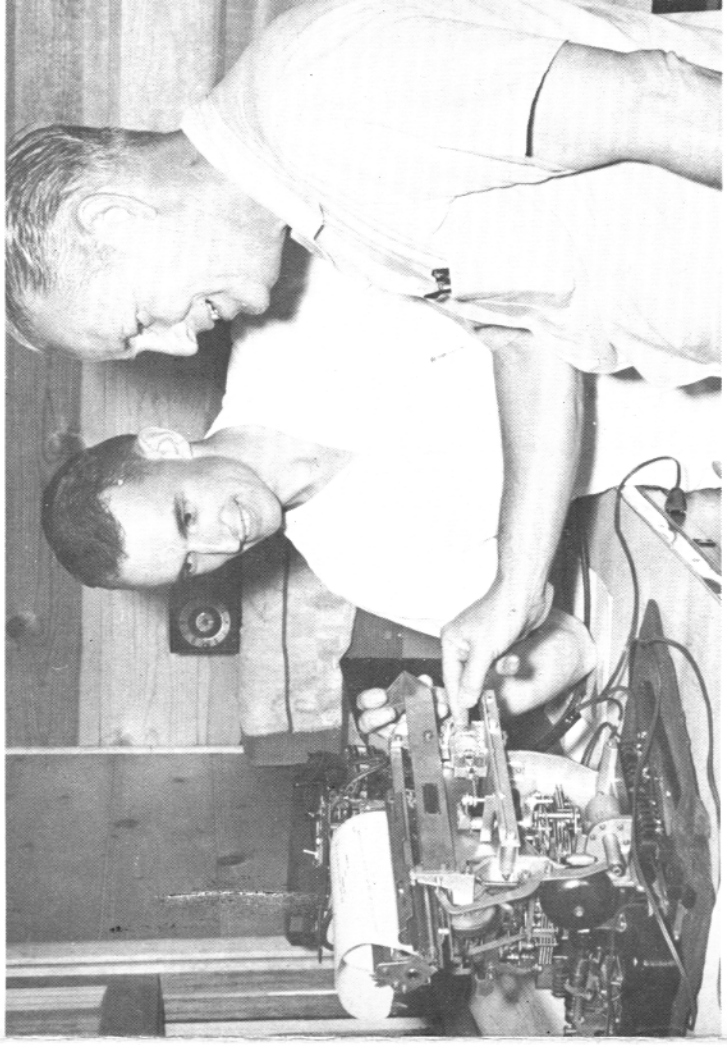
RTTY

NEWS OF AMATEUR RTTY

OCTOBER, 1958
25 Cents
Vol. 6, No. 10



"INSPECTING AUTO-MATE-26" — ZL1WB and W6AEE

HORSE TRADES

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

WANTED: Model 14 perf. and 14 TD **W7RZY**

WANTED: Coils for Wilcox CW3 receiver, 1.9/10 mcs.... **W6ZVV**

FOR SALE: W U 7A, 7B and &c tape head only **W9GRW**

FOR SALE: Tech Manuals:
TM 11-356 RTTY TU AN/FGC
TM 11-2234 Teletypwriter TT-4/TG
TM 11-352 Printer TG-7A
TM 11-2209 Teletypewriter set 13132
TM 11-2222 Revg T D TT-12/FGQ-1
TM 11-2241 FSK Converter CV-116/URR
..... **W8LGL**

FOR SALE: 1958 RTTY Call Book $1.00 ..... **RTTY**

FOR SALE: AN/FGC-1 TU, new, in original shipping case with spares **W5TVG**

WANTED: Tape gear **W9DPY**

FOR SALE: Two URA/8 TU, one complete, one all components **W6ETU**

TRADE: Prop pitch motor for RTTY gear **W9LNI**

FOR SALE: Tape perf **W7NAP**

FOR SALE: Model 26 complete with table **W7NAP**

FOR SALE: Model 14 Trans/Dist **W7IWH**

RTTY, Inc.
372 WEST WARREN WAY
Arcadia, California
Return Postage Guaranteed

PASADENA CALIF. OCT 29 1958

CATS

Fourth Annual "CHI-RTTY" Meeting

You are cordially invited to attend the fourth annual "CHI-RTTY" meeting on October 12, 1958. This will be the charter meeting of the CATS (Chicago Area Teleprinter Society).

The meeting place will be in the Hallicrafters Company cafeteria at Fifth and Kostner Avenues, Chicago, Illinois. Use the employees entrance on Kostner Avenue. The doors will open at 1000 so by all means come early and join the gang for an "eyeball QSO" and pound the keys before the formal meeting starts. Drop George, W9SPT, a post card if you are planning to be there before 1200 so we will know how much lunch to have for you.

As usual there will be no admission or other charges except for each individual's food. An evening dinner will be held in a nearby restaurant. Those planning to attend are requested to make reservations (with check) as soon as possible to George Boyd, W9SPT, 3540 North Seeley, Chicago 18, Illinois. The cost of the dinner will be $4.25 including tax and tip. Attendance will be limited to 40 persons because of the size of the dining room.

The technical program will start at 1300 under the able direction of "Beep," WOPB, who promises the usual fine array of interesting and informative talks. Equipment displays will feature ancient and modern machines from Teletype Corporation and Kleinschmidt Labs. A Teletype "ASR" will be compared with the equipment manufactured by Kleinschmidt.

The windup of the meeting will be the drawings for the attendance awards—polar relays, tape heads, filters and other parts. The attendance award for the dinner will be a working 15 machine.

Join the gang, October 12th, and shake the hand that shakes your printer—See you there.

George, W9SPT
Ray, W9GRW

Chuck, W9THE
Bob, W9JBT

RTTY SWEEPSTAKES CONTEST

31 Oct. and 1 Nov.

The Fifth Annual RTTY SS Contest will be held starting Friday evening at Six P. M., E.S.T. on the 31st October and run through Saturday, November 1st at Midnight E.S.T. This will allow thirty hours of operating for those who can last that long. Stations will exchange messages consisting of message number, originating stations call, check or RST report of two or three numbers, ARRL Section of originator, local time (0000-2400O preferred), date, and band used. Score one point for a message sent and receipted for entirely by RTTY, and one point for a message received and acknowledged by RTTY. For final score, multiply the total message points by the number of different ARRL Sections (see page 6 QST) worked. Two stations may exchange messages again on a different band for added points, but the section multiplier does not increase when the same section is worked again on another band. Each foreign country counted by ARRL for DXCC credit is treated as a new section for RTTY multiplier credit. Logs should be mailed to RTTY, 372 Warren Way, Arcadia, California.

In order to be scored, contest entries should be received by RTTY not later than November 15, 1958. Certificates will be awarded to top scorers in each ARRL Section. Best of luck and see you in the contest.

CONTEST PERIOD

Time	*Start*	*End*
EST	1800-31	0000-2
CST	1700-31	2300-1
MST	1600-31	2200-1
PST	1500-31	2100-1
HST	1300-31	1900-1
GMT	2300-31	0500-2

W8NIY Version W6OWP's T. U.

By ROLFE UTZ, ELKINS, W. VA.

Terminal units seem to be about a dime a dozen even with today's high prices, so one more article on the subject should not hurt anyone too badly.

First I can say I have built a round dozen of the critters and seven of these have been after the pattern depicted in Figure One. The reason — after building a new one I go back to this one.

Of several schools of thought, one says anything done locally is far better than remote doing so the mark "intelligence" is had by proper bias being applied to the tube in the flip-flop not being supplied with space "intelligence." This also provides "mark hold" which is considered of value at this QTH but is frowned upon by many.

The "mark hold" while being desirable is only one of many features had by this T.V. By having only one narrow audio band to "contend" with the Bandpass of the received can be tightened up to the limit and QRM succumbs to probability. Should QRM, even so, become a problem??, the toroid coil can have various capacitors switched in for a built in "QRM dodger."

No reversing switch is needed because, it is to be remembered we only need space information. We are supplying the "mark" locally, so take your choice and tune either side band in and close the eye indicating correct space tuning.

Another feature is that while the standard space frequency of 2975 is indicated on Figure One, the toroid can be tuned to any reasonable audio frequency. For example, 1020 cps could be used to take advantage of those range filters. This also makes for ease of tuning the toroids for those who do not have proper equipment to establish correct frequencies in the audio range.

Still another feature is the Bias control. With it you can set up the proper ratio's of mark and space and correct for improper sending bias, "within limits" of course. It is worth putting on the front panel.

The pot for the "eye tube" is made screw driver adjust because it needs little attention after having established proper eye closure.

No gain control is incorporated because we trust the limiters. The W2JAV limiter probably would be more effective, but the schematic, is as built.

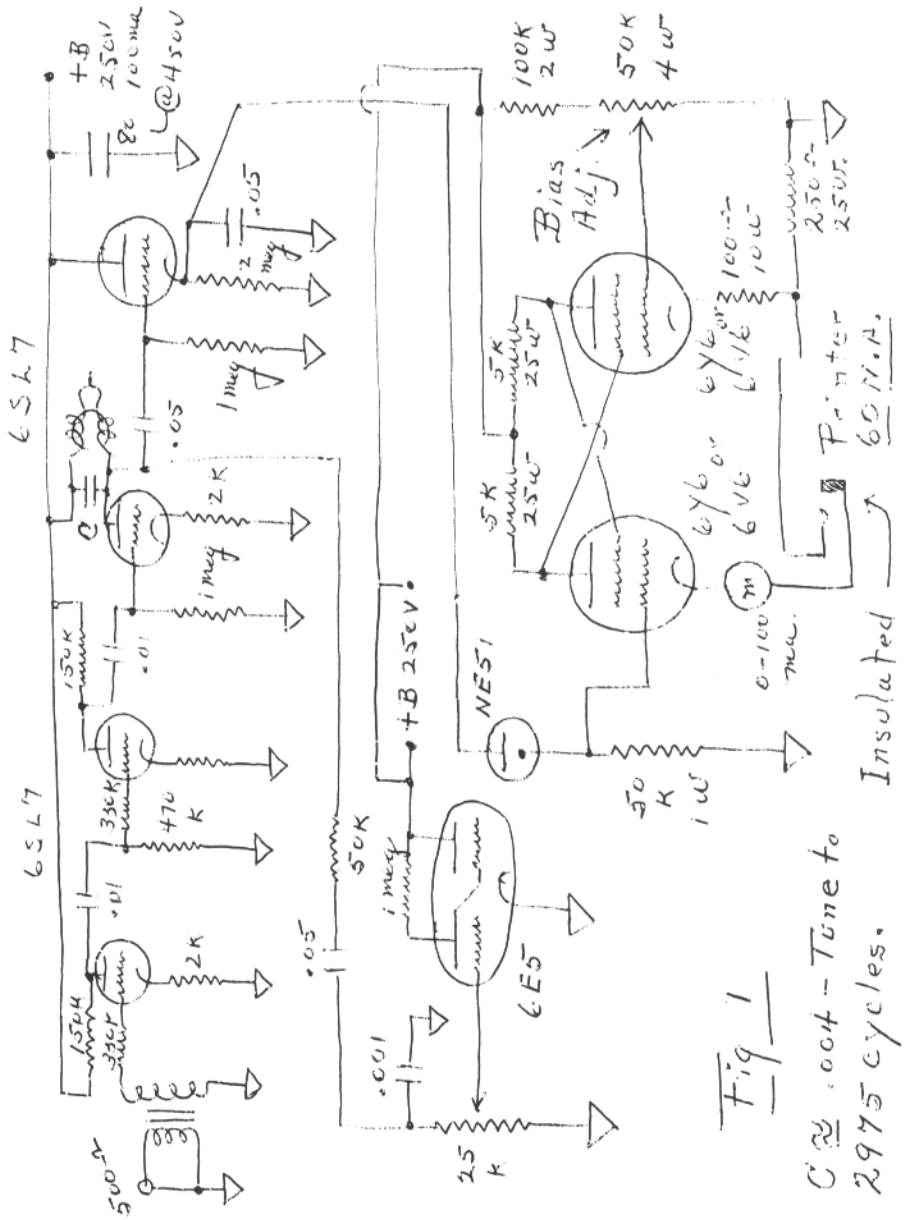
The input transformer is 500 ohms to grid.

Looking back to the second paragraph it would seem that the shack is filled with T.V.'s. This, however, is not the case because the units are scattered around in several shacks and the second one built is in use while the first is a "loaner" and the others built for others. The first (loaner) was originally built to Barts specs but enough current could not be had so experimentation began on it and then the circuit of Figure One evolved. It was somewhat messy and No. 2 was glamorized and is being used daily while the "others" sit in the corner with silent garble. The other five that is.

As is customary all resistor values are ½ Watt unless indicated otherwise.

The 80 mfd capacitor is used as the last filter to insure a reserve and stabilize the unit. No voltage regulator tube or tubes were needed. A larger value than 80 would be better of course.

No claim at expertness is being made but it is for sure this T.V. works good. No claim for originality is being made either—just for the correlation of ideas only.



A HIGHLY VERSATILE RADIO TELEWRITER ADAPTER

By BARRY M. KAUFMAN, K6PYB

The adapter to be described is designed to function as the complete link between the teletypewriter and station transmitting and receiving equipment. No other equipment, such as polar relays, audio oscillators or separate power supplies, etc., is needed.

The adapter consists of: 1. A regulated power supply, to furnish selector magnet current. 2. A receiving converter. 3. An AFSK oscillator, frequency shifted by the keyboard, for modulating a VHF transmitter. 4. A double-eye tube tuning indicator, controlled from the receiving filters. 5. Complete front panel switching, enabling the adapter to be switched to many modes of operation.

THE CIRCUIT

The loud-speaker output of the receiver (4 to 16 ohms)feeds J1. T1 is a 4-to-6500 ohm transformer, giving a voltage step-up of approximately 40. The output of T1 feeds the two stage 12AT7 limiter. The limiters are cathode biased for symmetrical clipping and have large series grid resistors to limit grid current. The plate of the last limiter is connected to the two toroid filters through isolating resistors. The magnitude and ratio of these two resistors has been adjusted to give proper band-width and equal voltage output from the two filters. It should be noted that the band-width of the two filters is not equal. Actually, the 2975 cycle filter has about twice the band-width of the 2125 cycle filter. This is not a drawback, because this circuit uses only one of the filters at a time.

The output of each of the filters is capacity coupled to the grid of one half of a 12AX7. During the presence of a signal, grid rectification takes place and a resultant negative DC grid voltage is developed. The cathodes of the 12AX7 are returned to a positive voltage controlled by the "noise gate" pot. This positive voltage must be exceeded by the signal from the filters in order for grid rectification, and the resultant DC voltage output, to take place.

Considering white noise as the signal, it can be shown that the output of a filter preceeded by limiters, is directly a function of post limiter band-width/prelimiter band-width. When a noise free signal is being received, the filter output will not depend on the input band-width to the limiter. Therefore, there is a large difference in filter output voltage between a noise-free signal and a signal-free noise. This difference becomes greater with increased receiver band-width. This phenomenon is used here for mark hold, since most low frequency receivers, and just about all VHF receivers, have band-widths of 2KC or greater. The noise gate is adjusted so that receiver noise will not make the machine print gibberish.

This feature is particularly useful when copying one-finger-typists whose signals occasionally fade below the noise. Most of the time the signal is on mark so this is when most of the fades take place. A converter without mark will hold print gibberish during deep fades. A converter with mark hold will print gibberish only when a typed letter or function happens to occur simultaneously with a deep fade; thus giving less typed errors than that of the non-mark hold converter. Of course, there would be no difference between the two systems with very fast and consistent typing at the full 60 word per minute rate. How often is this done?

The noise gate is also advantageous for receiving VHF AFSK signals. Off station receiver noise and phone signals will not affect the printer. The only signal which will make the machine print, is the normal RTTY tones. This might be something for the auto start boys to think about.

The plate of each half of the 12AX7 is connected to a deflection grid of the 6AF6 double-eye tube. This circuit works on the principle of unequal charging and discharging impedances for the .01 uf capacitors from each plate to ground. The charging impedance is 1.0 Megohm resistor from B+. The discharging impedance is the 12AX7 plate resistance controlled by the signal from the filters. The shadow angle of the appropriate half of the eye tube will increase when the plate voltage of the 12AX7 drops. This is caused by an increase of signal from the filters. The 12AX7 is conduct-

ing only during a small portion of a cycle of incoming tone. Plate conductance is high during this time, discharging the .01 uf capacitor. During the rest of the cycle, the 12AX7 is cut-off and the .01 is then charged by the 1.0 Meg resistor. The average plate voltage depends on the length of time (during an individual cycle) the 12AX7 is conducting which is a function of the signal amplitude from the filter. The eye operates smoothly and is free from any fuzzy fringes which are common with AC deflecting voltages.

S4 is a reversing switch enabling a choice of copy from either the 2125 or 2975 cycle channel. The DC signal proceeds through an RC filter, to eliminate the audio components, and on to the "tune-operate" switch. One half of a 12 BH7 is the keyer tube, and directly drives the selector magnets. The 5K pot adjusts mark current to any value between 20 and 30 mils.

The other half 12BH7 is the AFSK oscillator. This circuit is of the Hartley type, with some degeneration introduced to minimize the effect of tube parameter changes on the resonant circuit.

Keyboard contacts change the oscillator frequency by shorting and opening C4. The network (1 K in series with 01. uf) across the keyboard contacts in the machine must be removed, to prevent loading the oscillator. A 5K pot adjusts the modulation level of the AFSK oscillator to that of the station microphone.

Some of the features of this oscillator are: 1. Less than 1 db difference between mark and space amplitudes. 2. Very clean sine wave output. 3. Less than 7 cycle frequency change using a connecting cable having as high as 500 uuf capacity (this is equal to about 10 feet of Belden multi-conductor cable). 4. Less than 1 db drop in output with a keyboard contact shunt leakage of 27K ohms. 5. Supply voltage and tube parameters have very little effect on output frequency.

S1 is the main function switch. When in the "REC" position, the receiving converter operates the selector magnets from the received signal. The AFSK oscillator is muted and the station microphone is connected to the VHF transmitter. When turned to "FSK," the keyboard and selector magnets are connected to a DC current loop. J2 can be used to feed a diode keyer for FSKing a low frequency transmitter (zero volts on mark and +130 volts on space). The eye tube will still operate from an incoming signal as long as S3 is set to "TUNE." This can be used to adjust your own FSK shift to 850 cycles by receiving your transmitter on the station receiver, adjusting your mark and space frequencies to maximize the eye tube openings. The AFSK oscillator is still muted; the microphone is still connected to the VHF transmitter. When S1 is set to "AFSK," the AFSK oscillator is fed to the microphone input of the VHF transmitter. Some of the oscillator signal is fed to the receiving converter for local copy.

Here are some of the specifications not covered in previous paragraphs.

1. Input voltage to the receiving converter for full limiting is .02 volts at 4 to 16 ohms input impedance.
2. 3db band-width of 2125 cycle filter is 180 cycles.
3. 3db band-width of 2975 cycle filter is 300 cycles.
4. AFSK output level is zero to 0.1 volts controlled with pot on rear of adapter.
5. AFSK output should feed to any load above 5K ohms.
6. Shifts as low as 400 cycles may be copied because only one filter is used at any one time.
7. Total range of receiving converter is 68 divisions as compared to test model 26's local copy range of 73 total divisions.

A test was run on the adapter which gave very interesting results. White noise was mixed with a noise free continuous tape of "NOW IS THE TIME FOR ALL GOOD, etc." These were fed to the receiving converter which ran the printer. The converter was set up for normal operation on 2975 cycle channel. The white noise was receiver hiss from an SX-100 with BFO set such that a noise band-with of 2KC fell in the 1500 to 3500 cycle audio range. The signal and noise voltages were well above limiting levels and were measured on a full wave rectifier average seeking meter.

Errors per line verses average signal to average noise ratio are shown in graph one. The errors per line, for each S/N ratio were averaged over five lines of copy. It can be seen perfect copy takes place at a S/N ratio greater than or equal to one.

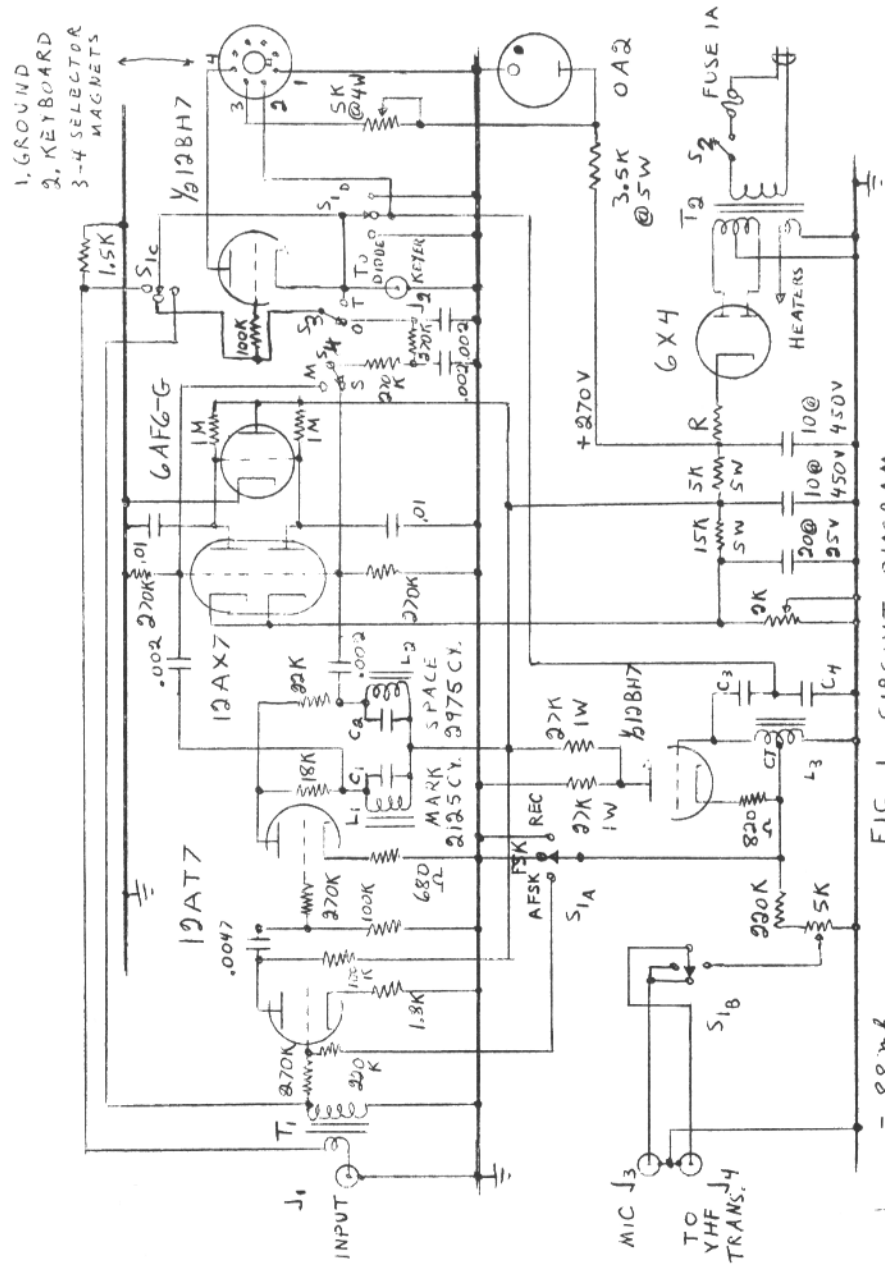
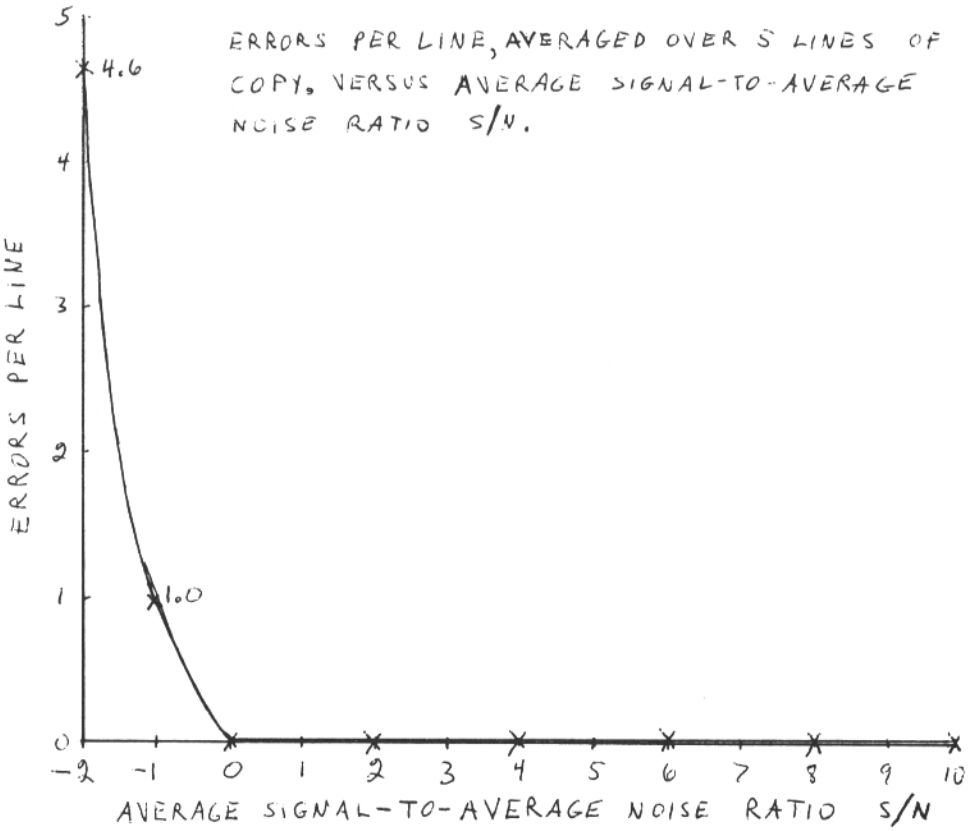


FIG. 1 CIRCUIT DIAGRAM



GRAPH 1.

Report on RTTY, at the Tenth National ARRL convention, Washington, D. C., Aug. 15-16-17, 1958:

RTTY was well represented not only the technical features so ably directed by Frank White, W3PYW, but in several exhibition booths where machines were running and viewed by general attendance said to be 3,500 at all combined convention features. The weather was fine and the printed program the best we have seen in 38 years. The fantabulous Sheraton-Park hotel was fully air conditioned and gave a suite of rooms at 552 to the RTTY tribe. Here many arguments went on, we played with machines, the "Big Tube," and Dick W3CRO tore down a Model 26 machine and got it going again with improved range, though we think he could do that blindfolded with boxing gloves on!

The RTTY technical session started at 2 p. m. Saturday and overflowed with standing room only in the hall. Frank W3PYW led off with "Useful features needed in radio teletype converters for amateur radio use," a comprehensive treatise for young and old. The threatened "panel of experts" didn't materialize due either to lack of time or improbability of selecting two or more hams that would agree on such controversial subjects as filter band widths! Next followed prolific Phil W2JAV on "Good keying practice employing local loops for signal generation," and his bag of tricks included a typing reperf, Model 14 TD, scope, variously adjusted polar relays, and tape recordings of signals with all kinds of bias distortion, chirp, ac hum on unshielded keyer leads, or what have you. It was very interesting in this field he knows so well. The big laugh was his comeback at "button pusher" when Phil demonstrated a magnetic tape containing a positively putrid signal which on code signed "WNOBP"! scoundrell!! The meeting having covered receiving and sending technicalities, Frank lastly introduced WOBP with such flattery as most active RTTYER in USA, to cover the subject, "Net operations and working DX on radio teletype." While a north central location permitted a fair appraisal of eighty and forty meter nets, data on six and two was meagre. Several foreign DX stations were listed with frequencies and usual operating hours with a plea for more active participation especially in the east. Some suggestions were offered as to improved interoperation between American and British printer speeds in the United Kingdom, and "tape gear" at two-bits was introduced, Hi.

The RTTY banquet was a quiet friendly informal affair attended by about 40 who drew diagrams on the tablecloth of their own perfect tu. The feature speaker was Don Martin, director of research & development for Collins Radio, and he gave a learned paper on improved FSK and combating fading and multi-path pulse distortion.

The friendships formed or improved at conventions are a very important feature not on formal printed programs. During four days we had numerous profitable technical discussions such as frequency stability, I. F. discriminators, full break-in, etc. with Fritz Franke of Hallicrafters; legislation with Frank; transistors and full mobile with Phil; printer speeds with Lou VE2TAC; new printer design for hams with Chuck of Kleinschmidt; RTTY impact on ham radio with Fred Schnell now W4CF who has printed many of us; operating procedure with Ed W1BDI; and a good cry with Dick who the previous week watched 60 Model 19 machines being compressed into a small block of steel amid flying sparks because that was easier than ham correspondence or possible complications. Much could be said on each of the above subjects and future Sunday bulletins probably will elaborate further.

The general ham banquet had 83 tables seating ten each and late comers found chairs with difficulty. The main speaker was the Vice President of the United States who recounted four interesting experiences with amateur radio, all a credit to the fraternity. Civil defense emphasized communication needs. Fred W4CF eulogized the late Hiram Percy Maxim 1AW whom we also knew personally and indirectly worked for on two accasions, and the description of the old spark rig was very factual from memories of having run it a few times. We didn't win any prizes, not even the mobile gear complete with station wagon, so after

a few days with FCC and the patent office on brainstorms, we got a 6:16 p.m. plane from Washington, started our homeward glide at 18,000 feet over Milwaukee, and arrived in Minneapolis before 9 p. m.

DX Notes: Meagre. As we were packing August 14th we noted that Bob W6DTM/-MM was sailing westward out of San Fran harbor and he said he hoped to meet Cas KR6AK Sept. 15th with some parts for him. We returned to the air the 21st to take some traffic from Ed W1BDI, then remembered Bob K6GZ our western outlet was vacationing! However Faust W6VR was firing up after six months traveling the Orient so he kindly took the reperfed MSGS then continued his sked with Robie W3RE on "Hi-20." Next looking on 15 meters found Bruce ZL1WB testing on 21088 under the spreading spurious of RQL-33 who has an approximate center frequency of 21090. Printing of Bruce was rugged on "make and break" though we got two good lines of "four six," and CW was hardly better. He went through the customs like a breeze but the large quantity of gear by boat is in Aukland and he expects to get it Monday or Tuesday. Last night we were on a short time for a contact with Eric VK3KF who still has the borrowed printer and while on another project may keep it about two weeks more. Eric was not on Friday due to needed work on his beam. Eric said the West Coast gang are sending him a Model 26 printer so he can keep on for our RTTY DX which sure is fine! Eric said Bob W6-DTM/MM is in Yokohama now. Fifteen folded at nine p. m. but opened again right after midnight with Eric and Bruce chatting and as they mentioned Beep, we broke in but soon lost them, durint! Wish they would both get on the same frequency but they are rock bound.

Larry Bump whom many of us have worked from Newfoundland as WOANY/-VO4, phoned while passing through Minneapolis but we were in Washington. The word seems to be that he will be stationed at Rapid City, South Dakota early in September. Perhaps he will be with Jerry WO-TOB/O also near Rapid City, but Jerry was with us in Washington, as was also Frank K6OUR (Major Ivey), another Mars man. Frank may locate in the Pentagon instead of Iowa, but final decision was to be made right after the convention. We hope all these RTTY men moving around will soon get settled, but we regret foreign DX folding up.

A few days ago we got a 400 mile landline fone call from a ham that wanted the "Auto-Mate 26" featured in Aug RTTY but was afraid it might not fit his machine. Unfortunately the article in one place leaves the impression it will not fit earlier production models of the 26, the ones in which the edges of the line feed bail plate are turned to the rear. In that case, you just make two hacksaw cuts on the corner of the gizzmo plate, like shown in the drawing, and it then fits either style of machine. Simple. Probably Ben W9UE will do it if you tell him you have the older type 26. The automatic carriage return gizzmo is very worth while, is to be found on most Model 28 machines, and a kit of levers to do this on the Model 15 can be obtained for twice what Ben asks.

— 0 —

Hope to have this 26 on 40, 80, and 220 MC before too long. Have a home brewed tu with hand wound toroids using the cores from TV horizontal flyback transformers works fine, but have to get the drift out of the receiver, as the filters are too sharp. Bob Weitbrecht, W6NRM, on a visit here saw the filters in the preliminary stages. Sure do miss Bob as Wisconsin lost a great RTTY man to California. Norm Krohne, W9SKF, and Harry Cahill, K9KNJ, are currently on 3620 KC. With their 26's. So shortly West Allis should be heard from.

"73"S.

FRED W9GRK

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RTTY is the Official Publication of the

RTTY Society of Southern California

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

Permission to copy is granted provided credit is given.

For Information Regarding the Society Contact the Following:

W6AEE — Merrill Swan
W6SCQ — Lewis Rogerson

For Traffic Net Information:
W6FLW W6IZJ

For "RTTY" Information:
W6DEO W6AEE

Not much to report here. Have a desk job now and not much travel so do not get to conventions as in the old days.

The 26 does fine and I hear you talking to the boys on 40 occasionally. Believe that there will be at least 2 new RTTY hams in Atlanta before end of year. One has an outfit now but not set up (W4ORI and the other is a new novice KN4RJT.

GEO. W4AIY

Believe that we discussed some RTTY frequencies and where to find some of the Commercials when I was out there. I submit a couple here for you to look for.

14350 Kcs about 425 shift station usually sends info regarding United nations press.

United press approx 14700 kcs in afternoons.

United Press approx 9.4 mcs in evenings and with 425 cycle shift.

United press approx. 7.75 mcs

In general I don't have much trouble in finding press stations to copy here.

You probably have copied KC4USV. He is quite readable here on 14340 Kcs and his regular schedule with K2KCR is on Tuesday and Friday mornings at 0500 GMT on RTTY (I got tentative schedule with him tonight hi) DICK, W8CAT

Wonder if you know of anyone operating the KWM-1 frequency shift?

CLAUDE SWEGER, WOBTV

Very accurate audio frequencies can be obtained from a BC-221 frequency meter by beating its low frequency band against a 125KCS oscillator. On this band the BC-221 has a band spread of forty dial divisions per thousand cycles. These dial divisions can be read to a tenth of a division, thus any audio frequency can be set up to an accuracy within three cycles.

JIM HEPBURN, VE7KX, Aug. 21/58

Keep up the fine work with RTTY. I have no suggestions to improve it, but I *would like to see some more about phase shift keying.*

73

RAY W9NGX

Hope to be on soon from the home QTH in D. C. with a Kleinschmidt TT4 and home brew T.V. Even though there is interest here at Kelfavic the chances of getting on are small—machines are hard to come by, even on a loan basis, up here.

JOHN, TF2WDJ

Please renew my subscription for another year at the new airmail rate and send me a copy of the new call book.

The balance is to cover subscription to:
Dr. Arthur C. Gee, G2UK,
"East Keal," Romany Road,
Oulton Broad, Lowestoft,
Suffolk, England.

"Doc" is very interested in RTTY. He has morse tape gear and was looking for a creed printer that would transcribe from the creed three unit tape. For the past year I have been corresponding with various "G" stations trying to stir up RTTY activity there. I sent an article on ham RTTY to the Radio Society of Great Britain Bulletin and got back a very curt note from the RSGB editor rejecting my article as "It is not the policy of this society to encourage FSK"!!! So now through Doc am going to try some of the other British radio magazines and see what can be done. Find that GM6MD is a teleprinter mechanic for a newspaper in Glasgow and now he has made WAZ (first GM) am trying to make a Christian out of him.

Worked Eric VK3KF on May 30 on fifteen but haven't had much success on that band. My VFO is too unstable and have been trying to lash up a crystal FSK for fifteen. Wish someone would put out a circuit for FSK on a XTAL—can't get enough shift and all my XTALS shift different amounts!!! Heard VS1HU the other nite, find I can run this Model 26 at the 66WPM speed by running it off my little Onan emergency gas engine generator. It gives about seventy cycles and turns up the 26 and 14 reperf to the higher speed OK.

Re our QSO last week. I think 14090 would be a suitable freq. for RTTY on twenty and recall I recommended it several years ago. Since the stateside boys moved to the high end of twenty, we have just been out of luck up here. We can only use RTTY between 14000 and 14150 up here. The old freq of 14140 was almost useless due to latin phone QRM and splatter from the local phone boys near 14150.

73

JIM, VE7KX