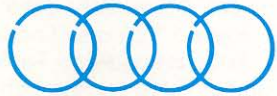




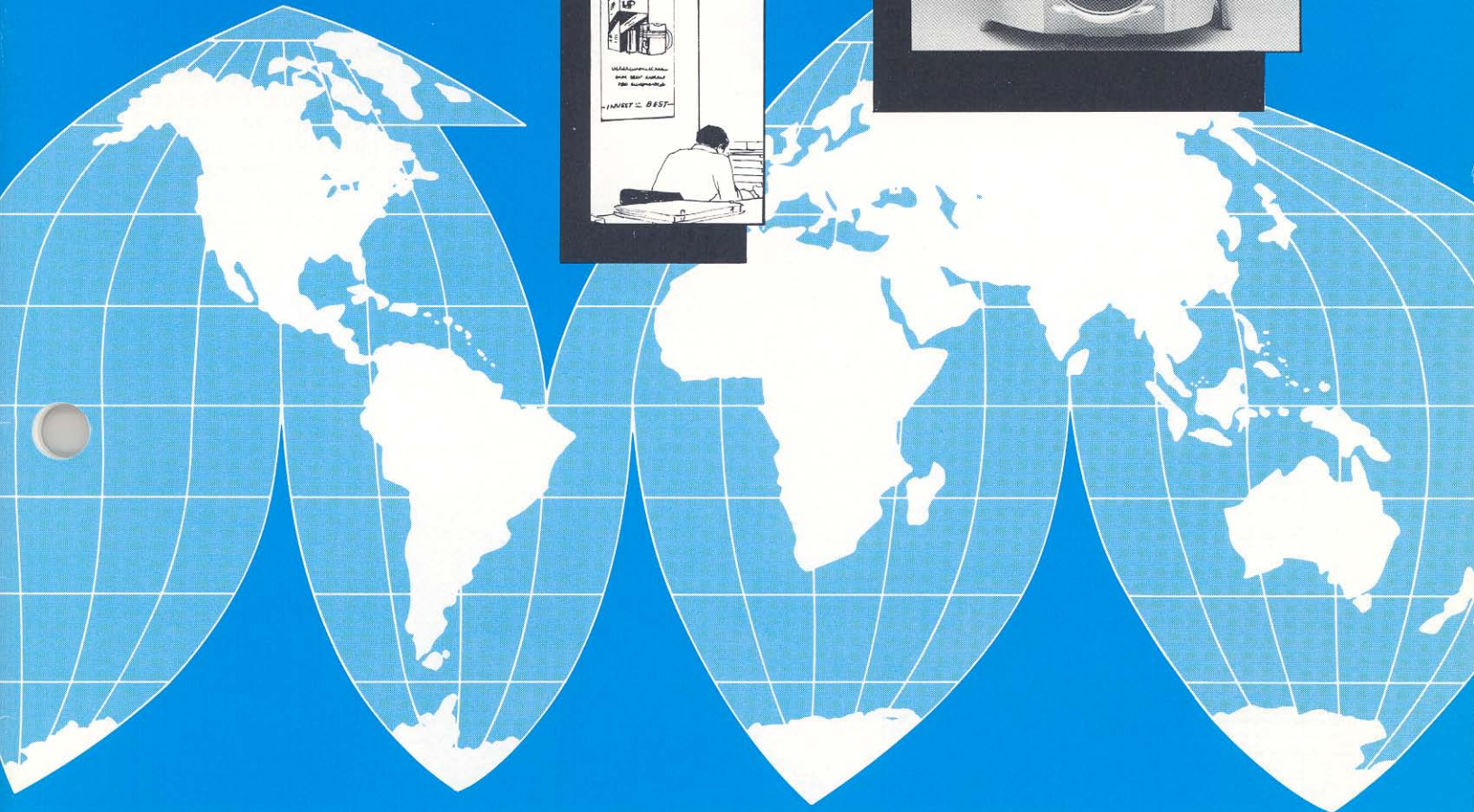
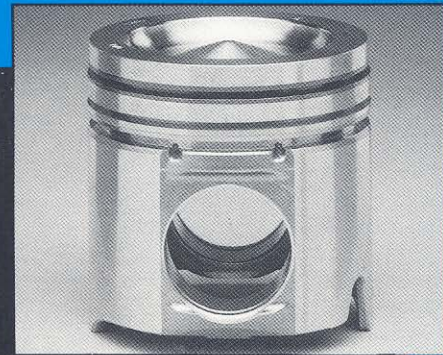
PARTS PRO CLASSIC

CLASSIC EDITION #7

Parts Pro Classic is provided as a historical reference.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).



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INVEST IN THE BEST

Letter From the Editor

The competitions getting tougher, all the more reason for keeping up with all the latest product changes from Cummins. This is the beginning of the latest series of two Parts Professional exams. Simply by returning exams 7 and 8 you can earn a 10 pack "Igloo" cooler. Please notice, the 90% average requirement has been removed. Just score a passing grade, 70% or better, entitles you to a cooler. The main goal of the Parts Professional is for you to increase your knowledge about Genuine Cummins Parts.

As always I wish to thank the contributing editors of this booklet and all those Parts Professionals out there who write or call me with their ideas.

Best Regards,

Joan E. Mobley
Cummins Engine Co., Inc.
Box 3005 M/C 40911
Columbus, Indiana 47202-3005

Compliments

We've included a Cummins Turbocharger Cross Reference, Bulletin Number 3884216.

The cross reference is designed to simplify your job at the parts counter. If you require additional copies, please contact your local Cummins distributor.

Your Ideas

OEPL

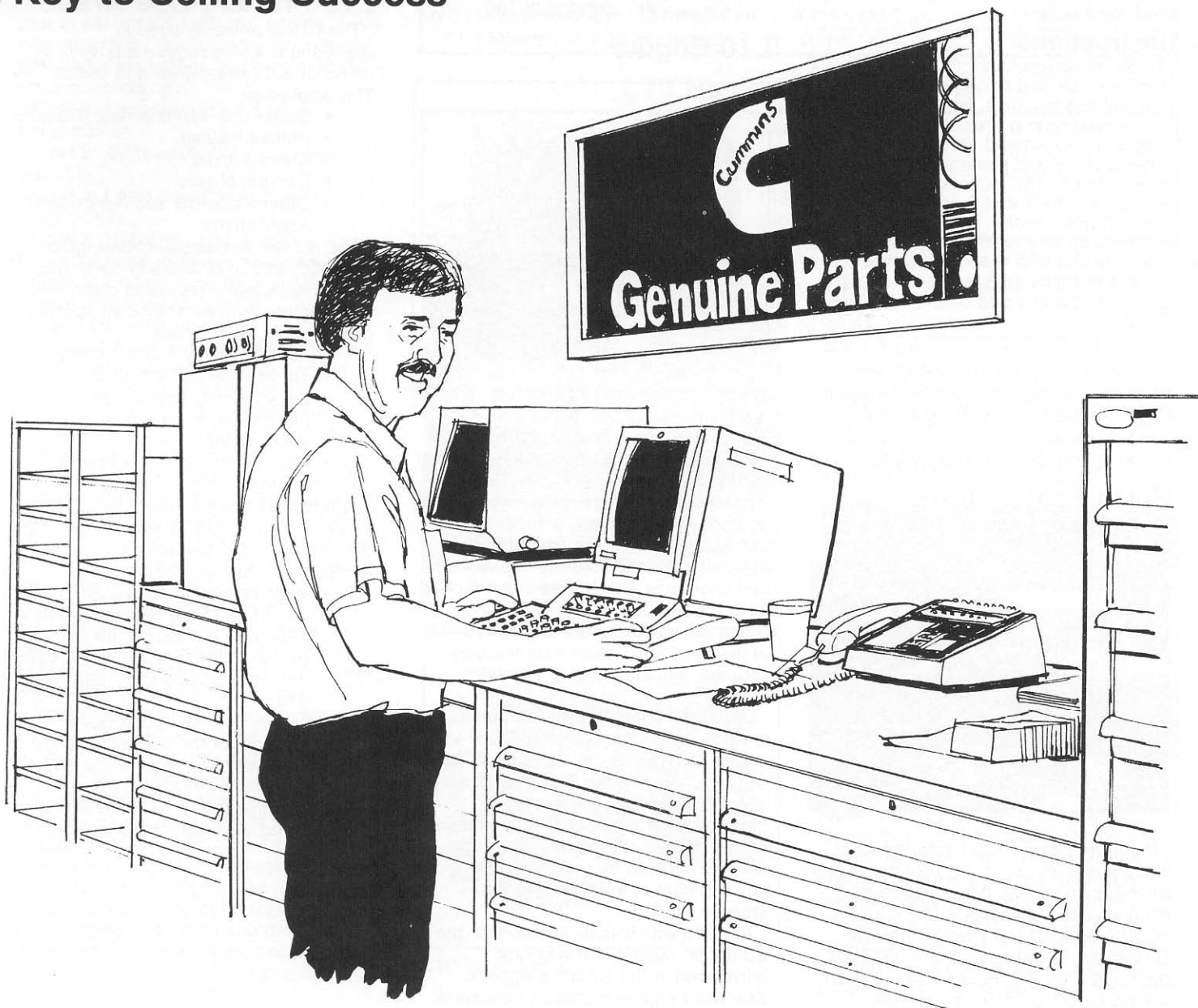
A tip from Alan Volkart, Cummins Missouri, Columbia Branch. Alan says, "be sure to check the remarks column on the OEPL cards." You may find a supersession list, Service Parts Topic or a Casting Number listed there which will make your job as a counter worker easier.

B Series CPL's

Ron Perreault from Cummins North Atlantic, South Portland, Maine, discovered one of our best kept secrets. Ron says, when he looks up an engine serial number for B and C Series engines the **PP** (performance Parts) option has the same numeric characters as the **CPL** (critical parts list) number. For example, the OEPL filmcards show, Engine Serial Number, (ESN) 44171371 contains "PP" option 742. Using Rons' discovery the CPL Number is 742 for this engine.



Cummins Parts Professional Tests - Product Familiarity is the Key to Selling Success



Welcome to Parts Professional Number 7. This issue covers the Cummins L10, the first Cummins engine designed to metric unit specifications. Our plan in this Parts Professional is to familiarize you with the L10, its development, history, design, and parts changes along with other important facts that will bring you up to date on the L10.

In addition to the L10 information, we'll have the usual features on Parts News Update, New Products, and Fleetguard.

We've also put together another Parts Professional Exam to quiz your knowledge of the L10 and the other

topics we cover in this issue. By the way, this is the seventh exam which means that we've got another incentive for you to try for in addition to the Parts Professional jacket and calculator which, hopefully, you are putting to good use. This time we're offering a Parts Professional "Igloo" 10 Pack Cooler. You can earn the cooler by returning Parts Professional Exams 7 and 8.



If this is your first experience with the Cummins Parts Professional, we would

like to remind you that you can qualify for the Parts Professional Igloo 10 cooler by following the instructions in the boxed area.

Instructions

To be recognized as a Cummins Parts Professional and to continue receiving the training booklets, complete the enrollment form on page 19, fold and staple the exam and enrollment page. The address and postage are preprinted on the fold-over envelope. Return exams 7 and 8 and earn a 10 pack "Igloo" cooler. Plus, you'll be keeping up with all the latest Cummins designs and with the most current Product Improvements, Standardizations and Service Products.

Participating in the Parts Professional program will help you learn more about Cummins products. You'll gain the competitive edge which, in turn will enhance your earning capabilities.

Parts Professional Chronology



If you're a new Parts Professional or just coming on board the program, you'll be interested in the preceding Parts Professional publications. Back issues may be ordered from your Cummins Distributor, Bulletin Numbers 3387320 - 02, 03, 04, 05, 06. However, exams 2-6 will no longer be graded. Booklet number 1 covered the head group and is no longer available. Answers are available upon request. The following is a brief summary of what we've covered so far. In the first four issues we divided the NH/NT engine into groups:

- Head
- Block
- Ends
- Accessory

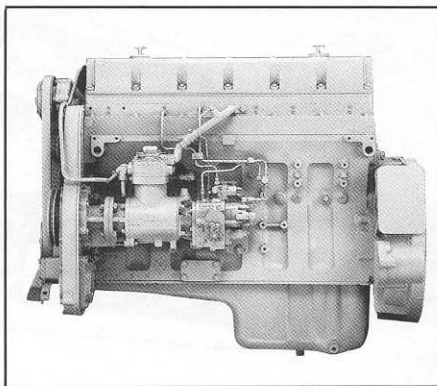
Booklet 5 covers three of the four National Overhaul Warranty (NOW) plans. Order Bulletin No. 3387320-05R. Booklet 6 targets the 50 to 250 horsepower B and C Series Cummins Diesel Engines. Order Bulletin No. 3387320-06.

For those of you who read French or Spanish, beginning with booklet number

5, you have a new base Bulletin Number.

- French - 3387334-05, 06
- Spanish - 3387335-05, 06

L10 Engine



Let's start out with a question. Why is there a Cummins L10 engine, and what markets do they cover?

To answer these questions we have to go back several years to 1974, right in the middle of the Arab oil embargo to the United States, and the subsequent fuel shortages. There was a major need for increased fuel efficiency. Plus, Cummins market research showed that in the 1980's the short haul trucking segment would be a major growth market.

Let's take a look at what Cummins had to offer at that time - the NTC and V903 engine families. Both dependable, long lasting and powerful. But, the increase in horsepower per given engine displacement, the necessity of meeting environmental requirements and the need to improve fuel economy led to the development of a lighter, more fuel efficient engine.

The L10 was initially planned for the European Market and was first introduced in the United Kingdom. European engine manufacturers were already producing engines in the 200 - 300 horsepower range to cover this market, primarily because of the already high fuel prices there. The European truck market emphasized fuel economy and also light curb weights in their trucking operations, two areas where the NTC and V903 simply weren't competitive. Cummins could whip them in terms of power and durability, but not in weight and price.

Cummins sought to fulfill the needs of the lower horsepower heavy duty diesel market in the USA and Canada, and at the same time compete in the European market. To do this, the Cummins Engine Company design engineers determined that a 10 litre engine would be required. Consequently the design study and

developmental work began in 1976 to produce the L10 engine.

L10 Primary Use Areas

The L10 is primarily used in applications which require a power rating of 300 horsepower and under.

This applies to:

- Single and Tandem Axle Tractors
- Refuse Haulers
- Dump Trucks
- Cement Mixers
- Other Industrial and Agricultural Applications

The current horsepower offerings of 240, 250, 270, 285 and 300 cover this market completely providing customers with engines to meet their own specific needs. The L10 provides:

- High reliability and durability
- Torque rise as high as 51%
- Exceptionally responsive performance, with rapid acceleration
- Fuel savings over competitive engines

Additionally two models of the L10, the Power Torque L10-250 and the L10-285 provide these unique advantages over competitive engines. Advantages:

- Wide operating range. An operating range between 1300 to 2200 rpm permitting the L10 to perform well in stop and go traffic and in short and long haul situations.
- Nearly constant horsepower throughout the operating range.

The combination of wide range and constant horsepower allows these versions of the L10 to be matched to easy-shifting wide-split transmissions.

Design Characteristics

Cummins engineers were faced with a number of design goals that had to be met to assure a successful engine. Let's look at a them, so that you can see the tremendous progress that was made in engine technology.

Goal 1: Lowest possible fuel consumption.

Goal 2: Compact/lightest package possible.

Goal 3: Least possible number of components.

Goal 4: Reliability and durability equal to that of existing heavy duty engines.

Goal 5: Engine must be a positive, logical extension of current state-of-the-art technology.

The L10 is extremely light for its power output, weighing in at approximately 1930 lb. It's much smaller than the NT engine in length, width, height and weight as this size comparison chart shows. The L10 is also dimensionally smaller than many of its competitors such as the Caterpillar 3306B and the Mack EM6. In addition, it's more fuel efficient than these two competitors - up to 7% more competitive than the Cat and 14% more than the Mack.

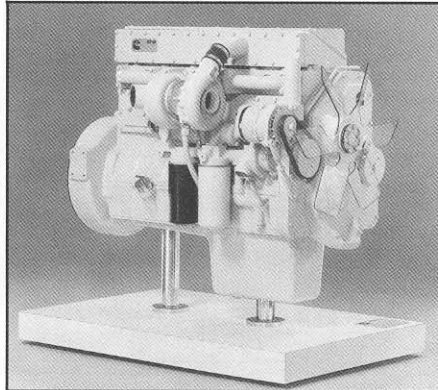
The reduction in overall size was accomplished in a variety of ways and involved all major engine components. In fact, early developmental engines had a sub-base or ladder frame design, which meant that there was no separate oil pan. The pan and lower half of main bearings were combined into the "sub-base". This type of design would not allow for an in-frame overhaul. The design was mainly a benefit to the European market, because at the time of engine overhaul the chassis normally undergoes major repair also (due to European operating conditions). As you can imagine this didn't suit the North American market too well, because in North America in-frame overhauls are standard.

L10 - NT Comparison

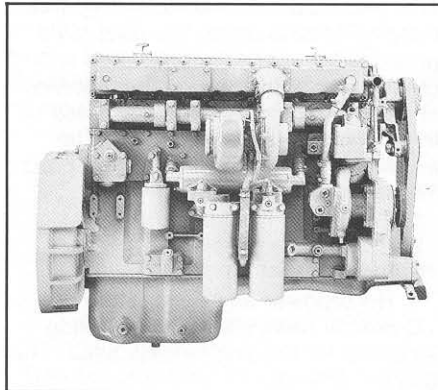
	Length	Width	Height(above crank CL)	Weight
NT	1499mm (59 in)	864mm(34 in)	907mm (35.7 in)	1150kg (2530 lbs)
L10	1308mm (51.5 in)	805mm (31.7 in)	709mm (27.9 in)	875kg (1930 lbs)

L10 Basic Specifications

	Metric Units	U.S. Units
Displacement	10 Litre	611 cu. in.
Bore	125mm	4.92 in.
Stroke	136mm	5.35 in.
Firing Order	1-5-3-6-2-4	



L10 Sub Base Engine



L10 Skirted Block

To satisfy the needs of the North American market, the L10 skirted block with a removable oil pan was introduced. This was done in 1980, and is still the current design for full production.

Note that the firing order is the same as all other Cummins in-line six-cylinder engines.

Cummins L10 Patents

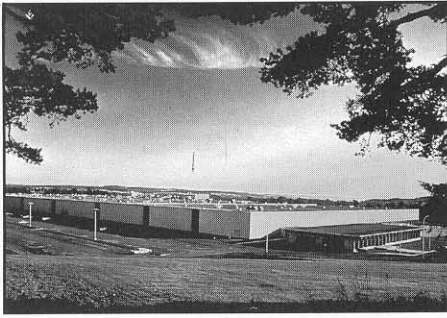
THIS ENGINE IS PROTECTED BY ONE OR ALL OF THE FOLLOWING U.S. PATENTS: 4244330; 4369627; 4284037; 4257370; 4231457; 4237847; 4294073; 4321896; 4345552.

The L10 is unique in many ways and really is the product of Cummins technology and engineering expertise. That's the reason why several of the engine parts are patented to prevent copying and protect your Cummins aftermarket parts business. In fact the engine is equipped with a decal which specifies all the parts which are patented. This decal communicates to non-Cummins parts suppliers that the L10 engine and specific parts/castings are not to be copied in any manner. Genuine new Cummins service replacement parts meet the same rigid specifications as those used in the manufacture of new engines. Non-Cummins parts are not required to meet these same requirements and could actually cause damage to the engines. The table to the left lists the 14 L10 parts that are patented.

Cummins L10 Patented Parts

Part Number	Description	U.S. Patent Number
3040822	Cylinder Liner	4,224,330
3046232	Gear Cover (Low Clutch Fan)	4,257,370
3035945	Gear Cover (High Clutch Fan)	4,257,370
3035946	Gear Cover (Belt Driven Fan)	4,257,370
3033227	Cylinder Head	4,369,627 & 4,284,037
3039185	Cylinder Block	4,237,847
3036246	Rocker Lever Cover	4,345,552
3036247	Rocker Lever Cover	4,345,552
3036248	Rocker Lever Cover	4,345,552
3039113	Rocker Lever Housing	4,345,552
3035942	Gear Cover Plate	4,321,896
3035943	Gear Cover Plate	4,321,896
3034984	Fan Clutch	4,231,457
3517999	Fan Clutch	4,231,457

L10 Manufacturing and Assembly



Jamestown

L10 engines are manufactured and assembled in Jamestown, New York and Shotts, Scotland. The Jamestown facility began producing engines in 1974. The 957,000 square foot facility is located in Southwestern New York State and employs approximately 900 people. The Jamestown engine plant is a highly automated facility which depends on its people to produce a high quality product.

The Jamestown plant is split into businesses that include:

- Research and Test
- Tools and Indirect Stores
- Cutter Grind
- Quality and Personnel

The plant assembles L10 engines and manufactures components for both the L10 and the NH/NT. Some of the components machined at the plant include:

- Single Cylinder Air Compressors
- Pistons
- Liners
- Cylinder Heads
- Lube Pumps
- Crankshafts and Camshafts
- Flywheel Housings
- Blocks
- Connecting Rods and Bearing Caps

The plant also assembles kits for the assembly plant in Shotts.

Shotts Engine Plant

L10 engines are also manufactured in Shotts, Scotland. The Shotts facility has 63,800 square feet under roof and employs 800 people. The facility began producing engines in 1956 and started building L10 models in 1982. The plant is separated into two semi-autonomous businesses they are:

- Assembly/Test
- Components

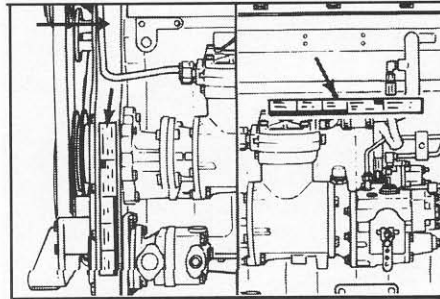
The work is performed in teams with members controlling their own quality, material handling, problem solving, simple maintenance and housekeeping.

Currently, the plant manufactures 50 engines per day with the production split 50-50 between the L10 and the NH families.

Metric Design

The engine was designed to be metric for standardization purposes between engine families. Components like the fuel pump and air compressor, are the same as other engines. You may find them mounted with either metric or SAE capscrews depending on the application. Metric capscrews are used throughout the rest of the engine.

Engine Identification



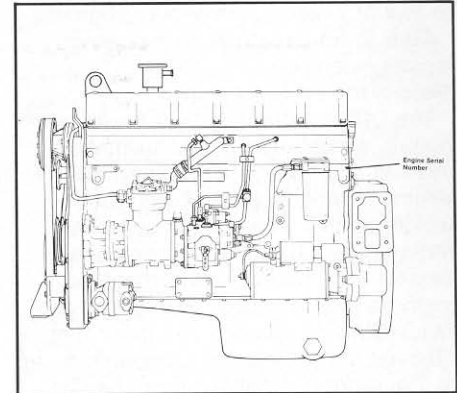
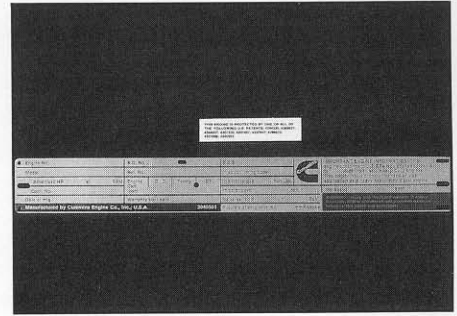
Before you can get the right parts for an engine you must correctly identify it. This information is available to you from the engine data plate. The data plate provides the model identification and other important information about the engine. On the data plate you'll see these 4 important points which are essential to obtaining the correct parts. They are:

1. Engine Serial Number (E.S.N.)
2. Control Parts List (CPL)
3. Model
4. Horsepower and RPM rating

Currently there are three mounting locations for the engine data plate. They are:

- High Mount on Gear Cover
- Low Mount on Gear Cover
- Behind Air Compressor

In addition, patent number information is included on a decal located on the rocker cover/fuel pump side of the engine.

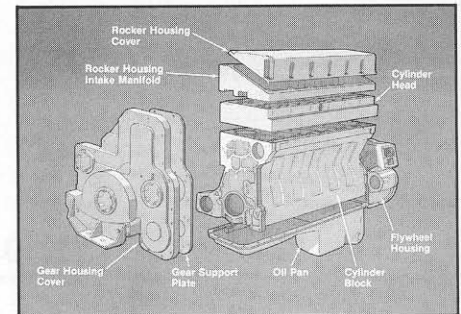


NOTE: The engine serial number is also stamped into a boss on the block near the top of the number six cylinder.

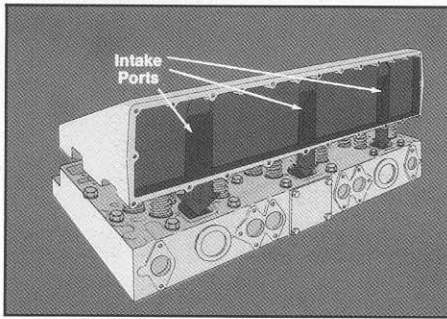
Now, let's take a look at the major components that make up the L10.

L10 Major Engine Components

Basic Engine Construction

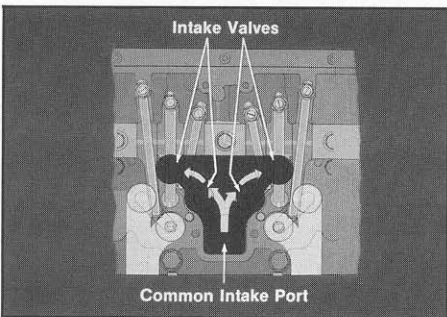


The cylinder block used on the L10 is a unique design. The illustration shown here illustrates the construction of the cylinder head, rocker housing and rocker housing cover onto the cylinder block. Depending on engine application, both front and rear sump oil pans are available.

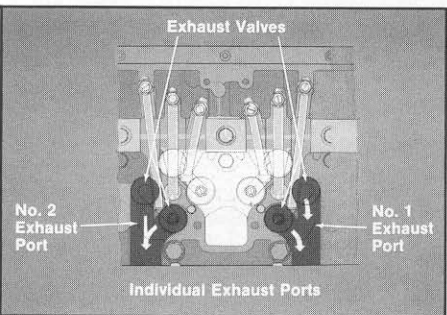


Air induction into the engine is through the rocker housing. There are three air intake ports that provide air flow directly into the **one-piece** cylinder head.

Cylinder Head



The cylinder head features large-volume intake ports. As you can see, the intake and exhaust valve arrangement in the cylinder head is somewhat different than in a typical in-line engine. The L10 has one intake port supplying air to two cylinders. Each cylinder has its own, individual exhaust port.



Note that the intake and exhaust ports are on the same side of the head. This positioning of the ports combined with the air inlet passages incorporated in the rocker lever housing, reduces the engine height by eliminating the need for an external air crossover.

The cylinder head incorporates four valves per cylinder, two intake and two exhaust. The valve area equals 90% of that used on the NT engines. The NT, as you know, displaces 855 cubic inches

whereas, the L10 displaces only 611. This large valve area increases the volumetric efficiency of the cylinder and allows inlet air and exhaust gases to flow freely into and out of the combustion chamber.

Cylinder Liner

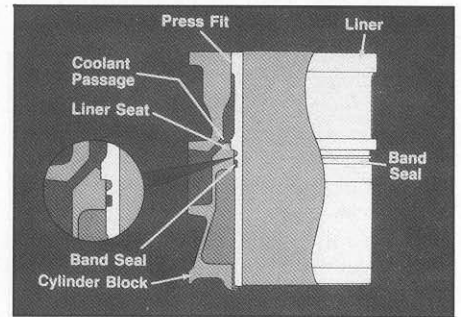


Next, let's take a look at the cylinder liner used on the L10. A unique Cummins patented design, called a **mid-stop**. This design provides a number of advantages.

The seating ledge, located approximately 102mm (4 in.) below the top of the liner at the bottom of the water jacket, seats vertically on a ledge in the cylinder block. The liner has a top press fit in the engine block which eliminates the upper counterbore in the block. This design provides more clamping load on the liner. More clamping load means:

- Less distortion of the liner.
- Reduced liner vibration (which reduces the chance of cavitation erosion).
- Less sensitivity to variations in liner protrusion from the cylinder block.
- More even distribution of the clamping load.

The mid-stop liner design also reduces the length of the water jacket by having the water jacket only at the upper end of the liner. This produces a lower heat rejection to the cooling system which reduces the cooling system requirements. Another important point is L10 liners are "plateau" honed. This procedure eliminates the need to place a lubrite finish on the liner bore. The plateau honing process provides excellent surface finish and oil control properties. Remember, L10 "mid-stop" liners are available only from Cummins.



You can really appreciate the design differences in the L10 liner when you put it next to a Big Cam liner as we've done here.

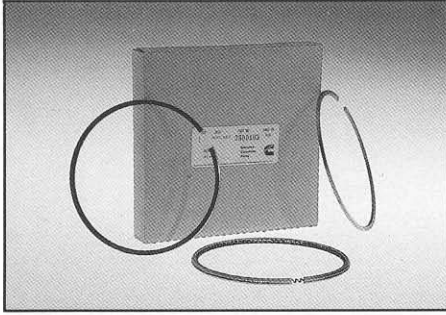


Pistons



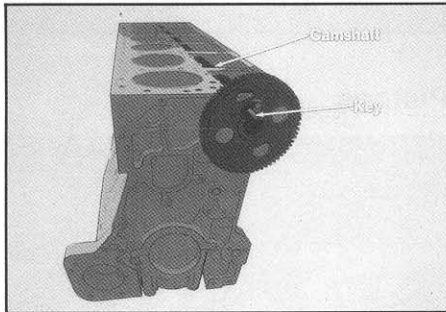
L10 engines feature a piston with a flat top design. This means there are no valve pockets cut into the top of the piston head. The skirt has a unique **CeCorr** finish which enhances oil retention and provides added protection for cold start-up. The L10 uses a large diameter hollow piston pin for added strength. In addition, the pistons are cam ground for excellent piston-to-cylinder-wall-fit.

Rings

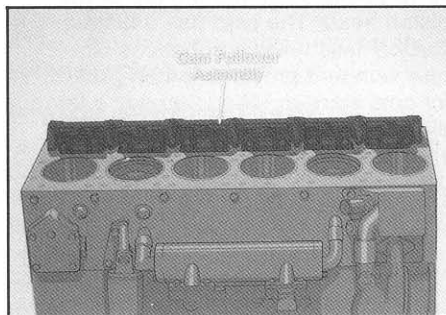


Three rings are used on the piston. The top compression ring has a chrome face and is made of ductile iron. The second ring is a high strength gray cast iron and provides excellent blow-by control. The bottom oil control ring, is also chrome faced and made of ductile iron. It incorporates a serpentine expander, similar to the NT. The expander keeps the correct tension against the cylinder wall.

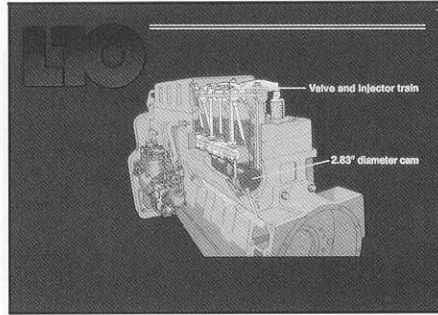
Camshaft & Followers



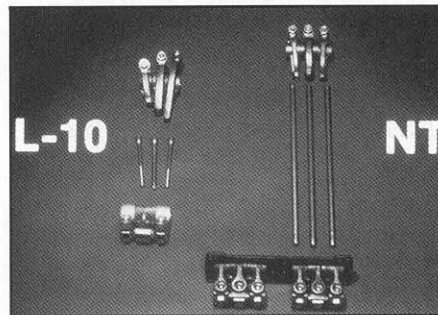
The large diameter camshaft is located near the top of the block. This location makes the valve train more responsive, thus improving fuel economy and performance. Different camshaft gear keys are used to advance or retard injection timing.



The cam follower assembly is mounted directly on the top surface of the cylinder block. This positioning of the camshaft and followers so close to the cylinder head presents some unique advantages.

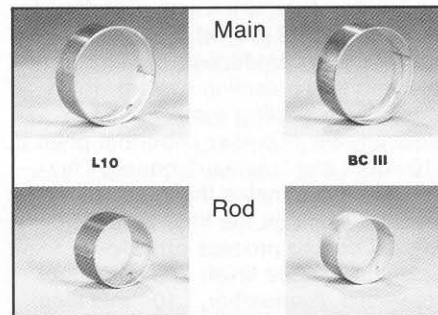


First, it allows the use of short push rods, resulting in a stiff overhead mechanical system.



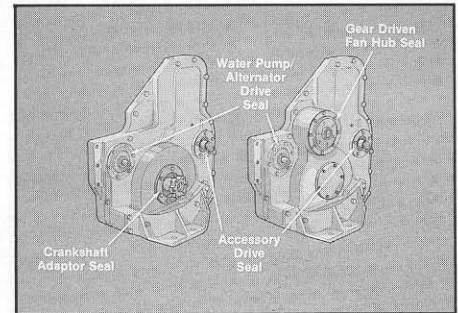
The large diameter of the camshaft and the short stiff push rods allow for high injection pressures. In fact, these injection pressures are up to 20% higher than the NT engine. The increased pressure contributes to increased fuel economy and reduced exhaust emissions.

Bearings & Oil Seals



A very important point which contributes to the long life of the L10 is the large, durable rod and crankshaft main bearings. You'll find that these are comparable in size to those found in the NT engines.

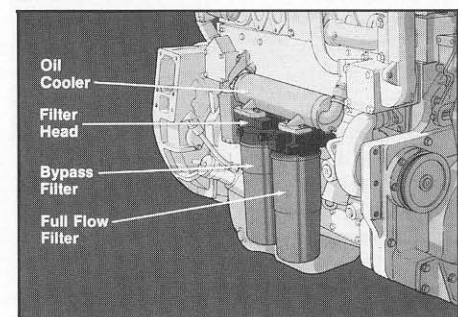
L10 main and rod bearings are so close in size to those used in the NT that the "NT" bearings will actually snap in place. However, the oil supply hole is located differently so you can visually tell them apart. Always check part numbers before you supply your customer. The L10 bearings are steel backed for high strength with copper-lead overlay and a tin flashing to withstand dirt and conditions of marginal lubrication. This is a superior bearing design which has proven itself over many years of service in all models of Cummins engines.



The seals are installed dry - completely oil free. The surface of the crankshaft where the oil seal contacts the crankshaft must also be oil free. If oil is present, it will cause the seal to leak. Always use the proper installation guide, Part Number 3376076.

The oil seals on the crankshaft and in all seal locations on the cover are the teflon lay-down lip design which provides excellent sealing characteristics and reduces wear on the crankshaft and other component journals. The seals mount in separate seal carriers which bolt onto the engine. This design tends to be self-aligning for improved leak resistance and extended seal life.

Oil Filters

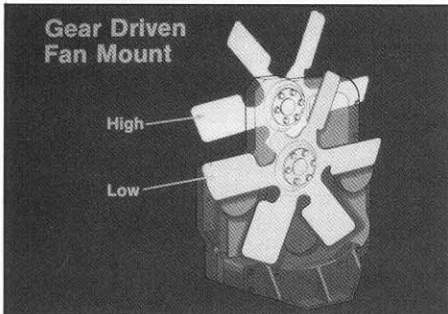


The internal components of the L10 are protected from wear through a unique dual filter assembly. The filter assembly head has two filters mounted to it. The filters are spin-on bypass and full flow. This design eliminates the need for a remote mounted bypass filter.

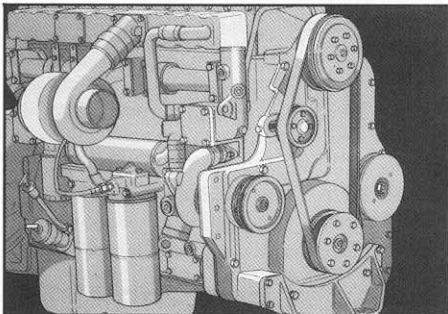
During engine operation, all of the lubricating oil passes through the full flow filter, while approximately 20% of the oil is circulated through the bypass filter which removes particles as small as 16 microns. Oil that has gone through the bypass filter is returned to the oil pan. The combination of these two filters provides the best possible engine protection.

Fan Drives

A variety of fan drives are available for the L10, depending on its application. Initially, the fan was gear driven, which is the popular configuration for transit vehicles, and is still available in this configuration.



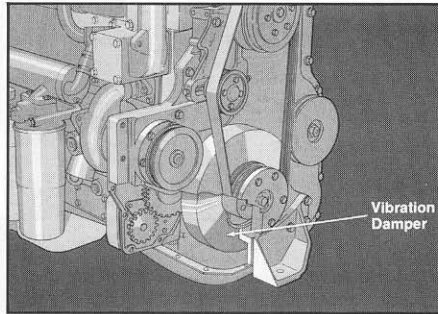
With the gear driven fan drive two mounting location options are available. The low-mount fan mounts 8.5 in. (216mm) above the crankshaft centerline, and the high-mount fan mounts 17 in. (432mm) above the crankshaft centerline.



Belt-driven fan hub options are also available for construction, industrial and most automotive applications. An inside idler arrangement is used to maintain proper belt tension. However, periodically this device requires adjustment to assure the belt is properly tensioned. Belt driven fan hub options are available in several different crankshaft pulley to fan hub pulley distances. These distances are as follows:

- 13 in. (330mm)
- 15 in. (381mm)
- 17 in. (432mm)
- 19 in. (483mm)
- 21 in. (533mm)

Vibration Damper

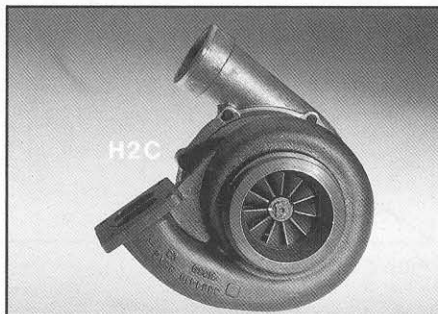


The L10 utilizes a viscous-type vibration damper that is mounted inside the front gear cover. There are three reasons for utilizing an interior mounted vibration damper:

1. Eliminates the front crankshaft seal on applications using the the gear-driven fan hub.
2. Reduces engine noise by enclosing a rotating component.
3. Enclosure reduces possibility of road damage.

The noise reduction point just mentioned is an interesting one which we'll develop in more detail. The L10 is computer designed for extremely quiet operation. Wherever possible noise making components are shielded with sound absorbent materials or components are made of sound absorbent material. The enclosed vibration damper is only one example. Others include the non-metallic valve cover, and stamped-steel oil pan (specially designed to absorb internal engine noise).

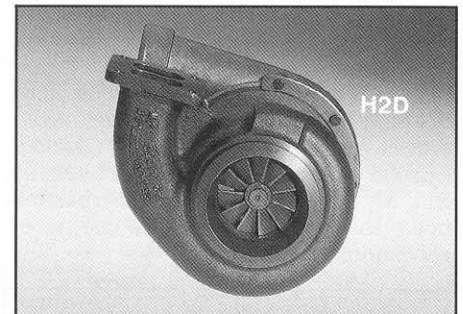
Turbocharger



Initially the L10 was field-tested with the Holset H1E turbocharger. Shortly after the introduction, the H2C turbocharger replaced the H1E. The H2C is specifically designed to match

the L10's operating characteristics. It features a divided turbine casing for improved exhaust gas handling efficiency. Although not having the appearance of the NT pulse exhaust manifolds, the L10 exhaust manifolds are the pulse-type design. Pulse exhaust design manifolds assist the gas flow to the turbocharger, minimizing energy loss for excellent fuel efficiency while providing faster turbocharger response, particularly at lower engine speeds. A revised turbine wheel and larger exhaust casing improve air flow over a wide range of engine operating speeds to match the increased power and torque of the L10 when optimized aftercooling is used.

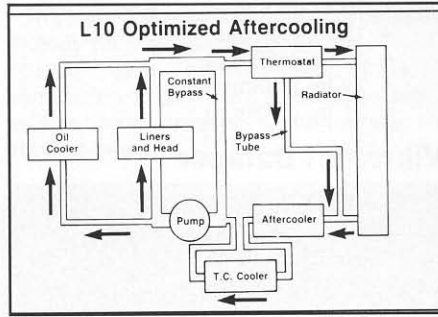
European L10 engines have turbochargers with rotor-type exhaust brakes. Therefore, you may notice that there is a machined surface on the turbocharger to accept this type of brake. It is not for use in North America. North American engines utilize the Jacobs Brake Model Number 404 engine brake (49 state only requires slave piston setting of .018 in). The 404 is now available in 50 state applications with a slave piston setting of .015 in. All 1988 L10 models will be set at the .015 slave piston setting.



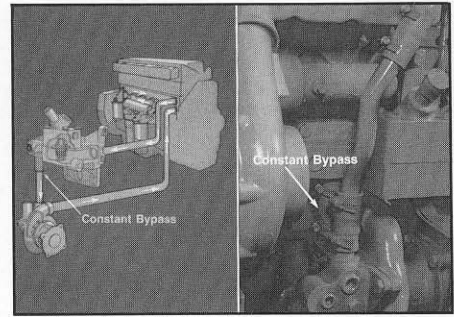
For 1988, new emission laws have taken effect and have compelled another turbocharger change. The new turbocharger for 1988 is the H2D. The H2D is quite similar to the H2C but features a more efficient design that promotes reduced intake temperatures and also has a higher airflow to assist in reducing particulate emissions.

Aftercooler/Cooling Circuit

Optimized aftercooling was introduced on the L10 in conjunction with the 300 horsepower rating. An important point to note is that the L10 is available with two different cooling systems. For customers who wish to have increased power and a 1 - 2% increase in fuel economy, the optimized aftercooling is standard. In addition to Optimized aftercooling, conventional aftercooling is available. Current L10 models are:



Optimized Flow



Coolant flow is substantially different between the optimized and conventional systems. Optimized Aftercooling requires a single thermostat assembly which has a dual function, different plumbing and a different radiator.

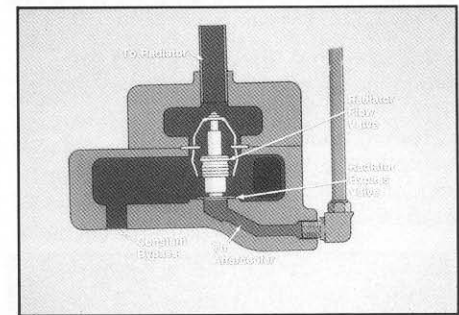
The optimized coolant loop distributes in the same manner as the conventional system, except for the thermostat housing, which has an 85% constant coolant bypass circuit. In this circuit 85% of the coolant circulates in the block and a single thermostat is used to blend the cold aftercooler water with the block water to maintain a constant operating temperature.

L10 Availability

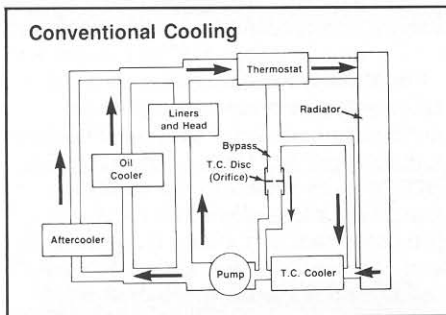
Conventional (High Flow)	Type	Rating
Conventional (High Flow)	Formula	L10-240
	Formula	L10-270
	Power Torque	L10-240
	Power Torque	L10-270
Optimized (Low Flow)	Formula	L10-300
	Formula	L10-240
	Formula	L10-270
	Formula	L10-300
	Power Torque	L10-240
	Power Torque	L10-250
	Power Torque	L10-270
	Power Torque	L10-285

Optimized aftercooling is an important selling point of the L10, and it also means that you have to be aware that there will be differences in service parts. We won't get into all the different parts, they're pointed out in the Parts Catalog, Bulletin Numbers 3884213 and 3822120. But, we will provide a brief description of optimized aftercooling so that you have an understanding of it.

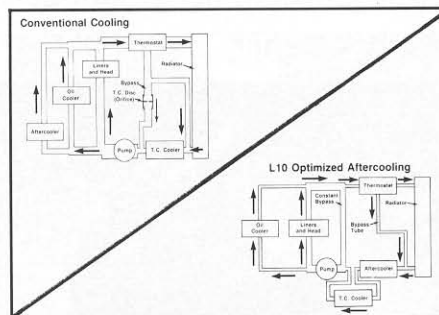
Unlike conventional aftercooling, with optimized aftercooling the coolant passing through the radiator is slowed to maximize the temperature drop through the radiator by as much as 60°F as compared to conventional aftercooling. This low temperature coolant, is sent directly to the aftercooler to provide optimum engine air inlet temperature. The lower temperature translates into improved engine efficiency, quicker response and reduced internal temperatures.



The single thermostat contains two control valves. The valve positions are different during each coolant temperature range resulting in three different flow routes.

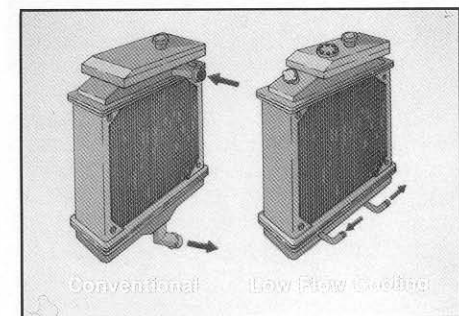


Conventional Flow



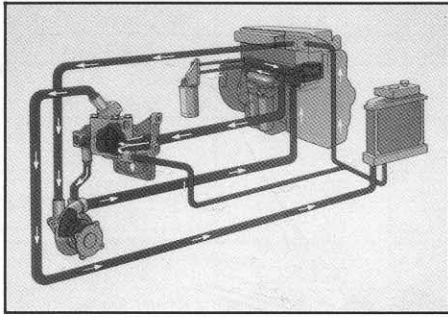
Flows Compared

In the conventional (high flow) cooling system, there is a higher flow of coolant going into the radiator which provides cooling by dropping coolant temperature by about 10°F. The coolant flows in three parallel paths. The water is drawn through the engine by the water pump, then flows to the cylinder head, block and oil cooler circuit. The coolant then returns to the upper manifold and back to the radiator.



The radiator used on the optimized aftercooled engine has much smaller inlets and outlets than those found on the conventional style aftercooled

engine. This is to reduce the flow of coolant and allow maximum cooling for the coolant going to the aftercooler.



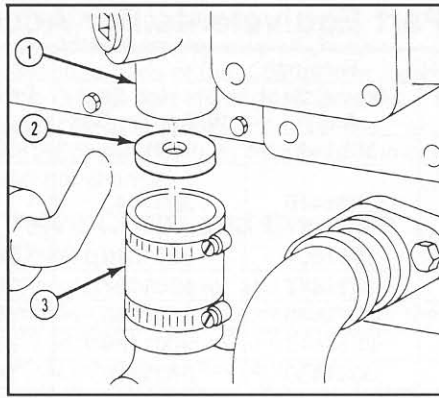
As this block diagram shows, optimized aftercooling has significantly changed the coolant flow through the L10. Because of these changes the coolant lines are substantially different.

We'd like to tell you even more about how Optimized Aftercooling works, but because of space limitation we can't devote any more time to it. If you'd like more information, please order Bulletin 3387275 from your Cummins Distributor.

Torque Converter Cooling

We've heard from the field that there's very little information available on torque converter (TC) cooling and the torque converter cooling disc that is placed into the cooling system on conventionally aftercooled L10 engines. We'd like to clarify the issue and familiarize you with this component.

This component is used in applications where an automatic transmission is used, most commonly in busses. On conventionally aftercooled engines the TC cooling disc is located inside the coolant bypass (return to water pump) hose. To clarify, this is the hose between the water pump and the thermostat housing. The disc sits on the water pump casting inside the hose. Disc dimensions are: Thickness = 0.25 inch; O.D. 1.63 in.; and I.D. orifice = 0.19 in. Disc Part Number 3027971 is depicted in the L10 Bus Parts Manual 3822121-00 on page 166. We've also shown an illustration of it which came from the L10 Shop Manual, page 0-139.



The TC cooler supply line comes from a 3/4 in. hole on the thermostat housing, nearest the coolant bypass hose. This line will tee into the radiator-out hose supplying the TC cooler. The TC coolant **out** line goes directly to the water pump inlet. The purpose of the disc depends on thermostat position.

- Closed Thermostat - Coolant flows from the engine, through the thermostat, and down the bypass hose. Presence of the disc orifice re-routes coolant to the TC cooler.
- Open Thermostat - Coolant flows from the engine, through the thermostat, to the radiator, out of the radiator, to the TC cooler, to the water pump inlet. Presence of the disc prevents flow around the TC cooler to the bypass hose to the water pump.

On L10 engines equipped with Optimized Aftercooling, no disc is used. The TC cooler is in series between the aftercooler outlet and the water pump inlet (the water transfer tube, Part Number 3039283, is not used). We hope this clarifies any questions that may have been present in the field.

L10 Product Changes

Like any Cummins product the L10 is under continual refinement as new technologies and techniques become available. For this reason we'll take a look at some of the major changes that have occurred.

We've already mentioned two significant changes. First was the change in the oil pan which we mentioned at the beginning of the program which allowed in-frame overhauls. Second, we mentioned that there was a turbocharger change from the H1E to the H2C, and now to the H2D for 1988. Change 1 was primarily for service, while change 2 was primarily to increase the efficiency of the engine. The change to the H2D enables the L10 to meet new emission laws. Let's take a look now at some of the other changes you should be aware of.

Accessory Drives

Three types of accessory drive arrangements are encountered on L10 models. They are the low mount and high mount gear driven and the belt driven arrangements. Due to the low usage of the gear driven applications the Part No. 3801256 and 3801257 gasket sets are no longer offered for service. If the accessory drive shaft is a **First Design** (reference SPT 86T9-1) it will require the use of Oil Seal Part No. 3801136 or Lower Engine Gasket Set Part No. 3801142. If your application is high or low mount gear driven or is belt driven and is equipped with a **Second Design** accessory drive shaft it will require the use of Oil Seal Part No. 3821625 or Lower Engine Gasket Set Part No. 3801676. The Service Part Equivalents table, located at the top of page 10, will help you choose the correct replacement parts to service your L10 engine.

The chart on the following page provides a Part No. cross reference for the original, first design and the replacement, second design, accessory drive shafts. There is absolutely no difference between the production seal and the service oil seal. **The service seal however includes an installation tool and a carrier gasket to make up the service seal kit.**

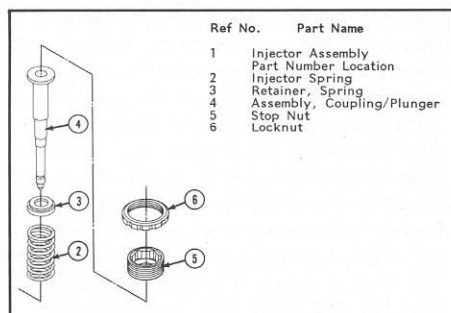
L10 Service Part Equivalents For Accessory Drives

Application	Original			Replacement		
	Production Seal	Sleeve, Seal Assy	Service Seal W/Carrier Gsk	Production Seal	Sleeve, Seal Assy	Service Seal Kit W/Carrier Gsk
Alt Drive Shaft Seal	3032008	3031445	3801135	3821384	3049464	3801624
1st Design Shaft Seal 1.496 in. (38mm)	3032009	3031446	3031446			3801136
2nd Design Shaft Seal 1.772 in. (45.0mm)	3041049	3041804	3801519	3821385*	3049465*	3801625*
Drive Seal W/60 Fan Clutch	3032010	3031447	3801137	3821386	3049464	3801626
Belt Driven Front Crank	3032011	3031448	3031138	3821387	3049467	3801627
Single Lip Rear Crank Seal	3032012	3031449	3801139	3821388	3049468	3801628
Double Lip Rear Crank Seal	3032013	3031450	3801140	3821389	3049469	3801629

*Engines with ESN prior to 34512652 (Jamestown build) and 23503450 (Shotts build) require use of accessory drive seal 3801136 in place of accessory drive seal 3801625 currently found in 3801676 Lower Gasket Set.

Top Stop Injectors

Top Stop Injectors were introduced in December 1985 as a product improvement. It is essentially the same injector that has always been used in the L10 except the stop nut is now adjusted to limit injector travel. Therefore, the injector train unloads during the metering portion of the cycle. Unloading the injector train allows lubricating oil to better lubricate and cool the ball and socket joints which reduces injector train wear.



Along with the release of top stop injectors, hardened injector plunger couplings and spring retainers have been released. These hardened pieces prevent wear from occurring on the bottom side of the coupling flange and on the top side of the spring retainer. All L10 top stop injectors must have these hardened pieces.

To minimize confusion new part numbers have been released for the hardened pieces and any assembly which contains hardened pieces. These new part numbers are listed in the Injector Part Number Change table.

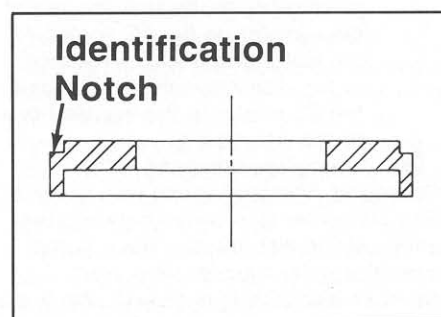
Some couplings, Part No. 3018775, already in the field have been hardened. The couplings that are **hardened** can be identified as being **gray**, where the non-hardened couplings are black. It is acceptable to use the gray couplings, Part No. 3018775, in top stop injectors.

Injector Part Number Change

Top Stop	Description	Non-Top Stop	Old Stock Disposition
3049995	Retainer, Spring	3018771	Obsolete
3049994*	Coupling, Plunger	3018775*	Obsolete
3049996	Barrel and Plunger Assy.	3018779	Obsolete
3045102	Assy. Injector	3027588	Obsolete
3049151	Assy. Injector	3047172	Obsolete
3049429	Assy. Injector	3202080	Obsolete
3049149	Assy. Injector	3201692	Obsolete

*Not available individually for service.

These are essentially the same as coupling, Part No. 3049994.



Part numbers are not stamped on the spring retainers. Because of this a notch has been added to the spring retainer, Part No. 3049995, to distinguish it from retainer, Part No. 3018771, in a top stop injector.

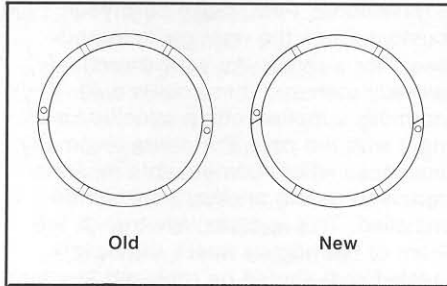
Changing from a non-top stop injector to a top stop injector changes the CPL number. The only change to the CPL is the injector, all other components are the same.

CPL Changes

Top Stop CPL (New)	Non-Top Stop CPL	Top Stop CPL (New)	Non-Top Stop CPL
0774	0528	0782	0662
0770	0580	0783	0671
0775	0608	0784	0707
0776	0613	0785	0708
0771	0626	0786	0726
0772	0631	0787	0735
0777	0638	0788	0748
0778	0641	0789	0764
0779	0643	0790	0765
		0835	--
		0836	--
		0939	--
		0956	--
0773	0649	0703	--
0780	0652	0704	--
0781	0655	0717	--

NOTE: New CPL is the same as the superseded CPL except for the CPL number change and omitting of the non-top stop injector and replacing it with the top stop injector (see Service Parts Topic 86T6-2).

Crankshaft Thrust Bearings



The O-ring grooves have been eliminated from the lube oil cooler mounting pads of the lube oil filter head. The O-ring, Part Number 3032099, is replaced by a gasket, Part Number 3819623. The oil filter head part number did not change.

Valve Cover and Breather Changes

Several valve cover and breather changes have been implemented on the L10 since its introduction. This has caused a large increase in part numbers. The internal breather design is a more universal replacement and will greatly simplify identification of the appropriate service part in case of any

Crankshaft Thrust Bearings

Part Number	Description	Old P/N	Old Stock Disposition
3822062	Std. Thrust Bearing	3028107	Use
3050589	0.010 in. O/S	--	--

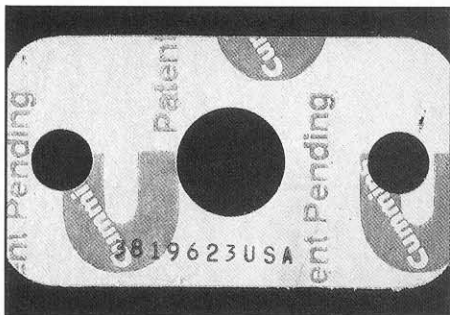
Valve Cover Replacement

3818924 (No Fill)	3036249 3036250 3818143 3819556 3819564	3819536 3819537 3818307 3819559	3818523 3818306 3818144 3818622
3818925 (Front Fill)	3036252 3818309 3819565	3819539 3818146	3819557 3818623
3818926 (Rear Fill)	3036251 3818308	3819538 3818145	3819598 3818522

In 1986 crankshaft thrust bearings were changed to a new design with an interlocking feature. The new design eliminates incorrect installation of the bearings.

Thrust bearings are always installed in pairs. Each part number represents one-half of a pair. Four parts are needed per engine.

Lube Oil Cooler Mounting Gasket



New Gasket Part Number 3819623.

field failure. There are three valve covers available to cover all obsolete part numbers. They are:

- 3818924 - No Oil Fill
- 3818925 - Front Oil Fill
- 3818926 - Rear Oil Fill

The valve cover table shows the three part numbers just mentioned and the part numbers which they replace.

- 3819500* - Front Oil Fill Top-Out Breather

*Note: This valve cover option was added for a specific application where side venting was not possible. It does not replace any other valve covers.

Alternator Pulley

Beginning with engine serial number, 34543400 the Jamestown engine plant released a **spun formed** alternator pulley, Part No. 3046408. Spun formed is the process used to describe a rapid metal turning operation that actually forms the pulley and its grooves by spinning and squeezing a raw metal disk as opposed to cutting or machining a cast iron material.

The spun formed alternator pulley replaces the standard cast iron pulley.

When removing the water pump for service it is necessary pull the alternator pulley. The new spun formed pulley requires an adapter, Part No. 3822616 be added to your standard "T" bar puller, Part No. ST-647. The adapter is required because the new pulley does not have holes for attaching the "T" bar, and due to the change in material it is not recommended to drill holes in the pulley itself.

So, please recommend that your customers purchase the new service tool. Also, for your information those customers who do not wish to use the new spun form style pulley for replacement the cast iron pulley, Part No. 3040965 is still available.

Other L10 Changes

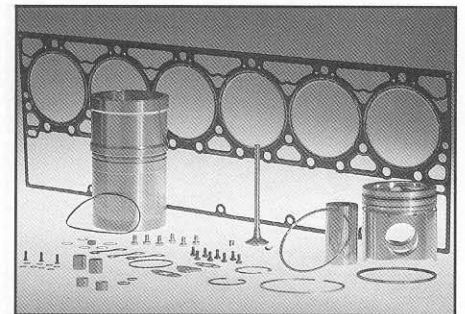
Current production lube pumps no longer have shaft bushings. The reason for this is that the quality of the bore is such that the base metal can support shaft rotation.

A rectangular O-ring seal, Part Number 3819723, has been released for the original cast iron corrosion resistor adapter. This change eliminates the possibility of leakage.

The new die cast aluminum water filter head uses O-ring Part Number 3819751 and incorporates a more efficient plastic shut-off valve instead of the old style steel valve.

There have been other L10 changes that you should be aware of such as to the the fan drives, valve cover gaskets and many other components. If you need to reference these changes, refer to the inside of the back cover. There is a listing there of applicable Service Parts Topics.

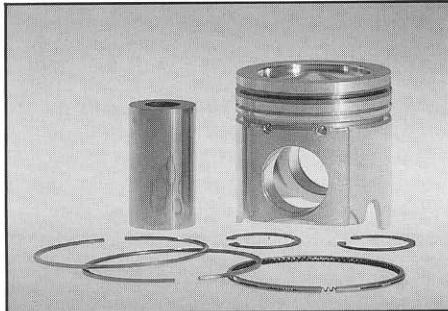
L10 Kits and Sets



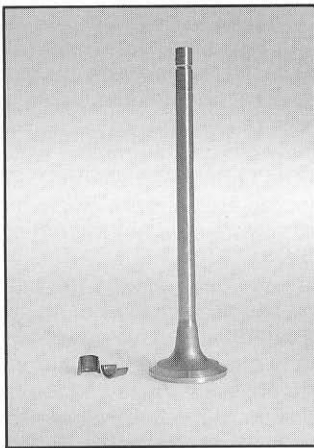
From the initial introduction of the L10 there has been an effort to simplify the parts distribution so that the right parts get to the customer. Most of the replacement parts for the L10 are structured in complete kits with all the necessary gaskets and mounting hardware included. For easy

recognition, you'll find that the kits are identified with the 3,800,000 number, just as they are with other Cummins engines.

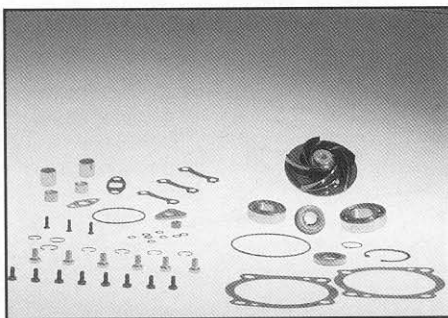
Some examples of how the number of parts that you have to handle are minimized are:



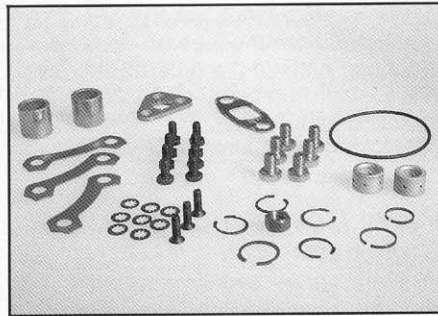
- Pistons are only available in kits with the piston rings, piston pin and retaining ring.



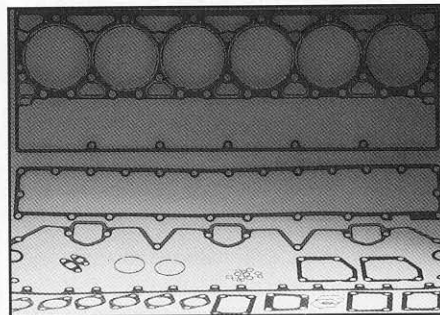
- Collets are included with each intake and exhaust valve kit.



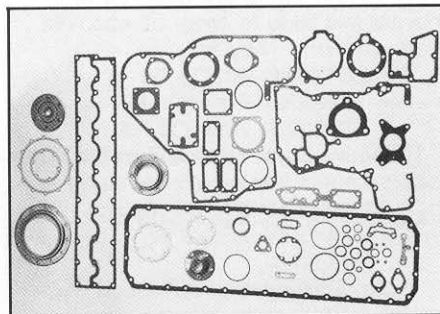
- Repair kits for most external components such as turbochargers, water pumps, and air compressors are packaged with the mounting gaskets, O-rings and seals.



- Most gears are already installed on the shaft except for those which have to be removed for installation or timing. The crankshaft, camshaft and lube pump gears are sold separately.



- Engine gaskets are supplied in sets. The upper engine gasket set, Part No. 3801641, includes the head gasket. However, it does not include the rocker cover gasket, Part No. 3034855.



- The lower engine gasket set, Part No. 3801676, includes the latest style "dimple design" oil seal to service the 1.772 inch accessory drive shaft, Part No. 3041043.

Due to customer request, Cummins now offers a kit for the crankshaft rear oil sleeve and seal, Part No. 3819774.

There are a few other special points that you must keep in mind as a Parts Professional. First, make sure your customer has the right gaskets and seals for a repair. As you've probably already gathered these seals are normally supplied with a specific kit or right with the part. But, there are many instances where components must be removed before another part can be installed. This is especially true at the front of the engine where the cover gasket seal should be replaced any time the cover is disturbed. Components which fit beneath the cover, like the vibration damper, lubrication pump, water pump, etc. which may at times require replacement will also require this gasket. So remember, make sure that your customer has everything to make the repair!

Oversize Parts

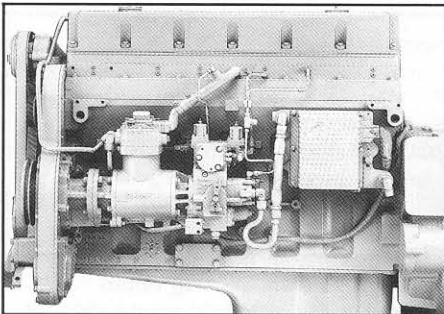
Several oversize parts are available for the L10. They include:

- Main Bearings
- Thrust (Main) Bearings
- Liner Shims
- Valve Seats
- Cross Head Guide
- Valve Guide
- Injector Sleeve
- Rear Seal Oil Sleeve
- Cylinder Head Capscrew (Salvage)
- Rod Bearings

These components and their applicable Part Numbers are shown in this table.

L10 Oversize Repair Kits

Description	Part Number	Comments
Main Bearing	3801151	0.25mm O/S(.010 in.)
	3801152	0.50mm O/S(.020 in.)
	3801153	0.75mm O/S(.030 in.)
	3801154	1.00mm O/S(.040 in.)
	3801150	Standard
NOTE: Main bearing set includes one PDC bearing kit, quantity 8 and thrust bearing quantity 4.		
Thrust Bearing	3050589	5.11mm
Rod Bearing	3016761	0.25mm O/S
	3016762	0.50mm O/S
	3016763	0.75mm O/S
	3016764	1.00mm O/S
	3016760	Standard
Liner Shim	3032623	
Liner Shim	3034663	
Valve Seat	3028071	0.25mm O/S
	3028072	0.50mm O/S
	3028073	0.75mm O/S
	3028074	1.00mm O/S
	3028070	Standard



"88" L10

L10 IN 1988

We'll close out our discussion of the L10 with a brief description of what you can expect on the L10 in 1988. A special point, after January 1, 1988, the 88 L10 will be the only production model certified for on-highway use. Several special changes have been made to the L10 for 1988 and all are to meet new emission laws. You can expect:

- Same engine sold in all 50 states of the USA.
- Fuel economy unchanged on 49 state engines, but 1 - 2% improvement over older California engines.
- New 50-state piston to reduce dead air space (not interchangeable).
- Change in piston produces higher compression ratio to further reduce particulates .
- Valves further recessed into head. Requires new cylinder head (not interchangeable with old head).
- New camshaft and injector. New intake lobe profiles for improved emissions.
 - Injection duration the same
 - Injection rate slower at start, faster at end
 - Intake duration the same, but higher lift for improved air flow
- New injector cup with 10 spray holes in place of 9 holes for finer spray, reducing particulates (soot).

- New H2D turbocharger in place of H2C.
 - More efficient, reducing intake temperatures
 - Higher airflow for reduced particulates
- New thermostat housing for lower intake temperatures (interchangeable with earlier versions).
- New noise panels for front cover and oil pan (available option).
- New engine front cover with noise panel mounting bosses (interchangeable).
- Other new miscellaneous panel mounting hardware.

What's New For Parts Publications

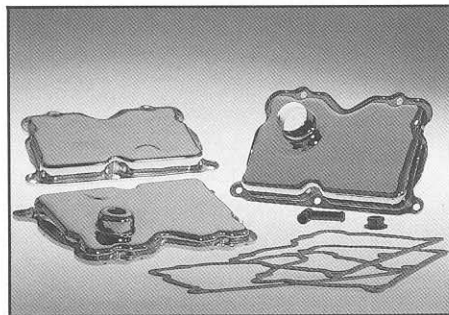
"88" Product Line



Four new parts catalogs have been released to support the 1988 product line. Plus, Parts Publications also brings you several customized publications servicing the construction market. Also, note the KTTA-50 Series Construction catalog has been revised. The Kits and Sets booklet has also been revised and expanded to include the latest product changes. The revision is now available from your local Cummins Distributor. The table provides you with the latest Cummins Parts Publications.

New Products

Chrome Rocker Cover Kit



New from Cummins, a highly polished NH/NT Chrome Rocker Cover kit, Part Number 3803036. Attractively priced to present a remarkable sales opportunity. This chrome kit makes a super showcase display appealing to the trucker who wants to add a touch of class to his Cummins engine. The three (3) chrome rocker covers are identical in style and dimension to the three (3) standard-style rocker covers currently offered for the pre-1988 NT. The Chrome Rocker Cover table provides a part number comparison of the individual rocker cover part numbers.

Parts Publications

Application	Bulletin Number
New	
88 Big Cam IV (fixed time automotive)	3884211
88 Big Cam IV (Step Time Automotive)	3884212
88 Big Cam IV 444 (automotive)	3884210
88 LTA10 (automotive)	3884213
Revision	
KTTA50Series (construction)	3822112-01
Customized	
LTA10 Dresser construction 250E	3884215
LT10 Dresser Construction 20G	3884214
4BT 3.9C Clark Melroe Bobcat	3884207
VT-28-C635 Dresser Construction Model 570A Pay Loader	3822031-01
VTA-28-C635 Dresser Construction Model 570A Pay Loader	3822032-01
Other Publications	
Kits and Sets	3822013-02
Turbocharger Cross Reference	3884216

Chrome Rocker Covers

Chrome cover	identical to	Standard cover
3803033		3006183
3803034		3049257
3803035		3006187
Individual covers can be purchased separately		

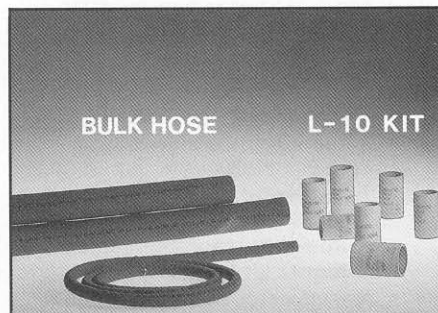
Chrome Kit Contents - 3803036

Part No.	Description	Qty
3042401	Grommet	1
3047134	Tube, Breather	1
3054841	Gsk, RKR Cov	3
3062178	Capscrew, Captive Washer	15
3803033	RKR,Cov	1
3803034	RKR,Cov	1
3803035	RKR,Cov	1

The kits include all gaskets, grommets and breather accessories. The table above includes the part numbers of items contained in Kit Part Number 3803036.

These kits are attractively priced to compete in the marketplace. Plus, they'll look super in your display area.

Cummins Premium Silicone Hose



It's time to start thinking about scheduling vehicles into your shops for winterization. Now Cummins offers a Premium Silicone Rubber Hose for year round and cold weather endurance. The premium hose was designed by the Cummins materials group for original use on **NT855, 444, and L10** engine water connections. The silicone rubber hose is constructed with a glass reinforced fiber which provides outstanding burst strength retention and does not require the use of special clamps. After extensive testing the Cummins silicone hose out-performed all other premium hoses in terms of burst strength, a test which determines service life.

Cummins has released fifteen (15) bulk hose kits, each 72 inches in length. From the kits it is possible to upfit most Big Cam III and IV's; and all L10 and L10 OAC (optimized aftercooled) models. The **Cummins Premium Silicone Hose** which is supplied for service is blue in color. The original hose installed in production at Cummins

Cummins Premium Silicone Hose

Part Number	ID Size	Color
3801863	0.38	blue
3801889	0.50	blue
3801862	0.62	blue
3801852	0.75	blue
3801853	0.88	blue
3801854	1.00	blue
3801855	1.12	blue
3801856	1.25	blue
3801864	1.50	blue
3801857	1.62	blue
3801858	1.75	blue
3801859	2.00	blue
3801860	2.25	blue
3801890	2.38	blue
3801861	2.50	blue

Engine Company is red. The color does not have any bearing on the glass reinforced fiber. The **same** materials are used in the construction of both the red and the blue.

Cummins offers three (3) specific silicone hose kits for service they are:

- Part Number 3801865 for Big Cam IV
- Part Number 3801866 for L10 Conventional Cooling
- Part Number 3801891 for L10 OAC (Optimized Aftercooling)

The hoses contained in these kits are the same as those used in production, therefore the hose is red in color.

The tables to the right provide you with the part numbers contained in the kits plus their lengths, inside diameter and where they are used.

Big Cam IV - 3801865

Part Number	Qty	ID x Length(inches)	Where Used
3054354	2	1.12 x 2.25	Aftercooler to Transfer Tube
3054355	1	1.00 x 2.25	Air Compressor
3054859	1	1.75 x 3.25	Water Manifold
3058268	1	0.88 x 3.00	Air Compressor
3818271	2	1.25 x 3.00	Transfer Tube to Thermostat Hsg

L10 Conventional - 3801866

Part Number	Qty	ID x Length(inches)	Where Used
3818270	1	1.25 x 2.75	Lube Oil Cooler
3818271	5	1.25 x 3.00	Aftercooler (4) & Lube Oil Cooler (1)
3818272	1	1.66 x 2.75	Thermostat Hsg

L10 OAC - 3801891

Part Number	Qty	ID x Length(inches)	Where Used
3818267	2	1.00 x 3.00	Aftercooler to Transfer Tube
3818268	1	0.88 x 3.00	Thermostat Hsg
3818269	1	0.50 x 2.50	Water Bypass Tube
3818270	1	1.25 x 2.75	Lube Oil Cooler
3818271	1	1.25 x 3.00	Lube Oil Cooler

Big Cam III Coolant Hose

Hose P/N	ID x Length(inches)	Bulk Kit P/N
179906	0.38 x 6.00	3801863
179912	0.38 x 6.00	3801863
102522	1.50 x 3.00	3801864
155789	1.00 x 2.50	3801854
200517	1.00 x 3.00	3801854

Big Cam II and Big Cam II/III 475

Hose P/N	ID x Length(inches)	Bulk Kit P/N
3818269	0.50 x 2.50	3818269
102522	1.50 x 3.00	3801864
179906	0.38 x 6.00	3801863
179912	0.38 x 12.00	3801863
3025874	1.00 x 2.50	3054355
155789	1.00 x 2.50	3054355

The tables to the left will help you identify the coolant hoses used only on Big Cam III, and on Big Cam II and Big Cam II/III 475's. The tables provide you with the bulk hose kit number for Uprate, per hose inside diameter (ID).

Cummins Premium Silicone Rubber Hose shows superior reduction in leakage when compared to other hoses at cold temperatures. One competitive silicone hose leaked excessively during cold temperature testing. Several additional tests were run with equally outstanding results for the Cummins hose. Based on these test results, glass fiber reinforced silicone rubber hose is the best choice to meet the long term requirements of high speed diesel engines.

Fleetguard Monitor-C®



New from Fleetguard a mail-in chemical coolant analysis package, called **MONITOR-C**. By drawing a small amount of coolant and using the Monitor-C program you can conclude the overall condition of a diesel engine's cooling system. Monitor-C can be used to check chemical protection levels against rust, scale, liner pitting and solder bloom, or whether these problems are already present. It can also diagnose under-concentrated antifreeze, which could lead to silicate gelation or overheating.

The Monitor-C program is reliable for users of all brands of cooling system corrosion inhibitors and filters. "The testing and interpretation recognizes the varying chemical formulas in the market and how each variant protects different areas of the cooling system," states Richard Hawkins, Manager of Fleetguard's Technical Services.

Getting started with Monitor-C is easy. Our CC2700 kit contains a plastic bottle for the coolant sample, a peel-and-stick label to fill in so that Fleetguard has all the necessary information, and a self-mailer box. Simply take a sample according to the instructions and ship it to Fleetguard.

When to use Monitor-C is a matter of user choice. Fleetguard recommends immediate initial sampling, and you may want to continue sampling at each oil change until you are satisfied that any problems are under control. Once the cooling system is determined to be in proper condition, a sample taken at each extended "C" maintenance check, 40-60 thousand miles is usually adequate.

Fleetguard will send you back a complete, concise, easy to read and understand report concerning an engine's cooling system. Monitor-C, a service program that assists in determining the optimum cooling system maintenance program. For more information on Monitor-C write to:

Fleetguard, Inc.
P.O. Box 162409
Irving, Texas 75016

or call your nearest Cummins Distributor or Dealer.

Parts Professional Accreditation Exam Instructions

1. Complete the examination, make sure to check only one answer PER question in the () provided.
2. Please be sure to fill in your Name, State and SS/INS No. at the top of the exam form. This will assure proper credit and save grading time.
3. If you are enrolling for the first time or you have had a change of address or employment fill in the mail list information in the boxes below. Keep yourself current on the mail list.
4. Return exams 7 and 8 and earn a 10 pack "Igloo" cooler.

For factory use only.

Dist. Code	<input type="text"/>	Dealer Code	<input type="text"/>	OEM	<input type="text"/>
Your Name	<input type="text"/>				
Social Security/Ins. Number	<input type="text"/>	Title	<input type="text"/>		
Home Address	<input type="text"/>				
City	<input type="text"/>				
State/Province/Country	<input type="text"/>	Zip/PC	<input type="text"/>		
Employed By	<input type="text"/>				
Address	<input type="text"/>				
City	<input type="text"/>				
State/Province/Country	<input type="text"/>	Zip/PC	<input type="text"/>		
Cummins Headquarter Distributor	<input type="text"/>				
Address	<input type="text"/>				
City	<input type="text"/>				
State/Province/Country	<input type="text"/>	Zip/PC	<input type="text"/>		

Parts Professional Booklets

- () Please send me the first series of four booklets. I understand that these are for extra reading only. Quiz 1-4 will no longer be graded.
- () I did not receive booklet no. 6. Please send me a copy.

Check who you are employed by:

- () Cummins Engine Company
- () Cummins Engine Distributor
- () Authorized Cummins Dealer
- () Authorized Cummins Service Center
- () OEM (specify) _____
- () Other (specify) _____

Turn Page, Begin Test

Detach here, fold and seal to mail.

Part Professional Test #7

1. The L10 engine was first introduced in _____.
 - A. () Canada
 - B. () Mexico
 - C. () United Kingdom
 - D. () United States
2. The power torque L10 models provide _____.
 - A. () a wide operating range
 - B. () nearly constant horsepower throughout the range
 - C. () consistent performance in stop and go traffic
 - D. () all of the above
3. Cummins L10 engines carry a patent decal.
 - A. () true
 - B. () false
4. The L10 firing order is the same as the NT.
 - A. () true
 - B. () false
5. The L10 has _____ part numbers that are patented.
 - A. () 14
 - B. () 11
 - C. () 2
 - D. () 9
6. Currently there are three mounting locations for the data plate?
 - A. () true
 - B. () false
7. The data plate provides you with an engine serial number (ESN). If the data plate is missing you can find the ESN stamped into a boss on the _____.
 - A. () block near the top of the number six cylinder
 - B. () head near the number one cylinder
 - C. () air compressor housing
 - D. () rear of the fuel pump
8. L10 engines are manufactured and assembled in _____.
 - A. () Shotts, Scotland
 - B. () Jamestown, New York
 - C. () neither of the above
 - D. () both A and B
9. The L10 liner design is patented.
 - A. () true
 - B. () false
10. The liner design is called a _____.
 - A. () ledge-top
 - B. () mid-stop
 - C. () verticle-stop
 - D. () liner-top
11. L10 pistons feature a _____ design.
 - A. () hollow-top
 - B. () flat-top
 - C. () no-top
 - D. () column top
12. The L10 liner has a top press fit in the engine block which eliminates the upper counterbore in the block.
 - A. () true
 - B. () false
13. The large diameter camshaft is located near the top of the block. This location makes the valve train more responsive.
 - A. () true
 - B. () false
14. The high position of the camshaft provides these benefits _____.
 - A. () short stiff push rods
 - B. () high injection pressures
 - C. () greater fuel economy and reduced exhaust emissions
 - D. () all of the above
15. The L10 utilizes a viscous-type vibration damper that is mounted _____.
 - A. () to the flywheel housing
 - B. () outside the front gear cover
 - C. () inside the front gear cover
 - D. () to the oil pan rail
16. There are three reasons for the interior mounted vibration damper.
 - A. () true
 - B. () false

17. The turbocharger currently used on the 1988 L10 is the _____.
 - A. () H2D
 - B. () H2C
 - C. () H1E
 - D. () HT3B
18. The Jacobs Brake model 404 is now available for 50 state engines with a slave piston setting of _____.
 - A. () .018
 - B. () .019
 - C. () .020
 - D. () .015
19. Optimized aftercooling was introduced in conjunction with the _____ horsepower rating.
 - A. () 270
 - B. () 385
 - C. () 300
 - D. () 210
20. Optimized aftercooling slows the coolant flow through the radiator and can cause a temperature drop of as much as _____.
 - A. () 40°F
 - B. () 60°F
 - C. () 5°F
 - D. () 0°F
21. The L10 optimized aftercooling circuit requires a _____.
 - A. () single thermostat assembly
 - B. () dual thermostat assembly
 - C. () triple thermostat assembly
 - D. () none of the above
22. The torque converter disc is located _____.
 - A. () to the left of the inlet hose
 - B. () to the right of the water hose
 - C. () inside the coolant bypass hose
 - D. () inside the water pump
23. L10 engines equipped with optimized aftercooling do not require a "torque converter" disc.
 - A. () true
 - B. () false
24. A 10 litre displacement equals _____ cubic inches.
 - A. () 707 cu. in.
 - B. () 412 cu. in.
 - C. () 611 cu. in.
 - D. () 212 cu. in.
25. Top stop injectors limit injector travel, thereby unloading the injector train during the metering portion of the cycle to _____.
 - A. () improve lubrication of the ball and socket joints
 - B. () reduce injector train wear
 - C. () neither A or B
 - D. () both A and B
26. Top stop injector couplings available for service are hardened to prevent wear from occurring on the coupling flange and on the top side of the spring retainer.
 - A. () true
 - B. () false
27. Top stop injector couplings which have not been hardened are gray.
 - A. () true
 - B. () false
28. Cummins has released _____ bulk hose kits, each 72 inches in length.
 - A. () 2
 - B. () 15
 - C. () 12
 - D. () 18
29. The 50 state piston used in the 1988 L10 produces a higher compression ratio to further reduce _____.
 - A. () air flow
 - B. () compression
 - C. () particulates
 - D. () injection
30. The upper engine gasket set does not include the rocker cover gasket.
 - A. () true
 - B. () false
31. Where do you buy batteries?
 - A. () battery specialist
 - B. () OEM ship-direct program
 - C. () other _____

References

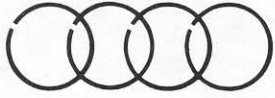
Brochures

L10 Power for the Long Haul	3605012
L10 Design Features	3382766
L10 Competitive Comparison (vs. Mack EM6)	3604913
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L10 New Big Cam IV	3604885

Service Parts Topics

84T8-10	L10 Belt Driven Fan Assemblies
85T1-11	Gear Cover Plates
85T3-1	Rocker Shaft and Rocker Support Modifications
85T3-2	New Valve Cover Gasket
85T6-4	Top Stop Injectors
85T7-1	Lube Suction Tube O-Rings
85T7-2	High Pressure Regulator Valve (Oil)
85T8-1	DCA4 Coolant Filters
85T8-5A	Cooling System Venting
85T8-6	Corrosion Resistor Assembly
85T8-8	Water Pump Shaft
85T9-1	Accessory Drive Revisions
85T17-3	New Valve Cover Gasket, P/N 3034855
86T1-3	Piston Ring Gap Specifications
86T1-4	Cup Plug Installation
86T1-5	SAE "A" and "B" Hydraulic Drive Idlers
86T1-8	Connecting Rod Numbers
86T1-10	Crankshaft Thrust Bearings
86T6-1	Top Stop Injectors and DFF Injector Barrel Change
86T6-2	Top Stop Injectors
86T7-1	Turbocharger Oil Supply Hardware
86T9-1	Accessory Drive Revisions
86T9-2	Freon Compressor Bracket
87T8-9	Optimized Aftercooling Controlled Leakage Check Valves
87T8-2	New Spun Formed Pulleys
87T17-2	1988 L10 Engine Release

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