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Automotive Engine Warranty

THIS LIMITED WARRANTY IS IN LIEU OF AND EXCLUDES ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

COMPLETE ASSEMBLY/LONG BLOCK - Whichever shall occur first:

36 MONTH UNLIMITED MILEAGE NO-FAULT: Passenger Cars and Light Trucks up to $\frac{3}{4}$ ton except motor homes* and special use vehicles* listed below. **This warranty covers parts and labor as described in Remanufacturer's Limited Warranty for a period of 36 months unlimited miles.**

24 MONTHS/24,000 MILES: Trucks 1 ton and over except motor homes* and special use vehicles* listed below. This warranty covers parts and labor as described in Remanufacturer's Limited Warranty.

12 MONTHS/12,000 MILES: All taxi cabs, Ford Mustang Cobra, GT, Ford F-150 Lightning and Harley Davidson Pickups Equipped With A Supercharger, or any other application equipped with an OEM Supercharger. *No-fault excluded.

This warranty covers parts and labor as described in Remanufacturer's Limited Warranty.

3 MONTHS: Stationary, agricultural and industrial. This warranty covers parts and labor as described in Remanufacturer's Limited Warranty. *No-fault excluded.

MOTOR HOMES: *No-fault excluded.

- **Class B and C:** These being built on Dodge, or General Motors "cutaway chassis" or van chassis will be warranted under the standard Eagle Engine warranty. Coverage excludes labor for removal and replacement of accessories not specific to the original manufacturer's chassis
- $\frac{1}{2}$ ton thru $\frac{3}{4}$ ton for standard 3 year 100,00 miles
- 1 ton for standard 2 year 24,000 miles
- **Class A:** These being "purpose built" chassis or truck chassis in excess of 11,000 lb GVW will carry a parts only 6 month 12,000 mile warranty.

This warranty is subject to the standards described in the Remanufacturer's Limited Warranty.

*** ALL TRUCK AND VAN CHASSIS EMERGENCY SERVICE VEHICLES AND RAILROAD VEHICLES WITH HIGH RAIL EQUIPMENT ARE EXCLUDED FROM THIS WARRANTY**

DIESEL ENGINES: (includes vans and pickups in commercial use) are warranted for a period of 12 months unlimited mileage. In no event should the total amount of Labor cost exceed \$600.00 for repair or replacement of a diesel engine. *No-fault excluded.

PERFORMANCE ENGINES: Engines up to 500 HP are warranted for a period of 12 months. Engines 500 HP or more carry a startup warranty only. In no event should the total amount of labor cost exceed \$450.00 for repair or replacement of a performance engine. *No-fault excluded.

NEW AND FACTORY SURPLUS are warranted for 12 months unlimited mileage for passenger car and trucks up to $\frac{3}{4}$ ton. Over $\frac{3}{4}$ ton 12 months / 12,000 miles. *No-fault excluded.

RACE AND/OR HOT ROD APPLICATIONS are excluded from any and all warranty coverage regardless of cause.

- (A) Warranty service is available by calling 1-800-811-9328 Monday through Friday during the hours of 7:00 AM to 5:00 PM Central Standard Time. No repair of the product will be covered by this warranty without the specific prior knowledge and consent of Eagle Engine.

Return of defect shall be made to Eagle within (30) days of discovery and prior to the expiration of the warranty.

- (B) Eagle will, at its option, repair, replace or refund any Eagle remanufactured product which is determined to be defective in material or workmanship, upon receipt of product, via pre-paid shipment to: Eagle Engine Sales, Inc.
- (C) Eagle's liability under this limited warranty, for the cost of labor for removal and reinstallation of any engine which is found to be defective in material or workmanship and which is repaired or replaced is limited to the labor expense determined from Hours at flat rate listed in All Data Labor Time Guide at a pre-approved rate of \$50.00 per hour for new and factory surplus engines, and up to \$50.00 per hour on remanufactured engines. Eagle's liability for parts-replacement is limited to only jobber cost of parts (i.e. gasket kit, oil pump, etc.) Prior approval by Eagle for all such cost of labor for removal and reinstallation is required.
- (D) This warranty is also expressly in lieu of all other obligations or liability, including liability for indirect incidental, consequential or special damages or any other economic loss with respect to the sale or use of the items warranted. Some states do not allow limitations on how long an implied warranty lasts or the exclusion or limitation of incidental or exclusions may not apply to you.
- (E) This warranty does not apply to normal maintenance or adjustments, normal wear due to working conditions, failure of associated parts, components and assemblies not included in the sale of the product, products which have been damaged by improper installation, accident, misuse, or neglect or which have been repaired or altered by someone other than Eagle Engine or its authorized representative, or to products used outside specified application including marine, stationary uses, propane conversion, or to products which are not operated in accordance with the printed instructions of seller or which have been operated beyond the rated capacity of the product; or to products damaged by overheating and/or improper lubrication.
- (F) This warranty is as fully integrated document consisting of the entire scope of the warranty to original purchaser and no agent, employee or representative of seller has any authority to bind seller to any affirmation, representation or warranty is specifically included within this document. There shall be no oral modifications to this warranty and any legal rights, and you may also have other rights which may vary from state to state.
- (G) The no-fault portion of the warranty covers the first time non-manufacturing responsible defect for the unit value and installation labor up to the original coverage timeline.

Dry start, foreign object damage, lack of lubrication, over speed, cracked head or block, detonation or pre-ignition, overheating and shipping damage are all examples of covered failures under the no-fault service agreement.



Parts and labor warranty under the no-fault agreement is limited to the first time failure of the assembly. Multiple failures due to non-manufacturing defects are not covered. Engines that are used in a manner that violates the terms of the standard warranty or used for purposes other than their original intended use is not covered. Do it yourself repairs and repairs performed by unlicensed repair facilities are not covered.

WHAT IS NOT COVERED

- (1) Towing charges, fluids, refrigerant, gas, filters, lay up time, lodging, car or truck rental or any other substitute transportation, telephone or telegraph charges, travel, damage to personal property, commercial loss, normal diagnostic time, or loss of revenue or other matters not specifically included.
- (2) Engines or internal parts that were improperly installed, damaged due to alterations, misuse, neglect, abuse or accidents, damage from the environment, or damage caused by improper maintenance.
- (3) Routine regularly required maintenance such as lubrication, changing filters, engine tune up, belts and hoses, any type of fluids or any other normal maintenance service all vehicles require.
- (4) Melted or broken pistons due to detonation or preignition, cracked blocks or heads due to overheating, damage caused by foreign objects dropped or drawn into cylinders or crankcase.
- (5) Any engine which has been improperly installed or fails because of defects or inefficiency of parts or units not furnished with the engine (carburetors, air filter, fuel pump, brake booster, etc.). Any engine operated under conditions causing greater than normal wear; or used for purposes for which it was not originally designed (such as stationary power units, race car, etc.).
- (6) Any engine installed in vehicle for which engine was not specified by engine re-manufacturer as original equipment option (such as passenger vehicle engine installed in truck or RV). Engines which operate on propane or any fuel other than gasoline.
- (7) Gaskets not installed by the remanufacturers are the responsibility of the installer and are not covered under this warranty.
- (8) Engines shipped out of the continental United States.
- (9) Eagle Engine assumes no liability for parts and/or labor after a warranty claim has been denied for any reason. Therefore, it is critical that all Eagle procedures are followed and proper field diagnosis is performed to insure future warranty coverage of replacement engines or parts.
- (10) All engine blocks and cylinder heads have a HEAT TAB attached to them. A heat tab is a metal disk with a special center material that is designed to melt, distort, or dimple if the engine exceeds a safe operating temperature. **THE WARRANTY IS VOID IF THE HEAT TAB IS MISSING, MELTED, DISTORTED OR DIMPLED IN ANYWAY.**
- (11) All vehicles equipped with an Engine Oil Cooler **MUST** be replaced at the time of engine installation. Failure to replace the Engine Oil Cooler will void warranty in cases of contamination or lack of lubrication. (Installer must provide proof of replacement at time of installation. Flushing of oil cooler is not acceptable.)

(12) Any alleged warranty engine that has been in service for a period of 12 months or longer may be subject to a factory inspection prior to replacement.

ADDITIONAL LIMITATIONS AND PURCHASER'S OBLIGATIONS:

- (a) The engine must be installed by an N.I.A.S.E. certified technician or equivalent.
- (b) The oil and filter must be changed after the first 500 miles of service, and at recommended intervals thereafter.
- (c) Recommended installation procedures must be followed and recommended parts associated with the installation must be replaced to validate warranty.
- (d) This Limited Warranty is void on engine assemblies if the Warranty Registration Card is not completed and mailed to re-manufacturer within ten (10) days of installation. Warranty coverage begins at date of original purchase.
- (e) The warranty applies to the original purchaser only, and may not be transferred.
- (f) Labor allowances are determined from the hours listed in the All Data Labor Guide and Parts Manual and are compensated for at a rate of \$50.00 per hour at flat rate. The maximum labor allowance to remove and replace an engine in motor home shall not exceed \$420.00. This includes motor home applications. You must call 1-800-811-9328 to exercise this coverage.

REMANUFACTURER'S RESPONSIBILITIES AND LIABILITY:

The liability of remanufacture under this warrant is limited solely to the repair or replacement of defective parts or workmanship, except as otherwise may be provided by applicable state law, re-manufacturer shall not be liable for any incidental, special, consequential or exemplary damages, of for any service not expressly provided for herein, relating to or arising from failure of the engine or its internal parts.

PURCHASER'S RESPONSIBILITIES IN THE EVENT OF ANY ENGINE PROBLEM WITHIN THE WARRANTY PERIOD:

- (a) **WHO TO CONTACT:** Contact the seller of the engine. The seller is the administrator of the warranty and will contact the re-manufacturer. You will be referred back to your installer or to a repair facility, (The seller is the business from which the engine was purchased.)

If you are in another town or state, likewise contact the seller. You will be directed to a pre-approved repair facility near you.
- (b) **PRIOR APPROVAL:** All warranty repairs, including any replacement parts or labor charges, must have prior approval of re-manufacturer. It is the seller's responsibility to contact remanufacture in event of a warranty problem. Your failure to contact the seller to obtain prior approval for any warranty repair will void the owner's warranty.
- (c) **RETURN OF PARTS:** Claims for repair work must be substantiated with the defective parts and work order. Upon arrival at re-manufacturer's factory, all claimed defective merchandise is inspected. Credit will be allowed providing that the engine or part is defective in material and/or workmanship — and is within the warranty period.
- (d) **AUTHORIZED REPAIRS:** Any repair that has been authorized by re-manufacturer must be guaranteed by the dealer or garage making the repair. Repairs or replacement do not extend the warranty period beyond the time/mileage period of the original purchase.



Transmission Warranty

THIS LIMITED WARRANTY IS IN LIEU OF AND EXCLUDES ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE

AUTOMATIC TRANSMISSION

Passenger Cars (includes vans and pickup trucks up to 3/4 ton for personal use) are warranted for a period of 36 months / 100,000 miles. Some models carry a 18 month / 50,000 mile warranty. See invoice for details.

Trucks (includes 1 ton vans and pickup trucks, all commercial use vehicles) are warranted for a period of 36 months / 75,000 miles.

Emergency Vehicles and Motor Homes: 12 months or 12,000 miles, whichever comes first.

Standard Transmissions: 12 months or 12,000 miles, whichever comes first.

ALLISON TRANSMISSIONS

AT- 2 year/Unlimited Miles AT School Bus – 3 year/Unlimited Miles MT – (School Bus – 2 year/Unlimited Miles) MT - 18 month/Unlimited Miles HT – 18 month/Unlimited Miles MD – 18 month/Unlimited Miles HD – 18 month/Unlimited Miles 1000 – 2 year/Unlimited Miles 2000 Series 18 month/Unlimited Miles School Bus – 3 year/Unlimited Miles B Series – 18 month/Unlimited Miles

Eagle Engine Sales, Inc. warrants that it will replace, repair, or refund at its sole option, any remanufactured transmission or part supplied by Manufacturer, which is defective in material or workmanship, for 36 months or 100,000 miles whichever comes first. 36 months or 75,000 miles whichever comes first on "Bulletproof" automatic transmissions, and 12 months 12,000 miles on manual transmissions. This warranty is limited to the first retail purchaser of the remanufactured transmission ("the Purchase"). This warranty is limited to defects in workmanship and material furnished by Manufacturer and is not an unconditional guarantee against all hazards or failures (see Exclusions and Limitations to Limited Warranty).

If it is determined that a remanufactured transmission or part furnished by Manufacturer is defective in workmanship or material, Manufacturer will allow a labor allowance (certain restrictions apply, see Warranty Labor Allowance). The labor allowance shall be credited to Purchaser only upon a determination that a remanufactured transmission or a part supplied by Manufacturer is defective in material or workmanship. The limited warranty period commences on the original date of sale to the retail Purchaser. In the event a replacement-remanufactured transmission is provided to the Purchaser pursuant to this warranty, the warranty period does not start over on the date the Purchaser is supplied with the replacement. The warranty period runs from the original date of sale to the Purchaser and is not extended by supply of a replacement.

There are no warranties that extend beyond the description herein. All other warranties express or implied, including but not limited to, all warranties of merchantability and fitness for a particular purpose are hereby disclaimed and excluded by Manufacturer. Manufacturer transfers only such title or rights as it has and the goods. No statement or undertaking whether a condition, warranty or otherwise, is given by Manufacturer that the goods do not comprised or include patented, and registered or protected designs inventions or equipment or trademark or copyright material. The above limited warranty is void and will not apply in the event the Purchaser does not follow the vehicle manufacturer's instruction or in any way abuses the vehicle. The above warranty does not apply to goods supplied to vehicles used for racing or any type of vehicular competition. In the event that any provision of this warranty should be or become invalid or unenforceable because of any laws or court action, the remaining terms and conditions hereof shall remain in full force and effect.

EXCLUSIONS AND LIMITATIONS TO LIMITED WARRANTY

This Limited Warranty does not warrant against and does not cover damage or loss due to the following:

1. MISUSE, MAINTENANCE NEGLECT, ABUSE, VANDALISM, ABNORMAL OPERATION OR ACCIDENTS.
2. DEFECTIVE OR IMPROPER INSTALLATION.
3. ENVIRONMENTAL CONDITIONS, OVERHEATING OR FREEZE CRACKS.
4. LACK OF LUBRICANTS OR FLUIDS.
5. IMPROPER COOLING SYSTEM FLUSHING.
6. FAILURES TO COMPONENTS OR PARTS NOT FURNISHED BY MANUFACTURER OR OTHERWISE APPROVED BY MANUFACTURER FOR INSTALLATION, OR COMPONENTS OR PARTS UNSUITABLE FOR USE WITH A WARRANTED REMANUFACTURED TRANSMISSION OR PART.
7. ABNORMAL WEAR AND TEAR OR USE OF A REMANUFACTURED TRANSMISSION OR PART WHICH IT WAS ORIGINALLY INTENDED OR A CHANGE FROM ORIGINAL APPLICATION.
8. INTERNAL MODIFICATION WITH AFTER-MARKET PERFORMANCE PARTS.

This Limited Warranty does not cover or provide credit for the following: Replacement fluids or other substances; towing charges, vehicle rental, or other substitute transportation; diagnostic time, labor (except as set forth herein) or service call; gaskets or other parts or items associated with but not included with this limited warranty; transportation charges or lodging; loss of time, income, sales or profits; loss of the use of vehicle; telephone calls or communication expense; lift, truck or storage fees; tune-ups or replacement of hoses or maintenance items; routine or regularly required maintenance; injury or death to persons or damage or destruction of property; or, consequential, incidental or punitive damages.



CONDITIONS TO COVERAGE

This Limited Warranty is subject to the conditions set forth below. Failure to comply with these conditions will void this Limited Warranty.

1. A registration card must be filled out completely by the installation facility and returned to Eagle Engine Sales, Inc. in order to validate the warranty.
2. A remanufactured transmission or part that is furnished as a replacement under this Limited Warranty for a remanufactured transmission or part found to be defective is warranted only for the unexpired warranty period remaining on the original defective remanufactured transmission or part.

This Limited Warranty is of no force or effect while any payments for remanufactured transmission or parts remain outstanding. Claims for transmission parts must be made at the initial delivery to the Purchaser of the remanufactured transmission.

3. Warranty claims shall be called in to Eagle Engine Sales, Inc at 1-800-811-9328. Eagle Engine Sales, Inc. reserves the right to request of the original repair order before a warranty claim is authorized.
4. Failed units must be returned to Eagle Engine Sales, Inc facility within 30 days. Failure to do so will result in the warranty claim being denied and the installer will be charged for the replacement warranty unit. To return a core, please contact Eagle Engine Sales, Inc.
5. Eagle Engine Sales, Inc. reserves the right to charge back the cost of the unit, shipping costs , and labor charges should it be determined by us that the failure was caused by improper installation, abuse, misuse lack of maintenance, neglect or any other condition not covered by this warranty.
6. Any alleged warranty transmission that has been in service for a period of 12 months or longer may be subject to a factory inspection prior to replacement.
7. All alleged warranty parts, along with a shop labor bill must be received by Eagle Engine Sales, Inc within 60 days of opening the warranty claim. After 60 days warranty will be considered inactive and closed with no labor or parts credit allowed.

TRANSFER OF WARRANTY

Transfer Procedure. This limited warranty is transferable by any Purchaser to the next owner(s) of the vehicle in which the remanufactured engine/transmission was installed during the term of the limited warranty as stated above, provided Manufacturer receives written notice of transfer of title from the original owner and payment of \$150.00 within thirty (30) days of the date of title transfer. The notice must include the Manufacturer's serial number, the previous owner's name as registered with Manufacturer, vehicle information, the name of the current owner(s) of the remanufactured transmission and the date of original purchase from the Manufacturer. Failure to file the required transfer notice and pay the required \$150.00 fee within thirty (30) days shall relieve Manufacturer of any obligation to such next owner(s) under the terms of this Limited Warranty. No transfer of the warranty shall extend the warranty term provided by this Limited Warranty.

WARRANTY UNIT LABOR ALLOWANCE

A labor allowance may be issued upon request at the Manufacturer's discretion. A labor allowance may only be issued in the first two (2) years of the applicable warranty period and no labor allowance will be provided by Manufacturer in the third year of this Limited Warranty. In the third year of an applicable warranty period, Manufacturer will supply the Purchaser with a replacement remanufactured transmission. In order to receive a labor allowance, the Purchaser must have first contacted Eagle Engine Sales, Inc at 1-800-811-9328 and speak with the Technical Department. The Purchaser must receive a "claim" number for the transmission. The Manufacturer must have been contacted "prior" to the removal of the transmission that is allegedly defective. Upon receiving the allegedly defective transmission, the Manufacturer will thoroughly inspect, analyze and determine the reason for failure. Valid reasons for an allowance to be issued include remanufacturing error, part failure, and torque converter failure. Installer, vehicle, wrong application or other (no problem found) claims will not receive labor allowance. In addition, the Manufacturer reserves the right to bill the purchaser for any installation damage, abuse and damage due to improper cooling system flushing.

Labor allowance credits will be given pursuant to the following schedule:

AUTOMATIC TRANSMISSION LABOR ALLOWANCE

The labor allowance credit shall be provided by the Manufacturer at \$50 per hour pursuant to the All Data Labor Time Guide for the work to be conducted. Provided, however, no more than \$525.00 shall be credited as a labor allowance hereunder.

MANUAL TRANSMISSION AND TRANSFER CASE LABOR ALLOWANCE

The labor allowance credit shall be provided by the Manufacturer at \$50 per hour pursuant to the All Data Labor Time Guide for the work to be conducted. Provided, however, no more than \$250.00 shall be credited as a labor allowance hereunder.

ALLISON TRANSMISSION LABOR ALLOWANCE

The labor allowance credit shall be provided by the Manufacturer at \$60 per hour pursuant to the Allison Labor Time Guide for the work to be conducted. Provided, however, no more than \$400.00 shall be credited as a labor allowance hereunder.

No other labor allowance credit shall be provided by Manufacturer other than as specified above.



Suggested Installation Procedures and Instructions for Gasoline Engines

TO INSTALLING MECHANIC OR TECHNICIAN

This engine has been carefully remanufactured to precision standards. It will perform properly IF certain steps are taken by the person making the installation.

An engine is a complex component that requires the highest degree of technical knowledge to install. It is recommended that you, the installer, have an ASE certificate or the equivalent before you accept the RESPONSIBILITY of properly installing an engine.

When a properly remanufactured engine fails to give satisfactory service, it can be due to detonation, pre-ignition or “lugging,” overheating or excessively rich air-fuel ratio, under-lubrication, dirt, coolant seepage, ineffective air filtering. The above mentioned reasons for failure are the responsibility, and under the control, of the installing mechanic/technician not the engine rebuilder.

CAUTION, these recommended installation procedures and instructions are a partial list intended only as a guide. If you are not qualified to undertake this installation, do not attempt it as you may be liable for resulting engine failure.

Replacing all of the following with new or rebuilt/remanufactured units is recommended: valve lifters, oil pump, push rods, rocker arms, oil pump screen with new screen, spark plugs, points (if applicable), condenser, motor mounts, oil filter, air filters, water pump, thermostats, PCV valve & grommets and clean lines (Note: A plugged line or faulty valve may cause excessive oil consumption and blowby), carburetor (may be rebuilt) and make sure the EGR valve is operating to OEM specifications.

Follow the manufacturer's installation procedures; especially proper torque values. Inspect the rocker cover baffle for possible restrictions.

Contamination is an engine's worst enemy. We recommend that you thoroughly clean parts that will be attached to the rebuilt/remanufactured engine.

Any and all parts not included with a remanufactured engine or engine component should be cleaned properly before installing on a new remanufactured engine.

INSPECTION OF ENGINE PRIOR TO INSTALLATION

- Check for freight damage and dirt contamination of the engine.
- Check for proper valve train timing.
- Check that ALL oil gallery plugs are installed, tight and sealed.
- Check that ALL freeze plugs are installed and sealed.
- Check that temperature recording labels or heat tabs on the block and the heads are installed.
- Check application of product - make sure the mounting holes, bell housing, crank shaft snout, flywheel mounting flange, bolt hole patterns, pilot shaft hole, smog/non-smog application, etc., are the same on new product as the old by comparing casting numbers.
- Clean all accessories to be transferred to the new product, from the old one. Resurfacing of the intake manifold and machine gasket surfaces is required.

TIMING COVERS

- Inspect for erosion, breakage, warpage, porosity and abnormal wear patterns.
- Measure covers containing oil pump for wear and replace if not within OE tolerances.
- Install new timing chain tensioners, dampers, etc.

VALVE LIFTERS - Flat, Roller, HLC (Hydraulic Lash Compensators)

- Install new lifters and inspect push rods on short blocks to avoid camshaft wear and premature failure.
- Pre-lube cam & lifters with extreme pressure lube.
- Do not preload lifters (it causes undo stress to camshaft and lifters which may lead to early failure).
- Lifter rattle at cold start is not uncommon, and does not cause engine damage.
- Roller Lifters may be reused if within OE specs.
- Hydraulic Lash Compensators (HLC) are generally reusable, but may need to be purged of all air.

DRIVE PULLEY (Harmonic Balancer)

- Check seal surface of pulley hub and repair or replace if grooved or damaged (harmonic balancer seal surface wear sleeves may be available).
- Lubricate seal surface prior to installation to prevent damage to seal.
- Check outer ring for slippage as this could cause "O" timing mark to not indicate top dead center.
- Replace balancers set in rubber. (The interior rubber deteriorates with age, allowing the balancer to slip, possibly causing timing problems and detonation, overheating, vibration and unexplained noises).

CYLINDER HEAD TORQUE

- Properly torque cylinder head at installation to OE specifications in the correct sequence. (Use new bolts when OE requires).

VALVE LASH

- Consult shop service manual for dry lash setting for nonadjustable rocker arms.
- Check dry lash at time of installation (if applicable).
- Check and adjust lash at 500 miles (if applicable).

INTAKE MANIFOLD MUST BE CLEANED

- Clean off carbon (remove steel heat shield, if equipped, clean and reinstall).
- Magnetic particle inspect or die check for cracks.
- Blow out with compressed air to avoid having foreign material enter combustion chamber.
- Remove baffle (where applicable) so that all collected contaminants can be removed.
- All EGR passages must be cleaned and free of obstruction.
- Do not over torque manifold bolts. Use OE torque specifications and sequence ONLY.
- Do not glass bead intake manifolds to clean.
- Check water outlet for corrosion.

ROCKER ARM ASSEMBLIES

- Check for wear and replace if necessary (remanufactured units are available).
- Confirm proper shaft installation as some can be installed upside down. Excessive oil consumption may result.

DISTRIBUTOR

- Check bushing, mechanical advance, vacuum advance, and total advance.
- Check to see that distributor is fully engaged and locked in the oil pump to proper depth.
- Adjust ignition timing to factory specifications.
- Check distributor drive gear for wear and replace as needed.

FUEL SYSTEM

- Carefully service or replace all aspects of the fuel system, i.e. pump, lines, carburetor or fuel injection components.



- Check fuel lines for breaks and crimps. Use only approved steel lines.
- Check fuel pump for proper pressure.
- Check double diaphragm type for faulty vacuum booster which may pump oil through the intake system.

FILTERS

- Replace all filters at time of installation and at O.E. recommended intervals. These filters include air, oil, fuel, and crankcase.
- Use cleaning procedure outlined previously above to clean air cleaner housing, crankcase vent tubes coolers, air compressors, Donaldson valves, etc.

THRUST BEARING

- Adjust clutch to proper free pedal BEFORE starting engine, NOT after.
- Check crankshaft end thrust before and after bolting transmission to engine.

PLEASE NOTE! - excessive main bearing thrust wear may be caused by the following:

1. clutch not adjusted properly
2. interference between pilot shaft and crankshaft
3. interference between torque converter & crankshaft
4. torque converter ballooning
5. blockage and/or restriction of transmission oil cooler
6. bent, kinked, or damaged supply lines
7. incorrect crankshaft end thrust

Preventing the causes of thrust bearing failure is the responsibility of the installing technician!

RADIATOR/COOLING SYSTEM

- Recore or replace the radiator and test flow.
- Verify thermal conductivity. Minimum of 25°F temperature differential between inlet and exhaust.
- Always replace pressure cap and thermostat.
- Check temperature sending unit fan switch.

HEAT RISER OR EXHAUST THERMOSTAT CONTROL

- Check to see if unit is free and operating properly.
- Lubricate with special high heat formula.
- Make sure hot air door operates freely on air cleaner.

OIL SYSTEM

- Fill to proper level.
- Use only OE specified lubricants or equivalent to full levels before operation.
- Use a pressure tank at about 40 pounds pressure to prime (pre-lube) engine as this will insure vital parts are lubricated properly to avoid a dry start. (Spinning of the oil pump to accomplish this is not recommended).
- If pressure tank is unavailable, use an aftermarket assembly lubricator kit for prelubing of system before initial fire up (follow recommended procedures). Call for further information.
- Install new oil pump and pickup screen. Install new oil filter filled with new oil prior to installation.
- Check oil pump intermediate shaft for correct size and shape to match distributor and oil pump, if applicable.
- Oil pump may need to be primed before starting. (Run at 800 rpm at intervals before releasing to customer for use to assure proper cylinder lubrication.)
- Replace oil pressure sending unit.

RUBBER GOODS

- Don't overlook small parts such as belts, hoses (those that carry liquids and air) and motor mounts which become weak and worn with age. We suggest that these items be replaced at time of engine replacement.

ACCESSORIES

- Be sure to service and inspect accessories such as alternator, starter, water pump, air compressor, fuel system, EGR valves and all sensors to avoid premature engine failure.

FLYWHEEL

- On engines that use a 1-piece full circle rear main seal and flangeless flywheel mounting system, over torque of the flywheel bolts may distort the rear seal area and cause an oil leak.

ENGINE START-UP

- Check oil pressure.
- Engine should start, excessive cranking may be present.
- Check for oil and water leaks.
- Install radiator cap after coolant is observed to be circulating (some thermostats air lock and prevent proper circulation of coolant).

MODULATOR VALVE (located on automatic transmission)

- Pull off lines, if valve is defective, oil may be present.
- Replace if above condition is observed, as it may allow transmission fluid to enter engine through vacuum system and prevent proper ring seal.

EXHAUST MANIFOLD PRESSURE & SYSTEM

- Replace oxygen sensor with a low pressure gauge.
- Run engine at 2500 RPM for 1 minute.
- High pressure reading should be less than 2.5 pounds.
- A pressure reading over 2.5 pounds indicates an exhaust system restrictions which will cause engine damage. Check catalytic converters and exhaust systems for restrictions.
- Inspect exhaust manifold for internal and external cracks, especially on marine applications.

ENGINE ANALYSIS

- Make an engine analysis data sheet (either a diagnostic printout or handwritten form) showing the status of the engine and the Engine Support System before installation, after installation and at the 500 mile checkup.
- Check engine or service engine soon lights (computer-control problems).
- Check for any trouble codes, this may be a clue to why the engine previously failed.
- Check for correct vacuum hose routing and for vacuum leaks.
- Replace distributor, wiring, coil, and spark plugs to avoid poor performance. On V-8's, check plug routing.
- Final road test vehicle, do not return to customer unless you consider vehicle operating according to OE specifications
- Give customer printout of exhaust gas analysis.

- | | | |
|----------------------------------|------------------------------------|---|
| • Load sensors | • EGR flow sensor | • Knock sensor |
| • M.A.P. | • Airflow sensor | • Halleffect switch |
| • V.A.C. | • Coolant temperature sensor | • Turbo boost limiting system (wastegate) |
| • BARO | • Crankshaft position sensor | • Torque converter clutch |
| • Throttle position sensor (TIS) | • Engine RPM sensor | • Road Speed sensor |
| • Stepper motor | • Electronic spark controls | • Oil and temperature sending Unit/gauges * |
| • Mixture control solenoid | • Idle speed control (ISC) | |
| • Incorrect PROM (on GM cars) | • Air temperature sensor | |
| • Catalytic Converter Sensor | • Air conditioning sensor (switch) | |
| • EGO sensor | | |

On computerized emission control systems, check the following items that are applicable:

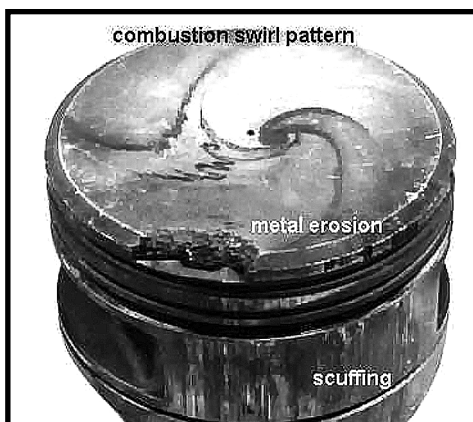
* The failure of some of these sensors can result in abnormal combustion temperatures and pressures, blown head gaskets, burnt pistons, piston scuffing and burnt valves, bearing failure and lack of power and may result in eventual engine failure.



Caution

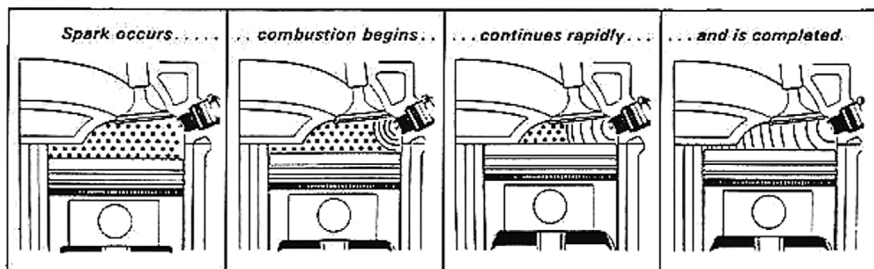
Detonation and Preignition

The piston shown here is an example of the damage resulting from detonation and preignition. Broken piston rings, sheared ring lands and holes in piston heads—all resulted from these two common types of abnormal combustion.



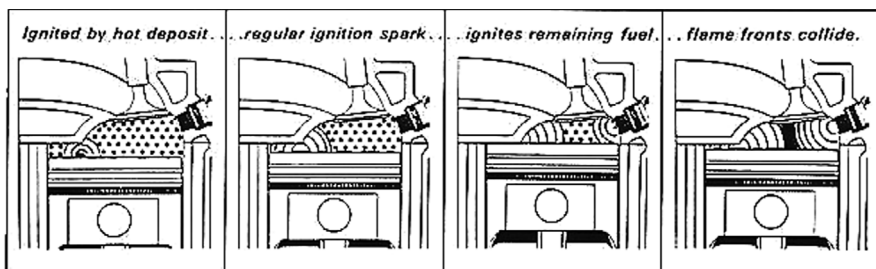
Normal Combustion

To understand abnormal combustion, it is first necessary to realize the nature of normal combustion. When the spark occurs at the beginning of the power stroke, the fuel-air mixture does not all burn at the same instant. The flame front moves rapidly, but with controlled speed, from the point of the spark to the outer edges of the combustion chamber. Abnormal combustion occurs when the fuel burns in a different manner from that described above.



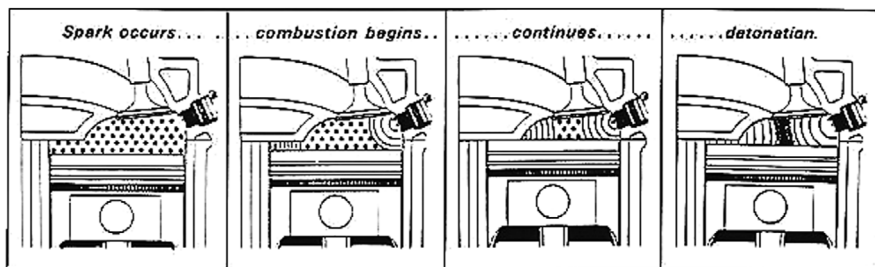
Detonation

Detonation is the burning of a portion of the fuel charge before the spark originated flame front reaches it. It happens in the following manner: When the spark occurs, the fuel around it burns, it tries to increase in volume. But since it is confined and not allowed to expand, the burning fuel raises the pressure in the combustion chamber much above the pressure resulting from the compression stroke. This rise in pressure also affects the fuel not yet reached by the flame front. When pressure goes up, so does temperature. Thus the temperature of the unburned fuel is raised, and the fuel may ignite before the flame front reaches it. This combustion produces a sound known as “engine knock”.



Preignition

Preignition is the igniting of the fuel charge before the regular ignition spark. If the premature combustion is completed before the occurrence of the regular ignition spark, there may be no identifying noise. However, if the regular ignition spark follows shortly after the preignition, there will be a pinging noise when the two flame fronts collide. Also, preignition can lead to detonation (just as detonation can lead to preignition), and in this case there will be a very distinct knocking sound. Actually, these two types of abnormal combustions are so closely linked that it sometimes becomes difficult to accurately define where one condition ends and the other begins. Inspection of the damaged pistons and rings may reveal which condition has been present. Since the violent explosion resulting from detonation is usually located at the inside of the combustion chamber opposite the spark plug, the damage usually is at the ringlands on the side of the piston head, as opposed to damage in the center of the piston head. Preignition, on the other hand, results in a very violent explosion involving the entire combustion chamber, and thus the piston gives way at its weakest point. In most cases this will be the center of the piston or the intermediate lands will be sheared. In addition, the extreme pressures and temperatures accompanying preignition are so violent that they remove carbon deposits and keep the piston extremely clean.



The damage resulting from preignition and detonation usually means that the piston must be replaced. For this reason, it is important to know the conditions that contribute to detonation and preignition so they may be prevented. The chart below is an outline of the principal causes of abnormal combustion.

Detonation

Cause

- Lean fuel mixtures.
- Fuel of too low an octane rating.
- Ignition timing over advance.
- Lugging the engine. (An engine is being lugged when further depressing the accelerator produces no increase in engine speed.)
- Excessive carbon deposits on piston and in combustion chamber.
- Increasing engine compression ratio by excessive milling of cylinder heads or use of a thinner gasket, etc.

Preignition

Cause

- Carbon deposits that remain incandescent.
- Valves operating at higher than normal temperature because of improper seal with valve seats.
- Hotspots caused by an inefficient or damaged cooling system.
- Spark plugs that run too hot for the given application or plugs with cracked or broken ceramic cores.
- Detonation or the conditions leading to it.
- Sharp edges in the combustion chamber.

Your Limited Warranty

A Must Read Document

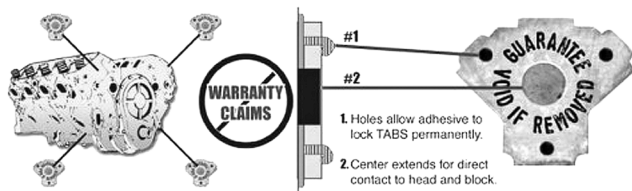
We warranty our engine assemblies for a period of 36 months/unlimited miles against defects in materials and workmanship, but we limit our liability to our replacement of defective material supplied by us. **NO LABOR REIMBURSEMENT IS IMPLIED OR INTENDED.** We will not be responsible for damage to parts that were not furnished by us. We will not be liable for damage to an engine assembly or cylinder head due to improper installation, lack of lubrication, overheating, or the presence of dirt or foreign material.

THE FOLLOWING IS VERY IMPORTANT

All engine blocks and cylinder heads have a heat tab attached to them.

**HEAT TABS
DO NOT FALL OFF**

A heat tab is a metal disk with a special center material that is designed to melt, distort, or dimple if the engine exceeds a safe operating temperature.



The warranty is void if the heat tab is missing, melted distorted or dimpled in any way.

Terms and Conditions of Sale

1. EFFECT OF THESE TERMS AND CONDITIONS OF SALE. The following terms and conditions shall apply to all quotations, purchase orders, order acknowledgments and other documents, dealings and transactions relating to the sale of Seller's goods. Buyer's ordering, acceptance or use of any goods of Seller shall constitute an acceptance of the following terms and conditions. Seller shall not be deemed to have waived any of the following terms or conditions, even if Seller fails to object to any contrary or inconsistent provision appearing on, attached to, or incorporated by reference in any purchase order or other document issued by Buyer. Seller's acceptance of any such purchase order or other document of Buyer shall be conditioned upon the understanding that these terms and conditions shall control, notwithstanding any such contrary or inconsistent term or condition of Buyer.

2. PRICES. Unless otherwise agreed upon in writing by Seller, all prices, payments and references thereto shall be in U.S. dollars. Prices do not include freight charges. All goods are shipped F.O.B., Carol Stream, Illinois, or Lakeland, Florida U.S.A. Additionally, prices do not include sales taxes, use or excise taxes, import or export duties, special financing fees, value added taxes, income or royalty taxes, special permits or licenses, or similar charges. Buyer shall either pay such charges or provide Seller with acceptable exemption certificates.

3. PAYMENT. All orders are subject to Seller's approval. If Seller deems Buyer's financial condition or payment practices to be unsatisfactory, cash payment or other security may be required. If Buyer fails to meet such requirements, Seller may discontinue the delivery of goods to Buyer and treat such failure at any time thereafter as reasonable grounds for the lawful termination of any pending order. Seller shall have the right to issue invoices to Buyer upon readiness of goods for delivery, unless otherwise agreed upon in writing by Seller. Unless otherwise specified by Seller, invoices shall be due and payable NET 30 DAYS following date of invoice without regard to delays of transportation or inspection. Interest shall accrue on any overdue payment at the rate of 1.5% per month, or at the maximum lawful rate of interest, whichever is less. Buyer hereby grants Seller, and Seller shall retain, a security interest in all goods shipped or delivered to Buyer until payment of the total purchase price is received. Seller shall have the right to take all lawful measures to protect and preserve Seller's security interest in the goods, including, but not limited to, the filing of Uniform Commercial Code financing statements.

4. TITLE AND RISK OF LOSS. All goods supplied to Buyer shall have marketable title, free and clear of any security interest, lien or encumbrance of any third party. Title to, and risk of loss, shall pass to Buyer upon notice to Buyer of readiness of the goods for shipment. Freight and shipping obligations shall have no bearing on transfer of title or risk of loss. Claims for damages or shortages attributable to Seller must be filed with Seller within 10 days following receipt of goods or notice of loss, whichever occurs first, and must be accompanied by Seller's packing slip and a detailed description of any such claim.

5. LIMITED WARRANTY. Except as otherwise specifically set forth herein, Seller warrants only that the goods supplied to Buyer shall be free from defects in materials and workmanship when properly installed and operated under normal conditions and in accordance with all applicable instruction manuals, recommendations and specifications. This limited warranty shall begin on the original invoice date, specific to the terms described in this Manual / Warranty listed on pages 2-3. To obtain consideration under this limited warranty, Buyer must first send written notice to Seller in Carol Stream, Illinois, U.S.A., stating in what respects the goods are believed by Buyer to be defective. Failure to give notice within the warranty period shall be a waiver of this limited warranty and no assistance or other action thereafter taken by Seller shall be deemed to extend or revive the warranty period. Any goods believed by Buyer to be defective shall be returned by Buyer to Seller's facility in Carol Stream, Illinois, U.S.A., transportation prepaid, for examination by Seller. No goods shall be returned to Seller unless Buyer first obtains a return authorization from Seller. If, in Seller's sole judgment, the goods returned by Buyer are not defective or for some other reason are not covered under this limited warranty, Buyer shall pay Seller's applicable service time charges for said examination. If, in Seller's sole judgment, the goods returned by Buyer are defective and covered under this limited warranty, Seller shall have the option of repairing, rebuilding or replacing such goods, at its charge, provided that such goods are returned to Seller's facility in Carol Stream, Illinois, U.S.A., transportation prepaid. This limited warranty shall not apply to products which, in Seller's sole judgment, have been the subject of negligence, abuse, accident, misapplication, tampering or alteration; nor shall it apply to products damaged by acts of God, war or civil insurrection, acts of terrorism, improper installation, operation, maintenance or storage, or other than normal application, use or service, including, without limitation, operational failures caused by corrosion, erosion, wear and tear, rust or other foreign materials in the system in which they are utilized. Further, this limited warranty shall not apply to any products, parts, accessories or other goods not manufactured by Seller, provided that Seller, upon request by Buyer, shall advise Buyer of any warranties known to Seller that may be offered by the manufacturer of such goods. This limited warranty shall not cover, and Seller shall not under any circumstances be liable for, damages for injuries to persons or property; loss of product; loss of profits; loss of use; expenses of labor, travel or other items relating to the removal or replacement of defective goods; damages resulting from the removal of defective goods or the installation of repaired, rebuilt or replaced goods; expenses relating to the transportation of goods to and from Seller's facility; any consequential, incidental, contingent or special damages, whether arising in contract, in tort or under statute; or any other damages or expenses not agreed upon in writing by Seller, even if Seller has been advised of the potential for any such damages or expenses. THIS LIMITED WARRANTY IS IN LIEU OF ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, ALL WARRANTIES OF MERCHANT-

ABILITY AND FITNESS FOR A PARTICULAR PURPOSE OR USE. No person is authorized to give any other warranty or to assume any other liability on Seller's behalf.

6. FORCE MAJEURE. In no event shall Seller be liable for any non-performance, delay in performance, or any other variation from Seller's performance obligations, nor for any loss or damage to any goods supplied to Buyer, when occasioned directly or indirectly by any cause beyond the reasonable control of Seller or its suppliers, vendors, subcontractors, or other representatives or agents, including, but not limited to, communication line failures; power failures; natural disasters or acts of God; acts of criminals or a public enemy; war; riot; acts of terrorism; official or unofficial acts, contracts, regulations or restrictions of any foreign or domestic governmental agency; acts of Buyer or its employees, representatives or agents; strikes or labor difficulties; or failures, shortages or delays in Seller's usual sources of labor or materials. Seller shall automatically be entitled to a reasonable extension of all periods of performance when delayed by any such cause.

7. MODIFICATION OR SUSPENSION OF ORDERS. Requests by Buyer for any modification or change of any order, including, but not limited to, any change in specifications, quantities or delivery obligations, shall be subject to Seller's written consent, and may result in adjustments to prices and delivery schedules. Any request by Buyer for a suspension of any order or a delay in any delivery shall be in writing, and shall be subject to the written consent of Seller. Such suspensions or delays may result in adjustments to prices, payments and delivery schedules. The time required for the subsequent fulfillment of any order may exceed the period of suspension or delay due to Seller's scheduling constraints or other reasons.

8. ASSIGNMENT/SUBCONTRACTING. Seller shall have the right to assign any of its rights or obligations under any order, and shall be entitled to subcontract the performance of any of its obligations under any order. Any attempted assignment by Buyer of any of its rights or obligations under any order shall be null and void in the absence of Seller's prior written consent.

9. INDEPENDENT CONTRACTOR. At all times, Seller shall be deemed an independent contractor of Buyer, and not a partner, joint venturer, employee or agent of Buyer.

10. LIMITATION OF LIABILITY. To the full extent permitted by laws, Buyer waives all rights against Seller for any damage to its property or that of third parties, or for injury to any person, however caused. In no event shall Seller's total liability exceed the specified purchase price of the goods covered by the applicable order.

11. REGULATORY COMPLIANCE. Buyer shall comply with all applicable laws, regulations and rules governing goods supplied by Seller, including, but not limited to, safety and health standards, environmental regulations, technical standards, and export controls.

12. SELLER'S OPPORTUNITY TO CURE. In the event that Buyer believes that Seller is not in full compliance with its obligations hereunder, Buyer shall notify Seller in writing and Seller shall have the right to remedy the alleged non-compliance within 30 days following its receipt of said notice.

13. VENUE; WAIVER OF JURY TRIAL. BUYER HEREBY IRREVOCABLY SUBMITS TO THE JURISDICTION OF ANY STATE OR FEDERAL COURT SITTING IN CHICAGO, ILLINOIS, OVER ANY ACTION OR PROCEEDING BASED HEREON, AND BUYER HEREBY IRREVOCABLY AGREES THAT ALL CLAIMS IN RESPECT OF SUCH ACTION OR PROCEEDING SHALL BE HEARD AND DETERMINED IN SUCH STATE OR FEDERAL COURT. BUYER HEREBY IRREVOCABLY WAIVES, TO THE FULLEST EXTENT IT MAY EFFECTIVELY DO SO, THE DEFENSE OF AN INCONVENIENT FORUM TO THE MAINTENANCE OF SUCH ACTION OR PROCEEDING. BUYER IRREVOCABLY CONSENTS TO THE SERVICE OF ANY AND ALL PROCESS IN ANY SUCH ACTION OR PROCEEDING BY THE MAILING OF COPIES OF SUCH PROCESS TO BUYER AT ITS ADDRESS AS SPECIFIED IN THE RECORDS OF SELLER. BUYER AGREES THAT A FINAL JUDGMENT IN ANY SUCH ACTION OR PROCEEDING SHALL BE CONCLUSIVE AND MAY BE ENFORCED IN ANY OTHER JURISDICTION BY SUIT ON THE JUDGMENT OR IN ANY OTHER MANNER PROVIDED BY LAW. BUYER KNOWINGLY, VOLUNTARILY AND INTENTIONALLY WAIVES IRREVOCABLY THE RIGHT IT MAY HAVE TO TRIAL BY JURY WITH RESPECT TO ANY LEGAL PROCEEDING BASED HEREON, OR ARISING OUT OF, UNDER OR IN CONNECTION WITH ANY ORDER. BUYER SHALL REIMBURSE SELLER, UPON DEMAND, FOR ALL COSTS AND EXPENSES (INCLUDING REASONABLE ATTORNEYS' FEES AND COURT COSTS) INCURRED BY SELLER IN ANY ACTION OR PROCEEDING.

14. INTERPRETATION. These terms and conditions shall be governed by and construed in accordance with the laws of the State of Illinois, including such State's Uniform Commercial Code, without giving effect to principles of conflict of laws. Whenever any conflict exists between these terms and conditions and any provision of such Uniform Commercial Code, these terms and conditions shall govern. The section headings contained herein have been inserted for convenience only, and shall not be considered in interpreting any term or condition hereof. If any term or condition contained herein is found to be invalid or unenforceable, it shall be deemed stricken herefrom without affecting the remaining terms or conditions hereof.

15. NOTICE. All notices required hereunder shall be in writing and delivered by overnight delivery or certified or registered mail, postage prepaid, return receipt requested. Any such notice shall be deemed to have been given on the date it is received, even if refused, during regular office hours at the address listed on the applicable order or at such other address as the affected party may have previously designated for notices.

notes