Fig. 3. The voltage across this rheostat is supplied from a power transformer winding having a grounded center tap. Therefore, the voltage to ground is zero at the center of this rheostat and on each side of center is 180 degrees out of phase with the other side. This voltage to ground is applied to one side of resistor R5, the other side of which is grounded. Therefore, an adjustable sixty cycle signal, in series with and either in phase or out of phase with the signal on the transformer secondary, is applied to the amplifier input. By adjusting the magnitude of this voltage to produce either a positive or negative deflection on the meter, any zero offset present when the external input signal is zero can be corrected.

8. VOLTAGE AMPLIFICATION

The a-c voltage across the input transformer, whose magnitude and phase depend upon the magnitude and polarity, respectively, of the d-c input signal, must be amplified. Voltage amplification is provided by two 12AX7 twin-triode tubes, a total of four consecutive voltage stages employing conventional resistance - capacitance coupling. Plate voltage is supplied to these stages from the power transformer through a silicon rectifier and resistance-capacitance filter. Because of the low level of the a-c signal in the first two stages, special care is taken to prevent the entrance of interferring voltages and to reduce the noise level. The heaters of the V1 tube are operated on d-c. This avoids pickup from a-c heater voltage. An additional precaution is the use of capacitors C5 and C6, which have negligible effect on the 60 cycle signal but effectively ground any higher frequency transient voltages entering the amplifier.

The output of the second amplifier

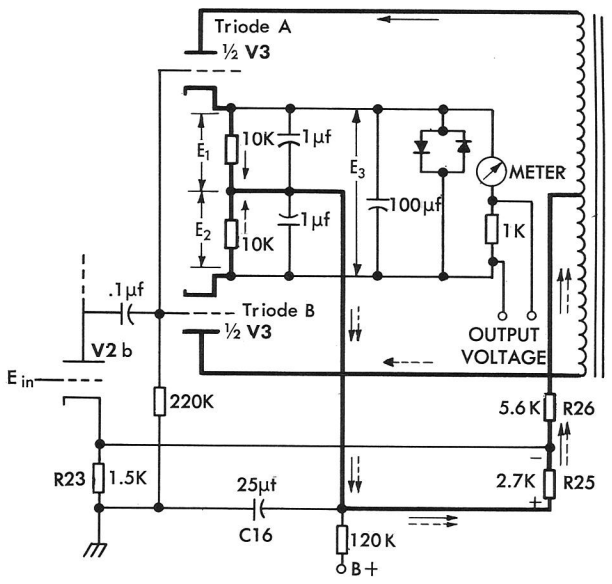

Fig. 5—The detector a-c to d-c converter. The tube current paths are shown heavy. The arrows, identified with corresponding curves in Figure 6, illustrate the circuit operation.

stage is developed across the network of resistors R14 to R17. The setting of the sensitivity switch determines what portion of this signal is applied to the third stage. The gain of the a-c amplifier can be reduced in this manner to obtain the various reductions in detector sensitivity provided. This section of the sensitivity switch is ganged to the input circuit section. For each gain setting there is both an operating position and a zero check position.

The cathode resistors of the third and fourth stages are unbypassed, thereby developing negative feedback in these stages. Additional feedback to the fourth stage is described in the next section.

9. A-C TO D-C CONVERSION

The final stage of the instrument is an electronic a-c to d-c converter. This stage employs both halves of the