Fig 19-33a

Fig 19-33b
Type I – INA

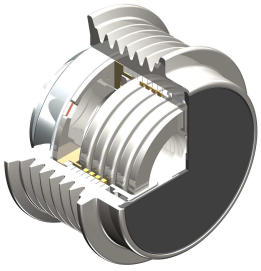

Fig 19-33b
Type II – Litens

Alternator pulley technologies:

There are three different kinds of alternator pulleys used by Original Equipment Manufacturers (OEMs) on vehicles today. Solid pulleys and two different types of clutching pulleys. Solid alternator pulleys are simply that. A solid pulley attached to the alternator shaft with a nut. They have been around for over a century but are quickly disappearing from vehicles. Clutch pulley Type I is called an overrunning alternator pulley (OAP) and is manufactured by INA. Type II is called an overrunning alternator decoupler (OAD) and is manufactured by Litens. Clutch pulleys are quickly becoming the automotive industry's standard as manufacturers begin to realize the benefits they provide.

Background: - Nowadays FEADs (Front End Accessory Drives) are engineered as a complete system, capable of providing years of durable, smooth and quiet operation as well as provide an increase in fuel economy. These systems are a quantum leap from the old V belts systems of yesteryear. Before the introduction of OAPs and

OADs, base engine vibrations, called in the industry "Torsional Vibrations" started to create serious problems for the FEAD. Issues such as noises, premature belt tensioner wear, belt flutter/jump off, etc. These problems were occurring typically at idle speeds because torsional vibrations are much greater at lower rpms (start and sub-idle) and tend to diminish as rpm increases.

The alternator is typically the component with the largest inertia (mass) within the FEAD system. It tends to decelerate slower than the engine. This can cause the belt to slip at the alternator pulley during engine decelerations and generate a chirping noise. OAP's were introduced in the early 1990's to address these chirping noises. In 2000, OADs were introduced to address not only belt slip noises, but also vibration and belt flutter issues that lead to poor durability and noise complaints. The OAD also allows the OEM to lower the idle speed and belt tension without introducing any adverse effects such as unwanted NVH (Noise, Vibration and Harshness). Lowering the belt tension has many benefits. These include significant improvement in the life of all the bearings within the FEAD system (alternator, a/c compressor, coolant pump etc). Along with improved durability, the lower belt tension results in smaller parasitic losses throughout the FEAD system therefore making it more efficient. The reduction in parasitic losses is also a significant contributor to the benefit of increased fuel economy and the reduction of emissions.

Type I – OAP (INA) Fig 19-33b

The OAPs function is achieved by introducing a one way clutch mechanism inside the alternator pulley. This clutch mechanism allows the heavy rotor inside the alternator to overrun during an engine shut down or a transmission shift. Allowing the rotor to overrun, effectively eliminates belt chirp noises during these engine deceleration conditions.

Operation of an OAP can be checked by simply inserting the correct tool, holding the pulley and rotating the inside shaft. It must rotate smoothly in one direction and immediately lock in the other direction. During engine operation, if the clutch mechanism inside the pulley slips for whatever reason, then you may notice a no charge situation (alt light on) and the battery may go dead. If the clutch mechanism locks up in both directions,

then you may notice belt slip noises or increased belt tensioner motion and premature wear.

Type II – OAD (Litens) Fig 19-33c

The OAD has all the same features of an OAP but also utilizes an internal vibration absorbing spring. This internal spring is the difference between the OAP and the OAD. The spring effectively isolates the alternator by absorbing the torsional vibrations within the FEAD. Think of the OAD as a "Suspension system" for the alternator, cushioning the heavy alternator rotor from those damaging vibrations that come from the firing pulses of the engine's combustion cycle. OADs are often extremely effective at absorbing the stronger vibrations of the newer, more fuel efficient engines. Smaller displacement engines, engines that include cylinder deactivation or simply diesel engines are often very rough and therefore require that a Litens OAD be utilized in the FEAD by the OE manufacturer.

The operation of a Litens OAD can be verified the very same way as the OAP. Simply remove the cap, insert the correct tool, hold the pulley and rotate the inside shaft. The OAD differs from the OAP in that the OAD must rotate smoothly in one direction and have a spring feel in the other direction. Both OADs and OAPs are considered to be wearable items and are therefore recommended to be replaced before pulley failure occurs. They should be checked and replaced (if required) whenever changing the serpentine belt and/or tensioner.

The Solid pulley, OAP and OAD are not interchangeable technology, therefore know what alternator pulley the vehicle was designed with and replace accordingly. Beware, if the wrong pulley technology is used then the FEAD components may repeatedly exhibit very early signs of failure, and the vehicle driver will notice much more vibration and strange noises especially at idle.