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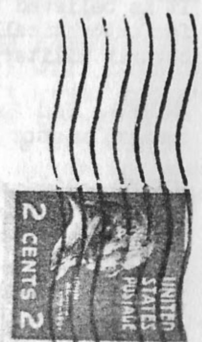
1953



Amateur Radio *Frontiers*

Due to pressure from the Teletype Corporation which has the word "Teletype" trademarked and to a continued desire to get the magazine on a paying basis several changes have taken place. The name has now been changed and the emphasis will take a subtle change to better fit the new name. We have all been well aware that the amateur teletype operators represent an intelligent group of amateurs that are interested in most of the newer aspects of ham radio. Many of our group are now on single sideband and the rest are interested. Interest is also high in facsimile, remote control, etc. These are all frontiers of ham radio and all shall be considered fair prey for these pages. Amateur teletype will continue to be the center of attraction and will not be sacrificed for other material.

This magazine serves a purpose that cannot achieved by CQ or QST: it can print circuits for experimental work, ideas, opinions, etc. It also can get the news of activities out in a few days where the regular magazines take almost two months. The deadline for all material is the 20th of the month and mailings will be as close to the first of the month as possible. Soooo, if there is anything that you have been hankering to write about which seems to fit in this new framework send it in. If you want to find someone to run special tests with let me know.

K2DIN, Ray Klatt, Utica, has started work on a W2BFD converter and expects to be on all bands with about 50 watts soon.

VE3GL, Rube Hadfield, Toronto, is on 7 mcs regularly with TT.

W5WKP, John Sappington, Fort Worth, would like to meet some of the other RTTY'ers.

The August issue of Electronics has some charts for toroid coil design. Fine, but does anyone have information on where we can buy either the coils or the cores?

SEPTEMBER 1953

Bulletin No. 27

W5BCO, Ralph Hicks, Tulsa, has recently picked up a Model 26 and expects to have it on 20 and 40 soon with a KW behind it.

The Model 26 is a wonderful printer for it is very much like the Model 15. It is not quite sturdy enough for 24 hour a day running, but for amateur service it is more than adequate. The Model 26 solves a lot of the problems of RTTY too in that it is a single magnet printer and thus requires no VT keyer. Most of the fellows are running the single magnet directly from the last stage of the converter, thereby saving the use of a polar relay to boot. It is far quieter than the 12, smaller, prints neater, etc. Several are now available from the ARTS for $225 each. Complete Model 12's are now running about $150 on immediate delivery so that is a terrific bargain. The 15's are still in the $800 range. Send a check now and you'll have your 26 in a few days.

While the commercials are blaring I might as well mention the large boxes of fanfold paper that are available. Send $5. Get your years supply of paper and be done with it.

HP1WM, Wilbur Morrison, "At last Panama is on the RTTY map. I am ready for any business sent this way, 20 or 40. I am using a Model 15 with a W2PAT converter, NC-183D receiver and 1 KW. We have five other HP stations now interested in RTTY but no printers. Only tentative schedules are possible as I travel around quite a lot in my position as Chief of Communications of Tocumen Airport."

Joe Doane, South Bend, is in the hospital with sugar diabetes and gangreen of the left foot, thus halting development of his distributor. How about dropping this old timer a letter? QTH: 130 Dix Way South, South Bend 17, Ind. If there is anything you want to know about teletype machines he can tell you.

W9UAU, Doc Lewis, Rockford, has been doing quite a bit of work on filters and has discarded the FL8 parts in favor of some cheap (20¢) filter chokes of the ac-dc variety which give a much better response. Using a 2000 and 3050 cycle band-pass they are down 22 db at 1750 and 3200 cycles. Cascading them gives quite a sharp response at 2125 and 2975.

W7TJY, Fred Minchin, Nevada, will be on soon with his 14.

ET2SM,Murray Leonard, Asmara, Eritrea, "Prior to my induction, I was a TV engineer, and didn't know from beans about teletype.....then came the DRAFT, and the next thing I knew I was a student at Fort Monmouth studying single sideband. Then I was sent to the Teletype Corporation to study multiplex with their engineers as instructors....it was then that I began to take a liking to this stuff. Finally, I was transported by plane to this remote spot of the world where I have been put to work as a "Radio Control" operator. This job is the coordination factor between RTTY receivers and "traffic." At first I didn't like it, but RTTY, like ham radio, sort of grows on a guy, and now I don't think I'll ever get it out of my system."

"WHAT'S NEW"

The AN/GGC-2(XC-1) described below operates by a reader simultaneously sensing the five TT pulses on tape. The SECO system used by Bell uses sequential sensing and uses standard TT mechanical decoding.

AUTOMATIC TELETYPEWRITER SWITCHING SYSTEM for the SIGNAL CORPS
By 1st Lt William F Spanke, SigC

(condensed from SIGNAL, official organ of the Armed Forces Communications Association, for July-August, 1953, By C Cool, W2EBZ)

The AN/GGC-2(XC-1) is Joint Army-Navy (AN) nomenclature for for a ground general use installation (G) of telegraph or TT (G) communications equipment (C) developed by Coles Signal Laboratory (XC) as a first experimental model (-1). The GGC-2 is used to automatically relay tape messages at TT relay stations, and is used to replace human operations as usually used at semi-automatic (tape) relay stations. The Teletypewriter Switching Center AN/GGC-2(XC-1) has been in eminently successful operation at Headquarters Fifth Army, Chicago, since 17 December, 1952.

Some of the principal features of the system are:

1. The ability to act on a message almost simultaneously with receipt of the message heading. It is possible to begin receiving the message heading at its destination even before the message has been completely transmitted by the station of origin.

2. The ability to appropriately act upon the six degrees of military precedence including the ability to cancel transmission of messages of low precedence when required for immediate handling of high precedence messages.

3. A substantial reduction in the number of operating personnel.

4. The extensive use of "common" or "pooled" equipment resulting in a high degree of flexibility, reliability and economy.

5. Compatability with existing semi-automatic operations making unnecessary the simultaneous installation of similar equipment throughout the network.

Figure 2B shows the minor additions to the message format required for automatic switching. The start-of-message indicator and the end-of-message indicator are added automatically as a result of slight modification of the semi-automatic equipment which works directly into the Chicago Switching Center.

Some of the operational features are depicted on the block diagram, Figure 3.

A received message is reproduced on a standard typing reperforator in the incoming line unit. The emerging tape extends through a "tape reader" and a standard TD. The tape reader is constructed to detect simultaneously all tape perforations representing each character and to convert them into electrical information which can be used for essential decoding and switching operations. As soon as slack tape developes, the tape reader begins operation but the TD remains inoperative. The reader first detects the perforations representing the start-of-message indicator. The indicator causes the tape reader leads to be switched to a channel number comparator where the channel number is checked automatically. The tape reader stops and a call is initiated for the services of the Director.

The Director finds the calling line and extends the tape reader leads to Director detecting relays. The tape reader resumes operation and feeds TT code (on a five-wire basis) representing the precedence indicator and routing indicator into the Director where the information is stored on relays.

To convert the TT code for the routing indicator into correct line number indication, the Director signals for the services of the routing translator. The routing translator receives the TT code information, decodes it, and translates it into an outgoing line number, and returns this indication to the Director. This action is accomplished in a matter of milliseconds. The routing translator can properly handle any of the thousands of routing indicators which are possible under the military routing indicator plan and allows rapid alteration of either the letters of a routing indicator or the line number over which it should be transmitted. The routing translator is common to the entire office, further simplifying changes in routing indicator assignments.

The Director now selects an appropriate cross office unit from the pool and establishes a cross office connection. If no other traffic is in storage, all cross office unit switches are on normal. The Director sets the cross office selector switch to the first cross office unit, sets the outgoing line selector switch of that cross office unit to the correct line and marks the message precedence in the cross office unit. The Director then releases itself from the incoming line unit, allowing the incoming line unit tape reader to resume operation and the TD to begin transmission of the message from the incoming line unit to the cross office unit at a slightly higher speed than the incoming transmission speed. The total Director holding time, including the time required to read the required information from the tape, is a few seconds.

The cross office unit contains a typing reperforator to reproduce the TT signals from the incoming line unit TD and a line speed tape reader and TD. When the start-of-message indicator is detected by the tape reader the automatic numbering equipment transmits a new start-of-message indicator, if required for this particular channel, followed by the next channel number appropriate for this channel. The entire message is recorded on a typing reperforator monitor to provide a semi-permanent record for the chennel.

When the sending station finishes transmission of the message, the end-of-message indicator will be detected in the incoming line unit and advanced through the incoming line unit TD. This furnishes a signal indicating that the cross office selector switch may be restored to normal.

Shortly the end-of-message indicator is detected in the cross office unit tape reader and advanced to the TD. This action signals for the time transmitter which transmits station identification, the time of day, a new end-of-message indicator and various TT functions.

The start-of-message and end-of-message indicators received from the sending station are absorbed in the switching operation and new indicators are added. This insures that accurately positioned indicators are always available at the next station.

KL7ATL, Sig Busch, Anchorage, "I've been fighting this for a long time, but I'm afraid the bug has bitten me quite hard. In fact, right now I'm starving for all the info that is available on RTTY. I'm already in the process of building a TT converter for the receiving setup, but I'm having trouble in getting the filters I need. I was bitten first by the bug when I saw Brownie's (W2PAU) set-up at the Southern New Jersey VHF Hamfest back in 1951, and ever since then I've been fighting the bug mainly because the Single Sideband bug bit me first. I know when I'm beat though, so I'll combine SSB with RTTY for AFSK on two meters and FSK on 40 and 80."

THE NORTHERN RADIO COMPANY MODEL 153 FREQUENCY-SHIFT TONE KEYER

AMATEUR RADIOTELETYPE ENTHUSIASTS AND FM 'PHONE MEN HAVE ALWAYS FACED A COMMON PROBLEM. IN MODULATING A CARRIER IN FREQUENCY, EITHER BY VOICE OR TELEGRAPHIC IMPULSES, IT BECOMES OBVIOUS THAT THE CIRCUIT CONDITIONS PRODUCING MAXIMUM CENTER-FREQUENCY STABILIZATION OF THE OSCILLATOR DO NOT CONDUCE TO EASE OF KEYING (OR MODULATION). THE REQUIREMENTS FOR HIGH OSCILLATOR STABILITY ARE DIAMETRICALLY OPPOSED TO THOSE PERMITTING SATISFACTORY DEVIATION OF THE CENTER-FREQUENCY.

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FOR VOICE MODULATION IT HAS BEEN POSSIBLE TO SECURE SUFFICIENT DEVIATION, WHILE RETAINING A HIGH DEGREE OF CARRIER STABILITY, BY GENERATING THE FM INDIRECTLY, USING PHASE MODULATION WITH LARGE AMOUNTS OF FREQUENCY MULTIPLICATION TO INCREASE THE MODULATION INDEX.

FOR TELEGRAPHY IT IS NECESSARY TO TRANSMIT SIGNAL COMPONENTS EXTENDING DOWN TO ZERO FREQUENCY (D.C.) WHICH PRECLUDES THE PHASE-MODULATION TECHNIQUE.

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ALL EXISTING COMMERCIAL AND AMATEUR TECHNIQUES OF FREQUENCY-SHIFTING A SELF-EXCITED OSCILLATOR (EITHER AT RADIO OR AUDIO FREQUENCIES) SUCH AS REACTANCE TUBES, VACUUM OR XTAL DIODES, ETC. HAVE FOUND IT NECESSARY TO MAKE COMPROMISES, AS MENTIONED ABOVE, IN CENTER-FREQUENCY STABILTIY IN THE INTEREST OF SECURING SUFFICIENT DEVIATION. ALL, THAT IS, WITH THE EXCEPTION OF THE NORTHERN RADIO MODEL 153 TONE KEYER.

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ALTHOUGH THE APPARATUS TO BE DESCRIBED WAS INTENDED TO BE USED FOR MULTIPLE TELETYPE SIGNALING OVER TELEPHONE LINES TO RECEIVING EQUIPMENT OF THE MODEL 152 STYLE (PREVIOUSLY DESCRIBED IN THE "BULLETIN"), AND CONSTITUTES WHAT IS KNOWN TO AMATEURS AS NARROW-SHIFT "A.F.S.K.", IT WILL BE APPARENT THAT THE CIRCUIT BEARS A STRIKING RESEMBLANCE TO THE WELL-KNOWN HIGH-STABILITY FRANKLIN OSCILLATOR CIRCUIT AND, THUS, SHOULD BE APPLICABLE TO "CARRIER-SHIFT" (F.S.K.) KEYING AS WELL.

ALSO, UNLIKE PREVIOUS CIRCUITS, IT PERMITS OF INDEPENDENT ADJUSTMENTS OF THE CENTER-FREQUENCY, THE MARK FREQUENCY EXCURSION, AND THE SPACE FREQUENCY EXCURSION. IT USES READILY-AVAILABLE COMPONENTS WHICH, PARTICULARLY FOR A.F.S.K. WORK, IS A GREAT ADVANTAGE IN AMATEUR CONSTRUCTION.

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IN COMMERCIAL WORK THE 153 IS USED TO PROVIDE 18 TWO-WAY TELETYPE CHANNELS OF COMMUNICATION OVER A CIRCUIT CAPABLE OF HANDLING AUDIO FREQUENCIES IN THE RANGE OF 425 TO 3315 CYCLES/SECOND. THIS "STACKING" OF CHANNELS LIMITS THE FREQUENCY-SHIFT TO PLUS-AND-MINUS 42-1/2 C.P.S. ALTHOUGH, FOR AMATEUR RADIOTELETYPE OPERATION, THE SHIFT SHOULD BE EXPANDED TO PLUS-AND-MINUS 425 C.P.S. (TO ACCORD WITH F.C.C. RULINGS).

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IN ANY FEEDBACK-OSCILLATOR THE GENERATED FREQUENCY IS DETERMINED PRIMARILY BY THE VALUES OF INDUCTANCE AND CAPACITY IN THE TUNED CIRCUIT ~~(OR CIRCUITS)~~ BUT ALSO, TO A CONSIDERABLE EXTENT, BY SUCH FACTORS AS TUBE LOADING AND THE PHASE OF THE FEEDBACK VOLTAGE. TUBE LOADING, PARTICULARLY VARIABLE LOADING, CAN BE REDUCED TO THE VANISHING POINT BY A "BUFFER-AMPLIFIER" TUBE WHICH EFFECTIVELY ISOLATES THE LOAD FROM THE GENERATING PORTION OF THE CIRCUITRY. A VACUUM TUBE OSCILLATES AT A FREQUENCY WHICH PERMITS THE CORRECT PHASE SHIFT, OF THE FEEDBACK VOLTAGE, SO THAT THE ENERGY RETURNED TO THE GRID CIRCUIT IS TIMED TO AID, AND NOT HINDER, THE BUILDING UP OF THE SIGNAL ON THE GRID.

ANY ALTERATION OF PHASE SHIFT IN THE OSCILLATOR REQUIRES THE GENERTED FREQUENCY TO CHANGE AS THIS, IN TURN, PRODUCES A COMPENSATING CHANGE IN PHASE IN THE TUNED-CIRCUIT. THE REASON FOR A QUARTZ CRYSTAL OSCILLATOR'S HIGH STABILITY IS THE LARGE COMPENSATING PHASE SHIFT PRODUCED WITH ONLY A TRIFLING CHANGE IN FREQUENCY (BECAUSE OF THE HIGH "Q" OF THE CRYSTAL).

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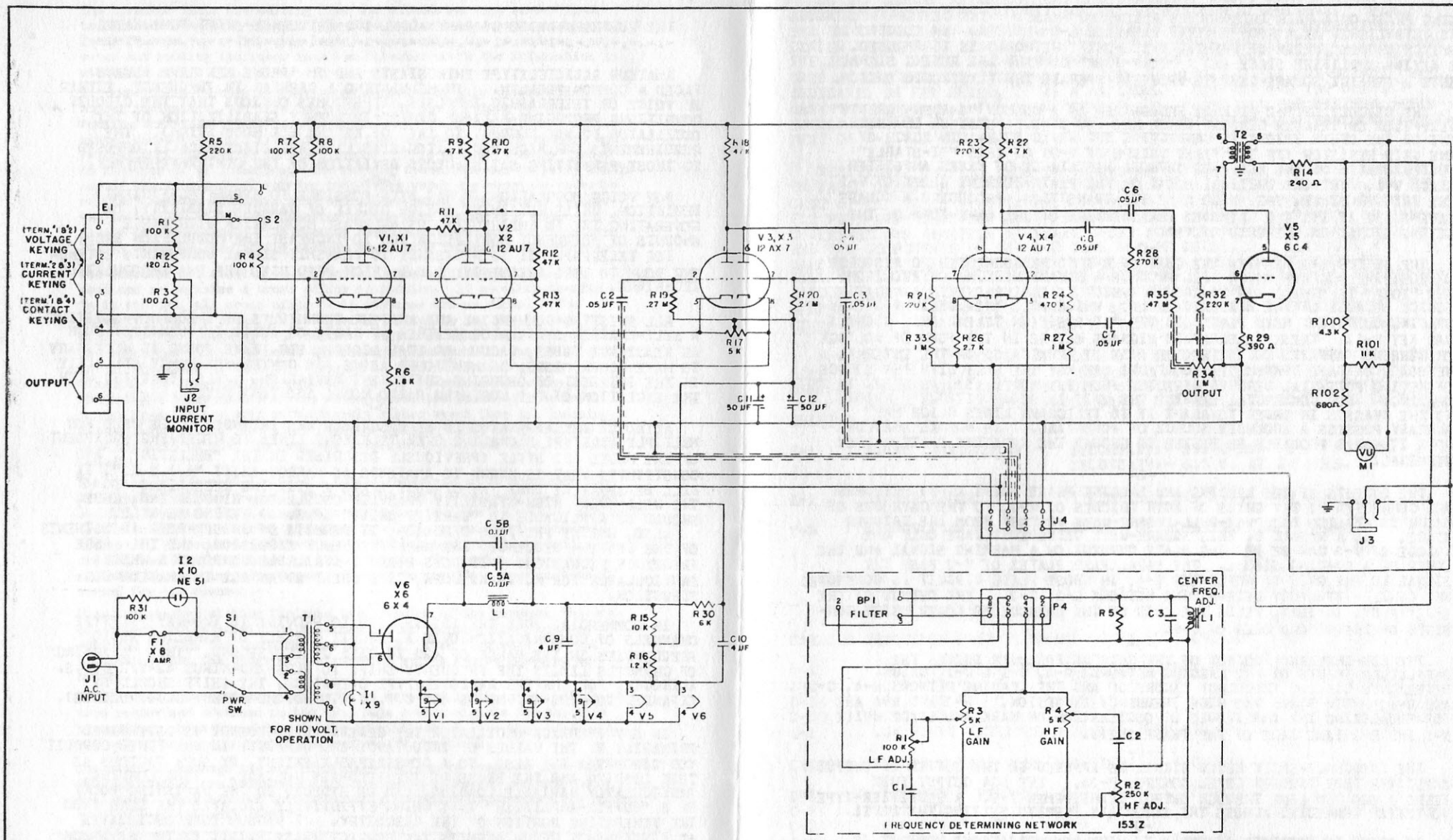
THE NORTHERN RADIO COMPANY MODEL 153 KEYER TAKES ADVANTAGE OF THE DEPENDENCE OF GENERATED FREQUENCY ON PHASE SHIFT BY PROVIDING TWO PATHS FOR THE OSCILLATOR FEEDBACK ENERGY. DEPENDING ON WHETHER THE TELETYPE PRINTER IS SENDING A "MARK" OR A "SPACE" SIGNAL THE FEEDBACK WILL TAKE PLACE THROUGH A PATH CONTAINING A NETWORK INTRODUCING A LAG-



By Permission
Mr. C. Lambert, Northern
Radio Company

Northern Radio Company
Dual F.S. Tone Keyer
Type 153

GING PHASE OR A PATH INTRODUCING A LEADING PHASE. THE CENTER-FREQUENCY IS ESTABLISHED BY A GOOD QUALITY PARALLEL L-C NETWORK. AN ELECTRONIC SWITCH CHOOSES WHICH OF THE TWO PHASE-SHIFT NETWORKS IS TO BE USED. A KEYING AMPLIFIER STAGE AND A "FLIP-FLOP" CONVERT THE KEYING SIGNAL INTO A PERFECT SQUARE-WAVE TO PROPERLY OPERATE THE ELECTRONIC SWITCH.

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THE CIRCUIT OF V-2 WILL BE RECOGNIZED AS A COMMON "GARDEN-VARIETY" FLIP-FLOP OR TRIGGER CIRCUIT WHICH HAS TWO STABLE "STATES" IN WHICH ONE OR THE OTHER TRIODE IS CONDUCTING BUT NEVER BOTH. IN PLACE OF ONE GRID RESISTOR (IN THE FIRST TRIODE OF V-2) OF THIS "BI-STABLE" MULTIVIBRATOR IS THE PLATE-TO-CATHODE RESISTANCE OF KEYER AMPLIFIER STAGE V-1. AT ONE CRITICAL POINT ON THE PLATE-CURRENT SLOPE OF V-1 THE TRIGGER STAGE, V-2, WILL MAKE ITS TRANSITION, PRODUCING A SQUARE WAVE-SHAPE AT ITS TWO CATHODES IRRESPECTIVE OF THE WAVE-FORM OF THE KEYING SIGNAL ON THE GRID OF V-1.

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THE SWITCH S-2 PERMITS THE GRID OF V-1 TO BE CONNECTED TO A SOURCE OF POSITIVE VOLTAGE WHICH WILL PRODUCE A STEADY MARKING OUTPUT FROM THE "TONE" TERMINALS, OR TO GROUND (WHICH IS EQUIVALENT TO A NEGATIVE SOURCE BECAUSE OF THE BIASED CATHODE), WHICH WILL THEN DELIVER STEADY SPACING OUTPUT. WHEN PLACED IN THE "L" POSITION TELEGRAPHIC SIGNALS CAN KEY V-1. THESE TELEGRAPHIC SIGNALS MAY BE IN THE FORM OF VOLTAGE OR CURRENT (APPLIED TO THE PROPER PAIR OF TERMINALS) OR THE EXTERNAL KEYBOARD OR TAPE TRANSMITTER CONTACTS MAY KEY THE UNIT WITH THE SOURCE OF KEYING POTENTIAL DERIVED DIRECTLY FROM THE MODEL 153, AS SHOWN IN THE DRAWING. FOR COMMERCIAL SERVICE THE UNIT IS SHOWN WITHOUT A GROUND TO THE CHASSIS IN ORDER TO ADAPT IT TO TELEGRAPH LINES WHICH MAY ALREADY POSSESS A GROUNDED SOURCE OF POTENTIAL. IN NORMAL AMATEUR WORK IT WOULD PROBABLY BE BETTER TO GROUND THE NEGATIVE PLATE SUPPLY TERMINAL.

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THE OUTPUTS OF THE LEADING AND LAGGING PHASE SHIFT (R-C) NETWORKS ARE CONNECTED TO THE GRIDS OF BOTH TRIODES OF V-3, TO THE CATHODES OF WHICH IS APPLIED THE PUSH-PULL SQUARE-WAVE VOLTAGE FROM THE TRIGGER STAGE. AS A RESULT OF THIS SQUARE-WAVE CATHODE VOLTAGE ONLY ONE TRIODE OF V-3 CAN BE PASSING PLATE CURRENT ON A MARKING SIGNAL AND THE OTHER ON A SPACING SIGNAL. THE PARALLELED PLATES OF V-3 PASS THE SIGNAL TO THE GRID OF AMPLIFIER V-4, IN WHOSE PLATE CIRCUIT IS CONNECTED THE CENTER-FREQUENCY DETERMINING NETWORK L-1, C-3. THE OUTPUT OF THE L-C "TANK", IN TURN, FEEDS THE GRID OF THE CATHODE FOLLOWER WHICH CONSISTS OF THE SECOND HALF OF V-4.

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THE LOW-IMPEDANCE OUTPUT OF THE CATHODE FOLLOWER DRIVES THE PARALLELED INPUTS OF THE LAGGING NETWORK, R-3, R-1 & C-1, WHICH DETERMINES THE LOW FREQUENCY EXCURSION AND THE LEADING NETWORK R-4, C-2 AND R-2, WHICH FIXES THE HIGH FREQUENCY EXCURSION. R-3 AND R-4 ARE FOR EQUALIZING THE AMPLITUDES OF OSCILLATION ON MARK AND SPACE WHILE R-1 AND R-2 TAKE CARE OF THE PHASE SHIFT.

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THE FREQUENCY-SHIFT KEYED SIGNAL IS APPLIED TO THE BUFFER OR OUTPUT AMPLIFIER TUBE THROUGH LEVEL CONTROL R-34. THE 6C4 OUTPUT TUBE FEEDS A 600 OHM LINE THROUGH OUTPUT TRANSFORMER T-2. A RECTIFIER-TYPE VOLTMETER CONNECTED ACROSS THE SECONDARY PERMITS SETTING THE LEVEL.

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IN ORDER TO SEPARATE CHANNELS IN WIRE-COMMUNICATIONS WORK IT IS ESSENTIAL THAT THE HARMONICS GENERATED IN ONE TONE-CHANNEL BE 50 DB OR MORE BELOW ITS FUNDAMENTAL-FREQUENCY OUTPUT IN ORDER NOT TO INTERFERE WITH OTHER CHANNELS. FOR RADIOTELETYPE AFSK WORK IT IS NOT NECESSARY TO USE THE BAND-PASS FILTER SHOWN IN THE OUTPUT OF THE MODEL 153 AS A SMALL AMOUNT OF HARMONIC CONTENT HAS NOT BEEN FOUND HARMFUL. EXPERIENCE WITH A.F.S.K. SYSTEMS (SINGLE-CHANNEL) ON V.H.F. AMATEUR BANDS HAS DEMONSTRATED THAT THE POOR RESPONSE OF MOST AMATEUR SPEECH AMPLIFIER AND MODULATING EQUIPMENT EFFECTIVELY LIMITS THE AMOUNT OF HARMONICS TO NEAR NEGLIGIBLE PROPORTIONS.

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POTENTIOMETER R-17 IS ADJUSTED TO BALANCE SO THAT THE KEYING OF THE TELETYPE SENDING CIRCUIT DOES NOT PRODUCE TRANSIENTS IN THE TONE OUTPUT OF THE UNIT AND IS BEST ACCOMPLISHED BY REMOVING V-4 TEMPORARILY FROM ITS SOCKET AND OBSERVING THE OUTPUT WITH A CATHODE-RAY OSCILLOSCOPE ALTHOUGH SUCH TRANSIENTS WOULD PROBABLY BE DISTINCTLY AUDIBLE AS CLICKS

TO SET CENTER FREQUENCY AND THE FREQUENCY SHIFT TURN R-3 AND R-4 ABOUT 3/4 OPEN (FROM GROUND) AND R-1 AT MAXIMUM RESISTANCE. PLACE S-2 ON "SPACE" AND ADJUST L-1 (OR C-3 IF A VARIABLE IS USED) FOR CENTER FREQUENCY. BACK UP ON R-1 UNTIL KEYER OSCILLATES AT THE SPACE FREQUENCY. PLACE S-2 ON "MARK" AND ADJUST R-2 UNTIL OUTPUT IS MEASURED AT THE MARKING FREQUENCY. TURN R4 SLOWLY UNTIL THE OUTPUT LEVEL, INDICATED ON THE METER, IS AT A MAXIMUM. RECHECK R-2 FOR CORRECT MARK FREQUENCY. SET S-2 ON "SPACE" AND ADJUST R-3 FOR MAXIMUM WHICH SHOULD BE SAME AS THE MARKING OUTPUT. CORRECT SPACE FREQUENCY ADJUSTMENT OF R-1 (IF NECESSARY).

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RESISTANCE R-5 (IN PLUG-IN FREQUENCY DETERMINING NETWORK) IS USED ON THOSE CHANNELS WHERE THE "Q" OF L-1 WOULD BE EXCESSIVE AND, IN THE CASE OF THE MODEL 153, IS ONLY FOUND ON THE LOW FREQUENCY CHANNELS. FOR PLUS-AND-MINUS 425 CYCLE SHIFT AROUND A CENTER FREQUENCY OF 2550 CYCLES/SECOND (AMATEUR STANDARD AFSK) SOME CHOICE OF THIS RESISTOR AND THE COMPONENTS OF THE L-C TANK MAY BE REQUIRED. ALTHOUGH ALL VALUES OF THE VARIOUS CHANNEL NETWORKS ARE AVAILABLE THROUGH THE TELETYPE SOCIETY ON REQUEST ONLY THOSE FOR THE TWO CHANNELS BRACKETING 2550 CYCLES WILL BE FURNISHED HERE. THIS WILL PERMIT SOME IDEA OF THE NEEDED VALUES FOR AMATEUR WORK TO BE OBTAINED. IF INTERESTED IN THE OTHER UNITS A STAMPED-ADDRESSED ENVELOPE TO W2BFD WILL SECURE THEM.

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PHYSICALLY, THE MODEL 153 (LIKE ITS COMPANION UNIT MODEL 152), IS ASSEMBLED ON A 3-1/2" X 19" STANDARD RACK PANEL, WITH TWO COMPLETE CHANNELS (INCLUDING SEPARATE POWER SUPPLIES) OCCUPYING ONE PANEL. THE FOLLOWING IS A LIST OF THOSE PARTS NOT ALREADY IDENTIFIED IN THE DRAWING:-

T-1	POWER TRANSFORMER	SECONDARY:- 295-0-295 V. AT 90 M.A. SECONDARY:- 6.3 V. AT 2. AMPS.
L-1	FILTER CHOKE	7 HENRIES, 110 M.A., 160 OHMS D.C.
T-2	OUTPUT TRANSFORMER	15000-TO-600 OHMS PLATE-TO-LINE

PARTS LIST FREQUENCY DETERMINING NETWORKS 152 Z

CARRIER FREQUENCY 2465 PLUS-AND-MINUS 42.5 CYCLES

C-1	.001 MFD	5 PERCENT	500 VOLT	SILVER	MICA
C-2	.005 MFD	" "	" "	"	"
C-3A	.01 MFD	" "	300 "	"	"
C-3B	.007 MFD	" "	" "	"	"
L-1	.34 HENRY VARIABLE INDUCTOR (UTC VIC-9)				

CARRIER FREQUENCY 2635 PLUS-AND-MINUS 42.5 CYCLES

C-1	.001 MFD	5 PERCENT	500 VOLT	SILVER	MICA
C-2	.005 MFD	" "	" "	"	"
C-3A	.008 MFD	" "	300 "	"	"
C-3B	.007 MFD	" "	" "	"	"
L-1	.34 HENRY VARIABLE INDUCTOR (UTC VIC-9)				

PRESUMABLY C-3A AND C-3B IN PARALLEL CONSTITUTE C-3 AS IDENTIFIED IN THE DRAWING. 73 DE W2BFD

W5BFX, Hugh Watson, Shreveport, La., "I am building the converter in #25 (Northern Radio 152) and am adding vacuum tube keyers to the same chassis. I will take the output of the converter and feed it to a polar relay, then through the distributor and back into the keyer tubes."

W3RHX, Stewart Moore, has recently mooved from Washington to New York and now lives in Hastings-on-Hudson. Stew has been active on 2M TT and is now building an all band kw to extend his contacts a bit.

W6UPY is the new call of Stan Mahurin, W7LUK, and he is located in Rolling Hills with a 32V2, 75A1 and a Super-Pro. In addition to that he also has a Model 15, a Model 12 with VT keyer and auto-start, reperforator tape gear and a keyboard perforator, not to mention a couple other Model 12's, 21A, and a 14. Stan is also an astro-nut, complete with a yard full of 'scopes.

ET2SM, Murray Leonard, Asmara, "I am trying to convince the C.O. here to let me take a set-up of RTTY equipment out on requisition and if I can swing it I may be on the band with a ham RTTY signal from Eritrea. Maybe I'll be the first real DX for RTTY! The new C.O., a Lt. Col., is a ham too and he is really hot to trot with ham radio. He has only been here a few days and already he has set up a BC-610 for his own use in the orderly room.....One word caught my attention in Bul. 24..."Dianetics." I too am a follower of the science, not to mention Hypnology and Cybrenetics. In fact, I intend to major in Cybrenetics for my masters....hopw to be able to get into M.I.T....but that is in the future for I still have two years before I get my B.S. in E.E. Incidently, I work with RTTY all the time here and I've found that it will print solid with signals that cannot even be copied as CW due to a lack of signal strength. We have some pretty long hauls and we have no trouble at all. One haul is direct from the Pentagon to here...Receivers are Super-Pro's in dual diversity and a few Collins 51J receivers. The converters are completely electronic. We also use to great advantage the Northern Radio converters which are by far the easiest to set up and the most trouble free."

W8WXM, Bob Slemmer, Columbus, "I imagine it won't be long now before I can start becoming active on RTTY. Three more months at Ohio State, then I granulate. Have a job with North Electric at Galion Ohio all lined up. It is a job de signing circuits for all-relay telephone switchboards, etc. Will be there about the first of the year if I don't horse up at this brain factory."

WØNME, Ike, Stratton, Nebraska, "...I now have this mess of galloping junk going in pretty good shape. I have the terminal amplifier and the AFSK oscillator built. It prints quite well to itself and I can copy some of the commercials and a very few of the amateurs on 40 meters. I will have to build a vacuum tube keyer and a frequency shift keyer before I can get on the air. I may also build a diode tuner for the receiver. I am not too proud of the way the BFO works in this HRO-50. I am using a BC-221 frequency meter instead of the BFO. I hope to get the necessary equipment built and get on the air within a month. If anyone has sent in the dope on a simple vacuum tube keyer please publish it soon. (See April '52 CQ column for only VT Keyer circuit so far sent in.) I am getting a big kick out of teletype, almost as much as I did on my first CW contacts about 27 years ago."

TELETYPE SEQUENTIAL CONTROL (SECO) SYSTEMS C Cool,W2EBS,McGraw-Hill

Teletype Corp Bulletin No. 201 (Issue 1) describes the "Teletype Sequential Control (SECO) System." Bulletin No. 1143B (Issue 3) lists parts for Sequential Selector BS2, BS3, BS6, Selector Panel BSP2, and Motor Unit MU38, MU39, and MU41. The BS2 is without mechanical timer. BS3 has mechanical timer. BS6 has a "H" answer back mechanism.

Teletype Bulletin No. 210B (Issue 1) gives "ADJUSTMENTS" for "SEQUENTIAL SELECTOR (BS6)" The general description contained in this bulleting regarding the BS6 follows:

The Teletype Sequential Selector is a motor-driven electro-mechanical receiving unit which automatically controls telegraph signal circuits in response to predetermined sequences of printing telegraph signals. These sequences may be composed of both character and functional signals which precede and follow regular Teletype messages. Facilities are available for equipping the unit with as many as 33 contacts. When changes are necessary, a contact may be placed under the control of a required sequence by manually substituting the necessary code levers.

The Seco unit is mounted by resilient fittings to a metal panel which may be secured to a relay rack, a cabinet shelf or a table. The panel also supports the motor and a countershaft which drives the main shaft of the selector unit. The panel incorporates sliding rails and latches which permit forward movement of the panel relative to its mounting brackets, which are positioned for standard relay rack spacing.

As an adjunct to the contact operating mechanizm a mechanical timer is attached to the left, lower rear, side of the Seco. The timer is geared to the mainshaft through a friction clutch. When it is desirable to introduce a pause in the control sequence, the timer operates in response to a BLANK combination in a transmitter start pattern.

The Seco incorporates an answer back feature which generates an "H" character signal by means of a cam and contact assembly located near the lower, right, rear corner of the unit. When the Seco at an outlying station receives the transmitter-start pattern signal sequency directing it to start an associated transmitter distributor, the "H" answer back mechanizm automatically starts. If there is tape in the transmitter distributor, it will also start and the "H" answer back signal will be shunted out of the signal circuit. If the transmitter distributor is without tape, it will not start. However, the "H" answer back signal will be transmitted over the signal line connected to the transmitter distributor.

The Seco uses a single magnet which operates on 20 or 60ma. A range finder assembly is included for setting the receiving range with the RY signal.

It is believed that the Seco system is used throughout the Bell system for automatically switching TWX circuits. The Seco is also used in certain military systems for remote signalling and control purposes.

W8BYB, Rod Buszard, Detroit, has a Model 26 to trade for a reperforator.

W2DXD, Bill Auld, is off on another business trip. This time to England and Wales. At least he will have plenty to talk about when he does get back and on the air.

Special: Model 26 with converter, has been on the air:$265. First check takes the deal.