SECTION 3

PRINCIPLES OF OPERATION

3-1. GENERAL

The Model 2005 is a highly accurate, series regulated, DC voltage source. Basically, it consists of a full—wave rectifier circuit, a series regulator circuit and a current limiting circuit.

The series regulator circuit is essentially an electronically variable resistance interposed between the unregulated source and the load. The resistance value is controlled by an amplifier which compares the source output voltage with a reference voltage. The amplifier adjusts the series resistance to reduce the error signal to zero.

The reference voltage is generated by an internal auxiliary power source. The error signal resulting from the voltage comparison is amplified and applied through a driver stage to the series transistor to vary its effective resistance.

3-2. FULL-WAVE RECTIFIER OPERATION

The full-wave rectifier consists of diodes CR1 and CR2. Its output is applied through fuse F2 to series regulator transistor Q1. The output of the full-wave rectifier is filtered by capacitor C1.

3—3. SERIES REGULATOR OPERATION

The series regulator circuit consists of differential amplifier Q5, amplifiers Q4, Q6 and Q7; driver Q2 and series regulator Q1. The voltage reference for the differential amplifier is zoner diode CR13. A constant current is maintained through CR13 by transistors Q9 and Q10 and zener diode CR11. These components are powered by an auxiliary 20-volt supply.

The constant voltage across CR13 is impressed across the base—emitter junction of one half of Q5. Potentiometer R12 is adjusted to bias the base—emitter junction of the input half of Q5 to the same potential. Zener diode CR10 provides a constant collector voltage for the input section of the differential amplifier. A constant current for this zoner diode is provided by CR22 and Q10, which are powered by an auxiliary 20 volt supply.

The differential amplifier, its voltage reference and the transistors which maintain a constant current through the voltage reference are located on oven board assembly *A1.* The oven maintains these components in a constant-temperature environment to provide highly stable operation.

The input to the differential amplifier is appliod from a voltage divider across the supply output. Any change in output voltage changes the bias on the differential amplifier and, consequently, changes the collector current on the output half of this stage. This