

Specifications Section

i02810716

Engine Design

SMCS Code: 1201

S/N: DWB1-Up

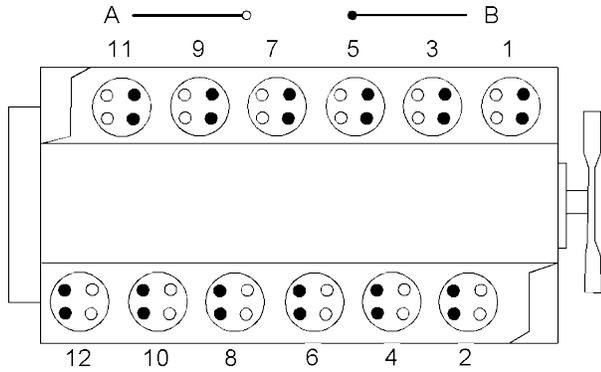


Illustration 1 g01113721

(A) Inlet valves
(B) Exhaust valves

- Bore 137.2 mm (5.40 inch)
- Stroke 152.4 mm (6.00 inch)
- Displacement 27 L (1648 cu in)
- Compression ratio 15:1
- Cylinder arrangement 65 degrees V 12
- Valves per cylinder 4
- Type of combustion Direct injection
- Valve lash with engine stopped (cold)
 - Inlet 0.38 ± 0.08 mm (0.015 ± 0.003 inch)
 - Exhaust 0.76 ± 0.08 mm (0.030 ± 0.003 inch)

Note: The front of the engine is opposite of the flywheel end of the engine. The left side and the right side of the engine are viewed from the flywheel end of the engine. The No. 1 cylinder is the front cylinder on the left side. The No. 2 cylinder is the front cylinder on the right side.

The crankshaft rotation is viewed from the flywheel end of the engine.

Crankshaft rotation Counterclockwise

Note: Number one cylinder is the front cylinder on the left side of the cylinder block. Number two cylinder is the front cylinder on the right side of the cylinder block.

Firing order 1, 10, 9, 6, 5, 12, 11, 4, 3, 8, 7, 2

i02810723

Engine Design

SMCS Code: 1201

S/N: SXC1-Up

S/N: MED1-Up

S/N: WDR1-Up

C32

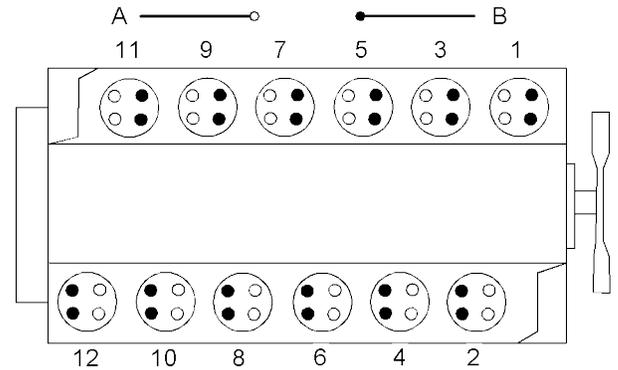


Illustration 2 g01113721

(A) Inlet valves
(B) Exhaust valves

- Bore 145 mm (5.7 inch)
- Stroke 165 mm (6.5 inch)
- Displacement 32 L (1953 cu in)
- Compression ratio 15:1
- Cylinder arrangement 65 degree V 12
- Valves per cylinder 4
- Type of combustion Direct injection
- Valve lash measurement
 - Inlet 0.38 ± 0.08 mm (0.015 ± 0.003 inch)
 - Exhaust 0.76 ± 0.08 mm (0.030 ± 0.003 inch)
- Crankshaft rotation direction (view from the flywheel end) Counterclockwise

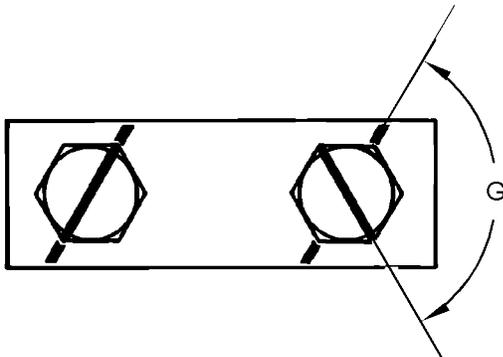


Illustration 39

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Marks for tightening main bearings

1. Apply clean engine oil on the threads of the main bearing cap bolts (8). Loosely install the main bearing cap bolts (8).
2. Apply clean engine oil on the threads of the side bolts (6) and the washers. Loosely install the side bolts and the washers.
3. Tighten the main bearing cap bolts (8) first on the main bearing tab side of the main bearing cap (7) to 258 ± 14 N·m (190 ± 10 lb ft).
4. Tighten the main bearing cap bolts (8) that are opposite the main bearing tab side of the main bearing cap (7) to 258 ± 14 N·m (190 ± 10 lb ft).
5. Put a mark on each main bearing cap bolt (8) and each main bearing cap (7). See Illustration 39.
6. Tighten the main bearing cap bolts (8) that are placed opposite the main bearing tab side of the main bearing cap (7) from the mark by angle (G) of 120 ± 5 degrees.
7. Tighten the main bearing cap bolts (8) that are placed on the main bearing tab side of the main bearing cap (7) from the mark by angle (G) of 120 ± 5 degrees.
8. Tighten the side bolts (6) that are opposite the main bearing tab side of the main bearing cap (7) to 80 ± 10 N·m (60 ± 7 lb ft).
9. Tighten the side bolts (6) that are placed on the main bearing tab side of the main bearing cap (7) to 80 ± 10 N·m (60 ± 7 lb ft).

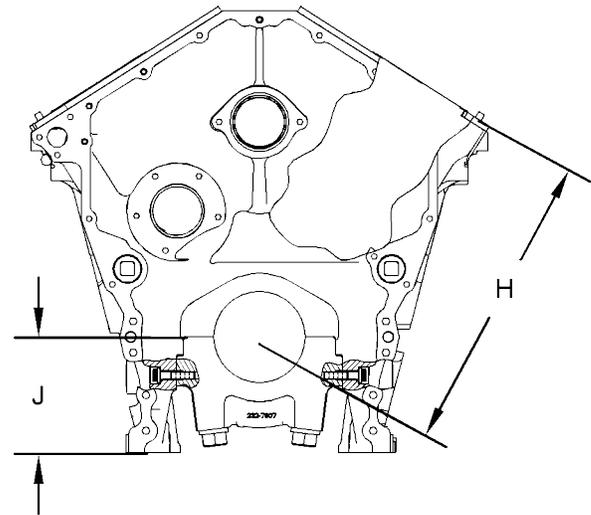


Illustration 40

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- (H) The distance from the centerline of the crankshaft bearing bore to the top of the cylinder block ... 419.10 ± 0.15 mm (16.500 ± 0.006 inch)
- (J) The distance from the centerline of the crankshaft bearing bore to the bottom of the cylinder block 165.10 ± 0.10 mm (6.500 ± 0.004 inch)

i02811418

Cylinder Liner

SMCS Code: 1216

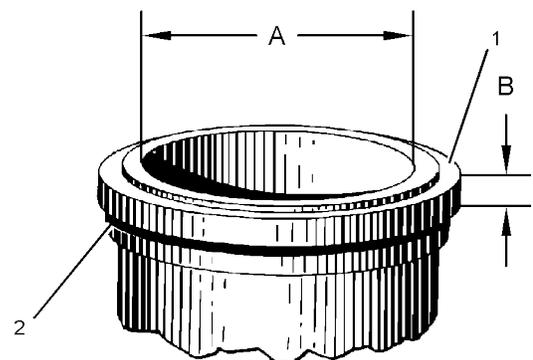
Part No.: 197-9322
S/N: DWB1-UpPart No.: 197-9322
S/N: SXC1-UpPart No.: 197-9322
S/N: WDR1-Up

Illustration 41

g01402328

i02801090

Connecting Rod

SMCS Code: 1218

Part No.: 232-3232
S/N: DWB1-Up

Part No.: 215-1955, 232-3232
S/N: SXC1-Up

Part No.: 215-1955, 232-3232
S/N: MED1-Up

Part No.: 215-1955, 232-3232
S/N: WDR1-Up

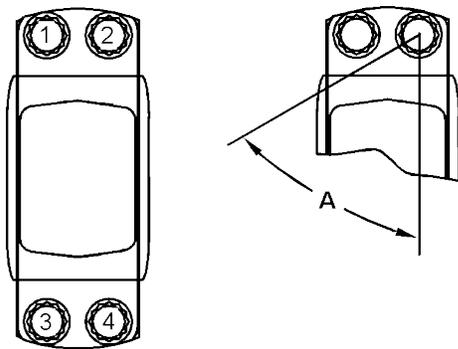


Illustration 48

g01318414

Tightening sequence, and index mark for torque-turn process
(1),(2),(3),(4) Bolts for rod cap

Note: The connecting rods should be installed in the engine so that the part number of the forging for the rod assembly is facing the connecting rod that is on the same crankshaft pin. The opposite side of the connecting rods will face the thrust surface of the crankshaft journal.

Use the following procedure for tightening the bolts for the rod cap:

1. Prior to assembly, lubricate the threads of the bolts and the seating face of the bolt heads with clean engine oil.
2. Finger tighten all of the bolts.
3. Tighten bolts (1) and (3) to 70 ± 4 N·m (50 ± 3 lb ft).
4. Tighten bolts (2) and (4) to 70 ± 4 N·m (50 ± 3 lb ft).

Note: Use a paint stick to place an index mark on each of the bolts. Use the index mark as a reference in order to torque the bolts for an additional angle.

5. Tighten bolts (2) and (4) by an additional angle (A) of 60 ± 5 degrees.

6. Tighten bolts (1) and (3) again to 70 ± 4 N·m (50 ± 3 lb ft).

7. Tighten bolts (1) and (3) by an additional angle (A) of 60 ± 5 degrees.

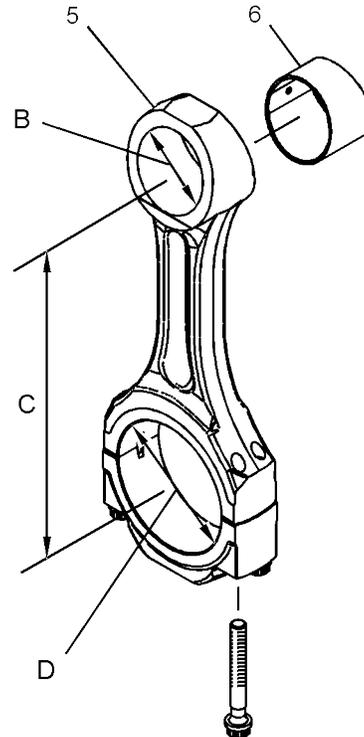


Illustration 49

g01399607

(6) Bearing for piston pin

(5) Connecting rod

- (B) Inside diameter of connecting rod of bearing for the piston pin 64.592 ± 0.013 mm
(2.5430 ± 0.0005 inch)
- (C) Distance between the center of the bore for the bearing for piston pin and the center of the bore for the crankshaft journal 274.91 mm
(10.823 inch)
- (D) Inside diameter of connecting rod for the crankshaft journal after the bearing for connecting rod has been installed and the bolts have been torqued. 103.500 ± 0.013 mm
(4.0748 ± 0.0005 inch)