Additional Classified on Page 15

Model 28 Typing Units, good condition, $100; #28 TD's, $39; AN/FCC-3 demodulators, or AFSK transmitters, checked-out $18, as-is $9; RD-92A/UX 60 rpm facsimile receiver, $90 checked out, with all data & 100 foot roll recording paper; #314 mercury-wetted relay, replaces 255A, $4.75 postpaid. Gordon White, 5716 N. King's Highway, Alexandria, Virginia, 22303.

WANTED: 28ASR CABINET with keyboard. Will consider complete 28ASR. Will pick up within 1000 miles. Send details to VE2MR, C.B. Taylor, Apt #1102, Montreal 28, Quebec, Canada

SALE: 255A POLAR RELAYS $2.50 Postpaid. 255A sockets $1.00 PP. 14 strip printers complete with keyboard, EOL and cover, like new, $45.00. #14 TD, 60 WPM sync motor, $25.00. Johnson 6NZ converter $15.00. Dow key electronic TR switch, $15.00. Bud low pass filter $12.00. K8CRE, Paul Hoerlein, Richville. Mich. 48758

MODEL 14 receiving only typing reperforators. $18.50 F.O.B. Huntsville. Send for details. R. Wanat, 4404 Judith Lane, #2A, Huntsville, Ala. 35805

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

SELL OR SWAP: KLEINSCHMIDT TT-98 page printer, TT-76 typing reperf. with keyboard, WANTED Model 28 ASR with typing reperf. Peterson, 152 Lawrence Drive, Berkeley Heights, New Jersey 07922, (201) 464-6193.

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 imputs permit dual-diversity reception. Excellent condition. $175.00 FOB Columbus, Ohio. Carl A. Barklow, 432 South Denwood Drive, Gahanna, Ohio, 43020.

COMMUTATOR TOP PLATE for model 14 TD. Teletype #77070, PC board construction, drilled with instructions $3.50. J.R. Salter, 11040 Creekmere, Dallas, Texas, 75218

WANTED: 0-5/FR EXCITER - Write Ed. Knight, WA8PFB, Box 111, Lewisburg, W. VA. 24901

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.

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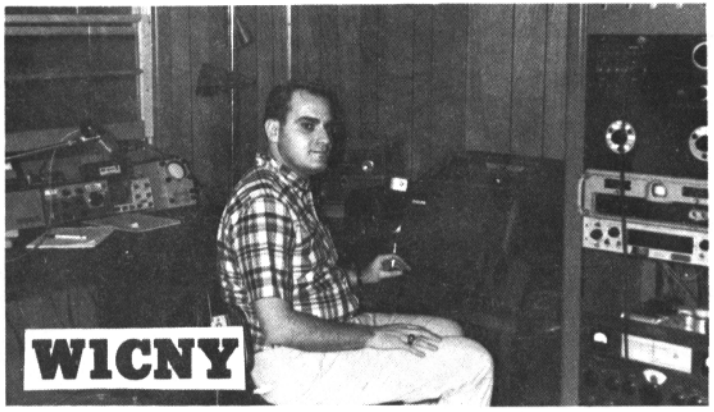
Vol. 16 No. 5 30 Cents



SIMPLE Transistor Converter

CECIL C. HOUK, W7ZNB ó
2773 Columbia St.
San Diego, Cal, 92103

If you want to build a simple T. U. then why don't you build a simple T.U. Fig. #1 is the diagram of a transistor T. U. that I made for a few Peso's; using all new parts! If you are new to RTTY this will get you started with a bang. If you can't afford to build this one with all new parts you also can't afford the paper to stay on RTTY! For the old timer, it will make a fine second T. U. for auto-start; as its power consumption is quite low.

I claim no originality to any of the circuits; but, it will work and that's what counts. I do thank the late W7WJ for some of the circuits. Using the values given, this T. U. should work with no adjustments. If you have an AF signal generator and Frequency Meter available, tune the Mark and Space filters to the 2125 and 2975 hz frequencies by "unwinding" different capacitor of the same value.

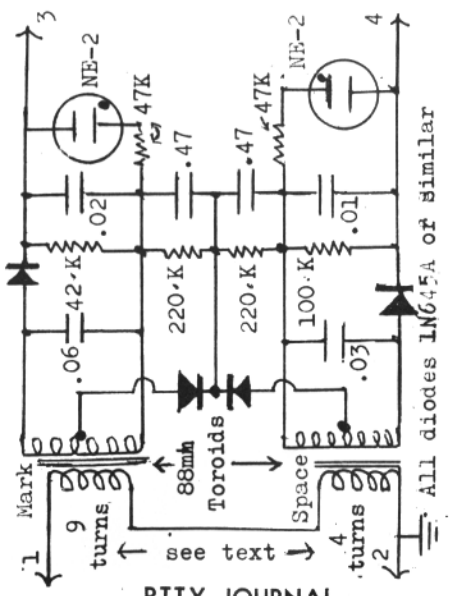
The detector circuit in Fig. 2 is not as complicated as it looks. The input to the toroids is direct from the receiver 4 ohm output via link coupling. This is 9 turns for the mark and 4 turns for the space coil. Use #20 wire, and wind the link in the same direction as the toroid is wound. Place the link around center tap (which is two of the adjacent leads connected together). The two neon lamps are the tuning indicators; just tune the receiver for maximum briliance of both lamps. If you wish to provide for narrow shift add a switch and .02 (approx) mfd capacitor, in series, across the space filter. You will have to select the exact value the tune the space filter 170 hz above the mark; this is critical.

The first two transistors (2NI305's) (you may want to try (2NI308's), are used as a Schmidt trigger to insure a good square wave to the keyer stages. The 2NI304 is an emitter follower for isolation. Then comes the 2N3440, which keyes the TTY machine. Don't worry this is a high voltage transistor, it will key a high voltage loop no sweat. I don't think I will ever use a 6W6 again.

The power supply I used for the +9 volts and -9 volts is Eveready 216 batteries. You can, if you want, build an AC operated supply. The 100 volts for the printer is a simple transformer-rectifier -capacitor affair. Get it where you can. If you use 100 volts the resistor in the collector of the 2N3440 will be about 2k, with 150 volts use 3K.

I made two of these T. U.s on fiber boards (with holes supplied 50¢), and they both worked the first time I turned on the power! Check the ARRL hand-book for an FSK circuit, and I'll see you on RTTY.

DETECTOR FIGURE 2



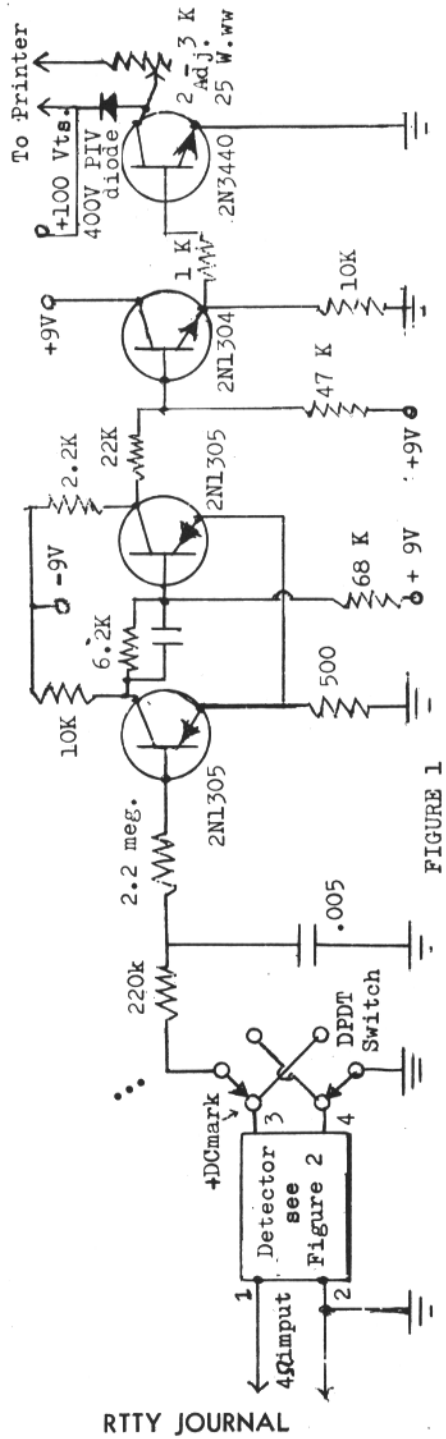


FIGURE 1

Transceiving the DRAKE R4A - T4X with standard tones.

As you Drake Owners know it is impossible to transceive the DRAKE equipment with standard tones as the 5645 oscillator will not pull over 1275 Hz. There is a simple "no holes" cure for this problem.

The reason the oscillator will not pull the required 2125 Hz is the inherant capacity in the shielded cable that runs from the crystal to the function switch on the panel.

Two possible methods of curing this problem.

1) If you can plan to use the unit for RTTY only, simply disconnect the cable center conductor at the crystal and tuck it away.

2) If you want to use the unit for other modes then disconnect the center conductor at both ends (leave the cable in place for future resale) tuck the ends away and install a piece of RG62U, or other low capacity cable in its place. This new cable should be as short as possible.

After you have done either 1 or 2 above, proceed as the instruction manual shows with the trimmers etc. You should be able to easily shift the required 2125 Hz now.

Jack Headley, Brookings S.D.

•••

FSK Hint for DX100B

I recently bought a second hand DX100-B as a standby RTTY transmitter. Using W6AEE's shift circuit in the August '55 issue of RTTY was desired. But getting into the v.f.o. was too much work for lazy me. So I took out the 6AU6 oscillator and inserted a 7-pin test socket and replaced the 6AU6. All required connections for the 6AL5 are now "out in the open." I stole this idea from the December 63 issue of QST which shows how this was done for FSK with a 20-A (Page 21).

Bob Rinaldi, W1CNY

PITCHS We SWUNG At and MISSED !

Credit for the three articles on narrow shift on page three of the April issue should be given to Ray Popkin Clurman, W2BK. Ray also mentions a correction on the diode connection in figure 2, page 3. It should run to the junction of the RFC and the shift capacitor rather than as shown.

•••

Useing The Collins 75S 1 on RTTY - -

IRVIN HOFF, W6FFC
12130 Foothill Lane
LOS ALTOS, Cal. 94022

This is another in a series of articles by Irv. Hoff on using specific receivers on RTTY.

The Collins receivers are in general the best that amateurs are likely to find available. Although initially expensive, if a person uses his equipment to any great extent the cost soon seems quite reasonable by virtue of the benefits gained by having "the best". I have two 75S-1 receivers at present -- one with a serial number of "166" that is quite a few years old, now. This receiver has been running 24 hours a day for years and with the exception of one new audio diode and one new PTO tube its maintenance has been almost nothing at all. The receiver was intended primarily for SSB and comes with a 2100 hz. filter placed to receiver audio of 300-2400 hz on either upper or lower sideband. An "AM" position (with diode detector) gives suitable reception in that mode. Optional acessory filters (and matching BFO crystals) are available for CW or RTTY purposes.

STABILITY

The stability of the Collins receivers by now is legendary. However, as in any receiver, if stability of a high order is desired, the receiver should never be turned off. Although this is likely to go "against the grain" (especially of the female portion of the household), it is actually better on the components also. The receiver only draws around 75 watts, which is about 5¢ per day at normal electric rates - for "high users" like most amateurs probably are, it would be around 2¢ per day, run continuously.

Use of a "PTO" rather than "VFO" automatically makes it possible to reduce most of the drift caused by the tuning capacitor in most VFO's, in addition to which the PTO frequency is only 2.5-2.7 mhz, also minimizing drift. Use of a low frequency crystal-controlled BFO around 455 khz also reduces the drift radically over that experienced with most variable BFO units. Use of "dual-conversion" rather than "triple-conversion" also eliminates one additional oscillator stage which can produce drift.

Drift is usually dependent upon temperature changes. If a receiver is allowed to run continuously, this temperature will stabilize to a maximum amount, and then drift is dependent on room temperature variation. In the case of the 75S-1, even on 20m I can maintain a frequency within plus-or-minus 20 cycles per week with no particular attention to the receiver.

However, the high frequency oscillator (for 20m for instance) used a 8577.500 crystal that doubles up to 17.155 mhz. This crystal can and does drift to some extent, and is the primary culprit for the amount of drift noted. If a specific frequency is to be maintained, the heterodyne (high frequency) crystal can be replaced with one of the new International Crystal "HA" (for High Accuracy) types - although relatively expensive at $9 each, they drift less than 10% that of a normal crystal, and indeed their use can be most beneficial.

Thus in stock condition, the 75S-1 will drift an amazingly small amount, and with the addition of a "HA" crystal, even this drift can be minimized to nearly equal a fixed-frequency crystal-controlled receiver. Such receivers are entirely adequate for unattended autostart operation on 170 shift for any frequency desired.

SELECTIVITY

The 75S-1 (and other Collins receivers) offer the finest selectivity to be found in any commercial receivers today. The mechanical filters are quite expensive, but well worth the high cost in added performance when viewed over a period of years. The receiver comes with a 2100 hz mechanical filter of 455 kc for upper and lower sideband. The BFO crystals have been selected to give 300-2400 hz audio tones automatically. Different BFO crystals can be added to give other audio tones . Optional mechanical filters are available for specific purposes, and a space for one such filter has been provided in the 75S-1. Such filters are not of the "plug-in" variety ala 75A-4 or 75S-B, but are intended to be more-or-less permanently installed via solder terminals underneath the chassis. A suitable crystal is then purchased to accomplish what the user intends the new filter to do. The two filters that the RTTY enthusiast is primarily interested in would be the 1500 hz (ideal for 850 shift RTTY, although a 1200 or 1100 hz filter might be better -- the latter being unavailable) with matching BFO crystal of 452.450 ; and the 500 hz mechanical filter which is nearly ideal for 170 shift (although 300-400 would be better, but again unavailable) when used with a BFO crystal of 452.790 khz. Such filters (room for only one) can be added and then selected automatically when the mode switch is placed to "CW" position. This also selects the new crystal at the same time.

ADDING THE CRYSTAL

A Collins modification sheet is available by requesting it. Write to:

Amateur Product Office
Cedar Rapids, Iowa

and then requesting their Bulletin 523-0182000-002211 which shows how the new crystal may be physically mounted on the rear of the mode switch in addition to the two crystals which are already there (the "lower SB" xtal of 453.650 and the "upper SB" xtal of 456.350).

The crystal ordered should be enclosed in a "HC-6/U" type holder with solder wires rather than plug-in pins. (This type holder is called the "F-700" by International Crystal if you order their brand.)

To order the crystal (452.450 for 850 shift and 2100 or 1500 hz filters or 452.790 for 170 shift and 500 hz filter) the following information can be used if ordering from International Crystal:

A. Frequency (452.450 or else 452.790)
B. Type ordered GP ($13) will be within 50 cycles or CS ($15) will be within 11 cycles
C. Calibration Temperature 25° (room temp. inside receiver)
D. Holder F-700 (has soldering wires)
E. Circuit Load 32 pf. (for Collins S-line)
F. Your name and address
G. Include money for the crystal.

Then send to:

International Crystal Manufacturing Co.
18 North Lee
Oklahoma City, Oklahoma 73102

The crystals will be air-mailed in a special plastic foam containter that will assure their safe arrival. HOWEVER, crystals in this frequency range will take from 2-3 weeks to manufacture. (Their "normal" freq. crystals from 3-20 mhz go out the next day.)

INSTALLING THE CRYSTAL

Get out your receiver schematic. Find the BFO tube V6B. To the left of this tube you will find the two crystals, one for upper sideband (456.350) and one for lower sideband (453.650). You will see switch section S-9 and above this another switch section. Take a pencil and name the top section S-9A and the bottom section near the crystals S-9B so we can talk a little about either section without becoming confused. First of all, look at S-9A. You will see one unused terminal. THIS IS THE ONE TO WHICH YOU ATTACH ONE SIDE OF THE NEW CRYSTAL. Just that simple. The other end of the crystal will attach to the common point of the other two crystals, which then go to the screen of the BFO tube.

S-9A merely selects the proper crystal to go to the grid of the BFO tube. (In the "AM" position the BFO is not used, so -65 volts bias cut-off is taken to the grid instead.)

Switch section S-9B merely shorts across the crystal not being used at the moment to reduce stray capacitance. In the "AM" position both the upper and lower SB crystals are shorted across.

You have now installed the new crystal and are finished with the BFO section. There is another interesting small change that will be beneficial but not necessary.

FIXING THE DIAL FOR RTTY

You could more-or-less quit at this point if you like. The only problem now is that the dial will be way off to one side when you set the hairline correctly for RTTY. It is simple to see why this has occurred. The "CW" position would normally be used with the 500 hz filter set-up for CW where you want audio tones of say 550-1050 hz. Thus a 455.800 crystal would be used and this would give you "upper sideband". Thus the dial was fixed to read approximately correct in the "CW" position for an upper sideband crystal. We don't use upper sideband for RTTY, but lower sideband. Now by adding a crystal of

452.450 for 850 shift, you are on lower sideband and off center (455.000) freq. by 2550 cycles. Since the dial in the "upper sideband" position was set for 1350 cycles (middle of normal 300-2400 audio tones for SB reception), now the hair-line will be almost 4 khz to one side of center - quite annoying to say the least, but otherwise in no way has the performance been affected.

This can be quickly and easily corrected. To the left of the BFO switch S-9, will be noted switch section S-8B. Look at that for a monent, and we'll tell you what it does. It's only purpose is to shift the PTO back and forth about 2.7 khz as you go from upper to lower sideband. There is a little trimmer on top of the PTO (C-308) by the PTO tube which makes this adjustment exactly right. It enables you to instantly go from upper to lower sideband without retuning the main tuning knob. The reason this is necessary is easily understood -- when in upper sideband you put the 456.350 crystal in use, and when in lower sideband you switch to the 453.650 crystal. The difference between these two crystals is 2.7 khz, so you want to move the PTO automatically this amount or else you will have to retune the main tuning knob. (Ever use a variable BFO? Remember how you had to keep one hand on the tuning knob and the other on the BFO as you changed the BFO? This merely accomplishes things automatically for you since crystals of known frequencies are being used in the BFO.)

Anyway, this switch section S-8B actually activates a regular little FSK keyer almost identical with that used in most amateur transmitters for RTTY purposes, only instead of moving the PTO just 850 cycles for RTTY, this little keyer moves it 2.7 khz to compensate for the difference in frequency of the two BFO crystals. Now you see what needs to be done - rewire S-8B so that in the "CW" position the dial thinks it is in lower sideband instead of upper sideband. Look at S-8B again -- you will see that in all positions other than lower sideband there is a common wire going to + 130 volts (which causes the 1N34A in the cathode of the PTO to conduct, thus putting C-308 in the circuit to shift the PTO). Only in the lower sideband position does it go to -30 volts to cut off the 1N34A and back-bias it to effective remove C-308 (just like in RTTY keyers.) So all you need do is rewire S-8B so that in the CW position the -30 volts will be forwarded to the 1N34A rather than the +130 volts. That is not hard to do and then the hair-line will only be 1.2 khz off center when properly adjusted for RTTY. That is due to the fact that the dial has been set up originally for lower sideband with a crystal of 453.650 and the new RTTY crystal of 452.450 is some 1200 hz lower in frequency, hence the dial will still be about 1.2 khz. to one side. That's lots better than nearly 4.0 khz!

While talking about tuning in RTTY, we might pass along the normal method used in setting the hair-line (fiducial if you want an "official" term) correctly for RTTY, as it seems so few people are doing it the best way.

1. Tune in WWV on 15 megs. (That is the only WWV you will get on the 75S-1 without buying a special crystal)
2. Do not "zero-beat" but instead (with receiver otherwise set for RTTY) tune in the WWV carrier as though it were an RTTY station stopped on "mark" frequency. Tune the receiver to display a "mark" indication on the scope, indicator, etc. used for RTTY.
3. NOW set the hair-line to 15.000 exactly (200.0 on the 75S-1's dial) and you are all finished.
4. Hereafter whenever you tune in an RTTY signal you can read its exact frequency directly off the dial with no addition or subtraction for his "2125 audio mark" tone, etc.

USING THE 2100 HZ FILTER FOR RTTY

There are two ways this can be done. One (the W7ARS method) is to add a small bracket to the top of the chassis with a SPDT switch. This switch then selects either the lower sideband crystal of 453.650 or else the new crystal of 452.450. This is a minor inconvenience as you will need to raise the lid to operate the switch unless you want to bring it to the front panel via some remote mechanical means. It offers the advantage of not requiring switch S-8B to be rewired. and offers the additional advantage of keeping the CW mode available for a 500 hz filter and 452.790 crystal for 170 shift.

The other method requires a bit of rewiring in the filter section, but only because Collins assumed you were going to add an extra filter in the CW position. As a result, in order to use the 2100 hz. filter in the "CW" position a few minor jumpers will have to be added to

switch sections S-6 and S-7. Just jumper the last two terminals together of both S-6 and then of S-7. This will then put the 2100 hz filter in the circuit for CW also. However, one other small task remains.

To minimize stray capacitance, the AM filter is grounded by S-6B and S-7B. The 2100 hz and CW filter (called optional filter in the schematic) are ground in the CW position. Then the 2100 hz filter is grounded at both ends in the CW position. Since we want to use this filter in the CW position, you need merely note the ground connection to S-6B and S-7B, and then lift these two connections from the switch terminals. It will now no longer ground the AM filter, but this is of no consequence, and will allow the use of the 2100 filter in the CW position with the new BFO crystal (452.450) added as already explained.

These changes are in most respects much more simple than they might possibly sound. It all adds up to the fact that you are trying to do something with the receiver (listen to RTTY) that it was intended to do, but of course Collins could not wire this receiver to suit everybody. I think ARRL claims only 3% of hams are on RTTY, so we are fortunate to be able to buy a receiver that adapts to RTTY so nicely, even if it means a few simple changes with a soldering iron. None of these changes could possibly hurt the resale value. And any of them could be quickly changed back to "stock".

FOR THE "REAL" RTTY NUT

A 1500 hz filter for 850 shift and a 500 hz filter for 170 shift would be optimum for RTTY. Of course you may want to use sideband sometime, so you would want to keep the 2100 hz filter in there for sideband also. What to do? Well you can if you like do away with the "AM" position by doing a little more rewiring. There is only room for one optional filter, but you can easily add the second optional filter below the chassis with a small amount of ingenuity. A number of incidental changes will then be necessary, but possible. The reciever could always be sold to another RTTY nut, or even changed back to stock. Chances are though you would then have such a superior receiver at modest cost you would not dream of selling it for some time to come.

Switch section S-6 and S-7 would be rewired to go to the new filter rather than to the "AM" filter. The "AM" filter would be left in the receiver but just not used for anything.

Switch section S-8B would be rewired to have -30 volts in the "AM" position instead of +130, thus putting the dial on lower sideband.

Switch S-8A would be rewired to use the product detector on all bands instead of switching to the diode detector for "AM" position. And finally S-9A would be rewired in the AM position - the present wire going to -65V would be removed and one end of the new crystal installed at that point. Presto, a 75S-1 with fantastic RTTY capabilities and at a cost much less that of buying a 75S-3B. (Another article will point out how even a 75S-3b still needs a crystal of 452.450 for 850 shift and one of 452.790 for 170 shift for best RTTY operation even though a variable BFO is inherent in that receiver.)

This "total conversion" can be accomplished in a 75S-1 for $350-$400 - the cost of a new Drake R-4, at current used 75S-1 prices. Including two new BFO crystals and both the 500 and 1500 hz filters. The stability of the receiver, the accuracy of the dial read-out and the marvelous selectivity of the expensive mechancial filters would make such a receiver an extremely desirable item to have and use.

Just a used late-model 75S-1 with 500 hz. filter could be converted for RTTY for the initial purchase price (these days around $300-$350 with the 500 hz filter included) plus $26 for two additional BFO xtals.

SUMMARY

The Collins 75S-1 receiver makes one of the finest RTTY receivers available today for any price by any manufacturer. A few minor changes will enable the enthusiast to get the normal audio tones of 2125 mark and 2975 space. The receiver is already constructed so an additional filter for RTTY may be quickly and conveniently added.

The stability of this receiver with its fixed-frequency BFO is legendary, and if a new $9 high frequency crystal (International Crystal "HA" type) the stability over a wide room temperature variation will stay within 10-15 cycles per WEEK.

Like other receivers, maximum stability is accomplished by allowing the receiver to stay on continuously. Turning it on and off everyday is actually hard on the receiver components anyway. Cost per week of continuous operation will only add 15-30¢ to the electric bill, depending on the rate in your area.

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VHF RTTY NEWS

RON GUENTZLER, W8BBB Editor
Route 1, Box 30
Ada, Ohio 45810

START AND STOP PULSES

Last month the Baudot code was described. It was shown that it is necessary for the receiving machine to "time" the signal being received. The timing process requires that the sending and receiving machines operate at exactly the same speed. It was also shown that half the characters in the Baudot code start with a mark and the other half start with a space. Therefore, some means of telling the receiving machine when a character starts must be employed.

In order to describe how this is done, a "peculiarity" of landline telegraph practice must be discussed.

TWO-WAY TELGRAPHY

Because wire is expensive, it is desirable to use a single wire for manual telegraphy. Figure 1 shows how this is done. At each end of the circuit there is a telegraph key and a sounder in series. If a simple key that is normally open were used at each end, neither party could send because the circuit would always be open. If however, there were a switch across each key, and the switch was kept closed when not sending, the circuit could be opened by either party when he wanted to send a message and the circuit would be interrupted by his key. In this manner it is possible to have a two-way circuit with only a single wire. (Simultaneous two-way traffic could not be handled by this method, of course.)

Another advantage of the circuit being described is that other stations can be inserted into the loop (always in series) and so long as all keys are shorted while not sending, the circuit will always be continuous and any person desiring to send can "unshort" his key and send to all other stations.

Two teleprinters can be arranged for two-way operation (not simultaneous two-way) by connecting them in a manner similar to the one described. See Figure 2 and compare it with Figure 1. On each machine the selector magnets and the keyboard contacts are put in series. The same problem with manual telegraphy occurs here. How can one person send to the other if the circuit is opened by the keyboard contacts on the other machine? The answer is that the keyboard contacts are automatically closed when no one is "typing" on that keyboard. In other words, when the machine or the circuit is not being used, a steady mark is being sent. Therefore, teleprinters are arranged to have a steady current in the selector magnets when there is no message.

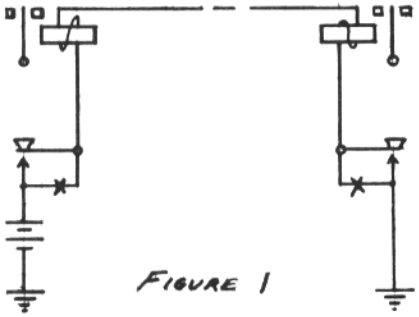

FIGURE 1

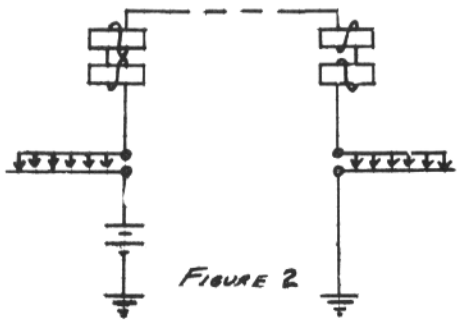

FIGURE 2

The standard schematic symbol for a teleprinter keyboard shows six contacts. One is shown closing the path. The other five are shown open. The five that are alike represent the contacts that form the five portions of the Baudot code. The one that is closed is used to form the "stop pulse" to be described later and is the same contact that is closed when the keyboard is not in use.

The "peculiarity" of printing telegraphy is that something (a steady mark) is being sent when nothing (no character) is being sent.

THE START PULSE

As described above, the idle condition of a Teletype circuit is indicated by a steady mark. A steady mark is also used between characters. The receiving teleprinter, therefore, is idle when current is flowing in its selector magnets. When a character is to be sent, the keyboard contacts open the circuit, thus sending a space. The receiving printer is therefore notified that a character is coming when a space is received after a steady mark. This space is called a "start pulse". This start pulse starts the timing sequence in the receiving printer. The start pulse is the same length as the elements of the Baudot code, 22 ms.

In Table 1, given last month, we could have added a column before Column 1 labelled "Start", but because it would have an "S" entry in it for every row, it was not shown.

The start pulse completely resolves the paradox mentioned last month. Because every character is preceeded by a space (the start pulse) and that is always preceeded by a mark, the beginning of every character is uniquely defined.

THE STOP PULSE

We could have also raised the question: When does a character end? This is a natural question because half the characters in the Baudot code end in a mark and the other half end in a space. One answer that could be given is: 132 ms after the beginning of the start pulse. Another, and perhaps better, answer is: At the beginning of the stop pulse.

It was mentioned previously that the idle or between character condition is a steady mark. Therefore, at the end of any Baudot character a mark must be sent to indicate the end of the character. In Table 1 we could have added a column after column 5, labelled it "Stop", and put an M in that column on every row; this was not done because the entry is always an M.

The stop pulse not only signals the end of a character and prepares the receiving printer to detect the beginning of another character but also acts as a buffer between characters. If the stop pulse were not used, it might be possible to send characters so rapidly that the receiving printer could not tell when one character had stoppped and the next one began.

The stop pulse is unique (when compared to the start pulse and the five element pulses) in that it has a definite minimum length but an indefinite maximum length. The stop pulse starts at the end of a character and ends when the next character is sent. When is the next character sent? This depends upon the person at the keyboard.

There are two standard minimum lengths for a stop pulse. On Western Union machines it is the same as the other pulses: 22 ms. Therefore, Western Union machines are called "7.0-unit" machines because the code they send is composed of seven even-length elements. Bell System machines have a stop pulse with a minimum length of approximately 31 ms. Because 31 ms is approximately 1.42 times 22 ms, and because the other six elements are 22 ms long, the Bell System machines are called "7.42-unit" machines.

The current waveshape occurring when the letters "Y" and "A" are sent are shown in Figures 3 and 4. These are the same as shown in Figures 1 and 2 last month, but contain, in addition, the start and stop pulses. The lengths of the individual elements as well as the complete character length are shown for both Western Union and Bell System machines. The mark occurring before the end of the start pulse is the end of the stop pulse of the preceeding character and may be any length greater than the minimum length corresponding to the keyboard being used. The stop pulse shown at the right of the figures ends whenever the next character is sent. Its minimum length is indicated.

We would like to mention at this point, that although Bell System and Western Union machines are 7.42 and 7.0-unit, respectively, they are perfectly compatible. The only difference is that on a Bell System keyboard the minimum interval between successive characters (the minimum length of the stop pulse) is 42% longer than it is on a Western Union keyboard.

An excellent article regarding the 7.0 vs. 7.42-unit codes can be found in the RTTY JOURNAL, 1967 March, p.3. This article is a reprint of: "Teleprinter Codes: 7 Unit Versus 7.42", F.W. Smith, Western Union Technical Review, 1954 October.

An additional, though very minor, difference between Western Union and Bell System machines is that Western Union

machines have "Bell" on "upper-case" J while Bell System machines have "Bell" on "upper-case" S.

SPEED

The term "speed" when used in connection with printing telegraphy usually means the number of words per minute that the equipment can handle. A word is defined as five characters plus a character space. Western Union characters are 7.0 units or 7.0 X 22 ms 154 ms long. Therefore, a Western Union "word" is 6 X 154 ms 924 ms 0.924 seconds long. Because there are 60 seconds in a minute, a Western Union machine can send or receive 60/0/924 65 words per minute. Therefore, Western Union machines are called "65-Speed" machines.

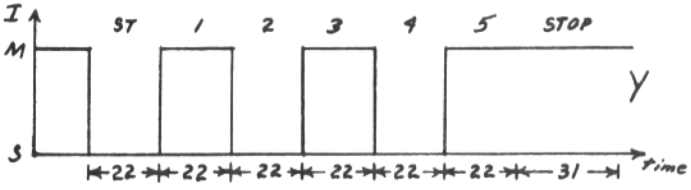

FIGURE 3

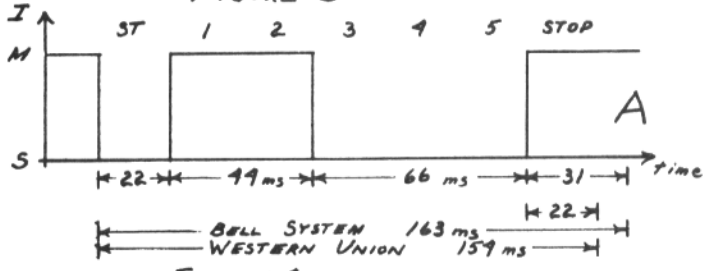

FIGURE 4

Bell System keyboards have a character length of 7.42 X 22 ms 163 ms or a word length of 6 X 163 0.978 seconds. 60/0.978 61.3 words per minute. Therefore, Bell System machines are called "60-Speed" machines.

The FCC Rules and Regulations, paragraph 97.69(b) states: "The nominal transmitting speed of the radio teleprinter signal keying equipment shall be adjusted as nearly as possible to the standard speed of 60 words per minute and, in any event, within the range of 55 to 65 words per minute."

OTHER SPEEDS

For completeness, we would like to mention that commercial users also employ 67, 75, and 100 WPM speeds. In addition, some use the 5-element Baudot code described here and others use an 8-element code. Only the 60- or 65-speed, 5-element signals can be received on a teleprinter adjusted for amateur service.

BAUD

The Baud or the "Baud rate" is defined as the reciprocal of the shortest element length measured in seconds. For both Western Union and Bell System machines operating at 65 and 60-speed, respectively, the shortest element length is 22 ms. Therefore, the Baud rate = 1/0.22 = 45.45 Bauds.

SUMMARY

The need for the start and stop pulses were discussed. The start pulse, always a space, indicates to the receiving machine that a character is coming and starts the timing sequence in the receiving machine. The stop pulse is used to end a character and to give a steady mark in preparation for the next character. The stop pulse also acts as a buffer between successive characters to enable the receiving machine to prepare to receive the next character.

It was also shown that Western Union and Bell System machines differ in the minimum length of the stop pulse they send, but that this difference in no way affects their compatability. The speed of operation in words per minute was calculated and the Baud was defined.

....

ARMED FORCES DAY --

This year's program will be conducted on Saturday, May 18 1968 and all licensed radio amateurs are encouraged to participate.

Special QSL cards confirming crossband communications will be forwarded to those amateurs who establish two-way contact with participating military stations. Certificates will be awarded to those who aptly demonstrate their operating ability and technical skill by receiving a perfect copy of the Secretary of Defense originated "CW" and/or "RTTY" message(s) transmitted during the receiving contest portion of the communication tests. Interception by short wave listeners (SWL) will not qualify for a QSL card in confirmation of crossband communications. However, anyone who has the equipment and abilities may copy the Secretary of Defense messages and receive a certificate.

MILITARY TO AMATEUR CROSSBAND TEST

Military radio stations WAR, NSS, NPG and AIR will be on the air from 1400 GMT to 0245Z GMT. During this test of crossband operations, the military stations will transmit on specified military frequencies while amateur stations will transmit in the indicated portions of the amateur bands. Contacts will consist of a brief exchange of locations and signal reports. No traffic handling will be permitted.

STATION	MILITARY FREQUENCY	EMISSION	AMATEUR BAND
NSS (Navy Radio Wash., D.C.)	KCS unless otherwise noted 4012.5	RTTY	3.60-3.65
	7380	RTTY	7.0-7.05 7.1-7.15 14.05-14.10
	*14382O	AFSK RTTY	144.0-145.5

*Provided it is consistent with operational and training commitments, this frequency will be keyed from a U.S Navy aircraft flying between Washington, D.C. and Boston, Massachusetts.

NPG (Navy Radio San Francisco)	4001.5	RTTY	3.65-3.8
	7332	RTTY	7.0-7.2
*	*148.410 (MCS)	AM/FM/AFSK	144-148

**Provided it is consistent with operational and training commitments, this frequency will be keyed from a U.S. Navy aircraft flying between San Diego and Seattle.

AIR (Air Force Radio Wash., D.C.)	3347	RTTY	3.5-3.8
	7315	RTTY	7.0-7.2

RTTY RECEIVING CONTEST

A radioteletypewriter "RTTY" receiving contest will be conducted for any individual amateur or station possessing the required equipment. This is a test of the operator's technical skill in aligning and adjusting his equipment, and serves to demonstrate the growing number of amateurs becoming skilled in this method of rapid communications. The "RTTY" broadcast will consist of a special Armed Forces Day message from the Secretary of Defense to all radioteletypewriter enthusiasts. The message will be transmitted at 60 words per minute in accordance with the following schedule:

TIME	STATION	FREQUENCIES
18 May 1968 0335 GMT	WAR	3347, 6992.5 14405
	NPG	4001.5
	AIR	3397.5, 7315
	A6USA	6997.5
	A5USA	4025
	AG6EA	4580, 7332
	AG3HQ	4590, 7540

SUBMISSION OF COMPETITION ENTRIES

Transcriptions should be submitted "as received." No attempt should be made to correct possible transmission errors.

Time, frequency and call sign of the station copied as well as the name, call sign (if any) and address of the individual submitting the entry must be indicated on the page containing the text. Each year a large number of perfect copies are received with insufficient information, thereby precluding the issuance of a certificate.

Completed entries should be submitted to the Armed Forces Day Contest, Room 5A522, The Pentagon, Washington, D.C. 20315 and postmarked no later than 31 May 1967. * *

RTTY-DX

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

Hello there. . . . .

While band conditions have continued to be excellent, activity during the past month seemed at an all time low. Perhaps it is the normal state of affairs after a big contest or perhaps there is an ammendment to Murphy's Law which specifically prohibits good band conditions and a high level of activity to occur at the same time.

Sandy Morton of the BARTG staff sent over a tape reviewing the contest from his vantage point in Scotland but unfortunately it arrived too late to be included in the round-up of the contest last month. Sandy's listening over the contest weekend netted 95 different stations in 26 countries in all continents. It is easy to see that it is quite possible to rack up quite a score by working these stations on two or more bands. Sandy is still having a battle with the code but hopes to get the best of it soon and come up with a GM call.

This month we take pleasure in announcing the following addition to W A C.

Nr. 103 Pierre Wolf XE1YJ

Pierre is no stranger to contest operators as he has represented Mexico in them all. Pierre also sent along the rules of an international contest sponsored by the L.M.R.E. that will run from 21 March to 31 December 1968. It is called Concurso "Mexico" 1968. There will be beautiful medals for the winners in each continent and diploma's for the winners in each country. In addition to RTTY, all other modes may be used of course. The detailed rules are too long to include in this column ' it Pierre has been running a tape about it and L.M.R.E. - Apartado Postal 907 - Mexico D.F. ZP1, Mexico will furnish details upon request. The new special prefix 4A1, 4A2, etc. will be used by most Mexican stations during the contest period.

Speaking about special call signs, Lou, I1ORS reports that 4K2A was on RTTY for a one day period recently. This station is normally UQ2NE, operated by Sarma in Riga, Latvia. It is pretty hard to keep up with all the numbers these days. We all wish Lou a rapid recovery from his recent operation. He is certain to be on the keyboard a lot during the recovery period as the nature of the operation forces him to talk with his hands.

Word from Arthur, ON4BX, says that the TU has been completed and has been sent to Pierre, F9RY/FC on Corsica. Thanks to Arthur, it is quite possible that activity has already started from FC. Art has also sent an unverified report of possible activity from China. A local traffic journal over there has indicated that C7GD has been heard on CW and occasionaly goes to RTTY at about 14090 kc. What a catch for somebody.

As reported last month, Mauro, I1KPK, has been working to organize a dx-pidition to Yugoslavia and I have some additional information on this project. Mauro says that everything is pretty well set to go but that the date will be closer to the end of April, possibly at about the time you get this issue. He is confident that permission will come through as the YU authorities have been granting visitors licenses for CW and SSB. It is also possible that he will be accompanied by I1KG, but in any event, Giovanni will be the QSL manager for this operation.

Activity is on the increase from Peru. Ray, OA4HR is the latest station on from here and he puts out a very good RTTY signal. Ray says that OA4J and OA4CK are getting terminal units built so we may possibly hear quite a bit of activity from the land of the Inca's in the near future.

Reporting this next news item is like reporting the passing of an era. And as regards RTTY - DX I guess we could call it just that. The week-end of April 7th marked the last of RTTY activity from K A 9 A K. With his tour of duty completed Cas is leaving Japan for a new assignment in another part of the world. We must certainly admire Cas for his devotion to the RTTY activities of amateur radio and in giving so many that rare Asian contact. You must understand that here was a fellow with a modern station including the best in RTTY machinery and equipment that is available, but delegated to the outer fringes of the spectrum above 29 mc. where long haul communication of any kind is the exception rather than the rule. Yet almost daily, and most certainly on weekends, if the path to your area was open you could hear Cas on the keyboard. The trouble was that the path was rarely open at the right times and too few of the gang could or would climb that high in frequency so most of the time Cas was pretty much alone. So until another ham comes along as dedicated to RTTY as Cas I am afraid that we will not hear much from Japan in the near future. I believe that I can speak for all of us in wishing him the best of luck in his new assignment.

In a recent QSO with LD1VR, Herbert passed along some very interesting information that I'm sure will be of interest to all. As you may know, Herbert travels around this globe quite a bit on business and is very likely to show up at some pretty rare spots with little or no advance notice. Well, just recently Herbert was signing HS1AH from Thailand but with a combination of poor conditions and no activity he did not work a single station on RTTY during his short stay. This was on fifteen meters so it would pay to tune these other bands from time to time as you never know what you may find. I'm trying hard to imagine my feelings had I heard Herbert loud and clear from HS for at the moment W and VE hams are not permitted to contact stations in Thailand!!!

Herbert's schedule is such that his planned trip to Turkey will now be toward the latter part of June. Between May 22nd and June 7th he will be here in the states. His first stop will be in the Los Angeles area and his itinerary will also take him to Washington for a few days and finally to Boston from where he will leave for Germany on June 7th. It certainly would not surprise me to hear DL1VR/W at some time between the above dates.

It has been brought to my attention that many of the DX readers are also interested in W A S and in fact, quite a few RTTY stations both DX and stateside are very close to this goal. I certainly will be glad to publish the calls of stations in any of the rare and most needed states from time to time if it will be of any help to those trying for W A S. There are two basic requirements however, what are the most sought after states, and, who can supply the calls and operating habits of any RTTY stations in these states? At the moment, North Dakota, New Mexico, and Nevada seem to be the most sought after. Can anyone supply any information on RTTY activity from here? -- Well, you probably won't believe this but it's true. Between scribbling the rough draft of this column and typing it up to send to Dusty I was twisting knobs on the receiver and guess what I worked! WØSDN in Walhalla, North Dakota. His name is Ev Bailly and he had a very good signal on 14095 kc. at about 0300z. So there is one from N.D. and the first one I worked too.

Just a reminder that next month we will again publish the RTTY - DX HONOR ROLL. Things are getting rough at the top so send in your listing no matter how small and join in the fun.

It is with extreme regret that in closing I must announce the passing of Bill Holman III, K L 7 B A J. He was stricken on March 1st while on vacation in Mexico. Perhaps his loss can be best expressed by quoting from the letter of John Eubank, KL7ELR, who informed us of his passing.

> "We were looking for Bill's return from his vacation and we will certainly miss him. He was OUR RTTY man up here and without him we will all have a more difficult time with our RTTY problems. We have all lost a real friend."

73 de John

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1968 RTTY SWEEPSTAKES

Sid Burnett, president of CARTG has announced that the CARTG will again promote and run the 1968 RTTY Sweepstakes. Remembering the outstanding job they did on last years contest we are assured of another excellent contest this year. The date of October 4-5-6 has been settled on. The rules and nature of the contest are open to suggestions from everybody. CARTG would especially like to get any ideas that would help promote more activity from RTTY fans that ordinarily do not participate. More U.S. and Canadian activity as well as foreign stations. Anyone with ideas as to rules, time of the contest, type of prizes that might be of interest or any ideas on any phase of the contest can be of help by writing your suggestions to CARTG, VE3RTT, 85 Fifeshire Rd., Willowdale, Ontario, Canada.

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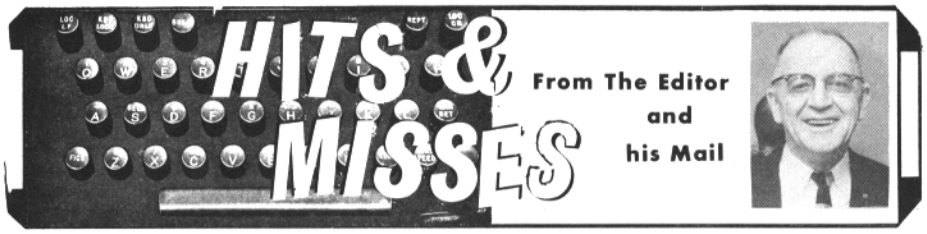
BROAD MINDED ?

TRY NARROW SHIFT !



We are writing this just after a couple of weeks in the sun. Feeling fine but our barber says we have some blisters on the top of our head. We knew the hair was pretty thin up there but didn't realize it was that bad. Stack of mail sits in front of us. We have checked it and only information that has to get in the next issue was taken care of. By the time you get this however we hope everything is under control again. Back to our regular 16 pages this month but hope to continue the 20 page issues next month. We might mention again; we like to get your newsy letters and comments, many times we intend to answer but just never seem to get time. We do appreciate them though and keep them coming.

•

With the seemingly senseless confusion on RTTY on 10 meters we again checked with the ARRL to see what progress, if any, had been made on the petition filed two years ago to permit RTTY operation in the lower CW portion of this band. After checking with the FCC office the answer was the same - no action. We can think of no possible objection to this change but apparently the lack of interest has made it easy to pass over. We suggested to the ARRL that the matter be brought up at the next directors meeting with the hopes that a little prod might start something. If any of you know your director in the ARRL, a little mention of this might help get at least a more concrete answer.

•

A big shindig is being promoted by the East Coast VHF Society at the Garden State Shopping Plaza, Routes 4 & 17, Paramus, N.J. on May 2-3-4th. Primarily a huge gathering for all kinds of VHF enthusiasts RTTY will be well represented with help from the Army Mars and other RTTY fans. Over 5000 hams are expected as well as thousands of the general public. A complete program with experts in all phases of VHF activity is planned and a special program for FM operation. For complete information write the East Coast VHF Society, PO Box 1263, Paterson. N.J. 07509.

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RTTY JOURNAL

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TOROIDS: 44 OR 88mhy. center-tapped, unused, 5/$1.50 POSTPAID. 11/16" REPERF TAPE $3/box of ten rolls. Page printer paper. $5.50/case. Gears for most machines $5/set. Heath DX-60A, new $55. Hammarlund HQ-100A Like new $90. Johnson matchbox: $40. (no SWR). $60 (built-in SWR). $60 (built-in SWR). Dow-Key DKC-TRM-1 TR switch: $14. Johnson phone-patch $18. 255A polar relay $2.50, sockets $1.25 POSTPAID. Apeco photo-copier with chemicals and paper $40. TT-63A regenerative repeater $22. sync motors $10. 3 line rubber address stamp $1.00 POSTPAID. WANTED: tower, tri-band beam. motor base for 28. rotator, 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 St. 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 bandpass 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.

WANTED-TT/L Demodulator. State price and condition in first letter. All letters answered. W. G. Marvin, WA8LTB, 248 Poinsetta Ave. Toledo, Ohio. 43612

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.

SPECIAL SALE - Teletype Model 14TD. New; $25.00, Good Used $14.00, Specify 65 or 75 wpm. FOB Detroit. Keith Petersen, W8SDZ, 1418 Genesee Ave., Royal Oak, Mich., 48073

LARGE TT/L-2 schematic 15 x 30, $1.00 postpaid W8SDZ,1418 Genesee, 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.

PRINTED CIRCUIT BOARD, TT/L2 with schematic, pictorial, voltage chart and construction tips: $6:00. Standard 44 or 88 mhy. toroids, unpotted: 5/$2.00 pp. USA; special larger, low resistance 88 mhy. toroids, 1.5": 50 ¢ each; all items above postpaid in USA. K5BQA, 11040 Creekmere, Dallas, Texas, 75218.

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

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Additional Classified on Next Page