RTTY

Amateur Radio Teletype Christmas Gift

On December 23, 1952, FCC announced its action on Dockets 10073 and 10173. This action covers other items besides radio-teletype. ARRL Official Bulletin 378 gives the details. NARC thru its official broadcasting network released this news on the evening of 23 December. It is of passing interest to note that throughout the actions relative to Dockets 10073 and 10173 NARC has extended its assistance in behalf of the teletype proposals. On the other hand ARRL has not been favorable. Time will prove the wisdom of these two group's policies. Following is given portions of the proposed rule making as issued by the FCC.

12.107—Special provisions regarding radio teleprinter transmissions. The following special conditions shall be observed during the transmission of radio teleprinter signals on authorized frequencies by amateur stations:

(a) A single channel five unit (start-stop) teleprinter code shall be used which shall correspond to the international Telegraphic Alphabet No. 2 with respect to all letters and numerals (including the slant sign or fraction bar) but special signals may be employed for the remote control of receiving printers, or for other purposes, in "figures" positions not utilized for numerals. In general, this code shall conform as nearly as possible to the teleprinter code or codes in common commercial usage in the United States.

(b) The nominal transmittting speed of the radio teleprinter signal keying equipment shall be adjusted as nearly as possible to the standard speed of 60 words per minute and, in any event, within the range 55 to 65 words per minute.

(c) When frequency-shift keying (type F-1 emission) is utilized, the deviation in frequency from the mark signal to the space signal, or from the space signal to the mark signal, shall be adjusted as nearly as possible to 850 cycles and, in any event, within the range 800 to 900 cycles per second.

(d) When audio-frequency-shift keying (type A-2 or type F-2 emission) is utilized, the highest fundamental modulating frequency shall not exceed 3000 cycles per second, and the difference between the modulating audio frequency for the mark signal and that for the space signal shall be adjusted as nearly as possible to 850 cycles and, in any event, within the range 800 to 900 cycles per second.

12.111 (a) (2) (i) Amendment:

(i) 3500 to 4000 kc, using type A-1 emission and, on frequencies 3500 to 3800 kc, using type F-1 emission, to those stations located within the continental limits of the United States, the Territories of Alaska and Hawaii, Puerto Rico, the Virgin Islands, and all the United States possessions lying west of the Territory of Hawaii to 170° west longitude.

12.111 (a) (3) Amendment:

(3) 7000 to 7300 kc, using A-1 emission on frequencies 7000 to 7200 kc, using type F-1 emission and, on frequencies 7200 to 7300 kc, using type A-3 emission or narrow band frequency or phase modulation for radio telephony.

12.111 (a) (4) Amendment:

(4) Amend by addition of the authorization for the use of type F-1 emission on frequencies 14000 to 14200 and 14300 to 14350 kc.

Official Bulletin Nr. 378 from ARRL Headquarters, West Hartford, Conn., December 23, 1952 to all radio amateurs Bt: FCC today finalized proposals on Docket 10073 and 10173 with the following results. Effective February 18, 1953 General and Conditional Classes Licenses are permitted 75 and 20 meter voice operations. Effective February 20, 1953 voice is authorized in 7200 to 7300 kc. by all amateurs except Novice and Technician. Novices are permitted CW operation 7175 to 7200 kc. Frequency shift keying, including Radio Teletype is permitted in non voice portions of 80/40 and 20 meters. New standards are adopted for teletype operation and procedures for signing off amateur calls is made more strict. Note again these changes are not effective until February 18, and 20 respectively. Details February QST, or refer June QST 1952 issue for essential details. AR.

Well fellows, there it is!

RYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRY

NEWS OF AMATEUR RTTY

DECEMBER 1966
30 Cents
Vol. 14, No. 12

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.

RTTY, INC.
372 Warren Way
Arcadia, California 91007
Return Postage Guaranteed

FOR SALE: Model 14 perforator, complete with cable, and power supply, also Model 14 TD, with sync motor, $70.00. RTTY, INC. 372 Warren Way, Arcadia, California 91006.

FOR SALE: Terminal Units, standard rack mount W2JAV tube type, professionally built by using military quality components, fully metered, ready to operate, excellent appearance, $75.00. Collins 75-A-2 receiver, mint condition (original owner) and speaker control unit with built-in 24 hour clock, phone patch etc $175.00. 32V2 xmtr. $150.00, with LP filter and mike or both for $300.00. Want Model 28 printer. W7NSU, 1011 Hobson Street, Walla Walla, Washington 99362.

WANTED: Reward, $1.00 each for the following RTTY's: Jan., Feb., Mar., Apr., May, June, Aug., Sept. 1964. Nov. 1963. Jan., Feb., Mar., Apr., Oct., 1961. $8.00 for complete set 1960. Will sell or Trade Oct., 1964. Mar., Apr., May, Oct., 1957. Dec., 1956. Feb., 1955. May, Sept., 1954. W6FBY, 716 North Rodeo Drive, Beverly Hills, Calif.

FOR SALE: 2125 and 2975 CPS dual tuning fork assembly $33.00, .05% stability 68 to 86°F. Transistor fork drive circuit kit $10.00; assembled circuit $16.00. Data available. RIVERBANK LABORATORIES, P.O. Box 65, Geneva, Illinois 60134.

SERVICE: Cleaning and repair of Teletype machines. Have in stock every part for Model 14, 15, 19, and many parts for 12, 26, 28, 32, 33, 35, can obtain any parts needed. Manuals for Model 14 15, and 28 and many odd-balls. Teletype machines all models in any style and all special features. Must sell: 11/16" reperf tape, 10 rolls to box, $2.00, or 40 rolls to case $7.00. Will buy or trade for Teletype parts and machines. Call or write, Martin Geisler, 8926 Kester Avenue, Van Nuys, Calif. 91402, Phone 213-892-0685.

FOR SALE: Teletype printers, parts and supplies. 88 mhy and 44 mhy toroids. W6VPC, 1067 Mandana Blvd., Oakland, Calif. 94610. Phone 415-444-5410.

WANTED: Small Kleinschmidt printer. W6LXG, 200 East Gardena Blvd., Gardena, California 90247.

PHONE-PATCH TELEPRINTER SYSTEM

R. H. WEITBRECHT — W6NRM
1966 Woodside Road, Redwood City, Calif. 94061

INTRODUCTION

The Phone-Patch Teleprinter System consists of equipment that permits transmitting and receiving audio frequency-shift keyed (AFSK) signals via ordinary telephone-line facilities. No direct wire to telephone line is required—the coupling is accomplished by means of an acoustic-inductive method working with a telephone handset laid in a special cradle box.

This cradle box contains a miniature loudspeaker which feeds sound into the microphone of the telephone handset placed thereupon. Also a pickup coil is provided to sense the magnetic field developed at the handset's earpiece end. When the handset is properly laid in the box, with handsets's cord dangling over the cradle box's V-notched end, effective signal transfer is accomplished in either direction.

This system works effectively with radio-teleprinter terminal units containing AFSK oscillators keyable by teleprinter loops. For instance, the equipment was designed to work with the W6NRM Mark IV-V Terminal Units. [1, 2]

These TU's contain AFSK oscillators and everything else along with readily available connections. Installation is simple, and switching is provided to permit insertion or removal of patching feature without having to disconnect or reconnect things.

The system permits transmission and reception of standard AFSK RTTY tones (2125-2295 Hz) or narrow shift tones (2125-2295), through telephone circuits. Furthermore, it allows an incoming RTTY signal to key into the telephone line via the usual RTTY station equipment; vice versa, an AFSK signal coming over the telephone line can key the station's radio transmitter for relay purpose. Hence this is a "phone patch". Incidentally, the AFSK signal is generated and keyed in the terminal unit itself—it is not the radio receiver's audio signal — and hence frequencies and level are definitely controlled to suit the telephone line. Controls are provided to adjust levels of signals going in and coming out of the line. A pair of switches, logically placed, permit sending or receiving via phone patch, along with the option of relaying via radio circuit—whether HF or VHF.

DESCRIPTION

As shown in the two photographs, the phone patch system is contained in two small boxes along with a number of cables and plugs. One box is a wooden cradle box designed to hold a standard Bell System 500-series telephone handset in proper position for maximum bidirectional coupling. The other, smaller, box contains an amplifier along with switches and gain controls. The several cables include:

(1) AC power cord; power drain is very small—about 2 watts.

(2) Headphone-type plug to insert into AFSK Output Jack of Mark IV-V TU.

(3) Phono-type plug to insert into 4-ohm phono-type jack input of Mark IV-V TU.

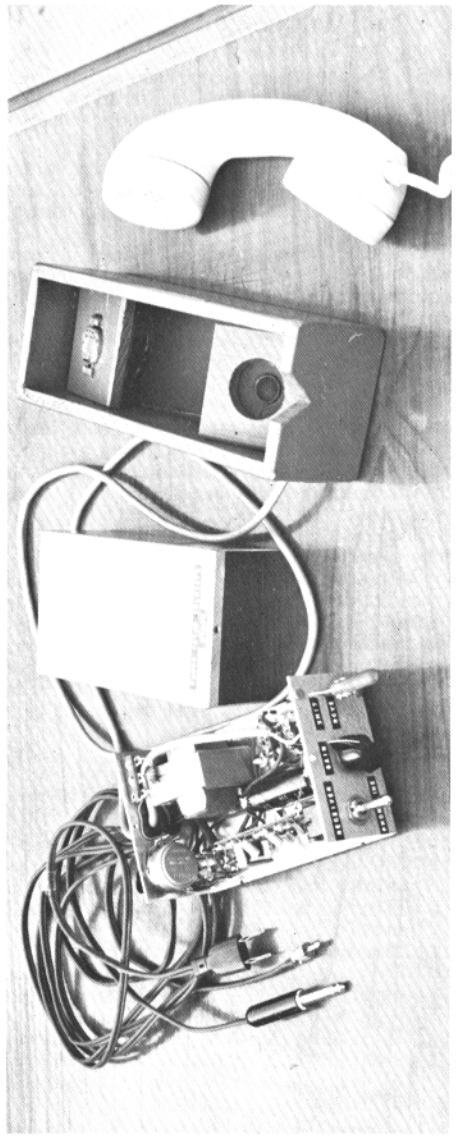
Further, there is a phono-type jack on the rear of the aforementioned small box; this receives the phono-type plug from the station's radio receiver audio output (4-ohm loudspeaker connection). A switch is on the front of the box to connect or bypass the phone-patch system insofar as the radio receiver and the RTTY terminal unit are concerned. Thus, the system can be left connected all the time, yet it can be switched in or out with a single toggle switch. Incidentally, this switch serves several functions, to be explained later.

Figs. 1 and 2 show block and schematic diagrams covering this phone-patch system with interconnections to other RTTY equipment. Fig. 1 shows, at a glance, how the phone-patch equipment operates. In the *Receive* mode (from the telephone line) the incoming AFSK signal is picked up via a telephone pickup coil, it is amplified and then applied to the input of the RTTY terminal unit which thereupon keys the teleprinter. In addition, the RTTY transmitter is keyed, if desired, to relay the signal on to some distant radio receiving point. In the *Transmit* mode (into the telephone line) the AFSK signal is generated and keyed by the teleprinter (keyboard and magnet in series) through the terminal unit; it is amplified and impedance matched so as to drive a miniature loudspeaker. The sound thus produced is fed directly into the telephone handset's microphone for transmission through the telephone line to the other end. In this mode, an incoming RTTY signal cannot only key the station's teleprinter but also keys the AFSK signal into the telephone line to accomplish relay purpose. Naturally, compatible phone-patch systems must be on both ends of a telephone line to permit effective communications using teleprinter equipment.

The pickup coil is a small choke coil, modified by removing frame and I laminations,

Continued . . .

[1] , March 19..
[2] RTTY, Sept. and Oc...



PHONE-PATCH SYSTEM (Continued)...

leaving coil and E laminations. A very small low-current AC-DC type choke would do—say 4 henry at 15 milliamperes, having a DC resistance of about 500 ohms. The miniature loudspeaker is a transistor type – Monarch type SP-1-3/4-S, available from Lafayette Electronics.

As the photograph and Fig. 2 shows, there is a 3-transistor amplifier in the phone patch system. As the telephone line signal level is quite low, some amplification is needed to bring the level to the point that is usable with a radioteleprinter terminal unit. The amplifier is an inexpensive printed circuit available from Lafayette Electronics; it was originally designed for use in intercoms, telephone amplifiers, PA systems, and other applications where some power amplification of audio signals is needed. It has a 5,000 ohm input impedance and a 4-8 ohm output impedance with maximum undistorted output of approximately 25 milliwatts. The amplifier operates from a 9-volt battery; however in this patch system a simple AC-operated power supply works just as well—using a 6.3 V 1A filament-type transformer driving a half wave rectifier feeding into a 1,000 uF 12-volt capacitor. Power drain is miniscule.

This amplifier is used to amplify signal going into or coming out of the telephone line, as switched by lever switch on the front of the small control box. This switch, placed in *XMIT* position, takes the AFSK signal from the TU, amplifies it, and then energizes the miniature loudspeaker in the cradle box. In *RCVE* position, the incoming telephone signal is picked up via the pickup coil in the cradle box; it is amplified and then applied to the input of the Mark IV-V Terminal Unit. (This assumes the *RECEIVER-PHONE LINE* toggle switch is in Phone Line position.)

In regard to this toggle switch—in *Phone Line* position, it transfers the audio output from the transistor amplifier into the audio input to the TU. In *Receiver* position the phone-patch system is bypassed as far as the AFSK signal from the telephone line is concerned—in other words, the radio receiver now feeds its audio direct to the TU.

This switch, along with the lever switch (XMIT-RCVE), when properly operated along with the RTTY station controls, permits phone patching of incoming or outgoing RTTY signal via telephone line. Thus, anyone having the proper AFSK teleprinter equipment along with a similar patch system at the other end of a telephone connection can "speak" out on RTTY through this patch system; conversely, a RTTY signal can be received and sent into the telephone circuit to the other end. Monitor copy is obtained at all times in either direction; moreover, the operator is able to intervene as deemed desirable.

Or, without RTTY patching, the system can be used for ordinary AFSK teletype-writing back and forth over the telephone circuit thus properly equipped. All in all, a versatile phone-patch system—adaptable to a variety of modes as needed in communication applications.

CONNECTIONS

The AC power cord can be left in all the time. The headphone-type plug is inserted into the AFSK output jack of the Mark IV-V TU. The phono-type plug is inserted into the 4-ohm audio input of the same TU.

The phono-type plug from the station receiver's audio line (4-ohm) is inserted into the phono jack at the rear of the small control box.

The cradle box should be placed at least a few inches away from other surrounding equipment, in a reasonably quiet environment, and convenient to a telephone set. The pickup coil in the cradle box is quite sensitive to surrounding AC magnetic fields; this will be noticed by trial—watching the scope display on the TU as the cradle box is moved about with the input gain control set at maximum. In general, several inches to a couple of feet should suffice—well away from power transformers in various pieces of station equipment.

The small control box can be placed anywhere, on top of Mark IV-V TU, on the side, anywhere on the table top, or, even behind a control panel on a console. In general, the control box should be easily accessible. As for the cradle box—it could be placed most any length away from the control box—even 20 or 30 feet if required to reach a telephone in the next room. Just be sure to use the recommended shielded cable.

OPERATING HINTS

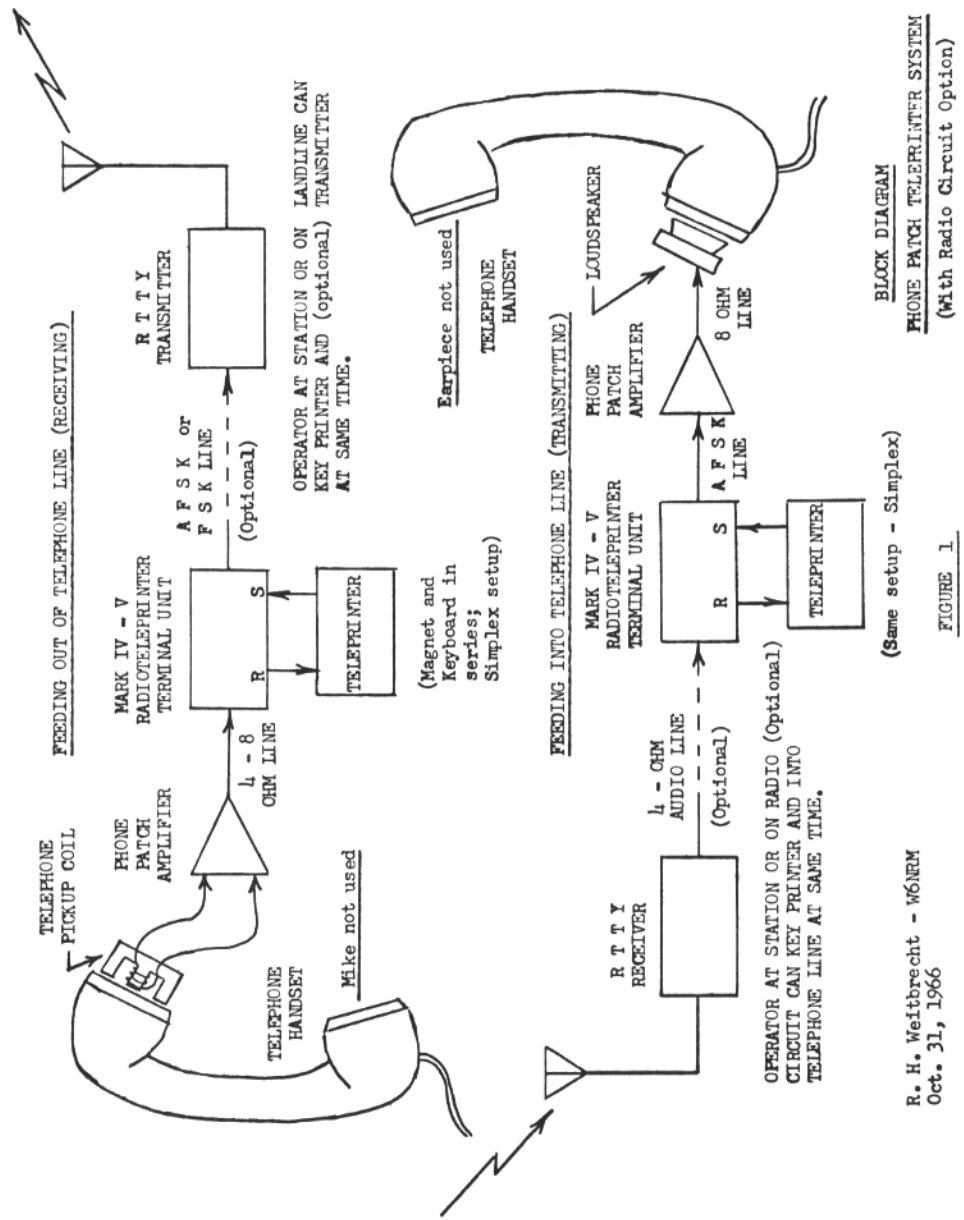
For *Phone Teleprinter Communications*—no radio circuit involved:

(a) Toggle switch in Phone Line position.
(b) TU set up and operating, with teleprinter hooked in. SLX-DLX switch in Simplex position (both keyboard and magnet in series—one loop).
(c) Markhold in AUTO mode (in TU).
(d) To transmit into phone line, place lever switch in XMIT position. Go ahead and type on the teleprinter keyboard.
(e) To receive from phone line, place lever switch in RCVE position. The other party will now transmit back to your end of the phone line.

The procedure should be quite obvious. Standard AFSK or NAFSK tones can be used as agreed upon by both ends of the telephone circuit—that is, 2125-2975 or 2125-2295 Hz. (Hz=hertz—same as cycles per second.)

For *Phone Patching into RTTY Circuit*:

Continued...



PHONE-PATCH SYSTEM (Continued) . . .

RTTY Signal Reception and Feed into landline circuit:

(a) Toggle switch in RECEIVER position. This feeds incoming RTTY signal direct to TU from receiver.

(b) Lever Switch in XMIT position. This position takes the AFSK signal being keyed by incoming RTTY signal and feeds it via amplifier to loudspeaker into telephone handset.

(c) The TU keys the teleprinter and at the same time keys the above mentioned AFSK oscillator.

RTTY Signal Transmission from landline circuit:

(a) Toggle Switch in PHONE LINE position. This feeds incoming phone line signal direct to TU, after suitable amplification.

(b) Lever Switch in RCVE position. This position takes the signal as picked up from phone line, amplifies it, and sends it into the TU via the aforementioned toggle switch.

(c) The TU keys the teleprinter and at the same time keys the FSK (or AFSK) circuit feeding the station's radio transmitter.

Naturally, the station's radio equipment is controlled as appropriate for transmitting or receiving.

Briefly, here are some tips:

For transmitting from phone line to radio, throw both toggle and lever switches DOWN.

For receiving from RTTY circuit into phone line, throw both toggle and lever switches UP.

Inspection of diagrams and controls should make this quite clear. Incidentally, it would seem desirable to use same type of switches (say lever) placed next to each other so that a finger throw can operate both at same time or only one or other as required.

ADJUSTMENTS

The Speaker gain control (on the rear of the small control box) is set about half way over or near maximum end. In general, we should have a few milliwatts of audio power going into the miniature loudspeaker—affording sufficient volume to properly actuate the telephone handset's microphone. Just set the control so that a sound level equivalent to normal telephone conversation obtains, as judged by listening to the loudspeaker during XMIT. In any case it should be loud enough to overcome possible ambient room noise conditions, yet not exceed the normal telephone-line level. The transistor amplifier and speaker is small enough in size so as to preclude possible excessive levels into the telephone line. The amplifier limits on excessive audio inputs and generates square waves in its output—however, due to limited power, the level is not too excessive.

The Input gain control (front control, between the switches in the photographs) can be left near maximum. It can be used as necessary to attenuate the phoneline signal going into the patch unit—manipulating it will give some idea of how well the phone-line circuit is working, with reference to the scope display on the TU.

Narrow audio frequency-shift keyed signals can be handled simply by plugging in 170-cps shift plugin units on TU's at both ends, and also throwing their AFSK oscillator shift switches to 170 cps. Naturally the TU's must be well tuned up to the proper frequencies involved so there is no compatibility problem.

CONCLUDING REMARKS:

A few points are in order as far as telephones are concerned. Here we have a wireless type of phone patch system—a type that utilizes acoustic-inductive signal transfer from and to an ordinary telephone handset. This concept is generally satisfactory insofar as the telephone company is concerned. As a matter of fact, there exist a sizeable number of business machines now being operated over telephone lines via couplers into telephone handsets. One example is the Xerox Magnafax Telecopier—a facsimile machine that enables transmission of written matter over a telephone line—in other words "mail letters over the phone". Then there is another example—the Robosonics "Record-O-Fone", a telephone answering device that also uses an acoustic coupler. Physicians are using acoustic-coupled devices to transmit electrocardiograms from homes of patients to offices or hospitals.

Telephone lines are being increasingly employed for data transmission of all kinds. Teleprinter signal is one such form of data signal. Computers are now being operated via phone lines, in connection with special input-output devices. Some of these devices are direct-wire affairs using "Data-Phone" terminal units furnished by the operating telephone companies concerned. Acoustic-inductive coupled systems are coming into wider use to offset the cost and installation problems of Data-Phone devices, and such wireless systems have been found to be quite effective.

However, telephone lines have certain frequency and phase characteristics which may and do affect AFSK signals. In particular, as the bandwidth of the typical telephone line runs from 200 to 3200 Hz, there is some noticeable attenuation at the 3 KHz end. During typical calls across the San Francisco Bay or between Los Angeles and San Francisco, a level drop of 6 db has been noticed at the 2975 Hz point, compared to 2125 Hz. This is one reason for alternative use of

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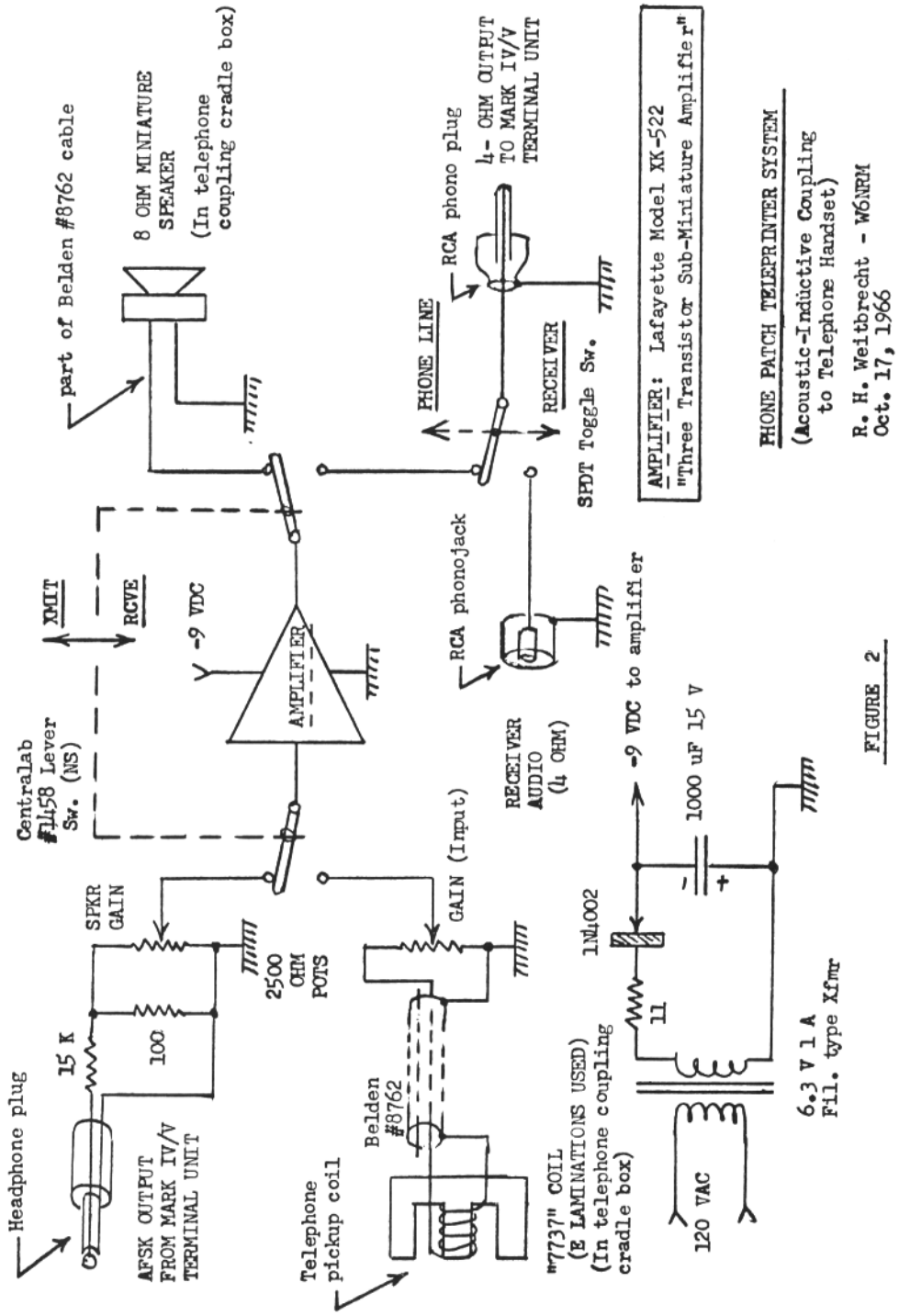


FIGURE 2

PHONE-PATCH SYSTEM (Continued) . . .

NAFSK in place of AFSK. However, tests employing standard RTTY tone frequencies have been quite successful—at least for 60-speed teleprinter operations. In connection, it is nice to know that the Mark-Space Frequency Diversity feature of modern RTTY terminal units will take care of the contingency that there may be no signal at the 2975 Hz spot—hence leading to Mark-only copying.

Also, choice of frequency used for tone signaling may influence telephone circuits, causing them to break or otherwise react, resulting in unsatisfactory service to subscribers. In particular, pure tones having frequencies centering on 1600 or 2600 Hz should not be impressed onto telephone circuits, as these frequencies are used as line-disconnect controls in the telephone plant's long distance setup. The telephone company furnished "dial TWX" teletypewriter service employs AFSK circuits operating full duplex in two frequency ranges centered at 1170 and 2125 Hz. Each channel has a 200-Hz AFSK signal. In such service, telephone lines are fitted with echo-suppressor disconnect devices that operate when AFSK signal in the 2125 Hz area is sensed—enabling such lines to carry data signals in both directions simultaneously.

Multifrequency tone generators in the form of "TOUCH-TONE DIALERS" are coming into wider use in this country. Such devices impress pairs of tones in the 1 KHZ region into the telephone lines to actuate dialing machinery in the telephone plant. Any number from 0 to 9 can be dialed out in approximately one-third time it took to dial such number using the old style rotary dial. Also, touch tone permits remote control of various signaling devices as may be controllable by the subscriber. This is mentioned to point out the increasing use of pure tones over telephone circuits.

Hence it is necessary to use some care in operation of phone-patch devices using pure-tone injection. Frequencies must be chosen with some circumspection; likewise, levels must be such that there will be a minimum of disturbances to telephone circuits. Receiving equipment can be made as sensitive as required, so a sending level of say —10DBM should be adequate.

All in all, here is a phone-patch teleprinter system that makes use of existing station RTTY equipment and enables supplementary communication over, say, local distances using ordinary telephone facilities. Local telephone calls are free and can be held any length of time as needed. Perhaps this would be a good way to "unload one's message hook" — get rid of traffic locally.

——————o——————

Thought you would be interested to know that the first Canadian RTTY Net will make its initial operation on January 1, 1967, on frequency 3630 kc. at 8 p.m. EST. This will be known as the Centennial Net in honor of Canada's one hundredth birthday in 1967, and will be using the new prefix "CE". Anyone interested can contact me at the above address for further details. We thought this would be a good way to commemorate Canada's Centennial Year. We are making a concentrated effort to get this project going and make this country a little more RTTY conscious.

Sid Burnett VE3GK
Gwen Burnett VE3AYL

3704 kcs is still an active RTTY spot every evening in Florida when the Florida Amateur TeleType Net (FATT) meets at 0000Z. (7 p.m. EST). Even during the high QRN and QRM months this summer, the net averages from three to five checkins every night. So wire that converter, tune that dial, turn that printer on, and join the gang. Any shift you desire as Rex, W4ZAG, NC can copy most any shift from 2/3 of a hertz nertz to 1500 cycles (max of 900 cycles don't forget).

NORAS DREAM – NETTLES OSCILLATOR RADIOTELETYPE AUDIO SELECTOR

WALTER E. NETTLES — W7ARS
8355 Tanque Verde Road, Tucson, Arizona 85715

Noise, both from natural phenomena such as static and all kinds of atmospherics as well as man-made interference, probably limits perfect copy of radioteletype signals more than any other single problem. This information is intended to help you do a better job of printing during adverse conditions that exist, as for instance on 80 meters during the summer months, or on weak signals masked by noise at any time.

The block diagram attached will help you understand the procedure we use to obtain a better balance of noise on the two signals radiated by the sending station representing mark and space information. Since it is common practice in most instances to balance out the noise in the two channels representing mark and space information at the point in almost all terminal units where detection takes place and the two tones are converted to direct current pulses, it becomes plain that the more similar the noise in the respective channels, the better the job of canceling that can be accomplished so that only the two desired signals control the circuitry following detection.

The output of the last intermediate frequency amplifier stage feeding the output detector in your receiver, is the desired point of take off for the signal, rather than the output of the receiver's audio amplifier. This can be accomplished easily by coupling through a small condenser (2 to 5 UUFD. being usually adequate) either attached directly to the plate lead of the tube socket or by making a small loop in the end of the condenser lead after sliding small teflon or other heat-resistant insulation over the lead to prevent any possible shorts to ground and slipping this small loop over the pin on the tube itself. The last suggestion is made for those set owners who do not wish to make a slight addition to their receiver by adding an outlet for the I.F. frequency, which is a built-in feature on many better grade communication receivers.

Any bandpass width commonly used in communication receivers with voice capabilities intended, will be satisfactory but in order to obtain optimum results, it is best to use as narrow a bandpass width as will suffice to encompass both mark and space frequencies with no appreciable attenuation on either signal. Since 850 cycles of separation of the two signals is as wide as you are likely to encounter, a bandpass from 1000 cycles to as much as 3000 cycles is quite adequate. If your receiver has a bandwidth capability of between 1000 to 1500 cycles, it is preferable to wider bandwidths. However, you may find it more convenient to use the bandpass you normally use for listening to 'SSB' voice communication and this works out quite well for all practical purposes and makes it much easier for a smooth operation where both 'RTTY' and 'SSB' modes are used quite regularly.

The output of the I.F. amplifier in the receiver drives two cathode followers which in turn have their outputs mixed with two separate beat frequency oscillators producing the desired similar tones for feeding the audio frequency filters. It is recommended that these filters be tuned to 1000 cycles and perhaps the simplest version would be a comb filter with each section consisting of two 88 Millihenry type toroids shunted with approximately a .15 UFD. Mylar tubular condenser and a 15K ½ watt resistor and coupled with a .005 UFD. condenser. In other words each comb filter would consist of four 88 Millihenry inductanecs, two .15 UFD. cond., two 15K ½ watt resistors and one .005 UFD. condeiser. It is not necessary that these filters be tuned on the nose of 1000 cycles, but they should be no lower than 850 cycles for simplest tuning procedure of any desired 'RTTY' station.

The output of these two filters, one for each channel, may be amplified any amount required to actuate whatever type of terminal unit you have at a point in the circuitry where you have two channels to accept the two tones separately. A switch can be installed in your present terminal unit to disconnect both legs of the circuit from your conventional front end and switch over to the output of Noras dream. By doing this, it will be a simple procedure to choose either front end circuit at will and make any comparison you may wish to check.

For *initial adjustment* of the two beat frequency oscillators *only*, it is necessary to find the center of the bandpass in your receiver that you intend using. There are several ways of doing this but perhaps the simplest is to put the receiver in an 'AM' position with 'AVC' and by using the local built-in 100 kc. marker oscillator, and by watching the 'S' meter and the frequency control tuning dial, determine as closely as possible the edges of the bandpass of the receiver. Then, straddling an imaginary center point, ascertain where

Continued . . .

NORAS DREAM — (Continued) . . .

500 cycles either side of center would be and tune the dial to one of those points. Make certain that the D.C. switch is off on one BFO but that the switch is turned on for the other. Now with a pair of earphones across the output of the mixer connected with the BFO in an 'on' condition, tune the 140 UUFD. variable condenser while the 50 UUFD. variable is at half mesh, for zero beat. Turn off that BFO and turn on the other one with the very fine tuning capability. Tune your receiver dial to the other 500 cycle point previously decided upon, connect your earphones to the output of the mixer now being supplied with the BFO just switched on, and again tune for zero beat with the 140 UUFD. variable again leaving the 50 UUFD. variable as well as the fine tuning capacitor at half mesh. You will find that zero beat is very touchy and hard to settle on with the larger 140 UUFD. condenser, so do as well as you can with it, then resort to the 50 UUFD. variable you previously set at half mesh to close in on exact zero beat. This applies to both BFO units.

Now a signal with 1000 cycle shift and with both beat frequency oscillators operating, will give you zero beat on one leg and a 1000 cycle tone in the other. It is of course necessary that the two tones be of the frequency to which the bandpass in your receiver is tuned. An easy way to prove to yourself that you have your BFO's properly tuned in respect to the bandpass of your receiver is to tune in any of your 100 KC marker points until it is zero beat in one channel and is producing a 1000 cycle tone in the other. Use your earphones for this check. Then, tune across the imaginary center point of your bandpass until the channel with the original 1000 cycle tone now is zero beat. Check the other channel and you will find the 1000 cycle tone is now over there. You can readily understand what is taking place when you reread the first sentence in this paragraph after going through this procedure.

Now with 850 cycle shift properly centered in the bandpass, each channel will have two tones. One at 150 cycles and one at 1000 cycles. When the frequency shifts the two channels reverse and the one that was putting out 150 cycle tone puts out a 1000 cycle tone. By the same token, the channel that was putting out a 1000 cycle tone now puts out A 150 cycvle tone. The audio filter allows only the 1000 cycle tone to pass with any magnitude and the 150 cycle tone is greatly attenuated. In the case of 170 cycle shift on an incoming signal, the two tones will be 1000 cycles and 830 cycles. Again the 1000 cycle tone will be easily passed by the filters and the 830 cycle tone will be greatly attenuated but less than in the case of the 150 cycle tone mentioned above and you will plainly observe this on your oscilloscope used for properly tuning in an RTTY signal. Assuming you use the popular W6-AEE method with one set of plates hooked to one channel and the other set of deflection plates hooked to the other channel for a cross type pattern, on 850 cycle shift you will have two straight lines whereas on 170 cycle shift they will begin to assume a rectangular shape. At 85 cycle shift this rectangular shape will become even more pronounced.

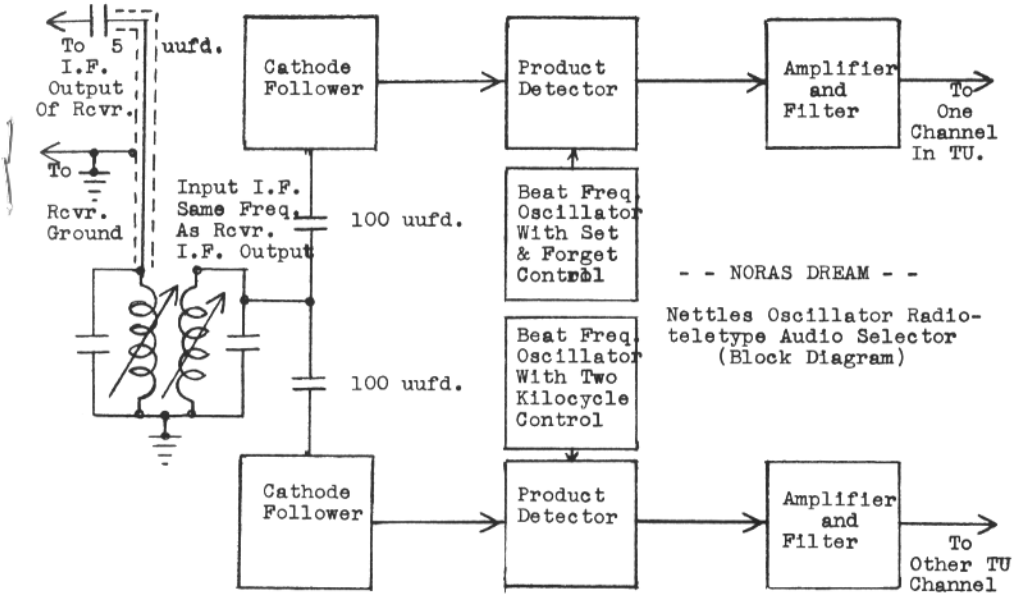
The reason for the small variable condenser on one of the BFO's cut to a size that will give two (2) kilocycle coverage only is so that you can vary the main BFO, which you will wish to keep right next to your receiver since you will tune it almost as often as you tune the knob of your receiver, and tune in any shift you desire. By using a 180 degree dial set midway for zero beat as obtained in previous instructions above, you can tune one (1) kilocycle (1000 cycles) either higher or lower than the original setting. At midpoint the oscillators are 1000 cycles difference in frequency. For a signal with 850 cycle shift it is necessary to produce the desired 1000 cycle tones that the beat frequency oscillators be exactly 1150 cycles different in frequency. To print an incoming 170 cycle shift, there will be a difference of 1830 cycles in the two oscillators in order to produce the desired 1000 cycle tones in the output of the mixer.

In other words, the amount of the shift subtracted from the frequency of the filters in this case being 1000 cycles and that remainder added to the filter frequency of 1000 cycles determines the spread between the two oscillator frequencies. This will always make the unwanted tone at a lower frequency than the desired tone which has certain advantages. Obviously the BFO's could be so adjusted so that the reverse was true but would require better filters to obtain the same end results and therefore the undesired tone is preferably the lower of the two.

The two beat frequency oscillators should be of the Colpitts series tuned type. One can be a set and forget frequency type of control while the other identical in all respects except with a very small capacity double bearing semicircular plate rotor condenser made up as I will explain shortly should have the single remaining rotor plate trimmed until exactly two kilocycles is covered with 180 degree rotation. When zero beating this condenser should be adjusted at exactly the midway position thus allowing 1000 cycle tuning in either direction, thus serving its purpose whether the other oscillator is higher or lower in frequency than this two kilocycle tuneable oscillator.

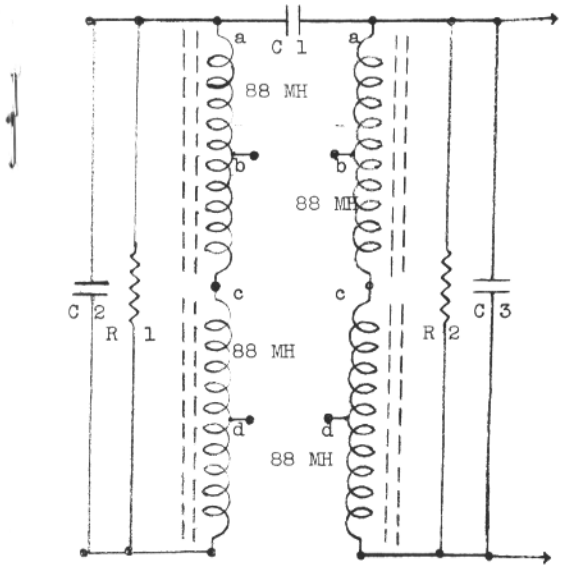
As can be seen in the photograph of one of the BFO's at the author's station, a small seven (7) plate variable with two bearings, this is important, was used. Two of the cen-

Continued . .



- - NORAS DREAM - -

Nettles Oscillator Radio-teletype Audio Selector (Block Diagram)



Suggested 1000 cycle audio filter to be used after the mixer or product detector.
C 1 - - - .005 ufd. Mylar
C 2 - - - .15 ufd. Mylar
C 3 - - - .15 ufd. Mylar
R 1 - - - 15K 1/2 Watt 10%
R 2 - - - 15K 1/2 Watt 10%
For greater selectivity, C 1 may be used at taps 'b' through d' and also may be varied more or less from m005 ufd. for in between values of selectivity as desired for some particular bandwidth. Connected across tap 'a' is a good compromise. An exact frequency of 1000 cycles is by no means a requirementN hence the latitude permissable in coupling which slightly varies the frequency of a comb filter.

NORAS DREAM — (Continued) . . .

ter plates of the original four in the stator were carefully removed. Only the center plate of the original three rotor plates was left on the shaft. Then with small shears and a file the rotor plate was gradually reduced in radius until one 180 degree rotation gave us the desired two (2) kilocycle frequency coverage. The dial reading of zero (0) to one hundred (100) therefore represents twenty (20) cycles per division and can easily be used in measuring any incoming or outgoing shift rapidly and easily and with a considerable degree of accuracy. The change in capacity compared with the total capacity in the circuit makes it so that the two (2) KC. Separation is very linear. The inductor in our BFO for 450 to 500 kilocycle coverage is made by using the core from an ordinary 88 millihenry toroid and wound full with no spacing on the inner diameter with number 30 B&S gauge enameled and silk covered magnet wire. We did cover the bare core with a thin layer of fiber paper in order to do a more workmanlike job in finishing off the toroid with terminals and end of winding terminations.

All resistors in both BFO's are of the ½ watt size with a plus or minus ten percent tolerance with the exception of those marked one (1) watt on the schematic diagram. The two diodes comprising the fullwave rectifier in the power supply for the BFO may be any small lead mounted diode with a suggested PRV of at least about 300 volts and the current requirements are very low — perhaps ten milliamperes so these requirements are very easily met. The D.C. switch is an important item on each BFO, as well as the small neon indicator lamp for same, since there will be times when you will find it helpful for test purposes, etc. to cut one or the other BFO units out of operation. The filament chokes for the 6BA6 oscillator tube is a conventional 88 millihenry toroid with the two windings phased so that they act in parallel insofar as R.F. on the cathode to ground is concerned. The center tap normally connects the two coils in series, which is what we (do not) want. At the two separation washers on the core for the two windings, one wire will go to the filament transformer and the other end of that winding at the other washer will go to the heater of the tube, while with the other winding you will hook it just the reverse. At either washer, one wire will go to the transformer and the other to the heater of the tube. Condensers marked 'mica' should be silver mica with their near zero temperature coefficient. The small centralab 47 UUFD. Negative temperature coefficient cond. with 150 parts per million change per degree centigrade in teamwork with the 50 UUFD. Midget variable does a good job of balancing out the tendency for positive drift. With reasonable concentration over a period of time you can stabilize the oscillator to a drift of between five (5) and ten (10) cycles from cold to maximum heat. Bear in mind that any adjustment of this compensation requires an opposite adjustment in the 50 UUFD. Midge variable not in series with the 47 UUFD. temp. comp. condenser in order to bring the BFO back to the desired frequency in relation to the bandpass frequency of the receiver.

One last comment on the BFO, if high impedance output is required on whatever mixer circuit you decide upon, simply ground the free end of the .01 UFD condenser in series with the 220 microhenry iron core R.F. choke, and bring the desired high impedance output directly off the plate of the 6BA6 through a 50 or 100 UUFD. Silver mica condenser to the point in your mixer circuit where this voltage is required. If you use a ring of diodes as has become popular in recent years for your product detector, then you will require the low impedance output of the PI-Network in the plate of the 6BA6 tube. If you use some of the product detector circuits such as recommended for the past several years in the 'ARRL' handbook using a 12AU7 dual triode, then you will want to do as described above and use it with high impedance output. So much information is available on suitable product detectors, I don't intend to waste your time in this article going into what is readily available in most any fairly late handbook covering amateur radio, etc. One more thing, the 500 UUFD. silver mica and the 220 microhenry R.F. choke and the .01 UFD really is a resonant circuit at the operating frequency of the BFO which must be the same as your intermediate frequency in your receiver. Since this may range from 450 to 500 kilocycles we have hit a happy medium but if you want the last drop of RF available to show up on the output, then a value of condenser slightly greater or slightly less than 500 UUFD. may be substituted until exact resonance is accomplished. I suppose a 470 UUFD. mica shunted with a small variable condenser of some sort such as the small compression types and a maximum capacity of 100 UUFD. would be another convenient way of resonating this circuit. Actually it isn't necessary to be 'right on' because it is fairly broad and long as both BFO units put out the same signal srength you should have no problem.

Attention should be paid to proper shielding of all components so there is no coupling between the two respective channels, or between the two oscillators, or between either of the oscillators and the receiver intermediate frequency amplifier stages. The lead to the I.F. transformer, which of course must be tunable to the frequency of the I.F. amplifier in your receiver, should be a good low loss grade of small shielded wire with

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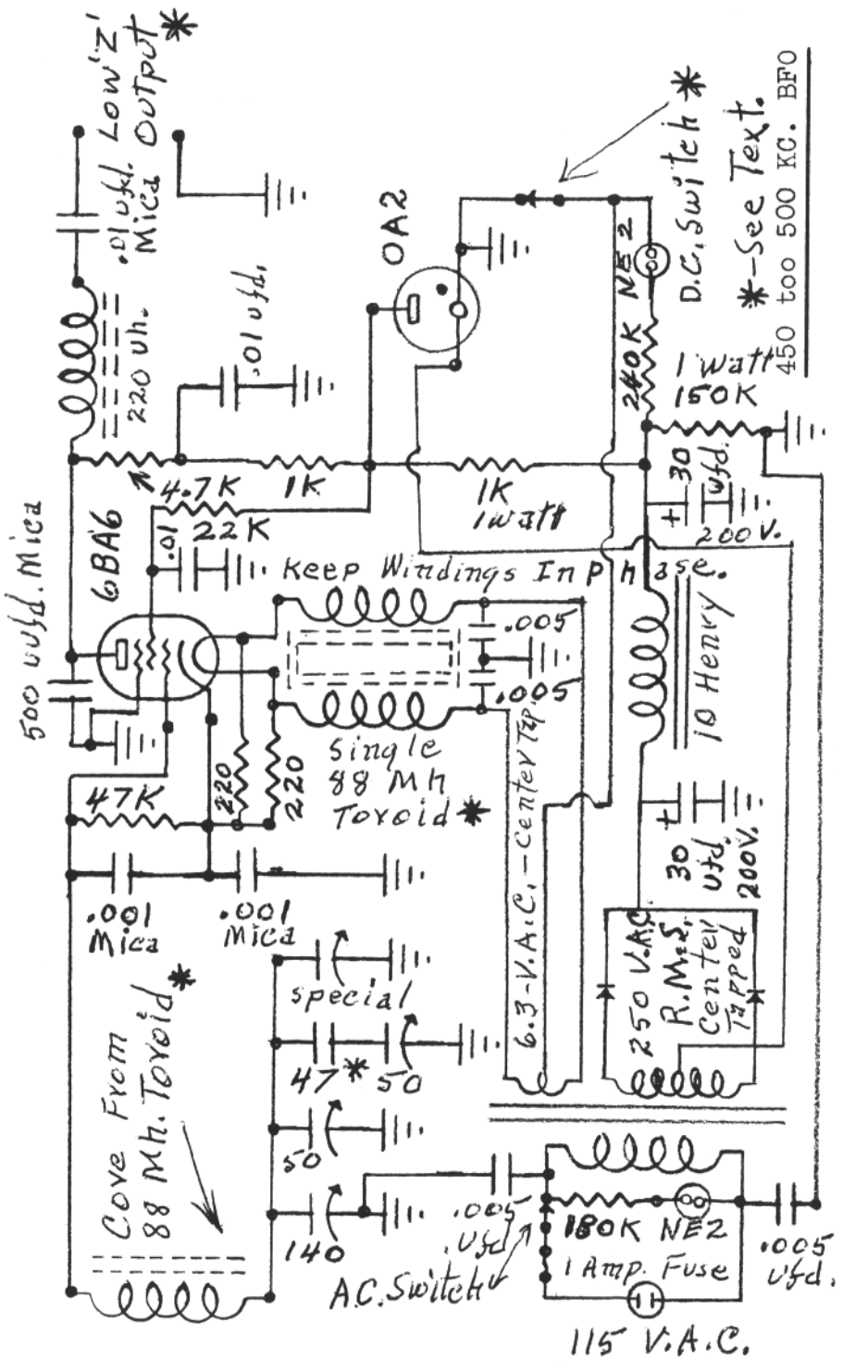


NORAS DREAM — (Continued) . . .

perhaps a capacity of 25 UUFD. per foot and logically need not be more than three (3) or four (4) feet in total length. You may find it necessary in the particular I.F. transformer you use to reduce the size of the capacitor in shunt with the primary winding by an amount equilavent to this extra capacity introduced by this lead in order to resonate this winding at the desired I.F., freq. of your receiver. Today's construction of I.F. transformers is usually with a variable inductance using a powdered iron slug adjustable and the winding itself is generally shunted with a near zero temperature coefficient condenser having a capacity of several hundred UUFD. So it is no difficult task to figure the capacity of your lead and replace this small shunt condenser with one of a lesser and correct value to insure resonance. Speaking of resonance, due to the 2 to 5 UUFD capacity condenser being so very small that attaches to the plate of the output I.F. stage of your receiver, there will be negligible detuning of this stage and only a slight adjustment, if any, of the slug or trimmer condenser on that winding will suffice to bring it back to exact resonance. The I.F. transformer used to feed the cathode followers is not critical as to coupling since the load is of a very high impedance. By using one I.F. transformer to feed both grids on the two cathode follower, it is necessary to use two separate coupling condensers as shown in the block diagram and we recommend one (1) meg. ½ watt resistors be used, if, as many of you may desire, to keep the proper grid bias on the cathode follower while at the same time have it feed a higher resistance load than the bias resistor alone would present to it. If you settle for a circuit where you use the bias resistor both for the load as well as bias then you will do well to dispense with the two coupling condensers as well as any grid resistors and simply feed the grids in parallel directly from the secondary winding of the I.F. transformer. In either case at normal output receiver levels the load on the I.F. transformer is of a very high impedance because of inherent characteristics of a cathode follower.

If instead of using the fixed tuned filter you prefer to make the arrangement even more flexible refer to the January issue of 1966 in 'RTTY Magazine' and make use of the variable tuned filters described therein. The circuitry of the bottom leg would be the one you would wish to use in both legs for the lashup as described above. As the circuit stands and R15 being 390K ohms, the lowest frequency to which it is able to be tuned is approximately 600 cycles, so in order to go lower it is suggested this resistor be changed to one (1) megohm and then the bottom frequency will be at about 200 cycles. R9 being variable, will permit you to cover considerable range toward higher frequencies and easily encompass the desired 1000 cycle frequency if you settle on that as the simpler method you prefer as far as tuning is concerned. R1 will be eliminated and replaced with two ordinary ½ or 1 meg potentiometers, one for the input to each leg. R36 can be any size from 27K ohms up to as high as 100K ohms and is not really critical since the input control can take care of the required low level input.

When using active filters, as touched on in the above paragraph, and using a bandpass of approximately 2000 to 3000 cycles in the receiver, it is not adviseable to use a frequency of less than 1000 cycles in the audio filter unless a low pass filter is used to attenuate all frequencies above 1000 cycles drastically. This low pass filter would be inserted before the input of the variable filter and one would be required for each leg. When using a bandpass in the receiver of only a bit more width than the shift taking place, there is no need for a low pass filter.

Assuming for instance that you possibly have a 300 to 500 cycle wide bandpass on your receiver intended for 'CW' reception, you can go on down with the variable frequency tuner so that for instance, a shift of 170 cycles with the filter adjusted at 250 cylces will give you tones of 250 and 80 cycles. The 250 cycle tone to be used and the 80 cycle tone discarded. The BFO's in this instance would be separated in frequency by 330 cycles allowing the beats of 80 and 250 to appear in the two channels according to mark or space information being sent and received. Naturally, the BFO's can be adjusted to where zero beat and a tone equal to the shift will be produced but unfortunately as the frequency gets quite low there are not enough excursions during a 22 millisecond period of time to permit a good square wave shape to be formed for rectification even with a full wave rectifier. Normally there is no point in trying to use a frequency lower than about 250 cycles in the two filter channels although when the going is really rough, quite often on shifts such as 850 or 425 or 300, you can make use of the zero beat and the tone equal to the amount of the shift in order to print marginal signals an Iota better.

Bob Weitbrecht, W6NRM is mulling over an idea he has in the back of his head from some experiments made several years ago that may make it possible to make good use of a filter frequency of approximately 45 cycles to be used with 60 wpm machine speed. If and when he comes up with the answers, I am sure he will share them with anyone interested in further improving their ability to print through extreme noise.

As mentioned above, you can use your present terminal unit or demodulator by eliminating or disconnecting the present so called 'front end' and using those portions

Continued . . .

NORAS DREAM — (Continued) . . .

that have to do with converting the tones to DC pulses for use in keying. Some designs have enough amplification in their divided channels and in the cases of other you may have to add an additional stage of audio amplification in order to bring the level of this design to an adequate voltage to properly actuate the circuitry of your demodulator.

The unit works equally well with the AVC of your receiver controlled by a stored DC voltage of the proper amplitude taken from your demodulator as suggested by W4MGT several years ago, providing the time delay is such that it doesn't cause your tuning to fall so rapidly that you can not easily peak a given tone. By using an AVC time delay of 2 or 3 seconds, it is as easily accomplished as tuning without any AVC at all. With the advent of 2-tone reception becoming so popular during the past few years, AVC assumes much more importance than heretofore. If the AVC of the receiver is controlled in the older and conventional manner by the incoming carriers within the bandpass of the receiver, then of course there is no problem in tuning the variable BFO and determining the correct adjustment as you observe the oscilloscope pattern. However, as Henry of W4MGT will tell you, AVC of the conventional type has many drawbacks as far as "RTTY" reception is concerned. The main difficulty it brings about is that either or both a strong signal and strong noise will control the sensitivity of the receiver when present in the bandpass of the receiver. When they are stronger than the desired RTTY signal, you have had it! Manual control of sensitivity has considerable advantage over conventional AVC on marginal signals but this is not true in the case of AVC controlled by your demoduator since the desired signal is controlling the sensitivity of your receiver and barring front end rectification or overload in some other circuitry of the receiver, you will notice a marked advantage by using this type of AVC. I am sure that if you desire further details on this type of AVC that Henry of W4MGT would be glad to supply you with adequate information. Since as far as I know, he was the first to use it, logically he is a good source for this information.

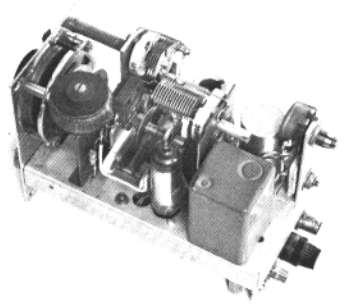
PARTS LIST

PRODUCT DETECTORS OR MIXERS AS USED AT W7ARS IN NORAS DREAM

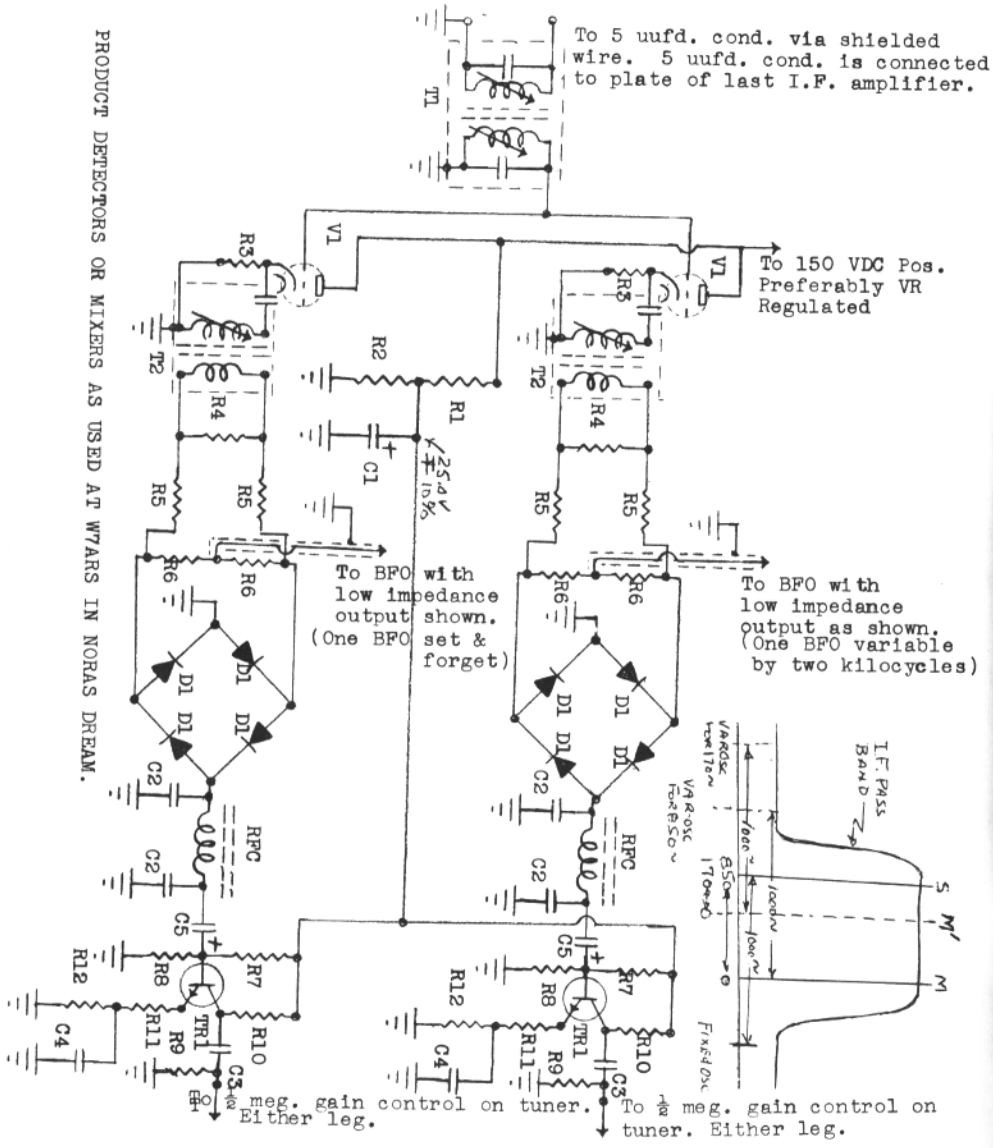
V1 — 6C4 or ½ of 12AU7 if separate tube from one in opposite leg of mixer. Avoid mutual coupling between mixer legs.
T1 — I.F. transformer tuned to same center frequency as I.F. transformer in receiver's output stage. Reduce the capacity of the condenser across the primary winding to compensate for capacity in the lead going to the plate of the output as explained in the text.
T2 —Single winding only of I.F. transformer of same freq. as T1 with resonating condenser placed in series with the winding across the bias and load resistor of the cathode follower. Eleven (11) turns closely coupled as possible and wound in a neat stack of four layers snug against the primary winding and on same mounting form as primary containing the iron slug. Use #30 enamel and silk covered preferably.
TR1 — Transistor 2N647 or equivalent
R1 — 18K, 2 Watt, plus or minus 10%
R2 — 6800 ohms, ½ Watt, plus or minus 10%
R3 — 1000 ohms, ½ Watt, plus or minus 5% or matched pair at 10%
R4 — 56 ohms, ½ Watt, plus or minus 5% or matched pair at 10%
R5 — 1500 ohms, ½ Watt, plus or minus 5% or four matched at 10%
R6 — 150 ohms, ½ Watt, plus or minus 5% or four matched at 10%
R7 — 33K, ½ Watt, plus or minus 5% or matched pair at 10%
R8 — 2700 ohms, ½ Watt, plus or minus 5% or matched pair at 10%
R9 — 47K, ½ Watt, plus or minus 5% or matched pair at 10%
R10 — 22K, ½ Watt, plus or minus 5% or matched pair at 10%
R11 — 270 ohms, ½ Watt, plus or minus 5% or matched pair at 10%
R12 — 3300 ohms, ½ Watt, plus or minus 5% or matched pair at 10%
RFC — .5 Millihenry, miniature powdered iron core R. F. Choke
C1 — 250 ufd., 50 volt DC., miniature electrolytic condenser.
C2 — .005 ufd., small mica condenser.
C3 — .01 ufd., disc type coupling condenser
C4 — .50 ufd., 10 volt DC., miniature electrolytic condenser.
C5 — 2 ufd., 6 volt DC., miniature electrolytic condenser

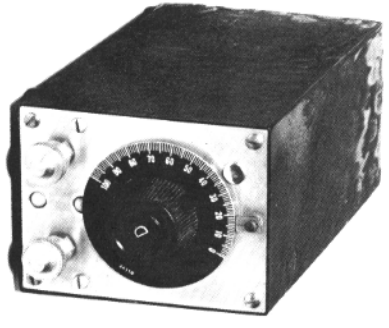
Capacitors across I.F. transformer windings not specified as they vary with the coil manufacturer but usually range from 200 to 500 uufd. for transformers in the range of 450 to 500 kilocycles. In this circuitry, 'Q' can vary considerably and within reasonable bounds is not at all critical as long as the windings are tuned to resonance at the I.F. in the output of the receiver.

D1 — Germanium Diodes, 1N128 or equivalent



PRODUCT DETECTORS OR MIXERS AS USED AT W7ARS IN NORAS DREAM.





HEARD IN RTTY-DX SS

W1AOH
W1AW
W1FGL
W1GKJ
K1MMC
W1WL
W2BSA/2

K2AGI
WB2CSP
WB2EWU
W2FAN
K2GOI
W2GYC
K2HTT
W2IDX
WA2IOP
WA2MQX
W2NRY
WA2RDO
W2RUI
W2UGM
K2USA
K2YEQ
WA2ZVL
K2ZWI

W3ADO
W3AVQ
K3GIF
W3ILZ
W3JZR
W3KDF
W3PYW
K3RRT
W3WLF
W3WPH
W3ZO
W3ZVJ

W4AIS
WA4CJV
W4CQI
W4GJY
WA4GKN

WA4KEY
WA4LWE
W4MGT
W4PWH
WA4TAI
K4VDM
WB6EAP/4
W7AWH/4

W5APM
W5FCP
K5GGL
K5OLU
K5QBU/5

WA6ADY
W6AEE
W6BB
K6BNS
W6DNJ
W6FFC
WB6GMM
WB6HZH
W6IWE
W6JOX
W6LDA
W6LDF
WA6LKZ
WA6MGG/6
K6MLI
K6MTX
W6NKP
W6NRM
WB6RXM
W6TX
WA6VVR
WA6WGL

W7ARS
W7ATV
W7CBY
W7ERA
W7ESN
WA7GGV
W7GVF

W7IE
W7MAE
K7MLO
K7MNZ
K7OFW
W7RQQ
W7TZL
K7UKC
K7VDD

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WA8CSJ
W8FWG
W8HHX
W8HYG
K8JND
K8MAM
WA8MJP
W8MSG
K8MYF
K8MZS
WA8NGJ
WA8OLD
W8ORL
K8QLO
W8QUR
K8YJQ
W8ZYW

WA9BMA
K9CYF
W9DPY
W9HHX
W9PU
K9QEB
K9QNV
K9RPX
K9VGT
W9WKC

WAØCQG
WØEOV
WØFQW

WAØGED
WØGMU
WØHAH
WØHUL
KØKWK
W7QCN/Ø

DJ3GI
DJ3HYA
DJ6ZBA
DL1VR
DL3IR
DL3NW
DL5WR
DL9DE

EI6D

EL2AL
EL2F

F2FO
F2LV
F3LL
F3PI
F7DS
F8KI

FB8YY

FG7XT

G2NIO
G3MWI
G6CW
G6JF
GI3HCP
GM3ENJ
GM3IQL

HB9P

I1AMP
I1CAQ

I1CIG
I1CKR
I1CLC
I1CNH
I1DGP
I1FOS
I1GMT
I1II
I1KBT
I1KG
I1KGE
I1ORS
I1RO
I1ROL
I1ZBS
I1ZWY

KG4CG
KH6AX
KH6EM
KL7BAJ
KP4AQL
KP4GN

LA1SH
LA6OI
LA6QVI

LU1AA
LU8DR

OE2FUL
OE2HVL

OK1KUL

ON4BX
ON4CK
ON4HW

OZ7T

PAØCDV
PAØDOK

SM3AZI
SM6OH
SMØCLW
SMØDIA

UA1KBW
UP2CG
UQ2KAX
UR2BZ

VE2UN
VE3AYL
VE3BIJ
VE3BN
VE3CM
VE3EBR
VE3FHQ
VE3IR
VE3QG
VE3WQ
VE4BJ

VK2EG
VK3KF
VK3PB

WA4DSI/VO2

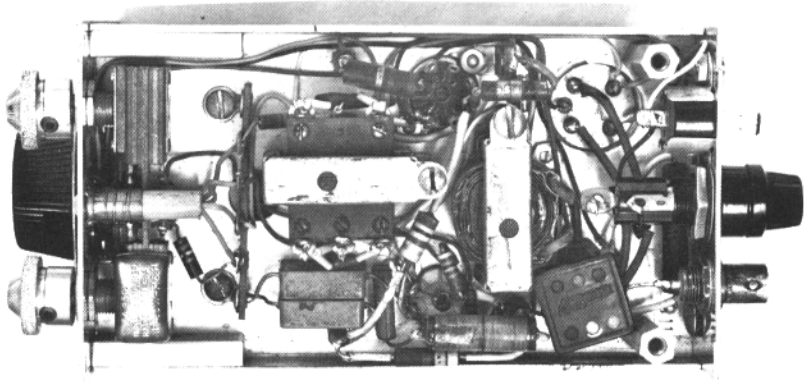
VP9BY

XE1BI
XE1HHX
XE1YJ

YV3LD
YV5AFA
YV5AVW
YV5CIP/1

ZL1WB

ZS1FD
ZS6UR



DX-RTTY

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

Hi DX'ers:

Dx news has been very scarce here this month, which is a switch from past performances. It would appear that many of you spent so much time chasing the rare ones in the Contest that you are still saturated. Unfortunately, circumstances did not allow this editor to participate in the DX Sweepstakes so I am unable to furnish any "first hand" opinions but judging from the logs coming in many of you did manage to plant a few bauds in far away places. At the time this is being written it is still too early to predict who are the top scorers.

It was indeed good to learn that Jean, FG7XT, and his family came through Hurricane Inez safely although suffering heavy property damage. Jean lost the roof on his house and all his antennas but managed to restore operations after a tremendous job of rebuilding. There was a lot of water in his shack and salvaging his gear must have been a most difficult job! Jean reported that thirty people died in the storm on the Island, over one hundred were injured and the banana and sugar crops were nearly completely destroyed. Although this news is now rather dated I am sure many of you who wrote asking about Jean's welfare will be glad to hear that he and has family are all OK.

Because of the fact that this is the last column of the year and the last one to originate from the West Coast Offices of RTTY, Inc., it is appropriate that we wind up some of the business here at DX headquarters. Cards are still filtering in for Joe, HL9TM, and I wish to re-affirm that all QSL's received for his QSO's have been forwarded to his home QTH and I suspect that in due time all will be confirmed. Joe's Stateside call is WA2SPL and any further communications for him should be directed there. The WAC-RTTY files and material will be shipped this month to the offices of Dusty, W8CQ, so those of you who are planning to apply for this award can send your confirmations to the address of the new publisher of this journal.

It is with a warm feeling of satisfaction that this editor turns over the operation of the DX portion of "RTTY" to Dusty, W8CQ and his associates. Dusty has always been a devoted "DX'er" and I can assure you that this phase of the RTTY coverage in the magazine will not be neglected. As a matter of fact Dusty has plans for some extended features in the DX area which should be happy news for all of you. Ed, K3GIF, will handle the chores and I will continue to do all I can to help out with whatever assistance I can give.

My association with Merrill, W6AEE, in helping to fabricate "RTTY" each month for so many years has been most rewarding. It has been the high spot of my long and "checkered" ham career. Merrill's devotion and enthusiasm for RTTY has been contagious and I am thankful that my association with his fine work has caused some of it to "rub off" on me.

The rewards I have received from my modest efforts to assist in the publication of "RTTY" have been very satisfying. Not the least of these rewards is the great number of you fine people in all corners of the World whom I have met in the past ten years. This Monthly page in "RTTY" could have never existed without your invaluable assistance. Just to say "thank you" is not nearly enough, but under these circumstances it is the best I can come up with. If I attempted to thank each of you with a personal word in these paragraphs it would take several pages, so please accept these few lines in the truly sincere attitude that I feel as I write them. Above all—please don't stop writing or breaking into my QSO's when I am on the air. Any news or information that you may include in your communications will be duly noted and sent along to Ed and Dusty. I truly hope that in the future time and space will allow me to visit with all of you, from time to time, in these columns.

In closing I want to take this opportunity to wish all of you and yours a pleasant, happy Holiday Season with lots of good DX in the year to come.

73 Bud, W6CG

A new booklet entitled "RTTY — THE EASY WAY" is now ready for distribution by the BARTG. The book, edited by Arthur Owen, G2FUD, is directed to both newcomers to RTTY and old RTTY hands. It contains such valuable information as circuits (TUs, filters, tuning indicators, motor and loop PSUs, etc.), dougle/single-current loop control and switching systems, RTTY operating and listening, monitoring, etc., etc., etc. . . .

For the newcomer this booklet contains all the information that you need to get going on RTTY and for the seasoned typer it has articles on TU's, FS Keyers, control systems and power supplies by some of the oustanding RTTY'ers of Europe.

Your copy is available for the modest cost of one dollar (air mail) by writing to Arthur Owen, G2FUD—Gwenarth, 184 Hale Road, Hale, Cheshire, England. Bud, W6CG

RTTY READERS

It is with mixed feeling that I sit here at my desk, assembling material for the December 1966 RTTY. In one way, it does not seem so long that I tried my hand at the January 1953 copy of our little RTTY magazine, but its some fourteen years ago now. It goes without saying, there would have been no RTTY as its become known, IF there had not been the help from so many amateurs who were interested in RTTY in all of its various phases. To attempt to name all who have done so much in the past, by submission of articles, items to help others obtain better operations, contests, equipment acquession, to mention a very few items. Others assisted in ways which we are all not able to help. Lending funds to purchase large lots of Teletypes when they became available. Each of you who took part in the many activities listed above know who you are, and all I can express is a BIG THANKS to each and all of you. To my wife, who has helped in so many ways, another big thanks, and if I were given to "punning" I could say, "This is my Swan-song". I hope to be able to write for Dusty and RTTY in the future when my work load at Lab is a bit lighter. 73 from "Ed." W6AEE, Merrill L. Swan, AR.

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FOR SALE: Nylon Teletype ribbons, brand new, $2.00 postpaid. Large prop pitch $25. plus shipping. Unused 4CX1000A $75. postpaid. WA5DAJ, 4305 Windsor Drive, Garland, Texas 75040.

FOR SALE: Model 28 KSR page printer, LPR typing reperf; LXD TD, all for $450. make offer for individual pieces. Few left 400 cycle two tube tuning fork, you supply tubes (6AU6) and DC/Fil. $4.00, postpaid U.S. Model 28 sync motors $10.00; toroids 88 mhy 5/$2. postpaid, U.S.A. K5BQA, 11040 Creekmere, Dallas, Texas 75218.

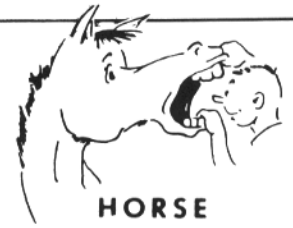
FOR SALE: Tested RT-1 Stoner TU, wired from basic kit, mounted in fabricated chassis, $50.00. W6LDG, 11110 South Colima Road, Whittier, California.

WANTED: Two empty AN/FGC-1 cabnets, for pick-up in station wagon in the East. Cash. Advise price and condition. W2JTP, 431 Woodbury Road, Huntington, N.Y. 11743.

WANTED: Cable W-140, W-1602 for CV-57 converter. **FOR SALE:** Collins 32-V-3 in very good shape, makes excellent RTTY rig, price $150.00. W8MSG, 3479 Kersdale Road, Cleveland, Ohio.

FOR SALE: Model 19, less 14 TD but with power supply and table. Includes large copy holder, sync motor. Condition excellent. Will sell or trade. VE3BNV, 555 Princess Street, Woodstock, Ontario, Canada.

FOR SALE: Model 28 KSR, xlnt shape. Model 14 typing reperf with keyboard and EOL light, xlnt. New model SFO-2 Technical Material RTTY regenerator, mfg. 1962 with book, $25.00. Mint NC-303 with matching 2 & 6 meter converter $125.00. BC-1031, 455 KC IF, panadaptor $20.00. K6PZT, 9337 Gotham Street, Downey, California. Phone 213-869-3292.



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WANTED: Your subscription to RTTY. $3.00 a year, eleven issues, U.S.A. RTTY, P.O. Box 837, ROYAL OAK, MICHIGAN 48068.

FOR SALE: Model 19, fine shape and look, $125. Model 15 with table, $80. Both have sync motors, TT 63A new, $35. Hallicrafters HT-32B, $300. Drake 2B, 2BQ, Calibrator, $200., both like new. Hi-Gain 18 HT Vertical Antenna, $75. GSB 201 linear, $150, scope HO-10, $45. WA6VBO, 1007 W. Olive Ave., Redlands, Calif. 92373. Phone 714-792-7037.

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