Inline Servo Installation

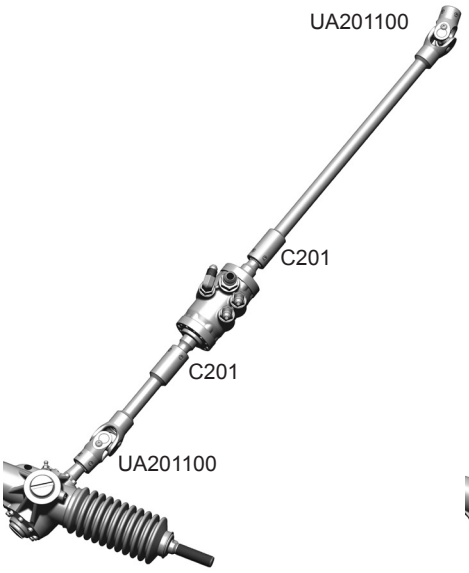
The servo is a directional control valve which opens in response to torque existing in the steering shaft. The steering “shaft” can be considered in this case to include all the components in a train from the pinion to the steering wheel.

Torque is created (1) when the steering wheel is turned against the resistance of the front wheels, or (2) when the steering wheel resists being turned by the force of the front wheels. Both of these conditions exist simultaneously to varying degrees as the car is being driven, and the valve does not differentiate between them.

In order to sense torque and control the power assist it is, in theory, only necessary that the servo be connected somewhere between the pinion and steering wheel. However, common sense dictates that because it is full of hot oil under pressure it should be kept out of the driver’s compartment.

Considered mechanically, a servo installed in the steering shaft is functionally identical to a servo attached to the rack. It will usually offer better clearance in a crowded component area, e.g., in a front-engined car, to avoid interference with a left-mounted dry-sump pump or a left-side fuel pump, or just a wide engine block located close to the steering rack. Sometimes it is just easier to analyze and troubleshoot a system where its elements are separated. Three proven reliable installation schemes are presented below; all use the principle that the servo is effectively **part of the steering shaft, not part of the chassis.** For clarity, hoses are not shown.

Case 1

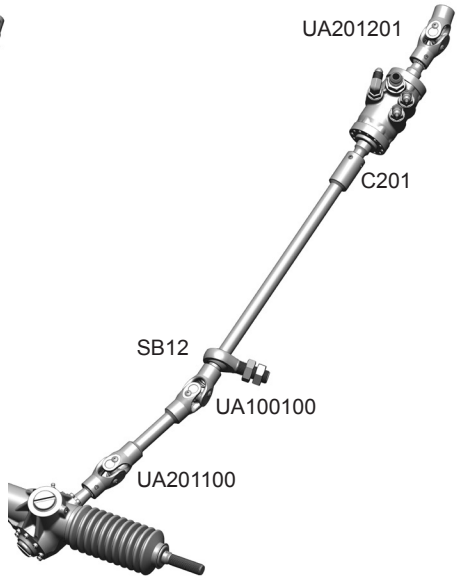


The simplest way to install a servo inline is to couple it into the intermediate shaft at any convenient point between the firewall bearing and the pinion. Since all the parts between the two u-joints are rigidly clamped together, the servo should be considered a solid part of the shaft.

It is not necessary to bolt the servo housing to the chassis nor restrain it against rotation; its torque reaction is internal.

Since the two u-joints in this case are at opposite ends of what is essentially a single shaft, their yokes should be *in phase,* i.e., aligned like the opposite ends of a driveshaft.

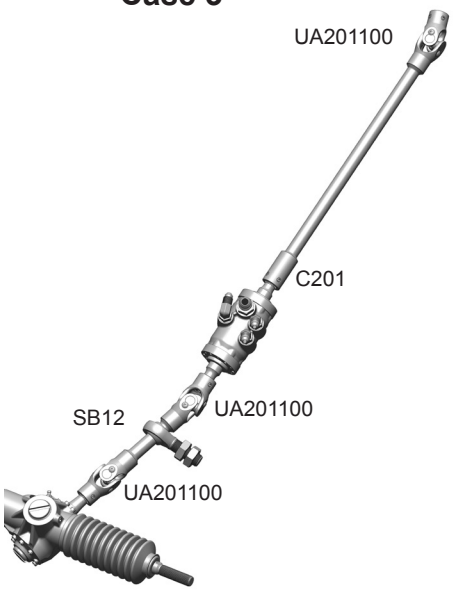
Case 2



If it is impossible to reach the pinion in a straight line from the firewall bearing, the intermediate shaft can be divided with a third universal joint. Because this u-joint is not connected to a fixed object (such as the firewall or the steering gear) it must be stabilized—as close to the joint as possible. In this instance an SB12 bearing is used on the upper section, but it could just as well be used on the lower, depending on which location were easiest to provide with a suitable mounting tab.

Note that the u-joint yokes on the lower shaft section are in phase. The servo is effectively part of the upper shaft section and its u-joint yokes should also be in phase.

Case 3



Here the Servo is again part of the upper section of a two-piece intermediate shaft, but is placed at its lower end, alongside the engine block. In this instance an SB12 bearing stabilizes the u-joint from the lower shaft section because the servo occupies the upper section.

Again, note that the u-joint yokes on the lower shaft section are in phase. The servo in this case remains part of the upper shaft section, and those u-joints should also be in phase.