The Audio Fair will be held in the Hotel New Yorker Oct. 14-17th. If you are going to be in town be sure to see it. Karlson Associates (me) will be in room 502 demonstrating the Karlson Ultra-Fidelity Enclosure, say hello. If you are ever in Newark stop in the new Hudson store at 35 William St. and see the huge Karlson display with twelve enclosures. It covers one whole wall of their new studio showroom.

W2ALJ/1, Mark Moynahan, Boston, who is doing transistor research, writes: "Have built at work a compact audio oscillator for RTTY testing. It has three frequencies 850, 2125, and 2975. There is no warm-up time; the frequency drifting is only a function of room temperature. I think the stability is well within your tolerances. The unit, oscillating, can be mailed in an envelope for 9¢."

BOOK REVIEW, bub.

All you lovers of the finer things in life, such as Pogo, King Aroo, Charles Addams, Pogo, George Price, Benchley, Pogo, Thurber, etc., will want the new book, "The Tattooed Sailor" by Andre Franquin, in their library. This collection of cartoons will leave you gasping for breath. Behold a sample. Non-Pogo fans will probably see little humor in the thing.

OCTOBER 1953
W6PHE, Doug Palmquist, Lubbock, Texas, "I dug up another teletype machine for you to sell for me. It's a Western Union 2064-12 rectifier, 15-D motor unit, Printing unit but no keyboard, a table and a 215-FB polar relay. I guess it's a model 15. I couldn't find any model number on it. I will have it overhauled and cleaned here at the phone company and then ship it to whom ever buys it. The fellow that owns it would like to get about $350.00 for it. It sounds a little high but will be in first class condition. By the way it's a page printer."

WILSU, W. J. Crosby, Jr., Charlotte, N.C., "I have been on teletype for some time now and I have my first station to work. I copy RTTY but I don't seem to work any. I run KW on 75 and am going to go to 20. Hope to work some of the boys soon on RTTY on any band. I have been trying to get up interest around here and I have a number of the boys interested. I have a type 12 complete with keyboard, cover, and motor generator ready to go - new paint job A1 condition first $200.00 takes it or what have you. These trades will be made free on board Jacksonvile, with the other station paying freight on same. If a trade is agreed to, W4GXL will pay freight on the equipment being received from the other station."

W4GXL, Bill Alexxander, Jacksonville, Fla., "W4GD and W4GXL have just completed what we think is the first RTTY contact in Jacksonville. We used model 26 page printers, using neutral (MKB) keying. Low Power (15) transmitters and command receivers were used. Results were not too good, but at least we're trying. W4GXL has access to a few model 26 printers, which will be traded for receivers, test equipment, converters, or what have you. These trades will be made free on board Jacksonville, with the other station paying freight on same. If a trade is agreed to, W4GXL will pay freight on the equipment being received from the other station."

W7EPO, William H. Wing, Milwaukee, WIs., "I don't know just when the bug bit me but all of a sudden it did! I get a big kick out of trying to make things work and guess that's part of the reason the bug clicked, but there must be more to it than that. I have been working CW for years and don't know what to say about it. I have no SQ, but have been using my own equipment, which is A1 condition. I have a type 12 complete with keyboard, cover, and motor generator ready to go - new paint job A1 condition first $200.00 takes it or what have you. These trades will be made free on board Jacksonvile, with the other station paying freight on same. If a trade is agreed to, W4GXL will pay freight on the equipment being received from the other station."

W2WBY, John R. Frost, Fargo, No. Dak., "Recently tried out the Costean- Eagnan Aqua Lung ---- works very nicely - only got down to approx. 30 ft. (though thru no fault of the lung), Just a wee bit apprehensive on first trial. H. - comments - terrific but a little expensive - since they are not widely used it is a little difficult to go back to town (when at the lakes) to get it recharged after 1 hr's usage and a compressor cost $200 sans electric motor - with motor $300. Will bet, however, that they will gain in popularity and at resorts one may be able to get them charged - (Pressure regd. is 2360 #/sq. in.) in the not too far distant future. Lake I was in too dirty to see anything - hope that Great Lakes will be more clear - will investigate before going "overboard" on acquiring one. If you haven't tried one yet it will be a brand new experience - something like a solo I'd guess."
TYPE 105 FREQUENCY SHIFT KEYER

PRACTICALLY EVERY COMPANY INTERESTED IN THE MANUFACTURE OF FREQUENCY SHIFT EQUIPMENT FOR COMMERCIAL OR MILITARY USE HAS PRODUCED ONE OR MORE MODELS OF FREQUENCY SHIFT EXCITERS EMPLOYING THE HETEROODYNE OR CONVERSION PRINCIPLES ILLUSTRATED. DIFFERENT EXCITERS HAVE ENJOYED POPULARITY BECAUSE OF THEIR OUTSTANDING CHARACTERISTICS. THEY PROVIDE STABILITY PRACTICALLY EQUAL TO A CRYSTAL OSCILLATOR (TEMPERATURE-CONTROLLED) YET HAVE THE KEYABILITY OF A SELF-EXCITED OSCILLATOR. FOR AMATEUR USE THEY POSSESS THE ADVANTAGE OF PERMITTING THE TRANSMITTING OSCILLATORS TO RUN DURING RECEIPT WITHOUT BLOCKING THE LOCAL RECEIVER. WHILE NOT AS SIMPLE TO CONSTRUCT AS A DIODE-KEYED CRYSTAL OSCILLATOR THEY ARE CONSIDERABLY MORE FLEXIBLE. THE WRITER, W2BFD, PLANS TO EXPLOIT HIS HETEROODYNE EXCITER FOR BOTH TRANSMISSION AND RECEIPT BY USING A RELAY TO CUT ON A DIFFERENT FREQUENCY-DEPENDENT VARIABLE CONDENSER DURING RECEPTION. THIS METHOD OF GENERATING THE LOCAL OSCILLATOR SIGNAL FOR RECEPTION MIGHT FIND A WELCOME FROM THE SINGLE-SIDEBAND GROUP, WHO HAVE SIMILAR STRINGENT OSCILLATOR-STABILITY REQUIREMENTS. IN DISCUSSING THE VARIOUS PIECES OF SIMILAR EQUIPMENT IT IS NOT THE WRITER'S INTENTION TO RECOMMEND THAT THE AMATEUR CONSTRUCT AN EXACT DUPLICATE. BY PRESENTING SEVERAL MEANS OF ACCOMPLISHING THE SAME RESULT A CONSIDERABLE AMOUNT OF LATITUDE IS GRANTED THE RADIOTELETYPE AMATEUR WHO MAY "Borrow" GENEROUSLY FROM THE VARIOUS SYSTEMS WITHOUT FEAR OF PATENT INFRINGEMENTS ETC. THERE SEEMS TO BE NO HINDERANCE TO THE CONSTRUCTION OF A FREQUENCY SHIFT EXCITER SUPERIOR TO THE COMMERCIAL PRODUCT BY MAKING USE OF THE BEST FEATURES OF THE VARIOUS UNITS THAT HAVE BEEN CONSTRUCTED AS DESCRIBED. W2BFD WOULD APPRECIATE A DESCRIPTION OF ANY SUCH EQUIPMENT DESIGNED BY RADIOTELETYPE AMATEURS SO THAT IT MAY BE CIRCULATED TO OTHERS.

PURPOSE

THE FREQUENCY SHIFT KEYER IS A HIGH STABILITY RADIO FREQUENCY OSCILLATOR WHICH PROVIDES A MEANS FOR SHIFTING AN R.F. CARRIER IN ACCORDANCE WITH THE VARIATIONS OF A D.C. INPUT SIGNAL. THIS EXCITER REPLACES THE CRYSTAL OSCILLATOR IN A TRANSMITTER AND PRODUCES "MARK" AND "SPACE" CARRIER SHIFTS FOR TRANSMISSION OF TELETYPE, FACSIMILE AND HAND-KEYED TELEGRAPH SIGNALS.

ELECTRICAL FEATURES

THE FREQUENCY SHIFT KEYER IS COMPRISED OF FIVE MAIN SECTIONS; A KEYING CIRCUIT, REACTANCE TUBE SHIFTED OSCILLATOR, CRYSTAL OSCILLATOR, MODULATOR AND POWER AMPLIFIER. A DC KEYING SIGNAL PASSING THROUGH THE KEYING STAGE IS LIMITED IN AMPLITUDE AND THEN FEED TO THE REACTANCE TUBE OSCILLATOR; IT IS USED TO VARY THE FREQUENCY IN ACCORDANCE WITH THE APPLIED INTELLIGENCE. THIS SHIFTED FREQUENCY IS MIXED WITH THE OUTPUT FROM THE CRYSTAL OSCILLATOR IN THE MODULATOR STAGE, AND THE SUM FREQUENCY IS USED TO DRIVE THE POWER AMPLIFIER.

CRYSTAL OSCILLATOR


200 KC OSCILLATOR


REACTANCE TUBE


THE FIRST SECTION OF THE REACTANCE TUBE, PINS 1, 2 AND 3, ACT AS A LARGE INDUCTANCE ACROSS ONE SIDE OF THE TANK. THE SECOND SECTION IS EQUIVALENT TO A SMALL CAPACITOR ACROSS THE OTHER SIDE. WHEN A POSITIVE KEYING SIGNAL IS APPLIED TO THE GRID OF THE SECOND SECTION MODULATION CURRENT IS DRAWN THROUGH THIS TUBE SECTION AND THE EFFECTIVE CAPACITY OF THE SECTION INCREASES, LOWERING OSCILLATOR FREQUENCY. THIS INCREASED CURRENT INCREASES THE BIAS ON THE FIRST TUBE SECTION, DECREASING ITS CURRENT. THIS IN TURN RAISES THE EFFECTIVE INDUCTANCE ACROSS THE TANK COIL, FURTHER DECREASING FREQUENCY. THE ADJUSTMENT IS SUCH AS TO MAKE THE FREQUENCY SHIFT LINEAR WITH VOLTAGE APPLIED TO THE REACTANCE TUBE MODULATED GRID.

KEYING TUBE

IN HAND-KEYED OR TELETYPE OPERATION, IT IS DESIRABLE TO "LIMIT" THE D.C. PULSES CONTAINING THE INTELLIGENCE. THE PURPOSE OF LIMITING IS TO MAKE THE KEYER ACCEPT A WIDE RANGE OF D.C. STEP LEVELS WITHOUT AFFECTING THE MAGNITUDE OF THE FREQUENCY SHIFT DESIRED. THE KEYER TUBE INCLUDED IN THIS EQUIPMENT SATISFIES THIS POINT SO THAT "SPACE" AND "MARK" FREQUENCIES ARE INDEPENDENT OF KEYING STEP AMPLITUDE.


WHEN THE TEST SWITCH IS TURNED TO "MARK", THE POSITIVE VOLTAGE AT THE GRID OF THE FIRST SECTION OF V-107 IS ENOUGH TO CAUSE THIS TUBE TO OPERATE FULLY SATURATED. THE DROP ACROSS R-131 IS SUFFICIENT TO LOWER THE GRID VOLTAGE ON THE SECOND SECTION AND CUT OFF PLATE CURRENT. THE VOLTAGE AT THE JUNCTION OF R-136 AND R-137 CHANGES TO A SMALL NEGATIVE VOLTAGE VALUE. THE TAP SETTING OF POTentiOMETER R-126 IS ADJUSTED TO EQUALIZE THE POSITIVE AND NEGATIVE VOLTAGES UNDER DIFFERENT CONDITIONS. KEYING VOLTAGE IS FEED TO THE REACTANCE TUBE ACROSS THE TAP OF R-126. THE FRONT PANEL "SHIFT" CONTROL.
TYPE 105
FREQUENCY SHIFT EXCITER

SUMMARY OF CHARACTERISTICS

Output Range: 2.5 to 6.7 mc.
Frequency shift: Adjustable from 0 to 1000 c.p.s.
Output Power: 3 Watts into 50 to 75 ohms.
Keying signal: Zero volts for space (lower) frequency and plus 15 to plus 150 volts for mark frequency
Keying speed: 150 dot cycles per second
Keying bias: Not over 15 percent at any keying speed up to 150 dot cycles per second

DESCRIPTION OF PARTS NOT IDENTIFIED ON DRAWING

C-103 1.5-7 mmf. ceramic trimmer
C-115 Dual air trimmer, 50 mmf. per section
C-125 3-12 mmf. ceramic trimmer
C-131 1.5-7 mmf. ceramic trimmer
C-135 2-gang var. condenser, 250 mmf. per sect.
C-136 250 mmf. variable condenser
L-101 500 micro-henry center-tapped slug-tuned inductor
L-102 2.5 milli-henry r.f. choke
L-103 2.5 milli-henry r.f. choke
T-101 Tuned transformer 2.3-6.5 MC. Secondary tuned by slug
T-102 Tuned transformer 2.5-6.7 MC. Secondary tuned by slug
T-103 Primary 28 turns, (closewound) secondary 3 turns wound on "cold" end of primary
WITH THE TEST SWITCH IN "LINE" POSITION, THE SAME CONDITIONS PREVAIL AS IN "SPACE" UNTIL A KEYING VOLTAGE IS SUPPLIED TO THE SYSTEM, WHEN THE CONDITION SHITS TO THAT OF "MARK".

**MIXER STAGE**

V-104 and V-105, both 6SA7's, comprise a balanced modulator combining the outputs of the crystal oscillator and 200K crystal oscillator to eliminate the crystal frequency from the output signal, the Crystal voltage is fed in phase to the two tubes. The same output voltage appears from each side of the output transformer, T-102, to ground and is thereby cancelled from plate to plate at the output of the modulator.

The output tank of the modulator is tuned to a frequency 200K higher than the crystal and made to track it throughout the frequency range. Since the only undesired signal of significant amplitude is the lower sideband (400K below the higher sideband), good selection is not a serious problem even at the higher output frequencies. Crystal frequency elimination across T-102 primary is achieved by varying the relative tube gains with R-115 until they are equal. This eliminates any residual crystal frequency at T-102 primary and, consequently, in the exciter output.

**POWER AMPLIFIER**

The frequency shifted output carrier from the modulator is fed into the 2E26, class "B" power amplifier, V-106. This is a standard tuned amplifier stage employing fixed bias. Power output is varied by adjusting bias voltage by means of potentiometer R-120. Neutralization is accomplished by feeding back a portion of the output voltage in proper phase from the secondary of T-103 to the 2E26 grid through C-103 and C-132. Power Amplifier plate current is read on milliammeter V-102.

**PULSE SHAPING CIRCUIT**

The Type 105 frequency shift keyer is equipped with the facility for shaping the B.C. teleprinter pulses so that the frequency transition from "MARK" to "SPACE" or from "SPACE" to "MARK" is gradual rather than sudden. Shaping the teleprinter impulses in this way results in a reduction of the bandwidth necessary to transmit intelligence.

The pulse shaping network consists of a capacitor, C-157, in association with resistors R-125, R-126, R-127, R-136, R-137, and R-151. A switch, S-105, permits the operation of the keying circuit with or without pulse shaping, as desired, since the values of the pulse shaping network were chosen for use with 65 V.P.M. teleprinter pulses, the shaping circuit switch S-105 (located at rear of chassis) should be turned to "ON" only for teleprinter keying.

Switch S-106 (mounted on rear of chassis) was added to later models of the Type 105 to make it possible to key from a telegraph line or teleprinter providing a source of signals of inverted polarity.

Although the manufactured product contains a temperature-controlled oven for the crystal, 200K oscillator etc., quite credible performance might be obtained without them. Commercial equipment operates around the clock and requires considerably more frequency stability. At room temperature, with careful construction, a heterodyne exciter should not drift more than a few cycles during the course of a use.

*Our thanks to VE3AV for supplying this information.*

**MODIFICATIONS APPLIED TO ORIGINAL MODEL OF CFA CONVERTERS AND INCORPORATED IN THE NEW MODEL BY TMC**

The following changes have been made in the discriminators: C11 and C14 are now .011 MFD. ±5% instead of .01. C13 and C16 are now .0024 MFD. ±5% instead of .0022. These condensers are all silvered mica.

A 1,000 ohm, 1/2 watt resistor has been inserted between L3 and terminal or pin 2 of its corresponding 6AL5, V6. The same has been done between L5 and pin 2 of V7.

C21 and C22 have been replaced by a single unit of equivalent capacity.

C30 has been changed to a 1,000 mfd, 500 VDC. It is rather hard to see why they call this a change over the original.

The C31-R83 circuit has been completely eliminated.

The four selenium rectifiers C1,2,3,4 have been replaced by a single 6AL5.

R58 has been changed to a 2,2 megohm 1/2 watt resistor.

R59 is now a 500,000 ohm, 2 watt potentiometer.

R85 is now a 100,000 ohm, 1/2 watt resistor.

This equipment is commercially built in very compact form so that it has a tendency to overheat. To keep it reasonably cool top and bottom plates have to be removed. This causes further troubles in the form of spurious transmissions from the oscillator which can be picked up on a number of frequencies since T7 is tuned to 500 Kcs.

Also if the test switch is left for more than a few seconds on the space position, R63 will burn out.

W5FEM, Charles White, Houston, "I have all the TTY equipment needed to get on the air. Have to fix the converters, etc., expect to get on the air about the first of the year. The few times I have had a chance to listen the Ham TTY sigs here are too weak to copy. Maybe this winter there will be some signs down here."

W1DAH, Bill Gamache, Springfield, Mass. "Am on RTTY with a Collins PSK unit - output 813's PP to kW. I have been copying the boys when I have time, but have not worked any."
When using a 75A3 Collins to copy facsimile, I have to disable the magnetron restriction filter which cuts off at 3 kc. If I don't set the marking mark, it is badly sliced off in strength. The change can be made very easily by putting a good high-grade 250 kc i.f. transformer into the space filter jacks on the receiver, enabling the filter to be cut in and out at will - by the switch on the front panel. Sold my mod. 12 to W8JIV - he has just finished his converter (W2PAT) and is getting excellent copy. How in hell can he find a mod. 12 keyboard?

W9EKU, Eugene A. Wille, Milwaukee, Wis., "Teletype Corp. has a kit of parts to convert a 26-B to a 26-A. The B model is the one with all the fractions, while the A model is the one with the punctuation marks. One kit contains the new arm, a new function arm, to block spacing on certain functions, and new name plates. The price is about $7.50. Keytops are not included and must be ordered separately. They are 35c each. Someone mentioned recently in the bulletin about removing the unshift on space feature. I have this feature too. I looked over the teletype manual, which I received from Teletype Corp., and found out that this is controlled by the function arms. I ordered and have received a new function arm, type 4, part #91941. The price was $1.65. This arm has only one projection, whereas the original arm with the unshift on space has an additional projection for the unshift on space feature. It should be possible to remove the unwanted projection from the existing function arm, type 4-A. A drawing is enclosed here with to show the position of the arms and the one to file off to remove the unshift on space feature. I haven't removed mine as yet, but intend to do so in the next week or so. Have my receiving converter just about working. It is patterned after the Technical Model CPA. By the way, I got a CPA manual from the manufacturer. I will be back on the air just as soon as I get my receiver back from being aligned, and get an antenna up for 40 and 80 meters."


New York City hams are invited to visit the Knickerbocker Amateur Radio Club (W2KN). Meetings are held evenings of the first and third Thursdays of each month, W2EBZ, sec'y.

"Teletype" was registered as trademark number 111,486 on March 26, 1925 by Morkrum-Kleinschmidt Corp., Chicago and is the owner of telegraph apparatus made by them. The M-K Corp. is now the Teletype Corp., a subsidiary of Western Electric. The term should not be used without giving the Teletype Corp. credit. In referring to printing telegraph equipment, use the term teletypewriter or radioteletype, abbreviated TT or RATT.


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