

## BMW S54

## Valve Adjustment Procedure



## INTRODUCTION

### BMW S54 Valve Adjustment

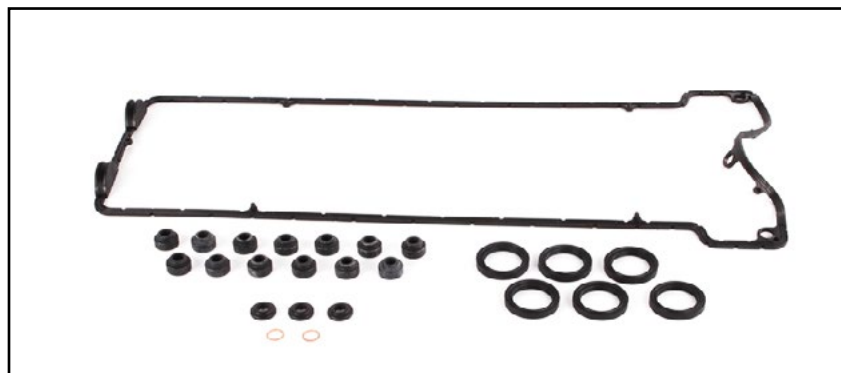
If you own a BMW with the S54 6 cylinder engine, don't overlook the valve adjustment. It's a critical part of the routine maintenance required for this engine, and it's part of the inspection I & II services that the Service Interval Indicator will alert you to. Even though the actual service intervals will vary depending on your driving habits, the valve adjustment is required at approximately every 30,000 miles.

Thanks to the forward thinking of the engineers at BMW, these are very simple valve adjustments, however you will need to have a few special things like a shim kit, shim tool, and feeler gauges, as well as the standard basic hand tools. While you're at it, this is also a perfect time to replace the valve cover gasket. Just to make sure you have everything on hand before you begin, take a look at the specialty and required tools, and give these instructions a quick read through. Thank you for looking to ECS Tuning for all your performance and repair needs. We appreciate your business!

### ECS Difficulty Gauge



1 - Easy                      Pro - 4  
2 - Moderate              Advanced - 3



This complete valve cover gasket kit will put the finishing touches on your valve adjustment!

**ES#1893860**

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## REQUIRED TOOLS

Note: The tools required for each step will be listed by the step number throughout these instructions.

### Standard Automotive Tools

- Protecta-Sockets (for lug nuts)..... [ES#2221243](#)
- **3/8" Drive Ratchet** ..... [ES#2765902](#)
- **3/8" Drive Torque Wrench**..... [ES#2221245](#)
- **3/8" Drive Deep and Shallow Sockets**..... [ES#2763772](#)
- **3/8" Drive Extensions**..... [ES#2804822](#)
- Hydraulic Floor Jack ..... [ES#240941](#)
- Torx Drivers and Sockets ..... [ES#11417/8](#)
- **1/2" Drive Deep and Shallow Sockets**..... [ES#2839106](#)
- **1/2" Drive Ratchet**
- 1/2" Drive Extensions
- 1/2" Drive Torque Wrench ..... [ES#2221244](#)
- 1/2" Drive Breaker Bar ..... [ES#2776653](#)
- File Set
- Air Nozzle/Blow Gun
- Bench Mounted Vise
- Crows Foot Wrenches
- Hook and Pick Tool Set..... [ES#2778980](#)

### Required For This Install

### Available On Our Website

- **1/4" Drive Ratchet**..... [ES#2823235](#)
- **1/4" Drive Deep and Shallow Sockets** ..... [ES#2823235](#)
- **1/4" Drive Extensions** ..... [ES#2823235](#)
- **1/4" Drive Torque Wrench**
- **Plier and Cutter Set**..... [ES#2804496](#)
- **Flat and Phillips Screwdrivers** ..... [ES#2225921](#)
- Jack Stands ..... [ES#2763355](#)
- Ball Pein Hammers
- Pry Bar Set..... [ES#1899378](#)
- Electric/Cordless Drill
- Wire Strippers/Crimpers
- Adjustable (Crescent) Type Wrenches
- Drill Bits
- Punch and Chisel Set
- Hex Bit (Allen) Wrenches and Sockets ..... [ES#11420](#)
- Thread Repair Tools ..... [ES#1306824](#)
- **Open/Boxed End Wrench Set** ..... [ES#2765907](#)

## SPECIALTY TOOLS

These OE feeler gauges have the length and angle for easy measurements



**ES#197828**

These shims are a must-have for the valve adjustment.



## SPECIALTY TOOLS

The BMW fan clutch tools are very helpful for removing the fan/clutch. The wrench fits the large nut that holds the fan/clutch to the water pump and the holding fixture will lock onto two of the water pump bolts so you can hold it stationary to break the fan loose.



**ES#2627584**

This valve shim tool has a special bend on the end and a magnet in just the right spot to reach in and pick up the valve shims.



**ES#2986423**

## SHOP SUPPLIES AND MATERIALS

**Standard Shop Supply Recommendations:** We recommend that you have a standard inventory of automotive shop supplies before beginning this or any automotive repair procedure. The following list outlines the basic shop supplies that we like to keep on hand. Shop supplies with a hyperlink are available on our website.

- Hand Cleaner/Degreaser - [Click Here](#)
- Pig Mats - for protecting your garage floor and work area from spills and stains - [Click Here](#)
- Spray detailer - for rapid cleaning of anything that comes into contact with your paint such as brake fluid - [Click Here](#)
- Micro Fiber Towels - for cleaning the paint on your car - [Click Here](#)
- Latex Gloves - for the extra oily and dirty jobs - [Click Here](#)
- Medium and High Strength Loctite Thread lock compound - to prevent bolts from backing out - [Click Here](#)
- Anti-Seize Compound - to prevent seizing, galling, and corrosion of fasteners - [Click Here](#)
- Aerosol Brake/Parts Cleaner - for cleaning and degreasing parts
- Shop Rags - used for wiping hands, tools, and parts
- Penetrating oil - for helping to free rusted or stuck bolts and nuts
- Mechanics wire - for securing components out of the way
- Silicone spray lube - for rubber components such as exhaust hangers
- Paint Marker - for marking installation positions or bolts during a torquing sequence
- Plastic Wire Ties/Zip Ties - for routing and securing wiring harnesses or vacuum hoses
- Electrical tape - for wrapping wiring harnesses or temporary securing of small components

## INSTALLATION NOTES

- **RH** refers to the *passenger side* of the vehicle.
- **LH** refers to the *driver side* of the vehicle.
- Always use the proper torque specifications.
- If applicable to this installation, torque specifications will be listed throughout the document and at the end as well.
- Please read all of these instructions and familiarize yourself with the complete process **BEFORE** you begin.

## PREPARATION AND SAFETY INFORMATION

ECS Tuning cares about your health and safety. Please read the following safety information. This information pertains to automotive service in general, and while it may not pertain to every job you do, please remember and share these important safety tips.

- Park your car in a safe, well lit, level area.
- Shut the engine off and remove the key from the ignition switch.
- Make sure any remote start devices are properly disabled.
- **ALWAYS** wear safety glasses.
- Make sure the parking brake is applied until the vehicle is safely lifted and supported.
- If using an automotive lift, be sure and utilize the factory specified lift points. Lifting a vehicle in an incorrect location can cause damage to the suspension/running gear.
- When lifting a vehicle using a jack, always utilize the factory specified lift points. Lifting a vehicle in an incorrect location can cause damage to the suspension/running gear. **ALWAYS** support the vehicle with jack stands.
- **ALWAYS** read and follow all safety information and warnings for the equipment you are using.



**Never get underneath a vehicle that is supported only by a jack. Always make sure that the vehicle is securely supported on jack stands.**

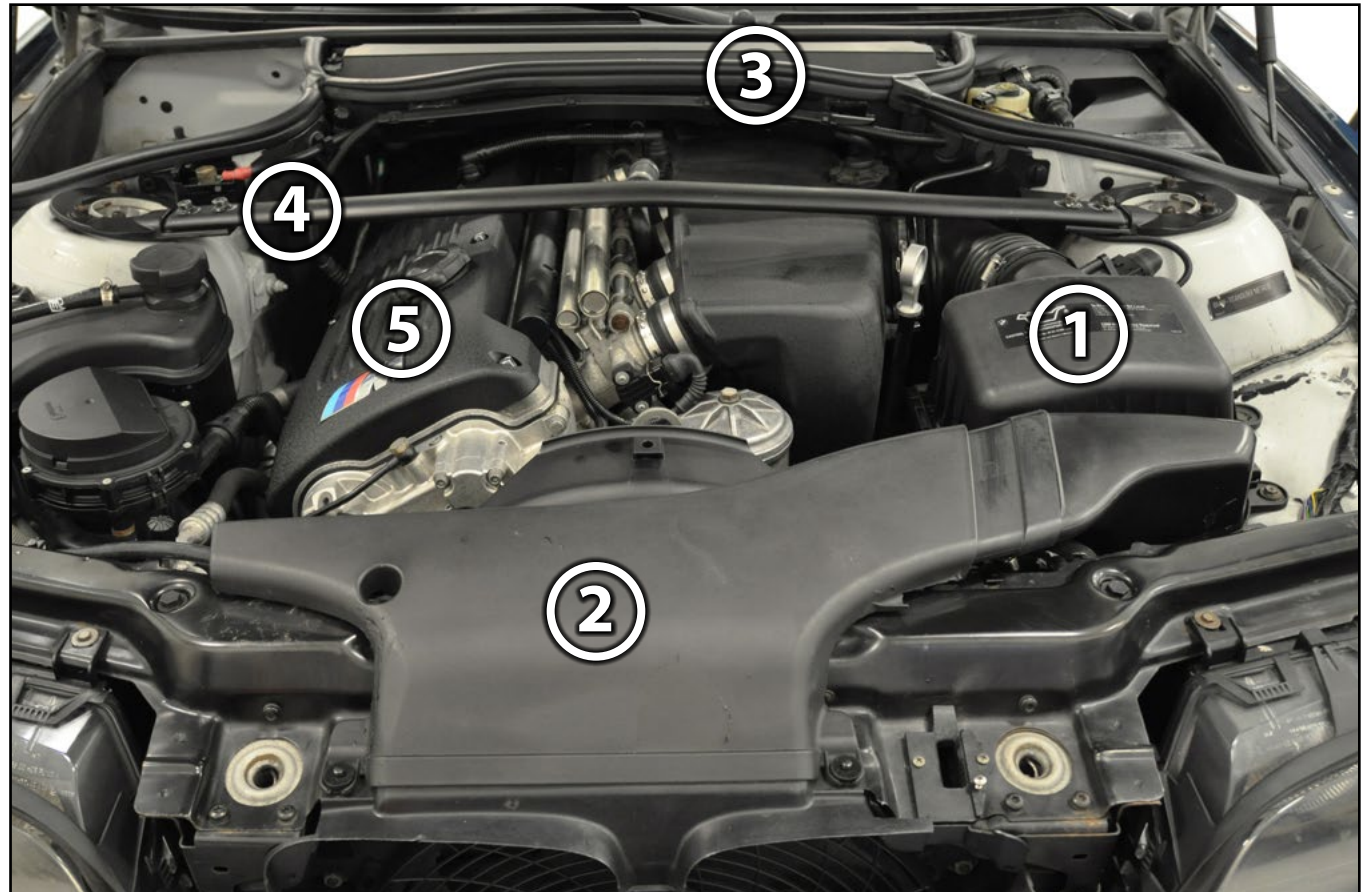


## GETTING STARTED

There are a few things you'll need to remove in order to perform a valve adjustment, and we're betting if you're going to tackle this job you don't need us to step you through the easy stuff, but we'll give you a quick run-down anyhow. The following items will need to be removed:

1. Air Box
2. Radiator Fan and Shroud
3. Cabin Filter Housing
4. Suspension Cross Brace
5. Engine Top Cover, Valve Cover, and Ignition Coils

The engine should be cool before performing the valve adjustment (no more than 95 degrees Fahrenheit).



## ADJUSTING THE VALVES

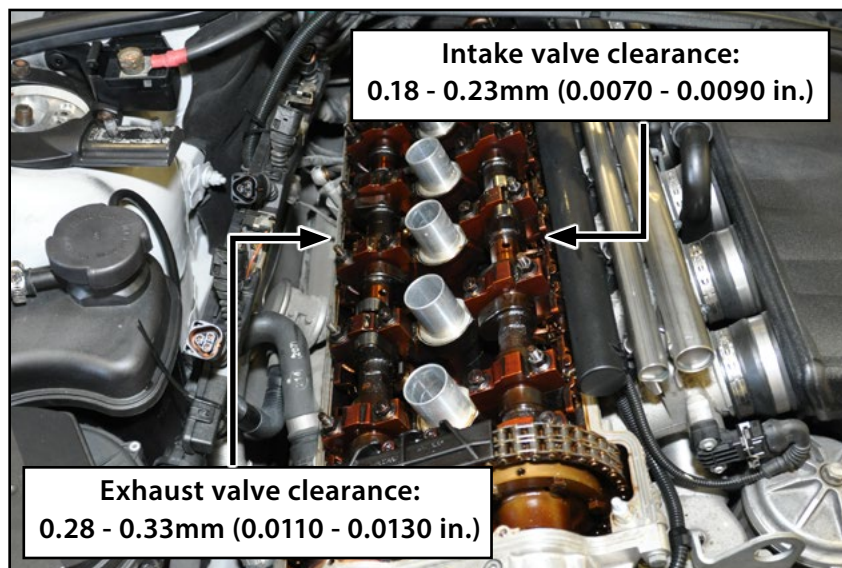
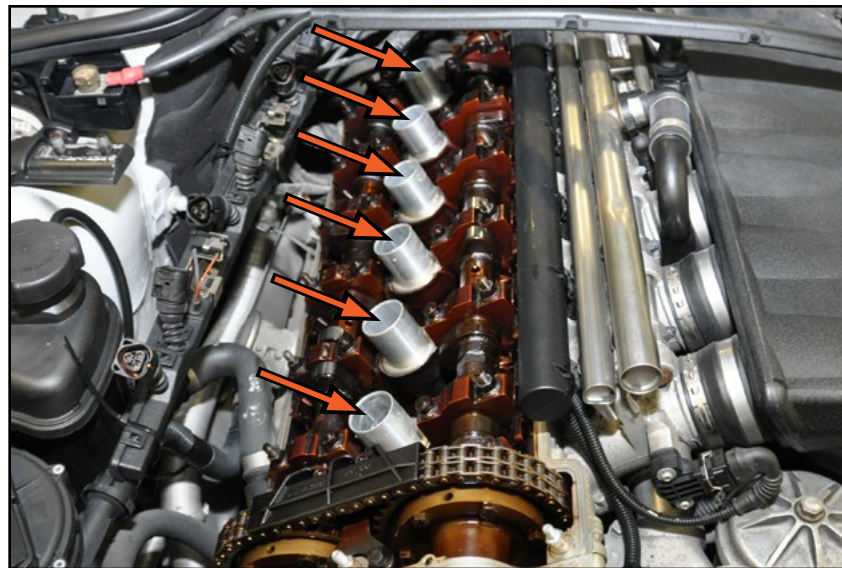
### Step 1: 5/8" Spark Plug Socket, Ratchet

OK, now that you have the valve cover off, you're almost ready for the valve adjustment, but first, remove the spark plugs. This will make it easy to rotate the engine over as you move through the cylinders.

### Step 2:

Valve adjustment is achieved by checking and adjusting the clearance between the cam lobe base circle and rocker arm directly underneath.

Since the clearance is different for the intake and exhaust valves, it's easiest to start with one camshaft, adjust all valves, then move on to the other. This way, you will not have to switch out the feeler gauge sizes over and over.

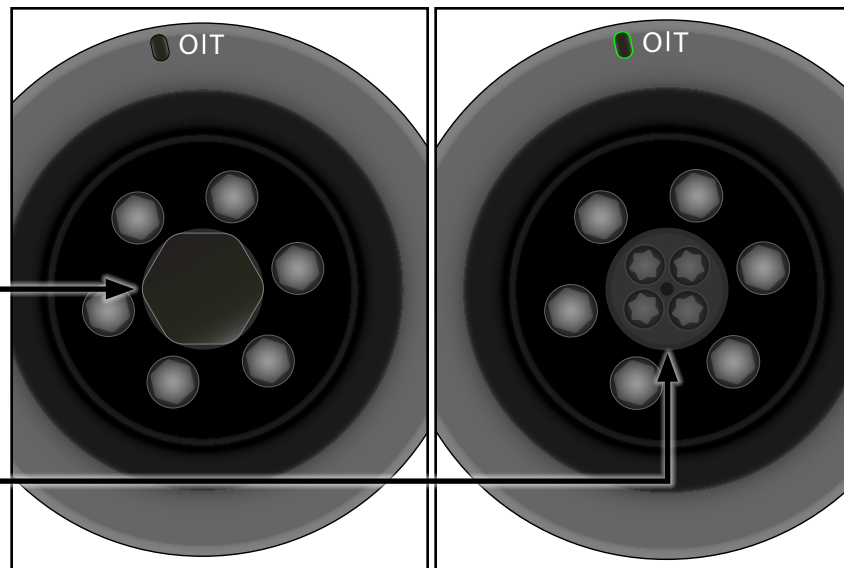


### ADJUSTING THE VALVES

#### Step 3:

Inspect the front of the crankshaft pulley (you may need to use a mirror). You will see either a large hex or four Torx bolts. The large hex will require a 32mm socket, and if equipped with the four Torx bolts, you will need a special crankshaft socket, [ES#197892](#).

Requires 32mm  
Socket



#### Step 4:

Decide which camshaft you would like to start with, then using the socket identified in step 3, rotate the engine in a clockwise direction so one set of camshaft lobes is pointing upwards. It is not necessary to begin with any particular cylinder, so you can start with the first set of lobes that point upward.



## ADJUSTING THE VALVES

### Step 5:

Precise cam lobe position is not necessary as you adjust the valve clearance. It can be checked anywhere along the cam lobe base circle (the lowest part of the lobe where the valve is closed). For clearance and access it is easiest to measure and install shims with the lobes pointing straight up.

### Step 6:

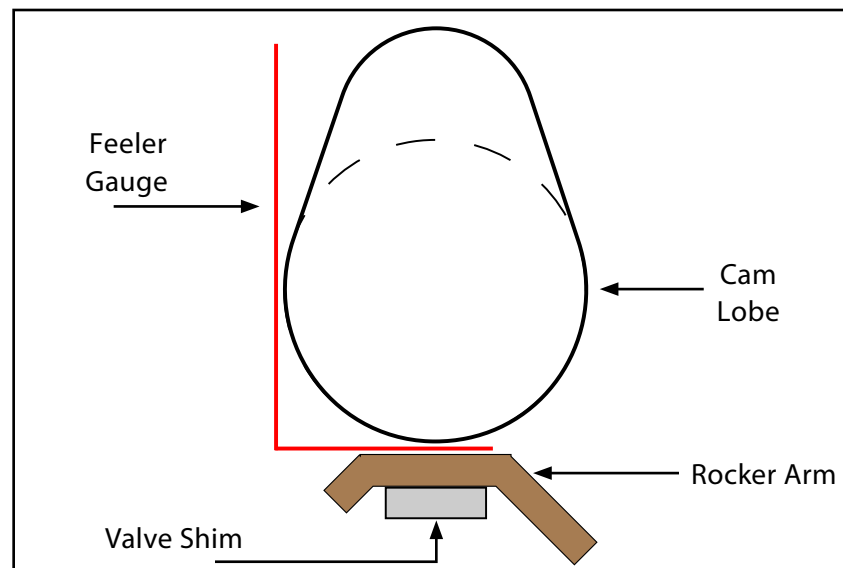
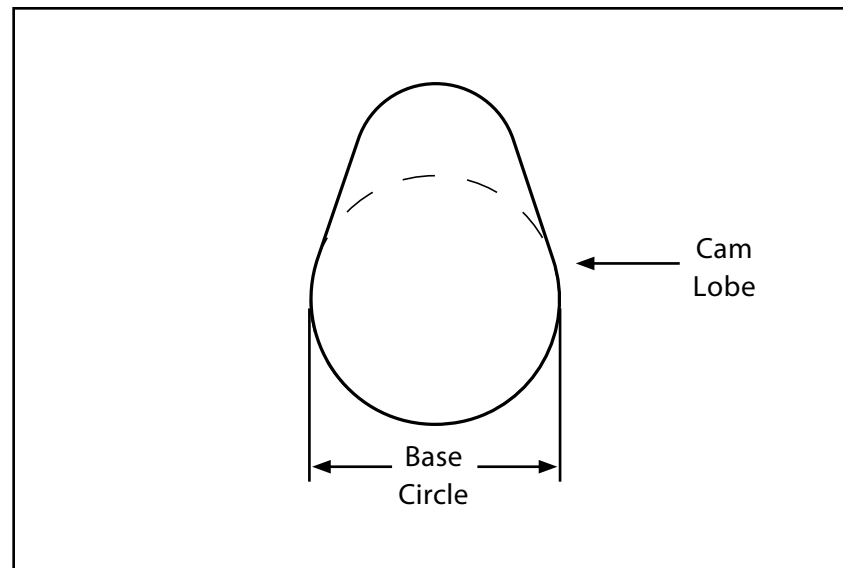
Using the feeler gauge, measure the clearance on the lobes you are starting with. Remember, the intake and exhaust valves have different clearance specifications.

**Intake valve clearance:**

**0.18 - 0.23mm (0.0070 - 0.0090 in.)**

**Exhaust valve clearance:**

**0.28 - 0.33mm (0.0110 - 0.0130 in.)**





## ADJUSTING THE VALVES

### Step 7:

If the valve clearance is correct, move onto the next. If it is too tight or too loose, you will need to replace the shim with a different size. Use multiple different feeler gauges to determine how much of a change is required.

In preparation to change a valve shim, place clean shop rags over the exposed timing chain openings, oil returns and vents, and spark plug holes.

### Step 8:

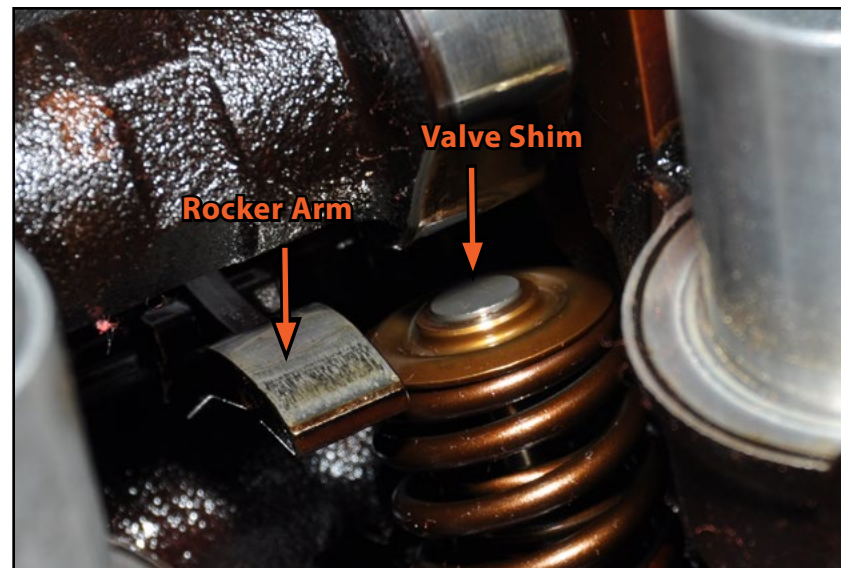
There is a rocker arm retaining clip behind each set of cam lobes. Pull it up and remove it (these will come off very easily).



## ADJUSTING THE VALVES

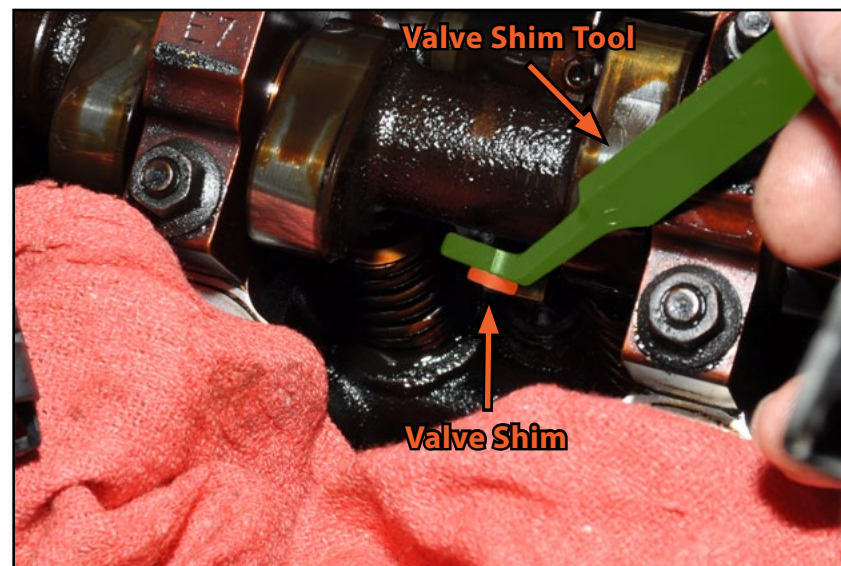
### Step 9:

Now, using your finger, simply slide the rocker arm off to the side, and you will have clear access to the valve shim.



### Step 10:

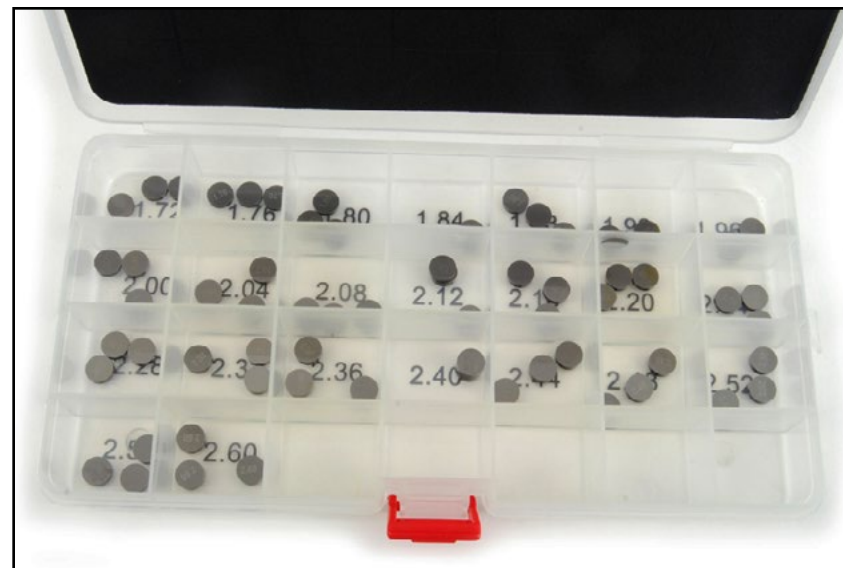
This is where the special valve shim tool is needed. Simply reach in with the magnet and pick up the valve shim. It's easy - but this is also where you'll have to be careful. These are fairly easy to drop, so you'll want to move slowly and carefully as you draw out the shim.



## ADJUSTING THE VALVES

### Step 11:

Measure the valve shim that you removed, then calculate the new size you will need in order to obtain the correct adjustment. Select the correct new shim from your kit.

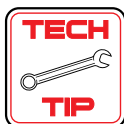


### Step 12:

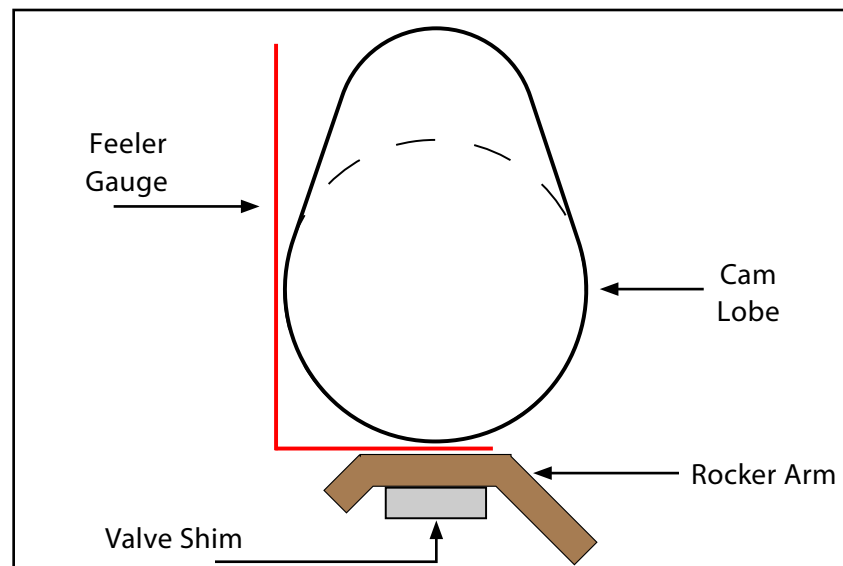
Carefully install the new shim, slide the rocker arm back in place, and install the rocker arm retaining clip.

Check the valve clearance to make sure you have used the correct shim, then repeat the procedure for all valves.

Reassemble the vehicle and your valve adjustment is complete!



See page 17 for some helpful torque specs.



## TORQUING TIPS

### Torque to Yield or “Stretch” Bolts

Many bolts will have a torque specification listed in the format - xx Nm (xx Ft-lbs) + xx degrees. These bolts are torque to yield bolts, commonly referred to as “stretch” bolts. The correct procedure for torquing these bolts is:

**Stage One** - Torque the bolt(s) to the initial Nm or Ft-lb specification. If there is more than one, be sure to torque them in the correct sequence.

**Stage Two** - Tighten or “stretch” the bolt(s) the additional specified number of degrees. If there is more than one, be sure to follow the correct sequence.

**Note** - Some bolts may have two or more stages of torquing before the final stage of “stretching” the bolts.

When tightening more than one bolt in a specified sequence, be sure to mark each fastener with paint **immediately** after performing the final stage or “stretching” of the bolts. This will ensure that you keep track of which bolts have already been “stretched”.

All Torque to Yield bolts should only be used once and should be replaced each time they are removed. If they are reused, they will not be able to achieve the proper clamping force with the specified torque.

### Lubrication

Torque specifications are always listed for a dry fastener (**no** lubrication) unless specified otherwise.

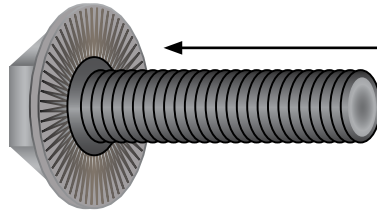
Some fasteners require lubrication on the threads -or- on the contact surface while torquing. These fasteners will be listed with the specific location and type of lubrication required. Always follow manufacturers recommendations exactly.

Lubricating a fastener that is intended to be installed dry and then torquing it to factory specifications will increase the clamping force and stress on the fastener and components, which can result in damage or failure.

Do not lubricate the threads of any fastener unless it is specifically recommended by the manufacturer.

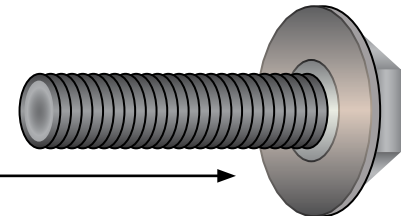
### Ribbed vs. Non-Ribbed Bolts

Ribbed and Non-Ribbed bolts in the same location generally require a different torque specification.



A ribbed bolt is identified by the ribs on the contact surface

A non-ribbed bolt is identified by the smooth contact surface





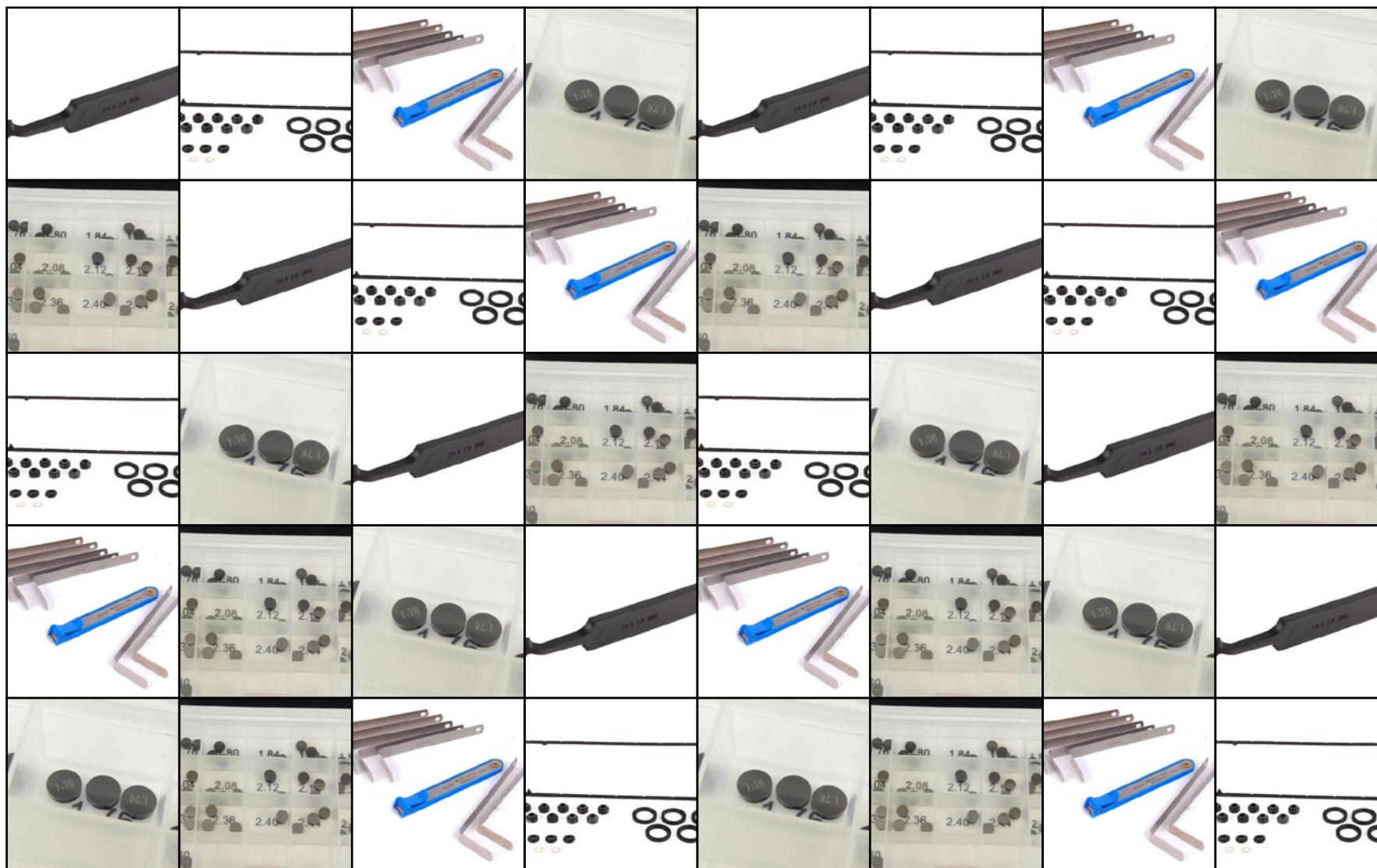
## TORQUE SPECIFICATIONS

Coil Pack Mounting Screws .....	4 Nm (3 Ft-lbs)
Spark Plugs.....	25 Nm (18 Ft-lbs)
Valve Cover Mounting Bolts .....	8 Nm (6 Ft-lbs)
Valve Cover Oil Drain Hose Banjo Bolt.....	25 Nm (18.5 Ft-lbs)

At ECS Tuning, we carry a line of high quality Schwaben tools and equipment to help you build your ultimate tool collection. Never before has affordability and quality been so closely related. Our entire Schwaben line is subjected to strict in house testing for strength and durability. See what we have to offer and equip your garage without breaking the bank.



## Your BMW S54 valve adjustment is complete!



These instructions are provided as a courtesy by ECS Tuning

Proper service and repair procedures are vital to the safe, reliable operation of all motor vehicles as well as the personal safety of those performing the repairs. Standard safety procedures and precautions (including use of safety goggles and proper tools and equipment) should be followed at all times to eliminate the possibility of personal injury or improper service which could damage the vehicle or compromise its safety.

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