

Kubota



Diesel Engine Basics

Distribuidor Autorizado

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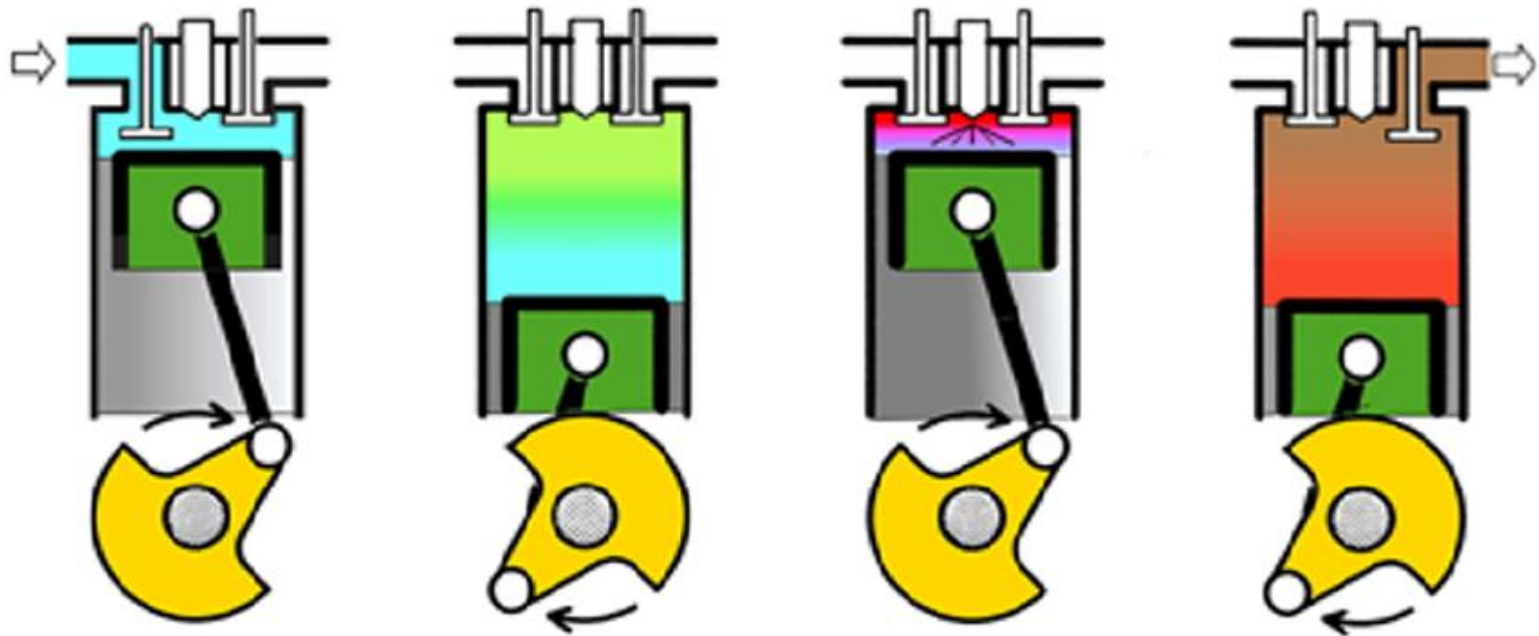
Web.: www.kubotadieselmotors.com



BobCat's Service & Parts s.A.C.

Maquinaria - Repuestos - Servicio Técnico Especializado - Alquileres

4 Stroke Cycle Engine



Intake

Compression

Combustion

Exhaust



AIR HEATS WHEN COMPRESSED

Compression Temperature & Auto Ignition Temperature

Temperature (F)

1112

932

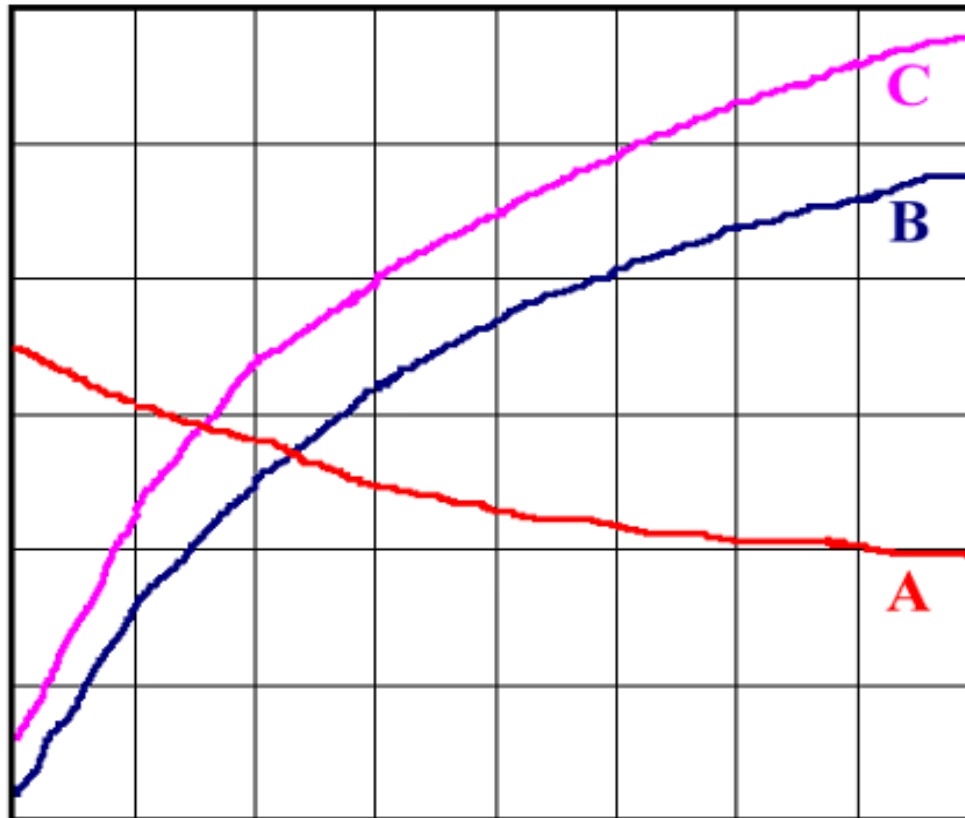
752

572

392

212

32



Compression Pressure (psi)

14

71

145

213

284

355

426

498

569

A: Diesel Fuel Auto Ignition Temperature

B: Air Temperature Initial 32 F

C: Air Temperature Initial 100 F





1280psi

850psi

420psi

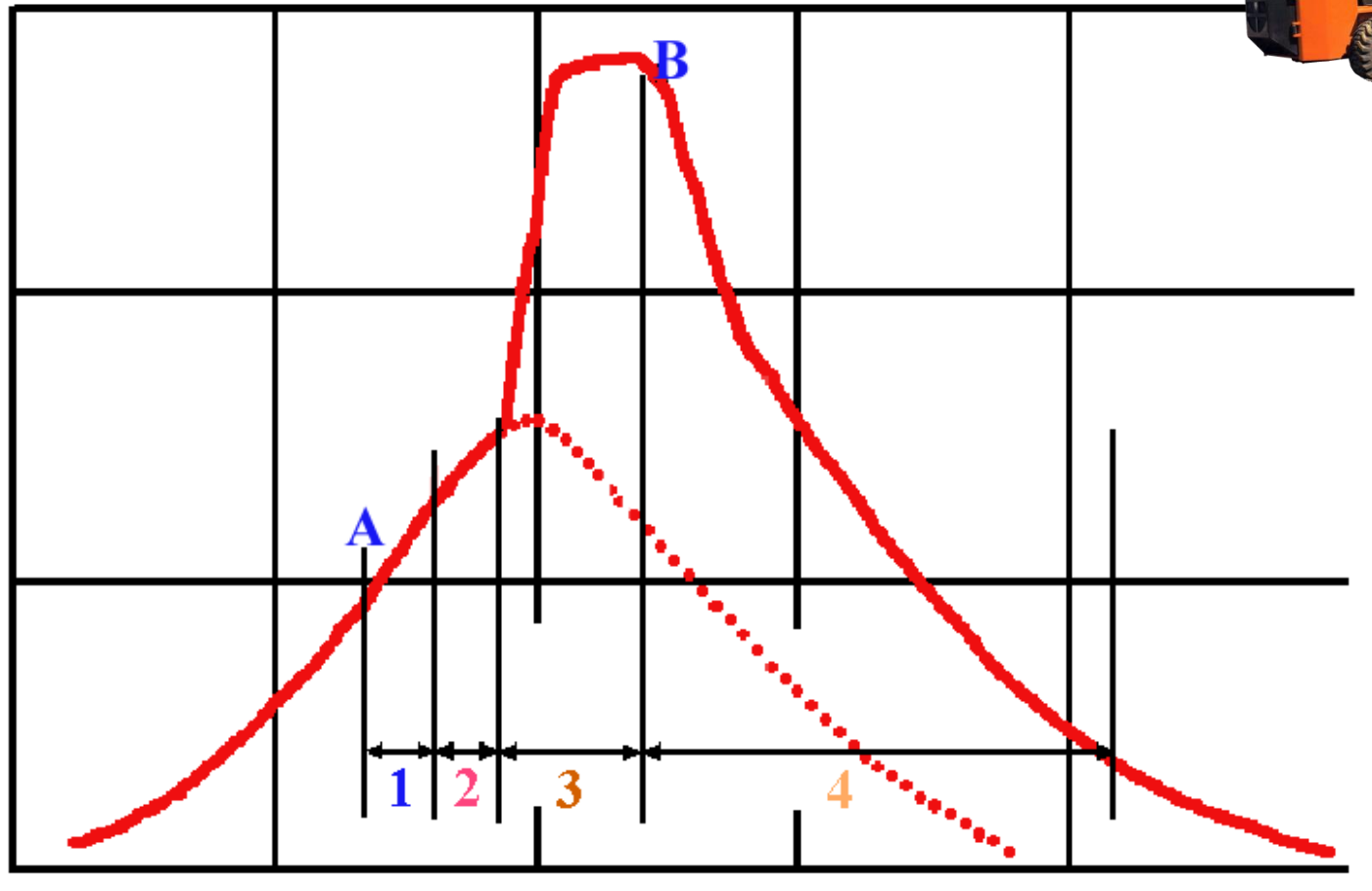
-40

-20

TDC

20

40



A: Fuel Injection Timing

B: End of Injection

1: Ignition Delay Period

2: Pre-flame

3: Diffuse Combustion

4: After Burning

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Kubota Engine Review



ENGINE MODEL IDENTIFICATION

■ How to read the model name

– Ex.: V1505-E

– V=Number of Cylinders

E= Eine; 1 cylinder engine

Z= Zwei; 2 cylinder engine

D= Drei; 3 cylinder engine

V= Vier; 4 cylinder engine

F= Fünf; 5 cylinder engine

S= Sechs; 6 cylinder engine





ENGINE MODEL IDENTIFICATION

■ How to read the model number

■ Ex: V1505-E

– 1505=Approximate Displacement (cc.)

662= 656 cc

722= 719 cc

1105= 1123 cc

1505= 1498cc

1903= 1857 cc

2203= 2197 cc

3300= 3318cc



ENGINE MODEL IDENTIFICATION

- How to read the model number
- Series of engines:
 - NSM: Z482, D662, D722 (68 mm stroke)
 - 03 Series: D1703, V2203 (92.4 mm stroke)
 - 05 Series: D905, V1205 (73.6 mm stroke)
 - 05 Series: D1105, V1505 (78.4 mm stroke)





ENGINE MODEL IDENTIFICATION

■ How to read the model number

■ Ex: V1505-E



– E=for Environmental / Ecological [Clean Engine]

- Being Regulated
 - U.S.A.: CARB; ULGE Reg. Below 25HP
 - :EPA; SI Reg. Below 25HP
 - :EPA; Non-road CI Reg. 19 to 37kW
 - :EPA; Non-road CI Reg. 37 to 75kW
 - JAPAN: MOC; Tunnel Construction 7.5 to 260kW
 - EU: Non-road CI Reg. Exc. Ag.Tractor 37 to 75kW
- Under Consideration
 - JAPAN: EA; Special Vehicles 19 kW & Above



INTERCHANGEABILITY

- **New Super Mini Series(68 mm stroke)**
 - Z482/D662/D722
- **05 Series(73.6/78.4 mm stroke)**
 - D905/D1005/V1205/V1305. D1105/V1505
- **03 Series(92.4 mm stroke)**
 - D1403/D1703/V1903/V2003-T/V2203
- **Note:**All engine parts will not be interchangeable within an engine stroke family, but approximately 88% will be interchangeable. This benefit allows for parts to be stocked for many popular engines, with lower investment expense.



HOW to Read Serial Number

The **SERIAL NUMBER** is an identified number for the engine.

It is marked after the model number.

New Serial No. has been applied **since January , 1998.**

It indicates month & year of manufacture as follows.

year of manufacture

Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Code	W	X	Y	1	2	3	4	5	6	7	8	9

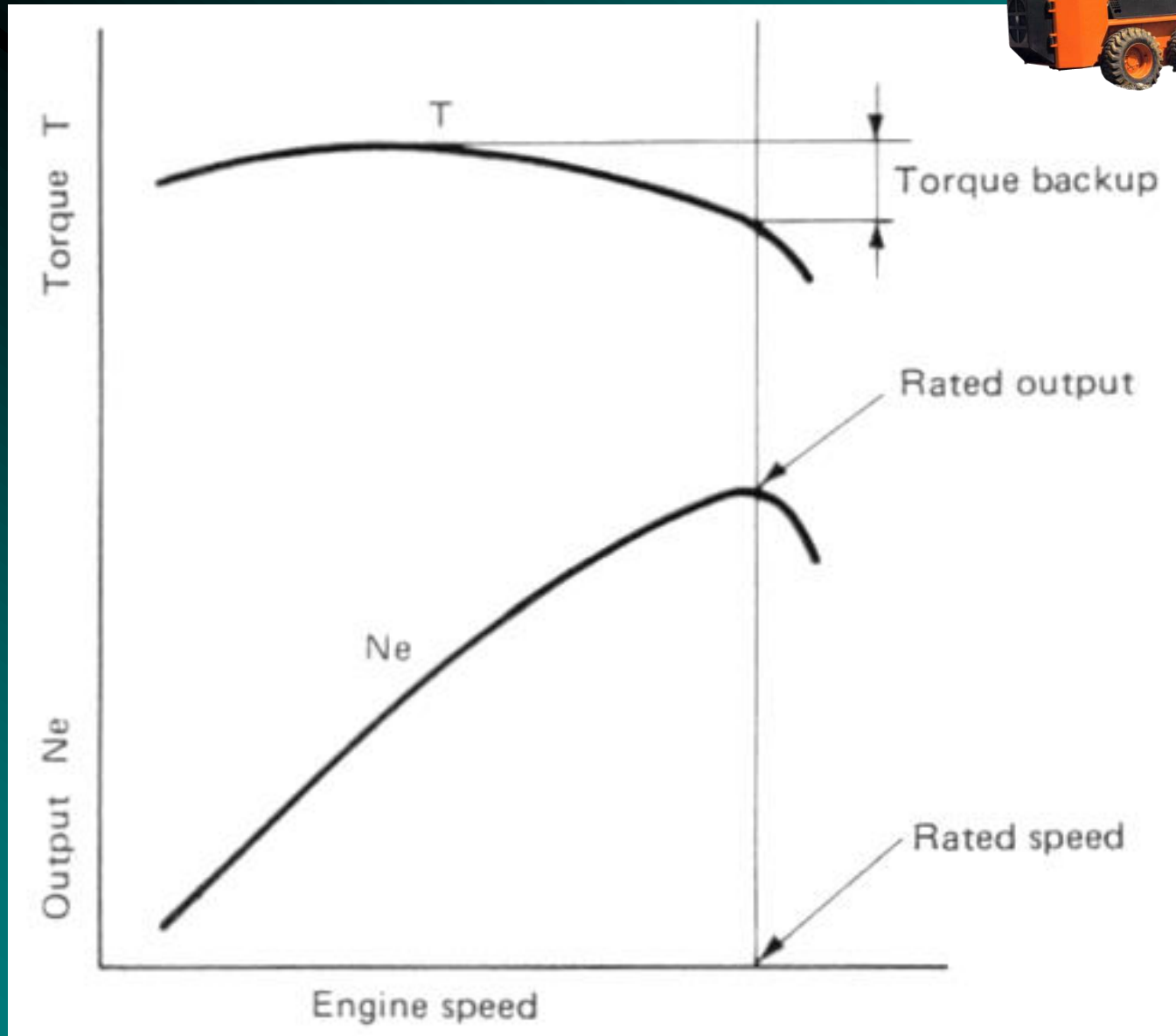
month of manufacture

Serial No.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0001~9999	A	C	E	G	J	L	N	Q	S	U	W	Y
0001~9999 (actually 10000~19998)	B	D	F	H	K	M	P	R	T	V	X	Z

e.g. **D722-WA0001** “W” indicates **1998** and “A” indicates **January.**

So ,**WA** indicates that the engine was **manufactured on January , 1998.**

Power Curves

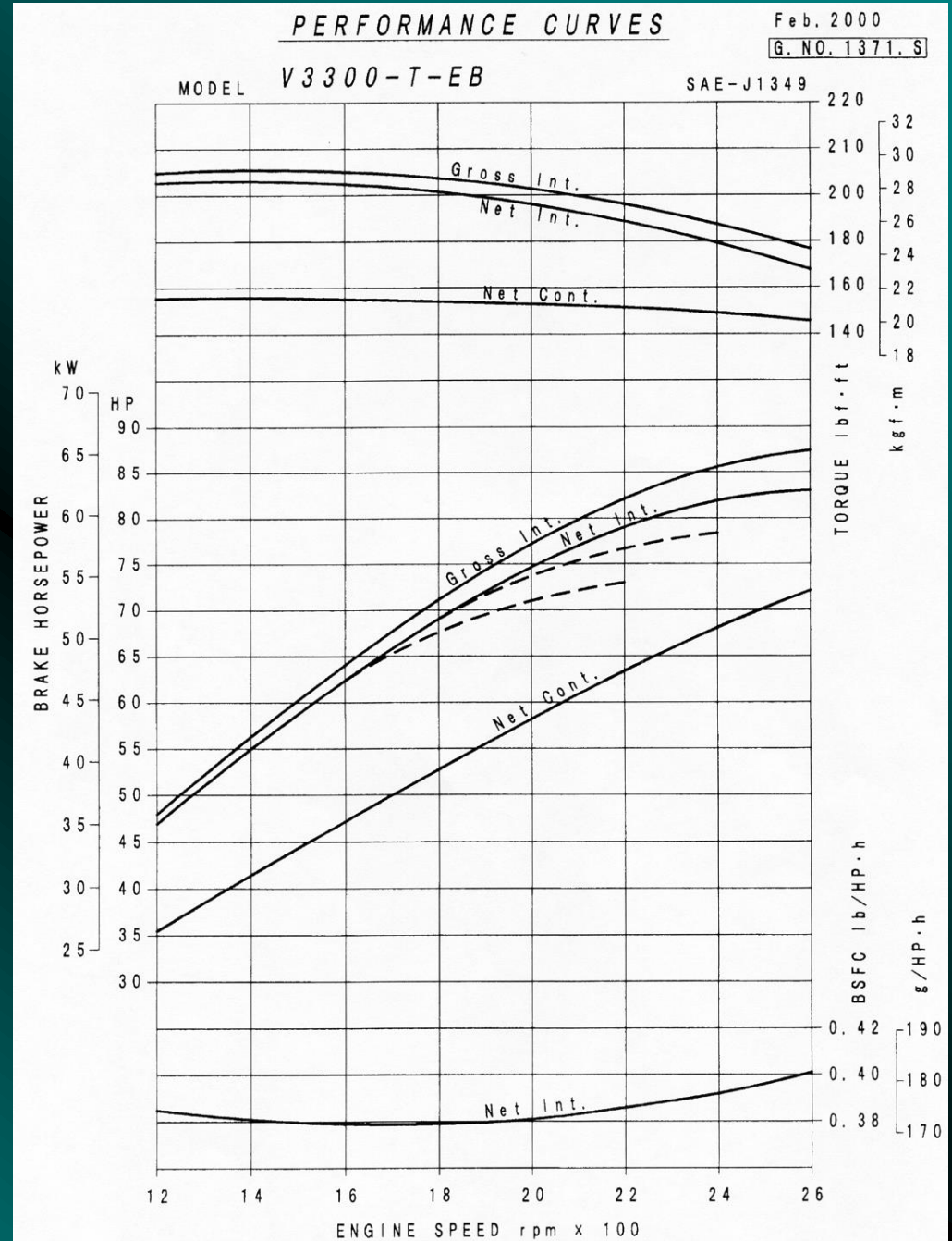




Power Curves

$$\text{Hp} = (\text{t} \times \text{rpm}) / 5252$$

$$\text{Torque} = (\text{hp} \times 5252) / \text{rpm}$$





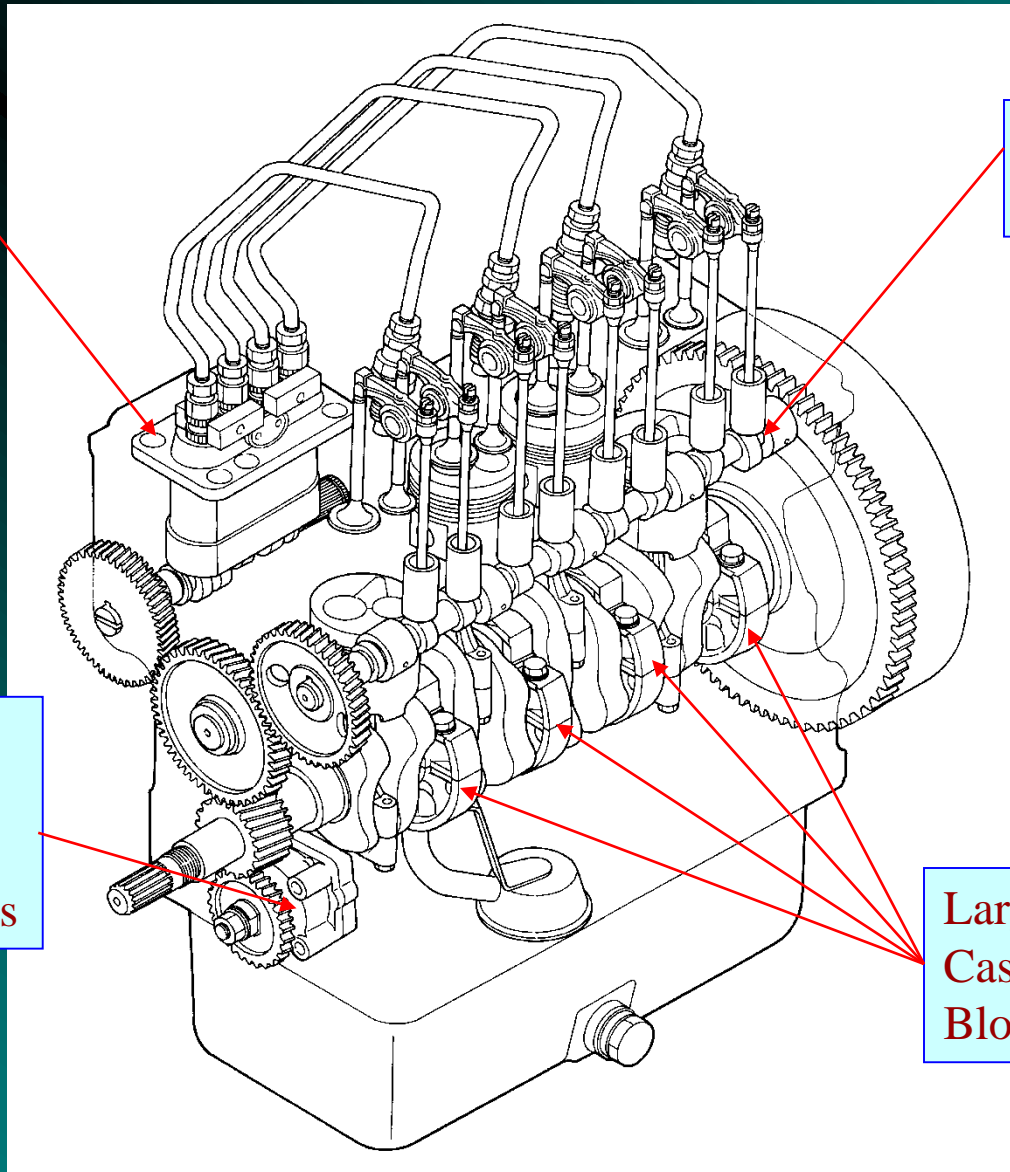
Typical Kubota Engine

Injection
Pump In
Block

High Mounted
Camshaft

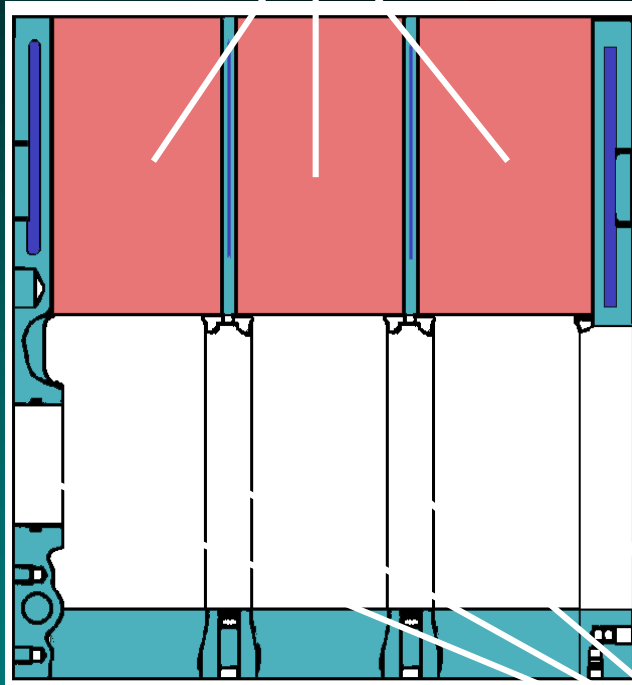
Two Types of
Oil Pump
Mounting for
Kubota Engines

Large Main Bearing
Cases for Tunnel
Block Design

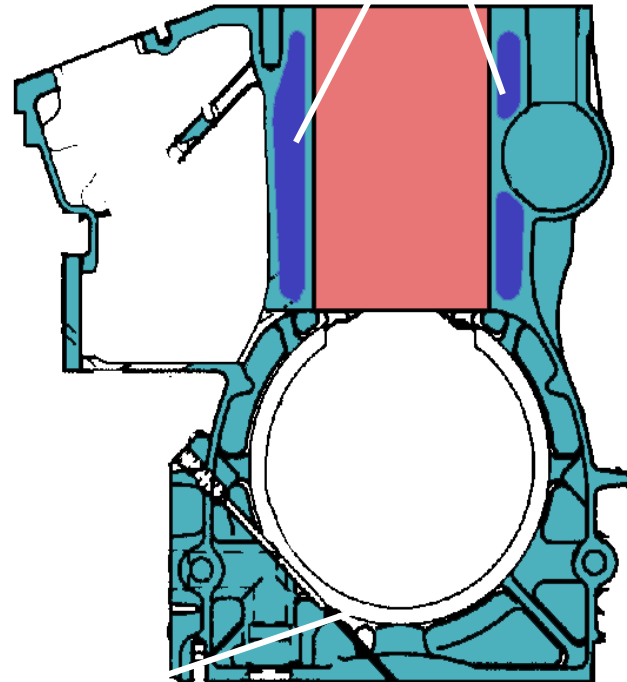


“Tunnel” type Crankcase

Cylinder Liner



Water Jacket

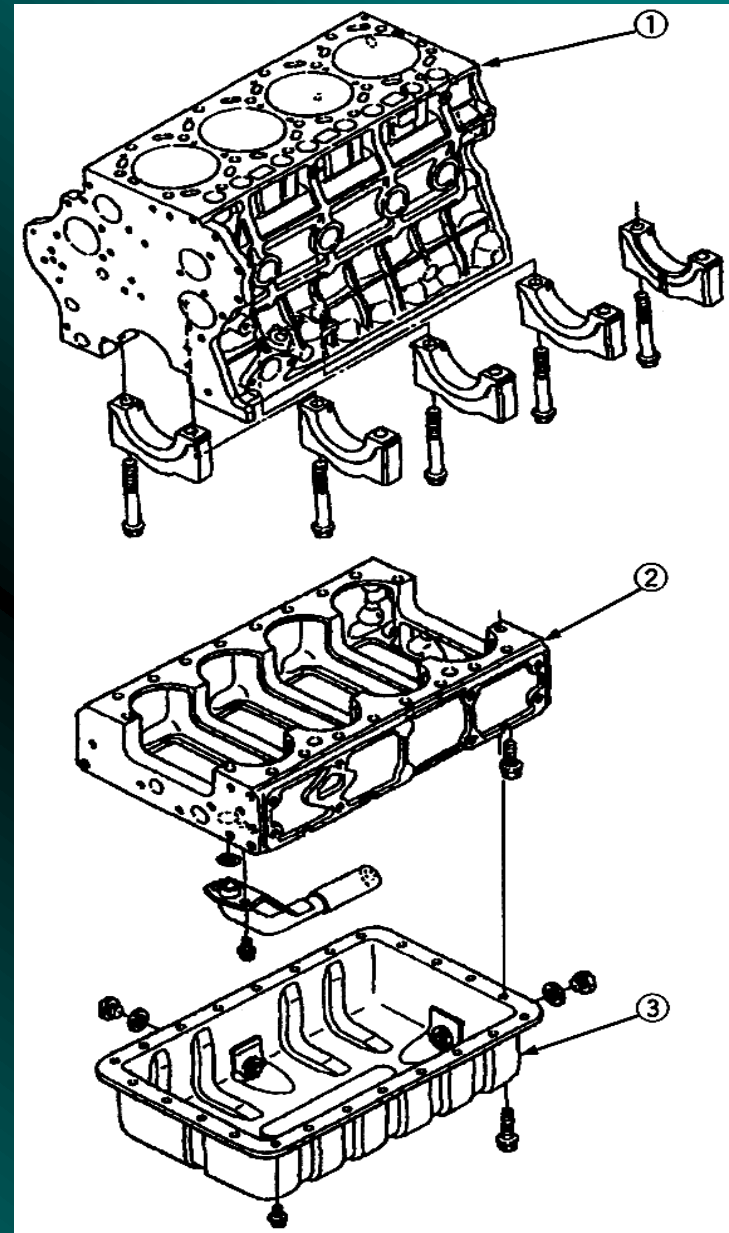


Main Journal

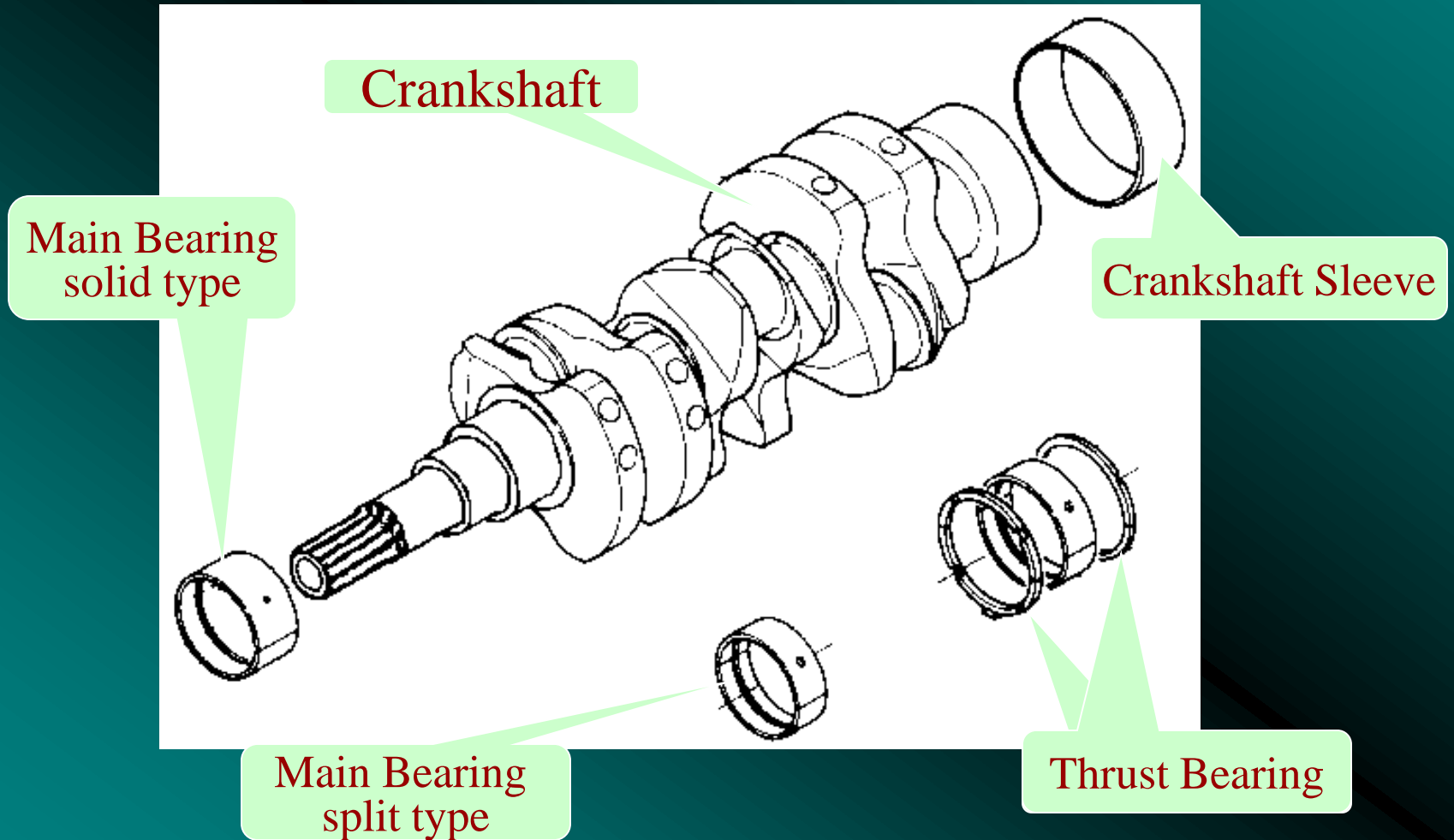


V3300 - Split Crankcase

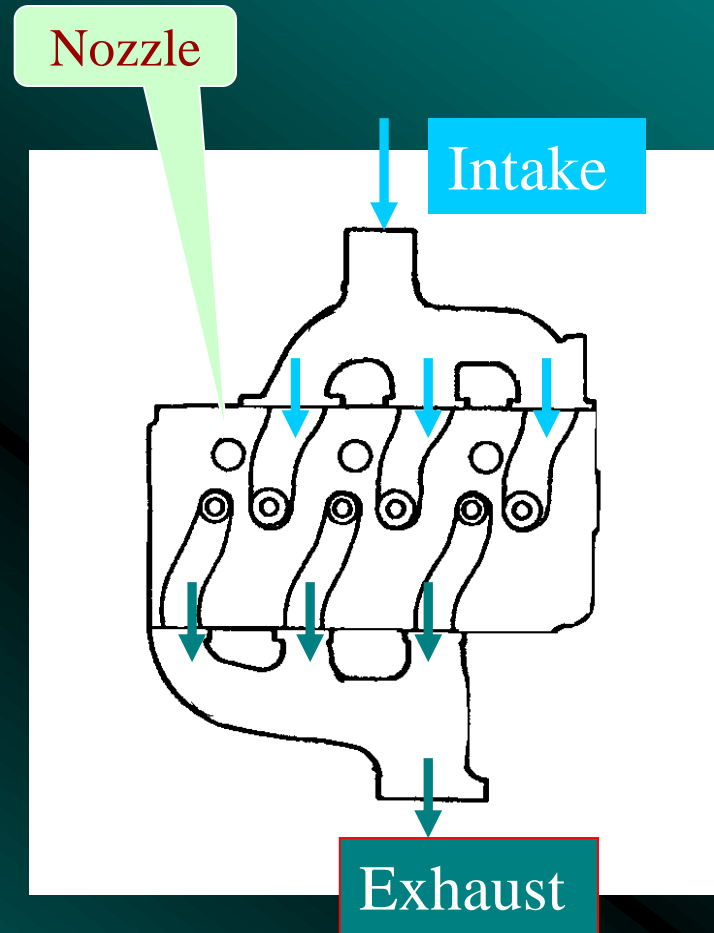
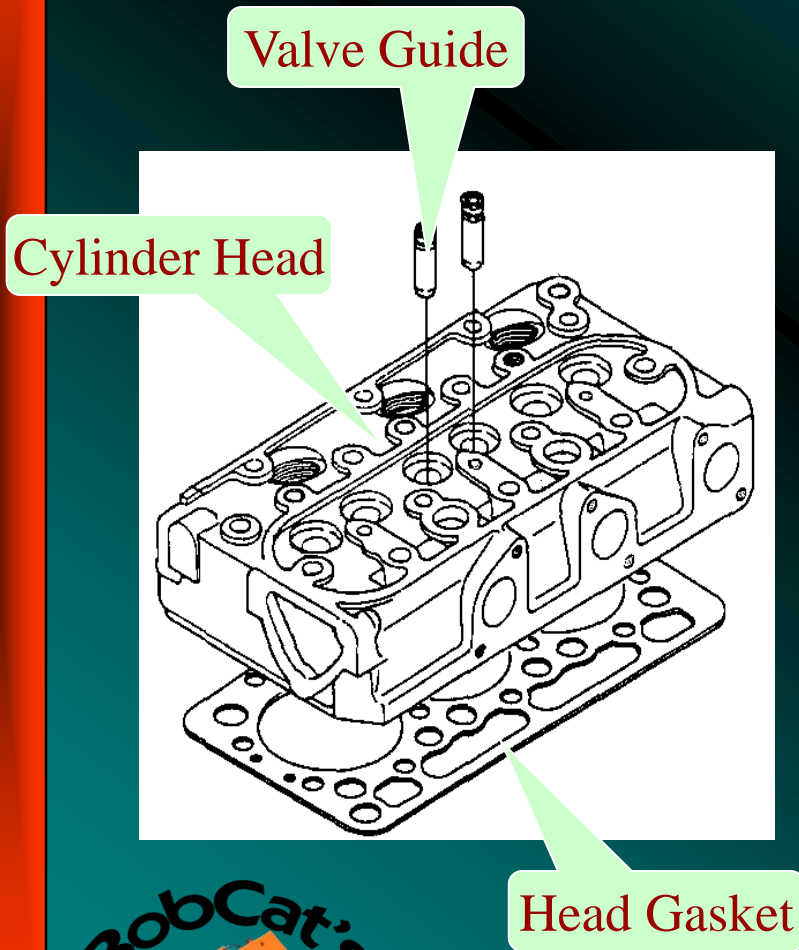
- 1) Crankcase 1
- 2) Crankcase 2
- 3) Oil Pan



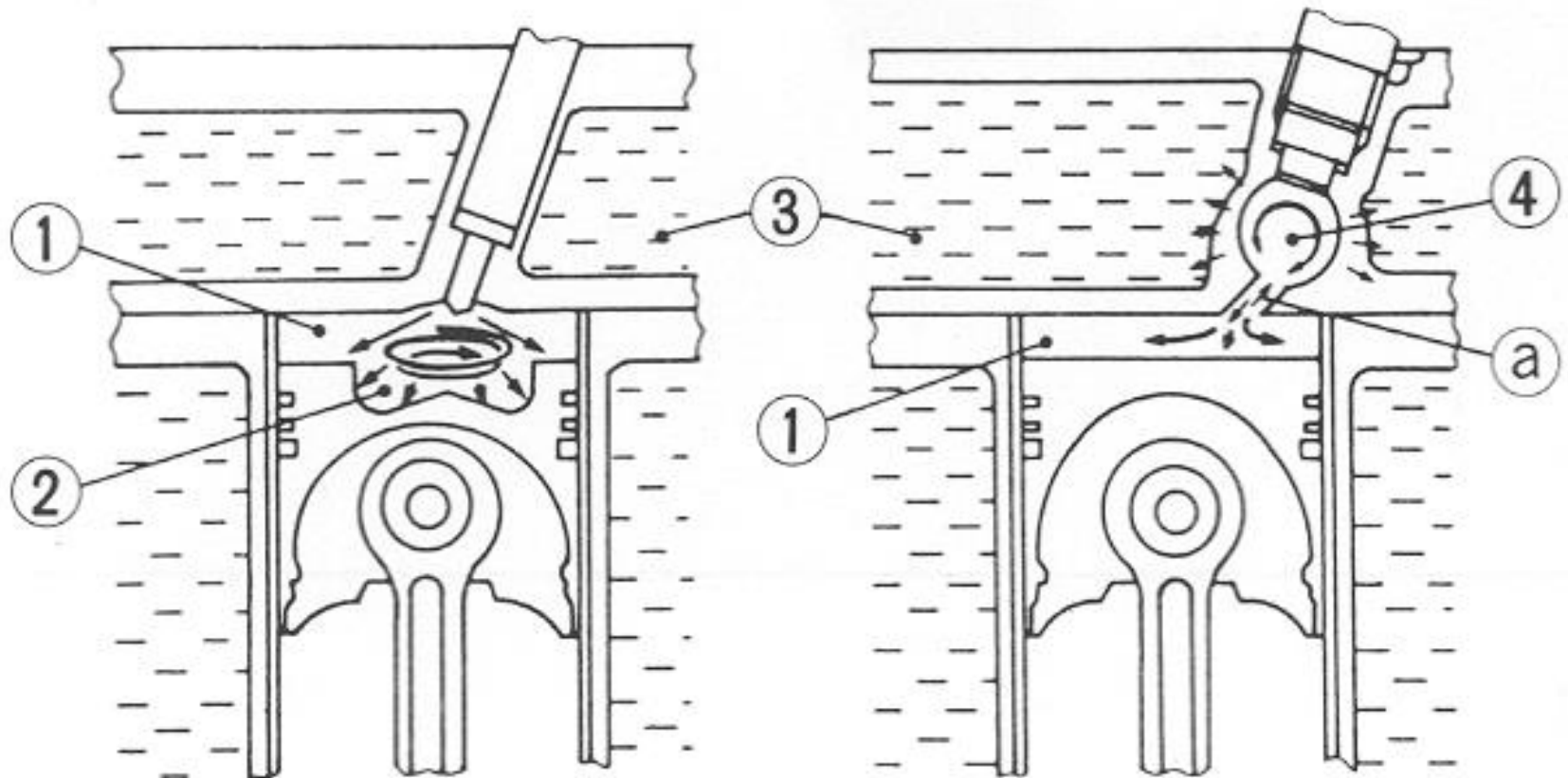
Crankshaft



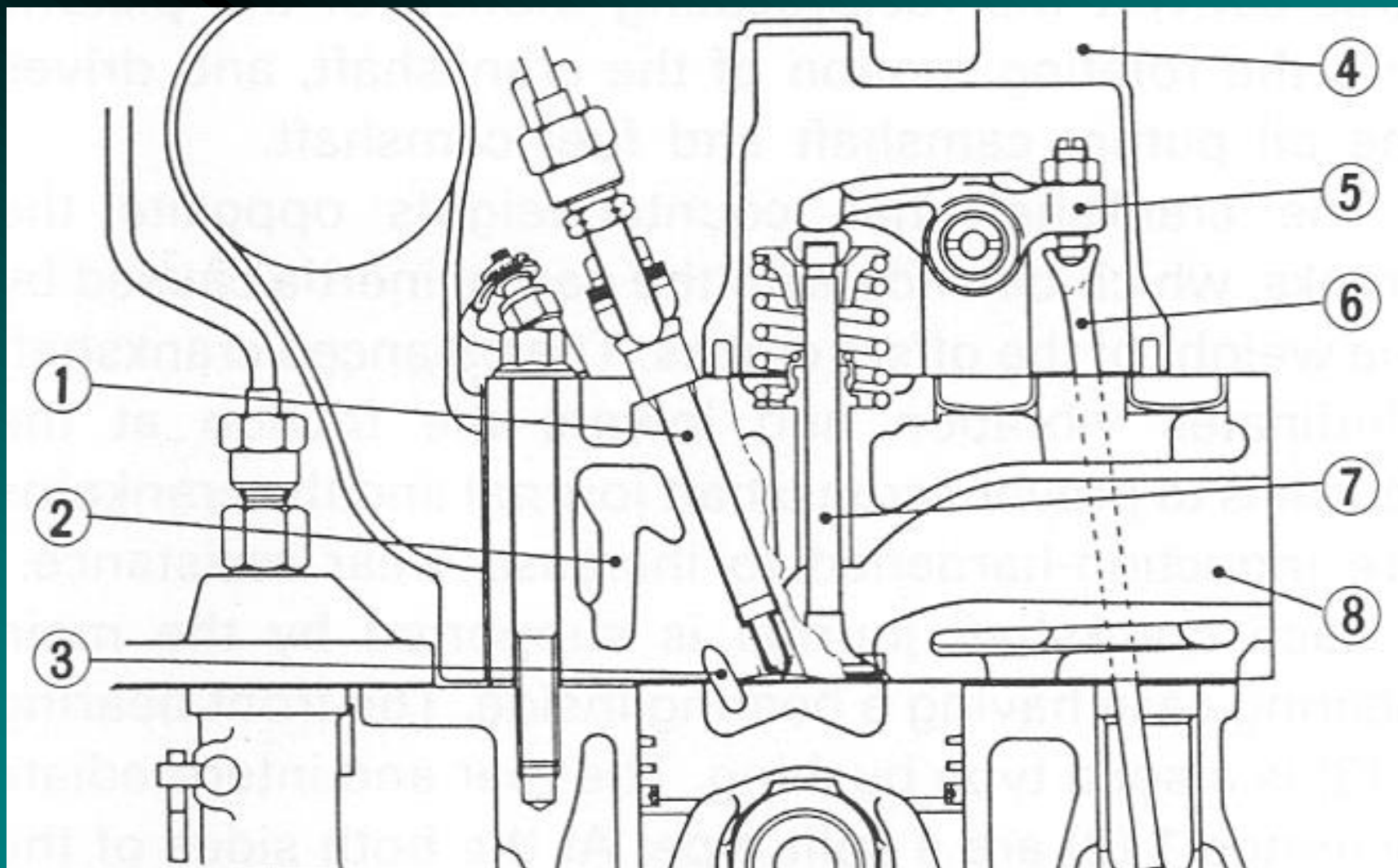
Cylinder Head



DI and IDI combustion types

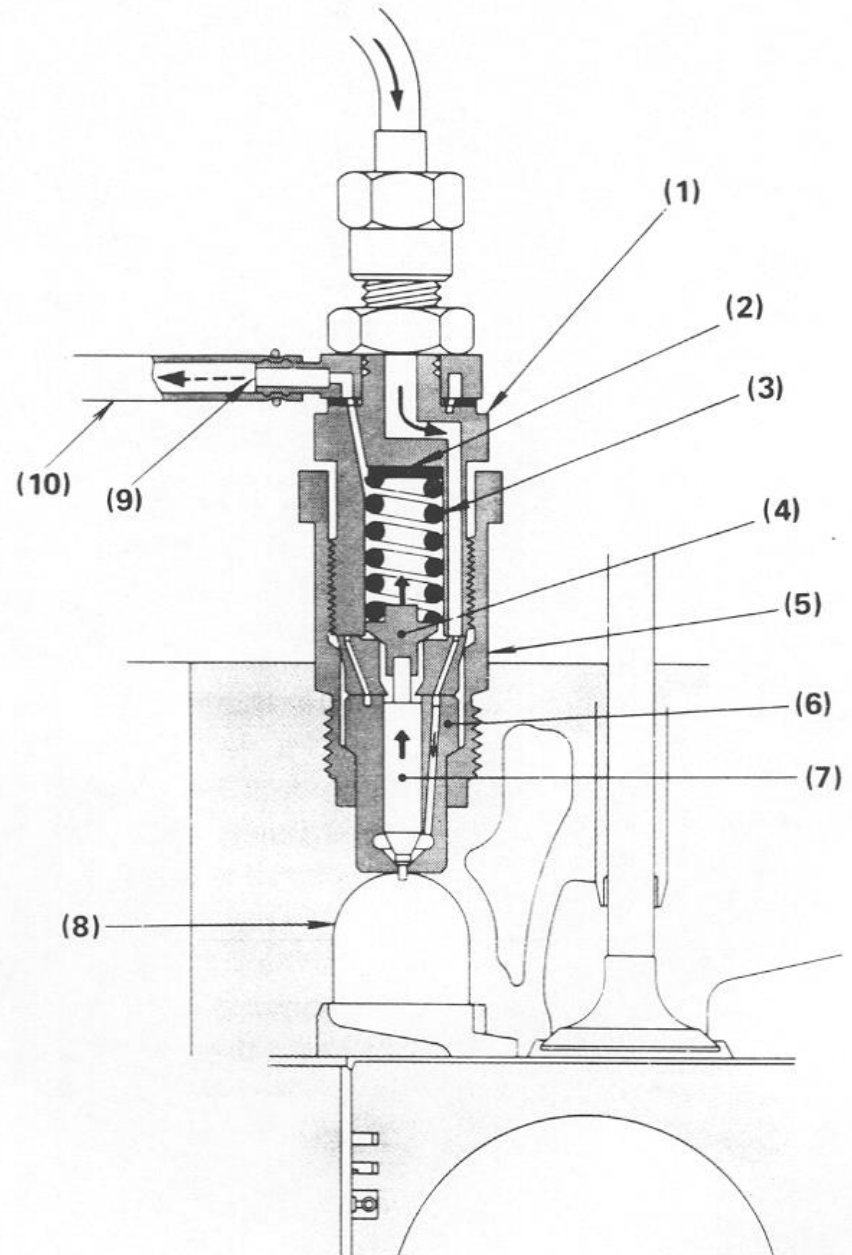


DI 03 series



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I D I 70mm and 82mm families





Three Vortex

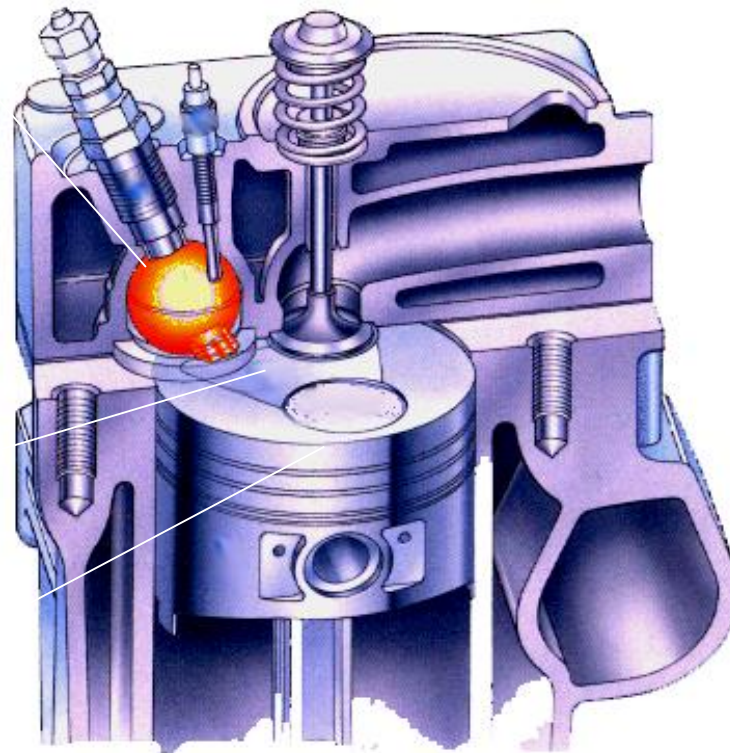
Fan-shaped
Concave

Valve Recess

Combustion
Chamber

Nozzle

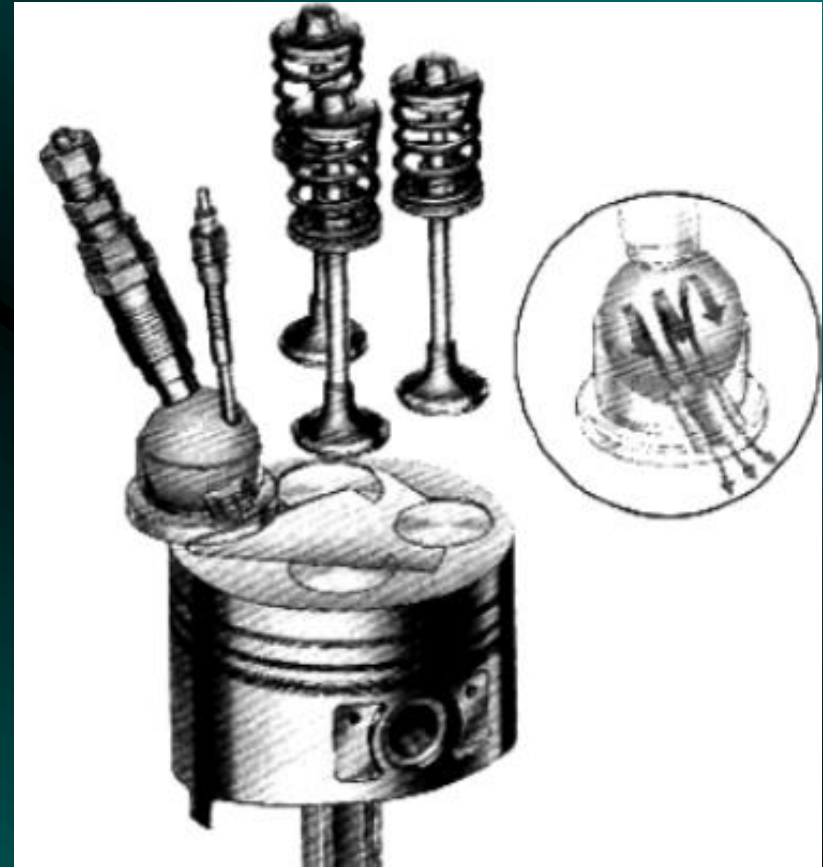
Glow Plug

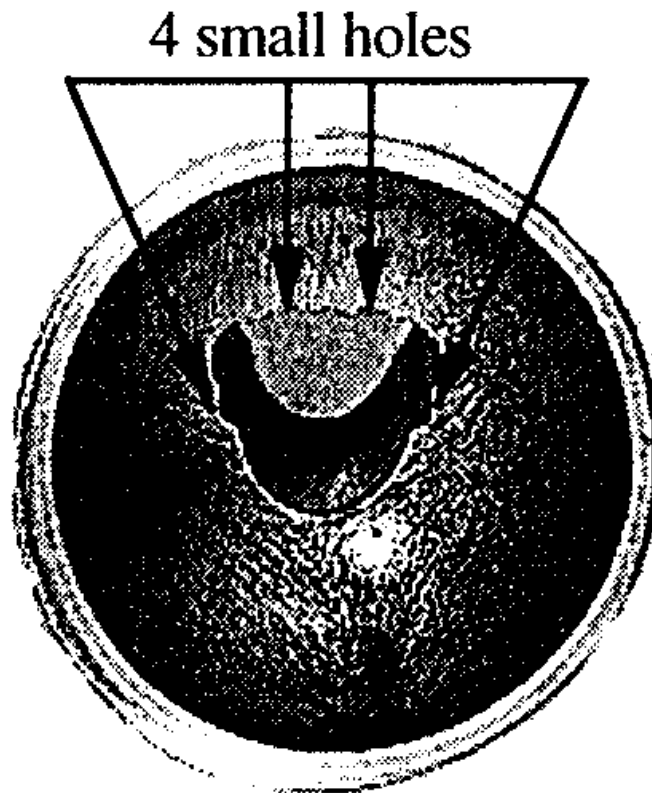




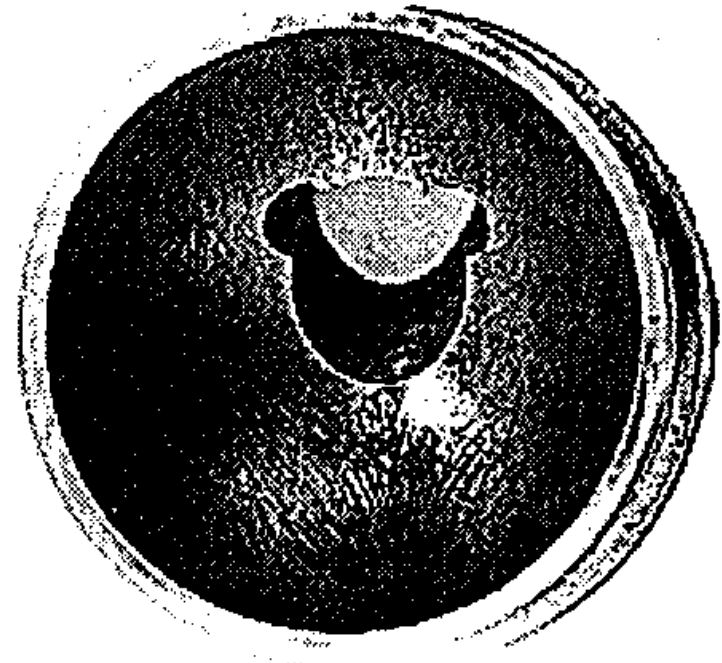
V3300 - 3 Valves per Cylinder

- 2 Intake Valves per Cylinder
- 2 Intake Ports per Cylinder for reduced turbulence in ports
- Significant increase in combustion efficiency



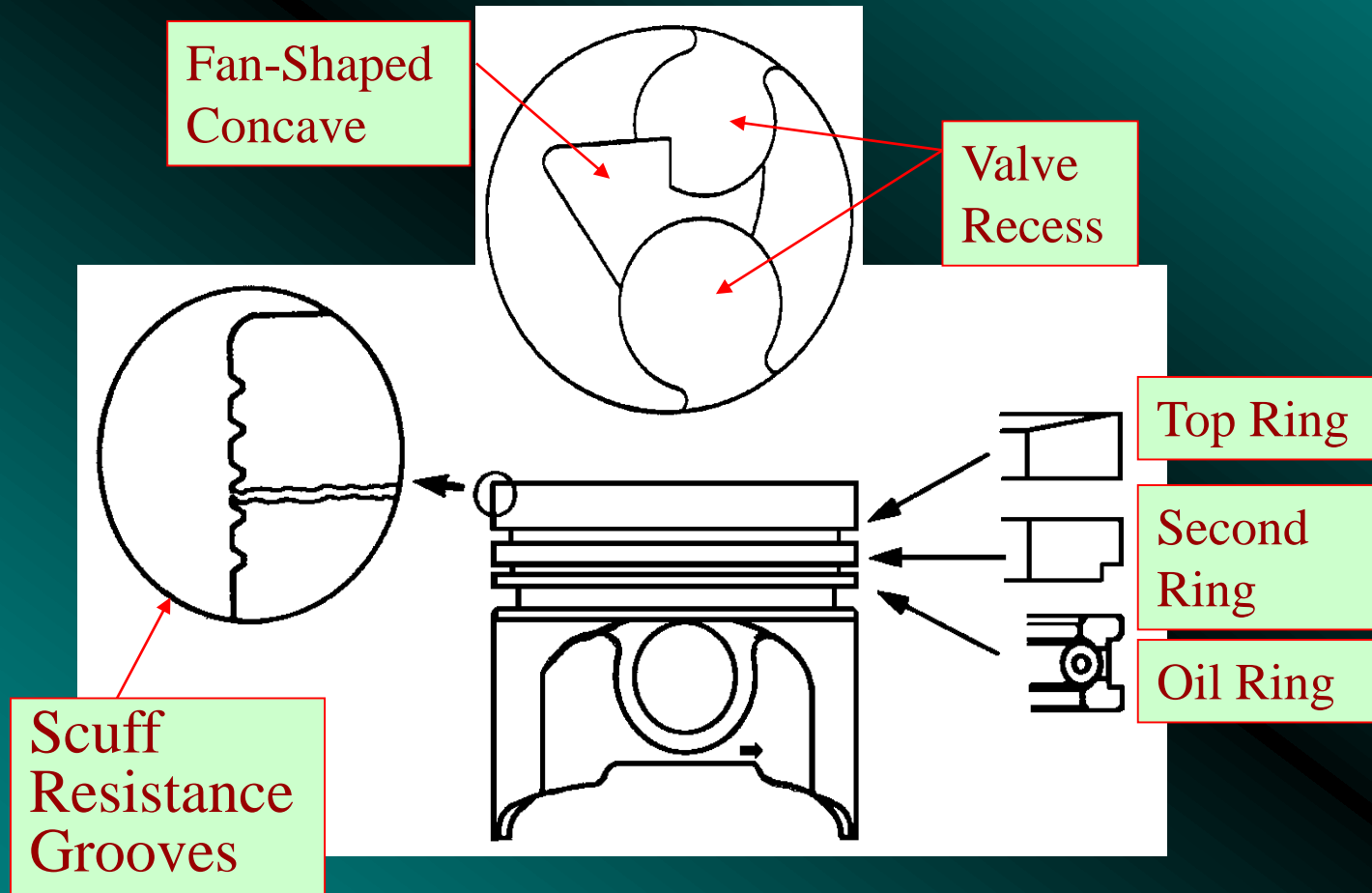


Extra 4 small holes type



3 holes type

Piston & Piston Ring



I.D.I. (Indirect Injection - swirl chamber)



D.I. (Direct injection)



T.V.C.S. (Three Vortex Combustion System)



Introduced a combustion chamber with Three intense air flow swirls(Vortexes)

N.T.V.C.S. (New Three Vortex Combustion System)



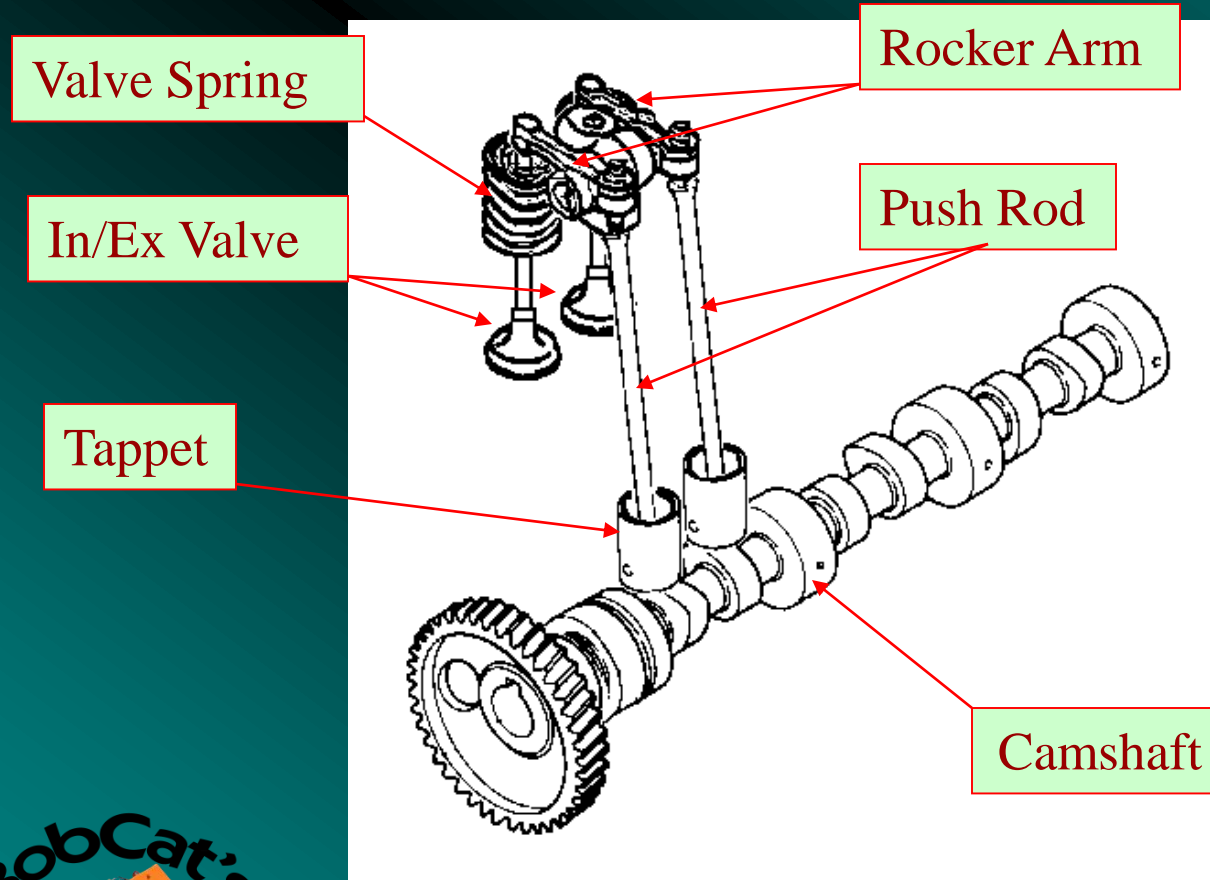
Added to the T.V.C.S. special concave recess on the piston crown.

E.T.V.C.S. (Environment Three Vortex Combustion System)

Modification of the N.T.V.C.S. to drastically reduce exhaust emissions.

E-Series E.T.V.C.S. engines will be identified with a new label on the cylinder head cover with the "E" character (eg. D1105-E).

Valve Mechanism





IDI

70mm and 82mm families combustion chamber caps



Replacement caps

70mm stroke series

15261-03142

(D650 15281-03142)

82mm stroke series

15521-03143

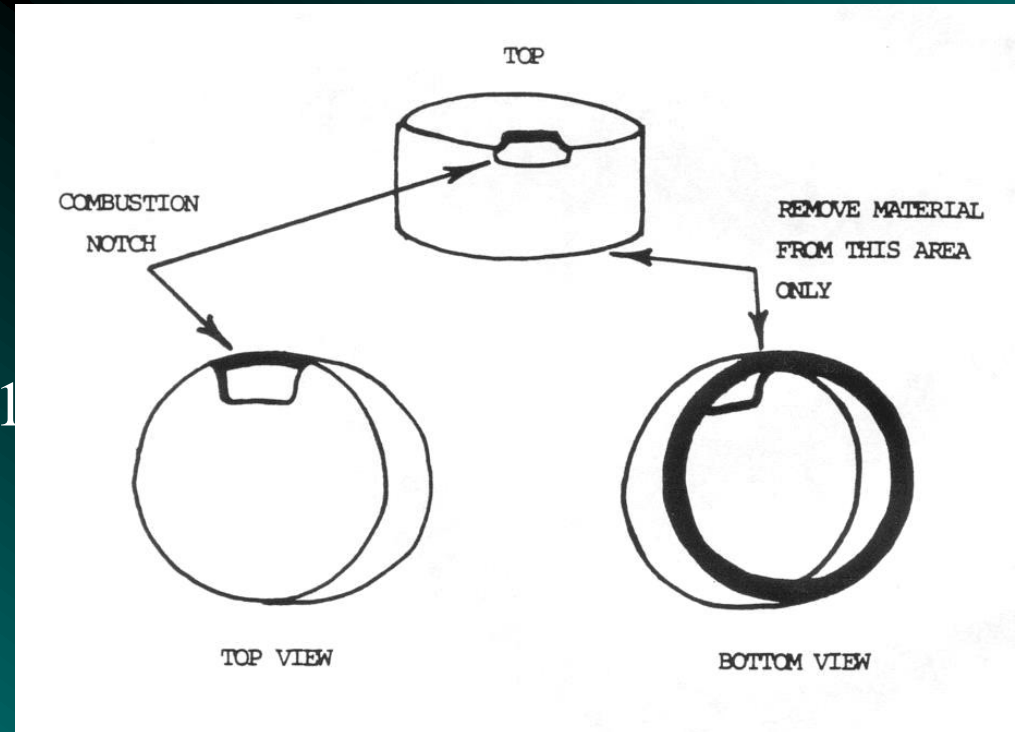
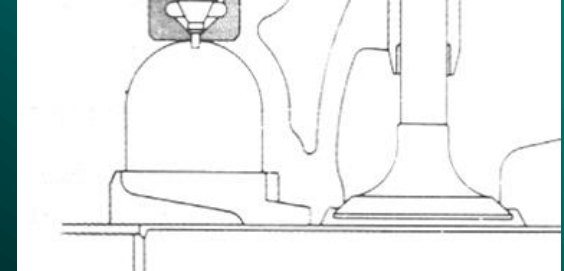
D1402, V1902, S2800

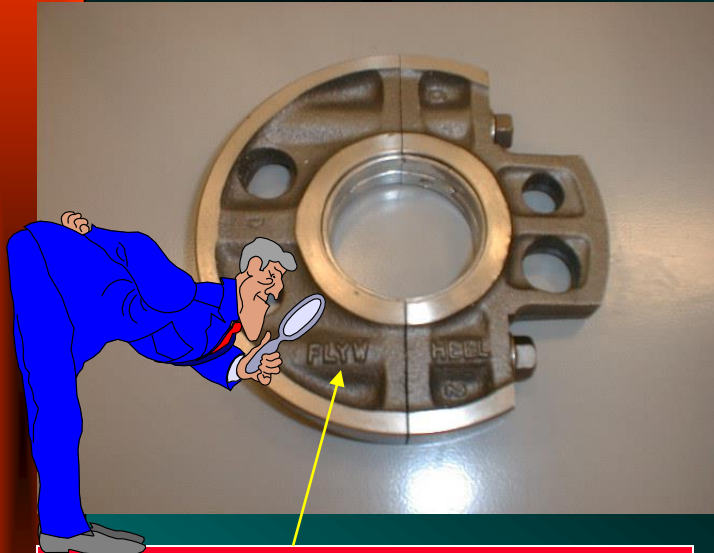
15291-03143

Z751, Z851, D1101, D1301

D1102, D1302, V1502,

V1702, S2200, S2600





Connecting Rod:

Numbers must line up, and must be installed toward injection pump side



Main Bearing Cases:
Marked "Flywheel" on
flywheel side of case

Pistons: Indentation on piston
must be toward injection
pump side of engine.

