RTTY

NEWS OF AMATEUR RTTY

OCTOBER 1965
30 Cents
Vol. 13, No. 10

HIGH SCORERS BARTG AND VOLTA RTTY SS CONTESTS

RTTY, INC.
372 Warren Way
Arcadia, California 91007
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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: 1.5 and 6.0 kc Collins Mechanical filter for 75A4. VE3GK, Canadian: 85 Fifeshire Road, North Willowdale, Ontario, Canada.

FOR SALE: 88 mhy Toroids, $1.00 for five plus shipping. Limited quantity. W7VKO, 3109 East Roma, Phoenix, Arizona 85016.

FOR SALE: Large 31 x 16 schematic diagram of MAINLINER TT/L, $1.00 postpaid. Set of four photographs of prototype TT/L clearly showing optimum layout, $3.50 postpaid. W8SDZ, 4626 Rambo Lane, Toledo, Ohio 43623.

FOR SALE: Complete model 19 Teletype set less table, will trade for or Trade: SB-34 or $350 cash. Carl H. Arndt, 510 Hawk Street, White Sands, New Mexico 98002.

FOR SALE: Model 19 printer with model 14 TD and table, and power supply complete, $175.00. CV 89/URA 8B TTY converter, $160.00. W6WOC, 2647 20th Avenue, San Francisco, California 94116.

WANTED: Model 15 page printer with auto LF/CR and cover. George Miyatake, 5035 24th Place South, Seattle, Washington 98108.

FOR SALE: CV57/URR converter, Part of URA-6, complete with tubes and handbook. Bought as surplus, never used, so make no guarantees as to how it operates. Will take best offer over $25.00 if picked up. $5.00 additional if packed and you pay shipping. K2VAM, P.O. Box 188, Holmdel, N.J. 07733.

WANTED: Information on a dual diversity converter, CV 31 C/TRA-7, schematic preferred. W5LCN, 1315 East Main Street, Alice, Texas.

FOR SALE: 88/44 mhy toroids, 5 for 1.75 pp. 225A Polar relays with sockets, $2.00 ea,. pp. 276 F mercury wetted relays, $1.50 ea., pp. Heat sinks, extruded aluminum, 1 x 4½ x 1¼ in., mounting area 1 x 1½ in., eight fins on remaining area, five for $2.00 pp. W9FTE, 5665 North 38th Street, Milwaukee, Wisconsin 53209.

FOR SALE: Two model 15 tables (metal) perfect. One model 28 typing unit. Two LESU 28 power supplies. Misc. model 15 parts and supplies. K6PZT, 9337 Gotham Street, Downey, California. Phone TO 9-3292, area code 213.

FIFTH ANNUAL WORLD-WIDE RTTY SWEEPSTAKES

THIS IS A COMPETITION BETWEEN ALL STATIONS THROUGHOUT THE WORLD TO DETERMINE THEIR ABILIY TO EXCHANGE MESSAGES VIA TWO-WAY RADIO TELEPRINTER.

1. TEST PERIOD:
   0200 GMT Oct. 16th to 0200 GMT Oct. 18th, 1965.

2. BANDS:
   This test will be conducted in the 3.5, 7.0, 14.0, 21.0, and 28.0 MCS amateur bands.

3. Stations may not be contacted more than once on any one band. Additional contacts may be made with the same station if a different band is used. In the interest of encouraging multi-band DX operation, the same country may be claimed more than once if contacted on different bands. The same state worked on more than one band may be claimed only once.

4. COUNTRY STATUS:
   For the purpose of this contest KH6, KL7, and VO will be considered as separate countries in addition to the ARRL country list.

5. STATIONS WILL EXCHANGE MESSAGES CONSISTING OF:
   (A) Message number.
   (B) Check (RST).
   (C) Time in GMT.
   (D) State or foreign country.

6. POINTS:
   (A) All two-way RTTY contacts by North and South American countries including KH6 will earn two points.
   (B) All two-way RTTY contacts by countries other than in (A) above will receive ten points.
   (C) All stations receive 200 points per country worked not including their own.

7. SCORING:
   (Includes All Stations)
   (A) Two-way exchange points times total states worked.
   (B) Total country points per band times number of continents worked.
   (C) Add item (A) and (B) above. This is your total test score.

8. SAMPLE SCORE SHEET:

   (A) EXCHANGE POINTS (196) TIMES STATES (40) EQUALS (7,840)

   (B) COUNTRY POINTS (800) TIMES CONTINENTS (3) EQUALS (2,400)

   (C) ADD ITEM (A) AND (B) ABOVE (10,240)

   TOTAL TEST SCORE

9. SAMPLE LOG:

   STATION LOG OF W6TPJ (CALL) DATE 17 OCT. 1964

SENT					RECEIVED				
NR	RST	TIME	BAND	STATION	NR	RST	TIME	STATE OR COUNTRY	PTS.
1	589	0205	14	W6CG	2	589	0204	CALIFORNIA	2
2	569	0230	14	VK3KF	6	579	0231	AUSTRALIA	2
3	?	?	14	W6NRM	4	359	0240	—	0
4	599	0300	14	W2IAV	7	599	0259	NEW JERSEY	2
5	579	0514	7	VK3KF	22	569	0514	AUSTRALIA	2

TOTAL EXCHANGE POINTS (8) STATES (2) COUNTRIES (2) CONTINENTS (2)

STATION LOG OF VK3KF (CALL) DATE 17 OCT. 1964

SENT					RECEIVED				
NR	RST	TIME	BAND	STATION	NR	RST	TIME	STATE OR COUNTRY	PTS.
1	599	0201	21	ZL1WB	1	599	0202	NEW ZEALAND	10
2	589	0204	21	W6CG	1	569	0205	CALIFORNIA	10
3	589	0210	21	W6NRM	3	569	0210	—	10
4	569	0220	14	W6AEE	2	569	0222	—	10
5	579	0224	14	VE7KX	9	589	0225	CANADA	10

TOTAL EXCHANGE POINTS (50) STATES (1) COUNTRIES (3) CONTINENTS (2)

NOTE: Log the state only once, the first time contacted. Log the country on each band contacted. (See sample log; paragraph 9.)

10. Logs and score sheets should be received by RTTY, Inc., 372 Warren Way, Arcadia, California 91007, by November 27, 1965 to qualify.

DX-RTTY

BUD SCHULTZ, W6CG
5226 N. Willmonte Avenue
Temple City, Calif. 91780

Hi DX'ers:

This month I am going to take up a goodly portion of the column with the results of the BARTG and the Alexander Volta DX contests. In answer to the many queries as to why they were not published here before this late date I can only explain that the final tabulations arrived here at the DX desk since the last issue went to press. Ordinarily we would devote several pages to these results but because of the late date and the lack of space I will try to condense them into this month's DX spread.

Let's take a look at the BARTG contest first. It was estimated that 200 RTTY stations took part in the test and conditions were quite good during the contest weekend. It is notable that 9 stations were able to work WAC while participating and the BARTG committee gives Jean, FG7XT, a big hand for the fine score he ran up in winning. Here are the top runners and their scores: FG7XT—45,030; KP4AXM—40,572; K8MYF—38,388; W2RUI—37,296; W3KDF—32,718; W3ZVJ—30,096; WØMPF—27,648; VE3BIJ—27,360; W1GKJ—26,368; VE3IR—22,260; ZS6UR—19,992; W2MXN—19,904; ON4HW—19,006; I1ORS—18,434; W8CQ—17,748; K9OXA—17,080; W8GPB—15,768; YV5AVW—13,820; K8JTT—13,806; WA9NHO—13,776. The greatest number of countries worked was 21—by K8MYF and W2RUI! Some of the rarer DX stations who participated were OE2WSL, OE1KRW, MP4BEK, TA1AH, KR6BQ, ZS6UR and ZS6BCT. Two Maritime Mobile stations were also among those present—W6JIE/MM and K7VGW/MM. Alan, G2HIO, who sent in the report pointed out that many of the overseas gang tripped up on their score sheets—because of the fact that the SS and Volta contests exclude bonus points for your own country. He also pointed out that some of the logs were works of art and in this respect mentions in particular K8MYF. I saw a copy of K8MYF's log and I will go along with this!

Now on to the Alexander Volta Contest results. The Volta report takes up ten neatly typewritten pages and is the most comprehensive collection of contest statistics I have ever had the pleasure of seeing. Each log received is broken down into working hours, number of QSO's, number of states, number of contacts per band, number of countries, number of continents, total score and so much more I just don't have the space to try and describe it all. Here are the top twenty winners and their totals: I1AHN—72,670; SM6CSC—50,570; G2HIO—41,160; I1ORS—39,800; G3MWI—37,960; W2RUI—35,494; K8MYF—32,552; ON4HW—31,630; I1RIF—31,540; DJ6ZBA—30,830; KP4AXM—28,420; DL1VR—23,020; W4MGT—20,900; W1GKJ—20,068; W3KDF—18,820; VE3BIJ—17,342; W4AIS—14,378; W4BOC—13,464; K8MZS—13,404; K1CPX—12,988.

Here are a few interesting statistics on the Volta Contest—218 stations participated in 24 countries—by continents they were as follows: N. America 154, Europe 54, South America 7, Africa 1 and Oceania 2. 29 USA States were represented. The contest summary included several pages of typical comments from those who took part and the great majority were very favorable with most writers hoping for more of the same in the future. It would appear that these two European sponsored contests were both very well handled and well received and those responsible for them are to be highly applauded for their efforts. Another notable statistic that this writer noted from the scores was the fact that W2RUI and K8MYF were the top two Stateside leaders in both contests—this should at least entitle these two DX'ers a word of congratulation! Before leaving the contest scene it would seem in order for me to remind all of you that our own World-wide RTTY Sweepstakes takes place this month, so keep that week-end open. To prepare for it you might oil up your printer, buy the little woman a new hat and get a large bottle of aspirin and keep your fingers crossed for good conditions.

DX SNIPPETS: OK1KUL, Milos, has his RTTY gear ready and is impatiently awaiting his permit for operation. Jack, W6CQK, writes from Venezuela that he recently returned from a trip to Milan where he spent a most enjoyable visit with Bruno, I1RIF. YV5HG and YV5AFA are both active on 20 with fine signals into the States. The "down under" boys are still coming through every week-end on 20. Eric, VK3KF, has a new final amp to bolster up his already "landline" copy here on the West Coast. Bruce, ZL1WB, says that NZ activity is now starting to pick up and several new ones should be active shortly. Irv, K8DKC, reports that KC4USV has been coming thru nearly every night on 7136 (NFSK) with fine signals. KC4USV has been working regular skeds with Walt, W7ARS. Irv also tells of a QSO with F3PI in Paris—the great Grandson of "Baudot" of Baudot code fame. Gus, KG4CC, has been very active on NFSK in the past ten days—look for him around 14,095 Kcs. European RTTY'ers are now coming through to the West Coast as late as 2230 GMT on 20 meters.

DX-RTTY Continued . . .

Some of those who are really banging in are SM6CSC, SM7HZ, DL3IR, F8KI, and a number of Italian stations.—Cas, Ex-KR6AK, is now KA9AK and is busy setting up the gear at KA9MF in a place called "Chitose". Cas writes that RTTY can only be used in Japan on freqs. above 28.5 mcs. He says that Ron, KA2RJ, has RTTY ready to go and they are anxious to get some DX activity started on the ten meter band. With the sun spot activity starting to favor operation on the higher frequencies it looks like a good bet to begin watching that band for openings to the Orient. If you need Asia for your WAC this may be a golden opportunity. Let's think seriously about some ten meter DX plans started. Once the ball gets rolling it should be a real good spot to pick up some new countries. FG7XX is a brand new one from Guadeloupe who put in an appearance this past month. His name is Maurice and tells me that Jean, FG7XT, is his sponsor. Maurice has a fine signal and does a fine job on the keyboard. has to be one of the most active RTTY spots in the World!

A salute this month to the two latest qualifiers for WAC-RTTY. Number 67 went to Cole, K5OLU, and number 68 to Dusty at W8CQ. Congratulations, fellers! By the way K5OLU is also a two-time winner of this award—he also holds number 18 which he was awarded when he was KR6MF. He expects to be sent to KX6 land in the future so perhaps he will be the first three-time winner.

Your DX editor and his XYL are about to leave for a visit to the DX headquarters of Ed, K3GIF for a few days. When we return I hope to be able to fill you in on some of the devious methods used by Ed and his cohorts on how to work some forty odd countries on RTTY without trying! If I am able to uncover anything I will report it here so we can all share. In the meantime hope I can work some of you from K3GIF.

Good luck in the contest and hope to see all of you here again next month.

73,

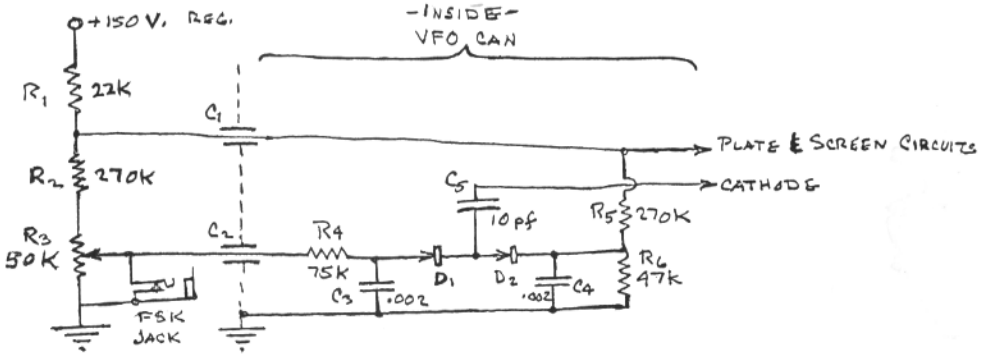
Bud, W6CG

"RIGHT-SIDE-UP" FREQUENCY-SHIFT KEYING FOR DX-100 ETC.

J. F. Blackburn, K6WA

With key down, diodes see about −25 v. and are effectively open-circuited (mark *high:* normal FSK).

With key up, diodes see a voltage which depends on the setting of R_3. Any shift from zero to some maximum can be obtained. D_1 & D_2 can be thermionic diodes, but semiconductors work perfectly *if* (1) their conductance is high enough with a slight positive bias, and (2) their carrier half-life is less than a millisecond or so. Either silicon or germanium low-current units such as IN34's are o.k. C_1 and C_2 can be any reasonable value such as .001 μf. R_1 probably is not necessary. It was in the original Heath circuit and I left it in.



THE W6NRM RADIOTELEPRINTER TERMINAL UNIT, MARK V

R. H. WEITBRECHT — W6NRM

1966 Woodside Road, Redwood City, California

PART TWO

(Continued from last month) . . .

FSK Diode Driver — AFSK Oscillator

This is the transmitting portion of the Mark V terminal unit, and the circuits are shown in Fig. 7. The area on the left concerns the FSK diode driver circuit, while the one on the right takes care of the AFSK oscillator with its output amplifier. The +6 volt signal from the "output port" of the Teleprinter Loop is received, via the SLX-DLX switch (described later), through an output Mark-FSK-Space selecting switch and is fed to the two areas just mentioned above.

The first area — the FSK diode driver circuit — is designed to generate accurate squarewaves for direct injection into an accessory frequency-shift keyer assembly mounted right next to the variable-frequency oscillator of the radio transmitter. The shifter circuit for this VFO will also be described later; now we consider how the signal is applied and phase adjusted.

Transmitter VFOs are of two general types; (1) straight through, with frequency multipliers as required to reach the desired output frequency — this is typical of the older radio equipment, concerned with CW radiotelegraphy or AM radiotelephony; and (2) heterodyne type, with second or more heterodyning oscillators as needed to translate the VFO frequency to an output frequency — this is typical of the single-sideband (SSB) circuits now commonly used in modern radio equipment. The latter type of circuits introduce a slight complication in that frequency relationship of one oscillator to another may not remain constant in sense as one switches to the various bands. For example, the Hallicrafters HT-32 exciter operates its heterodyning oscillator on either the low side or the high side of its VFO. If we apply frequency shift to this VFO, it is now apparent that on some bands the final output shift will be "normal sense", and on other bands the shift will be "reversed sense". In other words, the Mark frequency is normally on the high side of the resulting signal, but it may be reversed to the low side.

The difficulty is rectified by means of an Output FSK Sense Switch, feeding into a differential amplifier circuit — detailed as Q9 and Q10. This amplifier circuit has two inputs and one output to the shift-pot circuit. The aforementioned switch, a DPDT toggle, is wired as a reversing device, so that the +6 volt signal can be applied to either one input while the other input is suitably biased +3.5 volts by means of an accompanying voltage-divider circuit. Q9, arranged as an inverter emitter follower, is employed to control an emitter resistor which is also common to that emitter of Q10. In this way, we are able to apply the squarewaves to either the base or emitter of Q10, the FSK Diode Driver, as required to obtain one phase or other phase of the output signal going to the shift-pot circuit. The voltage levels of the output squarewaves is held at ground-chassis potential (OV.) and (—50 V.), regulated by means of a 1-watt Zener diode placed as shown. The shift-pot circuit will be shown later.

This is the right-hand area shown in Fig. 7. Q11 is arranged as an amplifier-oscillator stage driving an inductor-capacitor network resonating to certain audio frequencies, as indicated, selectable and controllable by means of capacitors as switched in the network. This AFSK oscillator can be set up for narrow (170cps) or normal (850 cps) output frequency shift, by means of a switch shown. The shift itself is made by means of a pair of silicon diodes so arranged as to be controlled by the +6 volt input signal. It controls the application or removal of a certain shift capacitor so as to place the resulting oscillation on Mark or Space frequencies. The shift-diode circuit is effectively cut off by means of +3.5 volts from the same voltage divider, so that during Space, the diodes involved are sufficiently reverse biased — thus assuring stability of Space frequency as well. The Mark frequency is stabilized because the diodes are forward biased and sufficiently saturated. The oscillation amplitude is limited by means of a pair of diodes, reversed and shunted across the tuned circuit. This stabilizes the output amplitude as well on either Mark or Space, so that there is no detectable output level variation as a result.

The output from this oscillator is fed into Q12 arranged as an output-stage amplifier. The level is adjusted by means of a series resistor between output of Q11 and the base of Q12 so that a 1-milliwatt output is obtained

into a 600-ohm load, fed therein by a transistor output transformer as indicated.

The audio shift is crisp and clean, with a minimum of transients. This is assured by the shunt diodes as mentioned above — a pair of silicon diodes having nominal 0.6-volt drop in each direction — thus providing a limiting action to keep the resulting oscillation amplitude across the tuned circuit to 1.2-volt peak-to-peak amplitude. The waveform is a reasonable sinewave, considering the simplicity of the oscillator circuit. It should be pure enough to pass through the audio circuits of a SSB transmitter to obtain resulting clean FSK signal on the air. Of course, if necessary, the AFSK tone can be fed into the input of the TU, and its output taken for injection into SSB transmitter from the Bandpass Filter, using an isolation transformer. The result will be a pure sine wave with negligible harmonics.

The frequency of the AFSK oscillator is set by adjustment of the variable inductor using an Allen wrench. The shift and tank capacitances should be so proportioned so that one obtains correct audio frequencies, whatever shift is used — either 170 or 850 cps. Merely inject the AFSK tone into the input of the terminal unit so as to determine the response with the cathode-ray indicator on the calibrated Mark-Space Detector Unit. The TU is, in effect, self-calibrating, not only for the AFSK signal but for the FSK signal as well, as will be mentioned next.

SLX DLX Switch — Bias Meter — Shift Pot Circuits

Fig. 8 presents the remainder of the output circuits in the terminal unit. There are three general areas involved. The left hand area details the Simplex-Duplex Switching Circuit — all it accomplishes is to arrange for the (SLX) single Teleprinter Loop with all magnets, keyboards, and TDs in series, or for the (DLX) split loop which consists of separated receive and send portions. Normally, the receive portion will handle the receiving magnets of any and all machines such as page printers and typing reperforators, while the send portion will contain all the keyboards and transmitter-distributors.

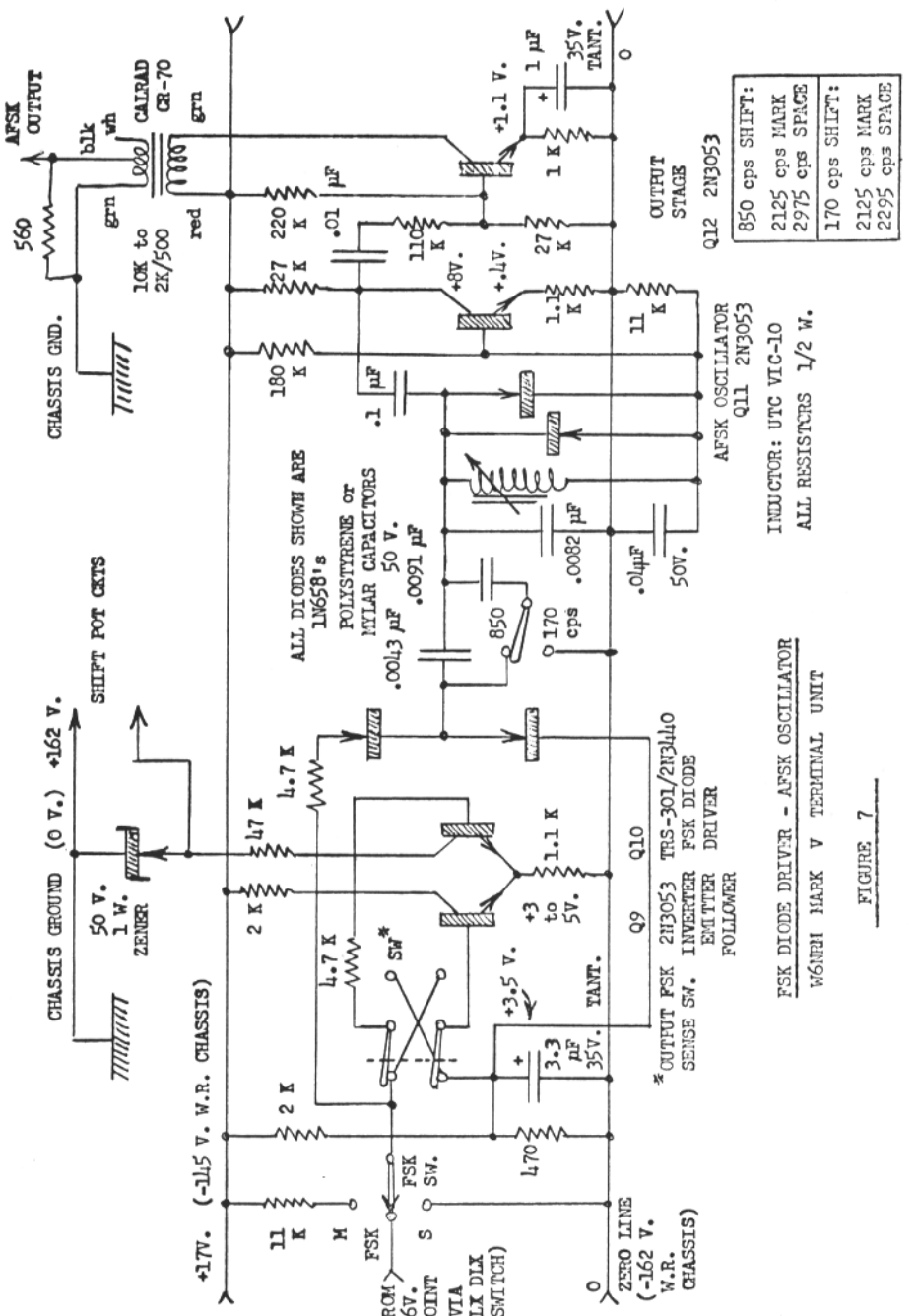
The receive portion is fed from the receiving portion of the terminal unit, through the loop keyer stage, Q8, as shown in Fig. 6. Current level can be either 20 or 60 mA as desired, and set up by the switch in the same figure. The send portion, however, operates at a fixed 20-mA current level — being initially designed to be controlled by contacts in keyboards and TDs. The send portion consists of an essential voltage-divider setup — consisting of a 10,000 ohm 20-watt resistor feeding into a 300-ohm resistor. The former resistor is adjusted for a nominal 20-mA flow so as to generate a 6-volt drop across the latter resistor; this becomes the +6 volt signal that goes via the (set to DLX) switch to the FSK-AFSK circuits of Fig. 7.

Thus, in the DLX position, we have separate receive and send loops, which then can be arranged in various ways during station operation. For instance, we can have a Model 15 page printer and a Model 14 typing reperforator in the receive loop, along with their keyboards, so we can prepare copy for bulletin transmissal and at the same time punch up a tape. An incoming signal could key both machines as required in this same receive loop. The tape is picked up and fed into a TD placed in the send loop for transmitting. This arrangement is quite convenient for use with a Model 19 teleprinter system thus set up.

Of course we could place a page printer with its keyboard, both in the send loop. We can transmit one text, while at the same time we are receiving different text on another printer in the receive loop. Assuming that we have a simultaneous two-way circuit with another station, this is termed full-duplex operation. The availability of both FSK and AFSK circuits for transmitting broadens the Mark V Terminal Unit's usefulness not only for working over radio circuits but over land-line circuits — either or simultaneously as required. The machine arrangement for use with this versatile SLX-DLX switching system is best left to the operator's imagination and desire. Just take note that the send loop is for 20 mA operation only, although it could be set to 60 mA if the resistors involved are changed.

This is the general right-hand area in Fig. 8, and it consists of few parts. There is a 50,000 ohm potentiometer for use as shift control; it adjusts the squarewaves as keyed into it by the FSK Diode Driver system for any voltage swing between essential zero and full 50 volts as clamped by the Zener diode. Fed into the FSK diode circuit on the transmitter's VFO, one obtains a smoothly adjustable shift from zero to as much as is necessary to obtain optimum adjustment to 850 cps shift.

Between the shift control and chassis ground there is a network; this is used as a part of measuring system used for evaluation of bias on a teleprinter signal going through the system. During such measurement, a 0-1 milliammeter is switched in to this network. First, the FSK Diode Driver is set up for current flow into the shift-pot/bias-meter area — by setting the Mark-FSK-Space switch accordingly. The meter is adjusted to an exact 100-reading mark on its scale by adjusting the 1 K pot in the network. It is of course assumed that the meter has been carefully zero-set mechanically with no current flowing in the meter. With the Bias Meter thus made ready, we inject some suitable synchronously-repeated teleprinter character into the system to determine the exact read-



FSK DIODE DRIVER - AFSK OSCILLATOR
W6NRH MARK V TERMINAL UNIT

FIGURE 7

ing. Consulting the table shown in Fig. 8, we can compare our reading with the tabular value for the typical teleprinter signal thus used.[5] If we employ a synchronous RY signal, such as that sent from a tape, whether from over the air or through the TD in the station's setup, we can evaluate as a whole for bias and report accordingly. Typically, for such signal, we will have 0.53 (53 on scale of 100) for a normal value setting which is full scale deflection on steady Mark. If we obtain this reading on the incoming signal, we say that it has zero bias. Should this reading be say 0.57, we have a difference of 0.04; this corresponds to a 10-percent Marking bias on the RY signal coming in. A reading of 0.52 would indicate 2.5 percent Spacing bias on the signal.

Reversed values in the table apply if the Shift Sense Switch happens to be set so that one obtains current flow in the meter on steady Space. Both normal and reversed values are offered as a convenience to the user who may be operating in either direction as dictated by the characteristics of his particular transmitter.

This Bias Meter system is accurate and reliable if used consistently – with a *synchronously-repeating* (60 wpm, 368 operations per minute) incoming signal. Effects introduced by multipath are quite obviously shown on this meter, so if accurate meter readings are desired for report purposes, they should be taken only when radio conditions are reasonably stable. Also, the Bias Meter is a useful accessory when keyboard contacts are being adjusted and gapped. Single teleprinter character can be synchronously repeated through the keyboard, and its reading determined and compared with the table value for that signal.

The meter is switchable to measure loop current (Teleprinter-receive loop only). A shunt of approximately 2.5 ohms is employed to develop 250 millivolts on a 100-milliampere current flow; this actuates the 250 mv. movement in the specified meter. If a different meter is used – it may be necessary to add sufficient series resistance to its movement, using an external resistor, so as to have an overall 250 millivolt system. This enables the 2,000 μF capacitor to serve as an effective damper on the meter movement during bias measurement on a repeating signal.

FSK Diode Circuit

Figure 9 shows a circuit of a shifter circuit for application to a typical low-powered VFO circuit as is commonly used in the current designs of SSB equipment. Such oscillators may be of either the series-tuned (Clapp) configuration or the parallel-tuned (Colpitts) version. In general, the attachment of the shifter circuit to the cathode connection forms a reliable and effective method of applying FSK. A piece of wire can be wrapped around the cathode pin of the VFO tube concerned and connected to this shifter circuit; or else the wire can be soldered to the corresponding cathode pin on the socket.

The network shown in the figure – consisting of two nominal 120K resistors and an .005 μF capacitor – is used for smoothing the sharp transitions in the outgoing signal and thus minimizing click-interference to adjacent channels. It also serves for isolation as far as RF is concerned. Be sure to use a shielded cable from the TU to the shifter circuit mounted close to the VFO stage.

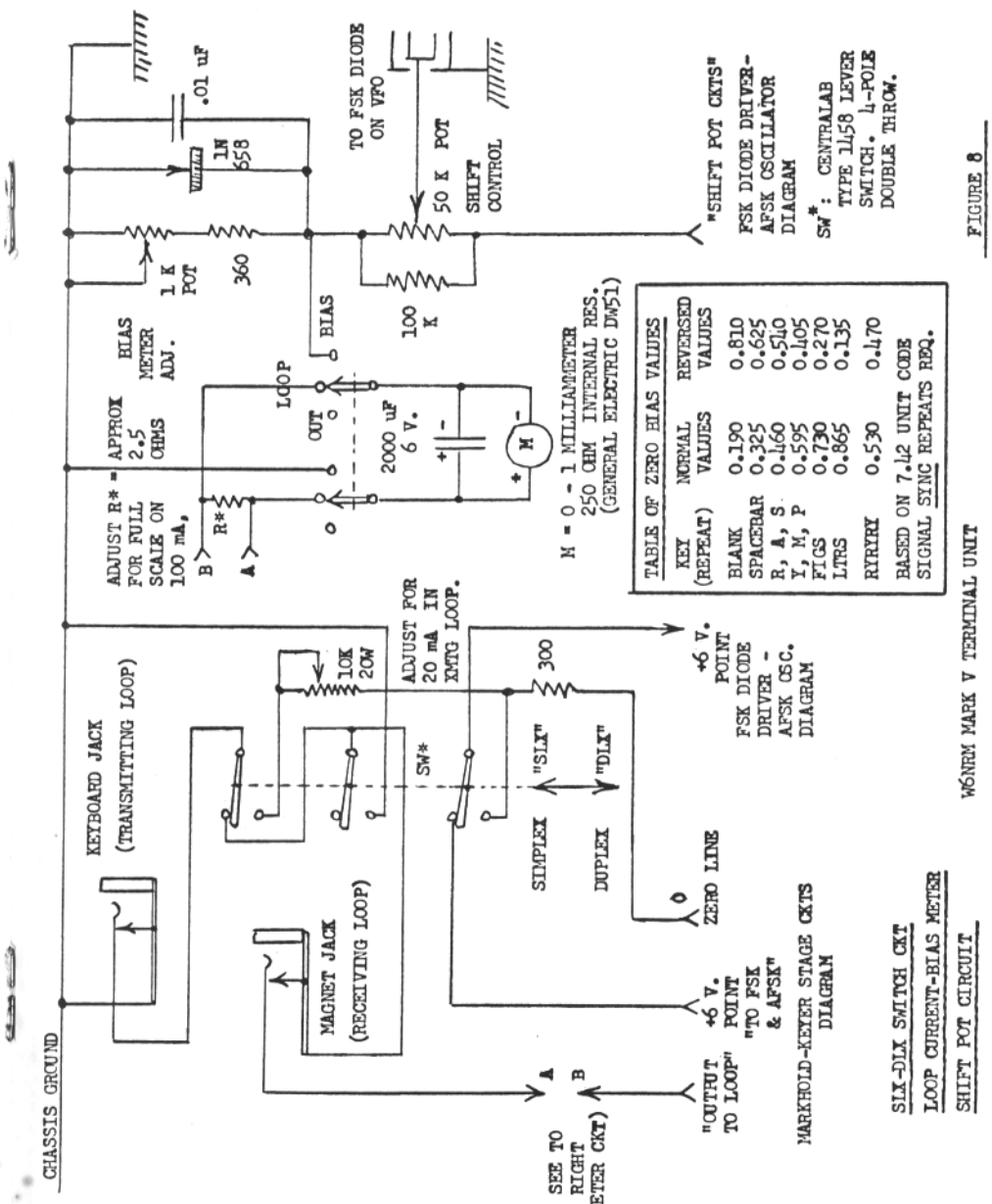
Adjustment is simple. With the shift pot control turned on full (50 volts coming through), adjust the 3-15 $\mu\mu$F trimmer capacitor until an approximate 1,000 cps shift is obtained. Switch between Mark and Space and observe the reading on the cathode-ray indicator on the signal thus self-tuned in. After the initial setting has been determined, use the shift pot to reduce the shift to an exact 850 cps shift value as displayed on the indicator.

Concluding Remarks

The Mark V Terminal Unit was constructed during Fall of 1964, and it has been in active use at W6NRM for many months with complete satisfaction. No trouble of any sort was encountered with the semiconductor circuits. The TU performs just like the Mark IV does, along with the desirable feature of instant warmup on power application insofar as the main circuits are concerned. The only compromise is that a tube is used in the indicator portion, and this cathode-ray tube warms up quickly enough for all practical purposes. The electronic Markhold system is working beautifully. Station Control operates into this Markhold via a relay; in fact the revised system is appreciably more versatile than that of the Mark IV during operations.

In view of the ferment now going on in RTTY circles concerning demodulation methods, it seems appropriate at this time to make some comments on the Two-Tone method. First of all, it is a good method, capable of effective performance during RTTY operations under a variety of conditions, and with a minimum of compromises. It enables the TU to make copy on Mark only or Space only, if necessary, during severe selective fading conditions. When both tones are coming in good, they are demodulated and automatically combined. Mark-Space Frequency Diversity is thus achieved, using a relatively simple and straightforward detector circuit. In this way, such demodulation methods as the Two-Tone and other axis-restoring arrangements used elsewhere are far superior for high-frequency radio-teleprinter communication work than a straight limiter-

[5] An Oscilloanalyzer for RTTY Signal Monitoring, RTTY, October and November 1961.



discriminator system can ever hope to achieve.

Some operating tips: Use just enough audio from the receiver into the terminal unit so that it operates with maximum power into the Mark-Space Detector Unit, but not limiting. Merely advance the gain until the indicator scope's pattern opens up fully, but just short of limiting. Further advance in gain results in limiting, with consequent excessive noise coming into the channel should either Mark or Space tone disappear altogether for brief periods of time due to selective fading. For instance, if Mark disappears and Space does not appear to provide a reverse indication to the loop, the memory capacitor in the Mark portion of the detector unit will now signal a Space indication to the loop to "fill in" for the lack of Space tone during that period. Selective fading is althogether too common on HF radio circuits; it is to be expected at all times. It is the result of cancellation of two or more voltages as induced in the one receiving antenna by two or more components of the radio signal arriving there via slightly differing paths. We can have all kinds of reflective modes, between different ionospheric layers, off auroral curtains, and even off flying airplanes or mountains.[6] For instance, the Los Angeles-San Francisco RTTY circuit during sundown time on 80 meters is quite subject to multipath conditions as one ionospheric layer dissipates and another takes over for the night. At any given moment, this is especially noticeable on one frequency, yet the other frequency we have a strong signal, capable of keeping the information going through the terminal unit. There is a distinct diversity between Mark and Space frequencies, even on shifts as short as 170 cps. Thus it behooves us to make maximum use of such redundant circuit designs as we are able to design into our equipment for operation on HF radio circuits.

Mark and Space are complementary to each other; in other words, one contains the mirror image of the other. This introduces parallel-channel redundancy, or the ability of obtaining information from one channel should the other fail. We must keep both channels occupied with information pulses as much of the time as possible. This indicates fairly high transmitting speeds, so that the teleprinter circuit is operated at close to maximum capacity. Then there will be achieved an equal balance of duplicated information in both Mark and Space channels, or close to 50/50 duty cycle. Slow typing or long restings on Mark places most of the burden on the Mark channel in comparison to the Space channel, and makes the receiving system, of whatever design, more sensitive to fading effects due to loss of redundancy. Hence it is desirable to type fairly fast, or else use tape transmission, during periods of poor radio conditions.

Most any radio receiver of modern design will serve to drive the Mark V TU. It is best operated in the SSB mode – with RF gain control open wide, AGC set for fast-attack slow-release, selectivity setting compatible with the shift to be used on RTTY, and audio gain adjusted as described above for maximum TU response short of limiting. The receiver should have passband tuning as well, for ease in optimizing channel bandwidth and adjustment with respect to beat-frequency oscillator. With passband tuning, it is easy to dodge interference effects on one channel or other of the RTTY signal, and thus continuing copying on the signal. Such a receiver is the Drake 2-B and its newest replacement the R-4. These receivers, along with the National HRO-500, are the only receivers on the market obtainable with such features. The 2-B's in use at W6NRM continue to serve in RTTY operations.

Older receivers, such as the ones without product detection and fast-attack slow-release AGC, are best operated in the CW mode – with AGC disabled audio gain full on, and RF gain retarded as required for proper TU action on a given radio signal. The general-coverage BC-348's at W6NRM serve very nicely in this capacity.

All in all, the Mark V Terminal Unit appears to be an optimum design, with all convenient features included. It can be operated on a variety of shifts, not necessary exactly 850 cps – thus making it more convenient for general RTTY work. Furthermore, it blends nicely into operations involving interconnection between radio and landline circuits. Landline operation is a subject for another article by itself! It will be interesting to see what further improvements are possible in terminal units of the future. Time will tell.

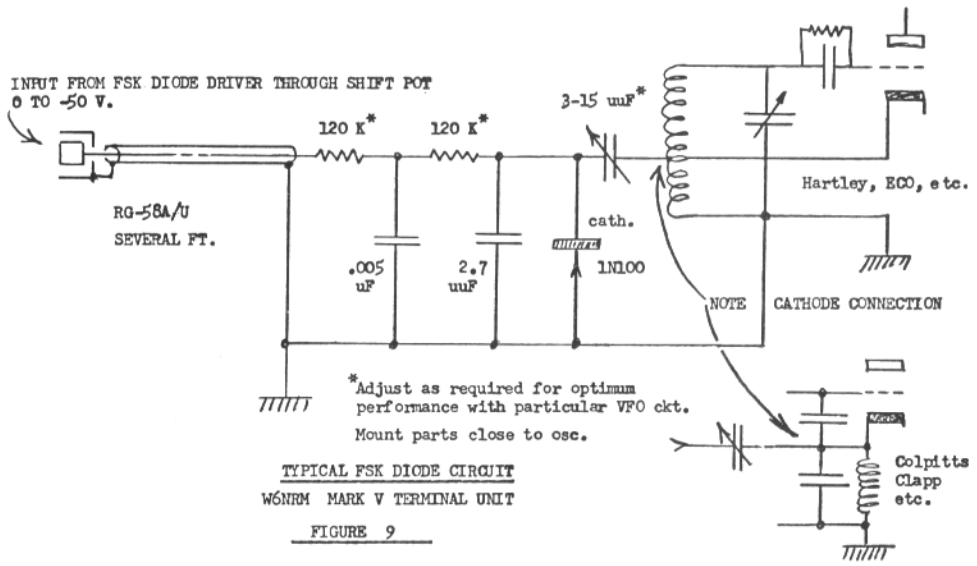
[6]Teleprinter Operations over HF Radio Circuits, **4U1ITU Calling**, 1964 Edition.

NOTICE IN REGARD TO PRINTED CIRCUIT FOR MARK V

Arrangements are being made for make up of printed circuit boards covering the various stages in the Mark V Terminal Unit. Inquiries should be addressed to the author–R. H. Weitbrecht, W6NRN–1966 Woodside Road, Redwood City, California.

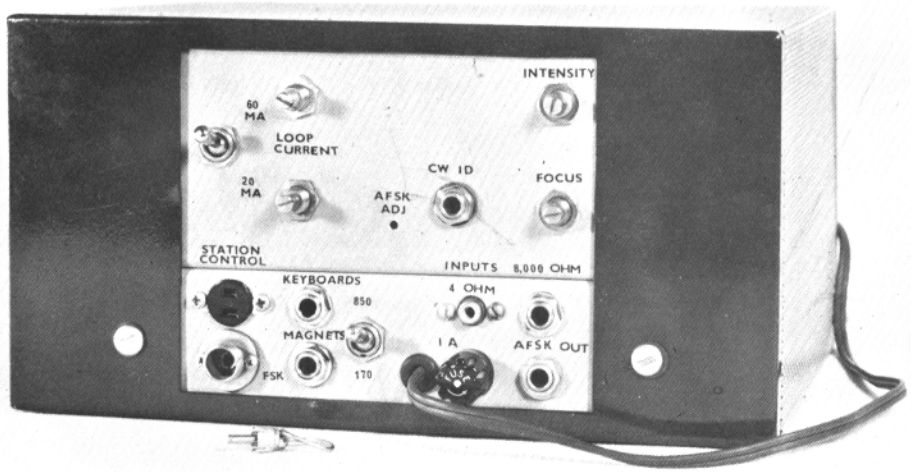
SCHEDULE OF WIAW RTTY TRANSMISSIONS OF OFFICIAL BULLETINS

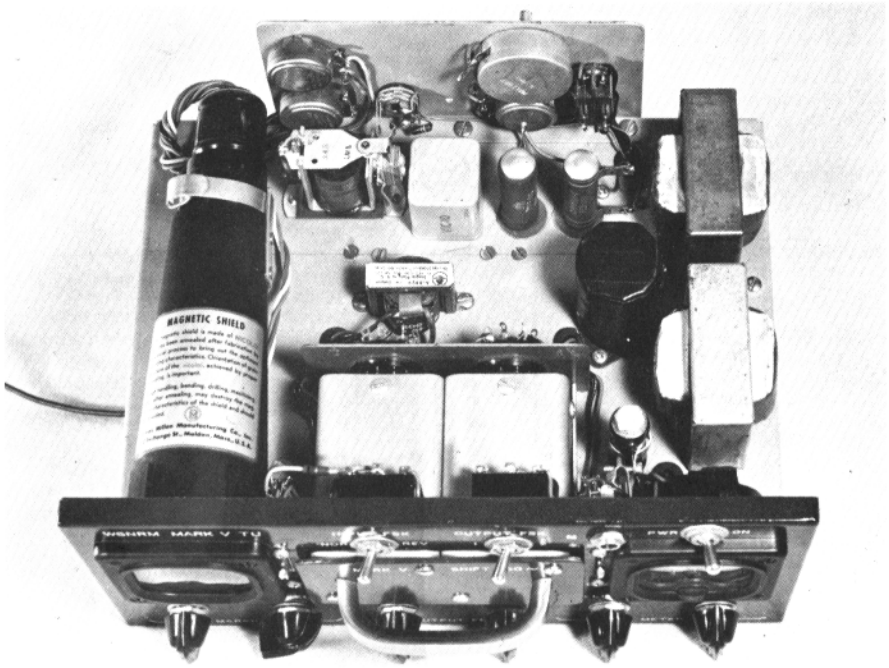
Sat.	3625 KC.	2245 EST	
Sun.	14095 KC.	2015 EST	
Mon.	3625 KC.	2015 EST	and 2245 EST
Tue.	14095 KC.	2015 EST	and 2245 EST
Wed.	3625 KC.	2015 EST	and 2245 EST
Thur.	14095 KC.	2015 EST	
	3625 KC.	2245 EST	
Fri.	14095 KC.	2015 EST	
	3625 KC.	2245 EST	

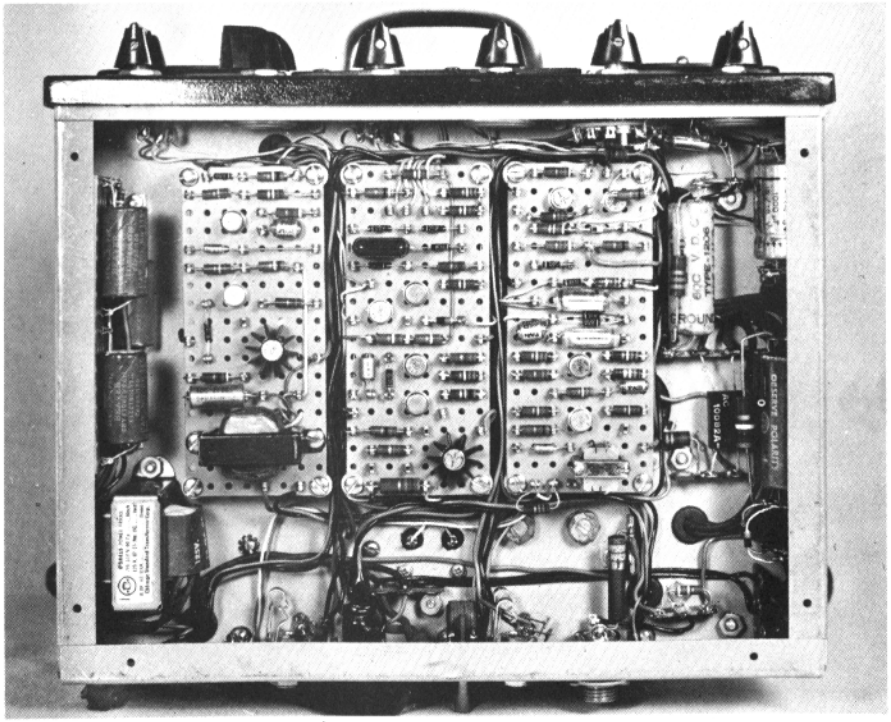


TYPICAL FSK DIODE CIRCUIT
W6NRM MARK V TERMINAL UNIT

FIGURE 9







RTTY TEST THE MONSANTO COUNTER/TIMER MODEL 1000

Recently RTTY obtained several of the Collins band pass filters (in surplus) and as there was the need to check performance of these units, a new counter was loaned to RTTY, by W6ZH.

Working in a research laboratory full time, we had thought of borrowing one from the Lab, until this unit was offered to us to test the filters. The results of our test were printed in RTTY recently.

The Monsanto Model 1000 Counter/Timer is a general purpose electronic instrument designed to perform these common frequency and time measurement functions.

MEASURE AVERAGE FREQUENCY—0 to 20.0 Mca.

MEASURE AVERAGE PERIODS—1usec to 10^7 sec.

DETERMINE FREQUENCY RATIOS FROM 5 X 10^{-8} to 10^7.

MEASURE INTERVALS BETWEEN SEPARATE STOPS AND STARTS.

COUNT (FUNCTION AS A SCALER FOR RANDOM OR UNIFORMLY SPACED SIGNALS).

Microelectronics are utilized in approximately 90 percent of the Model Counter/Timer circuits, thus making the unit unusually reliable, compact and easy to maintain. Seven of the fifteen printed circuit boards are interchangeable.

The Model 1000 measures 3½″ high, 17⅜″ wide, and 16¾″ long. Its weight is only 16 pounds. Can be used on 115 to 230 volts 50 to 400 cycles by simple changes to the input. It reads out using nine Nixie Tubes with storage. This provides direct reading of 7 digits plus prefix and units, automatically positioned decimal point. The first thing that was noticed was the drift in our old H-P 202 oscillator. After it settled down, we started to measure some of the filter units. Our 202 oscillator has a vernier dial on it, however we modified the fourth range on the 202 to cover from 2,000 to 3,000 cycles. The ease with which it was possible to recalibrate the 202 osc. made easy with the Model 1000. After the change it was possible to use the frequency to 2,000.0 cycles. The results of our tests indicated this to be a very excellent counter/timer, and accuracy greater than necessary for the present tests.

Those of our readers who have need for an outstanding counter/timer should write to: Monsanto Company, Electronics Department, 800 North Lindergh Blvd., St. Louis, Missouri 63166. RTTY wishes to thank Mr. Herbert Hoover, Jr., W6ZH, as well as Monsanto for the opportunity to test this new unit.

MORE ON RE-INKERS

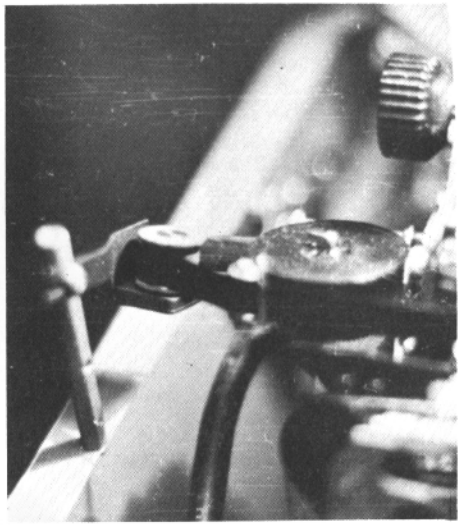
Ray Popkin-Clurman, W2LNP
134 Wheatley Road, Brookville,
Glen Head, L.I., N.Y. 11545

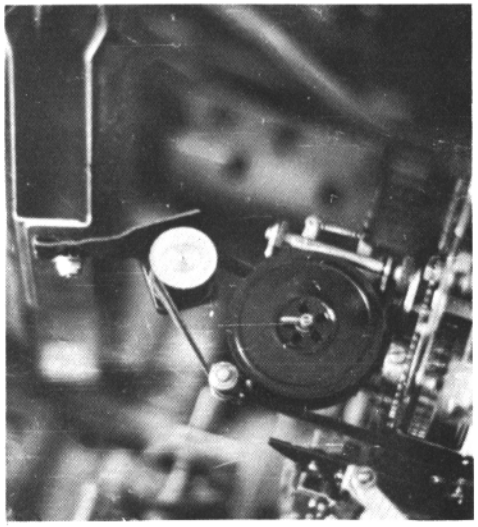
After the article by Telemethods International on installing their reinking kit, I took some hasty photos of how to do it for the much more difficult case of the 28ASR and 28KSR using the more commonly available reinking kit intended for the Model 14. (Number 2Z 5727-382.)

All the shots except the last three are of the 28ASR installation. The reinker does not move up and down with spools and ribbon. Instead it is positioned behind the center line of the spool so that the ribbon will continue to go normally over the idler as if it were coming from the spool instead of the reinker. The height of the spool of the reinker is set in a compromise position so that the ribbon will run easily through the reinker without riding up or down too much with the ribbon going through the spool of the reinker from either direction. It might be necessary to tilt the axis of the reinker slightly to the rear and away from the printer to get good tracking.

All the remarks about the ink in the kit by telemethods apply to the ones we got. We are using the ink diluted with carbon tet or lacquer thinner or one of the standard ink solvents.

The mounting of the reinker on the 28ASR takes advantage of the tape holder for the perf. The mounting on the 28KSR is on the edge of the cabinet on a metal pillar. The pillar is mounted to just clear the cover when the cover is closed.





CHICAGO AMATEUR TELEPRINTER SOCIETY

Here is just a line or two to let you know that the "CATS" are still around and kicking. As usual, things on two meters are very quiet this summer on 146.7 MC, but we have big hopes for the winter months, which brings us to the subject at hand, which is the annual CATS meeting.

A rundown of the information for the meeting would seem to be in order and I hope that there is room in one of your columns for the CATS. The annual CATS Meeting and Banquet is to be held on Sunday, October 24, 1965, at McCormick Place, Chicago, in meeting room No. 7 just prior to the opening of the National Electronics Conference, which opens on October 25, 1965. We hope that all interested amateurs coming to the NEC will come a day early and say HELLO. The meeting will begin at 10 a.m. for a good old eyeball QSO and demonstration period. At 1 p.m. the technical talks will begin. The meeting will conclude with the awarding of door prizes. At 6:30 p.m. we will meet at a local restaurant for the banquet during which a model 28 KSR will be given away to some lucky person at the dinner. Reservations for the dinner must be received by October 10, 1965, in the amount of $5.50. Reservations should be sent to Robert E. Paculat, 1327 N. Hamlin, Chicago, Ill.

K9HYF

HORSE TRADES

FOR SALE: Set of 3 manuals for 28KSR, new, $30.00 458 – VFO for 20A with FSK $18.00. CV-89A $175.00. Boehme repeater, new $35.00 Model 14 reperf, sync motor E.O.L. $70.00. W3LST, 228 Plummer Oil City, Penna. 16301.

WANTED: Information on FSK for transistor VFO for SWAN 350. Company refuses to give any help. WA2YZN, 636 Chilton Avenue, Niagara Falls, N.Y. 14301.

FOR SALE: One model 26 page printer, excellent condition, $60.00. One model 14 TD less motor, $39.00. Contact K2YZO, 4669 Union Road, Buffalo, N.Y. 14225.

FOR SALE: TELETYPE PAPER, CANARY, 8½", standard size single or two copy carbon (2 yellow, 1 carbon between). New only, $.90 per roll, or $8.00 per case of 12. REC-29 RA-87 loop supply, 110V at 400 ma, $6.00. RCA Senior VOLTOHMYST VTVM, excellent condition, $25.00. WAVEFORMS 510B wide range oscillator (sine wave). $75.00 like new. Tubes bought and sold. Write for big list of other bargains. Send your list. W2DLT, 348R Essex Street, Stirling, N.J. 07980.

FOR SALE or Trade: 4CX250B tube and socket (Emiac, new), $30.00. 4–400A tube, $25.00 (with socket, $35.0). G.E. new 3 4-250A tubes, $15.00 each. Jennings #U250 15.000 volt vacuum variable $75.00. Will sell or swap like value for model 14 typing Re-perf. 60 wpm in good condition. WA6UEF, 395 East Foster Road, Santa Maria, California 93455.

TRADE: Excellent Model 15 with table, also 14 reperf, printing type. Also 14 TD with slip base and tight tape cut off. All above with sync motor, and all covers. Trade for anything of equal value. You make the offer or sell all for $160.00. W4AIS, 7 Artillery Road, Taylor, S.C. 29687.

FOR SALE or Trade: CV-71/URR 50 kc IF converter (never used) in almost new condition. Trade even for W2JAV (with or without scope) and a TD for a model 19. Would prefer to pick up rather than ship. K1AFC, 228 Hickory Hill Lane, Newington, Conn. 06111.

FOR SALE: Model 14 TD with steel clutch, and sync motor, like new condx. Gre-green finish, 60 wpm gears, $75.00. Slip base mounting for 14TD, $10.00. Perfect for that new TU. Brand new Collins S-Line cabinets removed from new 75S3-B receivers. Complete with feet and mounting hardware, less style frame. Shipping weight 8 pounds. $12.00 each. FOB. K9BRL, 1105 North Ironwood Drive, South Bend, Indiana 46615.

WANTED: Desire to swap with other interested individuals information concerning frequencies and reception of commercial press stations or other interesting activities using RTTY. Wanted: weather type box for model 28. K2MVR, 33 Laurel Place, Upper Montclair, N. J. 07043. Phone (201) 759-3700 days.

FOR SALE: Kleinschmidt Model 150 Teleprinter, has standard keyboard, built-in (commercial) 20/60 mil battery loop supply, sync motor, one piece type bar. Uses single ply or fan-fold paper. Complete instruction and maintenance manuals, $175.00. Kleinschmidt Model 120 reperforator transmitter w/std keyboard and D attached, built in 20/60 mil neutral battery loop supply, sync motor. Instruction and Maintenance manuals, $175.00. W6MEW, 1006 West Louisa Avenue, West Covina, California. Phone (213) ED 7-6891 after 5 p.m.

FOR SALE: Model 15s including table and power supply, $70.00. Model 19 includes table, 14 TD and power supply, $145.00. Model 26s, complete with table, $50. Model 28 KSR cabinet type, $400.00 send SASE for list of equipments available. W6VPC, 1067 Mandana Blvd., Oakland, Canlifornia 94610.

AA6GKX/K6GKX
110 Argonne Ave.,
Long Beach, Calif. 90803

To create more interest in RTTY, several of the RTTY men in Southern California have organized an informal ragchew net which meets on Sunday mornings at 10 a.m. The frequency is 146.70 mcs. The net is known as the Earlybird Net. Would you be so kind to announce this in the next issue of RTTY Magazine.

AA6GKX/K6GKX,
110 Argonne Ave.,
Long Beach 3, Calif.
90803.

L. G. Maxwell, KP4AOL,
P.O. Box 964,
Ponce, Puerto Rico 00732

I am on the air with a military version of the Model 15 Teletype and would like contacts on Forty Meters at 0900 to 1000 GMT.

L. G. Maxwell, KP4AOL,
P.O. Box 964,
Ponce, Puerto Rico 00732.

NOTICE — RENEWALS SHOULD BE MADE TO EXPIRE ON DECEMBER 1965 OR 1966 ONLY.

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RTTY is the Official Publication of the

RTTY Society of Southern California
W6EV

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

For "RTTY" Information:
W6AEE, Editor W6CG, DX Editor