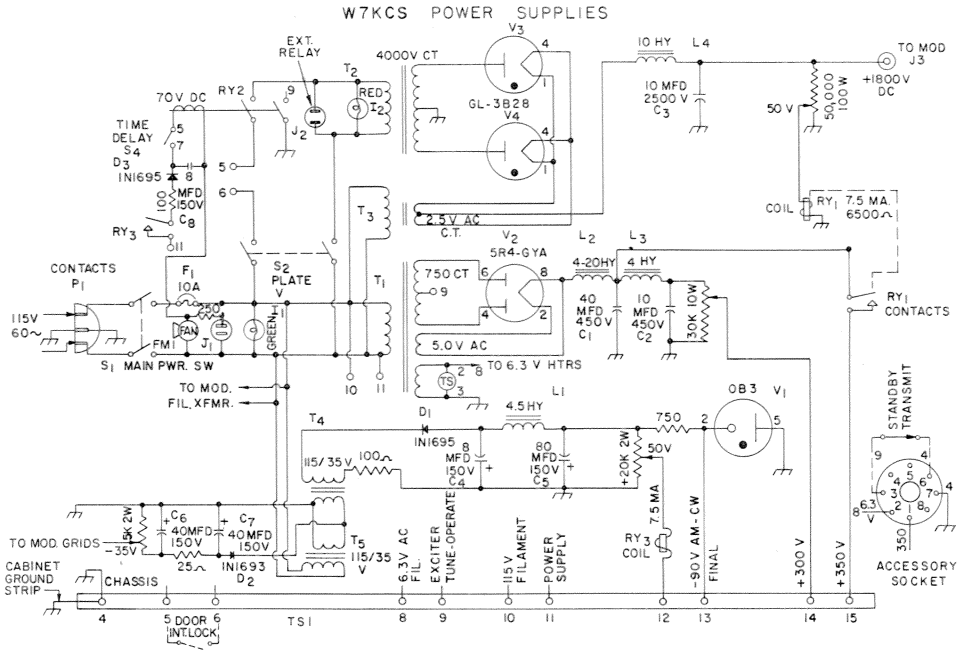

FIG. 4. COMPLETE SCHEMATIC DIAGRAM of protective circuits in the power supplies of the W7KCS/9 transmitter. Diagram includes the basic protective circuits shown in Fig. 3. Descriptions of components are given in TABLE I — PARTS LIST. Capacitances are in microfarads (MFD); resistances are in ohms, with wattage ratings given for resistors over ½ watt. Relays RY_1, RY_2 and RY_3 can have 5,000-ohm, 6-ma. coils; RY_1 and RY_3 have SPST contacts, RY_2 has DPST contacts.

TABLE I — PARTS LIST

C_1.....40-mfd., 450-volt working tubular electrolytic (G.E. QT1-14).
C_2.....10-mfd., 450-volt working tubular electrolytic (G. E. QT1-6).
C_3.....10-mfd., 2500-volt working Pyranol metal cased capacitor.
C_4, C_8—8-mfd, 150-volt working electrolytic (G. E. QT1-5).
C_5.....80-mfd., 150-volt working tubular electrolytic (G. E. QT1-20).
C_6, C_7....40-mfd., 150-volt working electrolytic (G. E. QT1-13).
D_1, D_3—400-peak volt, 100-ma. silicon rectifier (G. E. 1N1695).
D_2.....200-peak volt, 100-ma. silicon rectifier (G. E. 1N1693).
F_1.....10-ampere fuse and 3AG type fuse holder.
FM_1...115-volt; 60-cycle, shaded-pole motor (G. E. KSB-33).
I_1.....pilot lamp with 115-volt Canadelabra socket, green jewel.
I_2.....same as I_1 with red jewel.
J_1, J_2....2-pin female chassis type power receptacle.
J_3.....high-voltage insulated connector.
L_1..... 4.5-henry, 50-ma. filter choke.
L_2.....4 — 20-henry, 150-ma. swinging type choke.
L_3..... 4-henry, 150-ma. filter choke.
L_4.....10-henry, 300-ma. high-voltage insulated filter choke.
P_1.....3-pin grounding type male power plug.
S_1 S_2....DPST 10-ampere power toggle switch.
S_3.....3-position, 2-pole single section tap switch.
S_4.....115-v thermal switch; 60-second delay (Amperite 115NO60).
T_1.....power transformer, 750 volts, center tapped at 150 ma., 5-volt, 2-ampere, and 6.3-volt 6-ampere heated windings; 115-volt primary.
T_2.....high voltage transformer, 4000 volts, center tapped, at 300 ma., 115-volt primary.
T_3.....filament transformer, 2.5-volt, 10-ampere secondary, 10,000-volt insulation; 115-volt primary.
T_4, T_5....35-volt, 100-ma. secondary, 115-volt primary.
TS_1....terminal strip, 15 terminals.
V_1.....G. E. type 0B3 90-volt, octal-base voltage regulator tube.
V_2.....G. E. type 5R4-GYA full wave high-vacuum rectifier.
V_3, V_4....GL-3B28, Xenon-filled high voltage rectifiers.

vented by plate over-current relays, other element relays, or by careful tune-up procedure. Normally, during initial tune-up a wary eye is kept on the plate currents so that excessive loading of these circuits is generally only a result of careless procedure. At first glance these schematic diagrams (Figs. 2 and 3) appear to contain several electro-mechanical elements; however, it is surprising how inexpensively voltage-sensitive relays can be obtained. The two voltage-sensitive relays used in the W7KCS transmitter were less than $1.00 each.

Low-cost silicon diodes have greatly simplified the construction of grid bias supplies because they provide extremely low resistance in the forward direction. This is important in bias supplies since the over-all equivalent resistance of the supply adds to the grid leak resistance to determine the total grid bias under excitation.

In the W7KCS transmitter it is necessary to provide two values of bias voltage; namely, minus 135 volts power amplifier, and minus 35 volts for the modulator. Ninety of the 135 volts are obtained across the OB3 90-volt regulator tube in the circuit of the dual bias supply, Fig. 3.

The AC side of the circuit is two 110/35 volt transformers connected primary to secondary and secondary to primary. With the low current drain on the bias supply it is possible to maintain a DC voltage nearly the same as the input AC RMS voltage — or, the output voltage can be greater than the AC input voltage by using input filter capacitance. In addition, the high capacitance improves the normally poor regulation of half-wave rectifier supplies. Current limiting resistors are used (the 100 ohm resistor in the 90 volt supply) in order to reduce the transient currents during the first on-cycle of the rectifier. These small rectifiers cannot handle an extremely high current for an extended length of time; consequently, the impedance looking toward the source must sometimes be artificially made higher. In the low voltage (35 volts) supply the in-rush current was well within the approximately 20 ampere one cycle limit on these rectifiers.

(continued on page 7)