

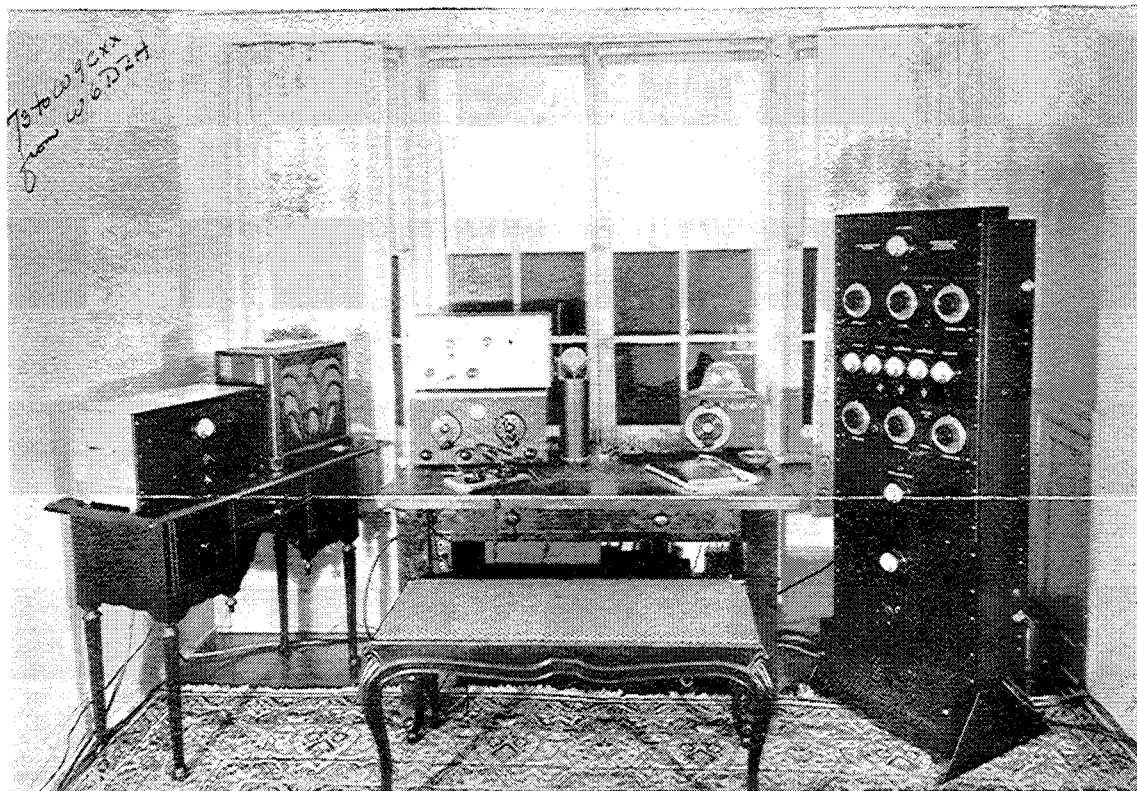
COLLINS SIGNAL

MARCH 1933 . . .

THIS ISSUE of the Collins Signal carries full details of two new Collins Transmitters the 32A and 32B. In addition to retaining the distinctive features of construction and design which have made Collins Transmitters outstanding in the field of amateur radio, these two latest units embody many new refinements. The prices are astonishingly low, so low that practically every amateur may now enjoy brilliant performance at moderate cost. Full details appear on following pages.

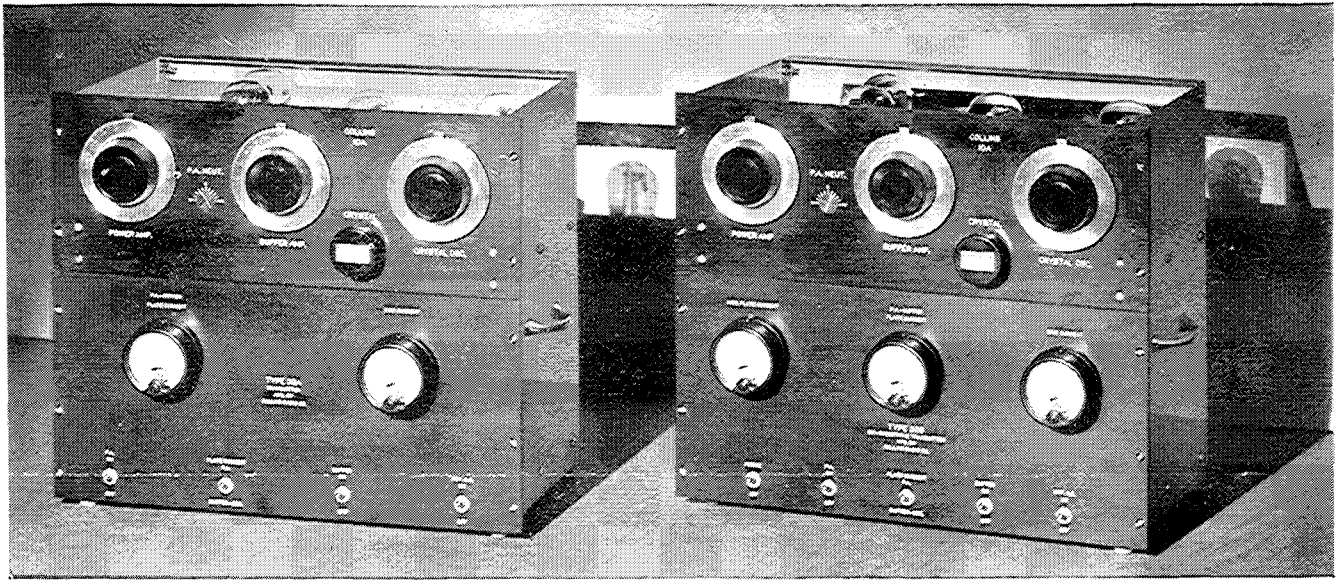
W6DZH
PASADENA,
CALIFORNIA

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32A AND 32B TRANSMITTERS



One gains the impression from the radio publications of the last few months that hundreds of new tubes have been added to the already large list of tubes available to the set designer. Most of these new tubes have been designed for use in receiving sets, and there has been relatively little activity in the field of transmitting tubes. Each new tube is supposed to bring with it greater possibilities of improved performance. Out of this flood of tubes there are a few that have proven to be of considerable importance to the transmitting amateur. The type 46 tube is of particular interest. It was originally designed as a Class B amplifier and it has proven to be very useful in that capacity in low powered radiophone transmitters. Its possibilities as a radio frequency amplifier were first pointed out by George Grammer in the July, 1932, and subsequent issues of QST.* A single 46 makes an excellent buffer stage and two 46's in parallel are capable of an output of 20 to 25 watts as a power amplifier. The 82 and 83 mercury vapor rectifiers complete the tube complement necessary to build an economical and efficient transmitter having a very unusual performance for an outfit of its size.

The new Collins 32A CW Transmitter and its radiophone companion, the 32B, have been designed to exploit fully the possibilities of these new tubes. These transmitters follow the general circuit arrangement laid down by Grammer in his QST articles, although the constructional features have been considerably modified to conform to standard Collins constructional methods. These new transmitters in appearance and in excellence of construction are very similar to other Collins transmitters, such as the 30W and the 40B. It is expected that they will find a greater field of usefulness than any previous model because of their lower cost and excellent performance.

*QST: July, August, November, 1932; February, 1933.

If a direct comparison is attempted between the Collins 32A-B transmitters and the Grammer transmitters, several marked likenesses and dissimilarities will be apparent. The general circuit and tube arrangement is essentially the same. However, Grammer directed his design along lines well suited to the home set builder and adapted existing receiver parts to his purpose so that the cost would be as low as possible consistent with good results. His first transmitter was not crystal controlled and was intended only for 1750 kc. operation. Later designs included crystal control and provided for work on the higher frequency bands.

With Grammer's excellent work as a background, the 32A-B outfits were designed to include all the desirable features of all band operation, crystal control, etc. The mechanical construction was redesigned along standardized chassis—relay rack lines. All parts are, of course, made especially for the transmitter and are not "borrowed" from receiver practice. The result is a complete "factory job" using the best possible parts at a price but very little higher than the cost of the parts for a similar home-made outfit.

The Tube Line-Up

In studying the circuit arrangement it probably would be best to refer first to the diagram of the 32A. A 47 crystal oscillator is followed by a 46 buffer stage. The buffer provides excitation for the parallel 46's in the power amplifier stage. In order that keying the power amplifier might not influence the frequency a separate power supply using a type 80 rectifier is provided for the 47 oscillator stage. A type 82 rectifier using a separate transformer and separate filter deliver 400 volts DC to the buffer and power amplifier stages. Keying is accomplished by opening the grid circuit of the power amplifier stage. Resistor bias is

used on all stages and, because of the high mu of the 46 tubes, no battery bias is necessary.

The 32B Transmitter employs essentially the same circuit arrangement as that of the 32A except that two 46's in class B are used as modulators which obtain their plate voltage from the same power supply that supplies the buffer and power amplifier. In order to take care of the additional current requirements the 82 rectifier tube is replaced with an 83. The standard model of the 32B uses push-pull 45's as class A drivers for the modulators. In this way harmonic distortion is reduced to a very low percentage. When a high quality microphone is used an additional preamplifier is required. The Collins type 90C Input Amplifier is well adapted for this service. The input transformer to the grids of the 45 has a primary impedance of 500 ohms to match the output of the 90C.

When it is desired to use a single button microphone with the 32B Transmitter it is possible to eliminate the input amplifier. A single 46 tube in class A is substituted for the push-pull 45's. A microphone input transformer is substituted for the 500 ohm transformer and the additional gain obtained by the use of the single 46 driver is entirely sufficient to modulate fully the transmitter when the microphone is spoken into in a conversational tone of voice. (This is the arrangement originally suggested in QST.) —Note: On special order the 32A and 32B Transmitters can be furnished connected for the newer type 59 tubes. There is no particular advantage in their use other than the convenience of employing a general purpose tube throughout.

All Band Operation

The 32 series transmitters can be operated on all of the popular amateur bands. This flexibility of operation is made possible by

the use of the same types of plug-in inductances as are used in the famous 30W Transmitter. On 1750, 3500 and 7000 kc. a crystal is used which has its fundamental frequency either in the desired band or in the next lower frequency band, and the buffer is operated as a straight amplifier or as a buffer-doubler. On all three of these bands the final amplifier is operated as a straight amplifier. 14,000 kc. operation is accomplished by doubling the frequency in the final amplifier. This is contrary to ordinary Collins practice but is done in this case to obtain greater simplicity of operation. When the frequency is doubled in the final amplifier the output on 14,000 kc. is approximately 10 watts as against 20 to 25 watts output on all of the other bands. Shifting from one band to the other is a very simple matter as will be explained later.

Meters and Controls

One of the primary specifications set down for the design of every Collins transmitter is that it must be capable of tuning solely by meter readings and that no flashlight bulbs resonance indicators or other

"gadgets" are required to adjust it properly on any desired frequency. For this reason meters have always loomed large in the cost analysis of these outfits. This specification has not been departed from in the 32A and 32B Transmitters but by use of a clever switching arrangement it has been possible to reduce the number of meters required in order to hold the cost of these transmitters within the popular range. Two Weston model 301 surface type meters are used on the 32A. One 0-50 milliammeter is connected in the grid circuit of the power amplifier stage. The other 0-200 milliammeter can be switched to read either the power amplifier plate current or buffer and oscillator plate currents. The 32B has these two meters and in addition has an 0-150 milliammeter in the plate circuit of the modulators which serves as a percentage modulation indicator. Switches are provided on the 32A in the 110 AC circuit, in the buffer and power amplifier plate circuits (used when neutralizing), and a single switch controls the position of the plate milliammeter. The 32B has the same switching facilities and in addition has a CW-phone control.

Audio Fidelity

The 32B Transmitter has an overall frequency characteristic which would do justice to the average broadcasting station. Its response is substantially flat from 80 to 8,000 cycles. Standard Broadcast type transformers are used in the audio circuits. The quality of transmission with this outfit depends almost entirely upon the quality of microphone which is used. Although good results can be obtained with a single button microphone, it is strongly recommended that a good double button, ribbon or condenser microphone be used in connection with the 90C Input Amplifier. The more faithful reproduction of voice obtained in this way is really worth while in putting an understandable signal through severe interference.

Tuning Procedure

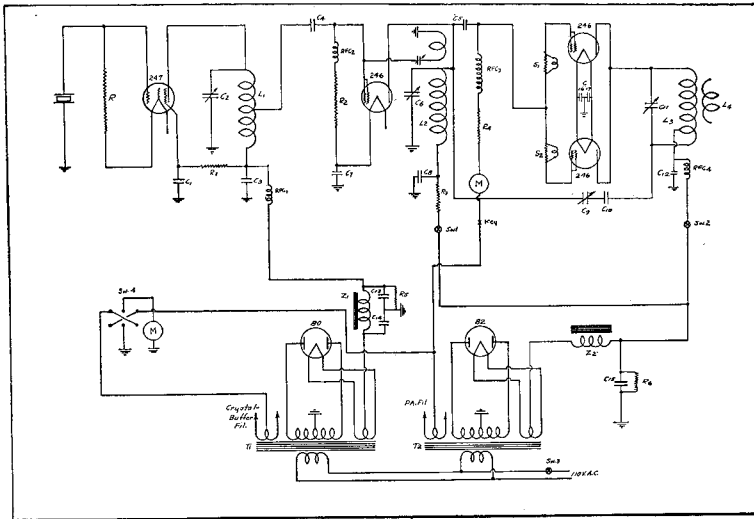
The tuning routine for both the 32A and 32B is as follows

One: Insert all tubes, coils and crystal in their proper positions.

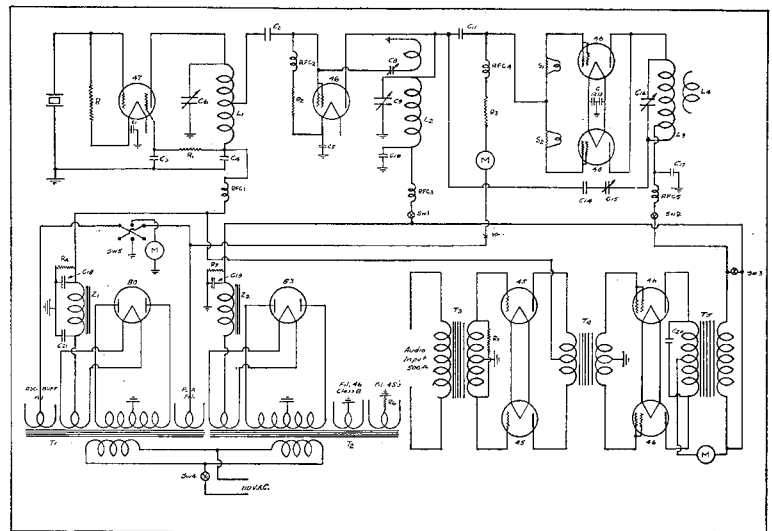
Two: Switch off the plate current to the buffer and the power amplifier and turn on the 110 AC.

Three: Rotate the crystal oscillator tuning dial until the crystal oscillator plate current shows a decided dip. This dip indicates that the crystal is oscillating.

Four: If the buffer is to be operated on the crystal frequency, it is necessary to neutralize it. This is accomplished as follows: With the crystal oscillator and the buffer and power amplifier turned off, press the key and rotate the buffer tuning dial until a grid current of a few ma. is registered. This grid current indicates that a certain amount of energy is passing through the buffer stage due to incomplete neutralization. Adjust the small neutralizing condenser on top of the buffer coil with an insulated screw driver. This adjustment will interlock slightly with the setting of the crystal oscillator and it will be necessary to reset the oscillator tuning for maximum grid current. A position of the buffer neutralizing condenser will be found where the



Circuits: 32A (above) and 32B (right).



PRICES

32A CW Transmitter	-----	\$85.00
Kit of Matched Tubes	-----	5.80
Mounted Crystal	-----	7.50
32B CW Phone Transmitter	-----	125.00
Kit of Matched Tubes	-----	9.80
Mounted Crystal	-----	7.50

• RE-BROADCASTS •

grid current will drop to zero. This indicates complete neutralization of the buffer. The buffer neutralization need not be touched again, and because each buffer coil has its own neutralizing condenser mounted on it this adjustment need not be reset when changing frequencies.

If the frequency is doubled in the buffer stage it is not necessary to neutralize it and the neutralizing condenser on the buffer coil can be set at approximately one-half maximum capacity.

Five: Switch on the buffer plate voltage and adjust the buffer tuning condenser for maximum grid current.

Six: With the power amplifier turned off rotate the power amplifier tuning condenser until a dip is noted in the grid current. This dip indicates that the power amplifier is not completely neutralized. Reset the power amplifier neutralizing condenser to a position at which no dip occurs when the power amplifier is tuned through resonance. Adjustments of the power amplifier neutralizing condenser interlock slightly with the settings of the buffer tuning so that the latter will have to be readjusted during neutralization.

Seven: Switch on the power amplifier plate voltage and tune the power amplifier to the point of minimum plate current.

Eight: The antenna can now be coupled to the transmitter by means of the antenna coupling coil and the antenna coupling and tuning adjusted so that the adjustment for minimum power amplifier plate current gives a value of 100 to 120 ma. The transmitter is now delivering power to the antenna and can be keyed in the ordinary manner. When a kit of tubes and crystal is ordered with the transmitter, a tuning chart is furnished giving the exact dial settings and meter readings for each frequency.

The 32B Transmitter is tuned exactly as indicated above. When the radio frequency portion of the outfit is functioning properly the microphone can be spoken into and the gain adjusted so that the modulator plate current talks up to approximately 100 ma on the peaks. The exact value of modulator plate current which gives 100% modulation is given on the tuning chart furnished with each transmitter.

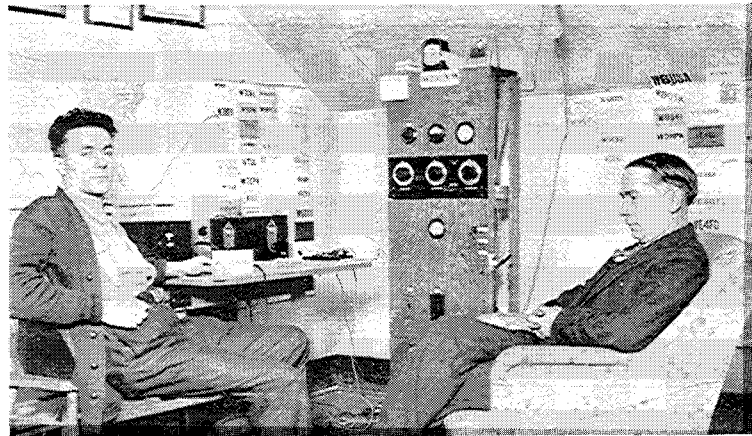
Performance

The range of a transmitter having the power of the 32A depends very largely upon the efficiency of the antenna. The 32A has shown itself capable of working both coasts of the United States very easily on any of the amateur bands under favorable conditions. A certain amount of foreign DX can be accomplished on the higher frequency bands. The frequency stability is excellent and keying is clean cut with a pure DC crystal note.

The 32B Transmitter, of course, has the same CW performance as the 32A. If a good quality microphone is used a surprising voice range can be obtained because of the complete modulation of its 25 watt carrier.

The mail has just brought in two photographs of amateur stations which are of particular interest. One of these is reproduced on the front page of this issue. It was sent to us by our good friend, Mr. E. C. Crossett, and is an excellent view of his station, W6DZH at Pasadena, California. His Collins 150B, with the 7D Speech Amplifier and 5A Condenser Microphone, are very much in evidence as are also a single signal receiver and an e.c. frequency meter. Mr. Crossett is well known to all the old-timers by his various calls: W1XZ, W1CCZ, W9MZ and W6DZH. The new equipment at W6DZH is getting a strenuous workout this winter on 20 meter phone and 40 meter CW.

The other photograph, equally interesting to us, was enclosed in a letter from Mr. Fred W. Fisher, W7CNW. Both letter and photograph are reproduced below. The letter will serve as an introduction to those amateurs who have not already made Mr. Fisher's acquaintance on the air.



Anacortes, Wn.,
Feb. 21, 1933.

Collins Radio Co.,
Cedar Rapids, Iowa.

Dear Sir:

Since I bought the 10A Crystal Unit and Power Pack from you this summer, a long time has gone by and I thought perhaps you might like to know whether or not we were satisfied with the apparatus and how it has worked out in actual performance.

We are very pleased with the two units; they have performed up to the best of satisfaction in every way and we have experienced but very little trouble with the installation. Until such time as we can see our way clear to buying more units and eventually acquiring the entire 150B, we have built a wooden rack using the same measurements as your relay racks and the job looks very neat. You will find a photograph of the outfit the way it now looks enclosed.

We are running the outfit with 1.5 Amps. in the antenna. The xtea draws about 15 mills; Buffer, 40 mills; and the final amp. between 80-95 mills. With no indication of the tubes getting hot.

A vertical Hertz antenna, 65' long and 45' high is used and works out very nicely.

The outfit has contacted 40 states, 6 provinces of Canada, four K7's, one K6 and all districts have been worked three different times. The reports received have all been very good.

Taken as a whole it has performed excellently and worked all kinds of dx on 80 meter band.

You can be assured of hearing from us again in the future as to how your equipment is performing.

Very sincerely,
Fred W. Fisher.

RCN/F

P. S.: Ur 80 and 20 meter phone heard here number of times.