

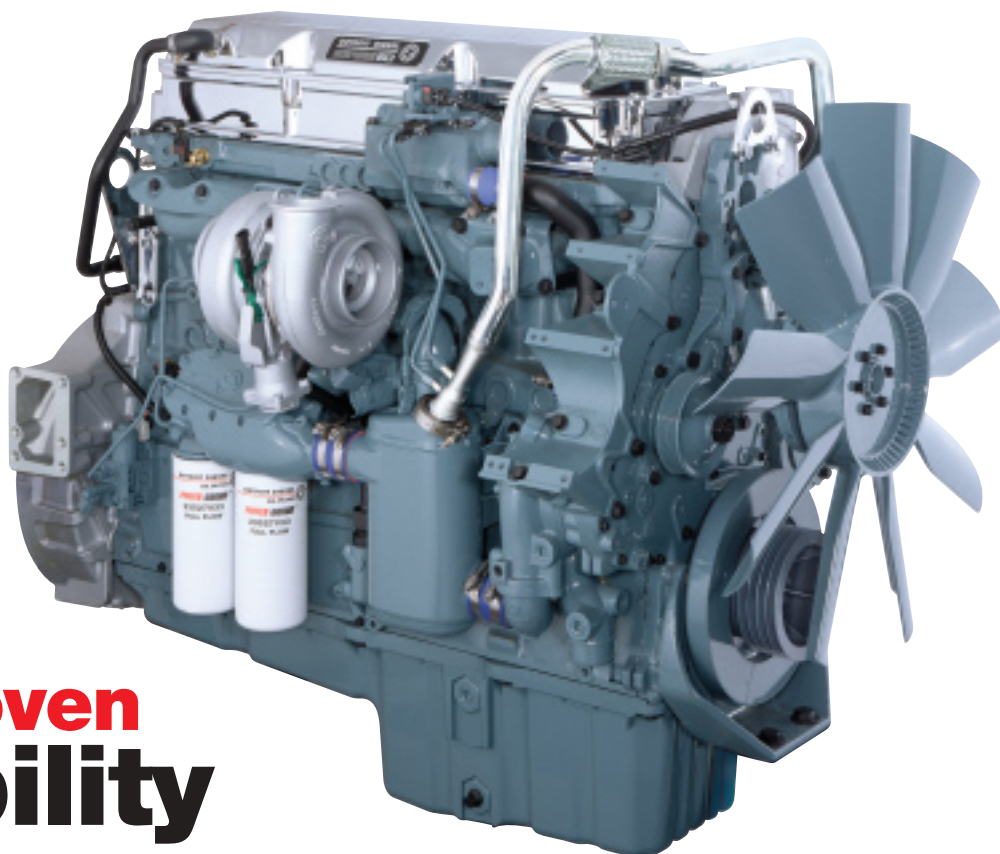
# DETROIT DIESEL

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## The SERIES 60<sup>®</sup>

# **Still** The Fuel Economy Leader



## **Proven** Reliability

## **Even Better** Performance

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# Since 1992, More Have Selected The **SERIES 60** Than Any Other Heavy-D

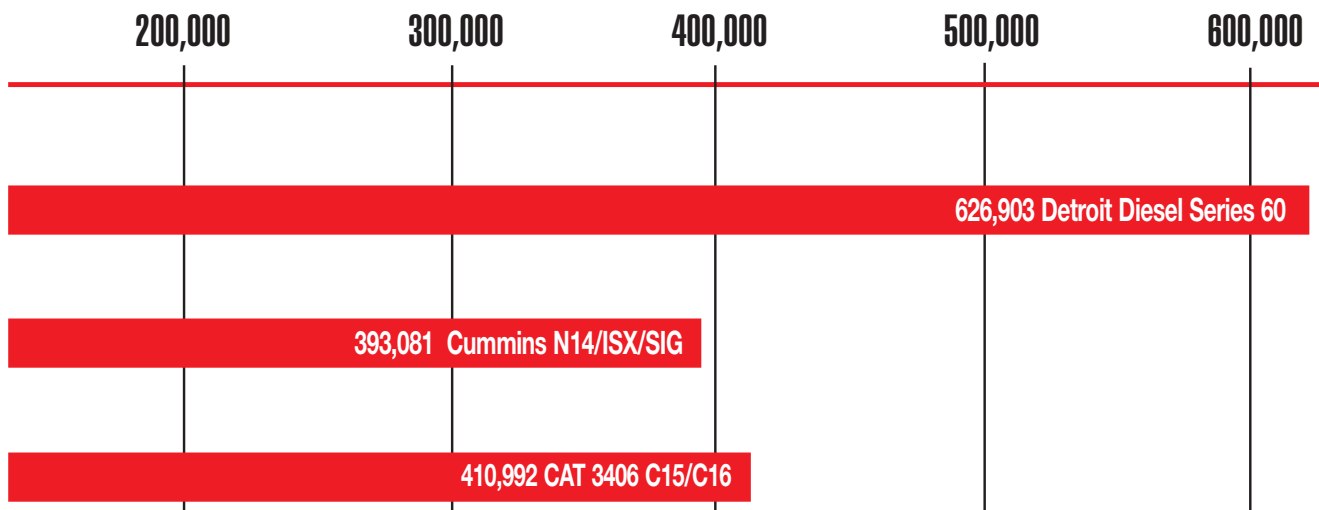
## **Why Is The Series 60 So Popular?**

Because It Offers Truckers The Best Combination Of:

- Performance
- Fuel Economy
- Low Cost Of Operation
- Reliability
- Long Life To Overhaul
- Driver Satisfaction
- Ease of Service
- Warranty Satisfaction
- Ratings Flexibility
- Electronic Controls
- Lightweight
- Residual Value

# Truckers

## Engines Registered Since 1/1/92



Based on R.L. Polk Registrations (through Sept. 2004)

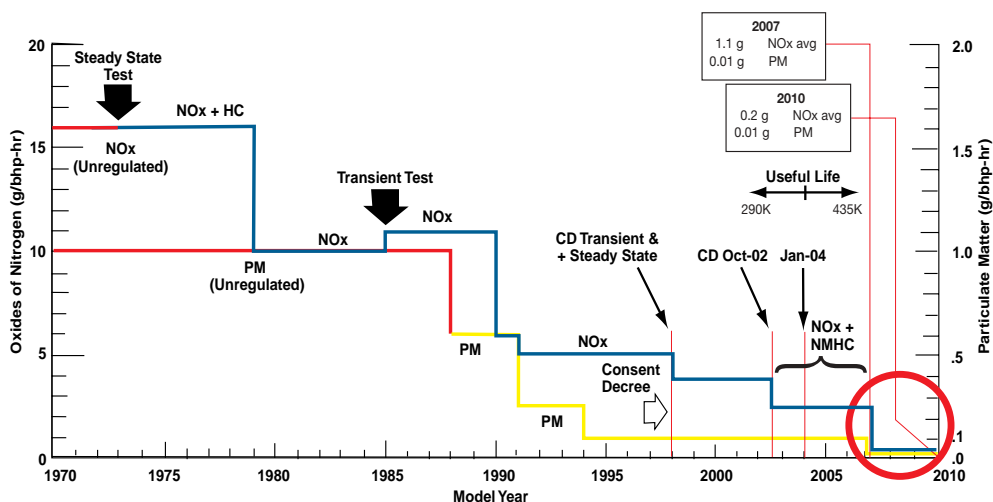
# uty Engine

## And The Tradition Carries On Into 2005

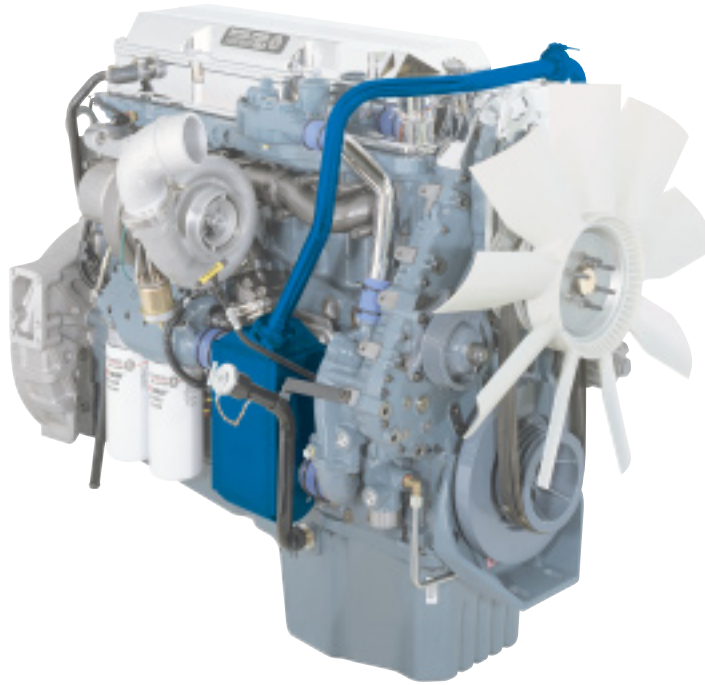
The EPA has regulated heavy-duty diesel engines since the 1970s. The following chart shows the trend to ever-lower emissions. Understanding the details of the chart is not of interest to most truckers.

Even though the emissions standards become increasingly more difficult to meet, the diesel engine industry has always been able to continue to improve engine durability, reliability, performance, and fuel economy. A quick look at the bottom right hand side of the chart also shows that emissions from diesel engines built in 2007 and beyond will approach zero.

## EPA Heavy-Duty Engine Emission Standards



# The Series 60<sup>®</sup> EGR



## The NO<sub>x</sub> Challenge

2002 emission regulations required a reduction in oxides of nitrogen (NO<sub>x</sub>) to 2.5 g/hp-hr. NO<sub>x</sub> is a by-product of high temperatures in the combustion chamber, the higher the temperature, the higher the production of NO<sub>x</sub>.

## How Does EGR Work?

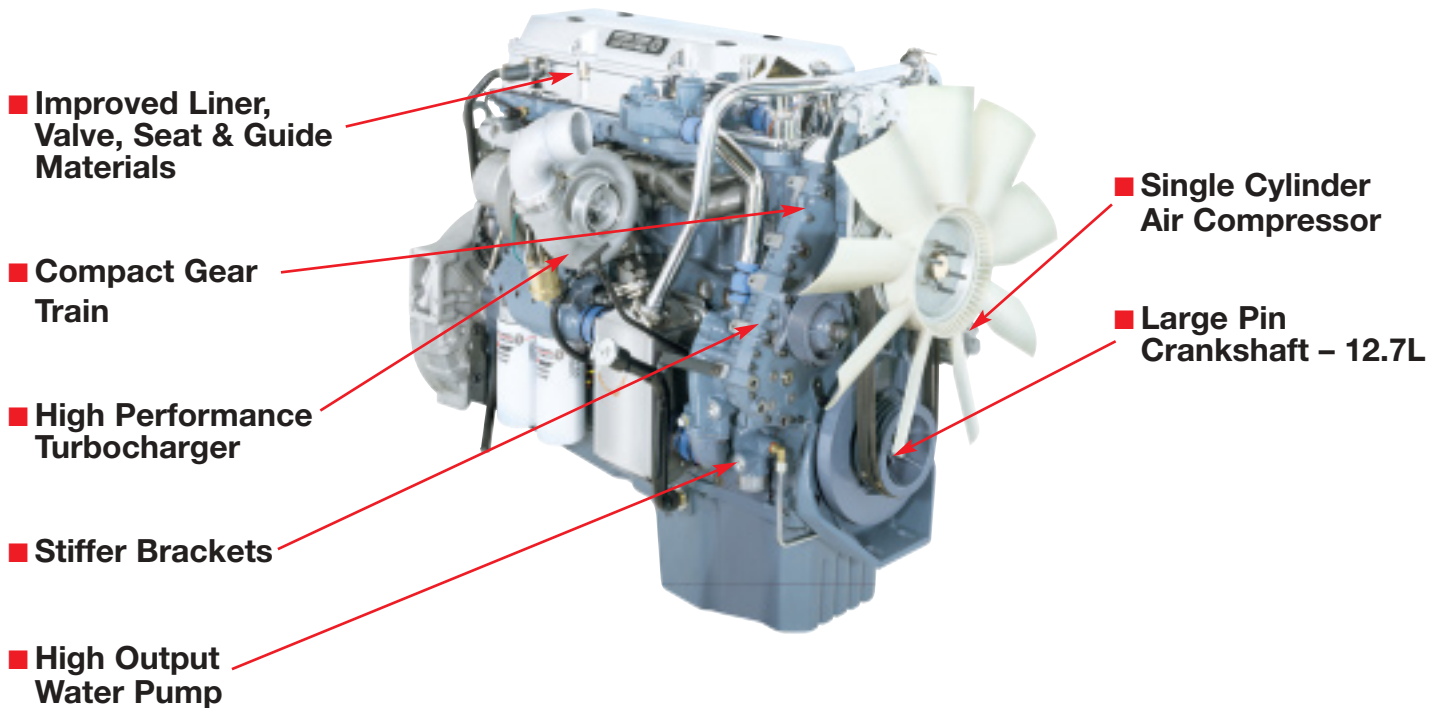
EGR (Exhaust Gas Recirculation) is a simple concept. During certain conditions of engine operation, the EGR valve is opened and measured amounts of exhaust gas are routed to the intake manifold. The exhaust gas mixes with the incoming fresh air and displaces some of the oxygen. Since there is now slightly less oxygen in the air, the peak temperatures created in the combustion chamber are reduced, and the levels of NO<sub>x</sub> are also reduced.

## EGR Is The Best Solution

EGR is the technology chosen by all but one major engine maker in North America. EGR has been in use on automobile engines since the mid-1970s.

The challenge faced by Detroit Diesel and the other engine makers was to reduce NO<sub>x</sub> without adversely affecting fuel economy, performance, durability, or other factors of engine operation. EGR has proven to be the best way to reduce NO<sub>x</sub> while maintaining excellent driveability, performance, fuel economy, and engine life.

# When EGR Was Added To The Series 60, Additional Refinements Were Also Made To The Series 60's Proven Design.



## These Refinements Paid Off In A Number Of Ways

# Base Engine Improvements

## Power Assembly

- **Piston**
  - Enhance Combustion Piston Bowl
- **Fire Ring**
  - Increase Thickness from 2.5 mm to 3.0 mm
  - Base Material and Face Coating
  - Material Enhancements
- **Connecting Rod**
  - 12.7L Common Rod with 14L
  - 12% More Rod Bearing Area
- **Crankshaft**
  - 12.7L “Big Pin” 95 mm Rod Journals
- **Higher Output Water Pump**
  - Improved Cooling



## Cylinder Head Assembly

- **Cylinder Head Modifications**  
*For Long Life and Fuel Efficiency*
  - Head Bolt Bosses
  - Top Deck Thickness
  - Intake Manifold Bolt Pattern
  - Intake Port Machining
  - Recessed Exhaust Valves
- **Valves, Guides & Seals**  
*For Long Life*
  - Nickel Chrome Intake Valves
  - Pyromet Exhaust Valves
  - Nickel Based Valve Seat Material
  - Powdered Metal Valve Guides

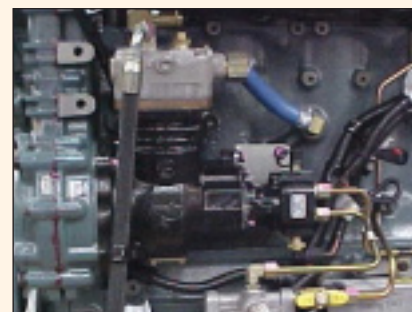
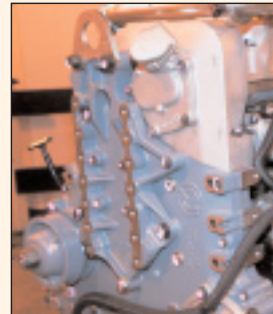


## Next Generation Gear Train

- **Less Vibration and Noise**
- **Decreased Frontal Area for Improved Under Hood Air Flow**
- **Improvements in Component Bracketry**
- **Higher Water Pump Flow**
- **Less Weight (53 lbs)**

## Single Cylinder Air Compressor

- **Bendix Model DF-359**
- **Same Output as TF-750 (16CFM)**
- **Naturally Aspirated**
- **Less Friction**
- **Reduced Oil Consumption (up to 60% less)**
- **Less Weight (20 lbs)**



# The Industry Was Quick To Realize The Advantages Of The Series 60 With EGR

***“2002 engines meeting expectations, overall, the news is good.”***

*(Fleet Owner, May 2003)*

***“Fleets Give Good Marks To EPA-Compliant Engines”***

***“Fleet representatives, reporting their first impressions of new lower-emission diesel engines, gave them generally high marks for the way they perform in actual operations.”***

*(Roger Gilroy, Transport Topics, March 24, 2003)*

***“New (EGR) engines running great.”***

*(Heavy Duty Trucking, April 2003)*

***“Carriers Say Maintenance Little Problem in ‘02s”***

***“Representatives of fleets that are running new diesel engines designed to meet the federal government’s October 2002 emissions standards said they have had few major maintenance problems with them.”***

*(Roger Gilroy, Transport Topics, March 24, 2003)*

***“Drivers should appreciate the new powerplants as they clearly perform better, especially at the bottom end, thanks to the changeover to variable geometry turbochargers and improved ECU programs. I’ve driven all brands with EGR and have been quite impressed.”***

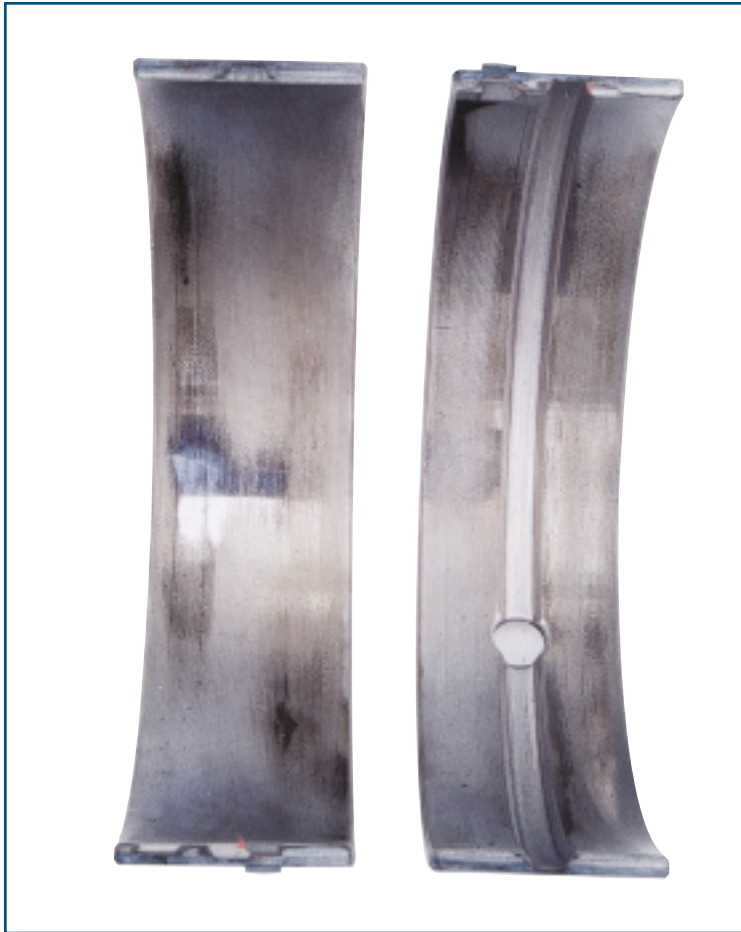
*(Jim Windsor, Editor, Heavy Duty Trucking)*

# **The Rapid Acceptance Of EGR**

**In 2004, DDC  
Shipped Over 49,000  
Series 60 Engines  
With EGR, Bringing  
The Field Population  
Of Series 60 Engines  
With EGR To  
Over 80,000 Units**

# How Well Are They Doing?

*After 250,000 Miles Of Operation DDC Wanted To See How The New Components Were Holding Up. **See For Yourself.***



*Main bearings did their job and show no wear. Upper no load main bearings show no wear and lower load bearings look as good. Bearings show only minor overlay polish.*



*Cam bearings show minor polishing.*



*Camshaft looks excellent. Journals and lobes show only contact path polishing.*



*Rod bearings show only minor overlay wear.*

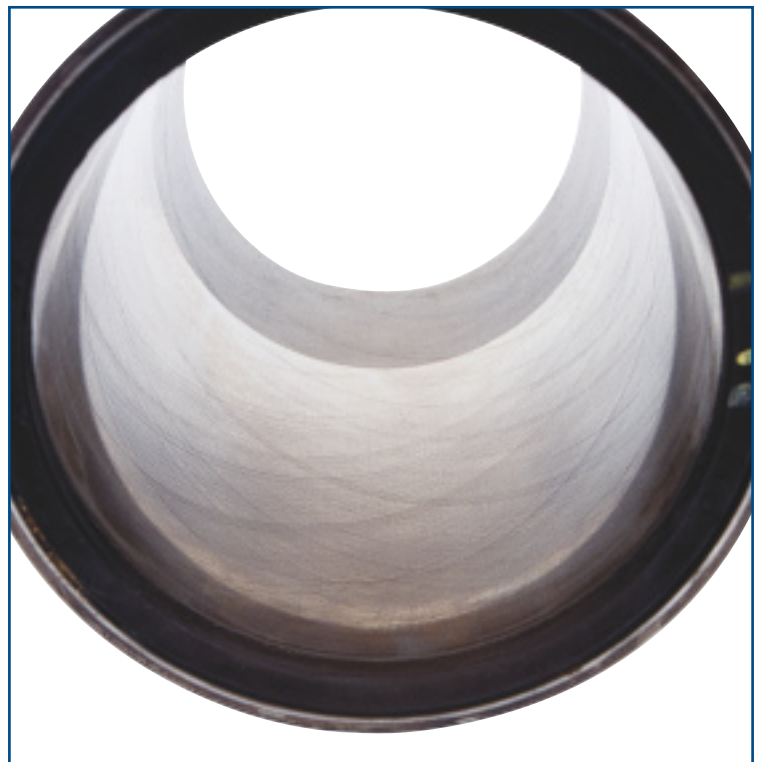
# More...



*Connecting rod bushing machining marks are still visible indicating minimal wear.*



*Piston bushings only show typical polishing.*



*Piston liner shows cross hatch pattern intact.*

# And...

## The Series 60 Is Still The Fuel Economy Leader!

Look At These Fuel Economy Results  
From Fleets That Ran Their Own  
SAE Fuel Economy Tests

### Series 60 w/EGR vs. ISX w/EGR

July 24, 2003      Fleet "A"      Series 60 **5.4%** (12L) & **5.9%** (14L) **Better**

August 20, 2003      Fleet "B"      Series 60 **2.83%** **Better**

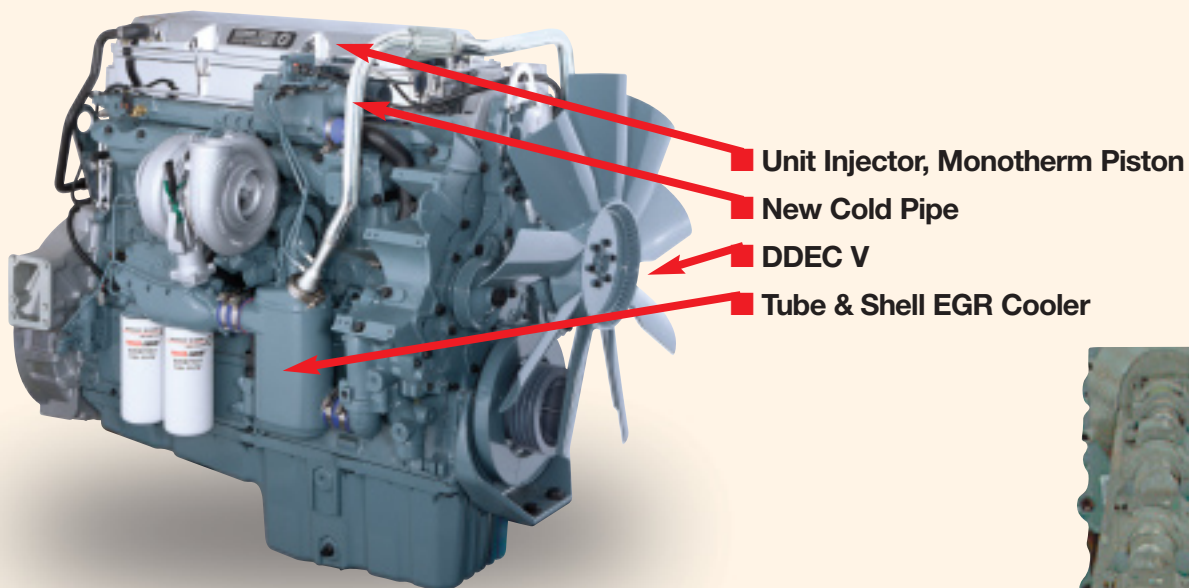
### Series 60 w/EGR vs. C15 ACERT

August 8, 2003      Fleet "C"      Series 60 **3.9%** **Better** @ 45,000 GCW  
Series 60 **4.1%** **Better** @ 75,000 GCW

# What's New?

## The Series 60 Continues To Evolve.

### Series 60 Engine Hardware Enhancements

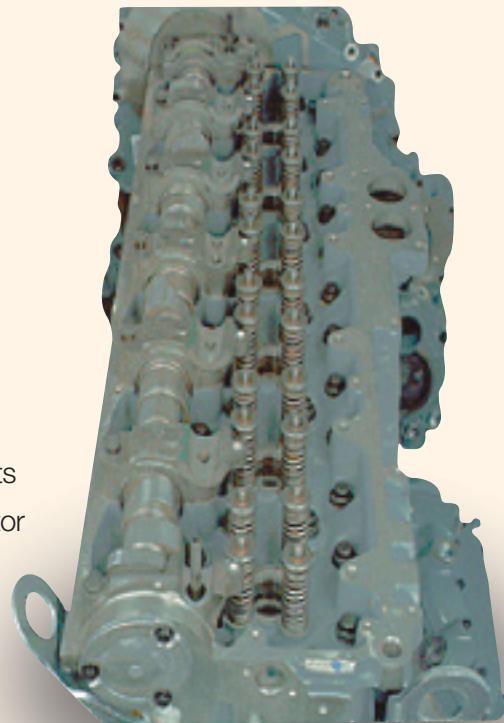


#### ■ Cylinder Head

- Better Air Flow For Improved Performance

#### ■ Camshaft / Overhead

- Optimized Injector And Valve Events
- Ceramic Intake, Exhaust and Injector Rollers For Better Roller Durability Under Adverse Conditions



#### ■ One Piece (Monotherm) Piston

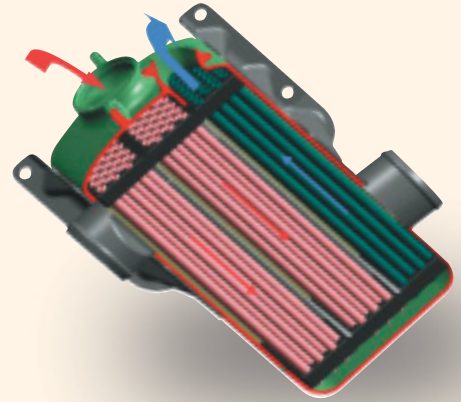
- Reduced Friction For Improved Performance
- Closed Oil Gallery For Improved Ring Cooling And Longer Life
- Higher Compression Ratio For Better Cold Weather Starting





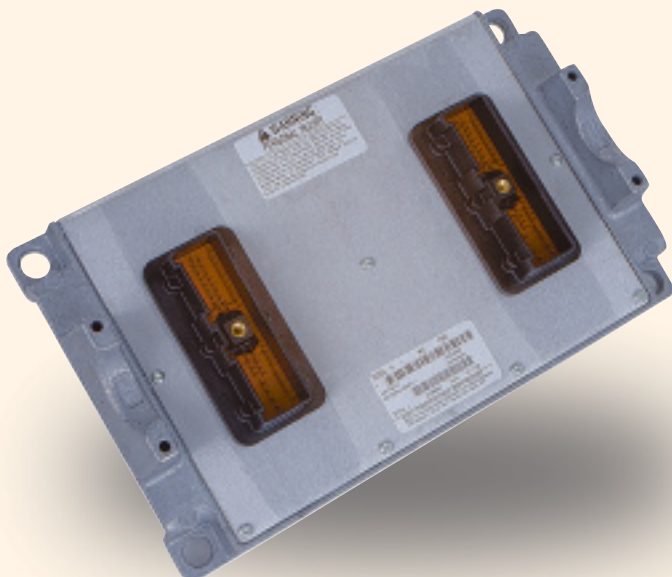
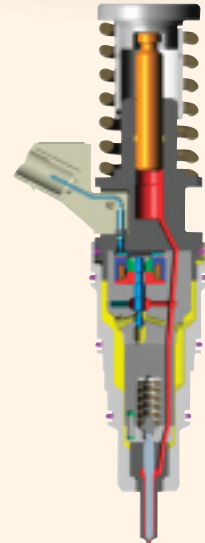
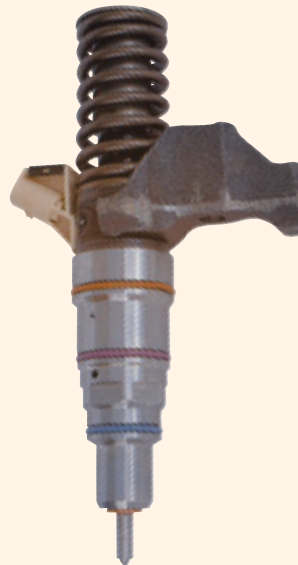
### ■ EGR Cooler

- Tube In Shell Design For Improved Durability
- Improved Efficiency
- Simpler Stainless Steel Housing With Less Welding
- 10 Lb. Weight Reduction



### ■ New Fuel Injector

- Improved End Of Injection Quality And Faster Response Time For Better Efficiency
- Reduced Weight – 2.5 Lbs.
- Stainless Steel Injector Sleeve Replaces Copper Tube
  - Increased Durability
  - Increased Corrosion Resistance
  - Serviced From The Top Of The Engine

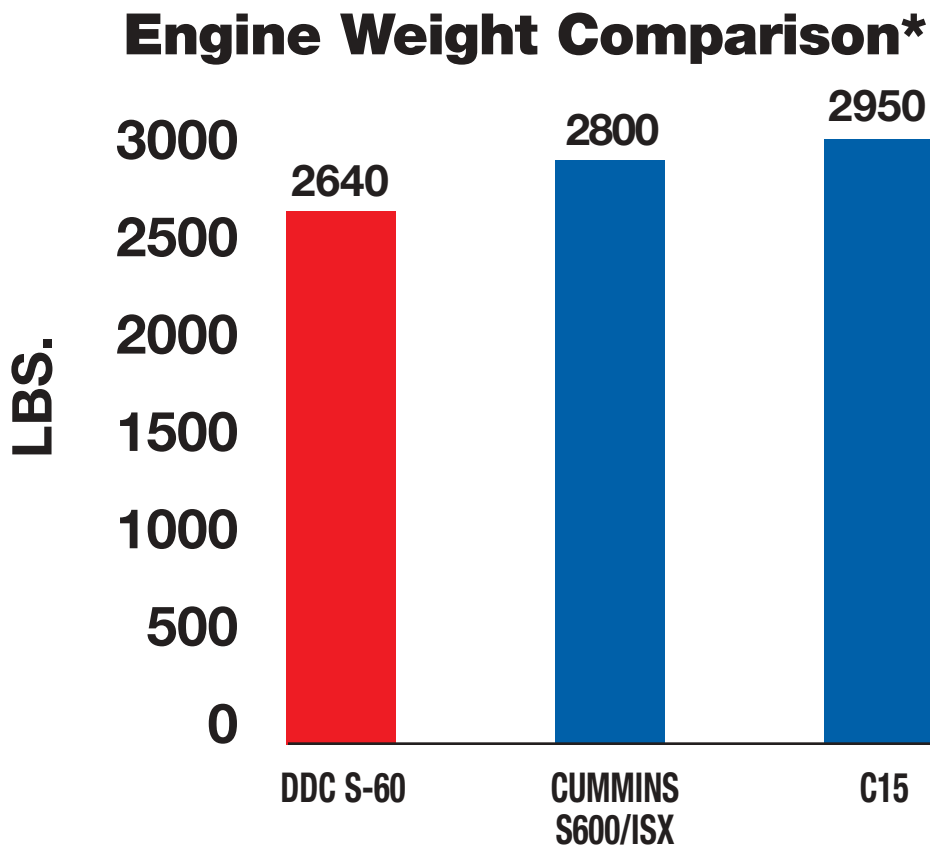


### ■ Electronic Controls – DDEC V

- Increased Capability For Future Needs
  - Increased Microprocessor Power
  - 4 Times More Memory
  - 150 Output Pins vs. 81 Current
  - Ability To Add Options (MAS)
- Improved Reliability
  - Improved Housing
  - Latest Connectors And Harness Technology

# What Else Makes The Series 60 Popular?

## How About **Weight?**



\* Includes Engine Brake

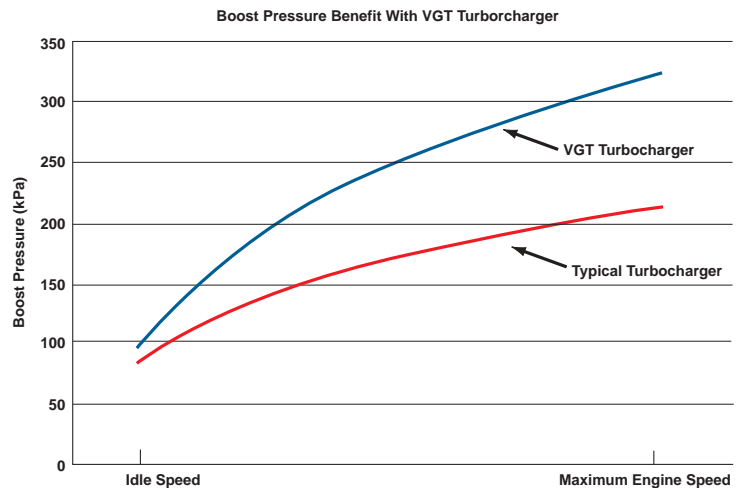
#### ■ The Series 60

- Lighter, More Fuel Efficient, Less Complex Than The ISX And The C15
- The Series 60 Sheds An Additional 28 Lbs.
  - 160 Lbs. Lighter Than The ISX
  - 310 Lbs. Lighter Than The C15

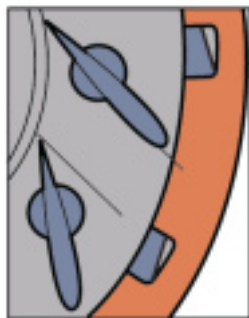
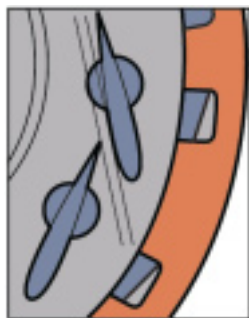


# More Benefits Of Variable Geometry Turbocharging (VGT)

- Maximum engine power up to 12,000 feet
- Improved engine braking
- Improved engine driveability and acceleration
- Improved performance at high altitudes
- Better fuel economy



- For turbo response and quicker acceleration



# 380-515 HP

## The Most Complete Power Range In A Single Engine Package

### 12.7L

Maximum HP @ RPM	Peak Torque @ RPM
390 HP @ 1800 RPM	1350 LB-FT @ 1200 RPM
380 HP @ 1800 RPM	1350 LB-FT @ 1200 RPM
380/390 HP @ 1800 RPM	1350 LB-FT @ 1200 RPM
445 HP @ 1800 RPM	1450 LB-FT @ 1200 RPM
435 HP @ 1800 RPM	1450 LB-FT @ 1200 RPM
425 HP @ 1800 RPM	1450 LB-FT @ 1200 RPM
425/445 HP @ 1800 RPM	1450 LB-FT @ 1200 RPM
455 HP @ 1800 RPM	1550 LB-FT @ 1200 RPM
450 HP @ 1800 RPM	1550 LB-FT @ 1200 RPM
445 HP @ 1800 RPM	1550 LB-FT @ 1200 RPM
445/455 HP @ 1800 RPM	1550 LB-FT @ 1200 RPM

### 14.0L

Maximum HP @ RPM	Peak Torque @ RPM
490 HP @ 1800 RPM	1550 LB-FT @ 1200 RPM
455 HP @ 1800 RPM	1550 LB-FT @ 1200 RPM
455/490 HP @ 1800 RPM	1550 LB-FT @ 1200 RPM
515 HP @ 1800 RPM	1550 LB-FT @ 1200 RPM
490 HP @ 1800 RPM	1550 LB-FT @ 1200 RPM
455 HP @ 1800 RPM	1550 LB-FT @ 1200 RPM
455/515 HP @ 1800 RPM	1550 LB-FT @ 1200 RPM
515 HP @ 1800 RPM	1650 LB-FT @ 1200 RPM
490 HP @ 1800 RPM	1650 LB-FT @ 1200 RPM
470 HP @ 1800 RPM	1650 LB-FT @ 1200 RPM
470/515 HP @ 1800 RPM	1650 LB-FT @ 1200 RPM
470 HP @ 1800 RPM	1650 LB-FT @ 1200 RPM
470/515 HP @ 1800 RPM	1650 LB-FT @ 1200 RPM
490 HP @ 1800 RPM	1650 LB-FT @ 1200 RPM
470 HP @ 1800 RPM	1650 LB-FT @ 1200 RPM
470/490 HP @ 1800 RPM	1650 LB-FT @ 1200 RPM

## Big Power With All The Other Benefits Of A Series 60 Engine

That's the 515 hp, 1650 lb-ft rating. The flat horsepower curve provides 475 hp or more all the way from 1500 to 2100 rpm. The power you need. Where you need it. When you need it. And below 1500 rpm, just as the horsepower falls below 475, you feel the full 1650 lb-ft of torque kick in, all the way back to 1200 rpm. All the torque you need, when and where you need it. The ideal balance of torque and power.

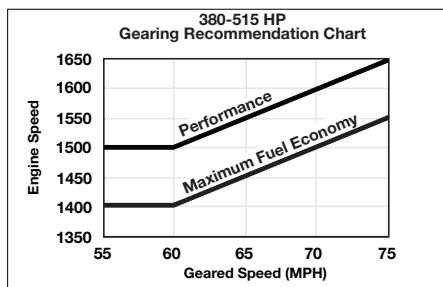
With more than 27 different power ratings to choose from, it's easy to match a Series 60 engine to the exact needs of any trucker. But sometimes their needs change.

That's not a problem with the Series 60 engine! The power chart on the left shows the groups of engine ratings within each family.

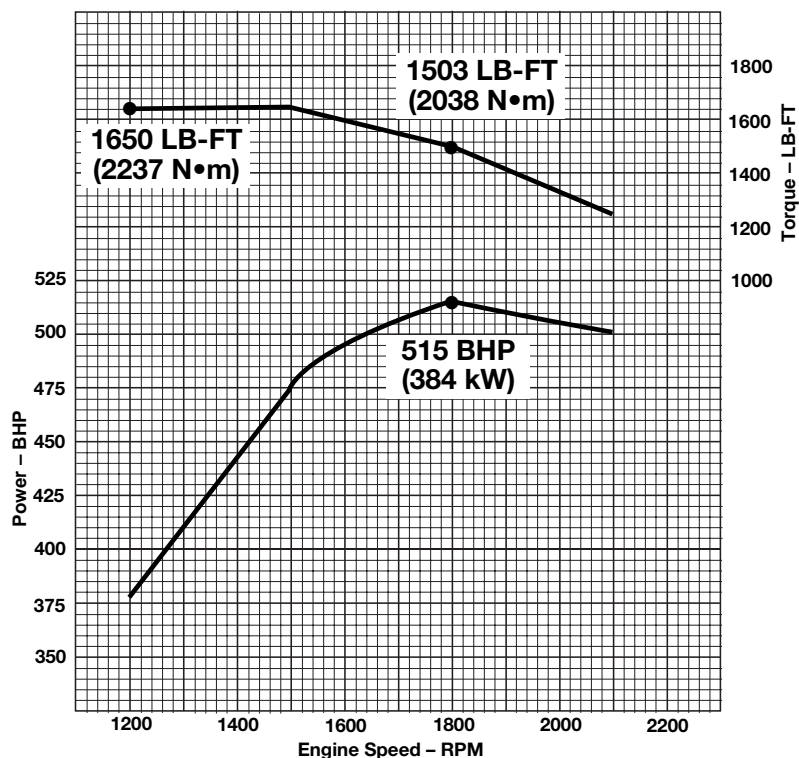
The families contained in each of the shaded sections have identical hardware. The groups displayed in each family show the preprogrammed horsepower range in a single engine. A simple electronic tool is all that is required to change power within a group. Power changes from one group to another within the same family simply require reprogramming of the engine's electronic control module.

It is possible to change power from one group to another (just make sure the truck cooling, air intake and exhaust systems and the driveline can handle the change). Upping the horsepower to the maximum limit at time of trade-in is an easy way to increase both the resale value and desirability of any truck.

### Gearing Recommendations Remain the Same



### 515 BHP



## Want To Know More?

### Take A Look At The Simple Design Of The Engine. The One-Piece Cylinder Head Contains The Overhead Camshaft. This Camshaft Arrangement Provides A Variety Of Benefits:

- Intake and exhaust passages are straight for easy entry and exit of air from the cylinder. The engine doesn't waste fuel "pumping" air in and out.
- Intake and exhaust passages are also short. Intake air is not overly heated as it passes through the head. The resulting cooler air in the cylinder improves economy. And the hot exhaust gases don't transfer too much heat into the head as they exit, saving more energy to operate the turbo and increase fuel economy.
- The overhead cam allows for direct actuation of the fuel injectors without push rods or push tubes. The result is high fuel injection pressure and better fuel economy.
- The overhead cam also allows for the use of 38 head bolts, providing over 1,000,000 pounds of clamp load on the head gasket.

## These Features Combine To Produce The Economy, Durability And Performance The Series 60 Engine Is Known For

The cylinder liner is cooled all the way to the top, using a patented DDC feature called top liner cooling. This reduces ring temperatures by 100°F, another reason Series 60 engines live so long.

Main and rod bearings are big. That's why the Series 60 engine has no requirement to roll out bearings—it's just not necessary.

The Series 60 engine block, with no camshaft, is a simple, trouble-free design.

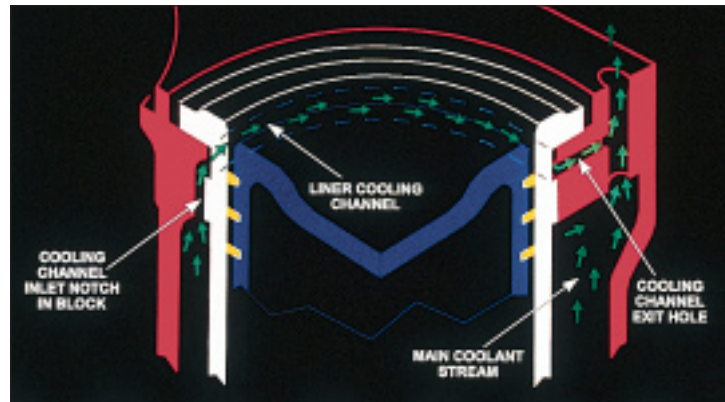
The Series 60 engine features a high performance variable output turbocharger for improved low speed performance, economy and excellent driveability.

Another benefit is the

Pad Mounted Alternator System with a Poly V belt and self tensioner. It's strong, rugged and simple.

Add the gear train to drive the accessories and the camshaft, and you have a complete Series 60 engine.

- Simple
- Rugged
- Easy to work on
- Key components are right under the rocker cover
- Fewer parts



## DDEC Engine Management Technology

### More Reasons The Series 60 Engine Is Number One

Every Series 60 engine is equipped with Detroit Diesel Electronic Controls (DDEC). DDEC® is the most popular electronic control system available. DDEC V, the fifth generation of DDEC, is now standard equipment on all Series 60 engines. In addition to precisely controlling fuel injection, DDEC offers all of the following:

- Three levels of engine protection
  - Warning only
  - Power ramp down
  - Automatic shutdown
- Cruise control
- Auto resume cruise control
- Multiple hp ratings
- Three levels of engine braking
- Engine fan braking
- Progressive shifting
- Vehicle speed limiting
- Vehicle overspeed diagnostics
- Low gear torque limiting
- Starter lockout
- Remote PTO control
- Communication capability with electronically controlled transmissions
- Idle speed adjustment
- Droop adjustment
- Idle timer shutdown
- Air temperature shutdown
  - High or low
- Warnings for:
  - Low voltage
  - Low coolant
  - High oil temperature
  - Low oil pressure
- Self diagnosis
- Four levels of security

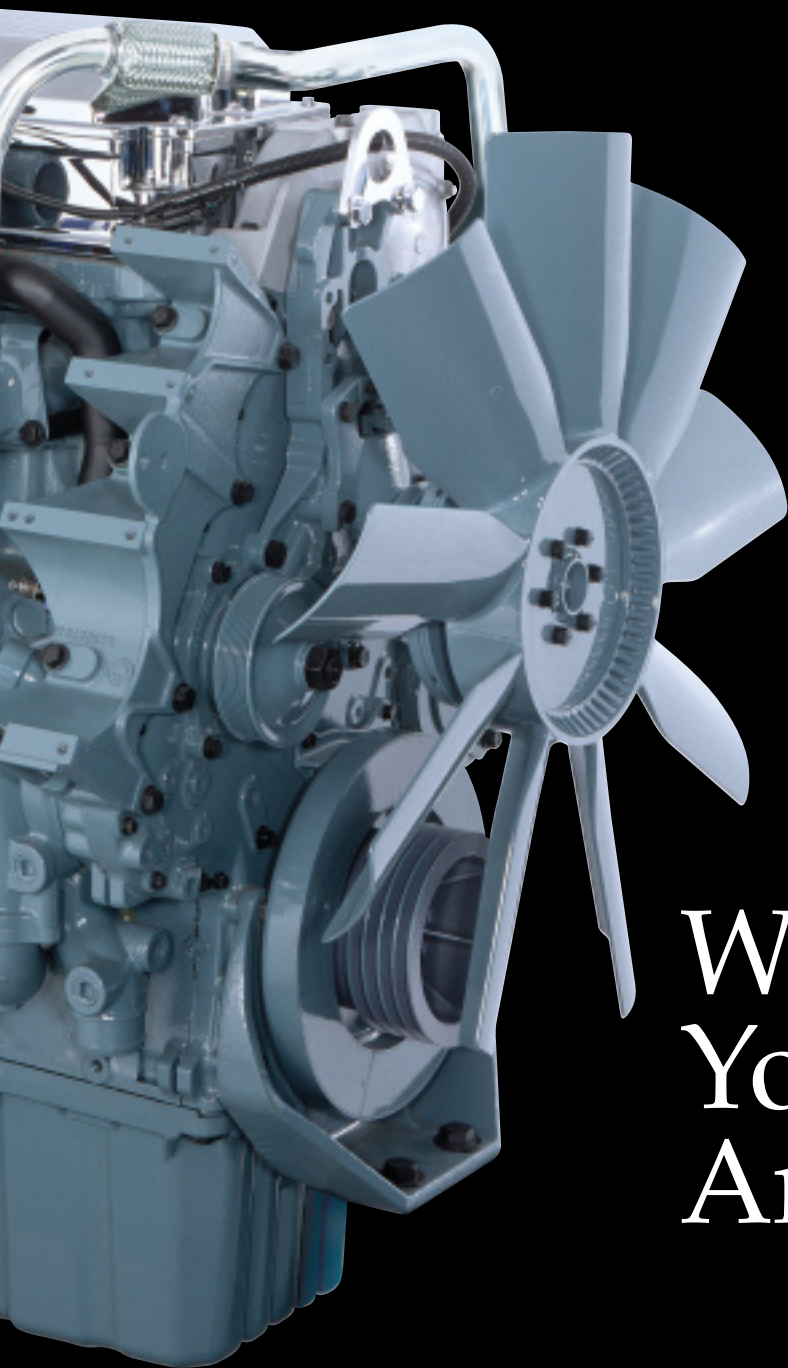
New for DDEC V is the addition of more memory, a built-in clock and calendar and built-in battery backup.

# Why Should Series 60

- A complete power range in a common package
- Easy to change horsepower settings
- The choice of the top fleets
- The choice of those who want big power
- Lightweight
- Low cost per mile
- Unaided cold starts to 20° F
- DDEC-controlled automatic Ether Starts™ to -30° F
- Maximum revenue



# You Buy A Engine?



- Simple design
- Easy to service
- Dozens of DDEC features as standard equipment
- The complete DDEC System
- ProDriver® DC
- Data Summaries
- Optimized Idle®
- Fuel Economy Incentive
- 1-800-445-1980 direct line to support
- Customized warranties
- Service throughout North America
- Diagnostic Link

Why Would  
You Buy  
Anything Else?

# The Series 60 Engine Will Continue To Provide Truckers With The Best Combination Of:

- Performance
- Fuel Economy
- Reliability
- Low Cost Of Operation
- Proven Durability
- Driver Satisfaction
- High Residual Value
- Proven Electronics - DDEC
- Flexible Power Ratings
- Excellent Parts And Service Support



## 1-800-445-1980

### Does The 800 Number Really Work?

*I think it was Christmas Eve when the injector went down. We called the 800 line, I was down for Christmas anyways they said we could get someone out right away well we said it was Christmas, we could wait. They said no, they have a guy and that was his job the guy called us back, he came out and did it right in our driveway, you know, did the injector right then and there. He was happy more than happy to fix us up that kind of sums the whole thing up.*

Customer Quote

*My Freightliner truck was new, and like on the second or third trip out, I had a water filter problem. Somehow a gasket got sliced when I was running and the fluid started leaking but the sensor shut me down on the side of the road right away. ProDriver said I had low coolant, so I went under the hood, found the leaking water filter and called the 800 number on the cell phone. Detroit said did you have taps on your filter yes shut them off go check your coolant level go to the dealer three exits up. I got fixed up was back on the road in half an hour. It was great!*

Customer Quote



**Series 60**  
**24-Hour Hot Line**  
**Phone 1-800-445-1980**

**DETROIT DIESEL**

A DaimlerChrysler Company



13400 Outer Drive, West, Detroit, Michigan 48239-4001  
Telephone 313-592-5000  
www.detroitdiesel.com

