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## CHICAGO 1956 RTTY MEETING

Meeting was called to order by George Boyd W9SPT at 1345 CDST 30 September at the Hallicrafters Co. George introduced Boyd Phelps WoBP (BeeP). BeeP reviewed last years meeting, and outlined the program for this year: Technical talks on terminal equipment, RTTY gear, etc. BeeP spoke on basic TT theory, advantages of AVC, limiting, band width, selectivity, and their effect against selective fading. Simplicity of grid limiting was noted.

BeeP said limiting should be used after a band pass filter for about 1800-3200 cycles. Otherwise, the harmonics caused by limiting of signals below 1500 cycles can get into the mark and space filters.

BeeP introduced Dave Chapman W9DPY. Dave talked on FSK and AFSK requirements for proper operation. Bandwidth must be wide enough. Also, the area under each half of the discriminator curve must be equal.

Robert Paculat W9JBT presented a paper by Edwin O'Brien W6LDG on an Audio Frequency Discriminator Converter. This copies either AFSK or FSK regardless of the amount of shift.

Ray Smessaert W9MDQ of Teletype Corp. talked on the Model 28. The 28 can print on a 9 millisecond interval. Ray answered questions on oil, grease, and maintenance.

R. D. Cortright W9NOE told about his keyer using a surplus stepping switch and wired for CQ and call sign.

Bob Weitbrecht W9TCJ demonstrated autostart L-F FSK for 3620 and 7140. Numerous msgs

have been copied at W9TCJ's unattended printer from WoBP, 370 miles away. Standby drain is 35 watts. A 5 sec 60 cps starts the printer; a 5 second space signal stops the printer after a message. Frequency accuracy of 50 c is needed.

BeeP showed a simple unit that rings an alarm bell, lights a light, and starts a clock on reception of 20 fast letter O within  $\pm 2$  kc of receiver freq.

BeeP mentioned that now was the time to set a standard for amateur NFSK. Shifts of 180, 170, 160, 90, 60, and 30 were suggested. W9SKF Norm Krohne noted that multiples of power line frequency (60, 120, 180) would possibly cause trouble by ripple and pickup in amplifiers. Fritz Franke (Hallicrafters) said his IF discriminator with crystal would work down to 20 cycles shift (But at what speed? Ed). W9LZV Jim Lomansney spoke on VNFSK down to 8 cycles shift of broadcast carrier (simultaneous A3 and F1). The unit used carrier limiting, AFC, and 100 c band width. BeeP showed a unit with variable Q, variable band width, and variable shift reception. NFSK of 160-170 c is considered best: 170 is 1/5 of 850, and 160 can be calibrated with WWV (600 - 440 c).

BeeP spoke on experiments with printer magnet current. The high voltage source and series resistance is important for fast magnet response (low L/R time constant). BeeP showed scope pictures of armature movement and bias distortions.

Fritz Franke extended a welcome to the gang to use Hallicrafters quarters for meetings. He talked on IF vs. AF terminal units, limiters vs. ratio de-

tectors for better noise ratio, and narrow shift with crystal in the IF.

The technical session included a question and answer period and drawing of prizes: polar relays from W9GRW Ray, call books, and RTTY subscriptions.

#### Attendance Sept 30:

W2PEH El	W9KLB Al
W3JUE Fred	W9LKK Loren
W6FDJ Roger	W9LZV James
W8GRL Larry	W9MAV Dan
W8VJS Clyde	W9MDQ Bob
W9ALM Bob	W9NGX Ray
W9BGC Joe	W9NOW Dean
W9BNM Bill	W9OCV Burt
W9BOQ Alan	W9OFR Bob
W9BQV Bill Sr	W9OMF George
W9BQY Bill Jr	W9PHJ Herb
W9CYL Jim	W9PKS Stephen
W9DNP George	W9PRO Hap
W9DPY Dave	W9QKE Jordan
W9DRW Dick	W9SKF Norm
W9DUF John	W9SPT George
W9GLR Jim	W9TCJ Bob
W9GRU Fred	W9UEZ Frances
W9GRW Ray	W9VMG George
W9GWN Ray	W9VOK Bob
W9HUZ Art	W9WLM Homer
W9IQS Bob	WoBP Beep
W9JBT Bob	WoFCW Lyle
	W9KIJ Don

Sunday night banquet was well attended. Radio typers reported on activity. Next years meeting is expected to be combined with the ARRL Labor Day convention in Chicago.

Monday the group toured the Teletype factory. Multiplex gear was inspected, assembly of 15's and 28's, 600 wpm gear, screen projection of received traffic, automatic relaying, and selective call systems.

#### EDITORIAL de W2EBZ

This month gives a larger bulletin. Every month we want a larger bulletin. But the size depends on (1) material available and (2) money available. And if we see the bulletin every month, or at rarer occasions, depends on editor's time available.

Material available depends on what is contributed by readers. So send in news of activity and technical notes. Material available also affects the punctuality of publication. I can write reams on philately, numismatics, apiculture, and cybernetics, but doubt if the subjects would be of interest to subscribers. So our readers must originate the content of the bulletin.

Money available depends on the volume of circulation. Money affects the size of the bulletin, but not the publication dates. Main expense is printing. And the main cost of printing is not for paper, but for the plates. Once the plates are made, it's almost as cheap to print 2,000 as to print our present 1,000. So if each one brings one—each subscriber enlists another new subscriber — money will be available to double the size of the bulletin.

Other expenses incurred, besides direct publication and mailing to subscribers, include postage for mailing to ARRL officials, others that can help amateur RTTY, and sample bulleting to interested amateurs. The sample bulletins are paying off, as a large percentage of interested hams that see a copy of the bulletin do send in their subscriptions.

—73 de Clay W2EBZ

NORMAN, W9SKF, FINALLY GOT HIMSELF INSTALLED IN "MORTGAGE MANOR", THE HOUSE HE HAS BEEN BUILDING FOR, LO!, THESE MANY YEARS. POOR NORM! EVERYTIME HE GOT AN OKAY FROM THE BANK FOR THE HOUSE HE WAS GOING TO BUILD THE CONTRACTOR WOULD UP THE PRICE OVER ORIGINAL ESTIMATE, BECAUSE OF INCREASES IN MATERIAL AND LABOR. BY THE TIME W9SKF GOT BACK FROM THE BANK WITH THE NEW OKAY IT HAPPENED ALL OVER AGAIN. ANYHOW HIS NEW QTH IS 1341 S. 88TH STREET, WEST ALLIS 14, WISCONSIN. GOOD LUCK NORM!

WE HAVE WORD FROM W4ZPZ THAT THE QTH IS NOW:- 1ST LT. NEAL SHEFFIELD, JR., 2151-1 SU DENTAL DETACHMENT (SOUNDS LIKE REMOVABLE BRIDGEWORK) ABERDEEN PROVING GROUND MARYLAND. NEAL WRITES THAT HE IS ALMOST CLOSE ENOUGH FOR VHF COMMUNICATION WITH NATIONAL RTTY HEADQUARTERS. (WHAT DO YOU MEAN "ALMOST" NEAL?, WE CAN WORK MARYLAND!) HE HASN'T TOTED UP HIS TYPING IRON FOUNDRY AS YET BUT WILL SEND ALONG WORD WHEN HE IS ALL SET. WANTS THE NATIONAL ARTS BULLETIN TO CHASE HIM TO NEW QTH. WILL DO.

W2BFD IS IRREGULARLY ON 52.6 AND SOMEWHAT LESS FREQUENTLY ON 53.16 MC WITH (1) FSK-850 CYCLES (2) AFSK 100 WATTS AM (3) AFSK 100 WATTS FM. THE SAME TELEPHONE-COMPANY BASE-STATION MENTIONED IN BULLETIN-LETTER 488 THAT IS DOING THE ABOVE JOB IS ALSO BEING SLIGHTLY MODIFIED TO WORK ON TEN AND 11 METERS TOO. AS A RESULT OF B-L 488 A NUMBER OF THESE AND THE MOBILE SETS ARE GOING TO VARIOUS CALIFORNIA AMATEURS TO HASTEN THEM GETTING ON SIX METERS WITH PRINTER.

W3MKZ, WHO HAS BEEN MANUFACTURING THE STANDARD ARTS "W2BFD" CONVERTER, REPORTS FROM JAPAN THAT HIS QTH SHOULD NOW READ:- R.E. QUENSTEDT, NSAFE, APO 500, C/O P.M. SAN FRANCISCO, CALIF. LET'S HOPE THAT BOB HAS SOMETHING TO KEEP THE PAGODA WARM WITH.

JUDGING IN THE "ANNIVERSARY CONTEST" WILL BE PUT OFF TO NOVEMBER 1ST INSTEAD OF OCTOBER 10TH AS ENTRIES ARE STILL DRIFTING IN. SEND 8 X 10 GLOSSY PHOTOS TO SECRETARY W2BFD IN WOODSIDE. IF YOU DO NOT HAVE PRINTS THIS LARGE SEND IN THE NEGATIVE AND WE WILL HAVE THE "BLOW-UPS" MADE AND RETURN THE NEGATIVE IF YOU WISH. REMEMBER, EVEN IF YOU DO NOT COME OFF WITH A VALUABLE PIECE OF TELETYPEWRITER EQUIPMENT YOU CAN COUNT ON GETTING YOUR PICTURE IN THE BULLETIN!

W2BFD HAS LATCHED ONTO A SMALL GOVERNMENT SUBCONTRACT AND HAS ADMITTED THAT THE DECISION TO GIVE UP EATING WAS PREMATURE.

HAD A LETTER FROM W3CA. IT'S BEEN A LONG TIME KEN! GLAD TO HEAR THAT YOU ARE STILL INTERESTED IN HAM RTTY. SORRY TO HEAR THAT THE DEAL ON THE TERMINAL UNIT DID NOT PAN OUT.

VE7CF WRITES IN THAT HE WANTS TO BUILD THE ARTS STANDARD TERMINAL UNIT AND WOULD WE SEND ALONG "DATA PACKAGE 6034" CONTAINING BLUEPRINTS ETC FOR CONSTRUCTION. (THEY ARE ON THE WAY, STEVE).

WALT BRITTON, W7JFU, WHO WAS OUTFITTED WITH A PRINTER BY THE SOCIETY NOT LONG AGO, WROTE TO US AROUND THE END OF JULY THAT HE WAS ON THE BEACH, HIS SHIP HAVING BEEN SOLD OUT FROM UNDER HIM. COUPLE DAYS AGO WE GOT A BEAUTIFUL CARD FROM HONOLULU. WALT SAYS HE IS MAKING SEVERAL RELIEF TRIPS TO HAWAII. HE HAS THE PRINTER GOING AT THE HOME QTH BUT GUESS THE TEMPORARY NATURE OF THE SHIP-OPERATOR'S JOB HAS SIDETRACKED THE PLAN TO GET THE MINIATURE PRINTER SET UP AS W7JFU/MM/RTTY.

WONDER WHERE THAT RUMOR STARTED ON THE WESTCOAST THAT TAPE EQUIPMENT IS SCARCE? WE HAVE HAD MENTION OF THIS IN NUMEROUS LETTERS FROM OUR FRIENDS ON THE COAST. THERE IS NOTHING TO THIS REPORT, FELLERS! TAPE EQUIPMENT IS MORE READILY AVAILABLE NOW THAN AT ANY TIME IN THE PAST. SO PLENTIFUL, IN FACT, THAT YOUR SOCIETY HAS WORKED OUT A DEAL TO PROVIDE TAPE INSTRUMENTS WITH ALL PRINTERS SECURED ON THE "REGULAR" BASIS. THE COST OF SUCH EQUIPMENT IN THE "COMBINED DEAL" IS LESS THAN EACH ITEM SECURED SEPARATELY AND MODEL 12, 14, 15, 24, 26, 100 AND KLEINSCHMIDT PRINTERS COST LESS ON THIS BASIS THAN THEY HAVE EVER BEEN SECURED BY AMATEURS ON A REGULAR BASIS. YOU ARE MISSING ALL THE REAL FUN OF RTTY IF YOU DON'T HAVE HIGH-SPEED TAPE GEAR.

\$5 IS OFFERED TO ANY AMATEUR MEMBER WHO CAN GIVE OR LEND US A COPY OF ARTS BULLETIN NUMBER 41, PUBLISHED AUGUST 10TH, 1947. (OF THE ORIGINAL SERIES). COPY MUST BE UNSOILED AND SUITABLE FOR OFFSET REPRODUCTION. WE WILL RETURN ORIGINAL IF DESIRED.

\$5 IS ALSO OFFERED FOR A SERVICEABLE COPY OF VHFTS BULLETIN 15, UNDATED. THIS IS THE SECOND SERIES OF BULLETINS FROM THE SOCIETY.

\$2 IS OFFERED FOR A COPY OF ARTS BULLETIN NUMBER 1, THIRD SERIES (EDITED BY W2NSD), IN REPRODUCIBLE CONDITION. SEND COPIES TO W2BFD, SECRETARY.

AS MENTIONED BY BYRON, W2JTP, THERE IS QUITE A BIT OF INTEREST IN RTTY RECEPTION OF METEOROLOGICAL REPORTS. THE SOCIETY HAS FURNISHED A CONSIDERABLE NUMBER OF 100-SERIES TYPING UNITS IN PRACTICALLY BRAND-NEW CONDITION AT \$60 PER EACH. THESE MACHINES HAVE THE NECESSARY METEO SYMBOLS ON THE TYPEBARS. THE UNITS ARE MINUS DUST COVERS BUT CRACKLE-BLACK COVERS (METAL) CAN BE FURNISHED, INTENDED FOR OTHER 100-SERIES MACHINES FOR \$10. A BLACK PLASTIC MOLDED DUST COVER CAN BE OBTAINED FOR \$5.

WE REALLY HAD GIVEN UP HOPE THAT JOHN, W2ANB, WOULD EVER GET ON THE RTTY BEAM. HE VERY PLEASANTLY SURPRISED THE RTTY HEADQUARTERS STAFF BY SENDING US A CARD SHOWING THE NEW TERMINAL UNIT IN ALL ITS GLORY. IT IS THE ARTS "W2BFD" STANDARD CONVERTER, THE LATEST VERSION OF WHICH IS BLUEPRINTED IN "DATA PACKAGE" ARTT-6034, HAVING, IN ADDITION, A SURPLUS 500-OHM BANDPASS FILTER ON THE INPUT. THE SMALL PHOTO JOHN SENT DOWN WOULD NOT REPRODUCE WELL. WE HOPE HE WILL SHOOT ALONG AN 8 X 10 OR LET US HAVE THE NEGATIVE SO WE CAN LET YOU FELLOWS SEE WHAT A NICE JOB HE HAS MADE OF IT. NEXT JOB HE PLANS TO TACKLE IS THE 32V2 MODIFICATION FOR FSK.

HAVE YOU THOUGHT OF GIVING A TALK ON RTTY AT YOUR LOCAL RADIO CLUB? THIS IS ONE OF THE BEST WAY TO ENSURE HAVING RTTY HAMS IN YOUR VICINITY TO KEEP YOU COMPANY IN YOUR MISERY. ON A RECENT MIDWEST BUSINESS TOUR YOUR SECRETARY, W2BFD, WAS INVITED TO SPEAK ON HIS PET HOBBY AT SEVERAL LARGE RADIO CLUBS. THE TALKS WERE IMPROMPTU AND WITHOUT EXHIBITS BECAUSE THEY WERE NOT ORIGINALLY PLANNED. DESPITE THE INFORMAL NATURE OF THE LECTURES NINE "RECRUITS" WERE GAINED FROM ONE MEETING ALONE, OUT OF A TOTAL AUDIENCE OF 37 AMATEURS! A LITTLE MISSIONARY WORK ON YOUR PART WOULD STRENGTHEN THE POSITION HAM RTTY OCCUPIES IN THE AMATEUR RADIO PICTURE. BY ALL MEANS STAGE A DEMONSTRATION IF YOU HAVE THE FACILITIES.

THE FOLLOWING ASSORTMENT OF TELEPRINTER MANUALS ARE AVAILABLE THROUGH SECRETARY W2BFD AT \$1.00 PLUS POSTAGE. THE CONTINUOUS DEMAND FOR MANUALS HAS EXHAUSTED OUR SUPPLY A DOZEN TIMES ALREADY. THERE ARE ONLY A FEW EACH OF THE PRESENT COLLECTION. PLEASE NOTE THAT THE MANUALS FOR THE MODEL 24 SERVE VERY WELL FOR THE MODEL 26 AS THERE ARE ONLY A FEW MINOR DIFFERENCES BETWEEN THE MACHINES.

MODEL 24 PRINTER.	DESCRIPTION AND THEORY OF OPERATION. (NEW MANUALS)
" " "	PARTS DESCRIPTIONS, STOCK NUMBERS. (NEW MANUALS)
MODEL 10-A	" " "
MODEL 12-A	SPECIFICATIONS
" " "	KEYBOARD AND RECEIVING DISTRIBUTOR PARTS
" " "	TYPING UNIT PARTS
" 15	DESCRIPTION AND THEORY OF OPERATION
KEYBOARD PERFORATOR	DESCRIPTION AND ADJUSTMENTS
TAPE TRANSMITTER	ADJUSTMENTS
" "	PARTS
POLAR RELAYS	ADJUSTMENT

OTHER THAN THE MODEL 24 MANUALS ALL OTHER BOOKS ARE USED AND WORN.

HADN'T HEARD FROM WINCL SINCE THAT PLEASANT LANDLINE CALL HE PUT THROUGH TO RTTY HEADQUARTERS SOME MONTHS AGO ABOUT SECURING A PRINTER. FRANK HAS BEEN ON RTTY SOME TIME NOW AND UNCLE SAM'S MAIL BROUGHT ANOTHER REQUEST FROM HIM FOR EQUIPMENT. YA ESTA DE CAMINO, COLEGA.

EARLY LAST MAY THE FIRST AMATEUR RADIOTELETYPE PRINTER TO ARRIVE IN NEW ZEALAND WAS SHIPPED TO ZL1WB, ALONG WITH SOME PERFORATED TAPE EQUIPMENT. PREVIOUS TO ITS ARRIVAL BRUCE HAD BEEN COPYING QUITE A FEW RTTY STATIONS FROM THE STATES USING A C.A.A. MODEL 1. BRUCE WRIGOL THAT A SECOND PRINTER HAS NOW ARRIVED SO WE MAY LOOK FORWARD TO A GREAT DEAL OF ACTIVITY FROM DOWN UNDER. PRINTERS ARE NOW GOING TO SEVERAL OTHER FOREIGN COUNTRIES AND WE HOPE TO BE ABLE TO ANNOUNCE, IN THE NEAR FUTURE, THAT SEVERAL OTHER BITS OF CHOICE RTTY DX ARE TO BE HAD FOR THE HUNTING. ONE OF THE PROBLEMS IS THAT STATIONS IN THE "STERLING AREA" HAVE EXTREME DIFFICULTY GETTING DOLLARS TO PURCHASE EQUIPMENT. FUNNY THING! WE LIVE IN THE "DOLLARS" AREA AND WE HAVE SAME DIFFICULTY!

THE REPRINT OF THE EARLY RTTY BULLETINS (BETWEEN 1946 AND 1951) IS ALL SET TO GO TO PRESS BUT SO MANY STRAGGLERS ARE STILL COMING IN THAT WE WILL NOT GIVE THE PRINTER THE NOD UNTIL WE FIND OUT HOW MANY ARE NEEDED. THESE ARE THE BULLETINS RUN OFF SINCE THE SOCIETY'S FOUNDING UP UNTIL W2NSD TOOK OVER THE PUBLICATION. IT IS A SAFE BET THAT YOU DO NOT HAVE THESE BULLETINS UNLESS YOU WERE IN RTTY BACK IN THOSE DAYS, AS NO REPRINT HAS BEEN ATTEMPTED BEFORE NOW. SEND IN YOUR \$2 FOR THE "PIONEER BULLETIN MANUAL" NOW. NO FURTHER REPRINT IS CONTEMPLATED SO THIS MAY BE YOUR LAST CHANCE TO COMPLETE YOUR RTTY REFERENCE FILE.

REQUESTS ARE STILL COMING IN FOR THE SLICK COPIES OF THE AUDIO FREQUENCY METER SCALE PICTURED ON NATIONAL ARTS BULLETIN 42. WELL OVER 120 OF THESE SCALES HAVE BEEN MAILED TO DATE. A FEW ARE LEFT. IF YOU PLAN TO BUILD THIS FREQUENCY-METER YOU WILL WANT ONE OF THESE. LOSERS WEEPERS! TALK UP NOW OR BORROW THE OTHER GUY'S FREQ-METER. W2JTP IS BUILDING ONE OF THESE METERS ACCORDING TO A LETTER RECEIVED AT RTTY HQ. HAVING SEEN SOME OF BYRON'S FINE WORKMANSHIP WE KNOW THAT HIS "CHINESE COPY" WILL BE A PIPPIN.

THE 100-SERIES PRINTERS ARE STILL RELATIVELY SCARCE. MOST OF THOSE "LIBERATED" THUS FAR HAVE BEEN ON THE EAST COAST AND MID-WEST. RECENTLY A "TRICKLE" OF THEM HAVE BEEN SHIPPED TO THE WEST COAST, ALLOWING THE MODEL 26 MACHINES TO BE PASSED ALONG TO NEWCOMERS TO OUR HOBBY. AMONG THE ADVANTAGES OF THE 100-SERIES MACHINES IS THE ELIMINATION OF THE TYPEWHEEL. TYPEBARS ARE USED AS IN THE MODEL 15 AND OTHER PRINTERS. THEY ARE OF SINGLE-MAGNET STYLE SELECTOR AND WILL TOLERATE A GREATER DEGREE OF SIGNAL DISTORTION BEFORE MISPRINTING.

A SYSTEM FOR CONVERTING TELETYPEWRITER KEYBOARDS INTO TAPE-TRANSMITTING DISTRIBUTORS WAS DESCRIBED IN THIS BULLETIN IN 1947. THE IDEA WAS APPLICABLE TO MODEL 12, 14, 15, 24, AND 26 KEYBOARDS AND CONSISTED OF SPLITTING THE SENDING-CONTACT GROUP BY SAWING THEM APART. THE IDEA WAS NEVER VERY POPULAR AND A NUMBER OF KEYBOARDS WERE RUINED COMPLETELY IN ATTEMPTING THE CONVERSION. WE HAD NEVER GIVEN THE METHOD FURTHER CONSIDERATION AND IT WAS QUITE A SHOCK TO US TO DISCOVER THAT THE 100-SERIES SENDING KEYBOARDS ALREADY HAVE THE CONTACTS ISOLATED FROM ONE ANOTHER! A HASTY TRIAL ON W2BFD'S MODEL 103 SHOWED THAT NO SWITCHING WAS NECESSARY, OR AT LEAST ONLY A SIMPLE SWITCHING SYSTEM BECAUSE THE AT-REST POSITION OF THE CONTACTS ON THE KEYBOARD IS "SPACING" OR OPEN-CIRCUIT. TAPE TRANSMISSION CAN BE ADDED TO A 100-SERIES MACHINE IN ABOUT TEN MINUTES!

STILL SOME OF THOSE \$7 BRAND-NEW CARTONS OF 5" DIAMETER TELEDELTO'S ROLL PAPER LEFT. THAT'S THE PAPER THAT IS BLACKENED PROPORTIONAL TO THE VOLTAGE APPLIED TO A WIRE CONTACTING THE PAPER. SOME VERY BEAUTIFUL HALF-TONE FACSIMILE PICTURES CAN BE REPRODUCED ON THIS PAPER. MOST OF THE FACSIMILE WORK ACCOMPLISHED UP UNTIL NOW HAS BEEN WITH PHOTOGRAPHIC PAPER REQUIRING DEVELOPMENT. TELEDELTO'S PAPER PRODUCES THE PICTURE BEFORE YOUR EYES IN BROAD DAYLIGHT WITHOUT CHEMICAL PROCESSING. A NUMBER OF OTHER USES HAVE BEEN SUGGESTED FOR THE "QUEER" PAPER. WE PLAN TO DESCRIBE A DEVICE USING TELEDELTO'S TO RECORD INCOMING RTTY SIGNALS AND WHICH WILL SHOW SIGNAL DISTORTION, BIAS, ETC. AS A PERMANENT RECORD ON PAPER IN BLACK-AND-WHITE. CARTONS CONTAIN 12 ROLLS EACH.

## FREQUENCY SHIFT CONVERTING EQUIPMENT

### CIRCUIT DESCRIPTION

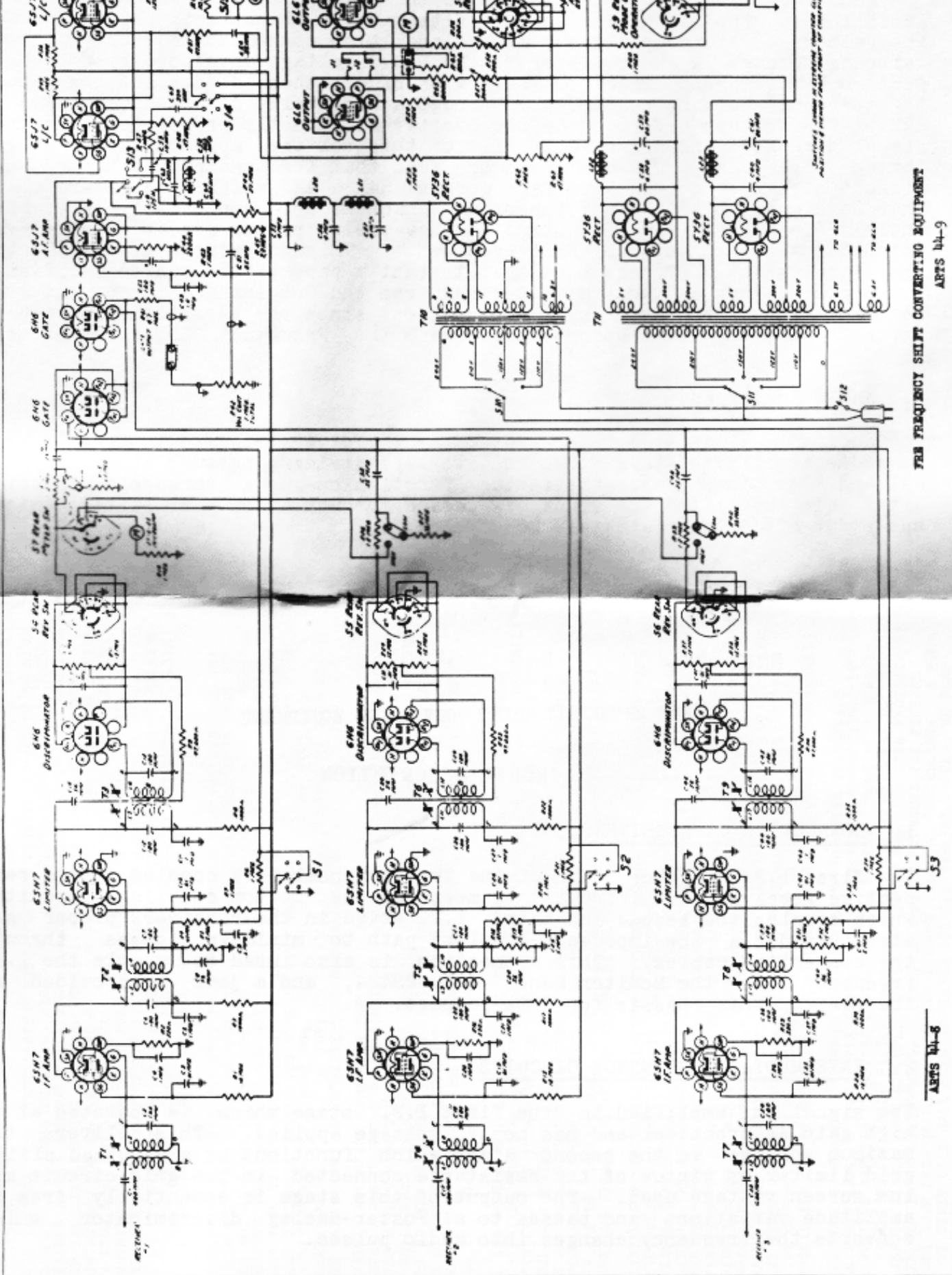
#### 1. CONNECTION TO RECEIVERS:

The first I.F. stage of each of the three channels is coupled to its respective receiver I.F. circuit by means of the bottom coupling capacitor which couples the second and third I.F. stage in the receivers proper and also provides a low impedance coupling path to minimize losses through the connecting cables. This connection is also used to couple the I.F. frequency into the Monitor Panel CALO-23424, and a jack is provided at the rear of this chassis for this purpose.

#### 2. INTERMEDIATE FREQUENCY CIRCUITS:

The signal is amplified in the first I.F. stage which is operated at as high gain as practical and has no AVC voltage applied. This delivers the maximum voltage to the second stage which functions as a combined plate-grid limiter by virtue of the resistance connected in the grid circuit and low screen voltage used. The output of this stage is essentially free of amplitude variations and passes to a Foster-Seeley discriminator which converts the frequency changes into audio pulses.

N-107130



FREQUENCY SHIFT CONVERTING EQUIPMENT  
ARTS 44-9

ARTS 44-8



### 3. DIVERSITY GATE:

The audio output is capacity coupled to the diversity gate which functions as follows: The signal from each of the three channels is connected to the cathode of its respective gating diode. Also connected to each of these cathodes through an audio filter is the D.C. voltage developed by its respective limiter grid circuit. The plates of all these diodes are connected together and return the circuit through a high value of resistance R41 & R42. The voltage developed by the limiter is directly proportional to the signal strength and essentially all of this voltage appears across this common resistance. It can thus be seen that the channel that has the highest signal produces a voltage across R41 & 42 which is greater than that developed in either of the other channels and consequently prevents their diode gates from conducting, since their plates are at a negative potential with respect to their cathodes. This in effect allows only the signal which is strongest at that instant to pass to the audio amplifier. The use of common AVC which is derived from the Combining Unit of the RDM Receiver further accentuates this condition since the variations in signal strength are magnified before they reach the Frequency Shift Converter.

### 4. AUDIO AMPLIFIER:

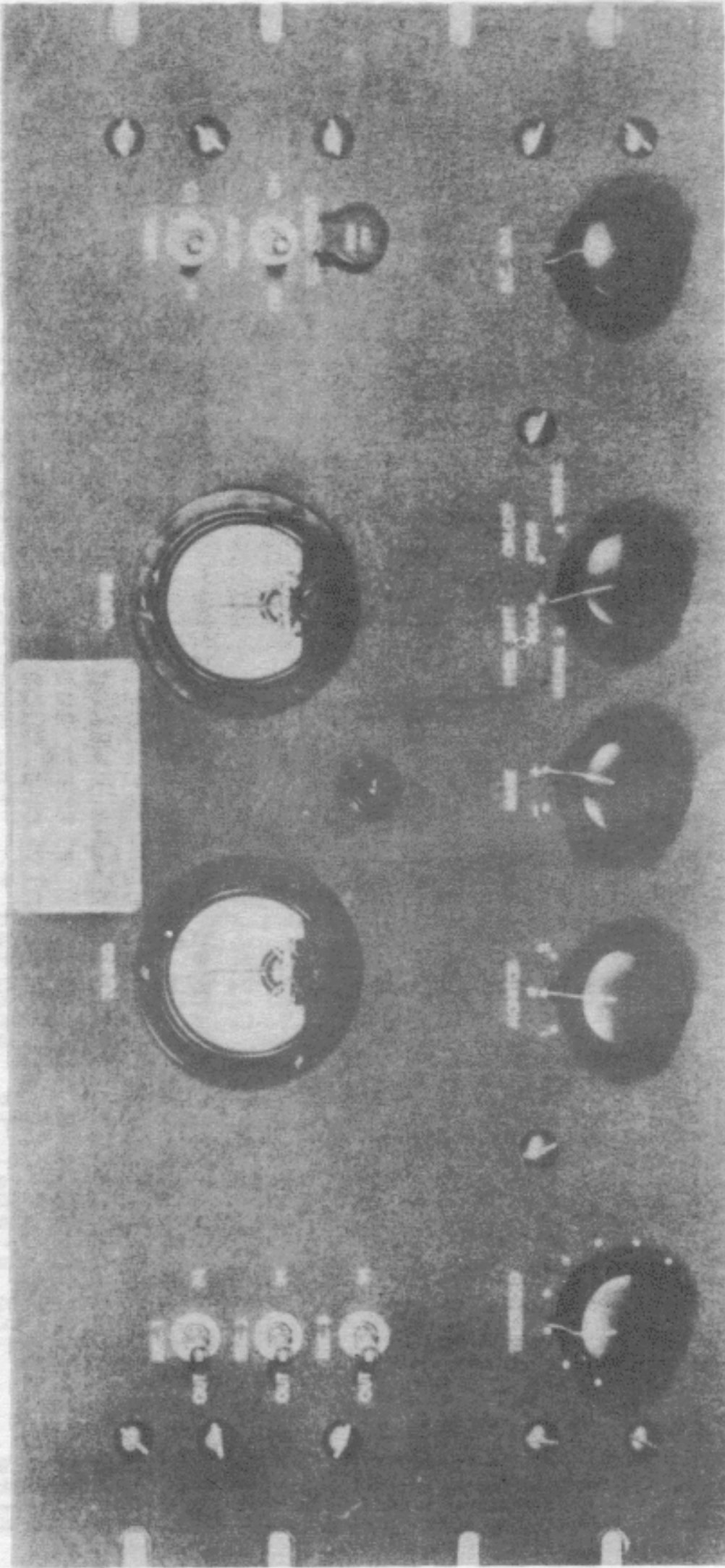
The audio signal after being selected by the diversity gate is then fed to an audio amplifying stage through a voltage dividing network consisting of R41 and R42 in series, the latter functioning as a threshold control. After being amplified the signal is passed through a low pass filter, which has a cut-off of approximately 200 cycles.

## 5. LOCKING CIRCUIT:

At this point it is necessary to re-establish the D.C. potential of the signal which disappeared when the signal coupled out of the discriminator through the capacitors C16, 32 and 48. This is accomplished by means of a locking circuit which functions as follows: Two 6SJ7 pentode tubes with the screen grid of one tube connected to the plate of the other as can be seen from reference to the schematic diagram. If a signal of sufficient magnitude and of negative polarity is applied to the grid of the left hand tube to cut this tube off momentarily, the lack of plate current in this tube causes a high screen voltage to be applied to the other tube. This in turn reduces the voltage on the screen grid of the first tube owing to the voltage drop across R50, which maintains this tube in a non-conducting condition with the cathode bias supplied by R52. If a positive pulse is now applied to the grid of the first tube sufficient to cause this tube to conduct momentarily, the above procedure is reversed, and the first tube now continues to conduct and the other tube is cut off. It is thus seen that the output of this stage is dependent on the sense of pulses applied to its input through a coupling capacitor and not on the absolute potential.

## 6. OUTPUT CIRCUIT:

The output circuit is arranged to supply either neutral or polar D.C. signals and also functions as a locking circuit. As can be seen from reference to the schematic diagram, two power supplies are used, the plate supply of each tube being returned through the cathode resistor of the opposite tube. This causes the plate current of either tube, when conducting, to bias the other tube to cut-off so that only one tube can be conducting at any one time. The signal is applied to the control grid of one tube through a coupling capacitor from the previous locking stage. This signal is of



**FREQUENCY SHIFT CONVERTING EQUIPMENT**

Front Panel Layout

sufficient magnitude to cut this tube off when it is conducting or, conversely, to cause it to conduct when it is cut off by the plate current of the other tube. For polar operation the load is connected between the cathodes of the two tubes, so that the plate current alternately flows in opposite directions through the load. The magnitude of this current is determined by the rheostat R59 which is connected in shunt with the load.

When the circuit is switched for neutral operation the load is substituted for the cathode resistor of the second tube and the control rheostat R59 is connected in series with the load to control the current. Connection is made to tone keyer through J3 and negative signals developed across the cathode resistor of the second tube after being stepped down through the voltage divider R60 and R61 are applied to the Tone Keyer which supplies keyed tone signals. When the Mode of Operation switch is set for On-Off service the input to the Tone Keyer jack is shorted which allows the Tone Keyer to function in its normal manner.

A "Mark-Return" circuit is provided which prevents the system remaining on "space" output signal for more than approximately 250 milliseconds, such as might be the case if a noise burst caused the locking circuit to revert to "space" when normally standing by on a "mark" signal. In operation a relay coil is connected in series with the plate of the "mark" conducting output tube. A time delay is provided on this coil by means of capacitor C62 and

R64 which hold the relay closed for approximately 250 milliseconds after plate current ceases, which occurs when the locking circuit locks on "space". Thus, if for any reason there is no current in the "mark" tube for this period, the relay opens, closing the contacts S15. This applies a negative pulse to the grid of the first locking tube through C65 which causes it to "lock-in" on "mark" again, restoring the circuit to its normal standby position. A switch is provided to remove this from the circuit when desired.

**ALABAMA**

W4MVM  
Anniston

W4UJJ  
Auburn

**FLORIDA**

K4UZI  
Coral Gables

W4ANM  
W4NYF  
Ft Lauderdale

W4JWG  
Ft Myers

W4EAS  
W4TJU  
Gainesville

W4GVK  
W4GXL  
W4NKC  
W4RTJ  
W4WMN  
Jacksonville

A. Guy Smith Jr  
238 W 42 St  
Jacksonville

Lawrence Boyer  
Box 1787  
Jacksonville 1

W4ACV  
W4UYU  
W4WAQ  
Miami

W4WMU  
Miami Beach 40

W4VMT  
Miami Springs

W4ORB  
Orlando

W4LCR  
Panama City

W4BNI  
Tampa 11

Henry T. Brown  
109 W. Emma St  
Tampa 3

W4OYC  
Pensacola  
GEORGIA

W4DND  
Athens

W4VMS  
Atlanta

B. E. Taylor  
P O Box 1  
Atlanta

K4WAR  
Augusta

W4AIY  
College Park

**KENTUCKY**

W4BAZ  
W4MOP  
W4MWU  
W4NZY  
W4OYG  
W4PHJ  
W4UPE  
W4VP  
Louisville

**NORTH CAROLINA**

Ernest Roy Best  
Box 741  
Bastonia

W4ZPZ  
Greensboro

W4TLA  
Rocky Mount

Joseph E. Renfroe  
2735 Bouganville  
Tarawa Terrace

W4RPL  
Winston Salem  
James H. Hoke  
123 Woodrow Ave  
Winston-Salem

**SOUTH CAROLINA**

W4UUB  
Spartanburg

**TENNESSEE**

W4HHK  
Coluerville

W4BQW  
Memphis

W4KFK  
W4MSZ  
Nashville

W4FEE  
Tullahoma

**VIRGINIA**

W4OTN  
W4SQF/KA2SC  
Alexandria

W4API  
W4LAV  
Arlington

T. W. Jones Jr  
RD 1, Hwy 54 W  
Ashland

W4UBY  
Fairfax

W4JCV  
Leesburg

W4SBK  
Middleburgh

W4SHJ  
W4UEP  
Norfolk

Alfred Williams  
15 Winder Dr  
Norfolk 6

W4FJ  
Richmond

W4EBH  
Winchester

W3FMC - W4FMC: Enclosing check to cover renewal for 2 years. You fellows are doing a fine job. Keep up the good work!  
---Fred

(We try, but can use any help that we can get. We need more news and techdope so we can get the bulletins out more on skedule. Also, we need more subscribers so we can afford to run more pages. With #43 we began using larger type for easier reading, now we need some extra pages. --Clay)

COLUMBUS, Ohio: Would like to know of likely place to find keyboard for Model 12. Prefer swap if possible. Have tubes galore, 813, 6146, you name it. Robert McPherson, W8EJX, 340 N Murrayhill Rd, Columbus 4, Ohio

SEATTLE: Received sample bulletin...have neglected to subscribe due pressure of business as radar and radio inspector here for RMCA... Have been active in RTTY for past 4 years. Presently have two working Model 26 printers with tape gear. Am fairly active on 40 and 80 and much more active on 2 meters.

Our local 2 meter net has consistently maintained sked for past 18 months or so. We use autostart and 522, ARC4, and ARC5 gear mostly. Those active are W7CBE, W7CCB, W7CO, W7FKL, W7GQM, W7KX, W7LHL, and W7MZT.

Most of the fellows use the W2PAT converter with modifications. I run 40 watts to a BC459 and 457 on 40 and 80, and also 500 watts to a pair of 813's on these bands.

My work takes me in contact with Navy TTY equipment. What I have learned in ham operation has done a lot of good

towards making a living. I've seen a lot of equipment come and go in the marine field...  
---D. Newman, W7CO

W9 IHO Terre Haute: Have a 26 and terminal unit... have been copying the gang FB on 40 but have been unable to get over 500 cycles shift out of the DX100 on 40 using the modification in RTTY. Looking forward to seeing ARTS monthly and working some of the gang soon. Wm. Siebenmorgen

W4 EBH: Enclosed check...for renewing... I don't know where we would be without you fellows to keep the spark lighted and first class info coming out all the time. You will be printing me before long. --Brad

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425 c FORK and 87.6c STROBE

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We have a few "A" tuning forks (435 c) that can be filed down to 425 cps for the tuning fork standard (ARTS 41-10). These are \$2 postpaid, or we will send the fork and a new ARTS subscription for \$4. See editorial this issue.

We have a few 87.6 forks for correctly adjusting speed of adjustable TT motors. (Similar to Teletype #103628 listing for \$12) These we are selling for \$4, or the fork and a new ARTS subscription for \$5.

--Clay W2EBZ

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BULLETIN No. 44 of the  
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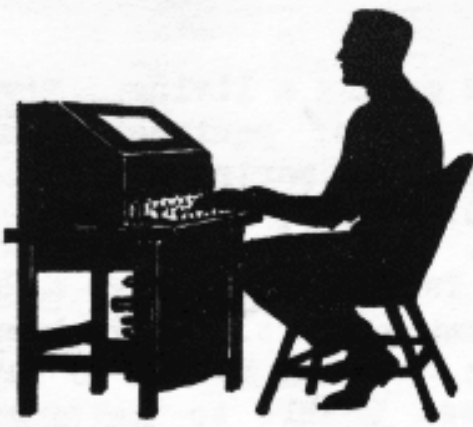
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ARTS 44-15



## *Amateur Radio- Teletype Society*

4 4 3 WEST 4 7 STREET  
NEW YORK 36, N Y

FORM 3547 REQUESTED

COVER shows the grandpappy of amateur RTTY, John Williams, W2BFD. John used first ham TT just ten years ago. John recently collapsed, and has been hospitalized. John says he will be out in a week, but the doctor says to rest.

W2DXD Bill is spending three months in Mexico on a job. Any RTTY below the border, Bill?

VE2AUD Dave McFall has a TU shaping up, and may be on 80m from Montreal by now.

K2RTE Arthur Marko in New York has a model 12, expects a converter soon, and will be on 2.

More Canadians are being worked from W2 land on 2 meters.

W4 listing by city and state (page 14) may help W4's locate someone nearby that can give help, or may need help, to get on the air with RTTY. The W4 RTTY population still isn't too thick.

Does anybody need TT paper with amateur TT imprint for use at exhibitions? Advise.

W6SCI Stephen Kaider is copying TT aboard the SS Hawaiian Farmer with a 26. Steve is RO.