased activity for the near future.

From down under, Tasmania is now firmly established on the RTTY map with fine signals from VK7JF and VK7DK. The latter has been printed S-9 in this area.

Arthur, ON4BX, reports that RTTY activity is now a fact from the Philippine Republic. Arthur was the first to contact DU1DBT in two way RTTY and says that conditions are best for them in Europe at around 16-1800z. The best time for North American stations to look for them is around 11-1300z. Arthur also indicates that you may find them on 14105 khz. on SSB and that they will get on the "green keys" if requested.

LG5LG is very active with excellent signals. This one is at a place called MOROKULIEN, an artificial state between Norway and Sweden created by the broadcast industry of each country for charitable purposes. The station was operated by Svein, LA1SH. Svein is recuperating from a broken leg so he should be active for some time. Incidentally, Moro means Fun in Norwegian and Kul means Fun in Swedish so when you put them together Morokulien must be a real FUN town. If you should happen to print a SK9 prefix it will be coming from the same place. For a QSL send 3 IRC to Hans Kinck, LA4YF, Bo 1 Telemark.

One usually doesn't hear RTTY and Sports come up in the same conversation. However, during the famous auto race at Le Mans in the twenty-four period of June 14-15, F8GE was set up at track side giving out the latest race information to all contacts. Porche was ahead at the time I worked them but I do not believe it was that way at the finish. F8GE is the radio club at Le Mans and Victor, F9AJ was at the keyboard at the time. A special QSL commemorating the event was sent to all that had a QSO. We would also like to make mention at this time of the great increase of RTTY activity from France in the past few months. Here are some of the stations that are active: F2LV, F2SY, F3KB, F3VW, F3UW, F3PI, F5SD, F5MF, F5KAE, F8GE, F8UC, F8KI, F8TZ, F8KW, F9RC. I'm sure that there are many more active that have not been logged as yet.

Ireland continues to be available with daily activity from Paul, EI5BH, and now Mike EI4AL, both with excellent signals. It is interesting to note that Paul was licensed as PK4PQ some years ago. It's a pity that this was some time before RTTY became popular on the Ham bands. Paul also advises that PAØAA, the station of VERON, is active again after the disastrous fire of some months ago. You will again be able to copy their very informative RTTY Bulletin every Friday at 2030z on 14100khz.

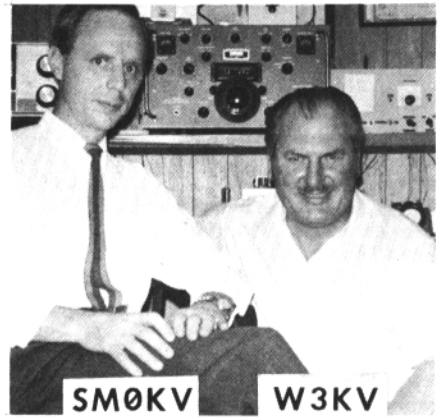
ON4BX reports encouraging news from VS6DR. He has received a manual for his Model 15 and you can expect to hear him on very soon. Arthur also reports periodic activity from Roberto, TG9AD.

If you are hunting prefixes SKØTM is a good catch. The station is located in the Museum of Science and Technology in Stockholm, a set-up similar to GB2SM in London.

The B A R T G will issue a special QSL card for all RTTY contacts made with the International Radio and Communications Exhibition to be held in London on October 1st thru 4th. The call will be GB3RS and the approximate hours of operation will be 10-1300 z and again at 16-1900z during the Exhibition period.

At the recent IARU Region One Conference held in Brussels, Arthur, ON4BX, and Bob, ON4CK had the pleasure to meet and be host to Gunnar, SM4GL, President of the Swedish Branch and a very active RTTY'er.

In late June it was your scribes pleasure to meet Olle, SMØKV for an "eyeball" QSO. In spite of Olle's busy travel schedule while in this country we managed to find him and to get him to the shack for several hours of RTTY chatter.



Lou, .II ORS, was due to be in the States in August but at this writing we were not aware of his schedule but hope that some of the boys will make contact with him.

W.N. (Newt) Williams, K8QLO, will be visiting Europe late this Summer and hopes to have the opportunity to meet as many of the RTTY boys as possible while there. His scheduled stops with dates and hotels follow. Sept 4 thru 7 Vienna (Schoenbrun) - Sept. 8 thru 10 Budapest - Sept. 11 and 12 Vienna - Sept 13 thru 16 Salzburg (Bristol) - Sept. 17 thru 19 Innsbruck (Tyrol) - Sept. 20 and 21 Garmisch, Germany (Alsenhof) - Sept 22 and 23 Venice (Bour Grunwald) - Sept. 24 thru 26 Florence (Savoy - Sept. 24 Milan (Excellsoir) - Sept. 28 and 29 Streisa, Italy (Regina Palace) - Sept. 30 thru Oct. 2 Brussels (Plaza) - Oct. 2 thru 4 London (St. Ermines). Newt also offers to personally deliver QSL's to any of the above locations if you get them to him at 5725 Lodewyck, Detroit, Michigan 48224.

With the nublication of the results of the B A R T G Contest last month, and publication this month of the D A R C - W A E Contest scores I would like to convey to you a few thoughts from the people that run the Contests. Both Ted, G8CDW and U1i, Dj9XB were somewhat disappointed with the number of entries in the respective Contests but in addition both deplored the fact that so many of the available

Continued on page 15

D X HONOR ROLL

Wrkd/Cfmd

1.	ON4BX	84/80	30.	XE1YJ	33/28
2.	FG7XT	89/76	31.	GeIYG	33/25
3.	IIKG	78/72	32.	WB6QFE	30/25
4.	W3KV	77/72	33.	DL5PQ	35/24
5.	ON4CK	71/63	34.	VK2EG	33/24
6.	W8CQ	63/61	35.	YV5CIP	30/24
7.	K8YEK	65/58	36.	W8GPB	45/23
8.	W4AIS	62/53	37.	WA2YVK	30/23
9.	WA6WGL	54/49	38.	CE3EX	31/22
10.	W3ISE	52/47	39.	VE5LG	29/21
11.	W6CG	51/46	40.	VE4FG	23/21
12.	W5QCH	48/46	41.	WØHAH	32/19
13.	W1GKJ	52/45	42.	W1ACW	28/19
14.	WA8BOT	51/45	43.	VP9BY	26/19
15.	K8QLO	48/43	44.	W3AVQ	22/19
16.	I1ROL	50/41	45.	ZL2ALW	28/18
17.	VE3AYL	48/40	46.	GeLDI	26/18
18.	K4VDM	42/40	47.	KE7EBK	27/17
19.	K8JTT	41/40	48.	K9QNV	24/17
20.	WB6ADY	39/38	49.	HK3SO	21/16
21.	W4CQI	49/37	50.	PJ2CR	27/15
22.	W8CAT	39/33	51.	OA4BR	22/15
23.	UA1KBW	36/33	52.	W6TX	20/15
24.	W7VKO	35/33	53.	K9BJM	15/15
25.	W2LFL	47/32	54.	VK3NR	32/13
26.	PY2CQ	43/32	55.	VK3DM	27/13
27.	VE4BJ	33/31	56.	W4FUI	33/11
28.	K6EV	33/29	57.	WB6RXM	21/8
29.	W4EGY	37/28			

The DX Honor Roll is published three times a year. January, April and September. Send John, W3KV a list of the stations worked and confirmed for listing, no QSL are necessary until someone reaches the magic 100 mark. Calls that do not send in a new score for a year will be considered inactive and deleted until a new score is received.

CARTG DX Sweepstakes

Oct. 4-5-6

HITS & MISSES

From The Editor and his Mail

We would like to acknowledge and thank the many readers that have suggested various articles they would like to see rerun. All of them are being considered and we will attempt to satisfy those that seem the most popular.

Most authors are willing to answer definite questions from readers but remember it is only common courtesy to enclose a stamped self-addressed envelope when asking for a reply.

WA8LIX/4 encloses a clipping from the Huntsville paper stating the space center would like to include a teletype on the Apollo space ship. One reason being the saving of the voices of the Astronauts in sending all the detailed information required.

Maybe a good idea but from our experience it would be a lot harder on the fingers, sending a lot of figures, than the voice, and with gloves on too? Anyway has anybody got plans for a 2282.5 mHz converter we can publish?

We are pleased to have another article from one of our foreign subscribers, this one from ZL2ALW. It is sometime hard for us to realize the difficulty in obtaining information some fellows have in places where teletype machines and parts and supplies are few and far between. The JOURNAL is sent to 45 different countries and we hope that some of the information helps stations to get on RTTY that otherwise would never make it.

Last month we goofed again. We reran the article on an inexpensive scope and failed to check the sources of supply we mentioned in the original article published in 1967. If anyone has a source of these tubes we will be glad to publicize it in the next issue.

In the past several months we have received a number of comments both for and against the proposal for faster, optional speeds on RTTY. Several have been from abroad. As the proposal will probably not come before the FCC for some time we would like to receive as many comments as possible in the next month. Remember that the quiet majority can often be overpowered by a loud minority so even a postcard with your vote helps give a broader view of sentiment for or against the proposition.

In the business that we make a living at we need an electronic service man, mostly for tape recorders and transistor radios. And we have wondered -- Maybe there is some young fellow planning on attending college that would like a part time job. Test equipment is available and hours can be very flexible. The pay, depending on ability would be from $3. to $4.00 per hour. There are a number of colleges within easy reach of Royal Oak. If anyone is interested write to the Journal and we will discuss the set up. Even better would be a full time person or even both. As you can gather service men are hard to find around here.

There is a great need for a simple, concise, handbook, on RTTY and we have often thought of trying to put one out but never seem to get the time. If anyone would like to take on the job we would be glad to furnish material from any back issues that could be used and even undertake the printing and distribution. Possibly the ARRL may get around to it soon, if not do we have any volunteers?

Since our announcement about a book of RTTY pictures, John Greve says he has enough for the first edition. They are offered in the classified section of this issue. If you missed the original announcement check back on page 2 of the June issue for details.

DX News- cont.

Continued from page 13

awards could not be issued and this mainly due to the fact of no score being submitted by RTTY'ers who were obviously in the Contest. Don't think that your score is too small to bother with. You may be surprised to see that in the final results you were high man in your area and the recipient of at least a beautiful certificate. Your fellow Hams that manage the Contests spend a lot of time and effort in preparing the affair and checking the Contest logs, usually as a Committee of One, so please give them your support as your time permits and above all, no matter how small you think it is, Send In Your Score.

On other pages of this issue you will find the full details of the 9th RTTY SWEEPSTAKES again sponsored by the C A R T G. Read them carefully and don't forget the "time-out" feature. Log sheets are available and we advise that you send for them as it will make your logging job easier and the committees checking job a lot easier.

73 de John

RTTY Contest Calendar

The lack of information far enough in advance has held down participation in many contests in the past. As the organizations promoting these contests are establishing them as regular events at certain times of the year, dates are being set well in advance and we will attempt to keep this calendar up to date to allow planning of the future, rules for each contest will be published separately but plan your operating to take in as many contests as possible.

CARTG-Medallion DX Sweepstakes - Oct 4-6 - Rules in this issue.
Volta DX Contest - Dec. 6-7, 1969
DARA WAE RTTY Contest - last week end of April 1970

BROAD MINDED

USE NARROW SHIFT

DARC RTTY CONTEST RESULTS

Single Op

Continental leaders

EU:	I1KG	7.480
NA:	W2RUI	20.350
SA:	no entry	
AF:	"	
AS:	"	
OC:	VK3DM	3.744

Top Ten

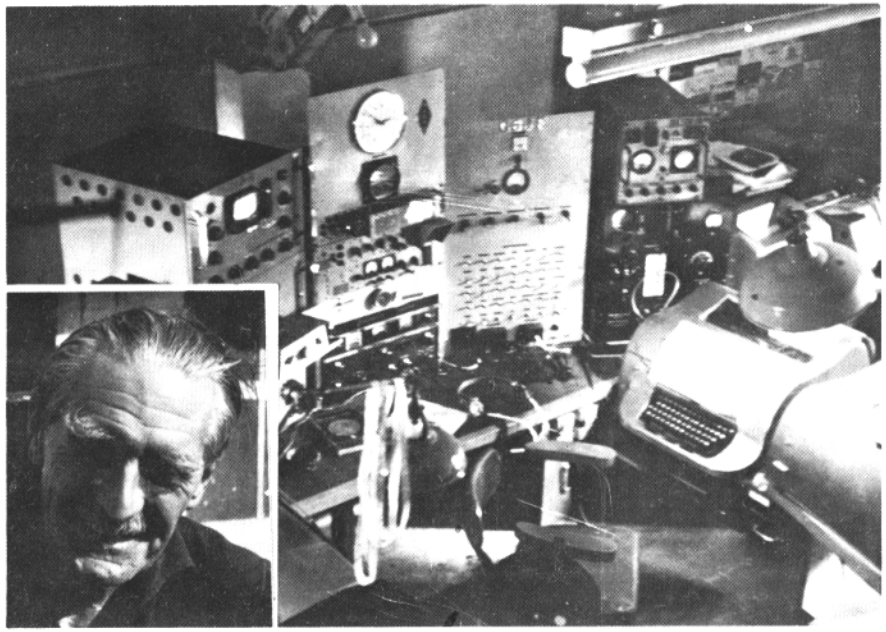
Europe		Non-Europe	
I1KG	7.480	W2RUI	20.350
DL1VR	6.864	W9HHX	13.034
SM4CMG	5.887	W3ILZ	8.339
DL5PQ	5.208	WB6RXM	4.984
IT1ZWS	2.300	VK3DM	3.774
DJ5JK	1.958	VE7UBC	2.562
I1CWX	1.920	W2FAN	1.326
DM3YA/a	1.575	WB6QFE	507
DL8VX	1.512	VE3RTT	384
I1PEP	1.455	---	

Results in details

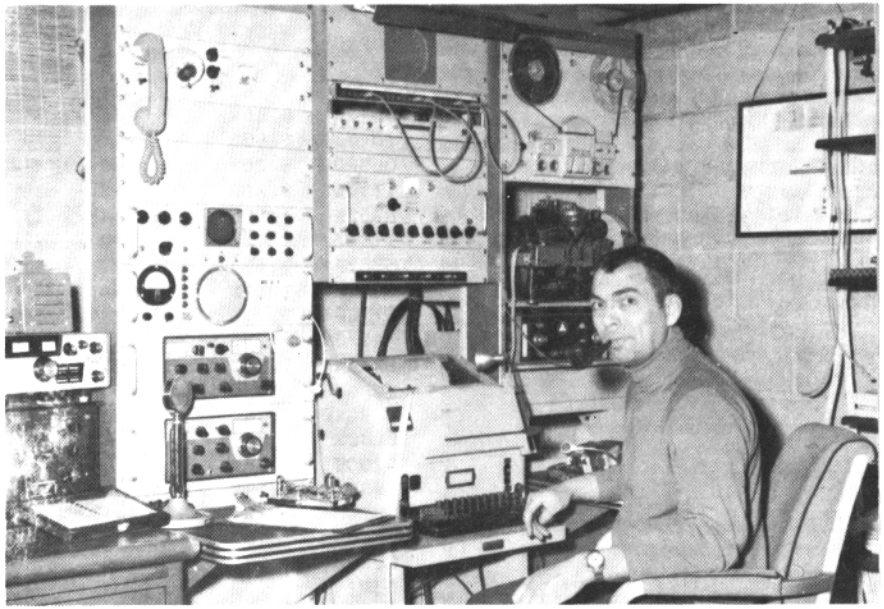
Europe Single Op

Call	Score	QSO	QTC	Mult.
I1KG	7!480	70	34	44
DL1VR	6.864	54	60	39
SM4CMG	5.887	56	111	29
DL5PQ	5.208	50	76	31
IT1ZWS	2.300	38	53	20
DJ5JK	1.958	28	48	22
I1CWX	1.92o	29	30	24
DM3YA/a	1.575	31	22	21
DL8VX	1.512	41	14	21
I1PEP	1.455	32	38	15
HA5FE	1.200	30	39	16
ON4BX	1.178	24	14	19
SMØKV	868	24	30	14
PAØGKO	840	21	28	12
DL8CX	810	20	--	18
OZ6OB	780	20	34	12
F9RC	690	28	16	13
DL2QH	390	17	--	13
SM4CEZ	280	17	22	7
DL3NO	240	10	12	8
F3PI	222	10	27	6
GI3VDB	198	19	--	9

Checklog: DL1TV, IT1LUP
SM7BBJ, OK1MP



'Reg' G6JF



'Hank' WA8GVK

Zone Exchange Point Table

Courtesy VOLTA SSB & RTTY Club

CORRESPONDENT zone

YOUR zone	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
1	2	14	10	13	16	18	22	20	25	30	36	37	39	21	22	19	20	17	11	25	29	29	22	22	16	28	25	31	39	35	14	36	25	29	34	39	40	47	44	15
2	14	2	15	8	7	16	16	12	16	23	24	30	30	12	14	16	19	20	19	19	25	31	26	30	28	35	35	40	50	50	25	47	14	21	21	28	33	36	37	6
3	10	15	2	8	11	9	13	14	18	21	28	28	30	26	28	27	29	27	21	32	37	39	32	31	24	37	33	40	43	35	11	32	29	35	35	42	48	50	52	20
4	13	8	8	2	3	8	10	8	12	18	22	25	27	19	21	23	26	26	22	26	33	37	37	34	30	40	38	44	52	44	20	40	21	28	26	33	40	41	44	14
5	15	7	11	3	2	9	9	6	10	17	20	24	25	18	20	22	26	24	35	32	38	33	35	31	41	40	45	54	46	22	41	19	27	24	31	38	39	42	13	
6	18	16	9	8	9	2	4	7	10	12	19	19	21	27	29	31	34	33	29	34	40	46	40	40	33	46	42	49	47	38	17	32	28	36	30	37	44	43	48	22
7	22	16	13	10	9	4	2	4	6	8	15	15	17	26	29	31	35	36	33	33	40	47	42	44	38	50	46	53	49	40	22	34	26	34	26	33	40	38	44	22
8	20	12	14	8	6	7	4	2	5	11	15	18	19	22	24	27	31	32	30	29	35	42	38	42	37	47	46	51	54	44	24	38	21	30	23	30	38	36	41	13
9	25	16	18	12	10	10	6	5	2	8	10	14	15	23	25	29	33	35	34	29	35	43	41	45	41	50	50	55	52	5	28	38	21	30	20	27	35	32	38	21
10	30	23	21	18	17	12	8	11	8	2	9	7	9	31	33	37	41	43	41	36	42	51	49	52	45	58	52	54	44	37	28	31	28	36	24	29	38	31	38	29
11	36	24	28	22	20	19	15	15	10	9	2	9	7	26	28	33	36	41	43	30	34	42	45	51	52	49	55	49	42	41	37	35	22	29	16	20	28	23	29	27
12	37	30	28	25	24	19	15	18	14	7	9	2	3	35	37	41	45	49	48	39	42	49	53	58	50	52	52	48	37	33	32	27	31	37	34	27	33	27	33	34
13	39	30	30	27	25	21	17	19	15	9	7	3	2	33	35	40	43	48	49	37	39	46	50	56	53	50	52	46	34	34	35	29	29	34	21	24	30	24	30	34
14	21	12	26	19	18	27	26	22	23	31	26	35	33	2	3	6	10	14	18	7	14	21	19	25	27	27	30	32	42	49	34	55	5	10	15	19	21	26	26	6
15	22	14	28	21	20	29	29	24	25	33	28	37	35	3	2	5	9	13	18	6	11	18	17	23	27	25	29	30	39	47	36	54	6	7	15	18	19	25	24	8
16	19	16	17	23	22	31	31	27	29	37	33	41	40	6	5	2	4	8	13	6	10	15	12	18	22	21	24	26	36	42	33	49	10	9	20	21	21	27	25	9
17	20	19	29	26	26	34	35	31	33	41	36	45	43	10	9	4	2	5	12	7	8	12	8	14	19	17	20	22	32	38	32	45	14	10	22	22	20	27	23	12
18	17	20	27	26	26	33	36	32	35	43	41	49	48	14	13	8	5	2	7	12	12	12	6	11	14	15	16	20	30	35	29	40	13	15	27	28	24	31	27	14
19	11	19	21	22	24	29	33	30	34	41	43	48	49	18	18	13	12	7	2	18	19	16	10	10	9	16	15	20	30	32	21	36	23	21	33	34	30	38	33	16
20	25	19	32	26	35	34	33	29	29	26	30	39	37	7	6	6	7	12	18	2	6	14	14	20	26	21	26	25	34	43	39	49	8	3	15	16	15	22	20	12
21	29	25	37	33	32	40	40	35	35	42	34	42	39	14	11	10	8	12	19	6	2	9	11	17	24	16	21	20	28	37	40	43	14	6	18	16	11	19	15	19
22	29	31	39	37	38	47	46	42	43	51	42	49	46	21	18	15	12	12	16	14	9	2	6	10	18	17	13	11	21	29	36	35	22	14	26	22	15	22	16	24
23	22	26	32	33	40	42	38	41	49	45	53	58	50	19	17	12	8	6	10	14	11	6	2	6	13	8	12	14	24	30	31	37	22	16	29	26	21	28	22	20
24	22	30	31	34	35	40	44	42	45	52	51	58	56	25	23	18	14	11	10	20	17	10	6	8	6	6	10	20	24	26	30	28	22	35	33	25	32	25	25	25
25	16	28	24	30	31	33	38	37	41	45	52	50	53	27	27	22	19	14	9	26	24	18	13	8	2	13	9	15	23	30	18	27	32	28	41	40	33	40	33	25
26	28	35	37	40	41	46	50	47	50	50	49	52	50	27	25	21	17	15	16	21	16	7	8	6	13	2	6	5	16	22	31	29	29	21	33	29	21	27	20	29
27	25	35	33	38	40	42	46	46	50	52	55	52	52	30	29	24	20	16	15	26	21	13	12	6	9	6	2	7	15	18	25	25	34	27	40	35	27	32	26	30
28	31	40	40	44	45	49	53	51	55	54	49	48	46	32	30	26	22	20	20	25	20	11	14	10	15	5	7	2	10	17	31	24	34	25	36	30	22	26	19	34
29	39	50	43	52	54	47	49	54	52	44	42	37	37	42	39	36	32	30	30	34	28	21	24	20	23	16	15	10	2	9	15	32	42	33	39	31	24	24	20	44
30	35	50	35	44	46	38	40	44	45	37	41	33	34	49	47	42	38	45	32	43	37	29	30	24	30	22	18	17	9	2	24	7	51	42	47	40	33	32	29	48
31	14	25	11	20	22	17	22	24	28	28	37	32	35	34	36	33	32	29	21	39	40	36	31	26	18	31	25	31	15	24	2	22	39	42	46	53	52	56	51	28
32	36	47	32	40	41	32	34	38	38	31	35	27	29	55	54	49	45	40	36	49	43	35	37	30	27	29	25	24	32	7	22	2	57	48	47	42	38	34	33	50
33	25	31	29	21	19	28	26	21	21	28	22	31	29	5	5	10	14	18	23	8	14	22	22	28	32	29	34	34	42	51	39	57	2	9	10	14	18	22	23	10
34	29	21	35	28	27	36	34	30	30	36	29	37	34	10	7	9	10	15	21	3	6	14	16	22	28	21	27	25	33	42	42	48	9	2	13	12	12	18	16	16
35	34	21	35	26	24	30	26	23	20	24	16	34	21	15	15	20	22	27	33	15	18	26	29	35	41	33	40	36	39	47	46	47	10	13	<	7	15	15	19	20
36	39	28	42	33	31	37	33	30	27	29	20	27	24	19	18	21	22	28	34	16	16	22	26	33	40	29	35	30	31	40	53	42	14	12	7	2	8	8	11	24
37	40	33	48	40	38	44	40	38	35	38	28	33	30	21	19	21	20	24	30	15	11	15	21	25	33	21	27	22	24	33	52	38	18	12	15	8	2	9	5	28
38	47	36	50	41	39	43	38	36	32	31	23	27	24	26	25	27	27	31	38	22	19	22	28	32	40	27	32	26	24	32	56	34	22	18	15	8	7	2	6	32
39	44	37	52	44	42	48	44	41	38	38	29	33	30	26	24	25	23	27	33	20	15	16	22	25	33	20	26	19	20	29	51	33	23	16	19	11	5	6	2	32
40	15	5	20	14	13	22	22	18	21	29	27	34	34	6	8	9	12	14	16	12	19	24	20	25	25	29	30	34	44	48	28	50	10	16	20	24	28	32	32	2

CLASSIFIED ADS Rates $1. 30 words - Additional words 2¢ ea. Closing date 1st of month.

NO GLARE WINDOWS for Model 15 & 19 Printers. Cadinum plated & Gold iridite finish. $12.50 P.P. Check or M.O. Bud WA6UEF, 17114 Sunderland Dr., Granada Hills, Calif. 91344.

RTTY GEAR For Sale; List Issued monthly. 88 or 44 mh toroids - 5 for $2.50 postpaid. Elliott Buchanan and Associates. 1067 Mandana Blvd., Oakland, Calif. 94610

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

SELL; BOONTON FM signal Generator, model 202-D; H-P Audio Osc model 202-B, 0.5 Hz to 60 KHz. Bother excellent with manuals $125. ea. Shipping prepaid. Page paper $7.50 case. WB2PLY, Box 207, Princeton Jct., N.J. -08550

CUSTOM ENGRAVING of your panels will make your home brew gear look like factory built equipment. We can engrave panels to your specifications. We also engrave plastics, brass and name plates of all kinds. Prompt service on all orders. NAME-O-PLATE Co. 20350 LaCrosse Ave., Southfield, Mich. 48075, Tele. 353-7926

LET J & J CUSTOM BUILD you Mainline TT/L-2 FSK demodulator exactly as described in the May issue of QST with sharp filters for 850 and 170 shift. tuned and adjusted in your unit for excellent performance. Also available TT/L-2 filters. J*J Electronics. Canterbury. Conn. 06331

WANTED #33 TELETYPE MACHINES (8-level) to help students set up terminals for shared-time computers. Any condition. Will swap #32 (regular 5-level) equipment. #28's or cash. G. White 5716 N. King's Highway. Alexandria. Va. 22303.

WANTED MODEL 28KSR; In good operating condition for $325. Also need schematic and/or conversion instructions. to copy, for W.U. Deskfax machine. K. Schwieker, K4KQR, 1124 Opelika Rd. Auburn. Ala. 36830

WANTED: RTTY Technical Manuals TM 11-352. 11-2222 and 11-2223. WA9EXZ. Herb Draeger. 533 S. Spring Ave.. LaGrange. Ill. 60525.

MODEL 14 TD's: 60 wpm w/synchronous motor. tight tape and end tape switches - $20. Slip bases - $4.00. TS-2B/TG "Fox" machines (w/o wooden cover) - $30.00. Teletype REC - 47 power supplies - $3.00. All in good condition. F.K. McGinnis. III. 3308 Mockingbird Lane, Dallas. Texas 75205

REGENERATIVE REPEATER: Teletype TT63A/FGC. All electronic signal regenerator takes biased. distorted, fading signals off the air and "regenerates" a nice clean local square wave signal for the printer. Actually takes only a fraction of the normally required signal to trigger this device. Can also be used as a receiving converter. 115 vt AC 60Hz. Dimensions 8 7/8 high by 19"" wide complete with tubes, wetted relay and cable, like new $16.00 ea. Teletype synchronous motor for model 14, 15 transmitter distributor. excellent $7.00 ea. Send for free teletype catalog. Atlantic Surplus. 300 7th St.. Brooklyn, N.Y. 11215

SWAP-AVAILABILITY INFO on test equipment. etc.. spotted on my travels -- for availability info. teletype material. Sell everything for the Teletyper. SASE for list. Typetronics, Box 8873. Ft. Lauderdale. Fla. 33310. W4NYF.

SELL-UNUSED CARTER DYNAMOTORS 12V in @ 14 A output 720V DC @.125A $3.00. NC-109 working condition $35.00. I-122 combination signal generator and hetrodyne frequency meter, 8 to 15 and 135 to 230 MC, $35. Above items plus postage. J*J Electronics. Canterbury. Conn. 06331

BERKELEY 554F 5 DIGIT COUNTER with crystal oven and original manual $150.00; Stelma TDA-2 rtty distortion analyzer with scarce manual $50.00; Clean Polycom 62B 6 and 2 meter tranceiver $250.00. Dick Shongut, W2QFR. 25 Cameron Place, New Rochelle, N.Y. 10804

LARGE ETCHED BOARD per June 1969 "QST" complete bandpass input and discriminator filters for 850 and 170 all on one board for 1275/1445/2125 Hz or 2125/2295/2975 Hz tuned and adjusted. J*J Electronics. Canterbury. Conn. 06331

MODEL 14 TYPING REPERFORATOR, send-receive. with synchronous motor, keyboard. holding magnet. end of lint indicator and cover like new $40.00 ea. Same as above, no keyboard. receive only $28.00 ea. Model 15 teletypewriter complete like new $70.00 ea, with "here is" keyboard for identification $80.00 ea. Model LO15 teletypewriter complete like new $80.00 ea. with "here is" keyboard for identification $90.00 ea. All above machines are in operating condition. Atlantic Surplus Sales. 300 7th St. Brooklyn, N.Y. 11215

WANTED- TUBES Type 4-400A, sockets and chimneys. Inductor B & W type 850A. Filament transformer, 5 vts-30 amps. B & w cnoke FC-30A. Five or six foot rack-cabinet with back door, lock and casters. Orville Magoon, 1941 Oakdell Dr., Menlo Park, Calif. 94025

Additional Classified on Next Page

Additional Classified on Page 18

SALE* FRXD-10 or 20 combo (typing reperforator and trns. - dist) with synchronous motor. This is an exceptional flexible unit combining typing reperf, a reader and distributor on one base. All these units can be used separately or together. Used with a model 15 page printer it will provide all the functions of a model 19 with much more flexibility. See Feb. 1964 CQ for schematic and additional information. Excellent condition, no cover, $32.00 ea. With out cover or retainer $22.00 ea. KEYBOARD for model 15 with Here-Is answer back attachments for identification. 21 characters. This mechanism is an electromechanical device which allows the identity of the called station to be transmitted automatically to the originating station upon the receipt of FIGs upper case "d" from the signal line. Like new $12. Send for free catalog of teletype parts and equipment. Atlantic Surplus Sales, 300 7th St., Brooklyn, N.Y. 11215

SALE8 RELAYS HG1004 Clare mercury-wetted contact relay, unused $5. ea. used ecellent $3.25 ea. HG4C-HG1003 mercury-wetted relay Clare, used, excellent $3.60 ea. HGP1017 Clare mercury wetted relay, used excellent $4.00 ea. Western Electric 275D relay, used, excellent $1.50 ea. Clare SK5014 relay, new $2.00 ea. Send for our teletype catalog. Atlantic Surplus Sales, 300 7th St. Brooklyn, N.Y. 11215

TOROID COILS 88 mh. uncased, postpaid. 5 for $2.00. LaVon Zachry, PO Box 845. Apple Valley, Calif. 92307

ONE MODEL 15 TELETYPE machine with table. in good condition. for sale. make offer or send check to Harry Palmer WA5TOY/4. 21 North Julia Street Apartment B. Mobile. Alabama 36604. 205-433-2127.

TELETYPE MODEL 26. $22.00 (pick up only) TU-6. glass circuit board construction (June 1967 RTTY Journal) $69.00. John Herring. Barbara Ave. Willson Subdivision, Weatherville. Cal. Phone 623-4372.

SELL: W.U. PORTABLE teleprinter. 10w x 15L x 12H. Uses 1/4 tape. Perfect condition. $40. W1OER, Don Kadish. 135 Barbara Rd.. Waltham. Mass. 02154

WANTED - Large quantities of page printers model 15 or 32. Any quantity considered in good condition. Quote price. Lee Broday, N.Y. N.J. RTT for the Deaf. 15-06 Radburn Rd. Fairlawn. N.J. 07410

WANTED A RHODE ISLAND QSO on RTTY to complete my WAS on RTTY. Anyone that can oblige me please call collect - person to person. Wayne Grove - K9SLQ, 219-824-3198. I will appreciate it.

TELETYPE PICTURES FOR SALE. Suitable for making your own tapes. 50 pictures for $1.00. Perforated and audio tapes also available. Pictures for volume two solicited. W9DGV. 2210-30th. St. Rock Island. Illinois 61201.

SWAP A MAINLINE TT/L-2 FSK demodulator completely wired and tested with two sets of filters for 850 and 170 (2125 and 2975) with scope. suitable for rack mounting. A $350.00 value. for a 75A4 or 51J3 or 51J4. J*J Electronics. Canterbury. Conn. 06331

VECTOR C12 PLUG IN UNITS. octal. alum case 3" high. 2" square. Ideal for RTTY filters. New. 75¢ each. Howard Fasold. WAOVQM. 138 Palisade Cir.. Manitou Springs. Col. 80829

TOROIDS 88 or 44 mhy. center tapped. never potted. 5/$2.00 postpaid 11/16th oiled Fresh reperferator tape $3. box/10. Model 32KSR complete $200. German Model 15KSR with table $75. Model 15 with tape punch and TD. Table. complete $120. (Just like model 19 set but only size of a 15 printer). Gears for most speeds. most machines $6. a set. postpaid. Polar relays $3. Sockets $1. Drake 2B & 2BQ $175. New Clegg 66er $160. GE portables and mobiles - write. Wanted Ham-M rotator. Bird Thruline watt meter and elements. Stamp for list. Van. W2DLT. 302R Passaic Ave. Stirling. N.J. 07980

TTL/2 PRINTED CIRCUIT BOARD, $6.00, newly designed input filter/discriminator board for two shift frequencies, same size as TTL/2 board (6 x 9), $6.00. Also, smaller individual input filter or discriminator boards, about 2 x 6 each $2.00. All postpaid in USA. James R. Salter, K5BQA, 11040 Creekmere, Dallas, Texas, 75218.

28ASR WITH TD and Electrom converter in excellent condition. Can be seen operating. Asking $1,350.00. Write W3JZR. Morris Cohen. 400 Brookhaven Rd.. Wallingford. Pa. 19086

AK-1 AFSK GENERATOR completely wired and tested. self contained with power supply in an 8 1/2 x 6 1/8 x 15 gray cabinet. J*J Electronics. Canterbury. Conn. 06331.

SPOOLS for TAPE

Standard 11/16 tape is just a little too large to fit on a standard 16mm movie spool. However the reels that Eastman Recordak films are spooled for some reason are just enough larger to be a perfect fit. Finding them may present a problem but banks or other industries using Recordak would be a good source to try. They are about four inches in diameter and will hold considerable tape.

Courtesy WA2FPT "Cry Potter".