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THE UNITED KINGDOM VEHICLE APPROVAL AUTHORITY

E11

COMMUNICATION CONCERNING THE COMPLIANCE OF A ENGINE TYPE WITH REGARD TO EMISSIONS OR MEASUREMENT OF POWER OF THE ENGINE ONLY, PURSUANT TO REGULATION NO 24.03

1. Trade name or mark of vehicle: Not applicable

2. Trade name or mark of engine: Dongfeng Cummins

3. Vehicle type: Not applicable

4. Engine type: C300 20 Engine Approval No: Not applicable

5. Manufacturer's name and address:

   Dongfeng Cummins Engine Company Limited,
   Automobile Industry Development Zone,
   Xiangfan,
   Hubei Province,
   P.R. of China 441004).

6. If applicable, name and address of manufacturer's representative Not applicable

7. Engine submitted for Test on: 22 December 2005

8. Technical service conducting Approval tests: Vehicle Certification Agency

9. Date of report issued by that service: 9 Janurary 2006

VCA 10-Oct-06 UK Approval Authority

10. Number of report issued by that service: As before (97/982438-1)

11. Test results:

11.1 Emissions*

11.1.1 Tests at steady speeds:

Measurement points	Engine Speed n (rpm)	Power P (kW)	Nominal flow G (litres/sec)	Measured absorption values (m^{-1})
1	2201	222.36	152.24	0.35
2	2150	221.80	148.71	0.35
3	1720	204.80	118	0.22
4	1450	171.40	97	0.14
5	1400	165.54	100.29	0.17
6	1240	143.14	96.83	0.35
7	1000	70.93	69.17	0.48

For engine type approval, power absorbed by the fan during the tests: Fan not fitted

11.1.2 Free acceleration tests

11.1.2.1 Engine test in accordance with Annex 5 (1): Not applicable

Percentage of maximum rpm (2)	Percentage of maximum torque at rpm stated (2)	Measured absorption value m^{-1}	Corrected absorption value m^{-1}
100	100		
90	100		
100	90		
90	90		
100	80		
90	80		

(2) The lower limit may be that stated by the manufacturer in accordance with this Regulation, part I, paragraph 6.3.4

11.1.2.2 Engine test according to this Regulation, part I, or vehicle test according to

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part III [(1)]:

Inertia	ABS (m^{-1})
2.97	1.41
2.37	1.26
1.77	1.09
1.44	1.05
1.09	0.92

Rpm at start: 600 rpm

11.2 Stated net maximum power [(1)]: 218.33 kW at 2200 rpm

12. Make and type of opacimeter: Hartridge Mk III

13. Principal characteristics of engine type:

Engine working principle: Four stroke

Number and layout of cylinders: 6 in-line

Cylinder capacity: 8268 cm^3

Fuel feed: Indirect injection Direct injection

Supercharging equipment: Yes

14. Engine complies with the requirements

15. Reason for extension of approval: Not applicable

16. Place: BRISTOL

17. Date: 10 October 2006

18. Signature:

A. W. STENNING
Head of Product Certification

19. A list of the documents contained in the approval file transmitted to the administrative service which has granted approval is annexed to this communication.

CSF070781

10-Oct-06
UK Approval Authority

a) ESSENTIAL CHARACTERISTICS OF THE ENGINE AND INFORMATION CONCERNING THE CONDUCT OF TEST

1. DESCRIPTION OF ENGINE

1.1	Manufacturer	: Dongfeng Cummins Engine Co.,Ltd
1.2	Manufacturer's Engine Code :	C300 20
1.3	Cycle	: Four stroke
1.4	Bore (mm)	: 114
1.5	Stroke (mm)	:135
1.6	Number and layout of cylinders	:6 in-line, 1-5-3-6-2-4
1.7	Engine capacity (cm^3)	:8.3
1.8	Volumetric compression ratio	:18:1
1.9	Minimum cross-sectional area of inlet and outlet ports (cm^2)	:1860/1662
1.10	Cooling system	
1.11.1	Liquid	
1.11.1.1	Nature of liquid:	:Antifreeze and anticorrosive liquid
1.11.1.2	Circulating pump (s)	:Yes
1.11.1.3	Characteristics or make (s) and type (s)	:Centrifugal
1.11.1.4	Drive ratio (s)	:1.81:1
1.11.2	Air	

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10-Oct-06
UK Approval Authority

1.11.2.1	Blower	:No
1.11.2.2	Characteristic or make (s) and type (s)	
1.11.2.3	Drive ratio (s)	:N/A
1.12	Temperature permitted by the manufacturer	
1.12.1	Liquid cooling	
	Maximum temperature	
	At outlet (k)	:373
1.12.2	Air cooling	
	Reference point	
	Maximum temperature at	
	Reference point (k)	:N/A
1.12.3	Maximum charge air	
	outlet temperature of	
	the inlet intercooler (k):	:326
1.12.4	Maximum exhaust	
	temperature at the point	
	in the exhaust pipe (s)	
	adjacent to the outer	
	flange (s) of the exhaust	
	manifold (s) (k)	:920
1.12.5	Fuel temperature	

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10-Oct-06
UK Approval Authority

	min. (k)	:311
	max. (k)	:315
1.12.6	Lubricant temperature	
	min. (k)	:350
	max. (k)	:400
1.13	Pressure charger	
1.13.1	Make	: Wuxi Holset Engineering Co.,Ltd
1.13.2	Type	:HX40W
1.13.3	Intercooler	
1.13.4	Intake system maximum allowable intake depression at rated engine speed and at 100% load (kPa)	: -3.17±1.0
1.15	Exhaust system	
	Maximum allowable exhaust back pressure at rated engine speed and at 100% load (kPa)	: 8.136 ± 0.339
2.	Additional anti-smoke devices (if any, and if not covered by another heading)	
	Description or diagram	:N/A
3.	Fuel feed	

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3.1	Feed pump	
	Pressure (KPa)	
	Or Characteristic diagram	:34.5~48.5
3.2	Injection system	
3.2.1	Pump	
3.2.1.1	Make (s)	:BOSCH
3.2.1.2	Type (s)	:PES6P120ARS7400
3.2.1.3	Delivery (mm^3) per stroke or cycle	
	at engine speed (rpm) at full	
	injection or characteristic diagram	:156.1±8（On pump bench）
	Mention the method used	
3.2.1.4	Injection timing	:N/A
3.2.1.5	Static timing (with tolerance)	:16° CA
3.2.2	Injection piping	
3.2.2.1	Length (mm)	:808
3.2.2.2	Internal diameter (mm)	:1.8
3.2.3	Injector (s)	
3.2.3.1	Make (s)	:BOSCH
3.2.3.2	Type (s)	:KBAL105P51
3.2.3.3	Opening pressure (kPa)	
	or characteristic diagram	:30000-31000

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10-Oct-06
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3.2.4 Governor

3.2.4.1 Make (s) :BOSCH

3.2.4.2 Type (s) :RQV350

3.2.4.3 Speed at which cut-off

starts under full load (rpm) : 2275

3.2.4.4 Maximum no-load speed (rpm) : 2500

3.2.4.5 Idling speed (rpm) : 750

3.3 Cold start system

3.3.1 Make (s) : Not applicable

Type (s) : Not applicable

4. Valve timing

4.1 Maximum lift of valves and angles of opening and closing in relation to dead centers of equivalent data

Maximum lift of valves (mm)

Intake :12.751

Exhaust :12.598

Angles of opening and closing

Intake Valve

Opening (BTDC) :10.0

Closing (ATDC) :34.0

Exhaust Valve

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10-Oct-06
UK Approval Authority

	Opening (BBDC)	:45.0
	Closing (ATDC)	:10.0

4.2 Reference and /or setting range (mm)

	Intake (cold)	:N/A
	Exhaust (cold)	:N/A

5. Engine-driven equipment

Maximum permissible power absorbed by the engine-driven equipment as specified in and under the operating conditions of Directive ECE R49/02, Annex I, section 5.1.1. at each engine speed as defined in section 4.1 of Annex III to this Directive.

	Idle (kW)	:0.3
	Intermediate (kW)	:1.61
	Rated (kW)	:2.37

6. Additional information on test conditions

6.1 Lubricant used

6.1.1	Make (s)	:Lanzhizun
6.1.2	Type (s)	:15W40 CF4/SG

(State percentage of oil in mixture if lubricant and fuel are mixed)

6.2 Engine-driven equipment

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6.2.1 Enumeration and identifying details :Air filter, muffler, fan

6.2.2 Power absorbed (kW) at various :N/A

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Indicated engine speeds

Equipment	Idle	Intermediate	Rated
Total			

6.3 Dynamometer setting (kW)

Per cent load	Idle	Intermediate	Rated
10	—	15.7	22.1
25	—	39.25	55.25
50	—	78.5	110.5
75	—	117.75	165.75
100	—	157	221

7. Engine performances

7.1 Engine speeds

Idle (rpm) :600~800

Intermediate (rpm) :1320

Rated (rpm) :2200

7.2 Engine power (kW)

(Measured in accordance

10-Oct-06
UK Approval Authority

With the provisions of

Directive ECE R49/02)

c= a+b : e= c-d

	Idle	Intermediate	Rated
Maximum power measured on test (kW(a))	—	154	119
Total power absorbed by engine-driven equipment as per section 6.2.2. (kW(b))	—	1	2
Gross engine power (kW(c))	—	155	221
Maximum permissible power absorbed as per section (kW(d))	—	1.61	2.37
Maximum net engine power (kW(e))	—	153.39	218.63

a) CHARACTERISTICS OF THE ENGINE-RELATED VEHICLE PARTS

1. Intake system depression : -3.17±1.0

at rated engine rpm and

at 100% load (kPa)

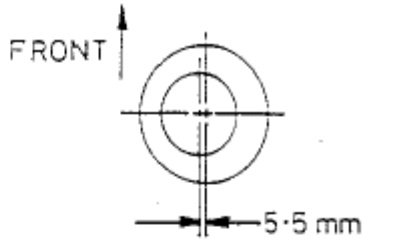
2. Exhaust system back :

3. Pressure at rated engine

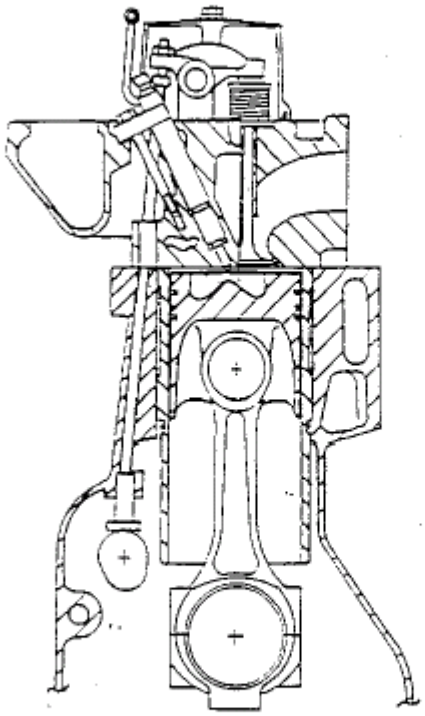
Rpm and at 100% load (kPa)

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PLAN VIEW OF PISTON

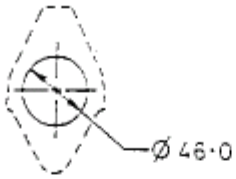


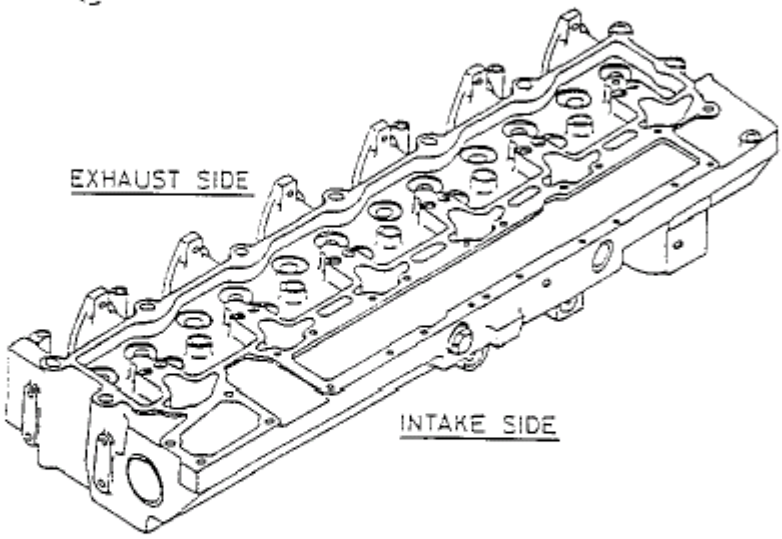
CROSS SECTIONAL VIEW OF CUMMINS "C","CT" AND "CTA" SERIES ENGINES.

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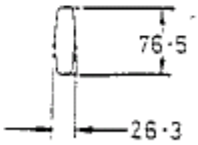
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EXHAUST OUTLET PORT
AREA = 1662 mm2

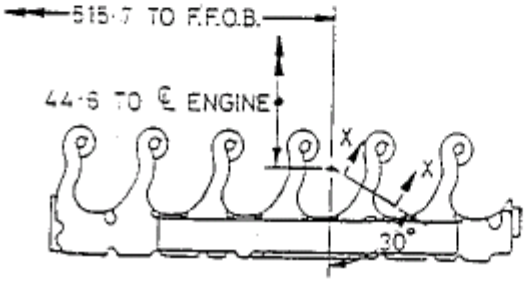




AIR INTAKE PORT
AREA = 1860 mm2



SECTION X X



AIR INTAKE PORT SCROLLS

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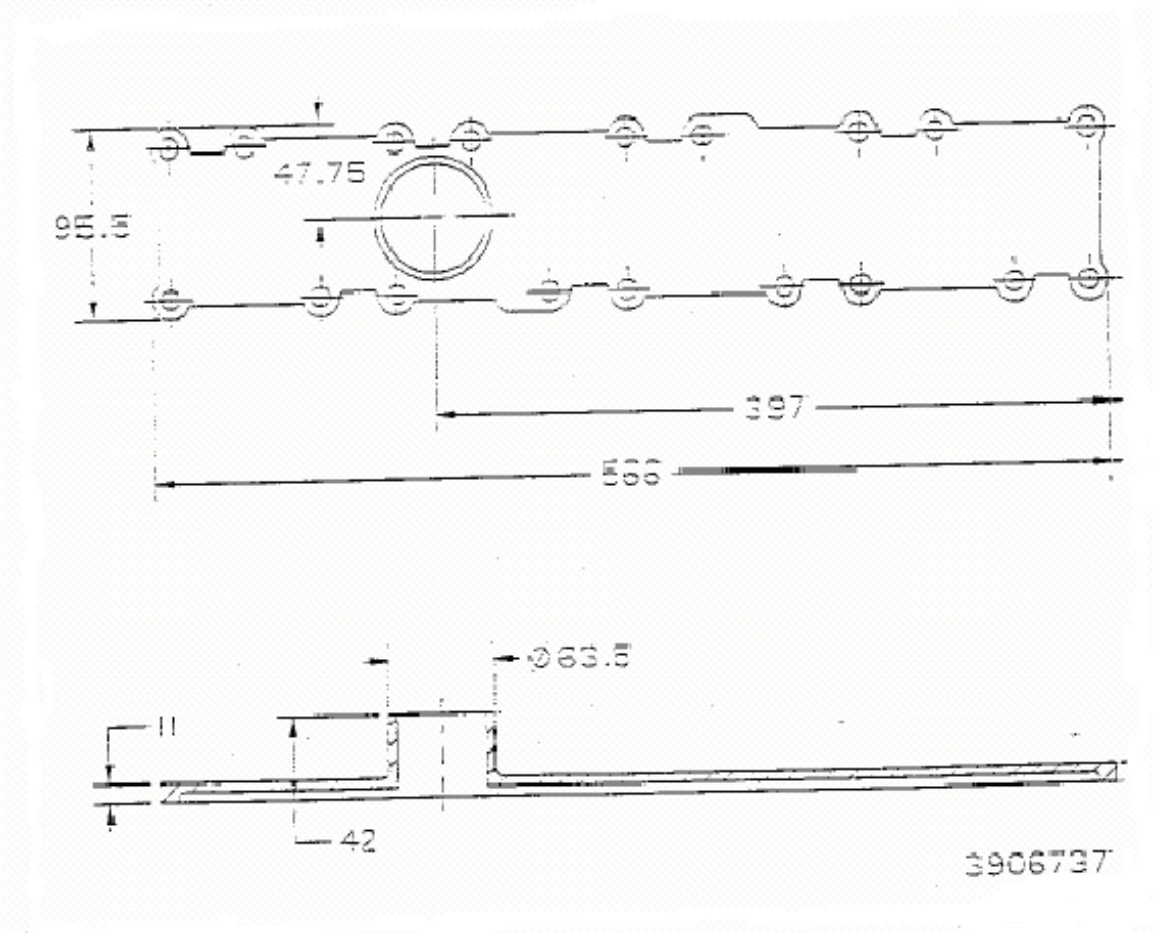
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FAN POWER ABSORPTION

Power absorbed by viscous fan hub
in maximum slip condition is 1.0 kW
over the speed range of the test.

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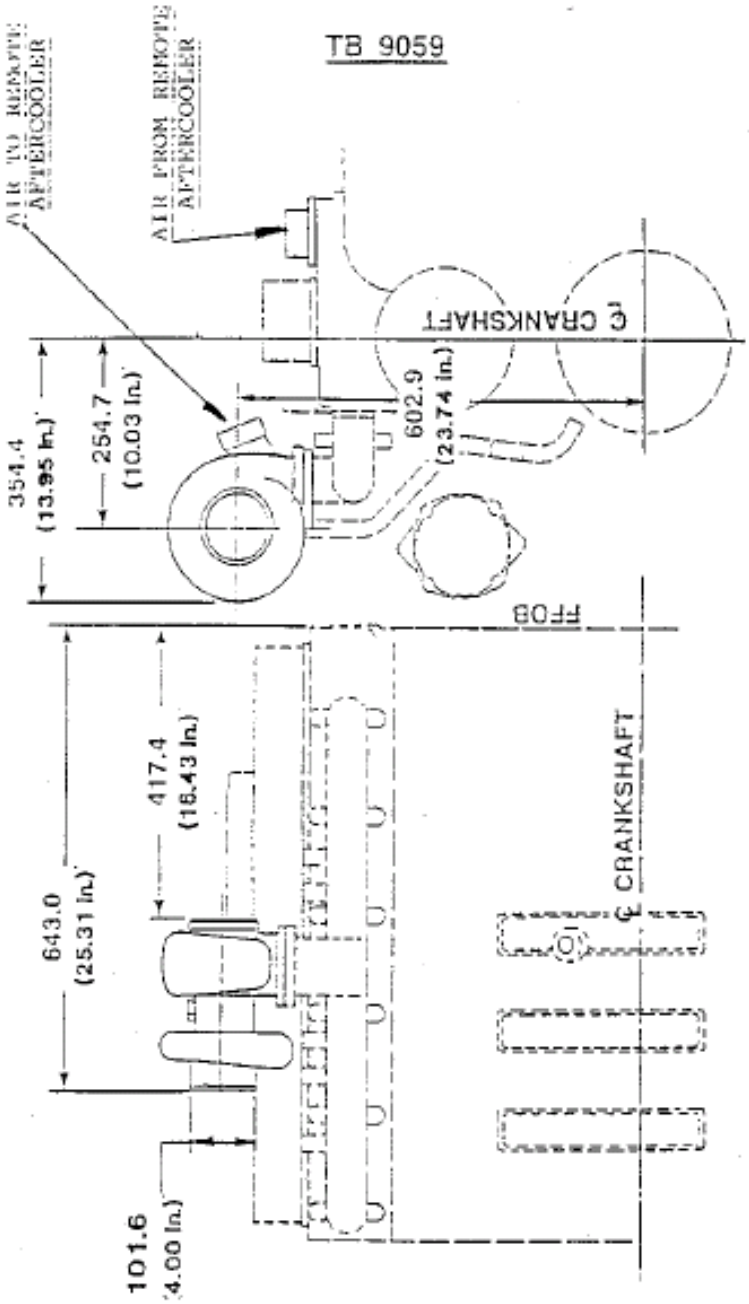
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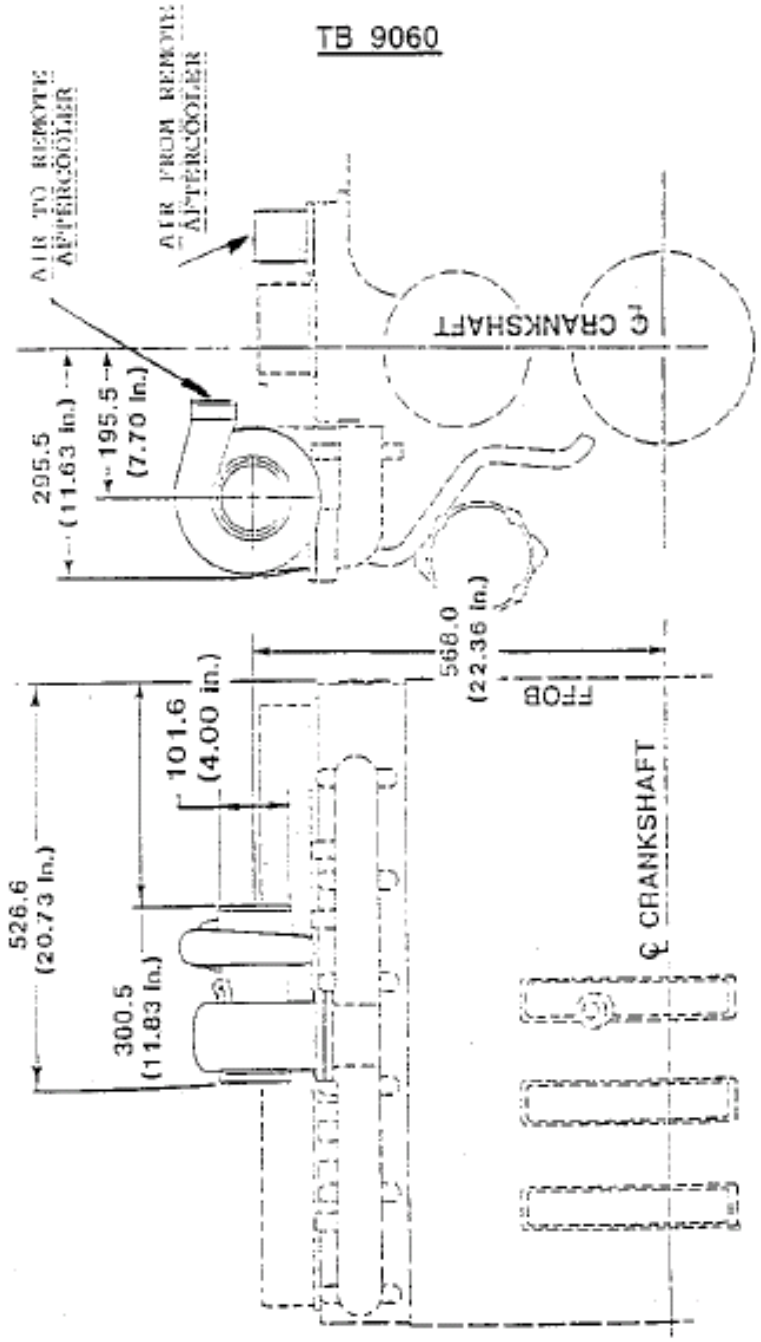
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TURBOCHARGER LOCATION



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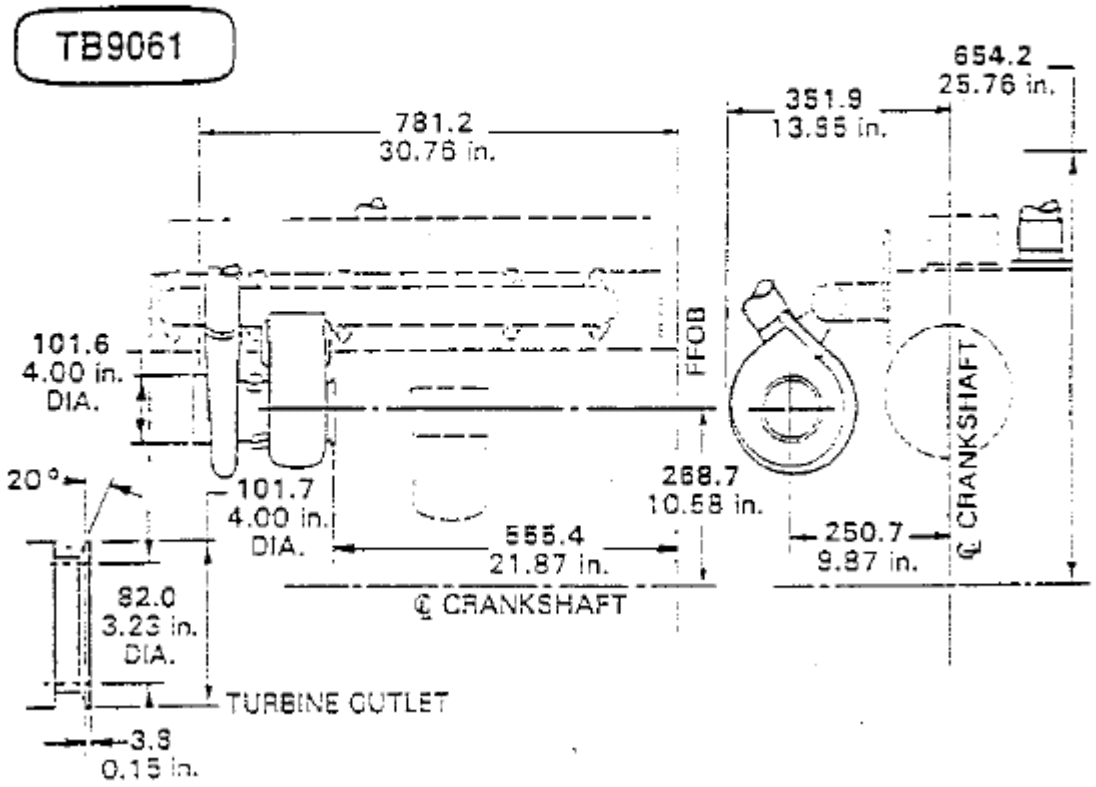
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10-Oct-06
UK Approval Authority

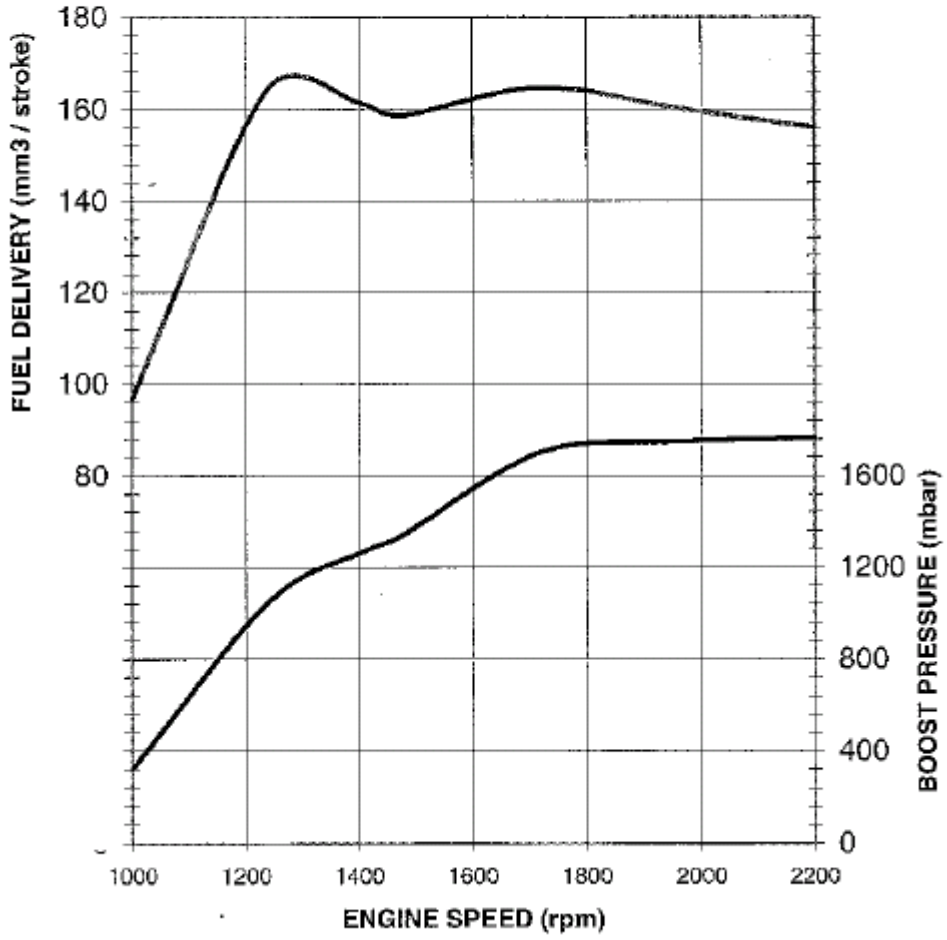
TURBOCHARGER LOCATION



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10-Oct-06
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Boost control & fuel delivery characteristics
Full engine load



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10-Oct-06
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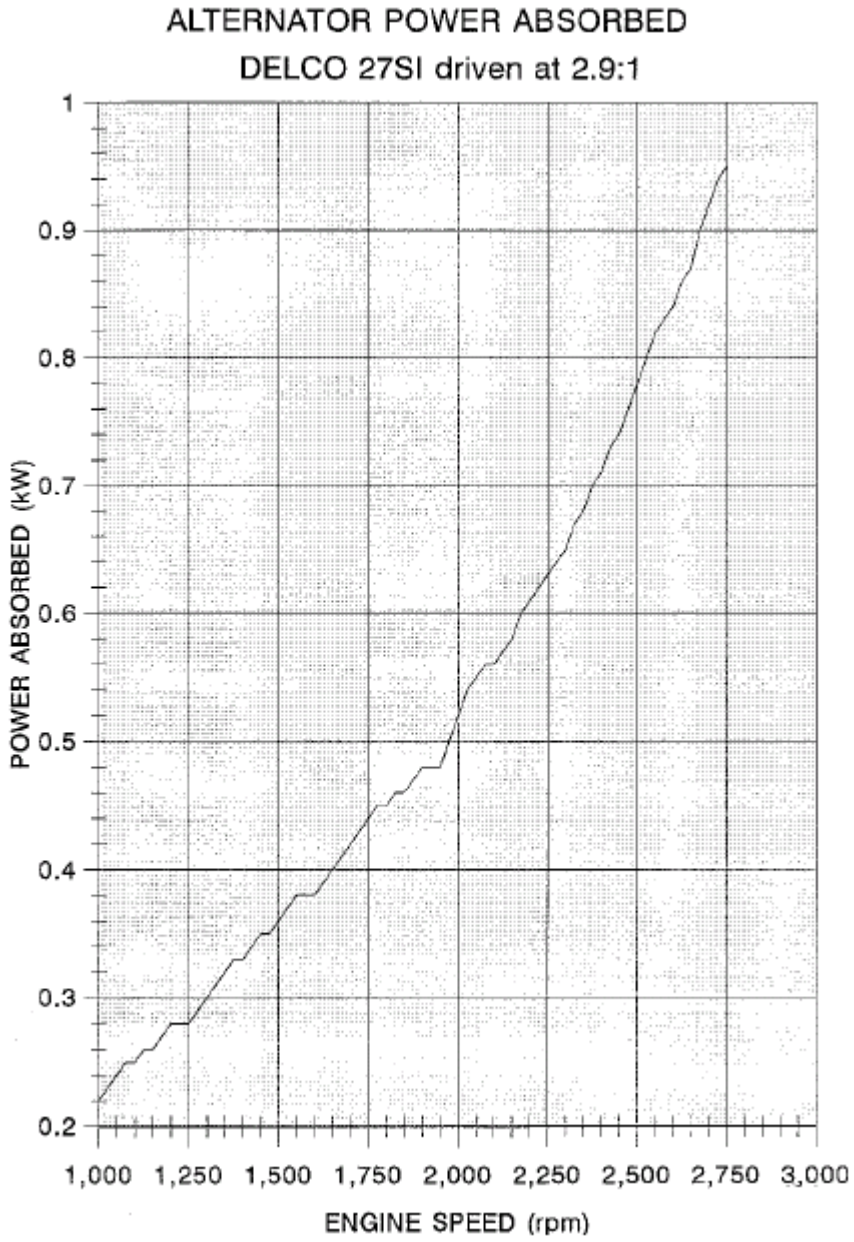
ADDITIONAL ANTI-SMOKE DEVICE

BOOST CONTROL

The Bosch P7100 fuel pump is fitted with a boost control device (Boost Capsule), designed to regulate the fuel delivery output to correspond with the inlet manifold pressure on turbocharged engines during acceleration and lugging. When a turbocharged engine is accelerated, there is sometimes a delay between the throttle lever arriving at full fuel position, and the turbocharger providing it's boost pressure to the combustion chamber. Consequently there is not sufficient air to completely burn the fuel, resulting in excessive smoke during this acceleration. The Boost Control device will sense the air pressure in the manifold during this period and adjust the fuel pressure to limit the amount of fuel injected, thus reducing the smoke produced.

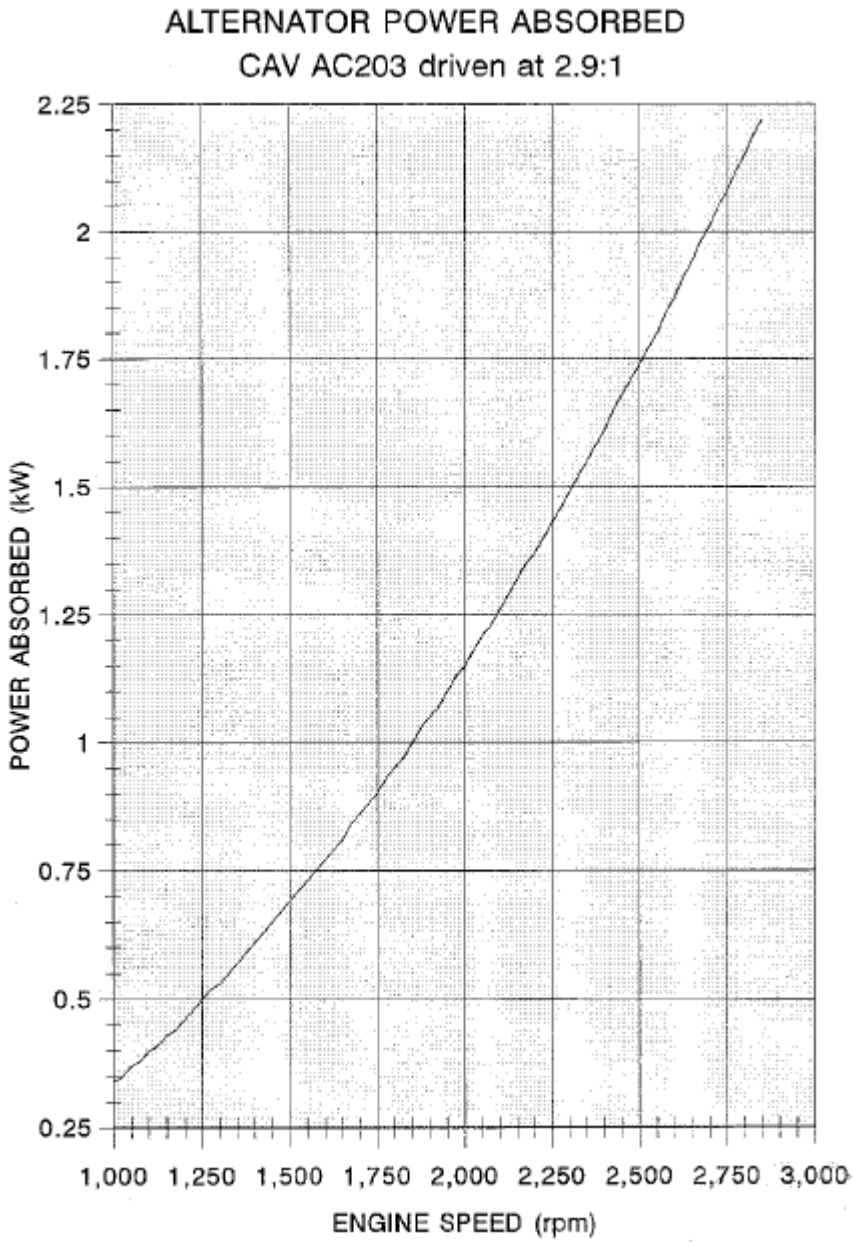
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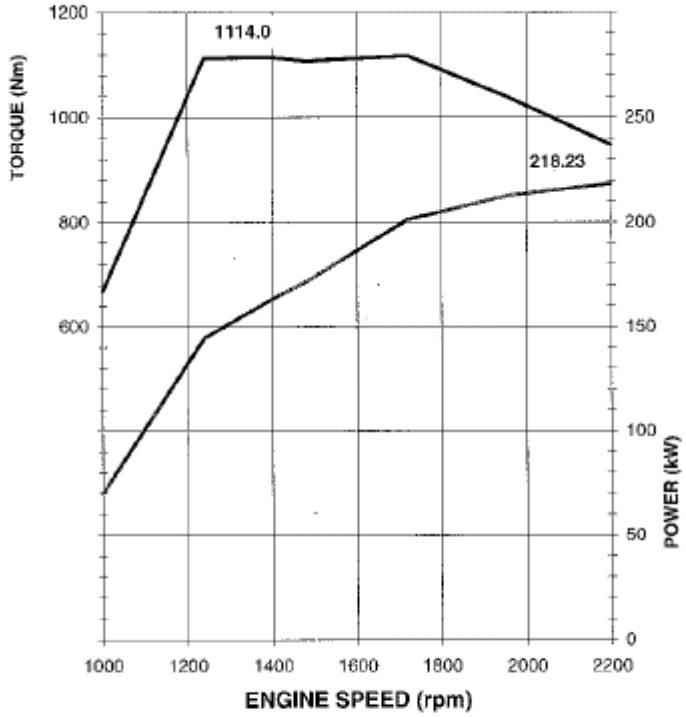
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10-Oct-06
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DECLARED NET ENGINE PERFORMANCE



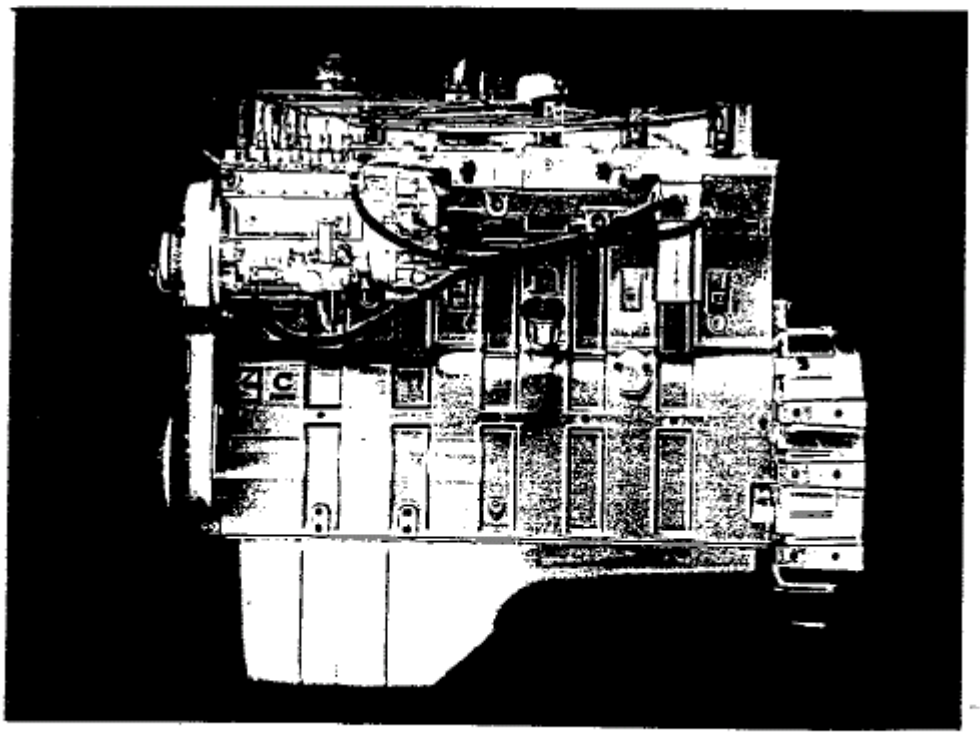
ENGINE (rpm)	1000	1240	1400	1480	1720	1960	2200
NET (Nm)	668.5	1113.0	1114.0	1107.2	1117.6	1036.8	947.2
NET (KW)	70.00	144.53	163.32	171.60	201.30	212.80	218.23
WORST FAN (kW)	1.00	1.00	1.00	1.00	1.00	1.00	1.00
WORST ALT (kW)	0.34	0.50	0.61	0.67	0.88	1.11	1.31

WORST CASE:
FAN: KYSOR 1.0 kW ALT: CAV AC203

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PHOTOGRAPH OF ENGINE



FUEL PUMP SIDE

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10-Oct-06
UK Approval Authority