To determine the secondary current, the following formula is used:

$$\text{Secondary Amp} = \frac{\text{hp} \times 746}{\sqrt{3} \times \text{open-circuit-ring voltage}}$$

*JHV* must decide what starting torque and speed are necessary for the load. Both these factors influence the value of secondary resistance used, since they are dependent upon the current supplied the motor. The secondary current may then be computed from the above equation after substituting the required starting horsepower. Once the value of the current has been computed, the necessary resistance may be found by Ohm's law.

Grid cross-sectional area may be calculated by use of the physical constants and resistance relations, which can be found in Mark's *Mechanical Engineers' Handbook*. With this data on hand, *JHV* can readily determine the resistors to give the necessary starting torque and speed.

Before purchasing new resistors or altering the existing devices it would be worth while for him to check with the manufacturer of the motor. The builder can usually supply specific information regarding any piece of equipment. Tyler G Hicks, New York City.

### Simple Test Outlined

I ASSUME THAT *JHV* has taken up with the manufacturer the matter of the wrong control resistors. To calculate secondary resistance for a slipring motor, the locked rotor volts and full-load secondary amperes must be known, as well as the torque required on the first point of the controller. The latter may be approximated if necessary.

Locked-rotor secondary voltage is obtained by raising the brushes off the sliprings and applying normal line voltage to the stator. Read the voltage across the sliprings with the brushes raised. The rotor may be considered as a generator changing the electrical power transferred across the air gap into mechanical power. As a generator it will develop electrical power equal to $E \times I \times \sqrt{3} \times$ (1-slip). With $E$ the value of the locked-rotor voltage; $I$ the secondary amperes at full load and in this case given as 190 amp, the factor (1-slip) is the efficiency of the rotor.

Mechanical power output must equal the electrical power generated in the rotor less the rotor losses.

$$\text{From this, } E_r = \frac{\text{hp} \times 746}{I_r \times 1.73 \times .950}$$

which equals 315 volts. Gordon Fox in his book, *Electric Motors and Controls*, says: The formula for determination of Y-connected balanced 3-phase second-