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

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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.

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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.

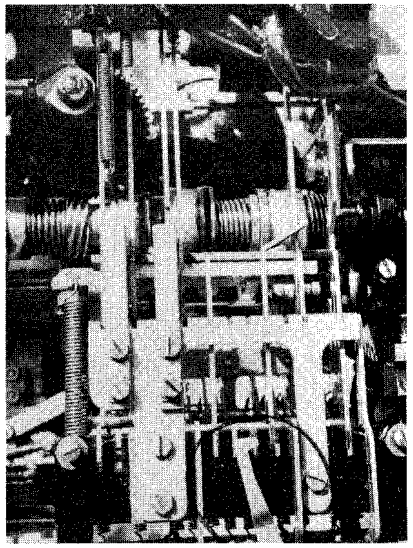


Figure 1. Photo showing the function bar comb and also (circled) the downshift-on-space lever.

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

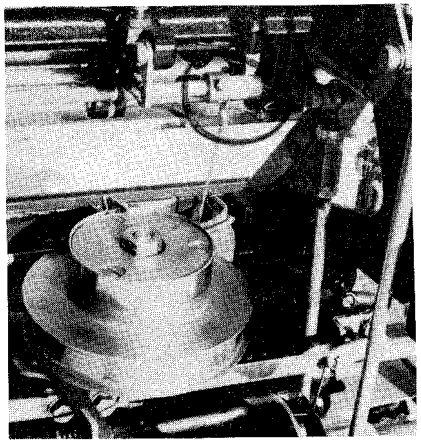
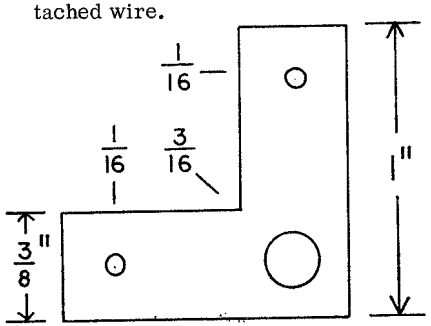


Figure 2. Photo showing the solder joint on the line feed push bar from the attached wire.



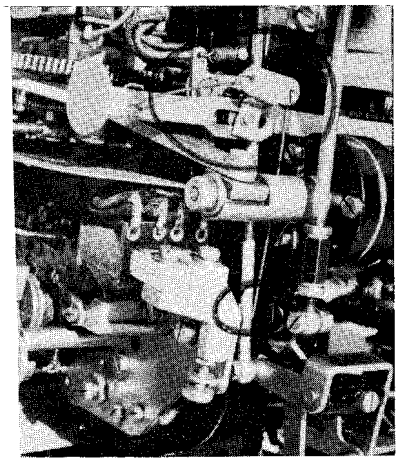


Figure 4. Photo showing how Bob's bracket looks after installation with holes drilled in the parts.

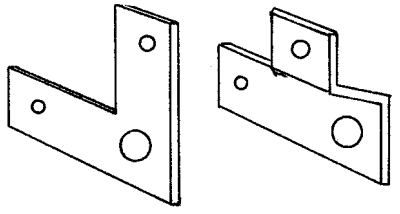


Figure 3. Drawing showing how to make a suitable bracket for the rear of the machine.

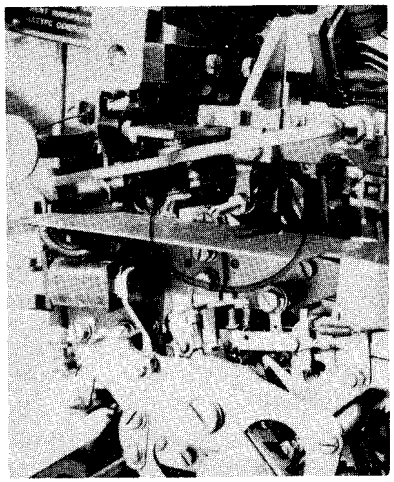


Figure 5. Photo showing the right margin adjustment.

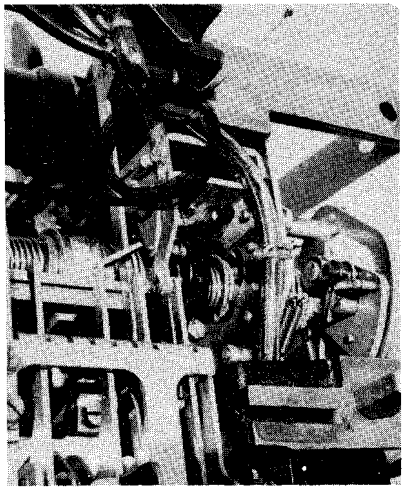


Figure 6. Photo showing the clamp on the spring housing and the finger. Also shows the installation of the wire at the top.

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.

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'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.

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