

Technical File for C12 Marine Propulsion Engine

C12P9768EU01

**CCNR Stage II and EU 97/68/EC amended by 2004/26/EC
NRMM Type Approval Number**

e1*97/68VC*2004/26*0004*00

**Instructions for checking the components,
adjustable features, and engine parameters**

Engine Model	C12
Engine Serial No.	NFL00923
Performance Spec.	0K5668

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LEXM6503-00

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WASSER- UND SCHIFFFAHRTSVERWALTUNG DES BUNDES
Zentralstelle Schiffsuntersuchungskommission/Schiffseichamt
 bei der Wasser- und Schifffahrtsdirektion Südwest

EG - TYPGENEHMIGUNGSBOGEN
 [EC - TYPE APPROVAL CERTIFICATE]



Benachrichtigung über die **-Erteilung/Erweiterung/Verweigerung/den Entzug¹** der
 Typgenehmigung.

[Communication concerning the -type approval/extension/refusal/withdrawal¹ of type approval]

für einen Motortyp oder eine Familie von Motortypen im Hinblick auf die Emission von Schadstoffen gemäß
 der Richtlinie 97/68/EG, zuletzt geändert durch die Richtlinie 2004/26/EG.
 [of an engine type or family of engine types with regard to the emission of pollutants pursuant to Directive 97/68/EC, as last amended
 by Directive 2004/26/EC.]

Nr. der Typgenehmigung: **e1*97/68VC*2004/26*0004*00**
 [Type approval number:]

Nr. der Erweiterung:
 [Extension no.]

(Gegebenenfalls) Grund der Erweiterung:
 [Reason for the extension (where appropriate):]

Entfällt
 [Not applicable]

ABSCHNITT I
 [Section I]

0. Allgemeines
 [General]

0.1 Fabrikmarke (Firmenname des Herstellers):
 [Make (name of undertaking):]

Caterpillar Inc.

**0.2 Herstellerseitige Bezeichnung für den (die) Stamm-/ und (gegebenenfalls) die Familie-
 Motortyp(en)¹.**
 [Manufacturer's designation of the parent-/and (if applicable) of the family engine(s) type(s)¹]

C12 (0K-5673) (492 kW / 2300 U/min.)	C12 (0K-5674) (492 kW / 2300 U/min.)
C12 (0K-5671) (339 kW / 2100 U/min.)	C12 (0K-5672) (339 kW / 2100 U/min.)
C12 (0K-5669) (287 kW / 1800 U/min.)	C12 (0K-5670) (287 kW / 1800 U/min.)
C12 (0K-5667) (254 kW / 1800 U/min.)	C12 (0K-5668) (254 kW / 1800 U/min.)
C12 (0K-4086) (254 kW / 1800 U/min.)	C12 (0K-5286) (254 kW / 1800 U/min.)
C12 (0K-4087) (287 kW / 1800 U/min.)	C12 (0K-5287) (287 kW / 1800 U/min.)

0.3 Herstellerseitige Typenkodierung, mit der der Motor (die Motoren) gekennzeichnet ist (sind):
 [Manufacturer's type code as marked on the engine:]

C12

Stelle:
 [Location:]

Art der Anbringung:
 [Method of affixing:]

Motortypenschild
 [Engine label]
Geklebt
 [Permanent adhesive]

0.4 Angabe der Maschinen bzw. Geräte, die durch den Motor angetrieben werden sollen²:
 [Specification of machinery to be propelled by the engine²]

Binnenschiffshauptantriebe mit Propellercharakteristik
 [Propulsion engines for inland waterway vessels with propeller-characteristic]

0.5 Name und Anschrift des Herstellers:
 [Name and address of manufacturer:]

Caterpillar Inc.
100 NE Adams Street
Peoria, IL, USA

¹ Nichtzutreffendes streichen.
 [Delete as appropriate.]

² Entsprechend Anhang I Abschnitt 1 dieser Richtlinie (z. B. „A“).
 [As defined in annex I, section 1 of this Directive (e.g. „A“).]

WASSER- UND SCHIFFFAHRTSVERWALTUNG DES BUNDES

Zentralstelle Schiffsuntersuchungskommission/Schiffseichamt
bei der Wasser- und Schifffahrtsdirektion Südwest

(Gegebenenfalls) Name und Anschrift des Beauftragten des Herstellers:
[Name and address of manufacturer's authorized representative (if any):]

Entfällt
[Not applicable]

0.6 Lage, Kodierung und Art der Anbringung der Motorkennnummer:
[Location, coding and method of affixing of the engine identification number:]

Ausdehnungstank oder Ladeluftkühler-Einlassöffnung, Aufkleber
[On Expansion tank or aftercooler inlet tube assembly, permanent adhesive label]

0.7 Lage und Art der Anbringung des EG-Genehmigungszeichens:
[Location and method of affixing of the EC approval mark:]

Ausdehnungstank oder Ladeluftkühler-Einlassöffnung, Aufkleber
[On Expansion tank or aftercooler inlet tube assembly, permanent adhesive label]

0.8 Anschrift(en) der Fertigungsstätte(n):
[Address(s) of assembly plant(s):]

Caterpillar Inc.
Rench Road, Route 29
Mossville, IL, USA

ABSCHNITT II

[Section II]

1. (Gegebenenfalls) Nutzungsbeschränkungen:
[Restriction of use (if any):]

Entfällt
[Not applicable]

1.1 Besonderheiten, die beim Einbau des Motors/der Motoren in die Maschine bzw. das Gerät zu beachten sind:
[Particular conditions to be respected in the installation of the engine(s) on the machinery:]

Entfällt
[Not applicable]

1.1.1 Höchster zulässiger Ansaugunterdruck: **6,50 kPa**
[Maximum allowable intake depression:]

1.1.2 Höchster zulässiger Abgasgegendruck: **6,70 kPa**
[Maximum allowable back pressure:]

2. Für die Durchführung der Prüfungen verantwortlicher Technischer Dienst¹:
[Technical service responsible for carrying out the test(s):]

Germanischer Lloyd AG
Vorsetzen 35
D-20459 Hamburg / Germany

3. Datum des Prüfberichts: **28.11.2006**
[Date of test report:]

4. Nummer des Prüfberichts: **69844-06 HH**
[Number of test report:]

5. Der Unterzeichnete bescheinigt hiermit die Richtigkeit der Herstellerangaben im beigefügten Beschreibungsbogen des (der) obengenannten Motors/Motoren sowie die Gültigkeit der beigefügten Prüfergebnisse in Bezug auf den Motortyp oder den Stamm-Motor. Das (die) Prüfexemplar(e) wurde(n) mit Genehmigung der zuständigen Behörde vom Hersteller ausgewählt und als Baumuster des (Stamm-)Motors vorgestellt.
[The undersigned hereby certifies the accuracy of the manufacturer's description in the attached information document of the engine(s) described above and that the attached test result are applicable to the type. The sample(s) has (have) been selected and presented by the manufacturer as the (parent) engine type(s), approved by the competent authority.]

¹ Werden die Prüfungen von der Genehmigungsbehörde selbst durchgeführt, „entfällt“ angeben.
[Fill in n.a. where the tests are carried out by the approval authority itself.]

WASSER- UND SCHIFFFAHRTSVERWALTUNG DES BUNDES
Zentralstelle Schiffsuntersuchungskommission/Schiffseichamt
bei der Wasser- und Schifffahrtsdirektion Südwest

Die Typgenehmigung wird erteilt/erweitert/verweigert/entzogen¹.
 [Type approval is granted/refused/withdrawn¹.]

Ort: **Mainz**
 [Place:]

Datum: **30.11.2006**
 [Date:]

Unterschrift:
 [Signature:]

[Handwritten Signature]



Anlagen: Beschreibungsmappe
 [Attachment:] [Information package]
 Prüfergebnisse (siehe Anlage 1)
 [Test results (see appendix 1)]
 [(Gegebenenfalls Korrelationsstudie zu Probenahmesystemen, die von den
 Bezugssystemen abweichen²)]
 [Correlation study relevant to sampling used which are different from the reference systems² (if
 applicable)]

¹ Zutreffendes eintragen.
 [Insert where appropriate.]
² Nach Anhang I, Abschnitt 4.2.
 [Specified in annex I, section 4.2.]

C12 Engine Part Number Table*

Performance Specification		0K-5673 0K-5674	0K-5671 0K-5672	0K-5669 0K-5670	0K-5667 0K-5668	0K-4086 0K-5286	0K-4087 0K-5287
Engine Ratings	Application	E	C	B	A	A	B
	rpm	2300	2100	1800	1800	1800	1800
	bkW	492	339	287	254	254	287
	(bhp)	(660)	(454)	(385)	(340)	(340)	(385)
Engine Model	Part Number	C12	C12	C12	C12	C12	C12
Engine Arrangement	Part Number	241-8164	241-8162	241-8160	241-8158	214-4211	214-4213
		247-9907	241-8163	241-8161	241-8159	214-4212	214-4214
Compression Ratio		16.0:1	16.0:1	16.0:1	16.0:1	16.0:1	16.0:1
Static Timing ¹	Deg.	N/A	N/A	N/A	N/A	N/A	N/A
Piston	Part Number	197-9328	197-9328	144-2948	144-2948	111-2669	111-2669
						197-9328	197-9328
						130-0862	130-0862
						138-2016	138-2016
						144-2948	144-2948
Cylinder Head	Part Number	202-2182	202-2182	202-2182	202-2182	202-2182	202-2182
Camshaft	Part Number	138-2520	138-2520	144-2929	144-2929	144-2929	144-2929
Aftercooler	Part Number	216-5147	216-5147	216-5147	216-5147	215-1433	215-1433
Turbocharger Basic Group	Part Number	243-2561	243-2561	191-0094	191-0094	191-0094	191-0094
Injector	Part Number	166-0149	166-0149	212-3468	212-3468	212-3464	212-3468
Personality Module Software	Part Number	227-3837	243-0702	243-0701	243-0700	215-1498	215-1499
		243-0703	246-1143			229-5802	229-5803
						234-4956	234-4957

Note¹: Engine timing is electronically controlled by the engine Electronic Control Unit (ECU). There are no adjustments that can be made to change engine timing.

*** Note: Replacement part may change**

The part numbers of the components listed above were valid in August 2006, but may change over time. They may not necessarily be the specific part numbers that this engine was shipped with. See also section "Record Changes to Emissions-Related Components."

Installation Requirements

The following installation requirements must be met at rated load and speed to enable the engine to comply with the emission limits of EU 97/68/EC amended by 2004/26/EC

Max. Jacket Water Inlet Temperature	92° C (198° F)
Max. Aftercooler Water Inlet Temperature For sea water aftercooled engines:	52° C (126° F) Combined Circuit Keel Cooled 32° C (90° F) Heat Exchanger Cooled
Maximum Air Inlet Restriction, 97/68/EC Clean Filter	3.7 kPa (10" Water)
Maximum Exhaust Backpressure	6.7 kPa (27" Water)

Engine Performance

The rated speed and rated power of the engine is included on the engine information nameplate. This nameplate is located on the bottom of the expansion tank on the service side of the engine. For engines without expansion tanks, the nameplate is located on the service side of the engine on the deaerator housing vertical surface.

Engine Emissions

Emissions data measurement is consistent with the procedures described in 97/68/EC amended by 2004/26/EC for Inland Waterway Vessel propulsion engines. The gaseous emission limits for this engine family are:

CO — 5.0 g/kWh
NOx + HC — 7.2 g/kWh
PT — 0.20 g/kWh

On-Board NOx Verification Procedure

Engine Parameter Check Method

Introduction:

The engine parameter check method that follows shall be used by the surveyor to verify that the engine, as installed on board the ship, complies with the exhaust gas emission limits of 97/68/EC amended by 2004/26/EC for Inland Waterway propulsion engines. This method is to be used for the initial certification survey, periodic and intermediate surveys.

Procedures:

The procedures listed below are detailed on the following pages. They can be used to demonstrate compliance with the emissions limits.

Steps of Engine Parameter Check Method:

1. Check Engine Parameters
2. Identify Emissions-Related Engine Components
3. Record Changes to Emissions-Related Components
4. Identify Adjustable Features

1. Check Engine Parameters:

There are no adjustable engine parameters related to exhaust emissions that are physically capable of being adjusted without taking the engine outside of the manufacturers limits. Other than the parameters programmed in the ECU (Electronic Control Unit), all programmable features are set at the factory. Therefore a section to record adjustable parameters becomes unnecessary.

2. Identify Emissions-Related Engine Components:

The table below lists the components that influence the engine's emissions for this engine model. The list under section Engine Part Numbers Table of this document shows the part numbers of those components as shipped from Caterpillar Inc. factories.

These part numbers can be identified through the personality module part number and the engine rating, which is also listed in this same table of this Technical File.

The personality module part number and the engine rating can be found on the Information Plate or film on this engine.

Note to surveyor:

See also section "Record Changes to Emissions-Related Components."

Note to Caterpillar® dealers:

Part numbers for the components influencing the exhaust emissions can also be found in the Technical Marketing Information (TMI) system by viewing the engine test specification number.

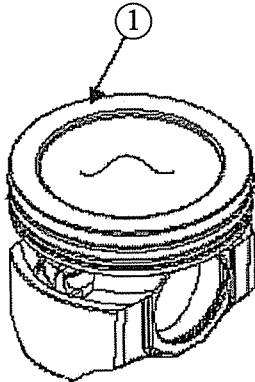
Compare the observed part number with the part number from the table on page 7 to ensure that the part numbers are correct for these emissions-related components.

Emissions-Related Component List:

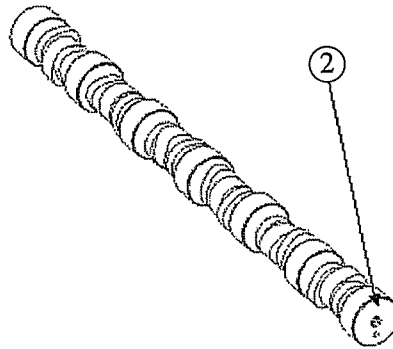
	Component Description	Location on Engine of Component Part No.
1	Piston ¹	On the top of the piston crown assembly.
2	Camshaft ¹	Stamped on the end of the camshaft.
3	Injector	Etched on side of valve assembly.
4	Aftercooler ¹	Etched on the aftercooler core assembly on the forward face.
5	Turbocharger	On nameplate of turbocharger.
6	Cylinder Head ¹	Cast into the inside face of the cylinder head.
7	Personality Module Software	On Information Plate of engine or use the Electronic Technician (ET) Service Tools.

Note¹: Part number not accessible without significant engine disassembly. Therefore it is not necessary to be checked by the surveyor.

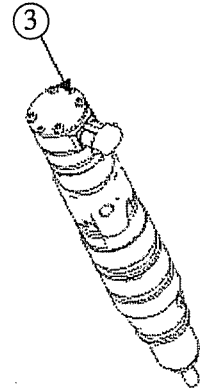
Part Number Locations:



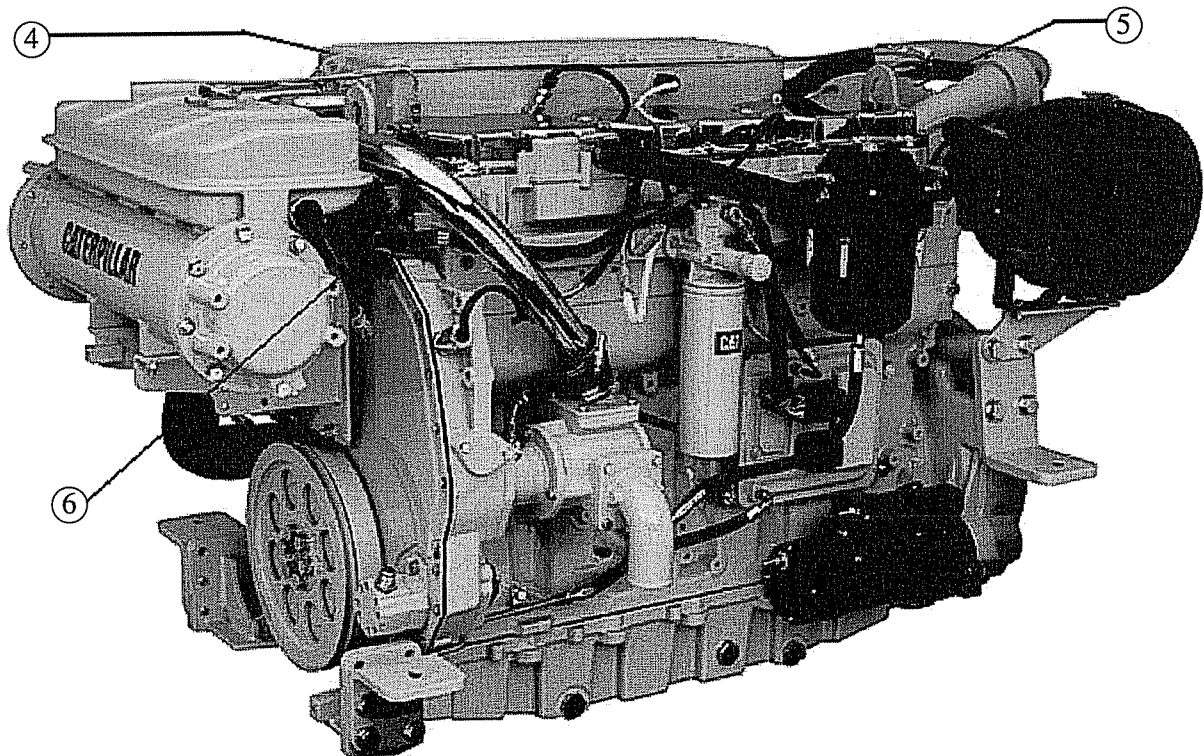
1. Piston



2. Camshaft

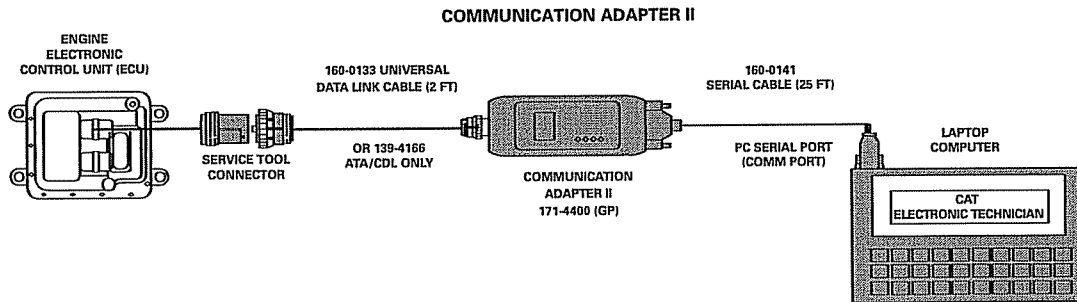


3. Injector



Verification Procedure for the Electronic Engine Software:

1. Hook up the laptop computer (with ET) to the engine Electronic Control Unit (ECU) as shown in the diagram below.



2. Start the Electronic Technician (ET) program on the computer.
3. Select the desired ECU from the displayed list. If the engine has only one ECU, only one ECU option will be displayed.
4. The display screen will show the engine model, engine location, and engine serial number. Displayed below this information will be a list of two columns. The first column lists the "Parameter." The second column lists the value for that parameter. The fourth parameter listed is the "Personality Module Part Number." This is the engine software. The corresponding value is the software part number.

3. Record Changes to Emissions-Related Components:

A record must be kept of the changes to the emissions-related components listed on the previous table. Use the table below to record these changes in chronological order as they occur.

Note:

Emissions-related components may only be replaced as listed in this Technical File or otherwise approved by the Administration or Recognized Organization, which has approved the Technical File.

Caterpillar recommends emissions-related components and all other components be replaced with parts approved by your Caterpillar dealer.

Record of Changes to Emissions-Related Components:

[illegible]

4. Identify Adjustable Features:

There are no adjustable features on the engine that will significantly affect NOx emissions. Other than the parameters programmed in the ECU (Electronic Control Unit), all programmable features are set at the factory. Therefore a section to record adjustable features becomes unnecessary.

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ENGINE TEST [NFL00923]**JULY 14, 2010**For Help Desk Phone Numbers [Click here](#)**Sales Model:** C12**Built Date:** 11Jan2010**Tested Date:** 11Jan2010**Shipped Date:** 19Jan2010**Tested:** 88**Plant:** Lafayette**Test Number:** 01**Cell Number:** 02

Test Element	Eng Updates	Test Value	Test Spec Value	Label
Spec Number		0K5668	0K5668	
Arrangement Number		3110897	3110897	
Corr FI Power		254.0 R	254.0	KW
Speed		1,800	1,800	RPM
COR FL FUEL RATE		890.6 R	884.0	G/MIN
CSFC		210.4	209.4	G/KW-HR
Adj Boost		166.9	160.0	KPA
Fuel Pressure		646	650	KPA
Oil Pressure		284	295	KPA
TQ COR FUEL RATE		878.3 R	858.0	G/MIN
TQ CK CSFC		207.9	200.4	G/KW-HR
TQ CK ADJ BST		121.9	125.0	KPA
Torq Ck Speed		1,400	1,400	RPM
TQ CK COR TQ		1,729 R	1,729	NM
Low Idle Speed		700	700	RPM
Low Idle Oil Pressure		121	120	KPA
High Idle Speed		1,888	1,890	RPM
Response Time				
FL Static Fuel Setting		8.16R	8.11	MM
FT Static Fuel Setting		8.51R	8.37	MM
Timing Dim				
FLS (Intercept)		-8 R	-37	
FTS (Slope)		-12 R	17	
Advertised Power			254.0	kW
Advertised Speed			1,800	RPM
Advertised Torque				NM

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Web Master(s): [PSG Web Based Systems Support](#)

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TEST SPEC [NFL00923]**JULY 14, 2010**For Help Desk Phone Numbers [Click here](#)

Reference Number: 0K5668

Effective Serial Number: NFL00109

Model: C12 DI TA SCAC

Make from Spec:

Test Spec Data

Description	Measure	Nominal	Ceiling	Floor
Corr Full Load Power	kW	254.0	256.6	251.4
Full Load Speed	RPM	1800	1810	1790
High Idle Speed	RPM	1890	1905	1880
Low Idle Speed	RPM	700	710	690
FL Static Fuel Setting	mm	8.170		
FT Static Fuel Setting	mm	8.480		
FLS (Intercept)		-20		
FTS (Slope)		3		
Corrected Fuel Rate	G/MIN	884.0	928.2	839.8
CSFC	G/KW.H	206.0	218.4	194.5
Adjusted Boost	KPA	156.0	179.4	132.6
Torque Check Speed	RPM	1400	1410	1390
Corr Torq Rise at TC RPM	%	28.5		
Corr Torque at TC RPM	N.M	1,729	1,851	1,607
C Fuel Rate at TC RPM	G/MIN	858.0	900.9	815.1
CSFC at TC RPM	G/KW.H	199.0	211.0	188.0
ADJ Boost at TC RPM	KPA	122.3	140.7	103.9
Power Loss/Cyl	% C FL PWR	21.0	27.0	10.0
Specific Blowby	L/KW.H			
Temp Jacket Water Pump Inlet	C	68	71	65
Delta T Jacket Water (out-in)	C	20	25	15
Inlet Manifold Temp	C			
Water Temp to Scac	C			
Scac Water Flow	L/MIN			
Oil Pressure	KPA	320	600	250
Oil Pressure Low Idle	KPA	135	600	75
Fuel Pressure	KPA	650	834	466
Inlet Fuel Pressure	KPA		20	
Inlet Fuel Temp	C	30	35	25
Inlet Air Pressure	KPA		104	87
Inlet Air Restriction	KPA		2.00	-2.00
Inlet Air Temperature	C		50	10
Fuel Density	DEG API		36.0	34.0
Boost Constant		1.0		
Governor Setting Constant				
Governor Setting Torque	% RTD TRQ			
High Idle Stability	RPM			
Low Idle Stability	RPM			
Set Point RPM	RPM	1820	1830	1810

Engine Reference Information

Description	Measure	Variables
FL Static/FT Static Fuel Settings	mm	8.17 / 8.48
Fuel Valve Part Number		1705241
Unit Injector Part Number		2123468
Timing Dimension	mm	
Torque Control Group Number		Change Level:
Fuel Pump/Gov Grp Part Number		1922070
Fuel Pump Type		EUI
Flyweight Part Number/Attitude		
Turbo Part No and Model		1910094 / S410W030-.82VTF
Advertised Power / Governor Speed		254.0kW 1,800 RPM
Compression Ratio		16.0
Torque Rise Cam Part Number		
Manifold Type		WC
Engine Flash File Part Number		2461141

**Torque Control Group
Spring Data**

Part No	Thickness	Quantity
No data found...		

**Torque Control Group
Spacer Data**

Part No	Thickness	Quantity
No data found...		

Timing Data**Mechanical Advance Part Number: Chg. Level:****Advance: 0.0 DEG****Dog Leg Differentials: RPM: -- KW: --**

Description	Measure	Spec	Minimum	Maximum
Timing Static @ 0 RPM BTDC	DEG		-2.0	2.0

Governor Type ELEC

Application/Performance Data

Description	Measure	Variable
Application Identification		301 MP "A"
Engine Sales Model and Series		C12
Combustion System type		DI
Aspiration Type		TA
Engine Source Factory Ref Number		40
Power Setting PL/PP Ref Number		PP5216
Engine Perf Data Ref No and Change Level		DM7527
Multi Engine Torq/Rating		
Emissions Family		
Generator Rating W/O Fan	EKW	
Generator	HZ	
Brakesaver test		
Certified Engine Rating	kW	
Engineering Model Ref		E795
Low Idle In-Veh Speed	RPM	

Altitude Derating Information

Description	Measure	Data:
Altitude - Maximum	M	2,250
Engine Power (ADV)	kW	253
Engine Power (Test)	kW	254
High Idle Speed	RPM	1890
FL Static Fuel Setting	mm	8.17
FT Static Fuel Setting	mm	8.48
Corrected Fuel Rate	G/MIN	884.0
FL Boost Pressure	KPA	156.0

Spec Number vs. Arrangement Number Cross Reference

Arrangement	Arrangement	Arrangement	Arrangement	Arrangement
2418158	2418159	3110751	3110897	

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**PART NUMBER CONSIST BREAKDOWN
[3110897]****JULY 14, 2010**For Help Desk Phone Numbers [Click here](#)**Part Number:** 2430704**Description:** ELECTRONICS GP**Version Symbol:** -**Change Level:** All [CLICK HERE TO VIEW NOTE INFORMATION](#)

Part Number	QTY	Description	Svc Ind	Set-Type	Note	In Chg	Out Chg	Out Chg Date	Reason	New Part	Breakdown
2430700	0001	SOFTWARE GP-ELEK	N	PTS-LIST		00	01	18JAN2005	REPL	2461141	Breakdown...
2430700	0001	SOFTWARE GP-ELEK	N	SVC REPLAC		00	01	18JAN2005	REPL	2461141	
2461141	0001	SOFTWARE GP-ELEK	N	PTS-LIST		01					Breakdown...
2461141	0001	SOFTWARE GP-ELEK	N	SVC REPLAC		01					

Total rows: 4Caterpillar Confidential: **Green**

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