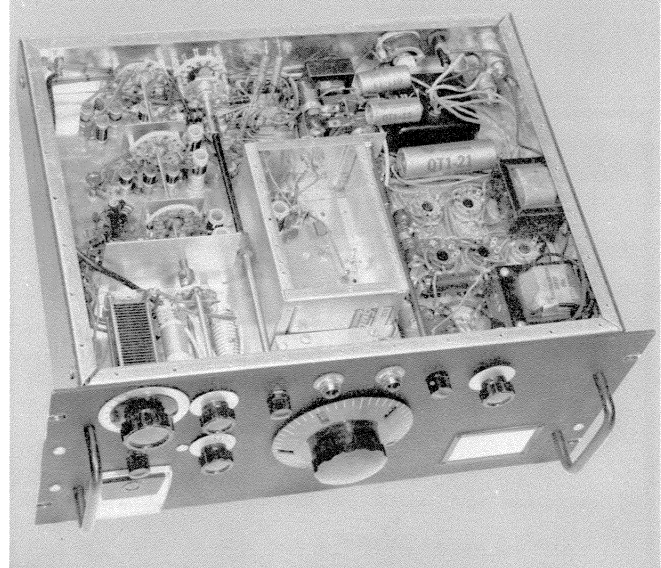


TOP VIEW of the heterodyne exciter chassis with the cover over VFO frequency determining components removed. The socket for the 7581 power amplifier sits above chassis on 1/2-inch high pillars. 7581 control grid lead from 12BY7-A runs above chassis from feedthrough bushing. Hole plugs near rear of RF section resulting from experiments with another type of coil and bandswitch assembly, and are not needed in the exciter as described. **CAUTION:** High voltage appears on the terminals of M_1 and S_3 . Cover with insulating tape.



UNDER-CHASSIS VIEW of the exciter, showing placement of the smaller components in the power supply and keyer sections. Over-all bottom plate, and bottom cover on the packaged VFO unit, have been removed. Crystal oscillator plate coils. (L_1 to L_4) are at rear. Mixer plate coils (L_5) are just in front of the bandswitch section on the rear angle bracket, with the 28-megacycle coil at left, and 3.5-megacycle coil next to switch wafer. Plate coils for the 12BY7-A amplifier (L_6), hidden behind interstage shield, are in same order, left to right.

are selected by S_{12} . A variable capacitor (C_v) in series with one side of these link coils serves as a loading adjustment for the amplifier stage.

METERING of the amplifier control and screen grid currents, plate current, high voltage, and RF output voltage at J_2 , is provided for by a single 0 to 1-milliammeter (M_1) with appropriate shunts, multiplier and RF rectifier circuitry. Positions of S_3 , and meter full-scale ranges are:

Position	Circuit	Max. Range
A	7581 control grid. Curr.	10 ma.
B	7581 screen grid Curr.	50 ma.
C	7581 plate Curr.	250 ma.
D	High voltage	1000 volts
E	Relative RF output in volts	

Since W2FBS designed his exciter primarily for CW operation, a differential type keying system has been built into it. This keyer was described in the previous issue of *G-E HAM NEWS*.³ A 12AU7-A twin triode functions as the mixer, grid blocking bias diode, and control tube for the 6BL7-GT twin triode which keys screen grid voltage to the 7581 power amplifier.

Both oscillators operate continuously, of course, but when the key is open, the 12BY7-A mixer and 12BY7-A buffer are cut off by a blocking negative bias applied through the 12AU7-A diode-connected section. The circuit also applies a negative voltage to the screen grid of the 7581, and it draws no plate current. Closing the key removes the blocking bias instantaneously, and the mixer and buffer start operating before the screen grid voltage to the 7581 rises to a positive value on the first keying digit.

The mixer and buffer stages continue to operate between keying characters, but when keying stops for a second, the negative bias slowly returns and cuts off both tubes. This minimizes the

change in loading on the two oscillators during keying and virtually eliminates "chirp," or shifting of the tunable oscillator frequency during keying. A "zeroing in" signal is provided by pressing S_{301} , a push-button switch, with R_{304} as a signal level adjustment.

The keying waveform is also adjustable with this circuit, as outlined in the original article. Another feature — screen grid voltage on the 7581 may be adjusted with potentiometer R_{303} to the value which results in optimum RF power output from the 7581 stage to drive a succeeding, and larger, power amplifier.

The high voltage power supply is a dual-voltage type⁴ with four single diode tube rectifiers in a bridge circuit. The transformer center tap delivers 60 percent of the full output voltage. The 6AX4-GTA or 6DE4 single diode tubes, while rated only for TV damping diode service, have operated experimentally in a number of similar power supplies for amateur gear with good results.

Neither side of the heater circuit should be grounded to avoid exceeding the maximum heater-to-cathode voltage rating of these tubes.

A separate bias voltage supply provides negative voltage for proper operation of the differential keyer; and, negative protective control grid bias for the 7581, adjusted to about minus 50 volts with 700 plate volts and 250 screen volts applied. A 3-position main power switch (S_{301}) permits turning on the tube heaters before the separate high voltage power transformer is energized.

All standard components were used throughout this exciter, and values within standard tolerances should work. The make and types of coil forms in TABLE III — COIL TABLE should be used, unless the constructor is willing to experiment and find the proper numbers of turns required for other types of coil forms which may be in the "Junk Box."

A LARGE SINGLE CHASSIS of aluminum houses W2FBS's exciter, and is 17 x 13 x 3 inches in over-all size (*Bud* AC-420, or equivalent). A standard 8 1/4 x 19 x 1/8-inch thick relay rack panel was used on this model, but a 17 or 18-inch wide panel from a table cabinet could be used instead, if one of the table-type cabinets on the market will house your exciter.

The packaged tunable oscillator (SOLID HIGH-C VFO) with its National-type NPW-0 500-division tuning dial is in the center of the chassis, with the rest of the RF section at the right, the power supply on the left, and the keyer behind the VFO. Most of the parts locations and general constructional details can be seen in the various views of the exciter on these pages.

Under the chassis, use of small-diameter coils, complete shielding of the tunable oscillator, and a shield between the 12BY7-A buffer and the 7581 power amplifier, are adequate precautions to guard against unwanted interaction between circuits. A ganged bandswitch is assembled from the Harrington GP-50 multi-band tuner, with Centralab 2500 series switch wafers coupled to it, to select the crystals, and coils L_1 through L_6 .

FOOTNOTES:

¹"Heterodyning Mix-Selector Charts," *G-E HAM NEWS*, November-December, 1956 (Vol. 11, No. 6) issue.
²"SOLID HIGH-C VFO," by W2FBS, *G-E HAM NEWS*, July-August, 1959 (Vol. 14, No. 4) issue.
³"TWO-TUBE DIFFERENTIAL KEYER," by W2FBS, *G-E HAM NEWS*, May-June, 1961 (Vol. 16, No. 3) issue.
⁴"DUAL-VOLTAGE POWER SUPPLIES," *G-E HAM NEWS*, September-October, 1957 (Vol. 12 No. 5) issue.

⁵The Harrington GP-50 bandswitching tuned circuit is made by Harrington Electronics, Box 189, Topsfield, Mass.
 Note: The November-December, 1956, and September-October, 1957 issues of *G-E HAM NEWS* are no longer available, but a reprint of the articles in these issues is being made in the new *G-E HAM NEWS* 55B Package. See page 8 in the November-December, 1961 issue for details.

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