

RTTY From KH6 Land

By KH6EM

These are my first experiences with RTTY. Recently I became interested in what was going on in RTTY and what made it tick. I felt that to really find out I should get on RTTY. Once the decision was made, I ordered the RTTY Handbook and sent in a subscription to W6AEE for the Southern California RTTY Bulletin. I also added a note inquiring about printers. In a few days W6AEE sent me a nice letter together with about a dozen back copies of the RTTY Bulletin by airmail. These were very welcome as I did want to get as much information on RTTY as possible. I read thru these copies thoroughly. During the following week, all spare time was spent going thru the Bulletins, QST and all of the RTTY columns in CQ. The RTTY Handbook also arrived by airmail. Thanks to you both for using airmail. It was wonderful to have this material to get the information I needed to get started.

During this period, not much hamming was done but the receiver was tuned around looking for RTTY signals to get an idea as to what they sounded like and how they came in. Sure enough they were at 21090, 14330 and 7140 kcs. Calls often mentioned in the literature like W3PYW, W2JAV, W0BP, W6CG, W6AEE, KL7OOT, WO-QPP, KR6AK, KA8RA, W6KUY/MM and many, many others were there. The desire to get on and contact these stations was great. The signals from the 75A4 were monitored on a scope. It was noted that the output was quite constant for signals S1 or better. Below this, signals would be in the noise level.

The first step was to build a converter. Just then the April issue of CQ arrived. There was the description of the W2AV converter. It seemed a little more involved than what I wanted as a beginner. I decided that the basic circuit was all I needed for a starter. Since the output from the 75A4 was observed to be rather constant, no limiter would be used. Further, the literature mentioned bandpass and notch filters. I felt that since the selectivity and stability in the 75A4 were good, I could concentrate on building sharp band-pass tone filters instead and hope that the combination would give me sufficiently good operating characteristics.

By a wonderful stroke of good fortune, I found 4 toroids of unknown inductance. A 3 turn link was put on each toroid and connected to an audio oscillator with different values of condensers. They turned out to be .15 henrys. Then started the process of tuning up two bandpass tone filters — one for 2125 and the other for 2975 cycles. The configuration chosen is the one shown in the schematic. This filter and tuning procedure was described by W6NRM in the January 1957 RTTY Bulletin. W6AEE advised that no copies were available. W6NRM went to considerable effort and photostated the whole article for me. I like this configuration. I found Bob's description very helpful. First, decide on the passband you want. I chose 200 cycles. One half of this is 100 cycles. Add this to your center frequency to find the high edge of the filter. This came to 2225. One pair of toroids was tuned to this frequency. Place a 2 or 3 turn link on each toroid. Connect link to low impedance output of audio oscillator which has been calibrated. I used WWVH. Connect scope across toroid. With various condensers, tune each toroid to peak at 2225. Next remove the link from one of the toroids. Install this pair in filter configuration. Connect link to audio oscillator and scope to output toroid. Connect various values of coupling condensers between the toroids until you get two peaks. One will be at the original 2225 frequency and the other will show up lower and lower in freq as larger coupling condensers are used. Also the peaks will be higher. Vary the coupling condenser until you get the second peak at 2025 cycles. Now place resistors of various values across each toroid to reduce these peaks and produce a flat top.

Do this with the 2975 cycle filter. Tune the pair of toroids to the high frequency edge which would be 3075 i. e. 2975 plus 100. Over-couple to produce the second peak at 2875 cycles. Load with resistance to produce flat top.

Now came the problem of feeding the filters. I used a 500 to voice coil transformer. Due to lack of experience, about 30 turns were wound on each input toroid. 30 turns were used in the hope that large link coupling would give more output. This turned out to be a mistake. The scope indicated

large output but the response was most distressing. The nice flat top passband had gone to pot. Instead it was lopsided with a high sharp peak. Reducing the number of turns in the link brought the filter back into shape. The resistances across the input toroids were increased somewhat and the shape restored by loading with more turns in the links. You will find that the output is greater from the higher channel filter. Reducing the number of turns in the high channel link and increasing them in the low channel brought the outputs closer. Also the input toroid resistances were varied. By juggling the links and the loading resistances on the input toroids, a balanced output and similar passband was obtained.

Some RTTY signals both amateur and commercial were tuned in. For a test two scopes were used — one on each channel. It was a pleasure to see the signals rise rapidly, simultaneously on both channels, stay up and then drop rapidly as the signals were tuned in on the receiver.

The converter itself is the basic W2PAT unit with no limiter but with the new miniature tubes of the W2JAV version. No provision is made to couple directly to the printer selector magnet from the cathodes as W4EHU has shown the deleterious effects of such operation. It is desired to operate the printer magnets with a constant current so keying is by a fixed voltage thru a polar relay. Measurements at the cathodes of the 6AQ5 tubes showed varying amounts of current depending on strength of signal. The basic unit worked very well. The NE-51's flashed prettily and the polar relay clicked along in unison. W2JAV had devised a system for receiving mark only or space only. It was decided to have a part of this too. An arrangement was made which switched the space triode of the 12AX7 to key from the grid of the mark 6AQ5. When the grid of the mark 6AQ5 is positive during a mark signal, the space triode would also be positive. This causes the plate voltage to drop to a low value. The NE-51 is not triggered so the space 6AQ5 is not conducting. The polar relay is drawn toward mark. The space triode is provided with bias so that when the mark signal ceases, positive voltage on the grid is removed. The plate current decreases, raising the plate voltage and firing the space NE-51. The space 6AQ5 conducts and pulls the polar relay to space. Actually, the circuit is operating as in the regular manner except that the space channel is getting its information from the mark signal. The toggle switch in one position gives normal operation. In the

other position, mark only operation occurs.

Some time was spent adjusting the bias and the tap on the 6AQ5 grid. Operation goes right along when switched to mark only. I might add that the signal must be fairly good. It won't work on marginal signals. During mark only operation, the receiver can be switched to the 800 cycle mechanical filter. This eliminates the space signal together with the any QRM in the vicinity. Talking about receiver tuning, I found the following to work well with my 75A4: Set Avc to fast. Bandpass on lower sideband but the white segment must be moved beyond zero to the first mark, half way between zero and one. On some commercials you must switch bandpass to upper sideband. For SSB the segment edge is at zero but for RTTY this must be advanced to the first mark. The 2975 frequency is just on the edge of the filter passband. Moving the control farther over brings the 2975 frequency into the passband. Audio is set at about 2. At 1 the signal just begins to fire the NE-51's. Set RF gain at maximum. You will note that there is no reversal switch. If signals are wrong just change to the other sideband and signals will come out right.

In order to have as few power supplies as possible, an OC3 VR tube was used to drop the 250 volts to 105 volts. This is connected to pin 1 which is the armature of the polar relay. The mark side contact was then wired thru a series dropping resistor to the printer magnet. A W3PYW diode shifter was built for the KWS-1. Since the diode must be keyed on space, direct keying from the keyboard would be incorrect. The 105 volts at the polar relay is keying the printer on mark and is not doing anything on space. I wired the other contact to the shifter. This took care of the transmitting end of things as the polar relay supplied the voltage and the proper keying relationship.

In an RTTY QSO with W3PYW himself, he suggested dropping the voltage to the shifter. A 5,000 ohm resistor was wired in series. There is still plenty of shift. The control is only half way up. At this point I wish to relate some of my experiences with the shifter. After reducing the voltage,

the shift still changed and at any odd time during a transmission. I would have to stop to reset it. Changing the .005 condenser cleared it to the condition where the shift changed only at the beginning of a transmission. The transmitter, converter and printer were plugged into the same 110 volt line. Rearranging the plugs and using an outlet across the room which is on the other 110 line of a 3 wire system for the printer cleared most of this. An adaptor was made by soldering a discarded 7 pin tube base and a 7 pin socket together. This was inserted in the VFO. The shifter lead was soldered to the No. 1 pin of the adaptor instead of just hooked around the No. 1 pin of the tube. The oscillator tube was plugged into the adaptor. These stopped the jumping shift altogether. There was still a slight variation of the shift with noise on the signal. The shifter was originally mounted with a light bracket to an existing screw. Moving the can caused a small variation in frequency as the bottom scraped the chassis. This bracket was changed to a heavier one. In addition, a second bracket was attached and held under an existing bolt on the other side. This stopped the variation and some of the noise. The original coax connecting the grid of the oscillator was cut a trifle too short so it was pulled out of the shifter to make it reach the No. 1 pin. In so doing, the bare braid was then touching the shield can. Pushing the coax back in left the outside jacket of the coax to insulate the braid from the shield can. This cleared the last trace of noise. It is surprising how these little details affected the signal since the braid was already grounded to a lug in the can and the can was grounded to the chassis thru the bracket. At last the shifter is running smoothly.

I anticipated noise from the polar relay making and breaking the 105 volts, so all inter-connecting cables between printer, converter, receiver and transmitter were made with shielded wire. Upon using the converter and receiving weak signals on 15 meters, there was noise. Disconnecting the line to the shifter at the polar relay cleared this. The shifter is not needed during reception. Connections were made to the toggle switch so that the shifter would be applied only in the transmitting position. Using coax feed for the antennas, there is no noise from the polar relay even on S1 signals. There is a little noise when using a length of wire directly to the receiver for an antenna.

The two toggle switches are placed close together. To transmit both switches are

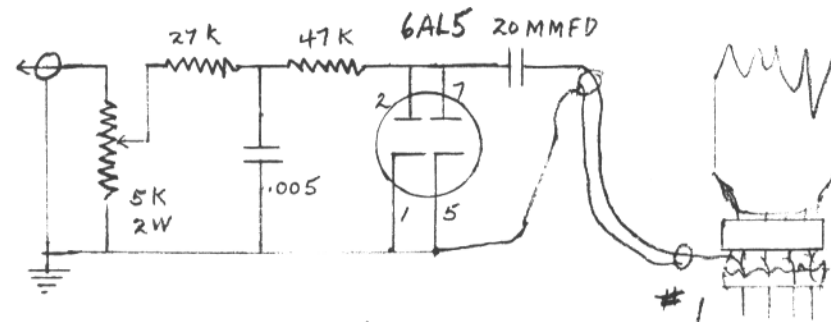
flipped up. Everything is then working locally. The keyboard keys the converter which is operating on local DC. The converter polar relay continues to key the printer magnet for local copy. The other contact of the polar relay is keying the shifter in the transmitter.

During the two weeks that I have been operating, I have had a whale of an interesting time. I have worked KR6AK, VK3KF, KL7ALZ, W2RUI, W2JAV, W3PYW, VE7KX, WOBP, W6AEE, W6CG, W7LPM and many, many others. I have found 15 meters very good. Signals can be down to S2 but I still get quite good copy. 20 is next altho there is some distortion of signals especially late at nite. On forty it is difficult to make good copy of the many mainland signals I hear. Altho signals are S9 there is too much distortion and noise.

I have used mark only operation on only one occasion. The transmitting station was having difficulty with his shift so was not transmitting the correct space signal. I could not copy in the normal manner. Switching over to mark only produced perfect copy. The polar relay was adjusted following the instructions in the RTTY Handbook. A final touch-up adjustment of the contacts was made while copying a press station in Tokyo sending RY's. The range was 20 to 105 on this model 26. While checking the operation of the NE-51's in the early construction stage, I was puzzled to find only 30 volts drop when being fed with RTTY tones and 60 volts on local DC operation. The mystery was solved when a scope showed a very large AC component from the plate detectors which was peaking 60 volts and triggering the NE-51's altho the DC meter showed only 30 volts. Signals from the filters are fed to a scope as shown in the schematic. Both receiving and transmitting signals are monitored. The display is a cross. If both verticle and horizontal portions of the cross increase and decrease together, the shift is right at 850 cycles. Signals within the passband of the filters will keep the cross at full size. The graph shows the measured response of the filters.

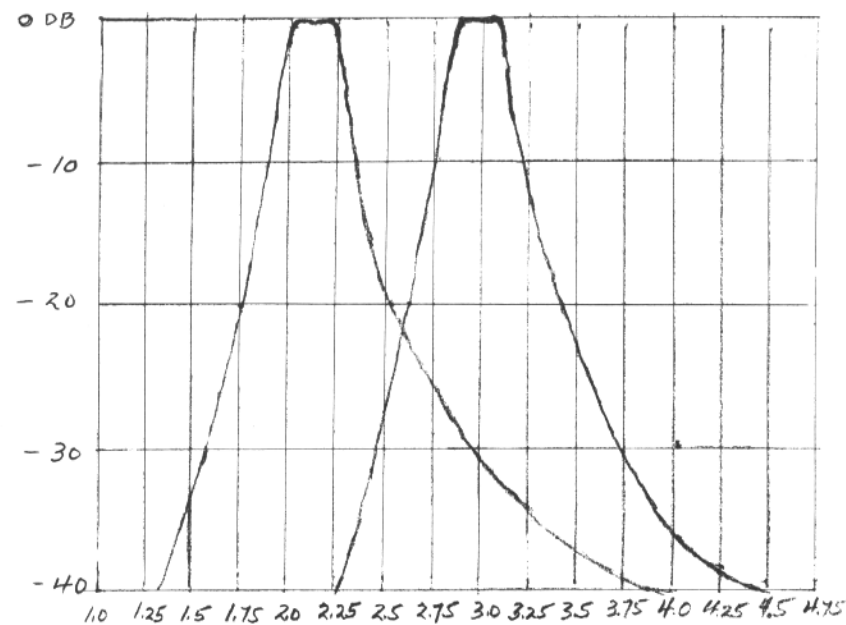
I hope that this account will be of interest and will help a few fellers to get on RTTY. It has been most interesting to me. I wish to thank W6AEE for his nice letters to me, for helping me get the 26 printer, for sending me those back copies of the Bulletin and to others who have written to me and all the RTTY stations I QSOed for making possible those interesting RTTY contacts.

(Continued on Page 11)

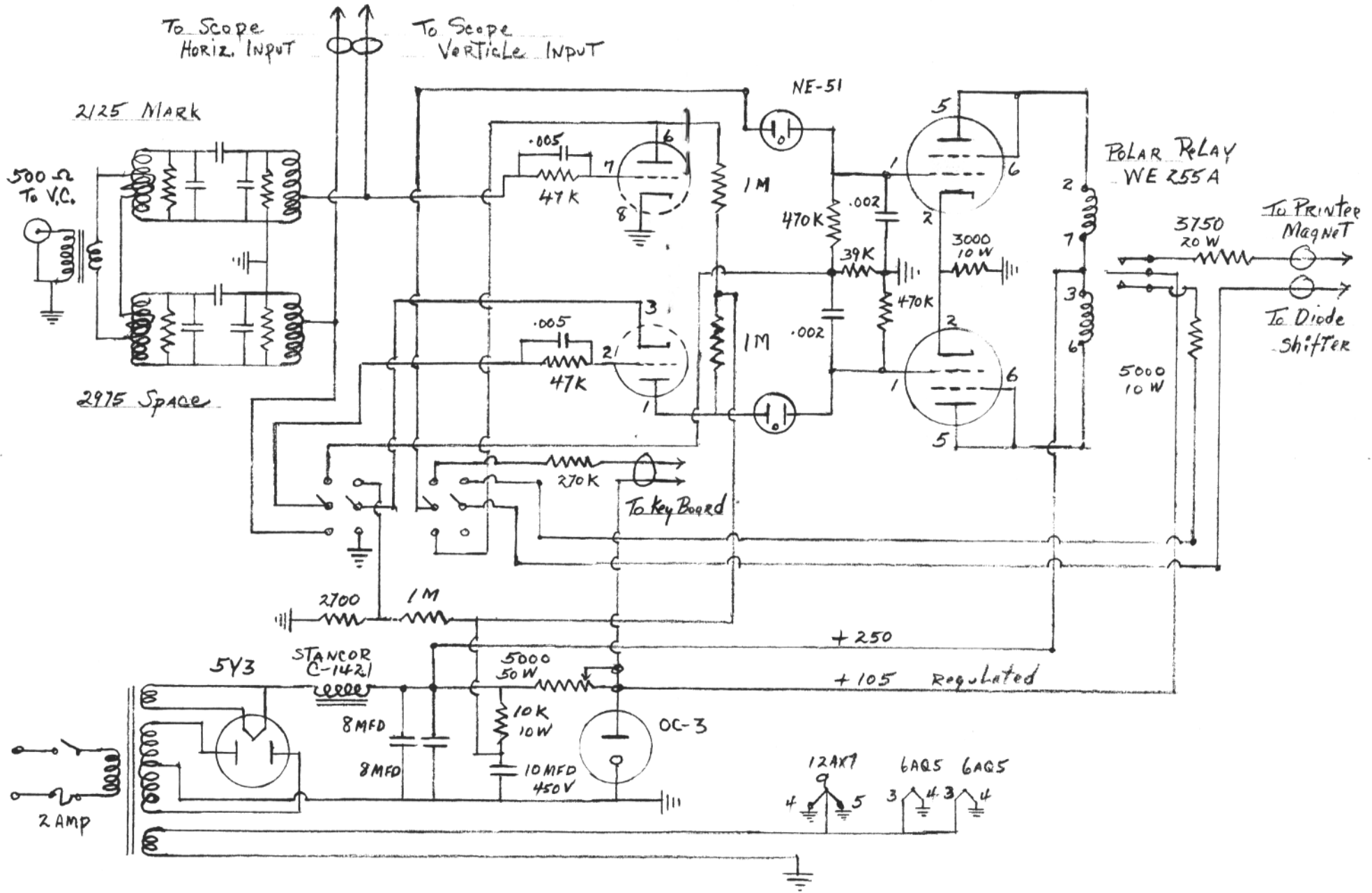


W3PYW Diode
Shifter Used
with KWS-1

Home Made
ADAPTOR



Response of Mark & Space Bandpass Filters.



Radio Teletype Converter
KH6EM June 1958

RTTY DX

By **BUD SCHULTZ, W6CG**

So much DX activity on RTTY has developed in the past few weeks that a summary should be of interest to any red blooded teletypewriter who has a desire to flex his muscles on a QSO or two outside the continental limits of the U.S.A. All it takes is a little patience, some persistent tuning and a little luck. The latter is not as necessary as the former. If you haven't been giving it a try, get in and get your feet wet — it's a barrel of fun and you will meet some very interesting people in these far-away-places. Don't get discouraged if you don't make the grade on the first few calls — remember the law of averages is on your side.

Heading the activity this month is the always present Okinawa gang. KR6AK continues to pour his potent FSK into the States every day from 0300 GMT until 0400 GMT or later if enough customers show up. Cas operates on 21090 KCs. KR6AK and KR6JL (Jay) also keep 14040 KCs very busy after the fifteen meter band closes to the states. Cas is using a G4ZU beam and Jay has a big four element job that speaks with a mighty voice. Cas is still looking for a cross band QSO from 28,300 KCs to 27,000 KCs. If interested drop him a line. Rumor has it that the Okinawa gang will soon be allowed to operate from 14,000 to 14,100 KCs. KA8RA (Floyd) has a BC610 going almost daily on 21085. Floyd says that Gray and Dee, the original RTTY'ers at KA8RA, are returning to the States. Scuttlebutt has it that there are a couple of VS6's and a CR9 showing a marked interest in some FSK work. On the night of April 19, Eric-VK3KF, made his first RTTY test transmission with great success. Excellent copy was made on his test at KR6AK, KL7MZ and W6CG. Eric expects to be active on 21083 KCs. very soon. He reports that VK3PO has access to some teletype gear and is beginning to feel the urge. VK4CG, Cliff, has authority to operate on RTTY but is still waiting for the necessary printer. It's in the works, Cliff, so hold on a bit longer. ZL1WB (Bruce) is still visiting the gang in the East. Anyone heard from Jack Paton, VR2AC, lately? WOANY/VO1 (Larry) is still keeping the keys hot from Newfoundland on 21090 KCs. He's looking forward to settling down in a big ham shack when he gets back to the States next summer. Is that house trailer getting you down, Larry? KZ5KJ (Ken) is doing real fine job of putting the Canal Zone on the RTTY map on 21090 KCs. The Alaskan gang is growing every day. KL7MZ,

KL7ALZ (Nick and Geri) keep things humming from Rabbit Creek on 21095. KL7OOT is back home after his trip to the States and should show up on the 14MC band. KL7BK (Jack) was bitten by the 21MC bug after his recent trip to Los Angeles and may desert Forty meters this summer. KH6EM is all set to go and is just marking time until his printer arrives from Pasadena. DL4WM has been arranging some RTTY skeds with KR6JL on 14040. This is the only European activity reported since DL4AT in the last SS contest. W6AEE (Merrill) reports he has had several inquiries about RTTY from some SM stations in Sweden. A little Smorgasbord would sure go good on the FSK channels about now!! Couple of VE8's in the Arctic were looking for some takers on 14015 at 0700 GMT recently but evidently were not listening on their own frequency. Rumor has it that ZS6KD is getting ready for a go at RTTY. There's your chance for an African contact if you missed the CN8's last year. On the Maritime Mobile front RTTY is well represented by W6KUY/mm, W2ZXM/mm and W6DTN/mm. W6KUY (Bud) has been working the gang regularly from as far away as the China Sea with his powerful little 35 watter. W2ZXM keeps daily skeds with K2AAA from "somewhere East of Suez." His signals have been copied on the West Coast on 21090.

Recently W5JBW (Amos) hit the DX jack pot. He put out a CQ on 21090 and was answered by KR6AK, KA8RA, and W6KUY/mm. All reported his signals made excellent copy. Nice going, Amos.

In spite of all the above reported DX activity it was recently brought home to this DX reporter that there is still plenty of missionary work required to sell RTTY to many of the overseas gang. After sending test tapes for ten minutes with the beam on Europe a French Station answered with the following: "Say, OM, what type of a jamming transmitter are you using and who are you trying to jam?" Guess pioneering will always have its frustrations.

Don't forget to send in any bits of DX scuttlebutt that you hear — your assistance is needed. Write and tell us how many countries you have worked on RTTY. Maybe we can talk the Editor in Chief into coming up with some kind of a RTTY/DX Award for 25 countries (or shall we make it 50?) Let's have your suggestions or criticisms and we will try to assemble this column the way you would like it. 73.



COVER PHOTOGRAPH

W6ASJ, Piedmont, Calif., OBS ARRL and NCARTS Bulletins, 1400 PST, Saturday and Sundays, 7140KC and 147.29MC, RTTY simultaneously.

Equipment . . . Model 14 TD, Model 14 typing reperforator, Gates/W6AEE TU, 75-A-2 receiver, Morrow Conelrad Alarm, LM13 Frequency Meter, Central Electronic Side Band Slicer and 20A Exciter, PP 811 SSB Linear Amplifier, Gonset 2 Meter Communicator, Gonset 2 Meter Linear Amplifier, Collins 310-B Exciter, 4-250-A Pi-Net Final Antennas . . . Gonset Twin-Six 2 Meter Beam, 46 foot Vertical for 80, 40, and 20, Trap Horizontal for 80, 40, 20, and 10.

K6OWQ DE VK3KF of 137 Cole Street S4, Victoria, Australia.

Well, Hello Mary, it is a great pleasure to be having this contact with you via medium of amateur RTTY and hope to be able to have more of them in the not too far distant future . . . Unfortunately this Mod. 15 is only on loan and may be required at a moments notice and that will put me QRT RTTY until it becomes available again. Yes, glad to help you make another first, Mary, and even if I do develop housemaids knee it is worth it and whilst on my knees may as well take time off to say "Allah be Praised" three times. If you keep up that good work you may get a first with WAC on RTTY. As a matter of interest, my receiving gear is completely crystal controlled. A double conversion job with HFO and BFO locked . . . Bud may be interested to know that with a two meg. XTAL in the HFO, using a circuit the same as the Xmitter C.O. I can tune over about sixty kilocycles of this band and still be XTAL locked throughout . . . The XTAL is on ABT two mcs. and 1 amp. 12th harmonic for injection to the first mixer . . . Can get about five kilocycles shift at the fundamental of the XTAL. Well, Mary, again it is a great pleasure to be talking to you this way. I am still a bit tongue tied as I'm not used to thinking and punching one of these things at the same time. I can hold my own on the CW with the best of the rag chewers, but this is all strange to me. So I will say no more this time but over to U. K6OWQ DE VK3KF in rainy squally Melbourne.

Friday evening from eight till nine PM. there was an air meeting between two of the above program members (W6CQ1 & W6FYM) and WOBP during which some concern was expressed as to the whereabouts of Bruce ZL1WB and apprehension as to his being on the above NCARTS program. We are pleased to say that one hour later we contacted Bruce at W2RUI. For nearly two hours in a fine chat that included Skipper of course and Johnnie W2RTW from Elmira, and Bruce states he will make every effort to catch a bus so as to arrive for the NCARTS banquet this coming Friday. California and Nevada hams printing this on 15 meters, better contact the club officers and attend, tho no advance registration seems required. Have fun!

Horse Trade: Don W9BQC, who has been very active in this net and in attending the "RATS" meetings in Minneapolis, wants to trade a machine that prints both upper and lower case letters and draws no current!! It is a standard size L. C. Smith typewriter, and he wants to swap for a Model 26 printer also in good condition. Object: to keep the College Club Station K0ASR on RTTY without him lugging his own machine across two states every week. Noble cause. Who can help? Contact: Don Jackson W9BQC, 2811 Custer, Rockford, Ill.

Yesterday was Armed Forces Day, and we wonder how everyone made out on the RTTY participation. Confusion on schedules was less than last year. At WOBP we had everything in duplicate for two frequencies plus tape reper. Somehow we lost WAR on 3347 just when due to start the broadcast so switched to A5USA on 5302.5 but didn't find them on the poorly calibrated super-pro. However except for a couple of static hits in a fade we did best on NSS at 6970. With the 75A-4. On the second try 15 minutes later we failed to find NDS on 7375 who may have been skipping over us, and the narrow shift on 6970 from NDF caught us with the wrong terminal unit! Mail your printing to Armed Forces Day Contest, Room BE 1000, The Pentagon, Washington 25. We are inclined to agree with the advance publicity to mail the copy "As received . . . no attempt should be made to correct possible transmission errors," and believe a sailor hit and adjacent key when

