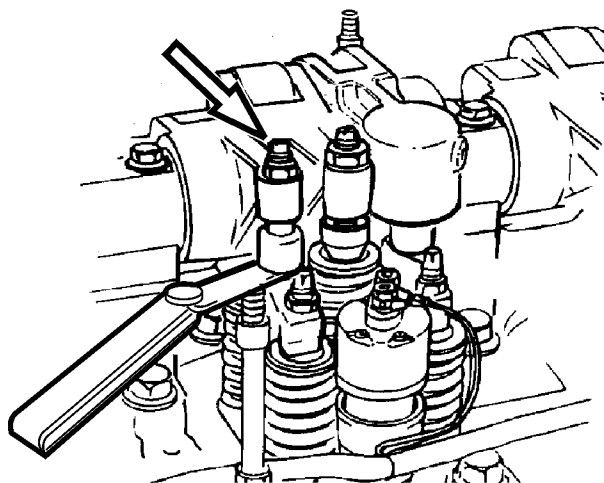


This TSI Service Bulletin replaces TSI Service Bulletin 214-013, "Valves, D12C" (11.2001), publication no. PV776-TSP160587.

Date	Group	No.	Supp.	Page
7.2004	<b>214</b>	<b>019</b>		1(11)

## Valve and Injector Adjustment with VEB D12, D12A, D12B, D12C

### Valve and Injector Adjustment with VEB



W2004459

This information covers procedures for adjusting valves and injectors on VOLVO D12, D12A, D12B, and D12C engines.

### Contents

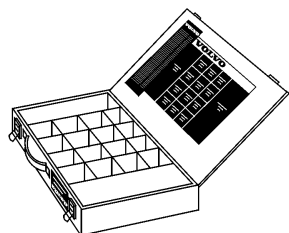
- ["Special Tools" page 2](#)
- ["Valves and Unit Injectors, Adjustment" page 3](#)

**Note:** Information is subject to change without notice. Illustrations are used for reference only and may differ slightly from the actual vehicle being serviced. However, key components addressed in this information are represented as accurately as possible.

## Tools

### Special Tools

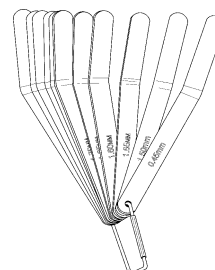
For special tools ordering instructions, refer to Tool Information, group 08.



W0001924  
**3949521**  
VEB shim kit



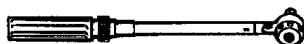
W0001774  
**9996956**  
Engine turning tool



W0000416  
**J41610**  
Feeler gauge set

### Other Special Equipment

Like special tools, the following items can be ordered directly from Volvo. Please refer to the specific tool number when ordering.



C2001260  
**1159794**  
Torque Wrench

# Service Procedures

## 2140-05-03-01

### Valves and Unit Injectors, Adjustment

(Valve cover removed.)

You must read and understand the precautions and guidelines in Service Information, group 20, "General Safety Practices, Engine" before performing this procedure. If you are not properly trained and certified in this procedure, ask your supervisor for training before you perform it.

**Note:** Variant abbreviations are used to identify an engine equipped with the following components:

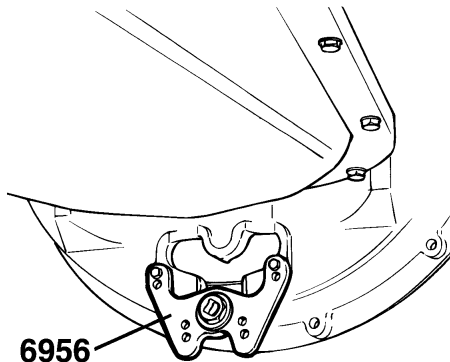
**VEB** Volvo Engine Brake

*Special tools: 3949521, 9996956, J41610*  
*Other special equipment: 1159794*

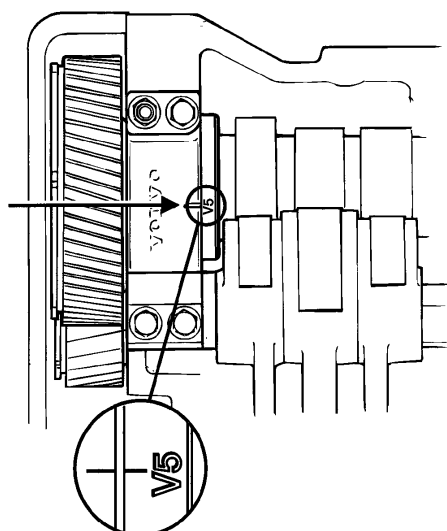
**1**

Remove the flywheel inspection cover from the flywheel housing. Install engine turning tool 9996956.

9996956



T2006672



W2004440

**2**

**Camshaft markings for setting of valves and unit injectors:**

- Markings 1–6, apply to adjustment of intake valves and unit injector.
- Markings V1–V6, apply to adjustment of exhaust valves only.

## Valve and Unit injector, adjustment

### 3

Loosen lock nut and back off adjusting screw until it no longer makes contact with the injector socket.

### Valve and Injector Settings

Cam Position	Injector	Intake	Exhaust
5	X	X	
V6			X
3	X	X	
V2			X
6	X	X	
V4			X
2	X	X	
V1			X
4	X	X	
V5			X
1	X	X	
V3			X

### 4

Adjust the unit injector's adjusting screw to zero clearance.

### 5

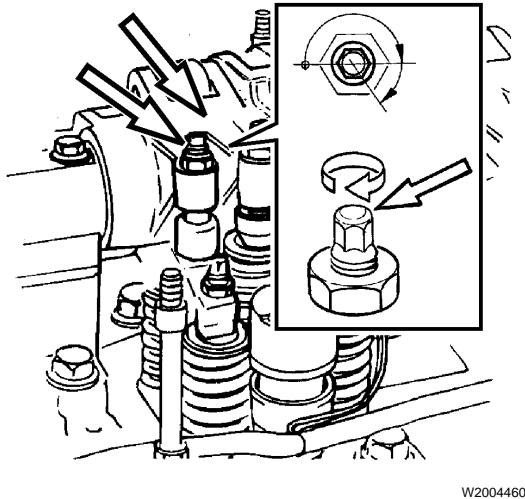
Tighten the adjusting screw 4 flats or 240°.

### 6

Torque-tighten the adjusting screw lock nut to 52 ± 4 Nm (38 ± 3 ft-lb).

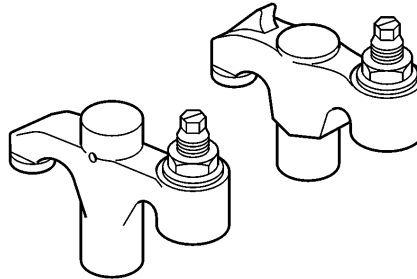
**Note:** Mark the rocker arm and injector rocker when each valve has been adjusted.

52 ± 4 Nm  
(38 ± 3 ft-lb)



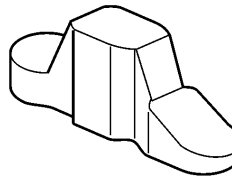
## Intake and Exhaust Valve Bridge Adjustment

7



T2019496

Valve bridge with guide

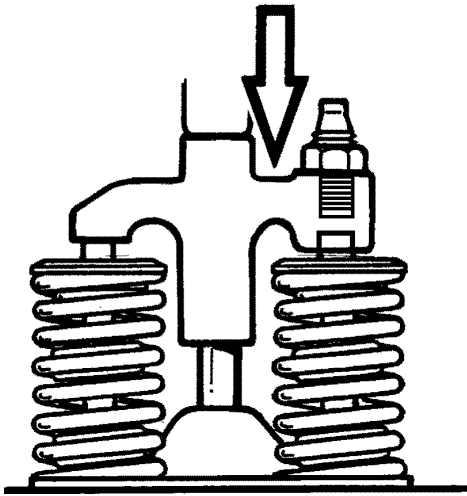


W2004467

Valve bridge without guide

**Note:** A valve bridge design (without guide pin) is used in D12 engines. These may be installed in combination with the current valve bridge design with guide pin. The procedure for adjusting valves remains the same, except that the valve bridge without guide pin does not need adjusting. Valve clearances are also unchanged. For intake valves, the valve bridge without guide pin may be installed facing either direction. A valve bridge with guide pin must always be installed as a replacement component.

8



W2004433



### CAUTION

The valve bridge must be adjusted prior to the valve clearance adjustment that is related to it. Failure to do this can result in breakage or damage to the valve bridge guide.

**Note:** The valve bridge adjustment can only be made when there is clearance between the valve bridge and the rockerarm.

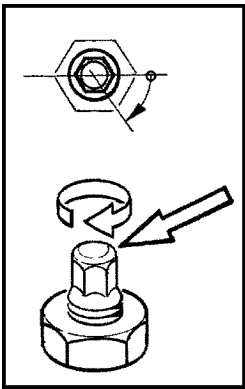
Adjust the valve bridge clearance:

- Loosen the adjusting screw lock nut.
- Loosen adjusting screw until it no longer contacts valve stem.
- Press valve bridge downward toward the valve stem.
- Tighten adjusting screw until it makes contact, then turn an additional 1 flat or 60°.
- Hold adjusting screw in place and torque-tighten nut to  $38 \pm 3$  Nm ( $28 \pm 2$  ft-lb).

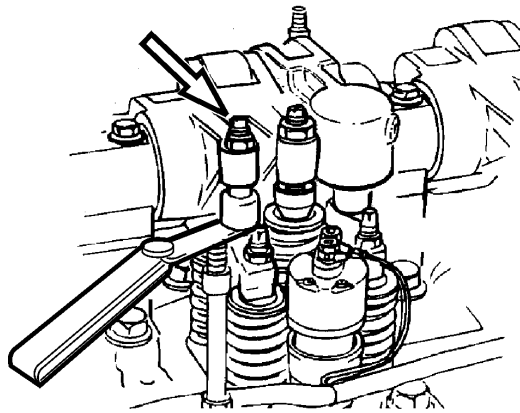
$38 \pm 3$  Nm  
( $28 \pm 2$  ft-lb)

9

Recheck valve clearance after nut is torque-tightened.



W2004468



W2004459

## Intake Valves, adjustment

### 10

With engine cold (140°F or less), adjust valve clearance to 0.2 mm (0.008 in.). Hold adjusting screw in place and torque-tighten lock nut to 38 ± 3 Nm (28 ± 2 ft-lb).

**Note:** Mark each valve rocker lever as you adjust it to know which valves have already been adjusted.

38 ± 3 Nm  
(28 ± 2 ft-lb)

### 11

Turn the engine to the next camshaft marking before adjusting another cylinder.

**Note:** Engine temperature at 140°F or less.

### Valve Clearance, Cold Engine Setting Valve

Inlet	0.2 mm (0.008 in.)
Exhaust VEB	1.6 mm (0.063 in.)

### Valve Clearance, Cold Engine Check Valve

Inlet	0.15 – 0.25 mm (0.006 – 0.010 in.)
Exhaust VEB	1.55 – 1.65 mm (0.061 – 0.065 in.)

Exhaust valves (VEB), adjustment

**12**  
Turn the engine to the next camshaft marking (“V” plus number) for the adjustment of exhaust valves.

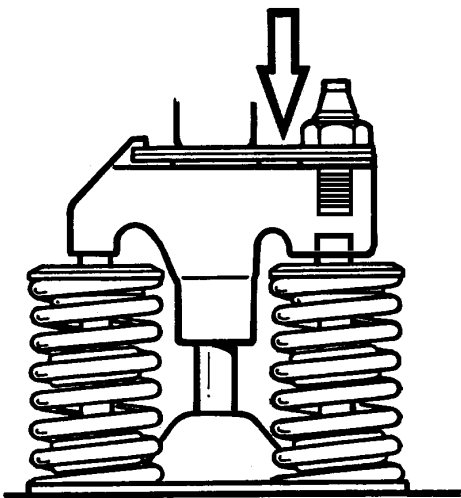
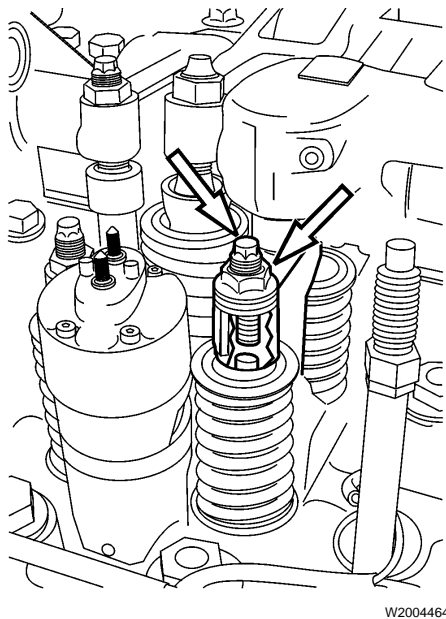
**13**  
Loosen the adjusting screw until the valve bridge does not make contact with the valve stem.

Valve and Injector Settings

Cam Position	Injector	Intake	Exhaust
5	X	X	
V6			X
3	X	X	
V2			X
6	X	X	
V4			X
2	X	X	
V1			X
4	X	X	
V5			X
1	X	X	
V3			X

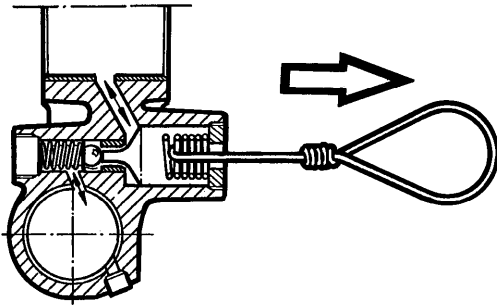
**14**  
Tighten the adjusting screw until it makes contact (zero clearance) against the valve stem. Turn an additional 1 flat or 60°. Do not tighten the adjusting screw lock nut at this point.

**Note:** When the adjusting screw is screwed down, the valve bridge must be pushed down at the same time until it makes contact with the valve stems.

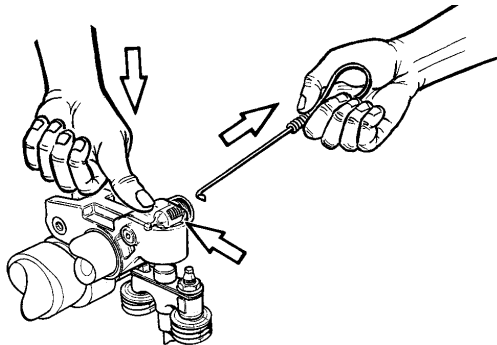




15



T2009074

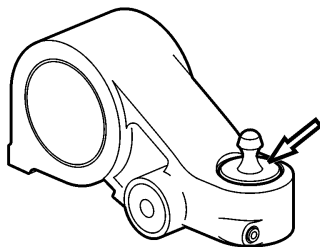


T2009009

Push the rocker arm down as shown. If the rocker arm “springs,” the rocker arm piston’s spring should be pulled outward while the rocker arm is pushed down until the piston makes contact with the VEB housing.

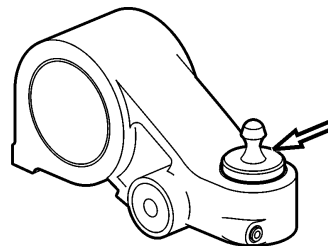
**Note:** Use a strong wire or a bent screwdriver to pull out the spring.

**Note:** For correct reading or measurement, make sure that the wire or the screwdriver has been well cleaned before they are used. Impurities between the rocker arm piston and the rocker arm can lead to the piston seizing and the brake function on the cylinder failing to work. Make sure that the piston’s sliding surface in the rocker arm is not damaged.



W2004447

VEB Compressed Piston in Housing  
(Correct valve lash adjustment)



W2004446

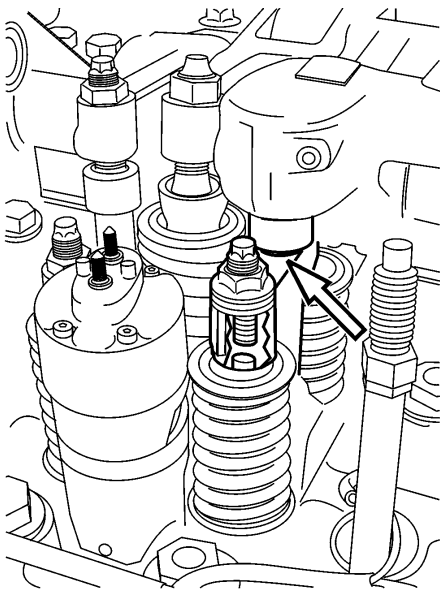
VEB Plunger Piston with oil trapped  
(Incorrect valve lash adjustment)

16

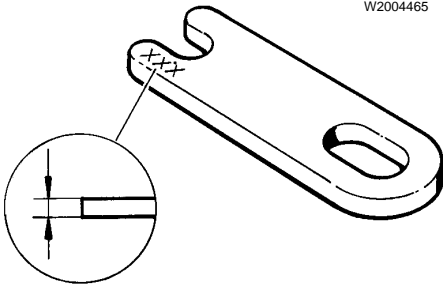
Measure the clearance between the rocker arm’s piston and the valve bridge. Acceptable clearance is 1.55 – 1.65 mm (0.061 – 0.065 in.).

1.55 – 1.65 mm (0.061 – 0.065 in.)

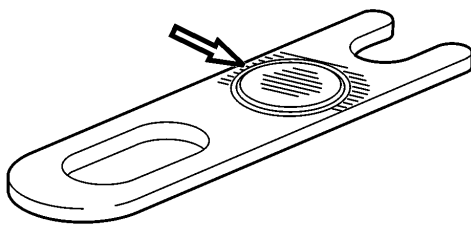
17



W2004465



T2009008



W2004423

**Note:** The exhaust valve rockers do not have adjusting screws. The exhaust valve clearance is adjusted by adding and/or removing the correct VEB shims.

**Note:** Shims are available in intervals of 0.05 mm. The thickness is stamped on the shim. VEB shim kit is tool no. 3945921.

If the valve clearance needs to be adjusted, remove the lock nut **without moving the adjusting screw**.

**Note:** If the shim is wearing on one side, turn it over and reuse.

**Note:** If the adjusting screw turns while removing the lock nut, repeat steps for Valve Bridge Adjustment.

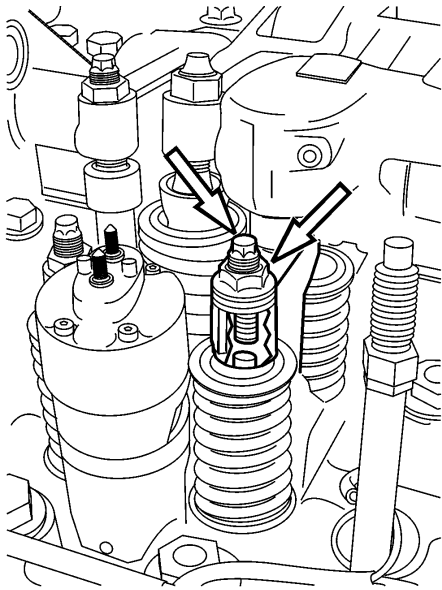
3945921

18

Use the measured value to calculate the thickness of the new shims.

If two shims must be used, select shims of approximately the same thickness.

**Note:** A maximum of two shims can be used.



W2004464

**19**

Make sure that the shim(s) and the valve bridge have been properly cleaned. Install shims and torque-tighten the adjusting screw lock nut to  $38 \pm 4$  Nm ( $28 \pm 3$  ft-lb).

**Note:** The adjusting screw must not be moved on the valve bridge when the lock nut is tightened.

$38 \pm 4$  Nm ( $28 \pm 3$  ft-lb).

**20**

After tightening the adjusting screw, recheck the valve clearance.

**Note:** Mark the rocker arm when the valve has been adjusted.

**21**

After work has been completed, start the engine and check for incorrect valve adjustment and leaks.

**22**

Bring engine to normal operating temperature. Let engine idle for approximately 5 minutes; the system performs its own cylinder balancing in order to attain smooth idling.

**Note:** During cylinder balancing, do not use any form of power-consuming equipment, such as power take-off or air conditioning.