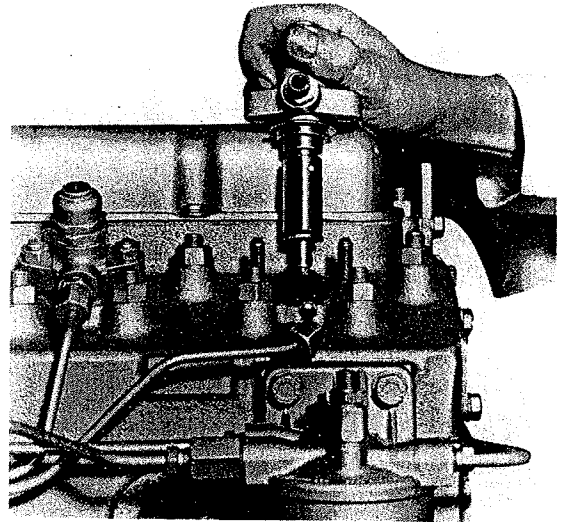


# SECTION E

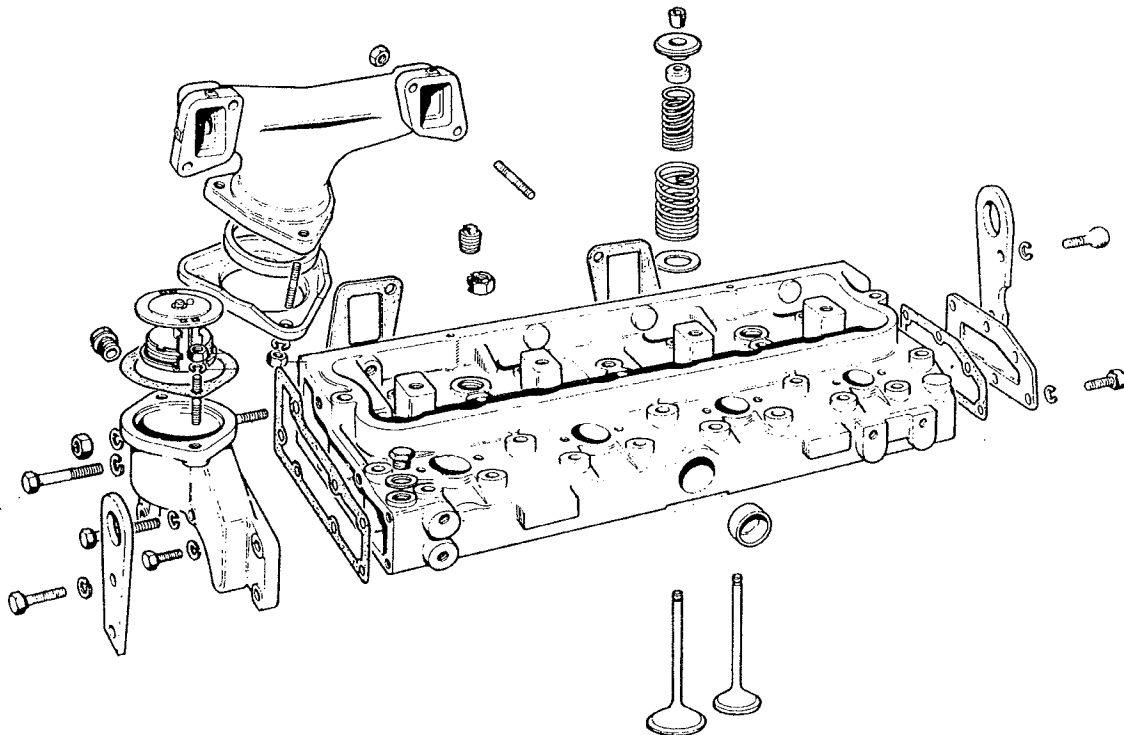
## Cylinder Head Maintenance

### To Remove the Cylinder Head

1. Drain the cooling system.
2. Disconnect battery terminals.
3. Detach the exhaust pipe. Remove turbocharger (T4.236 only).
4. Remove the atomiser leak-off pipe assembly.
5. Remove the fuel pipes from the fuel injection pump outlet and inlet to filter and boost control leak off pipe where fitted.
6. Disconnect fuel pipe from fuel lift pump outlet to fuel filter. Remove fuel filter.
7. Remove breather assembly.
8. Remove high pressure fuel pipes and atomisers (Fig. E.2).
9. Disconnect fuel pipe and/or electrical lead at the thermostat, and/or induction/port heaters, where fitted.
10. Remove air filter and/or connecting hose. Remove induction and exhaust manifolds.
11. Detach rocker cover.
12. Remove rocker assembly from cylinder head (Fig. E.4). Remove push rods.

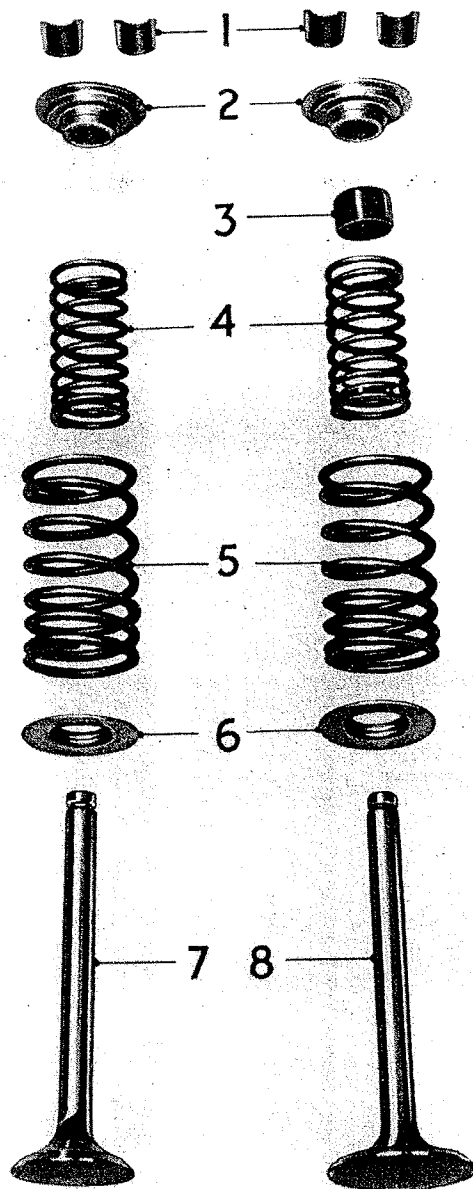


E2



E1

## CYLINDER HEAD MAINTENANCE—E.2



E3

1. Collets
2. Valve Spring Cap
3. Oil Deflector
4. Inner Valve Spring
5. Outer Valve Spring
6. Valve Spring Seat
7. Exhaust Valve
8. Inlet Valve

13. Remove cylinder head nuts/setscrews in reverse order of tightening sequence shown in Fig. E.12.

14. Remove cylinder head.

### To Remove the Valves

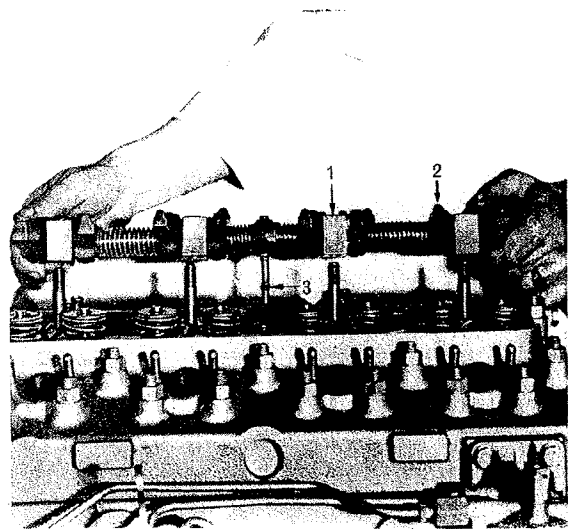
Mark all valves with a corresponding mark on the cylinder head to ensure that valves are refitted to their original positions unless replaced with new ones. Earlier engines had their valves and heads numbered during assembly as illustrated in Fig. E.6.

1. Compress spring caps and springs with a suitable valve spring compressor (Fig. E.5) and remove the two half conical collets from each valve.
2. Remove spring caps, springs and valve stem oil seals. Remove valves (Fig. E3).

**NOTE:** The quantity of springs, oil seals etc. fitted, and their location is dependent on application.

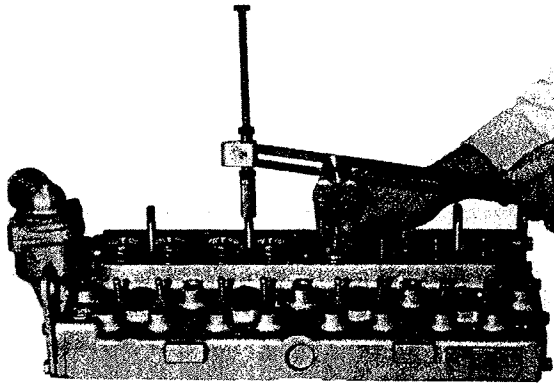
### Cleaning

1. Remove all traces of carbon from cylinder head.
2. If the water jacket of the cylinder head shows signs of excessive scale, a proprietary brand of descaling solution should be used.
3. Blank off rocker oil feed oil-way between numbers 2 and 3 cylinders and remove carbon from pistons and cylinder block face.
4. After valve seat machining and valve grinding operations have been carried out, all parts should be thoroughly washed.



E4

1. Rocker Shaft Bracket
2. Rocker Lever
3. Oil Feed Connection



### E5 Valve Guides

Engines are fitted with either detachable valve guides or the valve bores are machined direct into the cylinder head.

When wear takes place in the valve bores of cylinder heads without detachable valve guides, valves with oversize stems should be fitted.

Three service valves are available for both inlet and exhaust with oversize stems of 0.003 in, 0.015 in and 0.030 in (0,08, 0,38 and 0,76 mm) respectively.

To fit 0.015 and 0.030 in oversize valves, the bores in the cylinder head must be reamed with a piloted reamer. Suitable reamers for carrying out this operation can be obtained from Messrs. V. L. Churchill and Co. Ltd. (see Appendix).

Where detachable valve guides are fitted, these can be replaced.

To fit new guides; clean the parent bore, smear the Outer surface of the guide with clean oil and press home the guide until 0.594 in (15,10 mm) is protruding above the cylinder head. The guides are manufactured from cast iron and are brittle.

### Valves and Valve Seats

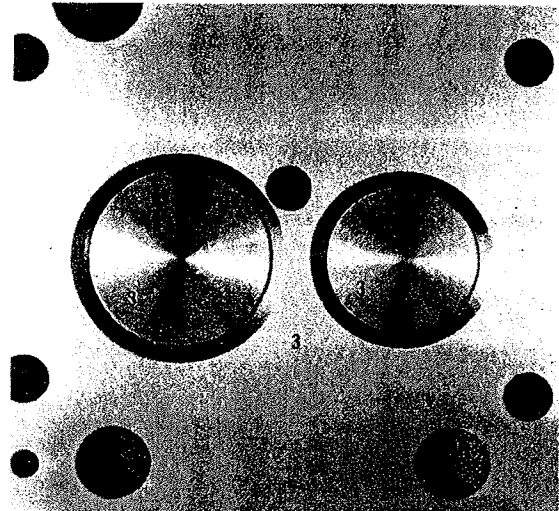
Check the valve stems for wear and their fit in the guides.

Examine the valve faces for pitting or distortion. Valve refacing should be at an angle of 45° or 30° for inlet valves on T4.236 engines (see Page B.10).

*Valves should always be refitted to their original seats and any new valve fitted should be suitably marked to identify its position if removed at a later date. Refer to Fig. E.6. for illustration of valve numbering.*

Note current exhaust valve depths on Page B.10 became effective from the following engine numbers:—

212U3810L  
236U135765  
236U147150L  
236US24721L  
248U31918L  
212UA200084L  
236UA110048L  
248UA135686L



### E6

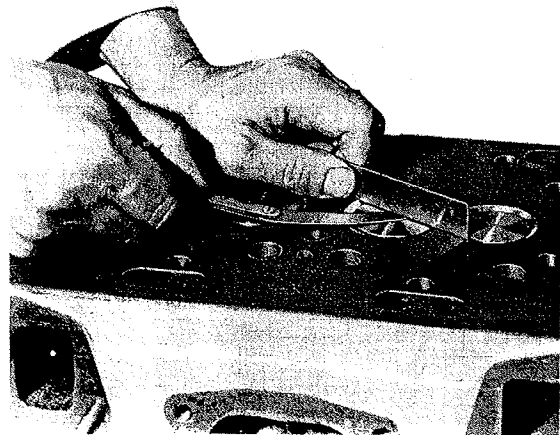
The valve seats in the cylinder head should be reconditioned by means of cutters or specialised grinding equipment, at an angle of 45° or 30° for inlet valves on T4.236 engines. Suitable valve seat cutters for 45° seats are included in kit 21825064 (see Appendix) and these cutters give a differential valve seat to reduce the width of the valve seat. A special cutter 21825065 is required for 30° valve seats.

As narrow a seat as possible should always be maintained.

### Hand Grinding

When grinding in valves it is essential that no signs of pitting are left on the seatings. At the same time care should be taken to avoid unnecessary grinding away of the seat.

After grinding operations have been completed, check the valve head depths relative to the cylinder head face (Fig. E.7) and wash the cylinder head.



### E7

## CYLINDER HEAD MAINTENANCE—E.4

### Valve Seat Inserts

In the majority of applications, valve seat inserts are not fitted to production engines, but may be fitted in service with the exception of T4.236 inlet valves which have a 30° seat.

However, there are some 4.248 and T4.236 applications in which exhaust valve seat inserts are fitted in production and where it is thought necessary, they may be replaced by new ones.

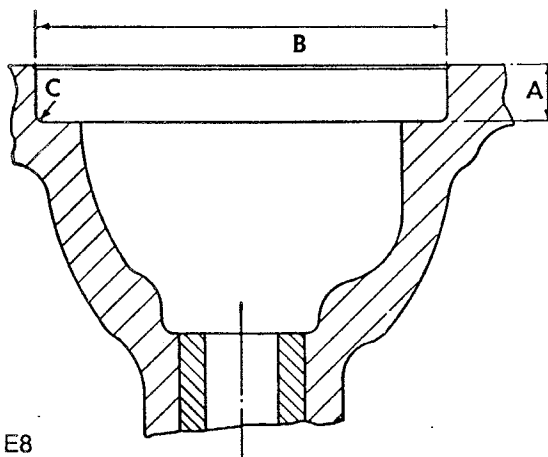
When fitting inserts to the valve seat, ensure that genuine Perkins Parts are used and proceed as follows:

- For cylinder heads having removable valve guides, press out existing guide and clean the parent bore. Press in new guide.
- For guideless cylinder heads. Using the appropriate oversize piloted reamer—0.015 in (0,38 mm) or 0.030 in (0,76 mm) according to the condition of the valve bores in the cylinder head—ream out the valve stem bores.

NOTE: Appropriate oversize stem replacement valves will be needed when this operation has been carried out on guideless cylinder heads.

Proceed as follows for either type cylinder head, with or without valve guides:—

- Using the new valve bore as a pilot, machine the recess in the cylinder head face to the dimensions in Fig. E.8.
- Remove all machining swarf and clean the insert recess. Using the valve bore as a pilot, press the insert home using the inserting tool (Fig. E.9). Under no circumstances should the insert be hammered in, neither should lubrication be used during pressing in.
- Inspect to ensure that the insert has been pressed fully home and is flush with the bottom of the recess.
- Using the valve bore as a pilot, machine the "flare" to the dimensions in Fig. E.10.



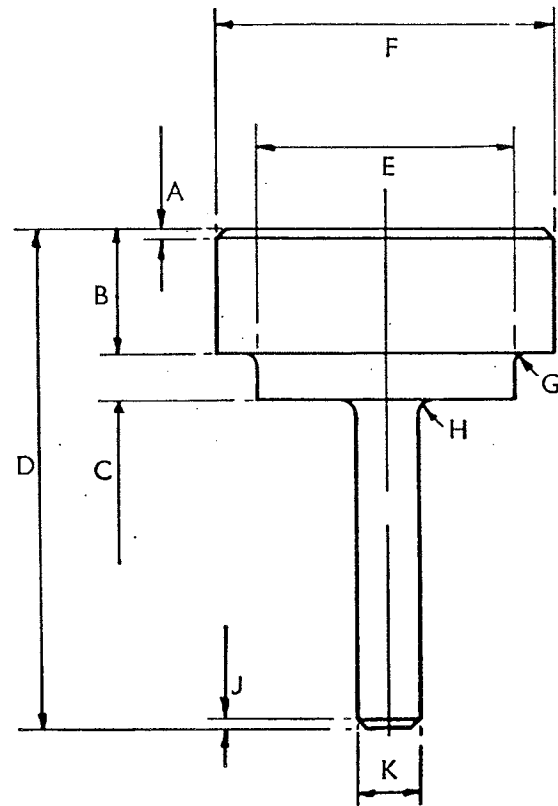
E8

#### Inlet

- A—0.283/0.288 in (7,19/7,31 mm)
- B—2.0165/2.0175 in (51,22/51,24 mm)
- C—Radius 0.015 in (0,38 mm) max.

#### Exhaust

- A—0.375/0.380 in (9,52/9,65 mm)
- B—1.678/1.679 in (42,62/42,64 mm)
- C—Radius 0.015 in (0,38 mm) max.



E9

#### Inlet

- A— $\frac{1}{16}$  in (1,59 mm) at 45°
- B— $\frac{3}{8}$  in (19,05 mm)
- C—0.250 in (6,35 mm)
- D—3 in (76,20 mm)
- E—1.582/1.583 in (40,18/40,21 mm)
- F—2.009/2.019 in (51,03/51,28 mm)
- G— $\frac{1}{32}$  in (0,79 mm) radius
- H— $\frac{1}{16}$  in (1,59 mm) radius
- J— $\frac{1}{16}$  in (1,59 mm) at 45°
- K—0.372/0.373 in (9,45/9,47 mm)

#### Exhaust

- A— $\frac{1}{16}$  in (1,59 mm) at 45°
- B— $\frac{3}{8}$  in (19,05 mm)
- C—0.312 in (7,92 mm)
- D—3.0 in (76,20 mm)
- E—1.248/1.249 in (31,70/31,72 mm)
- F—1.670/1.680 in (42,42/42,67 mm)
- G— $\frac{1}{32}$  in (0,79 mm) radius
- H— $\frac{1}{16}$  in (1,59 mm) radius
- J— $\frac{1}{16}$  in (1,59 mm) at 45°
- K—0.372/0.373 in (9,45/9,47 mm)

- Remove all machining swarf and burrs.

- Re-cut the valve seat at an included angle of 90°, so that the valve head depth below the cylinder head face is within the production limits 0.047/0.057 in (1,19/1,45 mm) for exhaust valves and 0.035/0.045 in (0,89/1,14 mm) for inlet valves.