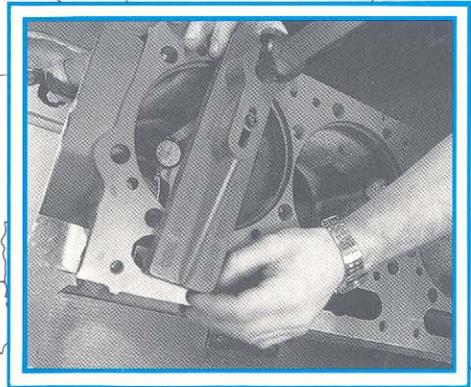
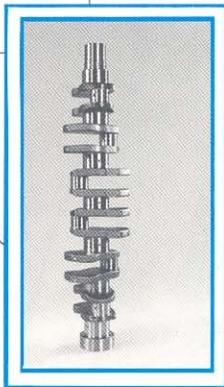
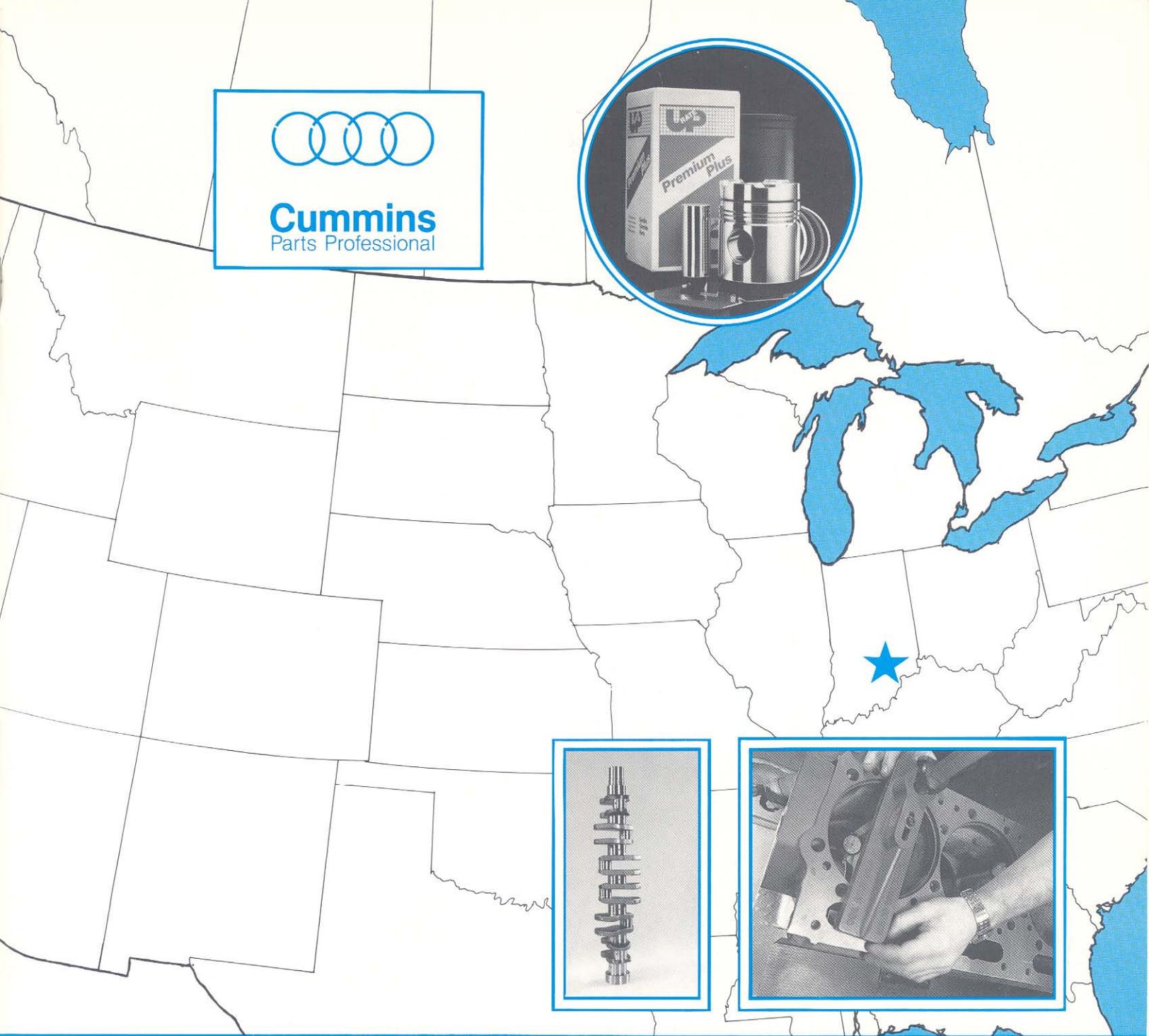




PARTS PRO CLASSIC

CLASSIC EDITION #2

Parts Pro Classic is provided as a historical reference.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



PARTS PROFESSIONAL

2

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



The Cummins Parts Professional series is a great way to increase product knowledge and parts sales. Being sharp and up-to-date on what's happening within the Cummins Parts Network, and how changes and updates affect service, help you to be the Parts Professional that customers ask for and technicians rely on. The more you know ... the better off you'll be ... both professionally and financially!

Parts Professional booklet #2 is primarily centered around the

NH/NT engine family. It is the second in the series and is designed to familiarize and update you with the NH/NT Block Group. The booklet also provides information on Training Publications, New Parts Products, Product Consolidations, Competitive Information, the latest on Kits and Sets, Cummins ReCon and Parts Marketing programs.

To be recognized as a Cummins Parts Professional and to continue receiving the training booklets, you must complete and mail the exams

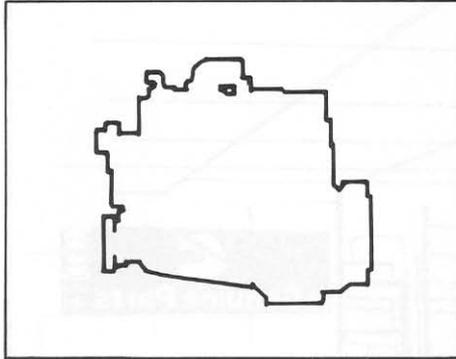
in the self-addressed envelope. Scoring an average of 90% or better on the first four exams will entitle you to an official "Cummins Parts Professional Jacket". Plus, you'll be on your way to keeping up with all the latest Cummins designs and product improvements.

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.

Engine Groups

Engine Groups

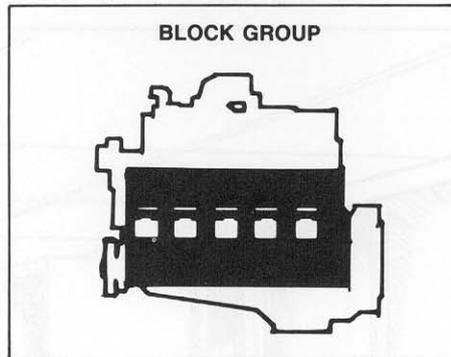
In Parts Professional booklet #1, we divided the engine into five basic groups:



- Head Group
- Block Group
- Pan Group
- Ends Group
- Accessory Group

In the first booklet we concentrated on the Head Group and its associated components and gaskets. If you missed the first issue, it can be ordered from your Cummins distributor bulletin no. 3387320-1R. Fill in the enrollment information and the quiz and mail them in the return envelope. This will get your name added to the mailing list.

Booklet #2 covers the block group.



The block is the backbone of the engine, as all of the groups are attached to, or supported in some way, by the cylinder block. It includes the:

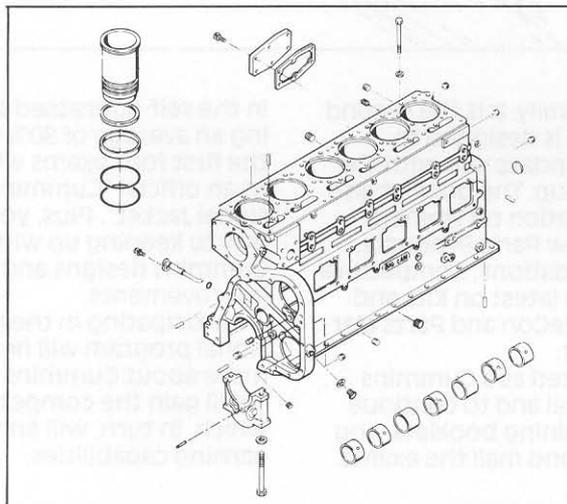
- Cylinder Block
- Cylinder Liners
- Pistons and Pins
- Piston Rings
- Connecting Rods and Caps
- Crankshaft and Main Bearing Caps
- Main and Rod Bearings
- Camshaft and Bushings
- Cam Followers
- Push Tubes

In addition there are many other associated parts to include in a customer's service order, many of which can be filled with Cummins kits.

As you go through this booklet, review the material carefully. You'll find a 30 question test at the end of the booklet covering the block group and other Cummins parts information. Double check your answers against the text in the booklet. Then, after you've finished the test, carefully complete the form and promptly mail the answers in the envelope provided.

NOTE: If you are already enrolled and received booklet #1 through the mail, complete only the questions asked and your name, address and social security/insurance number.

Block Group Components



Cylinder Block

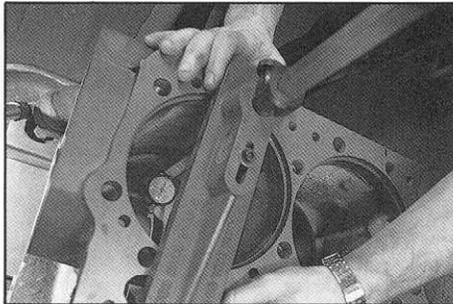
The Cylinder Block is the foundation of the entire engine. It is a precisely cast component which undergoes a series of complex cutting, boring and milling operations before it can be used.

The Cylinder block is made of a cast iron alloy, and must meet strict Cummins specifications. The alloy materials are carefully chosen by Cummins engineers and metallurgists to give the cylinder block several different properties. The following are alloys contained in the cylinder block and the benefits they provide.

- *Molybdenum*—Hardness and thermal properties
- *Titanium*—Strength and resistance to cracking
- *Zinc*—For elongation (allows for thermal expansion and contraction)
- *Tin*—Assists in bonding the materials together
- *Steel*—Tensile strength
- *Pig Iron*—Compressive strength
- *Graphite*—Machinability
- *Nickel*—Strength

Cummins Standards

Cummins blocks set the standard in the diesel industry. Testing and evaluation through the entire manufacturing process is tightly controlled to ensure high quality, precise machining and durability for reliable diesel power.

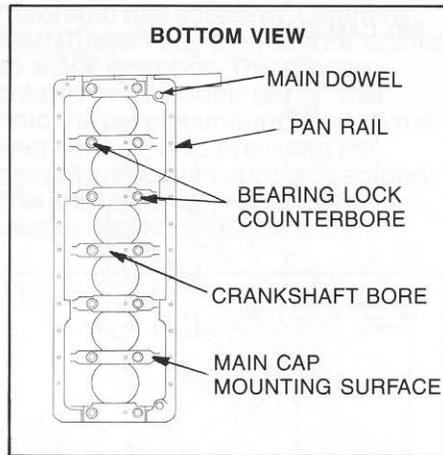


Cummins blocks are precisely cast and accurately machined and drilled to exact tolerances.

Manufacturing Process

The block manufacturing process at Cummins begins with rough cast cores being placed on a machining line, where all the holes are bored and finished, and all mating surfaces are machined. The initial point where all measurements and machining dimensions are made is a dowel hole at the front of the block on the fuel pump side of the engine. This is referred to as the main locating dowel. This dowel is shown in the art depicting the bottom of the block.

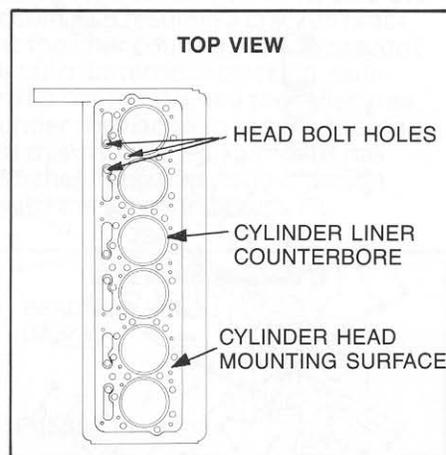
To give you an idea of the amount of machining that goes into each block, the following illustrations show all the hole, surface and drilling locations on the block. Keep in mind that anywhere there is a hole for drilling, there must also be a mating surface machined. For large bores on which components are fit and/or mounted, precise boring and counter-boring procedures are followed.



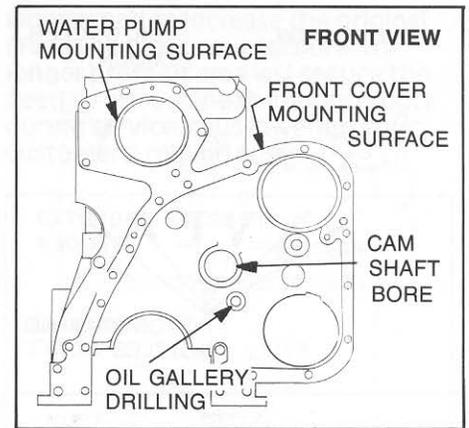
This illustration shows the bottom of the block: In this view, notice the locating dowels, oil pan bolt holes and main bearing cap bolt holes. Critical machining is required in these areas:

- Pan rail
- Crankshaft bore
- Main cap mounting surface
- Bearing lock counterbore

NOTE: The crankshaft bore is machined with the main caps in place. This assures accurate mounting of the cap to the block which, in turn, assures smooth crankshaft rotation. Once the block and cap have been machined, they are not interchangeable and are marked as a matched set.



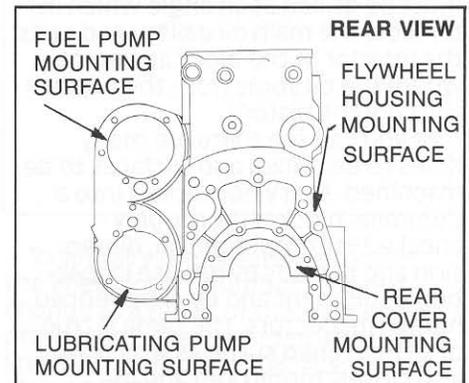
This illustration shows the top of the block. Note the holes for the Head Bolts, and the precisely machined surface where the Cylinder Heads mount. Notice the counterbore machined into the top of the block for the Cylinder Liners.



The front of the block has precisely machined surfaces for the:

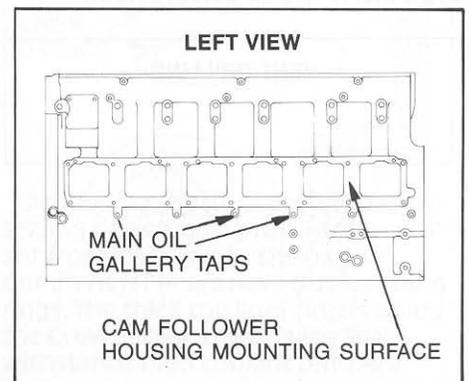
- Water Pump
- Front Cover

Also shown are the Camshaft Bore and Oil Gallery drilling.



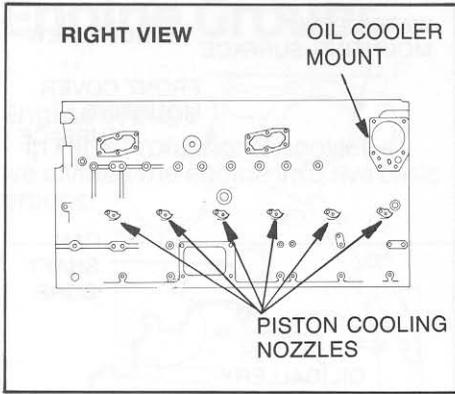
This illustration shows the rear of the block. The machined surfaces shown here are for the:

- Fuel and Lubricating Pumps
- Rear Cover
- Flywheel Housing



This illustration shows the left side of the block. The precision machined surfaces on this side include:

- Camfollower Housing
- Taps into the Main Oil Gallery



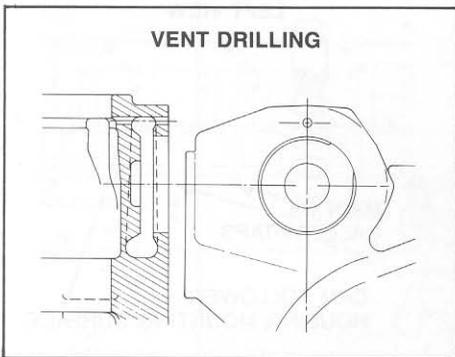
Precision machinings on the right side of the block are shown in this illustration. They are:

- Oil Cooler
- Piston Cooling Nozzles

Machining procedures for the piston cooling nozzles are extremely precise. This is because the holes must be drilled at an angle which intersects the main oil gallery and exits the interior of the block at a point where the oil spray from the nozzle will cool the piston.

As you can see there are many holes to be drilled and surfaces to be machined. Every hole bored into a Cummins block is thoroughly checked for proper depth, dimension and threads by precise inspection equipment and by experienced human inspectors. The same is true of all machined surfaces which are also closely monitored and inspected. Any defects in a block or machinery misadjustments are quickly discovered and corrected to ensure a premium quality product.

Big Cam IV Block Differences



Cylinder Blocks are not that different among the Big Cam models. In fact the major difference between the Big Cam III and IV blocks is a vent

BIG CAM III

REF. NO.	PART NUMBER	PART NAME	NO. REQ'D
1	3801310	Block, cylinder (3031150)	1
2	S-679	Washer, plain (25/64)	1
3	S-716	Plug, expansion	1
4	S-719	Plug, expansion	1
5	S-911-B	Plug, pipe (1/8)	2
6	S-966-E	Plug, pipe (1)	1
8	60408	Dowel	1
9	66292	Washer, plain	1
10	68445	Pin, groove	6
11	69901	Plug, pipe (1/8)	7
12	70653	Dowel	1

REF. NO.	PART NUMBER	PART NAME	NO. REQ'D
13	202903	Pin, roll	2
14	210884	Plug, threaded	1
15	3008466	Plug, pipe (1/4)	2
16	3008468	Plug, pipe (1/2)	3
17	3008469	Plug, pipe (3/4)	1
18	3013786	Plug, pipe (3/8)	5
19	70089-1	Gasket, cover	1
20	132019	Cover, water heater	1
21	3013904	Capscrew, captive	6
22	69699	Washer, plain	36
23	3011952	Plug, expansion	1
24	3013623	Capscrew, hexagon	36
25	3008047	Cap, main bearing (No. 1, 3 and 5)	3
25	3008048	Cap, main bearing (No. 2, 4 and 6)	3
25	3008049	Cap, main bearing (No. 7 only)	1
28	67211	Dowel, rear main	2
29	68585	Dowel, pin	6
30	208346	Capscrew, hexagon	14
31	140218	Washer, plain	14
	3801106	Kit, camshaft bushing	1
32	3011951	Bushing, camshaft (No. 7)	1
33	3028075	Bushing, camshaft (No. 1, 2, 4, and 6)	4
34	3028269	Bushing, camshaft (No. 3 and 5)	2

REF. NO.	PART NUMBER	PART NAME	NO. REQ'D
CYLINDER BLOCK			
All Models			
AR-11317		Kit, cylinder liner	6
35	183049	Seal drive	6
36	213740	Liner, cylinder	6
37	215090	Seal, crevice	6
38	3008998	Seal, O-ring	6

REF. NO.	PART NUMBER	PART NAME	NO. REQ'D
SHIMS, LINER			
39	3019955	Shim (0.007)	A/R
39	3019956	Shim (0.008)	A/R
39	3019957	Shim (0.009)	A/R
39	3019958	Shim (0.020)	A/R
39	3019959	Shim (0.031)	A/R
39	3019960	Shim (0.062)	A/R

REF. NO.	PART NUMBER	PART NAME	NO. REQ'D
PISTON COOLING NOZZLE			
All Models			
40	3014404	Assembly, piston cooling nozzle	6
41	3013591	*Nozzle, piston cooling (3013590)	6
40	3007442	Seal, O-ring	6
42	3033822	Capscrew, captive	6

REF. NO.	PART NUMBER	PART NAME	NO. REQ'D
43	S-901	Plug, pipe (1/4)	1

hole drilling in the coolant fill area. (See Service Parts Topic 84TO-5)

The parts list for the Big Cam III and Big Cam IV blocks are shown here with their differences highlighted.

As you can see, the block assemblies are very similar. The major difference is the water pump vent hole drilling, which changed the cylinder block part number.

BIG CAM IV

REF. NO.	PART NUMBER	PART NAME	NO. REQ'D
1	3801592	Block, cylinder (3031155)	1
2	S-679	Washer, plain (25/64)	1
3	S-716	Plug, expansion (1-1/8)	1
4	S-719	Plug, expansion (1)	1
5	S-911-B	Plug, pipe (1/8)	2
6	S-966-E	Plug, pipe (1)	1
8	60408	Dowel	1
9	66292	Washer, plain	1
10	68445	Pin, groove	6

REF. NO.	PART NUMBER	PART NAME	NO. REQ'D
11	69901	Plug, pipe (1/8)	7
12	70653	Dowel	1
13	202903	Pin, roll	2
14	210884	Plug, threaded	1
15	3008466	Plug, pipe (1/4)	2
16	3008468	Plug, pipe (1/2)	3
17	3008469	Plug, pipe (3/4)	1
18	3013786	Plug, pipe (3/8)	5
19	70089-1	Gasket, cover	2
20	132019	Cover, water heater	2
21	3013904	Capscrew, captive	12
22	69699	Washer, plain	36
23	3011952	Plug, expansion	1
24	3013623	Capscrew, hexagon	36
25	3008047	Cap, main bearing (No. 1, 3 and 5)	3
25	3008048	Cap, main bearing (No. 2, 4 and 6)	3
25	3008049	Cap, main bearing (No. 7 only)	1
28	67211	Dowel, rear main	2
29	68585	Dowel, pin	6
30	208346	Capscrew, hexagon	14
31	3039305	Washer, plain	14
	3801106	Kit, camshaft bushing	1
32	3011951	Bushing, camshaft (No. 7)	1
33	3028075	Bushing, camshaft (No. 1, 2, 4, and 6)	4
34	3028269	Bushing, camshaft (No. 3 and 5)	2

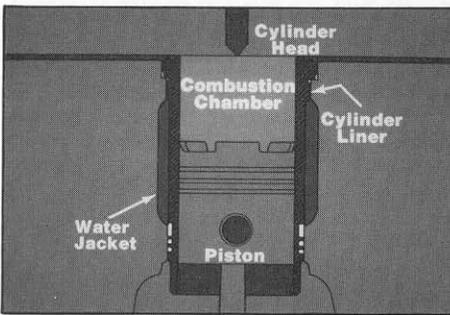
REF. NO.	PART NUMBER	PART NAME	NO. REQ'D
CYLINDER LINER KIT			
All Models			
AR-11317		Kit, cylinder liner	6
35	213740	Liner, cylinder	6
36	215090	Seal, crevice	6
37	3032874	Seal, O-ring	12

REF. NO.	PART NUMBER	PART NAME	NO. REQ'D
SHIMS, LINER			
38	3019955	Shim (0.007)	A/R
38	3019956	Shim (0.008)	A/R
38	3019957	Shim (0.009)	A/R
38	3019958	Shim (0.020)	A/R
38	3019959	Shim (0.031)	A/R
38	3019960	Shim (0.062)	A/R

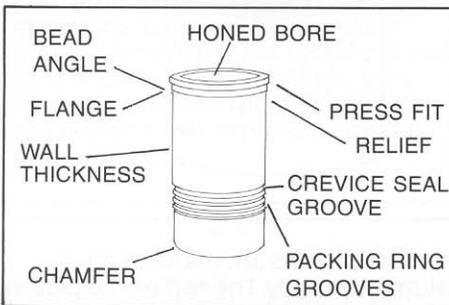
REF. NO.	PART NUMBER	PART NAME	NO. REQ'D
PISTON COOLING NOZZLE			
All Models			
39	3014404	Assembly, piston cooling nozzle	6
40	3013591	*Nozzle, piston cooling (3013590)	6
41	3007442	Seal, O-ring	6
41	3033822	Capscrew, captive	6

REF. NO.	PART NUMBER	PART NAME	NO. REQ'D
BLOCK DRAIN			
All Models			
42	S-901	Plug, pipe (1/4)	1

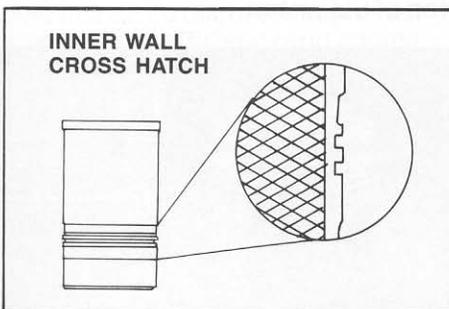
Cylinder Liners



Cylinder liners are placed in each of the cylinder openings in the block. The cylinder liner forms the walls of the combustion chamber. The top of the liner is sealed by the cylinder head and the bottom is sealed by the piston and rings, which move up and down within the liner.

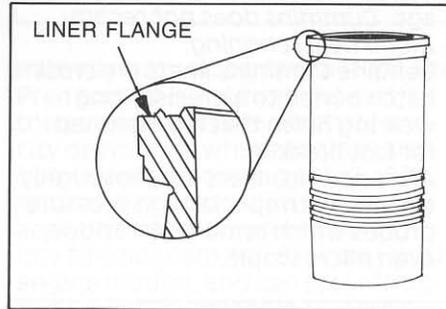


Cummins pioneered replaceable liners in 1928 and has been improving them ever since. Cummins liners are referred to as "wet liners" because they are inserted into the water jacket and come into direct contact with the coolant. Cummins liners are centrifugally cast. This process helps to eliminate certain impurities in the metals which provides a more durable wear surface and good oil control.



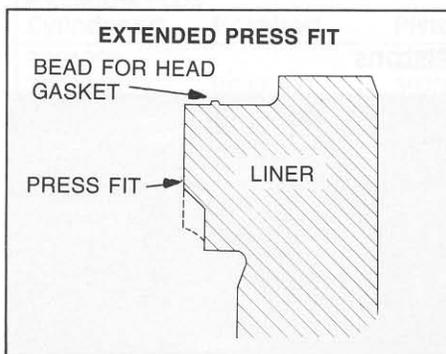
The inner wall of the NH/NT liner is cross-hatch honed for a precise finish that produces a network of recessed canals and island plateaus for proper oil control, fast break-in and

maximum fuel economy. Cummins NH/NT liners are then lubrite etched to aid oil retention. This process creates "microscopic pores" that hold the proper amount of oil on the liner surface, thus providing improved lubrication during operation. This improved lubrication contributes to longer component life.



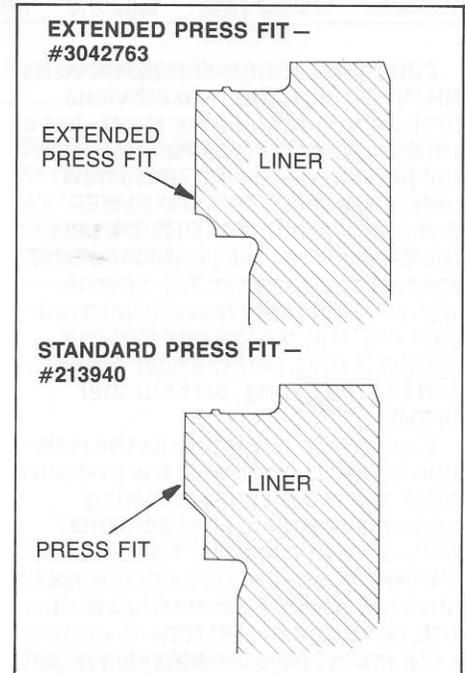
The top of the liner protrudes slightly above the block surface to assure proper gasket seal and uniform torque pressure. The liner flange fits into the block counterbore and is designed to be flat or slope slightly upward to the outer edge to absorb load during operation. The liner flange ensures proper liner-to-block counterbore fit.

Liner flange dimensions are critical. If the fit is too loose, it may cause "counterbore fretting", coolant leakage, and excessive block wear. If it is too tight, the liner may become distorted and crack. This condition could also result in a cracked block at the liner counterbore. To prevent liner counterbore cracking, Cummins has redesigned the relief area under the flange to reduce the load in this critical area. Cummins has further improved its liner design with the Extended Press-Fit.

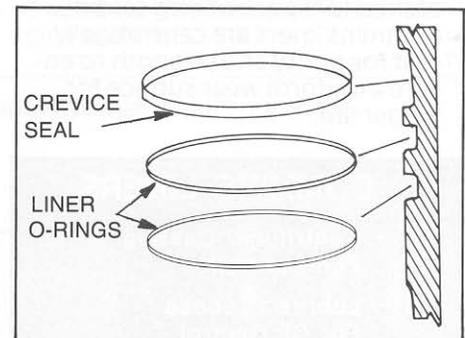


The Extended Press-Fit design has been released for full production and will help extend engine life to overhaul. As you can see in the illustration the press-fit area has been

lengthened to increase the original life of the block counterbore. The longer press-fit area will reduce the need to remachine the counterbore during service, thus lowering your customers' rebuild costs.



To simplify the ordering process, the liner kit part numbers will not change as a result of this product improvement. The Extended-Press-Fit liner part number is 3042763; it replaces 213740.



Around the bottom of the liner are sealing rings which prevent the coolant from leaking into the oil pan. Cummins NT liners have three sealing rings. The thick top liner ring is called the Crevice Seal. The Crevice Seal withstands high coolant temperatures and prevents foreign particles from damaging the center ring. The center O-ring separates water from the oil. The bottom O-ring prevents the oil from contaminating the upper rings.

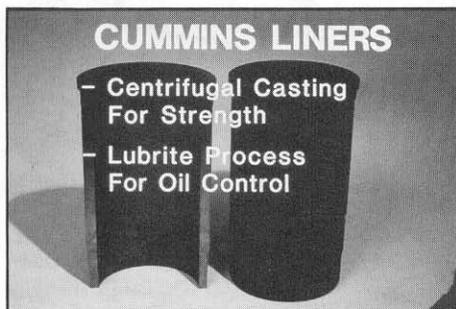
Part No.	Part Name	Type Of Material	Color	Qty. Per Liner
3032874	Seal, O-ring	EP	Black with one blue dot OR	2 new
3008998	Seal, O-ring	EP	Black with two green stripes	1
183049	Seal, O-ring	Silicone	Red	1

Cummins recently standardized its NH/NT O-rings. This new ethylene propylene O-ring—EP for short—has a smaller diameter cross section than the previous EP O-ring, and a new part number 3032874. The two EP O-rings, part number 3032874, plus the Crevice Seal, part number 215090, are packaged as a set. The new design EP O-rings are marked with one blue dot. This design replaces the middle O-ring, part number 3008998, and the red O-ring, part number 183049.

Caution: Do not intermix the redesigned (EP) O-rings with the previous black and red O-rings, as mixing them may result in liner deformation. (See Service parts Topic 85T1-9.)

If your customers are unsure about buying Genuine Cummins liners or kits, point out these facts:

- Cummins liners are specifically cast to Cummins specifications.
- Cummins liners are cross hatch honed for better oil control, quick break-in and maximum fuel economy.
- Cummins thick wall design resists cracks and erosion.
- Cummins NH/NT liners are lubrite etched for superior ring seating.
- Cummins liners are centrifugally cast for purity and strength to ensure a uniform wear surface for longer life.

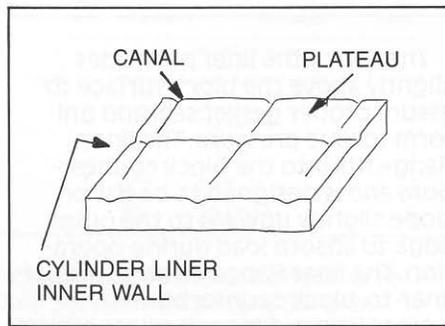


Sell your customers on new liners and kits, rather than re-honing. Here's some good information you can pass on to your customers:

- Cylinder re-honing in the field is not a simple task.
- Equipment available for field re-honing may either hone or clean

ineffectively, causing engine damage. *Cummins does not recommend field re-honing.*

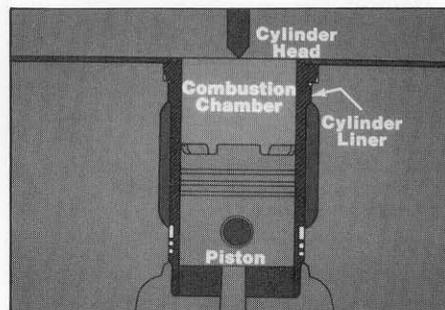
- Genuine Cummins liners are cross hatch honed to a precise, long wearing finish that is developed for fast break-in.
- After honing, liners are thoroughly cleaned with special high pressure probes which remove all residue, even microscopic.



Re-honing can leave abrasives on the liner surface which cause pre-mature piston, piston ring and liner wear.

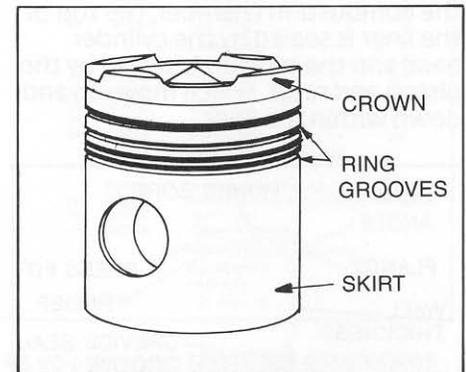
The risks of re-honing far outweigh the benefits your customers receive. Persuade them to check their liners against the re-use guidelines, consider how many miles they'll need until the next overhaul or trade-in, and seriously consider new liners or cylinder kits.

Pistons

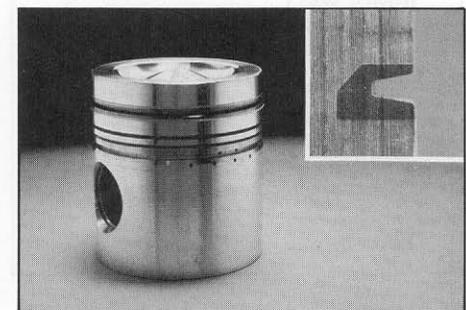


The piston is a moveable seal which forms the bottom of the combustion chamber. The piston transmits the force of combustion through the

connecting rod to the crankshaft. In a four-stroke cycle the piston performs four important functions. During the intake stroke, the piston moves downward drawing fresh air into the cylinder. On the upward stroke, the piston compresses the air, heating it well above combustion temperatures. When fuel is sprayed into the hot compressed air, combustion occurs, and the resulting pressure forces the piston downward, causing the crankshaft to turn. During the exhaust stroke, the upward motion of the piston forces the burned gases through the exhaust port.



Most pistons are made of an aluminum alloy. The top of the piston is called the crown. The bottom area is called the skirt. Between the crown and the skirt is the ring band, which consists of lands and grooves for the piston rings. Cummins NT pistons have a dome area in the center which causes the fuel to make a swirling pattern as it is sprayed into the combustion chamber. This helps the air and fuel to thoroughly mix, resulting in more efficient combustion. Valve relief pockets are machined in the top of the piston to prevent the valves from striking the top of the piston.

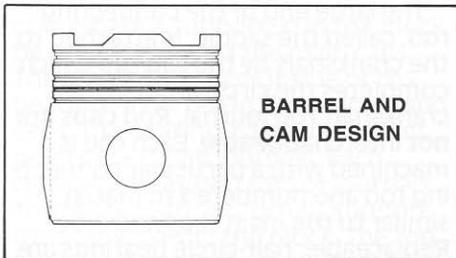


Due to tremendous pressures generated by diesel engines, the top piston ring pounds against its groove. In order to resist the wear caused by

this pounding action, the top ring groove has a long-wearing Ni-Resist insert cast into the piston. This Ni-Resist insert is made of an extremely hard nickel alloy to resist heat erosion and wear, which can cause premature ring failure.



Cummins piston designs have changed considerably over the past few years. Each has been a design improvement that has increased performance and fuel economy. Let's look at two of the most current piston designs: the Premium and the Premium Plus.



The Premium piston design is non-cutback and valve-pocketed, and is available for Small Cam and Big Cam I and II models. This design increased the diameter above the top ring groove, thereby reducing the dead air space above the top ring groove. The increased diameter improves combustion efficiency and engine response. The top ring groove has a Ni-Resist cast iron insert to further increase the piston's resistance to heat, erosion and wear, which can cause premature ring failure. Notice the crown is machined to match the injector spray pattern to provide optimum air and fuel mixing for complete combustion. The skirt is Barrel and Cam design. This design is known for its thermal expansion qualities during engine operation.

As a Cylinder Kit it's recognized as the design that best suits normal engine loads and higher RPM. This Cylinder kit carries a 12 month/100,000

High Volume NT PREMIUM Cylinder Kit and piston part numbers are:

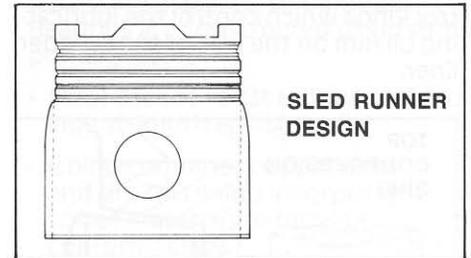
PREMIUM Cylinder Kit Part Numbers*	Piston Part Number
3801060	3017348
3801061	3017349
3801062	3023102
3801105	3025516
3801394	3037346

*See Section Three of Uprate Manual for specific application information.

mile warranty on parts and labor. The Premium kit is an Uprate kit and is the perfect choice for linehaul and city operations where engines are consistently operating at 300-400 rpm above peak torque. The kits apply the latest Cummins technology to Small Cam and Big cam I and II engine models, and can provide up to a 3% improvement in fuel economy. (See bulletin #3387319-R for complete cylinder kit listings) and Service Parts Topic 85T1-4.

The other current piston design, Premium Plus, is also a non-cutback design which increases the diameter above the top ring groove to reduce the dead air space above the top ring groove. Five Premium Plus pistons have a 3/8 inch higher top ring groove; they are noted in the table below. These Pistons are used on BC III 300 horsepower and below; and on BC IV 300 and 350 models. This higher top ring groove location serves to further reduce the dead air space, thereby increasing combustion efficiency and resulting in an additional .5% fuel economy improvement. The skirt is a Sled-Runner design. The

Sled Runner skirt reduces clearance between the skirt and the cylinder wall, which reduces noise caused by piston slap and provides better piston ring seating during operation.



As a Cylinder kit it is recognized as the design which best suits high load and lower-rpm applications. This Premium Plus Cylinder kit carries a 2 year/200,000 mile warranty on parts and labor. The Premium Plus offering is an Uprate kit and is the best choice for heavy-haulers running between 50-300 rpm above peak torque. This cylinder kit is now packed with the Extended Press-Fit liner for greater reliability. The kit is now available for Small Cam, Big Cam I, II, III and IV engine models.

The PREMIUM PLUS cylinder kits and respective piston part numbers are as follows:

PREMIUM PLUS Cylinder Kit	3/8" raised	Piston	PREMIUM PLUS Cylinder Kit	Piston
3801050		3020944	* 3801575	3025516
3801230	BC III 300	3028706	* 3801576	3017348
3801232		3028686	* 3801577	3017349
3801234		3028685	* 3801578	3023102
3801425		3031227		
3801458		3037285	** 3801705	3025516
3801460	NTCC, 240, 300	3034185	** 3801760	3017348
3801536	BC IV 350	3042318	** 3801761	3017349
3801537	BC IV 300	3045948	** 3801762	3023102
3801538	BC IV 300	3042320	** 3801794	3037346
3801661	BC IV 315	3042319		

Note: Refer to section three of the Uprate Manual for specific application information.

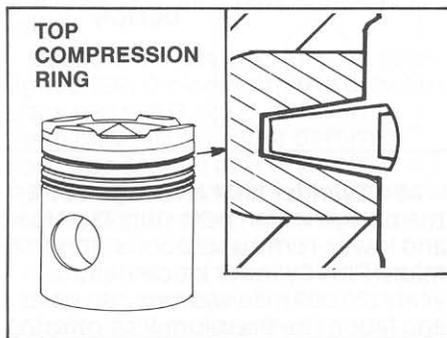
*Contains new extended Press Fit, oversized flange liner, part number 3046325 which replaces 3035812.

**Same content as PREMIUM cylinder kits except contain the NTC 475 ring pack.

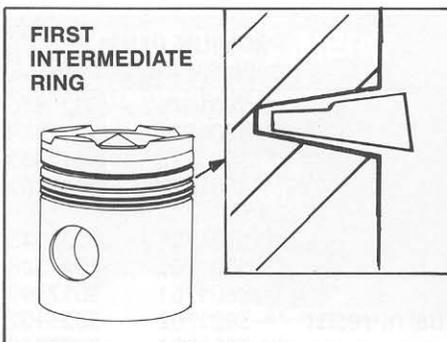
Piston Rings



There are two basic types of rings, Compression Rings which seal in the combustion pressures, and Oil Control Rings which control the lubricating oil film on the wall of the cylinder liner.

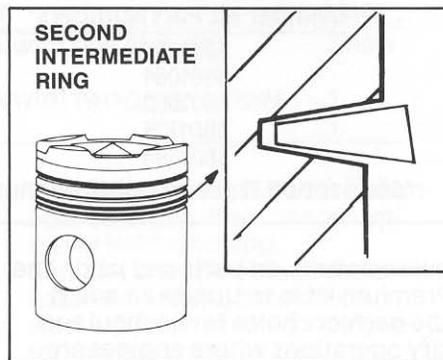


The Top Compression Ring is keystone shaped so that it produces a self cleaning action on the power stroke to keep the ring free from carbon build up. The Top Ring is barrel faced and chrome plated for quick run-in and correct oil control. For turbocharged engines, the top ring is front-edge loaded for better sealing and longer life.

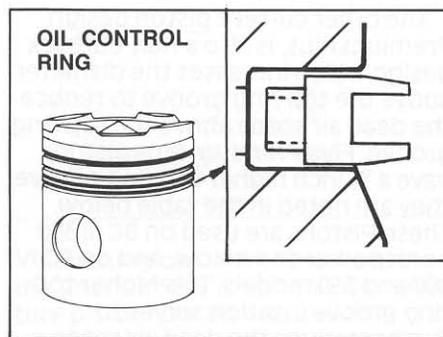


The First Intermediate ring has a 2 degree modified keystone shape. This design applies a 2 degree angle to the cylinder wall on the downstroke to scrape excess oil from the liner wall. It's back-edge loaded for better seating and oil control. The first ring is a cutback design to

further enhance its ability to control blow-by past the top ring.

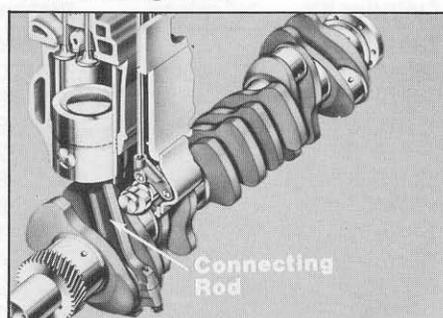


The Second Intermediate ring also has a 2 degree modified keystone shape and is back-edge loaded for better oil control. The main difference between the first and second intermediate rings is that the second ring is non-cutback.

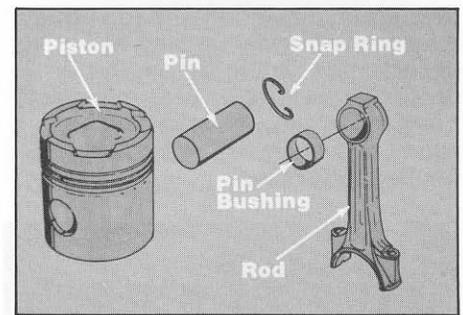


The Oil Control Ring is chrome plated and uses a Serpentine Expander. The serpentine expander maintains uniform ring pressure on the cylinder wall. The ring has large drain slots that remain open to prevent oil from collecting around the upper rings.

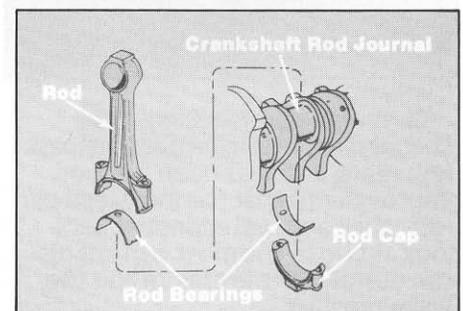
Connecting Rods



The piston is connected to the crankshaft by the connecting rod which transforms the reciprocal motion of the piston into the rotary motion of the crankshaft. The connecting rod is the second element in the engine's power train.



The connecting rod is attached to the piston by a solid piston pin. The bore in the small end of the rod is fitted with a *replaceable* bushing for the pin to ride in.



The large end of the connecting rod, called the saddle, is attached to the crankshaft by the rod cap which completes the circle around the crankshaft rod journal. **Rod caps are not interchangeable.** Each cap is machined with a particular connecting rod and numbered to match, similar to the main caps and block. Replaceable, half-circle bearings are inserted into the saddle and the cap between the rod and crankshaft.

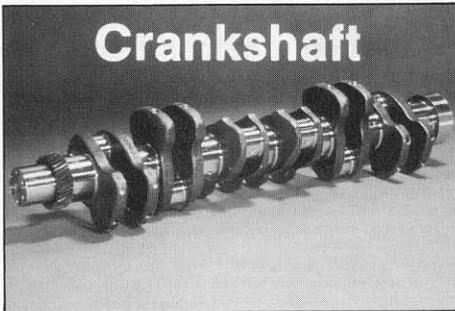


There are some differences between the Big Cam rods and the Small Cam rods which bear mentioning. In small cam engines, the rod cap is bolted to the rod, and oil is delivered through the bushings by an oil drilling through the center of the rod. The pin end of the Big Cam rod is thicker, and the oil drilling has been offset to improve bearing life. Dowel pins have been added to assure proper rod-to-

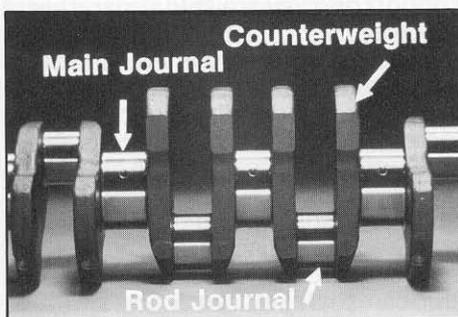
cap alignment, and the rod bolts have been replaced by capscrews which require less clearance.

NOTE: Big Cam rods may be used in Small Cam engines. However, they *must* be installed in complete sets. On the other hand, Small Cam rods cannot be used in a Big Cam engine because there is not enough clearance and the rods will strike the block.

Crankshaft



The crankshaft is the main power shaft of the engine. It transforms the reciprocating, up and down motion of the pistons and connecting rods into usable rotary motion. The crankshaft is supported in the block by the saddles and the main caps. The crankshaft turns inside of the bearings inserted in the saddles and caps. The bearing-to-shaft contact points are called journals. Each crankshaft has two sets of journals. The **main** bearing journals support the crankshaft in the block. The **rod** journals, which are offset from the main journals on the throws of the crankshaft, are attached to the connecting rods. Note the counterweights that are opposite the rod journals. These weights are designed into the crankshaft for balance.



The offset throws are used as levers to turn the crankshaft. The force of combustion acts on the piston, forcing it downward. This downward thrust is transmitted through the connecting rod to one of the rod

journals of the crankshaft, causing it to rotate. The rotational energy is then transmitted through the flywheel to the drive mechanism.

Bearings

There are three major types of bearings:

- Main Bearings to support the crankshaft.
- Thrust Bearings to minimize crankshaft end play.
- Rod Bearings to support the rods



Cummins bearings are manufactured to exacting specifications. They are specifically designed and engineered for complete compatibility to ensure reliability. Cummins offers bearings in standard, .010, .020, .030, and .040 inch oversizes. Cummins sells main bearings in sets, which include the lockplates and thrust bearings. Cummins recommends you replace the thrust bearings when replacing the mains. See Service Parts Topic 82T1-5 for part number specifics on main and thrust bearings. Excessively worn bearings will result in low oil pressure and eventual bearing failure due to excessive heat. Bearing failures will cause progressive damage to the connecting rods, crankshaft and/or the cylinder block.

Main Bearings must comply to these specific qualities:

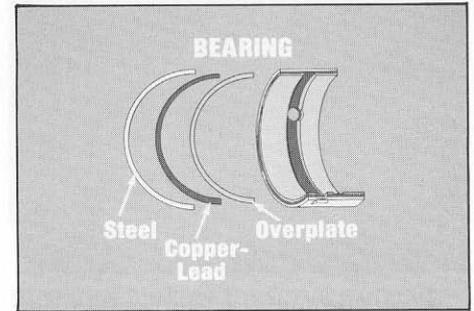
Fatigue Resistance – They must be able to stand up to the constant pounding of operation without fatigue or failure.

Conformability – They must conform to the shape of the crankshaft rod and main journals without allowing metal to metal contact.

Embedability – They must be able to embed foreign matter in order to prevent it from damaging the crankshaft.

Corrosion Resistance – They must not corrode in the presence of commercially available lubricants.

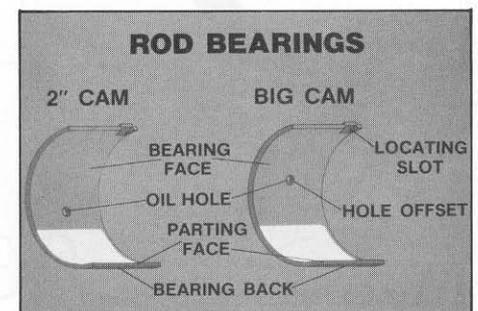
Compatibility – They must be compatible with other materials in the engine.



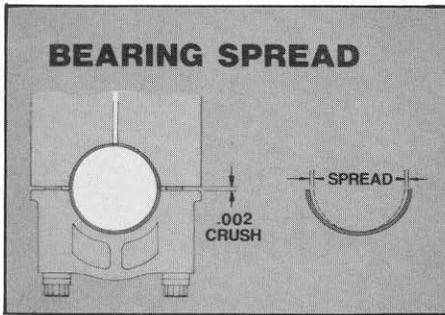
No one metal can provide all these necessary qualities, so Cummins Bearings are constructed using three primary layers:

- Steel Back to resist fatigue and provide strength and support.
- Lining combines copper, lead and tin. This lining incorporates softer materials to provide conformability.
- Composite Overplate allows the bearing to conform to crankshaft irregularities.

Rod Bearings

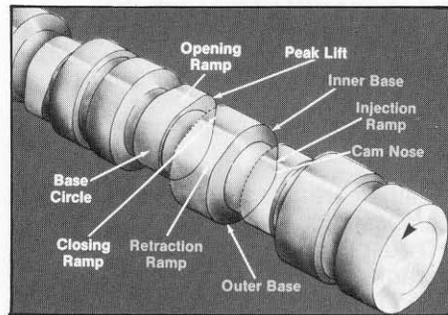


Another difference of which you should be aware is between the rod bearings used in Small Cam and Big Cam engines. The Big Cam rod bearings are thicker than the Small Cam rod bearings. Also, the oil drilling is offset on the Big Cam bearing because it must match the drilling in the Big Cam rod. Consequently, Small Cam rod bearings cannot be used in a Big Cam rod and vice versa.



Every Cummins bearing is manufactured with spread so that when it is fitted to the block, it will exert tension. This is done to ensure a solid contact between the bearing and the block. This contact assures good thermal conductivity. Also, when the bearing is installed, it will be slightly larger than the block or rod bore. This extra diameter produces a "crush" when the bearing cap is torqued into place. The crush actually holds the bearing in place and prevents any movement.

Camshaft Lobe Surfaces

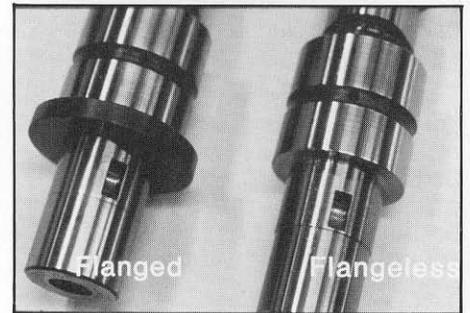


Injector Lobes

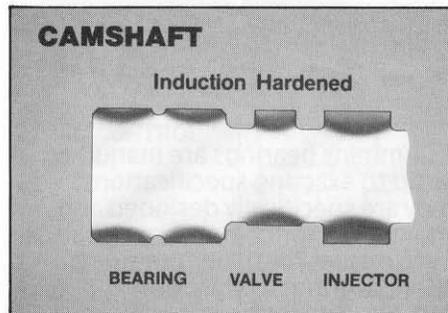
- Inner Base
- Injection Ramp
- Cam Nose
- Outer Base
- Retraction Ramp

Valve Lobes

- Closing Ramp
- Base Circle
- Opening Ramp
- Peak Lift

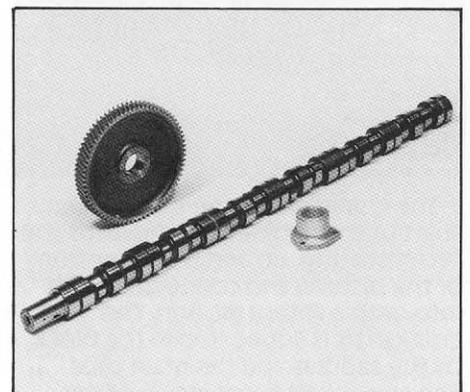


The flangeless design reduces the stress on the camshaft nose. In addition, it reduces the chances of fretting between the camshaft and the cam gear, and it greatly increases camshaft life.



Cummins Camshafts are precision engineered and manufactured to assure optimum engine performance. Cummins uses a special high-grade carbon steel in camshaft manufacture. Bearing journals and valve and injector lobes are induction hardened to a specified depth. This combination of high quality steel and induction hardening provides the critical hardness needed in the load bearing areas. This cross section illustrates the hardness patterns that produce a durable, long-wearing product. Every Cummins camshaft is 100% inspected using the latest technology to ensure the finest quality available in the market today.

Camshaft design has changed in recent years from a flanged to a flangeless design. The flangeless camshaft was originally introduced in 1980. See Service Parts Topic 82T1-9. This topic introduces camshafts by CPL numbers (Control Parts List).



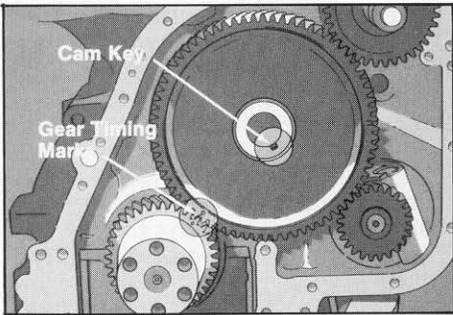
When it's time for an out-of-frame overhaul, recommend Uprating to the flangeless camshaft and the crowned camfollower rollers. The two camshafts are not directly interchangeable. A new camshaft gear and front cam support must be installed for total compatibility. The flangeless camshaft design does not require the use of a Retainer Ring Part No. 708124. Camshafts are sold as an assembly which includes the camshaft and the plug. The cam gear support and key are sold separately. When Uprating, remember to recommend adding the Crowned Camfollower Rollers, because they reduce camshaft edge loading which greatly increases camshaft durability to provide optimum camshaft life and engine performance. Some camshaft Uprates require a field fix number be stamped on the engine dataplate. See your latest CPL manual for specific camshaft key, camfollower housing gaskets and field fix information.

Camshaft



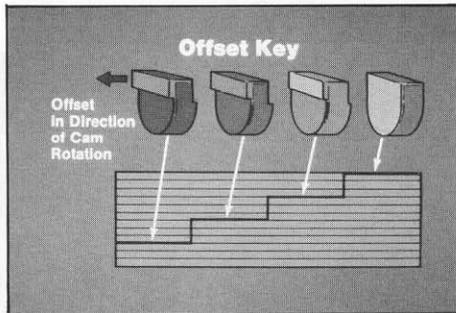
The Camshaft is the command center of the engine. The camshaft controls the opening and closing of the valves and controls the timing of injection. The camshaft's operation is closely synchronized to the crankshaft and makes one revolution to the crankshaft's two.

The Camshaft lobes are precisely machined and ground to specifically control engine performances. This illustration simulates the Camshaft lobe surfaces. The injector lobes are centered between the exhaust and intake valve lobes. The injector lobes are larger than the valve lobes.



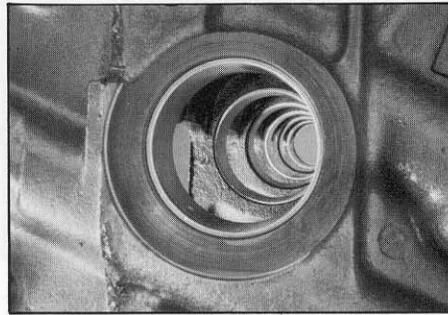
The camshaft rotates in the opposite direction of the crankshaft. In a right-hand rotation engine the camshaft rotates in a counter-clockwise direction. To complete a full cycle the crankshaft makes two complete clockwise rotations to the camshaft's one, because the diameter of the camshaft gear is much bigger than that of the crankshaft gear. The camshaft gear is oriented to the crankshaft by a timing mark on the gear and to the Camshaft by the camshaft key.

Camshaft Keys



A camshaft key is used when assembling the gear to the camshaft. These keys vary in size by their degrees of offset. The degree of offset affects engine timing. Offset keys allow the camshaft profile to be rotated slightly, while gear train timing remains the same. The offset can be used to either advance or retard valve timing. Timing varies among engine models, so there are a number of different camshaft keys available. This is why they are sold separately. Check the CPL (Control Parts List) Manual for specific camshaft key part numbers and their application to timing codes. The illustration should remind you of a good point to remember when installing camshaft keys. To retard the timing the top of the offset key always points in the direction of camshaft rotation. To advance timing, the top of the offset key points away from the direction of camshaft rotation.

Camshaft Bushings



The camshaft extends the length of the engine and is supported by a series of bores in the block. Each of the bores is fitted with a replaceable bushing, in which the journals of the camshaft ride. Lubrication to the camshaft journal is provided through oil holes in each bushing which line up with oil passages in the block.

In the Big Cam engine, the diameter of the camshaft journals has been increased from 2 to 2.5 inches. This obviously affects the size of the bushing, with larger ones needed in the Big Cam engines.



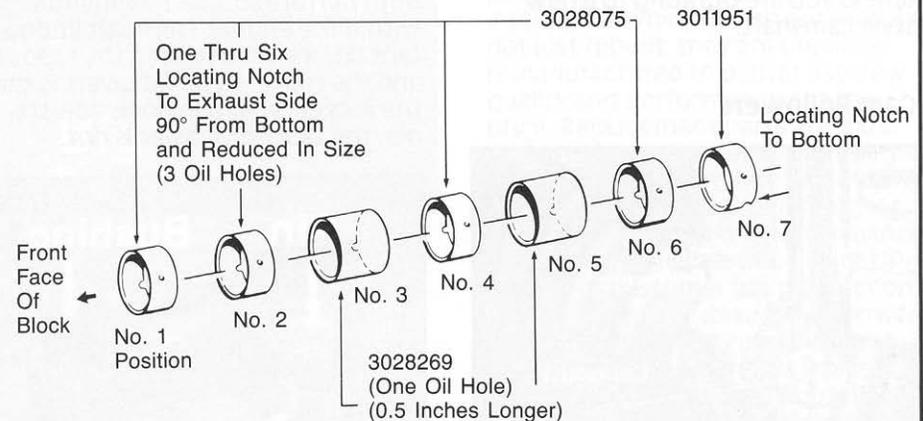
There are two types of camshaft bushings current for service on Big Cam engine models. The wide oil groove, or thin-walled bushing Part No. 3007689. This bushing is for all seven journals and applies to specific camshafts produced prior to 1981. The other is Kit Part No. 3801106; it has a wider oil groove and is known as a thick-walled bushing. This bushing was introduced in 1981 on some Big Cam II models. See the illustration and the table for kit and bushing part numbers and their journal positions.

Thin Walled

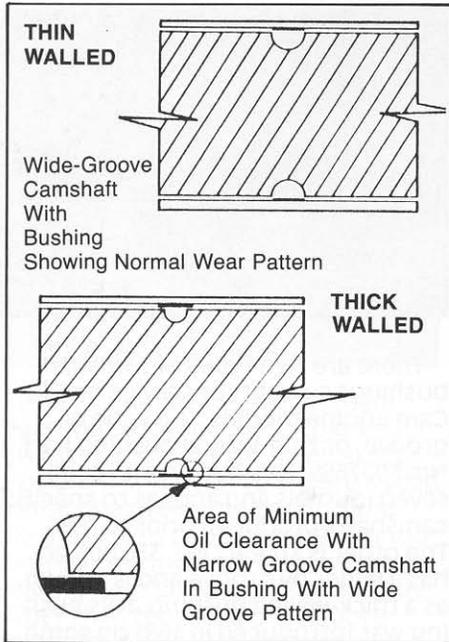
PART NUMBER	QUANTITY	PART NAME	CYLINDER BLOCK LOCATION
3007689	*7	CAMSHAFT BUSHING	NO. 1-7

*These bushings are quantity packed in 24.

Thick Walled

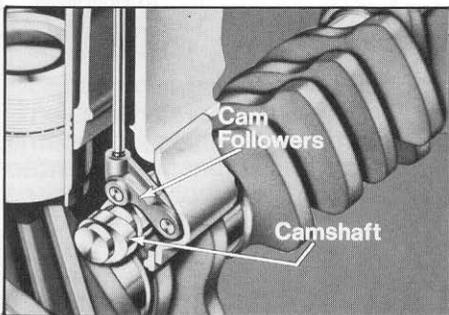


Number	Quantity	Part Name	Cylinder Block Bore Location
3801106		Camshaft Bushing Kit	
• 3028075	4	Bushing, Camshaft	No. 1, 2, 4, and 6
• 3028269	2	Bushing, Camshaft	No. 3 and 5
• 3011251	1	Bushing, Camshaft	No. 7 (Current)
• (3800100)	1	Insert, Caution	

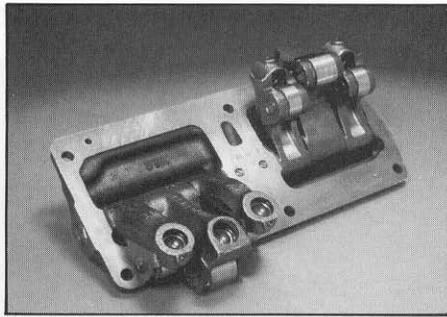


Actually, the major difference between the two types of bushings is in the width of the oil groove. Another difference in the thick walled, narrow grooved bushing Kit, Part No. 3801106, is that the position of the locating notches in bushings 1-6 were moved to match the oil drillings in the camshaft journal and bushings 3 and 5 are longer than the old style Part No. 3007689. The thick and thin walled bushings are not interchangeable. It is necessary to replace worn bushings with the same Part No. bushings that you remove, unless you are upgrading to a new style camshaft.

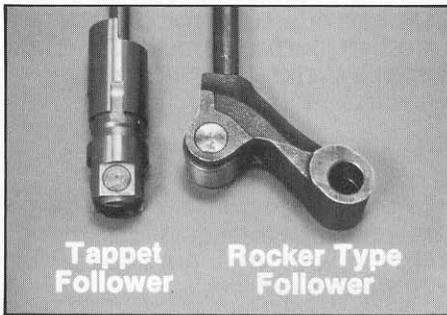
Cam Followers



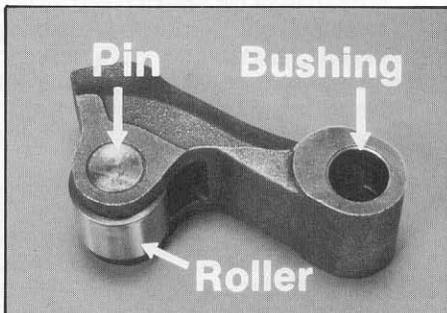
Cam followers ride on the camshaft lobes and change the eccentric rotation of the camshaft to up and down, reciprocating movement. The reciprocating movement is transmitted through the push tube and rocker lever to either the valves or the fuel injector.



There is one cam follower for each lobe of the camshaft. This means that each cylinder has three cam followers – one for the injector, one for the intake valves and one for the exhaust valves.

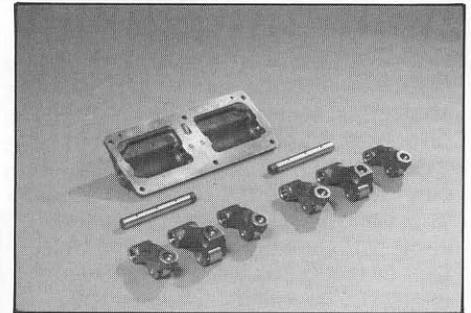


There are two common types of cam followers which you should be familiar with. These are the straight bodied tappet follower, found in V-engines, and the rocker type follower found in the in-line engines like the NH/NT series. Although the followers differ in appearance, they both perform the same function within the engine. The most important difference between the tappet and the rocker-type followers is that the rocker type follower is adjustable; the tappet follower is not.

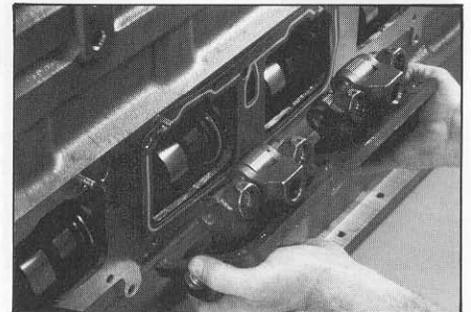


The rocker type follower consists of a rocker arm to position the roller of the cam follower over the lobes of the camshaft. One end of the follower holds the follower roller and its supporting pin. The other end of the follower contains a bore which is fitted with a bushing and rides on

the cam follower mounting shaft. The top of the cam follower above the roller contains a socket, machined to accept the ball end of the push tube. In most cam followers this socket is fitted with a replaceable insert of hardened metal. Lubrication is supplied to the follower roller and the push tube socket through small drillings in the body of the follower.

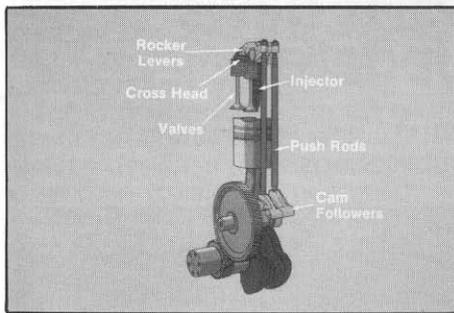


The rocker-type cam followers are mounted in sets of three, supported by two shafts located in a cast iron housing. In some engines the same shaft may support two or more sets of followers.



The cam followers are assembled in the housing and are installed through an opening in the side of the block. The cam follower housing is fitted with a gasket and mounted to the block with capscrews. In addition to forming an oil proof seal, the gasket acts as a shim or spacer. Changing the thickness of the gasket alters the point of contact between the roller and the camshaft, and will either advance or retard the timing of the valves and fuel injectors. Changing the gasket thickness between the follower housing and the engine block provides an additional timing adjustment over and above the timing provided by the camshaft key.

Push Tubes

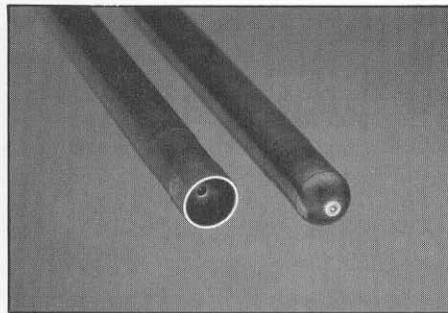


The Push Tubes connect the cam-followers with the rocker levers. As the cam follower is raised and lowered by the rotation of the camshaft, the push tube also moves up and down, transmitting the motion of the cam follower to the rocker lever. Most of the PUSH TUBES used in high horsepower engines are HOLLOW, although SOLID PUSH RODS are found in some lower horsepower Cummins engines, like the SMALL VEE.



Notice that the Intake and Exhaust push tubes are usually identical, but the Injector push tube is slightly LARGER for extra strength. This extra strength is necessary because it takes more pressure to inject the fuel than it does to open the valves.

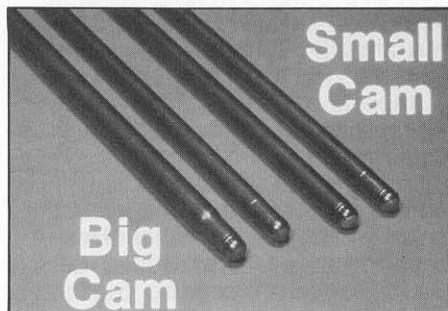
Each push tube has a ball joint at one end, and a socket at the other. The socket end of the push tube is connected to the rocker lever by an adjustment screw and lock nut which fits through the end of the rocker lever.



Sometimes a push tube will develop a small crack and become filled with oil. Push tubes filled with oil are heavier, and the extra weight causes increased wear of the cam-follower and the camshaft. If you suspect oil filled tubes, *drop the push tube on the floor*. If it makes a ringing sound, the tube is good. If it makes a dull sound, it's filled with oil. New Cummins Push Tubes are quality engineered and manufactured by Cummins.

Big Cam Vs Small Cam PUSH Tubes

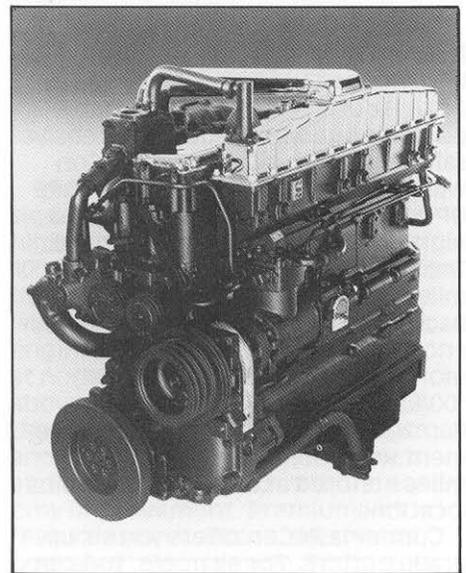
Big Cam push tubes are shorter than small cam push tubes. The Big Cam tubes are also slightly larger than small cam tubes. The combination of the shorter length and extra size provides greater strength and longer service life.



Cummins ReCon Components

Cummins ReCon offers premium quality, competitively priced exchange components that help get your customers on the road faster and keep them running longer. Every Cummins ReCon component is completely remanufactured for maximum reliability and durability.

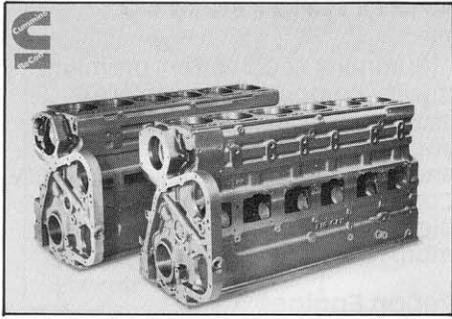
ReCon Engines



If your customer needs a new engine but doesn't want to pay the price, recommend a complete ReCon engine. Cummins ReCon engines are not just rebuilt, they are precision remanufactured to deliver like new quality and performance at a low price. Replacement parts are 100% Genuine Cummins Parts. Cummins ReCon offers a complete line of UP-RATED engines that provide higher horsepower, improved performance and increased resale value. With UP-RATE your customer gains fuel economy that pays for itself. More power, better fuel economy and higher resale value are the benefits gained with a ReCon engine. All Cummins ReCon engines are backed by a one year/100,000 mile, 3600 hour warranty which covers 100% parts, labor and progressive damage. An additional 3 year/300,000 mile/10,800 hour warranty covers the block crankshaft, camshaft and connecting rods.

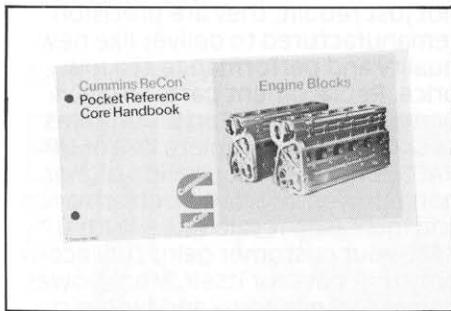
ReCon Engines					
CPL	Models Available	HP	Peak Torque lb-ft @ RPM	Torque Rise Percent	
636	NTC 300 SCIII Magnum	300	975 @ 1300	30	
637	NTC 350 SCIII Magnum	350	1065 @ 1300	22	
695	NTC 400 SCIII Magnum	400	1200 @ 1500	20	
633	NTC 300 BCIII	300	1000 @ 1300	33	
632	NTC 350 BCIII	350	1175 @ 1300	34	
625	NTC 400 BCIII	400	1250 @ 1300	25	

Cummins ReCon Blocks A Block Worth Building On ...



ReCon has a premium quality NH/NT Exchange Block Program. With ReCon Exchange Blocks you get a no risk exchange at an affordable price. If your block requires extensive salvage or high-risk repairs, ReCon will still accept it under its BAD CORE OPTION ... scrap it ... and give you a high-quality remanufactured block. The Block program offers a 300,000 mile Nationwide Warranty that's backed with confidence and convenience. The Warranty provides six months (unlimited miles/hours), 100% parts, labor and progressive damage ... plus an extended replacement warranty for 3 years/300,000 miles honored at over 4500 Cummins locations.

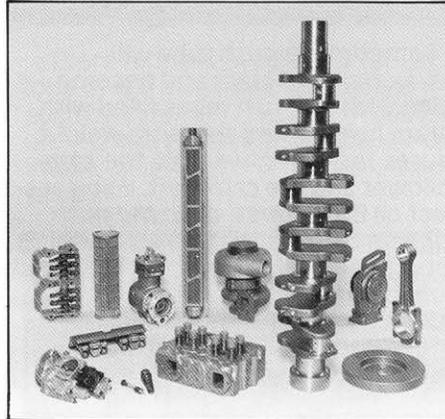
Cummins ReCon offers you six upgrade options. For example, you can exchange your old style Small Cam Block for a ReCon block remanufactured, using the latest Cummins Specifications and technology.



Remember, all Blocks are acceptable under the Block acceptance policy. Damaged block cores require a slight extra charge as they cannot be reused, but can be accepted under the "Bad Block" program. All bad blocks are scrapped. Check your Cummins ReCon Core Handbook for acceptable exchange.

These are the main guidelines for GOOD CORE acceptance.

1. Assembly is complete and not disassembled.
2. Casting is not visibly cracked or broken.
3. Part number is offered for exchange by Cummins ReCon.
4. Not damaged by rough handling.



Other Block Group components that are included in the Cummins ReCon Exchange programs include the:

- Connecting Rods
- Cam followers and Tappets
- Crankshaft
- Camshaft

Not all programs may be available to you. Consult current marketing program guidelines approved in your area. Then, make sure your customers know about the programs pertaining to them. ReCon offers high quality, lower cost alternatives to buying new and keeps your warranty genuine. See the latest ReCon Fact Sheets and Core Acceptance Handbooks for more information on current exchange programs.

ReCon Reference

3385363	Camshafts Pocket Core Handbook
3385282	Engine Blocks Core Handbook
3385236	Crankshafts Connecting Rods Core Handbook

Fact Sheets

Cummins ReCon Camshafts
Cummins ReCon Turbochargers
Cummins ReCon Water Pump
Cummins ReCon Injectors
Cummins ReCon Electrics

Parts News Update

WHAT's New For Training Publications?



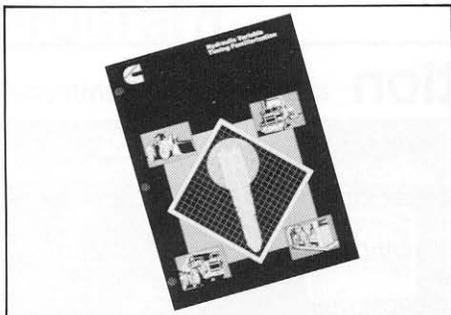
Cummins has produced a Two-Step OEPL slide tape training program, Bulletin No. 3387323-R,S,T. It is designed to familiarize you with the revised OEPL system. The revised system requires a two-step look up process using an engine's serial number as the key. The Two-Step system electronically records worldwide shop order information, thereby increasing Cummins' ability to offer you more accurate and up-to-date service Part numbers. The new OEPL became effective January 1, 1984. The last page of this Parts Professional booklet contains a fold out which is designed to be torn out and attached to your microfilm reader for use as a quick training guide. Also, note the Two Step OEPL system does not replace the pre-1984 OEPL cards. Both OEPL systems must be maintained along with the Pricing and Engine Family and/or Master Parts Listing Cards for complete parts information. This booklet includes recall materials for this program.



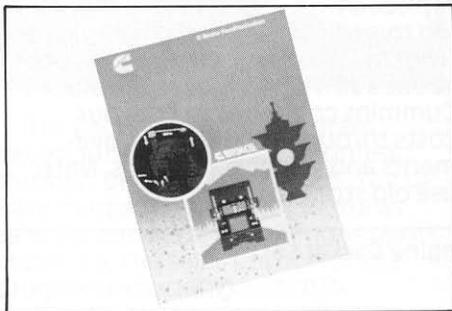
An Uprate package, Bulletin No. 3387319-R,V*,W** has been designed to train and familiarize you with the features and benefits of 9 Uprate

components. The manual includes Uprate options by CPL, performance comparisons, Service Parts information, Fuel Charts and a complete look at the contents of Uprate kits.

The manual includes samples of the Uprate Worksheet. The worksheet is designed to be used with customers to calculate how much can be saved by uprating older Big Cam or Small Cam engines to the latest technology. The worksheets are available in pads of 25. The Uprate training Package also includes a 1/2" VHS video tape which introduces you to the Gold Rush Days Parts Marketing program and a training session on how to use the Uprate Worksheet with customers.

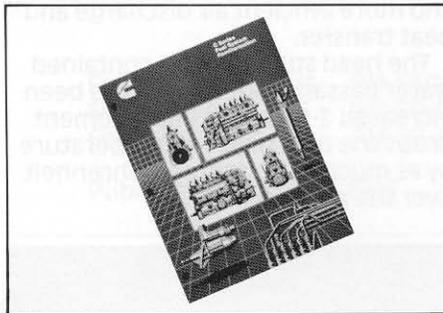


Hydraulic Variable Timing (HVT), Bulletin No. 3387305-R, S, T, V*. This program is designed to familiarize you with the principles and components required for this new type of variable timing device.



Cummins C Brake, Bulletin No. 3387316-R, S, T, V*. This program is designed to familiarize you with the basic operation of the Cummins Compression Brake. The program provides a helpful parts breakdown for the purpose of identifying its major assembly items.

C Series Engine Familiarization, Bulletin No. 3387317-R, S, T, V*. This program is designed to familiarize you with the basic theory and operation of the new C series diesel engine.



C Series Fuel Systems, Bulletin No. 3387318-R,S,T,V*. This program provides an overview to the Bosch fuel system used on C series engine models. The program discusses the basics of fuel system operation; it includes the two different fuel pumps and the 17mm injector.

All training publications may be ordered through your nearest Cummins Distributor.

* available in 1/2" video tape
** worksheets

New Products



Premium and Premium Plus Cylinder Kits

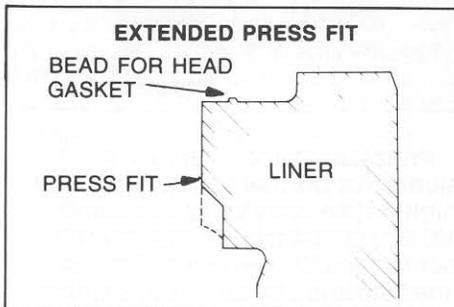
Premium Plus Cylinder Kits are designed for higher engine loads and lower rpm; carry a 24 month/200,000 mile warranty. Premium Plus Cylinder Kits feature a sled-runner piston and a unique skirt design to reduce noise. For Full Engine Uprates to Big Cam III @ 300 HP, this piston features a higher top ring groove, which improves combustion efficiency and increases fuel economy up to .5%. Premium Plus Cylinder Kits are now standard on production Big Cam III and IV engine models. Premium Plus Cylinder Kits also feature an improved ring pack, the standard pack for the NTC 475 engine. The top compression ring has an inlaid chrome face and more precise dimensions to improve sealing and resistance to wear. It's also made of a tougher base material to resist ring breakage. The

second ring is chrome plated for reduced ring and groove wear. Uprate Premium Plus Cylinder Kits offer PLUS Protection, Technology, Economy and Durability. See Service Parts Topic 85T1-4 for more details and page 7 of this publication for complete part number information.



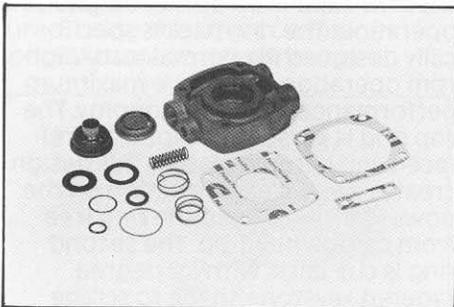
Premium Cylinder Kits are designed for normal engine loads and higher rpm; they carry a 12 month/100,000 mile warranty. Premium Cylinder kits are the perfect choice for line haul and city operations where engines are consistently operating at normal loads and 300-400 rpm above peak torque. These kits apply the latest technology to Small Cam and Big Cam I and II engine models, and can provide up to a 3% fuel economy improvement. Premium kits feature a non-cutback, deep valve pocketed piston design. The piston skirt is a barrel and cam design for thermal expansion during engine operation. The ring pack is specifically designed for normal load/high rpm operation to achieve maximum performance and fuel economy. The top ring is keystone shaped, barrel faced and chrome plated. This design creates a self-cleaning action on the power stroke to keep the ring free from carbon build-up. The second ring is cut-back, with a 2 degree tapered keystone shape to scrape excess oil from the cylinder walls. The cutback design permits the ring to twist, which enhances blow-by oil control. The second intermediate ring is not cut-back but has the 2 degree tapered face. The oil control ring has chrome plated rails and backs and is equipped with a serpentine expander. The serpentine expander maintains uniform ring pressure on the cylinder wall. This ring has large oil drain slots that remain open to prevent excess oil from flooding the intermediate oil rings.

Both the Premium and the Premium Plus Cylinder kits feature the Non-Cutback design pistons. Remember, this feature reduces the dead air space above the top ring groove which benefits combustion efficiency. Both pistons have Ni-Resist inserts cast into the top ring groove to resist heat erosion and wear. Every Cummins Piston has this insert bond ultrasonically inspected for maximum reliability and durability. Let's take a moment to reinforce what we learned in the cylinder kit section of this publication about Liners.

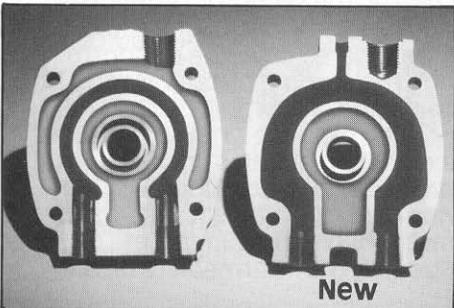


Both Premium and Premium Plus Cylinder kits are packed with the Extended Press Fit Liner. The Extended Press fit liner is 53% longer in the counterbore press fit area. The benefit is extended counterbore life, which lowers your overhaul costs.

Air Compressor Kit



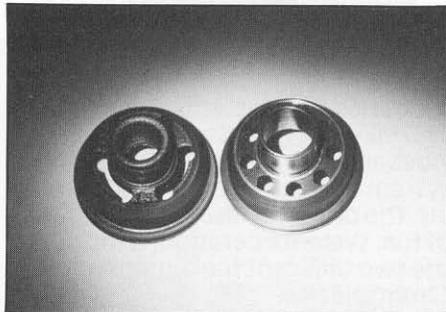
Upgrade your 13.2 CFM Air Compressor with the redesigned Head and Valve Kit.



The newly designed head and valve kit provides greater cooling capacity

and more efficient air discharge and heat transfer.

The head still has a self-contained water passage, but its size has been increased 3-fold. This improvement drops the discharge air temperature by as much as 30 degrees Fahrenheit over the previous design.



The Discharge Valve Seat is press-fit directly into the cylinder head. This further improves heat transfer from the valve components. Also, notice the 9-hole air flow design which produces a more efficient air flow pattern. This kit also includes a new air discharge valve seat that doubles the discharge area in and out of the cylinder. This new discharge valve produces less restriction, thereby increasing air delivery by as much as 6%.

Cummins air compressor designs do not require separate air cleaner systems. The compressors intake air system may be integrated to the engine, which eliminates the need for a second air cleaner.

Product Consolidation

Cummins has introduced a new L10 Rocker Cover Gasket Kit.

		QTY.
3801642	Valve Cover Gasket Kit	
3034855	Rocker Lever Cover Gasket	1
3034856	Isolator, noise	14
3335042	Hexagon Head Capscrew	14

This kit contains all items needed to replace the old style Rocker Housing Cover Gasket Part No. 3032514. Reference Service Parts Topics 85T17-3 and 85T3-2 for complete details.

L10 ... Cummins has released a new Upper Engine Gasket Set, Part No. 3801641. This Gasket set replaces Upper Set, Part No. 3801141. The difference between the two sets is the new set excludes the Rocker Housing Valve Cover Gasket Part No. 3034855. It has been found that this new com-

position style Valve cover gasket is re-usable. Therefore, it is not necessary to replace this gasket each time the covers are removed. It has been found that this gasket may be re-used several times before it must be replaced with a new gasket. Removing this re-usable Valve Cover gasket from the new Upper Set represents about a 25% savings over the old set. Cummins continues to cut your costs through product improvements and kit consolidations. Note: use old stock to depletion.

Part included in the new L10 Upper Engine Gasket Set:

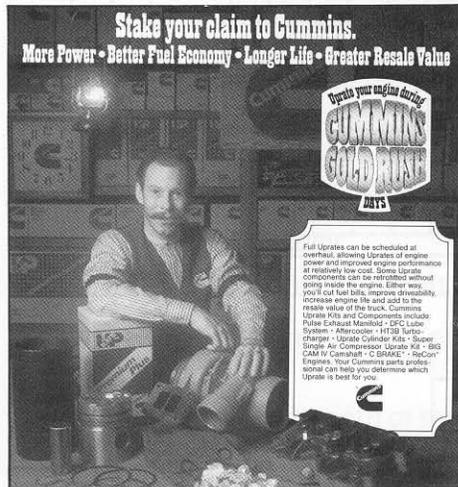
ITEM	ITEM NAME	QTY.
3801641	Set, Upper Engine Gasket	
S- 684	Washer, Plain	8
145504	Seal, O-Ring	1
3017730	Gasket, Exh. Mfid. Cover	1
3026155	Gasket, Exh. Mfid.	6
3028539	Gasket, Connection	2
3028551	Seal, Exh. Mfid.	2
3039114	Gasket, Rocker Lvr. Housing	1
3044502	Gasket, Cylinder Head	1
3600882	Gasket, Cover Plate	1
3600883	Gasket, Connection	2
3755739	Gasket, Turbocharger	1
3755843	Gasket, Turbocharger	1
3765575	Gasket, Turbocharger	1
3821272	Washer, Plain	7

Product Improvement

Cummins is releasing a new L10 Cylinder Block Assembly, Part No. 3801665. This new assembly supercedes Part No. 3801532. The offering of this new Cylinder Block Assembly Part No. 3801665, creates a cost savings to the customer, because the capscrews are re-usable and have been excluded from the assembly kits.

Parts Marketing Program

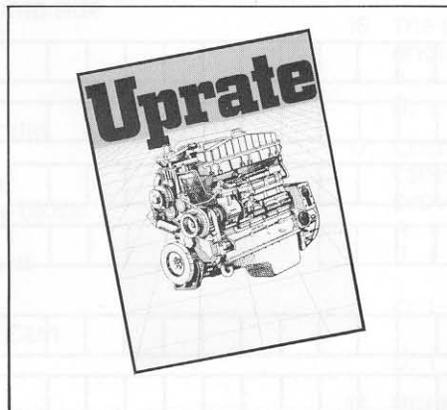
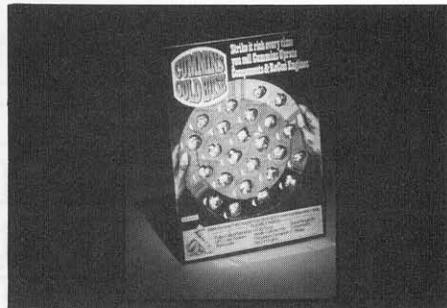
Cummins Gold Rush Days



This Parts Marketing program began June 1, 1985, and continues through December 31st, 1985. The UPRATE marketing program features sales incentives and training support materials. The sales portion of the program includes a customer sweepstakes complete with sales pullboards and a mystery caller. The training support includes an Uprate manual and a video tape.

	US	Canada
Full Service Dealers	PM-FSD-010-S	PM-FSD-010-C
Sales Dealers	PM-SD-010-S	PM-SD-010-C
Service Center	PM-SC-010-SPM-SC-010-C	
Publication Date	May, 1985	

The Gold Rush Sales Pullboards are designed to provide a sales incentive for the nine Uprate components. For complete details on participating in the Cummins Uprate program, consult these Part Marketing Announcements.



The nine featured Uprate components include the:

- Pulse Exhaust Manifold
- HT3B Turbocharger
- DFC Lubrication System

- Aftercooler
- Flangeless Camshaft
- C BRAKE
- Super Single Air Compressor (Head and Valve Kit)
- Premium/Premium Plus Cylinder Kits
- Recon Engines

Consult the latest Uprate manual for the benefits these components provide. The manual provides an in-depth look at how uprate pays for itself by providing:

- Increased fuel economy
- Higher Performance
- Fleet Standardization
- Greater Resale Value

Uprate components and kits can be added anytime. Uprates is Cummins' way of ensuring its customers that the products you buy today are not obsolete tomorrow. Cummins makes the latest Uprate technology available for most NT 855 cubic inch Small Cam I and Big Cam I, II and III engine models.

Be a Parts Professional

Design changes occur due to Cummins' ongoing research and product development. A parts professional should be aware of all product improvement, so stay up to date.

1. Top piston rings are _____ plated for longer wear.
 - A. chrome
 - B. molybdenum
 - C. titanium
 - D. barrel
2. Fatigue resistance, Conformability, Embedability, Corrosion Resistance and Compatibility are all important qualities possessed by Cummins _____.
 - A. O-Rings
 - B. Head gaskets
 - C. Rod and main bearings
 - D. Cylinder liners
3. Field re honing will restore the lubrite finish in a cylinder liner.
 - A. True
 - B. False
4. The major difference between Big Cam III and Big Cam IV cylinder block is:
 - A. Alloy metals
 - B. Saddle design
 - C. Bearing offset
 - D. Vent hole in coolant fill area
5. The initial point where all manufacturing and machining dimensions of the cylinder block are made is:
 - A. Fuel pump cast surface
 - B. Main Dowel at the front fuel pump side of the engine block
 - C. Head gasket surface
 - D. Oil pan bolt holes
6. The use of the extended press fit cylinder liners:
 - A. Increases engine power output
 - B. Increases the original life of the block counterbore
 - C. Increases the length of the block
 - D. Decreases engine weight
7. Big Cam rods cannot be used in Small Cam engines.
 - A. True
 - B. False
8. The difference between Big Cam and Small Cam rod bearings is:
 - A. Alloy materials
 - B. Barrier layer
 - C. Oil hole location
 - D. Tang location
9. Big Cam push tubes are _____ than Small Cam push tubes.
 - A. Shorter and larger
 - B. Longer and shorter
 - C. Identical to
 - D. Only longer
10. The centrifugal casting process used in manufacturing Cummins liners:
 - A. Maintains better control over liner metal density
 - B. Holds in heat
 - C. Insulates against the coolant
 - D. Stretches the metal
11. The cross hatch hone pattern used in Cummins liners:
 - A. Produces minimum friction
 - B. Allows for faster break in
 - C. Creates microscopic pores that hold the proper amount of oil
 - D. All of the above
12. Bearings are slightly larger than the block bore to produce:
 - A. Spread
 - B. Spalling
 - C. Crush
 - D. Bearings movement
13. The camshaft surfaces are called the intake, exhaust and injector lobes.
 - A. True
 - B. False
14. The crankshaft rotates at the same speed as the camshaft.
 - A. True
 - B. False
15. The part numbers for camshaft keys are contained in the:
 - A. Shop Manuals
 - B. Parts Catalogs
 - C. CPL Manual
 - D. Fuel Pump Code and Calibration Manual
16. The camshaft bushings used in Big Cam engines are all the same.
 - A. True
 - B. False
17. Changing the gasket thickness between the camfollower housing and the engine block provides:
 - A. Increased oil leak protection
 - B. Extended service life to the cam followers
 - C. A means to make up for excessive camshaft wear
 - D. Additional timing adjustment
18. Uprating to the new crown cam follower roller design:
 - A. Requires new roller pins due to bore diameter changes
 - B. Causes a timing change
 - C. Changes roller side clearance
 - D. Should be done in a complete set
19. Some new design Cummins pistons feature a raised top ring groove to:
 - A. Reduce the dead air space above the top ring groove
 - B. Improve combustion
 - C. Improve performance
 - D. All of the above
20. Blocks that are cracked or damaged cannot be accepted by Cummins ReCon as core exchanges.
 - A. True
 - B. False

21. Cummins has recently standardized its "EP" liner O-Ring seals.
 A. () True
 B. () False
22. Old style liner O-Ring seals can be intermixed with the new style O-Ring seals.
 A. () True
 B. () False
23. Premium pistons are:
 A. () Non-cutback and valve pocketed
 B. () Available for Small Cams and Big Cam I and II models
 C. () Barrel and Cam design
 D. () All of the above
24. Premium cylinder kits carry a 12 month/100,000 mile warranty.
 A. () True
 B. () False
25. Premium cylinder kits are recommended for:
 A. () Normal engine loads and higher rpm applications
 B. () Applications that consistently operate at 300-400 rpm above peak torque
 C. () Uprating Small Cams and Big Cam I and II engine models
 D. () All of the above
26. The Premium Plus cylinder kit carries a 2 year/200,000 mile warranty.
 A. () True
 B. () False
27. The premium plus cylinder kit is:
 A. () Offered as an Uprate kit and is recommended for higher loads and lower rpm operations
 B. () Packed with the new extended press fit liner
 C. () Available for most Small Cams and Big Cam I, II, III and IV models
 D. () All of the above
28. The newly designed 13.2 CFM air compressor head and valve kit:
 A. () Provides greater cooling capacity
 B. () Drops the discharge air temperature as much as 30 degrees fahrenheit over the previous design
 C. () Produces more efficient heat transfer
 D. () All of the above
29. The top of the liner:
 A. () Protrudes slightly above the block deck
 B. () Is machined undersize
 C. () Fits directly under the counterbore
 D. () Fits loosely
30. The purpose of the Serpentine Expander in the piston oil ring is to:
 A. () Maintain uniform ring pressure
 B. () Keep the oil drain slots open
 C. () Both A and B
 D. () None of the above

Two-Step OEPL

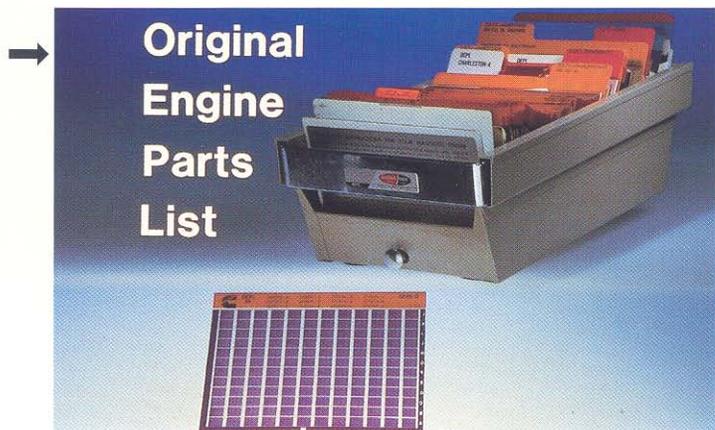
Many of you have already received your new OEPL (Original Engine Parts List) microfilm card systems and are probably wondering, "what's the difference between the old OEPL system and the new system?" Well, the new OEPL cards are different; it's a TWO-STEP system.

This fold-out is designed to assist you with the essentials for filing and using the TWO-STEP system. The TWO-STEP system utilizes two cards, the ENGINE SERIAL NUMBER CARDS and the ORIGINAL ENGINE PARTS LIST CARDS. This new way of organizing parts information requires you to know the engine's serial number and to acquire and then record the Shop Order Number. The OEPL then becomes Shop Order Driven. Many engine serial numbers may be built to the same shop order. The Two-Step system provides more information and is easier to access once you get used to the process.

The TWO-STEP system does not obsolete the OEPL you already own. You will need to maintain and use both the OEPL and the TWO-STEP systems. The TWO-STEP system is current for engines built after Dec. 31, 1984 and the original OEPL cards for engines built prior to this date. Both systems require the use of the MASTER PARTS CARDS when a part or an assembly number cannot be located using the Original Engine Parts List Cards (OEPL).

This pamphlet is also used as recall for the Two-Step OEPL training program, bulletin No. 3387323-R, S, T. It is also recommended that this pamphlet be used as recall material in your work area until you become familiar with the usage and maintenance of the Two-Step OEPL system.

1



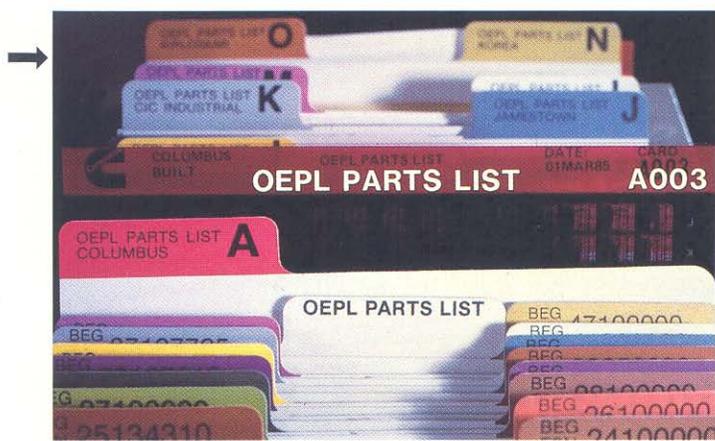
The OEPL is a segment of the total Cummins microfilm system and lists the major assembly parts for engines built during the 1960's through December 31, 1983.

2



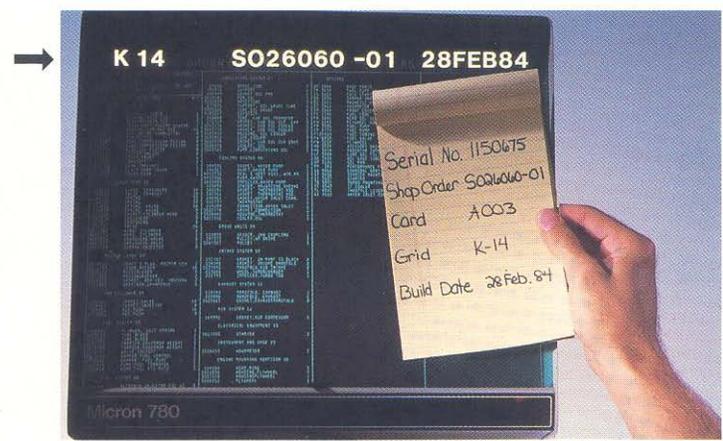
Cummins recently improved the OEPL system. The "Two-Step" system utilizes two cards an ESN Index Card and an OEPL Parts List Card.

7



Now, locate the correct OEPL card and grid location for a specific shop order number.

8



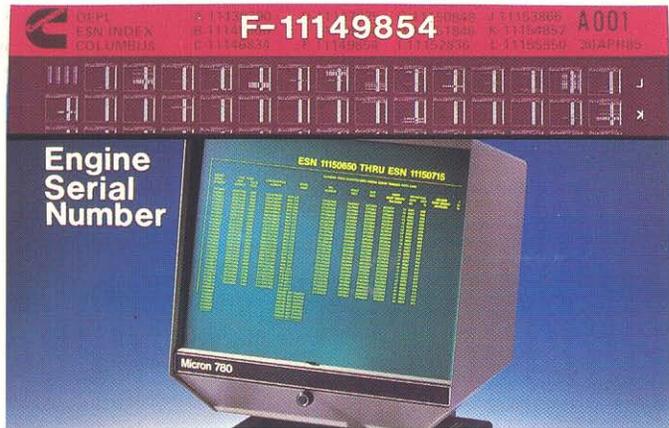
Verify the Shop Order and the build date by checking the OEPL Page header against the information which you recorded.

3



The Two-Step system records worldwide shop order information. Please file these two groups of cards behind their respective color coded index tabs; and file them separately from the pre-1983 OEPL system.

4



The ESN index cards are headed with specific engine serial number prefixes, which are associated to specific grid rows. The grid rows are your access to an engine's shop order number.

9

K14 SHOP ORDER: SO20600-01

PART NO	QUANTITY	DESCRIPTION	UNIT	QTY	DESCRIPTION	UNIT	QTY
LUBRICATING SYSTEM 07							
80180	1	BRACE TUBE		1	80900	1	SEAL OIL
10475	1	SUPPORT		1	27838	1	SEAL OIL
19069	1	ORIGINE OIL PAN		1	30020	1	SEAL OIL
3015543	1	PAN OIL		1			
302065	1	BRACKET RE		1			
17781	1	SUPPORT OIL GAUGE TUBE		1			
302023	1	TUBE OIL SENS		1			
302027	1	TUBE OIL TRANSFER		1			
17273	1	GASKET LUB OIL CLR CVP		1			
3013776	1	GASKET LUB OIL COOLER		1			
3013779	1	GASKET LUB OIL CLR COVER		1			
302280	1	HOUSING COOL		1			
3027872	1	CORE COOLER		1			
3022876	1	GASKET LUB OIL CLR COVER		1			
3022975	1	COOLER OIL		1			
3022723	1	PUMP LUBRICATING OIL		1			
COOLING SYSTEM 08							
189582	1	GASKET WATER PUMP		1			
189587	1	SHAFT WATER PUMP		1			
189591	1	SEAL & SEAT ASSY WTR PM		1			
4012805	1	PUMP WATER PUMP		1			
200486	1	SPACER ADJUSTING DRIVE		1			
180381	1	GASKET THERMOSTAT HSG		1			
180381	1	GASKET THERMOSTAT HSG		1			
180381	1	GASKET WATER INLET CONN		1			
201737	1	THERMOSTAT		1			
214189	1	CONNECTION WATER INLET		1			
3013778	1	GASKET CONNECTION		1			
3016042	1	HOUSING THERMOSTAT		1			
3017392	1	COOLER OIL		1			
DRIVE UNITS 09							
180800	1	DRIVE SHAFT ASSEMBLY		1			
3024235	1	DRIVE FUEL PUMP		1			
192573	1	PULLEY WP DRIVE		1			
3007307	1	PULLEY		1			
INTAKE SYSTEM 10							
151707	1	GASKET OIL MANIF TO BLOCK		1			

Scan the OEPL page for the correct master parts list grouping that pertains to a specific assembly or part.

10

3013778	GASKET LUB OIL COOLER	FH 3081	REAR DRIVE
3013779	GASKET LUB OIL COOLER	FH 3213	FLYWHEEL
3022970	HOUSING OIL COOLER	FP 3036	FUEL PUMP
3022972	CORE COOLER	FP 3779	FUEL PUMP
3022974	GASKET LUB OIL CLR COVER	F130615	FUEL VALVE
3022976	CORNER OIL	FV 8055	FLYWHEEL
COOLING SYSTEM 08			
189582	GASKET WATER PUMP	1	ORIGINE OIL PAN
189587	SHAFT WATER PUMP	1	PERFORMA
AR12732	SEAL & SEAT ASSY WTR PM	1	STARTER M
AR12965	PUMP WATER	1	TURBO MD
3002483	IMPELLER WATER PUMP	2	THROTTLE
203408	SPACER ADJUSTING SHEAVE	2	WATER INL
180381	GASKET THERMOSTAT HSG.	2	
180381	GASKET THERMOSTAT HSG.	1	
180381	GASKET WATER INLET CONN.	1	
201737	THERMOSTAT	2	
214189	CONNECTION WATER INLET	1	
3013778	GASKET CONNECTION	1	
3016042	HOUSING THERMOSTAT	1	
3017392	COOLER OIL	1	
DRIVE UNITS 09			
3024235	DRIVE FUEL PUMP	1	
192573	PULLEY WP DRIVE	1	
3007307	PULLEY	1	
INTAKE SYSTEM 10			

Once you've located the master parts grouping record the part number you need.

Exercise

ENGINE SERIAL NUMBER INDEX CARDS

1. Record the fuel pump part number and calibration code for Engine Serial Number 11278602 _____, also record the control parts list (CPL) number _____.
2. Locate Engine Serial Number 33109478, record the ESN Index Card Number and its' grid location _____, record the Build Date _____, and determine if the engine has a Second Shop Order revision, _____.
3. Record the Shop Order Number, _____, Revision Number, _____ Microfiche card and Grid Location, _____ and the Build Date, _____ for ESN 11278607.

OEPL/ORIGINAL ENGINE PARTS LIST

1. Record the Turbocharger part number for ESN 11253654 _____.
2. Record the Piston Part Number _____, and the Injector part number _____ for ESN 11278640.

PC/PRICE CHANGE

1. Record the Flywheel Housing Part number, _____ and the Fleet price _____ for ESN 11278602.

SUPERSEDING

1. Determine if part number 181094 has been superseded _____, if it is superseded record the current part number _____.

MASTER PARTS LISTING

1. Record the Water Pump Part number for ESN 11150675 _____, proceed to the Master Parts Cards and record the Water Pump Impeller number _____.

Answers To The Most Asked Questions Concerning The Cummins Microfilm System:

1. What is the bulletin number for the annual Microfilm subscription service?

The bulletin number for the Cummins Microfilm is 3379636.

2. What is the cost of the annual subscription service?

The subscription service is \$130.00 per year and is billed each February. It provides you with the monthly OEPL updates, price change information, Master Parts listings, and Service Parts Topics.

3. What is the bulletin Number for the complete 42X Cummins Microfilm system, and what is included with the system?

The bulletin number is 3379640 and costs \$500.00.
Includes all updates for the remainder of the year.
Includes complete set of cards plus the B and C Series data.
Includes trays, tabs, separators, instructions and filmcard booklet.

4. Is a separate microfilm system available for B and C Series users only?

Yes, these cards may be ordered separately, bulletin number 3822018 B and C cards include:
Complete set of cards available 4th quarter 1985.
Tray system only.
Instruction booklet (Multi-language).
Initial subscription is \$75.00 with updates for remainder of the year.
Yearly subscription is \$50.00 billed in February.

5. How often does Cummins mail update cards?

Once a month.

6. Does Cummins still offer the binder system?

No, it has been discontinued.

7. Are the new TWO-STEP OEPL Cards filed in the same tray with the other OEPL system cards?

It is best to file the two systems separately as they have different instructions for usage.

Recent Block Group Changes to Review

85T1-9	Liner Seal, O-Rings
85T3-2	L10 Valve Cover Gasket
85T17-3	L10 Gasket
85T1-10	Main Bearing Washers and Dowel Rings
85T3-3	Rocker Lever Shaft Plug
85T3-2	New L10 Valve Cover Gasket
82T1-5	Main Bearings and Thrust Rings
82T1-12	Big Cam Camshaft Gear and Bushing Improvements
82T1-14A	Design Change on NH/NT Camshaft
83T1-6	Crankshaft Fillet Radius Change
82T1-5	Bearings to be Used with the new Crankshafts
84T4-1A	Valve and Injector Cam Follower Roller Design
3379031-R	Technical Overview of Camshaft Durability
82T1-6	Camshaft Bore Cup Plug and Camshaft Bushing Installation
81T1-10	Camshaft Keyway Standardization (Small Cam)
81T1-20	Camshaft Bushings
80T1-2	Obsolete Camshaft Support Bushings
80T1-6	Introduction Flangeless Camshafts (Preproduction)

