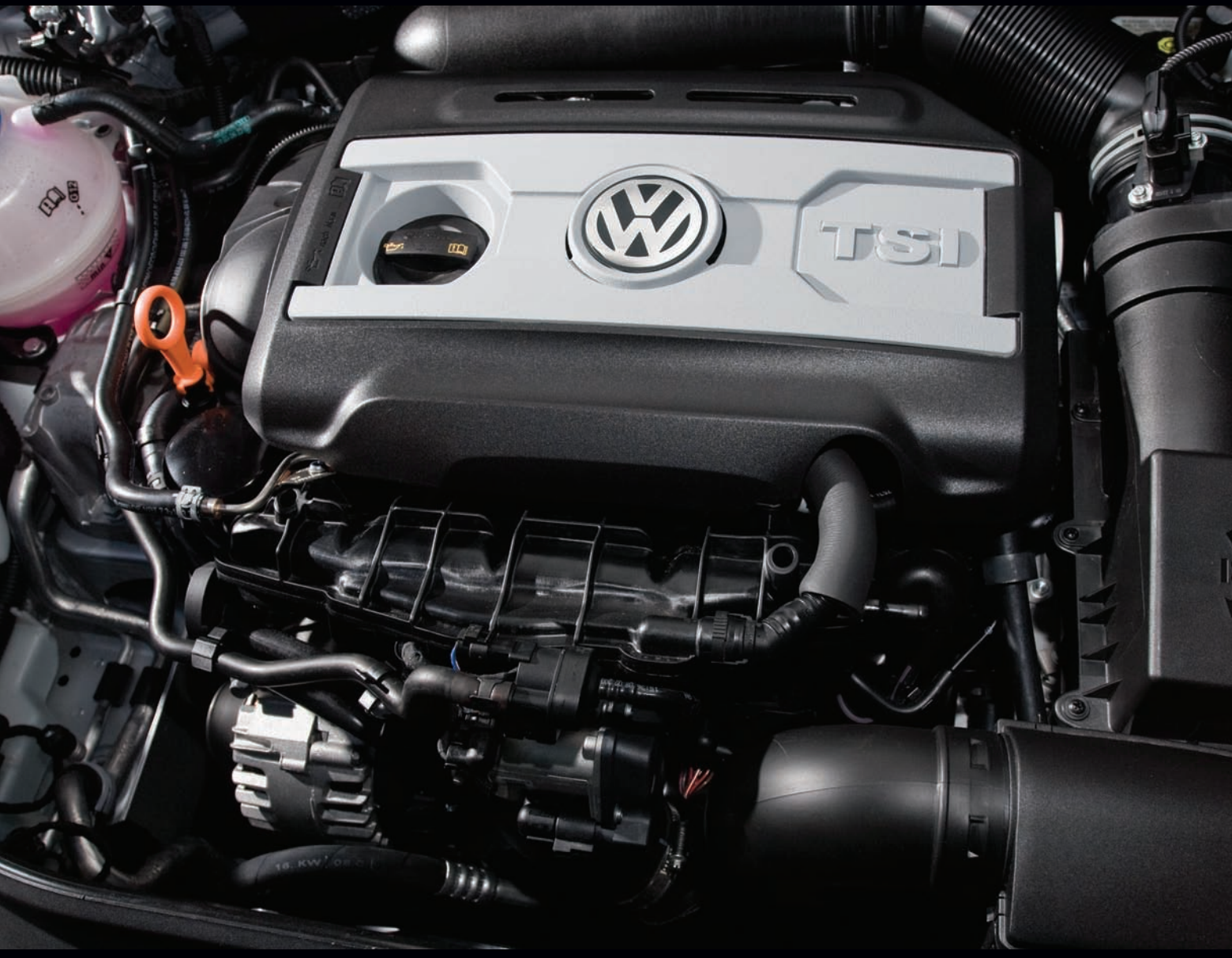
Volkswagen Tech Connect

Your Source for Genuine Volkswagen Repair Information

Volume 3 Number 1 Spring / Summer 2011



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EVAP
Comfort Systems
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Caution: Vehicle servicing performed by untrained persons could result in serious injury to those persons or others. Information contained in this publication is intended for use by trained, professional auto repair technicians ONLY. This information is provided to inform these technicians of conditions which may occur in some vehicles or to provide information which could assist them in proper servicing of these vehicles.

Properly trained technicians have the equipment, tools, safety instructions, and know-how to perform repairs correctly and safely. If a condition is described, DO NOT assume that a topic covered in these pages automatically applies to your vehicle or that your vehicle has that condition. For specific warnings pertaining to the servicing of specific Volkswagen systems and features, refer to https://erwin.volkswagen.de/erwin/showhome.do.

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Cover: 2011 Jetta Engine

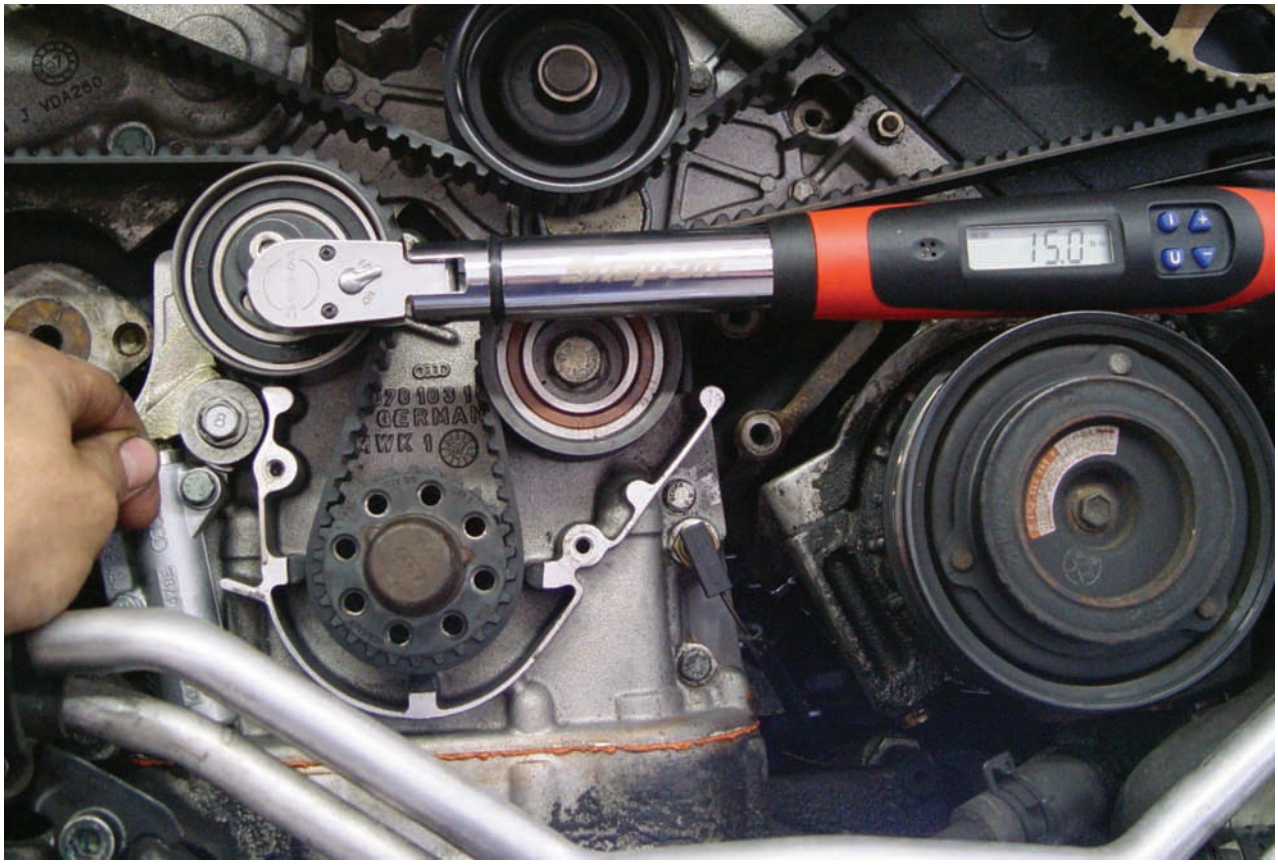
vwparts.com

Working on Our Timing.

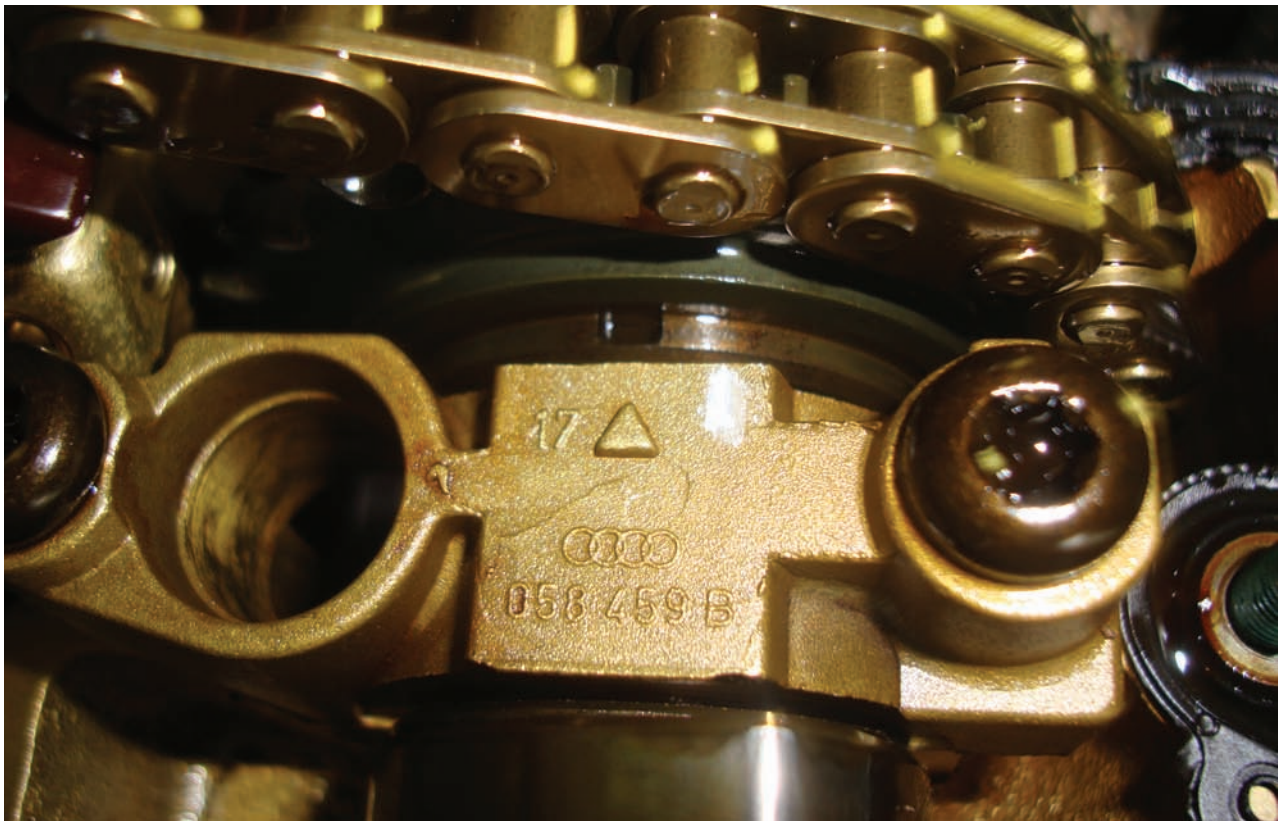
The first Volkswagen engine to have a timing belt was the one in the Rabbit, introduced nearly four decades ago. T- belts last a lot longer now, but replacement is a much more involved job.

In any Otto-cycle engine, if a problem occurs in the 2:1 rotating relationship between the crankshaft and the camshaft, the engine may lose power or not run at all. If it's an interference engine (sometimes called a "hitter"), the valves may contact the pistons causing severe and expensive damage. So, timing belt inspection and replacement intervals must be strictly observed. Although these rugged toothed belts last much longer than they used to, given the huge number of miles most cars are expected to last today, just about every one with a T-belt will need to have this job done. But to say it's not the simplest service in the world is a big understatement, especially given recent advances such as variable valve timing (VVT).

Now, a timing belt job is still a timing belt job, but when diagnosing drivability issues we now have another factor in the equation. The self-diagnostic capabilities of Volkswagen vehicles can determine if there is a problem with base valve timing and these VVT systems. Once the problem is determined, it still needs to be repaired. Just like the synchronization between the crankshaft and camshaft, the timing between intake and exhaust valves is critical to performance. Also, improper timing will set a DTC and turn on the MIL, and the job will have to be done over.



Notice how we are preloading the tensioner to 15Nm of torque. This pulls the belt tight around all the sprockets and pulleys. At this point we can pull the pin to release the tensioner. The next step is to tighten the cam gear bolts to 55Nm to secure them.



Look at how the arrow on the cam cap lines up with the notch in the cam gear. This is a correct timing setup. The white paint mark you see was where the notch was lined up. The intake cam had to be moved to the left one tooth on the sprocket.

Check 'em often

The 2.0L gasoline engine is not the interference type, but the 1.8L turbo and 2.8L are. Volkswagen service literature does not officially require specific replacement intervals for timing belts on all models, but for others specifies every 105,000 miles (along with the tensioner). So, always look up the recommendation for the car at hand. Regardless, the company's service engineers say that in all cases the belt must be checked every 40,000 miles. If you are working on a vehicle for the first time and it has any considerable mileage on it, we recommend that you check the belt and related components. Belts can stretch, fibers can break, and hydraulic tensioners can weaken or seize over time.

The basic test that goes back to the first use of timing belts on Volkswagen vehicles is to find the longest section of belt -- on a 2.0L, between the water pump and cam sprocket -- and try to twist the belt more than 90 degrees with your fingers. If it is difficult to twist, the tension is okay. If you can twist it more than that, you should replace it. While you won't find this test in the latest service literature, it's still useful. You should also look at the condition of the rubber teeth and inspect for fraying and cracking. After all, the belt and tensioner you are inspecting may be aftermarket replacements. Many inferior parts make it to parts store shelves. They may or may not meet the quality control standards of the vehicle manufacturer, and may have their own maintenance interval. This is why it is always a good idea to only use parts that you purchase from your Volkswagen dealer. There will be no question when it comes to quality. Also, there are three different 2.0L engines with three different timing

These cam sprockets need to be on tight. If you try to remove one with a standard puller, you may damage it. Inspect the sprocket for cracks, such as this one has.

belts. Is your aftermarket supplier going to get you the correct one?

The V6 is way different

The 2.8L engine is a different animal. Woodruff keys are not used to position the cam sprockets to the camshafts. They are conically cut so that surface friction and bolt torque secure the sprocket to the cam. The crankshaft sprocket is still keyed to the shaft. Setting up this timing belt is different. Special tools are required to secure the camshafts in place. Each cam has a flange with two holes in it, 180 degrees apart. One hole is smaller than the other. The small holes should be positioned towards the outside of the engine, and the two larger holes toward the inside. VW special tool 3391 holds the cam flanges and the camshafts in place. The sprockets are removed from the camshaft with a puller. Making room for this puller is why you should remove the front support. VW tool 3032 is recommended, but any puller that can get behind the center hub of the sprocket can get the job done.

If your puller only grabs the outer sprocket or the sprocket fingers, you may crack the part trying to remove it. Check around the hub section for cracks that may have been caused by previous service. Of course, the part will need to be replaced. The crankshaft is held in place with a securing pin, VW special tool 3242. On the driver's side of the block behind the motor mount is a plugged hole for the tool.

With the crankshaft in position, thread the tool into the block until it is fully seated. You should not be able to rotate the crank at all. With the crank and cams secured, you can remove and

reinstall the timing belt. It is strongly recommended that you replace the hydraulic tensioner, tensioner pulley, and idler pulley at this time as well. If any of these components were to seize or come apart, it would not only waste the effort of this current job, but would also cause a much worse catastrophe because the cylinder heads would have to be removed for valve replacement. It would also be a good idea to replace the thermostat, since it is behind the timing belt.

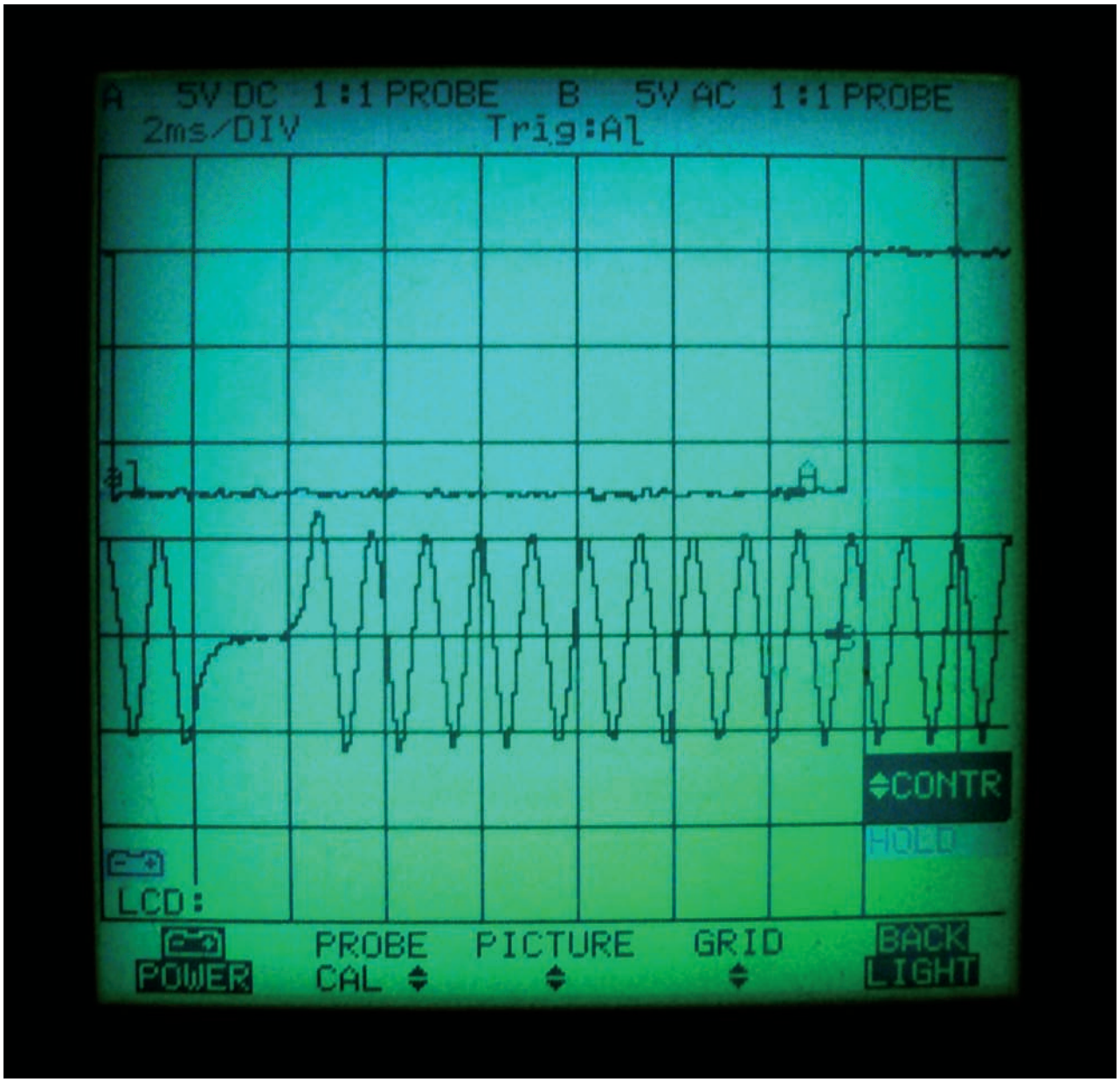
To install the timing belt, wrap it around the crank sprocket, idler pulley, bank #2 cam sprocket, water pump pulley, bank #1 cam sprocket, and tensioner pulley. The cam sprockets will "float" on the nose of the camshafts, so don't leave the securing bolts too loose or too tight. The goal is to set the proper tension on the belt while the crank and cam are held in place to insure proper timing. Also, you need to torque the tensioner securing bolt to its proper torque. Use an 8mm Allen socket in the tensioner pulley and rotate it toward the belt until you have applied 15 Nm of torque. This ensures the belt is properly seated and tensioned. Remove the pin from the hydraulic tensioner assembly. This should hold the belt tight. The cam sprockets may have moved but it does not matter. VW tool 3391 holds the cams in place so you have proper timing. Tighten the cam sprocket bolts to 55 Nm to make sure they do not rotate on the shaft.

Hybrid belt and chain

This handles the timing belt portion of the job. By now you should have noticed that only the exhaust cams are driven by the timing belt. That's because the exhaust cams have small timing chain sprockets mounted at their other end under the valve cover. It is at the rear of the head for bank #1 and the front of the head on bank #2. This sprocket drives a small timing chain that then drives the intake camshaft. There is a timing chain "camshaft adjuster" mounted in between these sprockets. It either pushes the timing chain up or pulls it down. The normal position is down for basic valve timing. When the tensioners are pushed upward, they pull the intake cam into the advanced position. A solenoid mounted in the adjuster allows in oil pressure to be used to position the upper and lower pistons.

The PCM uses the crank and cam position sensors to determine whether or not the initial valve timing is correct and if the camshaft adjuster is working properly. You can evaluate scan tool data to see if the timing is being advanced. Look at measuring value blocks in the 090s and you should see valve timing readings given in kW (kilowatts). This is what makes timing belt installation critical. The vehicle may run with one tooth off, but you will not be able to fool the computer and valve timing codes will appear. Every tooth on the timing belt results in a 6 kW change in your scan tool reading, so you can't have any mistakes here. On 2000 and later models, you can go into basic settings block 094 and increase rpm to 2000. Here, the VVT system will be checked and you will be told if one or both banks have passed or failed. You can also put a lab scope on the crank and cam sensors and activate the solenoid yourself. You can watch the change between the timing of the crank and cam.

If the adjuster is "ratcheting" on a cold start, oil pressure is being bled off, so it will have to be replaced. This requires the removal of both camshafts, particularly on the driver's side head. While you have the adjuster off, be sure to blow out the oil passages that feed it. You should feel air coming out of the cam journal oil feed holes. A new gasket contains the half moon seal that is mounted under the gasket. When you receive the new camshaft adjuster you will see a fixture holding the pistons in place. You should install the unit with the fixture in place, and remove it when you are ready to crank the engine by hand two rotations to double check the timing marks for the cams. When installing the adjuster, be sure you have the two notches in the cams lined up with the arrows on the cam caps. You should have 16 timing chain rollers between the two notches when the tool is removed.



Here we have a scope pattern of both the cam and crank sensors. The upper trace is the Hall-effect cam sensor, and the lower trace is the pulse generator crank sensor. Notice the relationship between the two. This shows that the base timing is correct. You can also activate the VVT solenoid and watch the two patterns move apart as the timing changes.

This is how Volkswagen designed its VVT systems for years on DOHC (Dual Over Head Cam) engines. Starting around the 2005 model year, timing belts were only used on the BBW and BEW SOHC (Single Over Head Cam) motors, the others having been switched to timing chains. The BPY engine does not have VVT, but it is DOHC, so the timing belt procedures remain the same. On later engines, the camshaft actuator was moved to the front of the camshaft as part of the sprocket. VVT was also applied to the exhaust cam for greater engine control. ●

Leak Detectives.

Even though OBD II-compliant vehicles have been on our roads for almost 15 years, EVAP system failures continue to stump technicians. Let's look at some techniques that'll help you avoid that.

Evaporative emission systems have been installed on all cars sold in the U.S. since 1971. The concept is certainly simple enough: Since venting the gas tank (and long ago the carburetor's float bowl) directly into the atmosphere would make up a large percentage of a vehicle's HC emissions, there was a need to contain and dispose of these fumes. The solution that was universally adopted was to store them in a charcoal canister, draw in fresh air, and feed this mixture into the engine to be burned.

Monitored

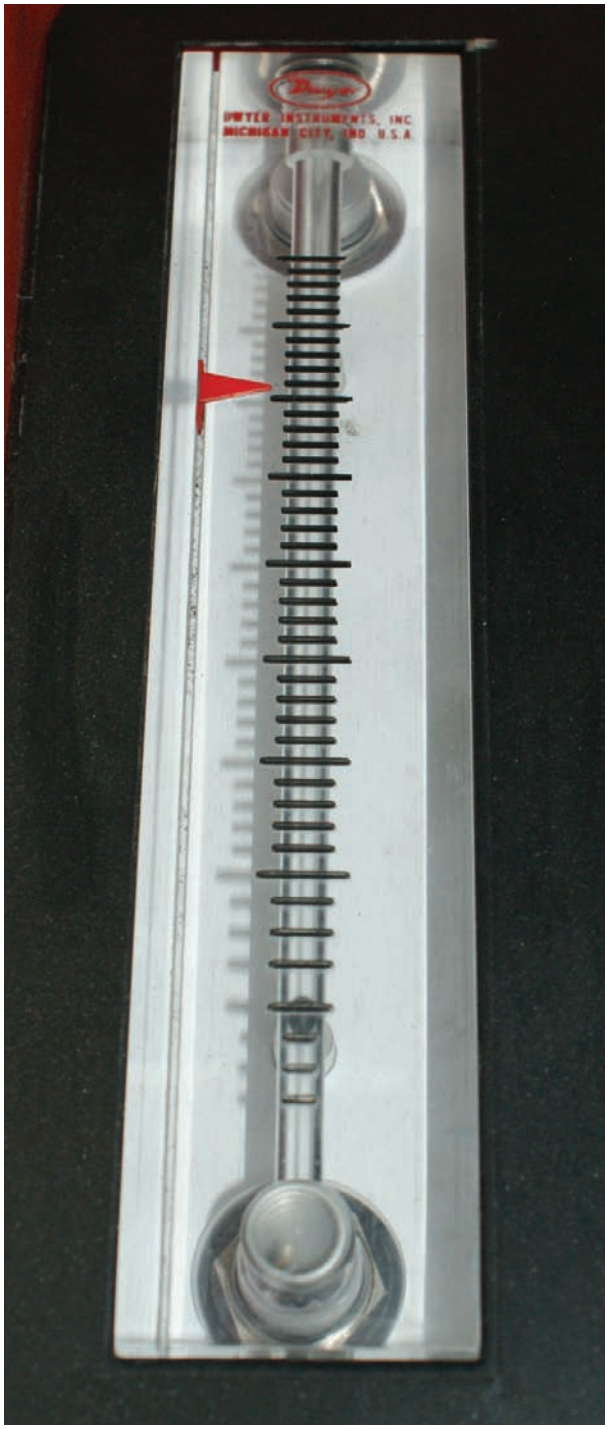
But this elegant simplicity disappeared with the advent of OBD II, which makes EVAP a monitored system. That means that as the vehicle is driven an electronic control unit tests the system's operation. In this case it's looking for leaks in the components that store, route, and control fuel vapor. An OBD II requirement is that the system must be able to detect both small leaks (no more than .020 in. in diameter), and large ones (.040 in. and up). Now, there are many different ways for a tech to check for leaks, but there are only two methods of electronically monitoring for them. You can generate pressure and look for a pressure drop (pressure decay). Or, you can pull the system into a vacuum and see if it holds (vacuum decay). Volkswagen engineers chose to use the positive pressure method.

A breather line connects the fuel tank to the charcoal canister. This carries vapors from the tank during refueling. Canisters themselves are mounted in various locations according to space and proximity to the fuel tank. They contain activated charcoal as their storage medium. Another line on the canister is routed to the intake manifold, and is connected to a canister purge solenoid. This solenoid is duty-cycle-controlled by the Powertrain Control Module (PCM). When the computer feels it is necessary, it pulses the solenoid and allows fuel vapors from the canister to be drawn into the intake manifold to be burned. While the engine is idling, cycling is on and off, but may be pulsed on more with increased engine rpm and load. On most front- and four-wheel drive models, the solenoid is mounted on the passenger side of the engine compartment on the air filter housing.

If you have the proper fitting, you can pipe directly into the test port and add smoke. If you do not have this fitting, you can add smoke to the canister side of the canister purge solenoid. It may time out a few times before you get enough smoke into the tank.

Pumped up

Volkswagen EVAP systems use a Leak Detection Pump (LDP) to perform the pressure decay leak detection method. The way an LDP functions is simpler than it sounds. Manifold vacuum is applied to the upper chamber of the pump. A solenoid is pulsed on and off allowing and restricting this vacuum source to the upper chamber. This raises and lowers a diaphragm in the LDP that has opposing spring pressure applied to it. This up-and-down action generates a positive pressure in the bottom of the LDP. The pressure is at maximum when the spring can no longer overcome the pressure in the system. This pressure is applied to the fuel storage components. A pressure switch monitors how long it takes to build



Look at the flow meter on your smoke tester. In this case, the ball is up in the tube, meaning there may be a leak. Of course, you will have to block the hose from the LDP to its fresh air filter to totally close the system. If the ball still floats, you have a leak.

pressure, and whether or not the pressure is maintained over a period of time. If the pressure is maintained, then there is no leak. If the switch changes states within this specific time then a pressure loss must have occurred. The PCM will run the LDP again and retest.

This EVAP system is usually not intrusive to customers. The only indication they'll ever have that there is a problem is an illuminated MIL (Malfunction Indicator Lamp) with a Generic code somewhere in the P044X range. Here a VAG 5054 would give you factory-specific codes that would narrow down the possibilities in a more cost-effective way. In any event, it is sometimes a difficult task to sell jobs to customers when there are no perceived problems with their vehicles. You have to let them know that this is an emissions-compliance issue, and in many states these days there is an OBD II inspection process. The vehicle will not pass if the code is active and the MIL is on.

Measuring blocks

You have a few different options when you are actually going to do a diagnosis. First, if you have a VAG5054 scan tool you can observe data in "read measuring blocks," address number 08. For most vehicles built in the past 10 years, you would look at data block 070 and 071. Block 070 tells you the status of the purge solenoid and if it is working properly. Data block 071 lets you know if the leak monitor passed or failed the last time it was run. If you actually want to test the system, you can clear the codes and enter into "basic settings" address 04. You can enter the same measuring block numbers 070 and 071, but in this case you will run the tests if the conditions are right. With the engine running at operating temperature, entering 070 starts the canister purge solenoid test to check purge flow. With 070 the LPD is activated and the system will test itself for a leak.

Look in field 4 after the test is complete to see whether or not the system is okay. This can help during diagnostics as well. While the LPD is running the PCM is measuring how long it takes to fill the system. This time will vary with fuel level. This is why the EVAP monitor does not run unless the tank is between ¼ to ¾ full. If the LDP needs to cycle on again, or it takes too long to build pres-

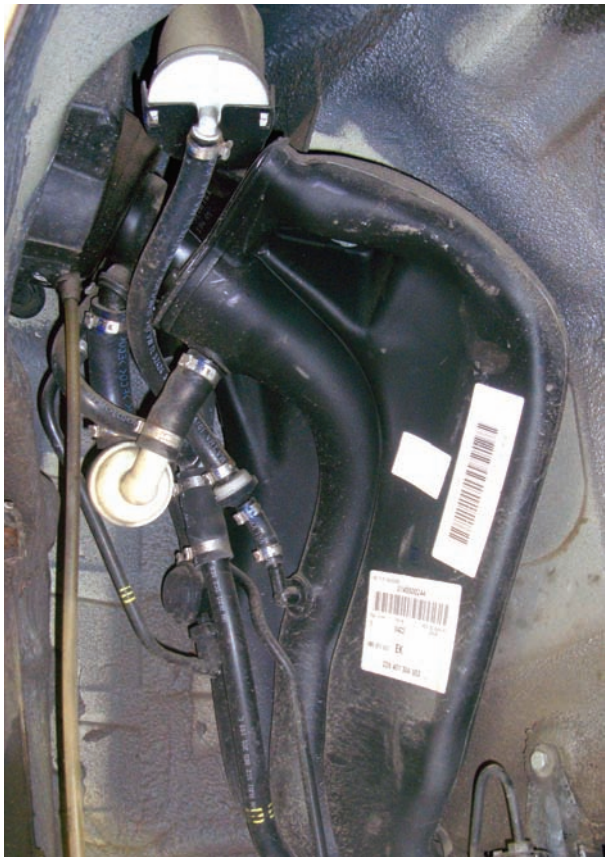
The Canister Purge solenoid is usually located on the passenger's side inner fender. You can inject smoke here if you need to. You can also remove the canister line and listen for a pulsing vacuum sound. If the sound is steady, the solenoid is stuck open. You will also get a P0171/4 from the lean condition at idle.

sure, then there must be a leak. Using the VAG 5054 you can block off the line leading from the LDP to the canister. This action takes most of the fuel storage system out of the equation. If the test passes, you now know the LDP is working and the leak must be after this point.

You should now block the line leading to the canister from the fuel tank and run the same 071 test in basic settings. If the test fails, you know the problem is somewhere between where you first blocked it off and the current block-off point. Check the lines into and out of the canister and the canister itself. It is sometimes difficult to use a smoke machine to test for cracks in plastic parts such as the charcoal canister. Simply apply a soapy water solution to the plastic part and look for air bubbles just as you would look for a leak in a tire. If the system passes the next test, keep blocking hoses farther away from the LDP. When the system finally fails the basic settings 071 test, you know the leak is between the current point and the last point you blocked off.

Smoke it

Another way to pinpoint a leak is to use a smoke machine. It's such a simple device we wonder why we didn't think of it first. Burn oil, then apply light pressure and plug it into a system. If you see smoke, you have found the leak. Nitrogen works the best for the necessary pressure, and is really the only safe choice because shop air would create a fire hazard. Your smoke machine needs to be rated for EVAP systems that operate at 0.25 psi. We're dealing with inches of water when it comes to EVAP systems. The best place to start smoking the system is at the inlet of the canister purge solenoid coming from the canister. This should permeate throughout the entire system after a few minutes. You know the system is full if you remove



To capture vapors during refueling, Volkswagen vehicles have an expansion tank as part of the filler neck. This holds fuel vapors, separates liquid fuel and returns it back to the fuel tank. You may have to add smoke from the gas cap if you suspect a leak here.

Blocking the line from the filter to the LDP seals the system. Any smoke you see must be coming from a leak. If there are no leaks, the ball in the flow meter should drop completely.

the gas cap and smoke comes out. Secure the cap and start looking at hose connections and lines.

There is also the possibility of an internal leak. During the leak test the canister purge solenoid is closed. If it is not properly sealed, or stays stuck open, the manifold vacuum on the other side will drop the pressure in the system. You will not see smoke because it is passing through the purge solenoid and entering the intake manifold. A stuck-open solenoid will constantly draw fuel vapors from the canister. Engine management will react to this un-metered air and will increase additive fuel trim. This is the first place you should look if you pulled two codes from the PCM, one for purge flow/leak and a second for a lean condition, P0171 and P0174. You may get lucky if you start the engine and remove the tank side of the purge solenoid hose. You should hear a pulsing vacuum leak. If the sound is steady, the solenoid is stuck open. Try tapping on the solenoid and see if it starts working again. If it does, it still must be replaced. You can verify your repair with basic settings again and see if it passes the block 071 test. EVAP problems can be difficult to diagnose.

Sticking solenoids and LDP switches can be intermittent. With the proper tools like a smoke machine, however, you should be able to find most problems. Sometimes a soapy water solution will lead you to a crack in plastic parts. Having a VAG 5054 or equivalent may help you find the problem and lets you test to find out if your repair actually fixed the vehicle. Knowing how a system works is half the battle!

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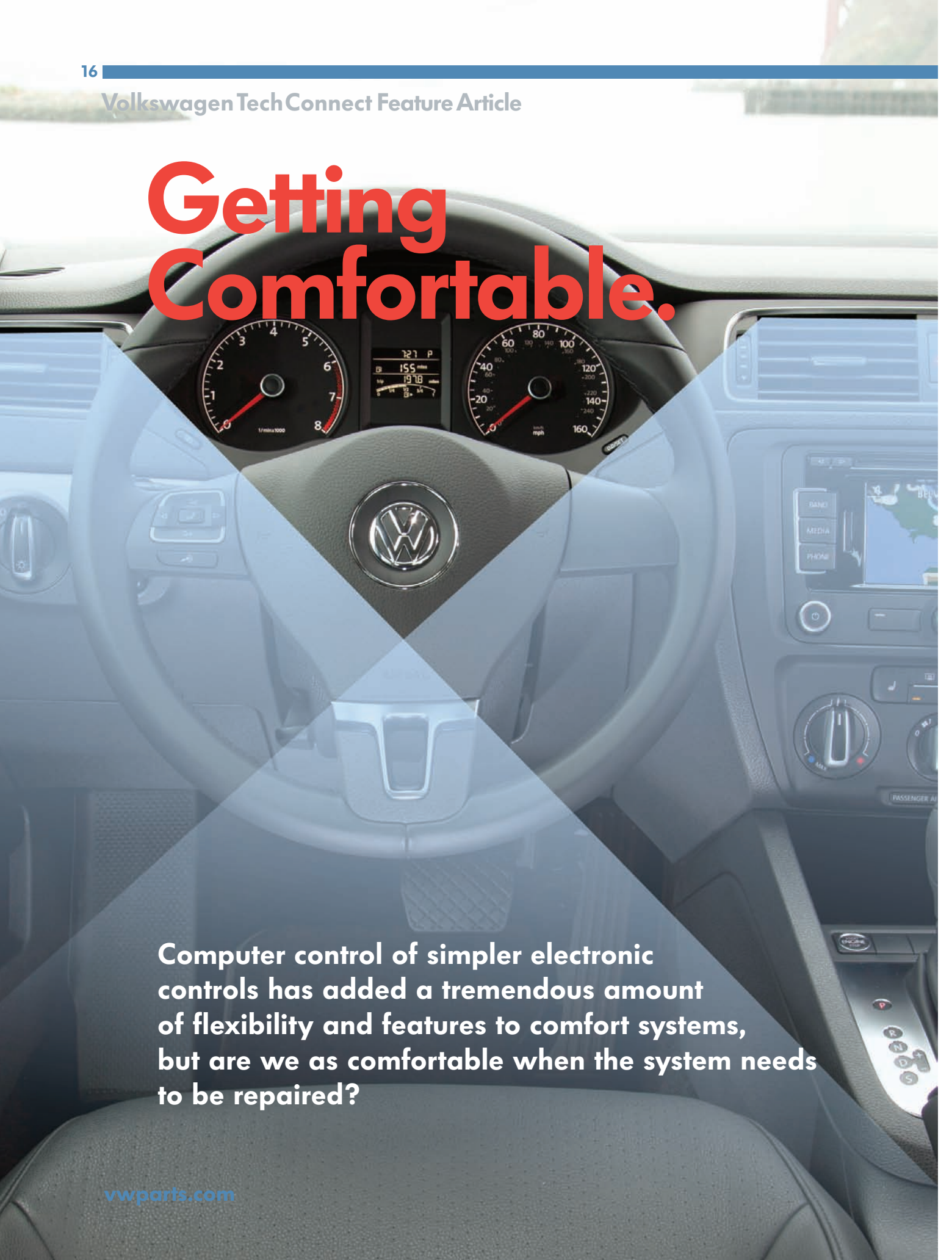
Getting Comfortable.



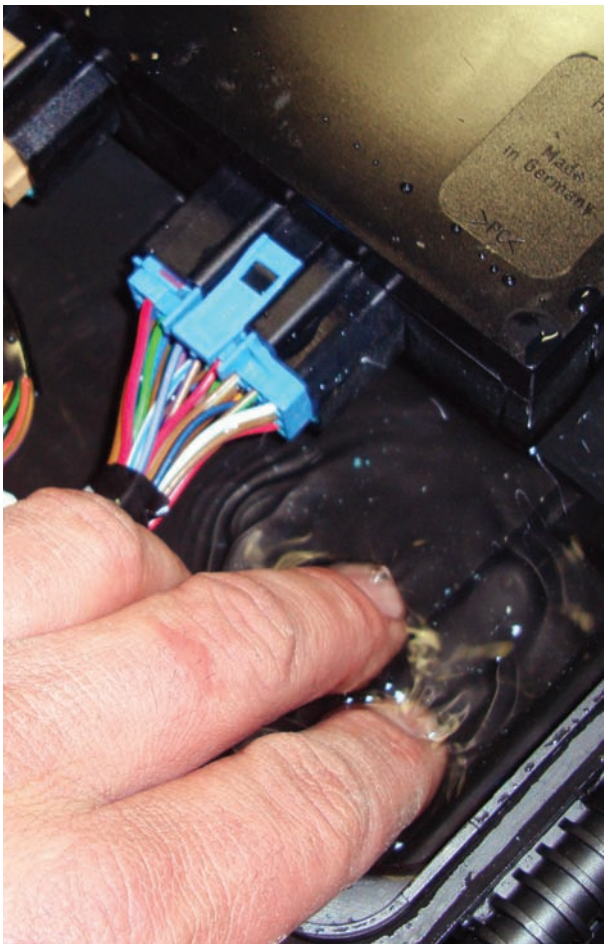
Computer control of simpler electronic controls has added a tremendous amount of flexibility and features to comfort systems, but are we as comfortable when the system needs to be repaired?

How you feel about progress depends on which side of the technical-knowledge fence you're on. Some shop owners and technicians love it -- others hate it. What happened to the days of relays and switches? Well, simply, they're gone, and for some good reasons.

Modern European-engineered vehicles are marvels of technology. They have multiple networks and gateways to link the networks. If individual wiring were to be used in place of networks, it would add a significant amount of weight to the vehicle, take up valuable interior space, and make it harder to diagnose and repair wiring problems. Networking also allows for different features and functions with an added measure of safety. For example, if somebody's arm gets caught in the window while it's closing, a door control module can see the increased current draw of the motor and reverse its direction before there's an injury. All power windows and door locks can be controlled with the push of a button. Seat positions can be memorized with presets. The features go on and on.

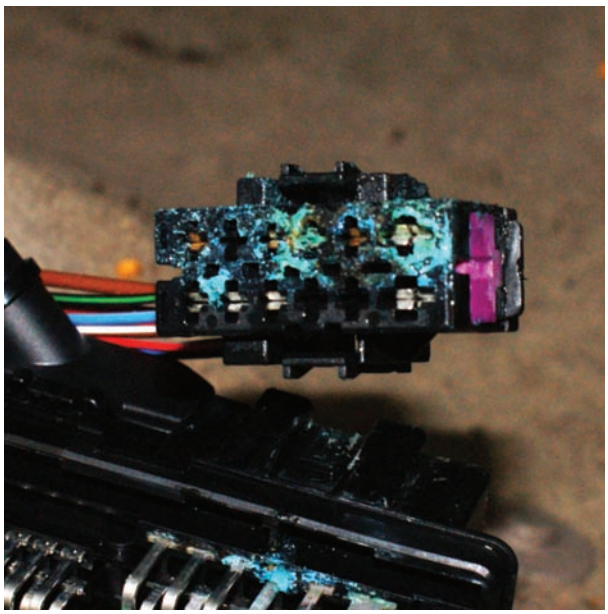
Need VAG

The downside of all this safety and convenience is the complexity of the diagnosis when something goes wrong. Is it the switch? Is it the control unit? Is it the network? With proper training and an understanding of how these systems work, you should be able to diagnose most problems in a reasonable amount of time. There's no doubt that diagnoses would be very difficult without a VAG 5054, or its equivalent. Communicating with control units and looking at data inputs would be practically impossible while modules are communicating with one another. You can put a scope on them and verify that the network is up, but the actual messages must be interpreted by a scan tool. You should know the framework of the networks so you can develop a diagnostic plan. You'll also need to do some electrical testing. Each control unit still must have power and ground, so don't put down your digital multimeter just yet.

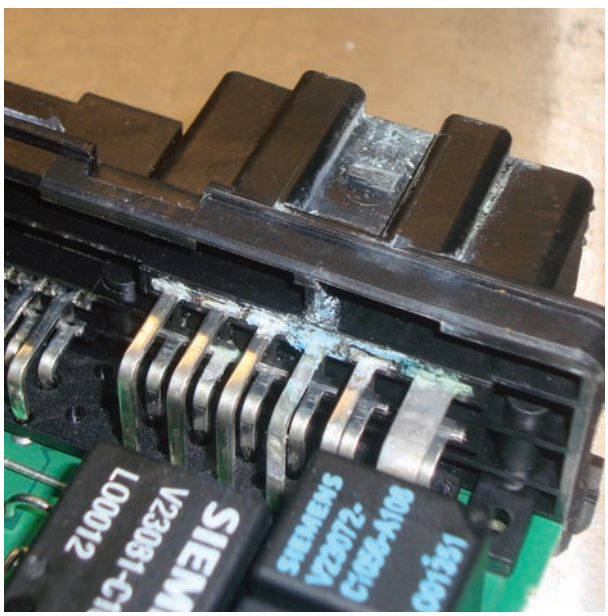


Pulling out the central control module housing reveals that it's filled with water, which will obviously have an adverse effect on electrical connections and control unit functions. Find the source of the water leak!

The first thing you need to know is that not every Volkswagen vehicle has the comfort system. It first appeared in the 1998 Passat, and was added to the Jetta and New Beetle models in 1999. It is only installed on vehicles with power windows. Those with manual windows have a central locking module with some convenience features. When using your VAG 5054 or equivalent, enter word address 35 for the Central Locking system, and address 46 for the convenience module. This module, sometimes referred to as the Central Control Module, handles the interior lights, trunk



Here, a connector is corroded, affecting electrical signals. Connectors and their pins are available for purchase from your Volkswagen parts supplier so they can be repaired.



If there is corrosion inside the module, either on the pins or on the board, you will need to replace the control unit, and the new one will have to be coded. You can enter the old code if it's available, or you can code it from a list of features.

lock, keyless entry, alarm with starter lock-out, sunroof/window/central locking signals, and scan tool communication. It communicates through what is known as the CAN-Bus. In the case of a 2000 Passat, the wires involved are Orange with a Brown tracer and Orange with a Green tracer. They start at the convenience module and are connected to each door module. Yes, each door has an individual module.

Your scan tool never comes in contact with these CAN-Bus wires. A separate K-line connects the convenience module with the diagnostic connector. The central control module is mounted just in front of the front seat, underneath the carpet. Like the door modules, the central control module works with the Memory Seat/Mirror Control Module as part of the Comfort System. To access self-diagnostic information, don't look in the convenience module. Instead, enter Seat Adjustment Driver's Side directly using address word 36. For the seat adjustment module, all switch inputs, and seat and mirror motor controls are directly wired to the seat adjustment module. They communicate, along with the driver's door module, through a separate A-Bus. This only relays this information to the central control module through the A-Bus. When the ignition is switched off, the driver's door module puts out the command to go into sleep mode. Only the anti-theft warning light (controlled by the driver's door module) and the keyless entry antenna (controlled by the central control module) are still active.

Functional testing

Battery draw is now reduced to acceptable levels. If there's an overnight battery drain, you may want to look into the driver's door and central control modules first. The driver's door module is looking for all the doors, trunk and hood switches to indicate closed before sleep mode is activated, so make sure all of these switches are working. You can check them manually, but door panels will have to be removed. It is much easier to look at measuring blocks to observe the switch states.

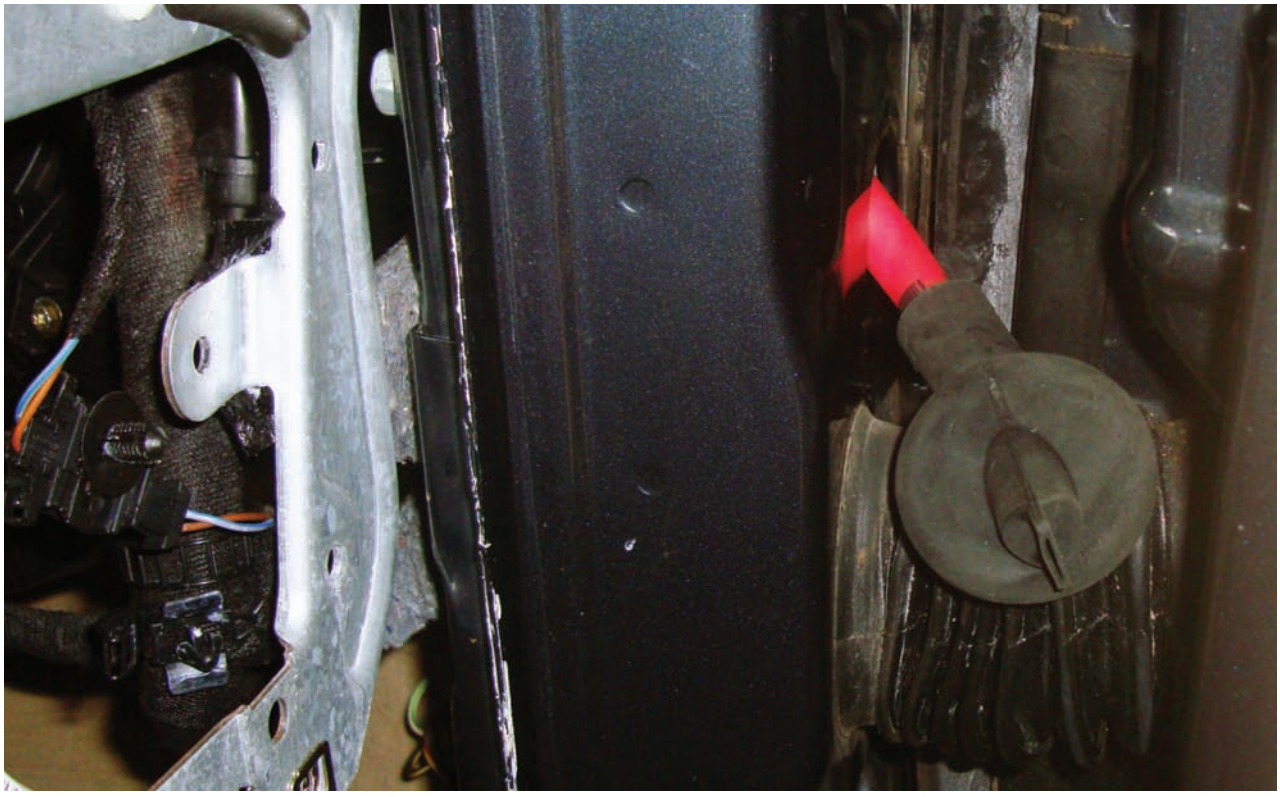
Make sure the cowl drains are not clogged, which would allow standing water to migrate into the body. This can build up underneath the carpeting without the customer even knowing. On Passat models, this means removing the battery for access.

The central control module stays active for about 10 minutes except when a door is opened, and then the system starts to go to sleep. These systems have a lot of features, and you'll find some of the best testing you'll be doing will be of the functional variety. Functional testing is simply operating all of the inputs and seeing what works and what doesn't. How is functional testing going to help you?

Let's look at the power window features of the comfort system. Part of it is how all of the vehicle's windows are controlled from the driver's side door switch. If you unlock the driver's door, either that door will unlock or all of the doors will unlock, depending on the coding of the central control module, but more on that later. Insert the key and unlock the driver's door. If you continue to hold the switch in the unlock position, the driver's window should move in the open position.

This means the key unlock switch is sending a good signal to the driver's door module. Hold the unlock position even longer and all of the windows should start to move down. If they don't, you know there's a problem with the CAN-Bus. The same can be said for the lock position except all of the windows will close. If all but one or two windows go down, you know you have a problem with those individual door modules or components. Functional testing is merely observing what is working and what isn't.

If the driver's window did not go down, you may have a bad key switch. At this point use your VAG scan tool (or equivalent) to monitor the door key switch input. If you see it does not function properly, you now have a good reason to remove the door panel and check the switch electrically. You may have a broken wire or a bad switch in the locking latch assembly. If the driver's door win-



The sunroof drain is also a source of water intrusion. Make sure the orange rubber line is seated in the grommet and directing water outside of the cabin. These parts are available from your Volkswagen dealer.

dow went down, but the others did not the CAN Bus may be down. You can watch these signals in the convenience module (word address 46). If the measuring block data is indicating the switch is working in the door module, but not the convenience module, you may have problem in the wiring. Check the door jam first -- since these wires have to bend during opening and closing they are a likely trouble spot. If the wiring is good there, the next stop should be the convenience module itself.

Central control

While scan data is a tremendous time saver, you cannot over look the need for electrical testing. The central control module is the brains of the operation. You can perform a lot of electrical testing right there. By moving the driver's seat all the way back and removing the plastic rocker panel cover, you can reach under the carpeting and remove the convenience module housing. There is enough wiring slack to pull it out from underneath the carpet. Look at the electrical connections. You can use a lab scope to see if the CAN-Bus signals are making it to the module. These are redundant signals, so you will see CAN-High and a CAN-Low that should mirror each other. If the module's connectors are corroded with green copper oxide and it's sitting in a pool of water, you've probably found the source of the electrical problem.

On vehicles with sunroofs, the drain can get clogged or come out of its rubber grommet mounted in the "A" pillar. This will allow water to find its way to the floor pan area. You may also have a leaking door seal, or possibly the owner left the door open or the window down while it was raining. Either way, you will have to deter-

mine if the control unit is salvageable. The connectors and electrical terminals are available from your Volkswagen dealer, so the harness can be repaired if necessary. Chances are if the control unit is water-damaged there will be other symptoms. The central control module controls many items listed earlier such as starter lockout, trunk lid opening, etc. You should perform more functional testing to verify whether or not the convenience module is bad.

What other systems should you test before condemning and module? Interior light control and keyless entry systems seem like good choices. Interior lighting is completely controlled by the convenience module. If the interior light switch is turned to the door position, the door switches indicate unlock, the door is opened by means of the inside handle, or the ignition key is removed, the lights will stay on for 30 seconds after keyless entry. The lights will shut off when you close and lock all of the doors. If the interior lights are switched on, the convenience module will shut them off in an hour to save the battery.

Lock it

Keyless entry is also part of the central control module. The antenna runs along the bottom of the door sill and goes directly into the convenience module. When the keyless entry buttons are activated to lock the doors, they should lock, any open windows and the sunroof should close, the interior lights should go out, and the alarm should be armed. There is a button to open the trunk or rear lid. Pressing "Unlock" will disarm the alarm, turn on interior lights, and open windows as mentioned earlier.

The central locking system is also a major player in the comfort system. Keyless entry transmissions go directly to the convenience module. Key switch input signals go directly to the driver's door module. Either way, these lock or unlock commands pass through the CAN-Bus and are sent to the other door modules. The alarm will also be activated or deactivated if locked or unlocked respectively. Individual doors can be locked from the inside handle, but the driver's door module can lock and unlock all the doors by means of switch input. Either through "Adaptations" or "Coding" you can change the way features work. For instance, with Selective Locking only the driver's door is opened with the door switch or keyless remote. If selective locking is not coded into the module, then all of the doors will lock and unlock at the same time. Coding will need to be performed on a new central control module.

Coding

What is coding? Each control unit can be used in several different models, and these vehicles may have had different equipment installed at the time of production. Even though these features are available, the customer may want various functions to react differently. For this purpose we have control unit coding. Through your VAG scan tool you can enter coding word address 07. The coding number is going to change depending on what features you want turned on and off. Each feature has its own number. By adding up these numbers you can only come up with one possible total for active features. When the convenience module sees this specific number, it knows what features were turned on and which ones were turned off. You can turn on or remove specific features only by adding the features that were turned on. You cannot subtract these numbers since you do not know which features were turned on and off to begin with.

Knowing how these systems work is half the battle in diagnosing body control system problems, and will allow you to use your scan tool more effectively. It should give you an indication of where the problem is. This way, you only remove the body panels you need to access for electrical testing. This will save you time and your customer money. We can't think of a better way to do business.

Slipping away.

Since Volkswagens have always been high on the list of fun-to-drive cars, their owners often opt for manual transmissions. So, clutch work is still with us

While an automatic transmission may be simpler for most drivers to operate than a manual gearbox would be, it is also a lot more difficult and expensive to diagnose and repair. For instance, when there's a shifting problem, the technician needs to isolate if it's being caused by the electronics or a mechanical component inside the transmission.

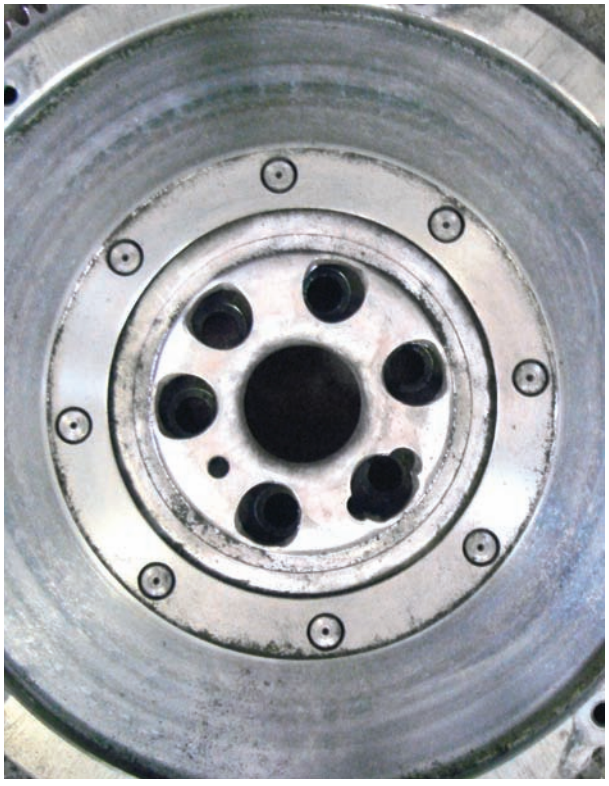
Manual gearboxes, on the other hand, are easy to troubleshoot, require little to no maintenance, and generally last the life of the car without expensive repairs. But there is a weak link involved: the clutch. Sooner or later the friction material on the disc will wear out, springs will weaken, and other parts will deteriorate.

Don't assume

Whenever you get a case of slippage and the car's odometer reads high mileage, chances are the friction material on the disc is just plain worn out. But don't jump to any unfortunate conclusions. Check that release mechanism before pulling the transmission. Depending on the year and model, Volkswagen clutches may be actuated either hydraulically or by means of a cable. Also, the cable may be adjustable or self-adjusting. There's little margin for error in release distance. It doesn't take much in the way of worn parts, air in the hydraulics, or assembly or adjustment mistakes to cause trouble. Check everything from fork, pushrod and ball stud pivot wear surfaces to cable and automatic adjuster condition and cylinder leakage. Since it's so easy to go wrong, look at all those parts carefully at disassembly so you'll know exactly how they go together. If chatter is the complaint, again don't automatically blame the friction components.

Deteriorated motor mounts or a loose torque strut could be the culprit -- a quick look and a little pushing and pulling will let you know. Also, what kind of a release/engage signal is the clutch getting? If it's jerky because of guide tube or fork roughness, you can't expect the other components to work right.

When customers tell you that the gnashing of transmission teeth is jarring their nerves, do a spindown test. You should be able to engage



Is that flywheel worth machining? If you remove any material from the inside friction surface, you will also need to machine the outer step. This means pins need to be pulled and reinserted.

reverse (which hasn't got synchromesh) without clash within no more than 10 seconds after depressing the pedal. No? Then there's excessive drag, possibly due to a dry and corroded pilot bearing. Another thing to think about is corrosion on the spline that keeps the disc in contact with the flywheel. Then there's the opposite situation -- no engagement. Again, the release mechanism is the first place to look, and faulty assembly is the probable cause.

Do it all

In cases where you're satisfied that the transmission has to come out for further clutch inspection and parts replacement, the steps include removing both axle shafts along with the shift linkage and gearbox/engine mounting bolts. The starter may need to be removed as well.

It's unfortunate that some people believe that you only need to replace the clutch friction disc (a.k.a. fiber plate) when its linings have worn out. This is a decidedly unprofessional view. Not only do pressure plates wear, but the throw-out bearing is under load during every shift. Since it's such an involved process to R & R the gearbox, it's more cost-effective to replace all of these components while everything is apart.

There's a development that's made this job more convenient for us: the availability of clutch kits. That means you get the disc, pressure plate, release bearing, and a plastic alignment tool in one package. Some even include a pilot bearing. These kits can be purchased from your Volkswagen dealer's parts department.

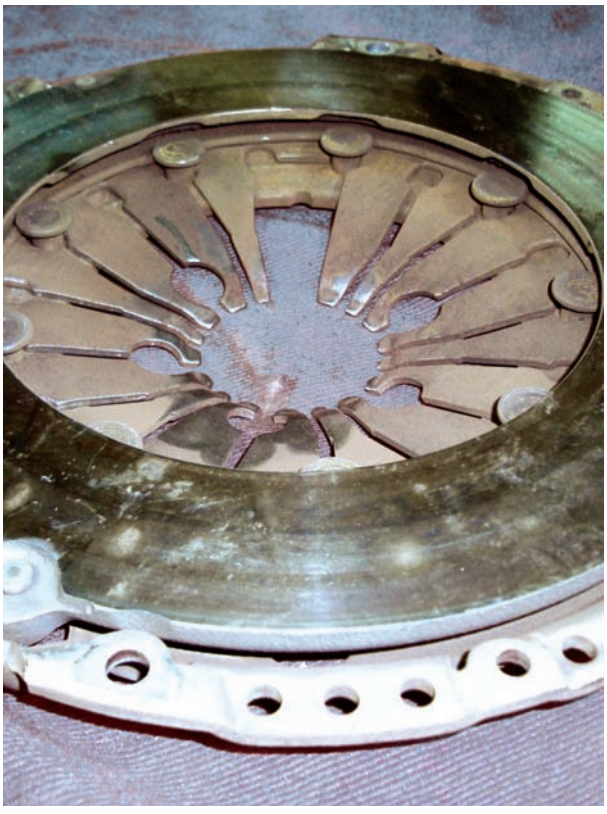
Flywheel factors

The real question you need to ask yourself is, "What do I do with the flywheel?" It is recommended that you machine the entire clutch surface to assure proper grip with the new friction material. Not attending to this may void the warranty on the new parts. This is not to say that there will never be a case where the flywheel is fine as-is. Basically, it should have no visible cracks, wear, discoloration, burned spots, grooves, or ridges. Accumulations of facing material or blued areas can be eliminated with fine sandpaper. The rule of thumb for max runout, by the way, is .003 in.

Many technicians don't really understand the ideal surface. No, not rough as a file, although there's a common misconception that such a finish gives lots of bite. It should be as smooth as possible because engagement power is a matter of maximum surface area.

Volkswagen vehicles use a "stepped" flywheel design. This means if you machine the inner portion you are actually moving the pressure plate away from the flywheel. This increased gap will reduce the grip the pressure plate and flywheel will have on the fiber plate. In order to maintain the same factory specifications for flywheel

Look at the rivet head on this clutch disc. The flywheel side of the fiber plate is just about worn down to it. Luckily, the rivet is not gouging into the flywheel. This disc needs to be replaced.



Notice how one of the fingers on the pressure plate is missing. This is one reason why this component should be replaced with every clutch job.

depth, you will need to cut the upper step the same amount as you did the flywheel clutch surface. To do this you are going to have to remove the pressed-in alignment drive pins from the flywheel so you have a flat surface to machine. By the way, remember to mark the flywheel's position on the crankshaft before removal.

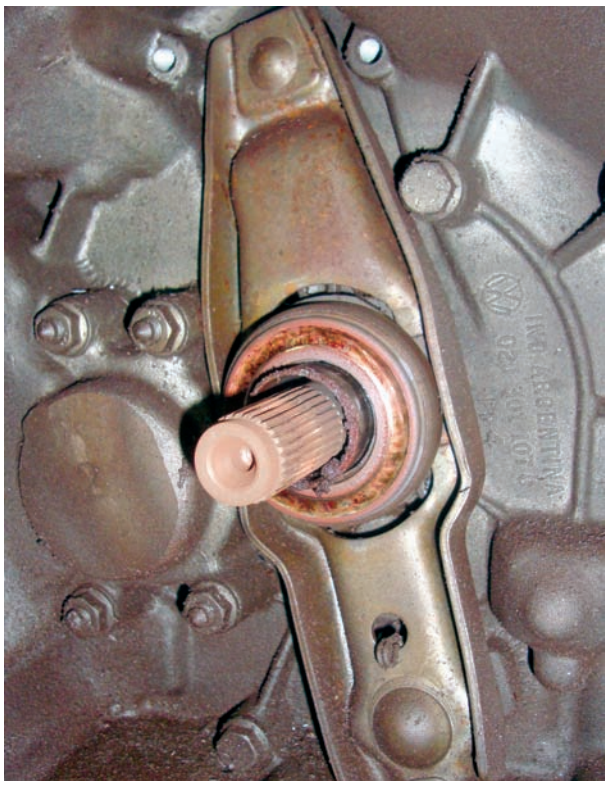
In many cases, it makes more sense to simply replace the flywheel with a new one. Then you can be sure specifications will be met and the friction surface will be ideal. Some late-model Volkswagen vehicles may have a dual-mass flywheel, which absorbs torsional vibrations from the crankshaft. This is achieved with a primary mass bolted to the crankshaft, a secondary mass on which the clutch is mounted, and a spring and damper assembly between them. When removing the dual-mass flywheel, you must line up the bolt holes so the bolts can pass through. Do not use an impact gun to remove the bolts. Remove them only by hand.

New bolts and pilot bearings

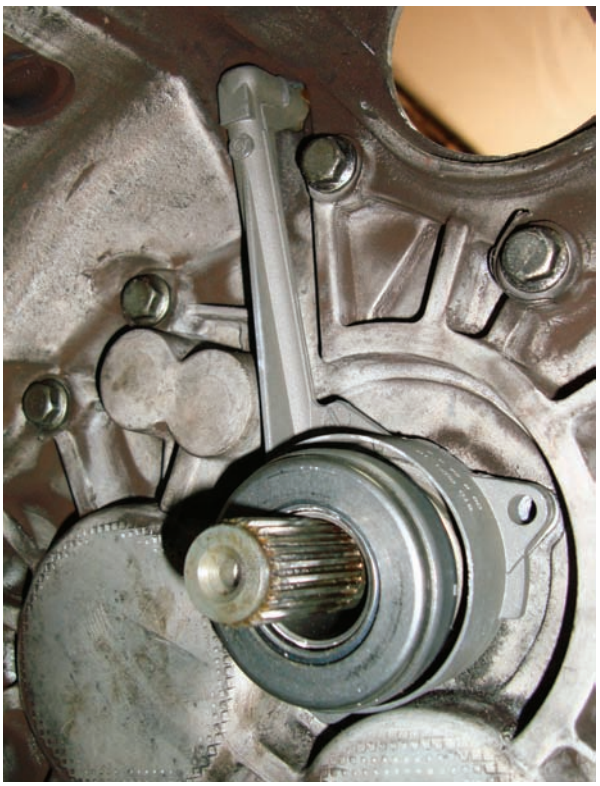
When installing any flywheel, new mounting bolts must be used. That's because they are of the torque-to-yield type -- the threads stretch as they are tightened. They weaken and the threads will continue to stretch if used a second time, possibly causing bolt failure.

Another part that is often overlooked when doing a clutch job is the pilot bearing. It supports the input shaft of the transmission and can wear to the point that it allows the shaft to move around. This can lead to input shaft bearing wear and unusual noises during shifting. You should remove the pilot bearing with an internal puller and press in a new one with a bearing/race installer.

Armed with your new pilot bearing, flywheel mounting bolts, cut/new flywheel, pressure plate, clutch disc, and throw-out bearing, you



Here we have a conventional input shaft and throw-out bearing. Before installing, clean the splines and shaft as well as possible and lubricate with wheel bearing grease. Anti-seize compound is a poor lubricant, and tends to fling off onto the friction material.



Newer manual gearboxes have the slave cylinder and throw-out bearing as one piece mounted inside the transmission bell-housing. This unit should be replaced while servicing the clutch. Special bleeding procedures are required, so go to www.erwin.vw.com for specific technical information.

can start the reassembly process. Apply high temperature grease to the pilot bearing. Install the flywheel using the new bolts (heed the alignment marks you made -- dual-mass flywheels can go on a few different ways). Center the clutch disc using the proper tool, and bolt down the pressure plate. Now replace the throw-out bearing. Use high-temperature wheel bearing grease on the splines the friction disc rides on, and on the shaft for the throw-out bearing. DO NOT use anti-seize compound as it doesn't have the proper anti-friction qualities, and it tends to fling off, perhaps ruining the friction material.

With the throw-out bearing and the fork in the proper position, you can now install the transmission. Bolt on the axles, attach the shift linkage, and install the starter. Self-adjusting release cables should be reset, and the plain type adjusted. Bleed the hydraulics, preferably with a pressure bleeder.

Sometimes customers will worry because pedal effort is lighter after a clutch job than it was before. Explain that you've put things back the way they were originally, including getting rid of friction in the release system through cleaning and lubrication, and that this is how the clutch felt when it was new. They just never noticed the gradual increase in the force required.

Basic clutch service hasn't changed much except that now there are so many small things that can get overlooked, such as new pilot bearings and flywheel bolts, and bleeding hydraulic clutches every two years. Doing it right will increase your sales and provide your customers with proper service and pain-free operation.

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(800) 345-1679

Oak Lawn
Mike Haggerty VW
(708) 425-8989

O'Fallon
Auffenberg Volkswagen
(618) 622-4645

Orland Park
VW of Orland Park
(708) 428-5000

Ottawa
Sierra Volkswagen
(815) 433-1666

Peoria
Volkswagen of Peoria
(309) 243-1101

Rockford
Lou Bachrodt Volkswagen
(815) 332-3001

Schaumburg
Fox Valley Volkswagen
(224) 353-2481

Springfield
Green On Dirksen, Ltd.
(217) 523-3643

Urbana
O'Brien Volkswagen
(800) 386-6767

West Chicago
Fox Valley Volkswagen
(630) 818-4181

Indiana

Bloomington
Royal Volkswagen
(812) 332-9251

Clarksville
Clapp Volkswagen
(812) 948-1541

Evansville
D-Patrick
(812) 473-6500

Fort Wayne
Vorderman Volkswagen
(260) 969-6065

Greenwood
Dreyer & Reinbold
(317) 885-4809

Indianapolis
Falcone Volkswagen
(317) 263-0002

Indianapolis
Tom Wood Volkswagen
(317) 688-6109

Lafayette
Mike Raisor Imports
(765) 447-0808

Merrillville
Team Volkswagen
(888) 805-3689

Mishawaka
Gurley Leep Imports
(574) 254-7130

Iowa

Cedar Falls
Dick Witham Volkswagen
(319) 277-8123

Davenport
VW of Quad Cities
(563) 386-1511

Hiawatha
VW of Cedar Rapids
(319) 743-6050

Iowa City
Carousel Motors
(319) 354-2550

Johnston
Lithia VW of Des Moines
(515) 253-0333

Mason City
Schukei Volkswagen
(641) 423-5402

Kansas

Lawrence
Crown Volkswagen
(978) 685-3400

Olathe
Bud Brown Volkswagen
(913) 393-8183

Topeka
Sunflower Motors
(785) 266-8480

Wichita
Steven Volkswagen
(316) 681-1211

Kentucky

Florence
Kerry Volkswagen
(859) 371-8191

Lexington
Don Jacobs Volkswagen
(859) 260-2621

Louisville
Bachman Volkswagen
(502) 719-7250

Louisville
Neil Huffman VW
(502) 448-6666

Louisiana

Baton Rouge
Southpoint Volkswagen
(800) 291-0032

Bossier City
Moffitt Volkswagen
(318) 746-2175

Lafayette
Southwest Volkswagen
(337) 456-7535

Mandeville
Northshore Volkswagen
(985) 626-1067

Metairie
Walker Volkswagen
(504) 465-2000

Maine

Auburn
Patrick Motors
(800) 367-7222

Bedford
Minuteman Volkswagen
(781) 275-8000

Braintree
Quirk Volkswagen
(781) 917-1537

Brockton
Paul Clark, Inc.
(508) 587-9040

Danvers
Kelly Volkswagen
(978) 774-2600

Fall River
Mattie Imports
(508) 678-5555

Hyannis
Tracy Volkswagen
(508) 775-3049

Lawrence
Commonwealth VW
(978) 687-3001

Medford
Colonial Volkswagen
(781) 475-5208

North Attleboro
VW of North Attleboro
(508) 695-0321

Northampton
VW of Northampton
(866) 554-0763

Volkswagen Dealers Listing

Norwood
Volkswagen Gallery
(800) 240-0382

Pittsfield
Flynn Volkswagen
(413) 443-4702

Raynham
Metro Volkswagen
(508) 822-1000

Tewksbury
Atamian Volkswagen
(978) 851-4356

Watertown
Boston Volkswagen
(617) 783-1300

Wellesley
Wellesley Volkswagen
(781) 237-3553

West Springfield
Fathers & Sons
(413) 737-7766

Westborough
Colonial Volkswagen
(508) 366-8383

Maryland

Annapolis
Fitzgerald Automall
(410) 224-3480

Baltimore
Heritage VW Parkville
(410) 661-3400

Baltimore
Russel Volkswagen
(410) 744-2300

Cockeysville
VW of Hunt Valley
(410) 666-7777

College Park
DARCARS Volkswagen
(301) 441-8000

Fallston
Cook Volkswagen
(410) 877-1500

Frederick
Fitzgerald Volkswagen
(301) 696-9200

Gaithersburg
King Volkswagen
(240) 403-2300

Hagerstown
Sharrett Volkswagen
(301) 739-9999

Laurel
Ourisman Volkswagen
(800) 288-6985

Owings Mills
Heritage Volkswagen
(410)581-6696

Pasadena
Antwerpen Volkswagen
(410) 553-0843

Rockville
Congressional
Volkswagen
(301) 340-7668

Waldorf
Waldorf Volkswagen
(301) 843-8950

Maine

Auburn
Rowe Volkswagen
(207) 784-2321

Augusta
O'Connor Volkswagen
(207) 622-6336

Bangor
Darling's, Inc.
(207) 941-1330

Brunswick
Morong Brunswick
(207) 725-4323

Falmouth
Morong Falmouth VW
(207) 781-4020

Saco
Prime Volkswagen
(207) 283-2900

Waterville
Thompson Volkswagen
(207) 873-0777

Michigan

Ann Arbor
Howard Cooper VW
(888) 822-8707

Bay City
Thelen Volkswagen
(989) 684-2980

Escanaba
Halbinsel Volkswagen
(906) 789-9650

Farmington Hills
Suburban VW
(248) 471-0800

Grand Rapids
Betten Imports
(616) 301-2100

Grand Rapids
Gezon Volkswagen
(616) 361-7361

Holland
Crown Volkswagen
(616) 393-0400

Kalamazoo
Maple Hill Volkswagen
(269) 327-0816

Lansing
Williams Volkswagen
(800) 258-2853

Livonia
Ralph Thayer Volkswagen
(734) 425-5400

Monroe
Elite Volkswagen
(734) 242-3900

Muskegon
My Auto Import Center
(231) 799-2886

Rochester Hills
Fox Volkswagen
(248) 656-0400

Sterling Heights
Vyletel Volkswagen
(586) 276-4650

Traverse City
Traverse City Volkswagen
(231) 946-5540

Troy
Suburban Volkswagen
(248) 649-2074

Minnesota

Albert Lea
Dave SyversonVW
(507) 373-1438

Brainerd
Auto Import
(218) 829-3307

Burnsville
Burnsville Volkswagen
(952) 892-9470

Inver Grove Heights
VW of Inver Grove
(651) 204-4607

Mankato
Mankato Volkswagen
(507) 625-5641

Maplewood
Schmelz Countryside VW
(651) 484-0424

Rochester
Rochester Motors, LLC.
(507) 282-9468

Saint Cloud
Eich Motor Company
(320) 251-1737

Saint Louis Park
Luther West Side VW
(952) 374-0700

Mississippi

D'Iberville
Mandal Volkswagen
228-392-6560

Jackson
Volkswagen of Jackson
(601)368-3691

Missouri

Ballwin
The Dean Team
(636) 227-0100

Gladstone
Northtowne Volkswagen
(816) 436-2275

Hazelwood
Bommarito Volkswagen
(314) 731-7777

Kansas City
Molle Volkswagen
(816) 941-9500

Kirkwood
The Dean Team
(314) 966-0303

Springfield
Volkswagen of Springfield
(417) 886-6000

St Louis
Suntrup Volkswagen
(314) 892-7790

St. Peters
Bommarito Volkswagen
(636) 928-2300

Montana

Bozeman
Volkswagen of Bozeman
(406) 586-1771

Great Falls
Bennett Imports
(406) 791-2507

Whitefish
DePratu Volkswagen
(406) 863-2520

Nebraska

La Vista
Performance Volkswagen
(402) 502-8671

Lincoln
Schworer Volkswagen
(402) 435-3300

Omaha
Stan Olsen Auto Center
(402) 397-8200

New Hampshire

Greenland
Seacoast Volkswagen
(603) 436-6900

Keene
Noyes Volkswagen
(888) 355-2488

Lebanon
Miller Volkswagen
(603) 448-6363

Manchester
Quirk Volkswagen
(800) 842-9600

Nashua
Tulley Volkswagen
(603) 888-0550

Rochester
Beranger Volkswagen
(603) 332-6242

Tilton
AutoServ Volkswagen
(800) 775-3141

New Jersey

Bernardsville
Bernardsville Volkswagen
(908) 766-1600

Burlington
Burlington Volkswagen
(609) 386-0084

Cape May Court House
Burke Brothers
(609) 463-4903

Cherry Hill
Cherry Hill Volkswagen
(856) 654-5660

Clifton
Gensinger Motors
(973) 778-8500

Edison
Reydel Volkswagen
(732) 287-2444

Englewood Cliffs
East Coast Volkswagen
(201) 568-0053

Fairlawn
Jack Daniels Motors
(201) 398-1209

Flemington
Flemington Volkswagen
(908) 782-2400

Freehold
Volkswagen of Freehold
(732) 339-6910

Hamilton Square
Hamilton Volkswagen
(800) 348-8816

Lyndhurst
Three County VW
(201) 933-6566

Monroeville
Avis Volkswagen.
(856) 358-8103

Neptune
World Volkswagen
(732) 922-1500

Newton
Volkswagen of Newton
(800) 842-0562

Pleasantville
Atlantic Volkswagen
(609) 646-8600

Pompton Plains
Crestmont Volkswagen
(973) 839-6444

Princeton
Princeton Volkswagen
(609) 921-6401

Ramsey
Joe Heidt Motors
(201) 327-2900

Rockaway
Trend Motors
(866)-44T-REND

Roselle
Linden Volkswagen
(908) 486-6201

Shrewsbury
Shrewsbury Volkswagen
(732) 741-8500

Somerville
Millennium Volkswagen
(908) 685-1068

Summi
Douglas Motors
(800) 672-1172

Turnersville
Prestige Volkswagen
(856) 629-9200

Union
Union Volkswagen
(866) 307-9328

New Mexico

Albuquerque
University Volkswagen
(505) 761-1900

Las Cruces
Sisbarro Autoworld
(575) 524-3561

Santa Fe
Premier Motorcars
(505) 471-7007

New York

Amherst
Northtown Volkswagen
(716) 836-4600

Amityville
Legend Volkswagen
(631) 691-7700

Bayside
Bayside Volkswagen
(516) 482-3346

Binghamton
Gault Volkswagen
(607) 321-6450

Bowmansville
Schmitt's Volkswagen
(716) 683-3343

Volkswagen Dealers Listing

Bronx
Big Apple Volkswagen
(718) 920-1400

Brooklyn
Kings Volkswagen
(718) 646-6700

Brooklyn
Open Road Volkswagen
(718)492-6400

Cicero
Burdick Volkswagen
(800) 233-2002

East Rochester
Vincent Volkswagen
(585) 586-2225

Fayetteville
Romano Volkswagen
(315) 637-4668

Glenmont
Capital Cities Imported
(518) 463-3141

Greenburgh
Lash Volkswagen
(914) 931-9700

Hicksville
Platinum Volkswagen
(516) 822-4800

Huntington Station
Habberstad Volkswagen
(631) 470-8180

Ithaca
Maguire Automotive
(607) 257-1515

Kingston
Heart Volkswagen
(845) 336-6600

Latham
Martin Nemer VW
(518) 785-5581

Lynbrook
Sunrise Volkswagen
(516) 596-5970

Marcy
Paolozzi's Car World
(315) 736-8291

Middletown
Compass Volkswagen
(845) 344-4440

Mohegan Lake
Mohegan Lake Motors
(914) 528-2528

New York
Open Road Volkswagen
(646) 358-8100

Nyack
Palisades Volkswagen
(845) 689-3536

Oneonta
Oneonta Volkswagen
(800) 351-8166

Orchard Park
VW of Orchard Park
(716) 662-5500

Pleasantville
Prestige Imports
(914) 769-5100

Queensbury
Garvey Volkswagen
(518) 793-3488

Rensselaer
Cooley Motors
(518) 283-2902

Riverhead
Riverhead Bay VW
(631) 727-5590

Rochester
Dorschel Volkswagen
(585) 334-9440

Rome
Volkswagen of Rome
(315) 337-8900

Sayville
Donaldson's
(631) 567-8100

Schenectady
Langan Motorcar
(518) 374-2225

St. James
Smithtown Volkswagen
(631) 724-6600

Staten Island
Open Road Volkswagen
(718) 513-7515

Wappingers Falls
Hudson Valley VW
(845) 298-2365

Watertown
F.X. Caprara Volkswagen
(315) 788-7400

Woodside
Koeppel Volkswagen, Inc.
(718) 728-5300

Nevada

Henderson
Findlay Volkswagen
(702) 558-6600

Las Vegas
Desert Volkswagen
(702) 942-4000

Reno
Lithia Volkswagen
(775) 851-5826

North Carolina

Asheville
Deal of Asheville
(828) 232-4002

Burlington
Maxwell Volkswagen
(336) 227-2727

Cary
Leith Volkswagen
(919) 297-1640

Charlotte
Carolina Volkswagen
(800) 489-2336

Charlotte
VW of South Charlotte
(704) 552-6500

Durham
Southern States VW
(888) 998-0075

Fayetteville
Valley Auto World
(910) 867-7000

Goldsboro
Frema Motors
(919) 778-1010

Greensboro
Flow Motors
(336) 856-9050

Greenville
Joe Pecheles Volkswagen
(252) 756-1135

Hickory
Paramount Auto Group
(828) 328-4012

Huntersville
Keffer Volkswagen
(704) 766-2129

Jacksonville
National Volkswagen
(910) 938-1417

Raleigh
Southern States
(919) 863-6638

Wilmington
Bob King Volkswagen
(910) 392-3889

Winston-Salem
Flow Motors
(336) 761-3698

North Dakota

Fargo
Valley Imports, Inc.
(701) 277-1777

Ohio

Akron
Dave Walter
(330) 434-8989

Amherst
Spitzer Volkswagen
(440) 988-4444

Bedford
Ganley Volkswagen
(440) 439-3444

Canton
Kempthorn Volkswagen
(330) 580-4916

Cincinnati
Beechmont Volkswagen
(513) 347-4477

Cincinnati
Northland Volkswagen
(800) 521-PART

Columbus
Byers Imports
(614) 552-5410

Columbus
Hatfield Volkswagen
(614) 465-8989

Dayton
Evans Volkswagen
(937) 890-6200

Dayton
White-Allen Group
(937) 291-6000

Dublin
Midwestern Auto Group
(800) 394-2571

Fairfield
Fairfield Volkswagen
(888) 932-4734

Loveland
Kings Volkswagen
(513) 677-2710

Medina
Medina World Cars
(330) 725-4901

Mentor
Classic Volkswagen
(440) 205-6504

North Olmsted
Ganley Westside Imports
(440) 734-2000

Perrysburg
Ed Schmidt Volkswagen
(419) 874-4331

Springfield
Bill Marine Auto Center
(937) 325-7091

Steubenville
Sunset Motors
(740) 264-1696

Willoughby Hills
Fred-Vincent Volkswagen
(440) 944-8700

Wooster
Performance Volkswagen
(330) 264-1113

Youngstown
Stadium Volkswagen
(330) 726-8948

Oklahoma

Norman
Fowler Volkswagen
(405) 310-3700

Oklahoma City
Cable Volkswagen
(405) 787-0095

Tulsa
Volkswagen Tulsa
(918) 712-8989

Oregon

Beaverton
Herzog-Meier VW
(503) 372-3298

Bend
Carrera Motors
(541) 382-1711

Corvallis
Jack Scoville, Ltd.
(541) 753-1694

Eugene
Sheppard Motors
(541) 343-8811

Gladstone
Armstrong Volkswagen
(503) 656-1215

McMinnville
Mac Volkswagen
(503) 472-4657

Medford
Lithia Volkswagen
(541) 774-7500

Portland
Dick Hannah's VW
(360) 256-5000

Salem
Volkswagen of Salem
(503) 581-1421

Pennsylvania

Allentown
Faulkner-Ciocca VW
(800) 554-7165

Ardmore
Piazza Volkswagen
(601) 642-4275

Butler
Mikan Volkswagen
(724) 287-4763

Chadds Ford
Garnet Volkswagen
(610) 361-0624

Colmar
North Penn Imports
(800) 887-2111

Danville
Jack Metzer Volkswagen
(570) 275-2212

Devon
Fred Beans Volkswagen
(800) 803-9829

Downingtown
Jeff D'Ambrosio VW
(610) 873-2400

Dubois
Central Volkswagen
(814) 583-5121

Easton
Young Volkswagen
(610) 991-9140

Edgemont
Y B H Sales & Service
(610) 356-3493

Erie
New Motors, Inc.
(800) 352-1052

Feasterville
Colonial Volkswagen
(215) 355-8856

Greensburg
Sendell Motors, Inc.
(724) 837-9500

Harrisburg
Sutliff Volkswagen
(877) 203-5832

Hollidaysburg
Fiore Volkswagen
(814) 695-5533

Kingston
Wyoming Valley Motors
(570) 288-7411

Lancaster
Autohaus Lancaster
(717) 299-0325

Langhorne
Volkswagen Langhorne
(800) 298-4300

Lebanon
H.A. Boyd, Inc.
(717) 273-9385

Leesport
Vision Volkswagen
(610) 777-6500

McMurray
Three Rivers Volkswagen
(724) 941-6100

Mechanicsburg
Cumberland Valley
(717) 697-9448

Monroeville
Day Volkswagen
(724) 327-4950

Montoursville
Fairfield Volkswagen
(570) 368-8121

Moon Twp
Day Apollo, Volkswagen
(412) 264-0253

New Kensington
Hillcrest Volkswagen
(724) 335-9847

Norristown
Jim Wynn Volkswagen
(610) 539-4622

Orwigsburg
J. Bertolet, Inc.
(570) 366-0501

Philadelphia
Northeast Volkswagen
(215) 824-0800

Pittsburgh
Cochran Volkswagen
(412) 245-3333

Scranton
Kelly Volkswagen
(570) 347-5656

State College
Volkswagen State College
(814)237-0368

Warrington
Thompson Volkswagen
(215) 343-1600

Volkswagen Dealers Listing

Wexford
Billco Motors, Inc.
(724) 940-1000

Whitehall
Gilboy Volkswagen
(610) 434-4211

York
York Volkswagen, Inc.
(866) 893-2337

Puerto Rico

San Juan
Euroclass Motors, Inc.
(787) 782-4087

Rhode Island

East Providence
Scott Volkswagen
(401) 434-8678

Wakefield
Speedcraft Volkswagen
(401)792-3300

West Warwick
Balise Volkswagen
(401) 822-4400

South Carolina

Columbia
Wray Volkswagen
(800) 424-0183

Greenville
Steve White Volkswagen
(864) 288-8300

Hardeeville
Hilton Head Volkswagen
(843) 288-0500

Mount Pleasant
Low Country VW
(843) 881-8555

Myrtle Beach
East Coast Volkswagen
(843) 215-6500

North Charleston
Stokes Volkswagen
(843) 767-2525

Spartanburg
Vic Bailey Volkswagen
(864) 585-2492

Sumter
Goodwin Volkswagen
(803) 469-2595

South Dakota

Rapid City
Liberty Volkswagen
(605) 718-1000

Sioux Falls
Graham Automotive
(605) 336-3655

Tennessee

Bristol
Wallace Volkswagen
(423) 764-1145

Chattanooga
Village Volkswagen
(423) 855-4981

Clarksville
Gary Mathews North, Inc.
(931) 552-1111

Franklin
Hallmark Volkswagen at Cool Springs
(615) 236-3200

Johnson City
Wallace Volkswagen
(423) 952-0888

Kingsport
Fairway Volkswagen
(423) 578-3625

Knoxville
Harper Volkswagen, Inc.
(865) 691-5569

Madison
Hallmark Volkswagen
(615) 859-3200

Memphis
Gossett Volkswagen
(901) 388-8989

Memphis
Gossett VW
(901) 333-8989

Murfreesboro
Southeast Signature
(615) 898-0700

Texas

Abilene
Sterling Volkswagen
(325) 673-4663

Arlington
Randy Hiley Volkswagen
(817) 575-6100

Austin
Maund Automotive
(512) 420-2409

Brownsville
Payne Volkswagen
(956) 350-4488

Bryan
Garlyn Shelton Imports
(979) 776-7600

Corpus Christi
VW of Corpus Christi
(361) 653-8400

Dallas
Boardwalk VW Park Cities
(214)561-8100

El Paso
Hoy-Fox Automotive
(915) 778-7788

Fort Worth
Autobahn Motorcars
817-336-0885

Garland
Rusty Wallis Volkswagen
(972) 271-6767

Georgetown
Hewlett Volkswagen
(512) 681-3510

Houston
Archer Volkswagen
(713) 272-1750

Houston
Clear Lake Volkswagen
(281) 848-5660

Houston
DeMontrondGroup
(281) 872-3909

Houston
Momentum Volkswagen
(713) 596-3380

Houston
Momentum VW
(281) 925-5160

Houston
West Houston VW
(281) 675-8600

Irving
Metro Volkswagen
(800) 527-7287

Killeen
Automax Volkswagen
(254) 699-2629

Lewisville
Lewisville Volkswagen
(972) 538-0550

Longview
Gorman-McCracken VW
(903) 753-8657

Lubbock
Gene Messer Volkswagen
(806) 793-8844

McKinney
McKinney Volkswagen
(800) 565-9807

Mission
Payne Mission
(956) 584-6300

Richardson
Boardwalk Volkswagen
(214) 453-5020

San Antonio
Ancira Volkswagen
(210) 681-5050

San Antonio
Rod East Volkswagen
(210) 824-1971

Temple
Garlyn Shelton VW
(254) 773-4634

Tyler
Crown Motor Company
(903) 561-3422

Wichita Falls
Herb Easley Motors
(940) 723-6631

Utah

Layton
Cutrubus Motors VW
(877) 725-1234

Orem
Ken Garff Motors
(801) 374-1751

Salt Lake City
Strong Volkswagen
(801) 433-2269

South Jordan
Volkswagen SouthTowne
(801) 676-6409

St. George
Findlay Volkswagen
(435) 986-8850

Virginia

Alexandria
Alexandria Volkswagen
(703) 684-7007

Charlottesville
Flow Volkswagen
(434) 296-4147

Chesapeake
Greenbrier Volkswagen
(757) 366-0833

Fairfax
Fairfax Imports, Inc.
(703) 273-6700

Fredericksburg
Bill Britt Volkswagen
(540) 898-1600

Lynchburg
Terry Volkswagen
(434) 239-2601

Newport News
Casey Volkswagen
(757) 988-1275

Richmond
Brown's Volkswagen
(804) 379-6610

Richmond
West Broad Volkswagen
(804) 270-9000

Roanoke
First Team Volkswagen
(800) 277-0717

Springfield
Volkswagen Springfield
(703) 451-2389

Staunton
Valley Volkswagen
(866) 308-6316

Sterling
Lindsay VW of Dulles
(703) 880-8160

Vienna
Stohlman Volkswagen
(703) 287-4115

Virginia Beach
Checkered Flag VW
(757) 490-1111

Winchester
Miller Volkswagen
(540) 868-9916

Woodbridge
Karen Radley Volkswagen
(703) 550-0202

Vermont

Barre
Walker Volkswagen
(802) 223-3434

Manchester Center
Hand Volkswagen
(802) 362-1754

Rutland
Kinney Motors.
(802) 775-6900

South Burlington
Volkswagen S. Burlington
(802) 658-1130

Washington

Auburn
Auburn Volkswagen
(800) 827-2787

Bellevue
Chaplin's Bellevue VW
(425) 641-2002

Bellingham
Roger Jobs VW(
360) 734-5230

Bremerton
Parr Volkswagen
(360) 377-3855

Burlington
KarMart Volkswagen
(360) 757-0815

Edmonds
Campbell Nelson VW
(425) 778-1131

Everett
Pignataro Volkswagen
(425) 348-3141

Kennewick
Overturf Motor Co.
(509) 586-3185

Olympia
Hanson Motors, Inc.
(360) 943-2120

Port Angeles
Dan Wilder Volkswagen
(360) 452-9268

Seattle
Carter Volkswagen
(206) 782-7474

Seattle
University Volkswagen
(206) 634-3322

Spokane
Appleway Volkswagen
(509) 892-2243

Tacoma
Robert Larson's Autohaus
(253) 671-6420

Vancouver
Dick Hannah Volkswagen
(360) 314-0450

Yakima
Steve Hahn Perf VW
(509) 248-4700

West Virginia

Barboursville
Moses Volkswagen
(304) 736-5244

Clarksburg
Star Motor Company
(304) 623-7827

Parkersburg
Larry Simmons
(304) 485-5451

South Charleston
Joe Holland Volkswagen
(304) 720-9257

Wheeling
Wheeling Automotive
(304) 242-7313

Wisconsin

Appleton
Volkswagen Appleton
(920) 733-3333

Brookfield
Hall Volkswagen
(888) 420-4255

Eau Claire
Car City Volkswagen
(715) 852-2361

Franklin
Boucher Volkswagen
(414) 525-1100

Green Bay
Broadway Imports
(920) 498-6666

Janesville
Frank Boucher VW
(608) 757-6120

La Crosse
Bob Burg Volkswagen
(608) 782-8806

Madison
Zimbrick Volkswagen
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