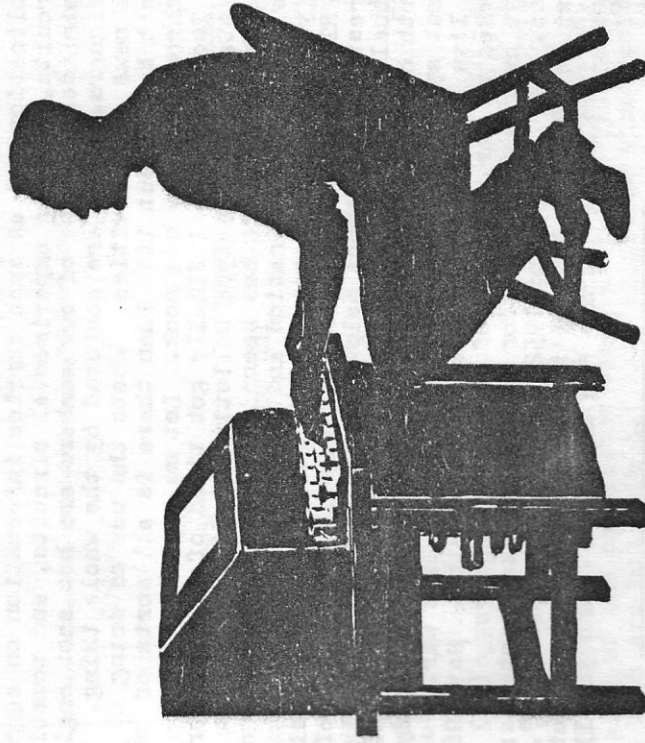


Amateur Radio

Teletype

Bulletin No. 24



June 1953

RETURN POSTAGE GUARANTEED

Amateur Radio Teletype Society

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WELCOME

This issue of the Bulletin may be the introduction to RTTY for some of you. For your benefit I would like to explain a few things. First I'll institutionalize a bit, telling you that amateur teletype is a very special branch of ham radio. It is not difficult to understand if you are interested enough to read the available information and to ask questions of those who might know the answers without being afraid of showing your lack of knowledge.

The men that are on the air on RTTY are, almost without exception, a rare selection of interesting, intelligent persons. You will, as you get to know them, find that for some reason RTTY allows character to come through far more quickly and easily than it does on phone or c.w. Then there is the thrill of hooking all that stuff together and watching words and sentences come clanking out; someone talking to you!

There is no great difficulty to getting on the air. Printers are available, converters are easy to build. And that is all you need! Sure, you can make up excuses and remain on the outside. That's easy. It costs too much. It takes too much time. I haven't room. Etc. Who are you fooling?

As you read through this Bulletin you will soon notice that it is not designed for the neophyte. This is a monthly publication and as such carries information on commercial circuits, amateur experimental circuits, and sometimes just plain ideas. Some of our members are hot shot engineers and designers. Some are confused by the whole thing. There is the news of activities. What's the use of doing it if you can't brag about it? Then there is all sorts of trivia that I throw in on my own hook. Let me explain.

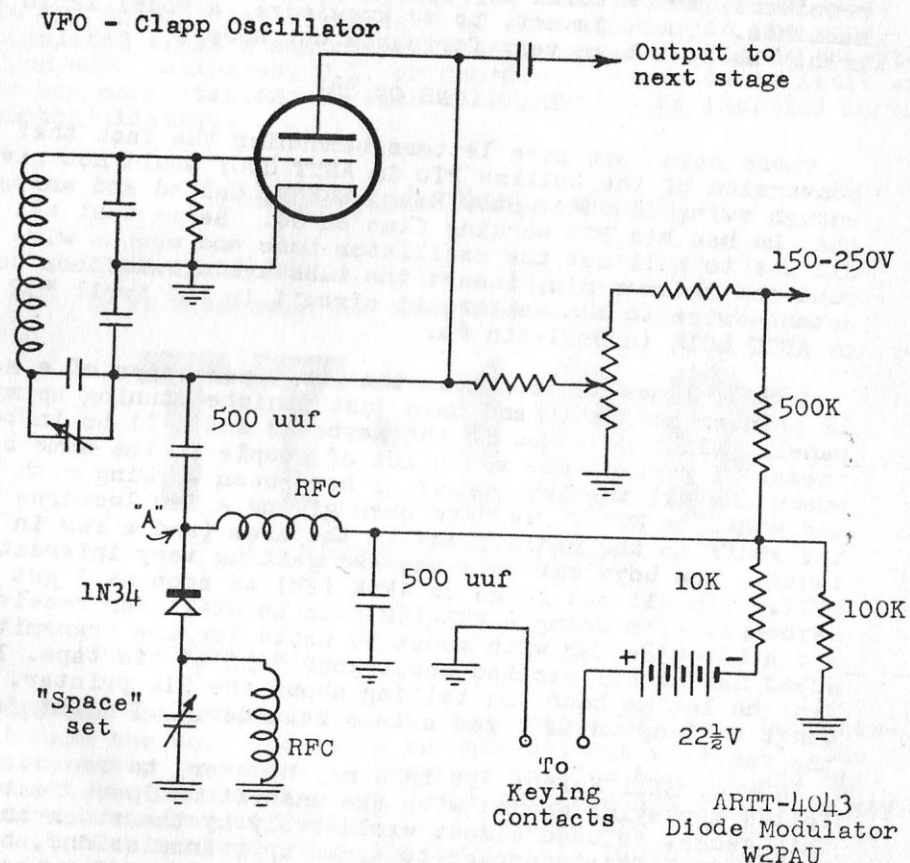
Two years ago I finally got tired of waiting for someone to start up a teletype bulletin and did it myself. My feeling from the start has been: if what I write does not have the stamp of imagination and originality on it I have failed. As you will note later in this Bulletin I do not always stick to RTTY. There are so many things in this world of vast interest that I cannot help but mention them from time to time. Actually I have been the model of constraint in not pouring forth on many more subjects. I have a hundred ready stories about my submarine war patrols in the last war.

I've been pretty active on the air too. Have 98 countries worked so far, with 32 of them on 75 meters. (All phone) Have awards from ARRL for the Sweepstakes contests: 1941, 1946, 1947, 1949, and 1952. DX Contest award 1947. VHF Contest in 1948. I like DX'ing, rag-chewing, VHF, but best of all I like RTTY. It has 'em all beat. And you'll think so too.

VE2AGF and Lou Buck put on a radioteletype demonstration at the local radio club recently and report that there was a fine turnout, everything worked smoothly, and the interest was very high. Judging from the number of fellows getting on up in Montreal they are doing a fine job of selling RTTY.

W2DXD, Bill Auld, last heard from somewhere in India going after his DX personally, will have a full set of tape gear when he gets back and airs himself.

Here is a modification of the diode modulator which offers several advantages. It permits the use of a grounded condenser for determining the frequency shift. It provides mark-high signals without a relay. It bangs the diode from fully conducting to fully cutoff which avoids some of the problems of inconsistent shifting. The only drawback, and that a minor one, is the use of a battery. Since the battery can be quite small and will give approximately full shelf life there should be little lost sleep over it.



The 500 uuf d.c. blocking condenser may be connected to either side of the oscillator tuned circuit. This condenser and the 1N34 are hot with r.f. and should be wired accordingly. The value of the "space" set condenser will depend upon the stiffness of your oscillator. The voltage from point "A" to ground should be very low on "space", less than one volt; On "mark" it should be about 20 volts negative. If it isn't, reverse the diode or replace it. The RFC are the R-100 or similar type RF chokes.

W3RHX, Stu Moore: "I take the D.C. bar exams this June - the end of four years of night school (law)... So all the available time now goes into the bar studies. Incidentally, I am moving to NYC around July 1st, permanently, and will be a patent attorney with the Sylvania Corporation offices then. Expect to bring my 15 years accumulation of gear with me plus hi-fi gadgetry. Now tell me, where does one erect a 132' antenna in that New York madhouse? ((T'ain't easy...wg))"

W8HP, Walt Williams, adds to GLS's info: "There are three of us on two meters with crystal controlled transmitters and receivers, and a total of nine in the area who have model 26 machines. There is not, to my knowledge, a Model 12 in the area! We have been very fortunate out here."

THE COLLINS ON 80!

There have been more letters bemoaning the fact that the conversion of the Collins PTO in ARTT 4007 would not give enough swing on 80M. Stew Haag, W4MOP, called and announced that he had his PTO working fine on 80. Seems that all he did was to pull out the oscillator tube and wrap a wire around the cathode pin, insert the tube again, and hook the cathode wire to the Weibrecht circuit in the April '52 CQ or ARTT 4014 in Bulletin #6.

W8HCD, James Shupe, "I am the proud possessor of a Model 12 printer and table and have just finished tuning up my panel. All I need now is the keyboard and I'll be in business. I guess there are a lot of people in the same boat, where are all the keyboards? I have been working with W8PTF and W8BAJ on RTTY. We have been giving a few lectures on the stuff to the radio clubs in the area (and a few in Indiana). The boys out this way are getting very interested in RTTY. I'm all set to go on AFSK (2M) as soon as I get the keyboard. I'm using a VHF-152 into an SX-71 for receiving and a 6J6-832-829B with about 90 watts for the transmitter. W8BAJ has me all excited about your "QSO's" via tape. In fact he let me hear you talking about the 21A printer. It won't be long until I get a tape recorder....I might join the fun."

W9HXW, Bill Soich: "It irks me, however, to see so many fellas monkeying around with the unshift on Space feature. This gadget is used almost exclusively by the stock brokers and press. It's supposed to speed up transmissions, but heck, we are not concerned with this; at least for the time being. I would suggest that everyone dispense with it entirely. This would facilitate matters greatly, particularly for those who don't have it."

W1NBP, Archie, recently acquired the complete RTTY gear of W2TDV and will be with us on 40 and 80 soon. TDV, I suspect, got discouraged about the FCC not permitting operation of the two meter repeater station atop the NYC Municipal Building which was installed over two years ago, tested, found to work excellently, and then never OK'ed by the FCC. The FCC is still hemming and hawing over it. Maybe the next generation will be able to get that one through.

THE SCOREBOARD

Being a certified lover of contests, it is only natural that some sort of competition should raise its ugly head for the RTTY department. Besides, other departments in CQ and QST have their scoreboards. No reason to be chicken. The Certificate which was mentioned in Bulletin 23 furnishes a fine excuse for a scoreboard. So....please send in for publication in the Bulletin and CQ a list of the stations that you have worked on two-way RTTY on any bands. The certificate will require 100 acknowledgments, either QSL card or printer, each of which must state the time, date, and band used for the contact, as well as specifying that teletype was used. To try to even the advantages of those living in the more populated areas a maximum of twenty contacts will be accepted from each call area, U.S. or Canadian. There is no limit as to how many stations in each call area can be included in the monthly listing.

Amateur Radio Teletype Society

This is to Certify that.....
has established contact with 100 different Amateur Teletype Stations.

TT-100

Certificate of Achievement

Certificate Number..... Awarded.....

W9UAU has tried to call in on 80 a couple of times but doesn't have the soup necessary to make it. Doc writes, "...the entire setup is a maze of haywire; have to hook up and disconnect two clipleads, flip three switches and close the key before I can get on FSK and then reverse the process to receive." Doc mentions that the 426½ cycle tuning forks are made by Clay-Adams Co., 141 East 25th Street, New York 10, N.Y. and they run about \$2 each. If you have a business you might be able to order them direct; if not John, W2BFD, can probably scare one up for you. Doc also mentions that he has a source of teletype ribbons at \$12 a dozen. Doc has been fighting the war of nerves with some CW men who chase him around 80 and send V's, as have most of the rest of us, and is about ready to throw in the sponge and bring in a 600 watt rig to try to even the score a bit...."Have been trying to talk the XYL into getting me a Collins receiver for my birthday, but I doubt that I will get one as she has quite a marked allergy to radio. The bug seems to have bitten her but developed an immunity rather than a take."

FLIP-FLOPS VS. POLAR RELAYS

There has been a spirited discussion for some time anent flip-flop circuits vs. polar relays. It is probably high time to lay this monster to rest by giving you both sides of the argument. I was very much in favor of the f-f over the p-r until I suddenly ran into a couple batches of relays and had plenty of p-r's on hand. Anyway, here is what John had to say on the matter:

"Now let's straighten out this business of polar relays vs. flip-flops! I am NOT agin' flip-flops or trigger circuits at all. I merely feel that, if you were trying to convince a new-comer by stating he could build a least-common-denominator-panel and thus persuade him to get into RTTY, your chances would be better if you put a polar relay in the drawing you would make for him.

"On two meters, where one rarely hears of trouble from contact clicks, one polar relay takes the place of a tube-plus-other-components. You would find difficulty convincing some newcomers that flip-flop theory is simple. Certainly there is little to choose between the operation of a polar relay and a flip-flop with proper time constants in operation except when noise reduction becomes important. The chap who builds a vacuum-tube keyer might as well install the flip-flop as it adds little more to the picture.

"Regarding the short-duration noise pulses which make a rapid reversal of polarity, momentarily, in the output of the mark-space diode circuit; you CAN cure this by increasing the size of the diode load bypass condensers ----- at the expense of added distortion in the 22 c.p.s. teletype signal.

"If these condensers were greatly increased you would reach a limit where only the fundamental 22 c.p.s. keying frequency would be present in the output. Such "sine-wave" keying would produce a very poor orientation range in the printer mechanism (which is theoretically supposed to sample the central fifth of each impulse, but which samples other portions when propagation conditions vary). In commercial practice it is customary to transmit the fundamental and third harmonic so that a reasonable approach to "square-wave" keying results.

"FSK is capable of transmitting very-near square-wave signals, and FSK receiving gear can tolerate more signal distortion than make-break method. To get the kind of rejection needed to eliminate sharp interfering pulses you need a "bypass" condenser for the diode load resistor having absolutely zero effect on the fundamental and third harmonics of the signal (22 c.p.s.) and short circuiting any higher frequencies. In essence then, what is needed is a low-pass filter, cutting off above the third harmonic, and is precisely what is used commercially almost without exception. There has been no reference, in amateur articles, to this need for a low-pass filter following the discriminator. Considering the simplicity of the filter and the fact that the cutoff frequency does not have any sacred value it is surprising that there has been no use made of the idea. The filter should have a characteristic impedance approximately equal to the diode load impedance at the frequencies involved and the values of inductance work out, in practice, to be very conveniently obtained from old audio transformers by

fiddling with the air-gap a bit.

"Thus I concede, I concur heartily, that a flip-flop plus low-pass filter is the equal (maybe superior) operationally to a polar relay, but it will never be as simple or quick-and-dirty. The low-pass filter can be used in conjunction with a polar relay giving even better performance.

"When you get around to vacuum-tube keyers and single-magnet printers you have a situation which favors the flip-flop. An ideal single-magnet printer setup would be a diode circuit feeding a low-pass filter, flip-flop and a cathode-follower type of power stage. The single printer magnet would be in the cathode of the power stage so that, if necessary, the "panel" could feed into a grounded telegraph line in an emergency (or even a single wire and return through real ground for a ham-station remote printer). Putting the printer magnet in the plate circuit either requires (1) that an extra power supply free from grounds be used for line-battery or (2) a two-wire line be used (metallic circuit).

"One advantage of a flip-flop which has been neglected is brought out in commercial equipment such as the Navy "FRA" unit. That is you can use condenser coupling from the diode circuit to the flip-flop instead of d.c. coupling. This permits the teletype signal to drift slowly out of tune without messing up the copy as the transitions are the only important thing here. However you immediately have to put in a "mark-hold" circuit to take care of the situation where the distant station is on steady mark and a short pulse of spacing noise flips the flip-flop to spacing.

"So, I believe we have the records straight about how I feel about electronic flip-flops! Disregarding such factors as clicks, I think that the signal from the contacts of the polar relay is as acceptable to the printer as the signal from the flip-flop (and verse-vica)."

MODEL 25 PRINTERS

John also mentions that there are quite a few Model 25 printers available for the same price (about) as the 21A. The 25 is a strip printer almost identical with the 21A, however there are differences (as the French say: Viva La Difference). The 25's are brand spanking new! But, and here is the catch, they are six unit printers. There is not much difficulty in converting one into a Model 21A and we will have more data on that procedure for you. Quite a few of the fellows are buying one each 21A and 25 and then they end up with a brand new 21A.

WLHOD, Al Webb, is having noise from his Model 12 and finally has decided that a VT keyer is in order. As he says: "...the local spark noise is terrific and makes for some original copy, if nothing else." Al is looking for 4-125A's. "Have some friends in G.E. Electronic tube manufacture but it appears that Eimac or RCA makes the tube despite the G.E. label and sales literature. Part of the swap business that all major tube manufacturers enter into in the interest of all..."

THE KARLSON ENCLOSURE

It may come as a surprise to many of you, but not all of my time is spent on RTTY, only most of it. With most of the remainder I have been promoting the Karlson Ultra-Fidelity loudspeaker enclosure for hi-fi systems. This endeavor has been undertaken with practically no funds and has progressed a bit slowly as a result. Actually we have accomplished the impossible. There are many different designs of enclosures on the market and new ones are appearing every few weeks. On the face of it one might suppose that we were selling just another enclosure. This, of course, is not the case. The Karlson enclosure will take an ordinary good coaxial speaker and with it outperform anything ever before built at any price. It is astounding to the hard-bitten engineers in the field who know definitely that the results we get are impossible. The secret is a completely new type of loading method, a non-resonant chamber.

Several stores have become interested in the Karlson now and are selling them as fast as we can build them. We have just completed setting up a new assembly line of the units and are taking on representatives all over the country to help us get the Karlson into more stores. You can now see it in the Terminal Radio catalog, Sun Radio, and Asco catalogs. As we sell more and more of the enclosures we build up a larger collection of testimonials. If you are interested in more dope about it I will be glad to send you a reprint of an article that appeared in Audio Engineering. Also look for an article on it soon in Radio News.

W6OWP, Bart, is still interested in the possibilities of make/break RTTY and is looking for someone in the east who would like to conduct some experiments and exchange ideas. Bart reports that there is quite an active western area traffic net on 3620 (this is news to ARRL), but that there were plenty of adjacent frequencies for QSY'ing if any activity had been there RTTY-wise. Most of the activity there has been on 40, and that primarily during the daylight hours when QRM was less and static less. Bart spent about twelve hours on 14340 with no results. He reports quite a bit of phone QRM from DX stations and thinks the lower part of the band might be better. He also mentions that 7088 has not been nearly as satisfactory as 7140 due to the heavier c.w. QRM lower in the band and to the vigilance of the c.w. jamming crew which seems to be working on the lower frequency. As to technical problems: "Immediately apparent has been the need for FSK conversion gear capable of printing on lower signal-to-noise ratios....absolute need for diversity reception on certain types of fading which can affect signals peaking at S-9....importance of eliminating hash from the printer equipment while receiving. I know that I'm not the only one who is thinking of new circuits to improve FSK reception. It will be most interesting to follow developments along this line." Bart mentioned also, "...the first eastern signal printed here, as well as the first and only Canadian so far, was VE2AKT, Montreal, whose CQ on 2/21 was vigorously answered but no contact established." Bart has also been copying W2NSD out there on 80M.

*Amateur Radio
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By golly, this issue of the Bulletin fills out two full years of publishing. I've griped and grumbled a lot, I know, and I apologize. I've tried to treat you as a friend and not gone beating around the bush too much. The old proverb about not being able to please all of the people all of the time took quite a while to really sink in, but I think it has now as you may notice in this issue of the Bulletin which dares to print non-radio information. You see, the Bulletin has largely been a personal communication medium between you and me. I could have kept it cold and impersonal, writing it more like a magazine, but would it have held your interest this long if I had? The main reason for the Bulletin was my interest in amateur teletype which I wanted to share with more people. This has worked out better than I had hoped. It is only natural then that some of my other interests should find their way into this Bulletin. For instance, my interest in the workings of the mind. It struck me that under hypnosis people could demonstrate fantastic feats of strength, hearing, seeing, feeling, remembering; that some people have either natural or developed abilities to do remarkable things, singing, playing the piano, composing, mathematics, remembering, etc. Now, if certain people can do these why can't everyone? After a couple years of research on this notion it seems very sure that anyone can. The whole subject is no simpler, nor more complex, than radio teletype, therefore I cannot, in any restricted space such as this, plunge into it. People who have been working on the problem seriously have become "optimum." They have perfect memories, their emotions are under complete control, though they are warm and friendly; they do not have accidents or illnesses; they have complete control and awareness of their own bodies; and they all say, "You can do this too."

Now I realize that most of the fellows reading the above will get sort of glazed eyes and neither see or understand what was said. This is as it should be. Let me draw a parallel. You can, as I have many times, get in a roundtable on 75 meters and mention RTTY briefly. Most of the fellows in the QSO will not hear you, forget what you said, or just ignore the TT mention. But usually one fellow will perk up his ears and ask for more information. This fellow, properly nurtured, will soon be on the air on RTTY.

So it is with Dianetics. I won't go into now, for I don't want to lose your attention. Have I your attention? In the future I will occasionally touch on some of the facets of this interesting field. Might be I could even get someone else to say something on the subject. W6TD, W8BAJ, or W7MWZ may. So may W2ZGU, W2MUP, and W200G.

THE INSIDE STORY

Guess I am just a salesman at heart. I've been selling RTTY, high-fidelity, and psychology; all of the things that I find interesting and fascinating I've been selling to you. There are a lot of things that I haven't gone into yet too. Most of the time I have been severely limited by the space available in the Bulletin and have barely been able to cram all of the TT news into the eight pages.

The hundreds of letters and cards of praise and encouragement that have come in make me feel that overall I have been doing the right thing.

Please keep in mind when you read something you like or don't like in the Bulletin or in CQ that I am just a fellow sitting in the middle of Brooklyn at his typewriter. Thanks.

BULLETIN 25

The next issue of the Bulletin will feature one of the most astounding converter circuits you have ever seen. This converter will give full polar output with shifts of frequency as little as two cycles, requires no special tuned filters, and has many other fantastic features. This is one circuit that everybody will be building. Whatever you do don't miss Bulletin 25.

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Most of the subscriptions to the Bulletin end with this issue. If your subscription has run out you will find an addressed stamped envelope with this issue of the Bulletin. All you have to do is put \$3 (three dollars) in the envelope (cash - check - money order) and mail it. The envelope has your call letters on it so that I can keep the books straight. The more subscriptions there are to the Bulletin the better Bulletin that can be put out, so every subscription is important. Don't miss out by ordering after they are all gone.

W8BAJ, Jim Morrisett (Dayton): "Well, the Hamvention was pretty good, I guess. Rube (W8PTF) gave a TT demonstration and lecture, and the etc. was the usual sort of etc. Would have been a 1000% bigger bang-up success if I would have won the Collins 75A3. Dirty shame. Didn't win any of the lesser prizes either, not even the lil ol 807's, so I carried home a whole carton of Merit Transformer Corp. book-matches. But I hardly ever use matches. Could use them to burn up my ticket stub..... I'm engaged in a long-range project of giving up all my worldly possessions, so's to have left, in 50-100 years or so, just the corpse, which I hope to shuck gracefully. So, I'm in a tractable state of mind for sacrificing the pleasures etc. of RTTY, especially in exchange for nice, portable, money. See what I mean? (Jim's gear has been slow in delivery) However, if gear is available soon (immediately), I might consider playing around with it now and dispensing with it later. If there seems to be a possibility of reliable communications with W2NSD and other Enlightened Ones."

W1UHE, Norman Patenaude, has a printer on order from John and has in the meantime completed his receiving converter and VT keyer. Norman will move into the new house he has been building for the last year and a half this fall. It is in a fine VHF location, being 265' above sea level. He is interested in working 220 and 435 mc TT if he can raise any other local interest. Any takers?

VE2ANM, Albert Malumed, reports that he is all set to go on the transmitting end but still needs some filters before the converter will convert.

W9EQF, Tom McBride, is also abuilding his converter. He is going to try toroids first though and see how they work. He has arranged it so that the units are plug-in for ease of experimenting.

W8MO, Theodore Stahl, got hold of some printers recently real economically, a 21A and a 25A. Ted is looking around now for a Model 12 or 26.

W9SPT, George Boyd, says, "Got tired of trying to stabilize the 'gypsy' in the HQ-129X, so I decided to build up another, Clapp, doubler-buffer, stabilization of voltage, etc.; the works. Progress disgustingly slow; not even the metal-work is done. Ought to be mechanically stable though since it is made of 0.064 brass and up. Trying to work brass sure makes me wish for a good brake, but - have you looked at the prices of things like that? Would never have enough dough left for RTTY if I bought all the tools I want and think I need.....Bob, W9JBT, and I went out to Rockford (Ill) last Sunday afternoon to look over Doc's stuff (W9UAU). He sure has the equipment lined up! Worked a W8 who had just come on the day before....Saw you (W2NSD) on a little later, but we were leaving for the trip back home and didn't stop to work you. We were holding Doc up from dinner by that time anyway.Wonder if any ideas for a receiving distributor have passed over your desk by this time? (Many) Mechanical or electronic, it makes little difference to me, though the electronic looks like quite an undertaking. Bob and I have milled it over, and when it got up to about 15 tubes including keyer tubes we kinda gave it up.....Notice that TT haters have found that parking on the space frequency will kick up quite a fuss. Might be a good idea for the RTTY'ers to put in reversing switches on both transmit and receive."

Major Long, Chief MARS, writes: "The MARS (Army) program is interested in encouraging amateur radio teletypewriter enthusiasts. We plan to announce a net operating on MARS frequencies in the near future."

NETS: Quite a few of the larger conglomerate round-tables make you tune your receiver all over the place. Why not all park on one frequency? This could be easily accomplished if each time a new station calls in the next station to transmit would send the letters "QZB." This would mean "Zero-Beat," and would be followed by about 20 seconds of mark signal so that all of the VFO's and Xtal oscillators could be touched up to the channel.

W8PTF, Rube, now has a model 26. He has installed FSK in his HT-18 exciter and needs only a good final for it to be heard. Rube will have his two 12's in service with other local hams. Looks like the Dayton area will be really active from now on.

W7IHI, Ken Caplan, has been all tied up with business and such. He plans to blow the dust off the Model 12 now and see what he can do to catch up with the rest of us.

W9ABC, Bill Lill; "About four months ago I first heard of RTTY and it just seemed like I couldn't think of anything else. I began to search through all the CQ's and QST's to learn all that I could about this new and refreshing phase of our hobby. Just to show you how much I am interested in it, I couldn't even type at the time, so I got a book from the library and with a little practice my typing speed is up to about 20 wpm (touch system too)." ((hmmm, it would be a good thing if some of the fellows that are on the air would put in some time learning to type. That long wait while the other fellow finds the key he wants to hit is excruciating. But then, I too am a Hunt & Peckist.))

W1BGW, Jack Berman, recently acquired a 75A2 and certainly appreciates the stability for TT after chasing stations up and down the dial of the old receiver as they drifted. Looks like he is going to invest in a Collins 310B-1 exciter too. Jack thinks we should stick to the 3620 frequency. As one of its principle users he should know. He likes the idea of the TT-100 certificate (and may be one of the first winners if he keeps up the good work). He is not taken with the idea of having to have the time and date on the submitted copy for the certificate though.

ANTAGONISM

ARRL has been right cooperative with us lately. But the ball is in other hands and still being eagerly carried. A recent newsletter put out by Dave Middleton, W5CA, had a long letter from W6OWP in it lambasting RTTY. His letter has been reprinted, along with several others even more vitriolic, in the May issue of Midwest Clixs put out by W0KXL. These letters complain bitterly of the QRM on and about 3620 to traffic nets. They suggest that TT be kept below 3510 or above 3750, etc. Through sarcasm, citation of special cases and emotion whipping phrases this little band grinds merrily away at us. They accuse RTTY of having no personal contact. They think we are machines. There is no slightest hint of any conception of working with us, any sharing of channels, only getting rid of us. Even though most of the TT gang are c.w. men RTTY is considered foreign and thus fair play for the full gamut of bigoted reactions. So, there is the situation. What can we do to improve it? Perhaps some letters from the RTTY operators explaining why they like TT, and unclouding some of the misunderstandings would help if published in CQ. I'll print 'em if you write 'em.

How about a letter?

THE ORIGINAL METHOD EMPLOYED TO FREQUENCY-SHIFT KEY AN AUDIO SUB-CARRIER FOR AMATEUR RADIOTELETYPE (AND THE MEANS MOST COMMONLY EMPLOYED) HAS BEEN TO ALLOW THE KEYBOARD SENDING CONTACTS (OR THE TAPE-TRANSMITTER RELAY) TO INTRODUCE OR REMOVE A CAPACITOR ACROSS THE FREQUENCY-DETERMINING TANK OF THE A.F.S.K. OSCILLATOR.

OBJECTIONS TO THIS ARRANGEMENT ARE (A) CLOSING OF THE CONTACTS, PRODUCING AN ABRUPT FREQUENCY SHIFT, MAY OCCUR AT ANY PORTION OF THE AUDIO FREQUENCY CYCLE. IF CONTACT CLOSURE TAKES PLACE AT THE PEAK OF THE CYCLE THE SURGE OF CURRENT INTO THE FREQUENCY-SHIFTING CONDENSER PRODUCES A TRANSIENT. THIS TRANSIENT, UNLESS REMOVED BY A FOLLOWING BANDFILTER, (OR A "SPEECH" AMPLIFIER OF LIMITED AUDIO BANDWIDTH) CAN CAUSE THE TELETYPE SIGNAL TO OCCUPY MORE OF THE RADIO SPECTRUM THAN TWICE-2975-CYCLES. IN COMMERCIAL MULTI-CHANNEL CIRCUITS, WHERE LARGE NUMBERS OF CLOSELY-SPACED AUDIO SUB-CARRIERS ARE FREQUENCY-SHIFT-KEYED, THE FILTERS ARE A "MUST" TO PREVENT THE TRANSIENTS FROM APPEARING IN THE OTHER CHANNELS. IN MOST AMATEUR EQUIPMENT RELIANCE IS PLACED MOSTLY IN THE BANDWIDTH LIMITATIONS OF THE AUDIO SYSTEM OF THE TRANSMITTER TO REDUCE THIS BROADENING OF THE SIGNAL.

OBJECTION (B):- WHEN THE KEYBOARD CONTACTS ARE OPEN (SPACING) THE CAPACITY OF THE CABLING IS ACROSS THE TUNED CIRCUIT IN SERIES WITH THE MARK-DETERMINING CAPACITOR. WHILE THIS IS NOT ABLE TO PRODUCE A FREQUENCY ERROR, HAVING BEEN TAKEN INTO ACCOUNT DURING THE INITIAL CALIBRATION, IT CAN MAKE TROUBLE IF A NUMBER OF PIECES OF EQUIPMENT ARE "PATCHED" IN AND OUT OF THE SENDING-CONTACT CIRCUIT. THE CUSTOMARY WAY OF ELIMINATING FREQUENCY ERRORS OF THIS SORT IS TO INCORPORATE A 500 MMF PADDER ACROSS EVERY PAIR OF KEYING CONTACTS. THE REGULAR SPACE-DETERMINING CAPACITOR IS LEFT ABOUT 250 MMF OF THE REQUIRED VALUE SHORT AND THE INDIVIDUAL PADDERS ARE ADJUSTED TO PRODUCE THE EXACT SPACE FREQUENCY. AMATEUR TELETYPE STANDARDS CALL FOR A MAXIMUM OF PLUS-OR-MINUS TEN AUDIO CYCLES ERROR OR DEPARTURE FROM THE 2125 CPS (MARK) AND 2975 CPS (SPACE.) IT IS GOOD PRACTICE TO KEEP IT WITHIN ABOUT THREE CYCLES.

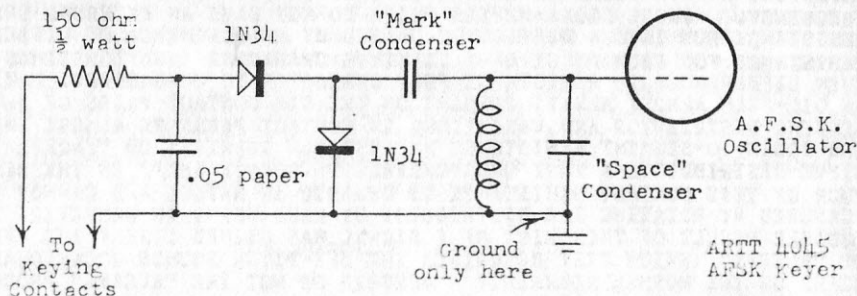
THE ABOVE-MENTIONED OBJECTIONS HAVE INDUCED A NUMBER OF MEMBERS TO MAKE USE OF A DIODE KEYING SYSTEM TO PRODUCE THE FREQUENCY SHIFT AND THUS PERMIT CONNECTING THE KEYBOARD CONTACTS IN A CIRCUIT CONTAINING MERELY D.C. CURRENT. THE DIODE-KEYER DOES NOT REMOVE THE TRANSIENTS UNLESS IT HAS A "SIGNAL-SHAPING" FILTER IN THE CONTACT CIRCUIT. FORTUNATELY SUCH A FILTER CAN CONSIST OF A SINGLE RESISTOR AND CONDENSER. THE CONDENSER DOES NOT CHARGE UP INSTANTANEOUSLY (WITH RECTIFIED AUDIO VOLTAGE) BUT TENDS TO SLIGHTLY ROUND OFF THE ABRUPTNESS OF TRANSITION FROM MARK TO SPACE. WHEN THE CONTACTS CLOSE THE SERIES RESISTOR PREVENTS THE INSTANTANEOUS DISCHARGE OF THE CONDENSER SO THAT THE SPACE-TO-MARK TRANSITION DOES NOT TEND TO GENERATE TRANSIENTS.

MOST A.F.S.K. DIODE-KEYERS IN CURRENT USE HAVE, IN TURN, INTRODUCED OTHER OBJECTIONABLE EFFECTS. MOST OF THEM HAVE INDICATED SENSITIVITY TO RESISTANCE IN THE EXTERNAL CIRCUIT, WHICH VARIES WITH THE NUMBER AND TYPE OF CIRCUITS "PATCHED" INTO THE SENDING-BUS. IN FACT ONE CIRCUIT HAS MADE USE OF THIS SENSITIVITY TO EXTERNAL RESISTANCE BY EMPLOYING A POTENTIOMETER IN THE CONTACT CIRCUIT TO SET THE "MARK" FREQUENCY. THOSE DIODE-KEYERS WHICH DO NOT HAVE AN EXTERNAL SERIES RESISTANCE RUN INTO A DIFFICULTY CAUSED BY A PHENOMENON OF DIFFERING RESISTANCE FOR EACH PULSE OF A TELETYPE CHARACTER (AND SOMETIMES EVEN DIFFERENCES IN RESISTANCE FROM CHARACTER TO CHARACTER). WITH AN OIL-FILM ALMOST ALWAYS PRESENT ON THE SIX CONTACT-PAIRS OF A TELETYPE SENDING DISTRIBUTOR AND VARIATIONS IN CONTACT PRESSURE ALMOST INEVITABLE AND BRUSH-TO-SEGMENT RESISTANCE AN UNSTABLE QUANTITY ON "FACEPLATE" STYLE DISTRIBUTORS A VERY UNDEPENDABLE FREQUENCY SHIFT IS THE RESULT. MUCH OF THIS CONTACT RESISTANCE IS DYNAMIC IN NATURE AND CANNOT BE MEASURED BY ROTATING THE DISTRIBUTOR BY HAND USING AN OHMMETER. THE AUDIBLE RESULT OF THIS KIND OF A SIGNAL HAS GAINED ITSELF THE NAME OF "BLEEPS" (WHICH BEST DESCRIBES THE OFF-PITCH SOUNDS OCCASIONALLY HEARD ON THE NORMAL SIGNALS.) WHETHER OR NOT THE "BLEEPS" PRODUCE

ERRORS IN RECEIVED COPY DEPENDS ON (1) THE STRENGTH OF THE RECEIVED SIGNAL (2) THE ACTUAL AMOUNT OF THE FREQUENCY ERROR OCCASIONALLY INTRODUCED (3) THE BANDWIDTH OF THE RECEIVING FILTERS AND THE ACCURACY OF THE "CROSS-OVER" POINT IN THE RECEIVING DISCRIMINATOR. THE SOLUTION OF THIS DIFFICULTY IS TO "SWAMP" THE VARIABLE RESISTANCE WITH A FIXED EXTERNAL RESISTANCE OF LARGE ENOUGH VALUE TO MAKE THE CONTACT RESISTANCE VARIATION NEGLIGIBLE.

MEASUREMENTS MADE ON A NUMBER OF KEYBOARDS AND TAPE-SENDING DISTRIBUTORS INDICATES THAT, IN ALL BUT VERY POORLY MAINTAINED UNITS, THE SERIES RESISTANCE VARIES FROM A MINIMUM NEAR .001 OHM TO A MAXIMUM OF ABOUT TEN OHMS. THIS CAN PRODUCE A SIZEABLE FREQUENCY ERROR IF THIS IS THE ONLY RESISTANCE IN THE CIRCUIT. A SERIES-RESISTOR OF ABOUT 150 OHMS WILL KEEP KEYED FREQUENCY ERRORS BELOW 1 C.P.S. ADDED WIRING RESISTANCE MAKES IT SHIFT AN INCONSEQUENTIAL AMOUNT WHEN ADDITIONAL CIRCUITS ARE PATCHED IN. AN ATTEMPT SHOULD BE MADE TO KEEP LEAKAGE RESISTANCE FROM SHUNTING THE CONTACTS. MOST OF THIS LEAKAGE IS DUE TO DUST SETTLING ON THE OIL-FILM COATING THE FIBRE INSULATION HOLDING THE KEYBOARD CONTACTS. THOSE PRINTERS HAVE A CLICK-FILTER BUILT-IN ACROSS THE KEYBOARD CONTACTS WERE INTENDED FOR 60 M.A. CIRCUITS. THE VALUES OF THE SHUNTING CAPACITORS IN THE CLICK FILTER SHOULD BE CHECKED OR REMOVED. EXCESSIVE ROUNDING OF THE PULSES MAY OCCUR WITH TOO MUCH CAPACITY.

R.F. PICKED UP IN THE DIODE CIRCUIT CAN CAUSE FREQUENCY ERRORS SO THAT THE SHIFTED TONE IS DIFFERENT WHEN THE RADIO TRANSMITTER IS ON THE AIR THAN WHEN THE OSCILLATOR WAS CALIBRATED. PLACEMENT OF THE CAPACITOR OF THE "SHAPING" FILTER CLOSE TO THE DIODES WILL ELIMINATE THIS NUISANCE. 60 CYCLE HUM CAN BE INTRODUCED IN AFSK OSCILLATORS IF A METALLIC OR CAPACITIVE GROUND IS PRESENT AT THE KEYBOARD CONTACTS. IT IS ADVISABLE TO MAKE THE ONLY GROUND IN THE KEYING CIRCUIT AT THE DIODE KEYS. THE "SELF-GENERATING" TYPE OF DIODE KEYS SHOULD BE AVOIDED FOR VERY LONG RUNS OF KEYING LINES. WHERE THE PRINTER IS AT CONSIDERABLE DISTANCE FROM THE OSCILLATOR IT IS MORE SUITABLE TO FURNISH A KEYED SOURCE OF REGULATED D.C. VOLTAGE TO CARRY THE DIODES FROM SEVERAL-TIMES-CUTOFF TO HEAVY-CONDUCTION. THE ACCOMPANYING SKETCH OF A GERMANIUM DIODE-KEYER WILL BE RECOGNIZED AS HAVING BEEN USED FOR SOME TIME, MINUS THE RC FILTER, IN A.F.S.K. UNITS DESIGNED BY DIFFERENT AMATEURS. IT IS INTERESTING TO NOTE THAT THE USE ON HIGH-"C" OSCILLATOR CIRCUITS MINIMIZES WIRING CAPACITY EFFECTS IN CONTACT KEYS BUT INCREASES RESISTANCE EFFECTS IN BOTH CONTACT AND DIODE KEYS. FROM 75 TO 150 MILLIHENRIES APPEARS TO BE THE PREFERRED RANGE OF OSCILLATOR INDUCTANCE FOR BOTH TYPES OF KEYS. SLUG-TUNED COILS PERMIT SETTING THE SPACING FREQUENCY USING COMMERCIAL-TOLERANCE CAPACITORS. OSCILLATOR FEEDBACK SHOULD NOT BE EXCESSIVE TO AVOID THE GENERATION OF AUDIO HARMONICS YET SHOULD BE SUFFICIENT TO PREVENT ERRATIC KEYING WHEN MARK FREQUENCY IS BEING TRANSMITTED. IT IS GENERALLY NOTICED THAT THE AMPLITUDE LEVEL OF THE SPACE FREQUENCY OUTPUT IS ABOUT 1-1/2 DB GREATER THAN THE MARK. MOST RADIOTELETYPE AMATEURS DO NOT ATTEMPT TO EQUALIZE THE LEVEL COMING OUT OF THE OSCILLATOR BECAUSE "SPEECH" AMPLIFIERS CAN ORDINARILY BE DEPENDED ON TO DROOP IN FREQUENCY RESPONSE NEAR 3000 CYCLES. TOO GREAT A DIFFERENCE IN AMPLITUDE MEANS FEEDBACK IS PROBABLY INSUFFICIENT. 73 DE W2BFD-----



INTRODUCTION TO THE WESTERN UNION TYPE 20 FREQUENCY-SHIFT CARRIER TELEGRAPH SYSTEM.

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UP TO 36 TELEPRINTER CHANNELS, IN THE TWO DIRECTIONS OF COMMUNICATION OVER A TELEGRAPH WIRE, MAY BE SIMULTANEOUSLY KEYED WITHOUT MUTUAL INTERFERENCE BETWEEN CHANNELS BY THE USE OF NARROW-BAND FREQUENCY-SHIFT CARRIER. CARRIER CHANNELS WERE ORIGINALLY DERIVED FROM VOICE CIRCUITS BY MAKE-AND-BREAK TECHNIQUE (CW) BUT IT WAS DISCOVERED THAT FREQUENCY-SHIFT HELD THE SAME ADVANTAGES OF ELIMINATING NOISE AND AMPLITUDE VARIATION EFFECTS AS FOR RADIO TRANSMISSION.

LONG-HAUL TELEPHONE CIRCUITS ARE ALSO WORKED ON A "CARRIER" BASIS, PERMITTING MANY VOICE CHANNELS FROM A SINGLE PAIR OF WIRES. EACH OF THESE VOICE CIRCUITS CAN BE EQUIPPED WITH A MULTI-CHANNEL CARRIER BAY THEREBY IMMENSELY MULTIPLYING THE AMOUNT OF INTELLIGENCE THAT CAN BE COMMUNICATED WITHOUT EXPANSION OF OUTSIDE PLANT.

IT IS NOT THE INTENTION, IN PRESENTING THIS CIRCUIT, TO URGE AMATEURS TO DUPLICATE IT, EN TOTO, BUT RATHER TO PRESENT THE VARIOUS FORMS IN WHICH FREQUENCY-SHIFT TECHNIQUES DEMONSTRATE THEIR ADVANTAGES. UNKNOWN TO MOST AMATEURS THE NATION'S LONG DISTANCE TELEGRAPHIC TRAFFIC IS HANDLED, ALMOST ONE HUNDRED PERCENT, BY WIRE "CARRIER" CIRCUITS. THE DAYS OF THE D.C. TELEGRAPH ARE OVER EXCEPT FOR VERY SHORT LINES. IT IS CUSTOMARY TO GROUP THE CARRIER CIRCUITS AT A CENTRAL STATION IN EACH CITY, CONNECTING THE LOCAL OFFICES BY D.C. LOOPS OR "LEG" CIRCUITS (AS THEY ARE KNOWN IN WESTERN UNION) TO THE CARRIER CENTRAL. THIS PERMITS A MINIMUM OF EQUIPMENT AT THE LOCAL OFFICES AND CONCENTRATES ELECTRONIC MAINTENANCE AT A SINGLE POINT IN EACH CITY.

IN THE TYPE 20 SYSTEM THE CHANNELS ARE SEPARATED 150 CYCLES. THE KEYING IS ACCOMPLISHED BY SHIFTING THE CARRIER FROM ITS MARKING FREQUENCY 35 CYCLES BELOW THE CHANNEL CENTER-FREQUENCY TO THE SPACING CONDITION 35 CYCLES ABOVE THE CHANNEL MEAN FREQUENCY. THIS IS SUFFICIENT TO PERMIT RUNNING A TWO-CHANNEL MULTIPLEX PRINTER (SUCH AS TWO MODEL 21-A PRINTERS) ON EACH OF THE 36 TELEGRAPH CHANNELS DERIVED BY TYPE 20 ON EACH VOICE CHANNEL. THIS SMALL SHIFT WILL EASILY ACCOMMODATE A TELETYPE PRINTER AT 66 WORDS-PER-MINUTE. IT CAN BE THUS SEEN THAT A TELEGRAPH WIRE CAN BE MADE TO PROVIDE HUNDREDS OF INDIVIDUAL SIMULTANEOUS PRINTER CIRCUITS BY FURNISHING PROPER ELECTRONIC EQUIPMENT AT THE TERMINALS.

UNDER THE PRESENT STRUCTURE OF F.C.C. REGULATIONS AMATEURS ARE NOT PERMITTED TO OPERATE MORE THAN ONE PRINTER PER RADIO CHANNEL NOR MAY THEY EMPLOY NARROW FREQUENCY-SHIFT TECHNIQUES. IT SHOULD BE COMPARATIVELY SIMPLE TO ADAPT THE CIRCUIT TO RADIO STANDARD-SHIFT OF 850 CYCLES SPREAD BETWEEN MARK AND SPACE BY ALTERATION OF THE COMPONENTS. IN GENERAL THIS WOULD MEAN EMPLOYING LOWER-"Q" COILS. THE HIGH-"Q" INDUCTORS NEEDED FOR NARROW-SHIFT IN THE TYPE 20 ARE RATHER EXPENSIVE.

IN THE NEAR FUTURE WE PLAN TO PUBLISH, IN THIS BULLETIN, SEVERAL OTHER ITEMS OF CARRIER TELEGRAPH EQUIPMENT. ONE OF THESE IS REMARKABLE FOR ITS ABILITY TO PROVIDE 60 M.A. D.C. OUTPUT (MARKING) OR ZERO OUTPUT (SPACING) FOR A SHIFT IN CARRIER FREQUENCY OF AS LITTLE AS PLUS OR MINUS TWO (2) CYCLES (NOT KILOCYCLES)!!!! NATURALLY SUCH A DEVICE, WHICH TURNS OUT TO BE VERY SIMPLE TO CONSTRUCT, CAN ACCOMMODATE ANY LARGER AMOUNT OF SHIFT.

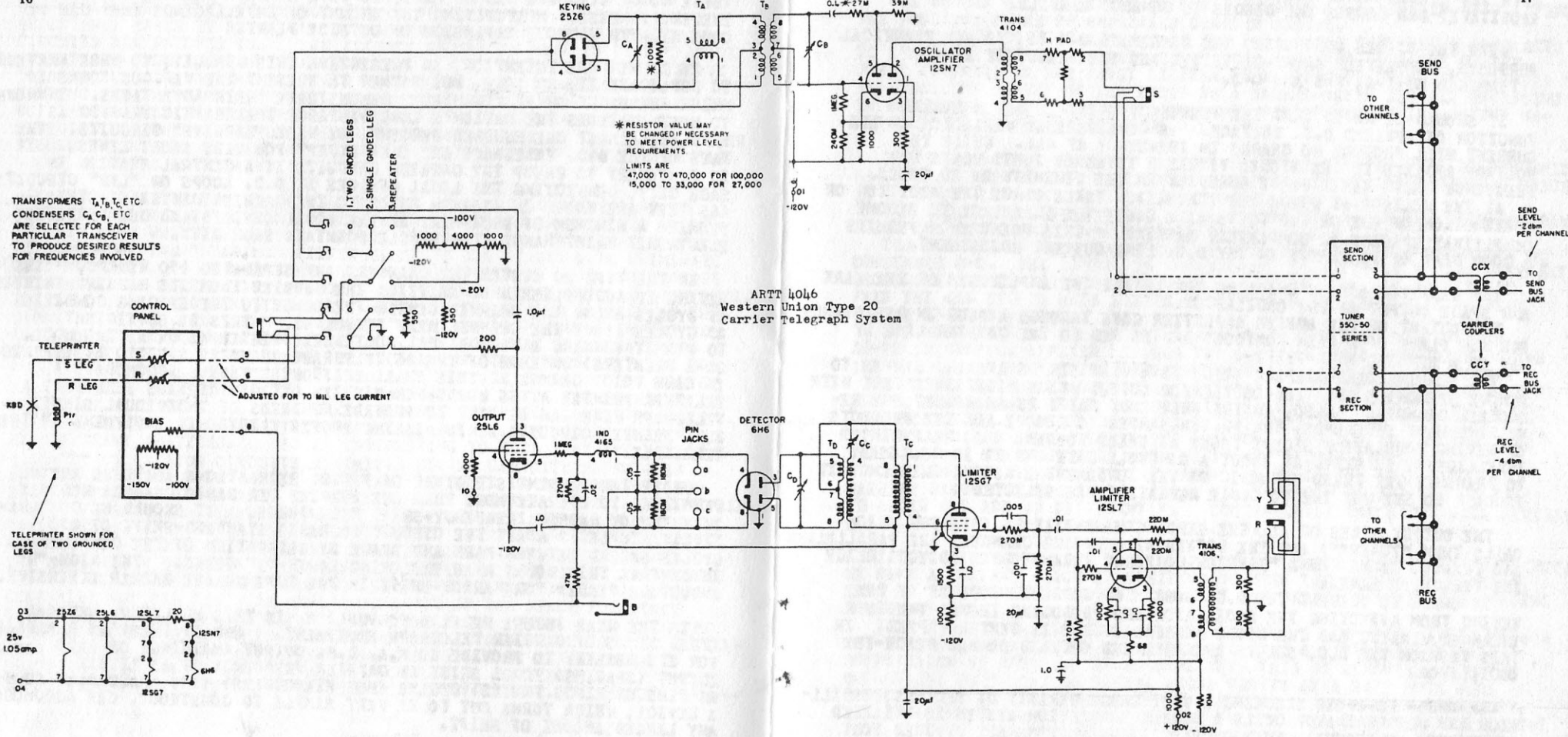
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THE TYPE 20 TRANSMITTER

HALF OF A 12SN7 TUBE ACTS AS A TRIODE HARTLEY OSCILLATOR WITH THE OTHER HALF FORMING A BUFFER AMPLIFIER TO RAISE THE LEVEL AND ALSO TO ISOLATE THE OSCILLATOR FROM ITS LOAD TO PREVENT FREQUENCY INSTABILITY THE TUNED CIRCUIT, WHICH DETERMINES THE OUTPUT FREQUENCY WHEN THE CHANNEL IS "MARKING", COMPRISES T-A, C-A, T-B AND C-B.

ACROSS C-A IS CONNECTED THE SHUNTING DOUBLE-DIODE 2525 (TYPE 20 IS OPERATED FROM 24 VOLT BATTERY). WHEN THE SENDING CONTACTS OF THE KEYBOARD IN THE "S" LEG ARE CLOSED 70 M.A. OF D.C., REGULATED AT THE "CONTROL PANEL", FLOW FROM THE MINUS

TRANSCEIVER



120 VOLT BATTERY TERMINAL THROUGH THE 550 OHM DROPPING RESISTOR TO THE SENDING "LEG" THROUGH THE KEYBOARD AND BACK TO BATTERY VIA THE GROUND CONNECTION.

THE TWO CATHODES OF THE KEYING DIODE, BEING TIED TO THE LINE, ARE HELD AT MINUS 80 VOLTS BECAUSE OF THE DROP IN THE RESISTOR. AS THE PLATES OF THE DIODES ARE RECEIVING MINUS 100 VOLTS (THROUGH THE CENTER-TAP ON THE PRIMARY OF T-B) THE EFFECTIVE PLATE VOLTAGE ON THE DIODES IS 20 VOLTS WITH THE PLATE NEGATIVE AND THUS NON-CONDUCTING.

WHEN THE KEYBOARD CONTACTS OPEN TO TRANSMIT A "SPACING" SIGNAL THE SENDING LEG BECOMES 120 VOLTS NEGATIVE, CARRYING THE DIODE CATHODES WITH IT. THIS MAKES THE EFFECTIVE DIODE PLATE VOLTAGE 20 VOLTS (POSITIVE) AND CAUSES THE DIODES TO CONDUCT HEAVILY.

WITH THE DIODES CONDUCTING THE CONDENSER C-A IS, TO ALL PRACTICAL PURPOSES, COMPLETELY SHORT-CIRCUITED AND THE FREQUENCY IS NOW DETERMINED BY T-A, T-B AND C-B.

IT SHOULD BE NOTED THAT THE FREQUENCY-SHIFT IS NOT A LINEAR FUNCTION OF APPLIED D.C. VOLTAGE. A CONSIDERABLE VARIATION IN LEG CURRENT WILL PRODUCE NO CHANGE IN FREQUENCY AT ALL. WHILE THE VOLTAGE APPLIED TO THE DIODES VARIES A TOTAL OF FORTY VOLTS THE FREQUENCY SHIFT TAKES PLACE ABRUPTLY IN THE VICINITY OF 20 VOLTS.

AT THE VOLTAGE AT WHICH THE TRANSITION TAKES PLACE THE ADDITION OR SUBTRACTION OF ONE OR TWO VOLTS WILL CAUSE THE FREQUENCY TO BECOME COMPLETELY SPACING OR COMPLETELY MARKING. THIS PHENOMENON PERMITS A GOOD DEAL OF TOLERANCE IN THE D.C. LINE CURRENT ADJUSTMENT.

THE RESISTOR ACROSS C-A AIDS EQUALIZING THE AMPLITUDES OF THE MARK AND SPACE OUTPUT OF THE OSCILLATOR.

THE OUTPUT OF THE BUFFER AMPLIFIER GOES THROUGH A PLUG-IN RESISTANCE PAD (IN PLACE OF A GAIN CONTROL) AND IS FED TO THE CARRIER LINE BY WAY OF A SENDING BAND-FILTER.

THE SENDING BAND-FILTER, WHICH IS A VERY SIMPLE AFFAIR, SERVES TO REMOVE HARMONICS FROM THE OSCILLATOR OUTPUT WHICH MIGHT INTERFERE WITH ANOTHER CHANNEL. ALSO, AS THE FREQUENCY SHIFT IS AN ABRUPT ONE REQUIRING MANY SIDEBANDS, THE FILTER SERVES TO REMOVE ALL THE PRODUCTS OF KEYING MODULATION EXCEPT THOSE ACTUALLY NEEDED. AS TELEPRINTER INTELLIGENCE IS KEYED AT ABOUT A 29 CYCLE RATE AND IT IS CUSTOMARY TO TRANSMIT THE THIRD HARMONIC OF THE FUNDAMENTAL KEYING FREQUENCY IT IS EASY TO SEE WHY THE 70 CYCLE DEVIATION WAS SELECTED.

THE OUTPUT SIDES OF ALL THE SENDING BAND-FILTERS (WESTERN UNION CALLS THEM "TUNERS") FOR THE DIFFERENT OUTGOING CHANNELS ARE PARALLELED AND THENCE, BY WAY OF A "CARRIER COUPLER" (TRANSFORMER TO YOU) REACH THE TELEGRAPH LINE.

IN ORDER TO PREVENT THE D.C. SURGES OF CURRENT PRODUCED BY THE KEYING FROM AFFECTING THE OSCILLATOR AND PRODUCING THUMPS T-A IS A BALANCED WINDING AND THE DIODE WINDING OF T-B IS CENTER-TAPPED. IN THIS FASHION THE D.C. SURGES ARE BALANCED OUT AND DO NOT REACH THE OSCILLATOR.

IN ORDER TO AVOID STOCKING A VERY LARGE VARIETY OF FILTERS, OSCILLATOR AND DISCRIMINATOR COILS A DOUBLE-MODULATION SYSTEM IS UTILIZED TO PRODUCE 18 CHANNELS IN EACH DIRECTION. ITEMS ARE STOCKED FOR NINE CHANNELS AND, TO PRODUCE THE OTHER NINE CHANNELS, ANOTHER GROUP HAVING THE SAME FREQUENCIES ARE HETERODYNED "EN MASSE" SO THAT THEY FALL ABOVE THE FIRST GROUP IN FREQUENCY. ON THE RECEIVING END THE UPPER GROUP IS HETERODYNED BACK AGAIN AND THUS TUNERS FOR ONLY NINE FREQUENCIES ARE REQUIRED. THE DIAGRAM FOR THIS IS NOT FURNISHED AS IT IS UNLIKELY THAT AMATEURS WILL HAVE MUCH NEED OF IT UNDER PRESENT WIDE-SHIFT, SINGLE CHANNEL REGULATIONS.

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THE TYPE 20 RECEIVING CONVERTER

FROM THE HODGE-PODGE OF SIGNALS ALL SCRAMBLED TOGETHER ON THE CARRIER LINE THE RECEIVING BAND-FILTER (TUNER) TAKES A 150 CYCLE

SLICE. AT FIRST THOUGHT IT WOULD APPEAR THAT AN EXTREMELY SHARP FILTER WOULD BE REQUIRED TO ELIMINATE THE EFFECTS OF ADJACENT CHANNELS BUT SUCH IS NOT THE CASE.

BECAUSE FREQUENCY-SHIFT, AS A FORM OF FREQUENCY MODULATION, PERMITS ONLY THE STRONGEST OF A GROUP OF FREQUENCIES TO DOMINATE THE OUTPUT, THE RECEIVING FILTER HAS MERELY TO GIVE A SMALL "EDGE" TO THE DESIRED SIGNAL OVER ITS IMMEDIATE NEIGHBORS IN THE SPECTRUM. HOWEVER ALL COMMERCIAL EQUIPMENT EMPLOYS GOOD FILTERS TO PERMIT THE CONVERTERS TO "DIG" DEEPER INTO THE NOISE LEVEL WHICH PERMITS GOOD OPERATION WITH INDIFFERENT SIGNALS.

COMING OUT OF THE RECEIVING BAND-FILTER THE SIGNAL IS BROUGHT UP TO USABLE LEVEL WITH A SINGLE STAGE OF CLASS "A" AMPLIFICATION.

THE SECOND HALF OF THE SAME 12SL7 BEHAVES AS A LIMITER BY CLIPPING THE POSITIVE PEAKS OF AMPLIFIED CARRIER SIGNAL.

THE OUTPUT OF THIS LIMITER IS FED TO A 12SG7 TUBE WHICH ALSO ACTS TO LIMIT THE SIGNAL BY PLATE SATURATION, HOWEVER, BECAUSE OF THE PHASE REVERSAL IN THE FIRST LIMITER, THE OPPOSITE PEAKS ARE CLIPPED AND THUS THE OUTPUT OF THE 12SG7 IS A SQUARE-WAVED SIGNAL, UNVARYING IN AMPLITUDE, BUT HAVING THE FREQUENCY VARIATIONS IN ITS OUTPUT UNAFFECTED BY LIMITING OPERATION.

THE RECEIVING "DETECTOR" CIRCUIT IN THE SCHEMATIC WILL BE RECOGNIZED AS BEING A FORM OF THE WELL-KNOWN "FORSTER-SEELY" DISCRIMINATOR WHICH IS SO OFTEN EMPLOYED FOR FREQUENCY MODULATION RADIO.

THE OUTPUT TRANSFORMER T-C MERELY SERVES TO MATCH THE HIGH-IMPEDANCE 12SG7 OUTPUT TO THE LOW-IMPEDANCE DISCRIMINATOR CIRCUIT.

THE PRIMARY OF THE DISCRIMINATOR COIL T-D IS SERIES-RESONATED BY CONDENSER C-C. THE SIGNAL IS TRANSFERRED INDUCTIVELY TO THE RESONANT SECONDARY AND AT THE MID-FREQUENCY, TO WHICH THEY ARE BOTH TUNED, FEED THE 6HG DIODES WITH A SIGNAL SHIFTED 90 DEGREES WITH RESPECT TO THE APPLIED VOLTAGE.

THE SECONDARY OF THE OUTPUT TRANSFORMER T-C ALSO PROVIDES AN IN-PHASE SIGNAL, APPLIED THROUGH THE CENTER-TAPPED SECONDARY OF T-D AND THE COMMON CONNECTION BETWEEN THE TWO DIODE LOAD RESISTORS.

BOTH THE IN-PHASE AND THE QUADRATURE SIGNAL ARE RECTIFIED BY THE DIODES AND PRODUCE EQUAL AND OPPOSITE VOLTAGES ACROSS THE TWO DIODE LOAD RESISTORS. ABOUT 90 VOLTS IS OBTAINED BETWEEN PIN-JACKS "A" AND "B" AND THE SAME BETWEEN "B" AND "C". BECAUSE OF THE LIMITERS THIS VOLTAGE DOES NOT VARY WITH DIFFERENT SIGNAL LEVELS.

CHANGING THE INPUT FREQUENCY ABOVE OR BELOW THE MEAN (NOMINAL) CARRIER FREQUENCY CAUSES THE PHASE RELATIONSHIP OF THE TWO VOLTAGES TO ALTER AND ADD UP DIFFERENTLY. CONSEQUENTLY ONE DIODE WILL RECTIFY A LARGER SIGNAL AND THE OTHER A SMALLER.

TAKING STOCK, WE FIND THAT AT POINT "A" (WITH RESPECT TO POINT "C") WE HAVE A VOLTAGE WHICH IS POSITIVE 50 WHEN THE SIGNAL IS MARKING, ZERO AT THE CENTER OR CROSSOVER POINT AND NEGATIVE 50 AT THE SPACING FREQUENCY.

THIS POLAR D.C. SIGNAL IS PASSED THROUGH A LOW-PASS FILTER WITH A CUT-OFF FREQUENCY AROUND 200 CYCLES TO GIVE A LITTLE ADDITIONAL SUPPRESSION OF NOISE. IT ACCOMPLISHES THIS BY REMOVING FROM THE OUTPUT ANY COMPONENT OF SIGNAL WHICH VARIES AT A RATE MUCH MORE RAPIDLY THAN ONE TWO-HUNDREDTH OF A SECOND. AS MENTIONED BEFORE, THE HIGHEST USEFUL COMPONENT OF THE TELEPRINTER KEYING-RATE IS ABOUT 70 C.P.S. SO THIS FILTER REMOVES NOISE PULSES OF SHORT DURATION WITHOUT DISTORTING THE PRINTER SIGNAL. THIS FEATURE COULD BE A WORTHWHILE INCLUSION IN TELETYPE CONVERTERS OF AMATEUR DESIGN.

FROM THE FILTER THE SIGNAL IS APPLIED TO A 25L6 D.C. CURRENT-AMPLIFIER STAGE. THE OUTPUT OF THIS STAGE PASSES THROUGH THE LINE-CURRENT CONTROL, OVER THE RECEIVING LEG, THROUGH THE PRINTER MAGNET, VIA GROUND BACK TO THE BATTERY.

INSPECTION OF THE SCHEMATIC WILL DISCLOSE THAT, IN ORDER TO PLACE A GROUND ON THE PRINTER MAGNET (AND THUS AVOID AN ADDITIONAL LINE BACK TO THE CARRIER OFFICE) IT BECAME NECESSARY TO GROUND THE POSITIVE SIDE OF THE PLATE SUPPLY. THIS IS UNCONVENTIONAL FROM AN AMATEUR

THE CONTROL MARKED "BIAS" VARIES THE GRID BIAS OF THE D.C. AMPLIFIER TO COMPENSATE FOR MARKING OR SPACING MECHANICAL BIAS IN THE TELETYPE MACHINES.

A FIVE-POLE THREE-POSITION SWITCH IS INCORPORATED TO MODIFY THE CONNECTIONS TO THE D.C. "LEGS" AT WILL. THE DRAWING SHOWS THE CIRCUIT OPERATING WITH "TWO GROUNDED LEGS" (ONE SENDING, ONE RECEIVING).

IN THE SECOND POSITION THE KEYBOARD AND PRINTER MAGNET ARE CONNECTED IN SERIES IN THE LINE MARKED "SEND LEG" AND CAN SEND OR RECEIVE (BUT NOT SIMULTANEOUSLY) OVER THE SAME LINE. WITH TWO GROUNDED LEGS THE SENDING IS INDEPENDENT OF THE RECEIVING AND DIFFERENT MESSAGES CAN BE TRANSMITTED AND RECEIVED AT THE SAME TIME. (AMATEURS WOULD CALL THIS "DUPLEX")

IN THE THIRD POSITION THE D.C. OUTPUT OF THE RECEIVING CARRIER EQUIPMENT IS LOOPED BACK TO THE D.C. INPUT OF THE CARRIER SENDING CIRCUIT WHICH PERMITS THE UNIT TO ACT AS A TELEGRAPH REPEATER ON LONG CIRCUITS. IN OTHER WORDS:- THE WEAK NOISY INCOMING SIGNAL IS CLEANED UP, PRODUCING A SQUARED D.C. OUTPUT WHICH KEYS A BRAND-NEW OUTGOING CARRIER SIGNAL FROM THAT POINT. IN THIS RESPECT IT IS SIMILAR TO THE METHOD EMPLOYED IN THE NEW AND THE ORIGINAL W2BFD TELETYPE PANELS TO RELAY INCOMING SIGNALS TO ANOTHER STATION "DOWN THE LINE".

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PLEASE NOTICE THAT A D.C. CURRENT OF 70 M.A. FLOWS IN BOTH THE SENDING AND RECEIVING LEG CIRCUITS. THIS IS WESTERN UNION PRACTICE WHEREAS TELETYPE EQUIPMENT IN OTHER SERVICES HAVE STANDARDIZED ON 60 M.A. IF USE IS MADE OF THIS CIRCUIT FOR 60 MIL OPERATION CERTAIN OF THE RESISTOR VALUES SHOULD BE ALTERED FOR OPTIMUM PERFORMANCE.

A "CHINESE COPY" OF THIS EQUIPMENT IN MINIATURIZED FORM WAS CONSTRUCTED IN 1946 AT W2BFD USING THE 90 AND 150 CYCLE MINIATURE FILTERS FOUND IN THE BC-733 AND RB9/ARN-3 LOCALIZER AND GLIDE-PATH SURPLUS RECEIVERS. OPERATION OF A PRINTER WAS EASILY OBTAINED AT THESE LOW FREQUENCIES AND, OF COURSE, AT THAT TIME THE F.O.C. REGULATION WAS NOT YET IN EFFECT. HOWEVER IT MUST BE REALIZED THAT THE PROBLEM OF TRANSMITTER AND RECEIVER FREQUENCY STABILITY, BAD ENOUGH WITH 850 CYCLE SHIFT, IS TOUGH INDEED WHEN THE DEVIATION IS ONLY A FEW CYCLES. IT IS OKAY FOR A.F.S.K. THOUGH AND PERMITS RELAYING TELETYPE SIGNALS VIA "PHONE PATCH" IF A LIASON WITH RED CROSS OR CIVIL DEFENSE IS DESIRED. ALL THAT IS REQUIRED IS A "BLACK BOX" TO BE CLIPPED TO THE TELEPHONE LINE AT EACH END AND WHICH, IN AN EMERGENCY, WOULD PERMIT (FOR EXAMPLE) A RED CROSS TELETYPE OPERATOR, TYPING ON HIS OWN MACHINE, TO BE RELAYED VIA "PHONE PATCH" THROUGH AN AMATEUR STATION AND VICE-VERSA. WE HAVE DONE THIS USING THE STANDARD A.F.S.K. TONES BUT QUITE OFTEN A PHONE LINE WILL BE ENCOUNTERED WHICH SIMPLY WILL NOT PASS THE 2975 CYCLE SPACE FREQUENCY WITHOUT A LOT OF ADDITIONAL AMPLIFICATION. USE OF NARROW-BAND FREQUENCY-SHIFT WOULD PERMIT A SIMULTANEOUS TELEPHONE CHANNEL AND A TELETYPE MESSAGE TO USE THE LINE WITHOUT MUTUAL DIFFICULTIES. THOSE 1020-CYCLE RADIO RANGE FILTERS, SUCH AS THE FL-3 ETC. WOULD BE IDEAL FOR NARROW-SHIFT WORK AND THE SAME UNIT CONTAINS A 1020 BAND-REJECT FILTER WHICH WOULD TAKE THE "PIC-WHISTLE" OUT OF THE TALKING CHANNEL. MANY OF THE GANG CALLING W2BFD BY LONG DISTANCE TELEPHONE HAVE BEEN TEMPORARILY FRUSTRATED BY MORE-OFTEN-THAN-NOT GETTING CONNECTED TO AN AUTOMATIC ROBOT WIRE-RECORDING DEVICE. A FEW SMART LADS HAVE GOTTEN AROUND THAT BY FEEDING THE AFSK SIGNAL INTO THE LINE WHILE THE OPERATOR IS TRYING TO FIND OUT WHAT IT IS ALL ABOUT. WHEN THE WIRE-RECORDING IS LATER RUN BACK TO THE TELETYPE MACHINE A MESSAGE IS PRINTED (AND ITS "FREE") HI!

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STOP AND CONSIDER! HOW MUCH EMERGENCY TRAFFIC COULD BE HANDLED OVER A SINGLE RADIO CARRIER IF 18 OUTGOING AND 18 INCOMING CHANNELS WERE AVAILABLE FOR PRINTER OR HAND-KEYED (ABORIGINAL) SIGNALS!

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TOROIDS: Three in potted can. Easily removed and tuned to the mark and space frequencies. Make ideal input filters. Excellent for the WJOLL converter. Postpaid.....\$5.50
Write: Box 9, A.R.T.S.

WANTED: Teletype converters. Have you a converter you are no longer using? Why not make it available for newcomers? Help someone get started on RTTY. Please give as much information about your converter as possible and how much you want for it.

W.E. 215A Polar Relays. Very good condition, no chipped bases. Box 10, A.R.T.S. Shipped postpaid.....\$5.50

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PRINTERS: Model 21A all electronic printer. With this, the converted typewriter above, and readily available distributors you are on the air on teletype. F.O.B.....\$50.00
Write: Box 13 for waiver. Only a few available so send check to hold your unit until waiver is returned.

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The ELECTRONIC SPECIALTY SUPPLY COMPANY, as a special service, will custom build the W2BFD designed teletype converter for you.

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Made of lightweight inoxidized steel tapered threaded sections. Bottom section has 3/8-32 stud.
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NEW YORK 13, N.Y.

W4PCT, George Hanna: "Still using the machine I borrowed from Rube, W8PTF, but my stuff has started to come in and have everything except the keyboard and polar relay. The reason you haven't heard me on FSK is that I have not as yet found out how to shake the frequency of my 32V2 the necessary 850 cycles on 80 meters. Am going to write to Collins and see if they have a cheap and dirty way of doing it. Have been copying you fellows all OK though, and as you stated in the Bulletin, CW doesn't seem to do too much damage. One night I was able to get perfect copy from the TT station on the channel and also copy two CW stations who were booming in. Have given up trying to get a QSO CW to printer though. We had a bad wind storm here a few weeks ago which took down my 24 element two meter beam, so now I am off that band until I get my antenna back up. We had several RTTY contacts with W8BFQ and W8WJC last winter. That was on two meters and the distance is well over 200 miles!"

W0UYJ, Greg Ferrey: "Just got my Model 12 on ten meters recently and have been working crossband with W0HKF here in St. Paul. I had a long talk with the local FCC boys regarding the RTTY on ten. After reading all the fine type in the regulations they agreed with me that as long as we use FM (or narrow-band FM) we can use AFSK on 29 to 29.7 me." ((Notwithstanding the agreement of the local FCC lads, an excellent bamboozel job, you cannot use AFSK on ten meters, AM or NFM. ---W2NSD)). "So until I get a suitable shifter fixed up for my Collins VFO I have been feeding the audio from the AFSK panel directly into the mike input of the phase modulator. This system is working fine with no QRM (and no other RTTY signals as yet on ten) and the receiving station doesn't have to worry too much about drift as he can receive without using the BFO. Another thing I like about ten meters is the absence of all those CW signals. The phone stations don't seem to give us much bother. When ten opens up some day I think we should be able to get some pretty good copy." ((And a lot of FCC QSL cards from unbamboozled monitoring stations)).

TAPE HINTZ: Unless you get the feed holes of the perforator exactly in step with the sprocket tape puller the holes will not stay correctly spaced. To check this punch LTRS a few times and watch the tape. Any unevenness will be apparent. To check the speed of your distributor you can save yourself a nervous breakdown trying to count 368 revolutions per minute by feeding a tape into the tape transmitter which has LTRS holes punched in it and BELL holes to mark any number of holes, such as every ten, and two bells at #368 and #369. You get the idea and can ad lib to suit yourself.

OPERATING HINTZ: The need for some standard reporting "Q" signals has been obvious. It has been proposed that the regular QSA report is satisfactory for our use.

- QSA-1 Completely Unreadable
- QSA-2 An occasional word gets through
- QSA-3 Decipherable
- QSA-4 An occasional misprint
- QSA-5 Solid copy.

The QSA report can be followed by the reason for poor copy: QSB, QRM, QRN, Jamming, etc.

W2TLY, Pete Selmer, has some info that may be of help to you some time: "After I installed the single line spacing gear obtained from W9UAU I found that the line feed pawl would not act as a stop for the single line space. I then proceeded to grind the pawl down so that it would fit the teeth of the gear. When I was finished I found that I had an erratic line feed. After spending a couple nights on the subject I finally discovered what was wrong. It seems that the spring which pulls the pawl into position as the line feed key is pressed did not have enough tension. I replaced it with another spring which had a stiffer pull and that solved the problem."

W9UAU, Doc Lewis, wants to know about the FL8B filter. He bought some to make the band-pass filter (ARTT 4002) and found, after melting out the wax, that they are made up of six small reactors nicely mounted on a diecast frame with adjusting screws for the "I" laminations. Two of the three reactors have three leads and the capacitor is one of those multiple deals with lugs coming out both ends. Does anyone have any dope on the FL8B? It certainly doesn't seem to be much of a replacement for the FL8A used in ARTT 4002!

W0WBY, John Frost (Jack), has his order in for a full set of printer equipment and has already received some of it. Looks like North Dakota will be well represented soon. Jack mentions that he is also interested in hi-fi and tape recording. As he says: "After seeing Bills' setup (W0LHS) it took only a week to place my order with W2BFD for printer and keyboard. At present I am a student in college here in Fargo working on M.S. in chemistry."

VE8AV expects to be on with RTTY on 20-40 meters within a few weeks.

W2ALJ, Mark Moynahan, is on his way to Alaska where he will assume his old identity of KL700 and try to poke an RTTY signal down here to us. Believe he will be up near Point Barrow somewhere with a KW-1 plus.

W3FLG, Clay Weller: "At the present time I am working on a precision tone generator to produce 850, 1000, 2125, and 2975 cycles by means of phonic wheels. This work is sharing time with a new converter for use with AFSK and FSK. The tone generator must be finished first so that it can be used to set up the converter."

W9ZBK: "Most of my operation is done on 80 Meters. Have had a few QSO's on 40, but have had no luck on 20.....Sure getting a kick out of RTTY! While in QSO with W8RMH last night I burned up my antenna tuning coil....."

W9HXW writes that he will be getting a model 15 soon and will be in there with us.

W9GRW, Ray Morrison, has called on the phone to say that he has been working with W9IAY and that they should be on soon. Ray has been rounding up gear and certainly has put most of us to shame. He uncovered a bunch of stuff in a local junk yard!

HP1WM has built the W2PAT converter and is looking for a printer to use with it.

W1NBP has his 12 running well now and expects to have his Lysco 600 on the air soon. Looks like we will soon have a Connecticut QSO available on 80 meters.

W2DWU has been having miseries. He built the PAT converter and his own distributor to drive the model 21A. Something don't work.

W9GRW certainly did well for himself. He gathered up a good collection of TT gear from local sources and already is listening in on the TT channels. Expect him to be transmitting before this reaches print.

W8BYB has a couple 7" TV sets to trade for tape equipment or Command transmitters.

W9TCJ came down with a heavy attack of Spring Fever.

VE3AKO points out that I misinterpreted his last letter and that the Canadian stations are still stuck on 7150-7200 kc.

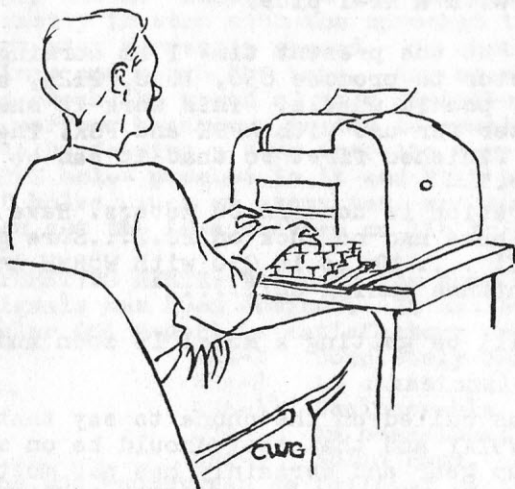
VE2AKT called on the phone to say that this miserable state of affairs is temporary and that full authorization of all c.w. frequencies is imminent.

W5BFX worked out his own conversion of the Model 10 Remington typewriter for RTTY, complete with the W2MYL End of Line Indicator circuit built in. Tests with K5NRS show 100% copy.

W4LSU, fired with enthusiasm from the column in CQ, went out and managed to find two Model 12's locally. He then built a converter and talked a friend into getting on with his other machine.

CARBON ROLLS NEEDED

John, W2BFD, turns out his information sheets on his Model 12 by means of making a tape of the information and then running off copies from the endless tapes. In order to speed the process he normally uses carbon roll paper which makes three to five copies at a time. Soooo-- if you have any carbon roll paper how about sending it on to John!



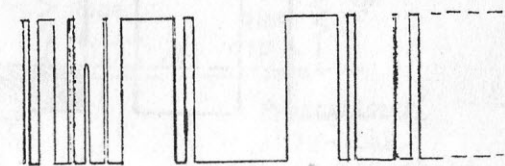
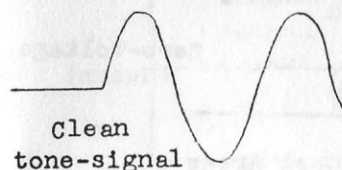
AUTOMATIC THRESHOLD CONTROL

WØHZR

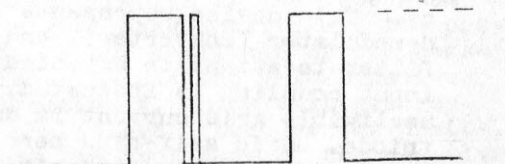
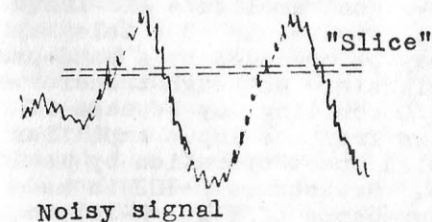
In a typical telegraphic demodulating system audio tones are converted electrically into d.c. pulses which, in turn, operate a telegraphic printer or teletype machine. Random noise usually exists at voltage levels less than that of the desired audio tone or tones.

Common practice is to amplify the signal strongly and then limit it to the extent that signal amplitude is constant. This reduces the effects of fading, but creates an undesirable condition in that the low level noise is raised to the same level as that of the desired tones, thereby reducing the signal-to-noise ratio markedly. Noise thus amplified is capable of causing misprints in the received copy when it masks the audio tones during periods of intelligence selection.

It has been determined experimentally that in receiving systems where an audio signal is amplified strongly and then limited, the minimum noise component exists at one-half the instantaneous peak amplitude of the desired tone-signal.



Noisy signal amplified and limited

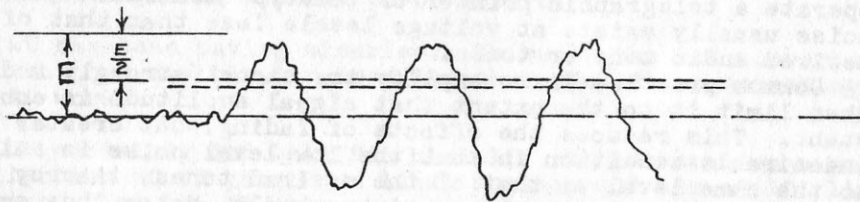


Noisy signal "sliced" and limited

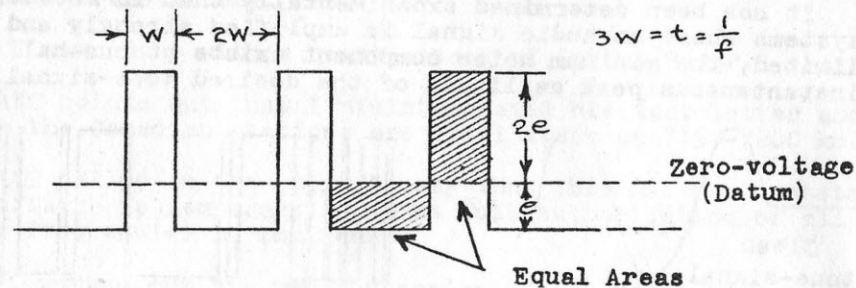
With no tone, and again at peak tone amplitude, (when a sinusoidal signal is used) the rate of change of the tone signal is at a minimum, whereas the noise component may consist of several cycles per tone cycle period.



It appears desirable therefore to "slice" an incremental portion of the tone-signal waveform midway between zero amplitude and peak amplitude, rather than to amplify all components of the incoming signal, including noise.



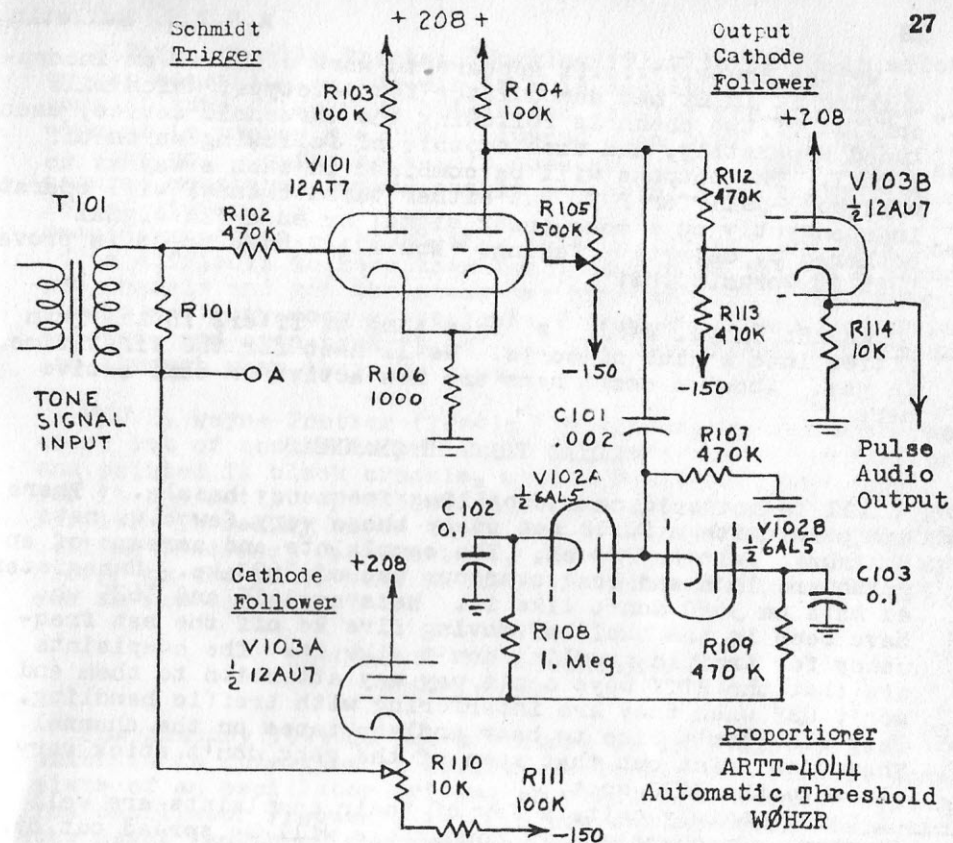
After "slicing," amplification and limiting may be done without substantially decreasing the signal-to-noise ratio.



The system described here accomplishes the above slicing process on a pulse-time proportional basis and is substantially independent of both tone-signal amplitude and frequency. This device represents the "front-end" of a telegraphic demodulator (converter), and may be preceded by a band-pass filter to attenuate unwanted signals. Although transformer input coupling is indicated, R/C coupling may be used if negligible grid current is drawn from the input amplifier triode. Grid self-bias here will upset operation by making the device amplitude-sensitive. Resistance R-102 is made much larger than the complex impedance of T-101/R-101 to permit smooth limiting when grid current begins on a positive going signal. Grid-cutoff will occur on negative-going signals. The dual triode V-101 is connected as a "Schmidt-Trigger," which is a monostable regenerative amplifier of high gain. It is capable of saturation in either direction with less than 0.5 volts signal RMS input voltage. Potentiometer R-105 is set for symmetrical squaring of a sinusoidal input signal when point "A" is grounded. No further adjustment of R-105 is necessary unless voltages drift or tube characteristics change.

The rectangular output waveform from V-101 is applied to a coupling circuit consisting of C-101 and R-107, which has a time-constant much longer than the longest tone-signal cycle period. A division of signal voltage occurs here such that the shortest portion of the pulse cycle delivers the greater voltage with respect to ground.

If the rectangular wave is symmetrical, the positive-going and negative-going pulses will be equal in both direction and



amplitude. Should the positive-going pulses be one-half the width of the negative-going pulses, (which is the case when "slicing" is done at one-half signal peak amplitude), the positive-going pulses will have twice the amplitude of the negative-going pulses. Pickoff diodes V-102A and V-102B deliver positive and negative d.c. respectively, which voltages represent the peak amplitudes of the pulses. Because the positive-going pulse is ideally twice the amplitude of the negative going pulse, the positive d.c. output at the cathode of V-102A is twice the amplitude of the negative d.c. at the plate of V-102B, and provision must be made to make the algebraic sum of the voltages zero because this sum voltage is to be a feedback error-signal. Two unequal resistors, R-108 and R-109 are used to balance the voltage at zero.

The d.c. error signal is applied to the grid of the cathode follower stage V-103A which transforms the impedance to the low level necessary for control. Resistor divider R-110/R-111 is employed to regain the d.c. level present at the grid of the tube (which removes the effect of tube self-bias). The d.c. feedback voltage always tends to be of such a magnitude as to maintain the "slicer" bias at such a level as to compensate for the signal amplitude present. As the signal fades the grid bias is reduced proportionately.

The range of control is limited by the voltage gain of the Schmidt-trigger stage. In the circuit given, approximate bias compensation is provided in the signal amplitude range of 0.7 to 30V (RMS).

Writes Bruce, "...it appears to work well. I am incorporating it in my new demodulator for teletype, which will consist of two channels following the threshold device, each tuned separately, and each capable of following an on-off signal. The outputs will be combined in such a way as to work push-pull for FSK, but either tuned channel will operate independently on a make-break signal or on a FSK signal bothered by delective fading. Now all I have to do is prove that it works....Hi!"

WØHZR: "Boyd, WØBP, is organizing us TT'ers in the Twin Cities into a club of sorts. We'll meet for the first time in May. About a dozen hams are now active or semi-active here.."

GOING THROUGH CHANNELS

All is not said on the calling frequency hassle. There has been quite a furor set up by those very few c.w. nets that have felt our touch. The complaints and screams of anguish are loud and long over our use of 3620 kc. Unregistered nets on 3620 don't like it. Nets on 3615 and 3625 who have been in the habit of moving five kc off the net frequency for traffic handling don't like it. The complaints are that the RTTY boys don't pay any attention to them and won't QSY when they are interfering with traffic handling. They also don't like to hear endless tapes on the channel. They also point out that some of the gang don't stick very close to the 3620 spot.

Unfortunately quite a few of their complaints are well founded. Frequently a TT roundtable will be spread out over two or three kc. The general feeling of all of these complaints seems to be that RTTY should move from where it is and go someplace else, anywhere else. There are few suggestions along the line of how to live with RTTY, just how to get rid of it. The standard suggestion is to move TT up to 3750 and above, in the Canadian phone band. Somehow the c.w. crew seems to have formed the opinion that RTTY is a cold and impersonal communication medium, certainly not in any way to be compared with warm, friendly, c.w.

All this consternation has been whipped up over our very minor transgressions and indiscretions on or about 3620. Now, the way things are heading, what with the SoCal group picking their own calling channels, the NYC group picking theirs, and all other groups following suit, the c.w. bands are in for a good random peppering with RTTY. It will be interesting to follow the rising tide of emotion against RTTY and see what effect this has on the incidences of jamming, and even on the actions of the FCC.

W9SKF will be on 40 soon's he can get a good antenna raised. He has a 50 watt rig all set to go so watch for him.

W5LKH, Rolf Brown, with his brother, W9ORT, are opening a business and have been held back from active teletyping.

W8SH mentions that W8DXM has built the W2PAT converter and should be on the air any day. Bob also releases the info that he has a brand new 8 lb son.

KL7AIO, Charlie Travis: "Working (?) with KL7BK in effort to get something on the air in this section. BK provided some filters of unknown origin and lacking the necessary equipment to properly adjust I turned them over to a CAA fellow to work on. So far he hasn't done so good. These items are genuine monsters, tuning easily and being very sharp, give a lot of difficulty genuine monsters. Though they tune easily and are very sharp it is difficult to keep them small enough to fit on a standard chassis and get the necessary bandpass..... Radio conditions are very poor at present; 20 and 40 meters do a rapid fadeout, and even then it is only the west coast signals coming through when they are open."

WØUVL, Wayne Trotter (Trot): "Am all set up for auto-receive, but of course no printer. I cleaned up my perforator and painted it black crackle, made a built-in power supply for it and set it up according to the spec's in a book I got for it. It really works swell now..... Say, on changing the calling frequency on 80 meters, I'd like to see it moved up closer to the phone band so that the only antenna I've got can be cut for both."

ELECTRONIC TAPE DISTRIBUTOR W6NRM/W9TCJ

The January 1953 CQ had a picture of this distributor which is in operation at W9TCJ. Basically the circuit consists of an oscillator driving an electronic scanner system. The oscillator frequency is 22.5 cps and in itself determines the exact length of the mark and space units ("bits") of the teletype signal. The electronic scanner consists of three flip-flops (bistable multivibrators) driving a matrix switcher or phantom switching system made up of small neon lamps. The purpose of this unit is to change the all-at-once presentation of the teletype code as set up by the tape sensing head into a one-at-a-time form at the correct speed for teletype operation. One compromise has been taken in the design of this distributor in the interests of keeping it as simple as possible: Instead of the customary 7.43 unit code, the device works on an exact 8 unit basis. This lowers the operating speed from the normal 368 operations per minute to 341, a 7% decrease in speed, but otherwise generates the proper signal. Subsequent circuits consist of d.c. amplifiers, tape magnet keyer, tone oscillator, and power supplies. The only important adjustment is the oscillator (L/C) which drives the flip-flops. A total of 17 tubes are used.

W2PRB has a 15 printer but needs a keyboard for it.....

W8GLS, Glenn Munro: "There are now nine stations on the air with RTTY in the Detroit area. W8HP and I are operating a point to point circuit on 147.5 mc using FM AFSK. Of course we operate on ten meters too, which is where most of the Detroit area gang are operating at the moment."

W2EHW, Murray Cohen, is looking for a model 26. Well?

DON'T READ THIS, IT'S NOT TELETYPE

And Oh yes, I've been reading again. Skip this paragraph if you can't stand anything that is not about radio or RTTY. Throw in all the adjectives for "Return to Paradise" by Mitchner. It is wonderful, and only 35¢ now. That and his "Tales of the South Pacific" certainly are two of the really outstanding books that I have ever read. Margaret Meads' "Sex and Temperament in Three Primitive Societies" (also 35¢) was interesting and certainly shows how much of our own society, our customs, our everyday life, the things that we accept as 'natural'-- even such basic ideas as there being any difference, any great difference, between man and woman, are only a part of our culture, our training. Another book which held me was "The Discovery of the Orgone, Volume One, The Function of the Orgasm" by Wilhelm Reich, M.D. This book is primarily a history of the development of Psychoanalysis and the different schools of thought that it split into. The work of Dr. Reich cannot be underestimated for he has made some important observations as to why people are neurotic and what can be done about helping them. (330 p., \$6). Then there was "How to Talk With People" by Irving Lee, a book that I was sold on reading by the Institute of General Semantics, darn them. It has some data of value on how to best run business meetings, etc., but certainly does not greatly hold the interest. (\$2.50, 176 p). I also beat my way thru a couple of good science-fiction books. All this and 22 magazines a month! Now if I could just figure some way to stop wasting so much time watching TV and talking on the phone I might get more done, at least more reading.

One of the hottest things I have run across yet in the brainy field is a small book called "Occult Aspects". This is put out by the Eidetic Foundation, Fairhope, Alabama, and gives a clear explanation of how and why the following work: Psychoanalysis, Psychiatry, Hypnotism, Voodooism, Spiritualism, Clairvoyance, Psychokinesis, Telepathy, Astrology, Yoga, Occultism, Rosicrucianism, Theosophy, etc., etc. It is difficult not to be enthusiastic when you have finished reading such a book, particularly when you have already investigated quite a few of these fields. I have been reading with interest books on General Semantics, Cybrenetics, Orgone, Dianetics, Gestalt, Yoga, Hypnoanalysis, Hypnotherapy, Psychiatry, Psychoanalysis, Examiner Therapy, Integration Therapy, etc., and have found a whole world of interesting data, facts, ideas, theories, etc., in these various investigations into the working of the mind. Relatively simple techniques are available today which will vastly increase the efficiency of the mind. I would very much like to undertake some of these processes and shall if I can ever get caught up with all of the things I am attempting to do.

W3RHX noted the delightful mint flavor of the glue on the flaps of the stamped envelopes I sent out recently to try to lure \$\$\$. Nothing but the best for my customers.

Man the oars men, a letter from Dick Hay, W4LW, lists 69 radioteletype equipped amateur stations of the Naval Reserve. Each outfit has a Model 19, a receiving Model 15, a receiving Model 14 reperforator, an FSK converter, and an FSK keyer.

INDEX OF DIAGRAMS

No.	Bul.	CQ	Title	Doner
4000	2	10/52	Collins 709D-1 FSK Osc.	
4001	3		AFSK Osc. Remote Keyer	W2JAV
4002	3&16		FL8-A Band Pass Filter	W2JAV
4003	3		Printer Connections, Experimental	W9SKF
4004	4		0-5/FR FSK Exciter, Press Wireless	
4005	4	4/52	Tape Wiring, Xmtr & Distributor	
4006	4	4/52	V.T. Keyer	W6NRM
4007	4&17		Collins 70E-8 FSK Conversion	W6ITH
4008	4		FSK Unit using Xtal Diode	W6ITH
4009	4&20		Converter Tuning Indicator	W6NRM
4010	5		R/C Filter Circuit	W3ODF
4011	5		BC-733D Filter Conversion	W6AEE
4012	5		Filter Alignment Setup	W6AEE
4013	6		Reducing Printer QRM	Doane
4014	6		Diode FSK Circuit	W6NRM
4015	6		Miller Effect FSK of VFO	
4016	6	2/52	Model 12 Wiring with VT Keyer	
4017	7		W2BFD Filter Alignment Setup	W2BFD
4018	7		Decade Capacitor	W2BFD
4019	7		Audio VTVM for Filter Measurement	W2BFD
4020	7		R/C Converter	W3ODF
4021	8		End of Line Indicator, Single Flash	W2MYL
4022	8		End of Line Indicator	W2MYL
4023	9		Parallel T Network Filter	W0HZR
4024	9		Bridged T Network Filter	W0HZR
4025	9		Automatic Frequency Control	W0HZR
4026	9	6/52	Variable Crystal Oscillator	W4OLL
4027	9		Misers Converter, No Tubes	W2BFD
4028	10		AFSK to FSK Converter	W6AEE
4029	10		I.F. FSK Converter	W6AEE
4030	10		Jiffy Converters	
4031	10		Mark Hold Circuit	Robts
4032	11		Converter Using 80mh Chokes	W6VEG
4033	12		Ratio Converter Using FL-5 Filters	W6OWP
4034	12		Flip-Flop	W6NRM
4035	12		FSK Modulator & Electronic Driver	W6NRM
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4037	14		Receiving Distributor Plate Layout	W2BFD
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4042	23		FSK Exciter Model XFK	
4043	24		Diode Modulator	W2PAU
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		4/53	FSK Variable Crystal Oscillator	W4OLL
		9/52	FSK Converter Using Toroid Filters	W4OLL
		11/46	Converter Using 50L6 Output Xfms	W2BFD

Have you written lately?