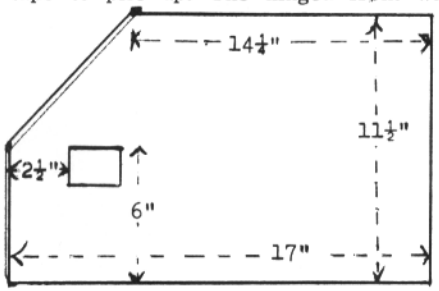
Simple Cover for an FRXD

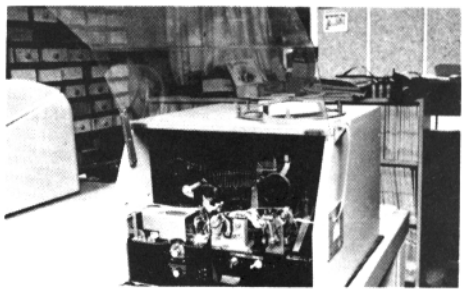
BY K8ERV

In commercial use the FRXD was usually used in banks, operating behind panels, hence very few covers are ever available. Unless used in a remote location they can be noisy and I built a simple cover for mine that helped this condition.

As the punched tape drops down from the machine a table with a hole cut through was used and the cover had no bottom. If more convenient the cover could be made taller and support put in to support the machine and allow room below for the tape to pile up. The hinged front was made from plastic, heated along the bend and fitted to the case. The cover could have been straight up and down if the bending becomes a problem. The inside of the case is lined with felt, any insulating material can be used. Notches are cut in the rear for wires. The photo shows how it is set up for operation.

The dimensions are not critical, almost any material available may be used. The sizes given will work but the builder can readily improvise to suit his own situation. The photo and drawings are offered as an idea and suggestion only.





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RTTY JOURNAL

NOVEMBER – 1967

EXCLUSIVELY AMATEUR RADIOTELETYPE

Vol. 15 No. 10 30 Cents

Day After Comments on the CARTG DX Sweepstakes.

The 7th World Wide Sweepstakes promoted by the Canadian Radioteletype Group has just finished, and here we are at a keyboard again. After 48 hours of monitoring and operating, with times out for eating (too much) and sleeping (not enough) during this contest I am sure everyone will agree it was a noisy, howling success. In our limited experience of about ten dx contests this was by far the best-with more individual participants, more counties represented, more activity on all bands and with excellent propogation conditions during the entire period.

Right now we are pretty tired to make many comments but we wonder if the very success of the contest may not be its downfall, certainly during the peak periods many stations must have been discouraged at the impossible QRM and given up, QRM is natural to any contest but with RTTY we have special problems and may need special or different rules to speed up contacts. Now while the contest is fresh in our minds is the time to comment on any changes that might help. A few possible thoughts entering our mind are --

Make station logs show rest periods of at least 6 hours once or twice during the contest period. Eliminating some of the items necessary in the message, a simple number with the RST is all that many contests require. The time shows in the log anyway and the country and zone can be told from the call. The zone system of scoring has some advantages but distance is not a factor on the higher frequencies, we had less trouble working Australia for 40 points than some contacts on 80 meters that gave us only 2. This is no criticism of the contest, but I am sure the Canadian Group will appreciate any comments and suggestions you care to include with your log sheets. Don't forget any log turned in with over 5 entries receives a beautiful certificate. Send your logs to CARG, 3C3RTT, 85 Fifeshire Rd., Willowdale, Ontario, Canada before November 25th, 1967.

Few notes from monitoring -

DLIVR is our bet as the winner but a great many were close and of course we did not hear all the stations at the end. In the states, W2RVI, K8MYF, WA4LWE were near the 200 mark the last we heard and of course others may have been ahead of that but we didn't hear them near the end. Over 40 different countries were logged by FG7XT who had fun listening for a change.

A special feature was the appearance of IIKG at Sardinia using the call of ISIKG, a brand new one for everybody that worked him and our compliments to the gang that put this station on the air.

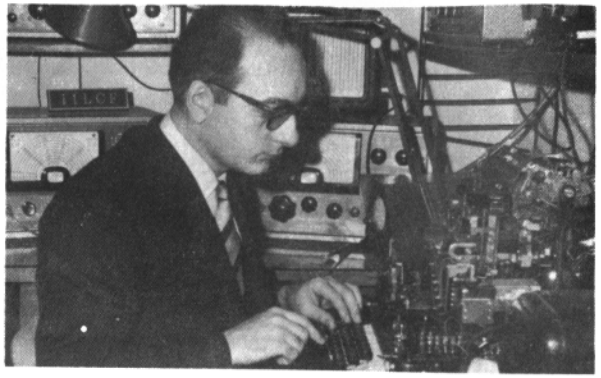
Asia was available from KA9AK on ten meters, one of the sad things about the contest was hearing Cas calling CQ, with a good signal here in the mid-west, and very few takers.

Our thanks to all that helped make this such a good contest either from participation or planning and a special bow to Sid, VE3GK who was the "leader of the gang."

* * *

RTTY IN ITALY

FANTI Dott. FRANCO
IILCF
Via A. Dallolio n. 19
BOLOGNA 40139, ITALY.



It is extremely difficult to estimate exactly the date of birth of RTTY in Italy.

However about 5 or 6 years ago there were some signs of RTTY activity.

Interest in this mode of communication was given a remarkable stimulant by the activity of iIRIF and his successess in international contests.

This really awakened interest in Italy, and the RTTY door was thrown wide open.

Since then many articles in Radio Revista, (the magazine for Italian Radio Amateurs on RTTY. Also important was the Como Association with the Magazine SSB & RTTY PRESS and interest created by promoting the VOLTA DX contest.

However, some of this initial enthusiasm was severly dampened by the high cost of teletype equipment then available in Italy.

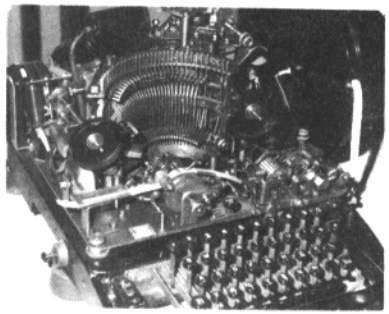
Our market here is divided into three categories - new material, war surplus and the scrap-metal market.

In the normal market (new material) prices were, and still are, very high by amateur standards; for example the price of an Olivetti T2-CN is 580000 lire (that is $928.) This price is unchanged today.

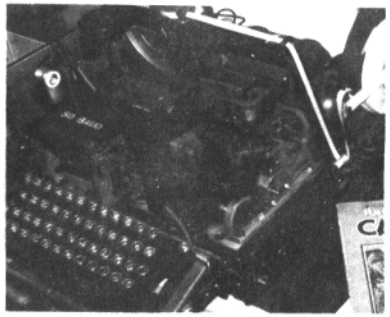
In the surplus market, consisting of all classes of war surplus material left behind by the armies which crossed Italy, teletype equipment was hard to locate, and it proved almost impossible to determine where this was stored.

The only good source of supply were the scrap-metal dealers, and in one of these scrap-yards I discovered the first Siemens and Lorenz teleprinter for sale at a genuine scrap-metal price (Photo N 1 Siemens and N 2 Lorenz).

However the dealers were not slow to realize that there was a considerable demand for teleprinters, and the price, especially for the TG-7 printer, was soon increased.



SIEMENS Fig. 1



LORENZ Fig. 2

The "boom" of RTTY activity and interest reached a peak in 1966, and the demand on the market, and hence the prices, became stabilized.

For the OM who took up teletype some years ago, Kretzman's manual was of inestimable assistence, and indeed became the RTTY Bible.

The result of all this activity and interest is amply documented over the past few years in the logs of the various RTTY contests which have almost always had an Italian as the leading entrant.

It is difficult to estimate the exact number of Italian RTTYers as a reasonable guess I would say about 350, or expressing this as a percentage, about 10% of all Italian amateurs are also equipped for RTTY.

Which machines and converters are most commonly used? About two years ago, the Italian Postmaster General made available for disposal to radioamateurs about 100 old Olivetti model T1 tapeprinters which had become absolete, and surplus to departmental requirements.

There ar also about 150 type TG-7 machines and similar models in use, and 10 or 20 or so Siemens and Lorenz printers, and an occasional new Olivetti T2-CN.

Converters are mainly homemade, built in semi-professional style and based on the Mainline design.

What are the future prospects for RTTY in Italy? I have already mentioned that the first "boom" in RTTY activity, and although some OMs appear to be less enthusiastic now, interest is still spreading and more and more operators are being converted to this mode of transmission.

What keeps interest alive are the anual contest, and a contest for Italian amateurs only, has been recently introduced.

This is intended to encourage 40m. and 80m. activity for C.E.R. purpose. (Radioamateur Emergency Corps.) The C.E.R is not yet recognized by the authorities, but has provided a useful service in recent Italian floods, and encouraging results have been obtained.

Good results and ambitious programs form the basis of present-day activity in Italy.

* * *

ADJUSTING CONTACTS
on a WESTERN UNION MACHINE
by WA3CFK

On my old Western Union machine I had to completely realign the keyboard contacts without the advantage of a scope, bias meter, etc. Also the system using a milliameter as described in an earlier issue of "RTTY" wouldn't work with the different stop pulse in the Western Union Machine.

First - Open the keyboard contacts until they no longer make contact at any time (with the exception of the start pulse contacts).

Second - While sending a string of "letters" adjust the contact the furtherest from the start pulse contacts (contact "5") Until the printer starts printing the "T" and then adjust the contacts a hair closer together.

Third - While sending a string of "letters" adjust the contact closest the start pulse contacts (contact "1") until the printer starts printing the letter "Z" and move contact #1 a hair closer together.

Fourth - While hitting the "letters" key adjust contact #4 until the "Z"s change to "B"s and move contacts #4 a hair closer.

Fifth - While hitting the "letters" key adjust contact #2 until the "B"s change to "Figures" and move contacts #2 a hair closer.

Sixth - While hitting the "letters" key adjust contact #3 until the "figures" change to "letters" and set the contacts a hair closer.

Seventh - Set the start pulse contacts the same distance apart as the other machines. It will be necessary to move the cam from behind it so it will remain open. (on W.U. machines the camshaft can be rotated by unplugging the machine, pressing a key, and turning the motor by hand until the contacts)

Eighth - If the machine prints errors from the keyboard, you probably moved the contacts too much after they were adjusted. Back up on it slightly. If it misses a pulse, the contacts were not close enough. Adjust the Range Selector by the usual manner. It should be around the same place as it is for receiving signals of the air. . .

I don't recommend this method for optimum results but it will serve as in an emergency if the contacts are completely out of adjustment.

* * *

INEXPENSIVE
ROLL PAPER for PRINTERS
Contributed by KP4AQL

The intermediate roll of paper from the 3M copier #209 passes through the machine only once and is thrown away. Most machines will use about a roll a week. The paper although a little thin works fine on a printer. The paper is called Intermediate Roll #657.

* * *

Automatic Frequency Control for Receivers.

ERIC FERGUSON VK3KF
137 Cole St. Gardendale
VICTORIA, AUSTRALIA

INTRODUCTION:

There have been many types of A.F.C. devised and applied with varying degrees of success to radio receivers. Some of these have been relatively simple in application and others of a complexity beyond the constructional scope of the average "home brew" amateur. However, the system of A.F.C. to be described, whilst relatively simple to construct, is readily applied to any H.F. receiver in which the H.F.O. tuning capacitor is accessible and is so effective as to render even the older types of receivers with their inherent poor frequency stability quite satisfactory as RTTY receivers.

The operational principle is to "lock in" the receiver H.F.O. frequency by means of a "selected" beat frequency audio tone which appears at the receiver's own output in such a way, that any tendency for the audio frequency tone to deviate, is reflected as a change in capacity at the H.F.O. tuning capacitor of such value as to maintain the audio output frequency relatively constant. The "selected" frequency is the center of the mark element frequency of the T.U.

The principle adopted is not new, but unlike many of it's forerunners, is not readily susceptible to "capture" by a signal adjacent to that being received and is immune to static or noise pulses. The susceptibility to capture is not infinite, but the only signal which may intervene would be one so far inside the mark element pass-band of the T.U. and of such amplitude as to render printing of the desired signal impossible. In practice, this minor susceptibility to capture has it's advantages, particularly in net operation where one station ceases transmission and another takes it's place whose frequency is not "spot on". In this event, the A.F.C. makes the tuning correction automatically.

The frequency range of automatic control varies in different receivers and is dependent upon the amount of H.F.O. tuning capacity used at a particular frequency, but generally control may be exercised over receiver or incoming signal frequency drift up to about 1.5 KHz. with not more than about 5 to 8 Hz. change in the mark and space tones at the receiver output.

GENERAL DESCRIPTION:

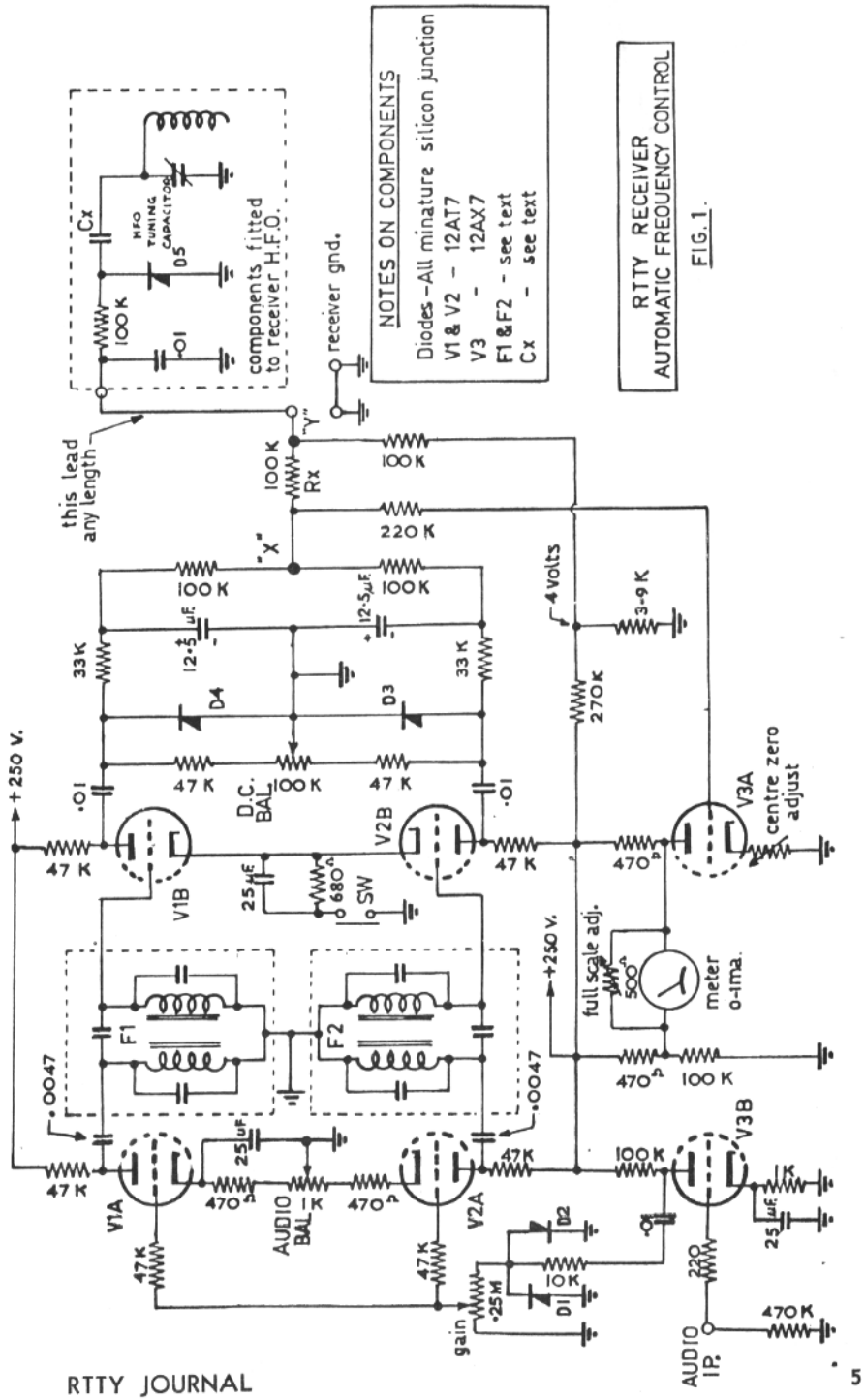
Fig. 1. indicates the schematic circuit diagram of the vacuum tube version of the A.F.C. unit, the various functions being as follows:-

Audio frequency is applied from the receiver output to the AUDIO IP. terminals, which for convenience may be paralled with the input to the T.U. The input level is not important except for a minimum of about O.2 V. r.m.s. Audio is applied to the grid of V3B, amplified and then severly limited by the action of the two silicon diodes (D1 & D2) connected in the anode network. From these limiters an essentially squared waveform is passed via the gain control to the grids of V1A and V2A. Connected between the anodes of these tubes and the grids of V1B and V2B are the sharply resonant filters F1 and F2 of which F1 is resonated 25 Hz. below and F2 25 Hz. above the center mark frequency of the T.U. which may be 1275, 2125 or the particular frequency used in the T.U.

Following V1B and V2B is a rectifier/filter network which converts the applied audio to d.c., that from V1B being positive and that from V2B negative with respect to ground. These two d.c. sources are then terminated at a common point "X" in Fig. 1.

Assume now, that a signal is applied to the input at a frequency mid-point between the resonant frequencies of F1 and F2 and further that the gain of the two amplifiers (V1A/V1B and V2A/V2B) is the same. Then the resultant positive and negative voltages at point "X" would have the same amplitude and would cancel out so that "X" is at zero potential with respect to ground. However, it may be seen from Fig. 1. that the cathode of V1A is by-passed to ground whilst that of V2A is left unby-passed, the result of which is, the gain of V1A/V1B is greater than that of V2A/V2B. It is this difference in gain which necessitates the use of the severe limiting in order to maintain the gain difference between the two amplifiers constant during any variation of the signal input level. The reason for the difference in gain will become clear after further examination of the circuit.

Examine that portion of the circuit in the top right hand corner of Fig. 1. en-



closed by the dotted lines. All the components shown therein are mounted inside the H.F.O. tuning capacitor compartment of the receiver. In all receivers so far "doctored" by the author, no difficulty has been encountered finding room for a small component mounting strip adjacent to the tuning capacitor. Of the components, note in particular D5, this is the A.F.C. diode and the "heart" of the system. In the original concept this diode was visualised as a special variable capacity silicon junction type sometimes referred to as a "vari-cap". However, as experiments proceeded, it was found that practically every silicon junction diode examined, exhibited variable capacity characteristics in proportion to the amplitude of reverse d.c. voltage applied to them and of some half dozen types of glass package, minature silicon diodes examined, maximum capacity at zero reverse voltage was between 23 and 34 pF. and each had a useful capacitive range of about 5 to 7 pF. when up to about 6 volts was applied. The maximum capacity (at zero rev. E.M.F.) is of no importance due to the limiting capacity of "Cx", the value of which will be discussed later, and a capacity range of about 3 pF. is sufficient to exercise all the A.F.C. required. Whilst not recommending any particular type, the 1N2070-A should be quite satisfactory and for European or Oceania countries, the OA202. This latter type has been used for all the diodes (D1 to D5) in the prototype A.F.C. unit.

Trace the connection from the junction of D5 and Cx via a 100 Kohm. resistor to point "Y" and then via a second 100 Kohm. resistor to a fixed 4 volt source. This is the "priming" reverse voltage applied to the A.F.C. diode (D5) which sets it's capacity to about the center of it's useful range. Note also that "Y" is connected to "X" via another 100 Kohm. resistor and that an earth return exists via the resistive components of the rectifier/filter network. This voltage dividing network is so arranged that "X" and "Y" are always maintained positive with respect to ground and it is here that the difference in the gain of the two amplifiers may be explained.

When the input signal is centered between the resonant frequencies of F1 and F2, it is essential that the "priming" voltage at "Y" be undisturbed, that is, it remains the same value as if no signal were applied and because of it's positive nature, the gain of the V1A/V1B amplifier is increased as described earlier in order that a state of balance may be more readily obtained by the adjustment of the AUDIO BAL. and D.C. BAL. controls. Now, assuming this balance to have been achieved with a signal centered between the resonant frequencies of F1 and F2, it follows that any tendency for the input frequency to change toward the peak resonance of either filter results in a change of voltage at both "X" and "Y" to either add to, or substract from the "priming" voltage and consequently the capacity of D5 is either decreased or increased in proportion to the voltage change. Because the receiver output frequency is that applied to the A.F.C. unit, the amount of capacity change at D5 is goverened by the change which tends to occur due to receiver or incoming signal drift and as a result an H.F.O. frequency correction is made which maintains the output frequency towards the mid-point of F1 and F2 frequencies, that is, it does not change more than a few Hz. for quite large H.F. frequency changes.

Because the mark element of a received signal is present only a portion of the time, the time constant of the filters associated with D3 and D4 must be sufficiently long as to maintain a relatively smooth d.c. output and this is achieved by using 12.5 uF. capacitors in the filters. This permits control to be exercised with as low a mark content of one element in five per character.

A metering circuit is provided and associated with V3A. This meter facititates not only initial alignment, but during operation enables a continuous check on any frequency drift. It's use is explained in the section devoted to Alignment and Operation.

The inductors used in the filters F1 and F2 in the prototype are each 260 mH. having a "Q" of 130 at 1 KHz. and tuned with basic capacitors of .02 uF., final trimming being made with mica capacitors to provide peak resonance at 2100 and 2150 Hz. respectively and the coupling between sections of the filters is 270 pF. With this arrangement, the cross over at 2125 Hz. is -7 db. with respect to peak resonance. However, it is thought that the popular 88 mH. torroidal inductors may be satisfactory, provided three of them are used in each filter when the mark frequency is 2125 Hz. or two for 1275 Hz., the object being to acheive a 6 to 7 db. attenuation at 25 Hz. from resonance. Ringing which may occur in these filters due to their high terminating impedance is no disadvantage

because this tends to add to the time constant of the d.c. filters.

The coupling capacitor "Cx" is somewhat critical in value and which is largely dependent upon the amount of capacity used by the receiver H.F.O. at a given frequency, and where the receiver may be used on different frequencies, a value should be chosen which provides the widest possible range of A.F.C. at the highest frequency (lowest H.F.O. capacity) on which the receiver will be used. Generally a value of between 1 and 2 pF. will be found satisfactory. Too low a value will result in inadequate control and too high a value causes a low frequency ripple to become apparant at the receiver output due to rapid "hunting" of the H.F.O. brought about by over correction. A suitable value is not difficult to ascertain for a particular receiver by the "trial and error" method.

Adding the A.F.C. diode does change the receiver calibration but not to the extent that it cannot be corrected by the H.F.O. trimming capacitor, the added capacity not being more than about 2pF.

For operating convenience, the switch shown in the cathode earth returns of V1B and V2B should be front panel mounted. All other controls once adjusted need not be toucned unless a tube or other component may need replacing and therefore may be chassis mounted and operated by screwdriver.

ADJUSTMENT AND OPERATION:

Preliminary adjustment may be made prior to any connection between the A.F.C. unit and the receiver. Remove V3, switch on power and after a few minutes warm up period rotate the meter FULL SCALE ADJ. control to provide full scale meter deflection. The meter may be anything between a 100uA. to 1mA. full scale movement. Replace V3 and open circuit the cathode switch in V1B/V2B cathodes. This switch may be termed the "A.F.C. ON/OFF" switch. Allow V3 to reach operating temperature and then rotate the CENTRE ZERO ADJ. control to provide half scale meter deflection. These two operations may have to be repeated two or three times to arrive at the correct position of the two controls when the meter indicates exactly full and half scale with V3 removed or inserted. The half scale reading is a reference and represents the amplitude of the "priming" voltage applied to D5 as it appears at point "X".

Apply to the AUDIO IP. terminals a frequency centered between the frequencies of F1 and F2. Place both the "gain" and D.C. BAL. controls to approximately their mid position and place the A.F.C. switch to ON. The meter will probably indicate above or below center scale. Adjust the AUDIO BAL. control with the object of returning the meter reading to centre scale. If this cannot be done with the ADUIO BAL. control alone, try it in conjunction with the D.C. BAL. control. The amplification of 12AT7 tubes varies considerably and it may be found that the desired meter reading cannot be obtained by adjustment of the two controls. If this happens, set the two controls to approximately their mid-position and apply a fixed resistor between the grid and ground of either V1A or V2A, the value of which causes the meter to approach half scale. The final adjustment to centre scale meter reading may then be accomplished by the controls.

When balance has been acheived, switch the A.F.C. on and off a few times, noting that the meter does not move. Minor adjustments may be necessary. Check that the applied frequency has not altered during the adjustments.

Reduce the level of the input signal to the minimum which may be encountered during normal operation and change the input frequency about 5 Hz. to cause the meter to deflect either side of centre and adjust the "gain" control to provide either a 25% or 75% meter reading. Increase the level of the input to the maximum which may appear during normal operation and note that the meter does not vary by more than 2%. This checks the satisfactory operation of the limiting diodes D1 and D2.

Vary the frequency of the input signal up to about 10 Hz. either side of center frequency and note that the meter indicates either full scale or zero depending on which way the frequency is varied. With some meters full and zero scale readings may not be obtainable, but the limits should be noted when the frequency is about 10 Hz. either side of centre. Other more sensitive meters will indicate zero and full scale with less than 10 Hz. input variation. The unit is now ready for application to the receiver.

Connection between the A.F.C. unit and the receiver may be made by a line of any convenient length, but where practical, it is well to site the unit near the receiver to facilitate tuning in conjunction

Continued on page 13

VHF RTTY NEWS

RON GUENTZLER, W8BBB Editor
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Ada, Ohio 45810

RECEIVER FRONT END IMPROVEMENT

To those interested in a little experimentation, we would like to send along a few thoughts for improvements of VHP receiver front ends.

As we see it, there are two possible paths to take: 1) Buy or build a preamp to put in front of the receiver, or 2) Do some work on the present front end.

The first path is simple and can be very effective if a good preamp is obtained. If a preamp is to be used, we are inclined to go the FET route. We do not know of any on the market yet, but wait, they will be coming along. We would like to give one word of caution: just because the preamp gives gain doesn't mean it is doing any good; in fact, it can be doing harm.

The second path has many facets. We are going to discuss only the "shadow-grid pentode" or "beam-hexode" tube. Also, we are going to stick close to the application of this tube to VHF receiver application. For those interested in HF receiver improvement, may we recommend an excellent article by Joel Balogh, K3CFA: "Improving Your Receiver With a Frame-Grid R.F. Pentode", QST, Feb., 1966, Vol. L, No. 2, pp.22ff. Also see his: "Cross-Modulation in Receiver R.F. Pentodes", Technical Correspondence, QST, June, 1966, Vol. L, No. 6, p. 41. (The VHF'er should read it also.)

VHF TUBE NOISE

Before discussing the method for improvement, a brief discussion of tube noise at VHF will be undertaken.

There are three principal sources of noise in tubes operating in the VHF range: 1) Shot-noise which is a natural consequence of the fact that electrons are individual particles and therefore the current flow within the tube is not steady but is actually made up of intermittent pulses of current; this type of noise will always be present whether a tube or transistor is used. 2) Induced grid noise results from the fact that the individual electrons possess a charge and as they move past the control grid they induce a charge on the control grid which causes the potential on the grid to vary. This is a randomly-varying potential and is, therefore, a noise voltage. Because the grid signal is amplified, the induced charge on the control grid is amplified and thus causes noise to appear in the output circuit. 3) Partition noise results from the random selection by the electrons flowing thru the tube of the screen grid or anode as their final destination. This selection process is random and therefore results in a noise component in the anode circuit.

Induced grid noise and shot-noise are common to both pentodes and triodes. However, partition noise is obviously present only in pentodes. Partition noise will usually be the dominant source of noise in VHF tubes. Therefore, the quietest front ends will use triodes. However, triodes suffer from low plate resistance and low gain. An ideal solution to the noise, gain, and plate resistance problems would be a pentode with no partition noise. A partial solution to this problem is the "shadow-grid pentode" or "beam-hexode". Two examples of this tube type are the 6FS5 and the 6GU5.

"SHADOW-GRID PENTODES"

Internally, these tubes have the usual heater, cathode, control grid, screen grid, suppressor grid (actually "beam-forming" plates), and anode. In addition they also have a "shadow-grid". Going from cathode to anode the grids are, respectively, control grid, "shadow-grid", screen grid, and suppressor grid. The "shadow-grid" is internally connected to the cathode; because of its relatively low potential, the electron stream flowing from cathode to anode avoids this grid. The screen grid is optically aligned with the "shadow-grid" and is operated at the usual positive potential. However, very few electrons strike the screen grid because it is in the "shadow" of the "shadow-grid" as a result of the optical alignment and zero potential on the "shadow-grid". Because the screen grid current is low, the partition noise is low.

The "shadow" effect is reflected in the current ratings under typical operating conditions: A typical pentode has 10 mA anode current and 2 mA screen grid current; the "shadow-grid" tubes have 10 mA anode current and 0.17 mA screen grid current!

Because these tubes have four grids their EIA base number is different from any other type, but a careful inspection of the basing will show that practically they are the same as most of the popular 7-pin miniature pentodes.

A MODIFICATION PHILOSOPHY

When modifying commercially-designed equipment, we have found the following two guidelines to be valuable: 1) Do not attempt to "improve" high-quality commercial equipment unless there appears to be a very good reason for attempting the "improvement", and 2) The "improvement" attempted should require the least amount of changes possible so that if it fails, the equipment can be restored to as nearly original status as possible.

In keeping with these guidelines we have found that the following are desirable: 1) Use original sockets, and 2) use as much of the original wiring as possible. Admittedly these may be very restricting, but, if it is possible to work within these limits, a modification failure can be undone with very little work and the "unmodified" equipment should bear little signs of the "hack" performed upon it.

In keeping with this philosophy, we took Joel Balogh's list of tubes and found the EIA base numbers for all the tubes he listed. In addition, we also took three different, reasonably recent tube manuals and found all tube types using these same base numbers.

In some cases there is only a minor difference between EIA numbers. For example, the 6AU6 uses base arrangements 7BK and the 6AK5 uses arrangement 7BD. Close examination will show that the only difference between these numbers is that 7BK has the cathode on pin 7 and suppressor grid on pin 2 while 7BD has both elements connected to pins 2 and 7. In addition, we also looked for tubes having a "UHF" basing; by this we mean that the cathode is brought out on at least two pins. 7BD meets this requirement.

A basing arrangement which is acceptably similar to 7BD is 7GA.

USING THE "SHADOW-GRID" TUBES

Most VHF receivers use a 6AK5 for the first RF stage, therefore the conversion to a 6FS5 or 6GU5 is as follows: Remove the 6AK5 and plug in the "shadow-grid" tube!

There are, of course, a few minor considerations.

The rated gm of the 6FS5 is 10K and that of the 6GU5 is 15.5K. Because the gm of the 6AK5 is only 5K, the new tube may give enough additional gain to cause the front end to oscillate. On a fixed-frequency receiver this is only a minor problem, but on a tunable receiver it can be a real pain. (Remember, although more gain is obtained with a hotter tube, the important criterion is lower noise factor.)

The tubes are rated at 6.3V for the heater, but each has a different current rating. If you have a 12-volt receiver it may be necessary to make a minor heater circuit change.

If the plate voltage is series-fed, no problem, but if shunt-fed, it may be necessary to make a minor change. The "shadow-grid" tubes definitely want the anode at a higher potential than the screen grid and the plate demands a fair amount of current. For example, in our ancient Motorolas the plate "tanks" were tuned lines shunt-fed by means of 100K resistors. We had to replace the resistors with Ohmite Z-144 inductors.

The "shadow-grid" tubes do not like much control grid bias. Also, they tend to draw a relatively high control grid current. Our experience has shown that the best noise factor is obtained with the least amount of bias. If the receiver has AGC applied to the first RF stage, there should be no AGC voltage present when weak signals are being received. Because the increase in gain in the RF stage will raise the noise level in the receiver, AGC voltage may be present with the new tube while not present with the original tube. Also, because of the high control grid current, the new tube may feed a voltage into the AGC bus.

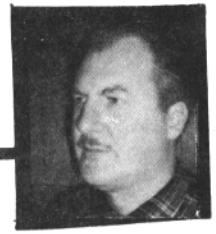
If anyone experiences difficulty when using one of these tubes, we will be happy to assist; please supply us with as many details as possible including the circuit of the RF stage(s).

SO WHAT'S NEW?

We have recently received a letter from Bob Cooper, WB2SUQ, stating that he and W2NCA are experimenting with FSK on two meters. Bob says: "We would like to set up a schedule with anyone that might be interested. We are both capable of using

Continued on page 11

RTTY-DX



JOHN POSSEHL W3KDF Editor

P.O. Box 73 Blue Bell, Penn. 19422

Hello there. . .

As this is being written there is still about two weeks to go before the start of the contest, but by the time you read it the contest will have been history. If we may paraphrase the politicians, and come up with a prediction, we would say that conditions were excellent, the turnout better than anticipated, and the scores astronmical. To make yours count be sure to get them to the CARTG before the deadline.

For some time we had been telling you all of the anticipated operation from Curacao, and the test tapes to there by Jose, PJ2MI, helped to build up the suspense. We are now happy to welcome Ike, PJ2CR, to the RTTY gang. Ike made his appearence on September 13-14 with excellent signals from a TR-3 transceiver, a Model 15 machine and a W2JAV convertor. He has been quite active since, giving a new country to many of you. While on the subject of new countries, there was a rumor that Giovanni, I1KG, would try to operate the contest from Sardinia (IS). Sure hope so, but I was unable to verify at this writing, and besides, it's all over by now.

Another station that we have been following closely is VU2KX, Venkat, of Calcutta. Arthur, ON4BX, sends word that he has had contact with Venkat on RTTY/CW. The equipment in India is all in fine shape as he prints Arthur very well, however, the authority to operate F-1 is still lacking. It is anticipated that this permission will be forthcoming shortly, in fact, almost any day now. Arthur is also working on getting the logs of Terry, 5X5FS, and perhaps act as his QSL manager for past contacts. This would be wonderful and we will keep you informed as things materialize.

Have you ever wished you could get away from all that QRM and noise on twenty meters caused by the commercial junk and the out-of-band SSB stations; and still work DX? Well you can. Give ten and fifteen meters a try. Ten in particular has been open from morning till night lately and there are, what seems to be, endless QRM free kilocycles available for the asking but with few takers. I think that most of us take a listen up there once in a while, and not hearing anything, assume the band to be dead and go right back to the mess on twenty. The next time you listen, tune up the rig and let out with some CQ's, you may be surprised at the results. Here are a few that have been on ten quite consistantly. VK3KF, VK3PB, KA9AK, PJ2MI, PJ2CR, HB9P, LU8DR, OA4BR, DL3DT, I1CTE, and many others that I/ve certainly missed. There is a surprising amount of narrow shuft activity on ten and in fact Cas perfers it. The copy for the narrow over the standard is far superior, all other conditions being equal. Zip, OA4BR, finally made WAC with a contract from KA9AK as this article was being written. I was in QSO with Zip on ten and he mentioned the fact he was looking for Cas, and sure enough, a few minutes later he made the contact. By the way I now have a supply of QSL cards from OA4BR and have verified and sent out those I have had requests for.

Fifteen meters has been active with a few countries that must be considered rare for RTTY. KZ5GN has been heard quite often and Henry, ZS'FD, has been back on with a very strong signal considering that he is using a forty meter dipole on that band. Thanks to Henry, this puts Africa back on the active list after quite a few months of silence from that continent. It also makes it possible to W A C on a week end if all goes right. (but does it ever!)

A few weeks back many of you no doubt heard VStAZ being called by many stations on twenty meters. It appears that Ray, W2LNP, was in Hong Kong for about a week and tried to get things going from this rare spot, and in fact did, however a combination of poor conditions and terrible QRM from the China mainland made contacts impossible at that time. We certainly hope that future activity will be successful from this rare DX location.

A letter from Bill Brennan, G3CQE, informs me that the indorsement stickers for the QCA certificate of the BARTG are now available up to and including the 100 mark. The certificate makes a colorful and attractive addition to any shack and is available from Bill upon receipt of QSL confirmations from twenty-five countries and one dollar or equivelant to cover the mailing and handling of the certificate and the return of your QSL's. The indorsment stickers are issued for multiples of twenty-five countries confirmed. Bill hangs out at "Sea Kiwi", Tower Hill, Williton, Somerset. We hope to run a list of the present QCA members along with the DX HONOR ROLL listing next month.

A very nice letter from Newt, K8QLO, shows that he and Ev, K8JTT, were recently traveling through Italy. While in Milan they visited with Bruno, I1RIF, at his fabulous shack on the 33rd floor of a modern office building in the center of the city and the boys had a QSO with Dusty from there. Then on to Florence where they met with Lou, I1ORS, and I1CTE and a few of the RTTY boys from that area. Lou supplied some information from Jan Mayen in the form of a letter from Alf, JX6XF, and Ivar JX5CI who both caused quite a bit of excitement from there about three months ago. They are both back in Norway now and report no present activity from the island on RTTY. Both hope to be active soon using their corresponding LA calls.

Bert, VE3EUU, has given up chasing DX on SSB and has been on RTTY for a month or so and having a ball. He already has four continents and fourteen countries to his credit. Bert has also made a very kind offer to any DX station in need of a synchronous motor to replace the governed type on the Model 15, 14, or 19. He has three available and it will be his pleasure to send them to the first three DX stations requesting them, and at his own expense. This is a good opportunity for some of the gang to get on speed and to eliminate the noise associated with the governed motors. Send your request to -- Bert Iseman, 67 Tavistock Rd. Downsview, Ontario, Canada. Bert would also like you fellows to take a look below 28.100 for Canadian stations when you are on ten meters.

The last HONOR ROLL listing of the year will be featured in the December issue and we will make this one a clean sweep listing the WAC and QCA certificate holders also. Please send me your standings in time to arrive by November 1st at the latest.

To finish out the year don't forget to set aside December 2 - 3 for the Third Alexander Volta Contest. The full rules appear elsewhere in this issue. This has been a very popular contest since it's inception and you will notice a few changes this year and a boost for the low power boys.

73 de John

* * *

- VHF NEWS -

continued from page 9

any shift from 1000 cycles down. We will be calling CQ on 146.9 mcs, 850 cycle shift, on Sundays at two different times. 0300 GMT and 1500 GMT." Both these stations are in the Patterson, NJ area.

Smitty, W3GKP, in Spenverville, MD is planning to run FSK on two. He would like to contact anyone interested in giving it a try.

Incidentally, one of our goals in this "column" is to act as a "clearinghouse" regarding VHF RTTY activity. We are doing our best by printing all information we receive regarding such activity. We can be effective only if we receive information. Any time we print information regarding activity we will be glad to supply an address so that it is possible for those interested to contact each other directly in order to set up schedules, etc. Also, we answer every letter received, usually the day received, in order to show our appreciation and to encourage a continuing supply of additional information.

Also, we would like to correspond with anyone who has done or is doing work with noise generators or noise factor measurements.

HERE IS THE "BOX SCORE"

To date:

Akron (146.700, 40F2, V) - 1
Chicago (145.51, 6A2, H) - 24
Cleveland (146.700, 40F2, V) - 5
Dallas (146.700, 40F2, V) - 10
Detroit (146.700, 40F2, V) - 12
Flint (146.700, 40F2, V) - 2
Lima, OH (146.700, 40F2, V) - 1
Los Angeles (147.6, 6A2, H) - 2
Milwaukee (146.880, 40F2, V) - 16
Portland Maine (146.7, 6A2, H) - 13
Patterson NJ (146.9, 1F1, ?) - 2
San Francisco (145.92, 6A2, V) - 5
Toledo (146.700, 40F2, V) - 2
Twin City (52.600, 40F2, V) - 8
Wheeling, WVa (146.700, 40F2, C) - 1
Wichita, Kan (146.700, 40F2, V) - 5

So that's all for this month,

73 ES CUL, RG.

* * *

HITS & MISSES

From The Editor and his Mail

We have a clipping from a Montreal paper detailing the locating of a rare blood type urgently needed by a Toronto Fireman. VE3GK put the message on the auto start net on 80 meters and VE2BYZ saw it and started checking and found two pints of the type needed in a Montreal hospital. In the mean time WA8PCK, W8SDZ, K8ERV and VE3DOY had also read the message on the auto start and more blood was located in Sudbury and Cleveland and a promise of some shortly from a hospital in Detroit.

Arrangements for shipping the blood were made, and the fireman can be added to a long list of people aided in similar situations by ham radio.

In this case radio teletype was mentioned in the article and aside from the good publicity, the value of the auto start system in raising other stations was demonstrated.

* * *

RTTY – DEFINITIONS

REDUNDANT --
"CW ID TO FOLLOW" sent after each transmission.

EMPSAT
"Excuse my poor spelling and typing" this abbreviation will save a lot of both.

SOLID COPY
"SOLIG COPV"

OCCASIONAL GARBLE
"OVCASIVCLL VTRBLE"

10 METER ACTIVITY
"When KA9AK is on.

NO 10 METER ACTIVITY
"When KA9AK is not on.

BELL RINGER --
The fellow that makes you decide to disconnect it.

* * *

We received a sample of "Handy RTTY LOG" a compact 4"x9" book that opens up to an indexed set of pages according to call districts. Makes a handy way to keep track of names, locations etc. of the stations worked. There is also room for DX stations. Price is 75¢ From Tom Serur, PO Box 2309, San Marcos, Texas.

* * *

The W2PAT converter has long been the essence of simplicity for someone getting on RTTY the easy way. We are anxious to get an article from someone that has improved a little and added a keying circuit, to this popular demodulator, so that a polar relay is not necessary. Either solid state or tubes. If someone has a different circuit, simple to construct and a maximum of four tubes, this would also be fine. We are convinced that a number of idle machines would be put on the air if a simple, junk box parts and tube demodulator, without polar relays, was available. Surely some one among our readers can furnish us this article.

* * *

Although not our fault we apologize for the mix up on the picture of Irv and his wife last month. Maybe it was due to being on page 13, anyway here is the way it should have been. Sorry it happened to such a nice couple.

"Irv" Hoff, W6FFC (ex K8DKC) and XYL

* * *

We are embarrased, in spite of printing what we thought was a large supply of extra copies, the September issue with the TT/L-2 is exhausted. We are investigating the cost of duplicating this issue and several others that we are out of. We will let you know when we find out the details.

* * *

Addition to TT/L – 2 Article (Sept 67.)

In the TT/L-2 article (Sept. 67) adjustment instructions, paragraph #2 (Slicer Balance), the rotary switch should be set to the number 5 position during this adjustment.

* * *

-RENEWALS-

It hardly seems possible but the next issue will complete our first year as publisher of the RTTY JOURNAL. The December issue will mark the expiration of a great many subscription. It will be impossible for us to mail any notices of expiration so we would appreciate if you would check the mailing stencil on your copy. The expiration date will be an abbreviated month and a number.-Dec. 7-as example means that the last copy you receive will be December 67.

Our stencils are filed according to your call, if no call then alphabetically according to call areas. PLEASE when sending renewals include your call and your Zip code. Why not check now and get your renewal in early. The January issue will be mailed just before Christmas and with slow mail service as well as extra work load at that time an early renewal will help us and assure you of not missing an issue.

* * *

New Subscriptions - Back Issues

As we are out of some recent back issues all new subscriptions will be started with the current issue. Back issues if available will be furnished at 30¢ per copy.

Back issues now available are May - July through December 1966 and March through June and October1967.

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

SUBSCRIPTION - 1 Year (11 Issues)
U.S.- Possessions - Canada-Mexico
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All Foreign Countries-
First Class -$3.50
Air Mail -$5.50

AUTOMATIC FREQUENCY CONTROL for RECEIVERS

continued from page 7

with the A.F.C. meter. After all connections are made, turn the A.F.C. switch to OFF and tune the receiver to a steady carrier to provide the normal mark element output frequency. Turn the A.F.C. switch ON and note any variation from center meter scale. Slowly tune the receiver about 1 KHz. either side of it's original setting noting the deviation of the A.F.C. meter and also that the receiver output frequency does not vary by more than a few Hz. Retune the receiver to provide center scale on the A.F.C. meter. All sections should now be operating correctly.

When tuning to a RTTY signal always switch the A.F.C. OFF until tuning is completed by the normal monitoring method, then switch the A.F.C. ON and complete tuning by centering the A.F.C. meter. Thereafter and frequency drift in the receiver or the incoming signal will be indicated as a rise or fall about center of the A.F.C. meter reading and tuning may be corrected from time to time without disturbing the output tones from the receiver. Experience will show just how far either side of center the meter will indicate before automatic frequency control is lost and corrections should be made accordingly.

Some gratifying results have already been obtained when using this A F.C. unit as a medium of frequency control for unattended operation. The principle employed being to inject a relatively weak signal into receiver from a simple crystal oscillator operating on the channel frequency. This maintains the receiver tuned to the crystal oscillator frequency, but when another signal starts up on the frequency having both mark and space elements, the space element frequency is used to disable the crystal oscillator by means of a relay and the received signal takes over control of the A.F.C. Experiments to date have shown that a tolerance of 40 to 50 Hz. is possible between the frequency of the crystal oscillator and the incoming signal with the particular T.U. element filters used (60 Hz. bandwidth at 3 db. points). At the completion of a received message and after a pre-determined time interval during which no space element is received, the crystal oscillator is again activated to re-control the receiver.

* * *

Third Annual DX CONTEST of the SSB & RTTY Club of ITALY

The SSB and RTTY Club of Como, Itlay has announced their third annual RTTY DX Contest. Dates are December 2nd, from 1400GMT through December 3rd, 2000GMT.

The total hours has been reduced from 48 to 30, not a bad idea and although one's own country will not count as a mulitplier, any other country worked may be claimed on each different band worked. This should help activity on all bands instead of everybody fighting QRM on twenty meters.

Very convenient log sheets for the contest will be mailed to anyone requesting them if time is available. The Italian RTTY Group have done a lot for activity on RTTY and with the success of their first two contests this promises to be another outstanding event. A number of awards will be issued as explained in the rules below.

RULES

(1) TEST PERIOD
14.00 GMT December 2nd to 20.00 GMT December 3rd, 1967.

(2) BANDS
The test will be conducted in the 3, 5-7-14-21-28 MHz amateur bands.

(3) EXCHANGE POINTS

(A) All two-way contacts with stations in one's own zone will receive two points.

(B) All two-way contacts with stations out side one's own zone will receive the points stated in the Exchange Points Table.

(4) Stations may not be contacted more than once on each band.
Additional contacts may be made with the same station if a different band is used.

(5) MULTIPLIERS
A multiplier of one is given for each country contacted.
The same country may be claimed as a separate multiplier, if a different band is used.

The one's one country doesn't count as a multiplier.

(6) SCORING
Total exchange points times number of multipliers.

(7) COUNTRY STATUS
A.R.R.L. Country list-except KL7, KH6 and VO, to be considered as separate countries.

(8) MESSAGES
Stations will exchange messages consisting of:

(A) Message number
(B) Check (RST)
(C) Time in GMT
(D) Zone number
(E) Country

(9) LOGS AND SCORE SHEETS
Use one log for each band or group the QSOs for bands on the same log.
Free log forms and score sheets are available on request from SSB & RTTY Club, Box 144, Como.

These forms are not obligatory. Logs should contain: bands; NR, exchanges and times sent and received; call signs; zones; countries and exchange points.

(10) DEADLINE
Logs and score sheets go to

SSB & RTTY Club
Box 144 COMO (Italy)

They must be postmarked not later than December 24th, 1967, to qualify.

For rare isolated places the deadline will be made more flexible.

(11) Certificates will be awarded:
- to the two top scorers in each country;
- to the two top scorers in each U.S. call district;
- to the three top scorers with power input under 100 W.

JX5CI

JX6XF

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

FOR SALE- WHEATSTONE OILED 15/32 perf tape for CW Boehme keying heads. Any quantity. P.L. Lemon, W6DOU, 3154 Stony Point Rd. Santa Rosa, Cal. 95401.

FOR SALE - Two Tone Transistor Demodulator as described in cover article June RTTY JOURNAL 1967-glass-epoxy PC board, drilled, $8.00 postpaid with all instructions for building and adjusting. Cashion Electronics, P.O. Box 7307, Phoenix, Ariz. 85011.

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.

LARGE TT/L-2 Drawings - 15 x 30, $1.00 postpaid W8SDZ,1418 Genesee, Royal Oak, Mich. 48073.

TOROIDS, 88mhy. center-tapped, unpotted, new, 5/$1.50 POSTPAID. New lot of Page printer paper. . .ONLY $3.50/case. . .Buy two for $6. and save on shipping. Johnson Matchbox, 250 watt, no SWR, $38./ Ameco CN144W 2 meter converter with power supply like new (xtal too) $35. Gears for all speeds -- WRITE. Northern Radio 104. $30. Heath VF-1 VFO $10. Polar relays: $3, socket, $1. Handles for 15, $1.50. 14 Tee Dee for parts (no head) $5. NC-300, $125. TRI-BAND TH-3 beam. . .like new $65. NCX-3 $185.
WANTED: CDR rotator. audio oscillator, SX-28 receiver. capacitor decade box. Mono AM tuner. lo-pass filter. W2DLT 302R Passaic, Stirling, N.J. 07980

2- MODEL 19s FOR SALE complete with TDs, covers and tables with Sync motors. $100.00 each. 2-Model 15s with tables and covers, sync motors, $70.00 each. All A-1, bases and keyboard wired for RTTY. W4AIS, 7 Artillery Rd. Taylors, S.C. 29687

SELL THREE Transistorized Northern Radio AFSK units in slide in rack. With Power Supplies, $20. R.M. Ellis, W7DMI, 1356 Elizabeth, Las Vegas, Nev. 89109

SELL- PAGE PRINTER PAPER, 3 ply, $7.50. case. Model 14 TD, sync motor, excellent condition $25.00. DXT test set, $160.00. WB2PLY, Box 207, Princeton Jct. N.J. 08550

WANTED- TRANSMITTER with built in FSK, must make Army Mars frequencies 3275 to 4035 and if available other amateur bands. W2HNG, 13530 232 st. Jamaica. N.Y. 11413

WANTED- TT/L in good working condition, state price, features, etc. WØLDO, 4857 Sunnyview Drive, St. Louis, Mo. 63128

WANTED- MODEL 35 KSR or ASR. Cash or trade. State condition. R.W. Gervenack, W7FEN, Rte. 1, Box 350, Monroe, Wash. 98272

WANTED- MODEL 19 printer set. W5EOT/2. Box 126, Wyandanch, L.I. N.Y. 11798

88 mh TOROIDS FOR SALE, 5/$1.50.pp. Merc wetted relays 276G or 276F $1.50. pp. 2 inch 3.6 ohm 88mh toroids 50¢ pp. Four winding repeat coils $1.00 pp. W9FTE, 5665 N. 38th St. Milwaukee, Wisc. 53209

WANTED - Teletype Parts for all machines. Models 14, 15, 19, and 28 etc. Must be new in Teletype Corp. pack or military with 5815FSC ....Phil, K2HJC, Box 96, Morrisonville, New York 12962.

RTTY GEAR for sale. List issued monthly. 88 or 44 mhy toroids 5 for $1.75 postpaid. Elliott Buchanan W6VPC, 1067 Mandana Blvd., Oakland, Calif. 94610.

PRINTED CIRCUIT BOARD, TT/L2 with schematic, pictorial, voltage chart and construction tips: $6.00; Precision Tuning Fork 400 hz. with electronics less 2-6AU6, small pwr. supply, modify to 425hz: $5.00; standard 44 or 88 mhy. toroids, unpotted: 5/$2.00 pp. USA; special larger, low resistance 88mhy. toroids, 1.5": 50¢ each; teletype test tape, either 11/16 punched paper or 1/4 inch magnetic AFSK (3.75ips) runs 7 min.: $2.00, all items above postpaid in USA. K5BQA, 11040 Creekmere, Dallas, Texas, 75218.

TT63A REGENERATIVE REPEATER complete with tubes, cable, instructions and schematic - like new $20. each. RTTY Dual frequencyshift tone converter, Northern Radio type 152, each tone converter is self contained with power supply, conversion details and schematic included, used good condition $20.00 each. Model 14 TD with synchronous motor - used - good - $25.00 each. Squelch Adaptor Mofification kit used on Hammarlund radio receivers, SP600 kit includes adaptor unit, name plate, knob, skirt assembly, tubes and cable clamps, new $7.00 each. We buy and sell parts. Write us. . .Atlantic Surplus, 250 Columbia St., Brooklyn, N.Y. 11231

SPECIAL SALE - Teletype Model 14TD. New; $25.00, Good Used $14.00, Specify 65 or 75 wpm. FOB Detroit. Keith Petersen, W8SDZ, 1418 Genesee Ave., Royal Oak, Mich., 48073 Phone 313-585-4431

FOR SALE: 2125 and 2975 CPS dual tuning fork assembly $33.00, .05% stability, 68 to 86 degrees F. Transistor fork drive circuit kit, $10.00, assembled circuit $16.00. Data available Riverbank Laboratories, Box 65, Geneva, Ill. 60134.

BUY - 28 TYPING units, etc., and all parts. Sell 14s 15s 28KSR. (28ASR) parts. W4NYF, 405 NW 30th Ter., Ft. Lauderdale, Fla. 33311. phone 305-583-1340 after 9.

WANTED: TELETYPE EQUIPMENT & parts; R388, R-390A, SP600, 51J-4, Cash or trade for new radio equipment. Alltronics-Howard Co. Box 19, Boston, Mass. 02101. Tel - (617-742-0048)

WANTED- COLLINS Mechanical filters- F455FA- 15, F455FA -21, F455FA- 05; Also KWM2 or 2A with mobile accessories; 312B-5, 30L-1. Cash or will trade TTY equipment. Write W4MIZ, 601 E. Acre Drive, Plantation, Florida 33313

COLLINS 75S-1, waters rejection tuning, 2.1 and 1.5 Kc mechanical filter with BFO crystal for standard RTTY tones (cost $100. factory installed) Mint condition - $295.00 firm. D. M. Burns, 4410 Reading Rd., Dayton, Ohio. 45420