

PARTS PRO CLASSIC



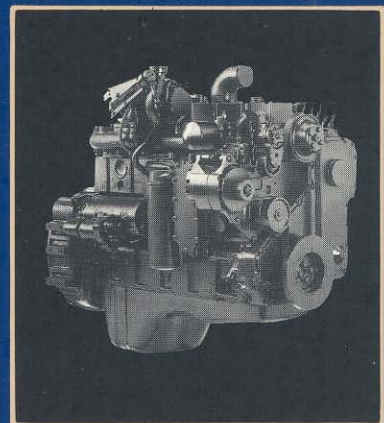
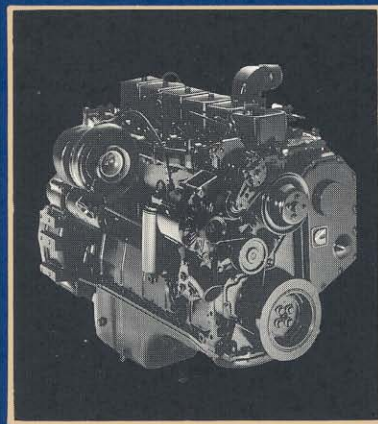
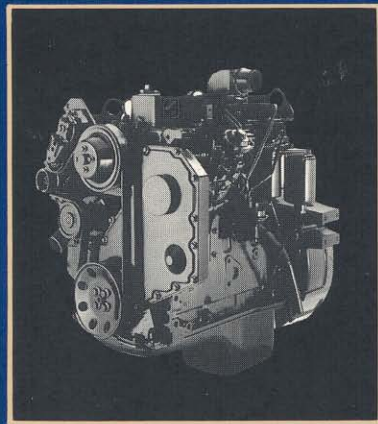
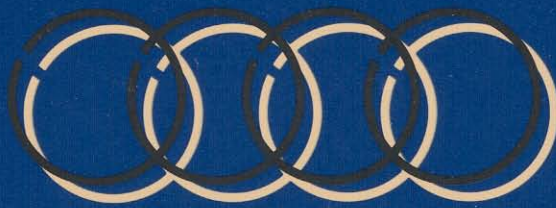
CLASSIC EDITION #16

Parts Pro Classic is provided as a historical reference. Special offers, prizes and awards no longer apply to this edition. Current Parts Pro issues along with all Parts Pro Classics may be found at [click\) qsol.cummins.com](http://qsol.cummins.com).



Cummins

Parts Professional 16



—INVEST IN BEST—

Parts Professional 16 Reply Card

Check here if this is a new address

Current Address

Old Address (if applicable)

Name _____ Name _____

Street _____ Street _____

City _____ State ____ Zip _____ City _____ State ____ Zip _____

Distributor Code _____
(if applicable)

Dealer Code _____
(if applicable)

Comments or Suggestions:

Dealer Name _____



Fill this card out and send it in to help us maintain our mail list.



Fill this card out and send it in to be put on the Parts Professional mail list and receive future issues. **Cards must be completely filled out in order to be processed.**

Parts Professional 16 Enrollment Card

Name _____

Street _____

City _____ State _____ Zip _____

Distributor Code _____
(if applicable)

Dealer Code _____
(if applicable)

Company Name _____

Street _____

City _____ State _____ Zip _____

Please send me previous issues yes ____ no ____

Welcome to Parts Professional #16!

This issue will focus on the 1991 Versions of the B and C Series engines. The population of these Mid-range engines is ever growing; therefore, they are becoming a larger part of a Parts Professional's business. Also in this issue will be some great new Tips from the Professionals.

At the front of this booklet, a reply card and enrollment card are available. We welcome any comments or suggestions you might have and encourage everyone's input. Please keep us up to date on any changes in address, and if you know of someone who is not enrolled in the Parts Professional program that should be, sign them up!

The answers for the quiz in this issue will be included in Parts Professional #17. The answers to the quiz in Parts Professional #15 follow the quiz in this issue.

Do to rising printing costs of back issues, we are making a change to binders we send out to those who do not have back issues. Our choices were to either begin charging for the previous issues in order to regain money to help with printing costs or find some way to provide the information at a lower cost. Therefore, we are going to make photo copies of the back issues #1-10 which will be used after the actual copies are all distributed. We feel that this is a way for us to continue providing this important information at no cost to you. All current issues, those printed within the last two years, will continue to be available in their actual booklet form. We hope that this will be a smooth transition into a new process that will, in the long run, benefit you, the Parts Professional.

As the new editor of Parts Professional, I would like to thank everyone for the responses I received after Parts Professional #15, it was very encouraging. Please keep the comments, tips and suggestions coming!

Continuing the tradition,
Good Luck and Good Selling!



Melissa A. Blackford

P. S. Thanks to Derek Walden for his technical advise on this issue.

TIPS

from the Professionals

1. Bill Waugh of Cummins Alberta in Lethbridge, Alberta Canada, has some advice for new Parts Professionals. Bill advises to never say it is not a Cummins part until you've checked thoroughly. He suggests keeping a journal of difficult parts to find and how you found them. Bill is definitely right when he says this tip can make the job easier for you and your fellow Parts Professionals.

2. A great phone selling tip comes from Bill Ward at Cummins Great Plains Diesel in Des Moines, Iowa. Bill says that when you are quoting ReCon engine sales over the phone, you should follow up with the customer by mailing him a copy of the engine quotation sheet. This should reach him 1 to 2 days after the phone call and in many cases he will still be in the evaluation process.

Bill suggests making the quotation as complete as possible. Besides the engine price, you should include any additional parts or grooming kits, freight costs and shop installation labor prices. Bill says that one of the biggest complaints customers have with engine sales is that they were not informed of additional billings. Thus, by being as complete as possible and following up with a copy of the engine quotation, you may find that you will increase the percentage of engines you sell over the phone.

3. Another parts man at Cummins Alberta in Lethbridge, Alberta - Canada, Robert Konynebelt, always tries to give his customers the lowest cost repair. For example, if a customer is replacing 2 head gaskets, he supplies him with a complete head set (part # 3801330) rather than 2 single head sets (part # 3801328). Robert says the key to this selling tip is to make sure the customer knows you just saved him approximately \$55.00 and he will be one HAPPY customer!
4. Mark Cush, from Cummins Ohio, has some great tips for core management. First of all, in order to keep the core business in a forward gear, he and his people designed and built a bin to organize core products. It is approximately 13 ft. long and divided into eight sections, ranging in width from 20" to 36". It houses such cores as turbos, air compressors, rods etc... Their goal was to be able to keep cores off the floor and to make packing shipments that are heading to ReCon a little easier.

Mark and his people also have an effective way of dealing with core management. It is an incentive program for the dealers to manage core returns more efficiently. Because the dealer does not have access to a good core tracking system, he needs a tool to help him. Cummins Ohio simply runs a back order report by dealer account numbers, weekly, that gives the dealer a week by week tracking system. It gives date reference number and how many days old the core due date is. The result is...90% of due core is returned within thirty days. This is an incentive to the dealer because it saves the dealer a late charge.

5. When calling on Premium Blue prospects, Jack Tullos from Cummins Mid-South, Inc. in Mississippi, reminds the customer that the 91 products are very dry engines that do not use a large quantity of add oil. Therefore, the customer will not be adding new make up oil and will not be replenishing the additive package to their system. Jack then stresses that Cummins Premium Blue and its strong additive package can mean savings on premature engine failures due to oil breaking down and wearing out parts.
6. "Selling ReCon Parts is probably one of the easiest jobs there is at Cummins Southern Plains in Oklahoma City," says Roger McComas. Roger points out the fact that the product is sound, low cost and has a good warranty; therefore, all a parts man has to do is listen when a customer is ordering a part related to a ReCon item and mention ReCon's benefits. For Roger and his people in Oklahoma City, this technique brings them a sale 95% of the time.

Their service department works very closely with their parts department. When a customer brings in a ReCon Part for rebuilding, they will let the customer know if it is more economical to rebuild or exchange. This saves the customer both money and downtime. Roger makes a good point when he says that sometimes it's the small things we do that bring customers back, and showing customers they care tops the list for the people at Cummins Southern Plains.

7. Our winning tip for Parts Professional #16 comes from Armando Serrano, a counter sales man for Cummins Southwest in Tucson, Arizona. Armando has a great tip for dealers and distributors whose lobbies are not big enough to display an engine or some cylinder kits.

Armando says, instead of displaying parts, which take up lobby space, he and his people display a number of posters and brochures of parts and engines. He suggests the poster, "Precisely Right", which shows a break-down of a cylinder kit—liner, piston and pin, and a set of rings. It also shows the three various types of cylinder kits—the standard, the premium plus and big power performer. Among others, Armando has a PT Pacer poster and posters for the new "COMMAND" engines, the LIO and the N14.

Armando also stocks racks of brochures and has a bulletin board with spec sheets for various engines—from the NTC 444 to the 4B3.9. Customers can get information "at-a-glance". Many of his customers want to know the weight or dimensions or the oil capacity of a certain engine. Rather than spend time looking up the information, Armando simply walks up to the bulletin board and points out the specific engine the customer is referring to on the spec sheet. All the information is there!!

Armando will be receiving a personalized jacket with the Parts Professional patch on it, as well as five Parts Professional Patches for his uniforms and a Parts Professional cap. In addition, our 6 other Tippers this issue will receive the Parts Professional cap and the patches. Send in your suggestions now for your chance to win prizes and to see your Tip printed in the next Parts Professional!



Editor's Note: Following are some brochures and posters along with their bulletin numbers that are available for you.

Brochures

Gaskets-Features and Benefits	3385752
Valves-Features and Benefits	3385753
Injectors-Features and Benefits	3385754
Crankshaft-Features and Benefits	3385755
Camshaft-Features and Benefits	3385756
Turbocharger-Features and Benefits	3385757
Injector Cups-Features and Benefits	3385758
C Brake Parts	3385629
ADC Fan Clutch	3385578
Cummins Fan Clutch	3385597
Pulse Exhaust Manifold	3385556
PT Pacer	3385709
Precisely Right	3385600

Posters

Precisely Right	3385733
Turbocharger	3385699

C Brake	3385630
Water Pump	3385589
Pulse Exhaust Manifold	3385109
PT Pacer	3385708

Send your Tips to:

Melissa Blackford
Editor - Parts Professional M/C 40911
Cummins Engine Company, Inc.
Box 3005
Columbus, IN 47202-3005

Rules: The Tips must be compatible with Cummins standard practices. They must relate to the sale of New or ReCon Genuine Cummins Parts or Premium Blue Oil.

Change for #14:

Parts Professional #14 indicated new 91 L1O liners were NOT to be used in pre-91 engines. Since #14 went to press, testing has verified that the 91 liner is of a stiffer construction with lighter press fit and better coolant distribution. These features reduce bore distortion in the running engine, thus provide better ring sealing and reduced oil consumption.

The latest 91 L1O cylinder head gasket or its successor **MUST** be used anytime the 91 liner is used. 91 liners may be mixed with older liners in pre-91 engines. **DO NOT** use pre-91 head gaskets on any engine containing any 91 liners.

All L1O liner and cylinder kits are being superseded to new kits containing the 91 liner. All L1O gaskets have been superseded to new sets containing the latest head gaskets.

Correction for #15:

Test question #8, option (a), "have an increased piston bore diameter", is missing the word (pin). Thus, it should read, "have an increased piston pin bore diameter". If (a) had been correct the answer would have been (d). Therefore, the correct response can be (a), (b), (c) or (d).

Important Notice

The following notice was released by Roberto Cordaro, Engine Business Group, Vice President - Marketing, announcing the cancellation of the A Series engine.

During the past year, Cummins and Cummins' distributors have made a concentrated effort to integrate the A Series engines into our product line. The volume growth we had originally projected has not materialized, thus the product is not financially viable.

However, our B Series volumes continue to accelerate rapidly, and it will be necessary to commit capital to support our B Series growth. Therefore, the decision has been made to phase the A Series engine out of the Cummins product line.

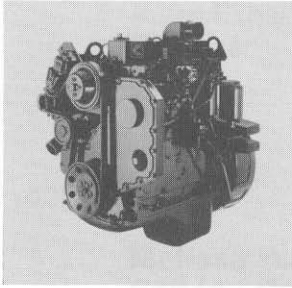
Effective March 31, 1991, no future orders for A Series engines will be accepted. The manufacturing process will continue until the orders placed by this date have been filled.

It is our intent to support this engine in terms of warranty, policy, parts bank, and any other contractual commitments which have been made.

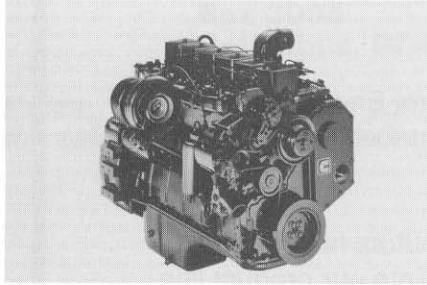
C. R. Cordaro

1991 4B3.9 and 6B5.6 Engines

4B3.9 Engine



6B5.9 Engine



With over a quarter of a million units in service in trucks and all kinds of industrial equipment, Cummins B engine durability is proven. 4 and 6 cylinder B Series engines have a reputation for delivering high torque pulling power wherever they are used. Cummins turbocharging expertise brings together a turbocharged combustion system that delivers outstanding vehicle performance in any application.

An example of the B's outstanding performance capabilities is the fact that standard rated 6BT engines accelerate from 0 to 60 mph in under 12 seconds in U.S. heavy-duty full size pickup trucks. No other production pickup diesel can match this. Cummins B Series simply stands out from the rest for high torque performance.

One very important point that should be stressed to your customers is that Cummins B series engines deliver in-vehicle fuel economy that is among the world's best, whether they are in commercial vans, 12 ton trucks, 26,500 lb GVW school buses or U.S. pickup trucks.

Cummins B Series engines contain up to 40 percent fewer parts than other diesels. Since there are fewer parts to fail in a B engine, reliability is increased. There are few external coolant or oil lines, instead, internal drillings perform the functions inside the engine.

A plus for the service and repair people is the B engines simple design. B engines set a new standard for engine service ability and repairability. Check out the accessibility and simplicity of the water pump for example.

The 1991 B Series certified automotive engines, which range from 105 - 230 hp, are a technical response to customer needs and 1991 government regulations on engine emissions. The new 4B3.9 and 6B5.9 turbocharged, charge air cooled engines have improved injection characteristics as well as increased cylinder pressure capabilities along with taking on some parts changes that we will now discuss.

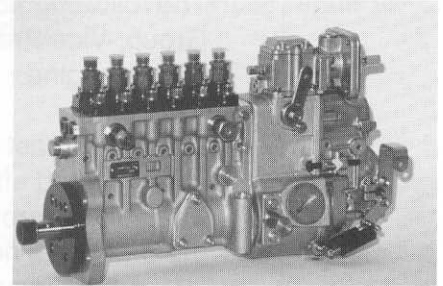
One of the major differences in the 91B engines from pre-91B engines is the various fuel pumps that are being used. The 4B certified engines will use a Bosch VP-14 rotary pump. This pump looks very similar to the current 4B rotary pump except for the addition of an external solenoid used to operate the KSB (cold start device).

Internally the 91 4B rotary pump remains very similar to the current 4B rotary pump except for some detailed changes required to increase fuel line pressure and decrease injection duration. The very few changes made to the fuel pump means that the Bosch certified distributor networks can continue to provide first class service support to Cummins distributors.

Three fuel pumps will be used on the 91 6B certified engines. The first is for engines up to, and including, 160 hp. These engines will use the Bosch VP-14 fuel pump. This fuel pump will also feature an external solenoid operated KSB and similar internal changes to those pertaining to the fuel pump for the 4B.

Engine ratings exceeding 160 hp will use the Bosch P7100 in-line fuel pump. This fuel pump

P7100 Fuel Pump



features an RQVK mechanical governor. The Bosch P7100 fuel pump represents "state of the art" fuel injection technology that is capable of supplying closely metered quantities of fuel at very high pressures for very short durations. Although technically advanced, the P7100 fuel pump is part of that Bosch service channel's "Basic Products Group". This means that all Bosch service agents in North America will have tools and knowledge to support this product.

Finally, there are ratings currently under development that will use the Nippondenso EP-9 fuel pump.

The electric fuel shutoff system is very important for the VP-14 and the P7100. The Bosch VP-14 rotary pump will have an integral fuel shutoff as does the current Bosch VE rotary pump. The shutoff is available in 12 V and 24 V activate to run and 12 V and 24 V activate to stop varieties as well as manually operated.

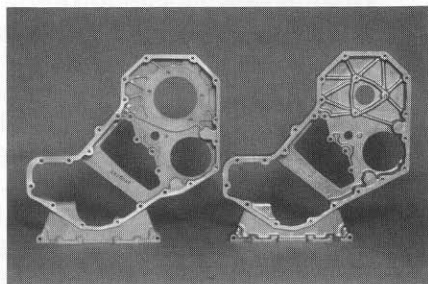
The Bosch P7100 uses an external fuel shutoff device that is mounted on the pump. The solenoid is available in 12 V and 24 V options. Also available is an electrical motor driven shutoff arrangement.

Fuel lines are also new for the 91 B engines. New high pressure fuel lines will be required for the P7100 and Bosch VP-14 fuel injections pumps. These are made from special high strength material to withstand the higher fuel pressures and are not compatible with pre-91 engines.

Various new low pressure fuel lines will be required to support the release of the Bosch P7100 inline pump and the Bosch VP-14 fuel pump on B series charge air cooled automotive engines. On engines using wastegate turbochargers, the fuel plumbing will include components that will shut off fuel supply to the engine in the event of a wastegate diaphragm failure, thereby eliminating the risk of engine damage.

Some new features specifically for the Bosch P7100 are the gear housing and gear cover. A new gear housing with revised gear centers will be released for the 91B automotive engines to accommodate the larger P7100 fuel pump. Engines using the

91 Gear Housing

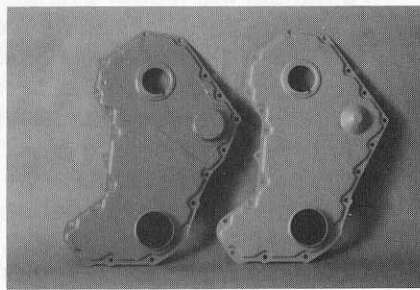


For Inline Fuel Pump

For Rotary Fuel Pump

Bosch VP14 fuel pump will continue to use the existing housing. Also a new gear cover will be released to fit the new P7100 gear housing. There will be two versions available - with and without noise dampening panels.

Gear Cover

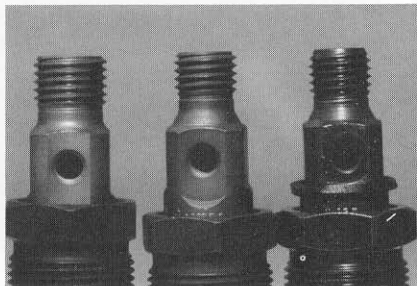


For Inline Fuel Pump

For Rotary Fuel Pump

The injectors used in 91 certified B Series engines will be similar to today's parts except that the injector inlet fitting on inline fuel pumps will increase from 12mm to 14mm and, the injector nozzle tip will change to 7mm.

Injectors



91 - For Inline Fuel Pump

91 - For Rotary Fuel Pump

Pre-91

New nozzles, having revised spray characteristics, will be used. There are four different injector part numbers for the different engine ratings.

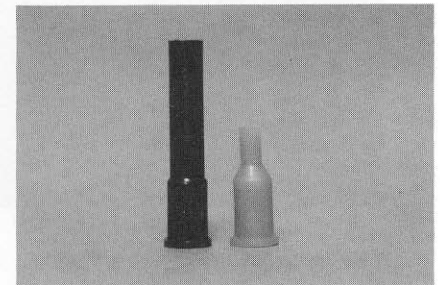
A new fuel lift pump will also be used on 91B engines using the Bosch P7100 fuel pump. This lift pump is a piston style pump that is capable of delivering increased fuel to the fuel pump. This lift pump is rebuildable and a rebuild kit has been released for this.

A new cylinder block with improved cylinder bore surface features will be released for 91 on the 4B and 6B engines. The process used to achieve this improved surface is known as Torque Plate Honing. These blocks will be used on both automotive and non-automotive configurations. There will also be minor block casting changes, but they will not affect engine installation. This new

cylinder block has several benefits, among which are reduced blowby past the rings, reduced wear on the cylinder bores and reduced oil consumption.

Also released with the new cylinder block is a new piston cooling nozzle that has higher oil flow rates and provides better directional control of the oil, thereby, resulting in improved piston cooling. The 91 style

Piston Cooling Nozzles

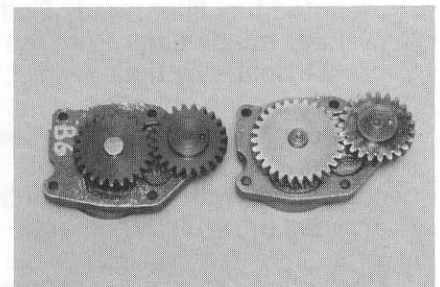


New

Old

cylinder block will be used to service pre-91 B Series engines. However, because of the larger diameter piston cooling nozzles, two new lube pumps, one for the 4B and one for the 6B, have been released with higher flow capabilities than pre-91. As a result of the higher oil flow rates a new oil cooler, pressure regulator and spring will be required.

Lubricating Oil Pump



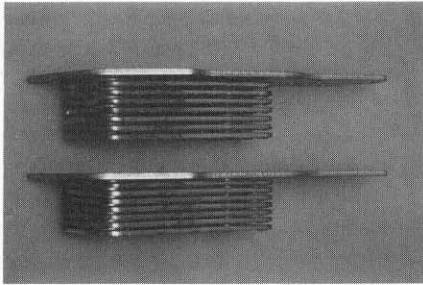
91

Pre-91

Also new for 91 are the cylinder heads for both the 4B and 6B automotive engines. The 91 4B cylinder head differs from the current head (and 91 non-automotive cylinder heads) by casting changes to the air intake ports for enhanced swirl capabilities. This improves combustion and lowers emissions.

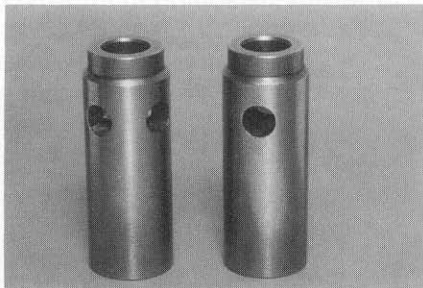
91

Oil Cooler



PRE-91

Oil Pressure Regulator



91

PRE-91

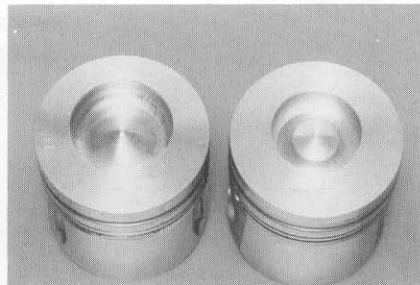
There are two new cylinder heads for the 91 6B. One for engines using rotary fuel pumps (those up to 160 hp) and one for engines using the Nippondenso EP-9 or Bosch P7100 inline fuel pumps. Cylinder heads used on 6B engines fitted with the Nippondenso EP-9 or Bosch P7100 fuel pumps will not use the integral fuel filter head boss due to the additional length of these fuel pumps. These engines will use a remote mounted fuel filter head. Both cylinder heads differ from the pre-91 heads by their swirl driven casting changes. Cylinder heads for 91B Series automotive engines are not compatible with non-automotive engines or pre-91 engines.

New cylinder head capscrews have been released for improved head gasket clamping load. The new capscrews feature "Torque-Angle" markings on the top and must be installed by using the "Torque Plus Angle" technique for reduced load variation. The new head bolts will be used in all applications of B Series produced after January 1, 1991 and can be used to service pre-91 engines.

To handle the higher cylinder pressures, a new head gasket has been released. This gasket can be used in all applications (including non-automotive) and can be used to service pre-91 engines. Two overthick versions are being developed for Q1 91 release. (.25mm and .5mm). Also, new upper gasket sets will be released.

The next major change to the 91B is the piston. New pistons will be released on B Series automotive engines having improved combustion chamber geometry. The optimized

Piston Combustion Chamber



PRE-91

91

combustion bowl will improve combustion efficiency, thereby reducing emissions.

Two piston designs are being released: one for use with the Bosch VP-14 rotary pumps and one for the Bosch P7100 and Nippondenso fuel pumps. There are two oversizes available in each version (0.5mm and 1.0mm) as well as standard.

In addition, the piston casting has been changed to accommodate a longer piston pin. The longer pin is required to withstand the higher cylinder pressure loads that will be experienced with the 91 ratings. The longer piston pin is not usable in pre-91 automotive pistons nor are pre-91 pistons usable in 91 automotive engines.

Also released are new piston ring sets that are available in 0.5mm and 1.0mm oversizes. The new ring packs feature a

Piston and Piston Pin



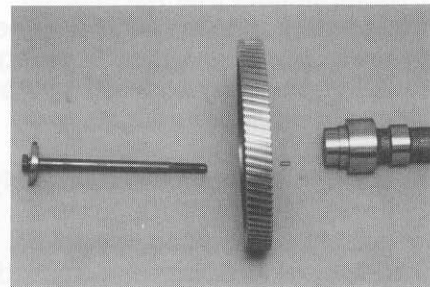
91

PRE-91

top ring having optimized geometry for blowby control. These ring sets can be used in all other versions of B series engines.

Another change for 1991 is a higher strength camshaft for use with engines using the Bosch P7100 fuel pump. This camshaft features a "bolted on" drive gear (unique for B Series). It is not possible to use the new cam in other 91B engines, nor is it possible to use it in pre-91 engines. Similarly, pre-91

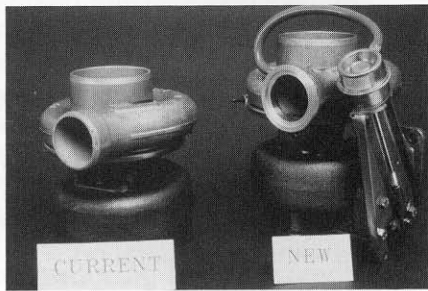
Bolted on Drive Gear of Cam



camshafts cannot be used to service 91 B series engines using the Bosch P7100 pump.

Next, a new Holset turbocharger with integral wastegate will be required on all 91 B automotive engines using the Bosch P7100 fuel pump. This turbocharger will fit on the same exhaust manifold mounting flange as do current turbos, but the addition of the wastegate and capsule has the potential to cause installation difficulties and interference with certain turbo orientations. This new turbo will be released with a half Marmon flange machined on the compressor outlet for connection to the turbo elbow. The elbow will be

Wastegated Turbocharger



Cummins B series are simply the best diesels of their type available...the benchmark by which other diesels around the world are being judged.

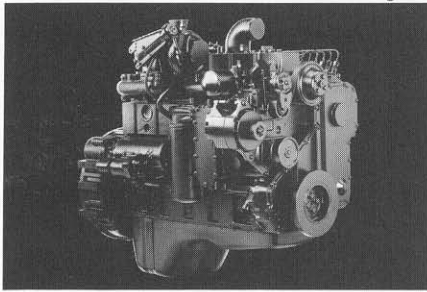
available in 90 and 45 degree angles as well as straight up and will be rotatable 360 degrees by means of the half Marmon connection.

The wastegate system diverts some of the exhaust gases to control the turbine shaft speed and compressor air delivery. This system limits the intake manifold air pressure at rated speed but increases intake air pressure at lower speeds resulting in improved torque, lower smoke, reduced fuel consumption and reduced emissions levels.

There is one 4B and one 6B intake cover for 91B charge air cooled engines. Both will be flat "4 bolt pad" type covers with 1/2 inch NPTF pipe tapped holes for air preheater temperature sensor and air compressor plumbing. Also included is a separate tapped boss which will connect the ground wire used with air intake preheaters.

Finally, new air intake connections have been released for charge air cooled engines. These intake connections are compatible with 2 1/2 inch charge air piping on 4B and 6B engines and 3 1/2 inch piping on 6B. Straight connections, 45 degree elbow and 90 degree elbow intake connections have been released for each plumbing size. Also available are premium high strength, high temperature intake hoses as well as Marmon style hose clamps. Use of these premium quality parts is mandatory to insure product reliability and durability.

C8.3 Engine



1991 C8.3

The C Series is a six cylinder engine producing from 150 to 300 horsepower. The C is available in naturally aspirated, turbocharged, jacket water aftercooled and charge air aftercooled models. They are designed to complement the smaller Cummins B Series engines in many markets as well as the larger Cummins L10 family in heavy duty applications. The key factor in the design was to deliver durability and reliability by incorporating proven Cummins features with new ideas to simplify and combine parts.

For 1991, the C Series certified automotive engines are being designed to meet new and more stringent United States EPA and CARB emissions regulations, and to respond to customer requirements for: improved engine load/speed characteristics, improved engine durability, increased engine reliability, and reduced fuel consumption. This is the first major evolutionary upgrade for the C Series. The overall strategy is to meet emissions while increasing power output by 10 percent and adding 25 percent greater durability.

In addition to delivering maximum power and fuel economy at the same time, Cummins new C8.3 COMMAND engines also deliver maximum torque that stays strong down to the lower RPMs. It's the command torque your customers need to tackle the big jobs.

And here's the best news of all: *your customer can get all this power and performance right where most of the driving gets done.*

One of the primary difference between the 91C and the pre-91C is the fuel injection system which is capable of delivering higher injection pressures for shorter injection durations. This combination of higher injection pressure and shorter duration allows for more precise fueling which results in a more efficient combustion process. In turn, more efficient combustion means less emissions, less fuel consumption and increased torque. The fuel system being used on the 91C is the Bosch P7100 in-line fuel pump (refer to 91B text photo of P7100). This is exactly like the P7100 used on the 91B Series engines; therefore, the information discussed in the B Series article on the Bosch P7100 fuel pump applies to the 91C as well.

In order to accept the high pressure fuel lines required with the P7100 fuel pump, the injectors now have larger fittings. The injection spray angle has been modified to provide optimized combustion. These injectors are unique to 91C series automotive engines. There are two new part numbers, one for 300hp ratings and one for all others.

The high and low pressure fuel line changes are similar to those made to the B engines with the Bosch P7100 fuel pump except the 91C high pressure fuel lines will have increased strength to withstand the higher fuel pressures. The new C high pressure fuel lines are not compatible with previous versions of C Series engines nor are they compatible with non-automotive 91C Series engines. The low pressure fuel lines are also similar to the B Series low pressure fuel lines in that they contain special plumbing to divert fuel if the

wastegate diaphragm fails.

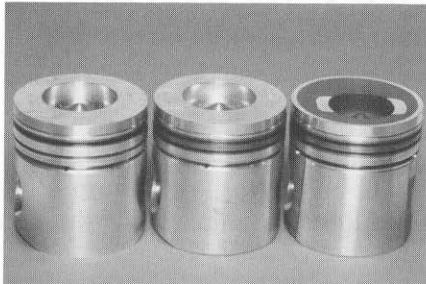
The same lift pump that was required for the 91B is being used on the 91C. This new lift pump, which supplies the required higher pressures, will be externally similar to the pre-91C Series lift pump and should have minimal installation implications.

A new gear housing will be released for 91C automotive engines to accommodate the larger Bosch P7100 fuel injection pump. The new gear housing will be similar to the current design and will not affect installation of the engine. Also incorporated on this engine will be a fully carburized front gear train. The cam, crank and fuel pump gear are all unique to certified engines. Pre-91 gears are not to be used on 91C engines.

Like the 91B engines, all C Series certified automotive engines will be charge air cooled for 91. A new intake cover with a raised 4 bolt round inlet flange has been released for these C engines and will be "standard" cover for 91 automotive engines. The raised pad feature of the cover moves the flange for the intake elbow above the high pressure fuel lines for ease of installation and serviceability. The 4 bolt hole configuration on the round flange allows an elbow to be rotated 360 degrees in 90 degree intervals.

Also released for the charge air cooled C engines are new air intake connections. These connections are compatible with 3 inch, 3 1/2 inch and 4 inch piping. Like the B engines, straight connections, 45 degree elbow and 90 degree elbow intake connections have been released for each plumbing size. Also similar to the B are the premium high strength, high temperature intake hoses as well as Marmon style hose clamps.

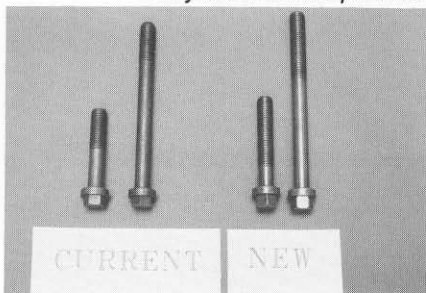
To maximize the benefits of the revised fuel injection system, other internal changes have been made to related components such as the piston combustion bowl and cylinder head intake port. The 91C piston features a revised bowl design to optimize combustion, thereby, improving efficiency and reducing fuel consumption and engine emissions. The 91C piston also incorporates several other features that will improve durability such as dual Ni-Resist Keystone ring groove, pin boss axis oil drain, stronger skirt and an anodized crown.



Single Ni Dual Ni 91 Anodized

There will be new cylinder heads released for the 91C Series automotive and non-automotive engines. The 91 automotive cylinder head differs from the current head (and the 91 non-automotive cylinder head) in two ways. First of all, there are casting changes to the air intake ports for improved swirl characteristics which in turn improves combustion and performance. Also, it has higher tensile strength which allows for increased clamping load and helps to reduce fatigue cracking. The overall cylinder head capscrew length has been increased, the threaded portion lengthened

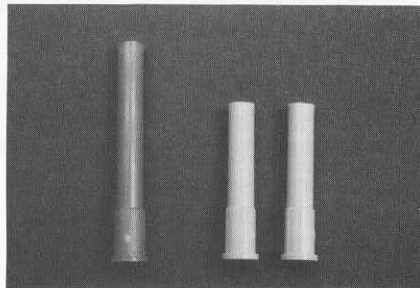
Cylinder Head Capscrews



and the hex head height increased. The tightening method for the cylinder head has been changed to the "Torque Plus Angle" method resulting in higher clamping loads. The pre-91C capscrews cannot be used to service 91C engines.

Another important change for the 91C Series is a new cylinder block. This block will be used on both automotive and non-automotive configurations. It has been redesigned to accommodate 2 piston cooling nozzles per cylinder which give a significant increase in piston cooling oil flow over the 1 nozzle per cylinder used in pre-91 blocks. The increased oil

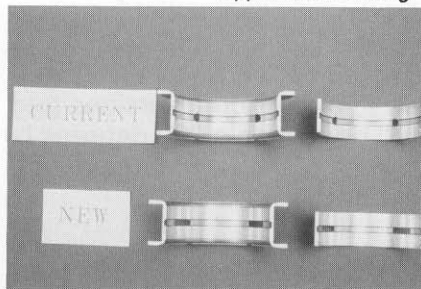
Piston Cooling Nozzles



Pre-91 91

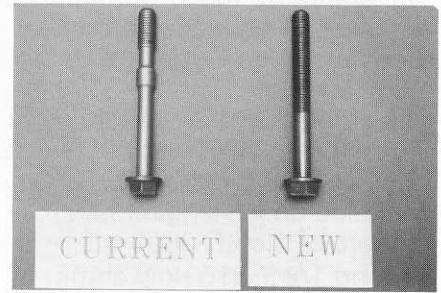
flow and improved direction greatly reduces piston crown temperatures, thereby reducing thermal loading and emissions and improving durability. The upper main bearing shell will change to allow the second piston cooling nozzle's oil to flow. This bearing will be usable in all pre-91C engines,

Upper Main Bearing



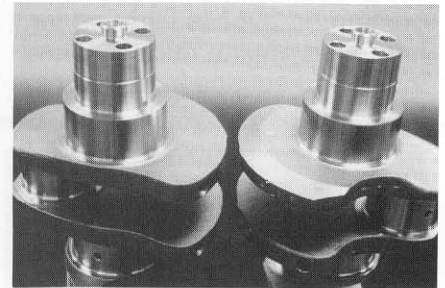
but pre-91 bearings will not be usable in 91 engines. The main bearing capscrew has been changed to have a larger diameter shank and the width across the flats on the head

increased to 21mm. These changes will improve main bearing cap clamping. The main bearing cap has changed to accept the larger capscrew shank diameter.



A crankshaft with chamfered counter weights has been released to allow clearance for the oil flow from the second piston cooling nozzle.

Crankshaft

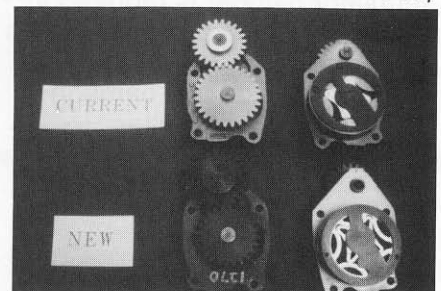


Pre-91 91

There will also be minor block casting and machining changes, but they will not affect engine installation.

In order to accommodate the increased demand of dual piston cooling and bypass oil filtration, a higher capacity oil pump was released. The rotor speed has been increased and the stator is hollow to allow filling from each side of the pump.

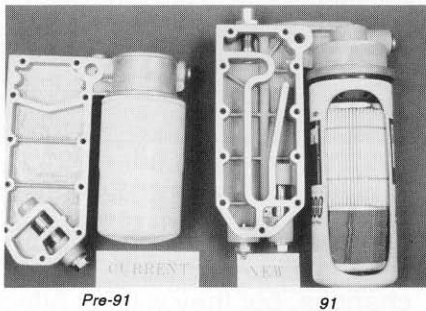
Lube Pump



The Fleetguard LF-3000 combination oil filter will be released as "standard" for 91 automotive engines. This is the same filter used today on Cummins Heavy Duty engines. The LF-3000 is the same diameter as the current C series filter, but is 3.79 inches longer. When installed on the engine, the bottom of the LF-3000 will extend 1/2 inch below crank centerline. A clearance to 2 5/16 inches below crank centerline is required to remove the LF-3000.

The oil filter head assembly is also new for 1991 automotive and non-automotive engines. The new filter head and cooler provide full flow oil cooling, a thermostatically controlled oil cooler and bypass filtration for improved engine durability and increased service intervals.

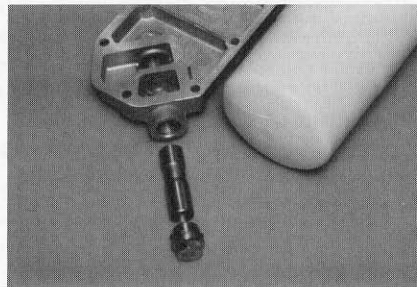
Oil Filter Head



Casting changes to this assembly increase the "thickness" of the cooler cover such that the cover and filter head extend out 1/2 inch further from the side of the block.

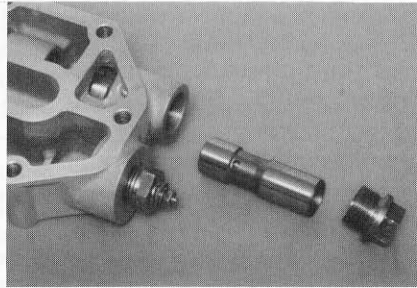
Also increased is the diameter of the pressure port in the regulator plunger in order to make the plunger more responsive. A more responsive regulator plunger is required to avoid excessive pressure spikes during cold starting because pressure spikes can damage gaskets and the oil filter.

Pressure Regulator



Pre-91

Pressure Regulator



91

Next, a new Holset turbocharger with integral wastegate will be released for those C Series engines with a rating of 225 hp or more (see 91B text photo of turbocharger with wastegate). It will fit on the same exhaust manifold mounting flange as do current turbos, but the addition of the wastegate and capsule may cause installation interference with certain turbo orientations. The addition of the wastegate moves the exhaust connection flange 1.5 inches toward the rear of the engine on a "rear out exhaust" arrangement. This new turbo will have a half Marmon flange machined on the compressor outlet for connection to a turbo elbow. The elbow will be available in 90 and 45 degree versions and will be rotatable 360 degrees by means of the half Marmon connection.

Similar to the 91B Series engines, the wastegated system diverts some of the exhaust gases to control the turbine shaft speed and compressor air delivery. This system limits the intake manifold air pressure at

rated speeds but increases intake manifold air pressure at lower speeds resulting in improved torque, lower smoke and reduced fuel consumption and reduced emissions levels.

Finally, the lower rated C Series engines will use non-wastegated turbochargers. These turbos will also feature a half Marmon flange machined on the compressor outlet.

With the C8.3, your customer gets the best of both worlds: cost savings of a small engine and durability of a heavy duty engine. This engine has a tough low weight design that makes it smaller and over 600 lbs lighter than its nearest competitor. This means more payload and bigger profits for your customer. And even though it's lighter in weight, this rugged COMMAND engine is built to last.

91B SERIES

ENGINE MODEL	POWER (HP @ RPM)	TORQUE (LB-FT @ RPM)
B5.9-230	230 @ 2500	605 @ 1600
B5.9-210	210 @ 2500	520 @ 1600
B5.9-190	190 @ 2500	475 @ 1600
B5.9-160	160 @ 2500	400 @ 1700
B3.9-120	120 @ 2500	300 @ 1700
B3.9-105	105 @ 2500	265 @ 1700

91C SERIES

ENGINE MODEL	HP @ THE COMMAND POINT	COMMAND RANGE	COMMAND TORQUE @ 1300 RPM
C8.3-210	210	1300-2400 RPM	605 LB-FT
C8.3-250	250	1300-2400 RPM	660 LB-FT
C8.3-250	250	1300-2200 RPM	800 LB-FT
C8.3-275	275	1300-2200 RPM	800 LB-FT
C8.3-275	275	1300-2000 RPM	860 LB-FT

New Parts Catalogs

Application	Bulletin Number
Revised	
KT/KTA38 Construction	3884249-01
LIO Agriculture	3884246-01
NT855 Agriculture (Big Cam III)	3884258-01
KTA19 Marine	3379568-03
NT855 Construction (Big Cam III)	3884235-01
KTTA19 Generator Drive	3884269-01
NT855 Generator Drive G2, G3 (STC)	3884262-01
C Brake	3822028-03
VTA28 Construction	3884354-01
New	
N14 Automotive (91)	3884365
310, 330, 350, 370, 410HP	
3A1.7 Generator Drive Low Speed	3884362
Heat Exchanger Cooled	3884364
C8.3 Automotive (91)	
91LIO Automotive 260, 280, 310 (STC)	3884386
91N14 Automotive CELECT 310-460hp	3884384
6BT5.9 Automotive (91)	3884388
6BT5.9 Chrysler (91.5 Pickup)	3884385

Features and Benefits

Product	Feature	Benefit	Advantage
91 4B3.9 and 6B5.9 Engines	Bosch VP-14 rotary fuel pump for 4B engine	Increases fuel line pressure and decreases injection duration Features electronic fuel shutoff	Better cold start capabilities
	Bosch VP-14 fuel pump for 6B engines up to and including 160 hp	Increases fuel line pressure and decreases injection duration Features electronic fuel shutoff	Better cold-start capabilities
	Bosch P7100 fuel pump for 6B engines exceeding 160 hp	Provides more precise fueling which results in more efficient combustion process	Reduced emissions, less fuel consumption and increases torque
	Injector inlet fitting on in-line fuel pump increased in size and injector nozzle tips changed to 7mm	Revises spray characteristics	Increased efficiency
	New cylinder block with improved cylinder bore surface and higher capacity piston cooling nozzles	Reduces blowby past the rings, reduces wear on cylinder bores, increases flow rates and improves directional control of oil	Reduced oil consumption and improved piston cooling
	Piston with improved combustion chamber geometry and casting changes to accommodate longer piston pin	Improves combustion efficiency and withstands higher cylinder pressure	Reduced emissions
	Top ring in new ring set has optimized geometry	Improves blowby control	Improved performance and durability
	Higher strength camshaft with "bolted-on" drive gear	Handles higher cam stresses	Improved durability
Holset turbocharger with integral wastegate on engines using Bosch P7100 fuel pump	Limits the intake manifold air pressure at rated speeds but increases intake manifold air pressure at lower speeds	Improved torque, lower smoke, reduced fuel consumption and reduced emissions levels	

Features and Benefits

Product	Feature	Benefit	Advantage
91C8.3 Engine	P7100 in-line fuel pump	Provides more precise fueling which results in more efficient combustion process	Reduced emissions, reduced fuel consumption and increased torque
	Modified injection spray for injectors	Provides optimized combustion	Increased efficiency
	Piston with optimized combustion bowl, dual Ni-Resist Keystone ring groove, pin boss axis oil drain, stronger skirt and anodized crown	Improves efficiency and Improves durability	Reduced fuel consumption
	Casting changes to air intake ports and higher tensile strength of the cylinder head	Improves swirl characteristics and increases clamping loads	Improved combustion and performance and reduced fatigue cracking
	Redesigned cylinder block accommodates two piston cooling nozzles per cylinder	Increases piston cooling oil flow, Improves direction and reduces piston crown temperatures	Reduced thermal loading and emissions and improved durability
	Crankshaft with chamfered counter weights	Allows clearance for the oil flow from second piston cooling nozzle	Reduced emissions and improved durability
	Fleetguard LF-3000 combination oil filter will be released as "standard"	Removes contaminants more efficiently	Increased life-to-overhaul
	Wastegated turbo-charger for engines with ratings of 225 hp or more	Limits the intake manifold air pressure at rated speeds but increases intake manifold air pressure at lower speeds	Improved torque, lower smoke, reduced fuel consumption and reduced emissions

Quiz #16

- 1) The fuel pump(s) being used on the 91B 6 cylinder engines is(are)
 - a. Bosch VP-14
 - b. Bosch P7100
 - c. Nippondenso EP-9
 - d. All of the above
2. On both the 91B and 91C engines using wastegate turbochargers, the fuel plumbing will include components that will not allow the engine to shut off fuel supply to the engine in the event of a wastegate diaphragm failure.
 - a. True
 - b. False
3. A unique feature of the 91B Series camshaft is
 - a. jagged lobes
 - b. 3 lobes per cylinder
 - c. 4 lobes per cylinder
 - d. a bolted on drive gear
4. Each 91C Series cylinder block will incorporate ___ piston cooling nozzle(s) per cylinder.
 - a. 1
 - b. 3
 - c. 2
 - d. 4
5. There is one 4B and one 6B intake cover for 91B charge air cooled engines.
 - a. True
 - b. False
6. The new oil filter head and cooler for the 1991 C engine provides
 - a. full flow oil cooling
 - b. a thermostatically controlled oil cooler
 - c. bypass filtration
 - d. all of the above
7. One of the primary differences between the 91C and the pre-91C is the fuel injection system which is capable of delivering
 - a. lower injection pressure for longer injection durations
 - b. higher injection pressures for longer injection durations
 - c. higher injection pressures for shorter injection durations
 - d. None of the above
8. There are ___ new piston design(s) for the 91B engine.
 - a. 4
 - b. 2
 - c. 1
 - d. 3

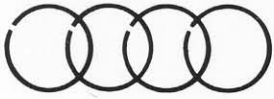
9. An advantage of the lift pump on 91B engines using the Bosch P7100 fuel pump is
 - a. its ability to reduce white smoke
 - b. its capability to deliver decreased fuel to the fuel pump
 - c. its ability to lift
 - d. its capability to deliver increased fuel to the fuel pump
10. The higher capacity oil pump on the 1991 C8.3 engine has an increased rotor speed and a hollow stator in order to
 - a. allow filling from each side of the pump
 - b. increase oil consumption
 - c. reduce weight
 - d. reduce filling from each side of the pump
11. The piston casting of the 91B has been changed to accommodate a shorter piston pin.
 - a. True
 - b. False
12. What two Cummins engines does the C Series engine complement?
 - a. B Series, L10
 - b. N14, B Series
 - c. L10, N14
 - d. L10, V903
13. On the 1991 B Series engine, a new gear housing has been released specifically for the
 - a. Nippondenso EP-9 fuel pump
 - b. Bosch P7100 fuel pump
 - c. VP14 fuel pump
 - d. None of the above
14. A new Holset turbocharger with integral wastegate will be required on all 91B automotive and non-automotive engines using the Bosch P7100 fuel pump.
 - a. True
 - b. False
15. The 91 C8.3 is approximately ___lb(s)_____than its nearest competitor.
 - a. 600, heavier
 - b. 150, lighter
 - c. 600, lighter
 - d. 400, heavier
16. The process used to achieve the improved cylinder bore surface of the 91 B3.9 and B5.9 engines is
 - a. Iron Nitride Surfacing
 - b. Electronic Discharge Machining
 - c. Torque Plate Honing
 - d. Shaving

17. The 1991 C Series automotive cylinder head differs from the current head (and the 91 non-automotive cylinder head) in what ways.
- a. casting changes to the air intake ports for improved swirl characteristics
 - b. it is stellite faced
 - c. higher tensile strength which allows for increased clamping loads and helps reduce fatigue cracking
 - d. both a and c
18. The 1991 C8.3 engine is the third major evolutionary upgrade for the C Series.
- a. True
 - b. False
19. The "main" reason(s) for offering the 91B and C engines is(are)
- a. to keep Parts and Service people busy with change
 - b. to meet customer requirements and government emissions regulations
 - c. to keep B and C engineers busy
 - d. all of the above
20. All 91B and C certified automotive engines are charge air cooled.
- a. True
 - b. False

Answers to Parts Professional #15

- | | | | |
|------|------------|-------|-------|
| 1. C | 6. A | 11. B | 16. B |
| 2. B | 7. D | 12. B | 17. C |
| 3. D | 8. A,B,C,D | 13. C | 18. D |
| 4. D | 9. D | 14. B | 19. D |
| 5. A | 10. B | 15. A | 20. B |

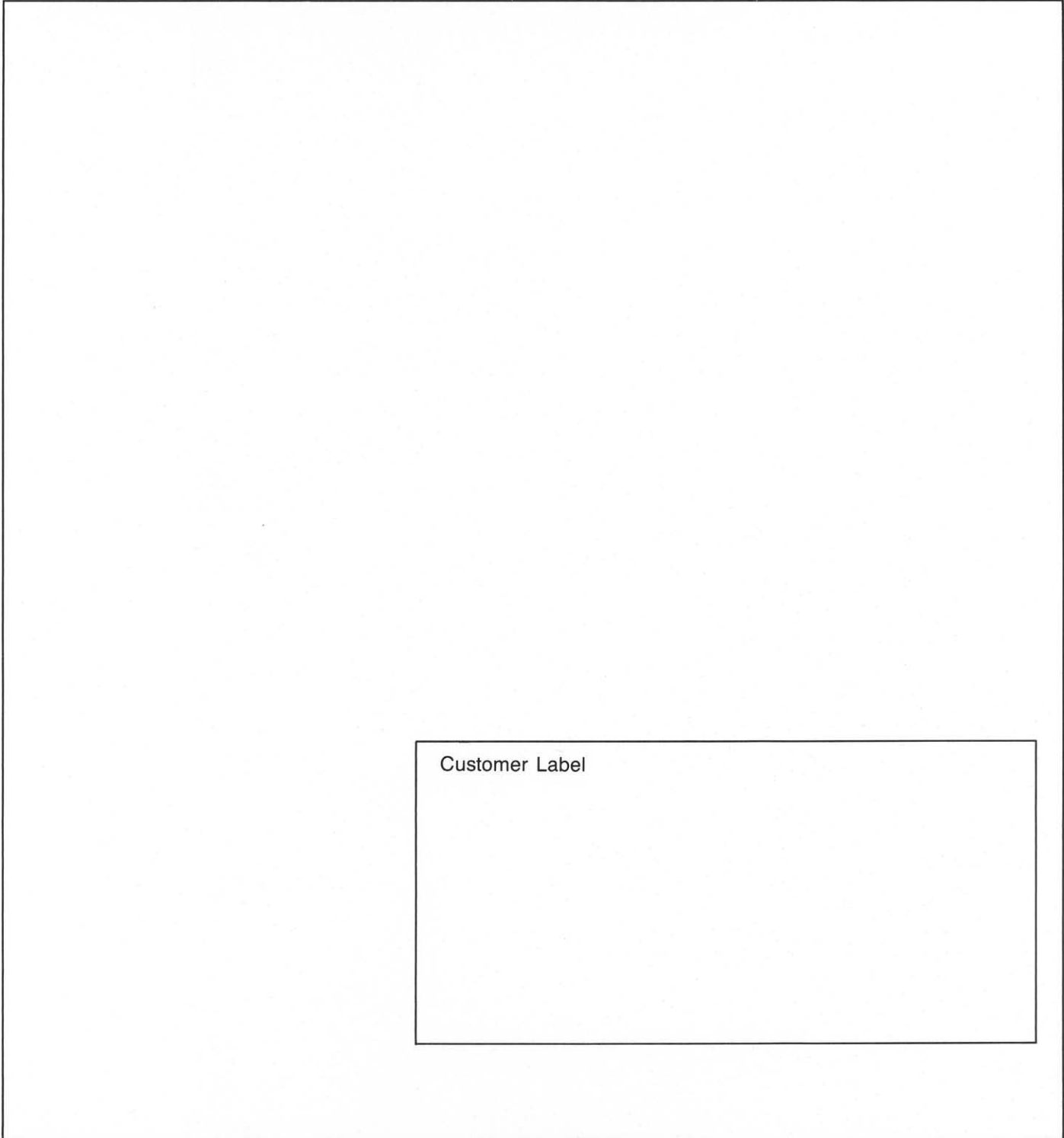
Return Postage Guaranteed



Cummins
Parts Professional

P.O. Box 34470
Louisville, Kentucky
40232-4470

Bulk Rate
U.S. Postage
PAID
Louisville, Ky.
Permit #354



Customer Label