

## ***The Ford Mustang Boss® 302 Torsen® Differential***

The high performance Torsen® Type-2 differential used by the Mustang Boss® 302 is ideally suited for extreme-performance rear wheel drive vehicles. The patented EQUVEX™ parallel-axis gearing provides better management of gear separation forces, resulting in low backlash and quiet operation.

Unlike conventional preloaded clutch-plate limited slip differentials, the Type-2 is a full time torque biasing system. Torque and differentiation are continuously managed between both drive wheels and biased instantaneously according to variable road conditions and in proportion to power from the engine. The unit's unique gearing is designed to provide a high level of performance for the life of the vehicle.

The Torsen® Type-2 is an advanced, multi-function traction differential that provides continuous, uninterrupted torque output, torque biasing and differentiation in one integral unit. The high torque bias ratio (TBR) enhances traction and mobility under extreme traction condition while also enhancing vehicle handling at the same time. It is always active, responding instantly to torque feedback from variable driving conditions.

Any limited slip differential functions because it generates internal friction; it is that friction which allows the differential to resist wheel spin. However, that friction also must be overcome in order for the car to turn normally. Conventional multi-plate differentials use a system of clutches and preload springs to create a fixed amount of friction that is always present under all operating conditions. What sets Torsen® differential in the Boss® 302 apart is the use of concentric helical gearing to generate a high level of friction in proportion to torque input from the engine. As torque from the engine increases, separation forces between the helical gears also increase, creating friction as they thrust against the bearing surfaces of the differential case. The high TBR of the Type-2 means that it can support a large imbalance of traction between the tires before allowing differentiation to occur when drive torque to the axle is high, yet it will differentiate freely when torque levels are low.

As a result, the Type-2 can provide a high level of wheel spin resistance under hard acceleration, while still allowing easy turn-in performance when the driver backs off of the throttle at corner entry. As the driver accelerates from the apex of the turn out onto a straightaway, the Type-2 will then hold wheel spin of the inside tire in check while distributing torque to where it can be best used – the outside tire. The practical upshot of this is that this torque distribution ability creates an understeer-canceling yaw that helps to drive the car through the corner, allowing the car to achieve its maximum lateral acceleration potential. Consequently, the Torsen® Type-2 allows the Boss® 302 to maximize traction while cornering without the understeer inducing characteristic that preloaded differentials have.

The Torsen® differential is a proven winner on the track. It has been a favorite of road racers and autocrossers all across the country for years, and its wins include several SCCA national titles. Torsen® differentials were the exclusive differentials used by the Mustang FR500S in the Ford Racing Mustang Challenge Series, as well as the subsequent Boss 302R race car. JTEKT Torsen Inc. is proud that the winning tradition is now continued by the production Boss® 302 and Leguna Seca models.