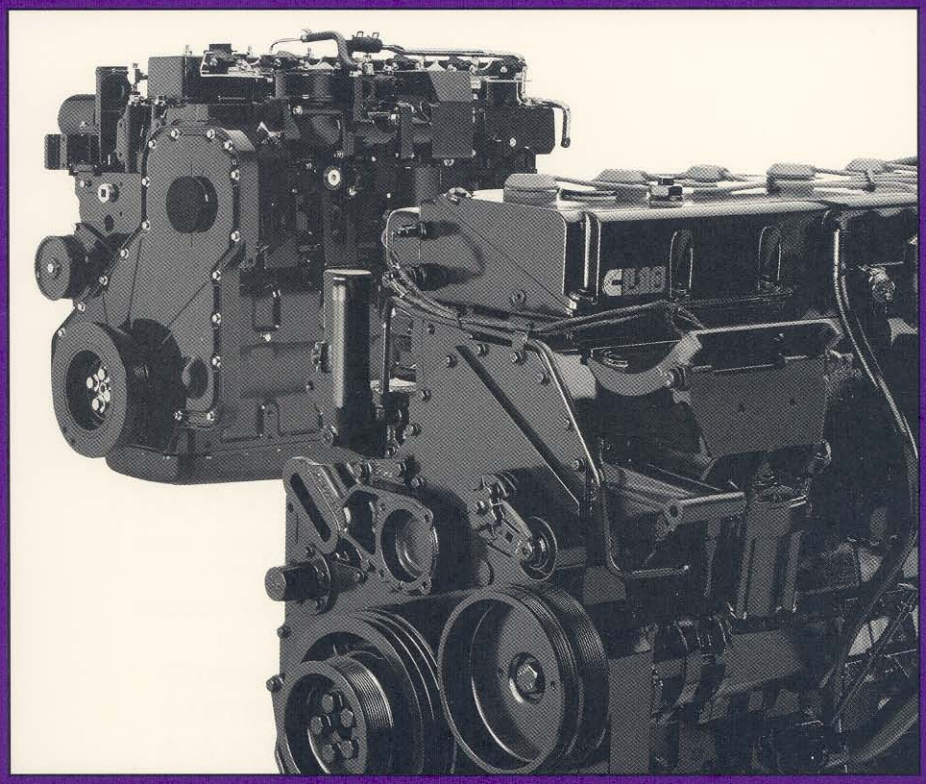
PARTS PRO CLASSIC

CLASSIC EDITION #25

Parts Pro Classic is provided as a historical reference.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 25



INVEST IN THE BEST

Parts Professional 25 Quiz

Current Address ☐ Check here if this is a new address

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Quiz

1.	A	B		
2.	A	B		
3.	A	B		
4.	A	B		
5.	A	B	C	D
6.	A	B		
7.	A	B	C	D
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11.	A	B		
12.	A	B	C	D

Parts Professional 25 Reply Card

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Dealer Name _____

Comments or Suggestions:

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Welcome to Parts Professional 25!

This issue will focus on the C8.3-250G and L10-IIIG natural gas engines. We have also included a brief article covering Engine Brakes on page 2.

After reading this issue, please take the quiz located in the back of the book. Tear out the answer card in the front of the book and circle the correct answers. We are giving you a year to return the quiz card. This way everyone will have a chance to take the test. Remember to use the peel-off address label to return your quiz card. If you score 100% on your test you will receive a Parts Professional gift.

If you have a *Success Story* or a *TIP from the Professional*, you can use the reply card to send in the information. Please remember that all *Success Stories* and *TIPS* must be compatible with Cummins standard practices and must relate to a sale of Cummins or Cummins ReCon® Genuine parts. The top winner for both the *TIPS from the Professional* and the *Success Story* will receive a Cummins Parts Professional Jacket.

If you need additional copies of Parts Professional 25, please contact your local distributor. In addition, all previous issues are available. However, the incentives associated with the past issues are no longer available.

Thanks to everyone who responded to the Parts Professional 24 survey. The Parts Professional program is for you. We will not know the topics you want us to cover unless you tell us.

I look forward to hearing from you!

Shawn Wasson
Advertising & Promotions Manager

Editor's note: Special thanks to Rob Wagner, Matt Donica, Tish Fuller, Pat McClendon

TIPS from the Professionals

The first TIP is from Jimmy Anderson of Texarkana, Texas. Jimmy says that he likes to take New Product information from the Parts Professionals and put it into Parts flyers. This way he gets the most current information out to the customers.

The second TIP comes from Nicolas Diaz of Long Beach, California. He writes when you're pulling orders make sure you double check the part numbers, location and description. Also once you start boxing your order make sure you put your order numbers on the outside of the box to prevent confusion, in case you're boxing several orders at the same time.

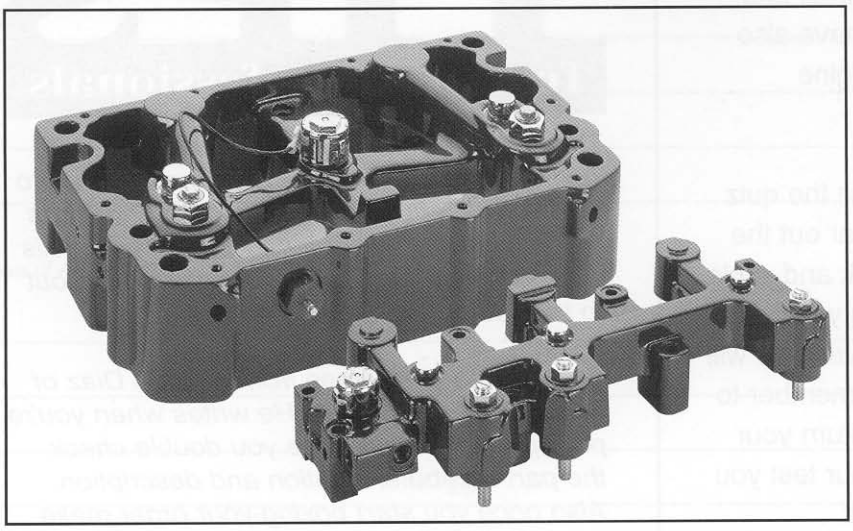
David Cross of Casper, Wyoming has the third TIP. He writes: use a cardfile (especially "cardfile" in your P.C.) to keep a customer file with engine serial number, CPL & model numbers referenced by your customer's unit number. This will save them from having to look it up each and every time. They love it!!!

The winning TIP comes from Jim Carruthers of Kamloops, British Columbia. Jim writes that before ordering parts for an overhaul he checks the S.N. and CPL numbers on the engine tag. It may differ from the truck build record, if the engine is a transplant. Also it tells you if field fixes have been done and you can see if the customer has added any options after the engine was built - I.E. - Remote filters, starting aids...

I want to thank Jimmy, Nicolas, David and Jim for their TIPS. All four people will receive Parts Professional caps and patches for their contributions. Jim will also receive a Parts Professional jacket for his winning TIP. Congratulations to all for your informative TIPS.

If you have a TIP that has been helpful to you, please write the TIP on the postage-paid comment card and send it to us. Remember to follow the guidelines outlined in the letter from the editor.

Engine Brakes



The engine braking systems for Cummins M11, M11 Plus, 94N14 and N14 Plus engines are branded the C Brake by Jacobs. Earlier production models carry the Jake Brake brand name.

In addition, the Cummins Extarder by Jacobs is the exhaust brake model for Cummins 5.9 and 8.3 engines. A new product, the Cummins RamBrake by Jacobs was recently released for the Dodge Ram pickup with the Cummins TurboDiesel engine.

Cummins and Jacobs Vehicle Systems signed a supply agreement in September 1995 for the development and supply of engine brakes for use on Cummins engines.

Under the terms of the agreement, Cummins will market, distribute and service all of the engine braking products used on Cummins engines, and Jacobs will be the exclusive supplier.

This alliance will provide Cummins customers with state of the art engine braking products by optimizing engine and brake components and controls.

The Cummins Distribution and Dealer network is established as the source for all engine braking needs for Cummins engines. Cummins Distributors and Dealers are authorized to sell parts, service, administer warranty, and provide technical information on engine braking systems.

In addition to the engine brake and exhaust brake kits, a full range of service parts and tune up kits are available through the Cummins system.

Cummins carries the warranty for all these products. The Cummins distribution network provides the customer with the advantage of "One-Stop Shopping" for all engine and engine braking needs.

There are many sources of information available on Cummins engine braking systems. Some of these are:

Product Reference Guide	3698828
Product Brochure–Engine Brake	3606036
Technical Specification–Engine Brake	3606037
Parts and Maintenance Brochure	3698877
Product Brochure–Extarder	3698530
Technical Specification–Extarder	3698531
Product Brochure–RamBrake	3698967
Technical Specification–RamBrake	3698969
Performance Poster–Engine Brake	3698898
Product Familiarization–N14 Engine Brake	3898153
Training Program	3698943

See your local Cummins distributor for additional information on engine braking products.

The Natural Gas Alternative

It's well known that Cummins produces more diesel engines over 200 horsepower than anyone else on planet earth. And with good reason. Cummins quality and durability are legendary. Plus, customers know they can count on Cummins to lead the technology race taking performance to a higher level year after year. But there's more to Cummins than diesel power. Less known is Cummins leadership in engines powered by natural gas.

With over 1,200 vehicles in service and more than 120 million miles logged, no one has more experience with alternative fuel engines than Cummins. Over the years we have proven that clean-running natural gas engines–in airport shuttles, transit or school buses, delivery vehicles, refuse trucks and other applications–can deliver the same performance and durability as their diesel counterparts.

This is an important, growing market segment that can not be ignored. It's easy to see why. Natural gas offers a clean, efficient alternative for environmentally sensitive areas. Many national and regional energy policies are in place to ensure natural gas will be readily available worldwide. But perhaps the most surprising fact is that alternative fuel engines can actually be cheaper to run in high fuel use applications. That's why more major fleets are running with natural gas than ever before. And with our track record, it's no surprise that Cummins is the premier supplier of natural gas engines.

This Parts Professional will cover two important models in our complete line of natural gas engines: the C8.3-250G and the L10-IIIG. Although both are derivatives of their diesel engine counterparts, they offer a totally integrated design–not some aftermarket retrofit kit. The selected components handle the demands of spark ignited, lean burn combustion. The air/fuel handling systems as well as the electronic engine controls are specifically designed for the application.

Lean Burn Technology

Optimum combustion requires a precise fuel/air mixture. If the fuel is mixed with too much air (lean) or too little air (rich) performance will suffer. The lean burn concept achieves optimum ignition at a greater air to fuel ratio. The resulting lower in-cylinder temperatures reduce NOx levels below all current emissions standards while improving engine durability. Lean burn technology raises the engine thermal efficiency to 37% compared to the 32% efficiency typically associated with spark ignited engines.

Burns Cleaner

For automotive applications the C8.3-250G meets the 1996 CARB emissions standards. Both transit (with oxidation catalyst) and automotive applications meet the 1997 EPA emissions standards. Automotive applications will also meet LEV (Low Emitting Vehicle) emissions levels with an oxidation catalyst.

C8.3-250G

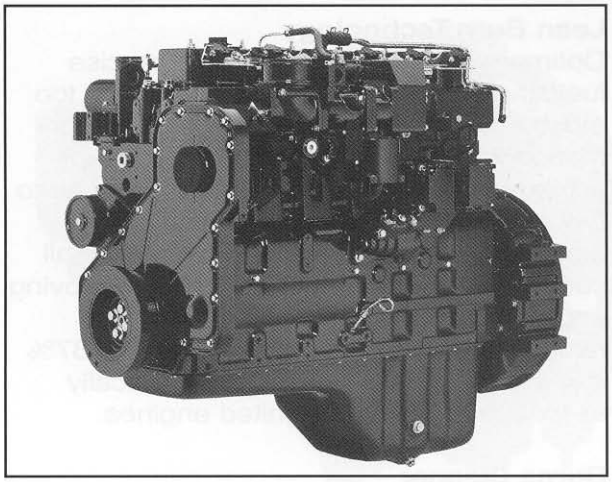
Application	1996 CARB	1997 EPA	1997 CARB
Transit	None	YES w/Cat.	YES w/Cat.
Automotive	YES no/Cat.	YES no/Cat. YES **LEV** w/Cat.	YES no/Cat. YES **NOx 3.5** w/Cat
w/Cat. – With Oxidation Catalyst no/Cat. – No Oxidation Catalyst Needed			

For the L10-IIIG, both transit (with oxidation catalyst) and automotive applications will meet the 1997 EPA emissions standards and the California Heavy Duty Standards.

L10-IIIG

Application	1997 EPA	California Heavy Duty Standard
Transit	YES w/Cat.	YES w/Cat.
Automotive	YES no/Cat.	YES no/Cat.
w/Cat. – With Oxidation Catalyst no/Cat. – No Oxidation Catalyst Needed		

C8.3-250G



The Cummins C8.3-250G is a natural gas fuel derivative of the C8.3 six cylinder diesel. It is a spark ignited, lean burn engine which utilizes a water-cooled and wastegated Holset turbocharger and charge air cooling.

Ratings

The C8.3-250G will be introduced with two ratings:

250 BHP @ 2400 RPM Torque Peak 750 LB-FT @ 1400 RPM

250 BHP @ 2400 RPM Torque Peak 660 LB-FT @ 1400 RPM

Fuel System

A specially designed fuel system is monitored electronically by the engine mounted CM420 (Engine Control Module) which uses eight sensors to gather critical data. Gas mass flow, turbocharger boost pressure, throttle position, manifold absolute pressure, intake manifold temperature, engine position, coolant temperature and exhaust gas are all measured by the sensors, and the information is relayed to the CM420 which controls the fuel control valve, the fuel shutoff valve and the wastegate control valve. The CM420 module also supplies engine over speed protection.

The fuel control valve is signaled by the CM420 to deliver the proper fuel quantity depending on operator demand. Gas must be supplied to the engine at a pressure between 60 and 150 PSI and at a temperature of -10°F to +70°F relative to engine air inlet temperature.

Cummins supplied fuel system components include a low pressure gas filter, fuel control valve, low pressure regulator, fuel shutoff valve (located in the gas control housing), air/fuel mixer and the eight sensors.

The low pressure gas filter is required. This remote mounted device is plumbed by the customer and located where it can be easily drained at service intervals. Connecting hoses must be approved for natural gas.

The fuel specifications for the C8.3-250G is printed in CMS 20067. This fuel specification is the same as the B5.9G and 94L10-260G.

Ignition System

The Cummins Ignition Module (CIM) is mounted on the front of the CM420 mounting bracket on the intake manifold side of the engine. It sends a signal to a coil mounted on each spark plug which supplies high voltage to the spark plug. Mounting the coil directly on the spark plug is a new design feature that reduces the number of replacement components required at service intervals. It also reduces the number of connections between the CIM and the spark plug coil.

The CM420 supplies information to the CIM enabling it to provide the appropriate spark depending on engine demand. Engine timing adjustments are not necessary unless the magnetic pickup housing or gear cover housing are removed.

The ignition system can withstand ambient temperature extremes from -40°F to +250°F.

WARNING: THE IGNITION SYSTEM CAN DELIVER UP TO 40,000 VOLTS TO THE SPARK PLUGS. EXTREME CARE SHOULD BE TAKEN WHEN WORKING WITH THIS HIGH VOLTAGE SYSTEM.

Spark Plugs

The spark plugs have been developed specifically for the lean burn conditions and high energy ignition requirements of the C8.3-250G. It is critical that only genuine Cummins spark plugs be used to assure proper performance.

Cooling System

The C8.3-250G engine requires the same size radiator and charge air cooler as a C8.3 275 HP diesel. The natural gas C8.3G produces more heat to the exhaust and cooling system than an equivalent horsepower diesel C8.3. That's why only heavy duty type cooling systems with a surge (reservoir) tank can be used. The C8.3G engine is equipped with a vent connection that must be plumbed to the surge tank.

Intake Manifold
A special air intake manifold cover attaches to the cylinder head. The throttle body with integrated actuator attaches to this special intake manifold. An air throttle body bolts to the air intake manifold. The air intake connection has a 101.6 mm (4.00 inch) OD which is the same as the C8.3 diesel air intake connection.

Exhaust Manifold
Same as C8.3 diesel.

Turbocharger
To improve the reliability of the Holset turbocharger a water cooled bearing housing has been incorporated. The air inlet and outlet connections are the same as the C8.3 diesel. Centerline locations for the various turbocharger arrangements are the same offered for the C8.3 diesel.

Applications currently using C8.3 diesels will require only minor modifications to adapt their exhaust plumbing to the C8.3-250G engine.

Lubrication
The engine oil specification is the same as the B5.9G engine. Only oils meeting this specification can be used.

C8.3G PRELIMINARY OIL SPECIFICATION:
API CD Quality
SAE 15W40 Viscosity
Ash: Less than .5% Sulfated Ash
Phosphorous: 600–800 ppm
Zinc: 650–850 ppm
Calcium: Less than 1200 ppm
TBN (ASTM D2896)–5/5.5
TAN (ASTM D 664)–.5/.7

Oil Cooler and Filter
Same as C8.3 diesel.

Oil Pan
Same as C8.3 diesel.

Valve Cover
Although the oil fill caps are different, the C8.3-250G uses the same valve cover as the C8.3 diesel.

Oil Fill Arrangements
Front oil fill arrangements are similar to those offered on the C8.3 diesel, however there is a special oil fill cap for the C8.3-250G.

The valve cover oil fill location is the same as the C8.3 diesel, but it also uses a special oil fill cap.

Some side oil fill arrangements are offered. These arrangements do not interfere with fuel system components and electronic modules.

Dipstick Arrangements
Some of the dipstick arrangements used with the C8.3 diesel can be used on the C8.3G. However, long dipstick arrangements that bolt to the intake manifold capscrews cannot be used. Also, some long dipstick arrangements cannot be used because they interfere with the new air intake manifold.

Fan Drive Arrangements
Only diesel fan arrangements compatible with 2400 rpm governed speed can be used on the C8.3G.

Vibration Damper
Only diesel vibration damper arrangements compatible with 2400 rpm governed speed can be used on the C8.3G.

Cylinder Head
The cylinder head allows spark plugs to be directly threaded into the head. The design allows maximum clearance for mounted fuel system components.

Engine Brake
No exhaust brake systems are allowed. Driveline retarders or retarders in the transmission can be used.

Air Compressor
Holset QE air compressors and Midland air compressors are available for the C8.3-250G. The air compressor is plumbed to the air intake connection for turbocharged engines models or to the air cleaner for naturally aspirated engine models.

CAUTION: THE COMPRESSOR AIR SUPPLY MUST NOT BE PLUMBED SO THAT AN AIR/FUEL MIXTURE CAN ENTER THE COMPRESSOR. DO NOT MODIFY COMPRESSOR PLUMBING. PLEASE CONSULT CUMMINS APPLICATION ENGINEERING.

Woodward Digital Governor
The Woodward Governor Control Module (GCM) must be mounted off-engine in a compartment not subject to excessive vibration, extreme temperatures (below -40°F or above +150°F) or harsh environment.

The GCM utilizes a 12 Volt DC power supply via a 25A slo-blow fuse or circuit breaker and a switch relay. Grounding the module to the chassis is recommended.

WARNING: DISCONNECT ALL CONNECTIONS TO THE WOODWARD GCM, CM420 AND CUMMINS IGNITION MODULE BEFORE WELDING ON VEHICLE CHASSIS.

Two SAE 1587-1708 network connections are available to the CM420 and Woodward GCM. Network connections at driver and engine locations are recommended for service access.

Key Vehicle Features of this GCM are:

1) Throttle Inhibitor (Vehicle Door Interlock)
2) Power Take-off (Fast Idle)
3) Integral Sensor/Switch(ISS) Foot Pedal with Idle Validation (per CES 14118)
4) Common Electronic Transmission Signal (0-6VDC or 4-20mA) for automatic transmissions
5) Fault Detection per standard SAE J1587-1708
6) Cruise Control (Optional)
7) Road Speed Limiter (Optional)

Wiring Harness

The engine mounted wiring harness conducts signals to the CM420 module from various sensors mounted on the engine. It also has an interface connector to supply signals to the Woodward Governor Control Module.

Engine Speed Sensor

A compact design engine speed sensor (dual output) is provided in the flywheel housing.

Throttle Pedal/Switches

The Integral sensor/switch (ISS) foot pedal with idle validation (per CMS 14118) approved for use with Cummins Electronic (CELECT) M11/N14 heavy-duty diesel engines can be used with the Governor Control system. Switches used with the Governor Control system are the same as the CELECT diesel.

Engine Check Light

A red (Check Engine) warning light is required and should be installed in the driver's area. This light must be visible to the driver.

Power Supply Requirements

Power supply to the CM420 and the Cummins Ignition Module on the engine is limited to 12 volts only. System draw is 23 amps for the CM420 and the Cummins Ignition Module.

The Woodward Governor Control system is also limited to 12 volts, but it has a 15 amp draw.

Using the engine with a 24 volt system will require the use of a voltage converter.

Exhaust System

The C8.3G engine for automotive applications will meet the LEV emission levels with the use of an oxidation catalyst. The purpose of the oxidation catalyst on this engine is to reduce unburned hydrocarbons, CO emissions and particulates. This catalyst is different from the diesel catalyst.

Use of a catalyst will require stainless steel exhaust piping and adapters (like the C8.3 diesel) between the turbocharger and catalyst. Installation recommendations for the C8.3G natural gas catalyst are contained in Bulletin Number 3884742 (AEB 21.20). This bulletin should be used as a guide for any exhaust system design work.

Non-catalyst applications do not require stainless steel piping and adapters between the turbocharger and the muffler. However, adequate care must be taken to allow moisture (caused by water vapor in the exhaust) to drain from the exhaust system .

The radiated heat from the engine and exhaust piping is higher than diesel engines. Typical temperatures at the exhaust manifold are between 900 °F. and a maximum of 1200 °F. Fuel lines, hoses, wiring and rubber components should be located away from the exhaust piping. Heat shields must be used between components that are within 12 inches of the exhaust piping, turbocharger, manifold or catalyst.

NOTE: THE CATALYST OUTLET TEMPERATURE MAY BE HIGHER THAN THE CATALYST INLET TEMPERATURE.

Engine Protection Package

If engine speed exceeds 2800 RPM, the CM420 temporarily shuts down the fuel supply to the engine. The fuel supply is reactivated when the engine speed reaches 2700 RPM. The ignition spark continues firing for a short time during overspeed to burn any fuel that may be present, since unburned fuel can damage the catalyst (if used).

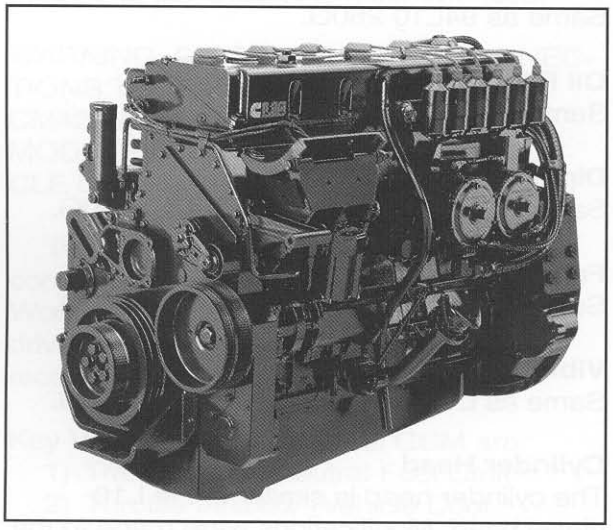
Additional engine protection which

monitors engine oil pressure will have to be supplied by the OEM.

Cold Starting
No cold starting aids like ether, etc. that are introduced through the air intake system of the engine are allowed. Aids such as engine block heaters and oil pan immersion heaters can be used

The C8.3G will start unaided in cold weather at a minimum temperature of -10°F. Care should be taken to allow the engine to warm up so that oil flow is established.

L10-IIIG



The Cummins L10-IIIG engine is the next step in the evolution of the L10 natural gas engine combining features of the 94L10/M11 six cylinder diesel and the 94L10-260G (AEB 10.35). It is a spark ignited, lean burn engine which utilizes a water-cooled and wastegated Holset turbocharger and charge-air cooling.

Ratings
The L10-IIIG will be introduced with two ratings:
300 BHP @ 2100 RPM Torque Peak 900 LB-FT @ 1200 RPM
280 BHP @ 2100 RPM Torque Peak 900 LB-FT @ 1200 RPM

Fuel System
Fuel delivery is monitored electronically by the engine mounted CM420. The CM420 receives its signal information from eight sensors. Gas mass flow, turbocharger boost pressure, throttle position, manifold absolute pressure, intake manifold temperature, engine position, coolant temperature and exhaust gas are all measured by the sensors, and the information is relayed to the CM420 which controls the fuel control valves, the fuel shutoff valve and the wastegate control valve. The CM420 module also supplies engine over speed protection.

The fuel control valves are actuated by the CM 420 to deliver the proper fuel quantity depending upon engine demand. Gas must be supplied to the engine at a pressure from 60 to 150 PSI and at a temperature of -10°F to 70 °F relative to the engine air inlet temperature.

Cummins supplied fuel system components include a low pressure gas filter, two fuel control valves, low pressure regulator, fuel shutoff valve, throttle plate and the sensors.

The low pressure gas filter is required. Two options are offered: engine mounted and remote mounted. The engine mounted option is located on the hand hole cover on the air compressor side of the engine. The remote mounted option is plumbed by the customer and should be located where it can be easily drained at service intervals. Connecting hoses must be approved for natural gas.

The throttle plate controls engine power based on the driver's foot pedal position. The throttle plate is controlled by the engine governor.

The fuel specifications for the L10-IIIG is printed in CMS 20067. This fuel specification is the same as the B5.9G and C8.3G.

Ignition System
The ignition system on the L10-IIIG engine is an electronic distributorless capacitive discharge high energy system.

The Cummins Ignition Module (CIM) is mounted on the air compressor side of the engine. It sends a signal to the two coil packs which supply high voltage to the spark plugs.

The CM420 supplies information to the Cummins Ignition Module enabling it to provide the appropriate spark depending on engine demand. Engine timing adjustments are not necessary.

The ignition system can withstand ambient temperature extremes from 40°F. to 212°F.

WARNING: THE IGNITION SYSTEM CAN DELIVER UP TO 40,000 VOLTS TO THE SPARK PLUGS. EXTREME CARE SHOULD BE TAKEN WHEN WORKING WITH THIS HIGH VOLTAGE SYSTEM.

Spark Plugs
The spark plugs have been developed specifically for the lean burn, high BMEP environment of the L10 natural gas engine. The heat range and spark plug gap have been optimized to provide long life and sufficient energy output to start the ignition process in all operating conditions. It is critical that only genuine Cummins spark plugs be used to assure proper performance.

Cooling System
The L10-IIIG engine requires the same size radiator and charge air cooler as the M11-330E diesel (1250 Lb-ft rating). The natural gas L10-IIIG produces more heat to the exhaust and cooling system than an equivalent horsepower diesel L10 or M11.

Intake Manifold Cover
A special air intake manifold cover attaches to the rocker box. The throttle body with an integrated actuator attaches to this special intake manifold.

Rocker Box
Same as 88L10.

Air Intake Connection
An air intake connection bolts to the air intake manifold. The air intake connection has a 101.6 mm (4.00 inch) OD which is the same diameter as the 91L10/M11 diesel air intake connection.

Exhaust Manifold
Same as 91L10 diesel.

Turbocharger
To improve the reliability of the Holset turbocharger on the L10-IIIG, a water cooled bearing housing has been incorporated. The air inlet connections and the air outlet connections for the turbocharger are the same as the 94L10 or M11 engines.

Rear-out and front-out exhaust turbocharger arrangements are offered for the L10-IIIG engine. Applications currently using L10 diesels (with 4 inch exhaust) and 94L10-260G engines will require only minor modifications to adapt their exhaust plumbing to the L10-IIIG engine.

Lubrication
The engine oil specification is the same as the 94L10-260G engine. Only oils meeting this specification can be used in the L10-IIIG.

L10-IIIG OIL SPECIFICATION:
API CD Quality
SAE 15W40 Viscosity
Ash: Less than .5% Sulfated Ash
Phosphorous: 250-350 ppm
Zinc: 250-350 ppm
Calcium: Less than 1200 ppm
TBN (ASTM D2896) - 5/5.5
TAN (ASTM D 664) - .5/.7

Oil Cooler and Filter
Same as 94L10/M11 diesel.

Oil Pan
Same as 94L10/M11 diesel or 94L10-260G.

Valve Covers
Same as 94L10-260G.

Oil Filler Arrangements
Same as 94L10-260G.

Dipstick Arrangements
Same as L10/M11 diesel or 94L10-260G.

Fan Drive Arrangements
Same as L10/M11 diesel or 94L10-260G.

Vibration Damper
Same as L10/M11 diesel or 94L10-260G.

Cylinder Head
The cylinder head is similar to the L10 diesel head. Modifications were made to the injector bore to accommodate spark plug mounting. Stellite valves and seats are used on both the intake and exhaust. Due to valve guide to valve seat squareness requirements, the gas cylinder head is not rebuildable in the field. A remanufactured head is available from Cummins ReCon.

Engine Brake
No exhaust brake or compression brake systems are allowed. Driveline retarders or retarders in the transmission can be used.

Air Compressor
Holset QE air compressors, Bendix air compressors (550 and 750) and Midland air compressors are available for the L10-IIIG. The Holset 30 cfm air compressor is not offered.

The air compressor is plumbed to the air intake connection for turbocharged engine models or to the air cleaner for naturally aspirated engine models.

CAUTION: THE COMPRESSOR AIR SUPPLY MUST NOT BE PLUMBED SO THAT AN AIR/FUEL MIXTURE CAN ENTER THE COMPRESSOR. DO NOT MODIFY COMPRESSOR PLUMBING. PLEASE CONSULT CUMMINS APPLICATION ENGINEERING.

Woodward Digital Governor

The Woodward Electronic Governor Control Module (GCM) must be mounted off-engine in a compartment not subject to excessive vibration, extreme temperatures (below -40°F or above 150°F) or harsh environment.

The GCM utilizes a 12 Volt DC power supply via a 25A slo-blow fuse or circuit breaker and a switch relay. Grounding the module to the chassis is recommended.

WARNING: DISCONNECT ALL CONNECTIONS TO THE WOODWARD GCM, CM420 AND CUMMINS IGNITION MODULE BEFORE WELDING ON VEHICLE CHASSIS.

Two sets of SAE 1587-1708 network connections are available from the Woodward GCM. Network connections at driver and engine locations are recommended for service access.

Key Vehicle Features of this GCM are:

1) Transmission Neutral Fuel Limit
2) Throttle Inhibitor (Vehicle Door Interlock)
3) Power Take-off (Fast Idle)
4) Integral Sensor/Switch(ISS) Foot Pedal with Idle Validation (per CES 14118)
5) Common Electronic Transmission Signal (O-6VDC or 4-20mA) for automatic transmissions
6) Fault Detection per standard SAE J1587-1708
7) Cruise Control (Optional)
8) Road Speed Limiter (Optional)

Wiring Harness

The engine mounted wiring harness conducts signals to the CM420 module from various sensors mounted on the engine. It also has an interface connector to supply signals to the Woodward Digital Governor Control Module.

Engine Speed Sensor

An engine speed sensor (dual output) is provided in the flywheel housing. The sensor features a compact design that does not interfere with chassis I-beams. A 4-pin connector mates with the engine harness above the flywheel housing to prevent connector contamination.

Throttle Pedal/Switches

The Integral sensor/switch (ISS) foot pedal with idle validation (per CMS 14118) approved for use with Cummins Electronic (CELECT) M11/N14 heavy-duty diesel engines can be used with the Digital Governor Control system. Switches used with the Digital Governor Control system are the same as the CELECT diesel.

Engine Check Light

A red (Check Engine) warning light is required and should be installed in the driver's area. This light must be visible to the driver.

Power Supply Requirements

Power supply to the CM420 and the Cummins Ignition Module on the engine is limited to 12 volts only. System draw is 23 amps for the CM420 and the Cummins Ignition Module.

The Woodward Digital Governor Control system is also limited to 12 volts, but it has a 15 amp draw.

Using the engine with a 24 volt system will require the use of a voltage converter.

Exhaust System

The L10-IIIG engine will meet the LEV emission levels with the use of a oxidation catalyst. The purpose of the oxidation catalyst on this engine is to reduce unburned hydrocarbons, CO emissions and particulates. This catalyst is different from the diesel catalyst.

Use of a catalyst will require stainless steel exhaust piping and adapters like the M11 transit diesel or 94L10-260G between the turbocharger and catalyst. Installation recommendations for the L10-IIIG natural gas catalyst are contained in Bulletin Number 3884742 (AEB 21.20). This bulletin should be used as a guide for any exhaust system design work.

Non-catalyst applications do not require stainless steel piping and adapters between the turbocharger and the muffler. However, adequate care must be taken to allow moisture (caused by water vapor in the exhaust) to drain from the exhaust system.

The radiated heat from the engine and exhaust piping is higher than diesel engines. Typical temperatures at the exhaust manifold are between 900 °F. and a maximum of 1200 °F. Fuel lines, hoses,

wiring and rubber components should be located away from the exhaust piping. Heat shields must be used between components that are within 12 inches of the exhaust piping, turbocharger, manifold or catalyst. NOTE: THE CATALYST OUTLET TEMPERATURE MAY BE HIGHER THAN THE CATALYST INLET TEMPERATURE.

Engine Protection Package

If engine speed exceeds 2400 RPM, the CM 420 will temporarily shut down the fuel supply to the engine. The fuel supply is reactivated when the engine speed reaches 2300 RPM. The ignition spark continues firing for a short time during overspeed to burn any fuel that may be present, since unburned fuel could damage a catalyst (if used).

Additional engine protection which monitors engine oil pressure will have to be supplied by OEM.

Power Train

The Woodward Digital Governor control module outputs a signal that can be used by various electronic automatic transmissions.

Cold Starting

No cold starting aids like ether, etc. that are introduced through the air intake system of the engine are allowed. Aids such as engine block heaters and oil pan immersion heaters can be used.

The L10-IIIG will start unaided in cold weather at a minimum temperature of -10°F. Care should be taken to allow the engine to warm up so that oil flow is established.

Parts Professional Quiz 25

To win this issue's prize, all you have to do is answer the following 12 questions correctly. Your answers must be received by March 31, 1998.

1. The Cummins C8.3-250G is a natural gas fuel derivative of the C8.3 six cylinder diesel.
   a. true
   b. false

2. The Cummins L10-IIIG is a spark ignited, lean burn engine which utilizes a water-cooled and wastegated Holset turbocharger and charge-air cooling.
   a. true
   b. false

3. The Lean Burn technology of the C8.3-250G and the L10-IIIG helps these engines achieve optimum ignition at a greater air to fuel ratio.
   a. true
   b. false

4. Lean Burn technology lowers in-cylinder temperatures to reduce NOx levels below all current emissions standards while improving engine durability.
   a. true
   b. false

5. Lean burn technology raises the engine thermal efficiency to _____ compared to the 32% efficiency typically associated with spark ignited engines. Cooler combustion reduces thermal stress on the pistons, valves and valve seats.
   a. 33%
   b. 35%
   c. 37%
   d. 39%

6. The C8.3-250G and the L10-IIIG engines will meet the 1997 EPA emissions standards only with the use of a oxidation catalyst in automotive applications.
   a. true
   b. false

7. The C8.3-250G and the L10-IIIG engines feature specially designed fuel systems that are monitored electronically by the engine mounted CM420 (Engine Control Module) which uses _____ sensors to gather critical data.
   a. 3
   b. 5
   c. 7
   d. 8

8. The fuel control valve is signaled by the CM420 to deliver the proper fuel quantity depending on operator demand.
   a. true
   b. false

9. The low pressure gas filter supplied by Cummins is required.
   a. true
   b. false

10. The CM420 supplies information to the CIM enabling it to provide the appropriate spark depending on engine demand.
    a. true
    b. false

11. The Holset QE, Holset 30 CFM, Bendix (550 & 750) and Midland air compressors are available for the L10-IIIG engine.
    a. true
    b. false

12. The Woodward Governor Control Module (GCM) must be mounted:
    a. off-engine
    b. in a compartment not subject to extreme vibration
    c. away from extreme temperatures (below -40°F or above +150°F)
    d. all of the above

NOTES

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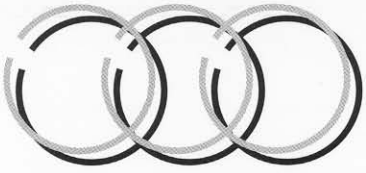

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