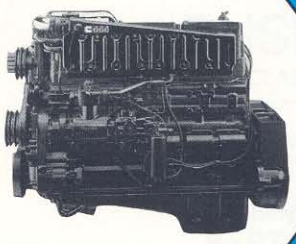
PARTS PRO CLASSIC

CLASSIC EDITION #12

Parts Pro Classic is provided as a historical reference.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

Cummins
Parts Professional



TIPS
from the Professionals

Cummins parts professional 12

INVEST IN THE BEST

Parts Professional 12 Reply Card

☐ Check here if this is a new address

Current Address

Name _____

Street _____

City _____ State ____ Zip _____

Distributor Code _____
(if applicable)

Old Address (if applicable)

Name _____

Street _____

City _____ State ____ Zip _____

Dealer Code _____
(if applicable)

Comments or Suggestions:

_____

_____

_____

_____

_____

↑ ↑

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

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

↓ ↓

Parts Professional 12 Enrollment Card

Name _____

Street _____

City _____ State _____ Zip _____

Distributor Code _____
(if applicable)

Dealer Code _____
(if applicable)

Company Name _____

Street _____

City _____ State _____ Zip _____

Please send me previous issues yes ____ no ____

Letter From the Editor

Welcome to Parts Professional #12!

You have asked for more information on the current line of Cummins Automotive engines. So, in this issue, you are going to get a brief history lesson on the progression of the NT engines from the Big Cam I through the 1988 Big Cam IV. We will look at the changes that have been made in the components of these engines and what that means to you as a Cummins Parts Professional. We will also look at the more recent additions to the Cummins family of engines: the A, B, and C Series engines.

At the front of this booklet, there is a reply card and an enrollment form. Please take the time to fill out the reply card and drop it in the mail. This will keep the mailing list current and give us some feedback on how we are doing at keeping our team of Parts Professionals informed. If you know someone that is not on the program that should be, use the enrollment card to sign them up.

If you are missing any of the past booklets, contact your Cummins Distributor. All past issues (#1-#11) are now available through them. Keep in mind, however, that the incentives offered in them are no longer available. They are kept in print for your use as training and reference materials.

The answers for the quiz in this issue will be included in Parts Professional #13. The answers to the quiz in Parts Professional #11 are included with the quiz in this issue.

Good luck and good selling!

Kristin Bridges
Editor

Corrections to Parts Professional 11:

Enclosed with this issue is the correct tab for your binders for Parts Professional 11. You may have noticed that the one sent with #11 had the wrong title on it. The tab should read "Associated Parts". "Cylinder Repair" was for issue #10.

Update

Since the publication of Parts Professional #8 covering the Cummins Microfilm System, there has been a major revision of the Master Parts Book. Parts are now listed by option in the Master Parts Book and the part number filmcard index now includes all of these engine options.

TIPS from the Professionals

WANTED: Tips From Our Professionals!

There are no longer deadlines for the tips. Just send them in and they will be printed in the first book we can get them in.

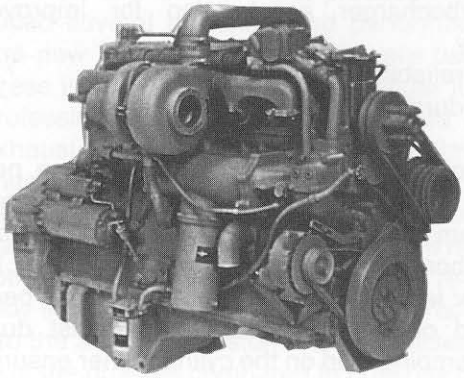
If yours is selected as the best for that issue, you will receive a personalized jacket with the Parts Professional patch on it **and** the Parts Professional cap with five patches. In addition, anyone with a tip that gets printed will receive the Parts Professional cap and five patches. Send in your suggestions now for your chance to win and see your name in print!

Although we didn't have any Tips this month, I did get a question from Terry Grunden of Cummins Diesel Engines, Inc. in Harrisburg, PA. The answer is one that is related to this issue and it should be helpful to many of you as you see more of the 88NT engines. Terry wanted to know if there is a head gasket set available for just one cylinder head on an 88NT. The answer is "yes". The genuine Cummins part number for that set is 3803150. The full head gasket set for all three heads on an 88NT is 3803040. Make sure you check these numbers in the future in case of supersessions. Thanks for the good question, Terry!

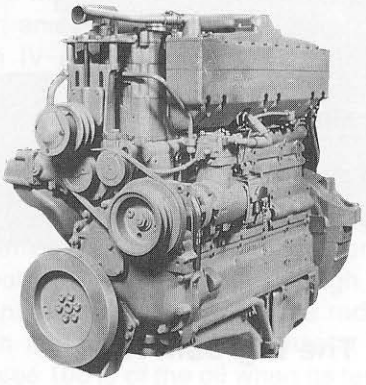
Rules: The tips must be compatible with Cummins standard practices. They must relate to the sale of New or ReCon Genuine Cummins Parts or Premium Blue Oil.

Send your tips to:

Kristin G. Bridges
Editor - Parts Professional M/C 40911
Cummins Engine Company, Inc.
Box 3005
Columbus, IN 47202-3005



Small Cam

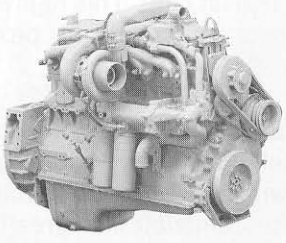


Big Cam

History of the Big Cam Engines

1977 ... The Beginning

In 1977, the Big Cam engine was introduced. The Big Cam engine took its name from the 25% larger diameter of its camshaft over the previous "Small Cam" engine. The Top Stop injector was also introduced in this engine. Demand Flow Cooling, the Pulse Manifold, non-cutback pistons, the T46 turbocharger, and the flangeless camshaft were introduced on the Big Cam II engine in 1979.



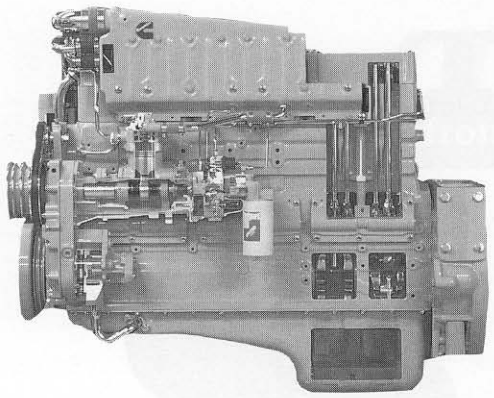
1982 ... The Big Cam III

The Big Cam III represented the beginning of a series of significant changes that would improve on the performance, the serviceability, and the durability of the original Big Cam design. It incorporated several important design changes to further improve the fuel economy, as well as the serviceability and the durability, of the Big Cam design. The T46B turbocharger compressor wheel had a swept back vane, or chevron design. Along with a new turbine wheel, this design provided improved low speed air flow to allow for more torque at lower engine speeds. The aftercooler core was redesigned to pass the coolant through three times instead of once. The more effective cooling of the intake air improved engine efficiency and durability. The HT3B turbocharger was added to Big Cam III in 1984 for further improvements in response and durability.

The Big Cam III engines also incorporated the spin-on full flow and bypass lube oil filters for ease of servicing. At the same time, the weight of the engine was reduced 55 pounds by using an aluminum oil cooler housing and stamped steel oil pan to replace the cast iron housing and cast aluminum oil pan used on previous models. Due to the unique design of the stamped steel oil pan, it transmitted less noise than the cast aluminum oil pan. On Big Cam III engines, the noise level of the engine was reduced sufficiently so that the need for oil pan enclosures was reduced.

The piston skirt was changed from a barrel shaped profile to a sled runner profile. This change helped to reduce the clearance between the skirt and the cylinder wall and to reduce piston tilt in the bore. These combined to reduce the engine noise caused by "piston slap" and to improve ring seating and oil control. On the Big Cam III 270 and 300 horsepower models, the ring pack was located 3/8 inch higher on the piston. This improved combustion efficiency and fuel economy by the reduction of the dead air space above the top ring.

The direct fuel feed (DFF) injector became standard on all Big Cam III engines. This injector had proven itself in the Cummins K series engines. It prevents fuel from entering the injector cup during the off mode when the engine is idling and reduces injector maintenance.



1984 ... The Big Cam IV

The improvements in the Big Cam III engines were substantial, but in 1984, research led to an even further improved engine: the Big Cam IV. Let's look at the most important features which distinguished the Big Cam IV. They are:

- Optimized Aftercooling
- New Head Gasket
- HT Series Turbocharger
- New Piston Ring Pack
- High Lift Cam
- Crowned Rollers

The Optimized Aftercooling provided cooler denser intake air to increase combustion efficiency which resulted in improved fuel economy. It also helped provide quicker acceleration of the turbocharger rotor assembly which resulted in improved driveability. Further, it lowered the combustion and exhaust temperatures which increased the reliability and durability of the engine.

The aftercooler on the Big Cam IV was more effective in the transfer of heat between the coolant and the intake air. It also has frontal plumbing which allows excellent accessibility to the top of the engine. In addition, a coolant filtration screen was added to the inlet side of the aftercooler to protect the high efficiency core from possible cooling system contaminants which might plug the passages in the core.

While early Big Cam IV engines used the T46B turbocharger, soon after introduction, the HT4B turbochargers containing a bearing system that reduces friction losses in the bearings was used. In addition, this turbocharger has a smaller rotating assembly and a slightly modified chevron blade design. These features in combination with the cooler intake air of Optimized Aftercooling provided:

- faster turbocharger acceleration for improved driveability
- improved reliability
- improved durability

Adding to both reliability and durability was a new head gasket initially introduced on the later versions of the Big Cam III engine. With this gasket, all coolant seals were bonded in place so they could not be misaligned or left off. Also, there was a silicone bead at each end of the gasket to seal against dust. Increased clamping load on the cylinder liner ensured the sealing in of combustion gas.

The Big Cam IV had a piston ring pack which had been introduced on Big Cam II NTC475 and later Big Cam II engines. The top compression ring was manufactured to closer tolerances to improve sealing, with an inlaid chrome face for greater life. A chrome face was also added to the second compression ring. This ring pack increased the life of the piston and rings compared to the old Big Cam III ring pack and is now known as the Premium Plus ring pack.

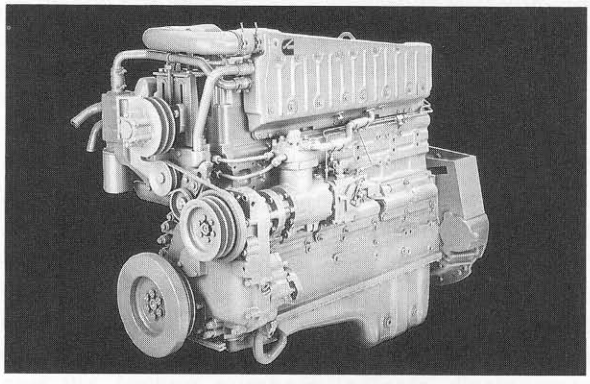
In addition, the ring pack was moved up on the piston by 3/8 inch in the 350 horsepower engines, as had been done with the Big Cam III 300 horsepower and lower horsepower engines. Raising the top ring reduced the dead air space above it, improving combustion efficiency. The top ring was not raised on the 400 horsepower engine, but this engine model did utilize a new high lift cam. This high lift cam improved engine breathing which, in turn, provided better fuel economy.

Another product improvement on Big Cam IV engines which had been used on the later Big Cam III engines was the crowned cam follower roller. This design lengthened the camshaft life, greatly increasing engine reliability and durability.

1986 ... The New Big Cam IV

The New Big Cam IV, first produced in 1986, introduced several durability and performance features. The new lower press fit liners were used to reduce stress in the counterbore for a longer life (see Parts Professional #10). The slip joint area of the Pulse Exhaust Manifold was redesigned to eliminate sealing rings and improve durability (see Parts Professional #9). In addition, the exhaust port openings in the manifold and in the cylinder head were redesigned for optimum exhaust gas flow. A dual Ni-resist nickel alloy iron insert for the top two ring grooves was cast into the aluminum piston. This increased the durability of the grooves compared to previous pistons which used an insert for the top ring only. The Fleetguard LF3000 combination oil filter was also first used on this engine.

An advanced HT Series Turbocharger and Step Timing Control (STC) were used in the 444, 400, and 365 models of the New Big Cam IV. These new models were equipped with the latest BHT3B (or the BHT4C for the 444) turbocharger. The advanced turbocharger technology applied to this product provided quicker engine response and improved fuel economy. The engines were also equipped with a hydraulically controlled variable timing system, Step Timing Control, which provided this engine with superior cold starting, while also limiting maximum cylinder pressures under high power operating conditions.



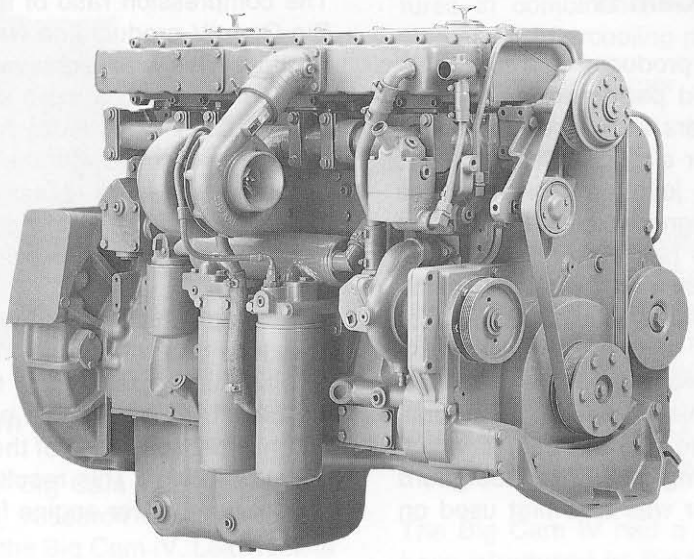
Today ... The 88 Big Cam IV

The changes which led to the 88 Big Cam IV were driven by the need to meet emissions requirements and to optimize performance and durability. While a sealing ring between the block and the cylinder liner had been a standard feature of the Big Power Performer models (365/400/444) since their introduction in late 1986, this is the first time it has been used on all models. This ring ensures a tight seal between the block and liner for increased durability.

The compression ratio of the pistons used in the 88 Big Cam IV product line was raised to improve combustion. This was achieved by a new piston bowl configuration and a more shallow valve pocket. The 88 Big Cam IV cylinder head is the same as the cylinder head used with the New Big Cam IV engines except for the more recessed valves, new valve seat inserts, and valve spring guides which were all necessary to retain compatibility with the new pistons.

A new, high efficiency single pass oil cooler was used to reduce coolant flow restrictions through the cooler resulting in increased flow through the radiator cooling circuit. In addition, a new thermostat was used which bypasses 100% of the oil when its temperature is below 228°F. This results in a higher average oil temperature, lower engine friction, and improved fuel economy.

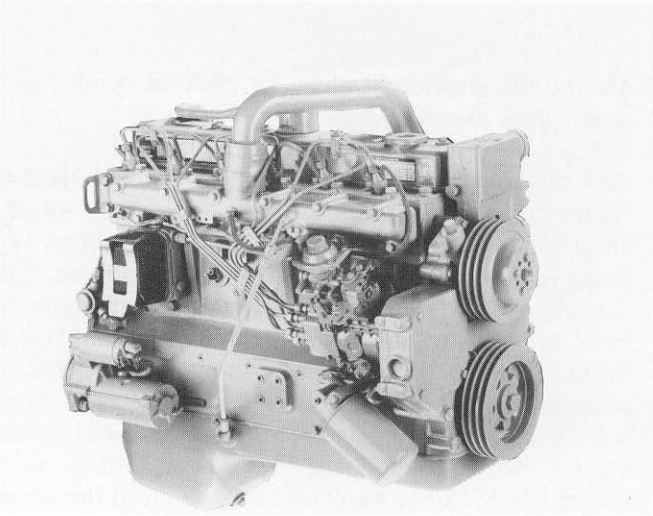
The Fleetguard LF3000 combination full flow and bypass oil filter is standard on all 88 Big Cam IV models. The benefits of the combination filter compared to two individual filters include improved filtration of contaminants, reduced sensitivity of plugging and water contamination, and ease of servicing (see Parts Professional #9). The two filter arrangement is still available to customers as on option on the 88 Big Cam IV.



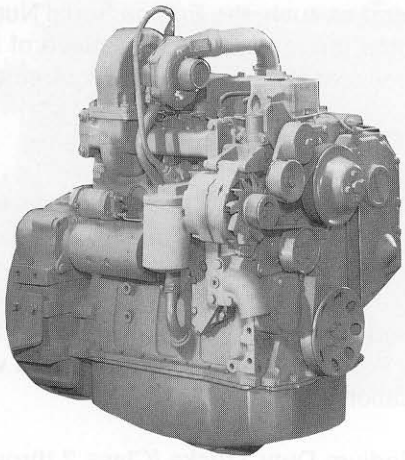
L10

The L10 engine ranges from 240 to 300 horsepower. The air induction into this engine is through the rocker housing. The intake and exhaust arrangement in the cylinder head is somewhat different than in a typical in-line engine. Both 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.

L10 engines feature a piston with no valve pockets cut into the top of the piston head. It also uses a large diameter hollow piston pin for added strength. The liners are a unique Cummins patented design, called a mid-stop. The seating ledge, located at the bottom of the water jacket, seats vertically on a ledge in the cylinder block. It 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 which means there is reduced liner vibration, less sensitivity to liner protrusion from the cylinder block, and more even distribution of the clamping load. In addition, the mid-stop liner also reduces the length of the water jacket by having the water jacket only at the upper end of the liner. All of these features combine to increase liner durability.



A Series



4B

Mid Range Engines

A Series

The A Series engine, formerly sold as the Onan L engine, is a vertical in-line engine with a metric design that ranges from 18 to 120 horsepower. It is designed for continuous or variable speed from 1500 rpm up to 3600 rpm. This engine uses the Indirect Injection Ricardo Comet design combustion system. It is available in naturally aspirated three, four, and six cylinder models. You will find A Series engines in several different types of applications: automotive, mobile refrigeration, construction, marine propulsion, electrical power generation, aircraft ground support, and general industrial applications. To make servicing easier in this broad range of applications, all accessories are serviceable from one side and there is a lot of standardization in parts between the engine models. The A Series nomenclature system is the same as the B and C Series system. The first digit indicates the number of cylinders; the next character denotes the engine series; the remaining letters signify aspiration; and the trailing numbers indicate displacement in litres. The A engines have 35 cubic inches (572 cubic cm) displacement per cylinder.

The 2-valve cylinder heads for the turbocharged engines are not the same as those for naturally aspirated engines. Turbocharged cylinder heads have a bridge scallop between the valves on the deck face for improved cooling capability and have different valves. Cylinder heads for naturally aspirated engines do not have this scallop. The pistons are different for the two types of aspiration as well. Pistons for turbocharged engines feature a hard-anodized combustion surface and a Ni-resist upper ring groove with a keystone ring.

This engine is similar to the B Series engine in that it does not use liners. The block can be bored for four different oversize pistons: 0.25 mm, 0.50 mm, 0.75 mm, and 1.0 mm. The six cylinder automotive engines use a Garrett T3 turbocharger with a wastegate. Applications other than automotive use a Holset H1C turbocharger without a wastegate system.

The A Series engine is the only Cummins engine to use an indirect injection combustion system. The system was chosen for its high speed capability, low emission levels, and smooth, quiet operation. It uses a pintle-type injector, a rotary injection pump, glow plug, and a replaceable prechamber insert. Glow plugs improve starting capability, and reduce start-up smoke by heating the prechamber. The injection pumps used are manufactured by Stanadyne (DB2) for industrial applications and Bosch (VE) for automotive applications.

Parts for A Series engines can be ordered through any Cummins distributor. These part numbers are 11 digit numbers and all start with "C0". To order the correct parts, you need to identify the engine model number, which is located on the engine dataplate. The spec (specification) letter is an engine hardware revision level. For example: spec A through C engines have solid valve tappets and spec D engines have hydraulic valve tappets. The model specification number designates a unique set of sales option codes. Sales option codes specify all customer options such as dipstick location and fan pulleys. Currently, the specification number is necessary information whenever parts are ordered. However, Cummins OEPL information is being created in support of the A Series

product and as such, the Engine Serial Number (ESN) will become the critical required piece of information needed to identify service parts requirements.

B and C Series Engines

The B Series engine is a Mid-Range diesel available in 4 and 6 cylinder models with a horsepower range from 52 to 300 HP. The C Series is another Mid-Range diesel and ranges from 120 to 400 HP for general industrial use and 180 to 250 HP for automotive use. You can find these engines in a wide variety of applications:

- Medium Duty Trucks (Class 2 through 6)
- Medium/Heavy Duty Trucks - Class 8 (C Series)
- Forklifts
- Generator sets
- Back hoes
- Front end loaders
- Compactors
- Irrigation pumps
- Tractors
- Combines
- Marine equipment
- Logging equipment
- Etc.

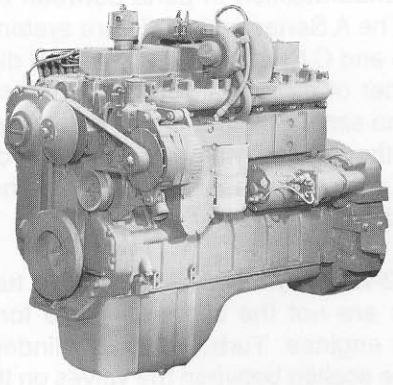
Both of these engines have an in-line configuration which means they have fewer parts and are easier to service than the comparable vee configuration engines. The two engines use direct injection for maximum fuel economy. The fuel pumps used on the B Series are rotary: either the CAV DPA pump or the Bosch VE pump. The exception to this is the 300 HP marine engines which use the Nippondenso EPQ inline fuel pump. The C Series uses the Bosch A or MWV inline fuel pump with the RSV or RQV governor.

The cylinder head on these engines is a specially designed, single-piece cross-flow cylinder head. This allows for short length and maximum structural stiffness of the block/head assembly which means reduced head gasket problems. Their crankshafts are designed to be capable of transmitting high power output while being compact. The camshafts are side mounted and gear driven which allows for low engine height and minimum maintenance. The B and C Series engines have two valves per cylinder with single valve springs which results in fewer overall parts. However, some C Series engines do use dual exhaust valve springs for use with exhaust brakes. In addition, there is parts standardization between the 4B and 6B engines to allow for ease of service and lower parts inventory.

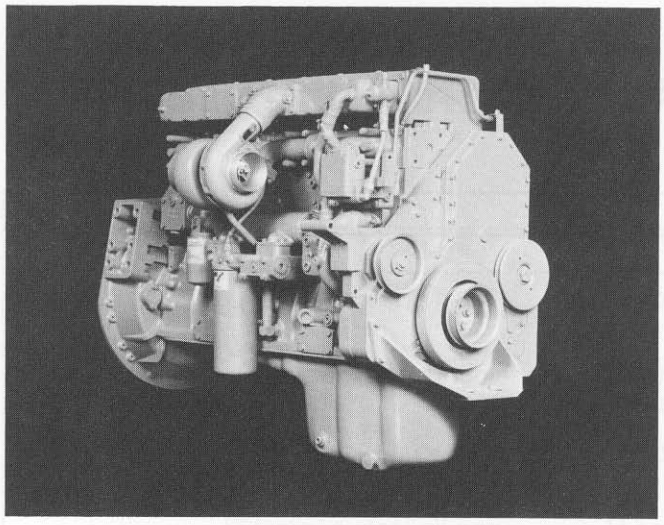
One of the main differences between the B and C Series engines is that the B Series engines do not use liners while the C Series engines use wet liners like those used in the heavy duty Cummins engines. The C Series liners feature a mid-stop design (like that in the L10) that locates the liner in the block. The B Series engines have three different piston sizes to allow for boring of the block: Standard, .5mm oversize, and 1.0mm oversize. There are different piston kits for each of these sizes. The Piston and Cylinder kits for the C Series engines are structured the same as those used in the heavy duty market, although the C Series pistons use a single Ni-resist insert on lower horsepower ratings and a dual Ni-resist insert on higher horsepower ratings. Please note that the piston kits for both the B and C Series engines omit the piston pin since the replacement of this component is not generally required with just a piston replacement.

The B and C Series engines have a unique series of numbers to identify their service parts. The seven digit part number starts with a "39" although there are a few exceptions. The Kits and Sets are assigned a "3802" series Cummins part number. There are also a limited number of parts released by worldwide Cummins plants that begin with a different prefix. In addition, there are some parts used on the B and C Series engines that are common to the higher horsepower engines (for instance, engine mounts). These parts retain their original part numbers.

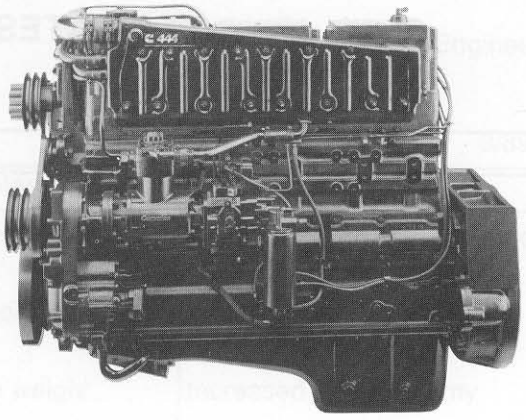
For more details on how the B and C Series engines work and how they were designed, see Parts Professional #6.



6C



New L10



444XT

New Products

L10

A new version of the L10 has been released for construction applications which will provide a variety of product improvements. This L10 features a stamped steel oil pan with a 9 gallon capacity. The sump pan has been deepened 1.6 inches and the overall length of the pan has been shortened 2.95 inches. Also, the sides of the pan have been widened approximately 1 inch on both sides. The CPL's for these engines are: 776, 775, and 894. These same features will be available later in the year on most automotive applications and will be used in the 1991 L10. This design reduces engine noise emissions when compared to earlier L10s. That means lower installed cost for the L10 and lower total cost for your L10 customers.

The 444XT

Cummins Engine Company has announced its new premium Class 8, heavy-duty diesel engine: the 444XT rated at 444HP @ 2100 RPM. The new 444XT shows significant improvements in response, clutch engagement torque, durability, and overall performance.

Specification/Design Highlights

- The peak torque of the 444XT is 1400 lb-ft @ 1500 RPM which provides extra power.
- The throttle response of the engine has improved by 30%. This was achieved through the use of the Holset BHT3B turbocharger. Response improvement is notable in the 1200 - 1500 RPM range.
- The piston bowl and injector cup have been redesigned to improve fuel economy.

Other Features

The 444XT includes the Cummins C Brake™ and Step Timing Control (STC) as standard features. Cummins PACE, the electronic fuel control system, is available as an option.

Through April 30, 1990, Cummins will offer 6/6, 6-year or 600,000 mile (1,000,000 km), major components coverage free with the purchase of the 444XT. Also included with the purchase of a 444XT is a free 444XT Owner's Kit which consists of a customized driver's jacket, cap, and atlas.

For more information about the new 444XT, contact your nearest Cummins Distributor; write the Cummins Engine Company, Box 3005, Mail Code 60403, Columbus, IN 47202-3005; or call the toll-free, 24-hours 1-800-DIESELS.

P.T. Pacer

The P.T. Pacer is a new foot-on-the-floor road speed governor for the L10 and NT engines which uses the P.T. fuel system. It is currently being used in the national Ford/Cummins economy run and achieving great results in mileage. Start watching for these engines this fall. We'll have more details on it in a future issue of Parts Professional.

LATEST PARTS CATALOGS

Application	Bulletin Number
Revised	
4B, BT3.9 Marine	3822100-01
424/444 Automotive (444XT)	3884288-01
6BT5.9 Marine	3822119-01
New	
6BTA5.9 Fire Pump	3884267-00
NT, NTA855 Big Cam I Gen Drive	3884297-00
NTA855 Big Cam Marine	3884298-00
KT, KTA38 Construction (low mount aftercooler)	3884289-00
KTA38 G3 Generator Drive	3884295-00
L10 Construction (reduced noise design)	3884307-00
KT, KTA38 Marine	3884296-00
KTA50 Construction (low mount aftercooler)	3884306-00
KT, KTA19 Power Unit (1990)	3884308-00
KTTA19 Power Unit	3884309-00
KTTA10 Construction 650/700	3884314-00
KT19 Locomotive	3884317-00
NTA855 Power Unit Big Cam III	3884316-00
3A1.7 Construction (Low speed)	3884320-00
3A1.7 Construction (High speed)	3884319-00
PT Pacer	3884310-00
6CTA8.3 Automotive charge air cooled	3884303-00
4A2.3 Construction (High speed)	3884285-00
4A2.3 Construction (Low speed)	3884286-00
6AT3.4 Construction (High speed)	3884304-00
6AT3.4 Construction (Low speed)	3884305-00
Customized	
6BT5.9 Chrysler (1990)	3884324-00

Cummins Parts Professional Fact Sheet

9/89

Product	Feature	Advantage	Benefit
Big Cam III	T46B Turbocharger	Improved low speed air flow	More torque at lower engine speeds
	Redesigned aftercooler	More effective cooling of intake air	Improved engine efficiency and durability
	Aluminum oil cooler housing and stamped steel oil pan	Reduced engine weight	Increased fuel economy
	Stamped steel oil pan	Less noise transmitted	Reduced need for oil pan enclosures
	Sled Runner piston skirt	Reduced clearance between skirt and cylinder wall and reduced piston tilt in the bore	Reduced the engine noise caused by "piston slap"
	Direct fuel feed (DFF) injector	Prevents fuel from entering the injector cup during idle	Reduced injector maintenance
Big Cam IV	Optimized Aftercooling	Cooler, denser intake air	Improved fuel economy
		Quicker acceleration of the turbocharger rotor assembly	Improved driveability
		Lowered combustion and exhaust temperatures	Increased reliability and durability of the engine
	HT Series Turbocharger	Bearing system reduces friction losses in the bearing	Improved reliability and durability
		Faster turbocharger acceleration	Improved driveability
	Premium Plus piston ring pack	The top ring has an inlaid chrome face	Increased ring and piston life
New Big Cam IV	Lower Press-fit liners	Reduced counterbore stress	Longer life to overhaul
	New Pulse exhaust manifold	Eliminates sealing rings	Improved durability
	Dual Ni-resist nickel alloy iron insert in pistons	Increases durability of the top two ring grooves	Longer life to overhaul
	BHT3B turbocharger	Quicker engine response	Improved driveability and improved fuel economy
	Step Timing Control	Improves cold starting while limiting maximum cylinder pressures under high power operating conditions	Improved fuel economy and durability
88 Big Cam IV	Sealing ring between block and cylinder liner on all models	Ensures a tight seal between the block and liner	Increased durability
	New piston bowl design and a more shallow valve pocket	Higher piston compression ratio	Improved combustion
	High efficiency, single pass oil cooler	Reduces coolant flow restrictions	More efficient cooling

Product	Feature	Advantage	Benefit
	New thermostat	Higher average oil temperature and lower engine friction	Improved fuel economy and engine durability
	LF3000 combination full flow and bypass filter	Improves filtration of contaminants and reduces sensitivity to plugging and water contamination	Increased life

Test Your Professional Knowledge

(Answers will appear in Parts Professional #13)

1. The aftercooler in the Big Cam III passes coolant through the core

   A. once
   B. six times
   C. three times
   D. ten times

2. The DFF injector used on Big Cam III engines had previously been used on C Series engines.

   A. True
   B. False

3. Which of the following were introduced on the Big Cam IV engine?

   A. Pulse Manifold
   B. Flangeless Camshaft
   C. Optimized Aftercooling
   D. None of the above

4. The piston ring pack used on the Big Cam IV engines is currently referred to as:

   A. Premium Plus
   B. Premium
   C. Big Power Performers
   D. Standard

5. The Fleetguard LF3000 oil filter was first used by Cummins on the:

   A. C Series engine
   B. J engine
   C. New Big Cam IV
   D. Big Cam III

6. The life of the New Big Cam IV engines with lower press-fit liners was improved because the liners:

   A. Were square
   B. Reduced stess in the counterbore
   C. Used a softer material
   D. Were smaller

7. What was the result of the higher compression ratio in the pistons used in the 88 Big Cam IV?

   A. Increased emissions
   B. Reduced noise
   C. Improved combustion
   D. Reduced coolant flow restrictions

8. The new thermostat in the 88 Big Cam IV engines bypasses 100% of the oil when its temperature is below 228°F which results in:

   A. A higher average oil temperature
   B. Lower engine friction
   C. Improved fuel economy
   D. All of the above

9. The Fleetguard LF3000 combination full flow and bypass oil filter is standard on all 88 Big Cam IV models.

   A. True
   B. False

10. The pistons in the L10 engine:

    A. Are exactly like those in the Big Cam IV
    B. Are exactly like those in the A engine
    C. Do not have rings
    D. Have no valve pockets cut in the top of the piston head

11. The liner design used in the L10 engine provides:

    A. Less clamping load on the liner
    B. Increased liner vibration
    C. More even distribution of the clamping load
    D. None of the above

12. The difference between the cylinder heads on the turbocharged A Series engine and the naturally aspirated one is:

    A. The turbocharged heads have a bridge scallop between the valves on the deck face and naturally aspirated ones do not
    B. There is no difference
    C. The turbocharged engines have smaller cylinder heads
    D. The turbocharged engines have a Ni-resist insert in the cylinder head

13. The A Series engine is the only Cummins engine to use an indirect injection combustion system

    A. True
    B. False

14. There are no plans to include A Series information in the OEPL data

    A. True
    B. False

15. The B and C Series engines use:

    A. Indirect injection
    B. The Ricardo Comet combustion system
    C. Carburetors
    D. Direct injection

16. Both the B and C Series engines use dry cylinder sleeves

    A. True
    B. False

17. The B Series engines have which of the following piston sizes available?

    A. Standard
    B. .5 mm oversize
    C. 1.0 mm oversize
    D. All of the above

18. All B and C Series part numbers start with a "39"

    A. True
    B. False

19. How many valves per cylinder do the B and C Series engines have?

    A. One
    B. Two
    C. Four
    D. It varies depending on the model

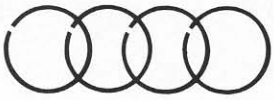
20. Which new products were announced in this issue?

    A. The new L10 for construction
    B. The 444XT
    C. The P.T. Pacer
    D. All of the above

Answers to Parts Professional #11

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

Return Postage Guaranteed



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

Cummins
Parts Professional
P.O. Box 34470
Louisville, Kentucky
40232-4470

Customer Label

Cummins Engine Company, Inc.
Box 3005
Columbus, Indiana 47202-3005

Bulletin 338732012
Printed in U.S.A. 9/89