

2-VALVE: MEASUREMENT AND ADJUSTMENT GUIDE

This guide is supplemental to a good shop manual: LT Snyder's manual is an excellent resource and is recommended. Use accompanying worksheet to track existing measurements and determine replacement shim sizes.

The Desmodromico (Desmo) engines use a positive valve control system to open and close the valves at the same time in the combustion cycle regardless of RPM. The Desmo concept uses an opening rocker arm and a closing rocker arm that press on shims attached to the valve stem to open and close the valve in a precisely controlled manner: as the components wear, the gap (clearance) between the rocker and the shim changes. To compensate for these naturally occurring changes, the shims are replaced with thicker/thinner shims to bring the gap back into specification.

Before the clearances can be checked there is a necessary amount of disassembly that must occur to get to the valves, depending on the model. It is always recommend having as little fuel as possible in the gas tank before beginning this work. It is often easier to work on one valve at a time. Measure and record the opening gap and the closing gap of one valve, determine if the clearances are within tolerance , and decide if the shims need replacing before moving on to another valve.

Once the necessary interferences are out of the way, remove the spark plugs: The engine turning tool will be damaged if the engine is rotated and the spark plugs remain installed.

REMOVE THE SPARK PLUGS.

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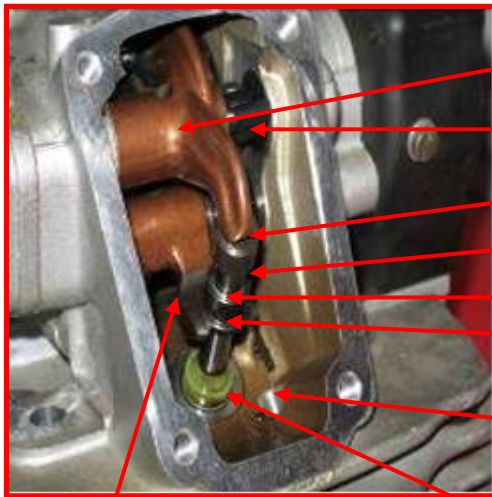
Install the engine turning tool by removing the cover on the left side and inserting the tool, making sure the tangs on the tool engage the indents on the crank shaft. Once the tool is positioned correctly, tighten the retaining bolt snug with a 13 mm wrench.

Retaining Bolt.

Rotate the engine counter-clockwise to find Top Dead Center (TDC) of the cylinder you are working on and align the timing mark on the crank. NOTE: Lining up the timing mark verifies only 1 cylinder is at TDC, sure to determine which cylinder is at TDC and work on that cylinder first. Once complete with the first cylinder's measurements, rotate the engine so the remaining cylinder is at TDC for the remaining measurements.



2 Valve Ducati Identifier



Opening Rocker Arm

Retaining Spring

Opening Gap (Closing Gap measured here)

Opening Shim

Retaining Rings

Closing Shim

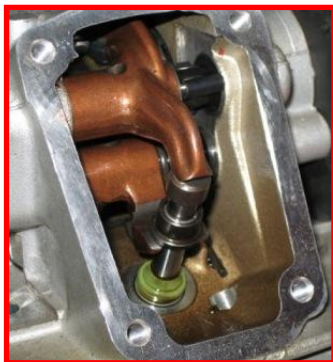
Oil Return

Seal

Closing Rocker Arm

OPENING GAP MEASUREMENT

Once the engine is at TDC for the cylinder being measured, remove the valve cover. Be gentle with the gasket if you plan on reusing it. At TDC, the opening shim should be easy to spin with finger pressure.



Use the included feeler gauge to measure the opening gap: the gap between the opening rocker arm and the opening shim. Begin measuring using a thin gauge, ~ .1mm; proceed using thicker/thinner gauges until the gap can be discerned. The correct feeling is one of slight resistance, similar to the feeling of inserting the gauge into a large book and moving it about between the pages.



Record the measurement on the accompanying worksheet. Record this as measurement: **A**. Record the Ducati recommended clearance in column **B**. Compare the two measurements. If **A** is greater than **B** (if the measured is greater than the recommended), subtract and record the result in column **C**.

This is referred to as the “unloaded gap” and is the clearance for the opening shim. This measurement is good for two things: It is the clearance for the opening shim and it will be used to compute the clearance for the closing shim.

This is measurement **A** the unloaded (opening shim) Gap

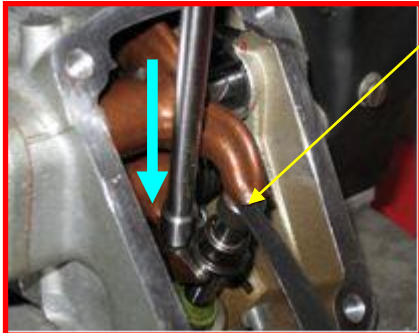
Record this measurement on the worksheet in 2 places: one in the opener and one in the closer sections for the valve being measured.

Compare measurement A with B. If A is larger than B, the opening shim clearance is too great and the opening shim requires replacement. Subtract B from A to get the difference (C), this measurement will be added to the existing shim measurement to obtain the new shim size (if required).

PROCEED TO CLOSING GAP MEASUREMENT

CLOSING GAP MEASUREMENT

The measurement for the closing shim gap is referred to as the “loaded” gap. Measuring in the same place while pressing down on the closing rocker arm will aid in determining the gap on the closing shim/rocker. Using the included valve depressing tool, press downward on the closing rocker. Measure using the following procedure:



While pressing down on the closing rocker arm, measure the gap between the opening rocker arm and the opening shim. This is an easier measurement than trying to measure the gap between the closing rocker arm and the closing shim directly.

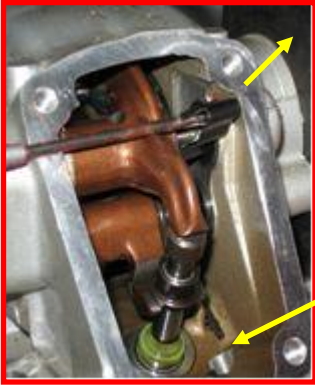
Record this measurement on the worksheet (F).

To get the accurate closing shim clearance measurement, the unloaded gap (A) must be subtracted from the loaded gap (F). Record this measurement as (H). **COMPARE** measurement (H) to the value for (I). If (h) is less than (I), the clearance is within specification and nothing needs to be done: If measurement (H) is greater than (I) a new shim will have to be installed to bring the gap into specifications.

To figure out how much bigger the new shim should be, subtract (I) from (H) to get the difference and record the difference as (J). The value of (J) will be added to the measurement of the existing closing shim to obtain the size of the new shim required to bring the clearance into Specification.

Repeat this procedure for the remaining valves. It is easier to measure all the clearances before any disassembly: once a valve is disassembled, no more engine rotation can occur until it is reassembled

OPENING SHIM REMOVAL AND MEASUREMENT



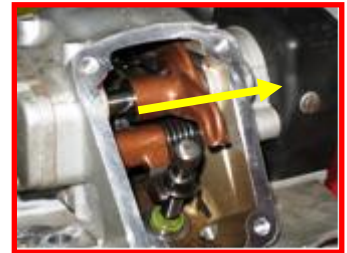
If either the opening or the closing shims require replacement to bring the gap(s) into specification follow this procedure.

Using a machinist's scribe or another pointed tool, pry off the spring clip from the rocker shaft. **WARNING**, this clip will fly into your eye or to parts unknown if it isn't restrained.

Before proceeding further, block the oil return hole to prevent small parts from falling into the internal area of the engine. A foam earplug inserted into

the oil return hole is an easy way to protect your engine

Once the clip is removed the opening rocker will need to be slid out of the way to access the opening shim. This will take some wiggling/working the cams back and forth to get the opening rocker to slide. If the cam belts are removed, wiggle the cam gear to get the rocker to slide off. If the cam belts are still in place, use the engine turning tool to wiggle the shaft and release the opening rocker to slide to the side



Remove the Opening shim from the valve stem.

MEASURE

NOTE: The Opening Shim has a Flat side and a recessed side. Using light pressure, close the dial caliper all the way and "zero" the unit: hold the On/Off/Set button until all Zeros appear in the display.

Open the Caliper sufficiently to allow the Opening Shim to fit between the jaws of the micrometer. The flat side of the Opening Shim should rest against the stationary jaw of the micrometer. The moveable portion of the micrometer will fit inside the recessed portion of the opening shim.



RECORD this measurement as **D**, the size of the existing shim.

ADD column **C** to **D** to obtain **E**. The number in column **E** represents the new shim size required to bring the opening gap into specification. Buy or replace the existing shim with one closest to **E**. Note, it is not always possible to get the exact shim size, a larger shim can be made to the correct size using emery paper to adjust the size of the shim.

CLOSING SHIM REMOVAL AND MEASUREMENT

If the closing shim needs replacement, remove the opening shim as described in the previous section. The valve stem is exposed with the opening rocker slid to the side. .



Be sure to cover the oil return hole before proceeding.

Place a clamp on the valve. In addition to having the cylinder at TDC, this is a little extra insurance to keep the valve from dropping into the cylinder.



Press down on the Closing rocker to expose the retaining rings. Slight engine rotation may be required to get the rocker to move far enough to expose the retaining rings. The retaining rings are in two halves.

Use the magnet to extract both halves of the retaining rings and set aside in a very safe place (a zip lock bag properly labeled with the valve the rings belong to).



With the retaining rings removed, you can now slide the closing shim up and off the valve stem. If the shim gets “stuck” at the top of the valve stem, it is an indication the valve stem has mushroomed a bit. Some emery cloth/sandpaper is needed to remove the wide part at the top of the valve stem to provide clearance for the shim to slide off.

The valve shim measuring tool and the electronic caliper will be used to take the measurement. The tool sets inside of the closing shim and gives a standard 10mm addition to your measurement.



MEASURE

Turn the caliper on. Close the jaws using light pressure. Select the unit of measure: either inch or mm.



Then shims are designated by Ducati in millimeters and using mm as the unit of measure simplifies new shim size selection. Press ZERO to set the base line for the caliper. Place the Shim Measuring Tool inside the closing shim (narrow end in) and measure the overall length.



RECORD

REMEMBER- The TOOL adds 10mm to the measurement: subtract 10mm from the measurement and record your number as **K** (in the example pictured, 6.57 would be recorded in column K)

ADD column **K** to **J** to obtain **L**. The number in column **L** represents the new shim size required to bring the closing gap into specification. Buy or replace the existing shim with one closest to **L**. Note, it is not always possible to get the exact shim size, a larger shim can be made to the correct size using emery paper to adjust the size of the shim.

REASSEMBLY



Obtain the correct shim(s) and reassemble the valve train. Slide the closing shim onto the valve stem, narrow side slides onto the valve stem first.

Depress the closing rocker and install the half rings (retaining rings). Do this with your finger. While depressing the closing rocker, set a half ring in place on the valve stem. Rotate this ring around to the back side of the valve stem to leave room for the other half ring. Install the other half ring and release the pressure from the closing rocker





Put Opening shim onto valve stem

Once installed, slide the opening rocker over the opening shim. REMEMBER, you will have to wiggle the motor using the Engine rotating tool to get the cams in position to slide the rocker over the valve.

Once the rocker is in place, press the spring clip into place. Some firm pressure will be required.



Once the valve is reassembled, re-check the clearances to verify the valve train is within specification. With the cam belts installed, rotate the engine to verify smooth operation. Reassemble as required.
