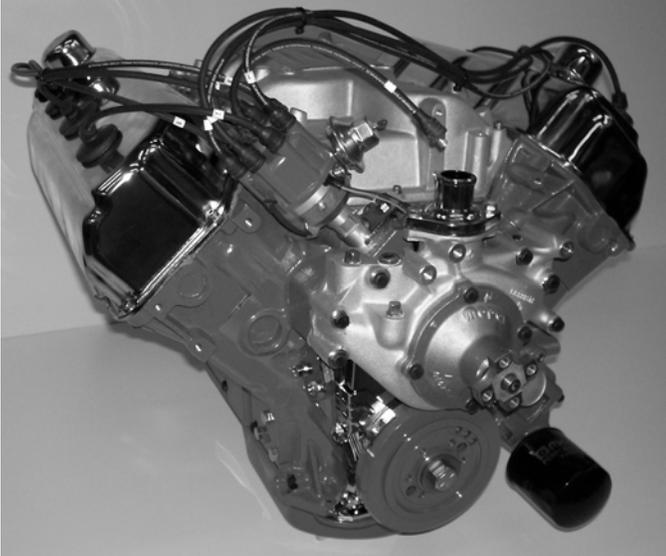




## INSTALLATION INSTRUCTIONS

### 426 / 472 / 528 CID HEMI® CRATE ENGINE

PART NUMBER P5249667AE – 426 CID Hemi Crate Engine  
P5249666AE – 472 CID Hemi Crate Engine  
P5007630AE – 528 CID Hemi Crate Engine



#### RB Hemi Crate Engine Assembly

- (1) Crate Engine Assembly
  - P5249667AE: 426 Hemi, 4.250" bore x 3.750" stroke
  - P5249666AE: 472 Hemi, 4.250" bore x 4.150" stroke
  - P5249630AE: 528 Hemi, 4.500" bore x 4.150" stroke
- (1) Installation Sheet: K6857116

Does not include carburetor, fuel pump, ECU or accessories.

### READ ALL INSTRUCTIONS BEFORE BEGINNING INSTALLATION

Mopar Performance recommends professional installation by an ASE certified technician. A vehicle hoist, torque wrenches and specialized removal and installation tools may be required.

Congratulations on purchasing a Mopar Performance all-new Hemi Crate Engine assembly. The Hemi Crate engines are assembled entirely from **NEW** Chrysler engineered components. The following is a list of potential issues which may arise during installation and the initial "fire up" process. If any problems arise, contact the Mopar Direct Connection Tech Line at 1-888-528-HEMI for advice.

The 426 Hemi was produced in the 1964 thru 1971 B-Body and the 1970-1 E-Body. Therefore these are the best and easiest choices for the installation. However, the Hemi crate engine has also become a popular upgrade for many other Mopar body styles and for street rods and custom cars. See item #3 below for custom swap tips. The Hemi engine was also installed in the 1968 Super Stock "A" Body cars but these are very, very hard to find today and therefore make this a more complicated "swap". Obviously, the 1970-1 Hemi parts can be used in the other year E-Bodies or can be used as donor parts when making a custom installation in a different body style.

#### BEFORE INSTALLATION

Please address the following issues **prior** to installing your Hemi crate engine.

1. **Oil Pan** - The oil pan supplied with the engine features a center sump. This pan was designed for the production 1970-74 E-Body. This makes the engine assembly work well in any application that utilizes a center sump oil pan for suspension and frame clearance. Measure from the front of the auto transmission (or bell housing) to the steering and suspension cross-member and compare to the measurements of the oil pan's sump on the engine. Some applications may require a custom oil pan, pickup, and dipstick and tube.

After installing the Hemi engine assembly, check to ensure that the oil pan does not contact the frame or steering linkage at any point. Steering linkage clearance must be checked by fully turning the front wheels lock-to-lock in both directions while the suspension is at ride height.

2. **Engine Balance** - All Chrysler Hemi engines are internally balanced, including this crate engine. If the torque converter/flywheel are from a 440-6BBL engine,



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which is externally balanced, they cannot be used with the Hemi. Any of the Street Hemi production parts can be used. While the "A" and "B" torque converters are similar to the Hemi and fit the A727 transmission, they have small lug bolts and a small-bolt flexplate and there is no 8-bolt flexplate to work with the small bolts. Therefore these A & B converters are not recommended.

Manual Transmission - flywheels - the key to the manual transmission package is that the bell housing, starter, flywheel, clutch disc and pressure plate are a team and must work together. If you change one part, then you must change them all! You can not take one part from one package and put it with a different package. While the flywheel relates to balance, the whole team relates to function. If you do not have an existing Hemi team or flywheel, we recommend flywheel P4529143.

Automatic Transmission - torque converters - all the Hemi torque converters are internally balanced so the trick is NOT to use an externally balanced unit similar to the production 440-6BBL or 400/440 cast crank engine. We assume that the transmission is the A727 from the Hemi or 440-6 engine package. Depending on which converter is selected, one of three flexplates will be required: P5007378 (for converters with 5/16" bolts), or P5153795 (for converters with 7/16" bolts), or P4529752 (SFI approved, for converters with 7/16" bolts).

3. **Engine Mounting** - Hemi crate engines can use production 426 Hemi engine mounts for either the B-Body or E-Body cars.

- Motor Mount Bracket P4510287
- Left Motor Mount P4510288
- Right Motor Mount P4510289

Custom mounts can be fabricated for non-stock applications. These motor mounts bolt to the side of the block, 3 bolts per side, rather than using "ears" like the 440 big blocks, which makes them unique. Hemi crate

engines use the same mounting system as the production Hemi engines. As with the original Hemi motor mounts the bosses are drilled and tapped through the block. Sealant should be applied to the bolt threads when installing the mounts to avoid oil weepage.

Note: If replacing a 170, 198 or 225 Slant 6 engine in a B or E Body car, you will have to replace the K-frame (engine cross-member). If replacing an "A" engine or small block V8, you will have to replace the K-frame and the transmission/bell housing. If replacing a 361, 383, 400, 413, 426 or 440 big block engine, some passenger cars will require the K-Frame (engine cross member) to be changed for a bolt-in swap which allows the use of production engine mounts. If the car had a Hemi engine, then we can re-use the Hemi K-frame and motor mounts. In either big block case, the bell housing or auto transmission case may be left the same because the bolt pattern is common. Another option, which in many cases is easier than changing the K frame, is to use conversion mounts which are available from Schumacher Creative Services. See [www.engine-swaps.com](http://www.engine-swaps.com) or call 206-364-7151.

In more custom engine swaps, motor plates or elephant ears are used to mount the engine to the car's frame. In either case, these metal brackets bolt to the front of the block between the water pump housing and the block itself. The best approach for dual-purpose cars is to put some rubber insulation between the bracket and the frame to act as an actual mount rather than bolt it solid!

If you have an actual production Hemi K-frame, it has a brace welded to the bottom. If you are converting another V8 K-frame to use with the Hemi engine for "street" use, then this brace/plate should be added to the bottom of the K-frame. It is slightly wider than the oil pan and looks like a ramp with side support. It extends about 1" to 1 1/2" out from the K-frame (actually down, as installed in the car) and its purpose is to protect/shield the sump of the oil pan.



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4. **Intake Manifold** – Depending on which Hemi crate engine you've purchased you will most likely see three bolt bosses on the front and rear of the intake manifold that do not have bolts attaching it to the block. This is correct. The intake manifolds on original 1966 engines were bolted here and were prone to cracking. Most intake manifolds are made to the original specifications which include these bosses. Do not install fasteners in these bosses or you will risk damaging your intake manifold.

5. **Vibration Damper** – Hemi crate engines come assembled with a vibration damper that is designed for general street use and is not SFI approved for racing. If an SFI approved damper is required for your specific usage consider Mopar vibration damper P5249699 which features a universal 6 bolt pulley mount pattern.

6. **Transmission** - Manual - we assume that you will use an A833 4-speed manual transmission. The production 3-speeds do not have enough torque capacity to handle the Hemi engine. There are special "race" manual transmissions that can be used but they can require some modification to the car's floor pan and some trans mount fabrication and driveshaft rework. The manual transmission attaches to the bell housing which bolts to the block. The best Hemi bell housing was the 1970-71 production units. If you have the complete "team" then the 1964 thru 1969 11" packages will work. However, if you have none of these production parts or not a complete package, then the 1970-71 package is the best one to buy and is basically what will be listed by part number in the I-sheet. The flywheel is P4529143, an 8-bolt crank flange unit which mates to the 8-bolt Hemi crank flange. The pressure plate is P4529141 and the disc is either P4529137 (23 spline) or P4529139 (18 spline).

Automatic transmission - we assume that you will use an A727. The best choice is an actual Hemi unit but you can also use a 440-6bbl unit. If you have another "B" engine trans, it will bolt to the engine block but should be re-built

internally to Hemi specifications. The best torque converter selection is the 1966 thru 1971 Street Hemi production unit for street applications. Depending on which converter is selected, one of three flexplates will be required: P5007378 (for converters with 5/16" bolts), or P5153795 (for converters with 7/16" bolts), or P4529752 (SFI approved, for converters with 7/16" bolts). With an automatic, you should have the trans cooler tank in the bottom of the radiator. We would also recommend that an auxiliary cooler be used in front of the radiator. This is the basic system that the production Hemi came with. Obviously if you have one of these production set-ups, they can be used as is.

Unless the automatic transmission is equipped with a manual valve body, the transmission must have a kick down linkage correctly functioning between the carburetor and the transmission kick down lever/throttle pressure rod. Bolt-on systems are available from on-line parts vendors such as: [www.bouchillonperformance.com](http://www.bouchillonperformance.com) or [www.arengineering.com](http://www.arengineering.com).

7. **Brakes** - One of the concerns with installing a Hemi engine into a car that did not have it originally is the brakes. There are the actual braking capacity and the engine weight issues. For installation, one issue is the master cylinder clearance. The left side valve cover gets close to the master cylinder so only the "Hemi" master cylinder can be used for a bolt-in installation. If equipped with power brakes, the brake booster may also need to be changed to a smaller unit, or for a "Hemi" brake booster if found.

8. **Front Suspension** - Since the cast iron head Hemi engine can be 100 to 200 pounds heavier than another V8, 440 or small-block, you should consider replacing the A-B-E Body vehicles' torsion bars. They are listed in the Mopar Performance catalog. The same can be said for installation in custom applications. Please consider upgrading your front suspension spring rates when installing a Hemi crate engine.



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#### BEFORE INITIAL START UP

Once the engine is installed, please address the following issues prior to initial start up.

1. **Sensors & Sending Units** - Due to the variety of warning lights and production/aftermarket gauges, the Hemi series crate engines are sold without sensors or sending units. All of the sensor/sending unit mounting locations are fully machined and sealed with pipe plugs. Remove the corresponding pipe plug and install sensors/sending units calibrated to your vehicle's gauges or warning lights. The normal oil pressure sending unit's mounting location is at the rear of the engine, on top. The normal water temperature sending unit mounting location is on the water pump housing.

2. **Ignition System** - Hemi crate engines are shipped with a Mopar distributor that is prepped to run with ECU P4120505, a 1 Ohm ballast resistor P5206436 and wiring kit P3690152 (each sold separately). Or if you prefer a capacitive discharge system order controller P4876728. Basically this ignition system requires 12 volts from the vehicle. A battery-in-trunk system is a concern because the battery's full 12 volts may not be delivered to the ignition system. Note - a fully charged battery's voltage, measured across the terminals is over 13 volts. Firing order is 1-8-4-3-6-5-7-2.

2a. **Spark advance** - The 426 Hemi can have the total spark advance set to 32 degrees while the 472 and 528 engines should use only 28 degrees total spark advance. Total advance is the sum of the initial spark advance plus the centrifugal advance with the vacuum disconnected or non-functional. Once timing is set remember to reconnect your vacuum line to the vacuum advance unit on your distributor.

3. **Engine Oil** - The Hemi Crate Series engines are shipped without engine oil, although a small amount may be present. Since the engine has NO oil, oil must be

added to recommended level BEFORE initial start-up. Use only oils with high zinc and phosphorous additives to protect the camshaft and lifters. Though many other brands will suffice, we recommend Mobil Delvac, Joe Gibbs Racing Oil XP4 or XP6, Chevron Delo 400 or Valvoline VR1 racing oil. Another alternative is to add Comp Cams additive (#159) to the engine oil before initial start up and at each oil change.

Make sure that you use matching dipstick and tube. If not or if in doubt, calibrate the dipstick to the pan. To calibrate, once engine is assembled, pan, dipstick and tube and filter all installed, carefully put in one quart less than the pan design calls for - 5-6-7 quarts. For example, if pan calls for 6 quarts, then use 5. Once in, pressurize engine with oil pump turning the shaft counter-clockwise to get oil pressure. Be sure to mark your distributor's location before removal and recheck timing after reinstallation. Let system set for two minutes, and then check actual oil level on dipstick. File notch at this level to indicate the one quart low condition. Then add one more quart to full pan capacity and check dipstick again. File another notch at this level to indicate "full".

4. **Carburetion** - Carburetion and carburetor jetting can be a major factor in engine performance. The 426 Hemi Crate engine is designed to use a 750 cfm Holley single 4bbl carb - P4349228. The 472 and 528 Hemi engines are designed to use the 850 cfm Holley single 4bbl carb - P5249808. Note: on the 426 you can consider using an 850 Holley, P5249808, for added horsepower, but it results in less torque and drivability.

Using different carburetors or jetting may affect the engine's power output. However, owners may use any carburetor with which they are most familiar or comfortable. Care should be exercised not to run the Hemi engine in a lean fuel/air condition as engine damage may result. Signs of a lean fuel/air mixture are spark detonation, rough idle, low power at lower RPM levels and/or a severe drop in idle RPM when the auto



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transmission is placed in gear. Other indications are a high rpm miss-fire, or a lean surge at steady highway speeds.

5. **Fuel System** - Install new fuel filters when installing a Hemi crate engine. The fuel cap should be removed and the fuel lines blown out with low pressure (under 5 psi) air prior to initial fire up. A mechanical fuel pump, P4007039AB, is available along with a fuel pump pushrod kit, P5249569. An electric fuel pump like P4007038 can be used separately or in conjunction with a mechanical pump on the Hemi engines especially for drag racing. If you have a 6 or non-440 V8 engine or must fabricate the fuel line, use 3/8" fuel line.

6. **Fuel Requirements** - The 426 and 472 Hemi engines are constructed with a 9.0:1 nominal compression ratio and the 528 Hemi is 10:1. Each can be operated on gasoline rated no lower than 93 octane on the "pump (R + M)/2 scale" but race fuel is recommended.

7. **Exhaust System** - The choice and installation of an exhaust system is left to each purchaser. The B and E Body production cars used cast iron exhaust manifolds which can be used with Hemi crate motors but we would only expect them to fit B & E Body vehicles. The A and B engine cast exhaust manifolds cannot be used! B-Body cast exhaust manifolds do not fit the A-Body vehicle. If exhaust headers are preferred or you are installing your Hemi engine in a custom application, headers are available through several sources such as TTI Products, Hooker, Hedman and others.

When installing or fabricating an exhaust system, the exhaust system must not contact any of part of the vehicle while the engine is running or at rest. A clearance of at least (1) one inch must be allowed in all directions for the entire exhaust system. For safety reasons, special care should be taken to ensure that neither the steering linkage nor any electrical wires can come into contact with any component of the exhaust system.

426 and 472 crate engines have a stock heat riser passage located on the rear of the intake manifold. This can be made functional using stock Hemi heat riser components. The 528 crate engine is not equipped to run exhaust heat through the intake manifold.

8. **Cooling system** - Hemi crate engines come with the aluminum water pump installed. The radiator should be a production Street Hemi unit for the model vehicle being used. A pure drag car can use a smaller radiator for less weight. We recommend using our viscous drive for the actual fan, P4120758. The radiator hoses can be common with any B/RB engine (383 or 440) from that car. If a non-production radiator is used, then lengths or inlet/outlet sizes may not match the regular B or Hemi water pump. Fill the cooling system with a 50/50 mix of high-grade ethylene-glycol anti-freeze and distilled water. An 8 lb radiator cap is also recommended.

9. **Starter** - The production starters are fine as long as you have a complete package which is especially important for the manual trans group. If you do not have a starter and don't have a complete system, then we recommend our lightweight unit, P5007860.

#### AFTER INITIAL START UP

1. **Oil Pressure** – Just prior to start up remove spark plugs and spin the engine for 30 seconds. IMMEDIATELY upon initial start up, check to ensure the engine is developing oil pressure. IF NO OIL PRESSURE IS INDICATED, TURN THE ENGINE OFF. Double check the oil level and repeat the procedure to prime the engine, or prime the engine with an oil priming shaft (P4286800) and electric drill operated in a counter-clockwise rotation. Be sure to mark your distributor's position before removal since spark timing was set before shipping the engine. If no oil pressure can be detected, call 1-888-528 HEMI for technical assistance and



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instructions. Continue only when oil pressure is established.

2. **Check for Leaks** - Look under the car for fluid leaks - coolant, oil, transmission or power steering fluids. Check all hose connections for coolant leaks. Check the exhaust system for exhaust leaks. If leaks of any kind are detected, turn off the engine and correct the leaks before proceeding.

3. **Engine RPM and Ignition** - After oil pressure is established, proceed with setting the ignition timing. Limit the engine to no more than 3000 RPM. An initial setting of 28 degrees total or LESS is recommended for all Hemi crate engines until "broken-in". See item 2a above.

4. **Exhaust Smoke on Startup** – One characteristic of the original Hemi engine is that the spark plug tubes are designed to seal against the cylinder head as long as the spark plugs are installed. Once the plugs are removed oil can seep between the tube and the cylinder head. This oil can appear as blue smoke on initial startup after spark plugs have been removed but it should dissipate quickly. Be aware of this condition when performing leak down or compression tests as a small amount of oil in the cylinder can affect these readings.

5. **Check Engine Temperature** - Hemi crate engines are built with 180 degree thermostats. Engine temperature should not have risen above this level while performing the steps listed above. An engine temperature exceeding 200 degrees indicates a severe cooling system problem such as a collapsed lower radiator hose, low coolant level, blocked airflow to the radiator and/or a bad radiator. Investigate and correct any and all cooling system problems before driving the vehicle.

6. **"Break In" Procedure** - Follow the schedule listed below to break-in the engine:

First 30 minutes of operation (engine under load): Do not subject the engine to full throttle, limit the engine speed to 3000 RPM and vary the engine speed (do not cruise at a steady RPM level) as you drive. Keep a close watch on the engine oil pressure and coolant temperature. Discontinue operation if the oil pressure drops below 10 psi while idling or 30 psi while driving or if the coolant temperature rises above 200 degrees. Turn engine off and re-inspect for leaks. Inspect for loose mounting bolts and/or linkage.

For the next 30 minutes of operation: Limit the engine speed to 4500 RPM. Give the engine five or six full throttle applications, separated by light throttle applications of 4 to 5 minutes each. Listen for spark detonation while under full throttle. Adjust the ignition system as outlined in the installation instructions.

For the next (3rd) 30 minutes of operation: Limit the engine speed to 5500 RPM. Alternate light, medium and full throttle applications with part throttle cruising.

At 1 1/2 to 4 hours of operation: Normal engine usage. After 4 hours, or 200 miles of operation, drain the oil and remove the oil filter. Install a new oil filter (P4452890) and refill the engine with 5 quarts of 10w-30, 10w-40 or 20w-50 engine oil which meets or exceeds an SAE rating of 'SG'. SAE30 or SAE40 single grade oils may also be used. Use only oils with high zinc and phosphorus additives to protect the camshaft and lifters. Though many other brands will suffice, we only recommend Mobil Delvac, Joe Gibbs Racing Oil XP4 or XP6, Chevron Delo 400 or Valvoline VR1 racing oil. Another option is to add Comp Cams additive (#159) to the engine oil before initial start up and at each oil change.

7. **Tappet Adjustment Procedure** – Hemi crate engines are built with hydraulic tappets which should not require adjustment. However, the rocker arms are common between mechanical and hydraulic tappets and are equipped with adjuster screws.



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With the camshaft on base circle turn the adjustment screw until the lash at the rocker tip is zero. Then turn the adjusting screw down 1-1/2 turns. Torque the lock nut to 25 ft-lbs. Repeat for all valves.

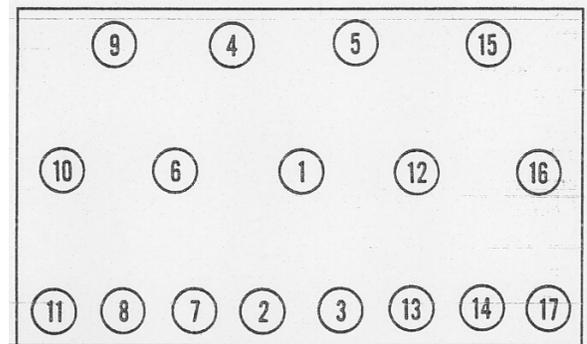
The following procedure will assure proper position of the camshaft when making the adjustment. An indicating light may be used in the ignition primary circuit to more clearly define the various positions of the camshaft.

Crankshaft Position	Intake	Exhaust
#1 TDC Firing	#2 & #7	#4 & #8
Rotate crank 180° to #4 TDC Firing	#1 & #8	#3 & #6
Rotate crank 180° to #6 TDC Firing	#3 & #4	#5 & #7
Rotate crank 180° to #7 TDC Firing	#5 & #6	#1 & #2

### TORQUE SPECIFICATIONS

Main Cap to Block	
Vertical Bolts (torque first)	100 ft-lbs
Cross Bolts (torque second)	45 ft-lbs
Water Pump to Housing Bolts	30 ft-lbs
Water Pump Housing to Block Bolts	30 ft-lbs
Thermostat Housing Bolts	30 ft-lbs
Oil Pan to Block Bolts	180 in-lbs
Oil Pan Drain Plug	20 ft-lbs
Oil Pump to Block Bolts	32 ft-lbs
Oil Pump Cover Bolts	10 ft-lbs
Timing Cover to Block Bolts	16 ft-lbs
Distributor Clamp Bolt	200 in-lbs
Oil Gallery + Fuel Pump Pushrod Plugs	23 ft-lbs
1/8" Pipe Plugs	15 ft-lbs
3/8" Pipe Plugs	23 ft-lbs
1/2" Pipe Plugs	33 ft-lbs
Alternator Bracket to Block Bolt	40 ft-lbs
Alternator to Block Bolt	30 ft-lbs
Alternator Adjuster Bolt	200 in-lbs
Rod Bolts (with moly lube)	63 ft-lbs

Cam Sprocket Bolts	40 ft-lbs
Rear Seal Retainer to Block Bolts	30 ft-lbs
Rocker Arm Shaft Bolts	30 ft-lbs
Rocker Arm Jam Nuts	21 ft-lbs
Intake Manifold Mounting Bolts	
Outer Eight Bolts	48 in-lbs
Inner Eight Bolts	72 in-lbs
Intake Manifold Heat Shield Bolts	89 in-lbs
Carburetor to Intake Nut	200 in-lbs
Valve Cover Nuts	53 in-lbs
Spark Plugs	25 ft-lbs
Crank Damper Bolt	135 ft-lbs
Fuel Pump / Block Off Plate Bolts	30 ft-lbs
Cylinder Head Fasteners	
Initial Step Torque	50 ft-lbs
Final Torque (aluminum heads)	67 ft-lbs
Final Torque (iron heads)	72 ft-lbs



Cylinder Head Fastener Torque Sequence

For technical assistance regarding this product, please contact the Mopar Performance Tech Line Monday-Friday, 7:00am - 3:00pm EST at 1(888) 528-HEMI or 1(888) 528-4364.



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#### MOPAR PERFORMANCE CRATE ENGINE ASSEMBLY 90-DAY LIMITED WARRANTY

MOPAR PERFORMANCE CRATE ENGINE ASSEMBLIES – Crate engine assemblies not used in competition are warranted for “parts only,” AS DELIVERED against defects in materials or workmanship for 90 days from the date of purchase. The following covered components for Performance Engine Assemblies, which prove to be defective in materials or workmanship, will be replaced on an exchange basis for 90 days: cylinder block and all internal parts; cylinder head assemblies; intake manifold; core plugs; valve covers; oil pan; timing gear and / or chain and cover; water pump; gaskets and seals.

Chrysler, Dodge and Jeep vehicle and parts warranties are voided if the vehicle or parts are used for competition or if they fail as a result of modification.