RTTY

K6OWQ

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NEWS OF AMATEUR RTTY

JANUARY, 1957
25 Cents
Vol. 5, No. 1

HORSE TRADES

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

FOR SALE—Model 12 with extra non sync and vacuum tube keyer W8DXM
TRADE—Gonset 2 meter communicator for 26 26 with table W4BUZ
FOR SALE—Model 12 (AC) with stand W7FNA
WANTED—Tape equipment, tape perf or typing reperf W6NKP
WANTED—Back issues of RTTY Vol 1 and 2. The New York Public Library, Preparation Division, Acquisition Branch, Fifth Avenue and 42nd Street, New York, N.Y.
FOR SALE—Terminal Unit for RTTY K6KHS
FOR SALE—Model 21-A with sync motor driven dist. Also Model 12 with table and sync motor, less keyboard very reasonable W2SDE
WANTED—Manual for O-5/FR Terminal W6BVQ
WANTED—Keyboard for model 14 .... W5JBW
FOR SALE—Type pallet Ø for model 26 $1.35 with keytop. Parts and repairs for RTTY gear W9GRW
FOR SALE—Bound volume four 1956 RTTY $5.00 Available soon .... RTTY

RTTY, Inc.
372 West Warren Way
Arcadia, Calif.
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Fourth Anniversary SS Contest

March, 1, 2, 1957

This years Anniversary SS contest will be a highlight of your RTTY operations for all times. Many new stations have been copied in the last weeks. Comments about the forthcoming costs run from, who will be top scorer to what states will be on. Is there a WAS for RTTY, etc. Several states which have been missing in past SS contest will be on this year. The Southeastern part of the country has been heard as well as Montana, Utah, Nebraska, Missouri and so on.

Eighty is open cross country most every evening, forty after dark continues to provide "land line circuits," twenty holds DX in person of ZL1WB. Fifteen should be there with the Seattle and Detroit gangs. Eleven is open for both AFSK and FSK. So regardless of what is your favorite band, you will find company and lots of good RTTY contacts. The contest preiod will run from Six PM EST on the 1st March, thru midnight of the 2nd March. This means for those strong hearted operators, there will be thirty hours of contest.

Scoring will ze, two points for a solid two way RTTY to RTTY QSO. Ik acknowledged reception one way scores only one point. The total scores obtained from QSO multiplied by the number of sections worked provides the Total score for this contest. The same station may be contacted on an additional band for extra score, however, the number of sections remains the same.

The contest exchange of messages should be in the regular message form. For an example see page ten of the January 1956 RTTY. Good luck and see you in the contest —30—

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and is published for the benefit of all RTTY Amateurs and Experimenters

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For Information Regarding the Society Contact the Following:

W6CLW—Ed Simmons
W6AEE—Merrill Swan
W6SCQ—Lewis Rogerson

For Traffic Net Information:
W6FLW W6IZJ

For "RTTY" Information:
W6CL W6DEO W6AEE

Instructions for Making Mark and Space Bandpass Filters Using 88 MH Telephone Type Toroids

By ROBERT H. WEITBRECHT, W9TCJ

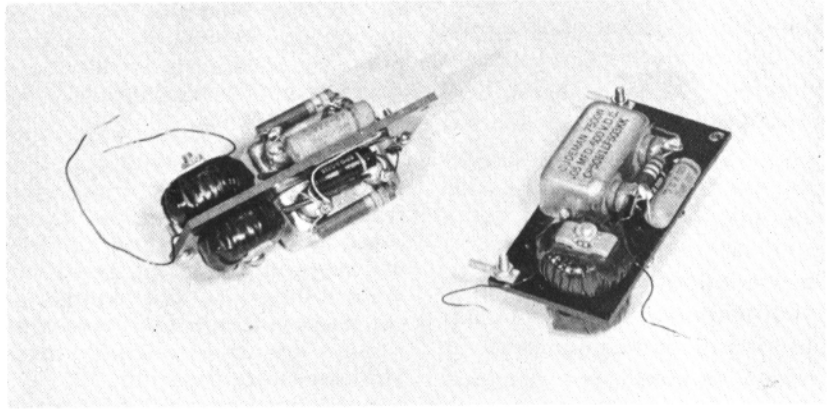
The 88 mh telephone toroids, available from a number of sources, have characteristics making them suitable for RTTY tone filter use. They come in one of two styles — potted with a pitch compound and encased, with terminals; or in "tin cans," five toroids packed to each can. The latter kind is, of course, preferred as then there is no pitch problem. Each toroid conists of two coils, and here in these applications both coils are connected in series as shown. Used in the below-given configurations these coils are of considerable utility for mark and space filters and will handle relatively high-levels of audio. As a matter of fact, resistance loading is used in the configurations to "spoil" the already-excessive "Q" of the toroids and thus tame them to a proper level. This results in flat-topped bandpass curves, the flat top being approximately 250 cycles wide at mark and space frequencies. The output impedance of each filter is relatively low, of the order of 20,000 ohms. Fed into a 6H6 rectifier-discriminator circuit, as much as 40 volts DC swing between mark and space frequencies is obtainable. An output transformer, of the plate-to-30 ohm line type, is employed to feed audio into both M and S filters directly from the audio output stage of the receiver (special application). Link coils are wrapped around input toroids of both filters for coupling to this output transformer. The output toroids feed into the 6H6 rectifiers. The above 40 volts DC swing was obtainable using an audio level input of about 5 volts RMS into the transformer.

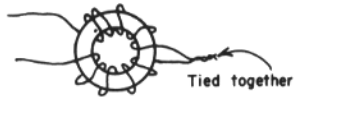
The basic configuration, shown in Figure 1, consists of two toroids, "L"; two resonating capacitors, "C"; a bandwidth capacitor, "Cc"; and two loading resistors, "R". The filter system is of the "pi" type and was selected from a list of several possible arrangements primarily because it is the only type that permit use of readily available one-valued toroid coils.

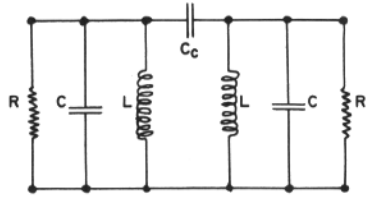
The tuneup procedure is as follows: Each toroid (both coils connected in series as indicated in the figure) is tuned up using one capacitor, "C", that will stay with the toroid. An audio oscillator, equipped for low impedance output, feeds into a one or two turn link wrapped around the coil being tuned up. The resonating capacitor, "C", is connected to the toroid coil itself, and finally an oscilloscope or AC VTVM is hooked on the toroid-capacitor combination to display output voltage levels. In this way, one readily determines the frequency of the "peak", or maximum response, which will be quite sharp, due to the high "Q" of the coil. For "C", use good quality paper capacitors such as bathtubs or tubulars only; no ceramics. During the tuneup, the toroid is "tuned" by removing a certain number of turns until it peaks at the correct frequency, to be given later. As many as ten or thirty turns will have to be removed, sometimes. Now, as we desire bandpass

filters, we determine upper limits of each bandwith and tune two toroids with their own capaictors, each LC individually to this upper-limit frequency. For the M and S frequencies, we desire 250 cycle bandwidths; hence the upper limit frequency is one-half 250, or 125 cps higher than 2125 cps. This becomes 2250 cps, the frequency to which two toroids with their respective capacitors are to be tuned using the above test setup. For space filter, the upper frequency is thus 3100 cps. Having calibrated four toroids; two for each frequency, we now install them in the above configuration. Addition of Cc, the coupling capacitor, to each filter setup automatically produces two peaks; one peak at the original tuneup frequency and the other lower in frequency. The "bandwidth" between the two peaks depends on the size of this Cc, and so we proportion it to obtain 250 cps bandwidth, for each filter.

Now, as we desire a flat-topped bandpass response, we add resistors to the configuration as shown above to load down the LC's enough to flatten the peaks to the midway valley. The values of C, Cc, and R are given below, and should serve to make up useable filters.







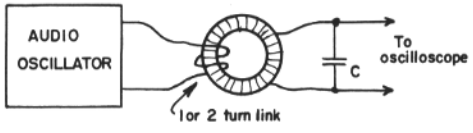


FIGURE 1.

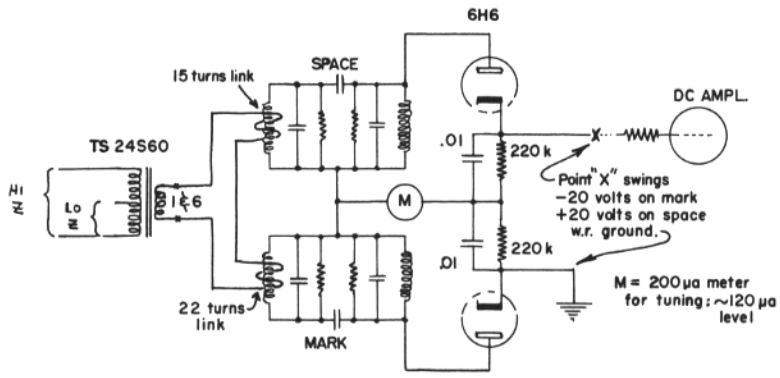


FIGURE 2.

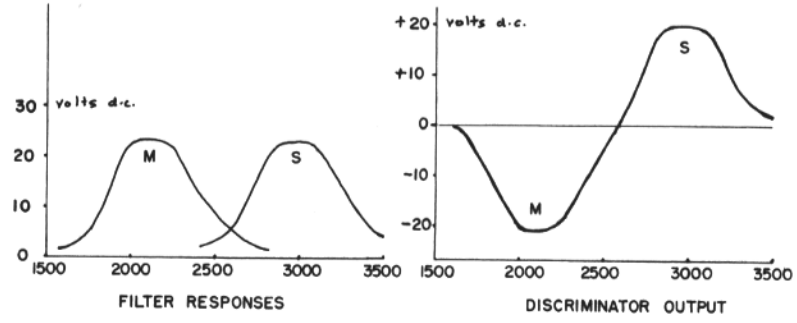


FIGURE 3.

For 2125 cps mark filter:

"C"	"Cc"	"R"
0.06 mfd	0.01 mfd	18,000 ohms

For 2975 cps space filter:

"C"	"Cc"	"R"
0.03 mfd	0.004 mfd	27,000 ohms

The Thordarson TS-24S60 output transformer is connected to the two filters thus made up. Some experiment will be necessary to equalize the resulting output voltages from both filters; for a starter, use 22 turns on the mark filter, and 15 turns on the space unit. Number 24 enameled wire is wrapped upon the taped-up toroids for these links, and after they are made, they are connected in series and to the 30-ohm (1 and 6) terminals of the transformer. Use blue and red wires for low impedance (about 600 ohms) or brown-blue leads for high impedance level. Try either and see which gives best match to the receiver audio in use.

The circuit, shown in Figure 2, is used in one W9TCJ terminal unit. With this setup, and having a voltmeter on the 6H6 diodes, and using an audio oscillator feeding into the transformer input, swing the oscillator through its range, keeping input level about 5 volts rms. One should now notice flat topped response curves from the discriminator readings on the meter. The link turns on either input toroid may bhave to be adjusted to equalize the mark and space voltage outputs; i.e. 20 volts negative for mark; and 20 volts positive for space, with reference to ground from point "X" in the figure. Figure 3 shows the discriminator characteristic thus obtained.

This circuit is used with a receiver that has AVC in use at all times, the latter then serving as amplitude regulator — somewhat same function as that of a limiter. However, the circuit could be and is desirably used with a limiter stage feeding into the above transformer. A suitable limiter is type 6V6 with screen operated at low voltage (controllable) so limiter saturates on a certain signal input to grid, or above that input level.

It may be mentioned that the use of link coupling into filters make for "ideal" free-swinging filter units that go up and down with the mark and space DC voltages as generated at the rectifiers. It has been found that use of coupling capacitors in place of links complicate the matter, thus tending to distort the DC waveform, and making tuneups more difficult. The use of transformer and links obviates this difficulty and makes for a smoothly working system. However, the filters themselves can be used with any kind of discriminator rectifier arrangement.

* * *

Here is a hint on the noise of a 26.

I found that the shock absorbers under the machine that rests in the four holes in the printer table top had lost some of their strength and had left the machine rest on the table top.

I took out the four bolts holding the shocks and installed a washer between the shock mount and the machine lifting it above the table top the thickness of the washer This stopped the table top from being used as a sounding board M

CCV

Harold S. Roth, 602 West Nebraska, Algona, Iowa — WØLFH

How Important Are Filters?

BRUCE MEYER, WØHZR

I should like to begin this dissertation with a word of praise for Rudy Couppez, our friend in Long Island, who has given so generously of his time to stir sluggish minds into serious thoughts about filters. Rudy has corresponded with many of us personally to offer the benefit of his many years of experience with machine communications. He has proposed several interesting systems suggestions. One of these, the "double-doubler" shift expansion principle as applied to amateur use, I believe he disclosed in 1953.

Rudy's recent article on filter bandwidth which stirred up such a storm of controversy was, I believe, entirely accurate *as far as it went*. However, that gentleman failed entirely to emphasize that component of RTTY communications with which we need be most concerned, namely QRM. Because of this, with apologies to Mr. Couppez, and with the encouragement of "eleventeen" active RTTY'ers I will state that the accurate squared-up reconstitution of the received signals by the democulator is the least of our problems.

The theories of filtering that Rudy has brought to our attention should be thoroughly studied by each of us who has not bothered to read the text books, but should certainly *not* be regarded as the *only* criteria of system performance. The fact of the matter is that optimum filtering depends on many factors, including signal-to-noise ratio, assymetrical distribution of energy in the pass band, type of noise, signal path characteristics, transient response of receiver circuits, etc.

What we must discover of course is that sometimes a narrow filter works better than a broad one, and sometimes not, *depending on conditions.*

Similar things are true about frequency shift. As far as we hams are concerned, there is not too much to be gained by any general adherence to narrow shift except conservation of bandwidth and the fact observed by WØBP and others that selective fading is not so selective as the shift approaches a minimum. It has been demonstrated by Rudy Couppez and others that shifts approaching zero frequency change, phase shifts for example, can quite adequately be used for radio communication, provided that the signal-to-noise ratio is good and provided that sufficient channel bandwidth is allowed to include the first order sidebands, (third harmonic of the dot-cycle frequency . . . about 70 cps). If the receiving terminal unit can reproduce the signals well enough so that the receiving distributor can correctly recognize the presence or polarity of each pulse within a character, the distortion of the pulses by elimination of "hi-fi" sidebands is of little consequence.

I believe that 850 cycle shift, while not crowding the art, is perfectly acceptable as a practical working value. (It makes it easy for us to use sloppy filters and still get results.) Also it makes it possible to duck QRM by treating either the mark or space channel as an MAB signal for the duration of the interference.

There is no good reason why shifts as low as 45 cps cannot successfully be used. Of course with narrow shifts the filters become tougher to build and the frequency stability of receiver and transmitter become very important. Below about 45 cps shift, (twice the dot-cycle rate), we get serious degradation of the signal caused by sideband overlap and cancellations of specific sideband com-

(Continued on Page 10)

Results of RTTY SS November 2 and 3, 1956

The November contest was enjoyed by a larger group than in any past RTTY contests. Logs for all contestants have not been received as this is being written early in December.

Top honors again go to Jim Hepburn, VE7KX at Lulu Island, B.C. Jim's total score was 5,550 points, which is an all time high. Thirty seven sections were worked with 150 points.

Next highest score went to Slipper, Floyd Ziehl, W2RUI, Lockport, N. Y. with thirty two sections and 136 points.

Shown below are those contest logs received at RTTY. Two other items of special interest are, first we had our first XYL SS contest operator, Mary Schultz, K6OWQ. Second Our first DX RTTY SS contester, ZL1WB, Bruce Rowlings, Onerahi, Whangerei, Northland, New Zealand. Due to his being authorized for FSK only he worked five sections with 14 points for a score of 70 points on a two way basis. He also submitted his log, showing stations received only as 13 sections and 17 points for a receiving score of 221 points. Your editor can remember earlier SS (RTTY) when this would have been a good two way score. Bruce has shown what can be done receing only, how about some of you RTTYers who are still copying only?

Station Call	*Sec.*	*Pts.*	*Score*
VE7KX	37	150	5550
W2RUI	32	136	4452
WOBP	30	138	4140
W2JAV	27	139	3753
W9TCJ	27	133	3591
W6MTJ	27	131	3537
W9PRO	27	128	3456
W2TKO	26	127	3302
W3PYW	25	109	2725
W6AEE	24	84	2016
W1BDI	23	67	1541
W9GRK	17	86	1462
WOFQW	20	72	1440
WOWRO	20	70	1400
W8LEX	19	70	1330
W9ZBK	20	64	1280
W6WIS	18	68	1224
K2USA	17	59	1003
W1AW	17	56	952
W6CG	17	44	918
W1WEW	19	48	912
W9BMV	16	56	896
W6CQI	17	50	850
W5JBW	15	46	690
W3KYR	13	40	520
KØWCM	12	32	384
W7HJC	13	28	364
ZL1WB—Recv. only	13	17	221
W3CRO	9	24	216
K6OWQ (XYL OPR)	9	20	180
W7CGA	7	22	154
W6CGF	8	18	144
W4FHU	6	14	84
W7CSC	5	14	70
ZL1WB—Two way	5	14	70
VE3GL	3	6	18
K6PNW	2	6	12
W6HIF	2	4	8

Coming, March issue of RTTY will be a special Minneapolis Minnesota Issue. Early reading indicated this to be another FB one. Remember the Bar Area's December 1956 issue?

Note that RTTY, INC. has moved to 372 Warrem Way, Arcadia, California. Also note the date below your mailing address which show date at which your RTTY Subscription expires. We will mail two issues beyond expiration date. Ed.

* * *

W8FYX de WØBP Minneapolis . . . Well it came back again . . . the fuzzy sound and I checked the range and the lower range is gone . . . It does not print below fifty when the note is fuzzy!!! Have to set the range very high to print you properly when that funny sound comes on your keying . . . kinda like an echo . . . more probably contact bounce . . . What kind of Diode Keyers are you using??? Are you using a tube modulator like a 6H6 to FSK or are you trying to use crystal diodes to FSK with?? Whats the dope on that?? Heard a station againg but still dont know who . . . Well would stick with you if not so sleepy and if could help . . . So whats the dope on the keyer tube using!!! W8FYX DE WØBP K K K K K

* * *

T LØBP DE W8FYX in Michigan OK Beep The keyer tube is a 6C4 6CR XXXX 6C4 6C4 and the thing is located right as close to the VFO as I could get it . . . DC drive to the grid and the plate is hooked to the grid circuit of the VFO . . .

Not much RTTY news up here VE7-AOC has his own machine now and is on two meters VE7AIK is on with low power exciter and VE7DV still on the way threatens to send his TU over here

Be seeing you on the air

73 Jim VE7KX

* * *

Tony W1YNC (sophomore at Storrs conn) dropped in for a week end and helped Chuck in the rtty ss . . . guess they did pretty well . . . without them I would have had no Conn contact If ear. hi.

VG73 Ed. W1BDI

* * *

Many thanks for info on Bruce, ZL1WB but have already worked Bruce the day before . . .

On November 20 at 1 AM our time had an hour and half QSO with Bruce on 14,125KC . . Bruce was copying me solid and I was getting fair copy from Bruce . . His sigs were very good, about S8 however he seemed to be having some troubles with RF in his polar relay . . Seemed to get extra characters thrown in now and then . . Believe this should be the *longest ham RTTY QSO on record* . . Hi I means DX wise . .

Fine on your trip east next March . . Sure hope they (the NY boys) can arrange something at time of IRE Show such as has been done in past several years . . W1BGW

WX here tonut is cold with temp about 8 above zero a couple of hour ago when I came home from work . . . So back to you Merrill . . W6AEE W6AEE DE WOPXJ Omaha Nebr K K

* * *

First off, I received a very wonderful letter from Bruce ZL1WB and from what he says, I can imgaine that he is one red-hot RTTY'er and it sure makes me feel bad to know that he is not in a position to have some place like "Bond Street" next place to him. In other words radio parts are very hard to get "Down Under" especially special items such as machines and neon lamps (, NE2)

In case you have not got the news, apparently the ZL hams now have FSK privileges on all bands except 14 and 21 MC.

37ØØ-38ØØ KC
71ØØ-72ØØ KC
2696Ø-2723Ø KC
29ØØØ-297ØØ KC de W9TCJ

* * *

Stations worked by ZLIWB (using MAB) up to Dec 11/56.

WOBP / W9DPY / W6AEE / W6CG / K6OWQ / W6WIS / W6FDJ / W6NYF / W6LDF / W97CJ / W1BGW / WEJAV / WOWRO / W5HZF / W3PYW / VE7KX

Total ocntacts forty-six (46) ince Sept 6/56.

de Bruce ZL1WB

(Continued from page 7)

ponents carrying useful energy. On the other hand, with very narrow shifts, phase rather than frequency is the animal to watch if you wish to extract the intelligence from the signal. Phase is tough to work with in a non-synchronous system such as start-stop telegraphy, but phase-comparison circuits offer additional tools for the experimenter and new concepts to which he really ought to educate himself.

I most firmly believe that we amateurs would be foolish to standardize on shift except where needed for communications net use. It is too early. A standard shift is primarily a convenience based on ease of measurement or ease of filter procurement. Comparison of shift to some readily available stable frequencies such as 60 cycle power or WWV tones is attractive and should be used to enable you to know what amount you are shifting, but shouldn't confine you to magic multiples of round numbers, or any other numbers.

As regards the number of cycles per pulse in the telegraph code signal, it really doesn't matter particularly. Two cycles is plenty if you use post-detection filtering. Most of us use forty or more cycles if we use 2125 and 2975 cps as our filtered tones. Here again the choice is largely a matter of convenience. There is one consideration here which is worthy of discussion, however. It is the matter of harmonics of the lower tone lying in the passband of the upper tone filter. Obviously when both tones lie in the 2000 to 3000 cycle band, no such disagreeable harmonic relationships are possible.

If all of us would experiment on the air with various shifts, and publish the results of these experiments so that others could add their thoughts and observations, we would surely make quick headway toward finding out when and if certain shifts are better than others. By the way, on-the-air testing is the *only* way we can guarantee that we have included in our tests all those conditions peculiar to amateur band operation.

A common failing of theorists is that although their calculations may be faultless, all the data are not in place when the crank of calculation is turned. This naturally leads to inconclusive conclusions. So don't feel badly about being branded a TINKERER. We all have times of discouragement. Really, the difference between the amateur experimenter and the dyed-in-the-wool scientist insofar as end results are conserned seems rather inconsequential. So go enjoy yourself, and good hunting!

RTTY Breakfast A.R.R.L. National Convention — San Francisco

W 6 A E E
(with Mail all answered) Photo's W9TCJ