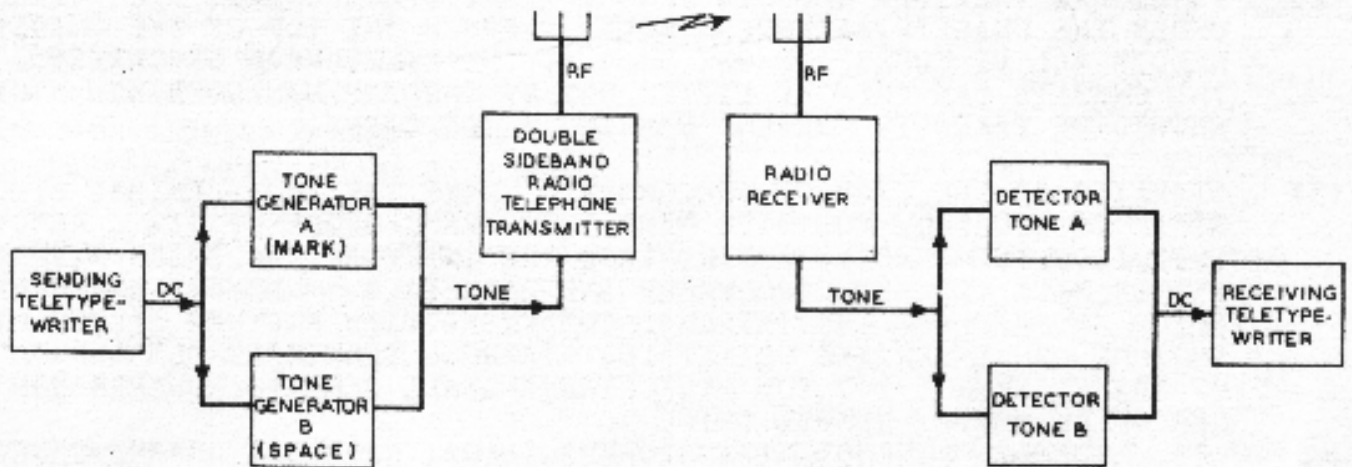
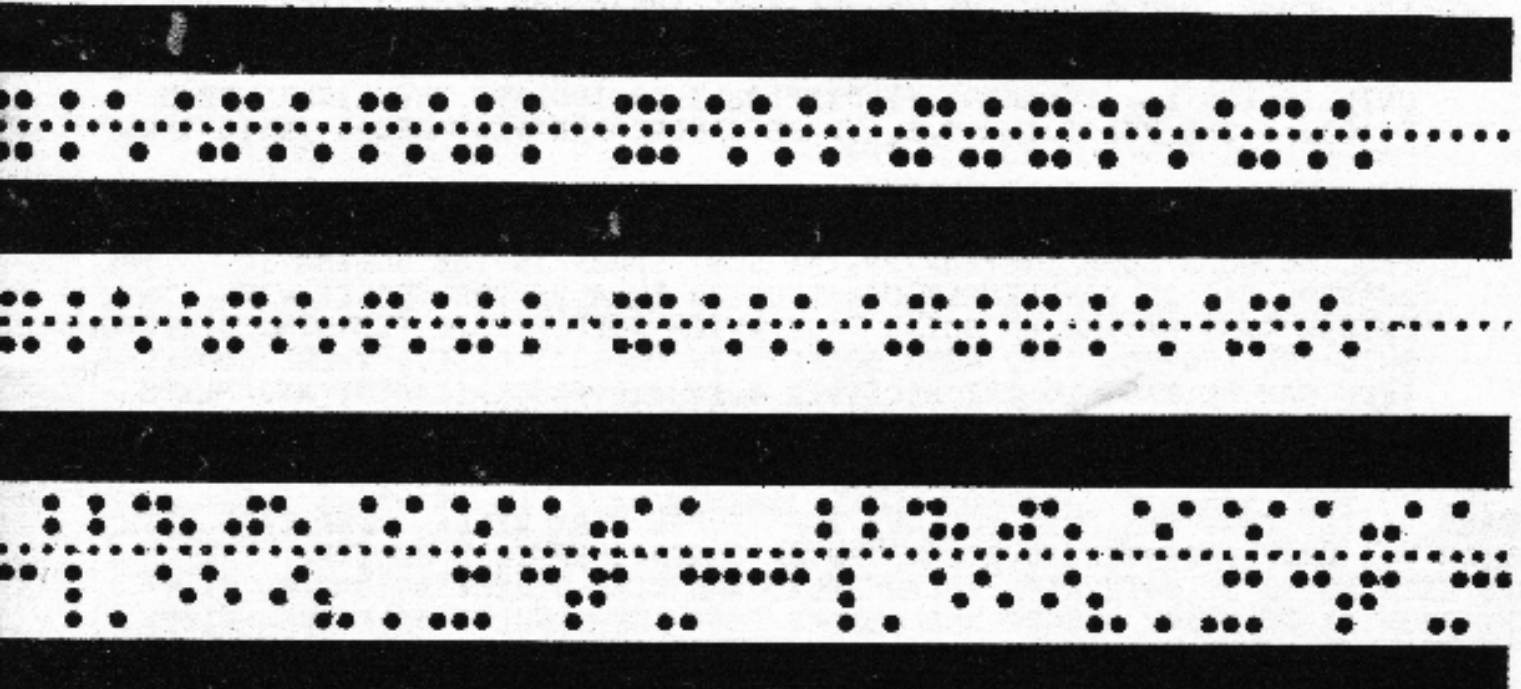


# A R T S

## 4 1



**AFSK Radioteleprinter System.** For audio frequency shift keying (AFSK) the sending teleprinter controls which one of two tones is to be transmitted. For single-channel operation, usual frequencies are 2125 cycles for mark and 2975 cycles for space. The receiving converter has two channels, one for mark and one for space, controlling the d-c to the receiving teleprinter. The same transmitting two-tone generator, if fed into a single-sideband suppressed-carrier transmitter, will produce FSK (F1) emission. By using a beat frequency oscillator in the receiver to produce the proper tones, the receiving system will copy F1 signals.





ADDENDUM TO TECHNICAL BULLETIN ON NAVY MODEL FRA CONVERTER (ARTS BUL.40)

CONSIDERABLE MAIL RECEIVED AT RTTY HEADQUARTERS INDICATES THAT QUITE A FEW OF THESE FREQUENCY-SHIFT UNITS ARE IN AMATEUR POSSESSION. BECAUSE OF THE 400 KC INTERMEDIATE FREQUENCY USED TWO METHODS HAVE GAINED FAVOR IN OPERATING THE FRA IN CONJUNCTION WITH AMATEUR-BAND RECEIVERS. (1) THE AMATEUR RECEIVER I.F. SIGNAL CAN BE HETERODYNED TO 400 KC, OR (2) THE FRA CAN BE RETUNED TO 456 OR 465 KC. THE FOLLOWING STEP-BY-STEP DESCRIPTION DISCLOSES HOW ONE MEMBER, W2RMB, EMPLOYED THE SECOND METHOD.

-. -

- (1) THE LARGE 110 VAC PLUG ON THE REAR CAN BE REPLACED WITH AMPHENOL NO. 61F10. IT USES THE SAME SCREW SPACING AND MAKES A NEAT INSTALLATION.
- (2) TO REMOVE THE I.F. CHASSIS FROM THE UNIT; DISCONNECT THE 6 WIRES UNDER THE CHASSIS, REMOVE 3 BOLTS THROUGH THE TOP OF THE CHASSIS, REMOVE ALL VR TUBES AND ONE 6SJ7 AT THE RIGHT REAR OF CHASSIS. THE CHASSIS CAN THEN BE LIFTED OUT BY CAREFUL MANEUVERING. CARE SHOULD BE TAKEN TO PREVENT BANGING METER CASES.
- (3) STARTING AT THE SIDE OF THE CHASSIS WHERE THE TWO-TERMINAL BINDING STRIP IS LOCATED, YOU WILL FIND I.F. TRANSFORMER T-101. REMOVE THIS FROM THE CHASSIS AND REPLACE THE INTERNAL CONDENSER WITH A SILVER MICA 100 MMF. CONDENSER AND REINSTALL. REMOVE TRANSFORMER T-102 AND REPLACE THE INTERNAL CONDENSER WITH ANOTHER SILVER MICA 100 MMF CONDENSER AND REINSTALL. ACROSS TERMINALS "B" AND "C" OF TRANSFORMER T-103 YOU WILL FIND A SMALL CERAMIC TUBULAR CONDENSER OF 56 MMF. REMOVE THIS  
REMOVE TRANSFORMER T-104, CAREFULLY MARKING LEADS TO FACILITATE REPLACEMENT. REMOVE THE SHIELD FROM THIS TRANSFORMER AND REPLACE 180 MMF CONDENSER C-115 WITH A SILVER MICA 150 MMF UNIT. WHILE TRANSFORMER T-104 IS OUT OF THE CHASSIS LOCATE BOTH CONDENSERS C-117 AND C-118 ON THE TERMINAL BOARD ON SIDE OF CHASSIS. REPLACE THEM WITH 300 MMF SILVER MICAS. IT MAY BE NECESSARY TO REMOVE THE SCREWS AND LOOSEN THE TERMINAL BOARD IN ORDER TO PERFORM THIS OPERATION. REINSTALLING THE TERMINAL BOARD AND TRANSFORMER T-104 YOU ARE NOW IN POSITION TO ALIGN THE I.F. STRIP TO YOUR PRE-CISE RECEIVER INTERMEDIATE FREQUENCY.
- (4) T-103, THE OSCILLATOR TRANSFORMER, IS ALIGNED FIRST BY USING A BC-221 AND MAKING A SMALL 1/2 INCH PROBE ON THE END OF A PIECE OF SMALL DIAMETER COAX. WITH THIS HELD NEAR THE BOTTOM OF T-103, OR NEAR THE OPENING AT THE TOP, AND THE BC-221 TUNED TO YOUR I.F. FREQUENCY, THE SLUG IS ADJUSTED UNTIL THE SIGNAL FROM THIS OSCILLATOR IS PEAKED. THE REST OF THE I.F. TRANSFORMERS CAN BE ALIGNED IN THE USUAL MANNER, AS THOUGH ONE WERE TUNING AN F.M. STRIP. THE REASON FOR THE SMALL PROBE, ABOVE, IS TO MAKE SURE THAT PICKUP IS ONLY FROM T-103. USING A GRID-DIP METER IS NOT VERY HANDY AS THE COIL IS TOO LARGE MAKING IT DIFFICULT TO ISOLATE THE SIGNAL FROM T-103. THE FIRST TWO I.F. TRANSFORMERS ARE VERY BROAD IN TUNING.
- (5) TO PROVIDE AN ADAPTOR FOR THE RECEIVER A CATHODE FOLLOWER STAGE, SUCH AS THE NAVY JOB DESCRIBED IN ARTS BULLETIN 40, IS CONSTRUCTED, USING A 6BA6 INSTEAD OF THE 6AB7 SHOWN IN THE SCHEMATIC. THE ADAPTOR CAN BE COMPLETELY CONSTRUCTED IN A VECTOR SOCKET WITH SHIELD CAN, HAVING AN OCTAL BASE WHICH WILL PERMIT PLUGGING DIRECTLY INTO THE HRO-50, T-1, NBFM SOCKET (IN W2RMB'S CASE), WHERE CONNECTION CAN BE MADE TO THE RECEIVER I.F. AND ALSO FILAMENT AND PLATE SUPPLY. THIS UNIT, WITH VARIATIONS, CAN, OF COURSE, BE MADE UP FOR ANY MODEL RECEIVER WITH COMPARATIVE EASE.

W2RMB STATES THAT THE UNIT FOLLOWS THE SIGNAL VERY WELL. THE EASE WITH WHICH THE LOOP (PRINTER) CURRENT CAN BE CONTROLLED IS A RELIEF. HE HAS BEEN USING IT BOTH WITH POLAR RELAY AND WITH DIRECT ACTUATION OF THE PRINTER SELECTOR MAGNET AND CLAIMS THAT THE RESULTS HAVE BEEN FINE.



# Armed Forces Day

Mark your calendar for May 19, Armed Forces Day, 1956. Let's all make a special effort this year to raise our score. In 1954 91 copied the RTTY broadcast. But in 1955 the score dropped to 52. See page 39-10 for the 1955 list.

The Armed Forces Day radioteletypewriter receiving competition will feature a special joint message from the Chief Signal Officer (USA), The Director, Naval Communications (USN), and the Director of Communications (USAF).

A letter of acknowledgment will be sent to each amateur participant who submits a copy made from the radioteletypewriter transmission of this message. Transmission will be at 60 wpm on the following schedules:

1300 EST	AIR	7915 kc
	NDC	7375 kc
1300 CST	AMUSA	5760 kc
	NDS	7375 kc
1300 MST	A5USA	14405 kc
	NDF and NDW2	7375 kc
1300 PST	AF6AIR	14405 kc
	NDW	7375 kc

Each transmission will commence with a period of ten minutes of a test and station identification to permit amateurs to adjust their equipment. At the end of the test period, the message will be transmitted. The message should be submitted "as received" to:

Armed Forces Day Contest  
Room BE-1000  
The Pentagon  
Washington 25, D C

Time and call sign of station copied and name and call sign of amateur receiving the transmission should be included.

No. 41. Bulletin of the Amateur Radioteletype Society April 1956  
Published at 163 West 13 Street, New York 11, N. Y. for all radio amateurs interested in radioprinter, radiophoto, and automatic radiotelegraphy. Subscription rate: \$3.00 for 12 issues

ARTS does NOT live in Brooklyn.

"Notice in "The Ham Shop" classified ads of CQ an ad by ARTS at another address, 1379 East 15th St, Brooklyn about the ARTS bulletins." ----W5SLJ

That ad is by a previous editor who offers an unknown number of back issues for \$5. The previous editor has had no connection with ARTS since bulletin #36, but is now connected with CQ magazine. Present ARTS editor is W2EBZ. We have back issues of bulletin # 36 and later for 25¢ each. The CQ ad is misleading in offering ALL back issues, when in fact all back issues are not available from the Brooklyn advertiser.

TELETYPE CORPORATION, 4100 W. Fullerton Ave, Chicago 39, has new edition of their booklet "The ABC's of TELETYPE Equipment," covering operation and use of page printers, perforators, re-perforators, distributors, Baudot code, and relay systems. Free

LENKURT ELECTRIC CO, San Carlos, Calif has available a 48-page booklet "Carrier and Microwave Dictionary." No charge.

ANTARCTICA KC4USA



We have no news yet regarding the possibility of RTTY on the Operation Deepfreeze (page 40-11) Meanwhile, try for them on SSB.

KC 4 USA Little America was activated at 0915 GMT 16 March. First contact was W6JHB. KC4USA is on single-sideband, and has been reported 20 db over S9 in the Middle West on Sunday, March 18th. KC 4 USA operates on SSB about 14202 to 14215 kc.



# AMATEUR RADIOTELETYPE SOCIETY

V. H. F. TELETYPE SOCIETY

38-06 61st Street

Woodside 77, N. Y.

TECHNICAL BULLETIN ARTT-2485A RECEIVING FSK WITHOUT A TERMINAL UNIT

THERE ARE TWO STANDARD METHODS OF RECEIVING FREQUENCY-SHIFT SIGNALS, WITH INNUMERABLE SUB-DIVISIONS OF THE BASIC SYSTEMS. THE FIRST, AND MOST COMMON METHOD WITH RADIO AMATEURS, IS TO HETERODYNE THE SIGNAL INTO THE AUDIO RANGE AND THEN FILTER, LIMIT AND DISCRIMINATE TO DERIVE A POLAR DC OUTPUT TO DRIVE THE DC AMPLIFIER FOR THE PRINTER.

THE SECOND METHOD, AS EXEMPLIFIED IN THE MILITARY (NAVY) "FRA" RADIOTELETYPE CONVERTER WHICH WAS DESCRIBED AND DIAGRAMED IN "ARTS-40" LAST MONTH, AND THE CV31/A UNIT, A VERSION OF WHICH, BY W5QHB, HAS BEEN PLANNED TO APPEAR SHORTLY IN "CQ" MAGAZINE, IS TO LIMIT, FILTER, AND DISCRIMINATE AT INTERMEDIATE FREQUENCIES.

THE AUDIO METHOD HAS THE VERY IMPORTANT ADVANTAGE OF PERMITTING THE SAME RECEIVING CONVERTER FOR BOTH FSK AND AFSK. EVEN IF NO VHF OPERATION IS EVER INTENDED OR POSSIBLE (AND THE GREAT BULK OF RTTY AMATEURS ARE STILL ON VHF) THERE IS A DEFINITE BENEFIT FROM THE USE OF AFSK. ONE APPLICATION IS THE ABILITY TO RECORD TELETYPE INFORMATION ON SOUND TAPE OR WIRE RECORDINGS TO BE PLAYED BACK AT A LATER TIME WITHOUT THE STORAGE AND WINDING PROBLEMS OF PAPER PUNCH TAPE. MOST OF THE HUNDREDS OF TECHNICAL AND OTHER BULLETINS TURNED OUT BY ARTS-VHFTS IN THE PAST TEN YEARS HAVE BEEN PERFORATED AND EDITED ON PAPER TAPE AND THEN RECORDED AT HIGH SPEED ON WIRE.

THE I.F. METHOD HAS THE ADVANTAGE OF SIMPLICITY IN THE FILTERING, WHICH GENERALLY MAY BE ACCOMPLISHED BY THE AMATEUR-BAND RECEIVER CRYSTAL OR MECHANICAL FILTER OR A "Q-5ER". IT IS NOT GENERALLY APPRECIATED HOW STRIKINGLY SIMILAR AN FSK CONVERTER, USING THE I.F. SYSTEM, IS TO A COMMON FM RADIO RECEIVER. ALL THE ELEMENTS OF AN FSK CONVERTER EXIST EXCEPT THE DC AMPLIFIER STAGE TO KEY THE TELETYPE-WRITER. BY EITHER ADDING A SWITCH, TO CONVERT THE FM RECEIVER AUDIO AMPLIFIER TO A DC AMPLIFIER, OR PROVIDING AN ADDITIONAL STAGE OF DC AMPLIFICATION, ANY FM RECEIVER BECOMES AN RTTY TERMINAL UNIT.

FAULT WILL IMMEDIATELY BE FOUND BY SOME WHO WILL SAY THAT A BROADCAST FM SET PROVIDES MIGHTY LITTLE FILTERING WITH ITS 150 KC BANDWIDTH. PERFECTLY TRUE! BUT WHO SAID A "BROADCAST" FM SET? SUPPOSE WE WERE TO USE A COMMUNICATIONS-TYPE OF (RELATIVELY) NARROW-BAND FM RECEIVER. THIS WOULD BE A VERY GREAT IMPROVEMENT. NOW IF THE COMMUNICATIONS FM RECEIVER IS OF THE TYPE USING 456 KC INTERMEDIATES WE CAN TAKE OFF A FEW MILLIVOLTS OF THE I.F. OUTPUT OF OUR HAM-BAND RECEIVER AND FEED IT INTO THE FM RECEIVER I.F. INPUT. THE COMMUNICATIONS RECEIVER PROVIDES THE SELECTIVITY (CRYSTAL OR MECHANICAL FILTER) WHILE THE FM RECEIVER PROVIDES SOME ADDITIONAL GAIN AND THE DISCRIMINATION. THIS PERMITS THE HAM RECEIVER TO USE AVC, IN ADDITION TO THE LIMITING PROVIDED BY THE FM SET. AN EXTRAORDINARILY WIDE RANGE OF FADING OF THE RTTY SIGNALS CAN BE TOLERATED BY SUCH A COMBINATION.

IF THE FM RECEIVER COVERS 25 TO 55 MC, AS MOST NOMINAL 30-50 MC COMMERCIAL "LOW-BAND" FM MOBILE UNITS DO, YOU HAVE A COMPLETE TELETYPE RECEIVER AND CONVERTER COMBINED, AT NO ADDITIONAL EXPENSE, BY THE ADDITION OF THE DC KEYSER STAGE OR THE PROVISION OF A SWITCH TO CONVERT THE AUDIO AMPLIFIER TO THIS FUNCTION. THIS UNIT WILL THEN COVER THE 6, 10 AND 11 METER BANDS. AS MENTIONED ABOVE, IN CONJUNCTION WITH A HAM-BAND RECEIVER IT WILL COVER ALL THE OTHER LOWER FREQUENCY BANDS. WITH THE FANTASTIC PROMISES OF THE PROPAGATION EXPERTS OF TERRIFIC "OPENINGS" ON THE 6 AND 10 METER BANDS AS A RESULT OF INCREASING SUNSPOT ACTIVITY (SEE MARCH "CQ") IT IS EASY TO SEE THAT INTERNATIONAL RTTY DX SHOULD BE A COMMONPLACE THING ON 6 AND 10 METERS SHORTLY.

FURTHERMORE, THIS EMPLOYMENT OF A MOBILE TWO-WAY RADIO UNIT, OFFERS THE FIRST REAL SOLUTION OF KEEPING A LOW BATTERY-DRAIN IN A MOBILE RTTY SETUP. SINCE THE RECEIVER ITSELF PERFORMS THE FILTERING, LIMITING AND DISCRIMINATION THERE IS NO NEED FOR AN ADDITIONAL CONVERTER WITH ITS RELATIVELY HIGH POWER CONSUMPTION. ALL COMMERCIAL TWO-WAY



MOBILE INSTALLATIONS USE A "SQUELCH" SYSTEM TO KILL THE RECEIVER AUDIO WHEN NO SIGNAL IS BEING RECEIVED. ALL MODERN FM SQUELCH SYSTEMS ALSO ARE DESIGNED NOT TO BE OPERATED BY NOISE OF ANY SORT. BY ADDING A SMALL MECHANICAL RELAY, SUCH AS A SIGMA 4-F, TO THE SQUELCH CIRCUIT WE HAVE AN "AUTO-START" RADIOTELETYPE SETUP. THE RELAY IS USED TO TURN ON THE PRINTER MOTORS WHEN THE DISTANT PRINTER SIGNAL IS RECEIVED. WHAT MORE COULD WE WANT?

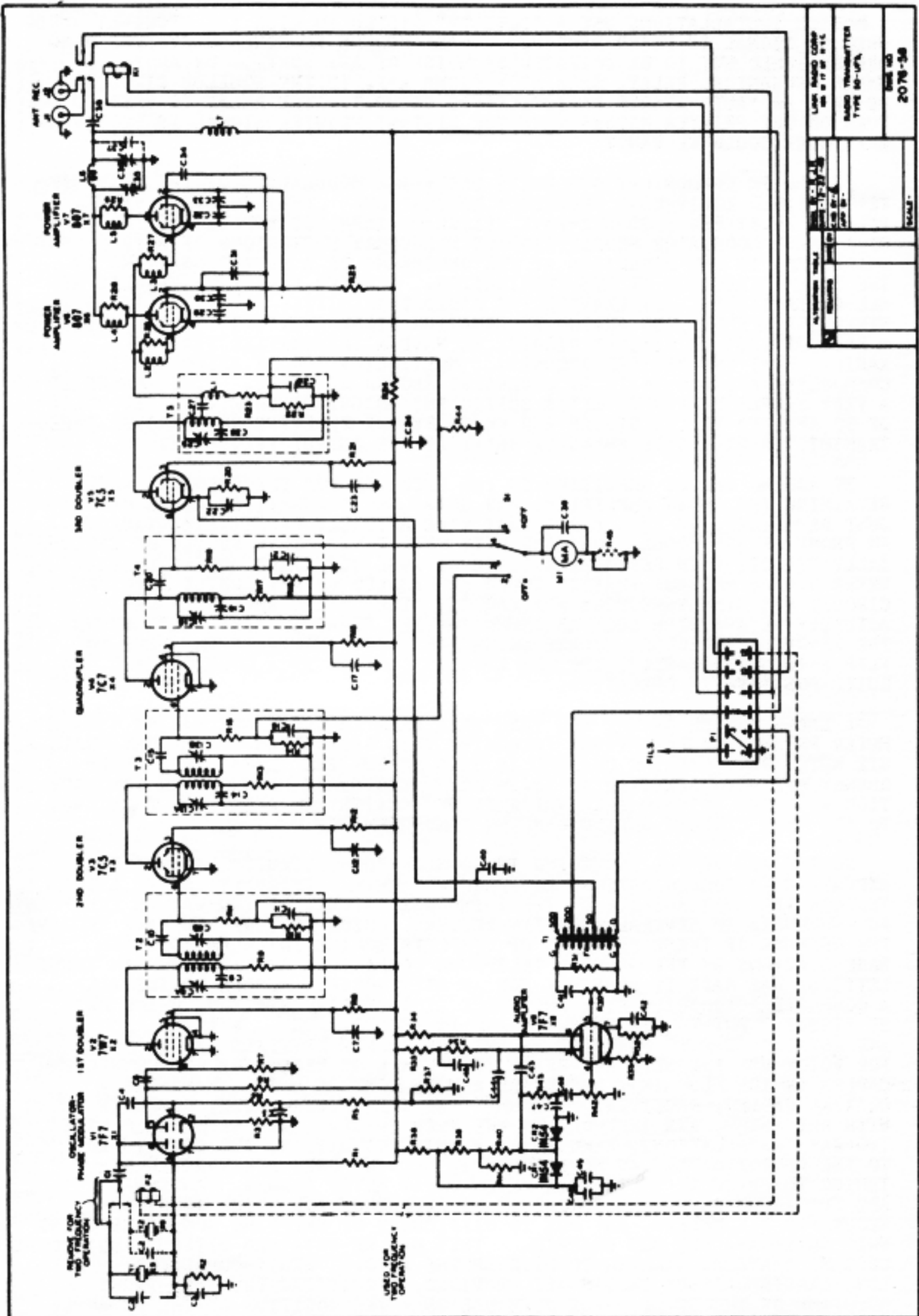
MODERN FM COMMUNICATIONS UNITS USE PHASE MODULATION OF THE TRANSMITTER TO YIELD EQUIVALENT FREQUENCY MODULATION. THIS IS OF NO VALUE FOR FSK TELETYPE. SQUARE-WAVE TELEGRAPH IMPULSES APPLIED TO THE INPUT OF A PHASE MODULATOR MERELY PRODUCE FREQUENCY EXCURSIONS OF A TRANSIENT CHARACTER, IN ONE DIRECTION AT THE BEGINNING OF A MARK SIGNAL AND IN THE OTHER DIRECTION AT ITS TERMINATION. CENTER FREQUENCY RESULTS AT ALL OTHER TIMES. BY LEAVING THE RADIO TRANSMITTER ALONE, AS IT IS WIRED FOR SPEECH, AND ADDING A GERMANIUM DIODE SHIFTING CIRCUIT, WITH A PAIR OF 1N34 OR SIMILAR DIODES, WE HAVE A TRANSMITTER THAT WILL EASILY SHIFT THE DESIRED AMOUNTS. MULTIPLICATION OF FREQUENCY IN COMMONLY-AVAILABLE UNITS IS GENERALLY AROUND 32 TIMES. THIS MAKES IT A VERY SIMPLE MATTER TO GET A SUFFICIENT AMOUNT OF SHIFT. A FEW VOLTS OF DC APPLIED TO THE DIODES AND KEYED BY THE TELETYPE KEYBOARD OR TAPE TRANSMITTER WILL GIVE ADEQUATE SHIFT AT THE OUTPUT FREQUENCY.

BY ADDING THE DC AMPLIFIER IN THE RECEIVER FOR THE PRINTER, WHILE RETAINING THE AUDIO AMPLIFIER, AND USING THE TRANSMITTER AS WE HAVE JUST DESCRIBED, WE HAVE A RIG THAT WILL ACTUALLY PERMIT SIMULTANEOUS FM PHONE (PHASE MODULATION) AND RTTY WITH FSK. THIS SHOULD BE ESPECIALLY EFFECTIVE IN PERFORMING CIVIL DEFENSE WORK FROM MOBILE UNITS WHERE NORMAL MESSAGE TRAFFIC COULD BE HANDLED BY RTTY WHILE A VOICE CIRCUIT WAS SIMULTANEOUSLY AVAILABLE. THE "D.C." AMPLIFIER CAN ACTUALLY BE A SYSTEM SUCH AS SHOWN FOR THE "FRA" IN "ARTS-40", WHERE THE 23-CYCLE TELEGRAPH SQUARE WAVES ARE AUDIO-AMPLIFIED AND USED TO FLIP A TRIGGER STAGE. THE FRA LOCKING CIRCUIT IS A GOOD ONE AND QUITE POSITIVE IN OPERATION.

A LARGE NUMBER OF THE NEW YORK AREA PRINTER GROUP ARE MAKING SIX-METER PRINTER INSTALLATIONS FOLLOWING THIS BASIC PLAN. THE NATIONAL SIX METER RTTY CALLING CHANNEL IS 52.6 MC BUT THE "LOCAL AREA" FREQUENCY HAS BEEN SELECTED AS 53.16 MC. TESTS ARE PLANNED, IN CONJUNCTION WITH THE CHICAGO-AREA VHF RTTY NET (MAINLY FM-AFSK) FOR A CHICAGO TO NEW YORK CIRCUIT DURING 6-METER BAND-OPENINGS.

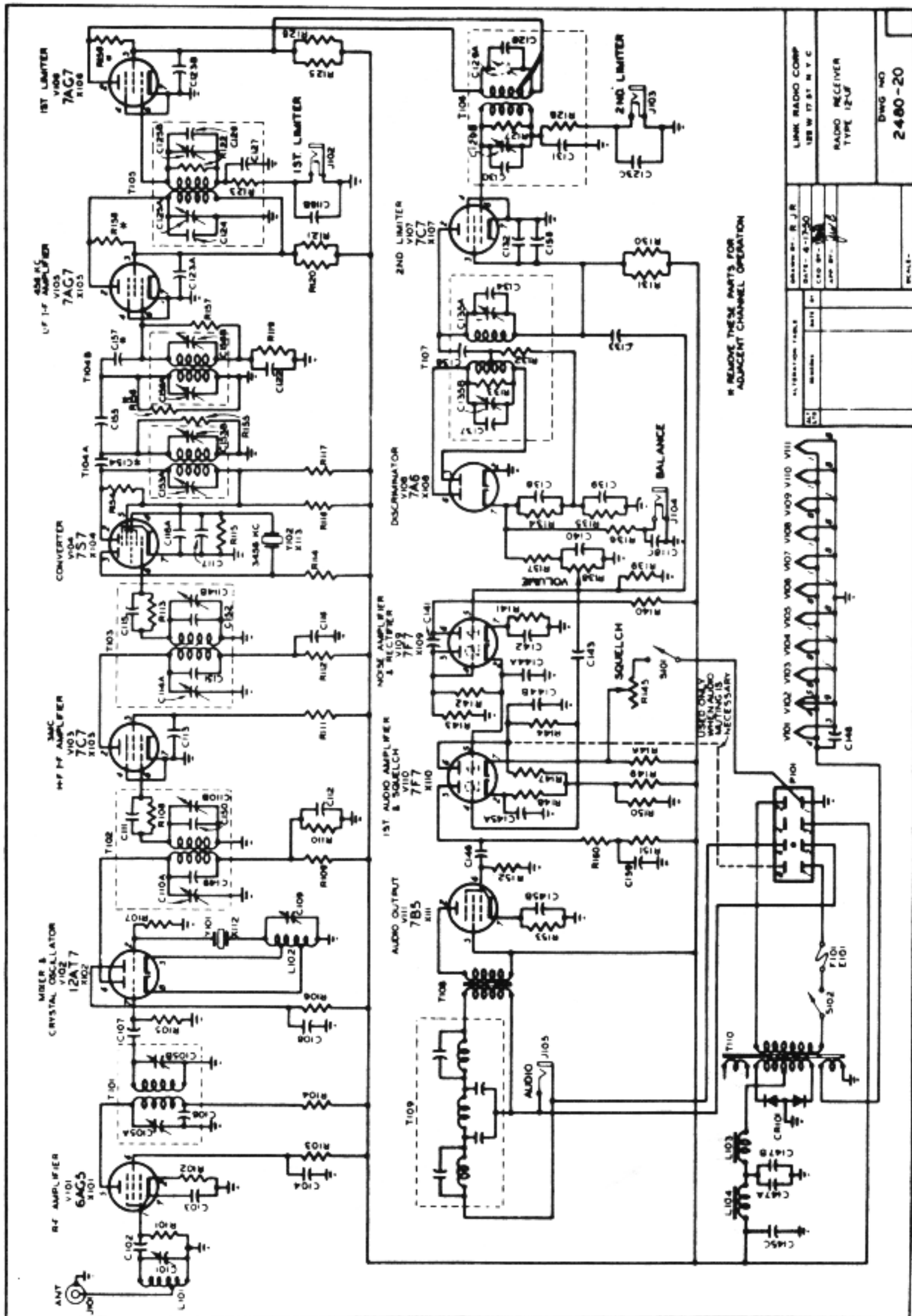
SO FAR ALL OF THE FOREGOING IS SO MUCH "SCUTTLEBUTT" WITHOUT THE EXPENSIVE FM COMMUNICATIONS EQUIPMENT. THIS DIFFICULTY IS SET ASIDE THROUGH THE AVAILABILITY OF THE 3 IMMENSE BATCHES OF TWO-WAY FM EQUIPMENT, AS ANNOUNCED IN SEVERAL BULLETIN-LETTERS, WHICH MOST OF YOU HAVE RECEIVED. THE RELEASE OF THESE HUNDREDS OF COMPLETE MOBILE INSTALLATIONS AND BASE-STATIONS BY THE SEVERAL TELEPHONE COMPANIES, AS EXPLAINED IN THESE LETTERS, HAS MADE IT POSSIBLE FOR AN RTTY SOCIETY MEMBER TO INSTALL A COMPLETE AUTOMOBILE RTTY AND VOICE SEND-RECEIVE STATION, WHICH MAY BE DIRECTLY PUT TO USE ON 6, 10 AND 11 METERS, FOR \$100. AND NOTHING ELSE TO PURCHASE EXCEPT THE QUARTZ CRYSTALS !!!!! FOR VOICE USE THE SETS ARE READY TO OPERATE AS RECEIVED. ALL CONNECTING CABLES (WHICH PLUG IN), DASHBOARD REMOTE CONTROL UNITS, HAND-SETS, COAXIAL CABLES, RECEIVERS, TRANSMITTERS WITH POWER UNITS, COMPLETE WITH ALL TUBES, ARE INCLUDED IN THE \$100 PRICE. THE SETS ARE POLICE TWO-WAY INSTALLATIONS, REMOVED IN RUNNING CONDITION, AND COME TUNED TO THE APPROXIMATELY 45 MC FREQUENCY, NEEDING ONLY SCREWDRIVER RETUNING TO PLACE IT IN THE SIX-METER OR 10 METER BANDS. ANTENNAS ARE FURNISHED ALSO, CUT TO THE 45 MC FREQUENCY AND WHICH MIGHT BE RECUT FOR SIX METERS, BUT DUE TO DIFFICULTY OF SHIPPING NON-TELESCOPING WHIP ANTENNAS, ARE NOT SHIPPED. THEY MAY BE OBTAINED WITHOUT ADDITIONAL COST BY AMATEURS WILLING TO PICK UP THE SETS. HEAVY-CONDUCTOR LONG-LENGTH BATTERY CABLES ARE PROVIDED, PERMITTING TRUNK OR FRONT MOUNTING OF THE SETS. FOR RTTY USE ONLY THE ADDITION OF THE DC AMPLIFIER AND THE DIODE SHIFTER ARE REQUIRED. THE MOBILE UNIT WILL ALSO OPERATE VERY WELL FROM AC POWER SUPPLIES FOR FIXED-STATION OPERATION.





ALTERNATE TUBES	7F7	7C3	7C7	6X4	6BE6
LINE BIAS COIL	SEE FIG 10-11				
SCALE	2078-38				

ARTS 41-6



LINK RADIO COMP 12B W 17 AT N Y C	
RADIO RECEIVER TYPE 12-U	
DWG NO 2480-20	
REVISION TABLE	
REV	DESCRIPTION
1	ASSEMBLED BY: R. J. R.
2	DATE: 8-17-50
3	CD BY: [Signature]
4	APP BY: [Signature]
RECEIVED:	



THE TRANSMITTERS OPERATE WITH A FINAL-STAGE INPUT OF AROUND 65-70 WATTS AND THE RECEIVER HAS A .4 MICROVOLT SENSITIVITY WITH VERY RELIABLE SQUELCH OPERATION BECAUSE OF THE CIRCUIT USED. THE EQUIPMENT IN THE THREE LOTS RELEASED THUS FAR IS RCA, MOTOROLA, FEDERAL, AND LINK. OF THE FOUR BRANDS THE LINK GEAR SEEMS MOST SUITABLE FOR RTTY USE.

IN ADDITION THERE ARE THE RELATIVELY HIGH-POWERED BASE-STATIONS, USED IN POLICE PRECINCT HEADQUARTERS. THESE ARE ALSO OF VARIOUS MAKE. THE SCHEMATICS PRINTED HERE ARE OF THE LINK 50-UFS TRANSMITTER-RECEIVER UNIT. THERE ARE MINOR VARIATIONS BETWEEN THE VARIOUS MODELS BUT THE DRAWINGS ARE TYPICAL. THE TRANSMITTERS COME IN 5-1/2 FOOT RELAY-RACK CABINETS HAVING GRAY WRINKLE ENAMEL FINISH AND BACK AND FRONT LOCKING DOORS. CHASSIS OF TRANSMITTER HAS BUILT-IN METER WITH SWITCHING FOR ALL STAGES BUT FINAL. FINAL STAGE HAS PLATE-CURRENT AND PLATE-VOLTAGE METERS SEPARATE FROM THIS AND MOUNTED TO BE VISIBLE ON OUTSIDE OF CABINET WHEN DOORS ARE CLOSED. BOTH DOORS CONTAIN BUILT-IN INTERLOCKS. AN ORNAMENTAL STAINLESS-STEEL GRILL, BETWEEN THE TWO PANEL METERS, CONCEALS THE BUILT-IN LOCAL-MONITORING LOUDSPEAKER. UNIT CONSISTS OF (1) A TERMINATION PANEL, WIRED FOR LOCAL OR REMOTE CONTROL (2) TRANSMITTER CHASSIS (SEE DIAGRAM) (3) RECEIVER CHASSIS (SEE DIAGRAM) (4) HIGH VOLTAGE POWER SUPPLY CHASSIS FOR TRANSMITTER (RECEIVER POWER SUPPLY SELF-CONTAINED). ALL BASE-STATIONS ARE FOR 110-VOLT 60-CYCLE AC OPERATION. THE EQUIPMENT IS CONTAINED IN THREE LARGE BATCHES IN DIFFERENT CITIES. SHIPMENT IS MADE TO MEMBERS FROM NEAREST POINT. F.O.B. PRICE IS \$160. A CRATING CHARGE OF \$10 IS MADE IN THE CASE OF THE LARGE BASE-STATIONS. RECEIVERS HAVE EXTREMELY SENSITIVE SQUELCH CIRCUITS OF VERY HIGH RELIABILITY. THESE BASE STATIONS MAY BE MODIFIED EXACTLY AS THE MOBILE UNITS, FOR USE WITH RTTY.

UNLIKE THE TELETYPE EQUIPMENT OBTAINED AT COST FOR RADIO AMATEURS, THESE RADIO UNITS DO NOT REQUIRE A SIGNED "WAIVER OF COMMERCIAL INTENT" AND CAN BE OBTAINED BY ANY RADIO AMATEUR, MEMBER OR NON-MEMBER. THEY ARE MADE AVAILABLE THROUGH W2BFD TO RTTY MEMBERS AT A SPECIAL PRICE, HOWEVER. (SEE ABOVE) PAYMENT SHOULD BE SENT TO JOHN WILLIAMS, C/O RADIOTELETYPE SOCIETY, 38-06 61ST STREET, WOODSIDE 77, N.Y., BY POST OFFICE MONEY-ORDER ONLY. THESE COMMERCIAL UNITS MAY BE EMPLOYED BY RADIO AMATEURS PARTICIPATING IN C.D. WORK, IN COMMUNICATING WITH SIMILAR C.D. INSTALLATIONS COSTING THOUSANDS OF DOLLARS.

THERE HAVE BEEN SO MANY REQUESTS FOR THESE EQUIPMENTS THAT IT WILL BE A GREAT ASSISTANCE, IN THE CASES WHERE AN ASSOCIATED GROUP OF AMATEURS OBTAIN THEM, IF YOU WILL "POOL" YOUR REQUESTS UNDER ONE NAME AND SHIPPING ADDRESS. PLEASE FURNISH NAMES OF ALL MEMBERS IN THE GROUP GETTING A SET AND INDICATE TO WHICH MEMBER ALL SETS SHOULD BE SHIPPED. THIS WILL REDUCE THE WORK TREMENDOUSLY.

THE LINK 50 UFS TRANSMITTER, ILLUSTRATED, MULTIPLIES THE CRYSTAL FREQUENCY 32 TIMES, IN SEVERAL STAGES OF DOUBLERS AND QUADRUPLERS, TO ARRIVE AT THE FINAL FREQUENCY. SEVERAL SUCCESSFUL ATTEMPTS TO TRIPLE IN A DOUBLER STAGE (GIVING A 48-TIMES MULTIPLICATION) GIVES THE AMATEUR USER THE POSSIBILITY OF MAKING USE OF ON-HAND CRYSTALS. ALL TUBES ARE FURNISHED BUT NO CRYSTALS.

THE LINK 12 UF RECEIVER IS A DOUBLE-CONVERSION JOB WITH THE CONVERSION OSCILLATORS CRYSTAL-CONTROLLED FOR A HIGH DEGREE OF STABILITY.

ALTHOUGH NOT GIVEN HERE, DIAGRAMS ARE AVAILABLE SHOWING THE REMAINING UNITS, THE CABINET INTER-UNIT CABLING AND EXTERNAL CONNECTIONS.

MAY WE SUGGEST THAT THE MANY AMATEURS, SETTING UP THIS GEAR ON SIX METERS ALL AROUND THE COUNTRY, PLAN ON PROVIDING A CRYSTAL TO MONITOR THE 52.6 MC NATIONAL 6-METER AUTO-START RTTY CHANNEL. EACH CENTER OF RTTY ACTIVITY SHOULD ALSO SELECT A REGIONAL FREQUENCY. IF LOCAL WORKING WERE DONE ON THE NATIONAL FREQUENCY, BAND-OPENINGS WOULD RESULT IN CHAOS.

THIS EDITOR VISUALIZES AUTOMATIC "BEACON" TRANSMITTERS ON SIX METERS, ALTERNATELY SENDING IDENTIFICATION IN C.W. AND RTTY. THE AUTO-START SEQUENCE WOULD BE INSERTED IN THE BEACON TRANSMISSIONS SO THAT PRINTERS ALL OVER THE COUNTRY WOULD START UP AND COPY EVEN THOUGH NO ONE WAS LISTENING (SAY, IN THE DEAD OF NIGHT) WHEN THE BAND OPENED UP. SOME DAY WE MAY LISTEN IN ON A QSO AND HEAR AN AMATEUR SAYING, "YES, O.H.I., I DO MY BEST DX WORK WHILE I AM SLEEPING" ! ! ! ! !



## SECOND ANNUAL NEW YORK DINNER

Second Annual New York March RTTY Dinner (Sponsored by NY/RTS) was held Monday evening, 19 March. Thirty-eight amateurs from various states attended.

W2JTP Byron acted as master of ceremonies.

W6AEE Merrill reported on surveys of the 40 meter channel by W6BP, W3PYW, etc. Altho usable in the west, 7140 is no good in most parts of the country. Broadcast carriers on 7138 and 7142 give QRM. Merrill suggests a new channel near 7100. The 80 meter frequency of 3620 is alright, containing only a few cw stations, and commercial RTTY at 3118 and 3127.

For 160 meters, open at present only for voice, the Coast Guard (in charge of LORAN) indicates no technical objections to FSK. For narrow shift, recently available, no definite amateur standard shift has been set but 170 cycles has been suggested. West Coast 2 meter stations use vertical polarization. California has about 150 stations on 2 meter RTTY. About 30 stations check into each net (Tuesday nights). The channel 147.850 is exclusively RTTY. It is noted by Merrill that Chicago and Detroit also have active 2 M RTTY nets. The February Anniversary SS Contest is held on the weekend closest to 20 February (when low frequency FSK was first permitted). Some RTTY bulletins have been late due to typesetting troubles, but should be running current shortly. Last year 26 attended this dinner. This years 38 is a good increase. Next year let's see another 40% increase in attendance.

W1BGW Jack Berman reports that W1WB, W1NTL, W1WEW, and W1AFN are active on 2 meters in the Boston area. Some are equipped for auto-start which has proved quite satisfactory. Stations are active also on 80 and 40 meters.

Jack reminds us that W9TCJ is now OBS and does good broadcast service. We should take advantage of the large traffic capabilities of RTTY, to send original data, experimental results, etc.

W1BDI Ed Handy reports that the ARRL may ask the FCC for 160 M FSK if enough requests come in. W1AW and W1BDI are on RTTY in West Hartford, and W1NBP in New London. Ed has been doing some fast traffic work by taking messages on 80 CW and delivering on 2-meter RTTY. RTTY is fast and accurate for traffic. For good public relations, some RTTY stations should be active in CD, RACES, etc. Three RTTY nets are now registered with the ARRL and will be printed in May QST: 2 M California net, the Midwest, and the Eastern net. Stations should QNZ (zerobeat) closer for better nets. Ed sends many bulletins. If nobody uses the propagation predictions, at least they are good to test printers. If the machine falls apart during one of Ed's long tapes, the machine fails the test! W1BGW is the able NCS for the East Coast net.

W9BGC Joe Juel seconds the comments of Merrill on frequencies. Also, a good frequency should be found for 20 meters. The Chicago area 2 meter RTTY net is on FM. Vertical polarization has been found very good in Chicago. The 80 meter net on 3624 kc meets at 1600 CST Sundays. W9TCJ is NCS, W9BGC alternate NCS of the Midwest RTNET. W1FGL, W1MX, and W1WEW are some of the distant stations checking into the net. Any station is invited to check in. The RTTY gathering at the October Electronics Conference in Chicago had an attendance of 55. Anyone interested in another RTTY gathering next October please indicate so to W9BGC early enough so that plans may be made.

Amateur radio has been coasting on a reputation of having pioneered in many radio discoveries and



developments. But until the recent advent of amateur RTTY, the hams have been lagging behind the commercials for the last 20 years.

W3CRO Dick and W2JAV Phil gave a technical talk on RANGING. They exhibited parts of the 26 to illustrate their talk. Dick notes that only detergent-free, dehumidified oil should be used. Some parts need #5, for others #20 is alright. Esso-Lube oil was suggested. Use the wrong oil, and you will find all your german-silver springs turning green! For testing, NAM and NSS send some good RY signals when they have no other traffic.

For pictures of the dinner, see the next issues of RTTY and CQ.

#### BANDS AVAILABLE BELOW 500MC

Bands available for FSK 0-900c (F1), facsimile (A4), AFSK (A2), wideband FSK (fm), and unmodulated carrier (A0) are listed.

3.5 - 3.8	F1	50 - 54	A2 A4
7.0 - 7.2	F1	51 - 54	A0
14.0 - 14.2	F1	52.5 - 54	fm
14.3 - 14.35	F1	144 - 148	*
21.0 - 21.25	F1	220 - 225	*
26.96 - 27.23	*	420 - 450	*
29.0 - 29.7	fm		

\* A0 A2 A4 fm

#### FOR SALE TO AMATEURS

For Amateur Use, Delivery Now

Frequency Shift Converters

Complete w/ case and tested tubes

FRF...\$75 FRC...\$75 FRA...\$60

Model 12 typing unit ac motor \$25

Model 12 keyboard, sync motor \$30

Model 15 keyboard complete \$40

Model 26 machines (inquire)

Model 21A and 25A strip printers

Parts for 12, 14, 15, 19, 26

Page Roll Paper

Morse Keyboard Perforators

(use 15/16" tape)

w/ case...\$60 w/o case...\$35

\*FELIX ESTEBAN (W2ZKV) IL 8-9691\*

84 - 24 57th Ave

\*ELMHURST 73. NEW YORK\*

ARTS 41-10

**EDITORIALS:** Printers have been sent to Rarotonga (Cook Islands) and New Zealand. Look for DX. We need news and technical dope. Send it in and you'll see the bulletin come out sooner. I can't make up news out of thin air.

**Printing Costs:** Printing first copy of the bulletin costs more than the following 999 copies. To double the pages in our bulletin we need to double our circulation. Remind your friends to subscribe and you will receive more pages as circulation goes up. Send in QTH of anyone interested in RTTY and we'll send a sample copy.

#### NATIONAL RTTY CALLING AND WORKING FREQUENCIES

National, FSK (mark frequencies; space 850 cycles lower) 3620, 7140, 27,200, 29,160, 52,600 kc

National, AFSK (2125 cycles mark; 2975 cycles space) 27,200, 147,960 kc calling & autostart; 144,138 kc repeater & duplex

California, AFSK 147,850 kc calling & working

Washington, D. C. AFSK 147,960 kc calling & autostart; 147,495 kc working

Chicago, AFSK (FM) 147,700 kc calling & working

Detroit, AFSK (FM) 147,300 kc calling & working

New York, AFSK (FM) 53,160 kc calling & working; (AM) 147,960 kc calling & working

#### TUNING FORK FREQUENCY STANDARD

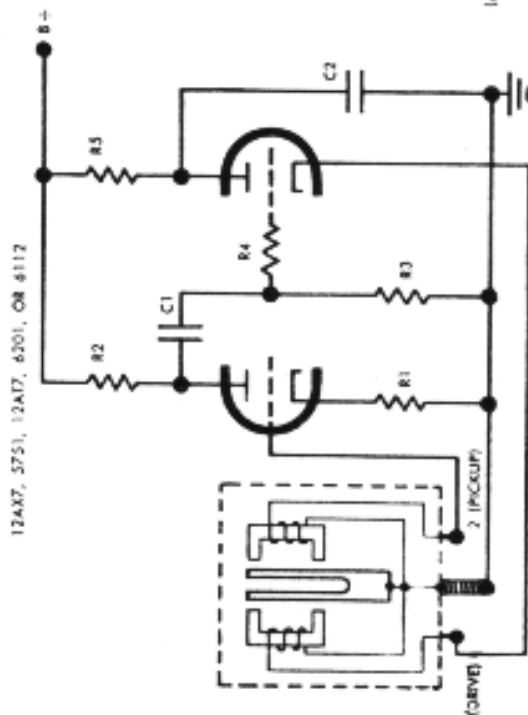
A tuning fork standard is a useful tool for adjusting RTTY exciters and converters. A 425 c oscillator, in conjunction with an oscilloscope, can be used for adjusting or measuring harmonically related frequencies of 170, 850, 2125, 2975, etc. Commercial forks with an accuracy of 1 part in 2000 cost about \$60. For accuracy of 1:10,000 cost is about \$85. Some amateurs have found \$1 surplus forks and have ground them to frequency and have built their own standards. Old earphones (discard the diaphragm) can be used for drive and pickup to the fork. Remember that the drive and pickup must be biased with a permanent magnet or d-c. Drawing on next page shows the circuit for Philamon Laboratories Type J fork resonator.



NOMINAL B+	R5 (MEG OHMS)	TOLERANCE B+
300	2.0	-20% + 10%
270	1.8	±20%
250	1.6	±20%
230	1.5	±20%
200	1.3	±19%
180	1.1	±18%
165	1.0	±16%
150	.82	±14%
135	.75	±12%
120	.62	±9%
108	.51	±6%
100	.47	±5%

R1 2,000  
R2 150,000  
R3 1.0 MEG.  
R4 100,000  
R5 (SEE TABLE)  
C1 .01, 10% MICA  
C2 .047 OR .05 OIL PAPER,  
(NOT METALIZED) HAVING  
'T' CHARACTERISTIC OR  
BETTER, -15% TO +40%  
TOLERANCE OR BETTER

(ALL RESISTORS ARE 1/4 W., 5% TOLERANCE)



The circuit has been designed to permit the user to choose at will **any one of five currently popular tube types—12AX7, 5751, 12AT7, 6201, 6112**, and yet still retain complete fork interchangeability. Provision has also been made to permit adapting the circuit for use with **any B+ value from 100 to 300 volts** by simply selecting the proper value of R5 as shown in the table. (If using the sub-miniature 6112 tube the B+ should not exceed +200 volts.) **Heater voltages may vary ±20%** from the nominal 6.3 or 12.6 volts as the case may be without affecting fork accuracy. If tube life is a factor however, the permissible heater voltage variations should not exceed the tube manufacturer's recommendations. As can be noted from the voltage table shown, the permissible percentage deviation from the nominal B+ value (without affecting fork accuracy rating) increases as the actual B+ increases. This is due to the fact that the tubes become more interchangeable with increased B+ because of the value of R5 increasing.

A reasonably clean sine-wave output having less than 15% total harmonic distortion may be obtained directly from the first grid or first plate of the oscillator circuit. The voltage at the first grid is actually the fork output voltage (pick-up coil) and will vary from .1 to .2 volts A.C. rms depending upon the particular fork and exact B+ voltage. The voltage at the first plate should be obtained through a separate .01 mfd coupling capacitor—and will range from 2.0 to 8.0 volts depending upon the exact tube type and B+ used. In production design, provision should be made to accommodate, and if necessary compensate, for the possible variation in output signal voltage that might occur with different resonators, tubes, B+ values, etc. Care should also be taken so as not to load the pick-up coil or first plate with less than 1/2 meg. impedance, so as to avoid causing excessive phase shift or amplitude changes that might affect fork accuracy.

The recommended oscillator circuit necessary for operating the Model J resonator is shown below. The circuit is simple, uses a minimum of parts, does not require trimming of components, and, provided tolerances are adhered to—may be manufactured in production quantities without danger of losing any of its interchangeability features. Designed so that **the fork is self-starting**, the circuit requires from 20 to 50 seconds from a cold heater start before full fork amplitude is reached.



W9HKA has a model 12 with table less keyboard to sell, priced about \$40.

### HIGH TORQUE TIMING MOTORS

Synchron Timing Motors are synchronous, self-starting, and self-lubricating. Their simplicity of design, quality of materials, and precise construction give positive assurance of long life and trouble-free service. On the job, under all operating conditions, in high and low temperatures, these miniature timers enjoy a worldwide reputation for low cost customer satisfaction.

#### Physical Specifications

Overall Size: 2 dia. x 1.35" deep; 4 mtg. holes .118" dia.; Shaft: 3/8 L x .125" dia. (Except 600 RPM -- 1/16" dia.). Torque: guaranteed to pull 20 in. oz. at 1 RPM. On motors faster than 1 RPM, the torque is reduced proportionately. May be mounted in any position and may be stalled continuously without damage. Permanent sealed-in lubrication. Rotation: clockwise. For operation on 110-120 V. 60 cycles A.C. Shpg. Wt. 2 lbs. each

Cat. No.	Speed	Cat. No.	Speed	Cat. No.	Speed	Cat. No.	Speed
HI - 1	1 RPM	HI - 8	10 RPM	HI - 15	40 RPM	HI - 22	180 RPM
HI - 2	2 RPM	HI - 9	12 RPM	HI - 16	48 RPM	HI - 23	200 RPM
HI - 3	3 RPM	HI - 10	15 RPM	HI - 17	50 RPM	HI - 24	240 RPM
HI - 4	4 RPM	HI - 11	20 RPM	HI - 18	60 RPM	HI - 25	300 RPM
HI - 5	5 RPM	HI - 12	24 RPM	HI - 19	75 RPM	HI - 26	600 RPM
HI - 6	6 RPM	HI - 13	25 RPM	HI - 20	100 RPM		
HI - 7	8 RPM	HI - 14	30 RPM	HI - 21	150 RPM		

Your Cost Any Speed **\$4.95** 10 or more each **\$4.50** (of 1 speed)

**HERBACH & RADEMAN, INC.**

1204 Arch Street Philadelphia 7, Pa. LOcust 7-4309



A. R. T. S.

AMATEUR RADIOTELETYPE SOCIETY

163 WEST 13th STREET

NEW YORK 11, N. Y.

A. R. T. S.

AMATEUR RADIOTELETYPE SOCIETY

443 WEST 47th STREET

NEW YORK 19, N. Y.



FORM 3547 REQUESTED

Morse From Teleprinter Tape Transmitter. Drawing ARTT-2601 (page 37-16) shows how to get morse code out of your teleprinter tape transmitter. Only components needed are a switch, polar relay, and connectors. First tape below is morse as punched on a Kleinschmidt keyboard perforator. This wheatstone tape may be read by a teleprinter tape transmitter (such as the 1A) and transmitter same as shown in ARTT-2601. The transmitter sprocket will guide the narrower tape. However, some changes must be made in the ARTT-2601 drawing, as the W2BFD black box was first made to use other holes on the tape. For wheatstone tape, one coil of the polar relay should be connected through the switch to hole two, and the other coil to hole 3. The middle tape below shows morse punched on standard 11/16 5-hole tape with a teleprinter keyboard perforator. The character "I" is used to punch a DOT. Two characters, LINE FEED and SPACE, make a DASH. Use one BLANK between letters, and three BLANKS between words. After a few minutes at it you can punch morse at a good speed. ARTT-2601 could be modified by using a 2P3T switch, in place of the DPDT shown, to read wheatstone tape in addition to the W2BFD tape. Try these suggestions for sending your call sign automatically as required by FCC. Send your call on FSK morse, nobody said CW was needed.

