

**Additional Classified on Page 19**

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WANTED: ARMY TELETYPE Manual TM 11-2215. Advise price including postage. A.S. Cooke, K2MOO, 21 St. Pauls Ct. Brooklyn, N.Y. 11226.

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WANTED: ANY OR ALL of the following issues of RTTY JOURNAL. Vol. 1 #12, Vol. 2 #5, Vol. 15 #1,2,6,7,8. Especially anxious to obtain the entire 1967 issues. Will buy entire volume if necessary. O.E. Olsen, D.D. Rt 2 Box 462A, Maitland, Fla. 32751.

TRADE: CV-57/URR for CV-7/URR. Want manual. W.W. Yancey, 840 Virginia Ave. N.E. Atlanta, Ga. 30306

Frequency Shift Converter CV-182A. Two i-f inputs permit dual-diversity reception. Excellent condition. \$175.00 FOB Columbus, Ohio. Carl A. Barklow, 432 South Denwood Drive, Gahanna, Ohio, 43020.

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# RTTY

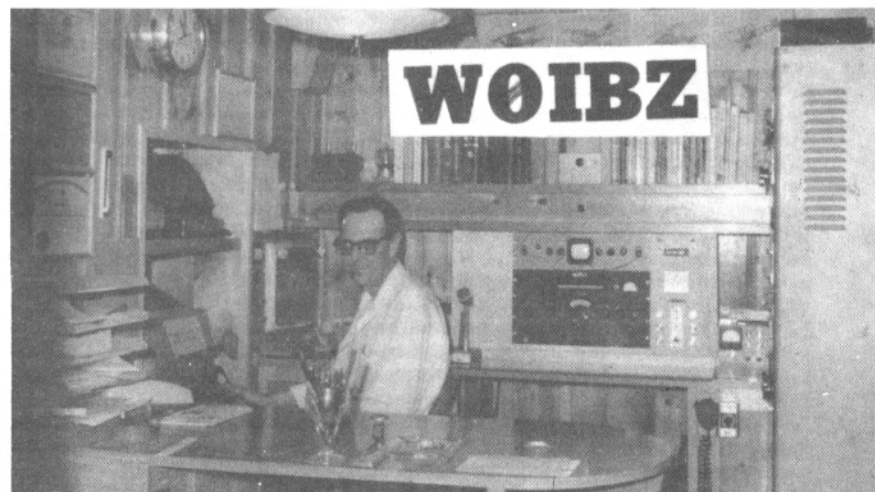
JUNE 1968

## JOURNAL

EXCLUSIVELY AMATEUR RADIO TELETYPE

Vol. 16 No. 6

30 Cents



# OPERATING COURTESY

## on RTTY —

JERRY HALL, KIPLP

Because RTTY operation is a mode unlike any other used by amateurs, several operating procedures and courtesies are peculiar to this mode. Most of these procedures relate to differences in the various printers in use. Although the keyboard is similar to that of a typewriter, this is just about where the similarity ends. As one soon discovers, there is no direct physical connection between the keyboard and the printer itself; only an electrical connection may exist. Many functional differences exist. For example, a teleprinter has no backspace function. When typing directly from the keyboard during transmission, it is common to type XXX or EEE following a typing error and then continue. When preparing perforated tape, errors may be deleted by backspacing the tape and "rubbing out" any mistakes with the letters shift key.

Unlike the typewriter, teleprinter carriage return and line feed functions are controlled by individual keyboard keys. They are performed independently, unless a printer has been specially modified. At the end of a line of typing, it is necessary to depress the carriage return key to return the carriage to the left margin, and then the line feed key to roll the printer paper up to a new line for typing. Common courtesy is to depress the carriage return key twice, the line feed key once, and then the letters-shift key once. Two carriage return functions provide added assurance against a black blob which might occur at the receiving printer from a pileup of letters at the end of the line if a carriage return function is missed. Two functions also allow ample time for a slow action carriage to return fully to the left margin before typing commences. (This becomes more important at tape speeds.) The letters-shift function assures that the receiving machine is not hung up in the figures position, as may happen with a static burst or interference. It also allows time for the receiving machine to become re-synchronized with the sending machine at tape transmission speeds, if static or interference has caused loss of synchronism.

Some printers are equipped with an automatic carriage return - line feed feature. Some may also include an automatic

non-overline feature. On such printers, the carriage will automatically be returned and a line will feed when the right-hand margin of the paper is reached. This avoids the "black blob" problem mentioned above and also avoids the accidental typing over of a previous line of print at the printer only. When transmitting from a keyboard associated with one of these printers, such actions in no way affect the transmitted information. To assure readable copy at receiving printers, which may not be equipped with these features, the standard format of two carriage returns, a line feed and a letters-shift should be used at the end of each line.

Another feature provided on some printers is unshift-on-space. When the carriage is in the figures position, a printer equipped with this feature will automatically shift from figures to letters when a space between characters is received. This feature assures that not more than one group of figures or punctuation will be received if the carriage is accidentally put in the figures position because of static or interference. But as with the automatic carriage return - line feed feature, keyboard transmissions from a unit with these printers are in no way affected, and each time it is desired to return the carriage to the letters position, the letters shift key should be depressed. Conversely, users of printers without this feature must constantly remember to use the figures shift key at the beginning of each group of figures. If not, "figures seven three space seven three" etc. may come out as 73 UE UE at the receiving printer.

It is generally considered discourteous to leave a receiving printer at the middle or end of a line when concluding a transmission. Before beginning morse identification, the carriage should be returned and one or two line feeds should be sent. Then none of the RTTY print will be obliterated with any wild printer activity which may result from the morse identification. Similarly, each RTTY transmission should begin with one or more letter shift functions to synchronize receiving printers, two carriage returns, one or two line feeds, and a

Continued on page 6

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# Using The

## COLLINS 75S-3B on RTTY

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LOS ALTOS, Cal. 94022

Editor's note: This is the second in a series of articles showing how specific receivers may be used for RTTY. A more general article by the author covering all receivers (THE RTTY JOURNAL, June 67 and April 68 should be reviewed prior to reading this discussion.)

The Collins 75S-3B is probably the most deluxe receiver that amateurs can currently buy. The list of optional filters for various purposes will include the proper selectivity for nearly anything you want to accomplish. The receiver is basically a "souped-up" 75S-1, but it is these additional refinements that put the receiver in a class by itself when it comes to versatility. Only the 75A-4 and Drake R-4A would be remotely comparable in many respects.

At this point, we might point out a few of the differences between this receiver and the 75S-1.

1. Selectivity. A 200 hz crystal filter for CW (unsuitable for RTTY, even for 170 shift), a 500 hz mechanical filter, a 1500 hz mechanical filter, a 2100 hz mechanical filter and one or two others of no interest to an RTTY enthusiast.
2. Optional Filters. Space for two extra optional filters to be plugged in. The 2100 hz filter that comes may be replaced with another.
3. "Rejection tuning" - a notch filter that is convenient for minimizing the effect of a nearby station.
4. Adjustable BFO - tunes from plus 3350 hz to -2650 hz for setting any of the optional filters to any desired audio response for DX-SSB, CW or RTTY. Zener controlled varicap for good stability.
5. Fixed-frequency BFO for rapid and optimum tuning on upper or lower SSB, positions available for other crystals for optimum CW or RTTY use.
6. Available in the 75S-3C with 28 crystal

RTTY JOURNAL

for various 200 khz band segments rather than the standard 14 crystals for amateur use -- handy for "MARS" or covering commercial frequencies.

7. Minor circuit changes to optimize already proven circuits - such as trimmer capacitors to maximize output of the various mechanical filters.
8. Difference power transformer putting out a higher voltage which is now zener-regulated to provide greatest stability possible.
9. AVC switch added with "OFF" and "FAST" and "SLOW". Older units had no such switch and only a fixed "FAST" position.

### USING THE STOCK 75S-3B ON RTTY

As it comes, the 75S-3B is all set to receive RTTY. No additional filters or crystals are "needed". However the instructions in the manual given for normal RTTY are erroneous, in that they cause to listen to the "upper" sideband, thus coming out "upside down". Collins apparently forgot that only in the "lower" sideband position will you receive mark 2125 and space 2975. This has probably caused some consternation among those owning the 75S-3 and 75S-3B receivers.

Here is the "right" way to receive normal RTTY with the 2100 hz filter:

1. Tune to "lower" sideband position.
2. Place the variable BFO to the dot near "4" on the variable BFO.

That's all there is to it. You are now receiving lower sideband (the mode switch in this case has nothing to do with whether you receive lower or upper sideband -- placing the variable BFO on the dot near the "4" did that automatically -- placing the mode switch on lower merely puts the 2100 hz filter in the circuit at the same time putting the hair-line on the equivalent of lower sideband. The interesting thing at this point is that you could still use the upper sideband position, keeping the BFO on the same "4" dot, and receive exactly the same audio frequencies, however in this case the receiver would have to be retuned some 2.7 khz and the hairline changed the same amount.

3

## USING OPTIONAL FILTERS

The 75S-3B has sockets to plug in two optional filters. These filters are selected from the front panel via the mode switch and are called: CW-1 and CW-2. The upper sideband crystal will be kept in the circuit for both positions unless you use the variable BFO. Since the upper sideband crystal is a 456.350 frequency, this would give a 1500 hz filter an audio response of 600-2100 hz, no good for RTTY, but suitable for CW, after a fashion. With a 500 hz filter, the upper sideband crystal would give an audio of 11001600 -- not good for RTTY, and not too hot for CW. Thus, you can do one of two things. Add a "proper" crystal for CW-1 and/or CW-2 or else use the variable BFO. Since the variable BFO tunes from -3350 to -2650 audio, it will effectively compensate for SSB, CW or RTTY. However, the variable BFO has some disadvantages. For one thing, when changing back to crystal-controlled BFO, you must turn the variable BFO control completely counter-clockwise, destroying the spot you had carefully selected previously. The "dot" for RTTY at "-4" is marked for you, and it can no doubt be easily found the next time.

However it is still a nuisance to use the variable BFO with the method needed of turning the knob around each time. Also, the variable BFO would need to be set a different place for a 500 hz filter used for 170 shift (at +3.56 rather than the dot at +3.9!) and this spot will be hard to find as it is not marked. Also, if you miss the correct spot at much as only 100 hz, you are already "hurting" on a filter as narrow as the 500 hz!

It should be obvious that adding a 452.790<sup>1,2</sup> crystal for a 500 hz filter for 170 shift would be highly desirable. This is easily done, and if you glance at the diagram we'll show you how.

Find the BFO tube V-8B. To the left of this tube you will find switch section S-9 and the two BFO crystals. Above this switch section is another switch section, unmarked. Take a pencil and mark this as S-9A, and the switch section adjacent to the BFO crystals S-9B. You will note that S-9A has -65V going to it in the "AM" position. In this position the fixed frequency

1 HOFF, THE RTTY JOURNAL, June, 1957 "tuning rtty signals"

2 HOFF, THE RTTY JOURNAL, May, 1968 "the collins 75S-1 on rtty"

BFO is biased off from AM operation. In the next position, it goes directly to the 453.650 lower sideband crystal and ALL OTHER positions it goes to the upper sideband 456.350 crystal. To install a new crystal (such as a 452.450 for 850 shift reception) in CW-1 position, merely break the jumper going to the section of S-9A representing the CW-1 position, and solder one side of the new crystal instead. Solder the other end to the common junction of the two crystals already in the receiver. If you like you can add a 452.790 crystal in CW-2 for the 500 hz filter. There is literally "nothing to it".

Let's say you have purchased only a 500 hz. filter which you have plugged into CW-2 position. You have added the proper 452.790 crystal, and are now ready to tune 170 shift RTTY. Ok, put the receiver to "CW-2", leave the BFO to "off" which puts the fixed-frequency crystal in the circuit, and merely tune 2125 mark 2295 space. Nothing else to it. The variable BFO will not be needed at all. The variable BFO still has a purpose, and that would be for CW, for instance, where you could now set the variable BFO on "+0.5" and get audio from 600-1100 hz, ideal for CW.

Since you still have the 2100 hz filter but have added a 452.450 crystal in the CW-1 position, then by putting the receiver to CW-1, you will get the 2100 hz filter. If you have made some minor jumpers to S-6 and S-7 (read the discussion of this in the article on the Collins 75S-1. RTTY JOURNAL, May 1968) Then the original 2100 filter may be used in single sideband or in CW-1 and be properly set for CW without resorting to the variable BFO.

If you don't want to add any extra filters, or add any extra crystals, there is still one simple thing you might want to do -- as we have said, using the variable BFO is somewhat of a nuisance since it has to be returned to the "off" position each time to return to fixed-freq. BFO. One way around this is to temporarily remove the headphone jack from the front panel (you can listen to headphones plugged into the 500 ohm jack in the rear called "antivox" if you want to use headphones, then), and put a toggle switch in place of the front-panel headphone jack. Then wire this switch in place of S-13 which at present is hooked to the rear of the variable BFO pot. That way, you can leave the BFO in one favorite spot and yet go instantly from fixed to variable BFO, and retain its setting. It will not hurt the resale value in any way.

It further allows replacing R-81, the 100K variable BFO control with a good "moulded carbon" control that will offer a much better control and greater stability than the inexpensive carbon pot presently used.

## CHANGING THE DIAL FOR RTTY

This section was thoroughly discussed in the "75S-1" article, and all the comments mentioned there are equally good for the 75S-3B. Basically, in the CW-1 and CW-2 positions, the little keyer consisting of a 1N34A and C-308 in the cathode circuit will convince the dial it is on "upper" sideband. Thus with the BFO set on "+4" dot or a 452.450 crystal in CW-1 or a 452.790 crystal in either CW-1 or CW-2 for 170 shift reception with a 500 hz filter, the dial will be about 4 khz off center. By rewiring switch section S-8B to put -30 volts on the CW-1 or CW-2 positions (whichever you are using with a new RTTY crystal) then the dial will read approximately correctly, since you have now told the PTO you are using "lower" sideband in the CW-1 or CW-2 positions rather than "upper". Switch section S-8B controls only the dial setting and has nothing to do with any other part of the receiver. Read the article on the 75S-1 to better understand this circuit and how to slightly modify it so the hair-line will read nearly center-dial for RTTY.

## UNDERSTANDING THE VARIABLE BFO

It is probable that a great number of people using the 75S-3 and 75S-3B will not fully understand the use of the variable BFO, and the numbers pertaining to it. First of all, the variable BFO can be tuned from 458.350 to 452.350 khz. This corresponds to an audio center frequency for the filter being used -3350 hz (upper sideband) to -2650 hz (lower sideband). Now we can delve into the numbers on the front, after which you will see how simple the circuit actually is.

The BFO crystals for upper and lower sideband were chosen to give 300-2400 hz. audio with the 2100 hz filter that comes standard. Thus crystals of 456.350 upper and 453.650 lower were chosen. This puts the center of the audio of the 2100 hz filter at plus 1350 hz for upper and -1350 lower.

Since you automatically get (stock version) upper sideband anytime you go to CW-1 or CW-2 positions, this is the automatic equivalent of +1350 cycles audio. Thus the variable BFO was numbered so that if you place it on "zero" you will then

get the same +1350 frequency you had previously gotten in that filter position with the fixed-frequency upper sideband 456.350 crystal. Thus although the variable BFO says "zero", it is really on upper sideband by 1350 cycles. To actually get "zero-beat" you would have to lower the BFO by 1350 hz, or move it to "-1.35" on the dial. (It would have been much better for Collins to have reversed the plus and minus symbols, but then it's their receiver design, not mine!)

Now since RTTY needs a center frequency of 2550 to properly get 2125 and 2975 tones, you must move the BFO accordingly. Well, since "zero" already is equal to +1350 hz, if you move it further to the right by an additional 1.2 you then will get 2550, and will be beautifully centered for RTTY -- only trouble is we normally receive RTTY on LOWER sideband not upper, so although you can copy RTTY ok, it will all be upside down. You'll have to rewire your scope on your converter (demodulator) and you'll have to listen in "reverse" mode on the demodulator or else rewire the switch. There's an easier way - much easier. Go the OTHER WAY with the variable BFO - now we wanted to get on 2550 hz LOWER SIDE-BAND, and since "zero" is actually -1350 UPPER SIDE-BAND, we start around to the left of "zero". Since 2250 plus 1350 is 3900, all we need to do is put the variable BFO on the dot near "+4" (actually it is for 3.9) and presto, proper RTTY again, only this time we are right-side up.

This BFO position will be correct to receive 850 shift RTTY with tones of 2125 and 2975 with either the 2100 hz filter or an optional 1500 hz filter. It will not be right for 170 shift with a 500 hz filter, as you would then get tones of 2300-2800 which would be no good for RTTY. So let's figure this out together. We have a 500 hz filter and want to get RTTY tones of 2125 mark and 2295 space for 170 shift. Ok, the center of those two tones is 2210. Subtracting this from 455.000 we get 452.790. We can either put in a fixed-freq. crystal for those tones and be done with all the problems for once and for all, or we can use the variable BFO. Since "zero" on the variable BFO represent +1350 upper sideband and we want -2210 lower sideband, add those two together and get a total of 3560 -- so now set the variable BFO to "+3.56" and you are all set for RTTY reception. It's not

hard at all if you merely keep in mind the variable BFO is actually on +1350 upper sideband audio when it says "zero" Let's say you have a 500 hz filter and would like to use it on CW. OK, let's assume you want audio tones for CW of 600-1100 hz. Center of that is 850. Since we aren't restricted by RTTY requirements of lower sideband, let's put this on upper sideband, then, which is easier to use anyway, as tones are "normal" for CW on upper sideband. Thus we want a BFO frequency of 455,850. As this is 850 above 455,000 and the variable BFO when set to "zero" was -1350, we need merely set the variable BFO on "-0.5" and we are in business. See how it works?

#### FINAL HINT

Under normal reception of RTTY, you will find running the RF gain wide open to be rather detrimental. It amplifies the noise, allows nearby signals to capture the AVC, etc. Just tune in RTTY as though it were a CW signal to get optimum results. Back off the RF gain so the S-meter does not move, and then back it off another 10-15 db. additional. Advance the audio gain sufficiently to properly operate the speaker or demodulator. This system usually gives optimum results on most demodulators, particularly during noisy band operations such as static crashes, etc. which will capture the AVC in the receiver otherwise. In general treat RTTY like CW for reception.

#### ORDERING THE CRYSTALS

The procedure and data for this was given in the 75S-1 article and need not be repeated here. Basically, they cost \$13 each, are 32 pf and normally take 2-3 weeks to obtain once the order has been submitted. Get a "HC-6/U" holder with soldering wires rather than plug-in pins. Get them for room temperature of 25 C.

#### SUMMARY

The 75S-3B is perhaps the most versatile receiver and certainly one of the most advanced that can be obtained for RTTY operation. With the addition of a 1500 hz filter for 850 shift and/or a 500 hz for 170 shift, this receiver offers a selectivity and stability only dreamed of by most other receivers. With the addition of one or two extra BFO crystals for these additional filters, the variable BFO need not be used, and optimum RTTY reception can be achieved.

Although the 75S-1 offers most of the

same features and would be nearly as suitable for RTTY, it no longer can be purchased new. The 75S-3B has some additional refinements over the 75S-1 which make it more versatile, particularly if it is to be used for CW as well as RTTY. It would be hard to fix the 75S-1 to work in an optimum manner on BOTH RTTY and CW.

All in all, the finest receiver offered to amateurs today for SSB, CW or RTTY. It comes at a high price, but broken down over 8-10 years normal use, the price then seems most reasonable, particularly when you realize during that time you were using the best available.

The original instructions in the 75S-3B manual are improper for "right-side-up" RTTY reception and the correct method was illustrated in this article.

#### OPERATING COURTESY

Continued from page 2

letters-shift. This will assure that the receiving printer is ready to accept a full line of printing, and that it will not be printing figures or printing on top of gibberish which may be created from morse identification.

Exception may be made to the above paragraph when working rapid break. Fast break usually requires one switch operation, although a few amateurs use electronic switching. (I use a VOX type circuit which operates from current interruptions in the keyboard circuit, so that depressing any key will cause RTTY transmissions.) Fast break RTTY operation is closely akin to voice controlled transmissions on phone or SSB. Although one cannot simultaneously transmit and receive on the same frequency, questions, answers, and comments can be exchanged quickly through short transmissions and rapid switchover. During such operation, a short question may occupy only one-half a line of typing.

Under NO conditions is it necessary to spell out the fact that "CW ID is to follow." You are only wasting everybody's time.

The foregoing presents in general terms some basic information on radio teletypewriter operation, to provide the reader with an overall idea about this fascinating mode. The Hoff series of articles in 1965 issues of QST is an authoritative source of more detailed information on nearly all phases of RTTY, and is highly recommended reading for those who are further interested.

\* \* \*  
RTTY JOURNAL

## Converting The Heath HW16 to 20 Meters -

Jack Headley, WOKXZ

Box 538

Brookings, So. Dak. 57006

This modification of the Heath HW-16 Transceiver is a supplement to the previous article by Truman Boerkoel, K8JUG that appeared in the RTTY JOURNAL in December 1967. It is assumed that his modifications have been completed. This conversion is in four parts because some of the modifications by the author may be omitted or are not needed on some models.

- 1) Actual 20 meter conversion
- 2) Addition of a receiver crystal selector
- 3) Addition of piston trimmers for each HF oscillator Crystal.
- 4) Voltage stabilization

1) The conversion to 20 meters is quite simple. With the aid of a grid dipper it should take only a short time. First replace the 15 meter HF oscillator crystal (26.545) with a high stability crystal at 19.545 mhz. An International HA-1 is strongly recommended. Next pad coil L-4 with a 10pf silver mica capacitor and tune the coil to 19.545mhz. Third, rewind the coil L-1 with 12 turns of number 22 enamel-wire. Then tune to 14 mhz. Do not attempt to pad this original coil as the Q is very poor to start with. Next pad coil L9 with 20pf and tune it to 14 mhz. Fifth, move the 15 meter tap on the final tank coil three turns towards the top. It should now cover the 20 meter band. You are now ready to receive on 20. Receive crystals may be selected in the same manner as in the K8JUG article.

A note on transmit crystals - Use a crystal in the 7 mhz range as the transmitter now doubles to 20. In my unit the use of the W6FFC crystal shifter (RTTY JOURNAL Dec. 67) and the addition of the receive crystal switch (See #2 below) gives fast band change capabilities.

2) Addition of the crystal switch in the receiver is optional but if two or three band operation is desired it is a must. There are, no doubt, several ways to install this switch and only the operators imagination is the limit. Here is one method-. First construct a small L bracket to fit the switch used. It can be mounted on the 38th flange at the front edge of the circuit board in the same area that the re-

placement VFO crystal is now mounted. A small single pole three position wafer switch is recommended. Mount the bracket and switch so that with a shaft extension it can be brought out through the right side of the unit. Notch the top cover on the right side to accommodate the extension and add a knob. The common side of the switch is then hooded to point X and the crystals attached to the switch and ground. The VFO may again be tied in and selected also.

3) It was found (especially on 20) that moving slugs L-4, L-5 and L-6 to vernier the receive frequency created a measure of instability so JDF VG26G piston trimmers were added to each HF crystal. To add them, drill a 1/4 inch hole through the circuit board and chassis between the crystals and the two filter capacitors. Each piston is mounted adjacent to the crystal it controls. Tie the lead from the piston to the "hot side" of each crystal. This no drift trimmer makes a very nice vernier and permits the HF oscillator coils to be tuned to a peak as in the alignment instructions in the Heath manual.

4) Drift has been a problem with this unit on all bands, therefore, it is strongly recommended that it be run 24 hours a day. However this is up to the operators discretion as to how much time he cares to wait for the unit to stabilize from a cold start. In addition to this, voltage regulation should be improved with the following. Mount a VR150 tube in the left front corner of the chassis behind the dial. Solder a one lug strip on the circuit board (foil) on the ground bus near the point P. Hook a wire from the solder strip to pin 5 of the VR150. Ground pin 2 of the VR150. Remove R31 (from L-6 to point P on the board) and install a 5600 ohm resistor from L-6 to the solder strip. Install a 4500 ohm resistor (10 watt) from point P to the solder lug. (The value of the resistor may have to be varied slightly to obtain no less than 10ma and no more than 30 ma when switching from receive to transmit). Stability of the HF oscillator should now be much better.

Conclusions: After some experience with the unit on 80 and 40 you may find that the addition of HA-1 crystals in the HF oscillator for these bands may be necessary for excellent stability. The only

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negative point in this system is that only one frequency in each band may be conveniently selected due to the verniering system. However, for the small monetary investment this unit makes a highly versatile rig for crystal controlled auto-start operation.

My thanks to Irv, W6FFC, for his suggestions on voltage stabilization. Also to Dick Smith, KØYAA, for his help in pre-planning the conversion.

## PITCHES We SWUNG At and MISSED !

### CORRECTION-

To Flipping Line Tuning Indicator  
March 1968, Page 4 - Fig. 2

At junction of 1 mfd. capacitor and Position 2 of SW 1 ADD 1 megohm resistor to ground.

This serves as a D.C. return in position 2 of the switch. Without it you will have trouble with Horizontal Centering. No retuning of Horizontal Centering should be necessary in any position of S1.

Very sorry if this caused a problem.  
Bob Deseck, ON4CK

## An Interconnecting System For RTTY Equipment -

Joergen Hansen, OZ7OF  
Vestergade 161  
Silkeborg, Denmark

The diagram on opposite page showing interconnection of various pieces of RTTY gear gives more possibilities than the normal series mode. It is being used at OZ7OF

There are four or more pulse transmitters, the printer and TD keyboards, the TU and the VHF TU outputs. These are led individually to the 4 (or more) pulse

## BROAD MINDED ? TRY NARROW SHIFT !

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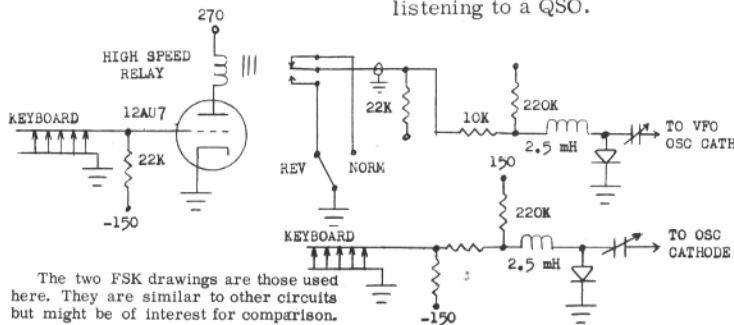
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Box 837 Royal Oak, Mich. 48068

receivers, i.e. the Printer and the Reperf Magnets, the AFSK and the FSK units. The diode prevents unwanted operation.

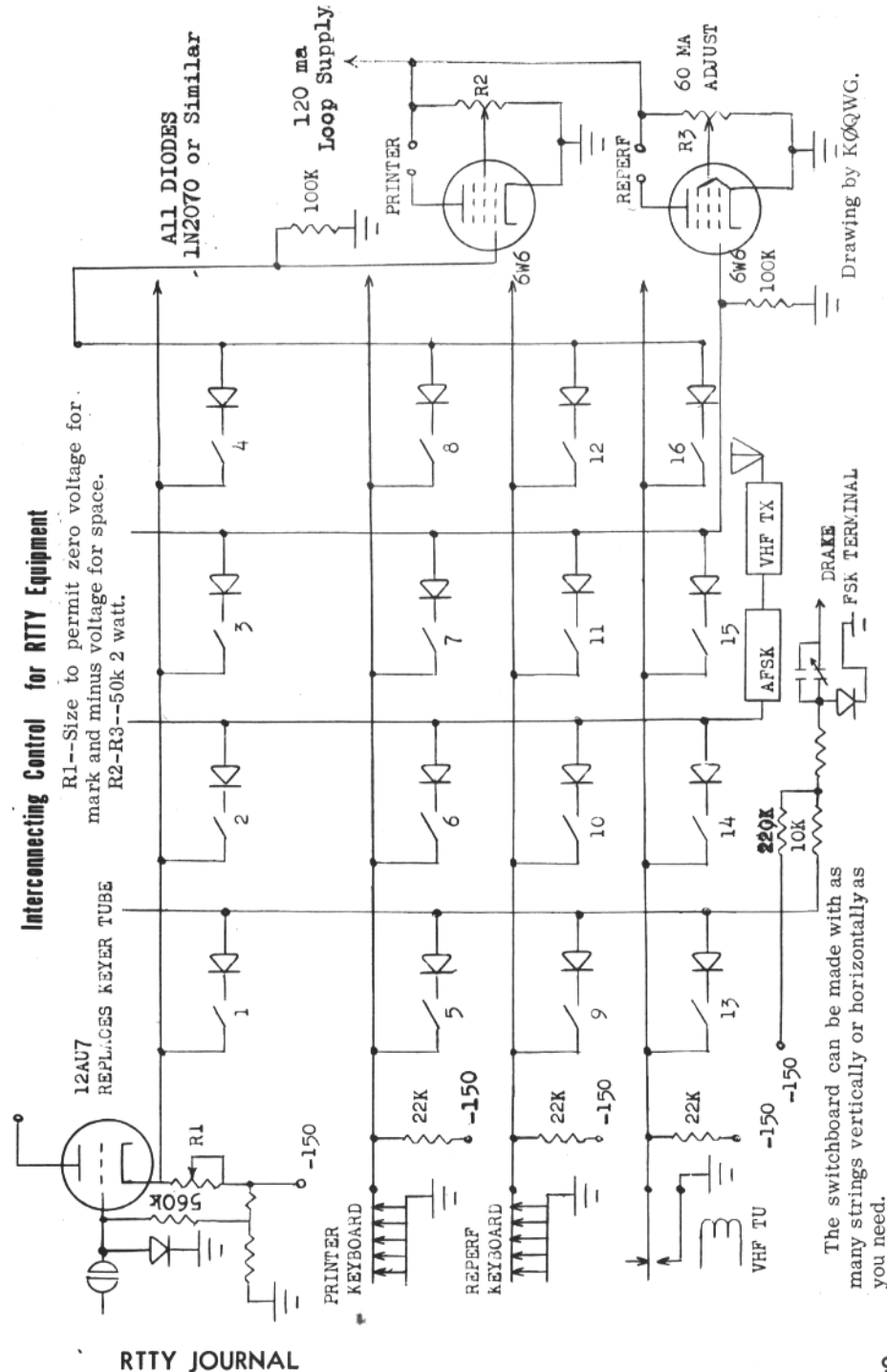
Closing switch #5, 7 and 4 enables you to send a message and take copy at the same time, and to receive normally. Furthermore, it allows for the taking of copy of incoming signals when #3 is closed.

#13 and #2 make it possible to retransmit incoming signals directly from the HF to the VHF bands and vice versa. #4 with #7 enables you to prepare tape while listening to a QSO.



The two FSK drawings are those used here. They are similar to other circuits but might be of interest for comparison.

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The switchboard can be made with as many strings vertically or horizontally as you need.

Drawing by KØQWG.

# RTTY theory & applications.

RON 'RG' GUENTZLER, W8BBB  
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ADA OHIO, 45810



Because of the localized nature of VHF activity it has been very difficult to receive enough material to fill a column every month. Ron, W8BBB, the editor has been writing a series of articles on beginning RTTY. The interest in this column has been excellent and rather than have some of the readers pass it over because of a VHF heading we have decided to start a new column to more nearly describe this type of material. Ron will still have a VHF column whenever the material warrants, alternating occasionally with this new column, so send any information on VHF as usual to Ron.

## MAKING A TELEPRINTER GO -

During the past few months we have described some of the principles of printing telegraphy. It seems best, at this point, to show how to connect a teleprinter for obtaining local copy. By doing this, it should be possible for a beginner to "play" with his machine and to illustrate, first hand, some of the things we have discussed.

### CONNECTING A MACHINE

The method used to make a printer work for local copy is simple: 1) Supply the motor whatever power its name plate asks for, and 2) Connect in series a DC power supply, a resistor, a milliammeter, the keyboard, and the selector magnets. (The power supply should be capable of supplying from 130 to 300 volts when 60 mA is flowing.) Adjust the resistor until 60mA is flowing, turn on the motor, and "hit" a key on the keyboard.

Assuming all works, try proving or illustrating a few of the things we have talked about. For example: Learn where the keys are and just what the LTRS, FIGS, RET, and LF keys do and how they work. Poke, judiciously, at the machine's innards and discover what a mechanical marvel it is. Try placing a 10-ohm re-

sistor into the loop, connect an oscilloscope across the resistor, and look at the waveforms when various characters are sent.

If any difficulties are experienced perhaps the following will help.

Before continuing, we would like to editorialize: Some "experts" state that the first thing an amateur should do when he obtains a teleprinter is rip out the wiring and, unless the motor is a synchronous motor, throw it away!!! We say NON-SENSE!!! You may have to make some minor modifications in the wiring, but be very cautious. More on this later. As far as the motor goes, if the motor is changed, the gears will probably have to be changed also. This involves quite a bit of work. If, after you have ripped out all the wiring and replaced the motor and gears, what happens if the printer won't work? The first thing to do is determine whether it worked when you obtained it. How can you possibly know if you instantaneously ripped it apart?

### THE MOTOR

Look at the name plate on the motor. If the speed is 1800 or 3600 RPM it is probably a synchronous motor. If it says it is, it is. Therefore, if it is a synchronous motor supply it the voltage it requires (probably 120V at 60 Hz). If the printer has a lot of auxiliary apparatus with it, it would probably be best to trace the wiring and carefully isolate the two leads going to the motor, writing down just what leads were disconnected from where. You will probably want to reconnect them later so make sure that you know just what you did disconnect. Our aim at present is just to get the machine printing local copy.

If the machine has an AC governor-controlled motor, there is some auxiliary apparatus such as the governor, resistors, and capacitors that must be left connected to the motor for proper operation. Try to determine where to apply

power and apply it.

If the machine has a DC governor-controlled motor, it will also have auxiliary apparatus such as the governor, resistors and capacitors. Trace the wiring and determine where to apply power. If at all possible, build, even if it is only a temporary "hay wired" deal, a power supply to run the motor. (Do not use the supply for the loop to run the motor). You will need about 110V DC at 1A. This may seem a bother, but it is better to try using the DC motor, even if it is for a few minutes of operation, than it is to rip away and possibly foul things up.

For methods suitable for DC motor power see: "Some Notes on the Western Union 2B Simplex Printer", R.E. Guentzler, RTTY, 1966 March, pp. 3-4; and "Teletype-Printer Noise Reduction", R. B. Gold, QST, 1966 August, p. 71.

One further comment about motors: A synchronous motor will run at only one speed and that speed is determined by its physical construction and the frequency of the applied power. Governor-controlled motors (AC & DC) can operate over a wide range of speeds. Even when the governor is removed, the speed may vary depending upon the mechanical load placed upon the motor and the applied voltage. The nameplate on the governor-controlled motor is not the speed at which the motor is supposed to be operated when governor controlled; it is the "nominal" speed when the "nominal" mechanical load and voltage is applied. For example, on some Western Union machines with governor-controlled motors the nameplate on the motor stated 1725 RPM, but the actual desired speed as controlled by the governor is 1682 RPM. On others, the motor nameplate stated 2200 RPM but the governed speed was 2104 RPM.

### THE SELECTOR MAGNETS

There are two basic types of selectors and, of these two types, one has two possible way to connect the magnets. These are summarized as follows:

- 1) Pulling magnets  
(60 mA, series only)
- 2) Holding magnets
  - a) Series - 20 mA
  - b) Parallel - 60 mA

What type selector does your machine have, and how should the magnets be wired? Perhaps the following will help you decide:

Older machines were equipped with a

selector mechanism that was operated by the selector magnets pulling an armature which was fairly massive and required a relatively large pulling force. Consequently, selectors using this type armature are called "pulling-type" selectors and the two magnets must be wired in series and must be supplied 60 mA for proper operation.

On newer machines and newer versions of the older machines, the selector was redesigned so the armature is moved, at least indirectly, by the motor rather than by the magnets. The armature is moved up to the magnets and then released. If current is in the magnet coils, the armature is held by the magnets, and if no current is in the coils, the armature falls away. Consequently, this type selector is called a "holding-type" selector and much less magnetic force is required. Therefore, the coils can be operated in parallel and 60 mA supplied to the combination or they can be operated in series and only 20 mA is required. For various reasons, although the lower current sounds attractive, the 60 mA parallel operation is recommended.

Now comes the rub - what type selector do you have and how should you connect the magnet coils? The obvious answer is: Ask someone who knows to look at your machine and tell you what to do. Next choice is to look at someone else's machine and see how his is constructed and connected. Last choice (from an ease of doing something standpoint) is to find out all by yourself.

Trace out the wiring connected to the selector magnets. If the coils are in parallel, you probably have a holding-type selector connected for 60 mA operation. If the coils are in series, try operating the machine with 60 mA in the coils as we described at the beginning (have the motor operating and "type" something). If it operates, and it probably will, slowly decrease the loop current until operation ceases. If it stops at about 30 mA, you have a pulling-type selector and you must use 60 mA with the coils connected as they are. If operation continues down to about 10 mA loop current, you have holding-type selector connected for 20 mA operation; reconnect the magnets so they are in parallel, adjust the loop current for 60 mA, and try operating the machine. If it works, fine; if it does not work, you have phased the coils improperly when you were reconnecting them. Reverse the leads to one

magnet and try it again. It should now work.

#### SPEED

At what speed does your machine operate? A while ago we discussed some of the "standard" operating speeds and also made a strong case for the fact that the transmitting and receiving machines must operate at the same speed. When you are operating your one machine by itself, it is operating at the "proper" speed, regardless of what that speed is, because the keyboard and selector are geared to each other and therefore, regardless of the actual speed, they are operating at the correct relative speed. However, once you try to transmit to or receive from some other machine, you must operate your machine at the proper speed relative to the other machine. Therefore, the actual speed is unimportant when making local copy, but will become vital once you "get on the air".

There are many possible ways to determine the speed of your machine. Some are much better than others; we will mention some of them and let you pick the method best suited to your situation.

- 1) The keyboard shaft should rotate at 368 RPM and the selector shaft at 420 RPM on a Bell System "60-Speed" machine, and the keyboard shaft should rotate at 389 RPM and the selector shaft at 420 RPM on a Western Union 65-speed machine. Obtain a Stroboscotac and measure the speeds.
- 2) If the machine has a synchronous motor, count the number of teeth on the gears (or gear and pinion) and calculate the speeds of the keyboard and selector shafts.
- 3) Connect your machine into a local loop with someone else's machine and send back and forth. If both machines can send and receive to/from each other, the speeds are probably correct.
- 4) Tune in an amateur RTTY signal and see whether you can copy it. (We have not discussed this yet, but if you are that far along, try it). This is not the best test in the world. If you can copy, fine. If you can't, there are many reasons other than improper speed that could be causing the trouble. Try several different amateur RTTY signals. Also try the reversing switch on your TU. Unfortunately, most commercial stations are not 60-speed, but if you look long enough you may find

one. However, if you do find a commercial station that you can copy, this may not tell you much because they operate at "standard" speeds of 60, 67, 75, and 100 WPM and which are you copying is debatable.

#### SUMMARY

Connecting a teleprinter for obtaining local copy is relatively simple. Supply power to the motor, and connect in series a DC power supply, the keyboard, the selector magnets, a resistor, and a milliammeter.

Several possible causes of trouble were discussed. It was recommended that a teleprinter be operated "as received", if possible; this is desirable because, if nothing else, it indicates whether or not the teleprinter was in operating condition when received.

#### SO WHAT'S NEW?

We have been gathering VHF operating news for the last few months. Next month we will devote the column to VHF RTTY NEWS and then continue the "beginner's series" the month after (September).

73 ES CUL, RG.

\* \* \*

### Check Your Renewal Date

Check your address stencil for expiration date of your subscription. The month and last numeral are the month and year of your expiration.

On your address stencil the month and year of the expiration of your present subscription are coded by an abbreviated month and figure. The figure being the last digit of the year. Dec. 8 - means the last issue on your subscription is December 1968.

RTTY JOURNAL

## An OPPORTUNITY for RTTY NETS

One of the greatest potentials of amateur teletype, and used the least, is traffic handling. Except on Mars, traffic nets on RTTY seem to have come and gone with only a few exceptions. From our limited experience it seems that the lack of worthwhile traffic has been one of the main reasons. Messages "Having a wonderful time" from the county fair are seldom conducive to an interesting net.

A new possibility has opened up. The Navy station on Midway Island KM6BI, under the direction of "Bud" one of the operators has organized a net to collect messages home from all of the Pacific islands. They will be put on tape and relayed to this country for distribution. With west coast stations probably taking most of the original traffic due to the late propagation hours, this traffic will then be distributed around the country, hopefully by regional RTTY nets.

This seems like an ideal opportunity for nets to accomplish an interesting, worthwhile job, increase and improve RTTY operating techniques and as a basis for the organization of a country wide traffic net on the amateur RTTY bands.

Just how this organization will be accomplished we frankly don't know. We hope that some organization or leader will come forward and make an attempt at co-ordinating existing nets and helping to find other nets for country wide coverage. We will be glad to assist with any publicity and at first as a clearing house for information. The first need will be for several well equipped stations on the west coast to take the traffic from the Pacific, "Bud" at KM6BI will be glad to hear from any stations interested in helping him put over this project. Write him at Midway Island Navy Amateur Radio Station, Box 43, APO San Francisco, Cal. 96614. The station is usually on RTTY at 0500GMT-14085-170 shift.

We feel very strongly that this is not only a very worthwhile project but would be of interest and benefit to a great many RTTY stations and hope that it can be developed to full potential.

## A MISS and a HIT !

Miss 3600

Transposed from a Computer Print Out and Reworked for RTTY by KIPLP.

RTTY JOURNAL

# RTTY-DX

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



Hello there. . .

This month we start off with congratulations to the following stations on receiving the W.A.C. Award.

Nr. 104 Henry G. Ross W6TX  
 Nr. 105 CARTG 3C3RTT

We were of course pleased to see noted in last month's issue that the CARTG will run the 8th RTTY Sweepstakes this coming October. I would like to urge you DX'ers to send in your ideas on promoting increased activity, scoring, and message format direct to CARTG or pass them on to Sid, VE3GK or Gwen, VE3AYL when you meet them on the air. All ideas will be evaluated to make the coming contest even better than the last one, if this is possible. Do it now so that the committee can formulate the rules in plenty of time for world-wide circulation.

A note from Brian, G3IYG, indicates that Pierre, F9RY/FC is very active since coming on the band last month, and Brian also reports activity from EA7KV and VP8US. Incidentally, the QSL manager for F9RY/FC is HB9TL. The next time you print G3IYG keep in mind that he is running QRP at 35 watts and I think that you will be presently surprised to see that it doesn't take lots of power to come through with real fb signals. I have also noticed that another QRP advocate, SM0KV, has hit the 300 mark in the ARRL DXCC listing. Congrats to Olle on that fb accomplishment.

We are certainly pleased to report a new station QRV from Argentina. Ernesto, LU3EQ has recently come on with a fine set-up and is looking for contacts on 14 and 21 mc. Ernesto is running 250 watts to a three element beam. He can use wide or narrow shift and uses a Model 15 machine and a TT/L2 T.U. He is on the bands between 0000 and 0400z most every day, but especially on week-ends. LU3EQ joins LU1AA, LU7EBB, and LU8DR in assuring a RTTY contact from Argentina.

CX1BS has been on the twenty meter band lately at around 0300z but he prepared to copy his shift at around 425 cycles.

## DX HONOR ROLL

1. ON4BX 70/66	21. K8JTT 36/28
2. FG7XT 80/65	22. XE1YJ 33/28
3. I1KG 70/65	23. W8CAT 31/27
4. W3KV 66/62	24. W4EGY 25/26
5. W4AIS 62/53	25. W6LDA 25/26
6. K8YEK 59/52	26. K4VDM 32/25
7. W8CQ 57/52	27. VK2EG 33/24
8. ON4CK 58/48	28. YV5CIP 30/24
9. W6CG 51/46	29. W0HAH 32/19
10. W1GJK 50/44	30. VP9BY 26/18
11. VE3AYL 48/40	31. K9QNV 24/17
12. WA6WGL 47/39	32. VE4FG 23/17
13. UA1KBW 36/33	33. OA4BR 22/15
14. WB6ADY 35/33	34. W6TX 20/15
15. I1ROL 45/32	35. G3LDI 25/14
16. VE4BJ 33/31	36. VK3NR 32/13
17. W3ISE 45/30	37. W4FUI 33/11
18. K8QLO 40/30	38. PJ2CR 19/10
19. WA8BOT 43/28	39. HK3SO 16/10
20. K2YEQ 37/28	40. WB6QFE 12/9

If in the next few weeks you are driving down the pike and a red Alfa-Romeo passes you bearing Italian or international license plates it could very well be George, I1CQD. At the moment George is in Mexico and perhaps visiting Pierre, XE1YJ, but he will be driving his way east with possible stops at Royal Oak and New York City from where he will head back to Italy in mid June. George also has a HW-32 with him so he might be on SSB if he has the reciprocal license. Thanks to Ray, W2BK for the above information and incidentally, Ray will be in Italy in August on his way to YU and hopes to meet some of the boys in the Florence area on his way through. By the way, the planned Expedition to YU by Mauro, I1KPK, et al, is still hung up with licensing difficulties which they hope will be resolved soon. It would be best that you monitor the bands for any late developments in the next few weeks as this is one country you would not want to miss.

This next item should get a lot of those machines in attics, cellars, and pawn shops up on the test bench oiled, primed, and ready to go. I would also think that it will cause quite a bit of vacation re-schedul-

ing. When it comes off it will be the talk of RTTY'ers for years to come as the granddaddy of all DXpeditions. Maurizio, I1BPD, is organizing a mobile trip through Southern Europe and North Africa during the month of July. This will be an RTTY only effort and a special van type vehicle will be fully equipped including provisions for mounting a rotary beam on the roof during stops. Here is the planned schedule.

Country	Time	Call
Monaco	July 1 to 2	3A2BPD
Andorra	July 5 to 6	PX1BPD
Spain	July 7 to 9	EA3OT/BPD
Balearic Is.	July 11 to 12	EA6BPD
Portugal	July 17 to 18	CT1BPD
Gibraltar	July 20 to 21	ZB2BPD
Morocco	July 22 to 24	CN8BPD
Algeria	July 25 to 28	7X2AA/BPE
Tunisia	July 29 to 31	3V8BPD
Sicily	Aug. 2 to 3	IT0BPD

We all certainly wish Maurizio and his crew the best of success on this tremendous venture. Between now and July it will pay to monitor the twenty meter band as any change in plans or the schedule will no doubt come out in the form of a QST to all RTTY'ers. Our thanks for the above information goes to ON4BX and W2BK.

A letter and announcement from Lamberto, I1ROL, points out that the first National meeting of the Italian RTTY Group will be held on June 15-16 at the Ariston Hotel, Lido Di Camairone, Italy. RTTY'ers from all parts of Italy will be in attendance and Lamberto says that they will particularly welcome any of the RTTY boys (and gals) from other countries that may be in Italy on those dates. The meeting site is right on the Mediterranean and judging from the colorful brochure Lamberto sent it would certainly be worthwhile to go a bit out of your way to attend if you possibly can. Further information can be obtained from Lamberto Rossi, I1ROL, Box 50, 56201 CASCINA (Pisa). Tel. 70.378.

A QSO with Charlie, W5QCH, brings out something to keep in mind. This summer Charlie will be in Jamaica, VP5, on business and hopes to be able to work out some arrangement to operate on RTTY while there. Plans are only tentative at this time but we will try to keep you posted as things progress. This would also be a "first" on RTTY.

Stan, WB6QFE, really hooked a good one on April 24th at 0750z. KM6BI, Midway Island was on using narrow shift at 14083 kc. The operator, Bud, has since come

back to the states but KM6DE is being set up on RTTY so we should have some activity from the Pacific Islands again real soon. Activity has been pretty scarce from this area since Arnold, KW6DS closed down operations on Wake Island a couple of years ago.

Although it was received too late to give out advanced notice; perhaps some of you had contact with the special RTTY station set up on Bornholm Island, OZ4EDR, on May 10th. It was to commemorate the 25th Anniversary of the Bornholm Radio Club.

I would like to point out that it is possible to pass along information almost any day on 14095 kc. as I have been monitoring this frequency daily at 1200-1300z and again at 2300 - 0000z. I do more listening than sending so a blind call will not only surprise the devil out of me but don't you be surprised to get an answer. If you have any activity or news you would like to have mentioned on these pages, you might try RTTY. Although I miss a day now and then these times might serve to get your information here before the column deadline which is the first day of the month.

The RTTY - DX Honor Roll follows and as you see the response is slowly increasing as are the totals of countries worked and confirmed. From the planned activity indicated above the next listing in the September Issue should show a big increase.

73 de John

\* \* \*

## BACK ISSUES -

ONLY back issues available are - July through December 1966, April and December 1967 and all of 1968. Copies are 30¢ each. Reprints of the TT/L-2 article are still available at 25¢.

\* \* \*

## RTTY JOURNAL

P.O. Box 837 - Royal Oak, Michigan 48068

"Dusty" Dunn - W8CQ

Editor & Publisher

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Don't forget to send any comments or suggestions on the rules for the next RTTY Sweepstakes being run by the CARTG Group. They are very anxious to have your ideas of the type of contest and the rules you would like. They are particularly anxious to have more participation of U.S. and Canadian stations and more use of the lower frequencies. Here is a chance for those of you that do not work DX to suggest a contest that you would enjoy. Send them to Sid Burnett, VE3RTT, 85 Fifeshire Road, Willowdale, Ontario.

As usual the Dayton Hamfest this year had over 3000 ham registered and the RTTY forum drew over a hundred RTTY fans. We were fortunate in having both of our column editors in attendance and renewed friendships with many old friends. 12 states were represented, that we know of, maybe more, at one time in the RTTY room. Our only regret was we had so little time to chat with many because of the confusion, but it was fun. Instead of formal speeches a panel of experts, W8SDZ, K8ERV, W8GPB, W8BBB, W3KV and C.P.O. McLaughlin of Navy Mars, held table clinics where individual questions were answered. From the comments so far everybody was busy and many questions were left unanswered when the time ran out.

Due to the method of packing, the RTTY JOURNAL binders when ordered in multiple are shipped individually. If you have ordered more than one and all do not arrive wait a few days and then let us know.

The FCC has sent out an inquiry regarding the use of teleprinters on some of the UHF bands for commercial or police use. The frequencies used run from 462.95 OmHz to 468.175. Tests are asked for to determine a number of operational factors and band widths. All this is for portable operations. Will have no effect on amateurs but might help develop efficient, small, portable equipment.

With the thought that in the long run it would benefit amateur radio, the FCC has recently announced the incentive plan of licensing which we are all familiar with.

Now the Electronic Industry Association has started a campaign among members, which includes most of the manufacturers producing radio equipment or parts, to raise money for a campaign to liberalize the license laws, educate the public(?) to the many safety and convenient features of citizen band radio--"two cars in every garage and a CB radio in every car." Increase the length of novice licenses and permit renewal, lower the code speed for novice licenses (?) and of course to permit novice phone operation on parts of the two and ten meter band.

Citizens Band radio has been a big money maker for manufacturers (after all you can't homebrew a set for CB. It must have government OK). Outnumbering amateurs by ten to one it has been a big market and if we were a manufacturer we would probably see the wisdom in such a campaign.

We have no particular quarrel with the 10-4 boys, if they are happy with their crowded frequencies and limitations, sneaking unlawful QSO's because there is no chance to police them, well and good. What we wonder about is why the amateurs, who already have passed a code and theory examination are asked to improve their skills still further to help radio while the manufacturers are asking the FCC to lower standards for those that have the money to buy but no desire to learn. It will be interesting to see what stand the FCC takes on the propaganda about to be issued through professional agencies.

"Jerry," who operated from KR6BQ from 1962 to 1965, is now located in Italy and unable to get on the air. Jerry says cards were sent to all contacts and if any card was lost he will be glad to send a duplicate. Send to G.L. Hale--RMC, USN, USS Sylvania (AFS-2), %FPO, NYC. 09501.

At the Dayton Hamfest, Heathkit passed out questionnaires requesting the type of demodulator (TU) that would be most in demand for RTTY if they were to make one. One suggestion turned in was for a modular construction that could be built in sequence, starting with a simple base and adding filters, extra stages etc. as wanted. They will be glad to have your suggestions, should it be tubes - transistors, how complicated - scope included etc. Drop them a line with your suggestions if interested. Send to Heathkit, Benton Harbor, Mich. c/o Jerry Tolsma.

Although not connected with RTTY, we have played slot machines in Puerto Rico, Panama, Curacao and last month Nassau. Let me say that our own Las Vegas lets you play "longer" for your allotment of dollars than any other place. All this as an announcement that the 1969 Saroc Hamfest will be held in Las Vegas next January, more details later. (Has anyone ever stopped playing when AHEAD?)

For those that like to keep up on all the RTTY publications we suggest the BARTG Newsletter, the Autumn issue had 40 pages. Send One dollar to A.W. Owen. G2FUD, Gwenarth, 184 Hale Rd., Hale, Cheshire, England.

It is surprising how much material it takes to fill 20 pages. This little squib is to partially fill up this issue and partially to request again any items you feel might be of interest to the readers. And--we need more pictures; here is your chance to be a "Cover Boy."

#### More Awards for RTTY ?

In ham magazines and at Ham conventions there is usually a large discussion and interest in awards for various accomplishments. Although this may not be of interest to everyone for sure, there is no question that many are interested and find enjoyment and challenge in competing for them. Unfortunately RTTY has very few. At the present time the only ones, we know of, are the following:

The ARRL will issue a "Worked All States" award endorsed for RTTY operation.

The RTTY Bulletin, PO Box 6047 Daytona Beach, Fla. 32022 offers a WAS certificate also. To date (as far as we know) only one person has qualified.

The RSGB offers a QCA award for work-

ing 25 different countries with endorsements for each additional 25 countries. Several have received the 50 endorsement.

Send cards for this award to Bill Brennan, G3CQE, Sea Kiwi, Tower Hill, Williton, Taunton, England along with one dollar for the certificate and return of the cards.

The RTTY JOURNAL issues a "Worked all Continent" award formerly issued by the Southern California RTTY Society. This past month #105 was issued and many more have qualified but need cards for confirmation. Cards for this award should be sent to John, W3KV, the Journal DX editor at Box 73. Blue Bell, Pa. 19422.

The RTTY JOURNAL would like to offer several more awards. What would you like? Comments from readers as to the type of award would be appreciated. Both for more local interest and DX operating. Contests offer opportunities but many do not care for contests and prefer to operate at their own convenience, working toward an award offers some goal and satisfaction in achievement.

QSL cards are always a problem, especially for the rare states or countries. I am quite sure that the Journal can arrange some system where cards may be mailed in bulk and distributed stateside similar to the QSL bureaus run by the ARRL. In some cases logs may be furnished for QSL information. With no intention of seeming to feather our own nest we know from experience that a number of foreign stations have trouble sending money out of the country, I am sure a small donations of quarters, sent to a central clearing house for a QSL--and don't scream--It costs more than that for postage or IRC coupons would be appreciated as a fund to pay for subscriptions to Radio magazines in this country for these foreign stations.

All this is work for somebody but we have promises of help and feel that it could arouse interest in more RTTY operating. Send your ideas to John W3KV, please. . .

## BROAD MINDED

## USE NARROW SHIFT

RTTY JOURNAL



Among the early morning hours this picture was taken by Tom, K8ERV at Dayton Hamfest. With more light shining inward than outside, the picture is a little hazy and so is our identification of some of the participants. With our apologies to those marked with a (?) they read, bottom row from left to right -- Andy, KØIRV -

Ed, K9SAK - Ernie, WØYRX, - ED, W9WKC - Bob, W8BOT, - Keith, W8SDZ, - Back row - Jerry, W4ZYDJ, -RG\* (VHF Editor) W8BBB, - (?) - (?) - Henry, K4CZ ex W4MGT, - John, (DX Editor) W3KV, - Tom, WØMCU - Dusty, W8CQ - Elmer, WØMPF, - Mike - (?) - (?) - Jerry, W8GPPB.

"MODEL 28's, PAGE PRINTER unit alone: \$99; Send for list of Teletype & FAX units. Back issues RTTY JOURNAL, 35¢ each, postpaid. G. E. White, 5716 N. King's Highway, Alexandria, Virginia, 22303.

RTTY GEAR FOR SALE. List issued monthly, 88 or 44 mhy toroids-5 for \$1.50 postpaid. Elliott Buchanan and Associates, Inc. 1067 Mandan Blvd. Oakland, Cal. 94610.

WANTED-MODEL 28 KSR, must be complete with console. Will pay cash if the price is right. W4AIS, George Tate, 7 Artillery, Taylors, S.C. 29687

For Sale: Model 15 w/sync motor, table and power supply, good condition, \$75. . . CV-89A converter with instruction book \$150. Both for \$200. W6CUV, 855 West B St., Dixon, Cal. 95620. Phone (916) 678-5178.

WANTED: MODEL 19 with automatic carriage return, table, perforator, TD, and DC power supply. Will pick up in 150 mile radius. Victor R. Newman, W8FFT, 12 S. Florida St. Buckhannon, W. Va. 26201.

WANTED: TELETYPE EQUIPMENT & parts; R388, R-390A, AP600, 51J-4, Cash or trade for new radio equipment. Alltronics-Howard Co. Box 19, Boston, Mass. 02101. Tel - (617-742-0048)

TOROIDS: 44 or 88 mhy. center-tapped, unused, 5/\$1.50 POSTPAID. 11/16" reperf tape available again . . . Box of ten rolls \$4 POSTPAID TO 5th ZONE. Page printer paper: \$5.50 per case. Gears for most machines \$5/set. 255A polar relay \$2.50. Socket \$1.25. Sync motors \$10. Kleinschmidt machine WRITE. HQ150 with xtal calibrator \$135. New Heath DX-60A \$55. 250-23 matchbox \$38. 250-23-3 matchbox \$60. TT-63A regenerative repeater \$22. 3 line rubber stamp \$1. POSTPAID, WANTED: Tri-band beam. Motor base for 28. CDR Rotator. Tower. ALL RTTY GEAR. Stamp for list. Van W2DLT, 302R Passaic Avenue Stirling, N.J. 07980

GETTING STARTED ON RTTY? - Send card for complete information on what you need and where to get it, how to set up your station, and how to operate your RTTY equipment. Pioneer Electronics, 738 Pacific S. San Luis Obispo, Calif. 93401.

TUNABLE TERMINAL UNITS - The Pioneer 900 features continuous tuning of shift range from 100 to 900 HZ, 20 semiconductors/ one integrated circuit, tuning lights, high voltage transistor driving printer magnet (125 volts), 250 HZ per channel selectivity, built-in band-pass filter, no polar relays, optional built-in loop supply, full metering. Price of amateur model \$199.50. Please write for additional information. Pioneer Electronics, 738 Pacific St. San Luis Obispo, Calif. 93401.

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.

SERVICE-BUY-SELL-TRADE, RTTY Cleaning and repair of Teletype Machines. Have in stock every part for model, 14, 15, 19, and many parts for 12, 26, 28, 32, 33, 35. Stock com. type pallets for the model 26 \$ .35 each p.m. Teletype machines all models, in any style, and all special features available. Will buy, trade or sell teletype parts and machines. 88 mhy toroids 5 for \$1.25 postpaid, and quantity discounts. Call or write, Martin Geisler, 8926 Kester Ave., Van Nuys, Calif., 91402. Phone (213) 892-0685.

WANTED 75A-1 Any condition. Prefer with RTTY crystal but will take anything. Also need help in locating part/or part number for model 26. Jim Lynch, 1412 Linn. Boone, Iowa. 50036

LARGE TT/L-2 schematic - 15 x 30, \$1.00 postpaid W8SDZ, 1418 Lenesee, Royal Oak, Mich. 48073. Phone 313-585-4431

TELETYPE TEST SET I-193C. Ideal source of perfect teletype elements for testing keyers, T.U.'s, etc. More accurate than keyboard. See RTTY Journal, April, 1965; September, 1967. Cost U.S. Gov't. over \$600.00. Brand new, with manual, four polar relays, tools. \$24.95, F.O.B. Harrisburg, Pa. Telemethods International, Box 18161, Cleveland, Ohio 44118.

SELL; NORTHERN Radio NB AFSK generators with power supply, in rack \$35. Millen 1 inch scope with amps and power pack in rack \$20. Bodine tape puller with half reel \$4. Lambda 200-300 volt regulated supply \$10. 6.5 kva 125 volt 60 cps generator, 4 cyl. card for information. R.M. Ellis 1356 Elizabeth, Las Vegas, Nev. 89109

SELL: TS-383 B/GG DISTORTION Test Set in excellent condition, \$150. 3 ply page printer paper \$7.50/ case. (50 lbs. shipping wt.) Bob Friebertshauer, WB2PLY, Box 207, Princeton, N.J. 08550

LORENZ AUTOMATIC send/receive teletypewriter with attachments (type LO-15A) with steel table, excellent condition \$125. ea. Teletype Model 15 send/receive complete with synchronous motor, cover, keyboard-\$85. ea. Reperforator-transmitter, type FRXD-10, \$65.00 ea. Teletype model 14 typing reperforator w/synchronous motor \$40 ea. Teletype model 14 transmitter-distributor synchronous motor \$20. with series motor \$15. ea. RTTY dual frequency shift tone converter; Northern Radio type 152, \$25. ea. TT63A/FG regenerative repeater, each generator will operate on 60, 75, or 100 wpm. teletype signals, also provides perfect TTY signals for transmission, serves as RTTY converter when fed single tones from receiver, self contained power supply, complete with tubes and cable \$20. ea. Three headed transmitter - distributor with synchronous motor \$25. ea. Synchronous motors for teletype, \$8.00 Send us your requirements. Atlantic Surplus Sales. 300 7th St. Brooklyn, N.Y. 11215

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