

General Motor Knowledge
Part 27

Rotor End Rings

by
Lynn R. Dutro

February 22, 1995
GMK27.wp5

The final parts of the rotor electrical circuit are the end rings. The end rings are cast at the same time as the rotor bars. They are in the shape of a ring, one on each end of the rotor. The end rings connect each rotor bar to all the others. End rings complete the electrical path required so that current can flow from one bar to another. Without this flow of current there can be no magnetic field. The physical size of the end ring determines its resistance to this flow of current. Changing the end ring size changes the motor's performance. Reducing the size of the end ring increases the resistance.

In very general terms, reducing the size or increasing the resistance of the end rings will reduce the torque at a given load speed. The peak torque will remain nearly the same but will occur at a lower speed. Increasing end ring resistance will generally increase starting torque. Watts and amperes may show a decrease at a given speed but the load will usually shift to a lower speed where the inputs may actually be higher than before. Increasing the end ring size, decreasing the resistance has the opposite effect.

Last month we talked about some of the reasons for placing a spiral on the rotor bars. The amount of this slot spiral has an affect on motor performance. Again in general terms, an increase in slot spiral will reduce the motors peak torque. The speed at which this peak torque occurs will not be changed much if any at all. Watts input at a given operating speed will decrease. Starting torque and the torque available to accelerate a load up to speed will increase. Reducing slot spiral, short spiral, will have the opposite effect. Torque and watts will increase for a given operating speed while torque at lower speeds will be reduced.

The relationship of rotor slot spiral, aluminum conductivity and end ring resistance is fuzzy at best. Each has a definite contribution to the motor performance characteristics. Each has an affect on the other. Neither one can operate totally independently. By examining each one independently, maybe we can gain a better understanding of the whole.