

L. Testing Valve Timing

After a considerable period of use, the valve timings may alter somewhat, due to stretching of the twin roller chain or to machining or facing of the separating surfaces of the crankcase or the cylinder block and head. This will usually make no appreciable difference to the engine performance but if necessary, it can be corrected by fitting an offset Woodruff key on the camshaft.

Since the ignition point alters in the same way, the ignition should also be checked and corrected in such cases (see Job No. 01—3, Section E).

Checking of the valve timing is too inaccurate at the prescribed tappet clearance (normal running tappet clearance). Thus for test measurements, the timings are given at a tappet clearance of 0.4 mm.

The timing is, however, not adjusted to this test clearance of 0.4 mm but instead, the test measurement is made with the valve raised 0.4 mm, because this method is much more accurate.

The timing obtained with the valve raised 0.4 mm is the same as that obtained with a tappet clearance of 0.4 mm.

In practice, it is usually sufficient to measure the timings with the inlet and exhaust valves of No. 1 Cylinder.

The test measurement is made in the following way:

1. If the engine is not installed in the vehicle, a suitable graduated disk divided into 360° is fixed to the crankshaft and a pointer is fixed to the crankcase (see Fig. 01—3/39).

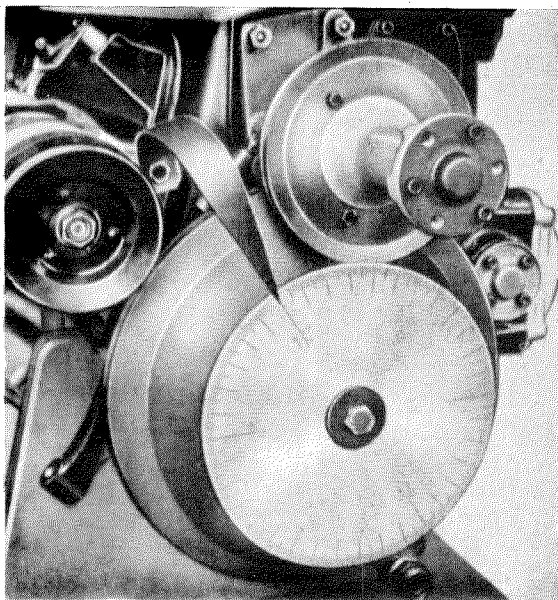


Fig. 01—3/39

2. If the engine is installed in the vehicle, Disk 180 589 07 23, divided into 360°, should be fixed to the camshaft (see Fig. 01—3/40).

When the test is made in this way, it must be remembered that the values read off from the camshaft must be doubled!

3. Remove all spark plugs.
4. Set No. 1 piston to TDC.
5. Now turn the graduated disk (1) so that the pointer (2) points to the 0° mark. Fix the graduated disk in this position (see Fig. 01—3/40).
6. In order to take up the normal running tappet clearance, a tolerance feeler band is inserted between the valve stem and the adjustment screw.
The tolerance feeler band must be thick enough to ensure that the normal tappet clearance is definitely taken up. It does not matter if the valve is slightly raised in consequence.
7. Screw the feeler (3) into the dial micrometer and fix the dial micrometer by means of Dial Gage Holder 198 589 01 21 (4) to the saddle bracket (5) which holds the cylinder head cover, in such a way that the feeler (3) is placed vertically on the valve head of the inlet valve of No. 1 cylinder and is at the same time depressed by 2.0 mm (see Fig. 01—3/40).

The feeler of the dial micrometer must be exactly perpendicular to the head of the valve otherwise appreciable errors in measurements will be made!

In addition, the chain tightener must be properly bled.

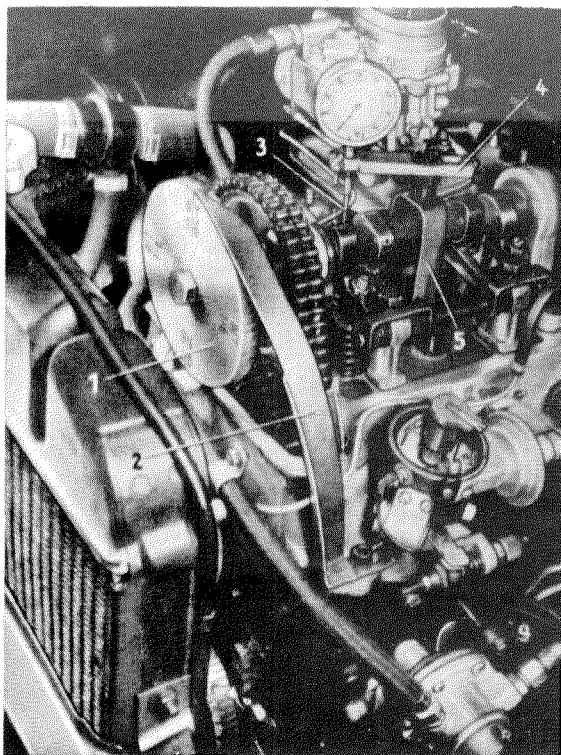


Fig. 01— 3/40

- 1 Graduated Disk 180 589 07 23
- 2 Pointer (may be hand-made)
- 3 Feeler
- 4 Dial Gage Holder 198 589 01 21
- 5 Saddle bracket for cylinder head cover

8. Set the scale of the dial micrometer to 0.
9. Now turn the crankshaft in the direction in which the engine turns to the point where

the dial micrometer measures 0.4 mm less — i.e., the valve is raised 0.4 mm.

Now read off the value indicated on the graduated disk.

If the graduated disk has been fixed to the camshaft, the value read off must be doubled. This value is the beginning of opening of the valve!

10. Continue to turn the crankshaft in the direction in which the engine turns until the valve is raised 0.4 mm when the valve closes — i.e., when the dial micrometer gage registers once more the same value as at the moment of opening. Make sure that the dial gage feeler is depressed the requisite 2.0 mm.

Read off the value indicated on the graduated disk. **The value indicated is the end of closing of the valve.**

Note: While measurements are being taken, the engine must under no circumstances be turned backward since this would cause considerable errors in measurement. Measurements must be checked, after reading off the angle of closure, by turning the crankshaft still further until the base circle of the cam is reached. At this point the dial micrometer must once more register 0.

11. **The valve timings of the exhaust valve are checked in the same way.**

Valve Timings for Test Measurements:

Camshaft	Inlet		Exhaust		Test clearance inlet and exhaust
	opens	closes	opens	closes	
121 051 11 02	12° BTDC	44° ABDC	51° BBDC	15° ATDC	0.4 mm

Note: If an offset Woodruff key has to be used, the following points must be taken into account:

- a) If the key is offset to the right (seen in the direction of travel) the valve opening instant is advanced and if it is offset to the left, the opening instant is retarded.
If the Woodruff key is offset 0.20 mm, this corresponds to a crankshaft movement of approximately 1° 30'.

A movement of one tooth on the timing gear corresponds to a crankshaft movement of 18°.

- b) If an offset Woodruff key is fitted, the ignition point must be readjusted (see Job No. 01—3, Section E).