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NEWS OF AMATEUR RTTY

AUGUST, 1960
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Vol. 8, No. 8

HORSE TRADES

This page of the Bulletin is for use of amateurs who have RTTY EQUIPMENT FOR SALE OR TRADE and those looking for equipment to buy or trade. It is a free service and may be the means of getting someone on the air.

WANTED: Cover for model 14 TD K5OLU
FOR SALE: Model 14 TD, Sync Motor $90.00
Ronald Renaud, W8FEU/1,1526 Commonwealth Ave., Brighton, 35, Mass.
FOR SALE: Model 26 less table — $40.00 .... W6OJF
WANTED: URA-8 Disc Transformer W9GYQ
WANTED: CUV-91 TU, Airmail details and price TG9AD
FOR SALE AN/FGC—1-X L. A. Area only W6PZV
FOR SALE: Teletype paper (NEW) $1.10 roll K6JDN
WANTED: Non-Typing reperf and TD
Tech Manual 0-5B/FR K4KKZ
FOR SALE: Model 26, Model 15 less cover, 15 typing unit and kybd and spare parts. TD. K6AXS, 302 West Orchard, Santa Maria, Calif.
FOR SALE: TMs for Teletype equipment, send for list. Model 14, and 15 printer W8LGL
WANTED: O-5B/FR or 0-5C/FR exciter, also
CV-61 TU W8LGL
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WANTED: 19 complete or 19 kybd. 14 TD, 14 typing reperf,
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A SURE FIRE F. S. KEYING SYSTEM

PART 1

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Quite a number of frequency shift keying systems have appeared from time to time in this and other publications, some of them for application of F.S.K. to particular factory built transmitters and others having a general purpose application. Close scrutiny of some has revealed on analysis, the probable introduction of an undesirable amount of distortion, a form of which is briefly discussed in an article "A Crystal Shifter For Teletype Use," RTTY March 1960 and by Bruce Meyer WØ HZR in RTTY, Feb. 1960, page 12. A common form of distortion is that introduced by relays between the keyer contacts and the frequency shift network of the transmitter and unless these are of good quality, fast acting types, a considerable amount of distortion may result mainly due to the transit time of the relay tongue between contact and "back stop" and vise versa. In any case a suitable relay costs more than an electronic switching circuit parts list.

The keying system I would like to present is one developed some years ago, primarily for F.S. keying a particular form of crystal oscillator which may be of interest to some and with the editor's permission, will be described in Part 2 of this series. However, whilst crystal control is desirable and often essential in commercial service, it offers restrictions to the amateur operator and with this in mind it was decided to adapt the keying system to a V.F.O. After consideration of various V.F.O. circuits it was felt that the series tuned "Clapp" version which enjoys widespread, one might say, universal popularity, would be the most suitable. Whilst this article deals with the application of the keyer to this circuit, the principle could be applied to other circuits which depend on a stable change from high to low impedance and vise versa for F.S. keying.

Reference was made to distortion a little earlier. It is common, in fact desirable, that a form of distortion be introduced to various communications, for example, the restriction of frequency range in voice transmissions to that necessary for intelligibility. In c.w. the "shaping" of the keyed wave front to avoid clicks and in RTTY this "shaping" is also desirable to avoid adjacent channel interference; but in any form of communication, a minimum percentage of distortion for the particular requirement is most desirable and for RTTY, this keyer supplies just that.

Fig. 1 indicates the circuit and component values of the keying unit, and perhaps a few words explaining its operation may interest those of an enquiring turn of mind who like to know how and why a certain piece of equipment in the shack does its job. The explanation will be kept to simple language rather than extend to a theoretical analysis; and those who wish to really delve into it may get out their own slide rules, vector diagrams and etc.

Let us assume point B of Fig. 1 to be connected to some point of an R.F. circuit of say 3.5 Mcs., whereby a change in parallel impedance at point B with respect to ground will produce a change in frequency in the R.F. oscillator. For our RTTY operation let us also assume zero volts with respect to ground appear at point A for a space element and say —30 to —40 for a mark element.

Examine the space element first. A small positive potential appears at the junction of R1 and R3 which is applied to the grid of V1 via R2. With H.T. applied, V1 conducts as also does W1. W1 by virtue of its low forward resistance offers a low impedance path from point B to ground via C2. The term "low impedance" is used rather than "short circuit" due to the finite impedance of W1 and C2. W1 has a forward resistance of from 100 to 300 ohms depending on the type of diode used and C2 a capacitive reactance of about 20 ohms at the frequency. This condition is used to tune the R.F. oscillator to the "space" frequency. The stability of this virtual short circuit is high, the only variable factor worth considering being the changing R.F. resistance of the diode, the high and low R.F. resistance of which is held stable by the operation of

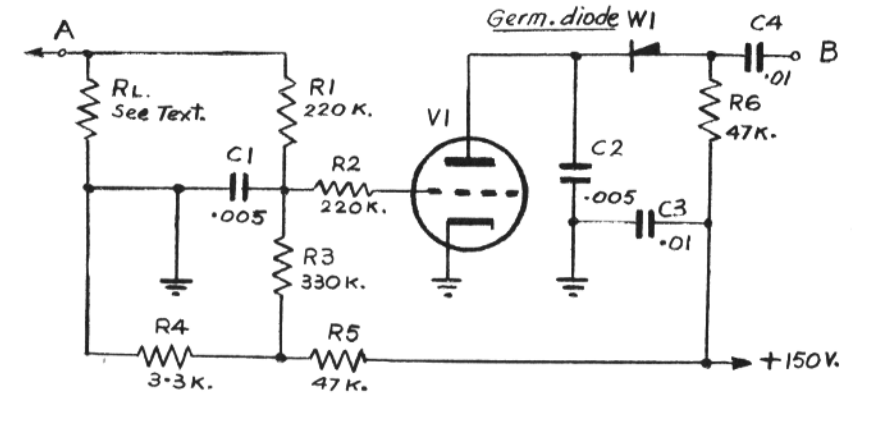

FIG. 1.

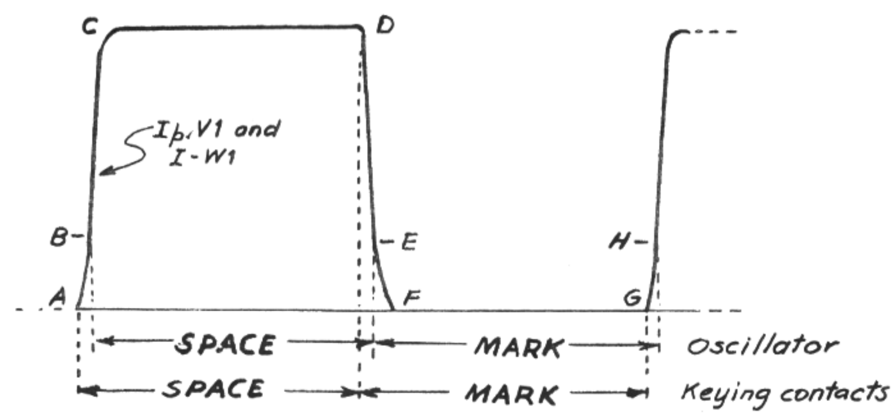

FIG. 2.

V1 which in the conducting condition causes current through the diode to rise to a point beyond where the forward resistance is critical and in the cut off condition the resistance of the diode is so high that its capacitive reactance (constant at no current) becomes effective and the stability will be maintained over a relatively wide voltage range about V1.

Consider now what happens when a negative potential is applied to point A of sufficient amplitude to bias V1 beyond cut off. Current ceases to flow through it AND W1, consequently the R.F. resistance of W1 becomes that of its capacitive reactance, usually in the order of some twenty to thirty thousand ohms. Germanium "contact" type diodes usually have not more than one or two mmfd. capacity, but silicon diodes, usually being "junction" types have a much greater capacity and consequent reactance. The diode cannot act as a half wave rectifier as its d.c. earth return is removed by the non-conduction of V1. This condition is then used to tune to the "mark" frequency.

Having (I hope) explained the switching action at point B, let us further examine what takes place during the operation. Referring back to Fig. 1 and for the moment disregarding C1. At the instant that V1 may be cut off by a mark element, the H.H. voltage at the anode commences to build up and C2 commences to charge up to the higher potential. During the charging time W1 continues to conduct, consequently point B remains grounded for R.F. until W1 reaches the stage where its reactance is high enough to have little effect on point B. From this it may be seen that there is some delay in the change of oscillator frequency after the mark element is applied to the keyer. Let us depart from this for a moment and take a look at an applied space element, still disregarding C1. V1 would immediately conduct as would W1, the discharge time of C2 having no bearing on the conduction time of W1 as V1 conducts. Now, if we compare the times of the mark and space elements we find a discrepancy due to the time constant around C2 affecting only one element, in other words, distortion occurs and as the time taken for a change from space to mark is longer than from mark to space, we may term it "space bias or space end distortion," then by calculating the difference in lengths of the two elements, express it in terms of percentage. (I might add here that the most common form of distortion on amateur RTTY I have observed is space bias distortion.) To overcome this effect in the keyer, C1 is added. The time constants of the grid and anode circuits are difficult to calculate. For C2, W1 and R6 the changing resistance/current characteristic of W1 introduces a complexity and for that matter could be different for individual diodes. R6 and C2 alone would have a time constant of about 0.25 mS.; but with W1 in circuit, measurements have shown it to be on an average of about 1 mS. The time constant of C1 is also complex due to the opposite polarities applied and the fact that two discharge paths are provided, R1 and RL in parallel with R3 and R4, whilst its negative charge is applied by R1 alone and positive charge by R3 alone. However, the important factor is its negative discharge to positive charge time being approximately equal to that of the time constant of C2, As pointed out elsewhere, the positive discharge and negative charge time may be disregarded, it being concurrent with C2.

Let us run through the mark-space transitions whilst considering C1. On space, the keying line is opened and the negative source removed from the junction of R1 and R3, C1 now discharges from negative and assumes a small positive charge. The time taken for the negative voltage on the grid of V1 to decay below cut off and for W1 to reach the critical conducting point determines the amount of "lag" applied to the mark element, then if this lag is made equal to that introduced by C2, the length of the mark and space elements will be equal. Fig. 2 whilst not actually following the characteristic curves of the tube and diode, serves to illustrate the process.

A. Represents the point at which the keyboard presents a space element and C1 commences to discharge, the near perpendicular line from A through B and C to D represents the anode current of V1.

B. At this point W1 commences to lower the reactance at point B Fig. 1 to provide the "short circuit."

C. The anode current of V1 limits.

D. Here the keyboard contacts close to provide a mark and C2 commences to charge up to the higher potential as the anode current of V1 falls, at the same time C1 changes from negative to positive. The charging of C1 and C2 at the same time

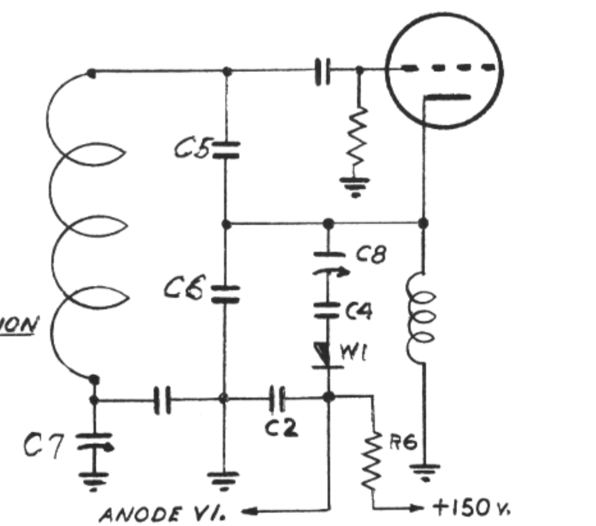

FIG. 3

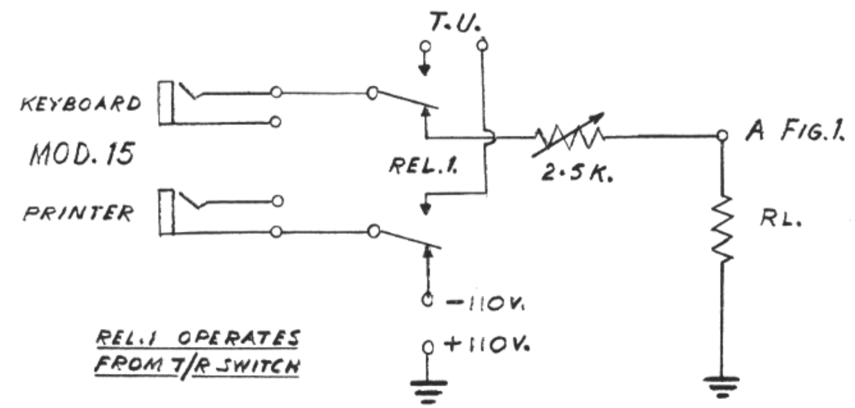

FIG. 4

presents no anomoly because the charge rate of C2 determines the lag so long as the time constant around C1 is no greater than around C2.

E. Here the diode reaches the critical resistance value when changing to a non-conductor for R.F.

F. Represents the "cut off" point of V1.

G. and H. Are repeats of A and B.

The perpendicular dotted lines from B, E and H to the base line represents the F.S. "keyed" space and mark elements, whilst the perpendiculars from A, D and G represent the key contact changes. Note that the base line distances A-D, D-G equal those of B-H, E-H indicating that the F.S. keyed characters or elements have followed those from the keyboard faithfully although lagging by the distance between the perpendiculars A and B. This is of no importance.

Reference was made to the suppression of clicks and a claim made that this keyer effectively suppressed them. This is brought about by the operating conditions of V1 and W1. If we look at Fig. 2 we find that although the line from A through B and C to D is not the true anode curve of V1, it follows the general pattern. Actually that portion beween A and B would curve more gradually from A and becoming steeper as B is approached and it is from this point on the slope that W1 operates providing a finite time for change from high to low impedance and vise versa which tends to round off the "corners" of the keyed square wave. The amount of shaping depends on the operating conditions of V1 and W1 and these have been chosen to introduce the minimum amount consistant with elimination of clicks. Measurements have shown that with the components of Fig. 1 and from 150 to 200 volts H.T., approximately 1 to 2 per cent start and end distortion may be produced.

So much for the keyer—Let us now apply it to the "Clapp" V.F.O.

Fig. 3 illustrates the grid and cathode circuits of the oscillator, to which has been added a small variable capacitor (C8) which is attached to the junction of C5 and C6. Also included in the oscillator circuit are some of the components of the keyer. This is necessary because they become portion of the R.F. circuitry.

It is obvious that if the rotor plates of C8 be grounded it will become part of the tuning capacity and the effect of grounding will be to lower the frequency of oscillation. Now if it were arranged to switch C8 in and out a change of frequency will occur at the rate of switching and if the capacity of C8 be adjusted so that the frequency excursions be 850 c.p.s. we have the requirements for F.S. keying.

The value of C8 depends on that of C7 and the fundamental frequency of the oscillator. For a 3.5 Mcs. oscillator with C6 .001 mfd., C8 will have a maximum capacity of 15 to 20 mmfd. If only the harmonics of 3.5 Mcs. are to be used, C8 may have a maximum capacity of 10 mmfd., the lower the maximum capacity the easier it is to adjust F.S.

When combining the keyer with the oscillator the components should be arranged conveniently, C8 should be mounted so that it is accessible for adjustment and it is also advisable to shield it from the main tuning capacitor and inductor as stray coupling will result in detuning the "set" frequency as C8 is varied. Also mounted in the V.F.O. are the components C2, W1, R6 and C4 of Fig. 1. If the shaft of C8 is to be fitted with a non-conducting extension shaft C4 may be dispensed with, its only purpose being to isolate C8 from the H.T. voltage. It should not be necessary to stress the importance of rigidly mounting these components and the inter-wiring as they become part of the R.F. circuit and the instability in them will be transferred to the oscillator. The remainder of the components of Fig. 1 may be fitted to an outboard chassis and may be some feet away from the V.F.O., the lead to the anode of V1 conducting d.c. only.

The method of adjusting the frequency shift is simple. A mark character is applied to the input of the keyer and the V.F.O. tuned to the center of the proposed frequency band, a space character is then applied and C8 adjusted until the output frequency is 850 c.p.s. from the mark frequency. It may be found that adjustment of C8 "pulls" the main tuning, in this case the adjustment of C8 and the main tuning capacitor may have to be adjusted two or three times to arrive at the 850 c.p.s. shift. Once adjusted it will hold over the whole of the frequency band to be used.

A switch may be fitted between the cathode of V1 and earth to disable the keyer when not in use or a plug and jack arrangement fitted to the V.F.O.

Coupling the teleprinter to the keyer should not present difficulty the essential being that about –40 volts appear across the keying line terminating resistor for a "mark." Fig. 4 illustrates a satisfactory means for switching a model 15 from receive to send. At VK3KF the model 15 is operated from a 110 volt d.c. supply with 60 mA. line current and the terminating resistor 680 ohms. When R1 of Fig. 4 is adjusted for 60 mA. about 40 volts appear across the terminating resistor. Where other than 60 mA. circuits are used such as for a model 26, the value of the terminating resistor can be calculated so that about 40 volts appear across it. For example, if the line current is 30 mA, a resistor of 1500 ohms may be used.

There does not appear to be any reason why a pentode, type tube could not be used at V1 in place of the 6J6 or 12AU6. The anode current is not more than 3 or 4 mA., and with a pentode, keying could be achieved with a few volts swing. Perhaps someone would like to experiment along these lines?

Part 2 of "A Sure Fire F.S. Keying System" as well as showing its application to a crystal oscillator will show how it may be used on a keying line of either ± polarity to key either the V.F.O. or C.O., or to invert keying which sometimes becomes necessary when changing bands whilst using a heterodyne type V.F.O.

In conclusion, a word about the diodes. Some types are more suitable than others for W1 of Fig. 1, though "at a pinch" almost any general purpose crystal diode will work. However many diodes, particularly the silicon junction types exhibit somewhat similar characteristics to the "semi-cap" components in that, their capacity varies considerably with current through them. Some of them will have a capacity change of as much as ten times the no current value as current is increased. This is no serious disadvantage when this keyer is applied to a V.F.O. as indicated except that the time constants to avoid clicks may have to be revised. Germanium diodes on the other hand are usually "contact" types and their capacity change is not great during current changes and may not be more than about twice the no current value. For this reason they are recommended and for that matter are essential if this keyer is to be used with the crystal oscillator which will be described at a later date.

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SUMMER MEETING OF SCRTS

August 20th, 1960 at W6AEEs, 372 Warren Way, Arcadia, starting with swim at Two PM, eats at Five PM and Technical talks at Seven PM.

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RECEIVER CONSIDERATIONS FOR RTTY

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Much attention has been given to the terminal unit to obtain circuits which will give good RTTY copy in the presence of noise and interference. However, we can't get the full benefit of a good TU circuit unless equal care and attention is paid to the receiver circuits ahead of the TU.

To see what troubles the receiver may introduce, let's assume we have a typical TU circuit of the type shown in Fig. 1. The input to the TU is a bandpass filter with a bandwidth of about 1.2 KC. and this is followed by a limiter. When an FSK signal is being received, the two audio tones, 2125 and 2975 cps, are passed by the filter and arrive at the limiter. Similarly, any noise or interfering signals whose frequencies fall within the filter passband also appear at the limiter. Now the limiter has the characteristic that it will be "captured" by the strongest signal present. If the FSK signal is the strongest, other signals and noise will be suppressed somewhat and we get good copy. Similarly, if the noise or interference is stronger then the FSK signal will be suppressed and we will probably lose copy. Note that the bandwidth of the mark-space filters following the limiter will not help us at all if our limiter is captured or saturated by the interference. The only function of these filters is to provide the frequency discrimination characteristic of the detector.

Thus we need to be concerned with noise and interference falling within the input filter bandpass. There are several possibilities for getting such unwanted signals from our receiver. However, some of these possibilities can be eliminated by careful attention to tuning techniques, by taking full advantage of our particular receiver capabilities and by making some improvements in receiver circuits where needed. A list of possible interference sources from the receiver is as follows:

1. Interference and noise present at the receiver antenna which falls on and around the M-S FSK signals.
2. Audio-image noise and interference produced in second detector.
3. BFO noise.
4. Cross-modulation in second detector.
5. Unequal noise around M-S frequencies due to improper tuning.

Let's consider items No. 1 and 2. Figure 2 is a plot of the spectrum at the receiver IF output (assuming a 455 kc IF.) Note that any noise and interfering signals falling in the cross-hatched area representing the TU input bandpass will, of course, get to the limiter. There is nothing that can be done at this point which will help this situation appreciably. But there is another set of frequencies, known as the "audio-image" which can also get through to the limiter. This is the dashed-line region. Notice that any signals in this region beat with the BFO, giving difference frequencies also falling within the TU passband. This is exactly analagous to the IF image problem which exists in any superhet receiver input. Just as the solution to the IF image problem is higher RF selectivity, the solution to the audio image problem is higher IF selectivity. From Figure 2, it can be seen that a receiver IF bandwidth of 7 kc will produce an audio image of the same strength as the desired signal if the BFO were at about the center of the IF passband. Thus, if your receiver IF is less than 30 db down at the 7kc bandwidth points, you may encounter this problem. Many older receivers have IF's which are 10 kc wide at the −3 db points!

The ideal bandwidth for the IF is about 1.2 kc, with sharp "skirts" as shown in Figure 3. Here, the audio-image region is very far down on the response curve and will give no trouble. Not many receivers have this ideal IF; however, the type of response used for SSB is quite satisfactory. The 3.5 kc dotted curve indicates this situation. Where the skirts are sharp, the image will be quite far down. The use of these sharp IF passbands may produce the trouble mentioned in item 5. If the BFO is not set properly, the mark or space frequency may move down the skirts, as indicated in Figure 4. This produces unequal signal levels

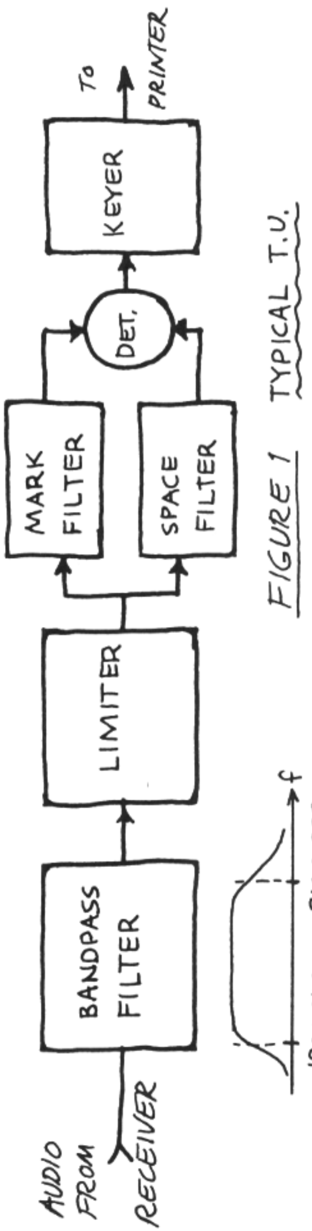

FIGURE 1 TYPICAL T.U.

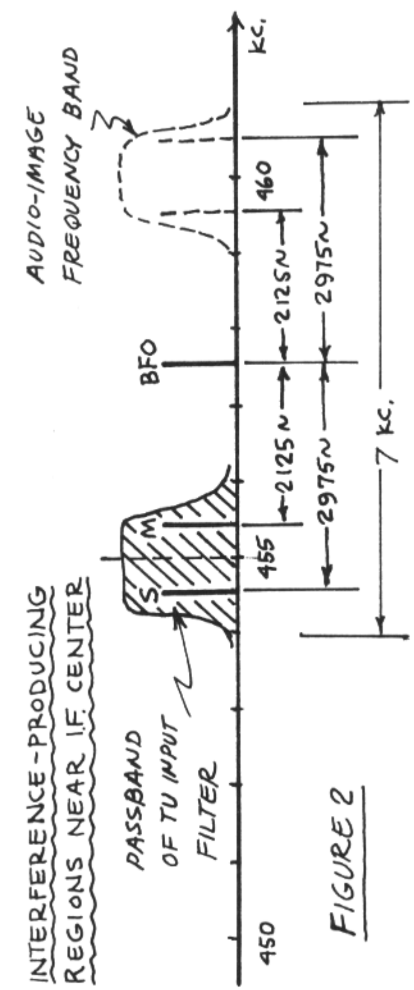

FIGURE 2

and also unequal noise energy around the M-S frequencies. Since most TU's are balanced with respect to noise, this unequal noise energy gives a bias to the detected pulses in the TU and makes its job more difficult.

If you have a panadapter or similar equipment, it is very easy to tune in FSK signals properly to minimize these problems. For those not so fortunate, here is a suggested procedure for getting the BFO properly set. Let's assume that we have a receiver with an IF bandwidth of 3.5 kc or less, a VFO with FSK and a TU with a suitable tuning indicator. Step 1: Tune in signal from VFO with BFO off, AVC on. Tune for peak reading on S-meter. If receiver has no S-meter, use a VTVM to read AVC voltage and tune for peak. This places the VFO signal at center of IF passband. If the passband is very flat (such as with a mechanical or lattice filter) try to center the signal by tuning halfway between points where S-meter drops an equal amount; say 1 S-unit.

Step 2: Turn BFO on, AVC off. Zero beat BFO with signal by adjusting BFO knob. Put a mark on BFO knob to indicate the center of your IF passband. On some receivers, it may be worthwhile to replace the BFO knob with a small dial to make resetting easier.

Step 3: Put on an RY tape on the TD or get someone to pound on the keyboard for you. Retune the receiver (using the main tuning knob) until a steady 425 cps tone is heard. Note that the BFO is now exactly between the M-S signals giving a 425 cps beat with each. The M-S signals now exactly "straddle" the center of the IF passband.

Step 4: Adjust BFO dial until the FSK signal is properly tuned in on the TU. You can go either above or below the signal whichever is "right-side-up" for your TU. Your receiver should now be tuned as in Figure 3.

Step 5: Mark this BFO dial setting so that the BFO can be set exactly for RTTY use. Always tune signals in with the receiver tuning knob, *never* with the BFO knob. This way, you can be sure that the M-S signals are equal and the audio image is minimized.

Suppose, in step No. 4, the BFO control does not have enough range to tune in the signal. It will then be necessary to adjust the trimmer on the BFO can to get it in range. The zero-beat point should then be rechecked since it will now be at a different dial setting. You can check your audio-image rejection at this point by setting the receiver gain control to give a normal level signal and then tuning the VFO about 5 kc to put it on the other side of the BFO (without touching receiver tuning) and noting the strength of the audio beat.

What can be done for the older receiver which doesn't have a mechanical filter or crystal lattice IF? If you have the instruction manual, take a look at the IF response curves and determine if there is a setting of the crystal filter or other IF selectivity controls that will produce a suitable bandwidth. If there is no simple way to improve things, it may be possible to rework the IF. A BC-453 used as a Q-5er is an excellent (and economical) solution. A bandwidth of about 1.5 kc is obtained with the coupling rods all the way out of the 85 kc cans. By referring to the ARRL SSB handbook, several crystal lattice filter circuits may be found. With some of the plentiful IF surplus crystals, a very effective filter can be built.

The other two items, BFO noise and cross-modulation, are determined mainly by the second detector circuit. The usual diode detector will produce cross-modulation products between strong signals. The signals themselves may be out of the TU passband but the beats may fall inside this passband. Since the BFO injection is usually not controlled, additional noise from this oscillator may appear in the audio output. Both these factors can be improved by using a "linear" type detector. The best type is a balanced modulator. The BFO can be rejected in the output. Again, the SSB handbook has some circuits. Another good detector is the so-called product detector. Either the Crosby triode type or a 6BE6 type such as used in the National NC-300 will work very nicely for RTTY use. There have been many articles in the various amateur magazines on adding product detectors to older receivers.

If you need a better IF system, a good project would be to convert a BC-453 to a Q-5er and change the second detector to a balanced modulator or product type. The BFO can be fixed tuned to the proper spot and left alone.

It is certainly true that strong signals can

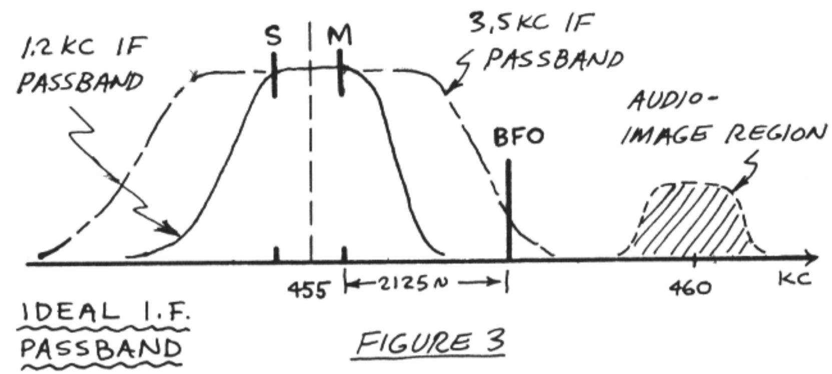

FIGURE 3

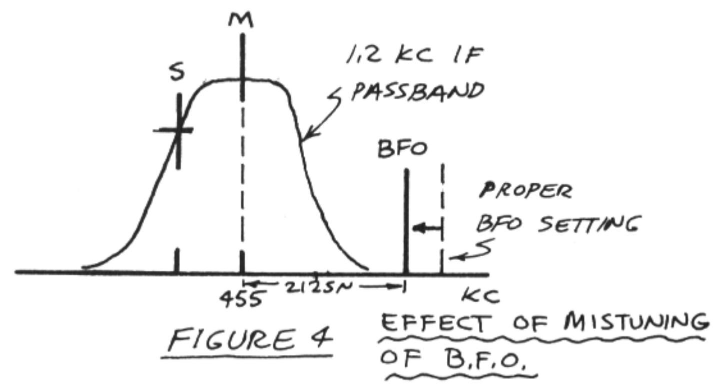

FIGURE 4

be copied with almost any kind of a receiving set-up. But it does take some attention to details such as mentioned here to print weak signals in the presence of all the noise, jammers and sundry demons that inhabit our RTTY frequencies!

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RTTY DX

BUD SCHULTZ, W6CG

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This month's collection of DX goodies is a bit sparse due to the fact that the head shrinkers had your Editor under wraps for about three weeks during treatment for some sort of internal atomic disturbance. (Undoubtedly brought on by too much exposure to RF, DX pile-ups and not enough exposure to the snore shelf.) . . . Most of the following dope was secured by devious and sneaky means and will have to be accepted at its face value.

Bill Brennan, G3CQE, came thru with his usual fine report on activity in the UK plus some Info from other parts of the RTTY world. Bill reports that G3FHL is now on the air and that G3NES is another addition to the RTTY group and is on with a 3X printer. ZS1FD tells Bill that he has a Model 7B on the way and is just itching to get his fingers on it. G3CQE also reports hearing Jan, PAØFB, on two meter RTTY but was caught with no transmitter and by the time he rigged up his mobile gear in the shack, Jan had shut down for the evening. Bill has been asked to give an RTTY demonstration at the RSGB National Convention in Cambridge in September and G3FHL is going to help him with the set-up.

John, K6OEK, recently returned from an extended tour of Europe, gave a most interesting account of a fine personal visit with RTTY'ers G2UK and G3IAO and with PAØFB. John was very much impressed by the enthusiastic reception he received and by the surprising progress of the RTTY group over there. He brought back a TU built by Doc, G2UK, as a souvenir of his visit.

After many weeks of waiting caused by unbelievable shipping, customs and other red tape problems, Bill Scarborough, ZK1-BS finally received the TU from Bill Gates and is having fine success at last with his RTTY activities. Bill says the only problem he has now is keeping the 26 running at proper speed. ZK1BS puts in speaker busting signal nearly every night on 14,090KCS. If you work him and want a QSL card just drop a S.A.S.E. to W7ZAS. Bill has certainly put The Cook Islands on the RTTY map!

New Zealand continues to have excellent representation in the activities of Bruce, ZL1WB, and Alec, ZL3HJ. Both are on both fifteen and twenty regularly. This writer notes that Bruce is still quite partial to YL operators . . . even on FSK! On the other hand, Alec has been much more active on the RTTY channels since his XYL left for a visit to Australia. (I'm married myself, Alec, and it figures!) Alec is presently making plans to install a model 15 alongside his model 26.

Eric, VK3KF, with his usual initiative has inaugurated a novel new system of RTTY communications while he is patiently waiting for his printer to arrive from the States. Several nights each week, before he leaves his office for home, he logs all the 14MC RTTY stations he can find and makes measurements of freq. shift, bias distortion, signal strength etc., then cuts a tape containing all the data and any other interesting facts about the transmissions (including reperfs of some of the transmissions). On his regular weekly sked he uses a borrowed tape distributor to feed these tapes up to the stateside gang so they can get a real excellent check on their gear. Eric's efforts have been extremely helpful to all who have been able to avail themselves of his measurement service. Look for him around 0300 GMT each weekend at 21,085KCs.

Dick, W7LPM, reports a QSO with HL9-KT on 14MCS. and has been working with VS6AZ in Hong Kong. Dick says VS6AZ has received the parts for his TU and will be active on RTTY by the time this column is printed. While covering Asia it might be proper to mention that KR6GF comes thru almost daily on 14MCS. until nearly 2000 GMT here on the West Coast with a real fine FSK signal.

Bob, TG9AD, says that Pete Smith, TG9-PS, has left Guatemala for the States and has no idea at present where Pete will operate from next. Pete did a swell job from TG9PS and his fat RTTY signal will certainly be missed. In the meantime Bob, TG-9AD, continues to keep Central America on the active list. At present Bob is building a new Gates TU to try and improve his copy.

The last word on the Yasme III via KY4-AA is that Danny and Dave are moored to the dock at Balboa, Canal Zone for some minor repairs and the installation of some more ham gear before they set sail for the long Pacific jaunt. To quote from Dick's letter: "Yasme III should sail for a goodwill visit to Guayaquil, Ecuador, about August first and after a short stay during which it is hoped an HC8 license may be acquired, will set sail for the Galapagos Islands for a ten day to two week operating period. From there they will probably go to Clipperton Island and thence to the Marquesa Group." Don't forget to watch for them because they do have RTTY gear aboard and will use it wherever it's feasible to get it ashore.

That's 30 for this month. BCNU—73.

Bud W6CG

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NYC - RTTY - DINNER 1960

MORSE IDENTIFICATION SIMPLIFIED

BURT JAFFEE, K9BRL

One of the inconveniences of present RTTY operation on the ham bands is the requirement of Morse identification as well as radioteleprinter identification. Various methods have been used, some for convenience and others to prevent the printer from "running wild" during periods of ID. FSK Morse, although legal, is confusing to copy by ear. Moreover, it causes the printer to garble unless the morse is composed of LTRS and BLANK functions which are somewhat more difficult to transmit in correct rhythm than Morse with a key. Narrow shift FSK identification will keep the printer marking; however, here too it is somewhat difficult to copy aurally. For ease of aural copy CW is to be preferred. If "mark lock" circuitry is built into the converter, this will allow CW identification to be sent either on the space frequency or a few hundred cycles off of the mark frequency so that the converter will "lock up" on mark during ID and the printer will remain marking. Upon reception of a mark signal, the converter will go back into operation.

A big disadvantage in most RTTY-CW circuits is that the operator must remember to close the key when transmitting FSK. How many times have you made a complete transmission only to find your key was open and you were not on the air? The simple circuit which follows will eliminate this problem, allow "mark lock" operation of converters so equipped and actually make the CW Morse identification somewhat enjoyable!

The telegraph key is used to operate a couple of sensitive relays in such a manner that the keying circuit of the transmitter is closed as long as the telegraph key is inoperative and open.

Upon closure of the key, contacts on RY 2 open the keying circuit of the transmitter. Capacitor C delays the release of RY2 for about a second. In the meantime the key will operate RY1 which in turn keys the transmitter. After CW is completed the key is left open and approximately one second later RY2 releases and closes the transmitter keying circuit, thereby returning the transmitter to the air. All the operator has to remember is to send CW on his key. Everything else is automatic. A second set of contacts on RY2 may be used to shift the carrier frequency (via the FSK circuit) either to the space frequency or a few hundred cycles off of the mark frequency to provide "mark lock" for stations so equipped.

Any high resistance relay that will follow CW keying may be used for RY1. A similar relay may be used for RY2 although it need not follow keying. Since the release time of RY2 depends upon its resistance and the capacitance of C, RY2 should be high so as to reduce the size of C. The release time may be varied by changing the values of either of these components. Since sensitive relays require only about 10 ma. for operation and the relays are only energized during CW operation, a battery is used to supply power. This also completely isolates the key from any high voltage circuits.

Recommended values are shown. Nothing is critical and values may be changed as required. A small silicon rectifier is inexpensive and may be used for CR. The entire unit may be constructed in a mini-box with a jack for the key and a cable running out to the transmitter keying jack and FSK circuit.

For the really lazy RTTYer the addition of tape sent Morse identification equipment may be used in place of the hand key! Why not give this circuit a try and quit swearing at Morse identification periods?

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