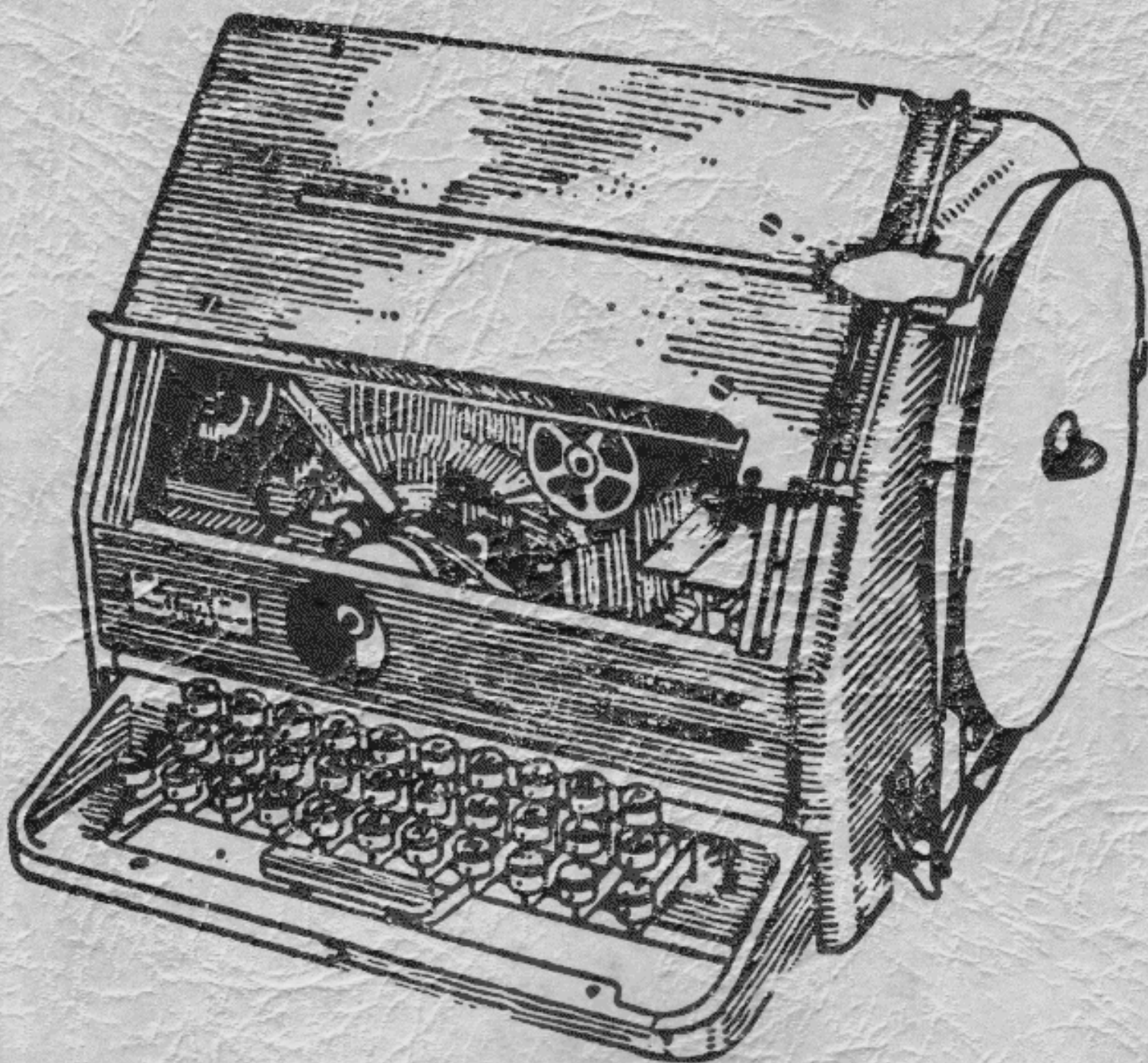


A SELECTION OF
EARLY AMATEUR RADIOTELETYPE

RTTY BULLETINS



AMATEUR RADIOTELETYPE SOCIETY

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**EARLY AMATEUR RADIOTELETYPE
BULLETINS**

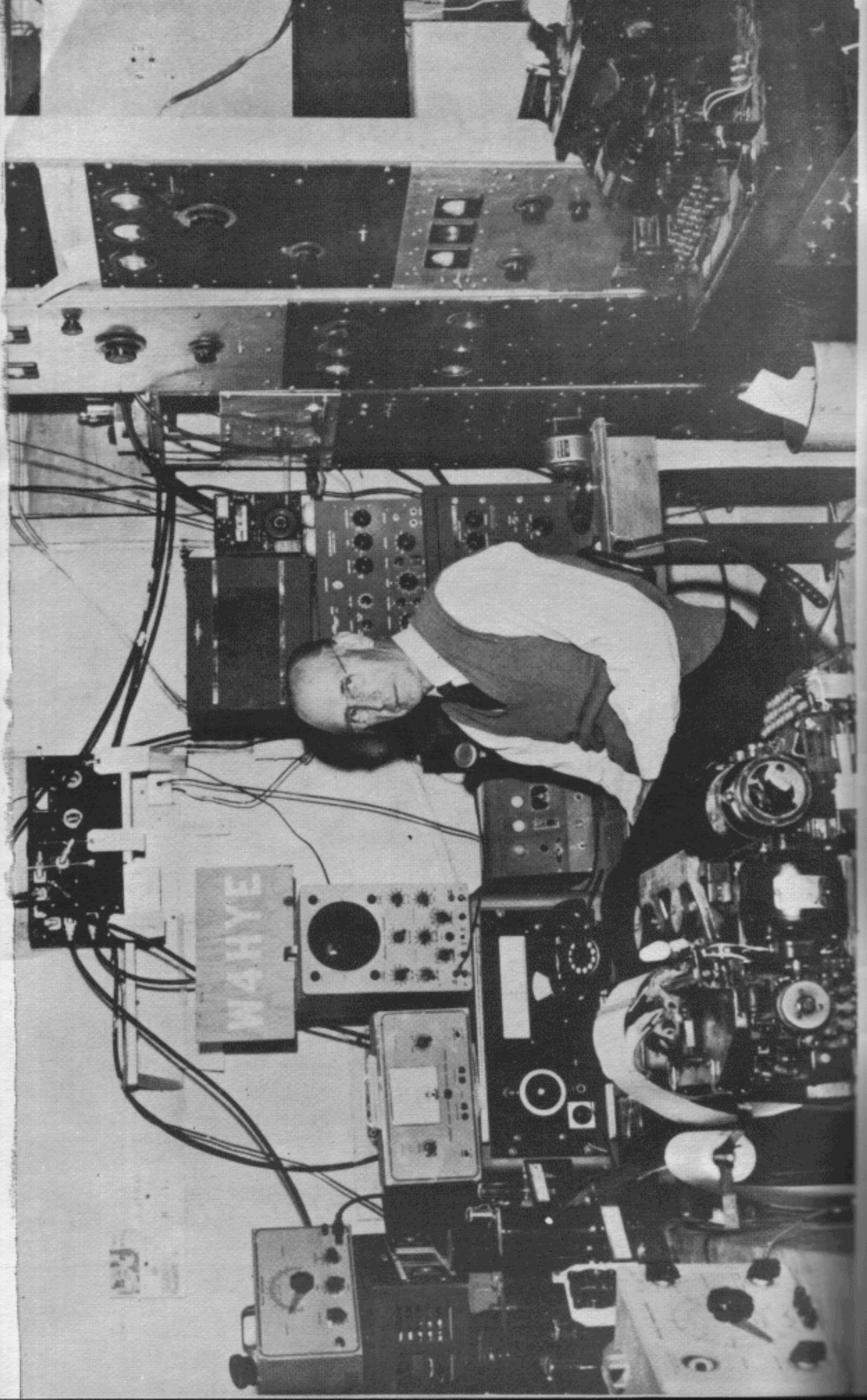
FROM 1946 TO 1951

VOL. I



PUBLISHED BY
AMATEUR RADIOTELETYPE SOCIETY

38-06 61st Street, Woodside 77, N. Y.



FOREWORD

Amateur Radioteletype, now boasting around 3000 participants, has come of age, having passed its 10th anniversary! Starting with just two teletypewriters in 1946, both the property of W2BFD, the ham RTTY population built up very gradually until 1948. By that year the major technical problems had succumbed to enthusiastic development by the little group and, with ARRL's recognition of our pioneering efforts by the publication in QST of RTTY's "history", our ranks suddenly began to expand. Instead of just the two or three states grouped around New York City the idea spread to every corner of the land. By early 1949 tiny groups were already in operation in Ohio, Louisiana, Washington, Oregon, New Mexico, California, Indiana, Minnesota, Iowa and Illinois.

The two years, between the founding of the Society in 1946 and "telling the world about us" in '48, yielded a rich harvest of technical advancement, fully documented in the numerous "bulletins" that were published gratis and "broadcast" by RTTY tape transmissions and Uncle Sam's post office. During this time amateurs, most of whom had never been closer to a machine printer than 20 feet, had to painfully acquire through professional contacts and by cut-and-try, operating knowledge and familiarity with the complex-appearing machines and circuits. The great majority of the present-day RTTY membership have no awareness of the difficulties that beset the early "jingle-bell" boys. Today there are virtually dozens of circuits of terminal units, frequency shifters, etc., etc., to select from, contrasted with the almost complete nonexistence of printer and frequency-shift information in 1946. The commercial companies were still hanging onto their wartime "hush-hush" techniques and most of the military manuals had not yet been declassified.

The earliest bulletins (ARTS series-1) were punched into teletype perforated tape and transmitted, on a local "loop", to from one to six page-printer machines connected in series and loaded with carbon paper rolls making from 3 to 6 copies at a time per machine. By 1951 the organization had gotten to become known principally by its alternate name of "VHF Teletype Society" (VHF representing 90% of the operations until FCC yielded to the pressure of numerous petitions and let us in the "happy hunting grounds" below 11 meters in 1953). The capacity of this system of printing the Bulletin was stretched to the breaking point, even with "assists" from members who could help out with mimeograph facilities. The editor for practically all of the original free bulletins had been W2BFD, founder and present National Secretary. Several hundred issues of these early ARTS series-1 and the VHFTS series-2 bulletins, news-letters and "flashes had been "cranked out", by 1951 being circulated to a few hundred members.

These news-letters dealt with the development of standards of operation and circuitry to guarantee that all of our stations might "speak the same language" and some issues were merely filled with that "chit-chat", social and "activities" news, so necessary to keep a "gang" pulling together. Other bulletins ran a "course" in FSK and RTTY theory for the newcomers to our ranks. The great majority of these hundreds of early news-letters went unnumbered, some even undated, but an attempt was made to number the more important ones. In case this may sound strange to a present-day RTTYer let us hasten to explain that, in our wildest imagination, none of the pioneer group ever contemplated the vast expansion that took place through the publicity we received in magazines, newspapers, conventions, exhibits and even radio and television broadcasts during the first few years. Who knows in advance of his participation in history? When the fact did, later, begin to sink in, many of the previously unnumbered releases were reissued with new numbers.

By the middle of 1951 a major change took place. Wayne S. Green, W2NSD, offered to take over the publication of the national RTTY bulletin, which was eating heavily into the secretarial time that W2BFD was able to donate to the headquarters work. The new ARTS Bulletin, ARTS series-3, after a beginning published by mimeograph, was photo-offset printed. The expense of this means of reproduction ended the period of free bulletins and the circulation continued on a subscription basis.

One of the biggest tasks facing RTTY headquarters (and it still is) was the stupendous one of procuring the hundreds of superseded teleprinters, on a non-profit basis, for the growing membership. It has been variously estimated that, to equip one single member, required the writing of a total of, perhaps, 20 letters to the member, telegraph agency, warehouses, freight outfits, etc. Multiply all this by the 3000 printers and countless thousands of pieces of accessory equipment that have been "liberated" for members by the Society and you will have a faint idea of the bedlam that was RTTY headquarters. Up until 1951 this organization had been operating under two names; VHF Teletype Society for (mostly) two-meter operation and Amateur Radioteletype Society for what low-frequency work existed. This low-frequency work was in the minority and, even today, nearly four years after the "green light" was given us by FCC for the use of the low bands, there are still many more VHF printer installations than on the "DC" bands. The discrepancy is being narrowed down rapidly, however, and we may look forward to seeing low-frequency RTTY in the lead one of these days.

With Wayne's assumption of the publication of the bulletin, under the name "Amateur Radio Teletype Society Bulletin" ("Radio Teletype" two words), there was still occasional need for the tape-printed editions as the offset-printed job was published on a monthly basis. If a particularly "hot" RTTY news item might be delayed otherwise it was run off via page-printer and carbon roll-paper. Thus it will be seen that, adding to the numerical confusion, is the fact that the W2BFD series-2 "flashes" overlapped the W2NSD series-3 bulletins at times.

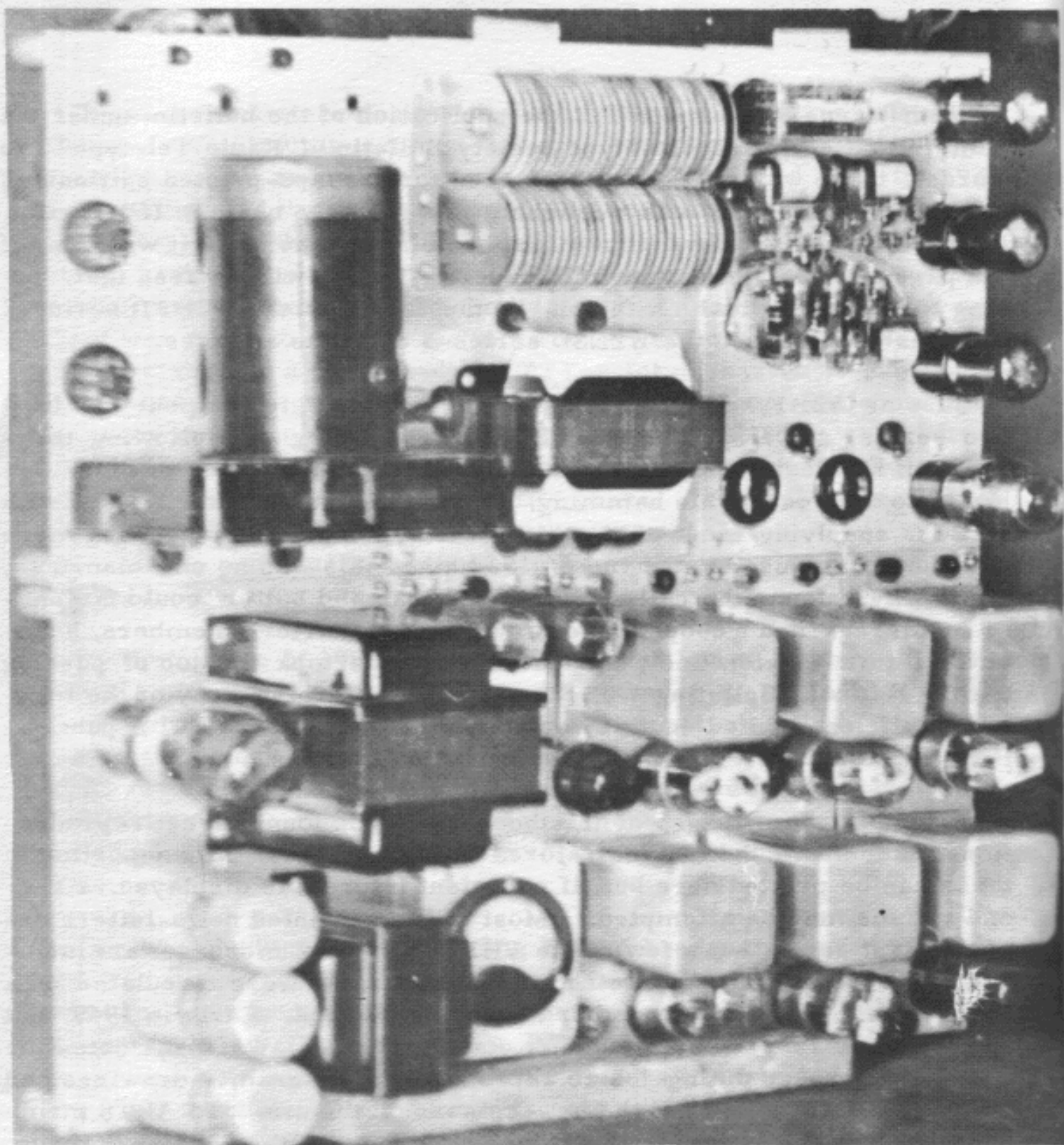
Just as W2BFD found, during the six years of turning out the first two series, so, also, did W2NSD find out, during the following three years of his "editorship", the great "bite" that this "labor of love" was bound to take out of his hamming, earning and family time. Even with W2BFD supplying most of the technical writeups it was growing more and more obvious, by the end of 1954, that this was no one-man task. When Wayne found the call to earn the "bread and butter" could no longer be disregarded a cooperative group of headquarters members, headed by editor Clayton Cool, stepped in and undertook the job of pushing out the National Bulletin. W2BFD continues to furnish many of the technical articles printed in this fourth series of amateur RTTY publications as he did for those published by W2NSD.

In the following pages of this booklet will be found direct reproductions made from the original stored bulletin tapes. Only a portion of these can be printed here but, if sufficient interest is displayed, a second volume may be attempted. Most of the reprinted news-letters are of the first series but a few of the VHFTS series-2 messages are included. No illustrations were shown but diagrams were circulated on a "loan" basis, with each member recopying by hand. Early in 1949, out of his enthusiasm for ham RTTY, Ray Macomber, W3CZE, footed the bill for a large printing job to reproduce the diagrams, drawings and instructions needed to get the new-comers on the air. To ARTS members, such as these, we attribute the huge progress the hobby has made.

The main bulletins are arranged in chronological order and the various news-letters and minor items are fitted in wherever space will be most efficiently used. Little or no editing has been done to the perforated tapes from which the bulletins have been printed. We reason that you would prefer to read them as they were originally published.

For the newcomer to our ranks let us state that we feel no more verdant fields exist in amateur radio today than these experimental "happy hunting grounds" of printing telegraphy. There still remains unlimited opportunity to pioneer in the allied subjects of Radioteletype, Radiofacsimile and Radio Remote Control.

THE FIRST FSK-AFSK TERMINAL UNIT FOR AMATEUR RTTY



Although there was an earlier converter, written up in "CQ" magazine of November 1946, this was designed during World War II for a purpose other than Radioteletype and served for only the preliminary experimental tests. The unit pictured above was engineered about one month after the world's first two Amateur Radioteletype machines were put on the air by W2BFD. A unit-style of construction was used to facilitate experiment. A 17-1/2" high rack panel held all the "sub-chassis", which consisted of rectangular sheets of aluminum, supported on the rack panel by means of spacer pillars. The Auto-Start unit in the upper right corner is the last of 7 experimental starters developed during 1946 and 1947. This converter was duplicated by hundreds of RTTYers in the following years, with the aid of Data Package ARTT-6002 available from RTTY headquarters. It has been more-or-less supplanted by the Society's new "Standard Radioteletype Terminal Unit" (Data Package ARTT-6034).

THE AMATEUR RADIOTELETYPE AND VHF SOCIETY
GENERAL BULLETIN NUMBER 1
OCTOBER 15TH, 1946

WHAT HATH GOD WROUGHT ?

WITH THIS FIRST BULLETIN OF WHAT, WE TRUST, WILL BE A LONG SERIES WE SHALL TRY TO CONDUCT THE "BUSINESS" OF OUR RECENTLY-INITIATED ORGANIZATION TO THE END THAT A MAXIMUM OF PLEASURE WILL BE DERIVED BY EACH MEMBER FROM HIS ASSOCIATION WITH THE GROUP.

THE BULLETINS SHALL BE TRANSMITTED BY RADIOTELETYPE AT 8:00 P.M. EVERY EVENING BUT SUNDAY (ANY VOLUNTEERS FOR SUNDAY NIGHT?). FOR MOST OF THE PRESENT MEMBERSHIP IT WILL BE NECESSARY TO MAIL THE BULLETIN UNTIL EVERYONE IS SET UP FOR RECEPTION. W2BFD, YOUR ACTING SECRETARY, OFFERS TO DO THIS, AT LEAST UNTIL SOMEONE ELSE VOLUNTEERS. WE ARE LOOKING FORWARD TO A TOTAL MEMBERSHIP OF AROUND 100 IF SUFFICIENT EQUIPMENT CAN BE OBTAINED.

DURING OUR LAST MEETING THE SUBJECT OF AN AUTOMATIC STARTING DEVICE, THAT WOULD PERMIT RECEIVING PRINTED MESSAGE TRAFFIC IN THE ABSENCE OF A RECEIVING OPERATOR, WAS DISCUSSED. A NUMBER OF METHODS WERE PROPOSED AND TALKED OVER. THERE ARE MANY DIFFICULTIES WHICH WE WILL HAVE TO OVERCOME BEFORE WE CAN SAFELY LEAVE SUCH AN "UNATTENDED" APPARATUS RUNNING. THE THREE MODELS DEMONSTRATED BY W2BFD AT THE MEETING ALL HAVE CERTAIN FAULTS. CIRCUIT DIAGRAMS WILL BE PROVIDED, OF THESE THREE MODELS, AND A TAPE-PRINTED DESCRIPTION OF THE "MODUS-OPERANDI". PERHAPS WE CAN OVERCOME THE PROBLEMS BY A BIT OF TEAM-WORK.

FOR UNATTENDED OPERATION IN THE HOME OF A RADIO AMATEUR THE PRIME REQUIREMENT IS FAIL-SAFE RELIABILITY. EVEN IF THE MESSAGE IS LOST THE MACHINE MUST SHUT DOWN UNDER FIRE-HAZARD CONDITIONS. THE MACHINES MUST START UP UPON THE RECEPTION OF ANY RADIOTELETYPE SIGNAL STRONG ENOUGH TO PRINT INTELLIGIBLE COPY BUT, EVEN MORE IMPORTANT, IT MUST POSITIVELY NOT START UP, WHEN UNATTENDED, UPON THE RECEPTION OF ANY COMBINATION OF QRN, QRM, OR FAULTY OPERATION OF ITS OWN CIRCUITRY. IT SHOULD BE EMPHASIZED THAT LITTLE OR NO FIRE-HAZARD EXISTS IN THE MACHINES THEMSELVES, WHICH ARE DESIGNED TO OPERATE UNATTENDED ON WIRE LINES AROUND THE CLOCK. IF ELECTRONIC EQUIPMENT IS CONSTRUCTED WITH A GENEROUS FACTOR OF SAFETY AND FUSED INTELLIGENTLY THERE SHOULD BE NO QUALMS ABOUT LEAVING PRINTERS CONNECTED FOR REMOTE CONTROLLED STARTING.

ONCE STARTED BY A PROPER SIGNAL THE MACHINE MUST REMAIN ON UNTIL A SHUT-DOWN IMPULSE IS RECEIVED AND MUST THEN, WITHOUT FAIL, CLOSE DOWN. FURTHERMORE, SOME SPECIAL CONDITION MUST BE SET UP FOR KEEPING UNATTENDED TELETYPEWRITERS RUNNING WHEN RECEIVING A PROPER SIGNAL BUT WHICH WILL INFALLIBLY SHUT IT DOWN AUTOMATICALLY IN THE EVENT THE SIGNAL IS LOST (WITHOUT HAVING RECEIVED THE SHUT-DOWN IMPULSE), OR IN THE EVENT THAT QRM OVERWHELMS THE DESIRED SIGNAL. OF THE THREE METHODS SUGGESTED, NUMBER THREE (BY W2BFD) USING A "PAUSE" IN TRANSMISSION, APPEARS TO REQUIRE THE SMALLEST AMOUNT OF ADDITIONAL EQUIPMENT. IT IS HOPED THAT, BY THE TIME WE HAVE OUR NEXT GET-TOGETHER, AN IMPROVED VERSION OF THAT SYSTEM WILL BE READY FOR DEMONSTRATION.

WE KNOW THAT THE "GANG" WILL AGREE ENTHUSIASTICALLY THAT THE DISCUSSION ON WIRE-LINE TELETYPE EQUIPMENT BY MR. KAVENDISH AT THE LAST MEETING CLEARED UP A NUMBER OF POINTS ABOUT THE MACHINES THAT HAVE BEEN DIFFICULT TO UNDERSTAND. HIS ANNOUNCEMENT, THAT HE FEELS CERTAIN THAT HE CAN PERSUADE THE "POWERS THAT BE" IN HIS COMPANY TO RELEASE AT LEAST FIFTY MORE MACHINES, WAS VERY WELCOME TO THOSE BOYS WHO HAVE BEEN WAITING FOR AN OPPORTUNITY TO ACQUIRE A PRINTER.

CONTRIBUTIONS TO THIS BULLETIN OF TECHNICAL MATERIAL, IDEAS FOR IMPROVEMENT OF OUR SOCIETY AND ANY PERTINENT MATERIAL ARE WELCOME. THIS IS YOUR BULLETIN, FELLERS! DISCUSSIONS PLANNED FOR THE NEAR FUTURE ARE (1) CONCERNING THE PROPOSAL FOR ALTERATION OF THE NAME OF OUR GROUP. SO FAR MOST OF THE MEMBERS ARE IN FAVOR OF DROPPING THE MENTION OF "VHF" FROM THE TITLE. ANOTHER BUNCH OF YOU PREFER

SOMETHING LIKE "THE VHF TELETYPE (OR RADIOTELETYPE) SOCIETY" AND THE REMAINDER WANT US TO ADOPT THE TWO TITLES, WITH USE OF ONE OR THE OTHER DEPENDING ON WHETHER WE ARE DEALING WITH TELEPRINTER OPERATION IN THE LOW-FREQUENCY AMATEUR BANDS OR ON 6, 2 AND HIGHER FREQUENCIES. NO ONE SEEMS TO KNOW, AT THE PRESENT TIME, WHETHER F.S.K. IS PERMITTED UNDER THE EXISTING REGULATIONS ON 20, 40, AND 80 METERS. DURING THE WAR RADIOTELETYPE HAS BEEN KNOWN AS RATT BY THE NAVY AND RTTY BY THE ARMY. AMATEURS FAVORING OUR USE OF THE FORMER SAY THAT IT IS PRONOUNCABLE. OTHERS SAY THAT, SINCE COMMERCIAL ABBREVIATION FOR "TELETYPE" HAS ALWAYS BEEN "TTY", IT FOLLOWS THAT RTTY SHOULD MEAN RADIO USE OF A TELETYPE MACHINE. UNLESS THERE ARE ANY COMMENTS TO THE CONTRARY, THIS BULLETIN SHALL USE R T T Y FOR SHORT. WE SHALL ALSO CALL OURSELVES "THE RTTY SOCIETY", FOR SHORT, WHEN NO AMBIGUITY IS LIKELY.

THE STANDARDS EMPLOYED BY W2BFD ARE BEING ADOPTED FOR OUR GROUP. THESE ARE AS FOLLOWS:-

AFSK MARK FREQUENCY SHALL BE 2125 CYCLES (MODULATED AS NEARLY 100 PERCENT AS POSSIBLE).

AFSK SPACE FREQUENCY SHALL BE 2975 CYCLES (DITTO).

PLUS AND MINUS TOLERANCES WILL BE ESTABLISHED LATER, AFTER GENERAL DISCUSSION.

FSK SHIFT SHALL BE 850 CYCLES, WITH THE MARK THE HIGHER OF THE TWO FREQUENCIES IN ORDINARY COMMUNICATION. THIS STANDARDIZATION WILL MAKE INTERCEPTION OF COMMERCIAL AND OTHER NON-AMATEUR TRANSMISSIONS INTELLIGIBLE TO OUR EQUIPMENT. IT WILL PERMIT INTEROPERATION BETWEEN AMATEURS, MILITARY AND COMMERCIALS IN THE EVENT OF AN EMERGENCY.

ALL TRANSMISSIONS SHALL BE COMMENCED AND TERMINATED, AND EVERY LINE OF COPY SHALL BE ENDED BY THE FOLLOWING SEQUENCE, INVARIABLY IN THIS ORDER:- CARRIAGE-RETURN, LINE-FEED, UNSHIFT (LTRS).

ALL MACHINES UNSHIFTING ON SPACE-BAR OPERATION SHALL BE MODIFIED TO ELIMINATE THIS FUNCTION, TO FOLLOW THE EXAMPLE OF THE MAJORITY OF COMMERCIAL AND MILITARY SERVICES.

IF IT IS NOT KNOWN WHETHER THE DISTANT PRINTER RINGS ITS "BULLETIN BELL" ON UPPER-CASE "S", UPPER-CASE "J" OR UPON DEPRESSION OF THE "BLANK" KEY IT WILL BE PROPER TO RING BELLS BY A SEQUENTIAL STRIKING OF ALL THREE IN TURN.

STANDARD OPERATIONS-PER-MINUTE WILL BE 368, 375 OR 390 DEPENDING ON THE DEGREE OF ELONGATION OF THE "STOP" PULSE IN THE SENDING EQUIPMENT. THE RECEIVING PRINTER BEING IDENTICAL IN ALL THREE CASES NO IMPORTANT DIFFERENCE IN OPERATION WILL BE ENCOUNTERED.

NO USE OF THE MOTOR "STOP FUNCTION" ON UPPER-CASE "H" IS CONTEMPLATED AND AMATEUR STANDARDS INCLUDE THE ELIMINATION OF THIS. THIS IS STRICTLY USEFUL FOR WIRE-LINE WORK.

THREE TAPS OF THE "BULLETIN BELL" ARE TO BE SENT A FEW SECONDS PRIOR TO CEASING TRANSMISSION, SO DISTANT OPERATOR CAN SWITCH OVER WITHOUT HAVING MACHINE RUN "OPEN". THIS WILL PROBABLY BE DISCONTINUED IF THE AUTOMATIC STARTING EQUIPMENT IS SUCCESSFUL.

MACHINES PROVIDED WITH "END-OF-LINE" BELLS SHOULD HAVE THEM ADJUSTED TO RING AT 65 CHARACTERS FROM THE BEGINNING OF THE LINE. A STANDARD LINE SHOULD ACCOMMODATE 72 CHARACTERS IF PRINTER IS PROPERLY ADJUSTED SO A LINE CAN BE COMPLETED, OR A LONG FINAL WORD CAN BE HYPHENATED, AFTER HEARING THE SOUND OF THE BELL. MICRO-SWITCHES CAN BE MOUNTED ON MACHINES NOT PROVIDED WITH E-O-L BELLS TO GIVE THE SAME FUNCTION.

END OF GENERAL BULLETIN NUMBER 1
W2BFD, SECRETARY PRO TEM

THE AMATEUR RADIOTELETYPE AND VHF SOCIETY
GENERAL BULLETIN NUMBER 2
OCTOBER 21ST, 1946

AUTOMATIC TELETYPE TAPE EQUIPMENT

THERE ARE THREE DISTINCT UNITS IN THE TAPE EQUIPMENT AS USED IN THE "W2BFD" SETUP...

(1) THE REPERFORATOR WHICH PUNCHES HOLES IN A PAPER TAPE IN THE TELETYPE CODE AND WHICH CAN BE READ WITH A LITTLE PRACTICE. THE REPERFORATOR RECEIVES ITS SIGNALS FROM EITHER THE LOCAL KEYBOARD, AT THE SAME TIME THAT THE PRINTER IS GETTING A COPY IN "ENGLISH", OR FROM THE DISTANT STATION'S SIGNAL WHILE THE DISTANT OPERATOR IS TYPING TO THE LOCAL PRINTER. THE REPERFORATOR IS DRIVEN BY A MOTOR WHICH SUPPLIES THE POWER TO THE PUNCHES AND THE MECHANISM WHICH PROVIDES THE INTERMITTANT MOTION OF THE TAPE. THIS MOTION IS SIMILAR TO MOTION PICTURE FILM GOING THROUGH A PROJECTOR. SPROCKET HOLES ARE PUNCHED INTO THE TAPE AT THE SAME TIME AS THE CODE PERFORATIONS.

(2) THE TRANSMITTER RECEIVES THE TAPE EITHER IN A CONTINUOUS LENGTH OR IN A LOOP (WHERE CONTINUOUS RETRANSMISSION OF A CERTAIN MESSAGE IS DESIRED) AND ADVANCES IT THROUGH THE CONTACTING MECHANISM WITH AN INTERMITTENT MOTION, THE CONTACTS REPOSITIONING THEMSELVES AFTER EACH ADVANCE IN READINESS TO TRANSMIT THE NEXT CHARACTER. THE MOTIVE POWER OF THE TRANSMITTER IS A POWERFUL ELECTROMAGNET WHICH RECEIVES IMPULSES FROM THE DISTRIBUTOR TO REPOSITION THE TAPE IN TIME FOR THE TRANSMISSION OF THE FOLLOWING LETTER. NORMALLY A COPY OF WHAT IS BEING AUTOMATICALLY TRANSMITTED TO THE DISTANT STATION IS ALSO HAD ON THE LOCAL PRINTER.

(3) THE DISTRIBUTOR PERFORMS TWO FUNCTIONS. THE RECEIVING HALF DISTRIBUTES THE INCOMING IMPULSES OF EACH CHARACTER, WHICH FOLLOW ONE ANOTHER IN TIME, TO THE FIVE PUNCH MAGNETS. AT THE END OF EACH ROTATION OF THE RECEIVING HALF OF THE DISTRIBUTOR A CONTACT IS CLOSED TO THE 6TH PULSE MAGNET ON THE REPERFORATOR, WHICH ENGAGES A CLUTCH AND PERMITS THE MOTOR TO DRIVE THE PUNCHES THROUGH THE TAPE, PUNCHING OUT THE CODE COMBINATION PREVIOUSLY SET UP IN THE FIVE PUNCH MAGNETS.

THE TRANSMITTING HALF OF THE DISTRIBUTOR SENDS A PULSE AT THE BEGINNING OF EACH REVOLUTION WHICH REPOSITIONS THE TAPE AND THEN, AS THE DISTRIBUTOR TRANSMITTING BRUSH PASSES SUCCESSIVELY OVER THE SEGMENTED COMMUTATOR-LIKE DISTRIBUTOR, IT TRANSMITS, ONE AFTER ANOTHER, THE CODE WHICH HAS BEEN PERFORATED IN THE TAPE.

THE TRANSMITTING AND RECEIVING DISTRIBUTOR BRUSH ARMS WOULD NORMALLY ROTATE WITH THE SHAFT, WHICH IS CONTINUOUSLY TURNING, BUT ARE RESTRAINED FROM SO DOING BY A LATCH. A FRICTION CLUTCH BETWEEN THE SHAFT AND THE BRUSH ARM PERMITS THIS. AT THE BEGINNING OF EACH REVOLUTION A MAGNET PULLS OUT THE LATCH, WHICH INSTANTLY ALLOWS THE BRUSH ARM TO ROTATE WITH THE SHAFT FOR JUST ONE REVOLUTION, WHEREUPON IT IS AGAIN STOPPED BY THE LATCH. IN NORMAL OPERATION THE INCOMING IMPULSES RELEASE THE LATCH AGAIN WHEN THE BRUSH ARM HAS BEEN AT REST A VERY SMALL FRACTION OF A SECOND. THIS ALLOWS THE EQUIPMENT TO MAINTAIN SYNCHRONISM.

COPIES OF THE TAPE CAN BE MADE BY RUNNING A TAPE THROUGH THE TRANSMITTER AND SWITCHING ON THE REPERFORATOR SO THAT A NEW TAPE IS MADE WHICH WILL BE IDENTICAL TO THE ORIGINAL.

THE DISTRIBUTOR MOTOR IS OF THE GOVERNOR TYPE SO THAT MESSAGES MAY BE RECEIVED OR SENT AT OTHER THAN THE STANDARD 368 CHARACTERS PER MINUTE (65 WORDS PER MINUTE) BY MERELY READJUSTING THE GOVERNOR. ON MANY TYPES OF DISTRIBUTORS SYNCHRONOUS MOTORS ARE ALSO USED.

A number of interesting applications of teleprinter tape equipment have been tried out at RTTY headquarters which are not strictly in the realm of communication. One of these is the "character recognition" circuit, which will close an external circuit to perform some function whenever a chosen character shows up at the tape-sensing "head". By means of this circuit one can also control a "word recognizer", giving an output signal only when a given combination of characters have passed through the tape reader. The output signal can be arranged to halt further advance of the tape or any other desired automatic control stunt.

HISTORY OF THE PRINTING MULTIPLEX

THE HUNGER FOR ADDITIONAL "CHANNELS", DERIVED FROM EXISTING CIRCUITS, SEEMS TO HAVE BOTHERED THE OLD WIRE MORSE PEOPLE ALMOST SINCE THE ADVENT OF TELEGRAPHY. THAT HUNGER HAS GONE UNAPPEASED UP TO THE PRESENT DAY AND IS THE STIMULUS FOR MANY INVENTIONS IN BOTH WIRE AND RADIOTELEGRAPH COMMUNICATION.

PERHAPS THE VERY FIRST ADDITION TO THE MESSAGE-CARRYING ABILITY OF A TELEGRAPH WIRE WAS THE INTRODUCTION OF THE SINGLE-CURRENT DUPLEX. THIS MADE USE OF A WHEATSTONE BRIDGE, OR ITS EQUIVALENT, ON EACH END OF THE LINE TO BALANCE-OUT IMPULSES FROM THE LOCAL SENDING TELEGRAPH MORSE KEY AND PERMIT THE LOCAL RELAY TO RESPOND ONLY TO SIGNALS FROM THE DISTANT END, EVEN WHILE MESSAGES WERE BEING TRANSMITTED. THE SINGLE-CURRENT (WE WOULD CALL THEM MAKE-BREAK CIRCUITS) WERE ADVERSELY AFFECTED IN RAINY WEATHER, WHEN LEAKAGE RESISTANCE WOULD SHUNT THE LINE WITH A VARIABLE LOSS. LATER ON A DOUBLE-CURRENT DUPLEX CIRCUIT WAS DEVELOPED WHICH USED POLARIZED RECEIVING INSTRUMENTS AND POLE-CHANGING KEYS. ONE MIGHT COMPARE SINGLE-CURRENT MORSE CIRCUITS TO AMPLITUDE MODULATION AND DOUBLE-CURRENT TO FREQUENCY MODULATION.

THE NEXT MILESTONE IN THE MORE-MESSAGES-PER-WIRE SCHEME WAS THE QUADRUPLEX, A SYSTEM MAKING USE OF BOTH THE MAKE-BREAK AND POLAR DUPLEX TELEGRAPH CIRCUITS. WITH THE QUADRUPLEX EACH TERMINAL OF THE TELEGRAPH LINE HAD TWO SENDING AND TWO RECEIVING OPERATORS. IN WET WEATHER THE POLAR SIDE WOULD CONTINUE TO FUNCTION WHILE TROUBLE WOULD DEVELOP ON THE NEUTRAL SIDE.

IT WAS RECOGNIZED, EVEN AS EARLY AS CIVIL WAR DAYS, THAT HAND-KEYED MORSE CODE DID NOT NEARLY UTILIZE THE FULL SIGNALING CAPABILITIES OF THE WIRE CIRCUIT. HIGH SPEED AUTOMATIC SENDING WAS NOT A COMPLETE ANSWER TO THE PROBLEM. THE DELANEY MULTIPLEX WAS A HUGE STEP FORWARD. EXPERIMENTS SHOWED THAT INTELLIGIBLE SIGNALS COULD BE RECEIVED EVEN THOUGH THE RECEIVING EQUIPMENT WAS CONNECTED TO THE TELEGRAPH LINE ONLY FOR BRIEF "SAMPLES". IN THE TIME-DIVISION MULTIPLEX, AS THIS METHOD HAS COME TO BE KNOWN, A ROTARY MOTOR-DRIVEN SWITCH OR COMMUTATOR, KNOWN AS A "DISTRIBUTOR", IS CONNECTED AT EACH END OF THE LINE. THE LINE IS CONNECTED TO THE BRUSH OR ROTOR OF THE SWITCH AND EACH OF THE "CHANNEL" CONTACTS OR SEGMENTS IS WIRED TO A SEPARATE SET OF MORSE SENDING AND RECEIVING INSTRUMENTS.

IF THE DISTRIBUTORS AT BOTH ENDS OF THE LINE ARE DRIVEN AT THE EXACT SAME SPEED AND THE BRUSHES ARE "PHASED" SO THAT BOTH DISTRIBUTOR BRUSHES ARE CROSSING THEIR "CHANNEL 1" SEGMENTS AT THE SAME INSTANT SIGNALING IS POSSIBLE. BY ROTATING THE BRUSHES AT HIGH ENOUGH SPEED EVEN THE SHORTEST MORSE SIGNAL (THE DOT) WILL RECEIVE SEVERAL IMPULSES. THE PULSATING CURRENTS ARE RENDERED UNDERSTANDABLE BY A "MEMORY" DEVICE, THE POLAR RELAY. EACH SENDING KEY WHEN UP SENDS CURRENT IMPULSES OF ONE POLARITY TO THE LINE (POSITIVE) AND OPPOSITE POLARITY WHEN DOWN. AT THE OPPOSITE END OF THE CIRCUIT THE RECEIVING POLARIZED RELAY ASSOCIATED WITH THE SAME CHANNEL SEGMENT RECEIVES DOTS, DASHES AND SPACES COMPOSED OF INTERRUPTED CURRENT IMPULSES OF BOTH POLARITIES. THE POLAR RELAYS ARE ADJUSTED TO THE "MEMORY" CONDITION; THIS IS THE ARRANGEMENT WHERE THE ARMATURE REMAINS ON EITHER ITS MARKING OR SPACING CONTACT, WHICHEVER THE FINAL CURRENT PULSE MOVES IT TO.

THUS IT IS SEEN THAT A LINE MIGHT BE COMMUTATED TO TEN DIFFERENT OPERATORS, OR PAIRS OF OPERATORS FOR THE MULTIPLEX CHANNELS CAN ALSO BE RUN IN "DUPLEX" AS MENTIONED EARLIER FOR THE SIMPLE MORSE CIRCUIT. EACH OPERATOR MAY HAVE THE EXCLUSIVE USE OF THE LINE FIVE TIMES DURING THE SENDING OF A SINGLE MORSE DOT. NINE TENTHS OF THE TIME HE WILL HAVE NO CONTACT WITH THE LINE AT ALL.

THE SIGNALING CAPABILITIES OF A LINE USED IN A "MUX" CIRCUIT MUST BE AT LEAST GOOD ENOUGH TO HANDLE THE INDIVIDUAL CHANNEL SPEED, MULTI-

PLIED BY THE NUMBER OF CHANNELS. THE MAJOR OBSTACLE TO EARLY MUX OPERATIONS WAS SECURING AND MAINTAINING UNISON BETWEEN THE LOCAL AND DISTANT DXTR (DISTRIBUTOR). IN THE DELANEY MULTIPLEX THIS WAS ACCOMPLISHED BY THE USE OF A "PHONIC WHEEL", A CRUDE FORM OF SYNCHRONOUS MOTOR. TO MAINTAIN THE SPEEDS AND PHASING A CORRECTION PULSE WAS TRANSMITTED OVER THE LINE ONCE IN EACH REVOLUTION OF THE DISTRIBUTOR. BY INGENUOUS METHODS THIS PULSE CAUSED THE DISTANT MOTOR TO CONTINUOUSLY CORRECT ITS SPEED.

IT WOULD BE THEORETICALLY POSSIBLE FOR CW RADIO AMATEURS TO INCREASE THE NUMBER OF STATIONS OPERATING ON A GIVEN RADIO FREQUENCY BY RESORTING TO TIME-DIVISION MULTIPLEX (USING EITHER MECHANICAL DISTRIBUTORS OR THEIR ELECTRONIC COUNTERPARTS). BY CONNECTING A CW SENDING-KEY, FOR EXAMPLE, TO THE CHANNEL 1 SEGMENT SIGNALS WOULD BE TRANSMITTED THAT WOULD ONLY BE RECEIVED BY OPERATORS WHOSE EARPHONES WERE CONNECTED TO THE CHANNEL 1 SEGMENT OF THE RECEIVING DISTRIBUTOR. NO PRACTICAL USE HAS BEEN MADE OF TIME-DIVISION CW BECAUSE OF THE VERY REAL PROBLEM OF MAINTAINING ALL AMATEUR DISTRIBUTORS IN UNISON.

BEFORE THE DELANEY MULTIPLEX REALLY HAD A GOOD WORKOUT THE PRINTING MULTIPLEX APPEARED ON THE SCENE. THE MURRAY PRINTING MULTIPLEX REPLACED THE SENDING AND RECEIVING MORSE INSTRUMENTS OF THE DELANEY SYSTEM WITH MECHANICAL PRINTERS. EACH PRINTER MADE USE OF FIVE OF THE SEGMENTS ON THE RECEIVING DISTRIBUTOR. PRINTING MULTIPLEX DISTRIBUTORS COULD HAVE, SAY, 20 SEGMENTS, 5 APiece TO EACH OF THE FOUR CHANNELS. SYSTEMS WERE IN USE HAVING AS MANY AS EIGHT CHANNELS DUPLEXED, MAKING IT POSSIBLE TO SEND EIGHT PRINTED MESSAGES IN EACH DIRECTION SIMULTANEOUSLY ON A SINGLE COPPER WIRE (AND RETURN VIA GROUND).

OVER THE FIVE SEGMENTS ASSIGNED TO ONE PRINTER CHANNEL WERE RECEIVED COMBINATIONS OF CURRENT OR NO-CURRENT, IN THE PERMUTATIONS OF THE "BAUDOT" CODE. THERE ARE 32 COMBINATIONS POSSIBLE, OF CURRENT OR NO-CURRENT, ON FIVE WIRES. BY USING ONE OF THESE COMBINATIONS AS A SHIFT SIGNAL AN "UPPER-CASE" GROUP OF CHARACTERS COULD BE PRINTED, JUST AS IN A TYPEWRITER. STILL ANOTHER IMPULSE WAS USED TO LOWER THE TYPE FROM UPPER-CASE.

MULTIPLEX SENDING IS ALWAYS DONE BY PERFORATED TAPE; THERE ARE NO KEYBOARDS. THE TAPE TRANSMITTERS ADVANCE THEIR TAPES DURING THE TIME THE BRUSH ON THE ASSOCIATED DISTRIBUTOR IS PASSING OVER THE SEGMENTS OF OTHER CHANNELS. THE DISTRIBUTOR HAS A "LOCAL RING" OF SEGMENTS WITH A "LOCAL BRUSH" TO PASS CURRENT TO THE MAGNETS OF THE GROUP OF TAPE TRANSMITTERS IN THE PROPER SEQUENCE AND AT THE PROPER TIME. TAPES ARE PREPARED ON KEYBOARD-PERFORATORS.

ALL OF THE ORIGINAL PRINTING MULTIPLEX TYPING UNITS HAD SELECTION OF THEIR TYPE-BARS ACCOMPLISHED BY A SERIES OF BANKS OF LOCKING RELAYS. 63 OF THESE WERE REQUIRED TO CONVERT THE BAUDOT CODE INTO CLOSURE OF ONE OF 32 CIRCUITS GOING TO SOLENOIDS OPERATING TYPEBARS. A GREAT DEAL OF TROUBLE WAS ENCOUNTERED WITH THIS SYSTEM, AS MIGHT BE EXPECTED. MECHANICAL DECODING SYSTEMS WERE DEVELOPED WHICH ELIMINATED THE RELAYS AND CONNECTED THE FIVE SEGMENTS TO FIVE "SELECTOR-MAGNETS".

PRACTICALLY ALL MULTIPLEX RECEIVING PRINTERS PRINTED ON NARROW STRIPS OF PAPER LIKE STOCK TICKERS BUT A FEW PAGE PRINTERS WERE IN OPERATION EVEN AS EARLY AS 1900.

SINCE THE ADVENT OF FREQUENCY-SHIFT KEYING SOME USE OF PRINTING MULTIPLEX HAS BEEN HAD OVER RADIO TRANSOCEANIC CIRCUITS WHERE A LARGE VOLUME OF TRAFFIC IS HANDLED. 3, 4, AND 6 CHANNEL SYSTEMS HAVE BEEN OPERATING IN THE PAST SEVERAL YEARS. VERY ELABORATE MEANS ARE EMPLOYED TO MAINTAIN UNISON BETWEEN SENDING AND RECEIVING DISTRIBUTORS. IT CAN READILY BE SEEN THAT MULTIPLEX IS BOUND TO FIND ITS BEST APPLICATION IN COMMUNICATIONS SITUATIONS WHERE AN EXTREMELY HEAVY VOLUME OF TRAFFIC MUST BE HANDLED BETWEEN WIDELY-SEPARATED POINTS OVER LIMITED RADIO FACILITIES. THE EXPENSE AND MAINTENACE OF MUX OVER SHORT-HAUL CIRCUITS HAS NOT PROVEN WORTHWHILE. A NUMBER OF COMPANIES ARE ENGAGED IN THE DEVELOPMENT OF ELECTRONIC MULTIPLEX METHODS WHICH MAY ALTER THIS SITUATION.



Robert Atkeisson, WØIQC, pictured above, has a typical well-equipped Amateur Radioteletype station. His installation consists of a BC-610 for working the 80, 40, 20 and 10-meter bands and a VHF ARC-5 to cover 2 meters. Receivers are a Collins 75A3 and a Super Pro. The radioteletype converter is the Society's standard terminal unit ARTT-6034 (designed by W2BFD), using both FSK and AFSK keyers. Bob's teletypewriter is a "TWX" machine, obtained for him by the national headquarters of the Society. He was also equipped with a Model 14 perforated-tape transmitter for high speed automatic message transmission.

W2MYL-W4HYE, whose station appears as the first illustration in this booklet, is an experimenter-type of radio amateur and derives a great deal of pleasure from constructing his own equipment. In RTTY since 1949, Graham Claytor has several converter units in operation and has the following teleprinters:- Model 14, Model 26, Model 400, Model 100 and two Model 12s. Graham has expressed preference for the 12-type machines over the later Model 26s. Operation is on both VHF (with auto-start) and all the popular "DC" bands. He secured his elaborate collection of machines and tape equipment through the Society.

AMATEUR RADIOTELETYPE SOCIETY
GENERAL BULLETIN NUMBER 4
NOVEMBER 5TH, 1946

THE STANDARD FSK-AFSK AMATEUR RADIOTELETYPE TERMINAL UNIT

THIS MONTH'S ISSUE OF "CQ" MAGAZINE SHOULD BE OF INTEREST TO MEMBERS OF THE RTTY "GANG" BECAUSE IN IT IS PUBLISHED A DESCRIPTION OF THE PROTOTYPE OF OUR "STANDARDIZED" TRANSMITTING-RECEIVING ELECTRONIC UNIT. THIS ADAPTOR OR CONVERTER UNIT WAS DESIGNED BY YOUR BULLETIN-EDITOR, W2BFD, DURING WORLD-WAR II AND WAS INITIALLY INTENDED FOR A COMPLETELY DIFFERENT PURPOSE. THE ARTICLE WAS WRITTEN UP DURING THE WAR AND SUBMITTED FOR PUBLICATION LAST YEAR, BEFORE THE EXCITEMENT OF RTTY GOT UNDER WAY.

THE SIMPLE UNIT DESCRIBED IN "CQ" IS THE RESULT OF SOME TWO YEARS OF EXPERIMENTATION TO PERFECT A SYSTEM FOR FREQUENCY-SHIFT RECEPTION HAVING AT LEAST 60 DB OF LIMITING ACTION IN AUDIO CHANNELS WITH A BANDWIDTH OF APPROXIMATELY 100 CYCLES. NO PARTICULAR DIFFICULTY WOULD BE ENCOUNTERED IF STANDARD COMMERCIAL PRACTICE WERE FOLLOWED, WHERE WAVE FILTERS EMPLOYING EXPENSIVE TOROIDALLY-WOUND INDUCTORS ARE USED, IN WHICH THE INDUCTORS AND CAPACITORS REQUIRE PRECISION ADJUSTMENT WITH LABORATORY MEASURING EQUIPMENT TO MUCH CLOSER TOLERANCES THAN 1 PERCENT.

IT SHOULD BE EMPHASIZED THAT SUCH COMMERCIAL METHODS CAN BE DUPLICATED BY MANY AMATEURS WHO HAVE THE SKILL AND WHO HAVE ACCESS TO THE REQUIRED LABORATORY-TYPE MEASURING EQUIPMENT. FOR THE MAJORITY OF US THE COMPONENTS OF SUCH FILTERS ARE TOO COSTLY AND THE ACCURACY OF ADJUSTMENT BEYOND OUR MEASURING INSTRUMENTS. THE UNIT THAT WAS DEVELOPED MAKES A COMPLETE DEPARTURE FROM ESTABLISHED PRACTICE IN THE RADIOTELETYPE FIELD BY SIDESTEPPING THE BAND-PASS WAVE FILTER SYSTEM AND EMPLOYING INSTEAD A TUNED AUDIO AMPLIFIER RESEMBLING OUR OLD FRIEND, THE DOUBLE-TUNED INTERMEDIATE-FREQUENCY AMPLIFIER SUCH AS USED IN EVERY RADIO RECEIVER. NOTICE THAT EMPLOYMENT OF THE EXPENSIVE TOROIDS IN TUNED-AMPLIFIERS (AS DISTINCT FROM WAVE FILTERS) IS NOT AS SUCCESSFUL AS THE CHEAP INDUCTORS USED IN THE W2BFD UNIT. SINGLE-TUNED TOROIDS PRODUCE "NEEDLE-NOSE" SELECTIVITY CURVES WHICH ARE UNDESIRABLE. EVEN THE LOW-"Q" COILS CAN PRODUCE TEN TIMES THE NECESSARY SELECTIVITY IF UNDER-COUPLED AND TUNED "ON THE NOSE".

THIS MONTH'S "CQ" ARTICLE SHOWS THE RECEIVING TUNED CIRCUITS RESONATED TO 2000 AND 3000 CYCLES FOR "MARK" AND "SPACE", INSTEAD OF THE 2125 AND 2975 CYCLES USED FOR RTTY. ALSO, ALTHOUGH NOT APPARENT FROM THE PUBLISHED DIAGRAM, SINCE THE ARTICLE WAS SUBMITTED OVER A YEAR AGO BEFORE RADIOTELETYPE EXISTED FOR US, THE SELECTIVITY IS NOT MAXIMIZED AS IT WOULD MAKE TUNING-IN OF COMMERCIAL, GOVERNMENT AND AMATEUR FSK SIGNALS TOO CRITICAL. AS ORIGINALLY DESIGNED, AND AS IT APPEARS IN "CQ", THE PAIRS OF INDUCTORS FORMING THE PRIMARIES AND SECONDARIES OF THE "FILTERS" WERE ADJUSTED FOR SLIGHTLY LESS THAN "CRITICAL" COUPLING WHICH YIELDS A SINGLE-PEAKED RESPONSE. FOR RTTY SERVICE THE PRIMARIES AND SECONDARIES ARE BROUGHT SLIGHTLY CLOSER UNTIL THEY ARE OVER-COUPLED TO A DEGREE SUFFICIENT TO PRODUCE A DOUBLE-HUMPED RESPONSE WITH PEAKS ABOUT 50 CYCLES APART. WHEN THE "DIP" OR "VALLEY" BETWEEN THE HUMPS IS ABOUT 2 OR 3 DB THE SELECTIVITY IS OPTIMUM AND PERMITS THE LOCAL RECEIVER OR THE INCOMING SIGNAL TO DRIFT PLUS OR MINUS 50 CYCLES OR SO. THE "SKIRTS" OF THE RESPONSE CURVE, OUTSIDE OF THE PASS-BAND, ARE VERY STEEP AND POSSESS NONE OF THE "RINGING" THAT IS CHARACTERISTIC OF SHARP WAVE FILTERS.

TUNE-UP IS NO MORE DIFFICULT THAN ALIGNMENT OF A RADIO RECEIVER I.F. AMPLIFIER AND CAN BE ACCOMPLISHED WITH A TUNABLE AUDIO OSCILLATOR ON WHOSE DIAL ONLY THE MARK AND SPACE FREQUENCIES NEED BE ACCURATELY KNOWN. IF NO VARIABLE AUDIO OSCILLATOR IS AVAILABLE A SATISFACTORY JOB OF ALIGNMENT MAY BE HAD BY UTILIZING THE BUILT-IN AFSK OSCILLATOR. JUST ABOUT EVERYONE WHO HAS CONSTRUCTED THIS TERMINAL UNIT HAS COMMENTED ON THE SLIGHT AMOUNT OF "SHIMMING-UP" BETWEEN THE PRIMARIES AND SECONDARIES REQUIRED TO VARY THE MUTUAL COUPLING THROUGH THE POINT OF DOUBLE-PEAKED RESPONSE THAT WE REQUIRE. THIS, NATURALLY, MAKES IT APPARENT WHY NO SCHEME MAKING USE OF VARYING THE DISTANCE BETWEEN PRIMARY AND SECONDARY FOR TUNING PURPOSES CAN PRODUCE SELECTIVITY OF THE KIND WE DESIRE. PLEASE NOTE THAT LESS-THAN-CRITICAL COUPLING ADJUSTMENTS WILL WORK WELL FOR AFSK, WHERE WE CAN CONTROL THE FREQUENCIES OF THE

SIGNAL WITHIN A FEW CYCLES, AND WILL DELIVER GOOD PRINTED COPY ON FSK IF THE OPERATOR DOES NOT MIND CONTINUOUSLY MONITORING THE TUNING OF THE RADIO RECEIVER (OR EMPLOYS CRYSTAL CONTROL OF THE OSCILLATOR IN THE RECEIVER). (HOW ABOUT AN "A.F.C." SYSTEM TO KEEP RECEIVER IN TUNE ?)

WITH LESS-THAN-CRITICAL COUPLING IN THE "FILTER" TRANSFORMERS THE RECEIVING POLAR RELAY WILL EASILY RESPOND TO SHIFTS AS LITTLE AS 50 CYCLES AND SOME OF OUR BOYS HAVE COMMENTED, WHEN SEEING THIS, THAT WE COULD HAVE STANDARDIZED ON MUCH LESS THAN THE 850 CYCLES WE ADOPTED. THIS IS PERFECTLY TRUE BUT ONE OF THE MOST EFFECTIVE MEANS OF "INDOCTRINATING" NEW MEMBERS THUS FAR HAS BEEN THE DEMONSTRATION OF THE GEAR OPERATING FROM COMMERCIAL SIGNALS. THERE IS ALSO THE POSSIBILITY THAT INTERCOMMUNICATION WITH COMMERCIALS, RED CROSS, ETC MIGHT SOMEDAY BE REQUIRED UNDER AN EMERGENCY SITUATION. WOULD WE WANT TO FIND OURSELVES "SPEAKING A DIFFERENT LANGUAGE" IN THAT EVENT? WE SHOULD, BY ALL MEANS, KEEP AN OPEN MIND ABOUT THE USE OF SMALL DEGREES OF SHIFT, HOWEVER, SINCE SOME ADVANTAGES NOT YET RECOGNIZED MAY INDICATE THE DESIRABILITY OF CHANGING EXISTING STANDARDS.

SOME 60 DB OF OVERALL LIMITING IS AVAILABLE IN THIS UNIT, COUNTING THAT WHICH OCCURS FROM OVERDRIVING OF THE TWO SELECTIVE AMPLIFIER STAGES IN EACH CHANNEL AND THE FACT WE ARE APPLYING ABOUT 200 VOLTS POSITIVE AND NEGATIVE TO THE DC KEYSER OUTPUT STAGE WHERE 16 VOLTS OR SO WOULD BE SUFFICIENT TO CARRY THE GRIDS FROM BEYOND CUTOFF TO SATURATION. THE CONVERTER WILL ACTUALLY PRINT INTELLIGIBLE COPY WITH SIGNALS FADING MORE THAN THIS 60 DB INDICATED. ON VERY WEAK SIGNALS, WHERE NO LIMITING IS TAKING PLACE, THE GAIN OF THE TWO CHANNELS CAN BE CRITICALLY BALANCED AGAINST NOISE, YIELDING ANOTHER 6 TO 10 DB INDIFFERENCE TO AMPLITUDE LEVEL. BY DELIBERATELY REDUCING THE AUDIO INPUT TO THE "PANEL", THE INDIVIDUAL CHANNEL GAIN CONTROLS CAN BE MANIPULATED FOR CLEAN PRINTING FROM ALMOST "NON-EXISTENT" SIGNALS. THE EFFECT IS PRETTY SPINE-TINGLING ON THE UNINITIATED. A POTENTIOMETER CAN BE SUBSTITUTED FOR THE PAIR OF FIXED RESISTORS IN THE DIODE "DISCRIMINATOR" WHICH CAN BE ADJUSTED TO EQUALIZE THE LEVEL AT WHICH THE INDIVIDUAL CHANNELS "LIMIT". SUCH EQUALIZATION SHOULD BE ACCOMPLISHED WITH LARGE-SIGNAL INPUT OF ALTERNATELY MARK AND SPACE FREQUENCY.

OUR PRESENT MEMBERSHIP KNOWS THAT A SET OF PENCIL-DRAWN DIAGRAMS AND TYPEWRITTEN NOTES ARE AVAILABLE FROM YOUR CORRESPONDENT, W2BFD, THAT ARE LOANED TO EACH NEWCOMER TO THE SOCIETY. AT PRESENT IT IS NECESSARY THAT THE NOTES BE COPIED BY HAND BY EACH RTTY MEMBER BUT WE HOPE TO BE ABLE TO HAVE THEM MIMEOGRAPHED SOME FINE DAY AS IT IS AN ALL-DAY JOB TO REPRODUCE THEM BY HAND. DOES ANYONE HAVE MIMEO FACILITIES AT HIS DISPOSAL? IT IS NOT OUR INTENTION TO STIFLE INDIVIDUAL VARIATION OF RADIO PRINTER INSTALLATIONS. THE ONLY REQUIREMENT, AS WE SEE IT, IS THAT SUFFICIENT "STANDARDIZATION" BE FOLLOWED SO THAT, IN A PINCH, WE CAN INTERCHANGABLY OPERATE ONE AMATEUR'S PRINTER ON ANOTHER'S TERMINAL UNIT ETC. ETC.

THE EXPLANATION FOR WHY THE RECEIVING CONVERTER, WHICH SERVES FOR BOTH AFSK AND FSK, IS ASSOCIATED WITH ONLY AN AFSK SENDING UNIT IS A SIMPLE ONE. MOST OF OUR FSK TRANSMISSION IS PRODUCED, AT THE PRESENT TIME, WITH REACTANCE-TUBE AND SIMILAR DEVICES. NECESSITY FOR SHORT LEADS DICTATES THAT THE TRANSMITTING SHIFTER, THEREFORE, BE CONNECTED DIRECTLY TO ITS RF OSCILLATOR (CRYSTAL OR SELF-EXCITED). FOR THIS REASON WE FIND IT EASIER TO RUN A DC KEYING PAIR OVER TO THE FSK KEYSER, INSTALLED IN THE RADIO TRANSMITTER, AND TO KEY THIS DC BY MEANS OF A RELAY INCORPORATED IN THE AFSK-FSK "PANEL. IN ORDER TO HAVE "LOCAL COPY" THE "SEND-STANDBY-RECEIVE" SWITCH ON THE CONVERTER IS OPERATED EXACTLY AS FOR AFSK, SO THAT THE LOCAL PRINTER TYPES FROM AUDIO SIGNALS GENERATED IN THE KEYBOARD CIRCUIT. IN SERIES WITH THE POLAR RELAY FOR THE PRINTER IS INSERTED AN ADDITIONAL RELAY, WHOSE CONTACTS KEY THE DC TO THE FSK EXCITER OR REACTANCE SHIFTER. INCIDENTALLY, THE RF FREQUENCY-SHIFTER CAN BE BUILT IN THE FORM OF AN "OUTBOARD" ADAPTOR SO THAT THOSE FELLOWS NOT CARING TO DRILL HOLES IN THEIR COMMERCIAL TRANSMITTERS CAN ADD FSK THE "PAINLESS" WAY. INSTEAD OF SHIFTING THE FREQUENCY OF YOUR EXISTING OSCILLATOR IT IS ALSO POSSIBLE TO ADD AN OUTBOARD "EXCITER" UNIT, CONTAINING A SEPARATE OSCILLATOR AND SHIFTER, WHICH IS THEN FED INTO THE EXISTING CRYSTAL OSCILLATOR AS AN AMPLIFIER OR DOUBLER.

THE SIMPLEX PRINTER

THE SIMPLEX PRINTER IS KNOWN UNDER VARIOUS OTHER NAMES, SUCH AS THE "START-STOP" PRINTER AND THE TELETYPE. THIS LATTER, HOWEVER, IS REALLY A TRADE NAME FOR SIMPLEX PRINTERS MANUFACTURED BY ONE COMPANY, THE TELETYPE CORPORATION OF CHICAGO AND, RIGHTFULLY, SHOULD NOT BE EMPLOYED TO MEAN "TELEPRINTER". COMMON USAGE SEEMS TO HAVE MADE THE WORDS SYNONYMOUS.

IT WILL BE EASIER TO GRASP THE OPERATION OF THE SIMPLEX MACHINE BY CONSIDERING WHAT WOULD HAPPEN IF WE REMOVED THE STOP-LATCH FROM THE 60-TO-65 WORD-PER-MINUTE (SO-CALLED "60-SPEED") MACHINES. THE EQUIPMENT IN THIS STATE IS ESSENTIALLY A SINGLE-CHANNEL MULTIPLEX PRINTER OPERATING AT 420 OPERATIONS-PER-MINUTE (ABOUT 70 W.P.M.). A TAPE TRANSMITTER COULD SEND AT 70 W.P.M. TO OUR SIMPLEX PRINTER IF WE USED A BRUSH ROTATING AT 420 R.P.M. ON A SIX-SEGMENT TRANSMITTING FACEPLATE. IF THE MOTOR SPEEDS ARE IDENTICAL AT TRANSMITTER AND RECEIVER NO TROUBLE WILL BE ENCOUNTERED. THERE IS NO SIMPLE WAY TO DO THIS BECAUSE, EVEN WITH SYNCHRONOUS MOTORS AT BOTH ENDS OF THE CIRCUIT RUN FROM THE SAME SOURCE OF AC THERE IS BOUND TO BE A SLIGHTLY DIFFERENT "SLIP" AT ONE OR THE OTHER WHICH IS CUMULATIVE. PRETTY SOON WE WOULD FIND THE TRANSMITTER SENDING, SAY, THE THIRD SELECTING PULSE WHILE THE RECEIVING SELECTOR IS IN THE PROPER POSITION TO RECEIVE THE SECOND OR FOURTH.

IN THE DESCRIPTION OF THE PRINTING MULTIPLEX (SEE NUMBERED BULLETIN 3) WE "GLOSSED OVER" THE MEANS EMPLOYED TO MAINTAIN THE SENDING AND RECEIVING DISTRIBUTORS NOT ONLY AT IDENTICAL SPEEDS BUT IN IDENTICAL PHASE. WITH THE EARLY DELANEY MULTIPLEX SETS A "PHONIC WHEEL" WAS USED. A VERY LARGE TUNING-FORK, WITH SLIDING WEIGHTS FOR FREQUENCY-ADJUSTMENT, AND EQUIPPED WITH A PAIR OF VIBRATING CONTACTS, PRODUCED A PULSATING DIRECT CURRENT IN A SET OF COILS SURROUNDING A TOOTHED, GEAR-LIKE, WHEEL. THE MURRAY PRINTING "MUX" CONNECTED A CONSTANT-SPEED MOTOR TO THE DISTRIBUTOR BRUSH SHAFT THROUGH A RATCHET DEVICE. A MAGNET ON THIS RATCHET WAS PULSED BY CURRENT CONTROLLED BY A SYNCHRONIZING SEGMENT ON THE FACEPLATE. IF THE BRUSH ARRIVED SLIGHTLY TOO EARLY THE RATCHET DEVICE WOULD CLICK ONE STEP AND ALTER THE PHASE-RELATIONS BETWEEN THE MOTOR AND DISTRIBUTOR SHAFTS. BY MAKING THE RECEIVING MOTOR RUN ABOUT 1 PERCENT FASTER THE RECEIVER WOULD CONTINUOUSLY "CORRECT". A HOLLOW MERCURY-FILLED FLYWHEEL ON THE BRUSH SHAFT STABILIZED THE OPERATION AND PREVENTED SERIOUS CHANGES IN SPEED DURING ANY ONE REVOLUTION.

IT WAS THE DIFFICULTY OF GETTING MULTIPLEX SETS IN STEP IN TELEGRAPH STATIONS SEPARATED HUNDREDS OR THOUSANDS OF MILES APART AND THE DESIRE FOR A SYSTEM TO PROVIDE A SINGLE COMMUNICATION CHANNEL UNDER THE CONTROL OF ONE OPERATOR THAT LED TO THE DEVELOPMENT OF THE SIMPLEX. THE MULTIPLEX USED A BINARY CODE DEvised BY EMILE BAUDOT, A FRENCHMAN, IN THE 19TH CENTURY. IT CONSISTED OF FIVE TIME INTERVALS DURING WHICH THE TRANSMITTED CURRENT COULD HAVE ONE OF TWO POSSIBLE CONDITIONS; THAT IS, ON OR OFF, OR POSITIVE OR NEGATIVE (MOST MULTIPLEXES SENT POLAR CURRENT IMPULSES). SUCH A CODE WILL YIELD 32 "LOWER-CASE" CHARACTER COMBINATIONS, WHICH MAY BE INCREASED BY MEANS OF A SHIFT (AS IN A TYPEWRITER). A 4-CHANNEL MULTIPLEX WOULD HAVE 21 SEGMENTS (ONE FOR SYNCH.).

THE ADVENT OF THE MORKRUM PRINTER STARTED A REVOLUTION IN THE THINKING OF TELEGRAPH ENGINEERS. BY ADDING A "START" PULSE BEFORE EACH CHARACTER OF THE MULTIPLEX CODE AND A "STOP" PULSE AFTER THE CHARACTER, A SIMPLE AND NOVEL MEANS OF SPEED AND PHASE CORRECTION WAS MADE POSSIBLE. THE RECEIVING DISTRIBUTOR WAS REARRANGED TO BE FRICTION-DRIVEN FROM THE SHAFT OF A MOTOR OF NO EXCEPTIONAL ROTATIONAL ACCURACY. A MAGNET-OPERATED "TRIP-LATCH" WAS ARRANGED TO HALT THE DISTRIBUTOR MECHANISM FOR A SMALL PART OF EACH CYCLE AND HOLD IT UNTIL THE "START" PULSE WAS RECEIVED. A SEVEN-SEGMENT SENDING FACEPLATE WAS PROVIDED AND WIRED TO MAKE THE START SEGMENT ALWAYS "SPACING" AND THE STOP SEGMENT ALWAYS "MARKING". THE FIVE "CODE" SEGMENTS ARE EITHER MARKING OR SPACING, ACCORDING TO THE CHARACTER BEING TRANSMITTED. THE PROVISION OF THE "STOP" PULSE AND THE "TRIP-LATCH" MADE DIRECT KEYBOARD SENDING PRACTICAL, WHERE THE MULTIPLEX COULD ONLY SEND FROM TAPE. THE TRANSMITTING DISTRIBUTOR ALWAYS COMES TO REST ON THE STOP SEGMENT SO, IF TYPING IS SUSPENDED, THE RECEIVER WILL IDLE WITH ITS DISTRIBUTOR LATCHED.

BY SLOWING DOWN THE SENDING DISTRIBUTOR FROM 420 R.P.M. TO 390 A MAJOR IMPROVEMENT IS MADE. THE RECEIVER ALWAYS COMES TO REST IN THE EXACT CENTER OF THE 22 MILLISECOND TRANSMITTED STOP PULSE. IN OTHER WORDS; ALTHOUGH THE TRANSMITTER REQUIRES 7 X 22 MILLISECONDS (154 MS) TO SEND A CHARACTER, THE RECEIVER, AT 420 REVOLUTIONS PER MINUTE, ONLY REQUIRES 143 MILLISECONDS. THIS IDEA IS BASIC TO THE INVENTION. NOW, IF THE TRANSMITTING AND RECEIVING DRIVING MOTORS DIFFER SLIGHTLY IN SPEED, NOT MUCH ERROR CAN ACCUMULATE IN JUST ONE REVOLUTION. THUS, IF THE RECEIVER IS THE FASTER OF THE TWO, IT ARRIVES SLIGHTLY EARLY AT ITS TRIP-LATCH AND HAS TO WAIT SLIGHTLY LONGER TO BE TRIPPED OFF BY THE NEXT START IMPULSE. THEORETICALLY THE SPEEDS COULD DIFFER AS MUCH AS PLUS-OR-MINUS 7 PERCENT. TO CORRECT FALLACIOUS THINKING AMONG RADIO AMATEURS (AND EVEN TELEGRAPH MEN HAVE BEEN GUILTY) THERE IS NO SUCH ANIMAL AS A "SEVEN-AND-A-HALF UNIT" RECEIVING PRINTER. ONE READS AND HEARS SUCH GLIB STATEMENTS AS "THERE ARE SIX 22 MILLISECOND PULSES AND ONE OF 31 MILLISECONDS". ALL RECEIVING PRINTERS, WITHOUT EXCEPTION, RUNNING AT THE AMATEUR AND COMMERCIAL "60-SPEED", ARE BASICALLY DESIGNED FOR THE RECEPTION OF SEVEN 22 MILLISECOND IMPULSES PER CHARACTER. THIS IS EQUIVALENT TO 390 CHARACTERS AND FUNCTIONS PER MINUTE. FOR SPECIAL PURPOSES SEVERAL OF THE COMPANIES MANUFACTURE AND USE T R A N S M I T T E R S WHERE THE STOP SEGMENT IS ELONGATED TO S E N D LONGER STOP PULSES. TELETYPE CORPORATION HAS STANDARDIZED ON A TRANSMITTER SENDING A 31 MS STOP INTERVAL, ALTHOUGH IT ALSO MANUFACTURES EQUIPMENT SENDING SEVEN EQUAL-LENGTH IMPULSES. MOST OF THIS EQUIPMENT IS FOR USE BY THE EXTENSIVE BELL SYSTEM. ELONGATION OF THE TRANSMITTED STOP IMPULSE IS BENEFICIAL WHERE PRINTER SIGNALS ARE BOOSTED BY NUMEROUS "REPEATERS", SUCH AS ON A TRANSCONTINENTAL WIRE CIRCUIT. IT MAKES RECOVERY FROM A PRINTER "STUMBLE" SOMEWHAT FASTER. ITS DISADVANTAGE IS A LOSS OF SPEED FROM THE MAXIMUM POSSIBLE. WESTERN UNION AND MANY OTHER COMPANIES MAKE USE OF A 28 MS TRANSMITTED STOP PULSE LENGTH, CORRESPONDING TO A SPEED OF 375 OPERATIONS PER MINUTE. IN ALL OF THESE CASES THE RECEIVING PRINTER IS THE SAME AS THE PRINTER FOR SEVEN EQUAL UNITS. A BIT OF THOUGHT WILL SHOW YOU THAT NO ALTERATION NEED BE MADE TO THE RECEIVER WHEN LENGTHENING THE STOP PULSE SINCE THE PRINTER IS AT REST ANYWAY! YOU CAN AFFORD A SMILE THE NEXT TIME YOU HEAR SOMEONE STATE THAT THE PRINTER IS "MADE TO OPERATE WITH A 31 MS STOP PULSE". WE KNOW BETTER, DON'T WE?

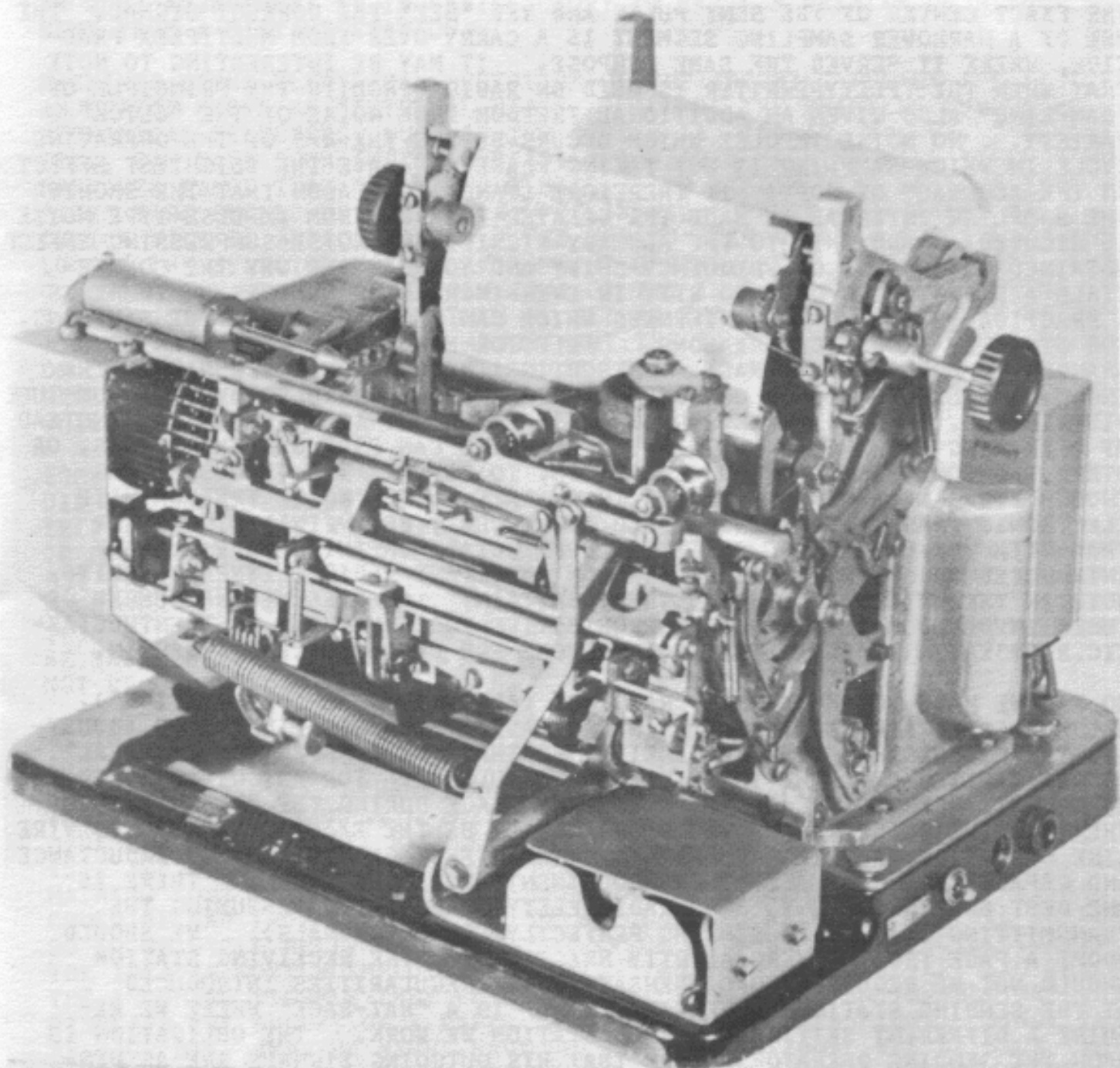
IF THE MOTOR SPEEDS ARE VERY NEARLY ALIKE IT IS ENTIRELY POSSIBLE TO UTILIZE MUCH SHORTER STOP PULSES, WHERE THE PRINTER SELECTOR IS ONLY AT REST A VERY FEW MILLISECONDS. SUCH OPERATION WILL YIELD NEARLY 70 W.P.M. FROM 60-SPEED MACHINES BUT WILL NOT BE SUCCESSFUL WITH POOR RADIO CONDITIONS. ESSENTIALLY EQUAL PERFORMANCES ARE HAD FROM TELEPRINTERS OF 368, 375 AND 390 O.P.M. MOST OF THE RADIOTELETYPE SIGNALS COPIED FROM FOREIGN SHORT-WAVE STATIONS ARE 7-UNIT VARIETY. RADIO AMATEURS MAY USE 368, 375 AND 390 OPERATION MACHINES INTERCHANGABLY. THE MODEL 2-B MACHINE, FOR EXAMPLE, IS A MODEL 14 WITH A KEYBOARD SENDING CAM CUT FOR A 22 MILLISECOND STOP PULSE.

SEVERAL MONTHS AGO WE "TIPPED-OFF" THE EDITOR OF "CQ" MAGAZINE OF THE INTRODUCTION OF MECHANIZED TELEGRAPHY INTO THE AMATEURS' "BAG OF TRICKS". THE RESULT WAS THE ARTICLE ON TELEPRINTER CODES IN THE AUGUST ISSUE, WHICH IS RECOMMENDED READING MATTER FOR ANY SERIOUS RTTY AMATEUR. THE HEADING OF THE ARTICLE INDICATES THAT THE MAGAZINE STAFF IS AWARE OF THE TECHNICAL POSSIBILITIES OF RADIOTELETYPE IN AMATEUR COMMUNICATIONS.

THESE BULLETINS AND NEWSLETTERS ARE "PUBLISHED" AT RANDOM TIMES AND ARE MAILED TO YOU GRATIS. IT WOULD BE OF GREAT ASSISTANCE IF MEMBERS WILL FURNISH STAMPED, SELF-ADDRESSED BUSINESS ENVELOPES WITH THEIR CALL-LETTERS MARKED DISTINCTLY IN THE UPPER LEFT CORNER. THE MAIN "CHORE" WITHOUT THE SELF-ADDRESSED ENVELOPES IS THE ADDRESSING JOB, ALTHOUGH THE EXPENSE OF STATIONERY AND POSTAGE IS NOT NEGLIGIBLE. WHEN ONE CONSIDERS THAT, SOME WEEKS, SEVERAL BULLETINS ARE PRINTED AND MAILED IT WILL BE SEEN THAT CONSIDERABLE WORK IS INVOLVED. AFTER JANUARY FIRST BULLETINS WILL ONLY BE MAILED TO MEMBERS HAVING ENVELOPES ON FILE AT RADIOPRINTER HEADQUARTERS. WE WILL NOTIFY YOU WHEN YOUR SUPPLY OF ENVELOPES IS ABOUT EXHAUSTED.

MULTIPLEX PRINTERS FOR START-STOP OPERATION ON RADIO

An interesting discovery showed that practically any Multiplex printer can be used as a Start-Stop machine and will give very fine operation. Telegraph company teleprinter men argued that it could not be done but several convincing demonstrations have subdued them. Most Multiplex printers are used in groups of 4 to 6, associated with a huge common distributor. Practically all of these machines are magnet-operated and contain no motors. Their tiny dimensions, compared to other printers, make them useful for mobile RTTY, portable equipment for Civil Defense and Red Cross work, etc. They will easily fit under the dashboard of an automobile and, with auto-start, will receive messages even when the car is unoccupied. They can also be operated as "Slave" printers, reproducing the messages appearing on the regular station printer when the ham-shack is at some distance, such as attic or basement. This eliminates the need to run out to the shack to see if any of the "gang" have left you a message by unattended Auto-Start.



ONE OF MANY TYPES OF START-STOP PRINTERS

SAMPLING----RANGING

IN SPITE OF THE FACT THAT THE SIMPLEX PRINTER GOT AROUND THE MULTIPLEX'S SYNCHRONIZATION PROBLEMS BY BRINGING THE RECEIVING DISTRIBUTOR TO A COMPLETE STOP AT THE END OF EACH CHARACTER (SEE BULLETIN 7) THERE CAN EXIST A SMALL ERROR IN THE PHASING OF THE SENDING AND RECEIVING BRUSHES. THESE ERRORS ARE CORRECTED AT THE END OF EACH REVOLUTION SO THAT THE NEXT REVOLUTION S T A R T S IN PERFECT SYNCH. HOWEVER THE SMALL ERROR OF A FEW PERCENT IN MOTOR SPEED COULD STILL CAUSE GARBLED COPY IF NOTHING IN THE DESIGN OF THE PRINTER TOOK CARE OF THE SITUATION. THE PRINTER SELECTOR MAGNETS ARE CAPABLE OF OPERATING IN LESS THAN 1/1000 OF A SECOND SO, DURING THE RECEPTION LET US SAY, OF THE 3RD CODE IMPULSE, A SLIGHTLY-FAST RECEIVER MIGHT ALREADY BE "LISTENING" TO THE 4TH IMPULSE. THUS, IF THE TRANSMITTED THIRD PULSE WAS "MARKING" AND THE FOURTH PULSE "SPACING" THE RECEIVER MAY ACTUALLY CALL BOTH PULSES "MARKING".

THE PATENT DISCLOSURE ON THE START-STOP PRINTER, WHICH INGENUOUSLY GOT AROUND THIS SOURCE OF ERROR, WAS TO INTRODUCE THE IDEA OF "SAMPLING". SAMPLING IS NOTHING MORE THAN DELIBERATELY MAKING THE RECEIVING PRINTER UNAFFECTED BY INCOMING IMPULSES FOR ALL BUT THE VERY CENTRAL PORTION OF THE TRANSMITTED 22-MILLISECOND PULSES. IN THE CASE OF MODEL 12 PRINTERS THIS "SAMPLING INTERVAL" AMOUNTS TO ABOUT 4 TO 4-1/2 MILLISECONDS. WITH A 4-MILLISECOND "INSPECTION" OF THE INCOMING 22-MILLISECOND PULSE THE SAMPLING CAN TAKE PLACE AS MUCH AS 9 MILLISECONDS EARLIER OR LATER THAN THE EXACT CENTER OF THE SENT PULSE AND YET "SEE" THE CORRECT SIGNAL. THE USE OF A NARROWER SAMPLING SEGMENT IS A CARRY-OVER FROM MULTIPLEX PRACTICE, WHERE IT SERVED THE SAME PURPOSE. IT MAY BE INTERESTING TO NOTE THAT WHEN THE TELETYPEWRITER IS USED ON RADIO CIRCUITS THE PRINCIPLE OF "SAMPLING" ALSO GIVES AN ADDITIONAL FREEDOM FROM NOISE OF THE "CLICK" VARIETY. NO NOISE IMPULSE WHICH OCCURS DURING THE 4/5 OF THE OPERATING CYCLE IN WHICH SAMPLING IS NOT TAKING PLACE CAN HAVE THE SLIGHTEST EFFECT ON THE ACCURACY OF COPY! IT THEREFORE STANDS TO REASON THAT THE SHORTER THE SAMPLING INTERVAL IS MADE THE GREATER FREEDOM FROM IMPULSE-TYPE NOISE IS SECURED. ADD THIS TO THE ALREADY SIGNIFICANT NOISE-SUPPRESSING EFFECT OBTAINED BY THE USE OF FREQUENCY-SHIFT AND YOU CAN SEE WHY THE COMMERCIALS ARE SWITCHING OVER TO RTTY IN EVER-INCREASING NUMBERS. THERE IS A PRACTICAL LIMIT TO THE BRIEFNESS WHICH CAN BE ALLOWED FOR THE SAMPLING, FOR STRICTLY MECHANICAL REASONS. SELECTOR-MAGNET ARMATURES CAN BE ARRANGED TO MOVE JUST SO FAST. RESORTING TO ELECTRONIC TECHNIQUES THE INCOMING TELETYPE SIGNAL CAN BE "SCANNED" PULSE-FOR-PULSE BY A VACUUM-TUBE DISTRIBUTOR, IN SAMPLES AS NARROW AS ONE MILLIONTH OF A SECOND. INSTEAD OF OPERATING MECHANICAL LATCHES THE SCANNING CAN FIRE GAS THYRATONS, OR OTHER TWO-CONDITION ELECTRONIC DEVICES, TO "STORE" THE IMPULSES LONG ENOUGH FOR A MECHANICAL SELECTOR TO OPERATE. THE NOISE FREEDOM WITH ELECTRONIC "NARROW-SAMPLING" WOULD, OF COURSE, BE INFINITELY GREATER THAN WITH THE MECHANICAL SYSTEM. COMMERCIAL COMPANIES HAVE ALREADY INTRODUCED SUCH ELECTRONIC DEVICES ON IMPORTANT RADIOTELETYPE CIRCUITS, BOTH IN THE UNITED STATES AND GREAT BRITAIN. AT PRESENT THE NUMBER OF TUBES INVOLVED MAKE THE SCHEME PROHIBITIVE FOR ANY BUT A MOST ENTHUSIASTIC RTTY'ER. IT IS A FERTILE TERRITORY FOR OUR MEMBERS TO WORK IN.

SO FAR WE HAVE NOT MENTIONED "RANGING" (ALSO KNOWN AS "ORIENTATION"). ALL MULTIPLEX AND START-STOP PRINTERS HAVE A MECHANICAL MEANS OF ADJUSTING THE SELECTOR CAM ON THE RECEIVER SO THAT THE "INSPECTION INTERVAL" OCCURS EARLIER OR LATER IN THE RECEIVED PULSES. FOR ANY GIVEN SPEED ERROR THIS PERMITS THE SAMPLING TO TAKE PLACE DURING THE "BEST" PART OF THE INCOMING PULSE, WHICH WOULD ORDINARILY BE THE EXACT CENTER. IN WIRE LINE OPERATION OF TELEGRAPH PRINTERS THE EFFECT OF DISTRIBUTED INDUCTANCE AND CAPACITANCE CAN MAKE OTHER ADJUSTMENTS MORE DESIRABLE. THERE IS ONE BEST SPOT ONLY FOR RADIOTELETYPE RECEPTION (ASSUMING THE TRANSMITTING STATION IS SENDING PERFECTLY-FORMED SIGNALS). WE SHOULD ADOPT A PAGE FROM COMMERCIAL RTTY PRACTICES. THE RECEIVING STATION SHOULD NOT BE REQUIRED TO COMPENSATE FOR IRREGULARITIES INTRODUCED AT THE SENDING STATION OR WE WILL END UP IN A "RAT-RACE" WHERE WE REQUIRE A DIFFERENT SETTING FOR EACH STATION WE WORK. THE OBLIGATION IS UPON THE SENDING OPERATOR TO SEE THAT HIS OUTGOING SIGNALS ARE AS PERFECTLY FORMED AS POSSIBLE. THIS MEANS KEEPING THE BRUSHES TRIMMED AND PROPERLY SEATED ON A "FACE-PLATE" STYLE OF DISTRIBUTOR, OR THE CONTACTS CLEAN AND PROPERLY SPACED ON A CAM-STYLE DISTRIBUTOR. THE

GROOVES BETWEEN FACE-PLATE SEGMENTS SHOULD NOT BE ALLOWED TO FILL UP WITH CONDUCTING DEBRIS.

THE TRADITIONAL TELEGRAPH PRACTICE OF RANGING A MUX OR PRINTER IS AS FOLLOWS:- A PERFORATED TAPE OF A SENTENCE CONTAINING ALL THE LETTERS OF THE ALPHABET AND THE NUMBERS, SUCH AS, "THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG 1234567890" IS TRANSMITTED TO YOUR RECEIVING PRINTER FROM YOUR LOCAL EQUIPMENT. BY CEMENTING THE START AND FINISH OF THE TAPE IT WILL SEND ENDLESSLY. THE TAPE COULD ALSO BEAR THE LETTERS, "RYRYRYRYRYRYRYRY" INSTEAD. THE RANGE ADJUSTMENT ON THE PRINTER IS THEN VERY CAREFULLY MOVED IN ONE DIRECTION FROM THE CENTRAL POINT UNTIL MISTAKES APPEAR IN THE PRINTED COPY. AT THE POINT WHERE COPY IS JUST SOLID A READING IS TAKEN OF THE RANGE SCALE. THEN THE UNIT IS RANGED IN THE OPPOSITE DIRECTION FROM CENTER AND ANOTHER READING TAKEN OF THE OTHER LIMIT OF CORRECT PRINTING. THE CORRECT FINAL ADJUSTMENT IS CUSTOMARILY TO THE MIDPOINT BETWEEN THESE TWO EXTREMES, ALTHOUGH IN SPECIAL CASES THERE MAY BE A DIFFERENT FINAL SETTING. IN SOME MODELS OF PRINTERS IT IS NECESSARY TO STOP THE MACHINE TO CHANGE ADJUSTMENTS AND IN OTHERS IT CAN BE DONE WHILE THE UNIT IS IN MOTION. SINCE THE ADJUSTMENT IS MORE-OR-LESS PERMANENT IT MAKES LITTLE DIFFERENCE WHICH STYLE IS HAD. THE TWO CLUTCH FELTS SHOULD BE THOROUGHLY OILED BEFORE ORIENTATION AS THE STARTING "SLIP" IS ALTERED WITH A DRY FELT. THE FELTS WILL NOT ACCEPT OIL PROPERLY UNLESS A SCREWDRIVER BLADE IS PLACED BETWEEN THE CLUTCH DISCS TO REMOVE PRESSURE WHILE THE OIL IS ABSORBED. IF A GOOD RADIO SIGNAL IS HAD AND THE POLARIZED RELAYS ARE KNOWN TO BE IN GOOD ADJUSTMENT IT IS SATISFACTORY TO RANGE A PRINTER ON A TAPE SENT FROM A DISTANT STATION.

MACHINES USING ELECTRICAL SELECTION OF THE INCOMING PULSES ARE FREE FROM AN EFFECT KNOWN AS "INTERNAL BIAS". ALL OF THE PRINTERS EMPLOYING MECHANICAL SELECTORS, SUCH AS THE MODELS 14, 15, 19, 24, 26, 2-B, CREED ETC., CAN HAVE SUCH INTERNAL BIAS. A BIASED MACHINE WILL YIELD A MUCH NARROWER RANGE THAN ONE WITHOUT BIAS. TO REMOVE BIAS OF THIS TYPE THE "FOX" TAPE SHOULD BE RUN AND A "PRELIMINARY" RANGE ADJUSTMENT MADE (WHICH WILL BE APPROXIMATE). THE SECOND STEP WILL BE TO TIGHTEN AND LOOSEN THE SELECTOR-MAGNET RETRACTING SPRING UNTIL ERRORS APPEAR, WHILE COUNTING THE NUMBER OF REVOLUTIONS OF THE KNURLED SPRING-ADJUSTING SCREW. THE SPRING TENSION SHOULD THEN BE SET AT THE MIDPOINT OF THESE DETERMINATIONS. WITH THIS SPRING ADJUSTMENT THE RANGING SHOULD BE PERFORMED ONCE MORE, FOLLOWED BY A FINAL ADJUSTMENT OF SPRING TENSION. THE CURRENT THROUGH THE SELECTOR-MAGNET COILS SHOULD BE THE SPECIFIED CURRENT, WHICH HAS BEEN STANDARDIZED BY THE BELL SYSTEM AS 60 M.A.

SOME WESTERN UNION MACHINES WHICH HAVE FOUND THEIR WAY INTO OUR HANDS DID NOT WORK PROPERLY AND READING OVER THE SPECIFICATIONS IT WAS DISCOVERED THAT W.U. SETS UP THEIR MACHINES WITH A TIGHTER SPRING TENSION FOR 70 M.A. OPERATION. (SOME OF THEIR EQUIPMENT IS 60 M.A.) IN THE INTEREST OF AMATEUR STANDARDIZATION WE RECOMMEND RECALIBRATING ANY SUCH W.U. MACHINES (OR FOREIGN-MADE PRINTERS) FOR STANDARD 60 M.A. "LINE" CURRENT. THIS WILL ENSURE INTERCHANGABILITY IN AN EMERGENCY. MOST PRINTERS CAN BE RECALIBRATED TO WORK ON ANYTHING FROM 40 TO 100 M.A. ALTHOUGH IT IS NOT RECOMMENDED.

AN INTERESTING WESTERN UNION PRACTICE IS TO SEND "A.C." FOR RANGING AND ADJUSTING PRINTERS AND CIRCUITS. THIS, IN AMATEUR NOMENCLATURE, WOULD BE KNOWN AS "SQUARE WAVES", AT THE BASIC PULSE-RATE OF THE PRINTER. THEY COMMONLY ACCOMPLISH THIS BY SENDING FROM AN EIGHT-SEGMENT FACE-PLATE MADE AS PART OF THEIR REGULAR SEVEN-SEGMENT TAPE DISTRIBUTORS. THE 1ST, 3RD, 5TH AND 7TH SEGMENTS ARE LEFT OPEN, "SPACING", WHILE THE REMAINING FOUR SEGMENTS ARE MADE "MARKING". A SIMILAR TYPE OF SIGNAL COULD BE HAD FROM THE CONTACTS OF A POLARIZED RELAY WHOSE COIL IS FED 20 TO 25 CYCLE ALTERNATING CURRENT (FROM A VACUUM-TUBE OSCILLATOR?). THE IDEA IS MOSTLY EMPLOYED FOR "BIAS" ADJUSTMENTS HOWEVER. TO CHECK THE INCOMING SIGNALS THEY EMPLOY A DEVICE KNOWN AS AN "UNDULATOR" WHICH DISPLAYS THE PULSES ON A PAPER TAPE OSCILLOGRAPH-FASHION. SINCE THE AVERAGE RTTY AMATEUR MIGHT HAVE ONLY VERY OCCASIONAL USE OF SUCH TESTING EQUIPMENT IT WOULD PROBABLY BE BETTER FOR OUR MEMBERS IN EACH GEOGRAPHICAL LOCATION TO BUILD SUCH APPARATUS AS A CLUB OR "GROUP" PROJECT.

END OF BULLETIN 8 BY JOHN WILLIAMS, W2BFD, EDITOR-PUBLISHER. 73 FOR NOW.

SINCE THE RECENT PUBLIC DEMONSTRATIONS OF THE SOCIETY'S NEW RADIOTELETYPE INSTALLATION AT A NUMBER OF RADIO CLUB MEETINGS IT IS EVIDENT THAT THE HIGH-SPEED TAPE-PERFORATING AND TRANSMITTING GEAR HAS FIRED THE IMAGINATION OF MANY WHO HAVE WITNESSED THE EXHIBITION. THE SETUP IS THE DESIGN AND CONSTRUCTION OF W2BFD AND IS PRACTICALLY THE SAME AS THE RTTY HEADQUARTERS INSTALLATION, EXCEPT THAT IT HAS BEEN "PRETTIED UP" FOR THE PUBLIC EYE, WITH ALL WIRING NEATLY LACED AND EVERYTHING IN "RACK-AND-PANEL" MOUNTING. FOR THE ASKING, THIS INSTALLATION IS AVAILABLE TO ANY RADIO CLUB WITHOUT CHARGE. BY PREARRANGEMENT WE CAN FURNISH A SPEAKER AND THIS EQUIPMENT AND CAN GUARANTEE THAT NOBODY WILL FEEL THE EVENING WASTED.

THE RESULT OF ALL THE PUBLICITY HAS BEEN THAT WE HAVE BEEN OVERWHELMED WITH REQUESTS FOR TAPE PERFORATING AND TRANSMITTING GEAR. BECAUSE THE QUANTITY OF THIS MATERIAL BEING RELEASED TO THE SOCIETY IS LIMITED WE DOUBT THAT WE CAN EQUIP MORE THAN 1/3 OF THESE AMATEURS WITH THE MACHINES THEY DESIRE.

THE TAPE TRANSMITTERS ARE SOMEWHAT EASIER TO COME BY THAN THE DISTRIBUTORS AND, BECAUSE OF THIS FACT, WE HAVE BEEN PETITIONED TO ADVISE WAYS IN WHICH TEMPORARY SUBSTITUTION OF OTHER EQUIPMENT WILL GET THESE FELLOWS ON TAPE. LOOKING OVER THE MODEL 12 PRINTER KEYBOARD WE FOUND TWO PRINCIPAL METHODS OF MODIFICATION POSSIBLE WHICH WILL PERMIT USE FOR TAPE DISTRIBUTION.

THE SENDING CONTACTS ON THE VARIOUS KEYBOARDS AVAILABLE TO AMATEURS ARE ESSENTIALLY IDENTICAL, CONSISTING OF A GROUP OF SIX CONTACTS OPERATED BY A CYLINDRICAL CAM. THE REARMOST PAIR DOES DOUBLE-DUTY BY SERVING TO TRANSMIT BOTH THE OPEN-CIRCUIT "START" PULSE AND THE CLOSED-CIRCUIT "STOP" PULSE. COUNTING FROM REAR TO FRONT THE REMAINING CONTACT PAIRS ARE THE NUMBERS 1, 2, 3, 4 AND 5 CODE-ELEMENT TRANSMITTERS. ALL OF THESE PAIRS ARE IN PARALLEL AND CODING TAKES PLACE MECHANICALLY BY EITHER PERMITTING THE CONTACTS TO CLOSE WHEN A DEPRESSION IN THE CAM SURFACE COMES OPPOSITE A PROJECTION ON THE CONTACT LEVER OR PREVENTING CLOSURE BY THE INTERVENTION OF A "LOCKING LEVER" OPERATED BY THE KEYLEVERS.

THE KEYBOARD CONTACTS CAN BE USED AS A TAPE DISTRIBUTOR BY SATISFYING THREE REQUIREMENTS AS FOLLOWS:-

- (1) PRELIMINARY TO TAPE OPERATION THE "LTRS" OR UNSHIFT KEY MUST BE DEPRESSED IN ORDER THAT NO LOCKING LEVER INTERFERES WITH CONTACT CLOSURE.
- (2) A METHOD IS EMPLOYED TO KEEP THE SENDING CLUTCH CONTINUOUSLY ACTUATED WITHOUT MANIPULATING THE KEYBOARD. THIS CAN BE DONE BY DEPRESSING THE "TRIP-LATCH" ON THE CLUTCH EITHER MECHANICALLY OR WITH AN ELECTROMAGNET.
- (3) BREAKING THE PARALLEL CONNECTION OF THE CONTACT GROUP ON ONE SIDE THE CIRCUIT. THIS IS MOST EASILY DONE ON THE OUTSIDE OR LEFTHAND CONTACTS.

UNFORTUNATELY THESE CONTACT GROUPS ARE NOT FORMED OF INDIVIDUAL CONTACTS WITH WIRE JUMPERS BUT ARE ACTUALLY STAMPED OUT OF A SOLID SHEET OF SPRINGY METAL WHICH, WHEN REMOVED, RESEMBLES A COMB IN APPEARANCE. TO OPEN THE CONNECTION BETWEEN THE "TEETH" OF THE COMB REQUIRES HACK-SAWING BETWEEN THE CONTACTS AT THE BASE. THERE WOULD BE NOTHING AT ALL TO THIS JOB EXCEPT THAT THE SEPARATED CONTACTS HAVE NOTHING TO LOCK THEM IN PLACE TO PREVENT THEIR TURNING EXCEPT A SINGLE SCREW PER CONTACT. THE RESULT OF THIS MODIFICATION IS NOT ALWAYS SATISFACTORY BECAUSE THE CONTACT POSITION, WHICH NEEDS TO BE CRITICALLY SPACED, HAS A TENDENCY TO BE "SLOPPY". A MULTIPOLE SWITCH IS REQUIRED TO RESTORE THE DISTRIBUTOR TO KEYBOARD OPERATION AFTER TAPE SENDING. THIS PARTICULAR CONVERSION JOB IS NOT RECOMMENDED SINCE YOU TAKE THE RISK OF BEING OFF THE AIR IF YOU MESS UP THE CONTACT GROUP. THE IDEA IS APPLICABLE TO ANY MODEL OF KEYBOARD.

A VERY GOOD SUBSTITUTE IS A DISTRIBUTOR INTENDED FOR USE WITH THE SIX OR SEVEN-UNIT CODE. A NUMBER OF THE SIX-UNIT DISTRIBUTORS HAVE BEEN RELEASED. BY STRAPPING THE SEGMENT FOR CODE-PULSE NUMBER SIX WITH THE "STOP" SEGMENT WE, IN EFFECT, LENGTHEN THE "STOP" PULSE. THIS INCREASES THE TIME THE RECEIVING PRINTER IS AT REST BETWEEN CHARACTERS BY 22 MILLISECONDS. A SLIGHTLY REDUCED SENDING SPEED IS THE RESULT BUT IS HARDLY NOTICABLE.

TWO-CHANNEL DIPLEX DISTRIBUTORS CAN BE CONVERTED TO STANDARD-SPEED TELETYPE CODE SENDING IN A MATTER OF MINUTES. THE DIPLEX DISTRIBUTORS, WHICH SENDS TWO MESSAGES SIMULTANEOUSLY WITH THE PULSES INTERLACED, HAS STANDARD WIDTH START AND STOP SEGMENTS BUT THE FIVE "INTELLIGENCE" SEGMENTS ARE SPLIT IN HALF. THE BRUSH, AFTER LEAVING THE START SEGMENT, TRAVELS FOR 11 MILLISECONDS ACROSS THE FIRST-PULSE SEGMENT FOR CHANNEL 1. THEN IT CROSSES THE FIRST-PULSE SEGMENT FOR CHANNEL 2 ETC. ETC. CONVERSION TO OUR STANDARDS MERELY REQUIRES THE STRAPPING OF THE 10 "INTELLIGENCE" SEGMENTS IN PAIRS. IF THE BRUSH IS PROPERLY TRIMMED AND PLACED IT WILL CONTACT ONE SEGMENT BEFORE BREAKING WITH THE PREVIOUS ONE AND THERE WILL BE NO SIGNAL MUTILATION.

PLEASE NOTE THAT DISTRIBUTOR FACEPLATES ARE NOW AVAILABLE INEXPENSIVELY, WHICH PERMIT HOME-CONSTRUCTION BY OUR AMATEUR MEMBERS. A VERY LOGICAL PLACE TO TAKE OFF POWER FOR THE BRUSH ON THIS DISTRIBUTOR-FACE WOULD BE THE MOUNTING OF A GEAR, PULLEY-AND-BELT, OR CHAIN DRIVE FROM THE REAR END OF THE KEYBOARD SENDING SHAFT WHICH IS TURNING AT THE CORRECT SPEED. THE DRIVE NEEDS TO BE ONE-TO-ONE RATIO. IF POSSIBLE THE FACEPLATE MIGHT CONCEIVABLY BE MOUNTED SO THAT ITS BRUSH COULD BE SOLIDLY MOUNTED ON AN EXTENSION OF THE KEYBOARD SHAFT. THERE MAY NOT BE ENOUGH ROOM FOR THIS IN THE PRINTERS PRESENTLY AVAILABLE.

NON-ROTARY ELECTRONIC DISTRIBUTORS HAVE SEEN SOME SERVICE COMMERCIALY, PARTICULARLY IN EUROPE, BUT THE BLUEPRINTS OF ALL THOSE INVESTIGATED THUS FAR HAVE CALLED FOR VERY COMPLICATED CIRCUITS USING MANY VACUUM TUBES. THE UTTER SIMPLICITY OF MECHANICAL TELETYPE DISTRIBUTORS MAKES IT DIFFICULT FOR EVEN THE LEAST COMPLICATED OF ELECTRONIC CIRCUITS TO COMPETE.

A WORKING MODEL OF A NON-ROTARY TAPE DISTRIBUTOR WAS CONSTRUCTED AT RTTY HEADQUARTERS USING A "CHAIN" OF 14 TELEPHONE-TYPE RELAYS, DRIVEN IN SEQUENTIAL ACTION BY PULSES FROM A "PULSE-GENERATOR" RELAY. THIS LATTER CONSISTED OF A PIECE OF CLOCKSPrING, SOLDERED AT ONE END TO THE ARMATURE OF A RELAY AND BEARING AN ADJUSTABLE WEIGHT AND CONTACT POINTS ON THE OTHER. THE RELAY OPERATES, LIKE A DOOR-BELL, BUT AT THE PERIOD OF VIBRATION OF THE PENDULUM-ARM, WHICH CAN BE ADJUSTED (LIKE A "BUG" TELEGRAPH KEY) WITH THE SLIDING WEIGHT. THE UNIT IS A MESS BUT HAS THE CONSOLING VIRTUE THAT WAR-SURPLUS TELEPHONE-TYPE RELAYS CAN BE HAD FOR A FEW PENNIES EACH THESE DAYS.

RADIOTELETYPE BULLETIN-LETTER

A NUMBER OF RADIOTELETYPE STATIONS HAVE SECURED O.B.S. APPOINTMENTS (OFFICIAL BROADCAST STATION) FROM A.R.R.L. AND RELAY THE OFFICIAL A.R.R.L. BULLETINS VIA PRINTER.

IT HAS BEEN FOUND THAT THE BROADCASTS FROM HARTFORD CAN BE GOTTEN TO AMATEURS MUCH MORE RAPIDLY BY USING THE TELEPRINTER METHOD. THE USUAL PROCEDURE IS TO COPY WIAW ON CW WHILE TYPING DIRECTLY ON THE TELEPRINTER KEYBOARD OR A KEYBOARD TAPE PERFORATOR. THE FIRST METHOD IS SOMEWHAT SUPERIOR BECAUSE PERFORATED TAPE CAN BE MADE ON A REPERFORATOR INSTRUMENT WHILE STANDARD PAGE-STYLE COPY IN INK IS TYPED ON THE PRINTER. AFTER THE PERFORATED TAPE HAS BEEN PREPARED IN THIS MANNER, WITH NO MORE EFFORT THAN TYPING, THE TAPE CAN BE RERUN ANY NUMBER OF TIMES TO RADIOTELETYPE STATIONS. IF YOUR COMMUNITY AND VICINITY HAVE AN "AUTO-START" RTTY NET IN OPERATION, AS MANY CITIES HAVE, YOU NEED NOT RUN THE BROADCAST MORE THAN ONCE SINCE ALL MACHINES ON THE NET WILL START UP AUTOMATICALLY AND TYPE OUT THE BROADCAST WITHOUT REQUIRING THE OPERATORS' PRESENCE IN THE "SHACK".

WHEN APPLYING TO THE A.R.R.L. FOR O.B.S. APPOINTMENT MAKE SURE YOU INFORM THEM YOU ARE A MEMBER OF THE NATIONAL RTTY ORGANIZATION.

THERE ARE THOSE OF YOU WHO ASK, "WHY DO WE HAVE TO COMPLICATE MATTERS BY USING TIME-DIVISION SYSTEMS TO SEND THE TELETYPEWRITER CODE; ISN'T THERE A SIMPLER WAY?". THE ANSWER IS THAT THERE ARE A NUMBER OF WAYS TO TRANSMIT THE SAME INTELLIGENCE FOR MECHANICAL PRINTERS, EACH METHOD HAVING ITS OWN PARTICULAR ADVANTAGES AND FAULTS.

AN ARRANGEMENT TO DISPENSE WITH THE "SEQUENTIAL" CODE TRANSMISSION WAS SET UP AT RTTY HEADQUARTERS BY W2BFD. THIS ARRANGEMENT, A TWO-WAY CIRCUIT, CONSISTS OF A MODEL 12 TYPING UNIT, MINUS KEYBOARD AND RECEIVING DISTRIBUTOR, AT EACH END OF THE RADIO PATH. THE TWO METER BAND IS BEING USED FOR THE DEMONSTRATION ALTHOUGH THE IDEA WOULD WORK OUT JUST AS WELL ON ANY BAND. A STANDARD KEYBOARD-PERFORATOR, WITH POWER SHUT OFF ON THE PUNCH-MAGNET CIRCUIT, HAS A MICROSWITCH MOUNTED ON EACH OF THE BELL-CRANKS NORMALLY USED TO POSITION THE FIVE PUNCH-SELECTING BARS. EACH OF THE FIVE MICROSWITCHES IS USED TO KEY-ON A SINGLE AUDIO TONE. WHEN THE "LETTERS" KEY IS DEPRESSED ALL FIVE TONES ARE TRANSMITTED SIMULTANEOUSLY. IN THE W2BFD SYSTEM THE TONES EMPLOYED ARE 500, 600, 700, 800 AND 900 CYCLES FOR CODE ELEMENTS 1, 2, 3, 4, AND 5, RESPECTIVELY. AT THE RECEIVING END THE FIVE TONES ARE ACCEPTED BY FIVE TUNED AUDIO CHANNELS, IDENTICAL TO THE TYPE USED FOR OUR STANDARD F.S.K. AND A.F.S.K.. AND UTILIZED TO OPERATE 5 SMALL RELAYS OF THE SIGMA 4-F TYPE. EACH RELAY CONTROLS, THROUGH ITS CONTACTS, THE OPERATION OF ONE OF THE FIVE MAGNETS ON THE RECEIVING PRINTER. A SIXTH, OR "UNIVERSAL" RELAY, IS ARRANGED TO OPERATE THE CLUTCH-ACTUATING SIXTH-PULSE MAGNET UPON THE RECEPTION OF TONE IN ANY OF THE FIVE CODE CHANNELS. BECAUSE THE CLUTCH REQUIRES A RELATIVELY GREATER AMOUNT OF TIME TO ENGAGE THAN THE SELECTOR MAGNETS REQUIRE TO LATCH UP THERE IS NO DANGER OF THE PRINTER MAIN-SHAFT BEING ACTUATED BEFORE ALL CODE ELEMENTS ARE SET UP. THE UNIQUE PART OF THIS SYSTEM IS THAT NO SYNCHRONISM OR UNISON NEED BE MAINTAINED. BY PROVIDING A MOTOR PINION THAT WOULD ROTATE THE MAINSHAFT SUFFICIENTLY FAST IT WOULD BE ENTIRELY POSSIBLE TO TYPE AT SEVERAL HUNDRED WORDS PER MINUTE. A BETTER METHOD WOULD BE TO EMPLOY A PRINTER THAT IS COMPLETELY MAGNET-OPERATED AND WITHOUT MOTOR. THERE ARE SEVERAL SUCH IN COMMERCIAL USE AND YOUR SOCIETY IS ATTEMPTING TO SECURE THESE FOR OUR MEMBERS.

USING THE FIVE-TONE SYSTEM WE HAVE, REALLY, EXCHANGED MECHANICAL COMPLICATION FOR ELECTRONIC COMPLEXITY. BANDWIDTH NEED BE NO GREATER THAN WITH OUR PRESENT SYSTEM SINCE, ALTHOUGH THERE ARE FIVE TONE OUTPUTS, THEY ARE KEYED ONLY ONE SEVENTH AS RAPIDLY FOR THE SAME TYPING SPEED. (ONCE PER CHARACTER). ON BANDS WHERE TONE MODULATION IS NOT PERMITTED WE MIGHT KEY ON AND OFF FIVE QUARTZ-CRYSTAL OSCILLATORS, SPACED, SAY, 100 CYCLES APART.

THE SYSTEM WHICH WE HAVE SET UP AS DESCRIBED ABOVE, IMMEDIATELY DEMONSTRATED THAT IT HAD LOST THAT GREAT ADVANTAGE OF F.S.K. AND A.F.S.K. OF SUPPRESSING INTERFERING SIGNALS DURING THE SPACING AND NON-TYPING INTERVALS. A SIXTH TONE WAS ADDED TO THE ORIGINAL LAYOUT WITH THE CIRCUIT REARRANGED SO THAT TONE NUMBER SIX WAS TRANSMITTED AT ALL TIMES EXCEPT WHEN ONE OR MORE OF THE FIVE CODE-TONES WAS BEING SENT. IN EFFECT WE HAVE AN A.F.S.K. SYSTEM IN WHICH THERE IS ONE SPACE FREQUENCY AND FIVE MARK FREQUENCIES. THE RESULTS WE HAVE OBTAINED SHOWED A GREAT IMPROVEMENT OVER THE BASIC ARRANGEMENT.

A SERIOUS OBJECTION REMAINS TO THE GENERAL ADOPTION OF THE FIVE-TONE OR SIX-TONE SYSTEM. FOR TONE OR RF KEYING THE MAXIMUM POWER IN ANY ONE OF THE FIVE TONES CANNOT EXCEED 20 PERCENT OF THE TOTAL POWER. FOR CERTAIN CHARACTERS ONLY ONE TONE MIGHT BE REQUIRED, OR COMBINATIONS OF TWO, THREE OR FOUR TONES. FOR THE UNSHIFT CHARACTER (LTRS) ALL FIVE ARE REQUIRED. FOR THE SAME RANGE AS OUR PRESENT F.S.K. OR A.F.S.K. UNITS THIS MEANS WE REQUIRE FIVE TIMES THE OUTPUT CAPACITY FROM THE RADIO TRANSMITTER FOR EQUAL RELIABILITY OF PRINTING. FOR VERY SHORT-HAUL WORK, WHERE SIGNALS ARE MUCH STRONGER THAN REQUIRED, THE MULTI-TONE SYSTEM PERMITS HIGHER TYPING SPEEDS AND FREEDOM FROM THE NECESSITY OF TYPING IN A RHYTHMIC MANNER. THE CONCLUSIONS WE HAVE COME TO ARE THAT OUR PRESENT SEQUENTIAL SYSTEM, MAKING USE OF TIME-DIVISION DISTRIBUTION EXACTLY AS IN WIRE-LINE PRACTICE, IS MUCH SUPERIOR FOR GENERAL AMATEUR USE AND WILL CONTINUE TO BE THE AMATEUR STANDARD.

SEVERAL OTHER VARIATIONS OF THE MULTI-TONE IDEA HAVE BEEN EXPERIMENTED WITH BY REARRANGEMENT OF THE W2BFD FIVE-TONE INSTALLATIONS. A COMBINATION OF MULTI-TONE AND SEQUENTIAL (NON-SYNCHRONOUS) CODING WAS TRIED, WHERE EACH CHARACTER CONSISTS OF THE SEQUENTIAL SENDING OF TWO TONES, WHICH MAY BE ANY PAIR OUT OF SIX POSSIBLE FREQUENCIES. ONE TONE IS SENT UPON DEPRESSION OF A KEY AND THE SECOND TONE IS SENT UPON RELEASE OF THE SAME KEY. SINCE ONLY ONE TONE IS EVER BEING TRANSMITTED AT A TIME THE EFFICIENCY OF THE TRANSMITTER IS NOT REDUCED. THERE IS AN INCREASE IN THE COMPLICATION OF ELECTRONIC CIRCUITRY HOWEVER. IT MIGHT WELL BE THAT THESE OTHER SYSTEMS MIGHT HAVE FOUND MORE FAVOR IN AMATEUR EYES IF THE SENDING TELETYPE EQUIPMENT HAD NOT BEEN AVAILABLE IN COMPLETE AND USABLE FORM THROUGH THE SOCIETY. 73 DE W2BFD

DESPITE THE RELATIVE EASE OF CONSTRUCTING THE W2BFD SELECTIVE TRANSFORMERS THERE HAS BEEN A CONTINUAL SEARCH AMONG OUR MEMBERS FOR A STILL-EASIER METHOD. SEVERAL SUBSTITUTES HAVE BEEN DEvised WHICH, TO A GREATER OR LESSER DEGREE, REDUCE THE LABOR OF CONSTRUCTING THE FREQUENCY-SELECTIVE ELEMENTS OF THE RADIOTELETYPE CONVERTER. NONE OF THESE, UNFORTUNATELY, HAVE RETAINED THE ADVANTAGES POSSESSED BY THE W2BFD "FILTERS". SEVERAL YEARS WERE SPENT BY YOUR EDITOR IN EVALUATING HUNDREDS (YEP, I SAID HUNDREDS!) OF SELECTIVE ARRANGEMENTS COMPOSED OF COMMON, READILY AVAILABLE COMPONENTS. MANY HAD GREATER SELECTIVITY THAN THE SYSTEM FINALLY EVOLVED BUT NOT OTHER QUALITIES, SUCH AS THE ABILITY TO WITHSTAND A HIGH DEGREE OF LIMITING ACTION WITHOUT DETUNING THE RESONANT FREQUENCY. THE SYSTEM AS IT EXISTS TODAY, IN USE IN PRACTICALLY ALL AMATEUR RTTY STATIONS, TUBE-FOR-TUBE, SEEMS UNBEATABLE. IN MERELY FIVE TUBES THE RECEIVING CONVERTER WILL ACCEPT AN FSK OR AFSK SIGNAL VARYING OVER 60 DB IN AMPLITUDE AND ALMOST COMPLETELY "SMEARED" WITH INTERFERING NOISE AND KEY THE SELECTOR MECHANISM OF OUR PRINTERS IN A RELIABLE MANNER. (FIVE TUBES IF TWIN-TRIODES ARE USED).

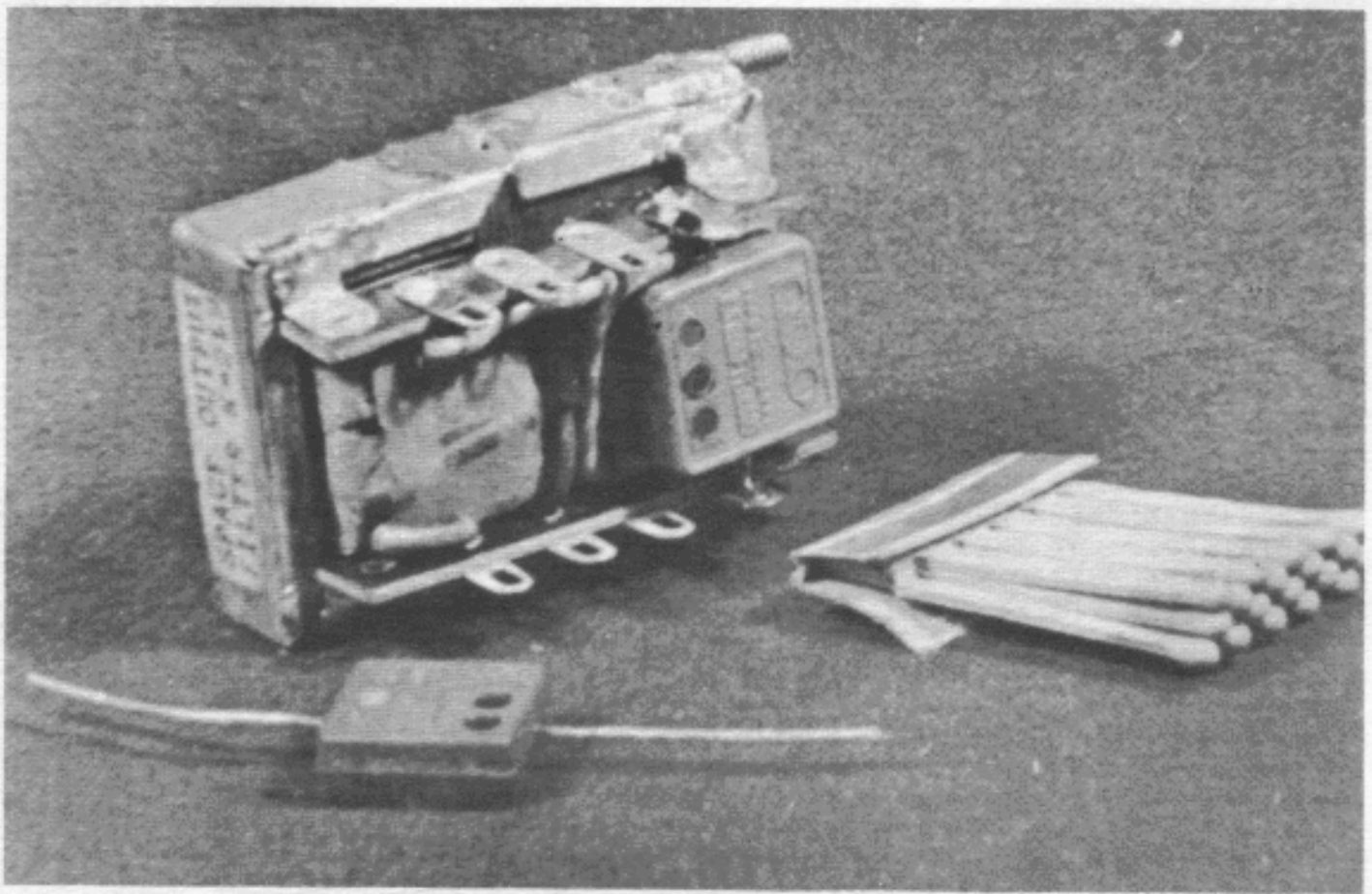
WE HAVE BEEN PLAYING AROUND WITH OTHER SCHEMES. A BENCH SETUP WAS MADE OF A SYSTEM EMPLOYING TWO RESISTANCE-CAPACITANCE SELECTIVE NETWORKS OF THE WIEN-BRIDGE TYPE. THE EXPERIMENT WAS GIVEN UP IN DISGUST AFTER WASTING A GOOD DEAL OF TIME ON IT. THE SELECTIVITY CURVE IS BROAD OR TOO SHARP (IF THE BEST "NULL" IS OBTAINED) AND IS COMPLETELY UNUSABLE IF THE SAME TUBES ARE CALLED UPON TO PROVIDE LIMITING. BY EMPLOYING A SEPARATE LIMITER PRECEDING THE NULL NETWORKS SOMEWHAT BETTER PERFORMANCE IS OBTAINED. BY THE TIME ALL THE EXTRA STAGES ARE ADDED WE HAVE DOUBLE THE NUMBER OF TUBES OF THE STANDARD CONVERTER. WHILE WE CONSIDER THE EXPERIMENT A FAILURE WE DO THINK THAT PATIENT WORK MIGHT UNCOVER A METHOD TO USE RESISTANCE-CAPACITANCE SELECTIVE CIRCUITS. ANYONE WANT TO GIVE IT A TRY?

ALONG MORE CONVENTIONAL LINES WE TOOK A LOOK AT THE SURPLUS MARKET WITH THE IDEA THAT SOME OF THE ARMY OR NAVY FILTERS MIGHT BE MODIFIED FOR RTTY JOBS. THE FL-8 AND FL-5 FILTERS ARE AMAZINGLY SELECTIVE, CONSIDERING THEIR SMALL SIZE. THE INSERTION LOSS IS FAIRLY LARGE, HOWEVER, AND WE WERE NOT ABLE TO MEET OUR OBJECTIVE; THAT OF PRODUCING A UNIT WITH THE SAME NUMBER OF TUBES AS THE STANDARD JOB, WITH AT LEAST AS GOOD SELECTIVITY (IN THE PRESENCE OF 60 DB OR MORE OF LIMITING) AND LITTLE OR NO WORK ON THE FILTERS.

ANOTHER SURPLUS ITEM IS THE PAIR OF 90 AND 150 CYCLE FILTERS USED IN THE "ZA" RADIO NAVIGATIONAL EQUIPMENT. THE UNITS WE OPENED WERE POTTED IN BLACK COMPOUND AND WERE QUITE MESSY TO REMOVE FROM THE CANS. THEN IT WAS DISCOVERED THAT THEY WERE HIGH-IMPEDANCE FILTERS, MADE TO WORK DIRECTLY INTO THE GRIDS OF VACUUM-TUBES. BY THE TIME THE TUNING CAPACITY WAS REDUCED TO THE 2000 AND 3000 CYCLE REGION THE IMPEDANCES WERE OUT OF SIGHT. BETTER LUCK WAS HAD WITH A PAIR OF FILTERS FROM THE BC-733 AND THE R-89/ARN-5 LOCALIZER AND GLIDE-PATH RECEIVERS. THE FILTERS ARE IDENTICAL IN BOTH THESE SETS AND ARE VERY SMALL. THE POTTING COMPOUND IS CARNAUBA WAX, MUCH EASIER TO WORK WITH. FOR THEIR ORIGINAL PURPOSE THE UNITS MATCHED THE LOW-IMPEDANCE PLATE OF AN OUTPUT TUBE TO THE STILL LOWER IMPEDANCE OF SMALL COPPER-OXIDE RECTIFIERS. WHEN REWORKED AND RETUNED WITH SMALLER VALUES OF MICA CONDENSERS THESE FILTERS WERE ABOUT THE BEST OF THE SUBSTITUTES FOR THE W2BFD UNITS BUT WERE STILL A LONG WAY SHORT OF THE MARK AND, MOREOVER, REQUIRED MORE LABOR THAN THE SIMPLE UNITS WE WERE TRYING TO REPLACE. A CIRCUIT DIAGRAM SHOWING THE RECONNECTION FOR RTTY USE CAN BE HAD FROM YOUR SECRETARY. 73 FOR NOW!

THE 1957 VERSION OF THE W2BFD SELECTIVE AUDIO FILTERS

Still considered "tops" for the job are the overcoupled tuned transformers, known in the vernacular as "The W2BFD Filters". They are normally adjusted for a Mark and Space bandwidth of 100 cycles, however they can be adjusted for single-peak response with a 50-cycle wide passband. The 100-cycle response will permit keyed output from FSK shifts of as little as 10 cycles above and below the midfrequency. The basic idea of the W2BFD tuned audio system has undergone little change through the years, but the actual construction of the selecting units has been improved and miniaturized. The filter-transformers depicted here will provide all the usable selectivity for RTTY operation that the degree of stability of modern radio transmitters and receivers will permit. All of the original W2BFD terminal units had filters built into plug-in cans to permit different Mark and Space frequencies and degrees of shift.

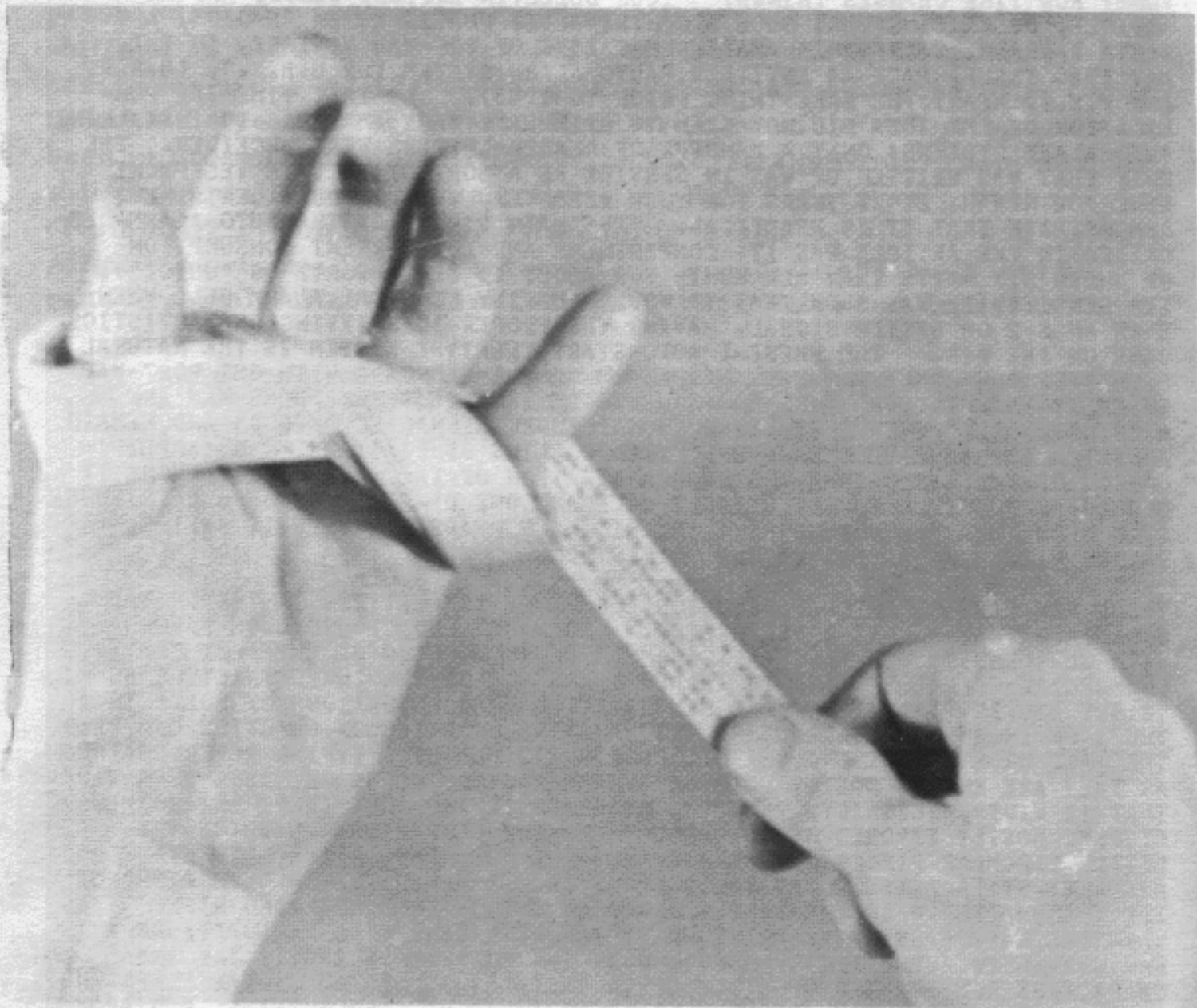


Many variations of the W2BFD idea have been applied to amateur radioteletype terminal units but, to properly merit the name, they must fulfill the following requirements:- (1) They must obtain audio selectivity through the use of tuned audio stages and not through the use of wave filters. (2) They must have a true bandpass action and not yield either a needle-nosed response (when sharp) or a gradual slope of the "skirts" when broadened. (3) They must use the same stages furnishing the selectivity to simultaneously act as limiters of amplitude variations and noise. (4) They should be equipped with independent balance controls for signals below the limiting threshold and for high level signals. (5) With 4 or 5 tubes in the receiving section of the converter they should be capable of delivering accurate printed copy from the teletype machine when the incoming RTTY signal is fading 60 db or better.

THIS IDEA OF A REMOTE UNATTENDED AUTOMATIC TELETYPEWRITER STARTING SYSTEM HAS FASCINATED A GREAT NUMBER OF AMATEURS LATELY. SEVERAL HAVE MENTIONED TO YOUR CORRESPONDENT THAT THERE MIGHT BE POSSIBILITIES OF APPLYING THE IDEA TO PHONE AND CW WORK, MAKING IT POSSIBLE TO "RING UP" THE HAM YOU WISH TO QSO AS SIMPLY AS YOU NOW USE THE LANDLINE TELEPHONE. FUNNY HOW TIME CHANGES THINGS! YOUR BULLETIN-EDITOR, W2BFD, HAD AN ARTICLE, DESCRIBING JUST SUCH A CONTRIVANCE, PUBLISHED IN "RADIO", A SANTA BARBARA, CALIFORNIA AMATEUR MAGAZINE OF PRE-WAR VINTAGE, IN THE MAY 1940 ISSUE, PAGE 44 ENTITLED "AUTO-ALARM SYSTEM FOR U.H.F.". (U.H.F. AND V.H.F. MEANT THE SAME THING PRIOR TO 1943). AT THAT TIME THE PUBLICATION OF THE IDEA DID NOT SEEM TO STIMULATE MANY AMATEURS TO INSTALLING AUTO-ALARM SYSTEMS; ONLY A HANDFUL OF READER-LETTERS WERE RECEIVED. THE UNIT THAT WAS WRITTEN UP WAS IN SERVICE AS A SORT OF PRIVATE TELEPHONE LINE FOR NEARLY EIGHT YEARS FOR YOUR REPORTER, WHICH SHOULD CERTAINLY DEMONSTRATE THAT IT IS PRACTICAL. THE MAIN VIRTUE OF THE AUTO-ALARM DESCRIBED IN THE ARTICLE WAS ITS COMPACTNESS AND LOW CURRENT CONSUMPTION OF UNDER SIX WATTS (RAN ALL MONTH FOR ABOUT 15 CENTS WORTH OF "JUICE"). ITS SENSITIVITY WAS SUCH THAT IT WOULD LUSTILY RING THE ALARM BELL WHENEVER AN S-2 OR BETTER SIGNAL, HAVING THE PROPER IDENTIFYING CHARACTERISTICS, CAME ON THE AIR. THE PRESENT AUTO-START TELETYPE SYSTEM IS THE NATURAL RESULT OF OUR COMBINING THE AUTO-ALARM OF PRE-WAR DAYS WITH OUR POST-WAR INTEREST IN PRINTERS. WE CONTINUE TO BELIEVE THAT THE PHONE MEN ARE MISSING A "BET" WHEN THEY NEGLECT UNATTENDED SIGNALING METHODS AND REMAIN ADDICTED TO "SCHEDULES" AND UNLIMITED CALLING OF STATIONS. BY AMPLIFICATION OF THE BASIC IDEA AND STANDARDIZATION OF THE SIGNALING METHODS IT SHOULD BE POSSIBLE TO SELECTIVELY CALL ANY ONE OF HUNDREDS OF OUR FRIENDS EVEN WHEN THEY ARE NOT WORKING THE RIG. PERHAPS, IF WE WAIT AWHILE, THINGS WILL WORK AROUND IN THIS DIRECTION.

THERE ARE TAPE REPERFORATORS WHICH ALSO TYPE THE LETTERS IN INK ON THE SAME TAPE THAT IS BEING PERFORATED. THEY HAVE NOT FOUND MUCH FAVOR WITH OUR MEMBERS FOR SEVERAL REASONS, TO SAY NOTHING OF THE FACT THAT COMMERCIAL OPERATORS TEND TO REGARD THE NEED FOR THE INK CHARACTERS AS "SISSY STUFF". AMATEURS CAN MEMORIZE THE 32 COMBINATIONS OF HOLES IN THE TAPE IN AN HOUR OR TWO AND, WITHIN A WEEK OR TWO OF PRACTICE CAN READ THE TAPE BY EYE FAST ENOUGH TO LOCATE ONE'S PLACE. TYPING REPERFORATORS, AS THEY ARE KNOWN, MOSTLY PUT THE INK CHARACTERS ALONG ONE EDGE OF A TAPE THAT IS WIDER, SLIGHTLY, THAN THE STANDARD 11/16", BUT THERE IS ANOTHER SYSTEM, MOSTLY FAVORED BY THE BELL TELEPHONE COMPANIES, IN WHICH THE LITTLE CIRCULAR PIECES OF PAPER (CHAD) ARE NOT REMOVED COMPLETELY BUT ARE LEFT STILL ATTACHED AT THEIR FRONT EDGE. WHEN THE "PECKER PINS" OF THE TRANSMITTER RISE THE LITTLE FLAPS COVERING THE HOLES ALSO RISE. WHEN THE TAPE PASSES THE POINT WHERE THE PINS SENSE THE PERFORATIONS A BAR SERVES TO AUTOMATICALLY SMOOTH DOWN THE UPLIFTED FLAPS. THE INK CHARACTERS ARE PRINTED UPON THE UPPER SURFACE OF THE TAPE, OVER FLAPS AND ALL. PERFORATED TAPE OF THIS "CHADLESS" VARIETY IS GENERALLY FED FROM A REEL, WHICH IS A DISADVANTAGE IN THE EYES OF COMMERCIAL OPERATORS, WHO CUSTOMARILY WIND THE TAPE IN A SPECIAL WAY ON THEIR FINGERS. A BALL OF TAPE SO WOUND CAN FEED A TRANSMITTER WITHOUT TANGLING AND WITH NO ATTENTION FOR HOURS ON END. IN THE PRESS BUREAUS THE TAPE IS SOMETIMES "BALLED" UP TO THE SIZE OF A MAN'S HEAD. IT IS QUITE TRICKY TO SEE EACH ALTERNATE TURN COME SLIPPING OUT OF THE ROLL AT JUST THE RIGHT TIME WITHOUT ANY LIKELYHOOK OF TANGLING. YOU CAN DO IT TOO, LIKE THIS:- THE TAPE COMES OUT OF THE REPERFORATOR FROM ITS LEFT SIDE AND ENTERS THE TRANSMITTING "HEAD" ON ITS RIGHT SIDE. HOLE NUMBER ONE IS FARTHEST FROM YOU, THE OPERATOR, SEATED IN FRONT OF THE MACHINE. EACH TAPE SHOULD HAVE FROM 6 INCHES TO A FOOT OF "BLANK" TO START IT, ON WHICH THE NAME OF THE PARTICULAR TAPE MAY BE WRITTEN ("DIXON'S CHINA MARKING CRAYON" IS EXCELLENT FOR THIS PURPOSE AND "TAKES" WELL ON THE OILED PAPER). START WINDING TAPE BY HOLDING UP LEFT HAND, FINGERS EXTENDED, PALM TOWARD YOUR FACE. TAKE THE START OF THE TAPE, NUMBER ONE HOLE UP, TOP, MARKED, FACE OF THE TAPE TO THE RIGHT AND INSERT BETWEEN THE SECOND AND THIRD FINGERS, WITH ABOUT AN INCH OR TWO EXTENDING THROUGH TO THE BACK OF THE HAND. BRING THE TAPE TO THE LEFT, BETWEEN THE THUMB AND FOREFINGER, AROUND THE OUTSIDE OF THE THUMB AND THEN GIVE IT A 180 DEGREE TWIST SO NO. 5 HOLE IS UPPERMOST, THEN BETWEEN THE 3RD AND 4TH (LITTLE) FINGERS AND AROUND, OUTSIDE THE PINKY TOWARD YOU. THEN GIVE IT ANOTHER 180-DEGREE TWIST AND BRING IT AGAIN THROUGH THE SPACE BETWEEN THE THUMB AND FOREFINGER, AROUND THE THUMB TOWARD YOU AND CONTINUE THIS INDEFINITELY. WITH PRACTICE YOU CAN WIND WITHOUT LOOKING AT IT AND VERY RAPIDLY AT THAT. 73

"BALLING-UP" PERFORATED TAPE, COMMERCIAL FASHION
(see preceding page)



The full potentialities of Amateur Radioteletype "Repeater-Station" operation have never been explored but experimental installations have been set up and some hair-raising results obtained. While applicable to any band the VHF and UHF ranges seem to pay the biggest dividends. If FCC permission is secured the repeater station can even be operated completely unattended! A repeater station receives an RTTY signal which is just above the minimum level required to print and keys a local relay controlling the repeater's own outgoing signal on another frequency in the same or another band. The low-power automatic repeater installed on an experimental basis in New York's skyscraper Municipal Building has enabled printer contact between pairs of RTTY stations at 5 to 10 times the mileage these stations could normally reach with the power an location they were using. Not long ago a ham phone message was relayed coast-to-coast on 2 meters, by word-of-mouth. Were RTTY repeating used not only would black-and-white printed copy be had but, because of the weak-signal performance of FSK and AFSK, the spacing of the relaying stations could have been greater. A wonderful age!

THE W2BFD RADIOTELETYPE "PHONE-PATCH"

THE DEMONSTRATIONS THAT THE LOCAL NEW YORK RTTY "GANG" HAVE MADE FOR THE RED CROSS CHAPTER TURNED OUT SO SUCCESSFUL THAT WE ARE CERTAIN THAT RADIOPRINTER AMATEURS WILL PARTICIPATE IN ALL FUTURE EMERGENCY SERVICES. DURING DISASTERS SUCH AS FLOODS, EARTHQUAKES, FOREST FIRES, AND OTHER MAJOR CATASTROPHES ONE OF THE MOST PRESSING IMMEDIATE NEEDS IS ADEQUATE COMMUNICATIONS BETWEEN THE STRICKEN AREA AND THE UNAFFECTED "OUTSIDE WORLD". RADIO AMATEURS HAVE SERVED IN THE PAST IN LIFE-SAVING ROLES BY THE HANDLING OF VITAL MESSAGE-TRAFFIC.

A TYPICAL SITUATION FINDS AN AREA DEVASTATED. WITHIN A VERY BRIEF SPACE OF TIME RADIO AMATEURS WILL SCROUNGE UP AND POOL SUFFICIENT EQUIPMENT TO ESTABLISH COMMUNICATIONS TO REPLACE THE KNOCKED-OUT TELEPHONE AND TELEGRAPH LINES. IT IS IRONICAL THAT, AT THE VERY TIME WHEN COMMUNICATION IS MOST ESSENTIAL, NORMAL FACILITIES ARE LEAST IN A POSITION TO SERVE THE RESCUING AGENCIES.

WHEN VITAL TELEGRAPH WIRES ARE KNOCKED OUT WE HAVE A SITUATION WHERE HIGHLY SKILLED TELEGRAPH EMPLOYEES CAN DO LITTLE BUT "THUMB-TWIDDLING" WHILE AN URGENT NEED FOR "CLEARING THE HOOK" EXISTS. CW AND 'PHONE AMATEURS STEP INTO THE BREACH AND CAN HANDLE A SMALL PORTION OF THE HIGHEST-PRIORITY MESSAGE TRAFFIC. IMPORTANT MESSAGES OF LOWER PRIORITY MUST WAIT FOR THE REPLACEMENT OF THE WIRES. THE REASON IS OBVIOUS; THE TRADITIONAL METHOD OF HANDLING MESSAGES BY VOICE AND MORSE-KEY CANNOT TAKE THE VOLUME.

THIS IS WHERE RTTY IS ABLE TO SHINE. THE SAME CW TRANSMITTER, IF KEYED FOR FSK, COULD HANDLE SEVERAL HUNDRED SHORT MESSAGES PER HOUR. SINCE VERY LITTLE OF THE PROCEDURAL INTERCHANGE IS NEEDED ON PRINTER THAT IS A "MUST" ON CW, AND BECAUSE SEVERAL OPERATORS CAN BE KEPT BUSY PUNCHING TELETYPE TAPE TO KEEP ONE PRINTER CIRCUIT GOING, THE SAME SINGLE RF CHANNEL WILL HANDLE TEN TIMES THE MESSAGE TOTAL WITH MACHINELIKE ACCURACY. SUCH CIRCUITS DO NOT HAVE TO MONITOR OUTGOING STUFF WITH A PRINTER BUT CAN EMPLOY THE PRINTER FOR RECEIVING SIMULTANEOUSLY ON ANOTHER FREQUENCY WITH THE SAME HIGH CAPACITY. IN AN EMERGENCY THERE WOULD BE NO RESTRICTION AGAINST OPERATING DUPLEX.

STOP AND THINK! HERE WE HAVE A TELEGRAPH OFFICE WITH TRAINED OPERATORS AND TELETYPE MACHINES BUT NO WIRES! WHEN THE EMERGENCY APPEARS THE RADIO AMATEUR MIGHT VERY WELL PROVIDE A FREQUENCY-SHIFT RADIO LINK THAT COULD "REPEAT" INTO A WIRE-LINE CIRCUIT. IN NORMAL TIMES RTTY AMATEURS MIGHT DRILL WITH FEW MACHINES, KNOWING THAT, IN AN EMERGENCY, THEY WOULD BE ABLE TO PROVIDE A USEFUL LINK TO PERMIT HIGH-SPEED OPERATORS TO DO THE ACTUAL SENDING. THIS IDEA IS NOT AS FAR-FETCHED AS IT MAY SOUND AT FIRST BUT WOULD REQUIRE A HIGH DEGREE OF COORDINATION AND STANDARDIZATION OF AMATEUR TECHNIQUE AND EQUIPMENT. ALL SERIOUS RTTY AMATEURS SHOULD GIVE THOUGHT TO ARRANGING THEIR EQUIPMENT TO RELAY INCOMING RTTY SIGNALS INTO WIRE-LINES AND VICE-VERSA. IN FUTURE BULLETINS WE HOPE TO BRING UP THE REQUIREMENTS OF WORKING INTO AND OUT OF WIRE LINES SO A THOROUGH UNDERSTANDING OF METALLIC CIRCUIT OPERATION IS HAD.

IN SOME TYPES OF EMERGENCIES LOCAL TELEPHONE WIRES WOULD BE UNAFFECTED. WITH THE DEVICE TO BE DESCRIBED IT WOULD NOT BE NECESSARY TO LOAD ALL YOUR EQUIPMENT INTO A CAR AND SET UP AGAIN AT, SAY, THE LOCAL RED CROSS BASE OF OPERATIONS. IT WOULD ALSO MAKE IT POSSIBLE FOR THE PRINTERS THAT ARE LOCATED AT PRACTICALLY EVERY RED CROSS CHAPTER, AND WHICH WOULD BE USELESS IF THE OUT-OF-TOWN PORTION OF THEIR WIRES FAILED, TO BE USED IN CONJUNCTION WITH AN AMATEUR STATION NOT EQUIPPED WITH A PRINTER BUT WHOSE OPERATOR HAD THE FORESIGHT TO HAVE FSK EQUIPMENT IN READINESS FOR EMERGENCIES. THE RED CROSS (OR OTHER AGENCY) TELEPRINTERS WOULD MERELY BE EQUIPPED WITH A DOUBLE-POLE, DOUBLE-THROW SWITCH IN THEIR LINE-WIRE CIRCUIT. ONE SIDE OF THE SWITCH WOULD BE MARKED "NORMAL" AND THE OTHER SIDE "RADIO AMATEUR EMERGENCY". THE INSTANT THE LINE WIRE OUTAGE OCCURS THE PRINTER, INSTEAD OF BEING A "DEAD DUCK" COULD BE SWITCHED OVER TO THE AMATEUR-PROVIDED RADIO LINK.

NOW SOME RED CROSS ESTABLISHMENTS HAVE OFFERED RADIO AMATEUR GROUPS SPACE ON THEIR PREMISES TO OPERATE A STATION AND TO DRILL. SINCE IT IS NOT LIKELY THAT AMATEURS COULD STAFF SUCH A STATION ON AN "AROUND THE CLOCK" BASIS THE EMERGENCY SITUATION COULD VERY WELL HAPPEN WHEN THE AMATEUR OPERATING STAFF WAS ABSENT. ALSO SUCH A SETUP WOULD REQUIRE A CONSIDERABLE INVESTMENT ON THE PART OF THE AMATEURS SINCE, AT THE PRESENT TIME THERE IS NO INDICATION THAT RED CROSS WOULD DEFRAY THE COST. RADIO TRANSMITTERS, RECEIVERS AND FREQUENCY-SHIFT EXCITERS AND CONVERTERS WOULD HAVE TO BE PROVIDED, WITH THE HAMS FOOTING THE BILL.

IF THE AMATEUR OPERATED FROM HIS OWN HOME SHACK THERE WOULD BE THE "WEAK-LINK" OF HAVING TO PUT THE TRAFFIC COMING IN ON HIGH-SPEED PRINTER, ONTO THE "LANDLINE" BY VOICE. THE SLOW SPEED WITH WHICH MESSAGES CAN BE RELAYED WITH ANY DEGREE OF ACCURACY, BY VOICE, WOULD BE THE "BOTTLE-NECK". YOUR CORRESPONDENT "COOKED-UP" THE IDEA OF A RADIOTELETYPE "PHONE-PATCH".

IF THE LOCAL TELEPHONE COMPANY'S PRACTICE WAS TO PROVIDE DC PATHS THROUGH THEIR SUBSCRIBERS' LINES FROM THE CALLER TO THE CALLED TELEPHONE THERE WOULD BE NOTHING TO SUCH A "PATCH" BUT TO YANK THE WIRES OFF THE PHONE AND TIE THEM ONTO THE PRINTER EQUIPMENT. THE BRUTAL FACT IS THAT LIFE IS RARELY THAT SIMPLE. ONLY AUDIO-FREQUENCIES CAN PASS OVER SUCH TELEPHONE CIRCUITS FROM SUBSCRIBER-TO-SUBSCRIBER. THE FREQUENCY CHARACTERISTIC OF TELEPHONE CIRCUITS MAKE IT DIFFICULT (ALTHOUGH NOT IMPOSSIBLE) TO SEND AUDIO TONES OUTSIDE OF THE 100 TO 3000 CYCLE RANGE.

EXPERIMENTS PROVED THAT DIALING UP THE SAME NUMBER SEVERAL TIMES WILL YIELD DIFFERENT FREQUENCY RESPONSES. SOMETIMES THE TOP LIMIT IS NOT MUCH OVER 2700 CYCLES. OUR INITIAL IDEA HAD BEEN TO MERELY PASS THE AFSK TONES OF 2125 AND 2975 CYCLES THROUGH THE LINE. WITH FSK THE BFO ON THE RECEIVER COULD BE ADJUSTED TO PRODUCE THE (AFSK) OUTPUT. WITH SOME LINES DIALED THE SYSTEM WORKED TO PERFECTION AND PRINTERS OPERATED AS SOLIDLY AS IF THEY WERE ON A DC "LOOP". ON THE 2700-CYCLE LINES THE "SPACE" FREQUENCY SUFFERED SERIOUS ATTENUATION.

MULLING OVER THE PROBLEM SHOWED US THAT WE REALLY HAD NO NECESSITY OF STICKING TO THE TWO STANDARD FREQUENCIES IF WE RESIGNED OURSELVES TO BUILDING A SEPARATE RTTY "PHONE-PATCH" ADAPTOR. LOWER FREQUENCIES IN THE RANGE OF 1000 CYCLES OR SO (WHERE TELEPHONE CIRCUITS "PEAK UP") WOULD BE VERY SUITABLE. AFSK WOULD BE FINE FROM ONE STANDPOINT, THAT PRACTICALLY ANY LEVEL OF SIGNAL FROM INAUDIBILITY TO EAR-SPLITTING STRENGTH WOULD FUNCTION WITHOUT ANY NEED OF ADJUSTING INPUT GAINS. ON THE OTHER HAND THE USE OF AFSK MAKES THE AFFAIR A ONE-WAY-AT-A-TIME (WHAT WE AMATEURS CALL "SIMPLEX" ON 'PHONE) OPERATION, UNLESS SHARP "DIRECTIONAL FILTERS" WERE USED AND DIFFERENT PAIRS OF FREQUENCIES USED FOR EACH DIRECTION OF TRANSMISSION. THE PHONE PATCH MUST BE SIMPLE AND COST LITTLE TO BUILD, AS AN INDUCEMENT FOR RTTY AMATEURS TO MAKE THEM, AS THE UNITS WOULD HAVE LITTLE USE EXCEPT IN AN EMERGENCY AND, THUS, WOULD NOT JUSTIFY A HEAVY INVESTMENT. SIGNAL-TO-NOISE RATIO IS CLOSE TO IDEAL ON SHORT TELEPHONE CIRCUITS AND MAKE-AND-BREAK (OR ON-OFF KEYING) IS 100 PERCENT PRACTICAL. OF THE TWO POSSIBILITIES, SENDING TONE ON MARK OR TONE ON SPACE, THE TONE-ON-SPACE SYSTEM HAS THIS IN ITS FAVOR; ALTERNATE TWO-WAY OPERATION CAN BE HAD WITH THE OTHER STATION ABLE TO BREAK IN AND INTERRUPT TRANSMISSION WHILE ONLY A SINGLE TONE-FREQUENCY NEED BE USED FOR THE TWO DIRECTIONS OF TRANSMISSION. THIS SYSTEM CAN BE OPERATED COMPLETELY WITHOUT FILTERS AND THE TONE, IN THIS CASE, DOES NOT HAVE TO BE ANY PARTICULAR FREQUENCY.

SIMULTANEOUS OPERATION OF SEVERAL SUCH CHANNELS CAN BE HAD IF FILTERS ARE EMPLOYED TO SEPARATE THE CHANNELS. SINCE THE SAME TONE IS USED FOR SENDING AND RECEIVING, THE SAME FILTER CAN BE USED FOR THE SENDING OSCILLATOR OUTPUT AND THE RECEIVING RELAY AMPLIFIER INPUT. NO ATTEMPT WAS MADE TO EXPLORE THE POSSIBILITIES OF LARGE NUMBERS OF CHANNELS SINCE USE OF MORE THAN ONE OR TWO IS UNLIKELY. TWO TELEPHONE-PATCH TERMINAL UNITS WERE BUILT BY YOUR EDITOR TO DEMONSTRATE THE WORKABILITY OF THE SCHEME. A SINGLE MAKE-BREAK TWO-WAY TONE CHANNEL WAS USED ON 1020 CYCLES. BY USING THE FL-5 AIRCRAFT RADIO-RANGE FILTERS, NOW AVAILABLE ON MILITARY SURPLUS, THE 1020-CYCLE BAND-PASS SECTION PERMITTED WIRE-LINE QUALITY OF PRINTER OPERATION. THE BAND-REJECT PORTION OF THE SAME FILTERS (WHICH PASSES ALL AUDIO FREQUENCIES EXCEPT A NARROW "SLICE" AT 1020 CYCLES) WAS USED FOR A VOICE CIRCUIT. ALTHOUGH A 6 D.B. LOSS

IN VOLUME RESULTED ON THE TALKING CIRCUIT THE TELEPHONE OPERATION WAS NORMAL IN OTHER RESPECTS. THE TELETYPE TONES WERE BARELY AUDIBLE IN THE TELEPHONE HANDSET AND THE LOUDEST TALKING LEVEL DID NOT "MUSS UP" THE SOLID PRINTER COPY. BECAUSE THESE FILTERS ARE AVAILABLE IN SUCH LARGE QUANTITIES IT MIGHT BE A VERY GOOD IDEA IF RADIOPRINTER MEMBERS WERE TO STANDARDIZE ON 1020 CYCLES FOR "PHONE-PATCH" WORK. TELEPHONE CIRCUITS PEAK UP NEAR THIS FREQUENCY ALSO.

A PENCIL DRAWING OF THE SCHEMATIC OF THESE UNITS HAS BEEN PASSED AROUND BY MAIL TO INTERESTED MEMBERS BUT IT IS A SLOW PROCESS, WITH EVERYONE HANGING ONTO THE SKETCHES FOR SEVERAL DAYS. IF WE CAN GET HOLD OF A MIMEO MACHINE FOR A FEW HOURS WE WILL TRY TO RUN OFF COPIES FOR DISTRIBUTION. ANNOUNCEMENT WILL BE MADE IN A LATER BULLETIN IF AND WHEN WE HAVE SUCCEEDED.

LEGALITY! NO PROBLEM AT ALL! CONDITIONS FOR A RADIOTELETYPE PATCH SHOULD BE NO DIFFERENT THAN FOR A 'PHONE PATCH (EQUALLY OBJECTIONABLE TO THE TELEPHONE COMPANY?). THE FACT OF THE MATTER IS THAT THERE IS NO 'LEGAL QUESTION BROUGHT UP AT ALL. IT MAY, AND PROBABLY DOES, VIOLATE A C O M P A N Y REGULATION BUT MOST TELEPHONE COMPANIES HAVE TAKEN AN "EYES CLOSED" ATTITUDE TOWARD AMATEUR PATCHING, PROVIDED THAT THE AMATEUR DOES NOT CREAT TROUBLES ON THE LINE OR TRANSMIT SIGNALS AT LEVELS HIGH ENOUGH TO CAUSE CROSSTALK. IN ANY EVENT, BECAUSE WE ONLY PLAN TO MAKE USE OF THE PATCH IDEA IN A BONA-FIDE EMERGENCY, THERE SHOULD BE NO INVOLVEMENT WITH THE OPERATING COMPANIES. REMEMBER, IF A HUMAN LIFE WERE AT STAKE, AN UNLICENSED PERSON COULD SEND A RADIO DISTRESS CALL WITHOUT FEAR OF THE LAW. CUL DE W2BFD ... -.-

RADIOTELETYPE BULLETIN-LETTER

SOME OF THE GANG VISITING WOODSIDE RTTY HEADQUARTERS HAVE COMMENTED ON THE TRICK W2BFD USES TO SEND TELETYPE "CQ" CALLS AUTOMATICALLY. YIELDING TO PURSUASION OF REQUESTS FOR A DESCRIPTION OF THIS "ROBOT" THE "MODUS OPERANDI" IS PRESENTED HEREWITH:-

SENDING IS ACCOMPLISHED BY ANY OF THE SEVERAL TYPES OF TAPE-SENDING DISTRIBUTORS AVAILABLE AT COST THROUGH THE SOCIETY. NO TRANSMITTER IS REQUIRED. A COMMON TELEPHONE-TYPE "STEPPING" SWITCH, HAVING A MINIMUM OF 5 BANKS OF CONTACTS, WITH 23 OR MORE POSITIONS, IS WIRED TO THE DISTRIBUTOR IN PLACE OF THE TAPE TRANSMITTER. EACH GROUP OF FIVE CONTACTS REPRESENTING ONE STEP OF THE SWITCH IS STRAPPED TO REPRESENT A PARTICULAR CHARACTER IN THE TELETYPE CODE. STRAPS MAY BE SOLDERED PERMANENTLY OR USE MINIATURE CLIPS FOR ALTERING THE MESSAGE. IN THE W2BFD CASE A PANEL WITH 23 ROWS OF FIVE TOGGLE SWITCHES IS USED. A COUPLE OF THOUSAND OF THESE SWITCHES WERE PICKED UP ON SURPLUS AT A LITTLE OVER A CENT APIECE OTHERWISE THIS SCHEME WOULD HAVE BEEN PROHIBITIVELY EXPENSIVE. IF THE SAME DISTRIBUTOR IS INTENDED FOR USE ALSO WITH A TAPE TRANSMITTER THE LAST BANK OF FIVE CONTACTS SHOULD BE WIRED TO THE TRANSMITTER. THE SEGMENT OR CONTACT ON THE TRANSMITTING DISTRIBUTOR NORMALLY EMPLOYED TO ADVANCE THE TAPE IS WIRED, INSTEAD, TO THE STEPPING SWITCH MAGNET. IF LONG MESSAGES ARE PLANNED, EXCEEDING 23 OR 24 CHARACTERS, TWO STEPPING SWITCHES MAY BE WIRED IN "CASCADE".

THE FOREGOING IS OFFERED AS AN EXAMPLE OF WHAT CAN BE DONE WITH NON-TELETYPE EQUIPMENT. HOWEVER, AS THE TAPE TRANSMITTERS ARE ONE OF THE CHEAPEST AND MOST PLENTIFUL OF THE UNITS AVAILABLE THROUGH THE SOCIETY, AND THE STEPPING SWITCHES NOW OBTAINABLE ARE RELATIVELY EXPENSIVE, MANY OF THE "GANG" PREFER MERELY TO HAVE A SECOND TRANSMITTER LOADED WITH AN ENDLESS LOOP OF TAPE. A PROPERLY ADJUSTED TRANSMITTER CAN RERUN A SLIP OF TAPE HUNDREDS OF TIMES BEFORE THE PAPER IS WORN. WESTERN UNION HAS A NEAT TRICK; THEY USE A PAPER-THIN STEEL TAPE THAT FEEDS THROUGH THE TRANSMITTER AS EASILY AS OILED PAPER AND IS PRACTICALLY INDESTRUCTIBLE.

THE VARIOUS TYPES OF KEYBOARD-PERFORATORS MADE AVAILABLE THROUGH THE SOCIETY, BY THE COMMUNICATIONS COMPANIES, ARE PURELY MECHANICAL DEVICES FOR PUNCHING HOLES IN OILED-PAPER TAPE AND ARE NOT, TECHNICALLY-SPEAKING, TELEGRAPH INSTRUMENTS AT ALL. TAPE MAY BE PREPARED ANYWHERE ON ONE OF THESE PERFORATORS, WITHOUT NEED FOR A TELEGRAPH LINE OR RADIO INSTALLATION, AND THE PRE-PUNCHED TAPE MAY BE USED AT THE TELEGRAPH SENDING OFFICE OR STORED INDEFINITELY FOR LATER USE. THE TELETYPE PERFORATOR IS MUCH LESS COMPLEX THAN ITS ANCESTOR, THE KLEINSCHMIDT MORSE-CODE PERFORATOR, WHICH IT RESEMBLES CONSIDERABLY IN OPERATING PRINCIPLE.

THE KEYBOARD PERFORATOR CONSISTS OF A STANDARD TELETYPE KEYBOARD ARRANGEMENT OF KEYLEVERS WHICH, IN A MANNER VERY SIMILAR TO THE FUNCTIONING OF A DIRECT-SENDING KEYBOARD, MOVES A SET OF FIVE "SELECTOR-BARS" AND A "UNIVERSAL BAR". DEPENDING ON WHICH KEY IS DEPRESSED A DIFFERENT COMBINATION OF SELECTOR-BARS WILL BE SET UP FOR EACH LETTER OF THE ALPHABET. THE UNIVERSAL BAR MOVES WHENEVER ANY KEYLEVER IS DEPRESSED.

THROUGH A SERIES OF LEVERS AND BELL-CRANKS A SET OF FIVE "PUNCH-BARS" ARE MOVED LEFT OR RIGHT A SMALL AMOUNT. IF THE PUNCH-BAR IS IN THE LEFT-HAND POSITION IT OCCUPIES THE SPACE BETWEEN THE TOP SURFACE OF THE POWER-DRIVEN "PUNCH-HAMMER" AND THE BOTTOM SURFACE OF ONE OF THE FIVE PUNCH-PINS. IN THIS CASE THE POWER STROKE OF THE PUNCH-HAMMER DRIVES THE PUNCH-PIN THROUGH THE PAPER TAPE DURING ITS PASSAGE THROUGH THE DIE-PLATES IN THE PUNCH-BLOCK. IN SOME OF THE KEYBOARD PERFORATORS THE STROKE IS FROM BACK TO FRONT.

THE UNIVERSAL-BAR, OPERATING THROUGH LEVERS AND BELL-CRANK, CLOSES A PAIR OF CONTACTS WHICH PERMIT 110 VOLT D.C. FROM A LOCAL RECTIFIER SUPPLY TO ENERGIZE THE PUNCH-MAGNET WINDINGS. ADJUSTMENT OF THE CONTACTS IS SUCH THAT THE PUNCH-BARS ARE ALL POSITIONED BEFORE THE CONTACTS CLOSE NEAR THE BOTTOM OF THE KEYLEVER TRAVEL. IN ADDITION TO THE FIVE CODE PUNCH-PINS IS A THINNER PUNCH WHICH PERFORATES THE FEEDHOLES NECESSARY TO PROPEL THE PAPER SLIP THROUGH THE PERFORATOR AND, LATER, THROUGH THE TAPE-SENDING TRANSMITTER. THESE FEEDHOLES ARE ARRANGED TEN TO THE INCH OF LINEAR TRAVEL.

THE KEYBOARD PERFORATOR AS DESCRIBED, THE MOST COMMON CASE, IS SATISFACTORY FOR SENDING-TAPE USED IN A PRINTER INSTALLATION WHERE THE RECEIVED MESSAGES ARE PRINTED ON A LONG TAPE. ABOUT 3/4 OF ALL THE TELEPRINTERS IN EXISTENCE ARE OF THIS TYPE. WHEN SENDING TO A PRINTER WHICH PRESENTS ITS COPY IN PAGE FORM SOME METHOD MUST BE EMPLOYED BY THE TAPE-PUNCHING OPERATOR TO KNOW WHEN HE HAS ARRIVED AT THE END OF A LINE ON THE RECEIVING PRINTER. THIS IS ACCOMPLISHED BY AN ADDITION TO THE BASIC INSTRUMENT KNOWN AS AN "END-OF-LINE INDICATOR". A PAWL ADVANCES A RATCHET-WHEEL ONE TOOTH FOR EVERY DEPRESSION OF A KEYLEVER (ANY KEYLEVER). A CONTACT ON THE RATCHET-WHEEL IS ARRANGED TO CLOSE AT 65 CHARACTERS (NORMALLY) FROM THE START OF THE LINE. THE CONTACTS LIGHT A LAMP BENEATH THE KEYLEVERS TO WARN THE OPERATOR TO USE THE CARRIAGE-RETURN AND LINE-FEED KEYS. TELEPRINTERS ARE CUSTOMARILY ADJUSTED TO ACCEPT 72 CHARACTERS TO A LINE SO THIS PERMITS FINISHING A SHORT WORD AFTER THE LAMP LIGHTS OR HYPHENATING A LONG ONE.

IT IS STANDARD PROCEDURE TO FURNISH IDENTICAL KEYBOARD-PERFORATORS FOR MAKING TAPE FOR TAPE OR PAGE-PRINTER CIRCUITS. ON THE TAPE-PRINTER CIRCUITS THE "END-OF-LINE" INDICATOR PARTS ARE MERELY OMITTED. WHEN THE CARRIAGE-RETURN KEY IS STRUCK, AFTER THE LAMP LIGHTS, THE PAWL IS RELEASED FROM THE RATCHET-WHEEL AND THE INDICATOR RETURNS TO THE STARTING POSITION.

ANOTHER TYPE OF DEVICE IS MANUFACTURED (AND AVAILABLE TO THE SOCIETY AT VERY INFREQUENT INTERVALS) KNOWN AS A "CHARACTER-COUNTER". THIS CONTAINS THE PAWL AND RATCHET-WHEEL MOUNTED IN A SEPARATE BOX. POWER IS FURNISHED BY A BUILT-IN ELECTROMAGNET. THE RATCHET WHEEL TURNS A CLOCK-TYPE HAND AROUND A SCALE ENGRAVED WITH THE NUMBER OF CHARACTERS. A BUILT-IN CONTACT OPERATES THE E-O-L LAMP IN THE SAME FASHION AS ALREADY EXPLAINED.

THE PUNCH BLOCKS IN KEYBOARD-PERFORATORS AND IN REPERFORATORS ARE IN TWO BASIC TYPES; ADVANCE-FEED AND CENTER-FEED. TAPE MADE ON AN ADVANCE-FEED BLOCK HAS THE LEADING EDGE OF THE FEEDHOLES ON A LINE WITH THE LEADING EDGE OF THE (LARGER) CODE-HOLES. THE OTHER STYLE OF PUNCHING HAS THE CENTER OF THE FEEDHOLES ON A LINE WITH THE CENTER OF THE CODE-HOLES. TAPE TRANSMITTERS CAN BE ADJUSTED TO ACCEPT EITHER TYPE AND, WITH MOST OF THEM, A "COMPROMISE" ADJUSTMENT CAN BE MADE WHEREBY EITHER CENTER-FEED TAPE OR ADVANCE-FEED TAPE WILL RUN WELL. THIS "COMPROMISE" IS POSSIBLE BECAUSE THE HOLE-SENSING "PECKER-PINS" IN THE TRANSMITTERS ARE MUCH SMALLER THAN THE DIAMETER OF THE CODEHOLES.

AMATEUR RADIOTELETYPE NEWS-LETTER

THE SPORT OF TUNING IN THE COMMERCIAL AND MILITARY RTTY STATIONS IS, PAPERWISE, QUITE AN EXPENSIVE PROPOSITION. HAVE YOU EVER NOTICED HOW MUCH PAPER THESE NAVY KEYBOARD "ARTISTS" SEND UP AFTER EACH THREE-LINE MESSAGE? OUR FAVORITE METHOD OF DEMONSTRATING THIS BRAND-NEW AMATEUR RADIO HOBBY OF OURS IS TO TOTE A COMPLETE PRINTER INSTALLATION TO ANY RADIO CLUB THAT IS "SUCKER" ENOUGH TO LET US SHOW OFF THE GIZMO. THE STANDARD DEMONSTRATION IS TO TUNE IN A COMMERCIAL OR MILITARY STATION AND LET THE MACHINE TALK FOR US. YOUR SECRETARY'S FACE HAS BEEN RED TOO OFTEN WHEN THE PRINTER WOULD SHOOT UP A YARD OF PAPER CONTAINING NO MORE THAN A COUPLE OF LINES OF NAVY GIBBERISH IN IT.

AN ADDITION TO A MODEL 12 WAS MADE TO DO SOMETHING ABOUT THIS SITUATION. A MICROSWITCH WAS MOUNTED SO AS TO BE ACTUATED BY THE MOTION OF THE CARRIAGE-RETURN OPERATING LEVER. WHEN PROPERLY LOCATED THE SWITCH CONTACTS REMAIN CLOSED FOR THE DURATION OF THE CARRIAGE RETURN. THE CONTACTS WERE WIRED TO THE COIL OF A SMALL RELAY WHOSE CONTACTS WERE REMOVED. THE RELAY WAS MOUNTED IN THE REAR OF THE MODEL 12 SO THAT A WIRE "LINK" SOLDERED TO THE RELAY ARMATURE PASSED UNDER THE PULLBAR FOR THE "LINEFEED" FUNCTION. THE "L" SHAPED LINK PREVENTS THE LINEFEED PULLBAR FROM DROPPING INTO THE NOTCHES IN THE FIVE CODE BARS UNLESS THE WINDING IS RECEIVING CURRENT. THUS ONLY ONE, OR AT MOST TWO, LINE FEEDS MAY OCCUR DURING THE TIME THE CARRIAGE IS RETURNING. ONE STANDARD PROFESSIONAL REQUIREMENT OF A TELETYPE OPERATOR IS THAT HE MUST ALWAYS SEND THE CARRIAGE RETURN BEFORE THE LINE FEED SIGNAL. WHEN THAT OPERATOR SENDS A STRING OF LINE-FEEDS THE PRINTER MERELY SITS QUIETLY AFTER SHIFTING UP ONE OR TWO LINES. A PENCIL SKETCH OF THIS SYSTEM CAN BE HAD FROM YOUR CORRESPONDENT. WRITE FOR IT TO W2BFD.

A FEW MODEL 24 MACHINES HAVE STARTED TO BE PUT IN SERVICE SO WE THOUGHT IT WOULD BE A GOOD IDEA TO SEE IF THIS STUNT WOULD WORK ON THE SINGLE-MAGNET PRINTER. IT DOES WORK, AND JUST AS WELL AS ON THE MODEL 12.

THE W2BFD PRINTERS AT RTTY HEADQUARTERS ARE SO LOADED DOWN WITH EXTRA ATTACHMENTS THAT WE FIGURED IT WOULDN'T HURT TO PUT A FEW MORE ON. WE NOTICED THAT ON DX RTTY SIGNALS HAVING AN EXTREME DEGREE OF QSB THAT EVERY ONCE IN AWHILE A LINEFEED OR CARRIAGE RETURN WOULD BE LOST AT THE BOTTOM OF A FADE. THE OBVIOUS SOLUTION TO THIS IS TO MAKE THE PRINTER SEND ITSELF AN "AUTOMATIC CARRIAGE-RETURN AND LINE FEED" ON THE 73RD CHARACTER FROM THE BEGINNING OF THE LINE. A MICROSWITCH MOUNTED ON THE RIGHT SIDE OF THE PRINTER IS OPERATED BY THE CARRIAGE WHEN IT EXCEEDS THE STANDARD-LENGTH LINE. THIS SWITCH CONNECTS TO THE "BLACK BOX" IN WHICH SEVERAL TELEPHONE RELAYS PERFORM THE FOLLOWING FUNCTIONS:- (1) THE INCOMING SIGNAL FROM THE POLAR RELAY IS INTERRUPTED TO SUPPRESS PRINTING DURING THE AUTOMATIC RETURN (2) A 2-CONTACT RELAY SIMULTANEOUSLY CLOSES THE CIRCUIT TO THE NUMBER 4 (CARRIAGE RETURN) PRINTER SELECTOR MAGNET AND THE 6-TH PULSE MAGNET. IMMEDIATELY FOLLOWING THIS ANOTHER RELAY, ALSO OF THE DOUBLE-CONTACT VARIETY, CLOSES THE CIRCUIT TO THE NUMBER 2 (LINE FEED) PRINTER MAGNET AND THE 6TH-PULSE CLUTCH MAGNET. FOLLOWING THIS THE FIRST RELAY RESTORES THE CONNECTION TO THE POLAR RELAY AND THE PRINTER RESUMES ITS TYPING. A MAXIMUM OF THREE CHARACTERS MAY BE LOST BY THIS AUTOMATIC ACTION BUT IT PREVENTS A "PILEUP" OR AN "OVER-LINE" WHICH COULD LOSE ONE OR TWO COMPLETE LINES. A SKETCH OF THIS CONTRAPTION IS ALSO AVAILABLE FROM YOUR EDITOR. WE HAVE NOT ATTEMPTED TO PUT THIS IDEA TO WORK ON THE SINGLE-MAGNET PAGE PRINTERS BUT IT IS QUITE OBVIOUS THAT IT WILL WORK JUST AS WELL ON THEM. 73 DE W2BFD

THE 14-SERIES TAPE TRANSMITTERS AND TRANSMITTER-DISTRIBUTOR COMBINATIONS.

MOST OF YOU WHO HAVE BEEN USING PERFORATED TAPE FOR HIGH-SPEED SENDING OF MESSAGES ORIGINATING IN YOUR OWN "SHACK", OR WHICH HAVE BEEN REPERFORATED FROM INCOMING SIGNALS, ARE ALREADY FAMILIAR WITH THE SIMPLE AND CONVENTIONAL 1-A AND 1-B TAPE "HEADS". THE WESTERN UNION 14, (A, B & C) IS VERY SIMILAR IN OPERATING PRINCIPLE BUT IS GENERALLY EMPLOYED WITH A COMPACT CAM-STYLE OF DISTRIBUTOR INSTEAD OF THE "FACE-PLATE" DISTRIBUTORS WITH WHICH WE HAVE BECOME ACCUSTOMED.

THE TAPE TRANSMITTER HAS A TAPE GUIDE AND TAPE GATE WIDE ENOUGH TO ACCOMMODATE EITHER 7/8" WIDE "TYPING-REPERFORATOR" TAPE OR 11/16" WIDE FULLY-PERFORATED TAPE FROM THE "NON-TYPING" VARIETY OF REPERFORATOR. IT SHOULD BE POINTED OUT THAT THERE ARE TWO TYPES OF "TYPING-REPERFORATORS". THE MORE COMMONLY ENCOUNTERED STYLE BEING THAT IN WHICH THE FIRST 11/16 OF THE 7/8" WIDE TAPE IS PERFORATED EXACTLY AS IN A NON-TYPING MACHINE BUT WHICH HAS A CLEAR, UNPERFORATED SPACE AT ONE EDGE OF THE WIDE TAPE ON WHICH THE CHARACTERS ARE PRINTED IN INK IN THE CUSTOMARY MANNER. WITH THE EXCEPTION OF THE BELL SYSTEM AND THE MILITARY SERVICES THIS STYLE OF MACHINE, AND THE KIND OF TAPE IT MAKES, IS ALMOST UNIVERSAL. THE BELL SYSTEM COMPANIES AND SUBSCRIBERS, AND ALSO THE MILITARY COMMUNICATIONS SERVICES EMPLOY A TYPING-REPERFORATOR USING 11/16" TAPE IN WHICH THE HOLES OR "CHADS" ARE NOT COMPLETELY REMOVED BY THE PUNCH-BLOCK BUT, INSTEAD, THE CHADS ARE LEFT ATTACHED AT THEIR LEADING EDGES. THE INKED COPY IS TYPED ON TOP OF THESE HINGED "LIDS", WHICH ARE FLATTENED DOWN AT THE TIME OF THE PRINTING OPERATION. THE TAPE TRANSMITTER FOR THIS SO-CALLED "CHADLESS" TAPE IS SIMILAR TO OUR USUAL TRANSMITTERS BUT HAVE ENLARGED HOLES IN THE TAPE-GATE TO PERMIT THE PECKER-PINS, IN THEIR UPWARD TRAVEL, TO PUSH THE LIDS UP. THE WESTERN UNION 14-SERIES OF TRANSMITTERS ACCEPTS TAPE OF THE FIRST VARIETY, EITHER 11/16" NON-TYPING OR 7/8" TYPING FULLY PERFORATED.

TYPING-REPERFORATORS HAVE NOT BEEN VERY POPULAR WITH OUR MEMBERS SINCE MOST OF US CAN READ THE TAPE AS FAST AS INKED COPY AFTER A BIT OF PRACTICE. THE "STANDARD" AMATEUR SETUP AT THE PRESENT TIME CONSISTS OF A NON-TYPING REPERFORATOR IN CONJUNCTION WITH A KEYBOARD PAGE-PRINTER OF THE 12 OR 24 MODELS. THE "CHADLESS" KIND OF REPERFORATOR, INCIDENTALLY, IS ONLY MANUFACTURED BY THE TELETYPE CORPORATION, WHILE ALL THE OTHER COMPANIES, BOTH IN THIS COUNTRY AND ABROAD, MAKE THE CONVENTIONAL WIDE-TAPE MACHINES.

RETURNING TO THE W.U. 14-SERIES TRANSMITTERS, THE TAPE-ADVANCE ACTION IS, LIKE THE WESTERN ELECTRIC 1-A UNITS, BY A POWERFUL 2-COIL ELECTROMAGNET. THIS MAGNET DRAWS ABOUT 300 M.A. WHICH IS PULSED BY A PAIR OF CONTACTS ON THE CAM-STYLE DISTRIBUTOR TO PULL THE "SLIP" AHEAD AT THE RIGHT TIME. IN PLACE OF A SPUR-WHEEL TO ENGAGE THE FEED HOLES IN THE TAPE THERE IS A SHUTTLE-LIKE DEVICE WITH TEETH IN ITS UPPER EDGE TO ENGAGE SEVERAL HOLES AT ONE TIME. THE ADVANTAGE OF THIS STYLE OF INTERMITTENT-MOTION DEVICE (WHICH HAS ITS COUNTERPART IN MOTION-PICTURE PROJECTORS) IS THAT THE WEAR OF THE FORWARD STROKE DOES NOT ALL COME ON A SINGLE SPROCKET HOLE. THIS GREATLY REDUCES ELONGATION OF THE FEED HOLES, THE ULTIMATE RESULT OF WHICH IS MIS-REGISTRATION OF THE CODE PERFORATIONS WITH THE SENSING PECKER-PINS.

IF THE AMATEUR HAS NO INTENTION OF EVER USING WIDE TAPE THERE IS ANOTHER ALMOST IDENTICAL SERIES OF TRANSMITTERS, THE 7, 7-A, 7-B, 7-C ETC, WHICH HAS AN 11/16" WIDE TAPE GATE AND GUIDE. IF MEMBERS FIND IT A NUISANCE TO LOAD NARROW TAPE IN THE 7/8" GATE, WHICH REQUIRES POSITIONING THE FEED HOLES OVER THE "CLAW", AN ARRANGEMENT HAS BEEN MADE TO EXCHANGE THE 14-SERIES TRANSMITTERS FOR 7-SERIES EQUIVALENTS. THE TRANSMITTERS ALONE, WITHOUT THE DISTRIBUTORS, SHOULD BE SENT TO RTTY HEADQUARTERS. A POSTCARD ADVISING US TO EXPECT THE UNIT BY PREPAID MAIL OR EXPRESS IS A GOOD IDEA.

THE CAM-STYLE DISTRIBUTORS WITH WHICH THESE UNITS ARE MOST FREQUENTLY ASSOCIATED (ON A COMMON BASE MAKING A COMBINATION WHICH IS KNOWN AS A "TRANSMITTER-DISTRIBUTOR") HAVE SENDING CAMS LOOKING VERY SIMILAR TO THOSE USED ON THE MODEL 12, 14, 15, 24, 26 ETC, KEYBOARDS. ADDITIONAL SECTIONS ARE ON THE CAM, HOWEVER, TO PULSE THE TAPE-ADVANCE MAGNET. NOTE ONE IMPORTANT DIFFERENCE OVER THE FACE-PLATE STYLE OF DISTRIBUTOR; WHEN THE CAM APPROACHES THE POINT IN ITS REVOLUTION WHERE THE CLUTCH IS ABOUT TO BRING IT TO REST THE TAPE-ADVANCE CONTACTS OPEN. THERE IS NO STEADY CURRENT THROUGH THE TAPE-HEAD MAGNETS WHEN TAPE IS NOT ADVANCING. WITH THE DISK-TYPE DISTRIBUTORS THE MAGNET CURRENT FLOWS STEADILY WHEN THE TAPE-ADVANCE OR "TIGHT-TAPE" SWITCHES ARE OPEN. THE BREVITY OF THE IMPULSE MEANS THAT A 75 M.A. CURRENT SUPPLY (WITH A LARGE-VALUE ELECTROLYTIC CONDENSER ACROSS ITS OUTPUT) WILL FURNISH THE PEAK 300 M.A. DEMAND. THIS COULD NOT BE DONE WITH THE FACEPLATE DISTRIBUTORS.

THE TRIP-LATCH WHICH CAUSES THE DISTRIBUTOR CLUTCH TO ENGAGE IS ACTUATED BY A MAGNET AND CONTROLLED BY BOTH THE TIGHT-TAPE SWITCH (MOUNTED ON THE RIGHT SIDE OF THE TRANSMITTER-DISTRIBUTOR) AND THE TAPE-ADVANCE SWITCH (IF ANY). THE MAGNET CAN BE POWERED BY 110 VOLTS A.C. DIRECTLY OR FROM 120-VOLT D.C. (IN THE LATTER CASE A RESISTOR MOUNTED ON THE DISTRIBUTOR BASE PLATE IS STRAPPED INTO THE CIRCUIT TO LIMIT THE CURRENT). JUST AS IN THE CASE OF THE W.E. 1-A TRANSMITTERS THE 14-TYPE TRANSMITTER-DISTRIBUTOR UNITS CAN BE ADJUSTED FOR EITHER ADVANCED-FEEDHOLE STYLE OF TAPE OR "REGULAR" FEED.

OCCASIONALLY SOME OF THESE TRANSMITTER-DISTRIBUTORS COME THROUGH WITH A VERY CONVENIENT GADGET BUILT IN. THIS IS THE BLANK-TAPE STOP CIRCUIT. BY TERMINATING ALL TAPES WITH AT LEAST FIVE OR MORE DEPRESSIONS OF THE "BLANK" KEY ON THE KEYBOARD THE "STOP-ON-BLANK" CIRCUIT RECOGNIZES THAT THE TAPE HAS COME TO THE END AND DISENGAGES THE DISTRIBUTOR CLUTCH CIRCUIT. TWO RELAYS WITHIN THE UNIT PERFORM THIS OPERATION. IN WIRE-LINE TELEGRAPHY THE RELAYS ARE ACTUATED BY THE 60 M.A. LINE CURRENT WHICH FLOWS THROUGH THEM. IN AN AMATEUR INSTALLATION PROVISION MAY HAVE TO BE MADE TO INSURE THAT A SOURCE OF 60 M.A. FROM A 120-VOLT SUPPLY WITH A 2000-OHM SERIES RESISTOR FURNISHES THIS CURRENT. MOST OF THE DISTRIBUTORS DO NOT HAVE THE "STOP-ON-BLANK" PROVISION.

TELETYPEWRITER KEYING RELAYS AND THE SELECTOR MAGNETS OF THE ONE-MAGNET STYLE OF PRINTERS HAVE QUITE LOW RESISTANCES, RANGING FROM 50 TO NOT MUCH OVER A COUPLE OF HUNDRED OHMS. WHY THEN, WITH ONLY A COUPLE OF VOLTS I-R DROP ACROSS THESE WINDINGS, DO WE ALWAYS SHOW IN OUR DIAGRAMS SOURCES OF 120 VOLTS WITH DROPPING RESISTORS? WITH THE EXCEEDINGLY SMALL AMOUNT OF POWER REQUIRED BY THESE RELAYS AND MAGNETS IT WOULD SEEM TO BE THE HEIGHT OF INEFFICIENCY TO WASTE MOST OF THE POWER IN A HEAT-PRODUCING RESISTOR. THE ANSWER LIES IN THE CHARACTERISTICS OF CURRENT-GROWTH IN INDUCTIVE WINDINGS ON IRON CORES. TAKE, AS AN EXAMPLE, THE WESTERN ELECTRIC TYPE 215-A RELAYS WITH 85-OHM WINDINGS. AT THE STANDARD 60 MILLIAMPERES USED IN NEUTRAL TELEGRAPH CIRCUITS THIS RELAY COULD BE OPERATED FROM A SOURCE OF APPROX. 5 VOLTS. IF A 5-VOLT SOURCE WERE ACTUALLY USED THE SELF-INDUCTANCE OF THE WINDING WOULD NOT PERMIT THE FULL 60 MA TO FLOW INSTANTLY UPON CLOSING THE KEYING CONTACTS BUT, RATHER, THE CURRENT WOULD GRADUALLY BUILD UP FROM ZERO. THE RESULT OF THIS GRADUAL (REMEMBER WE ARE SPEAKING IN THOUSANDTHS OF A SECOND) BUILDUP OF CURRENT IS THAT THE RELAY ARMATURE WILL NOT "TRANSFER" UNTIL THE CURRENT HAS PASSED SOME CRITICAL VALUE. THIS IS A FORM OF DISTORTION OF THE SIGNAL AND COULD EASILY PREVENT INTELLIGIBLE PRINTING. BY DRIVING THE RELAY FROM A HIGH-IMPEDANCE SOURCE HAVING SUFFICIENT VOLTAGE TO PRODUCE THE STANDARD 60 MA THE EFFECT OF THE SELF-INDUCTANCE IS GREATLY MINIMIZED. IT IS STANDARD TELEGRAPH PRACTICE TO USE 120-VOLT SOURCES PLUS DROPPING RESISTANCES. THIS PRACTICE HAS ANOTHER BENEFICIAL RESULT. WITH A 2000-OHM DROPPING RESISTOR AND A 120-VOLT SUPPLY IT SCARCELY ALTERS THE 60 MA CURRENT VALUE WHILE "PATCHING" IN VARIOUS NUMBERS OF RELAYS OR SELECTOR MAGNETS IN SERIES. IN FACT THE REMOVAL OF ALL INDUCTIVE WINDINGS FROM THE CIRCUIT WILL NOT RESULT IN A SHORT-CIRCUIT BUT ONLY A SLIGHT INCREASE IN CURRENT. A COMMON PRACTICE IN TELEGRAPH OFFICES IS TO HAVE GROUPS OF TELEPHONE-TYPE JACKS, OF THE VARIETY THAT SHORT THEMSELVES WHEN THE PLUG IS REMOVED, ALL WIRED IN SERIES WITH THEMSELVES AND A SINGLE DROPPING RESISTOR. THE WHOLE ENSEMBLE IS PERMANENTLY CONNECTED TO THE "TELEGRAPH BATTERY" OF 120 VOLT POTENTIAL. TELEGRAPH LINES, REPEATERS, PRINTERS, KEYBOARDS, TAPE-TRANSMITTERS, REPERFORATORS ETC. ETC. CAN THEN BE PATCHED INTO THE GROUP OF JACKS WITHOUT FURTHER THOUGHT TO THE CURRENT. THESE GROUPS OF JACKS ARE WIRED INTO WHAT ARE KNOWN AS "60-MILLIAMPERE LOOPS". IT MIGHT WELL BE THAT AMATEURS WOULD PROFIT BY FOLLOWING THIS TECHNIQUE.

ADJUSTMENTS OF WESTERN ELECTRIC 1-A AND 1-B TAPE TRANSMITTERS

THE COMPLETELY RELIABLE AND PRACTICALLY INDESTRUCTIBLE WESTERN ELECTRIC TAPE TRANSMITTERS WILL ACCEPT EITHER OF THE TWO TYPES OF PERFORATED TAPE IN COMMON USE. THE "IN-LINE" FEED TAPE HAS THE TAPE-ADVANCING FEED HOLES CENTERED ON A LINE PASSING THROUGH THE CENTERS OF THE CODE HOLES. THE "ADVANCED" FEED TAPE HAS THE LEADING EDGE OF THE FEED HOLE ON A LINE WITH THE LEADING EDGE OF THE CODE HOLES. THE DIFFERENCE IS ONLY A TINY FRACTION OF AN INCH. PRACTICALLY EVERY ONE OF THESE "HEADS" THAT WE HAVE ENCOUNTERED COULD BE GIVEN A "COMPROMISE" ADJUSTMENT SO THAT IT WOULD ACCEPT EITHER TYPE OF TAPE. THE EXPLANATION FOR THIS IS THAT THE "PECKER" PINS THAT RISE INTO THE HOLES ARE MUCH SMALLER THAN THE DIAMETER OF THE HOLES THEMSELVES AND SLIGHT OFFSET OF THE PINS WITH RESPECT TO THE CENTERS OF THE HOLES HAS NO ILL EFFECT.

ADJUST THE POSITION OF THE DETENT ROLLER, BY MEANS OF THE ADJUSTING SCREWS, SO THAT WHEN "LTRS" PERFORATED TAPE IS PLACED IN THE GUIDE, MESHING PROPERLY WITH THE FEED WHEEL, THE SELECTING PINS PASS THROUGH THE CENTERS OF THE HOLES IN THE TAPE. TURNING OUT ON ONE SCREW AND IN ON THE OTHER CHANGES THIS ADJUSTMENT. THE TWO ADJUSTING SCREWS ARE ON THE INSIDE (REMOVE LARGE COVER) OF THE BOX, VIEWED FROM THE JACK-CONTACT SIDE, UP UNDER THE TOP PLATE NEAR THE HINGE IN THE TAPE GATE.

SLIDING BAR, UPPER NUT:- WITH THE ARMATURE HELD IN ITS OPERATED POSITION ADJUST SO THAT THE NUT COMES WITHIN .015" OF THE LOWER SLIDE BEARING SURFACE.

FEED ROCKER BACKSTOP SCREW:- (UNDERNEATH TRANSMITTER) WITH THE ARMATURE IN ITS RELEASED POSITION TURN IN THE BACKSTOP SCREW UNTIL FEED PAWL FAILS TO CLEAR THE TEETH ON THE RATCHET WHEEL. TURN OUT THE SCREW UNTIL FEED PAWL JUST CLEARS ALL TEETH (OPERATE SLIDING BAR UNTIL FEED WHEEL MAKES ONE REVOLUTION TO DETERMINE THAT PAWL CLEARS HIGHEST TEETH, AS THEY SOMETIMES VARY IN LENGTH SLIGHTLY). TURN OUT AN ADDITIONAL QUARTER TURN AND TIGHTEN LOCKNUT.

ADJUST THE FINGER WHICH IS ATTACHED TO THE ARMATURE, BY MEANS OF ITS ADJUSTING SCREW, UNTIL THE HIGHEST SELECTING PIN IS ABOUT .006" ABOVE THE TAPE GUIDE PLATE WHEN THE SLIDING BAR FEED PAWL JUST ENGAGES THE RATCHET WHEEL. DETERMINE THIS BY PRESSING IN ON ARMATURE AND SIGHTING THE PINS ON THE GUIDE PLATE WHEN FEED PAWL JUST TOUCHES A TOOTH IN THE RATCHET WHEEL.

PUT BLANK TAPE IN THE TRANSMITTER AND LET SELECTING PINS COME UP AGAINST IT. TURN SPACING CONTACT SCREWS IN UNTIL THEY JUST TOUCH THEIR RESPECTIVE TONGUE CONTACTS. GIVE EACH SCREW AN EXTRA THREE QUARTERS TURN.

WITH THE BLANK TAPE STILL I THE TRANSMITTER, AND THE SPACING CONTACTS ADJUSTED, TURN THE MARKING CONTACTS TO WITHIN .006" OF THEIR RESPECTIVE TONGUE CONTACTS. USE A GAUGE.

DISREGARD ANY TENDENCY OF THE TONGUES TO LEAVE THEIR SPACING CONTACTS IRREGULARLY WHEN TRANSMITTER IS OPERATED.

ADJUST SELECTOR LEVER SPRINGS BY MEANS OF THE ADJUSTABLE ANCHOR SO THAT IT WILL REQUIRE A FORCE OF ONE OUNCE TO MOVE TONGUES AWAY FROM SPACING CONTACTS WHEN THE SELECTING PINS ARE HELD DOWN; MEASURE AT TOP OF TONGUE.

ADJUST SPRING ATTACHED TO SELECTING PIN SPRING LEVERS BY MEANS OF ADJUSTING NUTS (HOLES IN BRACKET ARE LARGE ENOUGH TO PERMIT RAISING OF SCREWS WITHOUT TURNING THEM). IT SHOULD REQUIRE ABOUT 3/4 TO ONE OUNCE TO MOVE TONGUES AWAY FROM THE MARKING CONTACTS WHEN THE SELECTING PINCS ARE IN THEIR UP OR RELEASED POSITION; MEASURED AT TOP OF TONGUE.

WITH SELECTING PINS HELD DOWN MOVE THE TONGUES AWAY FROM THEIR SPACING CONTACTS AND SEE THAT THEY RETURN TO THEIR SPACING CONTACTS FREELY WHEN RELEASED.

WITH THE PINS IN THEIR RELEASED OR UP POSITION, MOVE TONGUES AWAY FROM THEIR MARKING CONTACTS AND SEE THAT THEY RETURN FREELY WHEN RELEASED.

THE ARMATURE BACKSTOP SCREW:- ADJUST UNTIL THE FINGER CLAW CLEARS THE LOWER EXTENSIONS OF THE SELECTING PINS BY .020". THIS ADJUSTMENT MAY ALSO BE MADE BY PUTTING THE TRANSMITTER IN OPERATION, RUNNING RELEASES. TURN IN BACKSTOP SCREW UNTIL FALSE LETTERS APPEAR, THEN BACK OFF SLOWLY UNTIL RELEASES RUN CLEAR AND GIVE AN ADDITIONAL HALF TURN. TIGHTEN LOCKNUT SECURELY. ("RELEASES" ARE MESSAGES IN PRESS BUREAU LANGUAGE).

DETENT ROLLER SPRING:- SHOULD REQUIRE 3-1/2 OUNCES TO MOVE ROLLER AWAY FROM RATCHET WHEEL, MEASURED AT END OF DETENT ROLLER ARM.

IT IS IMPORTANT THAT DISTRIBUTOR CONTACTS BE KEPT CLEAN AND PROPERLY ADJUSTED. IF CONTACT GAP IS TOO WIDE, OR POINTS DIRTY, THE TRANSMITTER WILL NOT FEED PROPERLY.

NOTE:- TRANSMITTER CONTACTS OPEN AND CLOSE WITH CURRENT TURNED OFF. AFTER CONTACTS HAVE BEEN POSITIONED THE DISTRIBUTOR CAUSES PULSES OF CURRENT TO FLOW THROUGH THE VARIOUS CONTACTS. SPARKING OF ANY KIND AT THE CONTACTS OF A TELETYPE TAPE TRANSMITTER IS POSITIVE PROOF OF MOVEMENT OF THE CONTACTS, BECAUSE OF VIBRATION OR OTHER REASON. CONTACTS SHOULD BE OBSERVED WITH ROOM IN DARKNESS. DIRTY OR PITTED CONTACTS ARE FREQUENTLY RESPONSIBLE.

AMATEUR RADIOTELETYPE NEWSLETTER --- FEBRUARY 1951

YOUR RTTY SOCIETY HAS BEEN OBTAINING EQUIPMENT FROM MORE THAN HALF OF THE MAJOR COMPANIES MAKING USE OF SUCH GEAR. THE TWO LARGEST USERS OF TELETYPEWRITER APPARATUS ARE WESTERN UNION AND THE BELL TELEPHONE SYSTEM. IT IS ONLY RECENTLY THAT WE HAVE BEEN ABLE TO ESTABLISH A SATISFACTORY CONTACT WITH THE FORMER AND ARE NOW RECEIVING QUANTITIES OF THE PRECIOUS EQUIPMENT FROM THEM.

WE HAVE BEEN WORKING ON THE PROBLEM OF SECURING PRINTING TELEGRAPH UNITS FROM THE BELL SYSTEM ALMOST SINCE THE INCEPTION OF AMATEUR RTTY BUT, UP UNTIL RECENTLY, ABSOLUTELY NO HEADWAY HAS BEEN MADE. THE TRADITIONAL POLICY OF THE BELL COMPANIES IS TO DESTROY, OR RETURN TO WESTERN ELECTRIC FOR CREDIT, ALL SUPERSEDED MACHINES. INDIVIDUAL COMPANIES DO NOT HAVE THE POWER TO CHANGE THESE POLICIES, WHICH ARE CONTROLLED BY CONTRACTUAL ARRANGEMENTS.

WHEN WE HAD JUST ABOUT GIVEN UP, BY ONE OF THOSE PECULIAR ACCIDENTS OF "FATE", OR WHATEVER YOU WANT TO CALL IT, ONE OF LOCAL BOYS HAPPENED TO MENTION THAT HIS BROTHER-IN-LAW WAS A VICE-PRESIDENT OF A.T. & T. (!) THAT WAS ALL WE NEEDED TO KNOW. WE HAVE CONTINUALLY KEPT THE "PRESSURE" ON THIS MEMBER UNTIL WE SUCCEEDED IN "WANGLING" AN INTERVIEW WITH HIS RELATIVE. CONTRARY TO OUR FEARS OF A FORMAL "STRAITLACED" MEETING IT TURNED OUT THAT HE HAS MORE THAN A LITTLE KNOWLEDGE OF AMATEUR RADIO AFFAIRS AND WAS GREATLY INTERESTED IN WHAT WE WERE DOING. A DEMONSTRATION OF HAM RTTY WAS PUT ON FOR HIM (UNOFFICIALLY, OF COURSE) AND WE RECEIVED HIS PROMISE TO SEE WHAT HE COULD DO TO GET AN ORDER PUT THROUGH ENABLING INDIVIDUAL BELL COMPANIES TO DISPOSE OF THEIR PRINTERS WITHOUT DESTROYING THEM. ONCE THE "ICE IS BROKEN", HE TELLS US, IT WILL NOT ONLY BE POSSIBLE FOR YOUR SOCIETY TO SECURE EQUIPMENT BUT WILL MAKE IT POSSIBLE FOR GROUPS, ALL OVER THE COUNTRY, WITH OUR INTERVENTION, TO SECURE QUANTITIES OF THIS GEAR AS IT COMES UP FOR DISPOSAL. THIS IMPORTANTLY-PLACED SYMPATHIZER IN THE BELL SYSTEM HAS ALREADY STARTED THE MACHINERY IN MOTION. UNDERSTANDABLY HE HAS ASKED US NOT TO PUBLICIZE HIS NAME AS THIS MIGHT INTERFERE WITH THE FURTHERANCE OF THE PROJECT. SEVERAL RTTY LOCAL GROUPS HAVE BEEN PETITIONING THE TELEPHONE COMPANIES IN THEIR OWN VICINITIES TO RELEASE EQUIPMENT WITHOUT SUCCESS. WE ANTICIPATE THAT THEY WILL SHORTLY FIND A MUCH MORE FRIENDLY ATTITUDE ON THE PART OF THESE COMPANIES. PLEASE BE PATIENT GANG! AFTER ALL, ROME WAS NOT BUILT IN A DAY!

SEVERAL OTHER COMPANIES HAVE PRINTERS AND ORIGINALLY TURNED US DOWN BUT WE NOW HAVE THE "KNOW-HOW" TO PRY THE MACHINES LOOSE. WE WILL ANNOUNCE IN THESE NEWSLETTERS WHAT SUCCESS WE HAVE.

THERE ARE NUMEROUS POSSIBILITIES FOR REMOTE CONTROL OF AMATEUR EQUIPMENT, NOT NECESSARILY TELETYPE, BY MEANS OF CONTACTS ATTACHED TO CERTAIN OF THE MOVING PARTS OF A RECEIVING PRINTER. IN ACTUALITY EVERY SINGLE PRINTING OPERATION OR "STUNT" OF A TELETYPE MACHINE IS "REMOTE CONTROL" BUT WHAT WE HAVE SPECIFIC REFERENCE TO IS THE OPERATION OF SOME OTHER EQUIPMENT, APART FROM THE PRINTER, SUCH AS THE CONTROL OF A REMOTE RADIO TRANSMITTER, TURNING ON OR OFF A REPERFORATOR, OR THE DISTANT AUTOMATIC CONTROL OF A "RETRANSMIT" CIRCUIT TO RELAY A TELETYPE SIGNAL TO RECEIVING STATION THROUGH A "BOOSTER" STATION LOCATED AT AN INTERMEDIATE POINT.

MANY WIRE LINE PRINTERS ARE ALREADY EQUIPPED FOR CERTAIN REMOTE CONTROL "STUNTS" WHEN OBTAINED FOR MEMBERS BY THE SOCIETY. SOME OF THESE ARE THE "STOP ON UPPER-CASE "H", WHICH IS FOUND ON MANY PRINTERS. A NUMBER OF OTHER MACHINES, NORMALLY EQUIPPED WITH ALARM BELL ("BULLETIN" BELL) ON UPPER-CASE "S" OR UPPER-CASE "J", ARE FREQUENTLY RECEIVED AND FOUND TO HAVE A MICROSWITCH ASSEMBLY OPERATED BY THE MECHANISM NORMALLY MOVING THE BELL CLAPPER. A FEW MACHINES NORMALLY HAVING BELL ON THE "BLANK" KEY (ALL 5 BAUDS SPACING) HAVE BEEN RECEIVED WITH A MICROSWITCH IN PLACE OF THE MECHANICAL BELL SYSTEM.

THE "STOP ON UPPER "H" FUNCTION" HAS LITTLE OR NO VALUE TO AMATEURS BECAUSE IT DEPENDS, FOR RESTARTING MOTORS, ON THE BREAKING OF THE STEADY MARKING CONDITION NORMALLY HOLDING PRINTER WIRELINE CIRCUITS IDLE. AMATEUR RADIO TECHNIQUE DOES NOT CALL FOR THE MAINTENANCE OF A STEADY RADIO SIGNAL AT MARKING FREQUENCY DURING NON-OPERATING INTERVALS WHICH WOULD, THEREFORE, RESULT IN THE STARTING OF THE MOTORS UNINTENTIONALLY. THE STANDARDIZED AUTO-START SYSTEM, DEVELOPED ONLY FOR AFSK ALTHOUGH IT HAS FOUND OCCASIONAL APPLICATION IN AMATEUR FSK WORK, HAS PROVED SO UTTERLY DEPENDABLE IN UNFAILINGLY STARTING AND STOPPING DISTANT PRINTERS, WHILE IGNORING COMPLETELY SIGNALS FROM NON-TELETYPE SOURCES, THAT THE BUILT-IN MOTOR STOP-FUNCTION IS OF LITTLE OR NO USE. IT IS RECOMMENDED TO OUR MEMBERS THAT THE STOP-FUNCTION BE DISABLED AT THE SAME TIME THE "UNSHIFT ON SPACE" IS REMOVED. THIS WILL AVOID THE POSSIBILITY OF A LOST MESSAGE IF THE DISTANT OPERATOR ACCIDENTLY HITS THE "H" KEY WHILE IN UPPER CASE.

THE MICROSWITCHES ON EITHER UPPER "S", UPPER "J" OR "BLANK" KEYS CAN BE UTILIZED FOR ANY SPECIAL CONTROL PURPOSE DESIRED ALTHOUGH IT MIGHT BE WISE TO AVOID THE "BLANK" SINCE THIS CODE COMBINATION IS RECEIVED IF THE MACHINE RUNS "OPEN" ON A MISTUNED SIGNAL (FSK) OR DURING THE FIRST HALF SECOND OF AN AUTOMATIC "STOP" SIGNAL (STEADY SPACING OF MORE THAN ONE SECOND). USE OF THESE CONTACTS DIRECTLY LEAVES THE AMATEUR RTTY EXPERIMENTER "WIDE OPEN" TO THE POSSIBILITY THAT THE CONTROL CIRCUIT WILL BE FALSELY OPERATED BY A GARBLED OR QRM'D SIGNAL OR THE ACCIDENTAL STRIKING OF THE WRONG KEY BY THE SENDING OPERATOR. A MUCH MORE RELIABLE METHOD INVOLVES THE USE OF A CIRCUIT REQUIRING TWO OR MORE RAPID CLOSURES OF THE MICROSWITCH TO PERFORM THE CONTROL OPERATION. ELABORATING ON THIS WE CAN MOUNT AN ADDITIONAL MICROSWITCH ON SOME OTHER PART OF THE SELECTING MECHANISM AND REQUIRE A SEQUENTIAL RELATIONSHIP OF SWITCH CLOSINGS TO PERFORM THE REMOTE CONTROL "STUNT". THERE IS ONE PART OF THE MACHINE UNIQUELY ADAPTED FOR THIS SECOND MICROSWITCH; THIS IS THE CARRIAGE RETURN MECHANISM. REGARDLESS OF THE MODEL OR STYLE OF THE MACHINE EMPLOYED IT WILL BE FOUND THAT THEY ALL HAVE SOME MECHANISM WHICH IS IN A DISPLACED POSITION AFTER THE CARRIAGE-RETURN CODE HAS BEEN RECEIVED AND WHICH REMAINS IN THIS CONDITION UNTIL THE CARRIAGE HAS COMPLETELY RETURNED. WE CAN MOUNT OUR SWITCH ON THIS LINKAGE. WHY IS THIS SUPERIOR TO OTHER PLACES? WELL, IF YOU RECALL, THE CARRIAGE, IN RETURNING, REQUIRES THE INTERVAL OF TIME OF TWO ORDINARY CHARACTER SELECTIONS. THIS IS PARTLY BECAUSE OF THE NEED FOR THE "BUFFER CYLINDER" WHICH ACTS, LIKE A PNEUMATIC DOOR CHECK, TO ABSORB THE JOLT OF THE RETURN. NOW A SWITCH MOUNTED ON THE ABOVE-MENTIONED LINKAGE WOULD, THEREFORE, BE CLOSED FOR AT LEAST PART OF THE TIME OCCUPIED BY ANY CHARACTER IMMEDIATELY FOLLOWING THE CARRIAGE-RETURN, YET THE SWITCH WILL BE OPEN WHEN THE CARRIAGE HAS "HOMED". BECAUSE OF THE SLOW RETURN OF THE CARRIAGE IT IS STANDARD COMMERCIAL AND MILITARY (AND AMATEUR) PRACTICE TO ALWAYS FOLLOW THE CAR.RET. WITH LINE FEED. THE LINE FEED OPERATION CAN TAKE PLACE WHILE THE CARRIAGE IS STILL IN MOTION RETURNING TO THE BEGINNING OF THE NEXT LINE.

NOW IF A MICROSWITCH IS PLACED, OR ALREADY EXISTS, SAY, ON UPPER "S" AND THE SWITCH MOUNTED ON THE CAR.RET. LINKAGE IS PLACED IN SERIES WITH THE UPPER-"S" SWITCH THEN THE ONLY TIME A COMPLETE CIRCUIT WILL RESULT WILL BE WHEN A RAPID CAR.RET. KEY DEPRESSION IS FOLLOWED IMMEDIATELY BY THE "S". SENDING EITHER CHARACTER ALONE, SEPARATED BY AN INTERVENING CHARACTER, OR IN REVERSED SEQUENCE, WILL LEAVE THE CIRCUIT REMAIN OPEN. EVEN A PRINTER PERMITTED TO RUN "OPEN" ON RECEIVED NOISE, IN THE ABSENCE OF A RECEIVED SIGNAL, WOULD FIND DIFFICULTY IN FALSELY OPERATING THIS SWITCHING COMBINATION. NORMALLY NO OTHER CHARACTER BUT LINE FEED EVER FOLLOWS CARRIAGE RETURN, SO A NUMBER OF SELECTIVE COMBINATIONS ARE POSSIBLE BY OPERATING DIFFERENT DEVICES THROUGH SWITCHES PLACED ON VARIOUS LETTER LINKAGES, PROTECTED BY THE "CARRIAGE-IN-TRANSIT" PROTECTIVE IDEA. A NUMBER OF STUNTS HAVE BEEN PERFORMED BY W2BFD, WHO DEVELOPED THE SYSTEM AS DESCRIBED.

ANOTHER STUNT USED FOR AWHILE HAS BEEN THE USE OF THE MICROSWITCH ON UPPER "S" TO SWITCH ON THE DISTANT STATION'S TRANSMITTER WHEN YOU TURN THE CIRCUIT OVER TO HIM. IF THE DISTANT OPERATOR IS OCCUPIED ELSEWHERE IN THE SHACK HE WILL FIND THE RIG IN THE SENDING CONDITION BY THE TIME HE ARRIVES BACK AT THE PRINTER. IT IS NOT KNOWN, AT THIS TIME, WHETHER OR NOT THIS TECHNIQUE IS LEGAL BUT WE ASSUME THAT IT IS, SINCE THE DISTANT OPERATOR IS PRESENT IN THE SHACK AND CAN OVER-RULE THE CONTROL CONTACTS IF HE WISHES THE TRANSMITTER TO STAY OFF. THE SYSTEM HAS NOT BEEN VERY POPULAR DUE TO CERTAIN SHORTCOMINGS WHEN THE SIGNALS ARE MARGINAL. A BONA-FIDE AUTO-START SYSTEM WOULD BE SUPERIOR TO THIS COMPROMISE METHOD. ITS MAIN VIRTUE IS SIMPLICITY.

PLACING SWITCHES ON LETTER OR NUMERAL TYPEBAR LINKAGES HAS A CERTAIN ADVANTAGE SINCE IT PERMITS LATER READING OF THE PRINTED LETTERS REPRESENTING THE CONTROL FUNCTIONS THAT HAVE BEEN TRANSMITTED. IF TROUBLE DEVELOPS THE PERFORMANCE RECORD IS PRINTED IN BLACK AND WHITE.

REMOTE CONTROL OF A REPERFORATOR IS AN IMPORTANT JOB AND A USEFUL ONE. IMAGINE THAT STATION "A" HAS A MESSAGE FOR STATION "C", WHO IS OUT OF RANGE. STATION "B" IS MIDWAY AND CAN WORK BOTH BUT, UNFORTUNATELY, OPERATOR "B" IS NOT AT HOME. OF COURSE WE CAN AUTO-START PRINTER "B" BUT, IF THE MESSAGE IS A LENGTHY ONE, OPERATOR "B", WHEN HE GETS BACK, WILL HAVE TO RETYPE IT ALL, INCURRING THE POSSIBILITY OF ERRORS. NOW IF WE CAN REMOTELY START THE REPERFORATOR AT STATION "B" ALL THAT O.M. "B" WILL HAVE TO DO WHEN HE ARRIVES IS TO TURN ON THE PRINTER AT "C" BY STANDARD TECHNIQUE AND RERUN THE TAPE HE FINDS HANGING OUT OF HIS "REPUNCH". OF COURSE THE STARTING OF THE REPERFORATOR SHOULD BE SELECTIVE SO THAT TAPE IS NOT MADE OF ALL INCOMING TRANSMISSIONS BUT ONLY THOSE REQUIRING RELAYING. ALTHOUGH THERE HAS ONLY BEEN A BIT OF EXPERIMENTAL REPERFORATOR CONTROL WORK DONE IT WOULD BE WISER, IN VIEW OF PAST EXPERIENCES, TO ADOPT STANDARDS AT THIS TIME FOR THIS PARTICULAR FUNCTION, TO BE ASSIGNED TO NO OTHER FUNCTION. BECAUSE ALL EXPERIMENTAL WORK, THUS FAR, HAS SUCCESSFULLY USED THE RAPID TRANSMISSION OF SIX OR MORE CARRIAGE-RETURN SIGNALS IN SEQUENCE, THE SOCIETY HAS DECIDED TO ADOPT THIS AS THE STANDARD UNLESS IMPORTANT OBJECTIONS ARE BROUGHT FORTH BEFORE JANUARY 1948. A MINIMUM OF SIX CAR.RET. SIGNALS ARE REQUIRED, ALTHOUGH MORE ARE DESIRABLE AND WILL INSURE RELIABLE STARTING OF THE REPERFORATOR. INTERMIXTURE OF ANY OTHER CHARACTER IN WITH THE SEQUENCE WILL RECYCLE THE COUNT AND REQUIRE AN ADDITIONAL SIX TO ACCOMPLISH THE DESIRED PURPOSE. ANY BETTER SUGGESTIONS FELLERS? 73 DE W2BFD

AMATEUR RADIOTELETYPE NEWSLETTER --- JANUARY 1951

WE HAVE BEEN TELLING YOU RIGHT ALONG THAT GREAT POSSIBILITIES EXIST FOR AMATEUR RADIOTELETYPE IN EMERGENCY AND DISASTER COMMUNICATIONS, JUST AS 'PHONE AND CW AMATEURS HAVE RENDERED INVALUABLE SERVICES DURING NATURAL AND MANMADE CATASTROPHES IN THE PAST. THE VERY HIGH WORD-PER-MINUTE ABILITY OF AUTOMATIC PRINTERS, THE CAPABILITY OF RELAYING DIRECTLY INTO WIRE TELETYPE LINES, THE DEPENDABILITY OF FSK AND AFSK AS A MEANS OF TRANSMISSION AND THE ABILITY TO PERFORATE DISTRESS TRAFFIC IN TAPE IN THE ORDER OF PRIORITY ARE ALL FAVORABLE TO AMATEUR RADIOTELETYPE PARTICIPATION IN EMERGENCY WORK. NATURALLY NO ONE WANTS A DISASTER BUT, IN THE EVENT OF ONE TRANSPILING, A PROPERLY-FUNCTIONING RTTY TEAM COULD VERY WELL BRING CREDIT TO AMATEUR RADIO.

THE FACT THAT THIS IS KNOWN TO THE "POWERS THAT BE" IS INDICATED BY THE APPOINTMENT OF YOUR SECRETARY AS "EMERGENCY COORDINATOR" FOR "THE ENTIRE NYC AND L.I. SECTION, SPECIFICALLY IN THE RADIOTELETYPE SERVICE" IT IS THE FIRST SUCH APPOINTMENT TO BE MADE.

AS IS WELL-KNOWN TO OUR MEMBERS, OUR RTTY HEADQUARTERS, SINCE THE FOUNDING OF THE SOCIETY, HAS BEEN A SMALL AMOUNT OF SPACE ON THE PREMISES OF THE ELECTRONIC DEVICE COMPANY. WE ARE FAST OUTGROWING OUR SMALL QUARTERS BUT THIS IS THE ONLY SPACE AVAILABLE TO US AT THE PRESENT TIME. FOR ONE REASON, OUR RENT HAS BEEN ZERO (AN IMPORTANT CONSIDERATION FOR A NEWBORN ORGANIZATION, SUCH AS OURS, HAVING LEVIED NO DUES UPON ITS MEMBERS). THERE IS A POSSIBILITY THAT OUR HOST, ELECTRONIC DEVICE COMPANY, WILL VACATE THESE PREMISES FOR A LARGER, MORE CENTRALLY-LOCATED, SPACE. IF THIS TAKES PLACE IT IS OUR PROPOSAL THAT THE SOCIETY ASSUME THE TENANCY OF THE COMPLETE SPACE AT 38-06 61ST STREET, WOODSIDE, N.Y.

THE QUESTION OF RAISING FUNDS IS ALWAYS A "TOUCHY" SUBJECT, EVEN IN A HOBBY. THE SOCIETY MEMBERS HAVE DISCUSSED WAYS AND MEANS TO PERPETUATE OUR "GOOD WORKS" WITHOUT THE NECESSITY OF YEARLY MEMBERSHIP DUES. IT IS FELT THAT SOME MEMBERS RECEIVE GREATER DIRECT BENEFITS FROM THE OPERATION OF THE SOCIETY. EQUAL DUES, PAID BY ALL, WOULD BE PENALIZING A LARGE NUMBER OF OUR AMATEUR FOLLOWERS. SINCE THE SOCIETY WAS FORMED TO BE A NON-PROFIT ORGANIZATION THE YEAR-END SCORE SHOULD DISCLOSE NO PROFIT. ON THE OTHER HAND TO BE SOLVENT, AMATEUR RADIOTELETYPE, VHF TELETYPE SOCIETY MUST PAY ITS BILLS. TO BE ON THE SAFE SIDE WE SHOULD WIND UP THE YEAR'S OPERATIONS SLIGHTLY ON THE "BLACK-INK" SIDE OF THE LEDGER. ANY SMALL GAIN CAN BE KEPT IN THE "POSTAGE FUND" OR SPENT ON PUBLICIZING FURTHER THIS HOBBY OF OURS.

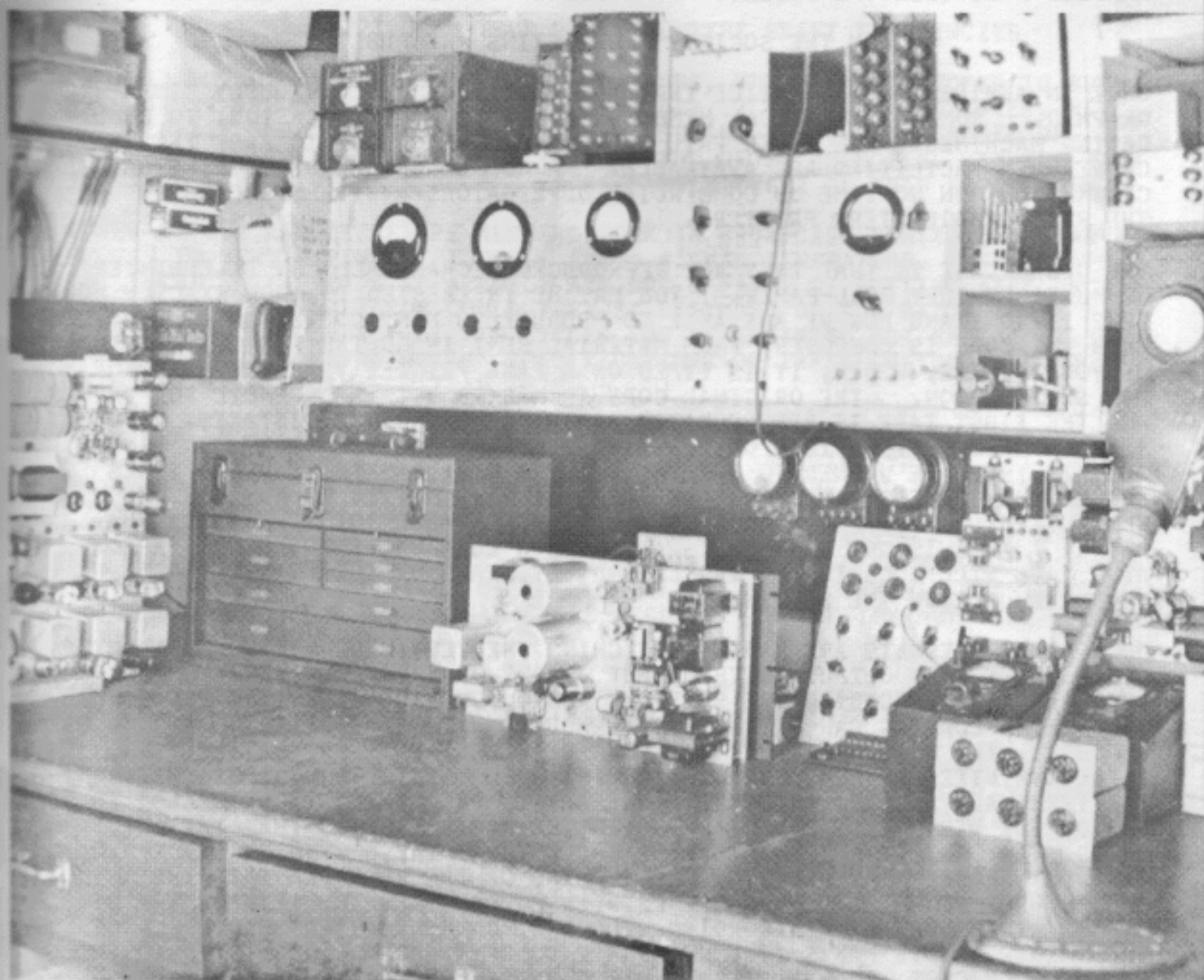
THE TELEPRINTER EQUIPMENT, OBTAINED AT COST FOR MEMBERS, HAS BEEN POINTED OUT TO US BY MANY AS THE LOGICAL PLACE TO RAISE FUNDS BY "TACKING" ON A SMALL "FEE" FOR THE SUPPORT OF THE ORGANIZATION WHICH, UNTIL NOW, HAS BEEN MAINTAINED BY CONTRIBUTIONS AND DONATIONS. HOWEVER THE BOOKKEEPING JOB OF PRO-RATING EACH MEMBER'S COSTS WOULD BE MORE THAN WE WOULD CARE TO TACKLE. THE DECISION WENT IN FAVOR OF EVENTUALLY RAISING SUFFICIENT FUNDS BY PUBLISHING TECHNICAL DATA AND BLUEPRINTS AT SLIGHTLY OVER COST. THE EXACT PRICE COULD BE VARIED, FROM TIME TO TIME, TO KEEP US "OUT OF THE RED" BY A SMALL MARGIN. HOWEVER THE GREAT BULK OF THE MATERIAL WILL STILL BE CONTINUED AVAILABLE FREE TO ALL. THE SOCIETY'S BULLETINS WILL CONTINUE TO BE MAILED TO ALL WHO MAINTAIN STAMPED, SELF-ADDRESSED ENVELOPES ON FILE AT HEADQUARTERS FOR THIS PURPOSE.

THESE BULLETINS HAVE AVERAGED ABOUT ONE PER WEEK SINCE THE MIDDLE OF 1946. IF WE INCLUDE THE "FLASHES", NEWS-LETTERS, AND NOTICES OF BATCHES OF MACHINES AVAILABLE, THEN WE HAVE AVERAGED ONE A DAY (OR BETTER!).

AMATEUR RTTY NEWSLETTER

WELL, IN SPITE OF MY SAYING THAT SOMEONE ELSE OUGHT TO TAKE A "WHACK" AT THIS JOB, YOU'VE GONE AND ELECTED ME PERMANENT SECRETARY OF THE SOCIETY AND I DON'T KNOW IF YOU GUYS HAVE ANY IDEA HOW BIG A HEADACHE YOU HANDED ME BUT, NATURALLY, I WILL DO MY BEST TO FURTHER AMATEUR RADIOTELETYPE AS I HAVE IN THE PAST. I AM GOING TO NEED ALL THE HELP I CAN GET IN PERFORMING THESE TASKS SO NOW IS THE TIME FOR VOLUNTEERS TO TALK UP. IN PARTICULAR WE NEED HELP WITH THE CLERICAL WORK THAT, NECESSARILY, GOES ALONG WITH A JOB OF THIS SORT. BECAUSE THE HEAD OFFICES OF ALL THE CONTRACTED COMPANIES FURNISHING EQUIPMENT ARE LOCATED IN NEW YORK CITY IT IS PERFECTLY NATURAL THAT THE SOCIETY'S OFFICE IS ALSO LOCATED HERE, AND FOR NO OTHER REASON. VOLUNTEERS IN THE METROPOLITAN NEW YORK AREA ARE ESPECIALLY NEEDED SINCE THE FILES ARE AVAILABLE HERE. WE NEED ADDITIONAL HELP IN ANSWERING MAIL FROM MEMBERS AND OTHER INTERESTED RADIO AMATEURS AND ALSO TO ASSIST IN THE EXTENSIVE CORRESPONDENCE BETWEEN THE SOCIETY AND THE WIRE COMPANIES, FREIGHT OUTFITS, PACKING CONCERNS ETC.

I PERSONALLY GET A HUGE "KICK" OUT OF CIRCULATING THE BULLETINS AND NEWSLETTERS FOR THE PAST SEVERAL YEARS BUT I FEEL I COULD DO A BETTER JOB FOR THE PRINTER GANG IF SOMEONE WOULD TAKE THE RESPONSIBILITY OF PUTTING OUT THE STUFF OFF MY SHOULDERS. SURELY AMONG YOU AVID RADIO-TYPISTS THERE MUST BE ONE OR TWO WHO HAVE ENOUGH SPARE TIME, INCLINATION AND ABILITY TO DO THE JOB! 73 DE W2BFD, EDITOR, PUBLISHER, SECRETARY.



CORNER OF THE LABORATORY SETUP AT RTTY HEADQUARTERS

Complete measuring facilities are available at the headquarters laboratory for standardizing Mark and Space RTTY frequencies for both FSK and AFSK, determining the passband of selective amplifiers and wave filters, comparing the relative performances of different types of terminal units, precisely measuring the values of inductance, capacitance and resistance to a fraction of one percent and the checking of the timing circuits of Auto-Start RTTY converters. The main test bench is of solid oak construction and is 12 feet long. Along a panel to the rear, running the length of the test bench are a number of Maxwell, Wien, Owen, Wheatstone, Schering, Hay and Resonance shielded bridges. A group of electronically-sustained tuning fork frequency standard audio sources and a wave analyzer are also provided. Shelves above the test bench hold oscilloscopes with 6-cycle-per-second sweeps for examining RTTY signals for distortion, Strobotac units for "freezing" high-speed mechanical motion, regulated power supplies, etc. In this early picture of the headquarters lab may be seen one model of the "Super-Sonic" shifter (operating at 17 KC) to the right of the tool chest. A set of the plug-in W2BFD filters are visible, stacked behind the goose-neck lamp.

HOW THE SOCIETY'S BULLETINS ARE PUBLISHED

ONCE IN AWHILE YOU MAY NOTICE THAT THE BULLETINS ARE OBVIOUSLY MIMEOGRAPHED. SOME OF THE LOCAL MEMBERS HAVE ACCESS, ON OCCASION, TO DUPLICATING MACHINES. WE NEVER FAIL TO JUMP AT THE CHANCE TO EASE THE WEARY CHORE WHEN FACILITIES ARE AVAILABLE. A COUPLE OF HUNDRED COPIES CAN BE CRANKED OUT IN NO TIME ON COMMERCIAL DUPLICATORS---WITH STENCILS CUT ON THE RTTY HEADQUARTERS PRINTERS.

THE USUAL CASE IS THAT THEY ARE REPRODUCED MECHANICALLY BY TELEPRINTER ON MULTIPLE-COPY ROLL-PAPER. YOU MAY BE INTERESTED TO KNOW EXACTLY HOW THIS IS DONE AND HOW WE ARE ABLE TO PRODUCE SO MANY COPIES IN A HURRY. WHEN THE COPY IS COMPOSED, FROM MATERIAL SENT IN OR THE FERTILE CRANIUM OF YOUR SCRIBE, W2BFD, IT IS TYPED ON A PAGE PRINTER WITH THE REPERFORATOR SWITCHED ON. THE ORIGINAL COPY IS MARKED WITH RED PENCIL FOR ERRORS AND THE FIRST TAPE IS REPERFORATED AGAIN, DELETING THE MISTAKES. FOR A SMALL NUMBER OF COPIES, OR VERY SHORT BULLETINS, THE START AND FINISH OF THIS TAPE ARE JOINED TO MAKE AN ENDLESS BELT PASSING SEVERAL TIMES AROUND TWO ROLLERS ABOUT SIX FEET APART AND PERMITTED TO RUN CONTINUOUSLY WHILE FEEDING ANYTHING FROM 2 TO 6-COPY ROLL-PAPER INTO THE HUNGRY MACHINE. THIS IS NOT VERY SATISFACTORY FOR LONG BULLETINS SINCE PERFORATOR TAPE WILL OCCASIONALLY TANGLE AND, BY MEANS OF THE "TIGHT-TAPE" LEVER, SHUT DOWN THE SENDING.

MUCH BETTER RESULTS ARE HAD BY SWITCHING THE TERMINAL UNIT TO "TRANSMIT" AND FEEDING AFSK OUTPUT TO THE INPUT OF ONE OF THESE NEW-FANGLED WIRE-RECORDERS AND RECORDING THE SHIFTING AUDIO TONES REPRESENTING THE SIGNAL. THE WIRE-RECORDING CAN OPERATE CONTINUOUSLY WITHOUT MONITORING AND, ONCE RECORDED, THE ORIGINAL PAPER TAPE CAN BE FILED AWAY FOR SAFE-KEEPING WHILE THE WIRE PERFORMS THE DUPLICATING JOB. THIS IS DONE BY SWITCHING THE TERMINAL PANEL TO "RECEIVE" AND PLAYING BACK THE "JINGLE-BELLS" TO IT. ONE OF THE VERY GREAT ADVANTAGES OVER THE PAPER TAPE IS THAT THE AUTOMATIC START AND STOP SIGNAL CAN BE INCLUDED AT THE BEGINNING AND END OF THE WIRE SPOOL. BY PLUGGING THE AC LEAD OF THE RECORDER INTO THE SAME SOURCE OF AC SUPPLYING THE PRINTER MOTORS THE RECEPTION OF THE STOP SIGNAL AT THE END OF A RECORDING WILL SHUT DOWN EVERY BLESSED PIECE OF EQUIPMENT. THIS MAKES IT UNNECESSARY TO HANG AROUND AND LISTEN TO THE RACKET. RACKET, DID WE SAY? LET US HASTEN TO EXPLAIN:-

THE SOCIETY HAS SECURED THE USE OF A BASEMENT SPACE IN THE WALRUS SOCIAL CLUB IN NEARBY ASTORIA, LONG ISLAND. WE HAVE SET UP FOUR MODEL 12 PAGE PRINTERS AND A MODEL 24, ALL DRIVEN FROM A WIRE-RECORDER, TERMINAL UNIT SETUP AS EXPLAINED. THE MACHINES NORMALLY ARE LOADED WITH 3-COPY PAPER BUT 6-COPY IS AVAILABLE FOR A LONG RUN. EACH OF THE MACHINES WITH 6-COPY PAPER CAN TURN OUT ABOUT 24 COPIES OF THE AVERAGE-LENGTH BULLETINS IN AN HOUR FOR A TOTAL OF ABOUT 120. THE DIN IS QUITE SEVERE! WITH THE AUTOMATIC SHUTDOWN FEATURE WE JUST START THE WORKS GOING AND RUN. WHEN WE RETURN EVERYTHING IS QUIET AS A MOUSE AND WE JUST CUT THE NEATLY-PRINTED BULLETINS APART AND MAIL THEM. THE WIRE RECORDER SPOOLS ARE ONLY A TRIFLE LARGER THAN TYPEWRITER RIBBON SPOOLS AND ARE VERY CONVENIENT TO STORE AND HANDLE. ALL OF THE EARLIER BULLETINS THAT WERE ONLY ON PERFORATED TAPE HAVE BEEN TRANSFERRED ALSO TO WIRE.

IN CASE YOU ARE WONDERING WHY WE DO NOT MAKE USE OF PROFESSIONAL DUPLICATING SERVICES WE CAN EXPLAIN IN A FEW WORDS; EXPENSE AND NO REVENUE! THE PRESENT SERIES OF BULLETINS ARE FURNISHED GRATIS BY JOHN WILLIAMS TO STIMULATE THE "GANG" AND TO AID THE DEVELOPMENT OF AMATEUR RTTY. IF YOU FEEL GRATEFUL DON'T WASTE YOUR EFFORT ON THANKS BUT GET TO WORK AND SPREAD THE DOCTRINE OF AMATEUR RADIOTELETYPE FAR AND WIDE. IF RECEIVING FREE BULLETINS BOTHERS YOUR CONSCIENCE YOU MAY SEND IN STAMPED, SELF-ADDRESSED ENVELOPES TO MAKE THE JOB SIMPLER AND LESS EXPENSIVE.

THE METHOD WE ARE USING FOR PRODUCTION HAS DEFINITE SHORTCOMINGS BUT IS VERY FLEXIBLE AND WE CAN ISSUE A BULLETIN OR A NEWS-LETTER AT THE DROP OF A HAT. THE BULLETINS ARE RUN OFF ON AN APPROXIMATELY WEEKLY BASIS BUT THE MACHINES ARE KEPT BUSY ON THE OTHER DAYS WITH "FLASHES" NEWS-LETTERS AND REPRODUCTIONS OF THE ARRL OFFICIAL BULLETINS ETC. THE CAPACITY OF THE SYSTEM HAS JUST ABOUT BEEN REACHED AND THE NEXT STEP WILL PROBABLY HAVE TO BE THE USE OF LETTERPRESS OR MIMEO REPRODUCTION.

STANDARDIZING AMATEUR RADIOTELETYPE SHIFT FREQUENCIES

IT IS A UNIQUE THOUGHT THAT RADIO AMATEURS, WHO ARE ACCUSTOMED TO SUCH PRECISE RF FREQUENCY MEASUREMENTS IN ORDER TO HUG THE BAND EDGES, HAVE NO ACCURATE AND DEPENDABLE MEANS OF MEASURING AUDIO FREQUENCIES OR THE AUDIO FREQUENCY DIFFERENCE BETWEEN TWO RF FREQUENCIES. IN THE PAST YEAR AND A HALF WE HAVE BECOME INCREASINGLY AWARE OF THIS SHORTCOMING.

A FEW OF OUR RADIOTELETYPE MEMBERS WORK IN BROADCAST STATIONS AND HAVE ACCESS TO VERY EXPENSIVE TUNABLE AUDIO SIGNAL GENERATORS. STRANGE TO SAY THESE INSTRUMENTS APPARENTLY ARE NOT CAPABLE OF PUTTING AFSK OSCILLATORS "ON THE NOSE" NOR COULD THEY BE DEPENDED ON FOR BETTER THAN A PLUS-OR-MINUS ACCURACY OF TEN CYCLES FOR DETERMINING FSK SHIFT! WHY IS THIS? THE MANUFACTURERS' SPECIFICATIONS ON THESE INSTRUMENTS PROMISE MUCH BETTER PERFORMANCE THAN THIS.

PRACTICALLY ALL OF THE RTTY AMATEURS WITHIN 100 MILES OF METROPOLITAN NEW YORK CITY HAVE SIMPLIFIED THE PROBLEM BY BRINGING THEIR GEAR FOR STANDARDIZATION TO SOCIETY HEADQUARTERS IN WOODSIDE FOR COMPARISON WITH THE MECHANICAL OSCILLATOR PROVIDED BY YOUR EDITOR, W2BFD. THOSE THAT CAN NOT TRAVEL TO WOODSIDE ARE FURNISHED A STANDARD SIGNAL OVER THE AIR FOR CALIBRATION PURPOSES. SEVERAL MEMBERS HAVE EXPRESSED INTEREST IN CONSTRUCTING DUPLICATES OF THE W2BFD ELECTRONIC TUNING-FORK ASSEMBLY WHICH GUARANTEES A FRACTIONAL-CYCLE ACCURACY IN THE TUNE-UP OF TERMINAL UNITS.

THE BASIC OSCILLATOR CONSISTS OF A MUSICAL TUNING FORK OF "A"-ABOVE-MIDDLE-"C" PITCH (435 OR 440 CYCLES) WHICH IS ALTERED TO VIBRATE AT 425 CYCLES BY FILING BETWEEN THE TINES. A PERMANENT-MAGNET BIASED PICKUP COIL IS PLACED CLOSE TO THE END OF ONE TINE AND RESONATED WITH A PARALLEL CAPACITOR TO THE FORK FREQUENCY. THE OUTPUT OF THE PICKUP COIL IS AMPLIFIED AND FED BACK IN CORRECT PHASE TO ANOTHER SIMILAR COIL PLACED NEXT TO THE OPPOSITE TINE. THE RESULT IS MECHANICALLY SUSTAINED OSCILLATION OF HIGH ACCURACY OF FREQUENCY. TO RETAIN THE AMPLITUDE OF THE GENERATED TONE AT A LOW VALUE, WHICH YIELDS THE GREATEST PRECISION OF TONE FREQUENCY, AN "AUTOMATIC VOLUME CONTROL" SYSTEM IS INCORPORATED. THE ENTIRE FREQUENCY-STANDARD EQUIPMENT IS BEING DRAWN UP AND REPRODUCED BY HECTOGRAPH, ALONG WITH A MORE ELABORATE AND COMPLETE WORD-PICTURE. COPIES OF THE FORK-STANDARD PAMPHLET MAY BE HAD FOR THE ASKING BY WRITING W2BFD.

OTHER MEANS ARE AVAILABLE FOR SHIFT-FREQUENCY CALIBRATION. AN OLD IDEA ADOPTED FOR RTTY IS THE USE OF A SYNCHRONOUS MOTOR, BEARING A TOOTHED WHEEL (SUCH AS A STEEL GEAR) ON ITS SHAFT, ROTATING NEAR A MAGNETICALLY-BIASED PICKUP COIL SIMILAR TO THAT DESCRIBED FOR THE TUNING-FORK OSCILLATOR. BY CHOOSING A GEAR OF THE PROPER NUMBER OF TEETH IT IS POSSIBLE TO OBTAIN A WIDE VARIETY OF "STANDARD" FREQUENCIES WITH AN ACCURACY EQUAL TO THE STABILITY OF THE POWER-LINE FREQUENCY ITSELF. IT IS ALSO POSSIBLE TO DRIVE THE TOOTHED WHEEL THROUGH A GEAR RATIO, OR BELT, OR CHAIN-DRIVE IT TO PRODUCE FREQUENCIES NOT DIRECTLY AVAILABLE FROM THE MOTOR SHAFT. ACCURACY IS MORE THAN SUFFICIENT FOR THE PURPOSE, ALTHOUGH THE FORK STANDARD HAS A BIT MORE "FINNESSE".

IT IS POSSIBLE TO GENERATE AUDIO TONES BY BEATING THE OUTPUT OF TWO RF CRYSTAL-CONTROLLED OSCILLATORS TOGETHER AND TAKING THE DIFFERENCE BEAT. UNLESS ONE CAN BE CERTAIN THAT THE TEMPERATURE COEFFICIENT OF THE TWO OSCILLATOR CRYSTALS IS IDENTICAL IN BOTH CASES THERE IS A GREAT PROBABILITY THAT GENERATED TONES WILL "DRIFT".

STANDARD FREQUENCY PHONOGRAPH DISCS ARE ALSO AVAILABLE FOR \$1 FROM THE SOCIETY. ON ONE SIDE THERE ARE THREE TONES RECORDED AS FOLLOWS:- (1) 2975 CYCLES "SPACE" AFSK STANDARD FREQUENCY (2) 2125 "MARK" STANDARD FREQUENCY (3) 440 CYCLES RECORDED DIRECTLY FROM PICKED UP SIGNALS OF WWV. THE PURPOSE OF THIS LATTER TONE IS TO ENABLE A CHECK OF THE TURNTABLE SPEED FOR PLAYBACK. BY TUNING-IN WWV AND ADJUSTING THE VOLUME TO BE APPROXIMATELY THE SAME AS THE DISC PLAYBACK BEATS WILL BE AUDIBLY HEARD IF THERE IS A DIFFERENCE IN SPEED FROM THAT AT WHICH DISC IS RECORDED. ON THE REVERSE SIDE OF THE DISC IS RECORDED A HIGH-SPEED TELETYPE TEST MESSAGE FOR DEMONSTRATING AND CHECKING PRINTERS. RECORDING OF DISC IS BY AFSK TONES KEYED BY A HIGH-SPEED TAPE "HEAD". 73 DE W2BFD, EDITOR

THE VHF (2-METER) CONVERTER DESIGNED BY YOUR BULLETIN EDITOR, W2BFD, APPEARS IN THIS MONTH'S ISSUE OF "QST". AS MUCH MORE THAN HALF OF OUR "GANG" ARE PRESENTLY ON TWO METERS, BECAUSE OF THE NEBULOUS STATE OF OUR RIGHTS AND PRIVILEGES ON FREQUENCIES LOWER THAN THE 10-METER BAND, THIS CONVERTER MAY BE OF INTEREST TO YOU.

THE MAJORITY OF THE VHF RTTY BOYS ARE USING SEPARATE RECEIVERS WITH CRYSTAL-CONTROLLED LOCAL OSCILLATORS ON THEIR AUTO-START PRINTER EQUIPMENT. THIS IS THE BEST WAY TO INSURE THAT THE RECEIVER WILL NOT DRIFT OFF THE CALLING CHANNEL WHEN NO ONE IS IN THE SHACK. HOWEVER THE DISADVANTAGE OF A CRYSTAL RECEIVER IS THAT ONE DOES NOT KNOW WHAT IS TRANSPIRING ELSEWHERE ON THE BAND. THE MOST COMMON CRYSTAL RECEIVER IN PRESENT USE, BECAUSE OF AVAILABILITY AND CHEAPNESS, IS THE BC-624 RECEIVER FROM THE SCR-522 COMBINATION. A BULLETIN IS AVAILABLE, ON REQUEST, THAT GIVES THE DOPE ON "PEPPING-UP" THIS WELL-BUILT SURPLUS JOB. A GREAT DEAL CAN BE DONE TO THE FRONT END OF THE BC-624 TO IMPROVE IT. NOISE CAN BE REDUCED CONSIDERABLY. AN INSTRUCTIVE BULLETIN IS ALSO AVAILABLE FREE FROM THE SOCIETY REGARDING THE USE OF THE BEAUTIFUL AN/ARC-3 TRANSMITTERS AND RECEIVERS IN OUR AUTO-START PRINTER NETS.

THE VHF CONVERTER DESCRIBED IN "QST" IS SUFFICIENTLY STABLE TO ALSO BE USED WITH CLOCK-CONTROLLED AUTO-START, EXCEPT FOR EXTREMES OF TEMPERATURE. IT IS INTENDED TO FEED THE 12 MC I.F. STRIP OF THE BC-624 THROUGH A SHORT LENGTH OF COAXIAL CABLE. THE SAME RECEIVER CAN, THEREFORE, BE USED WITH EITHER THE CRYSTAL OR THE TUNABLE "FRONT-END" AT WILL. SOMEHOW THE EDITOR OF "QST", IN ECONOMIZING ON SPACE, DROPPED SEVERAL OF THE MOST IMPORTANT PHOTOGRAPHS FROM THE ARTICLE, MAKING FOR CONFUSION IN ASSEMBLING THE SECTIONALIZED STAGES. ANYONE WISHING THESE VIEWS, WITH INTENT TO BUILD THE UNIT, MAY RECEIVE THREE 8 X 10 GLOSSY PHOTOGRAPHS FREE OF CHARGE BY WRITING THE SOCIETY'S SECRETARY AS FOLLOWS:-

JOHN EVANS WILLIAMS, 38-06 61ST STREET
C/O AMATEUR RADIOTELETYPE SOCIETY
WOODSIDE, LONG ISLAND, N.Y.

AS YOU ALL KNOW, RTTY HEADQUARTERS HAS NO PAID STAFF. WE ALL CONTRIBUTE WHATEVER TIME IS AVAILABLE TO US AFTER THE DAY'S GAINFUL TOIL IS AT AN END. W2BFD IS THE EXCEPTION, THE ONLY ONE IN THE SOCIETY IN METROPOLITAN NEW YORK WHO IS SELF-EMPLOYED. VISITORS FROM OUT-OF-TOWN SOMETIMES COMPLAIN THAT THEY FIND NOBODY ON THE PREMISES WHEN THEY CALL TO SEE WHAT THIS AMATEUR RADIOTELETYPE IS ALL ABOUT. IF THESE AMATEURS WILL GIVE US ONE OR TWO DAYS ADVANCE NOTICE BY POSTCARD OR LETTER WE CAN GUARANTEE THAT THERE WILL BE A ROYAL WELCOMING COMMITTEE.

A LOT OF THE SECRETARIAL WORK FOR THE SOCIETY IS DONE BY THE LOCAL BOYS, AND MOSTLY BY W2BFD, AT HOME. THIS IS DONE SO THAT THE XYL DOES NOT BEGIN TO FEEL THAT, BESIDES 10 HOURS OF DAILY BREADWINNING, 2 OR 3 HOURS OF HAMMING (MOSTLY ON PRINTER), THAT THE RTTY SECRETARIAL WORK (AMOUNTING TO SOME 15 HOURS WEEKLY) IS NOT THE CAMEL'S BACK-BREAKING STRAW!

FOR THE CONVENIENCE OF ANY WHO WISH TO CALL BY TELEPHONE LANDLINE AN AUTOMATIC TELEPHONE-ANSWERING GIZMO HAS BEEN CONNECTED TO THE SOCIETY'S TELEPHONE AT NEWTOWN 9-7275. CALLS MAY BE LEFT ON THIS DEVICE DURING THE HOURS WHEN THE HEADQUARTERS PREMISES ARE UNATTENDED. WHEN THE MACHINE RESPONDS TO THE RINGING OF THE PHONE, APPROXIMATELY ON THE THIRD RING, YOU WILL HEAR A RECORDED VOICE DELIVERING A 20-SECOND MESSAGE FOLLOWED BY A TONE "BEEP". WAIT UNTIL THIS TONE CEASES AND THEN LEAVE YOUR SPOKEN MESSAGE. ONE MINUTE IS PRESENTLY AVAILABLE BEFORE THE MACHINE "HANGS UP". THIS WILL BE LENGTHENED IF ENOUGH REQUESTS ARE RECEIVED. IF YOU BEGIN TO SPEAK BEFORE THE TONE STOPS THAT PART OF YOUR MESSAGE WILL BE LOST. THE MACHINE HAS A CAPACITY OF AROUND THREE OR FOUR HUNDRED CALLS. THE LOCAL TELEPHONE COMPANY HAS EXPRESSED INTEREST IN THE "ROBOT ANSWERER" AND A DEMONSTRATION HAS BEEN MADE BY W2BFD.

DURING THE SUMMER MONTHS THE CALLS AND MAIL ARE PICKED UP ONCE WEEKLY, DEPENDING ON THE VACATION SCHEDULES. WE HAVE MADE ARRANGEMENTS FOR URGENT TELEGRAMS TO BE FORWARDED WHEN ON VACATION. MAIL REQUIRING ANSWERS IS TAKEN ALONG AND HANDLED FROM THE VACATION "HEADQUARTERS". LETTERS REQUESTING EQUIPMENT ARE GIVEN FIRST PRIORITY AND NO DELAY IS ADDED BECAUSE OF THESE SUMMER VACATION ARRANGEMENTS.

FREQUENCY-SHIFTING BY MEANS OF RECTIFYING DEVICES

YOUR EDITOR GOT A LOOK AT SEVERAL INTERESTING CIRCUITS WHICH MAY HAVE SOME APPLICATION IN HAM RTTY. THE WESTERN UNION HAS BEEN MULTIPLYING THE NUMBER OF MESSAGES IT CAN TRANSMIT OVER A COPPER-WIRE CIRCUIT BY MEANS OF "CARRIER-CURRENT" TRANSMISSION. THIS IDEA HAS BEEN USED BY COMMUNICATIONS COMPANIES FOR YEARS, HAVING ITS BASIS IN THE "HARMONIC TELEGRAPH" INVENTED BY EDISON IN THE 1890S. THE THOUGHT OF SUPER-IMPOSING ADDITIONAL "CHANNELS" ON A SINGLE THREAD OF WIRE HAS FASCINATED VERY MANY PEOPLE, INCLUDING YOUR REPORTER, W2BFD. THE EXTENT OF W2BFD'S INTEREST WILL BE SHOWN BY GLANCING AT THE FEBRUARY, 1940 ISSUE OF "QST", IF YOU STILL HAVE IT AROUND. THE ARTICLE IS BELIEVED TO BE THE VERY FIRST "LONG HAUL" SYSTEM OF "CARRIER" USED BY AMATEURS. EARLY WORK BETWEEN 1938 AND 1941 PERMITTED CIRCUITS OF FROM 1 TO 5 MILES TO BE OPERATED OVER THE ELECTRIC-LIGHT LINES FOR REMOTE CONTROL PURPOSES. WHEN THE COMING OF WORLD-WAR II SHUT DOWN AMATEUR RADIO FOR THE DURATION THERE WAS REAWAKENED INTEREST IN THE W2BFD SYSTEM. A LONG-DISTANCE TELEPHONE CONVERSATION WITH BYRON GOODMAN OF "QST" STARTED A PROJECT ROLLING, TO KEEP AMATEURS OPERATING DESPITE THE SPACE-RADIO BLACKOUT. AS A CONSEQUENCE OF "QST" ENCOURAGING "WIRED-WIRELESS" A NUMBER OF INTERESTING LETTERS WERE RECEIVED BY W2BFD, AMONG WHICH WAS ONE SUBSTANTIATING REGULAR 105-MILE TWO-WAY COMMUNICATION ON VOICE AND CW VIA POWERLINE. THIS WAS ACCOMPLISHED WITH TEN WATTS. OPERATION WAS ON A RURAL LINE.

WE ARE GETTING OFF THE TRACK; WHAT WE STARTED OUT TO SAY WAS THAT SEVERAL OF THE "CARRIER" SYSTEMS USED BY COMMERCIALS HAVE AN INTERESTING TRICK EMPLOYED TO SHIFT THE CARRIER (IN THIS CASE AUDIO) FREQUENCY. ACROSS THE TUNED CIRCUIT (PARALLEL RESONANT) OF A STABLE SELF-EXCITED AUDIO OSCILLATOR IS AN ADDITIONAL, SERIES RESONANT, COIL-CONDENSER COMBINATION. SHUNTING THE CONDENSER IS A RECTIFYING TUBE WHICH HAS A POSITIVE OR NEGATIVE D.C. VOLTAGE APPLIED TO ITS ELEMENTS, DEPENDING ON WHETHER THE ASSOCIATED TELEPRINTER LINE IS "MARKING" OR "SPACING. WHEN THE RECTIFIER IS IN THE NON-CONDUCTING CONDITION, WITH NEGATIVE POLARITY ON THE PLATE, THE CIRCUIT PERFORMS AS IF THE RECTIFIER DID NOT EXIST. UNDER THESE CIRCUMSTANCES, ACCORDING TO THE ENGINEERING TEXTBOOKS, TWO OSCILLATORY FREQUENCIES ARE POSSIBLE, BUT WITH PROPER VALUES CHOSEN ONLY THE MODE HAVING THE HIGHER "Q" WILL PRODUCE OSCILLATION. THE CIRCUIT THEN OPERATES AT THE LOWER OF ITS TWO FREQUENCIES. WHEN THE RECTIFIER CONDUCTS THE CAPACITOR IN THE SERIES-RESONANT CIRCUIT IS SHORT-CIRCUITED AND THE INDUCTOR REMAINS CONNECTED IN SHUNT WITH THE PARALLEL-RESONANT TANK. AS TWO PARALLEL INDUCTORS HAVE LESS INDUCTANCE THAN ONE ALONE THIS MEANS THAT THE FREQUENCY IS RAISED. VOILA! WE HAVE SHIFTED FREQUENCY BY VARYING A D.C. CURRENT.

TO REDUCE THE POSSIBILITY OF KEYING TRANSIENTS THE ABOVE CIRCUIT IS ACTUALLY ARRANGED TO RECTIFY ON A FULL-WAVE BASIS, WITH THE SERIES-RESONANT INDUCTOR SPLIT IN HALF AND ONE HALF IS PLACED IN SERIES WITH EACH RECTIFIER PLATE. THE TWO INDUCTORS ARE REALLY ONE, BIFILAR WOUND ON A SINGLE CORE. TO KEEP THE OSCILLATOR AT D.C. GROUND POTENTIAL, WHILE PERMITTING TELEGRAPH VOLTAGES TO KEY THE RECTIFIER, THE OSCILLATOR TANK COIL IS, IN REALITY, A TRANSFORMER, HAVING A CENTER-TAPPED SECONDARY. WITH THE CHOICE OF PROPER COMPONENTS THE AUDIO OUTPUTS AT THE MARK AND SPACE FREQUENCIES CAN BE MADE TO HAVE EQUAL AMPLITUDES. THE SYSTEM, AS DESCRIBED, WAS PROVEN BY A TEST-BENCH SETUP TO WORK FINE FOR AMATEUR AFSK BUT REQUIRED A GREAT DEAL OF LABOR TO WIND THE BIFILAR SERIES INDUCTOR, WHICH NEEDS TO BE OF HIGH "Q". A SIMPLER "LASHUP" WAS WORKED OUT, USING A DOUBLE-DIODE RECTIFIER, A 25Z5 AND A 6H6 BEING USED WITH EQUALLY GOOD RESULTS. THE END OF THE FREQUENCY-LOWERING CONDENSER GOING TO THE TELETYPE KEYBOARD IN THE ORIGINAL W2BFD CIRCUIT WAS RUN THROUGH ONE HALF OF THE DOUBLE RECTIFIER WITH THE CATHODE GROUNDED. IN PARALLEL WITH THE FIRST RECTIFIER IS CONNECTED THE SECOND, BUT IN THIS CASE THE PLATE GOES TO GROUND THROUGH THE TELETYPE KEYBOARD OR TAPE TRANSMITTING EQUIPMENT. THIS CIRCUIT, WHEN THE AUDIO OUTPUT WAS EXAMINED ON A 'SCOPE, SHOWED VERY SLIGHT KEYING TRANSIENTS WHICH COULD PROBABLY BE REMOVED BY MEANS OF AN R-C FILTER IN SERIES WITH THE LINE TO THE TELETYPEWRITER. AS THE STANDARD MEAN OF AFSK SHIFTING, BY MEANS OF CONTACT-KEYING OF A CAPACITOR IN THE TUNED-TANK CIRCUIT, IS NOT ANY BETTER WITH RESPECT

TO TRANSIENT GENERATION AND SINCE THE EFFECT IS VERY SMALL IT SHOULD NOT BE CONSIDERED IMPORTANT. THE RECTIFIER-SHIFTING METHOD DOES HAVE A DIFFERENCE IN THE AUDIO OUTPUT LEVELS FOR MARK AND SPACE WHICH IS GREATER THAN FOR CONTACT-KEYING. (DUE TO LOWERED "Q" BY INSERTION OF THE RECTIFIER PLATE-CATHODE RESISTANCE?).

YOU MIGHT WELL WONDER "WHY BOTHER USING A RECTIFIER WHEN CONTACT KEING ELIMINATES A TUBE AND SOCKET?" WELL THE CIRCUIT SHOULD HAVE APPLICATION IF IT IS PLANNED TO USE THE PRINTER MORE THAN FIVE OR TEN FEET AWAY FROM THE AFSK OSCILLATOR WHICH IT KEYS. THE KEYING LINE ONLY CARRIES LOW-CURRENT D.C. FOR COMPACT INSTALLATIONS THE ORIGINAL SYSTEM IS SUPERIOR. PECULIAR EFFECTS ARE HAD WITH RECTIFIER KEYING IF R.F. GETS INTO THE KEYING LINE AND IS RECTIFIED. IT MIGHT BE WISE TO INSTALL A SIMPLE R.F. FILTER. INSULATION BETWEEN KEYBOARD SENDING CONTACTS MUST BE KEPT IN BETTER CONDITION (REGARDING CLEANLINES) BECAUSE D.C. LEAKAGE WILL PRODUCE A SPACING FREQUENCY THAT IS SOMEWHERE BETWEEN THE MARK AND THE INTENDED SPACING FREQUENCY. THE FULL-WAVE TELEGRAPH-COMPANY CIRCUIT, FROM WHICH THIS "SELF-GENERATING" SYSTEM ("SELF-GENERATING" FROM THE STANDPOINT THAT THE KEYED D.C. IS DERIVED FROM RECTIFIED AUDIO) WAS "HASHED UP" KEYS ABRUPTLY FROM MARK TO SPACE WITH ONLY A FEW VOLTS VARIATION ON THE RECTIFIER. LARGER VALUES OF VOLTAGE CHANGE HAVE NO FURTHER EFFECT ON THE OUPUT FREQUENCY. IN THIS SENSE IT KEYS LIKE A MECHANICAL RELAY.

UP UNTIL NOW THE STANDARD PRACTICE FOR FSK HAS BEEN TO SHIFT THE RADIO CARRIER FREQUENCY BY MEANS OF REACTANCE TUBES, USED EXACTLY AS ONE WOULD MODULATE A FREQUENCY-MODULATION TRANSMITTER. THE INTRIGUING THOUGHT OCCURS THAT THE IDENTICAL RECTIFIER-KEYING CIRCUIT USED BY THE COMMERCIALS FOR AUDIO-SHIFT MIGHT ALSO BE APPLICABLE TO RADIO FREQUENCY VARIATION. SEARCH OF THE COMMERCIAL LITERATURE HAS DISCLOSED NO EVIDENCE THAT ANY USE OF THE PRINCIPLE HAS BEEN MADE. MAYBE SOME OF OUR READERS HAVE COME ACROSS THIS PLAN IN PROFESSIONAL TELEGRAPHY. HAVE YOU? THE "BONUS" IN THE IDEA IS THAT FREQUENCY ADJUSTMENTS TO THE SHIFT, AND MINOR CORRECTIONS TO THE "RESTING" FREQUENCY MIGHT BE MADE BY POTENTIOMETERS BEARING ONLY D.C. OSCILLATORS ON THE TEST BENCH, SHIFTED BY THE RECTIFIER METHOD, PERFORMED EXCEPTIONALLY WELL IN THE 3 TO 4 MC REGION. WELL, GANG, THE IDEA IS YOURS TO KICK AROUND. 73 DE W2BFD

AMATEUR RADIOTELETYPE NEWS BULLETIN

MARCH 29TH, 1951

ODDS 'N ENDS:- DID YOU KNOW THAT THERE IS A DEGREASING PRODUCT ON THE MARKET WHICH WILL MAKE BEGRIMED TELETYPE PARTS SPARKLE LIKE NEW?. WE HAPPENED TO SEE A CLEANING OPERATION TAKING PLACE IN THE REPAIR SHOP OF ONE OF THE PRESS ASSOCIATIONS. THE STUFF IS UNBELIEVABLE. THE CHEMICAL IS KNOWN AS "GUNK". IT IS THE TRADE NAME OF A METAL-CLEANING PRODUCT PUT OUT BY THE CURRAN CORP. OF MALDEN MASSACHUSETTS AND SEEMS TO BE WELL KNOWN TO THE TYPEWRITER INDUSTRY. PERHAPS YOU RECALL PRINTER PARTS ON WHICH A COMBINATION OF STALE OIL AND DIRT HAVE BEEN "BAKED" TO A DULL BROWNISH FILM BY THE HEAT OF THE MACHINE. THIS STUFF WORKS LIKE MAGIC TO REMOVE THE FILM. DEPENDING UPON THE RAPIDITY OF ACTION DESIRED THE "GUNK" IS DILUTED WITH VARIOUS PROPORTIONS OF KEROSENE. BADLY SOILED TELEPRINTER PARTS CAN BE COMPLETELY CLEANED IN ABOUT 15 MINUTES IN HALF-AND-HALF GUNK AND KEROSENE. PARTS SHOULD BE WASHED WITH WARM RUNNING WATER AFTER REMOVAL. RUBBER PARTS AND ELECTRICAL COIL WINDINGS SHOULD BE REMOVED BEFORE IMMERSING. ALTHOUGH THE COMMERCIALS COMPLETELY DIS-ASSEMBLE MACHINES FOR CLEANING WE HAVE HAD EXCELLENT RESULTS BY DIPPING THE ENTIRE MACHINE, AFTER REMOVING ALL PORTIONS THAT COULD BE DAMAGED. RUST IS ALSO REMOVED. DO NOT LEAVE METAL TOO LONG IN THE DEGREASER AS IT WILL BE PITTED BY THE STRONG CHEMICAL. A PRELIMINARY "ROUGH" CLEANING IN A PAILFUL OF BENZINE AND NAPTHA MAKES THE JOB MORE EFFECTIVE. AFTER WASHING AND DRYING THE MACHINE OR PARTS SHOULD BE LIGHTLY OILED TO PREVENT RUSTING.

ALTHOUGH SPECIAL, LONG-LASTING, HEAVILY-INKED RIBBONS ARE USED BY COMMERCIAL COMPANIES FOR THEIR TELETYPE MACHINES TYPEWRITER RIBBONS ARE PERFECTLY SERVICEABLE AND A TRIP TO A TYPEWRITER SHOP WILL SHOW THAT PRACTICALLY ANY STYLE OF TELEPRINTER RIBBON HAS ITS COUNTERPART IN A TYPEWRITER VERSION. BETTER BRING ALONG THE OLD SPOOL AND LET THE DEALER IDENTIFY THE STYLE OF RIBBON FOR IT.

THE LARGE SIZE "QUAKER'S OATS" CARTON MAKES A FINE PROTECTIVE CONTAINER FOR THAT SPARE ROLL OF TELETYPE PAPER, ESPECIALLY IF YOU ARE "TOTING" YOUR PRINTER AROUND FOR A PUBLIC EXHIBIT OR A LECTURE TO THE LOCAL CLUB.

BY A DEVIOUS "GRAPEVINE" PATH YOUR SOCIETY HAS GOTTEN WORD OF A UNIQUE DEVELOPMENT IN THE BELL LABORATORIES. OUR BELL LABS INFORMANT, WHOSE NAME MUST REMAIN SECRET, HAS FURNISHED US INFORMATION REGARDING A DEVICE FROM WHICH THE "WRAPS" HAVE NOT YET BEEN REMOVED. IT IS CAPABLE OF PRODUCING A MAJOR IMPROVEMENT IN A TELETYPE SIGNAL THAT HAS BEEN EXTREMELY MUTILATED AND WOULD SEEM TO BE THE ANSWER FOR OUR MORE TECHNICALLY ADVANCED MEMBERS WHOSE MAIN OBJECT IN LIFE IS TO SQUEEZE THAT LAST BIT OF INTELLIGIBILITY OUT OF NOISE-FILLED AND QRM'D SIGNALS HAVING 75 DB OF QSB. WE ARE ENDEAVORING TO SECURE A SCHEMATIC DIAGRAM OF THIS ALL-ELECTRONIC UNIT FOR OUR MEMBERSHIP. IT MAY TAKE AWHILE BUT WE WILL ADVISE WHEN COPIES ARE AVAILABLE FOR ALL. (SIGNED) W2BFD, SECRETARY

OUTLINE OF THE 143-A ELECTRONIC REGENERATIVE REPEATER
(HEREAFTER REFERRED TO AS "REGEN")

ANY REGENERATIVE REPEATER IS A UNIT OF TELEGRAPHIC EQUIPMENT WHICH WILL RESPOND TO AN INCOMING WIRE OR RADIO PRINTER SIGNAL WHICH IS BADLY DISTORTED, FULL OF NOISE, BIAS AND OTHER WRONG CONDITIONS AND RETRANSMIT THE SIGNALS AS PERFECTLY-FORMED IMPULSES.

ORIGINALLY REGENS CONSISTED OF A DISTRIBUTOR WITH TWO SETS OF BRUSHES MOUNTED ON A COMMON SHAFT WITH A FRICTION CLUTCH AND A "LATCH" MAGNET, SIMILAR TO THE MODEL 12 RECEIVING DISTRIBUTOR. THE RECEIVING BRUSHES RESPOND TO THE INCOMING SIGNAL BUT, INSTEAD OF OPERATING PRINTER SELECTOR MAGNETS, THEY LOCK UP A BANK OF SMALL TELEPHONE-TYPE RELAYS.

THE TRANSMITTING BRUSHES, MOUNTED ON THE SAME SHAFT BUT DISPLACED A FEW DEGREES BEHIND THE RECEIVING BRUSHES TO PERMIT THE RELAYS TIME TO OPERATE, SEND THE CODE STORED IN THE CONTACTS OF THE LOCKED-UP RELAYS. THUS THE OUTGOING SIGNAL IS TRANSMITTED A FRACTION OF A CHARACTER BEHIND THE INCOMING SIGNAL. THERE ARE MANY VARIATIONS OF THIS BASIC IDEA.

IN TELEGRAPH PRACTICE SIGNALS ARE "BOOSTED" EVERY FEW HUNDRED MILES BY ORDINARY RELAY REPEATERS WHICH AMPLIFY THE SIGNAL BUT DO NOT CORRECT THE DISTORTION. HOWEVER THE DISTORTION, BIAS, AND NOISE ARE CUMULATIVE WITH EACH ADDED SECTION, DUE TO FINITE RELAY ARMATURE TRAVEL TIME (BITING A CHUNK OF THE SIGNAL AT EACH REPEATER), AND THE INDUCTANCE AND CAPACITANCE OF THE LINE, WHICH ADVERSELY AFFECT SIGNAL WAVE-SHAPE, FINALLY BECOMES EXCESSIVE. TRANSITIONS FROM MARK TO SPACE OR SPACE TO MARK, WHICH SHOULD OCCUR AT A DEFINITE POINT IN TIME, MAY BE ADVANCED OR RETARDED DUE TO "FORTUITOUS DISTORTION". FORTUITOUS DISTORTION OCCURS DURING THE RELAY'S MOST VULNERABLE MOMENTS; WHEN IT IS IN TRANSITION. A PULSE OF NOISE DURING A MARK-SPACE TRANSITION CAN DELAY OR ADVANCE THE ACTUAL INSTANT OF TRANSITION.

IF GOOD COPY CAN BE HAD AT THE 4TH REPEATER STATION AND BAD COPY AT THE FIFTH IT IS CUSTOMARY TO INSTALL A REGEN AT THE FOURTH STATION. IN ONE STROKE ALL PRECEDING CONDITIONS ARE CORRECTED AND THE SIGNAL IS GIVEN "A NEW LEASE ON LIFE".

ALL REGENS OPERATE BY SAMPLING ONLY THE CENTRAL PORTION OF THE ARRIVING SIGNAL ELEMENTS, WHICH ARE 22 MILLISECONDS LONG AT OUR STANDARD SPEED (60 SPEED). THIS SAMPLING IN THE MECHANICAL REGEN AMOUNTS TO ABOUT THE CENTRAL 1/5 OF THE RECEIVED PULSES. OBVIOUSLY THE OUTGOING SIGNAL WILL BE COMPLETELY INDIFFERENT TO NOISE AND DISTORTION THAT OCCURS DURING ANY BUT THE SAMPLING PERIOD. THE SMALLER THE SAMPLING PERIOD THE LESS NEED FOR ADJUSTING THE RANGE OF THE RECEIVING BRUSHES TO SAMPLE THE "BEST" PART OF THE RECEIVED SIGNAL. THERE IS A LIMIT, WITH MECHANICAL REGENERATORS, TO SHORTENING THE SAMPLING INTERVAL BEYOND A CERTAIN POINT. BY ELECTRONIC MEANS REGENS CAN HAVE VERY SHORT SAMPLING PERIODS. IN THE CASE OF THE 143-A THIS INTERVAL IS APPROXIMATELY 1/100 OF THE 22 MILLISECOND PULSES.

IN THE 143-A ELECTRONIC REGEN THE INCOMING SIGNALS ARE APPLIED (AFTER HAVING BEEN LIMITED TO PLUS AND MINUS 40 VOLTS AMPLITUDE IN A PREVIOUS DEVICE) TO UNBIAS A PAIR OF MODULATOR TRIODE GRIDS (ONE FOR MARK AND ONE FOR SPACE). HOWEVER THE INPUT SIGNAL OR "PEDESTAL" IS INSUFFICIENT (BY ITSELF) IN AMPLITUDE TO CARRY THE GRIDS SUFFICIENTLY POSITIVE TO PRODUCE ANY PLATE CURRENT FLOW OR OUTPUT. A SERIES OF PULSES 22 MILLI-SECONDS APART ARE FED TO THE SAME GRIDS DURING THE EXACT CENTER OF THE RECEIVED TELETYPE IMPULSES. THESE POSITIVE PULSES ARE ALSO UNABLE (BY THEMSELVES) TO QUITE BRING THE MODULATOR GRIDS UP TO THE STARTING POINT OF PLATE CURRENT FLOW. IF A MARKING SIGNAL IS RECEIVED PLATE CURRENT WILL FLOW MOMENTARILY IN THE MARK MODULATOR TRIODE BECAUSE BOTH THE "PEDESTAL" AND THE SELECTING PULSE ARE ADDITIVE. THIS RESULTS IN A VERY SHORT OUTPUT PULSE AT THE POINT CORRESPONDING TO THE CENTER OF THE (DISTORTED?) INCOMING MARK SIGNAL. THE SAME THING HAPPENS WITH A SPACING SIGNAL EXCEPT THAT THE OTHER MODULATOR IS ACTUATED. A TRIODE IS USED TO INVERT THE INCOMING SPACING SIGNALS WHICH HAVE NEGATIVE POLARITY SO AS TO APPLY THEM IN POSITIVE SENSE TO THE GRID OF THE SPACING MODULATOR. THE MARKING SIGNALS DO NOT HAVE TO BE INVERTED AS THEY ARE ALREADY POSITIVE.

THE SELECTING IMPULSES ARE GENERATED BY TRIGGERING OFF AN LC-TUNED OSCILLATOR WITH A BIAS OBTAINED FROM THE SPACING MODULATOR GRID. IN ORDER FOR THE CIRCUIT TO BE WORKABLE THE OSCILLATOR MUST START INSTANTLY, AT FULL AMPLITUDE, WITHOUT TRANSIENTS, STAY ON FOR 7 COMPLETE CYCLES AND STOP INSTANTLY, WITHOUT TRANSIENTS.

STARTING THE OSCILLATOR IS ACCOMPLISHED BY DRAWING A DC CURRENT OF ABOUT 4 1/2 MA THROUGH THE INDUCTANCE BY MEANS OF THE PLATE CURRENT OF AN ADDITIONAL "STOP" TRIODE. THE OSCILLATOR FEEDBACK IS INSUFFICIENT TO MAINTAIN OSCILLATION WITH THIS LOAD ACROSS ITS TUNED CIRCUIT. ON THE INSTANT THAT THE OSCILLATOR IS REQUIRED TO START THE "STOP" TRIODE IS BIASED TO CUTOFF. THE 4 1/2 MA FLOWING THROUGH THE INDUCTANCE DISCHARGES SINUSOIDALLY THROUGH THE TUNING CAPACITY AND THEREBY BECOMES THE SOURCE OF THE FIRST CYCLE OF OSCILLATION. THE SUCCEEDING SIX CYCLES ARE ADJUSTED TO HAVE THE SAME AMPLITUDE AS THE FIRST BY AN ADJUSTMENT OF THE "DECREMENT" CONTROL WHICH IS MERELY A CATHODE RESISTOR PROVIDING INVERSE CURRENT FEEDBACK.

IN ORDER TO HAVE EXACTLY 7 CYCLES OF OSCILLATION (EACH CYCLE 22 MS LONG) THE CYCLES ARE COUNTED. THE OUTPUT OF THE OSCILLATOR, TAKEN FROM ITS CATHODE, DRIVES THE GRID OF A "SQUARE WAVE" AMPLIFIER TRIODE WHICH HAS A SERIES OF POSITIVE AND NEGATIVE PULSES IN ITS OUTPUT. THE IMPORTANT POINT IS THAT THE POSITIVE OUTPUT PULSES OCCUR AT THE EXACT CENTER OF THE OSCILLATOR CYCLES AND THE NEGATIVE PULSES AT THE FINISH OF EACH CYCLE... THE NEGATIVE PULSES, OCCURRING AT THE END OF EACH CYCLE, ARE COUNTED IN A THREE TUBE BINARY COUNTER, WHICH PUTS OUT A PULSE AT THE COUNT OF SEVEN, WHICH IS USED TO STOP THE OSCILLATOR.

THE POSITIVE PULSES ARE USED, AS MENTIONED PREVIOUSLY, TO SAMPLE THE CENTERS OF THE INCOMING TELETYPE SIGNALS.

AS THE BINARY COUNTER ACTUALLY COUNTS 8 PULSES AN EXTRA (POSITIVE) PULSE IS DERIVED FROM THE OSCILLATOR STARTING CIRCUIT WHICH, ADDED TO THE SEVEN NEGATIVE PULSES, SHUTS OFF THE OSCILLATOR AT THE END OF THE SEVENTH CYCLE.

START-STOP DEVICES, SUCH AS TELEPRINTERS, ARE PECULIARLY SUSCEPTIBLE TO NOISE AND LINE "HITS" DURING THE "START" PULSE INTERVAL. ONCE THE RECEIVING DISTRIBUTOR IS UNLATCHED BY A BURST OF SPACING NOISE (WHICH MAY ONLY BE ONE OR TWO MILLI-SECONDS LONG) IT MAY THROW THE SYSTEM OUT OF SYNCHRONISM FOR SEVERAL CHARACTERS. IN THE 143-A REGEN THE SPACING SIGNAL, REPRESENTING A "START" PULSE, STARTS THE TIMING OSCILLATOR CONDITIONALLY. HOWEVER IT DOES NOT START THE COUNTING CHAIN UNTIL 11 MILLISECONDS LATER (AT THE INSTANT THE START PULSE IS SAMPLED IN THE MODULATOR). IF, DURING THESE 11 MILLISECONDS, THE SIGNAL REVERTS TO A MARKING CONDITION THE OSCILLATOR IS STOPPED AND THE COUNT NEVER BEGINS. THUS A FULL 11 MILLISECOND MINIMUM "START" SIGNAL IS REQUIRED AND SHORT NOISE BURSTS WILL NOT PRINT NOR DESTROY SYNCHRONISM. THIS FEATURE SHOULD BE ESPECIALLY EFFECTIVE WITH OUR RADIO TELETYPE EQUIPMENT EVEN WHEN WE ARE NOT ACTING AS A REPEATER STATION.

ANOTHER TRIODE, CALLED THE "COUNT RECOGNIZER", IS ARRANGED TO HOLD THE OSCILLATOR RUNNING EVEN THOUGH THE INITIAL RECEIVED SIGNAL (WHICH WAS SPACING) BECOMES MARKING IN ONE OR MORE SUCCEEDING IMPULSES.

AS MENTIONED PREVIOUSLY, THE OUTPUT OF THE MODULATOR TUBES IS A SERIES OF SHARP PULSES OCCURRING AT THE TIMES THAT WOULD BE THE CENTERS OF THE INCOMING PULSES IF THEY WERE UNDISTORTED. THESE PULSES ARE APPLIED TO A DOUBLE-TRIODE FLIP-FLOP CIRCUIT WHICH IS "FLIPPED" OR "FLOPPED", DEPENDING ON WHICH MODULATOR TUBE THE PULSE IS DERIVED FROM.. THIS DOUBLE-TRIODE REMAINS IN EITHER THE "FLIPPED" OR "FLOPPED" CONDITION AFTER THE COMPLETION OF THE PULSE, THEREBY HAVING A SQUARE-WAVE OUTPUT. THIS OUTPUT IS A PERFECT TELETYPE SIGNAL, 11 MILLISECONDS LATER IN TIME THAN THE INPUT SIGNAL TO THE REGEN. OUTPUT VOLTAGE IS PLUS AND MINUS 40 VOLTS WITH RESPECT TO GROUND.

A CONDITION PECULIAR TO THIS REGEN IS THAT A STEADY SPACING SIGNAL WILL BE TRANSMITTED IF HALF OF THE INCOMING STOP IMPULSE IS LOST. TO REMEDY THIS CONDITION ANOTHER TRIODE IS ARRANGED IN A "MARK RESTORING" CIRCUIT THAT MAINTAINS A STEADY MARKING OUTPUT WHENEVER THE OSCILLATOR IS NOT RUNNING.

AMATEUR RADIOTELETYPE SOCIETY

TECHNICAL BULLETIN-LETTER

QUITE A LARGE PERCENTAGE OF THE TELEPRINTERS NOW IN SERVICE ARE THOSE IN WHICH THE SELECTION IS MADE BY MEANS OF CODE-BARS POSITIONED BY FIVE SELECTOR MAGNETS. IN INCREASING QUANTITIES WE ARE FURNISHING OUR MEMBERS WITH MACHINES OF SEVERAL TYPES IN WHICH THE SELECTION IS PRODUCED BY ONE MAGNET. WE ARE NOT TAKING SIDES IN A CONTROVERSY AS TO WHICH IS SUPERIOR FOR OUR PUPOSES. COMMERCIAL WIRE SERVICES PREFER THE SINGLE MAGNET TYPE OF MACHINE FOR A SIMPLE REASON WHICH MAY, OR MAY NOT, APPLY TO AMATEURS. THE ONE-MAGNET TYPE OF TELETYPEWRITER SECURES ELECTRICAL SIMPLICITY AT THE EXPENSE OF MECHANICAL COMPLICATION BUT IT ENABLES THEM TO STAFF THEIR MAINTENANCE DEPARTMENTS WITH "TYPEWRITER MECHANICS" OR, AT LEAST, MEN WHO ARE NOT WELL BASED IN ELECTRICAL THEORY AND PRACTICE. A VERY MINIMUM OF TRAINING IS REQUIRED SINCE ALL FUNCTIONS OF A MECHANICAL SELECTOR ARE VISIBLE WHEREAS AN ELECTRICAL DISTRIBUTION SYSTEM REQUIRES PERSONNEL WITH GOOD ELECTRICAL BACKGROUND.

IN THE CASE OF OUR AMATEUR MEMBERS THE REVERSE MAY VERY WELL BE TRUE. FEW OF US ARE GREATLY INTERESTED IN THE ACTUAL MECHANICS OF THE PRINTER. WE CONSIDER THE MACHINE MERELY THE LAST ACCESSORY TO AN INTERESTING ELECTRONIC SYSTEM, MUCH AS WE WOULD REGARD A MICROPHONE, LOUDSPEAKER, ETC. THE INTRIGUING PORTION IS THE APPARATUS WHEREBY WE MANIPULATE WEAK, NOISY, FADING, DISTORTED FREQUENCY-SHIFT RADIO SIGNALS INTO DEPENDABLE DIRECT-CURRENT PULSES SUITABLE FOR OPERATING TELETYPE MACHINES, AUTO-START SYSTEMS, PERHAPS EVEN RADIO-PHOTO LAYOUTS AND, OF COURSE, ARRANGEMENTS FOR THE REMOTE CONTROL OF DISTANT EQUIPMENT. THE PRINTER, THUS, SEEN IN ITS TRUE PERSPECTIVE, IS MERELY A MEANS TO AN END. RADIO AMATEURS NEED NO TRAINING TO UNDERSTAND THE ELECTRICAL SELECTION SYSTEMS IN PRINTING TELEGRAPHY, INDEED THEY MAY BE SIMPLER OF COMPREHENSION THAN THE GROSSLY MECHANICAL MODELS.

THERE IS ANOTHER "FACET" OF THIS PRO-AND-CON DISCUSSION, HOWEVER. ON VHF THERE IS RARELY MUCH OF A PROBLEM OF INTERFERENCE IN THE RADIO RECEIVER FROM CLICK-TYPE NOISE CAUSED BY RELAY AND ELECTRICAL DISTRIBUTOR CONTACTS BREAKING DC. ON THE LOWER FREQUENCY RANGES THERE CAN BE CONSIDERABLE TROUBLE UNLESS EITHER (1) ADEQUATE CHOKE-CONDENSER FILTERING IS APPLIED TO THE CONTACTS OR (2) COAXIAL LEADIN FROM THE ANTENNA IS USED AND THE RECEIVER RF CIRCUITS WELL-SHIELDED FROM LOCAL PICKUP. METHOD (2) HAS, THUS FAR, BEEN MUCH THE SIMPLER, ESPECIALLY WHEN THE ANTENNA IS DISTANT FROM THE PRINTER. WITH THE ONE-MAGNET PRINTERS THERE IS ONLY THE RELAY-CONTACT NOISE TO CONTEND WITH.

THIS RELAY-CONTACT NOISE CAN BE COMPLETELY ELIMINATED WHEN A ONE-MAGNET TELETYPEWRITER IS USED WITH THE W2BFD RADIOTELETYPE CONVERTER UNIT BY REMOVING THE POLARIZED RELAY AND PLACING THE SELECTOR MAGNET IN SERIES WITH THE MARK OUTPUT TUBE PLATE CIRCUIT. THE SPACE OUTPUT TUBE PLATE SHOULD CONNECT TO "B" PLUS THROUGH THE POTENTIOMETER IN THE USUAL WAY. THE SPACE TUBE THEN ACTS AS A KEYED "BACK LOAD" TO PREVENT BAD REGULATION OF THE PLATE SUPPLY VOLTAGE. THIS SYSTEM DOES NOT OBTAIN THE MAXIMUM EFFECTIVENESS FROM THE CONVERTER DUE TO THE LOSS OF "TRIGGER-ACTION" WHICH IS INHERENT IN THE POLAR RELAY. AN ELECTRONIC "TOGGLE-SWITCH" CIRCUIT WILL BE DESCRIBED LATER WHICH OVERCOMES THE HANDICAP.

WELL FELLERS! THE BIG NEWS, OF COURSE, IS THE DATE FOR THE PUBLICATION IN "QST" OF THE DRAMATIZATION OF OUR PET HOBBY, AMATEUR RADIOTELETYPE. AS CLOSE AS WE CAN PIN IT DOWN, IT SHOULD APPEAR IN OCTOBER.

NOW IT MAY COME AS A SURPRISE TO MOST OF YOU THAT THE ARTICLE WENT TO "QST" WHEN YOU ALL KNOW THAT I HAD PROMISED IT TO LARRY LEKASHMAN OF "CQ"----- WELL, IT'S LIKE THIS; SEEMS LIKE REN MCMANN, W2PCD, KNEW ABOUT THE WRITEUP AND, SOMEHOW (YOU KNOW HOW THINGS LIKE THIS HAPPEN) GOT THE IDEA THAT IT WAS "QST" GETTING THE MANUSCRIPT. ON HIS LAST TRIP UP TO HARTFORD HE SPENT SOME TIME CHEWING THE FAT WITH THE HEADQUARTERS GANG AND, DURING HIS VISIT, TOLD THEM THAT "JOHNNY, W2BFD, WAS READYING THE ARTICLE TO SEND TO THEM". THE RESULT OF ALL THIS WAS A LETTER FROM HEADQUARTERS AND WE WERE IN A TOUGH SPOT. OF COURSE WE COULD HAVE PROCEEDED WITH THE ORIGINAL PLAN BUT--WOULD WE HAVE WANTED TO ANTAGONIZE "QST" AND THE A.R.R.L.? SO WE SWITCHED HORSES IN MID-STREAM AND, AS OF TODAY, THE EDITOR OF "CQ" WOULDN'T TALK TO US. WHAT A PICKLE?

IN CASE YOU GUYS HAVE BEEN WORKING TOO MUCH VHF, AND HAVEN'T GIVEN ANY THOUGHT TO THE MATTER, LET US GO ON RECORD NOW AS BEING OF THE OPINION THAT THE PUBLICATION OF THIS ARTICLE IN A JOURNAL OF SUCH WIDE AMATEUR CIRCULATION AS "QST" MAY GET US A BUNCH OF DX MEMBERS ALL AROUND THE COUNTRY, AND GET THEM FOR US IN A HURRY. ONE OF THE REASONS SUCH A SMALL PERCENTAGE OF YOU HAVE BEEN USING THE "W2BFD" CONVERTER FOR TRUE CARRIER-SHIFT (F.S.K.), FOR WHICH IT IS EMINENTLY SUITED, IS THAT THERE ARE NO MEMBERS LOCATED FAR ENOUGH AWAY (MIDWEST OR WEST COAST) TO PERMIT 10-METER OPERATION. CORRESPONDENCE WITH SEVERAL CALIFORNIA AMATEURS INDICATES THEIR INTEREST IN HAM RTTY. SEVERAL, AT OUR URGING, HAVE "SCROUNGED" A FEW PRINTERS FROM LOCAL SOURCES AND HAVE TRIED TO OPERATE THEM ON "MAKE-BREAK". WHEN WE HAVE CONVINCED THEM THAT F.S.K. IS THE ANSWER WE WILL HAVE RELIABLE LONG-HAUL CIRCUITS CAPABLE OF DEMONSTRATING THE HUGE TRAFFIC-HANDLING ABILITY OF MECHANIZED PRINTERS.

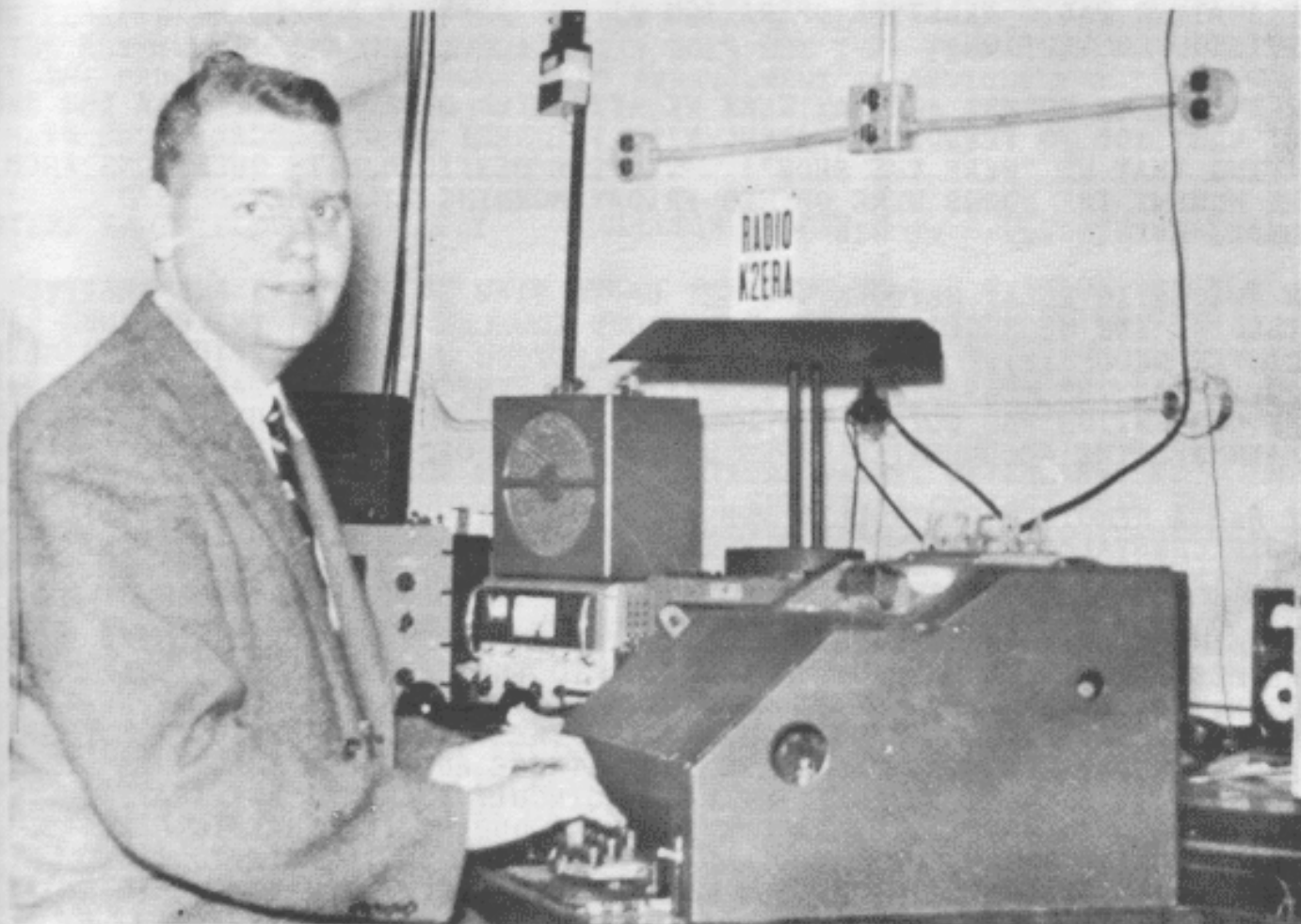
SOME OF YOU FELLOWS HAVE THE MISTAKEN IDEA THAT A.F.S.K. HAS BEEN OUR AIM FOR LOW-FREQUENCY DX USE OF PRINTERS. THIS IS NOT THE CASE. THE ORIGINAL W2BFD CONVERTER WAS INTENDED FOR CARRIER-SHIFT BUT, SINCE IT WAS DEVELOPED DURING THE WAR, WHEN AMATEURS WERE OFF THE AIR, IT WAS GIVEN ITS ORIGINAL TRIALS VIA POWER-LINE CARRIER-CURRENT (SEE W2BFD'S ORIGINAL ARTICLE ON LONG-HAUL POWER-LINE CARRIER IN FEBRUARY 1940 QST). A.F.S.K. IS THE LOGICAL METHOD FOR VHF WHERE SPECTRUM SPACE WILL NOT BE A PROBLEM FOR YEARS TO COME, IF EVER. AT WORST A.F.S.K. OCCUPIES NO MORE THAN A TYPICAL VHF 'PHONE CHANNEL. WE MAY EVEN WANT TO USE F.S.K. ON VHF EVENTUALLY, HOWEVER IT WOULD PROBABLY BE RESTRICTED TO DX WORK ONLY SINCE AUTO-START WOULD BE MUCH MORE DIFFICULT IF STABILITY WERE NOT ACHIEVED. A COMPLETELY DIFFERENT SYSTEM OF AUTO-START, INTENDED FOR USE WITH STRAIGHT F.S.K., HAS BEEN DEvised BY W2BFD. THE METHOD, ESSENTIALLY, CONSISTS OF TRANSMITTING A "BURST" OF LOW-FREQUENCY FREQUENCY-MODULATION OF THE CARRIER. THE LOW FREQUENCY CAN BE AN AUDIO TONE OR, BETTER YET, 60 CYCLES FROM THE AC LINE. THE "BURST" DURATION CAN BE FROM 3 TO 10 SECONDS WITH BEST RESULTS FROM THE LONGER INTERVALS.

WHAT HAVE BEEN OUR ACHIEVEMENTS THUS FAR? LAST YEAR-END WE HAD ABOUT 50 MEMBERS EQUIPPED WITH PRINTERS, ABOUT 35 OF THEM WITH CONVERTER PANELS. HALF A YEAR LATER WE HAVE SEVERAL HUNDRED MEMBERS, WITH A LARGE PORTION OF THEM EQUIPPED WITH CONVERTERS. ALSO, AND THIS IS A GOOD SIGN THAT SOME THOUGHT IS BEING APPLIED TO THE SUBJECT, NOT ALL OF THE UNITS BEING CONSTRUCTED ARE OF THE "W2BFD" DESIGN.

WITH THE NEXT ISSUE OF THIS BULLETIN WE ARE GOING BACK TO NUMBERING THEM AGAIN AND, BECAUSE THE "QST" ARTICLE STRESSES THE "VHF" ANGLE, WE ARE RE-ADOPTING "VHF TELETYPE SOCIETY" AS THE HEADING FOR THE BULLETINS. THIS DOES NOT MEAN THAT WE ARE ABANDONNING THE "AMATEUR RADIOTELETYPE SOCIETY" NAME FOR OUR ORGANIZATION, BUT MERELY THAT WE WILL USE IT ONLY IN CONJUNCTION WITH LOW-FREQUENCY RTTY WORK AND PUBLICITY UNTIL SUCH TIME THAT LOW-FREQUENCY OPERATION IS MORE COMMON.

THERE IS NOTHING IN THE FCC REGULATIONS EITHER PERMITTING OR FORBIDDING FSK, AS FAR AS WE CAN SEE. A LARGE NUMBER OF YOU HAVE INDICATED THAT YOU FEEL THAT THIS INDICATES OUR RIGHT TO OPERATE FSK ON THE CW BANDS UNTIL THE COMMISSION HAS MADE A RULING ONE WAY OR ANOTHER. OFF-THE-RECORD DISCUSSIONS OF THE MATTER WITH FCC PERSONNEL HAVE BROUGHT CONFLICTING OPINIONS ON THIS MATTER.

K2GHH, KERN BOWYER, HANDLING HEAVY TRAFFIC AT K2ERA
Bronxville Amateur Radio Club, Bronxville, N. Y.



In addition to the national RTTY organization's Technical Information Service and the procurement of good serviceable teletypewriter equipment for members without profit to the Society, at prices between \$15 and \$100 depending on model, RTTY headquarters provides many other services. One of these is the Frequency Standardization Service and furnishing of test recordings. Almost since the inception of radioteletype as an amateur sport RTTY HQ has furnished disc recordings of the standardized Mark and Space AFSK frequencies on one side of "platter", with a high speed teletype test message on the reverse for checking printer functions without having to rely on a tuned-in radio signal. To insure that the playback speed is correct there is also recorded a minute of WWV's 440-cycle transmission, taken right off the air. This can be compared by ear, upon playback, with WWV for an accurate speed check. The Society is now also able to furnish Webster wire-recording spools and sound-tape recordings (3-3/4 and 7-1/2 I. P. S.) of the same material. The latter, at the slower speed, are especially useful for demonstrations, exhibits, conventions and lectures. An interesting method of evaluating the performance of terminal units is to feed it "background" noise, picked up off the air, mixed with the output of the disc, tape or wire recording. By varying the gain of the receiver and the level of playback a good idea may be had of the ability of a particular converter to turn out errorless copy in the presence of extraneous noise and signals. A startling demonstration at a lecture, which has been performed many times since 1946 by W2BFD, is to make a recording with high-level CW signals as background covering up the printer AFSK. When the printer

to pound it out at 65 WPM the sceptics are invariably convinced.

THE 1949 A R R L HUDSON DIVISION CONVENTION

ALL THE TIME AND EFFORTS OF THE TELETYPE SOCIETY (AND ALSO YOUR CORRESPONDENT) HAVE BEEN OCCUPIED TO THE FULLEST EXTENT IN AN ALL-OUT JOB FOR THE PAST MONTH. THIS JOB WAS THE STAGING OF A GOOD EXHIBITION OF AMATEUR RADIO TELETYPE OPERATION AT THE 1949 A R R L HUDSON DIVISION CONVENTION.

WE SHOULD BE MODEST AND SAY THAT WE ATTRACTED SOME ATTENTION AT THE SHOW, BUT WANT YOU TO FEEL HAPPY ALONG WITH THE REST OF OUR LOCAL GROUP BY SAYING THAT WE "WERE THE SHOW"! WE WERE BESEIGED WITH QUESTIONS FROM THE MOMENT THE DOORS WERE OPENED FRIDAY MORNING TILL THEY CLOSED SUNDAY EVENING... WE DID IT!

AN AUTOMATIC RELAY NETWORK WAS SET UP TO WIAW IN HARTFORD AND TRAFFIC FILED AT THE MESSAGE CENTER WAS DIVIDED EQUALLY BETWEEN THE CW AND PRINTER GROUPS.... WE HAD NO DUST COLLECTING ON OUR TRAFFIC, WE ASSURE YOU... AS THE MESSAGES CAME IN THEY WERE PERFORATED IN TAPE AND WHEN THE CONVENTION WAS CUT-IN SEVERAL TIMES DAILY INTO THE AUTOMATIC RELAY CHAIN ALL THE ACCUMULATED TAPES WOULD BE RUN OFF IN JIG-TIME...

WE HAD A REMOTELY CONTROLLED V.H.F. TRANSMITTER AND RECEIVER SETUP (BOTH CRYSTAL CONTROLLED ON THE 147.96 MC CHANNEL) IN THE TOWER OF THE 9TH REG'T ARMORY, WHERE THE SHOW WAS HELD.

INCOMING TRAFFIC WAS PERFORATED DIRECTLY IN TAPE AND ALSO PRINTED ON THE MESSAGE CENTER MACHINE IN ADDITION TO THE MACHINE AT THE TELETYPE BOOTH, WHERE THE FREQ. SHIFT GEAR WAS LOCATED. MACHINES WERE SCATTERED ALL OVER THE PLACE, AND NO MATTER WHERE THE VISITORS TURNED, THEY SAW PRINTED COPIES OF WHAT WAS GOING ON. THESE ADDITIONAL MACHINES WERE ARRANGED TO BE SWITCHED OFF THE RADIO CIRCUIT WHEN MESSAGE TRAFFIC WAS GOING OVER INSTEAD OF RAGCHEWING, AND DURING THE TRAFFIC PERIODS WERE OCCUPIED TYPING WELCOMES AND INSTRUCTIONS TO THE VISITORS AND DESCRIPTIONS OF THE AIMS OF OUR SOCIETY... THESE LATTER WERE IN GREAT DEMAND BY THE SPECTATORS AND WERE TORN OFF, AS SOON AS FINISHED, BY INTERESTED AMATEURS...

MARS AND THE ARMY AIRFORCE HAD RADIOTELETYPE WHICH WE TIED IN WITH AND WERE ENABLED TO ESTABLISH PRINTER CONTACT WITH A PLANE THEY PROVIDED FOR THE PURPOSE...

IN CONTRAST TO THE CW SECTION, WHICH WAS SNOWED UNDER AND HAD SUCH A BACKLOG OF TRAFFIC THAT THE VARIOUS OPERATORS HAD TO TAKE HUGE WADS OF IT HOME WITH THEM EACH NIGHT, WE HAD NO MESSAGES WAITING LONGER THAN TWO HOURS DURING THE ENTIRE SHOW!

AN IMMENSE AMOUNT OF EQUIPMENT WAS LOANED BY OUR LOCAL MEMBERS AND THE TELEGRAPH COMPANIES TO MAKE A BANG-UP JOB OF IT AND WE ARE ALL DOG-TIRED OF LUGGING THE HEAVY EQUIPMENT AROUND. IT WILL BE SEVERAL WEEKS BEFORE WE HAVE SORTED IT ALL OUT AND GET BACK TO NORMAL.

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DURING THE CONVENTION YOUR BULLETIN EDITOR, W2BFD, MADE A RECORDING FOR THE "VOICE OF AMERICA" GIVING A "BLOW-BY-BLOW" DESCRIPTION OF AMATEUR RADIOTELETYPE. THIS WAS LATER REBROADCAST AND WE HAVE RECEIVED SEVERAL "HAM-O-GRAMS" FROM MEMBERS OF THE ARMED FORCES OVERSEAS, COMMENTING ON THE TALK. THE DIRECTOR OF RADIO COMMUNICATIONS FOR THE CITY OF NEW YORK, WHO DELIVERED A SPEECH AT THE SHOW ON BEHALF OF THE MAYOR, VISITED OUR EXHIBITS AND HAS SINCE INDICATED THAT THE CITY WOULD WELCOME AN AMATEUR RADIOPRINTER INSTALLATION IN THE "SKYSCRAPER" MUNICIPAL BUILDING FOR EMERGENCY PURPOSES AND TO RELAY REPORTS OF THE ELECTION RETURNS FROM UPSTATE NEW YORK (FOR BROADCAST OVER THE CITY'S BC STATION W N Y C)

MARS CHIEF MAJOR RALEIGH RALLS, IN CHARGE OF THE MARS EXHIBIT AT THE SHOW, IS AN ENTHUSIASTIC ENDORSER OF AMATEUR RADIOTELETYPE AND, AFTER SEVERAL LONG DISCUSSIONS WITH HIM, WE FEEL IT WILL NOT BE TOO LONG BEFORE WE HAVE INTERCOMMUNICATION BETWEEN MARS AND AMATEURS VIA RADIOTELETYPE. WE HAVE FURNISHED MAJOR RALLS WITH INFORMATION ON THE STANDARDS-OF-OPERATION EMPLOYED BY OUR AMATEUR GROUP SO THAT NO DIFFICULTIES WILL BE ENCOUNTERED IN EFFECTING INTEROPERATION. CHOICE OF THE 850-CYCLE SHIFT

BY YOUR SOCIETY IS THUS SEEN TO BE A HAPPY ONE AS IT IS ALSO THE SAME AS THAT EMPLOYED BY THE MILITARY SERVICES. MILITARY SERVICES, HOWEVER, DO NOT USE AUTO-START OF UNATTENDED PRINTERS, WHICH IS STRICTLY OF AMATEUR ORIGIN, BUT REPLACE THE AUTO-START WITH A "MARK-HOLD" CIRCUIT. THE MARK-HOLD CIRCUIT PERMITS THE PRINTER MOTORS TO RUN CONTINUOUSLY DURING LONG PERIODS OF INOPERATION AND MERELY KEEPS A CLOSED-CIRCUIT CONDITION ON THE KEYING LINE SO THAT THE PRINTER DOES NOT TYPE FROM NOISE COMING OVER THE RADIO PATH. THE MARK-HOLD ARRANGEMENT IS OBVIOUSLY NOT PRACTICAL FOR AMATEUR SERVICE WITH UNATTENDED PRINTERS BUT ITS EMPLOYMENT BY MARS DOES NOT COMPLICATE INTEROPERATION WITH AMATEURS.

AMATEUR RADIOTELETYPE SOCIETY

BULLETIN NUMBER 84

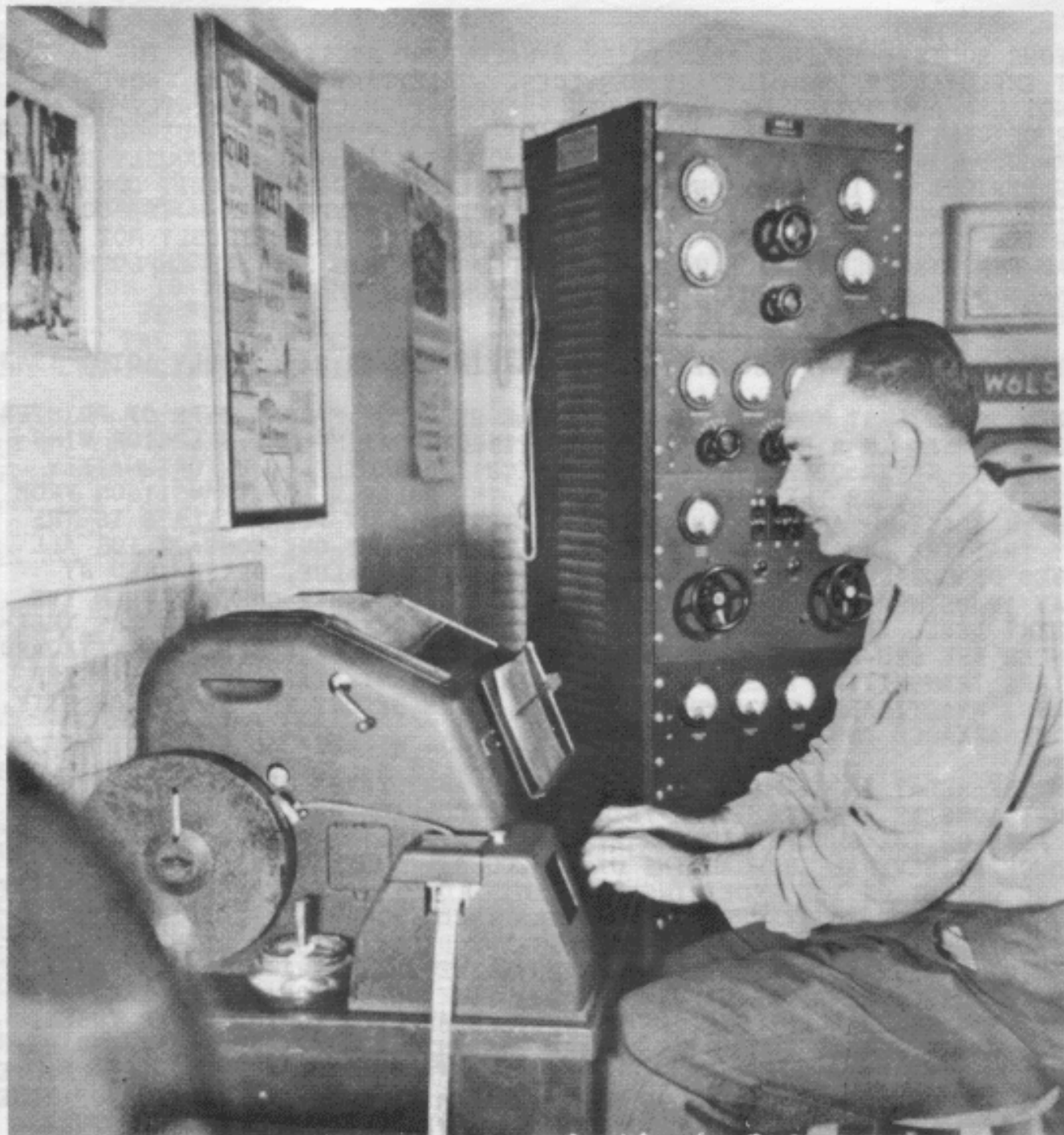
JULY 10TH, 1948

WE MENTIONED LAST MONTH THAT THE SINGLE SELECTOR MAGNET TYPE OF PRINTER COULD BE USED IN A RELAYLESS SETUP BY INCORPORATING THE SELECTOR WINDING IN THE KEYSER OUTPUT TUBE PLATE CIRCUIT DIRECTLY. UNFORTUNATELY THIS SYSTEM LOSES THE ABRUPT NATURE OF THE POLAR RELAY TRANSITION FROM MARK TO SPACE. AN OUTSTANDING CHARACTERISTIC OF POLAR RELAYS IS THE FACT THAT THE ARMATURE REMAINS MOTIONLESS AGAINST ONE CONTACT FOR ALL VALUES OF CURRENT LESS THAN A CERTAIN CRITICAL VALUE, DETERMINED BY RELAY ADJUSTMENT, AND ABRUPTLY TRANSITS TO THE OTHER CONTACT WHEN THE CURRENT LEVEL EXCEEDS THIS VALUE. THE PULSES TRANSMITTED TO THE TELEPRINTER ARE SQUARE AND RESEMBLE TO A LARGE EXTENT THE ORIGINAL KEYBOARD OR TAPE TRANSMITTER PULSES SENT FROM THE DISTANT STATION. POLARIZED RELAYS, PRACTICALLY UNKNOWN IN AMATEUR RANKS BEFORE THE ADVENT OF RTTY, ARE REMARKABLE INSTRUMENTS.

WHEN THE RELAY IS ELIMINATED SOME OF THE ABRUPTNESS OF THE MARK-SPACE TRANSITIONS IS ABSENT. THE FREQUENCY EXCURSION OF THE RADIO CARRIER (IN FSKM OR THE SUBCARRIER (IN AFSK) IS NOT INSTANTANEOUS AND MAY TAKE AS MUCH AS SEVERAL THOUSANDTHS OF A SECOND. DURING THE EXCURSION THE DC OUTPUT OF THE RECEIVING DISCRIMINATOR IS ALSO REVERSING POLARITY AND BUILDING UP TO ITS PEAK VALUE RELATIVELY SLOWLY. THIS ACTION IS FURTHER SLOWED BY ANY CAPACITY ACROSS THE DISCRIMINATOR OUTPUT. QUITE A LOT OF CAPACITY IS REQUIRED TO REMOVE THE AUDIO FREQUENCY COMPONENT FROM THE DISCRIMINATOR OUTPUT SIGNAL. THE RESULT OF ALL OF THE FOREGOING IS A GRADUAL BUILDUP OF THE VOLTAGE APPLIED TO THE KEYSER TUBES, WHICH THEORETICALLY SHOULD BE BIASED INSTANTANEOUSLY TO CUTOFF AND RETURNED JUST AS RAPIDLY TO FULL CONDUCTION. THE ARMATURE OF THE PRINTER SELECTOR MAGNET IS ADJUSTED TO PULL IN AT A VERY DEFINITE VALUE OF LINE CURRENT AND PULLS IN AT THIS VALUE DURING THE UP-SLOPE OF KEYSER TUBE PLATE CURRENT. IF THE SLOPE IS A GRADUAL ONE, AND IF THE TRANSMISSION MEDIUM AND OTHER CONDITIONS ARE VARYING, THE EXACT MOMENT OF PULL-IN MAY BE INDETERMINATE. IF IT PULLS IN EITHER EARLY OR LATE BY A SUFFICIENT AMOUNT WE WILL HAVE MISPRINTING.

TO REPLACE THE "TOGGLE-SWITCH" ACTION OF THE RELAY WE CAN INSERT AN ELECTRONIC CIRCUIT, CONSISTING OF A SINGLE TUBE, BETWEEN THE DISCRIMINATOR AND THE GRIDS OF THE KEYSER TUBES. THE "TOGGLE-CIRCUIT" IS ADJUSTABLE SO THAT IT REMAINS UNAFFECTED BY DISCRIMINATOR VOLTAGES LESS THAN A PREDETERMINED LEVEL FOR WHICH THE CONTROL IS SET AND TRANSITS VERY RAPIDLY FOR VOLTAGES SLIGHTLY EXCEEDING THESE LEVELS. A CIRCUIT HAS BEEN RIGGED BY YOUR "SCRIBE" W2BFD, WHICH PERFORMS THE ABOVE ACTION. AS MANY WILL WANT TO INCORPORATE IT IN EXISTING RADIOTELETYPE "PANELS" IT CONSISTS OF A MINIATURE 6J6 DUAL TRIODE AND SEVERAL 1/2-WATT RESISTORS AND CONDENSERS, FOR WHICH NO TROUBLE SHOULD BE HAD TO FIND SPACE. WRITE TO W2BFD FOR THIS CIRCUIT WHICH WILL BE LOANED FOR COPYING.

IF AT ALL POSSIBLE THE SELECTOR MAGNETS SHOULD BE PLACED IN THE PLATE CIRCUIT OF THE KEYSER TUBES AND NOT IN THE CATHODES. ONE OF OUR EARLIER BULLETINS EXPLAINED IN DETAIL THAT ALL TELEGRAPH MAGNET WINDINGS, FROM WHICH THE ULTIMATE IN SPEED IS REQUIRED, SHOULD BE FED THROUGH A HIGH RESISTANCE FROM A SOURCE OF SUFFICIENT POTENTIAL TO PUSH THE REQUIRED NUMBER OF MILLIAMPERES THROUGH THE WINDING. THIS ALSO APPLIES TO TUBE KEYSER. A CATHODE FOLLOWER APPEARS AS THE EQUIVALENT OF A LOW IMPEDANCE AND THIS ADVERSELY AFFECTS THE PERFORMANCE OF THE SELECTOR. ON THE OTHER HAND THE INSULATION BETWEEN THE WINDING AND THE CORE WAS NOT DESIGNED TO HANDLE MUCH OVER 150 VOLTS. A BETTER PLAN IS TO USE A SUPPLY WITH THE POSITIVE GROUNDED AND THE NEGATIVE FED TO THE TUBE CATHODES. THE SELECTOR MAGNETS THEN ARE CONNECTED BETWEEN PLATE AND GROUND. THE WINDING WILL THEN BE KEPT WITHIN A FEW VOLTS OF GROUND POTENTIAL. 73 W2BFD



Leo Shepard, the late W6LS, was the pioneer "organizer" of RTTY efforts on the Pacific coast between 1950 and 1953. Largely as a result of his enthusiasm and perseverance the dozen-odd RTTYers operating in California in 1951 grouped to form an active club which, by 1957, already numbers several hundred amateurs. W6LS, with the financial backing of W6CLW and assistance from other prominent West Coast members, such as W6AEE and W6OZE, made the arrangements with RTTY headquarters in New York for the shipment of several hundred items of teleprinter equipment to Los Angeles to get their program under way. Several large shipments were made and the equipment, distributed mainly by Leo, went a long way toward "getting the show on the road". Some indication of his enthusiasm may be realized from the 58 letters he wrote to headquarters during 1950 and 1951 alone. Besides this numerous group many other regional and local clubs, associations and societies have been formed around the country. Amateur Radioteletype Society assistance is available gratis for any bona-fide club or society requiring technical information or teleprinter apparatus on a bulk or individual basis. The slogan of your RTTY Society is:-

"KEEP 'EM PRINTING!"

AMATEUR RADIOTELETYPE SOCIETY
SPECIAL BULLETIN-LETTER

WE HAVE LITTLE NEED TO BRING TO YOUR ATTENTION HOW HARD ALL OF US HAVE WORKED TO MAKE AMATEUR RADIOTELETYPE A NATIONAL AFFAIR, AND NOT JUST A LOCAL "DEAL" CONFINED TO A FEW EASTERN STATES. STILL FAR OFF ON THE HORIZON, BUT DEFINITELY WITHIN OUR GRASP, IS THE COUNTRYWIDE EVERYDAY INTERCOMMUNICATION BY RADIO AMATEURS USING PRINTING TELEGRAPH EQUIPMENT. OF COURSE WE HAVE HAD A NUMBER OF TRANSCONTINENTAL, AND EVEN TRANSOCEANIC, QSO'S BUT HARDLY IN THE NATURE OF EVERYDAY OCCURRENCES.

SIMULTANEOUSLY, IN SEVERAL PARTS OF THE COUNTRY, LOCAL GROUPS OF RTTY ENTHUSIASTS ARE BANDING TOGETHER TO FORM RADIOTELETYPE CLUBS. YOUR EDITOR'S TYPEWRITER HAS BEEN WORKING OVERTIME CORRESPONDING WITH W6OZE AND W6LS. SHEP, IN PARTICULAR, IS A PROLIFIC LETTER-WRITER AND HAS THIS TO SAY ABOUT THE FORMATION OF AN RTTY CLUB FOR SOUTHERN CALIFORNIA:-

"AND THERE ARE ABOUT 15 ACTIVE STATIONS OUT HERE. MANY OF US EXPECT TO GET ON 11 METERS SOON. W6CMQ IS THE PIONEER OUT HERE; HE HAS BEEN ON SINCE EARLY 1949 AND HAS BEEN STIRRING UP THE BOYS. ----- A FEW OF THE BOYS WERE TALKING ABOUT A GET-TOGETHER TO DISCUSS STARTING AN RTTY GROUP ----- THANKS A MILLION FOR ALL THE DOPE YOU SENT OUT ABOUT THE IMPORTANT STEPS, AND THE PITFALLS TO BEWARE, IN FORMING A CLUB. YOUR EXPLANATION MADE GOOD SENSE, TOO, ABOUT NOT HAVING THE LOCAL CLUBS FORM "CHAPTERS" OF THE NATIONAL SOCIETY. THOSE I HAVE DISCUSSED IT WITH ALSO THINK THAT THE REGIONAL GROUPS SHOULD BE INDEPENDENT BUT WORK HARMONIOUSLY WITH THE NATIONAL ORGANIZATION. THE GROUNDWORK ACCOMPLISHED BY YOUR SOCIETY HAS OPENED UP A NEW "FACET" OF AMATEUR RADIO".

THE FOLLOWING COMMUNICATION WAS RECEIVED FROM CHARLES PATRICK, W6OZE:-

DEAR JOHN (W2BFD):

RECEIVED YOUR LETTER AND HAVE PASSED IT AROUND TO THE GANG. W6RL HAS SENT THE DOPE TO THE CONVENTION AND IT WAS DECIDED TO CALL THE GROUP THE "WESTERN DIVISION OF RADIO TELEPRINTER SOCIETY, SOUTHERN CALIFORNIA CHAPTER". WE HOPE IT MEETS WITH YOUR APPROVAL AS THE "GRANDDADDY OF TELETYPE".....

PAT, W6OZE

(EDITOR'S NOTE:- HI! WE ARE HAPPY THEY SCUTTLED THAT NAME IN FAVOR OF A MUCH SHORTER ONE. OF COURSE WE ARE PROUD OF OUR PART IN STARTING THIS ACTIVE GROUP.)

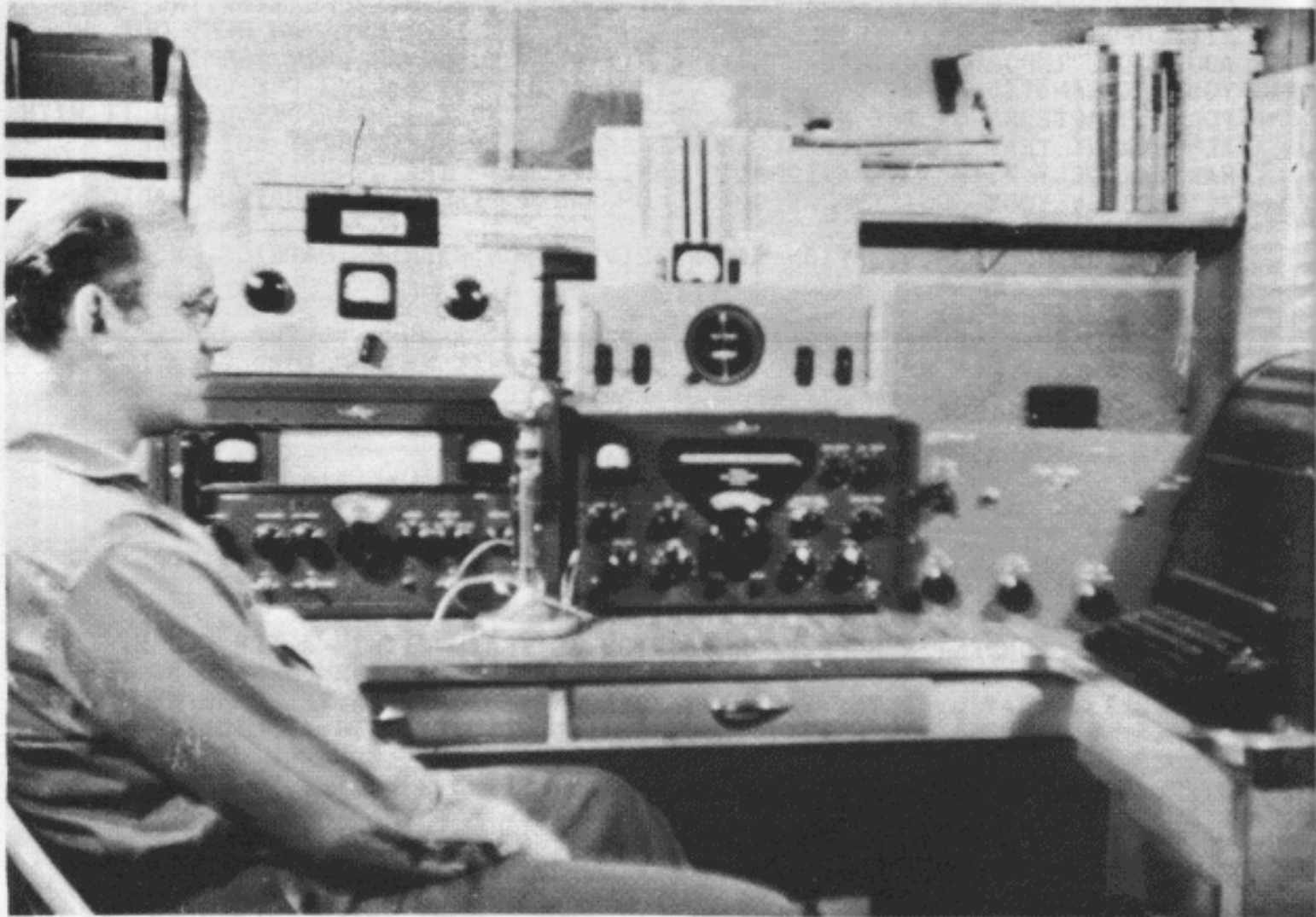
YOUR CORRESPONDENT'S HUMBLE PREDICTION IS THAT, WITHIN A FEW YEARS, RADIOTELETYPE COMMUNICATION BY AMATEURS WILL BE AS COMMONPLACE AS 'PHONE AND CW IS TODAY OVER THE SAME VAST DISTANCES AND WITH THE SAME OR GREATER EASE. MOREOVER, SINCE RTTY IS ESSENTIALLY A SPECIFIC APPLICATION OF REMOTE CONTROL, THE SAME EQUIPMENT WILL BE ABLE TO CONTROL NUMEROUS OTHER PIECES OF APPARATUS AT MANY DISTANT POINTS, BY THE TYPING OF A CODED COMBINATION OF LETTERS, STANDARDIZED AND PREARRANGED. IF YOUR SOCIETY SUCCEEDS IN OBTAINING WIRE-PHOTO EQUIPMENT FOR ITS MEMBERS, A PROJECT WE HAVE WORKED ON VERY SERIOUSLY, WE ALSO PREDICT THE ABILITY OF OUR MEMBERS ANYWHERE IN THE WORLD TO SEND DIAGRAMS, PHOTOGRAPHS, QSL CARDS ETC. BY RADIOPHOTO TRANSMISSION. AUTO-START, ALTHOUGH EXTREMELY EFFECTIVE NOW, WILL HAVE BEEN IMPROVED TO THE POINT THAT WE WILL BE ABLE TO "BROADCAST" AN RTTY CQ OR SELECTIVELY START SPECIFIC TELETYPEWRITERS OR GROUPS OF TELETYPEWRITERS. ADOPTING PROCEDURES ALREADY WELL ESTABLISHED WITH COMMERCIAL TELEGRAPH SERVICES, WITH AMATEUR VARIATIONS OF COURSE, WE CERTAINLY WILL MAKE USE OF REMOTELY-CONTROLLED TAPE REPERFORATORS, DIVERSITY, MULTIPLEX, AUTOMATIC REPEATER STATIONS, MORSE-TO-TELETYPE CONVERTERS AND, PERHAPS, EVEN AUTOMATIC ERROR-DETECTION SYSTEMS. WE PREDICT THAT, FOLLOWING THE LEAD SET IN OUR 1949 ARRL CONVENTION, NO FUTURE CONVENTION MAY HOPE TO BE COMPLETE WITHOUT A RADIOTELETYPE EXHIBIT. WE MAY EXPECT TO SEE TELEPRINTERS IN MANY RADIO AMATEURS' AUTOMOBILES AND BOATS, SUCH AS THE 1948 DEMONSTRATION BY THE NEW YORK CITY GANG. RADIO REPORTING OF COMPLICATED STATISTICS, SUCH AS THE YEARLY JOB TURNED IN IN REPORTING THE UPSTATE NEW YORK ELECTION RETURNS TO BROADCAST STATION WNYC, SHOULD BECOME A QUITE COMMONPLACE TASK OF RTTY. IT IS TO BE EXPECTED THAT MANY OF THE TELEPRINTER ITEMS OF EQUIPMENT, NOW SECURED FOR OUR MEMBERS BY THE NATIONAL SOCIETY, WILL EVENTUALLY HAVE TO COMPETE WITH AMATEUR-BUILT ELECTRONIC EQUIVALENTS.

WE HAVE MUCH TO LOOK FORWARD TO.

73 DE EDITOR W2BFD

A stunt used by professional teletype operators to enjoy some privacy in their personal conversations over the wire is to perforate what they want to say in tape and run the tape backwards through the tape reader. At the distant end it is received on a reperfector and the tape flipped end-for-end and rerun to the local printer, coming out in "English".

Teletypewriters obtained at cost for members by the Society frequently arrive in wooden boxes in which, in lieu of excelsior, are miles of news tapes with the latest cases of murders, arson, divorces, etc., especially when the machines are secured from the press associations. When demonstrating machines at lectures, hobby clubs, etc., use of these tapes "sparks" the show and saves a lot of preparation work on your part. Much more interesting than repetition of "The Quick Brown".



W7LJF'S RADIOTELETYPE STATION IN A HOUSE TRAILER

No sign of crowding at Albert O. Fye's amateur station at Coeur D'Alene, Idaho, even though it shares W7LJF's house trailer home. To the left of the TWX printer is the home-made converter which has a tuning indicator, AFC unit and relay-keying for the FSK unit. Alongside the terminal unit is the 75A4 with the beam control and indicator on top. Next comes the 32V3, modified for FSK, with the antenna tuning unit sitting on it. A 24-hour electric clock can be seen above the antenna tuner. Al has his beam on a 43-foot steel tower. Another steel tower holds a half-wave, center-fed for 80 meters. All we want to know now is where the OM sleeps, etc.? An RTTY gypsy, by Jove!

AMATEUR RADIOTELETYPE SOCIETY ---- VHF TELETYPE SOCIETY

SPECIAL ANNOUNCEMENT BY JOHN WILLIAMS, W2BFD, ARTS-VHFTS SECRETARY

WELL, FELLERS, 1955 APPEARS TO BE STARTING OFF WITH A LOT OF CHANGES. SINCE THESE CHANGES AFFECT THE FUTURE OF THE BULLETIN WE HAD BETTER TELL YOU WHAT IS TAKING PLACE:-

- (1) WAYNE GREEN, WHO HAS EDITED AND PUBLISHED THE ARTS BULLETIN SINCE I RELINQUISHED IT IN 1951 (AFTER CLOSE TO 6 YEARS OF PUTTING IT OUT MYSELF), HAS HAD TO YIELD TO THE PRESSURE OF EARNING A LIVELYHOOD AND IS BOWING OUT AFTER 3 FINE YEARS, DURING WHICH MANY NEW CONVERTS TO OUR HOBBY HAVE BEEN ADDED. HE HAS ACCEPTED THE EDITOR'S CHAIR IN "CQ" MAGAZINE AND WILL HENCEFORTH DETERMINE THE POLICY OF THAT AMATEUR MAGAZINE.
- (2) THE ARTS BULLETIN, WHICH HAS GROWN TOO LARGE TO BE A ONE-MAN JOB ANY LONGER, IS BEING TAKEN OVER BY A STAFF OF FIVE LIVE-WIRE RTTY AMATEURS, HEADED BY OUR OLD FRIEND CLAYTON COOL WHO WILL BE YOUR NEW EDITOR. THE CURRENT ISSUE OF THE ARTS BULLETIN WILL GIVE YOU ALL THE FACTS ABOUT THE BRAND-NEW BULLETIN STAFF.
- (3) I AM GOING INTO "CQ" MAGAZINE ALSO, AS NUMBER 1 BOY UNDER WAYNE. MY TASK WILL BE TO APPRAISE SUBMITTED MANUSCRIPTS FOR TECHNICAL VALUE, CORRECT SOME AND COMPLETELY REWRITE OTHERS. YOU WILL PROBABLY SEE AN ARTICLE BY ME ONCE IN AWHILE. MOST OF THE TIME I WILL BEHAVE LIKE THE "LITTLE MAN THAT WASN'T THERE" BUT I WILL BE IN THERE PITCHING TO SEE THAT THE MAGAZINE STAYS ON ITS TECHNICAL TOES. I DOUBT THAT MY NAME WILL EVEN APPEAR ON THE MASTHEAD BUT, REST ASSURED, IF RTTY IS STILL THE ORDER OF THE DAY, IT IS W2BFD WHO HAS CONTRIVED TO SNEAK IN A RADIOTELETYPE MANUSCRIPT WHEN THE "BOSS" WAS NOT LOOKING.

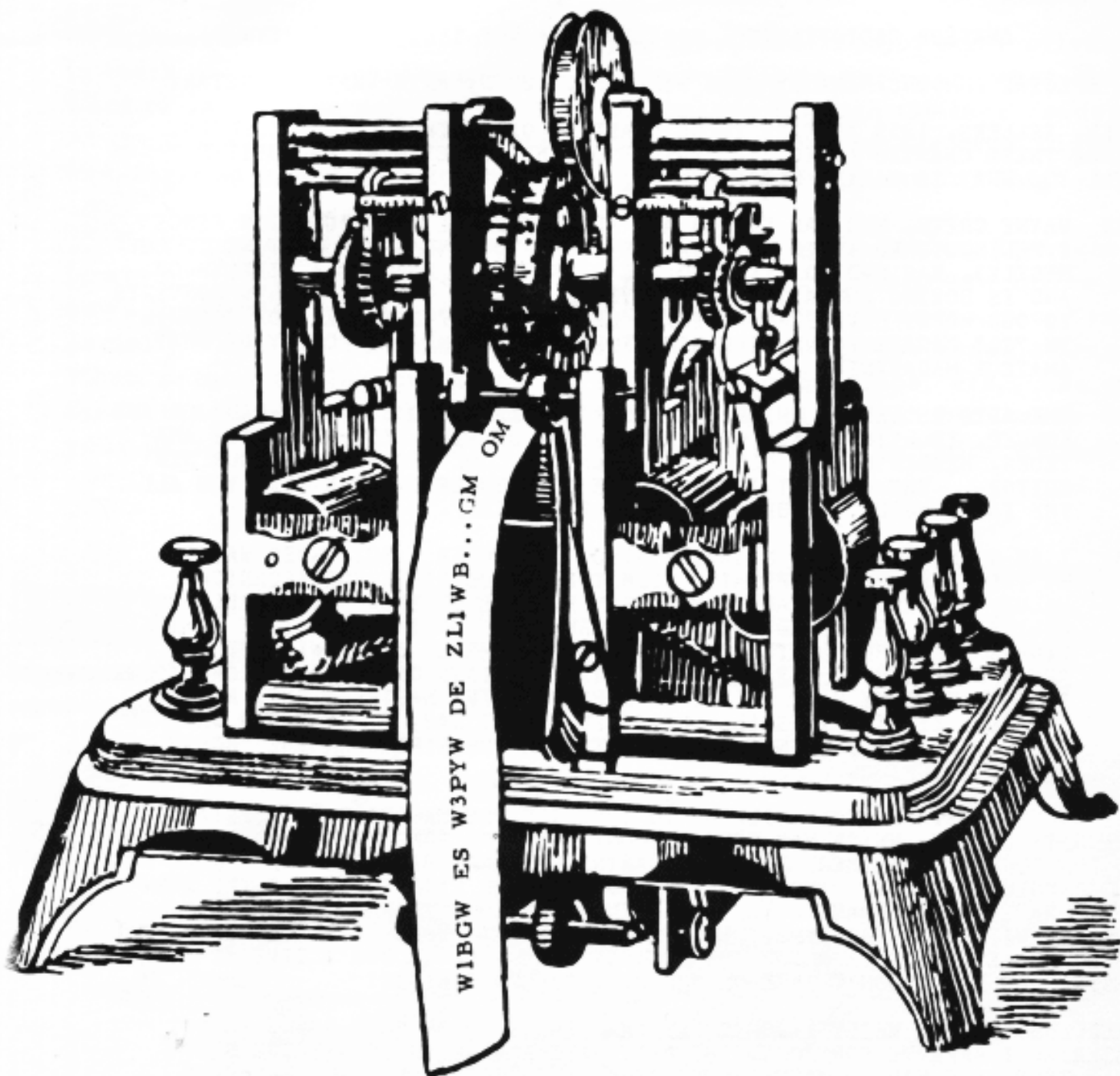
ONE OF MY FIRST PROJECTS WILL BE TO INVEIGLE THE MAGAZINE TO REESTABLISH THE RTTY COLUMN, WHICH HAS BEEN DISCONTINUED FOR SOME MONTHS. IN ORDER TO RUN SUCH A DEPARTMENT IN THE MAGAZINE WE FIRST HAVE TO FIND A REAL "HOT" COLUMN EDITOR. YOUR CORRESPONDENT WOULD LIKE TO TACKLE THE JOB BUT I HAVE A SMALL MANUFACTURING BUSINESS IN LONG ISLAND TO RUN, THIS NEW JOB WITH "CQ" MAGAZINE, PLUS THE SECRETARIAL WORK OF HANDLING SEVERAL THOUSAND LETTERS A YEAR FOR THE SOCIETY (YOU FELLOWS DON'T GIVE ME MUCH REST). OH NO! I WON'T TAKE ON THE RTTY COLUMN BESIDES!

NEEDLESS TO SAY, WHILE I WON'T LET THE 'PHONE OR CW BOYS DOWN, IN THE MATERIAL I APPROVE FOR "CQ", THE RTTY GANG ARE GOING TO GET THE BEST DEAL THEY HAVE HAD IN MANY A LONG YEAR. INCIDENTALLY, YOU MAY SEND ALL RTTY MATERIAL, SUCH AS MANUSCRIPTS, PICTURES OF STATIONS, "HOT" RTTY NEWS ITEMS, ETC., DIRECT TO ME AT RTTY HEADQUARTERS AT WOODSIDE, SINCE MOST OF MY TECHNICAL EDITING FOR THE MAGAZINE WILL BE FROM THAT LOCATION. IF YOUR MATERIAL IS OF GENERAL INTEREST I WILL SEE THAT IT GETS RUN IN EITHER "CQ" OR THE ARTS BULLETIN.

IT GOES WITHOUT SAYING THAT YOU ARE ALL GOING TO MISS WAYNE'S INIMITABLE STYLE, NOW THAT HE HAS "ABDICATED" HIS POST IN THE BULLETIN AND HAS LEFT THE SOCIETY. HOWEVER I AM SURE THAT YOU WILL FIND CLAY COOL AND HIS STAFF WILL TURN OUT A VERY FINE BULLETIN. CLAY HAS HAD EXTENSION PROFESSIONAL EXPERIENCE AS A TECHNICAL WRITER.

DURING THE PAST THREE YEARS, WHILE WAYNE WAS PUBLISHING THE BULLETIN, RTTY HEADQUARTERS HAS BEEN ABLE TO FUNCTION AT TOP EFFICIENCY SINCE WE DID NOT HAVE THE RESPONSIBILITY OF PUTTING OUT THE BULLETIN TO DISTRACT US FROM THE PRIMARY PURPOSE OF THE SOCIETY, WHICH IS (1) TO ACT AS THE SOURCE OF TECHNICAL INFORMATION, BLUEPRINTS AND CONSTRUCTIONAL DATA AND (2) TO CONTINUE THE JOB OF GETTING TELETYPEWRITER EQUIPMENT OUT OF THE CLUTCHES OF THE COMMUNICATIONS COMPANIES AND INTO AMATEUR POSSESSION ON A NON-PROFIT BASIS, THAT THE SOCIETY HAS TIRELESSLY ACCOMPLISHED SINCE ITS FOUNDING IN 1946. IN ADDITION TO FURNISHING THOUSANDS OF TELETYPEWRITER ITEMS DIRECT TO ITS MEMBERS THE SOCIETY HAS ALSO BEGUN TO ARRANGE FOR "BULK" LOTS OF PRINTER EQUIPMENT TO BE "LIBERATED" TO LOCAL AND REGIONAL CLUBS AND SOCIETIES AROUND THE COUNTRY, WHICH ARE BEGINNING TO SPRING UP. TRULY, AMATEUR RADIOTELETYPE IS IN ITS HEY-DAY!

PLEASE NOTE: RTTY TECHNICAL ARTICLES, NEWS ITEMS, STATION PHOTOGRAPHS AND DIAGRAMS SUBMITTED TO ME AT ARTS HEADQUARTERS IN WOODSIDE WILL BRING PAYMENT IN CASH IF SUITABLE FOR PUBLICATION IN "CQ". AWARDS OF TELEGRAPH AND TELETYPE APPARATUS ARE MADE IF MATERIAL IS USED FOR ANY OF THE SOCIETY'S PUBLICATIONS. 73 DE W2BFD, JOHN WILLIAMS



ARCHEOLOGICAL DISCOVERY OF THE CENTURY!

Attracted to the spot by a rhythmic ticking sound, a group of workmen on a construction job in Milwaukee, Wisc. uncovered the ruins of an ancient telegraph office. Excavation of the site disclosed an early model telegraph printer, dust covered but undamaged, busily cranking out endless yards of tape, yellowed to parchment-like appearance.

A hurry call to the Smithsonian Institute in Washington brought out a number of experts on ancient communications methods. All of the professors were baffled in classifying the strange instrument until they called in a colleague from Southern California who identified it as a perfectly preserved specimen of a Callahan's Printing Telegraph Machine (Circa 1870 to 1895 A. D.)

When asked how he was able to come up with the right answer this expert explained that it was common knowledge in his state that the radio amateurs there who had a hobby of Radioteletype, for some reason of their own, used machines employing the antique typewheel method, such as the Callahan's Model 27 and the Teletype Model 26, instead of the modern typebar and typebox systems.

The unretouched illustration above shows the Callahan's Printing Telegraph Machine, cover removed and dust blown out, as it appeared, still ticking away, as it was lifted out of the debris of the old Postal Telegraph office.