

CERTIFICATE OF ACHIEVEMENT

The Amateur Radio Teletype Society will award a Certificate of Achievement to those operators who can furnish proof of two-way radioteletype communication with one hundred amateur licensed stations, no more than twenty being acceptable from any one amateur call area. Either QSL cards or teleprinter copy containing the call letters of both stations, date, time, and amateur band in the text will be taken as proof of contact. Certificates will be numbered and dated.

THE TYPEWRITER KEYBOARD

W2BFD, Johnny Williams, got me on the phone again the other day and mentioned that he was talking to a big typewriter repair company anent the use of old typewriters for TT keyboards. The news is that either the model 10 or model 12 Remington typewriters will do the trick. You can buy all you want for \$2 apiece. There are hundreds available, get one now. You don't have to send away for it either, just see your own local typewriter repair man, he probably has a lot of them around.

WANTED: Instruction book for 14 reperf. Write Box 5, ARTS.
 FOR SALE: Complete Model 12, immediate shipment, \$150. Box 6.
 FOR SALE: Complete Model 26. Best offer. Box 7, ARTS.
 TOROIDS: 3 in can postpaid \$5.50. Box 8, ARTS.

RETURN POSTAGE GUARANTEED

Amateur Radio Teletype Society

1379 East 15th Street
 Brooklyn 30, N.Y.



ERNEST HAMMER
 17030 VIA FLORES
 SAN LORENZO, CAL.

WGHWV

POSTMASTER: If addressee has removed and new address is known, notify sender on FORM 3547, postage for which is guaranteed.



May 1953

AMATEUR RADIO TELETYPE SOCIETY

Teletype Bulletin No. 23

It came as a surprise to me, but it is an accomplished fact that we can use AFSK in the ten meter band, or at least part of it. Let me quote from a letter from Walt, W8HP: "Paragraph (6) of part 12.111 of part 12, Rules Governing Amateur Radio Service, says (sic) -----'and on frequencies 29.00 to 29.7 mc, using special emission for frequency modulation (radio telephone transmissions and radiotelegraph transmissions employing carrier shift or other frequency modulation techniques).' (Underlining done by yours truly). Further, Washington FCC was asked for an opinion on this matter and they opined (through official channels) that my interpretation was correct. In their reply they said that such was not prohibited. In other words we have a clear road for RTTY tone frequency modulation, using NFM, of course.

"RTTY," the monthly bulletin of the Southern California Radio Teletype Society has been getting fatter and fatter with each issue. A price has been placed on its head of \$1.80 per year. This covers mailing and bookkeeping costs only (as I well know). The May issue of RTTY will feature an all electronic distributor for the Model 21A printer which should be of interest to all. Send your money to Merrill Swan, W6AEE, 3769 East Green Street, Pasadena 10, California.



There have been a lot of nice compliments on the drawings by my mother (CWG) which have been appearing of late in the Bulletin and in the Teletype articles in Swap and Shop.

Here is a sketch of Bob Weitbrecht, W6NRM/W9TCJ, the wizard of Wisconsin. Bob, the victim of more or less continuous brainstorms, is now working on a super simple tone oscillator to get the 2125 and 2975 cycles tones from the d.c. pulses of the keyboard.

Bob is largely responsible for the almost universal use of the diode keyer for FSK operation due to his articles on it in the Bulletin and in CQ.

BOB WEITBRECHT W9TCJ

This is the second in the series of articles on commercial teletype circuits and equipment. Permission has recently been gotten to print the data on the Northern Radio teletype circuits and these will be featured in coming issues of the Bulletin. The description of the circuit was written by John Williams, W2BFD, and has been reprinted directly from his teletypewriter copy. If you have any circuits available which might be of interest to the TT gang please send them in for reprint in the Bulletin. The circuits and instruction books will be returned to you.

FREQUENCY SHIFT EXCITER MODEL XFK
THE TECHNICAL MATERIEL CORPORATION MAMARONECK, N.Y.

THEORY OF OPERATION:-

200 KC OSCILLATOR:- V1 IS A PUSH-PULL MODIFIED COLPITTS OSCILLATOR OPERATING AT 200 KC. THE MAJOR PART (95 PERCENT) OF ITS TANK CIRCUIT IS LOCATED WITHIN A TEMPERATURE STABILIZED OVEN WITH A FAST HEATING CHARACTERISTIC. EVEN THIS PORTION OF THE TANK CIRCUIT IS TEMPERATURE COMPENSATED AND UTILIZES ONLY COMPONENTS HAVING VERY UNIFORM RETRACE CHARACTERISTICS. IN ADDITION, THE PLATE VOLTAGE IS REGULATED AND THE OSCILLATOR IS COMPENSATED EXTERNAL TO THE OVEN FOR CHANGES IN AMBIENT TEMPERATURE. EXTERNAL TO THE OVEN ARE TWO AIR-SPACED, CERAMIC-SUPPORTED, TRIMMERS C7 AND C8 USED RESPECTIVELY AS FINE AND COARSE FREQUENCY ADJUSTMENTS.

REACTANCE TUBE:- THE REACTANCE TUBE V2 RECEIVES THE MODULATING INTELLIGENCE (AUDIO OR PULSE SIGNAL DEPENDING WHETHER FACSIMILE OR TELETYPE SIGNALS ARE BEING USED) AT THE GRID OF SECTION 1 (PINS 1, 2, & 3) AND CHANGES THE REACTANCE ACROSS THE 200 KC OSCILLATOR TANK, AND THEREFORE THE FREQUENCY OF THE 200 KC OSCILLATOR IN ACCORDANCE WITH THIS INTELLIGENCE. THE REACTANCE TUBE IS A PUSH-PULL BALANCED CIRCUIT AND OPERATES IN THE FOLLOWING MANNER. NORMALLY (I.E. - 0 VOLTAGE AT GRID) A SMALL CAPACITIVE CURRENT FLOWS THROUGH SECTION 1 OF V2 BECAUSE OF THE PHASE SHIFT THROUGH R5 AND C14, C2 AND THE INVERSION ACROSS THE 200 KC TANK. CONVERSELY, A SMALL INDUCTIVE CURRENT FLOWS THROUGH SECTION 2 OF V2 BECAUSE OF THE PHASE SHIFT THROUGH C12 AND R4 AND THE INVERSION ACROSS THE TANK. WHEN A POSITIVE VOLTAGE IS APPLIED TO THE GRID OF SECTION 1, THIS CAUSES AN INCREASE IN THE PLATE CURRENT OF SECTION 1 AND THEREFORE AN INCREASE IN THE CAPACITIVE CURRENT IN THIS SECTION THEREBY LOWERING THE FREQUENCY OF THE 200 KC OSCILLATOR. AT THE SAME TIME, THE INCREASE IN PLATE CURRENT OF SECTION 1 CAUSES A DECREASE IN PLATE CURRENT OF SECTION 2 OF V2 THROUGH THE MUTUAL CATHODE RESISTOR R7, THUS CAUSING A DECREASE IN THE INDUCTIVE CURRENT AND THEREFORE ALSO LOWERING THE FREQUENCY OF THE 200 KC OSCILLATOR. OVER A NARROW FREQUENCY RANGE (200 KC PLUS OR MINUS 500 CPS) THIS FREQUENCY CHANGE WILL BE LINEAR WITH RESPECT TO APPLIED VOLTAGE (POS. OR NEG.) THIS SYSTEM PROVIDES THE ADVANTAGE OF HAVING THE REACTANCE TUBE CURRENTS CONTRIBUTE A NEGLIGIBLE AMOUNT TO THE CENTER FREQUENCY OF THE 200 KC OSCILLATOR. C2 ADJUSTS THE PHASE SHIFT OF SECTION 1 SO THAT FOR A GIVEN POSITIVE OR NEGATIVE SIGNAL VOLTAGE THE AMOUNT OF SHIFT WILL BE EQUAL.

XTAL OSC. AND BUFFER:- ONE SECTION OF V6 IS USED AS A MODIFIED "PIERCE" CRYSTAL CONTROLLED OSCILLATOR WHILE THE SECOND SECTION IS USED AS A CATHODE FOLLOWER BUFFER. SINCE THE OUTPUT FREQUENCY OF THE FREQUENCY SHIFT EXCITER, MODEL XFK, IS DETERMINED BY THE SUM FREQUENCY OF THE 200 KC OSCILLATOR AND THE CRYSTAL OSCILLATOR, THE CRYSTALS ARE TEMPERATURE CONTROLLED IN AN OVEN AND THE PLATE VOLTAGE OF THE OSCILLATOR SECTION IS STABILIZED. A CRYSTAL SELECTOR SWITCH ALLOWS SELECTION OF ANY ONE OF THREE CRYSTALS OR AN EXTERNAL SIGNAL. THE CRYSTAL SELECTOR SWITCH ALSO SELECTS THE MULTIPLICATION RATIO AS DISCUSSED LATER IN PARAGRAPH ENTITLED "MULTIPLIER PRESET SECTION".

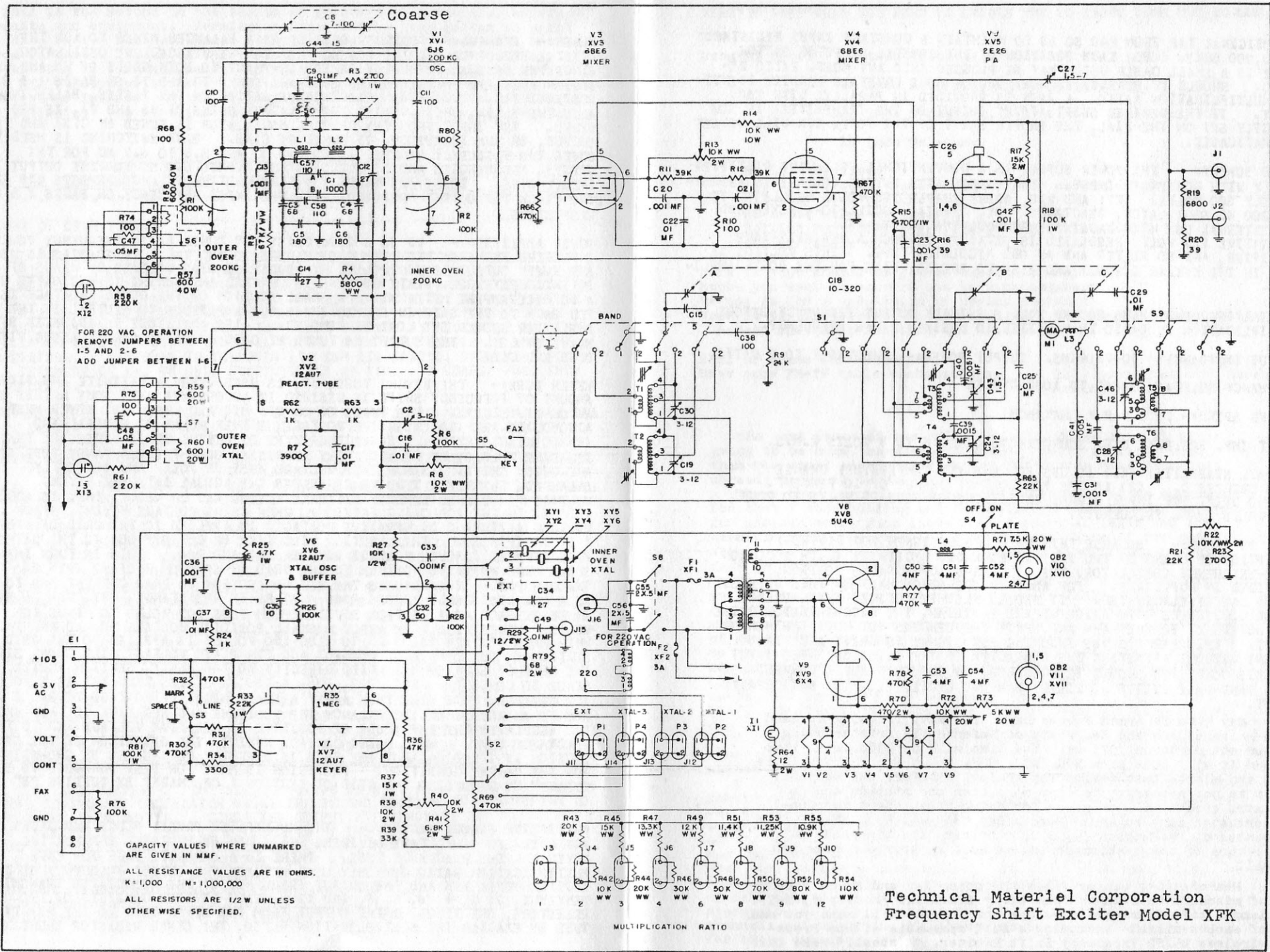
May 1953

MIXER:- V3 AND V4 TOGETHER OPERATE AS A BALANCED MIXER TO ADD THE CRYSTAL FREQUENCY AND THE 200 KC FROM THE REACTANCE TUBE OSCILLATOR. SINCE THE CRYSTAL FREQUENCY IS FED IN-PHASE TO BOTH GRIDS OF V3 AND V4, IT IS CANCELLED IN THE PLATES BY TRANSFORMER T2 AND T1 ON BANDS 1 & 2 RESPECTIVELY. TO OBTAIN EXACT CANCELLATION IN THE PLATES, BALANCING ADJUSTMENT R14, WHICH VARIES THE RELATIVE GAINS OF V3 AND V4, IS PROVIDED. THE INPUT FROM THE CRYSTAL OSCILLATOR IS TUNED BY C18A AND THE OUTPUT, OR SUM FREQUENCY, IS TUNED BY C18B. BAND SWITCHING IS USED TO COVER TWO FREQUENCY RANGES, .8 TO 2.3 MC AND 2.3 TO 6.7 MC FOR THE CRYSTAL FREQUENCIES AND 1 TO 2.5 MC AND 2.5 TO 6.9 MC FOR THE OUTPUT FREQUENCIES. THESE ARE BANDS 1 & 2 RESPECTIVELY. CONDENSERS C59 AND C40 TRACK THE OUTPUT FREQUENCY WITH THE INPUT FREQUENCY ON BANDS 1 & 2 RESPECTIVELY.

POWER AMPLIFIER:- V5 IS A 2E26 CLASS "B" TUNED RADIO FREQUENCY POWER AMPLIFIER FED FROM THE OUTPUT OF MIXERS V3 AND V4. FIXED BIAS IS USED AND POWER OUTPUT IS CONTROLLED BY ADJUSTING BIAS VOLTAGE BY MEANS OF POTENTIOMETER R22. PLATE CURRENT IS METERED AND TUNING IS INDICATED BY A 50 MILLIAMPERE METER M1. A SMALL PORTION OF THE OUTPUT VOLTAGE IS FED BACK TO THE GRID IN PROPER PHASE AND AMPLITUDE TO NEUTRALIZE THE AMPLIFIER SHOULD THE LOAD BE REMOVED. ITS AMPLITUDE IS ADJUSTED BY MEANS OF C27. THE OUTPUT IS TUNED BY C18C WHICH IS GANGED ALONG WITH C18B AND C18A.

KEYER TUBE:- THE KEYING TUBE, V7, IS USED WHERE A DEFINITE AND FIXED AMOUNT OF FREQUENCY SHIFT IS DESIRED IN ACCORDANCE WITH SOME NATURE OF AN ON-OFF SIGNAL. THE TYPES OF ON-OFF SIGNALS WHICH THE KEYER MUST ACCOMMODATE ARE (A) POSITIVE VOLTAGE, EITHER POLAR OR NEUTRAL AND (B) CONTACT KEYING. FOR EITHER TYPE OF KEYING IT IS NECESSARY THAT THE SAME VOLTAGE BE CONSISTENTLY IMPRESSED UPON THE REACTANCE TUBE FOR ANY GIVEN SHIFT. SINCE THIS VOLTAGE MUST BE POLAR AND PERFECTLY BALANCED, THE KEYER TUBE V7 GENERATES THE ACTUAL INTERNAL KEYING VOLTAGE FOR EITHER TYPE OF EXTERNAL KEYING (A) OR (B). THIS IS ACCOMPLISHED IN THE FOLLOWING FASHION: WHEN USING VOLTAGE KEYING, SPACE VOLTAGE (EITHER 0 OR NEGATIVE VOLTAGE) IS APPLIED TO THE GRID OF SECTION 1 OF V7 (PIN 2). THIS SECTION WILL THEN BE CUT OFF DUE TO THE CATHODE BIAS APPLIED THROUGH VOLTAGE DIVIDER R33 AND R34. THIS IN TURN IMPRESSES A HIGH POSITIVE VOLTAGE TO THE GRID OF SECTION 2 OF V7 (PIN 7) THROUGH R35. THIS CAUSES THE SECOND SECTION TO DRAW CURRENT AND TO ACT AS A LOW RESISTANCE ACROSS R36. V7 PLATE RESISTANCE, R37, R38, & R39 IN SERIES ACT AS A VOLTAGE DIVIDER FROM PLUS 105 VOLTS TO MINUS 105 VOLTS. THIS WILL THEN APPLY A SMALL POSITIVE VOLTAGE TO R40 AND R41. WHEN MARK VOLTAGE (PLUS 25 TO PLUS 150 VOLTS) IS APPLIED TO THE GRID OF SECTION 1, THE TUBE WILL CONDUCT AND ITS PLATE VOLTAGE WILL DROP. SINCE THE GRID OF SECTION 2 IS TIED DIRECTLY TO THE PLATE, SECTION 2 WILL CEASE TO CONDUCT. R36, R37, R38, & R39 IN SERIES THEN ACT AS A VOLTAGE DIVIDER, THIS WILL THEN APPLY A SMALL NEGATIVE VOLTAGE TO R40 & R41. R38 IS AN ADJUSTMENT TO BALANCE THE POSITIVE AND NEGATIVE VOLTAGE WHILE R40 REGULATES THE AMPLITUDE OF POSITIVE OR NEGATIVE VOLTAGE FED TO THE REACTANCE TUBE. WHEN USING CONTACT KEYING, THE OPERATION OF THE SECOND SECTION IS IDENTICAL BUT THE GRID IS DIRECTLY CONTROLLED BY GROUNDING FOR THE "MARK" CONDITION. PROVISION IS MADE FOR TEST PURPOSES TO SET "SPACE" BY GROUNDING THE GRID OF SECTION 1 OR "MARK" BY PUTTING "B" PLUS ON THE SAME GRID.

MULTIPLIER PRESET SECTION:- THE MULTIPLIER PRESET PLUGS AND JACKS ARE A SERIES OF VOLTAGE DIVIDERS WHICH MAY BE INSERTED BETWEEN THE KEYER AND THE REACTANCE TUBE. THERE IS A SEPARATE JACK FOR EACH MULTIPLICATION RATIO COMMONLY USED BETWEEN THE OUTPUT FREQUENCY OF THE EXCITER MODEL XFK AND THE OUTPUT FREQUENCY OF THE ASSOCIATED TRANSMITTER. NAMELY 1, 2, 3, 4, 6, 8, 9, AND 12. EACH DIVIDER CONSISTS OF TWO RESISTORS, ONE REDUCING THE OUTPUT FROM THE KEYER TUBE TO THE REACTANCE TUBE BY EXACTLY THE MULTIPLICATION RATIO, THE OTHER RESISTOR SHUNTING



CAPACITY VALUES WHERE UNMARKED
 ARE GIVEN IN MMF.
 ALL RESISTANCE VALUES ARE IN OHMS.
 K=1,000 M=1,000,000
 ALL RESISTORS ARE 1/2W UNLESS
 OTHERWISE SPECIFIED.

| | | | | | | | |
|----|-----|-----|-------|-----|-------|--------|-------|
| J3 | R43 | R45 | R47 | R49 | R51 | R53 | R55 |
| 1 | 20K | 15K | 13.5K | 12K | 11.4K | 11.25K | 10.9K |
| 2 | 10K | 10K | 20K | 30K | 50K | 70K | 80K |
| 3 | 10K | 20K | 30K | 50K | 70K | 80K | 110K |
| 4 | 10K | 20K | 30K | 50K | 70K | 80K | 110K |
| 5 | 10K | 20K | 30K | 50K | 70K | 80K | 110K |
| 6 | 10K | 20K | 30K | 50K | 70K | 80K | 110K |
| 7 | 10K | 20K | 30K | 50K | 70K | 80K | 110K |
| 8 | 10K | 20K | 30K | 50K | 70K | 80K | 110K |
| 9 | 10K | 20K | 30K | 50K | 70K | 80K | 110K |
| 10 | 10K | 20K | 30K | 50K | 70K | 80K | 110K |
| 11 | 10K | 20K | 30K | 50K | 70K | 80K | 110K |
| 12 | 10K | 20K | 30K | 50K | 70K | 80K | 110K |

Technical Materiel Corporation
 Frequency Shift Exciter Model XFK

MULTIPLICATION RATIO

THE ORIGINAL TAP FROM R40 SO AS TO MAINTAIN A CONSTANT INPUT RESISTANCE OF 10,000 OHMS. FOR EACH POSITION OF THE CRYSTAL SELECTOR SWITCH, THERE IS A SMALL CABLE WHICH MAY BE PLUGGED INTO ANY MULT. RATIO DESIRED. SHOULD IT BE REQUIRED THAT TWO OR MORE CRYSTALS REQUIRE IDENTICAL MULTIPLICATION RATIOS, A JACK IS PROVIDED IN PARALLEL WITH EACH CABLE. IF THE DESIRED SHIFT AT THE OUTPUT OF THE TRANSMITTER IS NOW DIRECTLY SET ON THE DIAL, THE PROPER SHIFT OF THE MODEL XFK WILL BE SET AUTOMATICALLY.

POWER SUPPLY:- THE POWER SUPPLY IS A CONVENTIONAL FULL-WAVE RECTIFIER SUPPLY WITH CONDENSER INPUT. THE UNREGULATED OUTPUT VOLTAGE IS APPROXIMATELY 300 VOLTS. R71 AND V10, (OB2) SUPPLY 105 VOLTS REGULATED TO THE 200 KC OSCILLATOR, REACTANCE TUBE, CRYSTAL OSCILLATOR, KEYS AND FOR EXTERNAL USE WITH FACSIMILE DEMODULATOR, MODEL XFD. A NEGATIVE 105 VOLTS REGULATED IS OBTAINED THROUGH A 6X4 HALF-WAVE RECTIFIER, AND RC FILTER AND AN OB2 REGULATOR TUBE. THIS VOLTAGE IS USED IN THE KEYING CIRCUIT AND ALSO TO PROVIDE BIAS FOR THE POWER AMPLIFIER.

CRYSTAL FREQUENCY PLUS 200 KC EQUALS PRIMARY OUTPUT FREQUENCY BEFORE MULTIPLICATION IN RADIO TRANSMITTER TO DESIRED FINAL FREQUENCY.

OUTPUT IMPEDANCE:- 50-70 OHMS. OUTPUT POWER:- ADJUSTABLE TO 3 WATTS.

FREQUENCY SHIFT:- LINEAR TO 1000 CYCLES

KEYING SPEED:- 1000 W.P.M. MAXIMUM

INPUT IMP. FOR EXT. R.F. SOURCE:- 70 OHMS, 6 TO 8 VOLTS R.M.S.

OVERALL STABILITY:- (1) 10 CPS FOR AMBIENT TEMPERATURE CHANGE OF 0-50 DEGREES C. (2) 10 CPS FOR VOLTAGE CHANGE OF 10 PERCENT. (3) NO DRIFT FOR INPUT SIGNAL VARIATIONS OF PLUS 25 VOLTS TO PLUS 150 VOLTS (MARK FREQUENCY).

NOTE BY W2BFD:- BECAUSE THIS UNIT WAS DESIGNED FOR DIVERSITY RECEPTION BY MEANS OF TWO INDIVIDUAL RADIO RECEIVERS (WITH A COMMON HIGH-FREQUENCY OSCILLATOR) THE LIMITER-DISCRIMINATOR PORTION IS PROVIDED IN DUPLICATE. FOR AMATEUR OPERATION HALF OF THIS DIVERSITY SETUP CAN BE ELIMINATED. IT SHOULD ALSO BE NOTICED THAT, UNLIKE OTHER CONVERTERS WITH WHICH WE ARE FAMILIAR, THE DISCRIMINATOR COILS ARE NOT TUNED TO THE MARK AND SPACE FREQUENCIES BUT MUCH FARTHER APART. THIS PERMITS THE INCOMING FSK SIGNAL TO DRIFT A CERTAIN AMOUNT WITHOUT AFFECTING THE CHARACTER OF THE SIGNALS. THE INPUT TO THIS CONVERTER SHOULD BE PRECEDED, AS IN OTHER AUDIO CONVERTERS, BY A BAND-PASS FILTER NO WIDER THAN 850 CYCLES PLUS THE ANTICIPATED DRIFT.

May 16th is Armed Forces Day. The Navy is going to send a message from the Secretary of Defense via printer using our standards on 7375 kc. The time will be 1300 local time and it will come from NDC, NDS, NDF, and NDW. There will be a ten minute test period for tuning in before the message. It is not necessary to copy more than one station and no extra credit will be given for doing this. Send your uncorrected copy to Armed Forces Day Contest, Room BE1000, The Pentagon, Washington 25, D.C. Indicate the time and call letters of the station copied as well as your own name and call.

Was clearing out my files the other day and found a bunch of miscellaneous pages from early Bulletins (mostly #3-4-5). Send a self-addressed envelope and 10¢ and I'll send you one of each available including a full schematic of the Press-Wireless 05/FR Frequency Shift Exciter. A steal. Make that a business size envelope so I won't have to cram so much.

HERE IS JUST WHAT YOU NEED TO ENABLE YOU TO ENJOY YOUR TVI TO THE UTMOST!

| | | |
|---------------|---|-------------|
| Used TV sets: | 7 inch Motorola, Teletone, etc. | \$35 - \$40 |
| | 10 inch Motorola, Emerson, Teleking. | \$50 |
| | 12½ inch Stromberg, Silvertone, Majestic. | \$60 |
| | 14 inch Teletone. | \$70 |

While they last.

All brands were trade-ins on larger screen sets.
All play with picture and sound.
Re-tubed where necessary.
Selling FOR ABOUT THE PRICE OF THE TUBES ALONE.
all are table models.

Here is your chance to get an excellent monitor.

Maybe you want to convert one to a panadaptor?

Or use it for a modulation or keying monitor?

Hook it to the teletype machine and have the copy crawling up the screen instead of wasting all that paper.

Sell or trade for RTTY gear.

Have some FM-TV table combinations.

Charles E. Spitz, W4API
1420 South Randolph Street
Arlington, Virginia

The next issue of the Bulletin, #24, looks like it is going to be huge, mammoth, gigantic. Well, it'll be more than the usual eight pages anyway for I have more than that already typed up to put in.

There have been so many screams of anguish at my suggestion that I stop putting out the Bulletin that it will continue for another year. Each issue will feature at least one commercial circuit diagram and description. More of the operating news will be fed into CQ, greatly simplifying the process of Bulletin publication.

The VHF Teletype Society got together for a meeting recently. An equipment chairman was named: W2MIB, Harry Evans (Doc), who will keep and active list of all available equipment and all desired equipment, thus facilitating the exchange of gear. This is not just a local service. Doc will be glad to hear about what you need or have available. Send a self-addressed envelope to Harry Evans, 2214 Leighton Road, Elmont, L.I.N.Y. List your equipment, one item per card, on 3 X 5 cards with your name and address. Ditto if you want something. I suggest you mark this item in your Bulletin so you can find it when you want it.

The meeting also selected a visiting committee to get in touch with local amateurs who have printers but who haven't gotten on the air.

A discussion of the calling frequency problem, and all the facets thereto, resulted in no decision. The general opinion was that we would set up a set of frequencies for use in this area and ignore any set up elsewhere, thus following the lead of the Southern California Society. As long as both groups know the frequencies used by the others they can move to them when they desire to communicate. It would seem then that, since groups on both coasts have no need or interest in a set of National calling frequencies that there need be no more discussion of this problem. The Bulletin will list those channels set up by the different groups around the country for their own use.

SMGCC