Additional Classified on Page 15

WILL BUILD: TT/L-2 & other FSK demodulators; Transmit FSK'ers; Will build to personal specs. Also build Heathkits & other electronic kits. Save money, generous terms. WA8SIL, 7055 Hillcrest Lane, Chesterland, Ohio, 44026

SELL: TEKTRONIX OSCILLOSCOPE, model 511AD, late serial, in excellent condition inside and out. NORTHERN RADIO CO. F.S.K. Exciter Type 105 Model 4A, with power supply and manual, in perfect condition. TELETYPE model 19 tape set, complete, just reconditioned, in like new shape, with smooth grey-green finish. Also, ART-13 autotune transmitter, and Hallicrafters SX-100 general coverage receiver. Make offers, for cash or trade. WANTED: Good DC scope in working order (Tektronix, or similar). Also, good model 28KSR console cabinet to buy, or to trade for my good model 28KSR tabletop cabinet. Anyone in my area with model 28 equipment or other interesting stuff to sell or trade? Gerry, WA2YJD, 35 Amherst Road, Great Neck, L.I. New York 11021, 516-487-2331 (I am on 3637.5Kc autostart)

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

WANTED 500 cycle filter for Collins 75A4 also need 2.1 Hz filter. Dusty Dunn, Box 837, Royal Oak, Mich. 48068

FOR SALE: Hewlett Packard 522B rack mount 120 KC. digital counter can also be used for time interval measurement, excellent condition, $300, shipping paid. R388 receiver, new PTO, good condition, book, $250 shipping paid. W7QCN/Ø, 1610 Shasta Drive Colorado Springs, Colo. 80910

FOR SALE: MODEL 19 with sync. motor, Auto CR-LF, CV/116 T.U. dual diversity auto freq. control. $200. certified check, FOB Sunnyvale. C. Mueller, 741 Kilkenny Ct. Sunnyvale, Cal. 94087

SELL COLLINS R388, excellent condition $350. 3.1kc 500 kc mechanical filter $25. TRADE 1.5kc 75A4 filter for 2.1kc ditto. W6BJI, 1260 West SanRamon, Fresno, Cal. 93705

SELL or TRADE: COLLINS Frequency Synthesizer 1.8 to 4.0 mHz. Acuracy .0025%, model 040A/FRT-15, with manual. rack mounted. $300.00 or Trade for anything. W4AIS, 7 Artillery Rd. Taylors, S.C. 29687

WANTED: 28ASR Cabinet with keyboard. Will consider complete 28ASR. Will pick up within 1000 miles. Send complete details to VE2MR, C.B. Taylor, Apt. 1102, 6630 Sherbrooke St. West, Montreal 28, Quebec, Canada.

WANTED: NAVY Manual for AN/FGC-7A regenerative repeater. George F. Marts, WOTDH, 4201 Colvin Dr. St. Louis, Mo. 63123

RTTY JOURNAL
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EXCLUSIVELY AMATEUR RADIOTELETYPE

Vol. 16 No. 7 — 30 Cents

'STAN' **WB6QFE**

AUTOMATIC Carriage Return --Line Feed - For Model 15 & 19 Printers

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

Anybody who has operated any RTTY soon finds at least three places where he gets quite unhappy--

(1) if his machine does not downshift on space characters
(2) if it "piles up" at the end due to missing a carriage return and
(3) if it prints over the same line twice because it missed a line feed.

The easiest of these to fix is the first, as nearly all model 15 and 19 machines have a lever on the under side of the printer that gives "downshift on space". Many commercial and military circuits do not use this most desirable feature for reasons certainly known only to them. Perhaps if we ran 10 Kw. transmitters to rhombic antennas and changed bands when the going got the slightest bit rough we could dispense with it also. At any rate, you probably already have the lever on your machine, it's on the bottom side -- lift the printer unit off the base and you will soon see it. Directly on the bottom of the machine is the function bar "comb" which is visible in Figure 1. about the middle of this comb on the forward edge is the lever that swings a little left and right. It is a little over two inches long, and is tightened with a screwdriver. Loosen it and swing it out of the way, then tighten again. That's all there is to it. That gives you automatic "downshift on space".

ADVANTAGES OF AUTO CR-LF

Once you have used a machine so equipped you cantvisualize how you could possibly go back to the original "land-line" version. You really then notice the advantages when you visit another station which does not have this feature. Without AUTO CR-LF, if you miss the "CR" character at the end of the line (or the other chap is using a strip printer or reperf without any "end of line" indicator) the machine will stay at the right margin and continue to print one character right on top of another. Of course you miss everything typed until the next carriage return comes along. This is known as "pile-ups". Adding AUTO CR-LF eliminates the pile-ups since it will return the carriage and turn up a new line automatically when the carriage gets to a certain place at the right of the page.

ADVANTAGES OF NON-OVERLINE

Most readers are at least vaguely aware that such things as AUTO CR-LF do exist, but not so many are lucky enough to know that "non-line" also exists. This is ridiculously simple to add to a model 28 where you merely exchange two function bars in the stunt box, but it's a bit more complicated for the model 15 and 19. If you receive a "CR" character without getting the "LF" (perhaps the "CR" was a miss-print from poor conditions) the machine will print over the same line again. This can be most frustrating. Adding "non-overline" makes it impossible to get a "CR" without an accompanying "LF". To put it more accurately, the easiest method of eliminating "over-lines" or "over-printing" is to disable the "CR" character entirely and fix the machine so that when a "LF" is received it adds an automatic "CR" at the same time.

DISADVANTAGES OF NON-OVERLINE

The advantages of having this feature are so very great that it is almost sacriligious to bother mentioning the one disadvantage. You cannot ever INTENTIONALLY get an overline any longer. The only time this is of any consequence at all is when printing an occasional picture on RTTY designed by Ralph Larsson of the TTY Corp., as he at times deliberately uses overlining to emphasize parts of the picture. The only other thing no longer possible is the ability to send: LOOK which is a few people do upon occasion. You have to decide quickly if the one or two pictures per year you might wish to receive are worth the loss of overline protection during the other 364 days you may be receiving normal copy. It seems an easy enough choice or I wouldn't be taking your time to read this article!

SURPLUS TTY CORP. AUTO CR-LF KITS

I confess to not being entirely familiar with what is available in this regard. I hear there are two such surplus kits available,

each costing around $20. What I am sure about is that it seems the fellows always wind up with the WRONG ONE, at any rate! The TTY Corp. kit has an electrical solenoid which gives a line feed whenever the "CR" character has been received. Since most "good operators" usually send the following sequence:

CR
CR
LF
LTRS

you can see where you can easily get double line feeds (and more) from these surplus TTY Corp. units. I can think of several people who yanked them back off in disgust after watching the paper roll out like it was toilet paper in a windstorm.

OTHER AUTO CR-LF KITS

Various other systems have been proposed, and some of them have quite worthwhile features. As I remember, none of them offer auto "non-overline" in addition to auto CR-LF protection, however. At any rate the system to be described is so very much more simple and inexpensive that it makes the other systems appear less desirable in comparison.

HISTORY OF THE SIMPLEX AUTO CR-LF SYSTEM

Vic Poor K3NIO originally dreamed up the basic concept being used at present. This was possibly in 1963. Tom Lamb K8ERV visited Vic's home and prepared a tape which he sent to all interested parties regarding this system.

By October 1964, the RTTY society of Michigan was publishing a three page bulletin describing the conversion, and offering a most simple method of constructing the parts. This was largely the work of Ed Bruening W8DTY whose artistry decorated the bulleting.

In 1967 Bob Zelenka W8TMO decided to add auto CR-LF to his machine. Bob is a machinest by trade and he soon came up with a "better way" to do the modification. Although any of the parts may be made at one home easily enough, the method that Bob uses offers greater reliability and excellent components that should hold up indefinitely. He made up several kits for friends who found once they were installed would give excellent results. The problem was in getting them installed, since few people are especially familiar with the workings of the TTY machine itself. As a result, Bob was reluctant to make the parts generally available. We hope that after reading this article you will be armed with more than sufficient information to either build and install your own parts, or obtain Bob's parts and then put them in the machine. He includes a nice printed instruction sheet with excellent drawings, some of which with his permission we are reproducing for this article. Bob's kit of parts costs $7.50 complete.

BOB ZELENKA W8TMO
14446 SWANEE BEACH ROAD
FENTON, MICHIGAN 48430

BASIC THEORY OF THE SYSTEM

This will have to be a little vague, as it will be explained in greater detail soon. The normal "CR" function bar is removed from the comb on the bottom and placed in an unused slot (the tab slot) so it will continue to suppress spacing for CR characters. (Also it will not get lost there.)

A bracket is then placed on the rear of the machine and attached by wires to the vertical line feed rod that works the rachet wheel to turn up a new line. When this rod moves for "LF", it will then cause the new bracket to tilt which pulls the manual carriage return release that you normally operate by poking your finger in the hole adjacent to the manual line feed crank. You now have auto "non-overline". You could quit right here and be much better off than ever before. However you are still susceptible to "pile-ups".

The rest is a bit difficult to visualize at first. It will sound like a "Rube Goldberg" arrangement in some respects, and indeed it is, but a most clever one at that.

A clamp is placed around the spring housing at the rear of the machine. This spring housing winds up the tape that pulls the carriage back to the left margin, and is easily seen if the roll of paper is removed. The housing is round and about two inches in diameter. (See Fig. 6)

This clamp has a finger projecting from it. This finger engages a wire you install that will lift the line feed function bar manually when it is taut, and this then causes the bail reset bar to operate the line feed rachet lever (which in turn pulls in the carriage return release lever) on whatever character is next typed. That's the system in a nutshell. Now to see if we can go into greater detail.

THE FUNCTION BAR COMB

Take the printer off its base and turn upside down, taking care not to pinch or bind any parts. The function bar comb will

be staring you directly in the face. Figure 1 is an actual photo showing this function bar comb. The comb is held in place by three hex-headed screws. Before removing these make a careful mental note of what it holds in place and where. Best yet, draw yourself a picture. The photo will help in reassembly. This part is the only tough part in the entire modification. You cannot be too careful in taking notes on that function bar comb. Now remove the comb. You will see the various function bars. The one second from the left (slot 2) is the "carriage return" function bar, and it is better identified (when once removed) as it has a number "2" stamped on it. To remove this function bar, first disconnect its spring. It may then be possible to work it free of the bail assembly, but that's too hard of a job, as you will want to put it back into the empty "tab slot" (slot 6) anyway, in order to suppress spacing when a "CR" function is received.

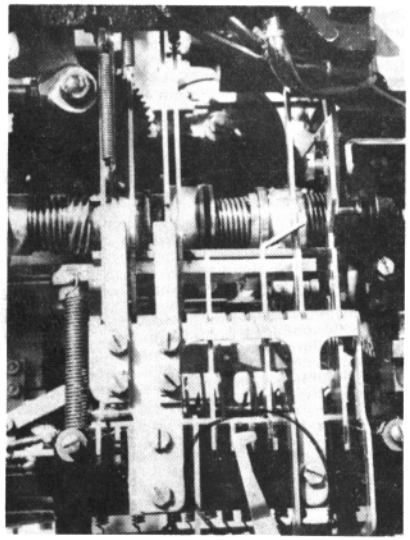


Figure 1. Photo showing the function bar comb and also (circled) the downshift-on-space lever.

It is easy to pull the various function bars out if you find the "roller bar" that goes through the center of the function bars. This is the part that keeps you from merely reaching in and pulling the function bar out once the spring has been disconnected. At the left end (looking at it with the printer upside down) of this roller is a housing held in place with a screw. Remove the screw, then the housing will fall off and the bearing will come out and then the roller bar may be pulled out. It is an easy job and so much harder to explain than to accomplish. Now that the roller bar is out of the way, it is simple to pull out the "CR" function bar from slot 2, then place it in the empty "tab slot" (6). Look back where the springs attach for the function bars, and there will only be one empty spring hole. That is where the "CR" function bar goes. Hook up the spring. You are now done in this section, so put the roller bar back in place, then reinstall the "function lever comb". If you have not taken careful notes of what was in which slot of the function comb, you may swear a few times in the process. Again, the photo of Figure 1 may help a little. You may wish you had three or four hands instead of two, but it's not really too hard a job and just takes a little patience to jockey everything into position -- it takes no particular talent, just a little time. It's surely well worth the effort, however.

In the unusual case where there might already be a function bar in slot six, remove it and put the one from slot 2 in its place.

In the event your machine uses sproket feed paper, contact Bob W8TMO for suitable instructions. This requires a slightly different way to attach the bracket.

You are well on your way for the non-overline portion, now.

The rest is all "easy" in comparison.

Now make an "L" bracket from steel, brass or hard aluminum. The thickness is relatively critical and should be about 0.40". Take a 1" square piece of stock and make it into a bracket as shown in Figure three.

Now find the manual carriage return lever that you normally poke with your finger to send the carriage back. Figure 4 shows the "Carriage return lock bar" that you poke with your finger. It also shows how the bracket supplied by Bob W8TMO looks when installed.

This "carriage return lock bar" slides back and forth and is held in place near the middle by a cotter pin and a couple of washers, one of which is a curved spring steel washer to hold it in place. Near the cotter pin is the "lock bar latch" that keeps the lever locked to the "in" position until the carriage has returned completely.

Remove the cotter pin and remove the curved washer. Install your bracket so that the one arm sticks straight up and the other points directly to the left. Bend the upper

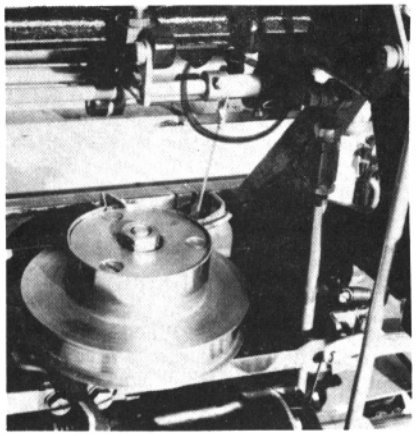
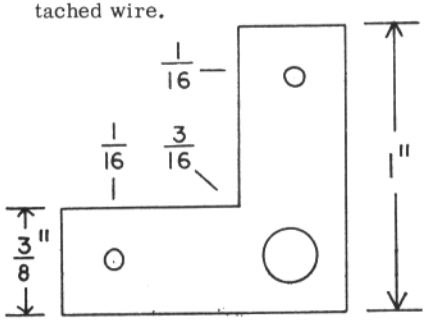


Figure 2. Photo showing the solder joint on the line feed push bar from the attached wire.



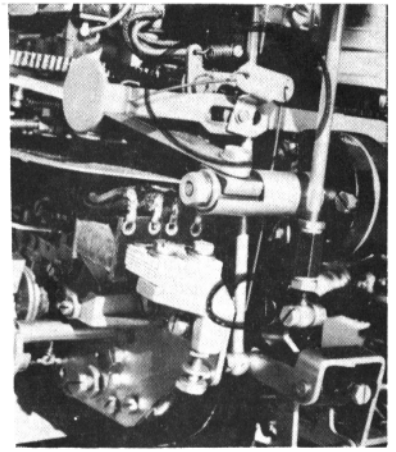


Figure 4. Photo showing how Bob's bracket looks after installation with holes drilled in the parts.

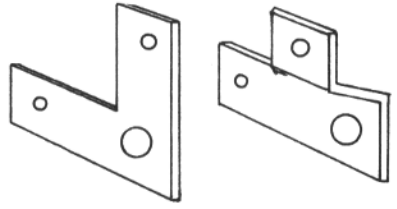


Figure 3. Drawing showing how to make a suitable bracket for the rear of the machine.

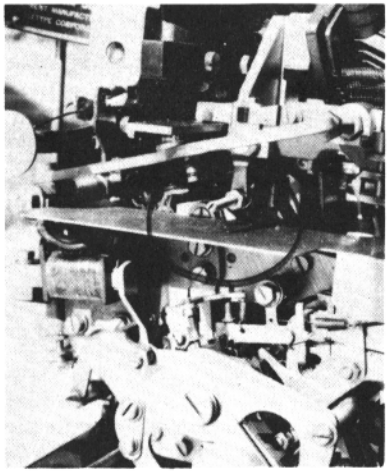


Figure 5. Photo showing the right margin adjustment.

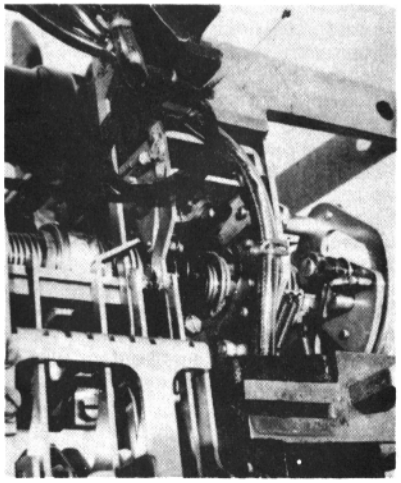


Figure 6. Photo showing the clamp on the spring housing and the finger. Also shows the installation of the wire at the top.

arm with an "L" so it clears the "lock bar latch" sufficiently. By observing the photo. in Figure 4, you can now see how the one arm of the bracket is attached to the horizontal "carriage return lock bar" slide and the other arm is attached to the vertical link that operates the line feed rachet to turn up a new line. If you have trouble seeing that vertical link in the photo or in finding it on your machine, just operate the line feed character a few times and watch for that vertical link to move.

You will note from the photo that a stiff wire is used for the bracket and that it then goes through holes in the vertical link and the horizontal "carriage return lock bar". Drilling those holes will put gray hairs on your head if you don't know how to go about it. The metal is "case-hardened steel", and you just plain cannot drill through it without first grinding away a slight amount of material at the spot you wish to drill. Removing the two levers to drill the holes is simple enough. If you don't want to drill, you can probably solder the wires onto the horizontal "carriage return lock bar" easily.

In this case, we suggest you still use the spring wire (use about 0.050" size) by crimping a "solderless" connector onto it. You then solder the "solderless connector" itself to the push bar. That only takes moments to do, and is quite simple. You need not use spring steel wire in this case, but it is very reliable.

For the vertical link, you can do the same thing, only this time the "solderless connector now is held in place by the bolt at the bottom that attaches the vertical link to the transfer mechanism. Drilling the holes is not all that hard to do, and as you can see from the photo makes a lovely installation.

At any rate, when the line feed vertical link moves downward to operate the rachet wheel to advance the paper, it will pull the wire attached to it down, tilting the bracket a little and this in turn changes the vertical motion to a horizontal motion, sucking in the horizontal "carriage return lock bar" which is then held in place by the "lock bar latch" until the carriage is back.

You have now finished with the auto "non-overline" portion. The rest only takes a few minutes to accomplish. The hard parts are all done now.

Now we start in on the auto CR-LF portion. You will need a piece of flexible steel stranded wire for durability. "Picture wire" is suitable but may have to be replaced at periodic intervals. Even better is a teflon-covered steel wire about a number 20 or 22 size. It will need to be roughly ten inches long. Crimp a "solderless connected" of about 3/16" center hole on one end of the wire.

Now find the paper release lever on the right end of the platen that you operate while inserting a new roll of paper, etc. Find the two collars that hold it in place at the rear. Loosen them and slide the lever out about an inch. Place the solderless connector over the end of this lever, then put a bushing (spacer) over the end of the lever that is about 5/8" inch long. This should have a center hole of about 3/16th" in order to slide over the end of the lever. A string of washers is just as suitable.

Now push the end of the rod back in place once more and tighten the collars down again. The collar at the end where the bushing was added will not be in quite the same place as it was, since it is now holding the connector in place about 5/8" from the end.

Now with the machine resting on its side, thread this wire down to the bottom of the machine so it can be attached to the "line feed push bar" that operates the line feed lever. This is in slot 12 as you look at the function bar comb that you had earlier removed. By careful inspection of Figure 2 photo, you can see where this wire has then been soldered in place. This gives some adjustment possible by merely resoldering until you get the tension you need on this wire.

If you find you cannot solder to the wire you have chosen, just install another crimp-on connector and solder that to the function bar instead. If you use stainless steel wire, it will need the connector, regular stranded steel wire will readily solder.

Now back to the top again. We are nearly finished. Now install some sort of clamp on the spring housing so that it cannot slip. This clamp should have a finger attached to it so that it will grab the wire you just attached as it comes around and increase the tension on it. It is this one item that may pose a problem toward your building this auto CR-LF modification. Undoubtedly you can obtain this one item from Bob W8TMO even if you do not wish to purchase his entire kit of parts. At any rate, the position of this clamp and finger

is adjusted so that when the carriage has advanced to the 72nd character, the next character typed will cause the teflon wire to pull up on the "line feed push bar" so that the reset bail will operate this lever on whatever character is next typed. That will operate both the carriage return and the line feed, then, via the bracket you installed on the rear.

This leaves one adjustment to be made, the right margin stop. Figure 5 shows the right margin stop adjustment. It should be adjusted so that the carriage can go to 74 or 75 characters before stopping, and then the auto CR-LF system will have latitude to operate without being restricted by the right margin itself. The auto CR-LF system then essentially becomes the right carriage margin, with the normal system an emergency backup at 74 or 75 characters.

This completes the installation. The "clamp" on the spring housing can be made from an automobile type "hose clamp" (about 32¢) and will need to be about 2" in diameter. The "finger" can be a nail welded to the hose clamp, or probably you can bend the excess portion of the hose clamp itself around in a manner it will grab the wire satisfactorily. You can then remove whatever part of the hose clamp is left over.

OPERATION

Since you have eliminated the "CR" function bar and now the carriage is returned on a "LF" character, you should make doubly sure that a "LTRS" character is sent after each "LF". Good operating practice requires this anyway, but some people do not know this. If a "LTRS" character is not sent and the typing speed is fast, the carriage cannot return all the way to the left in only the 165 milliseconds duration of one character. It will "drop" a character in the middle of the line in the process. It easily gets back within two characters of time, however, so if normal "LF" is followed by a "LTRS" no such problem will exist. Also remember that although you do not now have the slightest use for "CR" characters that you still need to send them while transmitting anyway, for the other fellow who has not made this change.

SUMMARY

Auto CR-LF and non-overline (plus downshift-on-space) will give the operator a "fool-proof" RTTY machine. This in conjunction with autostart or autoprint features on the modern demodulator (TU) will make unattended reception particularly delightful. Now you will probably get no better copy if you are there hovering over the machine than you will get by being completely absent. The only thing "given up" in the process is the ability to deliberately overline for that occasional picture you probably already have received half a dozen times by now anyway. (Once you have Johnson's picture and Kennedy's picture, you have already gotten most of them that have over-lines deliberately used, anyway!).

Bob Zelenka, W8TMO sells a kit of parts for $7.50 that will do a beautiful job of accomplishing the things described and his kit includes a nice instruction sheet with drawings. You can easily make most of the parts yourself if you have a decent junk box. At any rate, you get the idea by now that it is possible to do these things at a very reasonable expense.

It is possible that this article will spur others into developing a system that is yet more simple. One final word - most fellows use the "normal" 4 1/2" diameter rolls of paper. If you happen to be using the giant 5" double rolls, the hook on the clamp you install might interfere with the larger paper roll.

***

'SIMPLER' Stability.

by Bernie Schreier, W2IDX.

Narrow Shift keying is here to stay and an easy simple way to keep that signal from drifting is the old timers idea of "Lock Crystal."

Using clip leads a crystal is clipped across the VFO grid tank, keeping the "hot" lead as short as possible. . My VFO operates in the 5 mHz range and so a 5090 crystal for 14090 mHz output is clipped on. (or what ever your favorite frequency is) The extra bonus is that you are able to "rubber" the crystal frequency by some 10 kHz with the main VFO tuning capacitor. This allows one to slide around a bit and still be rock stable! In the event your crystal is a bit on the sluggish side you may have to rotate the tuning condenser through its entire rotation in order to "start" the crystal. With this idea after your normal warm up you will always come back "on Frequency." The crystal in use here is the ordinary .01 percent type and does an admirable job.

***

VHF RTTY NEWS

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

VHF OPERATING INFORMATION

We have been collecting information for the last few months, and decided to publish all of it at one time. Most of the information regards operations in the Detroit Area or is from people living in Detroit. (Incidentally, most of this information was sent by U.S.P.O.D. "mules", and we are not favoring Detroit just because we happen to be in RTTY contact with Detroit. The "mules" also run between here and the rest of the world, so if you have info - send it!)

ACTIVE STATIONS

The following is a list of the "Detroit Area" stations. Not all the stations are in the greater Detroit area, but because the activity there is large, the stations within a hundred or so miles tend to focus their activities upon Detroit. We are giving the complete list because it shows how activity can divide between two active channels and how much autostart is used. The list was compiled by W8GBT and updated via K8AQC.

Judging by several comments heard in the last month, there appears to be some controversy about using two channels for RTTY operation. K8AQC had the following comment: "The RTTY channels picked up a little Sunday night. Both 82 es point seven were running. That happens often enough to warrant 2 channels for RTTY contrary to some feelings. Anyway, we are going to add 146.880 MHz to the roster here for operation. I would like to see it used as a utility channel where there would be no

***

VHF RADIO TELETYPE STATIONS

40F2 (nominal), Vertically polarized, Xtal-control (RX & TX)

CALL		146.820	146.700	A-S HRS (EST)
W8AEJ	Trenton, MI.		A-S	1800 - 2400
K8AIZ	Grosse Point, MI.	X		
K8AQC	Allen Park, MI.	A-S	X	2200 - 2400
W8BBB	Ada, OH.		A-S	Continuous
W8BYB	Livonia, MI.	X	X	
W8BX	Detroit, MI.	A-S	A-S	1700 - 2330
W8CQ	Royal Oak, MI.	X	A-S	1700 - 0130
W8DLT	Pleasant Ridge, MI.	X	X	
W8DTY	Ann Arbor, MI.	X	X	
W8DYV	Taylor, MI.	A-S	X	2200 - 2400
WA8FYF	Flint, MI.		X	
WA8FZB	Lake Orion, MI.	X		
W8GBT	Southfield, MI.	A-S	A-S	1800 - 2400
WA8HFV	Livonia, MI.	X		
K8ICZ	Taylor, MI.	A-S	A-S	1830 - 0100
WA8KJH	Detroit, MI.	X	A-S	1930 - 2400
K8NOX	Ann Arbor, MI.	X		
WA8OXK	Dearborn, MI.	X		
W8PZP	Brooklyn, MI.	X	X	
W8RRE	Rochester, MI.	A-S	A-S	1800 - 0130
WA8RUB	Bloomfield Hills, MI.	X		
W8RZJ	Lincoln Park, MI.	X		
WA8SDC	Detroit, MI.	A-S		
W8SDZ	Royal Oak, MI.		A-S	1700 - 0130
K8YEK	Troy, MI.		A-S	1800 - 2200
K8ZCS	Toledo, OH.		X	

conflict. Like RTTY es phone." Once K8AQC gets running on point eight eight, he should try pointing his powerful signal toward Milwaukee, and the gang there should try giving a shout toward Detroit.

W8GBT sent along the following letter; we thought it best to publish it as received. He has some good ideas, and if there are any comments from our readers we (and Bob) would appreciate hearing them.

"I have been carrying some ideas around in my mind regarding VHF radio Teletype operation, and they might exist in the minds of others around the country. Maybe some of my thoughts have been expressed to you from others, and might be "food for thought" for a subsequent article relating to VHF Teletype operation.

"In the Detroit Area, with approximately 23 stations and two active channels, we run into some problems of good operating practice and standard procedures. While the answers to questions of this nature are subject to much debate and personal opinion, maybe your column could air and resolve some of these problems. Maybe something like a "Problem of the Month" type of thing to generate response from readers. . .

"Here are some of the things that have been on my mind in the Detroit Area:

1. Standard method breaking into an existing QSO: Here the problem is one of doubling, and getting acknowledged in a QSO. Maybe an answer is delaying for some typical amount of time for breakers.

2. In this area, because there are two active channels, it is almost necessary to have two complete set-ups in order to be sure that all of the activity can be monitored. In Detroit, we use 146.700 MHz and 146.820 MHz. The second channel resulted from one persons personal desire to have an open channel to use for his own reasons, but as it turns out, it was invaded by a large population of RTTY'ers. Because of the nature of this experience, it appears that one solution might be the adoption of "A calling frequency" that everyone monitors - for messages and "CQ's" - and the traffic can move to a second channel for "QSO's" leaving the main channel clear. This could be expanded to 3 channels if the need is indicated, yet allow the beginner or any station to monitor one key channel knowing everyone on an auto-start basis was available on a known channel.

3. Selective calling of stations for the purpose of leaving messages to a given station should be considered. One of the advantages of the Teletype mode of transmission is the ability of leaving messages to a given station, or a group of stations. While all stations are not equipped for selective calling, it should be encouraged, or compatible in future design. (In my own case, I copy everything that appears, but a call light operates, and latches; if my call is sent in text which induces me to read the copy to see if a message is sen to me or my call is mentioned in text.)

"I guess the main point here might be a set of standard operating practices that the beginner can plan for, and the old hands can use that is compatible. Discussions of this kind should generate a good deal of comment, and material for articles.

Sincerely, Robert D. Leland, W8GBT, 20235 S. Greenway Ave., Southfield, MI. 48075"

MORE DETROIT

Many of the VHF RTTY stations in Detroit are also capable of operating on 146.940 MHz (40F3, nominal) and on 449.5 MHz (40F3, nominal). Some of the stations have added 444.5 MHz (40F3, nominal) and are operating full-duplex (voice) on the 444.5-449.4 MHz "channels." Recently, there has been some RTTY activity on these UHF channels. W8GBT and K8AQC, at least, have been using the 449.5 MHz channel for relaying to/from 146.700 and 146.820 MHz.

The "relaying" is done by taking the AFSK signal from a given channel, demodulating it to a DC loop singal and then driving an AFSK keyer and applying the output of the keyer to the audio input of a transmitter. One advantage of taking the signal down to "baseband" (DC loop) is that some regneration (or "cleaning up") of the signal is possible. We have personally participated in some of the tests of this relaying system and have found the results very satisfactory.

A typical example: 146.700 MHz was used between Ada and K8AQC in Allen Park (Detroit) and 449.5 MHz between K8AQC and W8GBT in Southfield (Detroit). For the most part, direct communication between W8GBT and W8BBB would have been impossible, but the relay resulted in perfect copy both ways.

We realize that "relaying" is not new (ARRL), but it does provide something "new" to try. We would really like to somehow have obtained a motion picture of

Continued on page 14

RTTY-DX

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

Hello there. . . . .

As a starter we should correct a few discrepancies in last months column. First of all KM6BI is still very much active from Midway. In fact Dusty has worked him and says that he is usually on twenty meters at about 0400z using narrow shift. The boys on Midway are extremely interested in setting up traffic nets for the Pacific Islands so direct your comments to Bud at the QTH noted on page 13 of the last issue. Secondly, we were quite a bit behind the times in indicating that Jamaica was VP5, of course it is 6Y5 and has been for a few years now. In a way this serves as an introduction to what follows. On May 16, Neville, 6Y5NY started RTTY operation from Kingston, Jamaica. His transmitted signal was excellent and his equipment consists of a BC-348 receiver, a Heath HX-10 transmitter, a Model 15 and a home brew convertor. Congrats to Neville for putting the West Indies on the RTTY map and we hope that his enthusiasm for RTTY will spread to some of the other islands in the area. Another new station now QRV is CX8 BP in Montevideo. Dan has an outstanding signal and presently confines his operating to fifteen meters at about 21095 kc. He says that he will on every Tuesday at approximately 2330z, and for the past few weeks this has turned out to be correct. You will be interested in Dan's reason for using fifteen meters only. He says that twenty is too cluttered up with phone stations operating outside of their assigned frequencies causing considerable QRM. How true!

We are happy to announce the following stations receiving the WAC award this month.

Nr. 106	Univ. of Penna.	W3ABT
Nr. 107	Frank Fallon	WA2YVK
Nr. 108	Harold Baller	W3AVQ
Nr. 109	Zip Zellon	OA4BR

W3ABT, to my knowledge is the first college station to receive this award. The efforts of Russ, WA3FRP, a student at the University who does much of the RTTY operating, were finally rewarded with a confirmation from KA9AK. Zip, OA4BR, of course needs no introduction as for several years he has been the only station on from Peru. Now with Ray, OA4HR, also QRV Peru has been heard from almost daily.

Some more activity from down under. VK4NP, Norman, in Brisbane recently came on with a very good signal. He had some problems at first in getting the Creed on speed but Norman now joins the ever increasing activity from Australia. He is using a Galaxy transceiver and it is amazing how loud he is in this area when one considers the tremendous distance involved.

Freeman, KH6AX was recently awarded the Civil Air Patrol's exemplary service award for his long time volunteer radio work during air and sea emergencies. Freeman's communications set-up has assisted in many rescues in the area of Hawaii. Whenever you QSO Freeman you always get the impression that he is bursting with energy. Next time you chat with him keep in mind that Freeman is 72 years young. Congratulations Freeman on the fine work.

Lately there has been some maritime mobile activity on RTTY. Arthur, ON4BX had a contact with W7EOC/4S7. The ship was tied up to a dock at Colombo, Ceylon. WA3ILR/mm is the U.S. hospital ship Repose and you may have heard his tremendous signal recently from the South China Sea. The fact that his antenna is about 170 feet above the water probably has something to do with that. Freeman has been handling traffic from there on a daily basis. On Mothers day KH6AX handled over 60 messages. Freeman would like some skeds on 10 and 15 meters also and being completely modern he prefers narrow shift.

I recently had a very interesting three way QSO with another type of mobile, aero

mobile. HB9AKA and your scribe had a solid QSO with K3LYW/am while he was about 25000 feet over Greenland heading for the states. It was a military plane and of course all military equipment including a "Mite" machine. With that height of site and trailing a 90 foot long wire he sure was loud and clear.

ON4BX reported that there would possibly be RTTY activity from the Vatican toward the end of May. It was too late to include last month and probably too late when you receive this. At the time of this writing he had not been heard here so any further information would be appreciated. Juri, UA4KED reports via ON4BX that we should be on the lookout for activity from UA9KCE and UF6FE. Both are expected to show on twenty meters at any time, and incidently, both are in ASIA.

Some months ago we ran a few lines about Joe, OZ7OF getting George, YO3RF interested in RTTY. Well, Joe now says that George has permission to operate RTTY and the machine is ready to be shipped. The only hold up now is the international problem of getting the machine into Roumania. As soon as this is resolved we will no doubt hear a new country on RTTY in short order.

The other day I was sure I had worked a new one. SK2AU is on with a beautiful signal but it turned out to be in Sweden. It seems that SK is the new prefix for club stations as SL is for military stations. It is a good catch for the prefix hunters however.

Dusty tells me of a letter from "Ven" VU2KV explaining his absence from RTTY since the Bartg contest. An unexpected trip to England covers the QRT. "Ven" hopes to be back in India in late July and with luck hopes to bring back some tape equipment with him. "Ven" had a terrific signal on both 15 and 20 meters and also works 10 but mentions the lack of activity on that band. He did manage to work Cas KA9AK however and just in time as Cas left Japan soon after taking with him most of the interest in 10 meters. "Ven" worked 33 countries during the BARTG contest. An excellent record and the most countries worked that we have heard of.

With Ven and Cas both off the bands Asis ia again a scarce country but Ven hopes to be back by the fall CARTG contest for sure and with his good signal once again offer Asia on all bands.

A report early in June from I1CLC indicates that there will be quite a turn-out of RTTY'ers on June 15th at Lido Di Camaiore (not Camairone as noted last month) as there have been close to one hundred reservations prior to that time. The German RTTY group also had a national meeting at Wolfsburg over the weekend of June 2nd with a large majority of the over 200 licensed German RTTY amateurs in attendance. Thanks to Ted, DL1TV for the above information. We hope to have a more detailed report from both of these groups at a later date. It seems that RTTY is rapidly increasing in many countries throughout the world and there is no doubt that this trend wll continue as machines become available.

As you know, the World Wide RTTY Sweepstakes place on October 5-7. The rules have been finalized and perhaps there is a preview of them in another part of this issue. There are a total of ten Trophies and Plaques to be awarded so those of you of varied interest will all have something to shoot for. Advance copies of the rules are being sent to key stations the world over to get the word spread for this big one. At this time I would like to clear up an area where we may have a bit of a problem during the contest, and that is Ten meters. Unfortunately, it is the one band where few countries have the same operating privileges. Here in the States we can only operate above 29 mc. while many countries including Canada, cannot use RTTY above 28.1 mc. Obviously, in order to make points we will have to do quite a bit of "crossband" listening and calling. I would recommend that stations calling CQ during the contest also include some information as to where they will be tuning. It should save a lot of unnecessary calling and allow for more contacts on this band.

Some time ago we would be glad to publish calls of some of the rarer states on RTTY with the hope that it would help the boys trying for their WAS RTTY. We hope those listed below will be of interest. All have been logged on Twenty meters.

South Dakota -- WØCQN, WØSIR. North Dakota -- WØSDN. New Mexico -- K5ZCA, WA5JQI, W5VJP. Utah -- W7KIR, K7SAW. Nevada -- K7SFN. West Virginia -- W8DFA, WA8RON, Arkansas -- W5EOO. Nebraska -- WAØPZV. Oklahoma -- W5ESX.

The Dutch National Amateur Radio station PAØAA is again sending RTTY bulletins every Friday at 2030z on 14100 kc.

Continued on page 14

HITS & MISSES

From The Editor and his Mail

This is the combined July-August issue. The next issue will be mailed about the 20th of August.

***

Add to the list of RTTY awards from last month's issue--The ARRL will award a WAC certificate endorsed for RTTY. Very few of these awards have been issued so we doubt if this is generally known.

***

Things grow and grow--in past issues we have given considerable publicity to several gatherings and hamfests that have featured RTTY in a large way. Lately however we have been swamped by alert publicity men for all hamfests around the country and we have to stop someplace. Sorry fellows but the regular magazines offer ample notice of local gatherings and as we try to stick to RTTY news as far as possible please forgive us if we have to censor some of the items. As far as possible we will continue to mention gatherings especially slanted to RTTY and those events that draw from a large area.

***

The Inter-State net has moved for the summer from 3637.5 to 7137.5 mHz. Narrow shift. Although not exactly a net, this frequency continues to be one of the most active on any band and anyone is welcome to break in. If you have a technical question someone on this frequency can probably come up with the answer.

***

We have a RTTY Binder returned from La Grange, Ill. with the mailing label torn off. . . is someone missing it? All orders have been filled but unfortunately we have no records of the addresses.

***

Ask, and you shall receive, we thank all the fellows that have sent in pictures in answer to our plea. It seems to be feast or famine but keep them coming even though we may need a few months to publish them all.

***

There are some items that we never seem to get enough, and where ideas have been published in the past we get requests for repeats. One of these items is using different commercial exciters and transceivers on RTTY. Particularly articles showing the "simple" way that does not involve basic changes to the equipment that might hinder the re-sale value. This is almost asking for something for nothing but in many cases it has been done. Why not write a short article, with a few sketches if necessary, of the method you have worked out. The Galaxies, Drake, National, Heath, Hammurlund, Swan equipment have all elicited inquiries for use on RTTY Personally we just can't help out - maybe some of you can?

***

For some reason we have never got our "BILLING" department organized. The price of subscriptions is published in each issue and the cost of the classified ads is stated. We would appreciate a check with your order, if you are wrong we will refund or extend your subscription to take care of any difference. We are not distrustful - just lazy.

***

Except that Irv Hoff says there were sixteen minus voltage signs that should have been plus -- in the article last month on Collins 75S-3B article we have no pitches that we swung at and missed this month. If you are checking out your 75S3 and the voltage is plus, instead of minus, you are right on the ball and don't worry.

***

BACK ISSUES —

The only back issues available are July thru December 1966--March and December of 1968--February to date in 1968. Back issues are 30¢ each. The TT/L-2 reprint is also still available at 25¢. RTTY JOURNAL Binders are $2.50.

***

RTTY 'TROPHY WEEK END' Coming Up

It is not too early to mark your calendar for a huge "RTTY TROPHY WEEK END" coming up in October. The CARTG (Canadian Radio Teletype Group) are again sponsoring a whing ding of a contest on October 5-6th. Although primarily a DX contest this year's rules will offer opportunity for all RTTY fans including the SWL. 16 Trophies and plaques will be awarded along with some certificates. Full rules and particulars will be in next month's issue but among the divisions offering awards will be--The top ten DX scores, The best score on 40 & 80 meters alone. The most Canadian stations worked, The most States and Canadian provinces worked, The highest score using Narrow shift, The highest score on ten meters and last but not least the first competition we know of for the SWL. We know that there are a lot of listeners on RTTY that never get on for one reason or another. It is hoped that these listeners will enter and enjoy a measure of achievement among other listeners. The CARTG is spending a great deal of time and effort in this contest and we certainly hope some of the new features will create the greatest jam of QRM ever on the RTTY bands, and one of the most enjoyable.

***

WA2YVK

***

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

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***

Commercial RTTY Frequencies

The following is a list of Commercial stations given us. We are not sure if the copy is in English. Most of the stations seem to be in the far east. However, you fellows with all band receivers and the time and interest can hopefully check out some of these stations and give us a report. Commerical stations, transmitting in English at 60 wpm are getting scarce. We would like a list of stations,within these qualifications to publish in a future issue.

CALL	AGENCY	FROM	TIMING CODE/STOP	CENTER FREQ. EXCEPT AS NOTED	SHIFT
HMN56	KCNA	PYONGYANG	20/28.4	5.2440 AGE	
BAD46	H.N.A.	PEKING	20/28.4	6.9150	
JAE27	AP	TOKYO	20/28.4	7.3274 MSU 400	
3MA32	CNA VIA PREWI SF		20/28.4	7.5310	900
?	REUTERS	?	20/28.4	7.3520	
JAG7	JIJI	TOKYO	20/28.4	7.5675	
JAA98	UPI	TOKYO	20/28.4	7.5750	
JAP	UPI	TOKYO	20/28.4	7.6000	
DZG30/47/DZM64/23 TO UPI RCVRS ONLY					
----------	UPI	?	20/43.2	7.7450	
WZG47/PC078/PDK69 TO UPI ONLY					
----------	UPI	NEW YORK	22/31.2	7.8785	
DZP21/30	AP	MANILA	20/28.4	7.8895	
HMF17	KCNA	PYONGYANG	20/28.4	9.7500 AGE SU	
DZP61/60	UPI	MANILA	20/28.4	9.8950 MSD 710	
?	REUTERS	?	20/30	10.1570	
JAE58	AP	TOKYO	20/28.4	10.1998 MSU 400	
3MA33	CNA VIA PREWI SF		20/28.4	10.2348 MSU 800	
DZG30/47/DZM62/64/WFD86 TO UPI ONLY					
----------	UPI	?	20/43.2	10.3612 MSU 800	
WWC93	UPI	?	22/31.2	10.3620	
?	UPI (SEA)	?	20/28.4	10.3750 MSD 850	
DZP26	AP	MANILA	20/28.4	10.5625 AGE 400	
JAQ2	DPA	TOKYO	20/28.4	10.5700	
HMK25	KCNA	PYONGYANG	20/28.4	10.5800 AGE WIDE SU	
ZE048	UPI	HONG KONG	20/28.4	10.6722 MSU 400	
?	REUTERS	?	20/28.4	10.7527 MSU 400	
WFK80	REUTERS LONSAMEDIT SERVICE				
---------	REUTERS	?	20/28.4	10.7535 AGE 400 SU	
WFE40/WFD34/79 ASSOCIATED NEW YORK					
----------	AP	NEW YORK	20/28.4	10.8895 MSU 400	
BAD40	H.N.A.	PEKING	20/28.4	10.9812 MSU WIDE	
DZM63	UPI MANILA TO SYDNEY		20/28.4	11.1150 MSD 380	
DZP28		MANILA	20/28.4	11.6395 MSU 400	
?	(ANSA) VIA PREWI SF		20/28.4	11.6430	
JAO5	KYODO	TOKYO	20/28.4	12.0691 MSU 850	
?	REUTERS	?	20/28.4	12.2240 MSU 420	
HMS48	KCNA	PYONGYANG	20/28.4	12.3000 AGE WIDE SU	
ZLS2/4/5 RBYN WVR					
------	UNCLAS NEWS FILE	?	20/28.4	12.7192 MSD 850	
?	AFP	SINGAPORE	20/28.4	13.3950 MSD 420	
?	AP	KUALA LUMPER	20/28.4	13.5502 MSD 800	
BAK63	H.N.A.	PEKING	20/28.4	13.5600	
NSS	AFRTS	?	22/31.2	13.5753 MSD 850	
HMS19	KCNA	PYONGYANG	20/28.4	13.5800 AGE WIDE SU	
?	REUTERS FOR ASIA AND SOUTH-EAST-ASIA				
---------	REUTERS	?	20/28.4	13.7700	
DZP21/30	AP	MANILA	20/28.4	13.8840	
NSS	AFRTS	?	22/31.2	13.9920	
DZP29	AFP & REUTERS VIA PREWI ITT MANILA				
------	AFP & REUTERS	MANILA	20/28.4	14.4500 MSU 600	
WFX24	PDE	NEW YORK	22/31.2	14.4310	
JAF27	KYODO	TOKYO	20/28.4	14.5478 MSU 850	
JA02	UPI	TOKYO	20/28.4	14.5948 MSU 400	
WFK68/WFL54/58/WFN62					
---------	REUTERS	?	22/31.2	14.6330	
?	REUTERS	?	20/28.4	14.6577 MSD 500	
WFA28/WFD44/WFG48 DPA TO SOUTH AMERICAN POINTS					
	DPA	?	20/28.4	14.7259 MSD 825	
WFE54	AP	NEW YORK	20/28.4	14.7330	
DZP33	AP	MANILA	20/28.4	14.8125 MSU 450	
BAD44	H.N.A.	PEKING	20/28.4	14.9229 MSU 900	
DZG30/47/DZM64/62 TO UPI RCVRS ONLY					
----------	UPI	?	20/43.2	15.5370 MSU 850	
DZP22/31/34 AP-DJ		NEW YORK	20/28.4	15.5640 MSU 400	
WFK65/88	JTA PREWI	NEW YORK	20/28.4	15.6132 MSU 500	
HMN21	KCNA	PYONGYANG	20/28.4	15.6370 AGE SU 500	
DZM66	UPI	MANILA	20/28.4	15.6720 MSD 250	
WEY35	REUTERS LONSAMEDIT SERVICE				
---------	REUTERS	?	20/28.4	15.9081 MSU 400	
?	DAILY MIRROR	?	20/28.4	15.9150 MSU 420	
?	TASS	MOSCOW	20/28.4	16.1441 MSU 1020	
HMR68	KCNA	PYONGYANG	20/28.4	16.4000 AGE 970 SU	
?	PNCNA (H.N.A.)	?	20/28.4	16.4219 MSU 920	
?	KCNA	PYONGYANG	20/28.4	17.6340 WIDE	
?	REUTERS	?	20/28.4	18.2460	
DZM61	UPI MANILA TO SYDNEY		20/28.4	18.2600 MSD 360	
WFK8/WFL44/77 TO UPI RCVRS					
----------	UPI	?	22/31.2	18.4831 MSU 800	
WFX58	REUTERS	?	20/28.4	18.5430 MSU 400	
JAW48	AP	TOKYO	20/28.4	18.5695 MSU 400	
WFD78	UPI	NEW YORK	22/31.2	18.7380 850	
?	TASS	MOSCOW	20.4/30	18.7382 MSD 400	
JAQ4	JIJI	TOKYO	20/28.4	18.8395 MSU 850	
WFE40/WFD34/79 ASSOCIATED NEW YORK					
----------	AP	NEW YORK	20/28.4	19.6295 MSD 400	
WFG83	UPI	?	22/31.2	23.7171 MSD 800	

M (MARK FREQ.) SU (SHIFT UP ON SPACE) SD (SHIFT DOWN)
AGE (FREQ. GIVEN BY AGENCY)
WIDE (MORE THAN 900 HZ.)
MARK FREQ. PLUS OR MINUS 300 HZ
CENTER FREQ. PLUS OR MINUS 1000 HZ.

VHF NEWS

Continued from page 9

K8AQC while he was manually changing the direction of transmission by putting up/taking down the patch cords! He now has it close to being fully automatic.

So there it is. It is hoped that the somewhat detailed description of the Detroit operations may start someone thinking about building up activity in other areas and if there are any doubts about the amount of activity that is possible on VHF, perhaps the information may change these doubts. W8GBT had some good ideas. Perhaps they will create some additional thoughts.

We have just received a copy of "Principles of Telegraphy (Teletypewriter)", NAVSHIPS 0967-255-0010, from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, $1.50. (Dusty mentioned this a few months ago.) It is a must! Incidentally, having mentioned U.S.P.O.D. "mules" a while ago, it took exactly seven weeks for the above material to arrive!

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D X NEWS

Continued from page 11

These bulletins are in English and have some very interesting news on RTTY and DX activities in various countries around the world. We would also like to thank them for the publicity given to the RTTY JOURNAL in the last broadcast.

This is the last column for a couple of months and when we meet again the summer will be over and we will be getting into the change of propagation for the fall and winter, and of course, contest time.

We wish you all a pleasant summer and hope that the planned Dxpeditions in the coming months will give you all many new countries. Don't stray too far from the rig.

73 de John

***

BROAD MINDED USE NARROW SHIFT

SPEED	BAUD	SIGNAL	STOP	O.P.M.	INTERVALS	NOTES
45	29.68	33.7	47.9	248	7.42	
61.33	42.93	23.3	23.3	368	7.8	
56.8	45.45	22.0	44.0	341	8.0	HOFF
61.33	45.45	22.0	31.2	368	7.42	TWX
65	45.45	22.0	22.0	390	7.8	WESTERN UNION BUSTING
67.33	45.45	22.0	16.4	404	6.75	UPI
61.33	50.0	20.0	45.2	368	8.16	CCIT STANDARD
66.67	50.0	20.0	30.0	400	7.5	EUROPEAN
67.33	50.0	20.0	28.4	404	7.42	TELEX
71.43	50.0	20.0	20.0	428.57	7.0	
76.67	56.88	17.57	25.0	460	7.42	
100	74.2	13.5	19.2	600	7.42	

CLASSIFIED ADS

Rates - $1.00 30 words - Additional words 2¢ ea. Closing date 1st of month.

"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.

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

SALE: SIMPLEX Auto Cr. & Line Feed Kit for model 15 & 19. Completely mechanical with all parts and installing information included. $7.50 PP. Robert Zelenka, W8TMO, 1444€ Swanee Beach, Fenton, Mich. 48430

SWAP: GOOD #28 typing unit, Auto CR/LF, for #29 typing unit in decent shape; other Teletype goodies - Gordon White, 5716 North King's Highway, Alexandria, Virginia, 22303

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 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.

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.

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