Additional Classified on Page 19

TOROIDS; 44 & 88mhy., center-tapped, never potted, got them again after a short dealy $5/2.00 POSTPAID. Model 32KSR complete working page printer with all covers and stand, 60 or 100wpm.$300.00 Model 28ASR complete $900. Johnson KW Matchbox with built in swr $120. Hallicrafters SX-101A receiver $160. Drake 2B and 2BQ receiver exc. $200. Hallicrafters CSM-20 30 watt hi-band mobile FM rig like new $95. 11/16" reperferator tape $3/box/10. Page printer paper $6/box/12. WANTED: Back cover for RF unit of measurements Corp. model 80 signal generator. Hi-band or UHF FM gear. TRADE FOR RTTY EQUIPMENT??? Stamp for list. Van W2DLT 302R Passaic Avenue Stirling, N.J. 07980

GLASS HOUSE HAMS; Compiling a directory of hams employed in the glass container industry and allied fields. Send information to WB2AHF, 1197 West Woodcrest Dr., Vineland, N.J. 08360

SWAP: Motoral handy-talkies, partially transistorized, for #28, #35, or #37 RTTY gear. I also have RTTY, FAX, Demods and other gear. List send free. G.E. White, 5716 N. King's Highway, Alexandria, Virginia, 22303. 703-765-5478 after 9 pm.

WANT: RTTY demodulator. CV-60 by RCA, for use with AN/SRR-13 receiver. Interested in purchasing all units of this system. N. Thompson W1DXR 5 Palmer Gorham, N.H.

WANTED: 455KC input unit for CV-57. Elmer Shafer, W8MSG, 3479 Kersdale Rd., Cleveland, Ohio, 44124.

THE MAINLINE TT/L-2 FSK demodulator complete with or without scope phase indicator-850-170 shift included with a "Professional Appearance" silkscreened front panel 8 3/4 x 19 Grey Hammertone, rack mounted. Combination ST-3 with AK-1 AFSK - accessories - Mainline filters in vector C12 cans with octal plugs. J-J Electronics Communication Specialists. Canterbury, Conn. 06631

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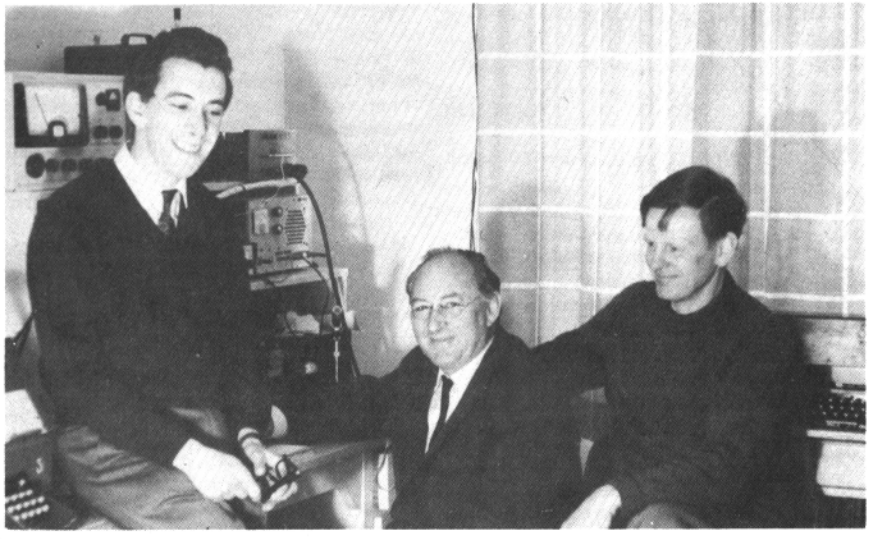


VK3KI 'Mike' VK3DM 'Jim' VK3NR 'Noel'

Activity on RTTY has greatly increased in Australia and we are happy to show three of them. According to Noel (VK3NR) Eric was also present at the picture taking but apparently too modest to appear. Eric VK3KF was one of the pioneers on RTTY from his country and sorry he wasn't in. Noel also reports a AFSK net around Melbourne on RTTY. The boys from down under have always been tops in amateur radio and RTTY is to be no exception.

***

Proposal for Higher RTTY Speeds Submitted to FCC.

There has long been a need for a change in the rules and regulations of the FCC to allow Amateur RTTYers the right to use higher speeds. On December 27, 1968, I submitted a petition to the Federal Communications Commission asking for an appropriate change. My petition was received and officially designated as Petition number RM-1392.

I urge all RTTYers to take the time to write to the FCC in support of this petition. I firmly believe that it is important to the betterment of Amateur RTTY and will allow us to keep up with the state of the art.

MARS has already switched many of its RTTY nets to higher speeds and Canadian Amateurs already are authorized to use all three speeds.

Letters commenting on this petition may be sent to:

Federal Communications Commission
Dockets Division
Washington, D.C. 20554

One original and 14 copies must be submitted. Reference must be made to the petition by its official number RM-1392.

The petition, exactly as submitted to the FCC, is reproduced below.

Before the
Federal Communications Commission

In the matter of

Docket No.

Proposed modification of Part 97.69 (B) of the regulations of the Commission pertaining to the Radio Amateur Service

Petition for modification of regulations

1. Petitioner, Keith B. Petersen, has been the holder of an Amateur Radio Operator's license and station license continuously since 1954. He is presently the holder of an Advanced Class Operator's license, for which he qualified by examination, and station license W8SDZ.
2. The change in regulations sought by this petition, hereinafter set forth in detail, may be stated in general terms as follows:

   (A) To change Part 97.69 (B) of the regulations of the Commission to allow 60, 75 and 100 words per minute transmitting speeds of Radio Teleprinter signal keying equipment in the Radio Amateur Service.
3. The specific change sought by petitioner, together with reasons given in support thereof, follows:

   (A) Proposal: to change paragraph 97.69(B) of the regulations of the Commission to read as follows:

97.69(B) The nominal transmitting speed of the Radio Teleprinter signal keying equipment shall be adjusted as nearly as possible to the standard speed of 60, 75 or 100 words per minute and, in any event, within the range of 10 percent of the above standard speeds.

(1) For several years it has been the opinion of many Radio Amateurs operating Radioteletype that speeds of operation other than just 60 WPM would be advisable. While the present 60 WPM speed is generally satisfactory for manual keyboard sending, the use of perforated tape transmission indicates that a faster speed is desirable. Operators using tape find that the 60 WPM speed is not very efficient use of "air time", especially when a high volume of traffic is being transmitted. In many Auto-start nets and local nets tape is being used, and when many stations participate in such nets, the higher speed would be helpful in speeding operations. This would be especially important during periods of local or national emergency when very large numbers of messages need to be transmitted in the shortest possible time.

(2) The use of multiple speeds on Amateur Radio teleprinter operations would contribute to the technical advancement of Amateurs by encouraging the development of appropriate speed conversion techniques, both electronic and mechanical. Upgrading of both equipment and skills should result.

(3) Many commercial radioteleprinter

Continued on page 10

FILTERS for RTTY

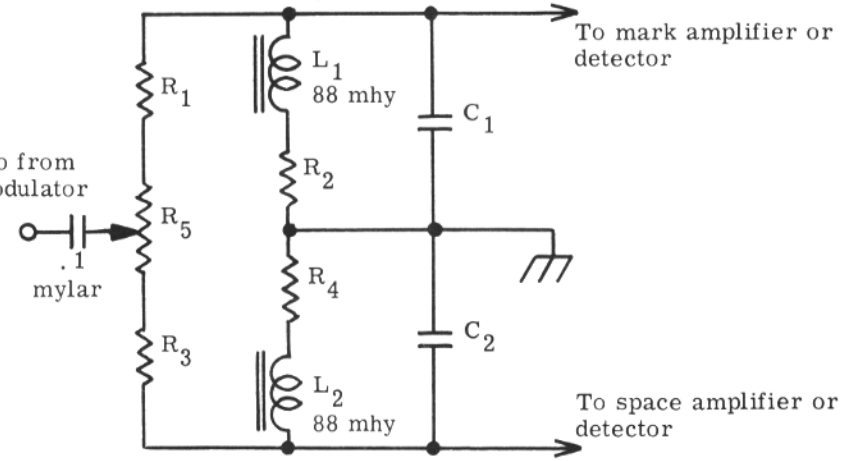
Part 3 - Optimizing Discriminator Responses

Jerry Hall, K1PLP
181 Brimfield Rd.
Wethersfield, Conn. 06109

Part 1 of this series of articles, dealing with filter construction and tuning techniques, appeared in the November 1968 issue. In December, Part 2 showed in graphical form how the 3 db bandwidth response and the amplitude response of simple L-C filters are affected by a change in either input isolation resistance or external loading resistance. A demodulator audio discriminator contains two such L-C filters, generally excited from the same drive point as shown in Figure 1. One filter is tuned to the audio mark frequency, and the other to the audio space frequency.

Most simple demodulator designs do not contain circuitry for the equalization of the mark and space bandwidth responses, provided by R2 and R4 in Figure 1. All circuits of good design however do contain a method of equalizing the mark and space amplitude responses, provided by a network of resistors similar to R1, R3, and R5. Some circuits call for only a potentiometer such as R5, while other circuits call for only two different-value fixed resistors, such as R1 and R3, but the end result is still amplitude equalization.

Figures 2a and 2b show the measured discriminator responses of a simple demodulator test circuit providing no bandwidth equalization. Referring to Figure 1, resistors R1, R2, R3, and R4 of the test circuit were each zero ohms (direct connection in place of resistor). R5 was a 250K ohm potentiometer, and the detectors were capacitively coupled directly to the outputs of the channel filter circuitry. Figure 2a shows the response for a 1275-2125 Hz discriminator, and Figure 2b shows that of a 2125-2975 Hz discriminator. It may be seen that the lower frequency range exhibits a severe bandwidth non-uniformity, and the higher frequency range displays a quite obvious non-uniformity. The actual 3 db bandwidth responses were measured as follows, with equalized amplitude responses obtained by



L_1 and C_1 to resonate at mark frequency.
L_2 and C_2 to resonate at space frequency.
See Tables 1 through 4 and text for resistor values.

Figure 1. Optimum Response Channel Filters

appropriate adjustment of the balance potentiometer.

1275 Mark, 39 Hz bandwidth
2125 Space, 67 Hz bandwidth
2125 Mark, 73 Hz bandwidth
2975 Space, 108 Hz bandwidth

By comparing the 45.45 baud rate of 60 wpm RTTY signals with the above figures, one can begin to realize that bandwidth equalization as well as amplitude equalization should be considered in any discriminator design. Indeed, the 1275 Hz mark channel filter will not even pass the full bandwidth of an RTTY audio signal, so some intelligence from the signal is filtered out. (As a simple but more severe analogy, imagine trying to copy a 2.1 KHz bandwidth SSB signal with the receiver bandpass filter set at 400 Hz. Although some of the modulation intelligence might be detected, it would be done with a bit of difficulty.) Further, unequal bandwidths may introduce the effects of bias distortion on a signal because of the delaying action of filters. So it is easy to see that for optimum copy of RTTY, some tailoring of the filter responses must be done.

There are two methods of equalizing the bandwidth responses of a pair of channel filters. In the March 1965 issue of RTTY, John Hemingway, K0EII, described a method based on the removal of a large number of turns of wire from the 88 mhy toroid used in the space channel filter. Removing the turns lowers the inductance, thereby shifting the L/C ratio to maintain resonance, and resulting in an impedance which matches that of the mark filter. With equal impedances, equal resistances can then be paralleled across each filter for symmetric control of the bandwidth responses.

The second method of equalizing bandwidths is also through external loading, but the 88 mhy toroids are not altered. Parallel loading can be used, but series loading of the inductor provides a finer degree of bandwidth control with stock resistor values which are available.

For optimum discriminator responses with series loading, each filter channel must contain selected values of isolation resistance and loading resistance. These are shown as R1 through R5 in Figure 1. This circuit (with specific component values) was first introduced by Irv Hoff in the November 1965 issue of QST, for improved reception of 170 Hz shift with the Mainline TT/L demodulator. In a subsequent article in August 1966, QST, Hoff expanded the information to show that this new circuit could be used for any shift, with the bandwidth responses adjusted by fixed circuit values for optimum operation under varied receiving conditions. The circuit reappeared with identical values in the TT/L-2 article by Keith Petersen in the September 1967 issue of RTTY JOURNAL (reprints are available from the editor for $.25). Each of the articles gives a method of selecting different filter pairs, through appropriate switching action. The response of each filter pair is tailored for optimum performance under certain receiving conditions or for certain signal shifts.

Until now, such published discriminator filter designs have been limited exclusively to the TT/L units, and to the 2125-2295-2975 Hz frequency range. "Design" is defined as the assignment of specific values to resistors R1 through R5 and resonating capacitors C1 and C2 in Figure 1, for specific discriminator characteristics. The advantages of operating with tailored channel filter responses can be enjoyed with any audio discriminator demodulator at any frequency range, perhaps by adding only a few resistors, a switch, and two or three potentiometers and capacitors.

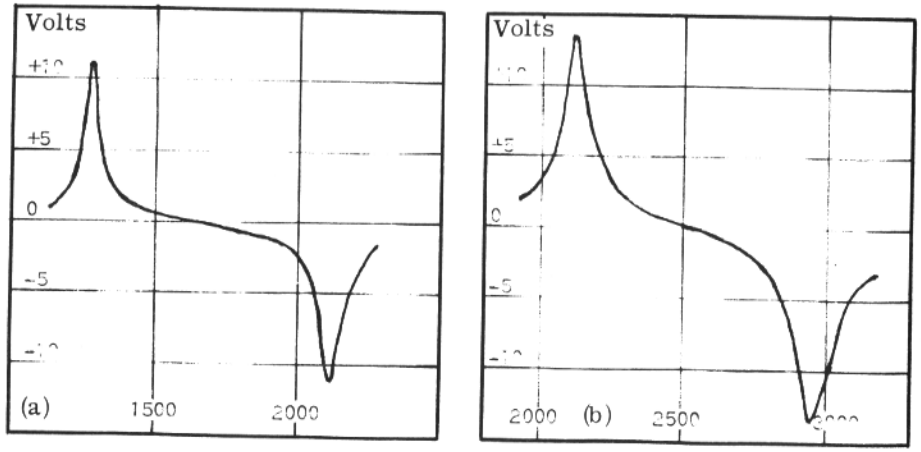
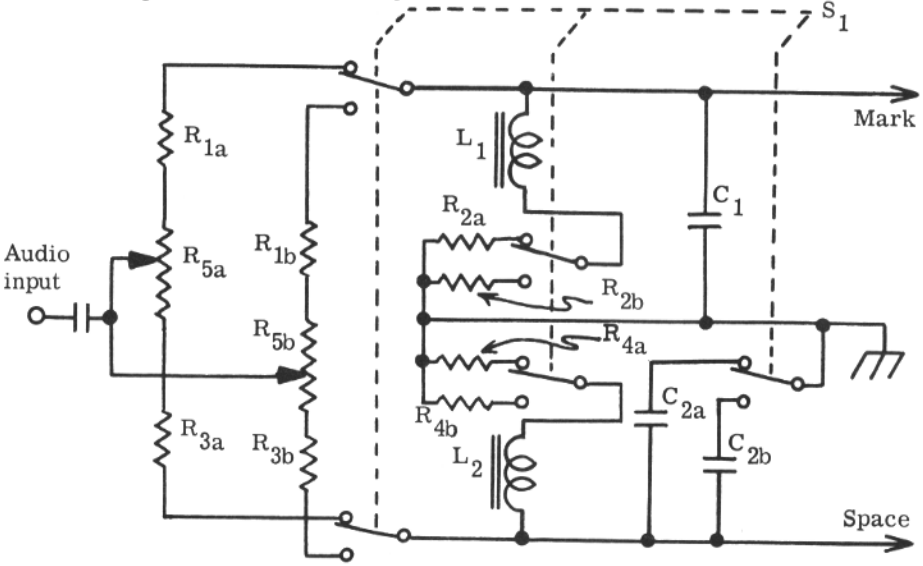


Figure 2. Responses of Unloaded Discriminator Circuits

SWITCHED RESPONSES

The circuitry of the TT/L units for changing filter pairs is simply that -- complete filters are switched in and out - different toroids, different capacitors, etc. In all cases for discriminator filters, the switching action selects circuits which each contain an 88 mhy toroid. In some cases a few of the associated parts are identical in the switched circuits, such as resonating capacitors. One can conserve parts (and chassis space) and yet accomplish the same function by using a 5-pole switch instead of the previously required 3-pole unit. The author suggests the switching arrangement of Figure 3. This figure shows only two positions for the 5-pole switch, but additional responses are available by using more switch positions, and extending the circuit to correspond. It may not be required to add five new fixed value components for each new switch position. For example, where R4A and R4B are shown as the switched loading resistors for the space filter, the third switch position might select R4C (not shown on the schematic) to be a value equal to R4A. In this case, it would be necessary only to interconnect the A and C contacts of this switch section, and use the resistor already existing for R4A in both positions. Indeed, resistors R2A and R4B (different positions of different switch sections) might actually be the same value, and could therefore be physically just one resistor. The disadvantages of this circuit are that plug-in filter construction is not convenient, and that the tuning for resonance of the second and succeeding switch positions must be done solely with capacitors (no toroid pruning). The advantages of this circuit over that of switching to independent channel filters is that only two toroids are required for all switch positions, that it is never necessary to resonate more than one circuit to the same frequency, and that it is not necessary to duplicate like parts for different switch positions.

This type of a circuit has been in successful use in my demodulator for approximately three years. If switching leads are kept short, no undesired effects



See text regarding S1 function.

Figure 3. Discriminator Response Switching.

occur. My unit presently uses five switch positions, which are described later in more detail.

UNIVERSAL DESIGNS?

The second article of this series dwelled on the complications involved in designing demodulator filters for precise responses. From that information, one can readily see that a design for one type of demodulator may not perform identically in another.

The channel filters themselves and associated resistors might be considered simply as a pair of frequency-sensitive voltage dividers. All input signals are divided down in amplitude, but off-resonance frequencies are divided down further than the frequencies to which the filters are tuned. The design of a tailored response channel filter necessarily establishes the amount of voltage division. The permissible amount of voltage division in the channel filter section may vary from one demodulator design to another. A given discriminator L-C circuit design might therefore work very well in one unit, but might perform miserably in a unit of another design because the D.C. pulses reaching the trigger or slicer stage are reduced too far in amplitude by the voltage-divider action of the channel filters. In this case, an amplifier stage added to the second unit to compensate for the losses of the filters would be necessary.

A second reason why "universal" optimized response discriminator designs may not exist is because of external circuit loading differences in various demodulator designs, affecting the bandwidth responses. Both input and output circuitry must be considered. The output circuitry is usually more important though, if values of R1, R3, and R5 are kept high. Circuit design of the optimized discriminator can compensate for external loading situations.

There are two general types of load that channel filters may work into. One is the high impedance input circuit of an amplifier stage, as used in the TT/L units. The other is the lower impedance of the detector circuitry itself, through a coupling capacitor. There may of course be a range of load impedances for either type of load, in various demodulator designs. The type of circuit presenting a lower impedance load is shown on Page 3 of the December article of this series. Such circuitry is used in the Twin Cities circuit, the transistorized W2JAV unit, and most other designs. The tube version of the W2JAV and the W2PAT demodulators present similar loading impedances through the grid-rectifying detectors. Although not necessarily universal, two basic design systems should generally apply to all demodulator discriminators, those with detectors following the filters and those with amplifiers following.

WHAT RESPONSES TO USE?

When discussing circuitry in August 1966 QST for optimum responses, Hoff recommended that three types of responses be used.

1. 850 Hz shift, with 300 Hz bandwidth channel filters.
2. 850 Hz shift, with 85 Hz bandwidth channel filters.
3. 170 Hz shift, with 85 Hz bandwidth channel filters.

The first listed response yields a discriminator output which is linear with frequency, permitting one to copy a wide range of shifts by straddle-tuning the signal. The second response was recommended for limiterless copy of 850 Hz shift. The third response provides a linear output for 170 Hz shift. With a selection of these three responses available, one can copy all legal shifts satisfactorily by straddle-tuning, if sufficient gain exists in the stages ahead of the slicer.

It has been my experience, though, that overall better copy can be obtained from the non-standard shifts by using "oddball" shift discriminator designs, rather than from straddle-tuning with a linear discriminator. Therefore, my unit has more selections and slightly different responses than those suggested by Hoff. Each of the five positions is used for F.M. operation with the limiter on, and the last four are also used for limiterless copy, depending on reception conditions. These are offered as an alternate suggestion.

1. 1100 Hz shift, 330 Hz bandwidth.
2. 850 Hz shift, 140 Hz bandwidth.
3. 700 Hz shift, 125 Hz bandwidth.
4. 425 Hz shift, 100 Hz bandwidth.
5. 170 Hz shift, 75 Hz bandwidth.

The first position may strike one as being rather unnecessary. But consider the newcomer to RTTY who has no way of accurately checking his shift, and is on the air calling CQ with a much wider than legal shift. Because no one can copy him with such wide shift, the CQing continues

for perhaps a half hour or more with no replies. Calls in answer to other CQs usually will not get him a contact, either. Not knowing the problem, the fellow may think he isn't getting out well and again calls CQ, looking desperately for any responses. The first position was incorporated just for that fellow. This position is used perhaps once in four or five months time, but is worth the effort of having the capability available just to be of help to a fellow amateur. (If a fixed input bandpass filter for 850 Hz shift was used, it would need to be bypassed for this position).

The remaining positions select responses for progressively narrower shifts, using progressively narrower bandwidths. Figure 4 shows the measured responses of the five switch positions. The 170-75 and 850-140 responses are used probably 90 percent of the time for general copy. Although the responses do not quite "overlap" at the 3 db points, the five selections have enabled me to copy every shift ever encountered on the HF bands including some 85 Hz shift signals, and test input signals with only 12 to 15 Hz shift.

If the progressive shift discriminator switching scheme is used, it is probably not worthwhile to incorporate more than four discriminator responses in the legal shift range. Additional switch positions would yield only little improvement for the intermediate shifts which may on occasion be encountered. If one is striving for the effect of a continuously variable shift response from the discriminator, the author feels the construction efforts would be more beneficial if directed toward a heterodyning mixer system. Then the advantages of minimum bandwidth filtering could be obtained for any shift width.

GENERAL DESIGNS

General designs are included here for four different demodulator systems. These are not offered as "universal" designs, but should give excellent performance in most units seeing common use.

1. Detectors following
   2125-2295-2975 Hz filters
2. Detectors following
   1275-1445-2125 Hz filters
3. Amplifiers following
   2125-2295-2975 Hz filters
4. Amplifiers following
   1275-1445-2125 Hz filters

Values in Tables 1 through 4 in conjunction with Figure 1 present the various designs, 29 in all. A sufficient number of designs are given so the builder may select either the Hoff-recommended responses or the progressive shift sequence for his favored audio frequency range and type of demodulator. Shift width and bandwidth data for Tables 2 and 4 are included at the left of Tables 1 and 3.

The tables show resistance values only, in ohms. Resistors R2 and R4 should be 5 percent tolerance; R1 and R3 may be 10 percent. All fixed resistors may be 1/4 or 1/2 watt. Potentiometers (R5) are linear taper 2 watt. Values for C1 and C2 should be selected to resonate with 88 mhy toroids L2 and L2 respectively at the appropriate frequency. These capacitance values may be determined from the nomogram appearing in the November article of this series.

R1 and R3 provide isolation between each L-C filter and the drive point, and between the two filter elements themselves. R5 is used to balance the amplitude response of the mark and space frequencies, while R2 and R4 provide the equalized bandwidth responses.

In the amplifier-following designs, the voltage division factor is compatible with the TT/L units, and the reader may use that circuit if he wishes to add a transformer-coupled amplifier to another type of demodulator. In fact, the 2nd, 5th, and 7th designs of Table 3 are taken directly from the TT/L circuit. If it is desired to add an R-C coupled amplifier, the circuitry of Figure 5 is suggested.

In the detector-following designs, maximum voltage response consistent with adequate isolation from the driving point was the criterion, to avoid unnecessary loss of sensitivity at the slicer or trigger stage. In a given table, all designs will yield essentially equal amplitude outputs, so the amplitudes will be constant throughout the various switch positions of a response-selecting arrangement. Bandwidths in detector-following demodulators may vary slightly from the design values given here due to different loading characteristics, but these differences should normally be only minor, a few Hertz or so.

It should be noted that with values of isolation resistance (R1 or R3 plus half of R5) below about 100K ohms, detuning of the L-C circuits may occur. This is more prevalent in the detector-following designs where the attempt was to yield minimum voltage division. Lowering of the resonant

SHIFT WIDTH	BAND-WIDTH EACH FILTER	MARK FREQ.	SPACE FREQ.	R1	R2	R3	R4	R5
170	75	2125	2295	120K	15	150K	10	250K
170	85	2125	2295	47K	22	68K	18	250K
425	100	2125	2550	220K	24	270K	15	100K
700	125	2125	2825	180K	39	270K	22	100K
850	85	2125	2975	270K	15	560K	0	250K
850	140	2125	2975	180K	47	330K	27	50K
850	LINEAR	2125	2975	0	150	18K	110	50K
1100	330	2125	3225	12K	150	56K	120	50K

TABLE 1.

MARK FREQ.	SPACE FREQ.	R1	R2	R3	R4	R5
1275	1445	22K	24	39K	20	50K
1275	1445	0	30	8.2K	24	50K
1275	1700	18K	39	47K	30	50K
1275	1975	18K	47	82K	33	50K
1275	2125	68K	27	240K	15	50K
1275	2125	8.2K	56	68K	39	50K
*	*	-	-	-	-	-
**	**	-	-	-	-	-

TABLE 2.

TABLES 1 AND 2. GENERAL DESIGN VALUES FOR TAILORED DISCRIMINATOR RESPONSES, DETECTORS FOLLOWING

SHIFT WIDTH	BAND-WIDTH EACH FILTER	MARK FREQ.	SPACE FREQ.	R1	R2	R3	R4	R5
170	75	2125	2295	560K	33	560K	27	250K
170	85	2125	2295	560K	30	560K	27	500K
425	100	2125	2550	510K	43	820K	39	250K
700	125	2125	2825	330K	56	820K	51	250K
850	85	2125	2975	820K	30	1.5M	20	500K
850	140	2125	2975	390K	62	910K	56	250K
850	LINEAR	2125	2975	180K	120	330K	150	50K
1100	330	2125	3225	56K	160	270K	180	250K

TABLE 3.

MARK FREQ.	SPACE FREQ.	R1	R2	R3	R4	R5
1275	1445	100K	43	150K	39	50K
1275	1445	56K	51	100K	47	50K
1275	1700	47K	47	220K	47	250K
1275	1975	27K	56	300K	56	250K
1275	2125	120K	33	750K	30	250K
1275	2125	91K	68	390K	68	50K
1275	2125	0	160	56K	180	50K
**	**	-	-	-	-	-

TABLE 4.

K1PLP

TABLES 3 AND 4. GENERAL DESIGN VALUES FOR TAILORED DISCRIMINATOR RESPONSES, AMPLIFIERS FOLLOWING

* UNSATISFACTORY OPERATION FOR THIS SHIFT RANGE DUE TO LOSS OF SENSITIVITY.

**UNSATISFACTORY OPERATION IN THIS SHIFT RANGE DUE TO SECOND HARMONIC OF MARK TONE.

SEE TEXT FOR WATTAGE, TOLERANCE, ETC.

filter frequencies by 20 and 25 Hz was noted in worst cases.

The design values for R1, R3, and R5 are such that the potentiometer wiper arm should be very near the center of its range for a balanced amplitude adjustment. Different value potentiometers than specified may be used if one-half the difference in value is added or subtracted (as appropriate) to each value of fixed resistance. Stated another way, the sum of the values of R1, R3, and R5 should be kept constant within a few percent.

Space limitations prevent the presentation of the measured response curve from each discriminator design. However, those of Figure 4 and curves presented by Hoff in QST are typical of what one might expect for the other designs, taking the shift width and the bandwidth design into account. It is interesting to note, though, that the "nose" responses of the 1275-2125 Hz range are broader or more rounded than those of Figure 4 for identical 3 db bandwidths.

It is possible that the detector-following designs will not yield improved operation in every audio discriminator demodulator because of added signal attenuation

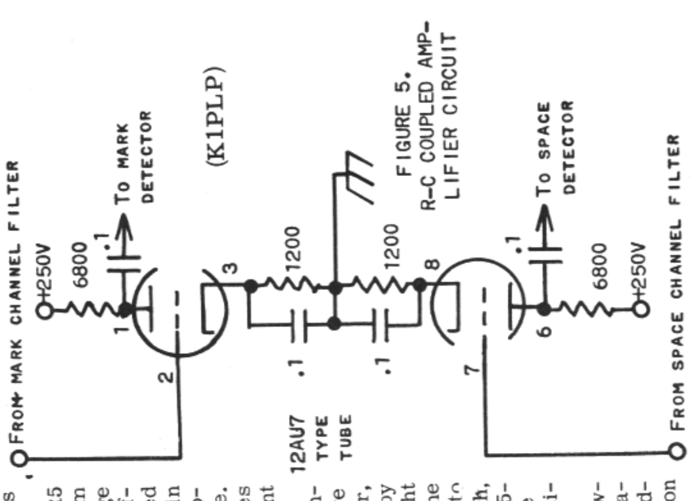


FIGURE 5. R-C COUPLED AMPLIFIER CIRCUIT

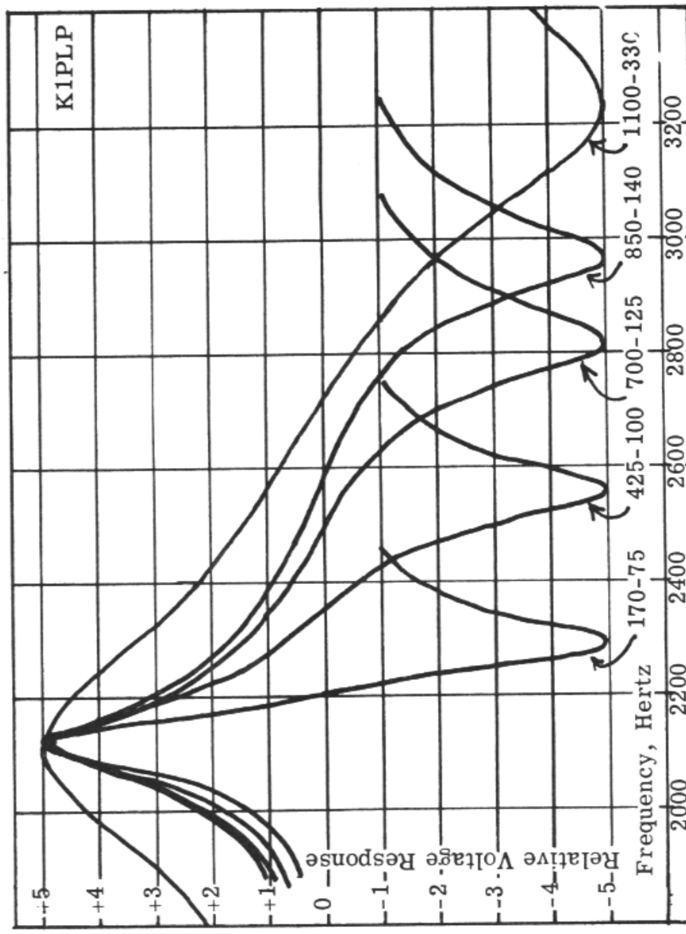


Figure 4. Tailored Discriminator Responses, Progressive Shift Switching

inherent in the tailored response designs. Before making permanent modifications, one might wish to select a single design applicable to a favorite shift and incorporate a temporary modification, giving it a good trial period to observe its performance. In some cases it may be necessary to add an amplifier stage following the filters. It would then be necessary to use a different design table for the same responses. It is important that the input audio signal to the amplifier not overdrive and cause the amplifier stage to draw grid current at filter resonance, for either the transformer - or R-C coupled circuit. It may be necessary to "tap down" the input signal at the grid through a resistive voltage divider. This could be accomplished easiest at the grid of the amplifier driving the L-C channel filters. The circuit of Figure 5 is designed for a maximum RMS voltage input of 5 volts, and provides a gain of approximately 7.

Whether you must add an amplifier or not, the chances are that you will be very pleased with the results, and will appreciate the ability to "switch in" and copy with optimized responses almost any shift that may come along.

With the editor's permission, I would like to take this opportunity for a personal note to thank those readers who have written with questions and comments on earlier articles of this series. The responses show a sincere interest in basic information which may come to RTTY oldtimers as second nature. Although the highly technical articles are interesting to everyone, let us budding authors not overlook the fact that RTTY activity is continually expanding and every day there are newcomers with a great thirst for knowledge of the simple RTTY facts. Very 73 from K1PLP.

***

Higher RTTY Speeds -

Continued from page 2

operations have already changed to 100 WPM, discontinuing 60 or 75 WPM circuits. More and more conversions are being made to the higher speeds as equipment reaches the market. The 60 WPM speed is now considered obsolete.

(4) Any consideration of higher speeds for Amateur operation should be based on present commercial standards. With presently available machines, the 60, 75 or 100 WPM speeds could be used. 75 WPM should be included so that the Teletype Corporation model 14, 15 or 19 equipment may be used. The model 28 series will operate up to 100 WPM. The military and civilian version of later Kleinschmidt equipment will operate on speeds to 100 WPM. It is easier at present to find machines equipped with 75 and 100 WPM gears than with 60 WPM gears. Newer equipment being released by the commercial communications people is designed for operation at 60, 75, or 100 WPM.

(5) The speed availability would be much the same as the present variable shift condition, which allows any frequency shift to 900Hz. This has proved to be no burden on any of the Amateur Radioteletype operations; it has in fact indicated many advantages with narrow shift that would not have been available if the regulations had not been changed to allow this freedom in choice of shift.

(6) No additional equipment would be required for either transmission or reception of higher speeds with the exception of simple gear change in the machines. Speed converters are commercially available which allow the use of a machine geared for the highest received speed. All other received speeds are up-converted to this higher speed. Tape storage or memory core units are available which allow transmission of slower speeds using equipment geared for the highest desired speed. These speed conversion devices are easily constructed by the Amateur using the latest integrated circuit components. Many Amateurs have two or more machines and can operate one at 60 WPM and another at 75 or 100 WPM. Many model 14, 15 and 19 machines are equipped with 75 WPM gears upon receipt.

(7) A few Amateurs have expressed concern that any speed other than 60 WPM would obsolete their machines. While it is true that the model 12 and 26 machines and much of the old Western Union equipment is low speed only, it should be remembered that the use of higher speed operation is with tape and in nets that are, for the most part, all tape. For manual keyboard sending the 60 WPM speed will be used and retained for many years. However, it should also be remembered that the older machines, such as the model 12 and 26, are now obsolete and that Teletype Corporation no longer stocks parts for them. Indications are that the same soon will be true of the model 15 and 19 series.

(8) The use of the proposed higher speeds would result in only a negligible increase in bandwidth of the transmitted signal. This is true because of the relatively large ratio of frequency shift to teleprinter keying frequencies.

December 27, 1968
Respectfully submitted,

I hereby swear that I am the petitioner in the above entitled matter; that I have read the foregoing petition by me signed and know the contents thereof; and that the matter and things therein stated are true of my own knowledge, save those matters stated on information and belief, and as to those I believe them to be true.

Keith B. Petersen
1418 Genesee Ave.
Royal Oak, Michigan 48073

***

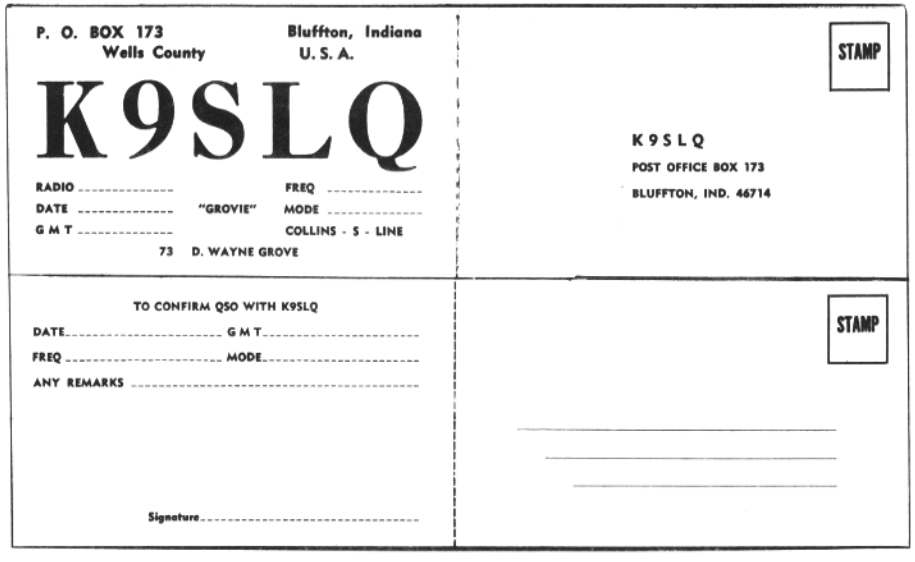
An IDEA for the QSL Problem-

We have always been interested in awards and contest but one thing that took away the fun was the QSL problem.

We recently received a QSL card from "Grovie" K9SLQ, that seems to be a fine idea. The card is reproduced below, it is thin cardboard and hinged in the center. One side contains the information for the station receiving it and the other portion is filled in by Grovie and is attested to by the other station and mailed back. Grovie also includes a return postage paid envelope. His envelopes are printed with a "Return Postage guaranteed" and permit number. A standard form. The permit may be obtained without charge from any post office but separate envelopes must be printed conforming to postal regulations. A 5¢ stamp could be affixed to the return card as easily. Regular double government postage cards could also be used, these cards would fold the long way of the card but work just the same. These cards may not be sent outside of the United States however so a plain card may be cheaper and an envelope used for foreign mailing. IRCs could be enclosed for the return postage.

The advantages. - The card is pre addressed and data filled in. Many hams do not have QSL cards but will fill this in and return if it can be done so easily.

Does it work? - at the time we write this late in January Grovie has worked 45 states this month and CONFIRMED every one. Our only suggestion would be an added line saying "QTH" on the return portion so that the location would not have to be checked with a call book in case it was not written in.



RTTY theory & applications.

RON 'RG' GUENTZLER, W8BBB
Route 1 Box 30
ADA OHIO, 45810

RTTY FOR THE BEGINNER
A SUMMARY

For the past several months we have been describing some of the fundamentals of RTTY. This has been done to give an overall picture of the various aspects of RTTY to someone who is new to the "art". We have now completed the series, and will summarize what has been said.

THE TELEPRINTER

Printing telegraph machines communicate with each other (and within themselves) by means of a code called the Baudot code. The code is composed of five even-length "pluses" or elements. Every character sent from a keyboard contains the five pulses. This is unlike the familiar hand-keyed "CW" code that contains many different length characters. The teleprinter requires that all characters be the same length because both the sending and receiving machines are mechanical things, and mechanical things are best suited for operation under repetitive conditions.

The code is generated by the keyboard. When a key is depressed, the machine translates the letter to be sent unto the proper code combination corresponding to that letter and then sends that code. The receiving machine receives the code for a given character, then selects (or decodes) the character being received, and prints it. It should be noted that a complete teleprinter, although it may, from the outside, appear to be similar to a typewriter, is actually quite different inside. Basically, it consists of two completely separate and independent machines - a sending unit called the keyboard base and a receiving unit called the printer. Usually the only thing common between the two units is the motor which drives both of them and the cover which is used to keep dirt and fingers out and the noise in. (Can't say it is very successful at any of those things!)

The "pulses" in the code used by teleprinters consist of an open circuit, called a Space, and a closed circuit, called a Mark. Because there are only 5 "pulses" per character, only 32 characters are possible. Mre thann 32 characters are needed (just the 26 letters and 10 digits equal 36 and some punctuation is desirable. etc.). Therefore, most of the code combinations are used for two different characters; this explains why the keyboard is different from that of a typewriter. The dual use of characters is accomplished by shifting the machine into "Letters" or "Figures" position. Once a shift is accomplished (two characters are needed for this) the receiving machine prints the characters corresponding to the shift position until a shift of the other type is received (An exception to this is found in some machines hat are equipped with an "unshift on space" arrangement whereby a shift to "Letters" occurs whenever LTRS or a character space is received.)

Although only 5 elements are used in the teleprinter code to convey information, two other elements are needed (Therefore it is called a 7 or 7.42 unit code). One of the additional elements is called a "Start pulse", it is always a Space, and it preceeds the first actual character code element. It was explained that the start pulse is needed to alert the receiving machine that a character is coming and it is used to start the timing process within the receiving machine. The other extra element is called a "Stop pulse". It is always a Mark and it follows the last character code element; its purpose is to provide a period of time between the end of one character and the beginning of the next character so that the receiving machine can finish the decoding process and start the printing process before the next character arrives.

THE LOOP

A teletype machine is made to communicate with itself or other machines by connecting the keyboard contacts and the selector magnets into a series circuit along with a variable resistor and a DC

power supply of at least +130 volts. Essentially any number of machines can be connected into this series loop, although too many selectors will tend to distort the code pulses and may cause errors. Once the machines have been connected, the variable resistor is adjusted until 60 mA is flowing in the loop. The voltage across the selector magnets in any machine is irrelevant; the current that is flowing is what is important - however, the power supply in the loop must have at least 130 Volts.

TRANSMITTING

The opening and closing of a loop by the keyboard can be transmitted by radio using two different, but closely related, methods. In one method, called frequency shift keying (FSK), the keyboard contacts are connected to the oscillator in a CW transmitter. The connection to the oscillator tuned circuit is made thru a diode and an RFC. (The actual circuit depends upon the specific make and model of transmission. When characters are sent, the contacts on the keyboard open and close and this changes the frequency of the transmitter. The frequency change is very small; usually, the Space frequency is either 170 or 850 Hz below the Mark frequency. Note that unlike CW, the transmitter is on the air continuously; the only difference between a Mark and a Space is a slight difference in the output frequency of the transmitter. FSK is usually used on 80 thru 10 meters. FSK is called f1 modulation.

The other method of transmission is called audio frequency shift keying (AFSK). AFSK is generated by shifting the frequency of an audio frequency oscillator; an oscillator built for this purpose is called a keyer. When the contacts are closed (Mark), the output frequency of the oscillator is 2125 Hz. When the contacts are open (Space) the frequency is 2975 Hz. The output of this oscillator is connected to the audio (microphone) input of a voice (AM or FM) transmitter. AFSK is usually used on 2 and 6 meters. AFSK when used with a DSB AM transmitter is called A2 modulation and when used with an FM transmitter it is called F2 modulation. (Consult the latest regulations regarding where the various modes are legal.)

RECEIVING

FSK is usually received in a manner similar to CW. The BFO in the receiver is turned on and the FSK is automatically converted to AFSK by the receiver. The receiver tuning is more critical than it is with CW because the receiver tuning determines the frequencies of the AFSK signal appearing in the output. When receiving an AFSK signal, the receiver is tuned as it would be for a voice signal. The output from the receiver (when either FSK or AFSK is being received) is connected to the input of a terminal unit (TU). The output of the TU is connected into a loop containing the selector magnets of a teleprinter. The TU "listens" to the tones. When a Mark tone is received, the TU allows current to flow in the loop; when a Space tone is received, the TU stops current flow in the loop.

AN OVERALL VIEW

The whole sending and receiving process can be summarized by saying that when the keyboard contacts are closed, the transmitter sends out the Mark frequency; the receiver output will be a Mark tone and the TU will close the receiving loop. When the keyboard contacts are open, the transmitter sends out a Space frequency, the receiver output is a Space tone, and the TU opens the receiving loop.

73 ES CUL, RG.

***

C.A.R.T.G. Selects VE3GK *For MERIT AWARD*

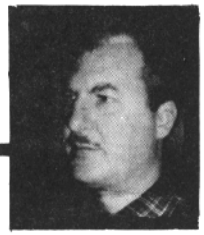
The first C.A.R.T.G. Merit Award Certificate is awarded to a person who has expended all of his time and energy in promoting Radioteletype in Canada, encouraging and assisting Canadian amateurs in this mode of communications, sponsoring an organization known as The Canadian Amateur Teletype Group (C.A.R.T.G.) with a membership of close to a hundred members, editing and printing monthly newsletters, with technical articles, current news of DX stations and reception, swap and shop columns, news of members' activities, etc, and sponsor of two worldwide RTTY contests, which have made Canada and C.A.R.T.G. a household word among members of the Radioteletype fraternity. For these and many other reasons too numerous to mention the Merit Award Committee are unanimous in their selection of the C.A.R.T.G. First Merit Award recipient: -

VE3GK - Sidney Burnett

Chairman of the
Merit Award Committee
Alan E.H.Venning, VE7LL

***

RTTY-DX



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

Hello there. . .

That phase of amateur radio called DXing is mostly a waiting game. Between regular QSO's and rag chews many fellows spend a good part of their on the air time scanning the bands hopefully looking for new countries to show up. Unlike CW and and SSB of recent years, where operation from new countries has been heralded by widespread publicity, elaborate operating schedules as to time and frequency, where you park yourself on the prearranged frequency, send and receive your 599 and go on your way; RTTY DX still has that classic concept of the hunt, ever watching and waiting, with patience finally being rewarded with the slow rhythmic clack of the type pallet hitting the paper. This month, for those first few that printed him the letters spelled out H R 2 A F K.

Fred at HR2AFK has been active since the beginning of February. His excellent signal comes from a Swan 400 and he uses a Drake R4A for receiving. The machine is a Model 26. Fred says that his is the first RTTY operation from Honduras and we certainly go along with that. His QTH is--

Box 254 San Pedro Sula
Honduras, C.A.

Fred dows a good job at operating and we hope that he will be active in the contests coming up shortly.

From down in the Caribbean area SL7AY/MM has been quite active for the past several weeks. This is a training ship of the Swedish Navy and is taking cadets on a training cruise of Caribbean waters. Two of their ports of call were Port-of-Spain, Trinidad and Curacao, and I am sure many more by this time. As for contacts with maritime mobile stations counting as a confirmation for the country they are visiting. I must reluctantly say that this is not possible under the existing criterion established by radio societies or groups offering awards. The main reason being I suppose is that the shipboard station is not licensed for amateur operation by the authorities of the country they are visiting.

In a recent QSO with W7QCN/1, Don said that he will shortly be transferred o

D X HONOR ROLL

	wrkd/cfmd		
1. FG7XT	89/76	27. K6EV	33/29
2. ON4BX	82/76	28. W4EGY	37/28
3. I1KG	78/72	29. XE1YJ	33/28
4. W3KV	77/72	30. WB6QFE	30/25
5. ON4CK	70/63	31. DL5PQ	35/24
6. W8CQ	62/60	32. VK2EG	33/24
7. K8YEK	65/58	33. YV5CIP	30/24
8. W4AIS	62/53	34. W8GPB	45/23
9. WA6WGL	51/49	35. WA2YVK	30/23
10. W6CG	51/46	36. VE5LG	29/21
11. W5QCH	48/46	37. VE4FG	23/21
12. W1GKJ	52/45	38. W0HAH	32/19
13. WA8BOT	50/41	39. W1ACW	28/19
14. I1ROL	50/41	40. W3AVQ	22/19
15. VE3AYL	48/40	41. VP9BY	26/19
16. K8QLO	46/40	42. G3LDI	26/18
17. K8JTT	41/40	43. K9QNV	24/17
18. W4CQI	49/37	44. PJ2CR	27/15
19. K4VDM	38/37	45. OA4BR	22/15
20. W3ISE	47/35	46. W6TX	20/15
21. W8CAT	37/33	47. K9BJM	15/15
22. UA1KBW	36/33	48. VU2KV	33/13
23. W7VKO	35/33	49. VK3NR	32/13
24. PY2CQ	43/32	50. HK3SO	18/13
25. VE4BJ	33/31	51. W6ZH	15/12
26. W2LFL	44/30	52. W4FUI	33/11

***

duty in Korea. He would very much like to set up a RTTY station for as you know, Don is very active in this mode and he expects to be there a couple of years. Don would appreciate any information from anyone having knowledge of amateur radio operating, RTTY in particular, authorized for service personnel in Korea. Time is pretty short, as he has to be there in April You can contact him as follows.

Don Bohart
1610 Shasta Drive
Colorado Springs, Colo.

There have been RTTY operations from Korea back in 1966 with HL9KF and HL9TM quite active for a while but nothing has been heard from there since. As amateur radio activity in various countries is a courtesy extended by the local government and operation is under the local radio laws that are likely to change from time to

time, Don would like to know the situation as it is now. We wish him luck and hope he is successful in getting a station set up as this would be a new country for many and also some much needed activity from Asia.

ZL2ALW sends word that ZL2AKH has left for the NewHebridies and will be on RTTY with the call YJ8JS as soon as his equipment arrives.

Ven, VU2KV is on but with a poor antenna which he expects to correct very soon. Ven brought back tape equipment from England on his last trip and will be active on the bands as soon as the antenna situation is fixed.

Lately there has been some real strong signals booming in from down under and first off you get the impression that there are a couple of new stations on from Australia. This is not so however, as VK2FU, Gil, and VK2WX, Jim and VK2ZSC, Adrian, are a father and two sons and they are really doing a Fb job from Blasland, a suburb of Sidney. The Michigan RTTY Group were instrumental in getting a Model 15 sent down and after a few months delay in shipping and customs it finally arrived in good shape. Bill, VK2EG, was a big help in getting the machine set up and going and since then they have been putting S-9 signals into these parts via the long and short paths. And well they should; if you are the curious type take a look at their antenna system on page 65 of Oct. '68 QST. Activity has been mainly on 14 mhz but Stan, WB6QFE, set up a sked and had a QSO on 7090 khz using narrow shift.

There should be no lack of activity on RTTY for the next few months, on week ends anyway. There is a contest for the next three months beginning in February. The "Flash" contest will have been history by the time you read this and we hope to report its highlights in the next issue. This was a bit different as contests go with an eight hour operating period on each of two week-ends.

The BARTG contest comes up in March, the rules of which appeared in last months issue. This is basically the same contest as sponsored by the BARTG for many years. The scoring is the same in previous years but this year there are mandatory rest periods.

April 26-27 the RTTY Group of the DARC is sponsoring its first contest, you will find the rules complete in next months Journal. This is a Worked All Europe contest and the rules are similiar to the WAE contest sponsored each year on CW and SSB by the DARC. By similar, I mean that it has the same special message feature (QTC) to allow you to get extra points. This feature is quite novel for a RTTY contest and at the same time it lets you make good use of a complete RTTY installation. As a brief explanation. You can punch out these "QTC" messages on tape, store them, and then send them out to a station on the TD at some later time, when the QRM is (hopefully) less, or when propagation conditions are better. U1i, DJ9XB, of the contest committee also tells me that the multi-operator will have no rest period. The committee does hope to have good activity for this first contest and they will welcome your comments after the contest is over.

The monthly amateur publication of the ARI now has a RTTY column conducted by Sergio, I1AHN, and Lamberto, I1ROL. I did have an opportunity to see one of the first columns but unfortunately could not "read" it as my knowledge of the language is pretty much limited to arriverderci or ciao. I can read all signs and numbers however and there was some mention of possible activity from UD6BD, UI8LC, UG6LR, and UA0KFG. These stations would all be in Asia. Also, RTTY activity in Itally centers around 3620 khz and 7035 khz on those bands. We hope to keep you posted on the activities of this group from time to time and meanwhile we will get ourselves a bi lingual dictionary.

Arthur, ON4BX, reports QSO's with a couple of newcomers to RTTY. Jim, GI3VDB in Belfast and Mike, YV5BQN in Caracas. The North Ireland station is particularly rare on RTTY. A few more new ones reported were HK5SL, Enrique, and also LU3EAC. OA8G, although not new, is on 21100 khz from time to time engaged in traffic with WA4ZRS. WB6QFE has reported activity from Juneau, with KL7EBK putting out a terrific signal from a four element Yagi at 85 feet. They sure grow antennas tall up in the north country.

In closing we extend congratulations for W A C to --

Nr. 118 John M. Syck WB6JSY

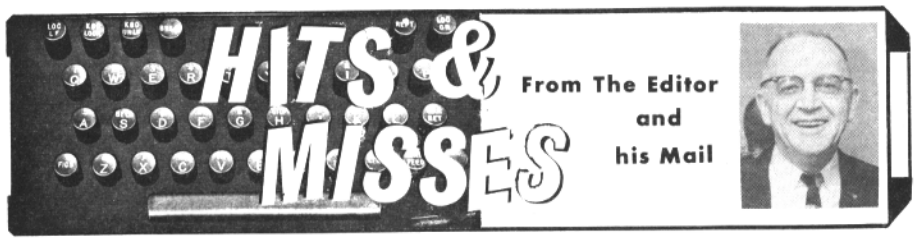
73 de John

***

BARTG DX CONTEST --

DETAILS in LAST MONTHS ISSUE

***



Twenty pages this month, either feast or famine but Jerry Hall's last article on filters deserved running in one issue and we figured this was a good time for a bonus 4 pages. Jerry is now with QST as a technical editor. We hate to see Jerry go but you can't keep a good man down, and at least now we know where to send some of the questions we get.

***

And speaking of keeping a good man down, our apologies to Don Kadish, W1OER who was the winner of the 40-80 meter section of the CARTG Sweepstakes. A mistake listed W2OER instead of W1OER. Also PJ2PH should read PJ2MI. Blame it on the printer or Mr. Murphy.

***

DAYTON HAMFEST - April 25-26. We have a suite in the Dayton Sheraton hotel reserved for RTTY JOURNAL friends The rooms will be open from Friday afternoon until Saturday night late. This is one of the largest hamfests of the year and we hope to meet many of you at this time. We will have the room number listed on the bulletin board in the lobby so don't be bashful.

***

For two years we have asked for some reason for the sending of CW ID to follow after each transmission. Freeman KH6AX, says that in handling traffic they use a fast break, when it is time for a CW ID they print it so the other party waits. Like Freeman's women however, this is a very specialized use and we still see no reason for general use. And neither does Freeman.

***

Bell Telephone of Canada have some model 15 and 19 printers for release to amateurs of Canada. Information and waiver requirements may be obtained from C.B. Taylor, 60 Pineglen Cresc. Ottawa 12, Ontario or by phoning his office (613) 239-2911.

***

WA2UXS has sent us an excellent index of the 1967 and 1968 issues of the RTTY JOURNAL. Watch for it next month.

***

The incentive licensing and frequency allocations has increased the incentive for at least one thing, buying a sharper receiver to cut through the increased QRM since the lower 25kh of the bands have been emptied. It has been especially noticed on RTTY where more CW stations have been operating since the bands have been cut down. Narrow shift IS a definite advantage here and really takes very little incentive to use. Remember the old arguments about SSB? Narrow shift is the SSB of RTTY. How long are you going to stay on Ancient Modulation?

***

Speaking of changes- this issue has a copy of a petition presented to the FCC for allowing a range of higher speeds on Amateur RTTY. We will be interested in the comments of RTTY fans, for or against. If you have any definite convictions you may send them to the FCC in a form of a "Comment" and it requires 14 copies. (Government you know) however probably just as good is telling your ARRL director your thoughts and reasons. If the directors are convinced that the idea is a good one the ARRL will back the proposal and could do far more than a number of individual letters.

***

Since announcing two Achievement Awards from the Journal last month, we have printed some comments on those trying for a WAS during the year 1969. We had hoped to have a picture of the Award for this issue but did not make it. It will be a plaque and stand out from the usual group of certificates on most walls. We have been trying to come up with some plan that will help the QSL problems of the scarcer states but no solution yet. This is another place that a contest would be a help as the logs from the scarcer states could be used for confirmation rather than cards. And don't forget the WPX award.

***

VOLT RESULTS

The compiling of contest reports is getting better. From I1LCF we have just received the results of the recent VOLTA DX contest. Lack of space prevents all logs being listed but the top 25 follow.

	Call	total points	Mult.	SCORE
1)	DL1VR	1.425	37	52.725
2)	W 2 RUI	1.372	37	50.764
3)	WA3HXR/YV5	832	21	17.472
4)	G 6 JF	612	28	17.136
5)	VK 3 KF	1.332	11	14.652
6)	i1 CAQ	545	25	13.625
7)	LX 2 FB	660	19	12.540
8)	ON 4 BX	481	26	12.506
9)	W 5 QCH	570	21	11.970
10)	PAO/GKO	450	25	11.250
11)	W 4 CQI	571	18	10.278
12)	HB 9 AKA	462	22	10.186
13)	K 4 CZ	626	16	10.016
14)	K 9 SLQ	612	15	9180
15)	W 3 KV	301	18	5.418
16)	LA 6 OI	227	23	5.221
17)	HA 5 FE	233	17	3.961
18)	DM 0 GST	243	15	3.645
19)	DM 2 BRN	246	14	3.444
20)	SM 5 CLW	177	18	3.186
21)	WA 2 YVK	303	10	3.030
22)	DL 8 CX	192	14	2.688
23)	W 5 VJP	374	7	2.618
24)	i1 EVK	181	14	2534
25)	WB 6 QFE	299	8	2.392

***

ICCN?

WHAT THE HECK IS ICCN?-

The Intercollegiate Communications Network (ICCN) is an amateur radio teletype network formed by the University of Texas at Arlington in the spring of 1968.

The purpose of the Intercollegiate Communications Network (ICCN) is to provide communications between universities and colleges. This network consists of all amateur radio clubs of the universities and colleges that care to join. These clubs meet "on the air" to handle messages among the various campuses. The types of messages fall under several categories: news, personal, student government, clubs, and general exchange of information.

Inquires and participation is invited from all colleges. For information write- Univ. of Pennsylvania Amateur Radio Club. Moore School of Electrical Engineering, Philadelphia, Pa. 19104

***

Improving The MAINLINE TT/L and TT/L-2 Limiter Stage

Keith B. Petersen, W8SDZ

The first limiter plate transformer (T-2 in the TT/L-2) has a tendency to ring when squarewaves are applied. This can be eliminated by connecting a .002 mfd 600 volt mylar capacitor across the primary leads of the transformer. The capacitor tunes the primary to the center of the audio range of the RTTY tones. This tuning action is rather broad due to the relatively high resistance of the transformer winding and thus there is no significant distortion of the desired passband characteristic.

Some units have a tendency for the limiter stage to oscillate at a very high audio frequency when little or no signal is applied. This oscillation tends to degrade the limiter performance on weak signals. The added capacitor described above eliminates this problem.

***

Check Your Renewal Date

Please check your address stencil for renewal date. The month will be abbreviated and the last figure the year date. ei . . . Jan 9 0 means your subscription expires with the January issue 1970. Where there are several numbers the last or highest number is the last digit of the year.

***

BACK ISSUES —

ONLY back issues available are July through December 1966, February 1968 to date. The TT/L-2 Reprint is also available. Single copies are 30¢ each. RTTY JOURNAL Binders are available at $2.50 pp in US, Canada or Mexico. $3.50 elsewhere.

***

RTTY JOURNAL
P.O. Box 837 — Royal Oak, Michigan 48068
"Dusty" Dunn — W8CQ
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NEW TELEPRINTER by OLIVETTI
Model TE 300

The Olivetti Company believes that in the near future there will be world wide developments in the field of long distance communication via teleprinters and is playing its part in shaping those future developments. These new teleprinter are deisgned to cover the standard requirements of the traditional telegraphical devices, and others more sophisticated, typical of terminals connected with computers operating in real time for private and public users (time sharing).

A most outstanding characteristic of this new high speed machine is its low operating noise level. This was accomplished by the use of advanced materials and design techniques.

The Model TE 300 is produced in two series, one with a 5 level code and the other with an 8 level code. Ninety-nine per cent of the components are common to both models. This is reported to provide an easy change from one level of code to another.

The eight level code is called "ISO-CCITT". The character is formed by a sequence of 11 pulses whose meaning is:

1st Start pulse
from 2nd up to 8th Intelligence pulses
9th Check pulse
10th 11th Stop pulses

The ISO eight level code has led to a lengthening of each character. If the ISO eight level code was used in the standard RTTY system the character timing would be 220 milliseconds long as compared to the usual 150 milliseconds long RTTY character.

This would result in a reducing in communication efficiency, and would not be acceptable when speed of communication is of prime importance. The Model TE 300 meets these requirements while operating at a speed of only 15 characters per second.

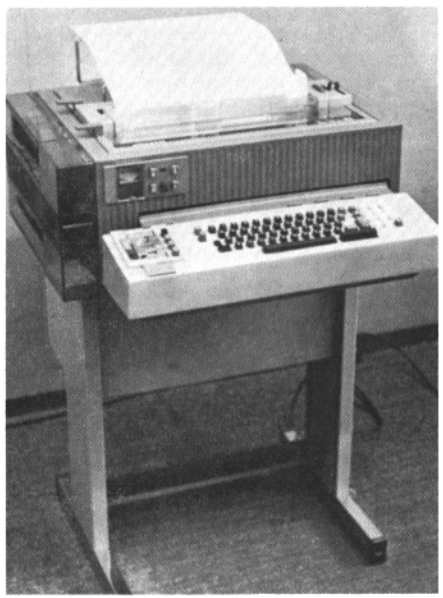
This high speed capability is also available when using the 5 level code with a rate of double that present use. The 8 level code coupled with its high speed transmission capability has provided expanded applications.

It has unique ability to print both small letters and capital letters like a typewriter.

Initial development on the Model TE 300 was begun in 1960 by Olivett design engineers. One outstanding feature of the new machine is its ability to regulate its adjustable speed to plus or minus .75%.

The speed of the machine is automatically monitored every 6 milliseconds. The keyboard was redesigned to enable to operation of the machine by non-professional typist.

Another feature of the new keyboard eliminates the possibility of locking up the keyboard by exceeding the typing speed of the machine. This problem was solved by Olivetti engineers by designing memories into the keyboard system. One model of the memory unit can accept two consecutive strokes of the keys at a speed of up 2,500 strokes per minute. A second model of the memory can store up to 700 strokes per minute and in turn have an output of only 400 strokes per minute. And last but not least is the functional and classic Italian styling of the Model TE 300 Olivetti teleprinter.



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

NO GLARE WINDOWS for Model 15 & 19 Printers. Cadinum plated & Goldiridite finish. $12.50 P.P. Check or M.O. Bud WA6UEF, 17114 Sunderland Dr., Granada Hills, Calif. 91344.

RTTY GEAR FOR SALE. List issued monthly. 88 or 44 mhy toroids-5 for $2.00 postpaid. Elliott Buchanan and Associates, Inc. 1067 Mandan Blvd. Oakland, Cal. 94610.

MODEL #32 KSR, can add perf, TD to make it an ASR, excellent shape, with stand, $315 in KSR configuration. Other RTTY, FAX stuff, list: free. G.E. White 5716 N. Kings Highway., Alexandria, Va. 22303.

WANTED: ASR Cabinets, KW Matchbox. For Sale; 28 sequence selectors, new, $25.00. TMC SFO-2 units $35.00. 28 type blocks, $10. VE3OR, C.B. Taylor 60 Pineglen Cres. Ottawa 12, Ontario, Canada.

DAYTON Hamvention April 26, 1969: Sponsored by Dayton Amateur Radio Association for the 18th year. Technical sessions, exhibits and hidden transmitter hunt. An interesting ladies program for XYL. For information watch ads or write Dayton Hamvention; Dept. R., Box 44, Dayton, Ohio, 45401.

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.

HARD TO GET 2BPI and 1Z2 tubes for URA type converters $16. pair. Boehme repeater, new $35. W3LST, 228 Plummer, Oil City, PA. 16301.

FOR SALE-ESTATE OF WA6JGI. 3 ea M-15TTY/sync motors/tables; 2 available at $75.00 each; 1 at $65.00. Will not ship. Bob Zachry 10772 Clarmon, Culver City, Calif. 90230. Phone 838-1766.

LARGE TT/L-2 DRAWING - 15x 30. $1.00 postpaid. Keith Petersen , W8SDZ, 1418 Genesee. Royal Oak, Mich. 48073. Phone 313-588-3991.

FOR SALE: ESTATE WA6JGI. Test equipment, low pass filters co-axial switches, Drake and Collins gear, Many more items. Write for list and prices. Howard Fasold, WA0VQM. 138 Palisade Cir., Manitou Springs, Col. 80829

QSL CARDS FOR RTTYers - Special designs 100 3-color $3.50 ppd. Mail 25¢ for samples, will be deducted from first order. W8LMO PRINT, 6344 Dubois Detroit, Michigan 48211

POCKET RUBBER STAMP - 3 lines and call letter. $1.00 postpaid. Guaranteed. Promotions. 6344 Dubois, Detroit, Mich. 48211.

ORDER: SIMPLEX AUTO-CR & LF kit for model 15 or 19 printers. Completely mechanical with instructions $7.50 pp. Robert Zalenka, W8TMO, 14446 Beach Rd., Fenton, Mi. 48430.

FRXD COMBINATION (typing reperforator and transmitter distributor) with synchronous motor. This is an exceptionally flexible unit combining reperforator, a reader and distributor on one base. All three units can be used separately or together, taking the place of reperforator and trans-distributor. Used with a model 15 page printer it will provide all of the functions of a model 19 with much more flexibility. See Feb. 1964 CQ for schematic and additional information, used, good condition. $32. ea.

LO-15 Teletypewriter send - rec. Mfg by Lorenz Corp. for Interlex and Teletype Corp. Most parts interchangeable with model 15. Teletypewriter European standard 65 wpm. This machine is a much later model than the model 15. Has a nice touch, quiet and smoother than the 15. Beautiful light green color, keyboard has white keytops. Excellent running condition, parts available -$80. each With Here -is attachement on keyboard add $10. Set of 60 wpm gears $5.00 Steel table with electrical box matching color, $15. each.

Send us your requirements for machines or parts. Atlantic Surplus Sales, 300 - 7th St., Brooklyn, N.Y. 11215

HAVE COLLINS F500B-14 mechanical filter to swap for F455J-15 or F500B-03; or sell for $35 plus postage. Sell Burnell S-7129 toroidal filter, 5 sections, 50 kHz center freq. 1500 hZ band width, $20. G.H. Goldstone, W8AP, 1010 Burnham Rd., Bloomfield Hills. Michigan 48013

WANTED MANUALS for Model 26 and FRXD. Also cover for FRXD-10 as shown in Feb. '64 CQ magazine. Sell or swap for RTTY gear two Motorola 5V 2 meter FM units. L.W. Petry, K9BJM, 704 Wilson Ave., Hoopeston, Illinois 60942.

RTTY RIBBON INK: Intense, highly legible black. Cheaper than replacing ribbons. Is it good? Ask any user. Big 2 ounces only $1.00. Marvin Cook, WA2RDO. 1992 Windsor Street, Westbury, N.Y. 11590

SWAP: Model 450R digital voltmeter, by NLS, with reference voltage source and manual. Good working condition, for Model 28 KSR, table top model. N.K. Thompson, 5 Palmer Gorham, N.H.

SALE: CV-57 with tech. manual., $75.00, Tektronix 513-D Scope, $150.00. Dual Trace Waterman UPM Portable Scope $60.00. CE-100 V Transmitter excellent $275.00. George Tate, 7 Artillery Road, Taylors, S.C. 29687"

FOR SALE; EXCELLENT 3 channel tape distributor (Teletype MXD, with TWX table 60 wpm and 7.42 (standard) code. Best offer. Robert Tanis, 1360 Kensington Dr., Ann Arbor, Michigan 48104

TOROID COILS 88mh uncased 5 for $2.00 postpaid. Lavon Zachry, P.O. Box 845, Apple Valley, Cal. 92307.

Additional Classified on Next Page