Amateur Radio Frontiers

Plans change of course, but right now it looks as if the next issue of the Bulletin will have to be a jumbo double issue in order to catch up with the mountain of material that has accumulated. The main theme of the issue will be modifications and data on the Northern Radio 152 Converter which originally appeared in the #25 Bulletin. This then is a last call for any data you may have on this circuit which will be of help to others.

The yearly Audio Fair has again spent itself upon the hardy New Yorkers. There were over three floors of exhibits this time and it was noisier than ever. The Karlson Associates exhibit really hit home this time and was the biggest hit of the show. A lot of people found out that the Karlson Enclosure did all we said it would and told their friends about it. Since the show the phone has been busy with calls asking about where the unit can be bought. Looks like a bang-up fall season.

In view of the increased time necessary to promote and demonstrate the Karlson Enclosure I have reluctantly decided that Bulletin #36 will be the last regular issue. In the interim I shall try to clear the hooks of all circuits and data that is on hand as well as publish the complete list of all persons who have shown an interest in RTTY. If there is no great interest in such a list I won't bother with it. Let me know.

Maybe too I will be able to find time to get back on the air again. Lately I have been listening in after midnight and have found the conditions of the bands appalling. Twenty was good for local use only, Forty dead, and Eighty was in sad shape. I did copy a commercial station on 3990 which was coming through loud and clear, but most of the phone and c.w. stations were very weak. Damned sun spots.

W0PRR/F, Floyd Lent, Paris, has acquired a printer and is building the associated equipment. Looks like it won't be long until we have an F7 to contact.

NOVEMBER 1953

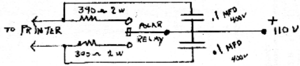
Bulletin No. 29

W6SEW, Jack Porep, Oakland, Calif., "I expect to be on the 40 meter RTTY by the first of October. I expect to be the first station on RTTY in Oakland. I have a model 26 to trade for a typing reperforator. I need information on converting a model 5-A stock ticker over to amateur use. These tickers come in three speeds: 300, 401, and 500 characters per minute. The machine I have is a 500 character per munute job. A repairman from Western Union told me the 5-A is a 6-unit tape printer. I noticed that it has only six distributor contacts, so I believe it could be converted into a 5-unit machine. The 5-A has a 1725 RPM motor. Also it has a built-in polar relay requiring 100 MA. It prints on 3/4" tape. Perhaps someone reading this can give me the information I need.

W5ENH, Hy Hymel, Little Rock, Ark., "Just thought I'd drop you a few lines to advise that the RTTY freqs. are being cluttered up now and then by another nut that don't know when he's well off! RTTY isn't entirely new to me, having diddled with it to some small extent while overseas in WW-2 when in a little radio-monitoring outfit. Just got going fairly well when the war ended and we had to pack up our equipment and turn it in. Didn't have much to work with in the way of receiving equipment. Had a 15-type printer and keyboard which nobody knew what or why we had it. But having spent 4 happy (?) years punching for the AP, yours truly started thinking up some use for the blamed thing. We also had a code slip-tape recorder (inked slip, also a hunk of equipment nobody knew how to read, including myself) which had a nice little limiter, rectifier and pair of 6L6 amplifiers that served the purpose admirably. (With the front end "Doctored" up slightly to sorta thin out the QRM & QRN.) Had a super-pro receiver and got the assorted pile to perking where I could get some fairly nice copy. The "BRASS" at headquarters got wind of it and wanted me to put it on a 24-hour basis. Oh Me, I pictured myself sitting there with the BFO knob in my hand day and night, trying to keep a signal "ZEROED IN", HI. The super-pro is a swell receiver but the oscillators just ain't good enough for RTTY on that kind of basis. Well, we had a BC-221 freq. meter on hand and I made the rounds to the salvage piles and with what Jap gear I had 'liberated' I scavanged enough guts to build an R. F. Doubler-amplifier for the BC-221 and feed it into the super-pro as an oscillator. Boy, that did the job. It would hold frequency for hours on end and I could get some sleep. Hi. I have the circuit for the freq. meter amplifier in case anybody might be interested. We did such a good job of monitoring with the little setup (not to mention clearing up numerous cases of 'Breach of Security') General G. C. Kenney wrote me a very nice letter of commendation and there were even rumors of a "BATTLEFIELD COMMISSION". Started getting the "Bug" again recently... have obtained an old 12-type printer & keyboard and built up the little converter as described by W2PAT in the Jan. issue of QST. (With, of course, the usual amount of individual changes and additions. One of which being a polarity reversal switch in the case of heavy QRM on either side of the signal.)

(cont'd)

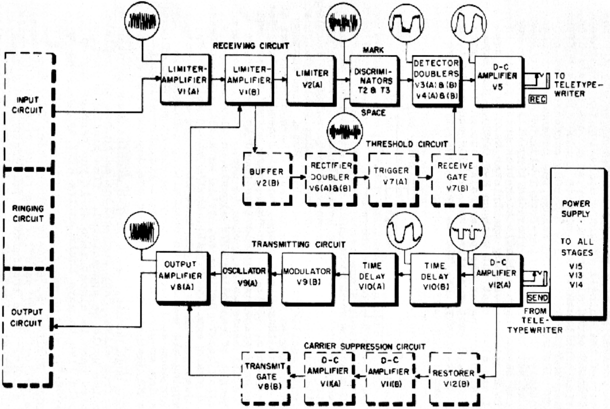
(W5ENH Continued)
Haven't seen anything in the 'MAG' about anyone having had trouble with the old series-wound motor on the 12-type receiver-keyboard. Man, I thought I would never get all the noise out of the thing!! I wound up having the armature "turned down" at an electrical shop at a cost of six-bits, by passing each brush to ground with a .008 1600v buffer condenser and paralelling A1. MFD 400v condenser and a 200- OHM 100 Watt resistor across the governor contacts. Incidentally, I have a tuning-fork I will be glad to loan anyone to set their motor--provided they will pay its way there and back. Have a little kick-back pulse pickup in my Radio Receiver caused by the Printer Magnets but believe I can clear that out with an R-C COMBO. Had some trouble with arcing at the polar relay but an R-C Combo of 390- OHM, 2 watt resistors and .1 400v condenser took care of that nicely. Hr. 'tiz in case somebody might be interested:



Have had a couple real nice QSO'S with the set-up as it is but want to get it perking better before I really "get gone" with it. I didn't have enough freq. swing by dropping the oscillator plate voltage (Brother, that feller Collins put a dandy oscillator in his ART-13) But I have another kink I am going to work on -- in fact I have already had it working in the 'Hay-Wire' stage, and will send it along for the ART-13 Boys. It'll be an "out-board motor" affair but it's the only practical method I've found to get enough spread on all bands which I plan to use. Say, has anybody thought of recording RTTY signals on wire or tape and playing back? Believe me, it'll work slick -- at least it did 8 years ago...... Well, that's about all of it now -- just wanted to let you know there was a W5 down here getting all wound up to chin with you fellows on RTTY. (As soon as I can get the snow out of my TV). Eight hours a day as wire-chief, TTY opr. etc. fer Missouri-Pacific RR just about does me for the day tho. Hi."

W9IEE, Hugh Morris, has a TG-7-B machine sans printer on the way from W1AFN. "Any suggestions as to how to complete the machine would be appreciated. Time available for ham activities here is almost zero so if you hear of anyone that would like to move their entire RTTY setup, pass my name along."

W4EBH, Bradford S. Bennett, Winchester, Va., has the following for sale for the price of $300.00 as a unit: Tape transmittor, perferator and distributor; all wired, cabled and filtered, with 3 polar relays wired in. Model 12 Teletype machine and motor generator which has been checked out on the air and is ready to plug in. Complete set of W2BFD instructions and blueprints including 3 sheets of blueprints of tape equipment.



Telegraph Terminal TH-5/TG, block diagram.

CENTER DIAGRAM

TELEGRAPH TERMINAL TH-5/TG by C A Cool, W2EBZ, McGraw-Hill Book Co

As described in TM11-2239 (unclassified), the Telegraph-Telephone Terminal AN/TCC-14 is composed of three separate components: Telegraph Terminal TH-5/TG, Electrical Filter Assembly F-98/U, and Telegraph-Telephone Signal Converter TA-182/U.

Characteristics of TH-5/TG

Mark frequency: 1325 cps Space frequency: 1225 cps
Type of modulation: Frequency shift Bandwidth: 200 cycles
Transmission speeds: Normal speeds of 60, 75, and 100 wpm
(based on 7.42 unit code and 6 operations per word)
Number of tubes: 15
Transmission output level: 0 dbm ±2 db (fixed)
Receiver sensitivity: 0 to -45 dbm
Terminal impedance: 600 ohms ±10%, nominal at 1000 cps for 2-wire or 4-wire operation
Receiving direct current (internal source): 20 ma (minimum)
Power source: 115 v, 50-60 cycles, 60 watts
Ringing generator: 100 v, 20 cycles under load
Dimensions (over-all including outer case): 6" x 8 1/2" x 10"
Weight: 19 lb.

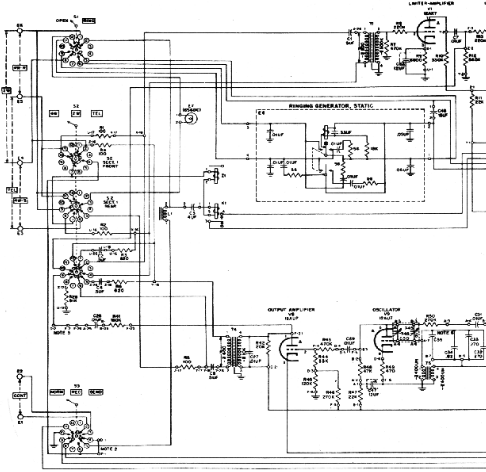
Description: Telegraph Terminal TH-5/TG is a 15-tube, frequency-shift carrier modulator and demodulator. It modulates d-c TT pulses to 1225 and 1325 cps. It demodulates 1225 and 1325 cps to d-c TT pulses. These d-c pulses must be capable of activating a TT selector magnet which requires a 20-ma current.

The TH-5/TG is a compact lightweight unit of miniature construction. The transmitting, receiving, and power supply components are mounted on a chassis that is fitted into a waterproof outer case. The panel contains two three-position wafer switches used to select the type of operation, a nonlocking lever switch used to transmit the 20-cps frequency, three jacks for TT connections, and six binding posts for connections in 2-wire, 4-wire, and radio-telegraph application. The TH-5/TG provides a means for transmitting and receiving a 20-cps frequency for signalling and breaking purposes.

Operation may be 4-wire, or one-way reversible on 2 wires. For one-way reversible operation, only one TH-5/TG may transmit at a time. The mark and space signals begin automatically on the first TT pulse. The mark signal ceases automatically a few seconds after the last TT pulse so that the unit may receive from the distant terminal. The 20-cps ringing signal may be transmitted when the other station is transmitting and break-in is desired.

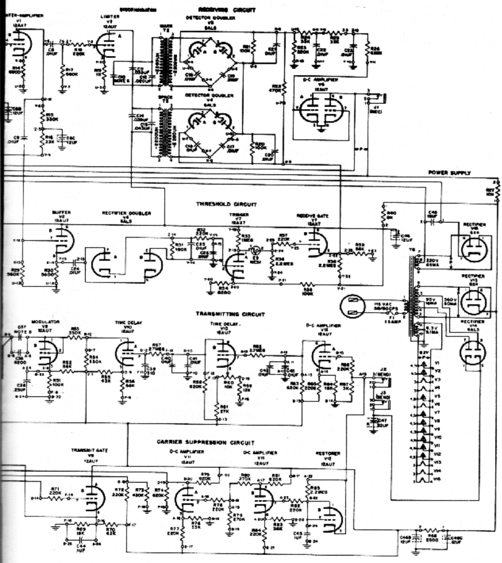
Theory of TH-5/TG: The telegraph terminal contains three major circuits and six auxiliary circuits. The major circuits, the transmitting, receiving, and power supply circuits, are illustrated in solid block form in the block diagram. The six auxiliary circuits are incorporated because of the switching requirements Five of these, the carrier suppression, threshold, input, output, and ringing circuits, are illustrated in perforated block form. The sixth auxiliary circuit, the time-delay circuit, is part of the transmitting circuit (V10A, V10B, and V12A).

INPUT-OUTPUT & RINGING CIRCUITS



NOTES

1. UNLESS OTHERWISE SHOWN, RESISTORS ARE IN OHMS, CAPACITORS ARE IN UUF.
2. STRAP FOR COMMON BATTERY USE ONLY.
3. REMOVE STRAP FOR 4 WIRE FULL DUPLEX APPLICATIONS.
4. THERE ARE NO CONNECTIONS ON SECT 2 FRONT OF SWITCH 2
5. ALL SIGNAL LEADS IN RECEIVER CIRCUIT SHIELDED UP TO & INCLUDING GRID OF V(8)
6. OSCILLATOR AND DISCRIMINATOR COILS ARE TUNED BY SELECTION OF CAPACITORS C10, C35 AND C37
7. ROTARY SWITCHES ARE VIEWED FROM THE END NEARER TO CONTROL KNOB.



ARTT 4054 *Telegraph Terminal TH-5/TG. schematic diagram.*

Transmitting circuit. This uses a modified Hartley oscillator that oscillates continuously at the mark frequency of 1325 cps. Altho oscillating continuously, it does not transmit because of the action of the carrier suppression circuit The carrier suppression circuit removes the carrier tone from the line when transmission from the TT has stopped. The modulator of the transmitting circuit is arranged so that the oscillator resonates at its mark frequency of 1325 cps. During a space pulse, however, the modulator operates to switch additional capacitors into the resonant circuit of the oscillator. This changes the mark frequency of 1325 cps to the space frequency of 1225 cps. Refer to the schematic diagram for the interaction of the transmitting and suppression circuits.

Receiving circuit. This receives the incoming signals (or home copy) from the transmitting circuit, limits and detects the signal, and then applies the resultant d-c pulses to the TT The limiter stages of the receiving circuit are designed to present a constant amplitude level of between 0 to -45 dbm (decibels referred to 1 milliwatt). The output of the discriminator is dependent on the amplitude of the frequency applied to it.

Power supply circuit. This furnishes filament voltage, plate voltage, and bias voltage for the receiving, threshold, transmitting, and suppression circuits. In addition, it supplies a d-c voltage to the 20-cps ringing generator in the ringing circuit.

Carrier suppression circuit. This removes the carrier tone from the line approximately 3 seconds after message transmission has stopped. This compensqtes for the capture effect of the limiter: high-level signals override low-level signals. Without the suppression of the home copy tone from the transmitting circuit, the incoming low-level signals would be suppressed in the limiter. Because of the capture effect, TT break-in operation is not possible.

Threshold circuit. During idle operation, this prevents false operation of the receiving circuit on low-level noises. The existence of low-level noise is indicated by the illumination of the neon lamp on the front panel. This circuit applies a bias on the output of the receiver, securing the circuit in the mark condition on signal levels less than -45 dbm. The threshold circuit removes this bias when signals of more than -45 dbm are being received.

Input and output circuits. These have binding posts thru which the line is connected to the TH-5/TG. A holding coil is incorporated into these circuits to provide a d-c closure for remote control of push-to-talk radios and common battery switchboards. The input and output circuits contain all the switches used in controlling the operation of the TH-5/TG.

Ringing circuit. This contains a ringing generator which transmits a 20-cps signal, and a buzzer that is activated by an incoming 20-cps ringing signal. Relay K1 is wired in series with the buzzer. Operation of K1 causes the TT to run open.

Time-delay circuit. This prevents loss of part of the start pulse when the carrier tone is restored to the line. The first space, or starting, pulse that is applied is delayed by the time-delay circuit. This delay permits the immediate transmission of a marking signal. The initial marking signal establishes a steady state condition in the transmission path. This allows for the subsequent transmission of the first undistorted space signal. All other transitions, as well as the first mark-to-space transition, are delayed also.

ELECTRICAL FILTER ASSEMBLY F-98/U

Characteristics of F-98/U

Midfrequency operation: 1275 cps Bandwidth: 100 to 200 c
Balanced impedance: 600 ohms input to band stop and to band-pass filter.
600 ohms output with band stop and band pass connected in parallel
Attenuation: 80 db or greater in stop regions
Supervisory signal: 20 cps at 100 ma
Weight: 25 lb

Description: Electrical Filter Assembly F-98/U has a band-pass section used for TT transmission. The band-stop section is used for telephone transmission. Use of F-98/U permits simultaneous TT and Tp service; the band-pass and band-stop sections separate the TT and Tp signals. The filter is hermetically sealed, requires no adjustment, and has no controls or indicators. Six binding posts located on the face of the panel are for connections.

Theory: F-98/U is used to derive a telegraph channel from a portion of the frequency band which a telephone channel uses while retaining the telephone channel for speech transmission. This is possible because only a small portion of the normal voice band is required for a Tg channel. Remaining band provides a satisfactory Tp circuit.

TELEPHONE-TELEGRAPH SIGNAL CONVERTER TA-182/U may be covered in a following article if interest is shown.

W8HTE, Richard Beedy, Springfield, Ohio, is looking for a model 12 keyboard, it being the last thing keeping him off the air.

W6BOJ, Tom Payton, Los Angeles, "Got a big kick out of your comments re CW men and their gripes - being an old CW man (1926-1953) myself I can appreciate their feelings. You might be interested to know that I am an ex-Chief Radioman and during the war was Materiel Chief for four years at the Navy Diversity receiving station at Balboa (Tarfan), Canal Zone, Panama. We put in one of the first TT stations the Navy had at that time and from ordinary 'key-up' method, developed the deal up to and including the installation of FSK. It was quite interesting while it lasted and we had a lot of fun with it as well as a lot of hard work. Since getting out of the Navy in '45 have been more or less inactive as far as "ham" radio goes but can still copy up in the 30 wpm area. I'm about to get set up again and thought I'd like to include RTTY in my plans, provided, of course, it is not too expensive."

Amateur Radio Teletype Society
Wayne Green, W2NSD
1379 East 15th Street
Brooklyn 30, N.Y.

W9QBH, Robert Hajek, Riverside, Ill., "I just got through reading your column in the latest CQ and really wanted to join you in your words. I agreed 1000% on the question of the present enormous amount of amateur "experimenters"with commercial equipment. I have been working part time at a motorola service station in Chicago and it's a pity to have to install a unit in a car owned by a ham. The junk which they want and then don't have much of an idea of how it works or not even an inkling of what might be wrong when it doesn't work makes a person sick. While I don't profess to know all there is, I pride myself with the fact that I feel I can dig into almost any piece of gear I have if it doesn't work right. I can also agree with you in general that the VHF boys are the sharper and also those fiddling with SSB. We have the FM network on two meters in Chicago and I personally have gotten somewhat sick of listening to the tripe that transpires there. Originally it was made of engineers and others that were fairly sharp, but many have obtained gear from Motorola and don't know beans about radio. The topics of conversation, needless to say, are much more uninteresting now and at times a real drag. While I have commercial Motorola gear here too, most of it is lab stuff which I had to fool around with to get going, really the hardest part of the job when you build your own gear. It's all very educational.

Getting down to TTY business. I finally got the table rewired and even had the printer printing from the keyboard one night, but the converter still has to be completed. I have all the parts for the Northern job without the sharp selectivit channels, but time is lacking. Maybe I'll be able to get it going, however, before I get back to school Sept. 20. I'm looking forward to getting on the air on 80 and printin' with the rest. Keep up the TTY publicity and punching!"