

## Locomotive Engine Cranking Abutment Prevention

### THE PROBLEM

An abutment occurs when the end of a cranking motor pinion gear tooth strikes the flat surface between the teeth of the flywheel ring gear. The cranking motor solenoid contains a low resistance pull-in coil and a higher resistance hold coil. The pull-in coil current is routed through the series-connected cranking motor armature and field winding. This current initiates motor rotation before the pinion gear teeth meet the ring gear teeth. Ideally, the inertial energy associated with motor rotation overcomes the friction between the rotating pinion gear and the stationary ring gear, thus allowing the pinion gear to slip into mesh with the ring gear. In practice, cranking motor friction may reduce pinion gear speed to the point where it is insufficient to break the abutment.

At some point in the evolution of the EMD locomotive, the probability of a sticking abutment was reduced, but not eliminated, by paralleling the pull-in coil with a 0.32 ohm resistor.

### THE CURE

Several years ago, Enerpro engineers realized that a large capacitance in parallel with the pull-in coil is much more effective than the 0.32 ohm resistor in producing a short duration armature current pulse. This high amperage pulse substantially increases the motor speed at the instant that the pinion gear abuts with the ring gear. Tests have shown that this simple addition effectively cures the sticking abutment problem.



### APPLICABLE DOCUMENTS

- R454 Engine Cranking Abutment Prevention Report
- R552 Abutment Preventer Temperature Change Test