

# **Gas Engine Performance Modifications**

## **Powertrain Control Module (PCM) Modification**

**PCM modification by installing a performance chip may reduce Powertrain durability and increased emissions. PCM modifications may change or eliminate the following factory calibration/setting/protections**

- **Change Air/Fuel Mix ratio**
- **Raise or remove the RPM and vehicle speed limiter protection**
- **Change Automatic Transmission Shift point protections**
- **Influence Electronic Pressure Control (EPC) - automatic transmission pressures**
- **Change Ignition Timing controls/protections**
- **Alter factory PCM settings that may affect speedometer/odometer accuracy**
- **Turn off engine/transmission cooling fan operation protection**
- **Elimination of Diagnostic Trouble Codes (DTCs) for modification detection and OBDII**
- **Custom adjust all engine parameters.**

**PCM modifications may cause many undesirable effects on the vehicle's Powertrain due to the increased stress and elimination of designed protections of components.**

# **Gas Engine Performance Modifications**

## **Powertrain Control Module (PCM) Modification**

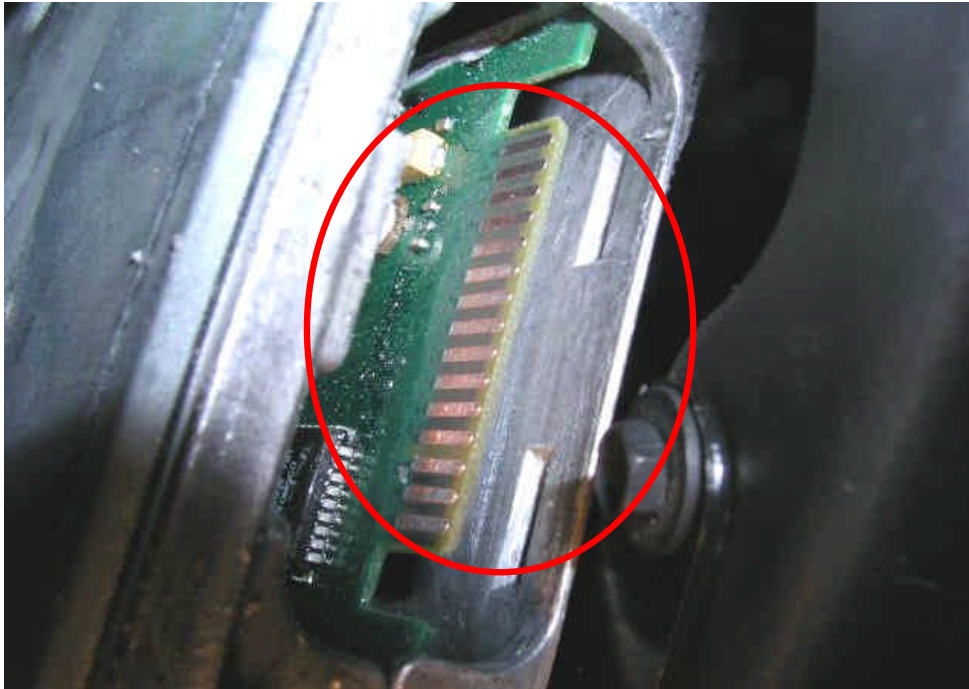
**All alterations or modifications of Ford Motor Company vehicles must be done in compliance with all applicable State and Federal Statutes and regulations. The installation/use of any non-Ford product will not necessarily void the Ford New Vehicle Limited Warranty. If, however, the non-Ford product fails or causes a Ford part to fail, the cost of the repair and any related damage are not covered by the Ford New Vehicle Limited Warranty. The vehicle owner would need to look to the manufacturer or installer of the non-Ford product for repairs, not to Ford.**

**The following information shows some examples of how to detect vehicle performance modifications.**

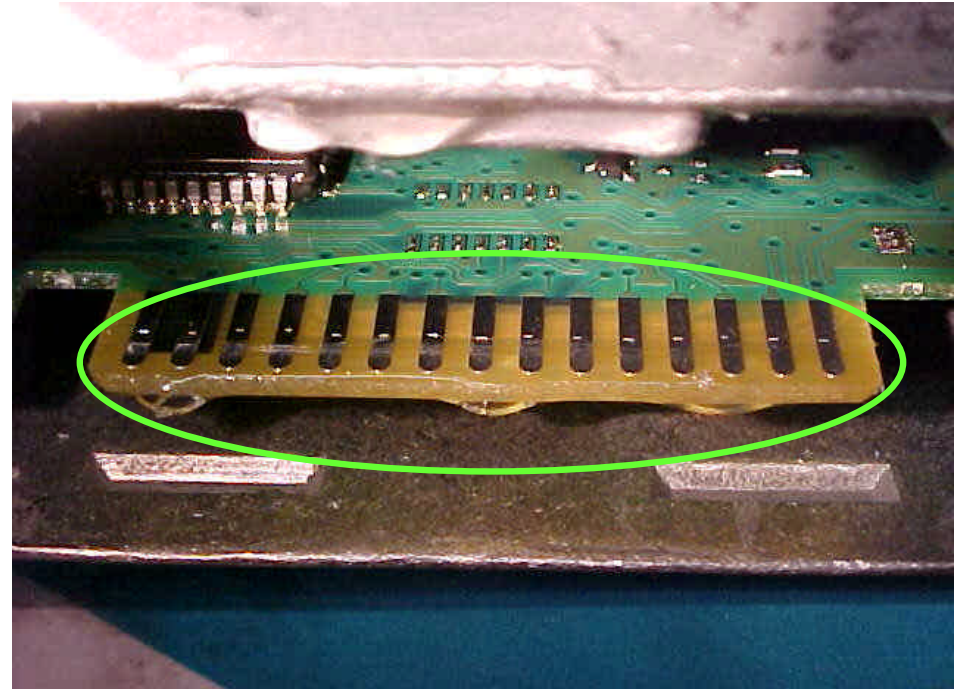
**Note: Unauthorized adjustments to engine systems or transmission controls (including EPC adjustments) may constitute tampering with the emission control system, which is prohibited by the Clean Air Act and may be punishable by penalties of up to \$32,500 per vehicle.**

# Gas Engine Performance Modifications

## Powertrain Control Module (PCM) Modification



**Sanded PCM Chip Board**



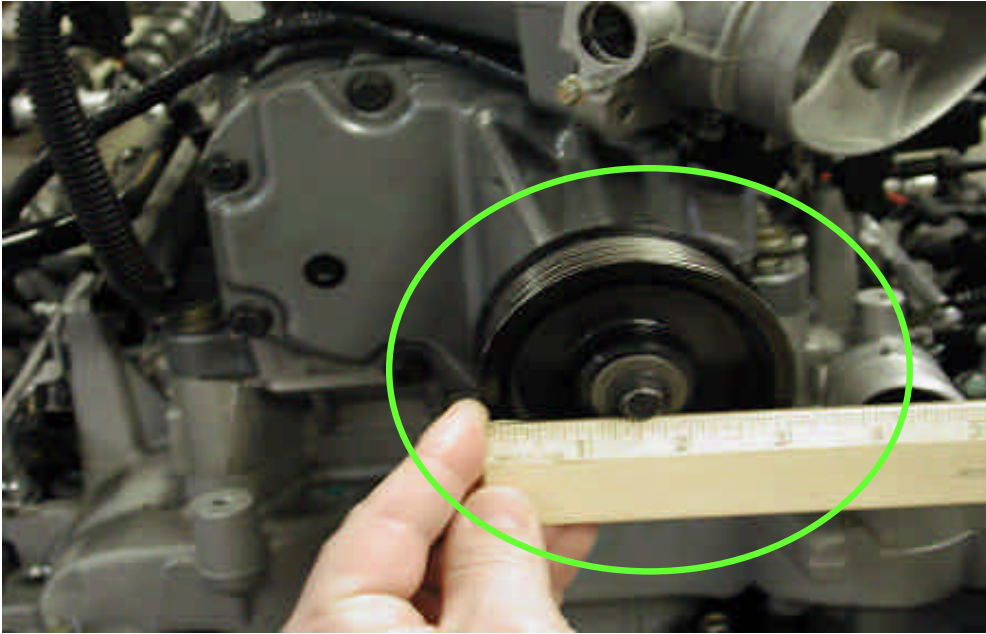
**OEM PCM Chip Board**

### Things to Note:

- Removal of the PCM from the vehicle is necessary to properly inspect the chip board
- There is a black plastic cover over the chip board that has to be removed
- Carefully inspect the pins of the chip board to make sure that the anti-corrosion coating is on the pins (ex. left side photo)
- Not all vehicles will have this port available on the PCM

# Supercharger Pulley Modification

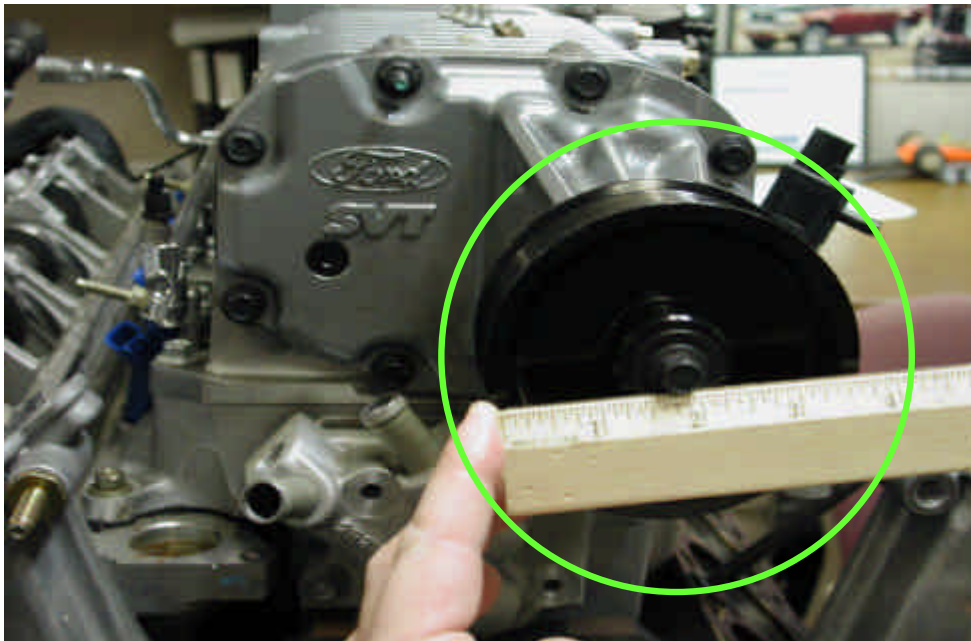
OEM F150 Lightning and Harley Davidson Pulley



Modified (non-OEM) Supercharger Pulley



OEM 2003 Mustang Cobra Pulley



## Things to note:

1. Check for witness marks on bolts that are installed to see if they have been removed
2. Check for evidence of the pulley being painted to cover up scars from removal.
3. Stock Pulley Sizes are:
  - a F150 Lightning – 76 mm
  - b F150 Harley Davidson Edition – 82 mm
  - c 2003 Mustang Cobra – 92 mm

# Crankshaft Pulley Modification

**OEM Crankshaft Pulley for Supercharged Engines**



**Non-OEM Aftermarket Crankshaft Pulley**



Note concerning drive and driven pulley modifications on supercharged engines:

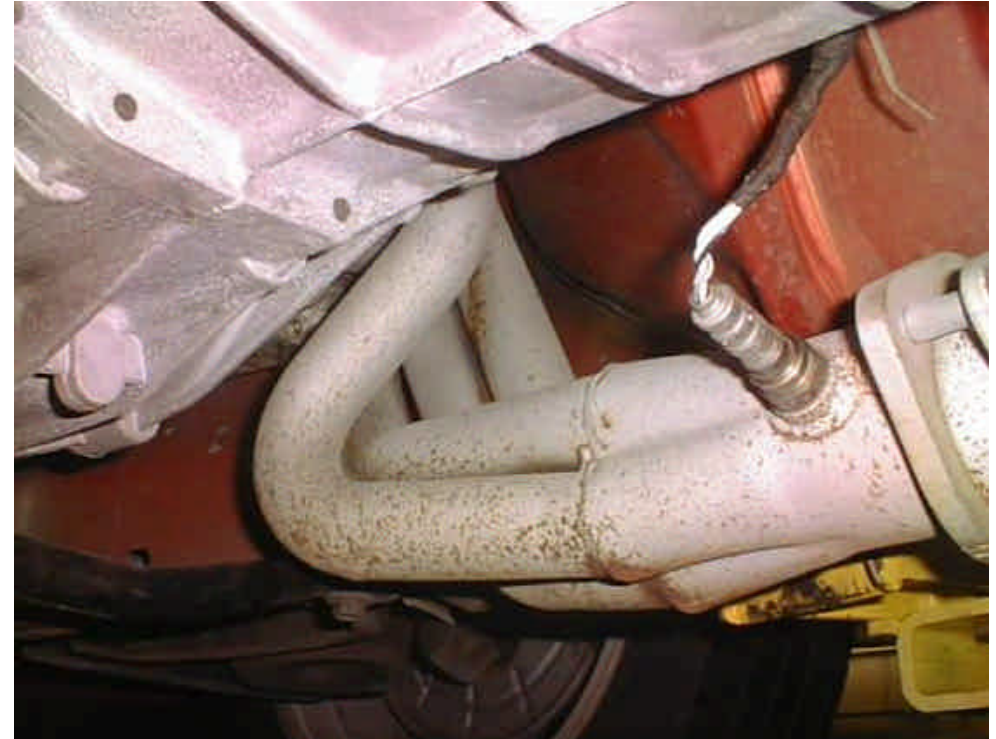
Aftermarket crankshaft drive pulleys and supercharger pulleys are a common modifications on supercharged engines due to ease of installation and removal. The modification is performed to increase air intake boost pressure into the engine. This modification may cause internal engine damage and emission concerns that are not covered under warranty.

# Exhaust Modifications

Header on a F-Series Truck



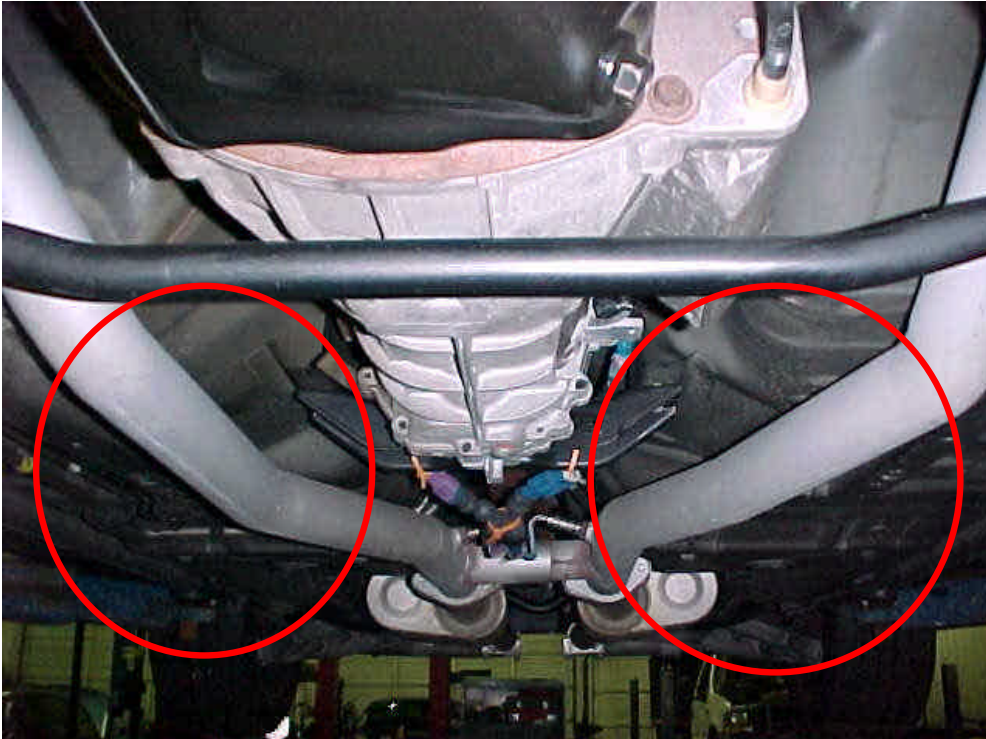
Header on Mustang GT



Exhaust modifications are generally an indication that other performance modifications have been performed to the vehicle. Modification of this type may be a violation of EPA Clean Air Act of 1990.

# Exhaust Modifications

No Catalyst in Exhaust (Aftermarket H-pipe)



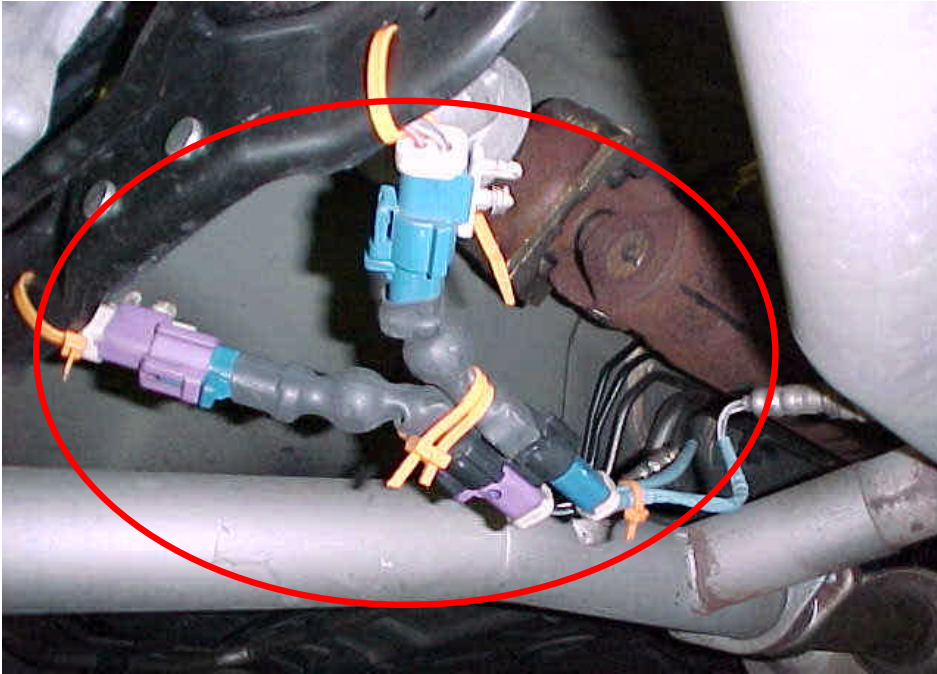
OEM Catalytic Converters on Mustang GT



Exhaust modifications are generally an indication that other performance modifications have been performed to the vehicle. Modification of this type may be a violation of EPA Clean Air Act of 1990.

## Other Aftermarket Add-ons or Modifications

### Oxygen Sensor Bypass/Simulators



### Gauges on A-pillar



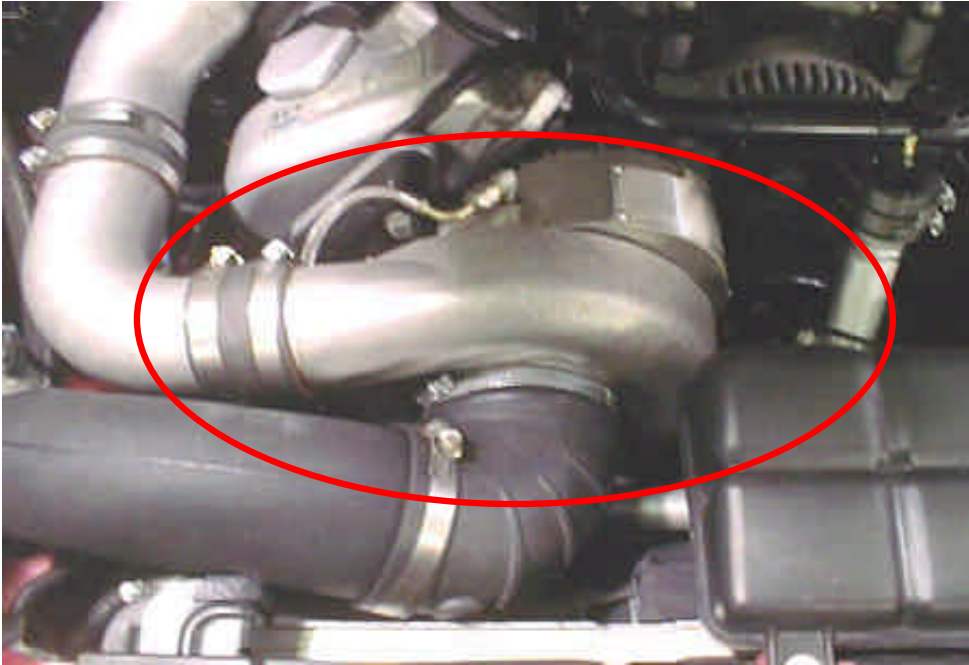
Oxygen Sensor Bypass/Simulators are installed when the Catalytic Converters are removed from the vehicle. They simulate the operation of a properly operating oxygen sensor to prevent the MIL lamp from illuminating. This modification is an indication that other performance modifications may have been performed.

Aftermarket gauges are an indication that there may be other performance modifications on the vehicle. Any damage that may be caused by improper aftermarket gauge installation is not covered by warranty.



## Other Aftermarket Add-ons or Modifications

### Aftermarket Supercharger



Aftermarket superchargers increase the amount of air going into the engine by pressurizing the intake. This pressure causes more air to enter the cylinder and causes increased compression pressures and may increase temperatures potentially causing damage to various drivetrain and internal engine components.

### DLC EEPROM Programmer



DLC EEPROM Programmer can be used to make changes to the factory calibration thru the DLC. These types of programmers can make changes to all of the same information that a PCM performance chip can make. Please refer to the first page of this document for more information for those changes.

# Example of Engine Failures that may be caused by Performance Modifications

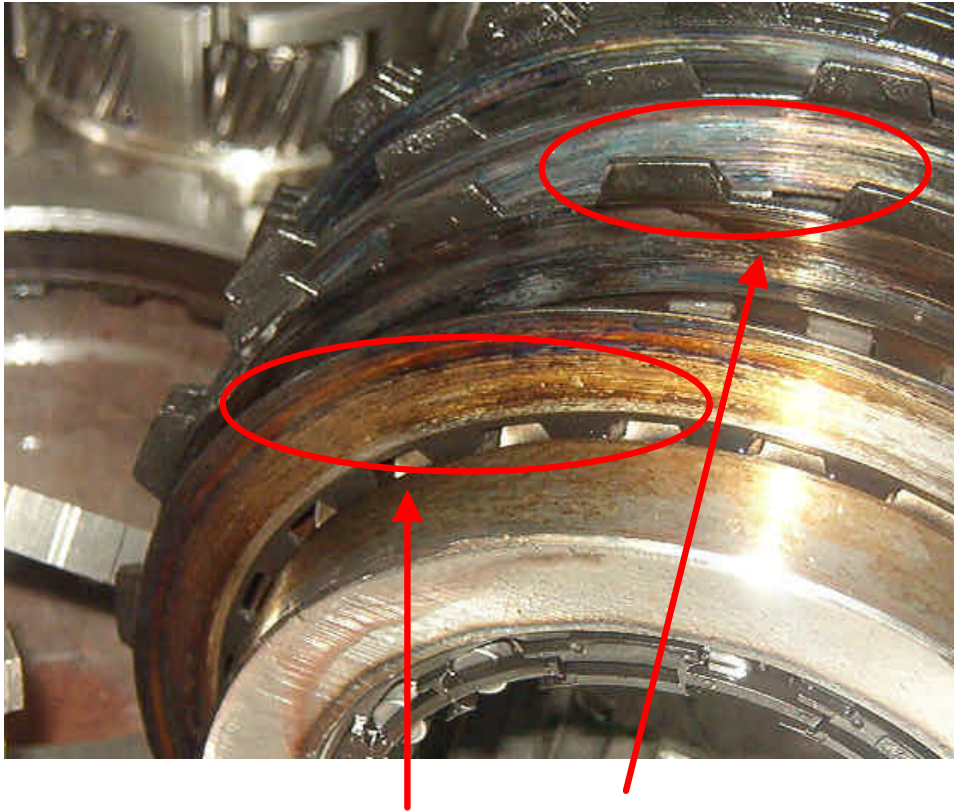
Upper Ring Land Broken



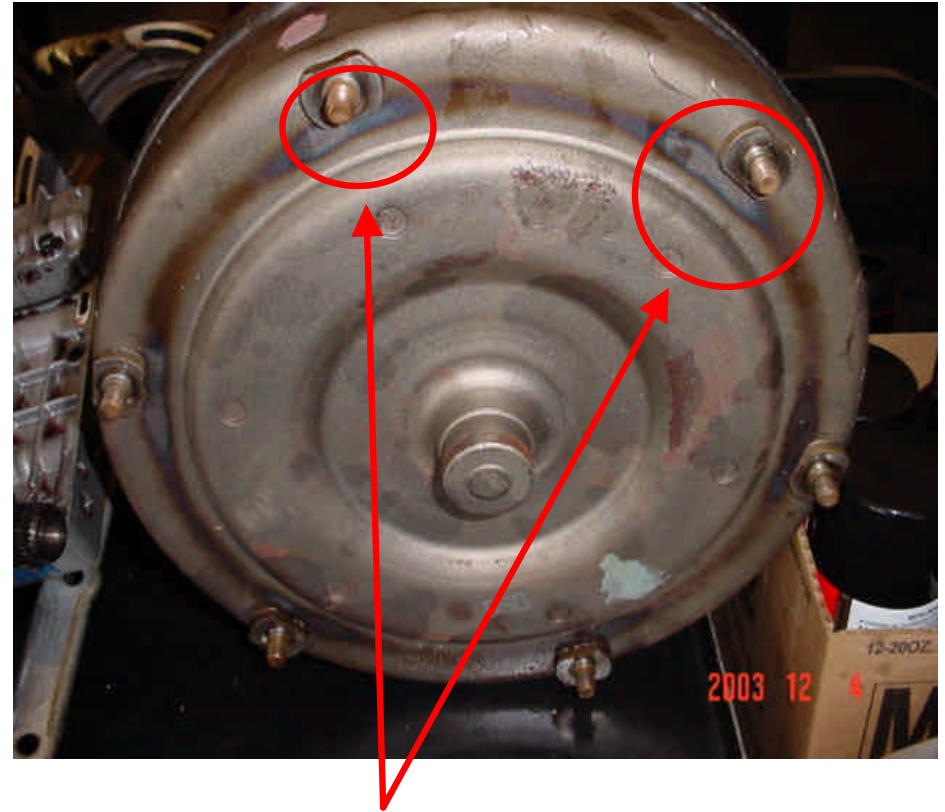
Hole in Engine Block



## Damage to Automatic Transmission Components that may be caused by Aftermarket Modifications:



**Burnt/Blued Clutches**



**Bluing/Hotspots on Torque Converter**