

Service Training

Self-Study Program 890293

Immobilizer Systems



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Contents

Introduction	1
Systems Overview	2
Operation	8
System Components	16
Diagnostics	24
Tips and Pitfalls	38
Glossary	45
Knowledge Assessment	47

This Self-Study Program covers information on the features of Volkswagen Immobilizer Systems. This Self-Study Program is not a Repair Manual. This information will not be updated.

For testing, adjustment and repair procedures, always refer to the latest electronic service information.

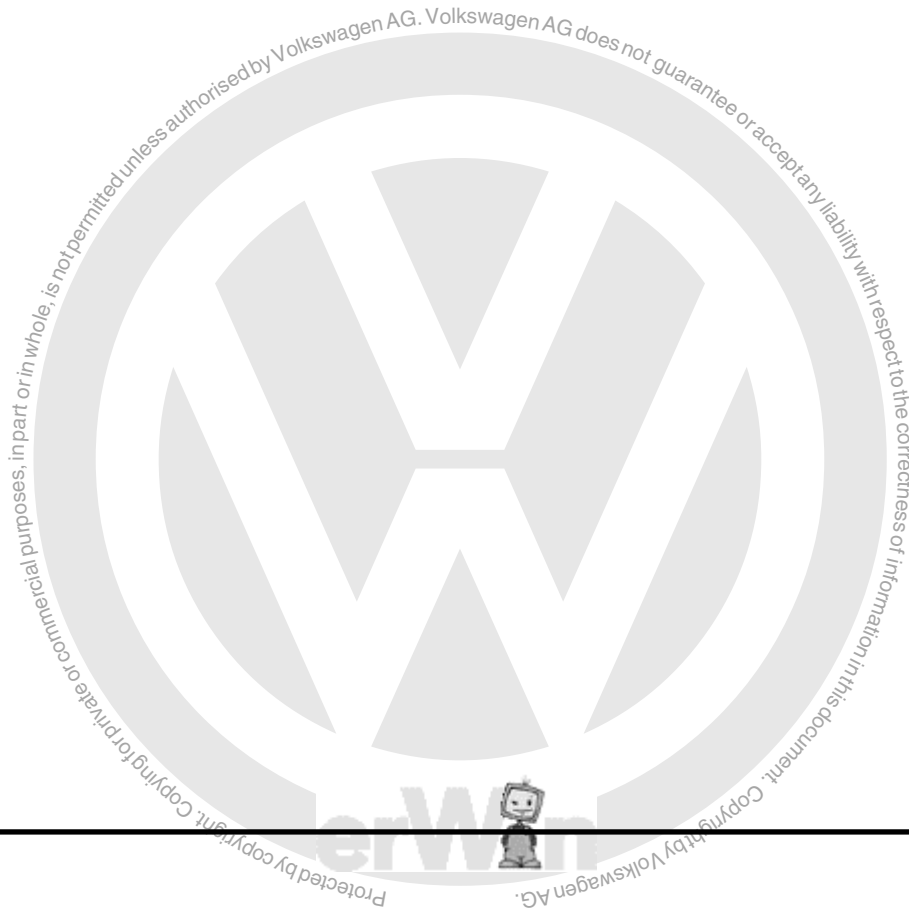
Note



Important!



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Introduction

Most stolen cars are taken directly to a "chop-shop," where components are removed and sold as "good, used parts" to unsuspecting repair facilities. This makes some of the most frequently stolen vehicles not the new, top of the line luxury cars, but those with higher amounts of marketable components.

The theft-deterrent systems installed in today's Volkswagens are recognized as among the most effective in the world. Driven by customer demand and auto-theft rates, Volkswagen Immobilizer Systems have evolved to a level that has made the New Beetle one of the 10 least-stolen vehicles in the U.S.*



Stay. Good boy.

For years, Volkswagen engineers have been working quietly in the background, designing systems to keep the bad guys from taking your prized V-dub to a new home. Without your permission. Alarm

systems. Theft-deterrent systems. Secret systems. Systems even James Bond doesn't have. Some of the most effective systems in the world. Systems so advanced that we can only now tell you that

they exist, for fear the information could fall into the hands of the bad guys.



The people want their car to stay where they park it.

* Forbes Magazine, *America's Least-Stolen Cars*. (0.7 per 1000 registered 2005 - 2007 model years; most recent data available)

Systems Overview

System Types and Timeline

The Immobilizer is a theft-deterrent system that checks for an authorized vehicle key before allowing the engine to be started. Four Immobilizer systems have been used in Volkswagen vehicles since 1998, with the first system offered in select vehicles in the North American Region (NAR) in MY 1999. They are identified as:

Immobilizer I

- Not offered in NAR
- Not reviewed in this SSP

Immobilizer II

- Generations 2 and 3 offered in the Eurovan and Cabriolet

Immobilizer III

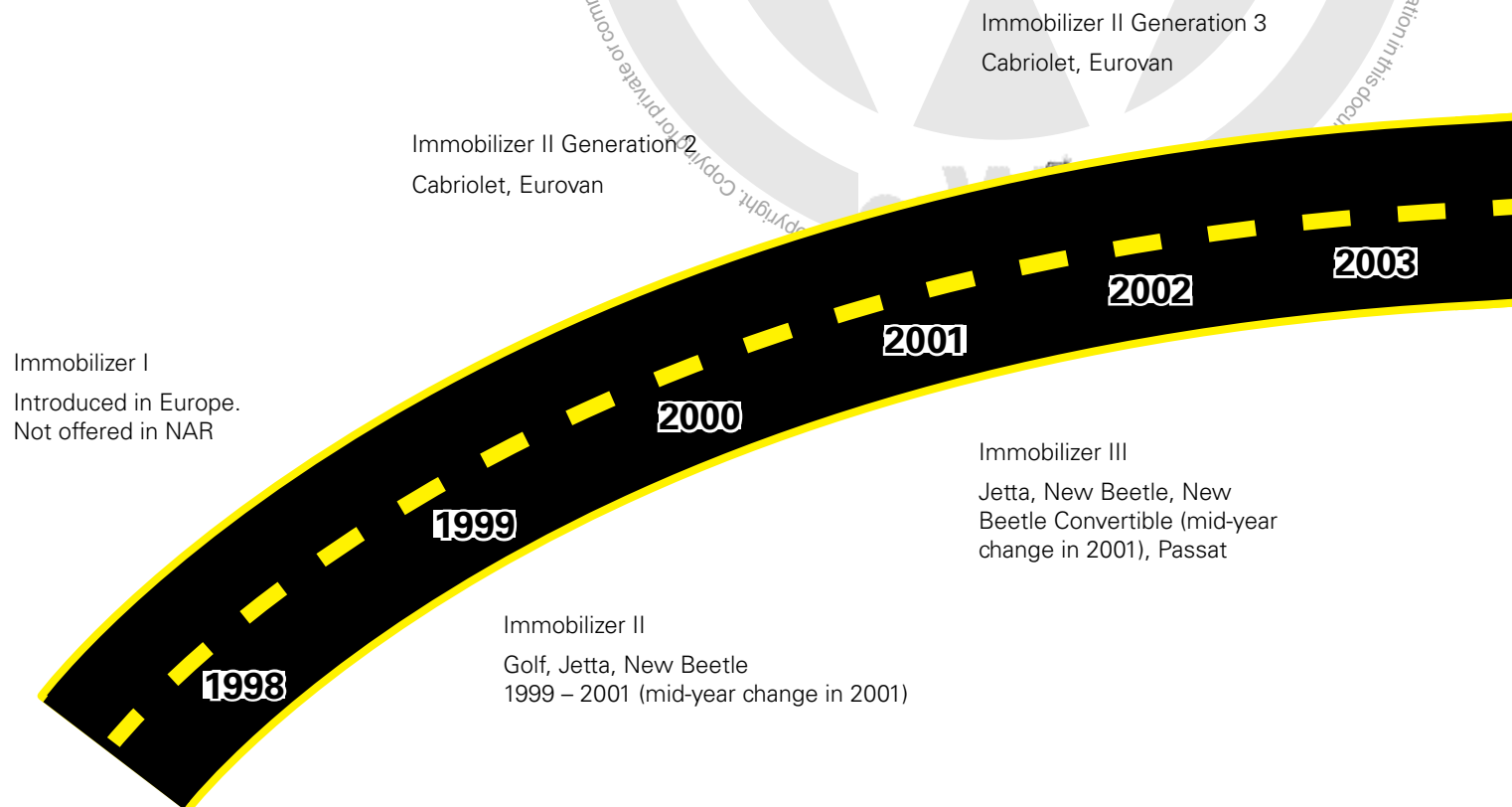
- Most common system in early to mid 2000s

Immobilizer IV

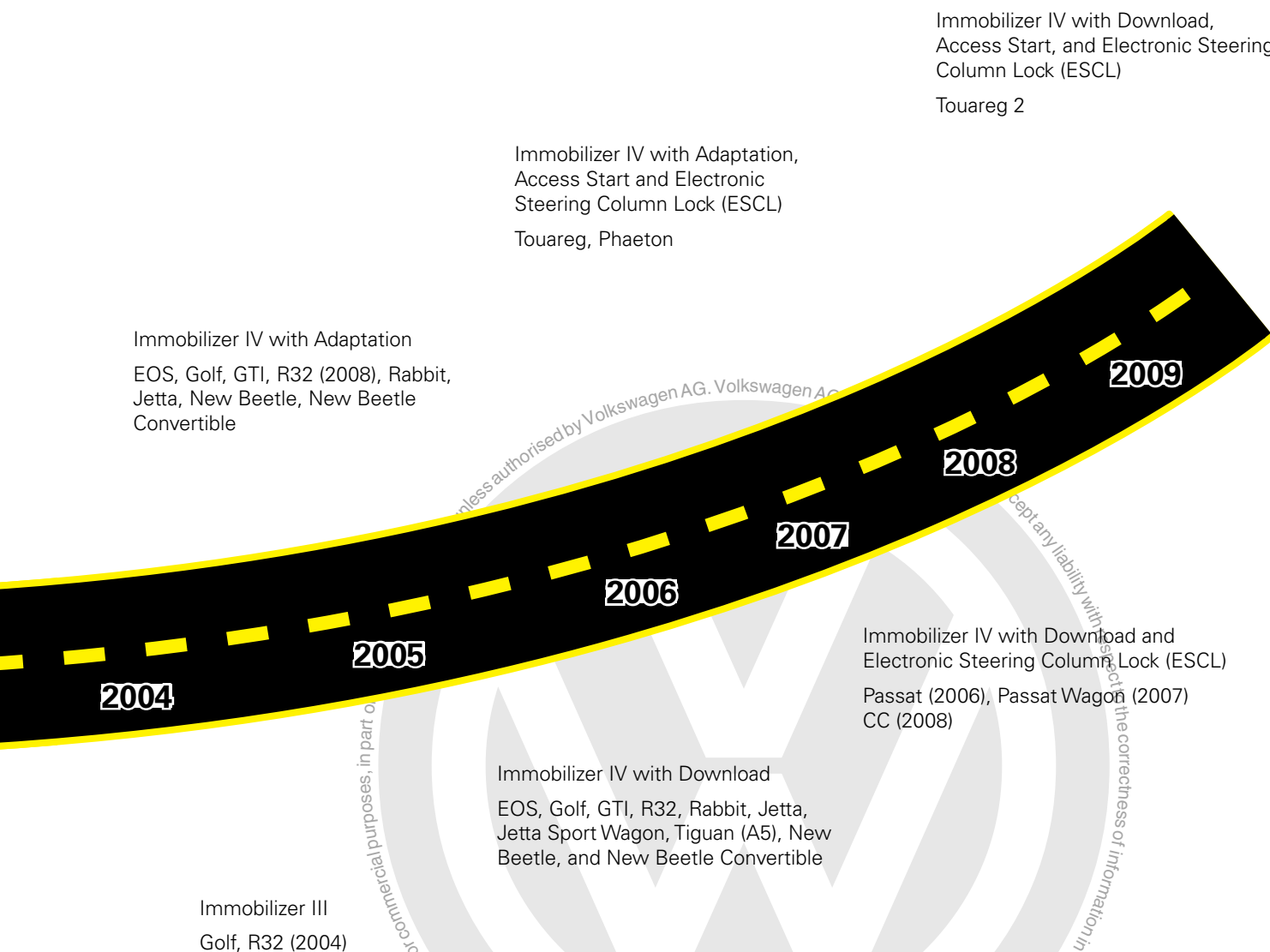
- Immobilizer IV with Adaptation
- Immobilizer IV with Download

The timeline displays the general evolution of the Immobilizer systems and associated vehicle applications.

All dates refer to vehicle Model Years (MY), not the actual dates of availability.



Systems Overview





System Versions

Immobilizer systems, regardless of the version or generation, all have the same primary function: prevent the engine from starting unless a valid key is inserted in the ignition switch. The components and the adaptation procedures used varies between the systems.

Immobilizer II

Immobilizer II uses a randomly-generated code to disable the fuel pump until the correct key is inserted.

Immobilizer III

Depending on model, Immobilizer III disables the fuel pump, ignition system, or fuel injectors and involves additional components to verify the randomly-generated key code.



Systems Overview

Immobilizer IV

Immobilizer IV is not a single control module but instead is a function. There is no single control module responsible for all Immobilizer functions but rather, the functions are divided among multiple modules and components.

Immobilizer IV systems can be divided into two types:

- Immobilizer IV with Adaptation
- Immobilizer IV with Download

Both systems operate the same; the difference is how the components are adapted to the vehicle.

Immobilizer IV with Adaptation

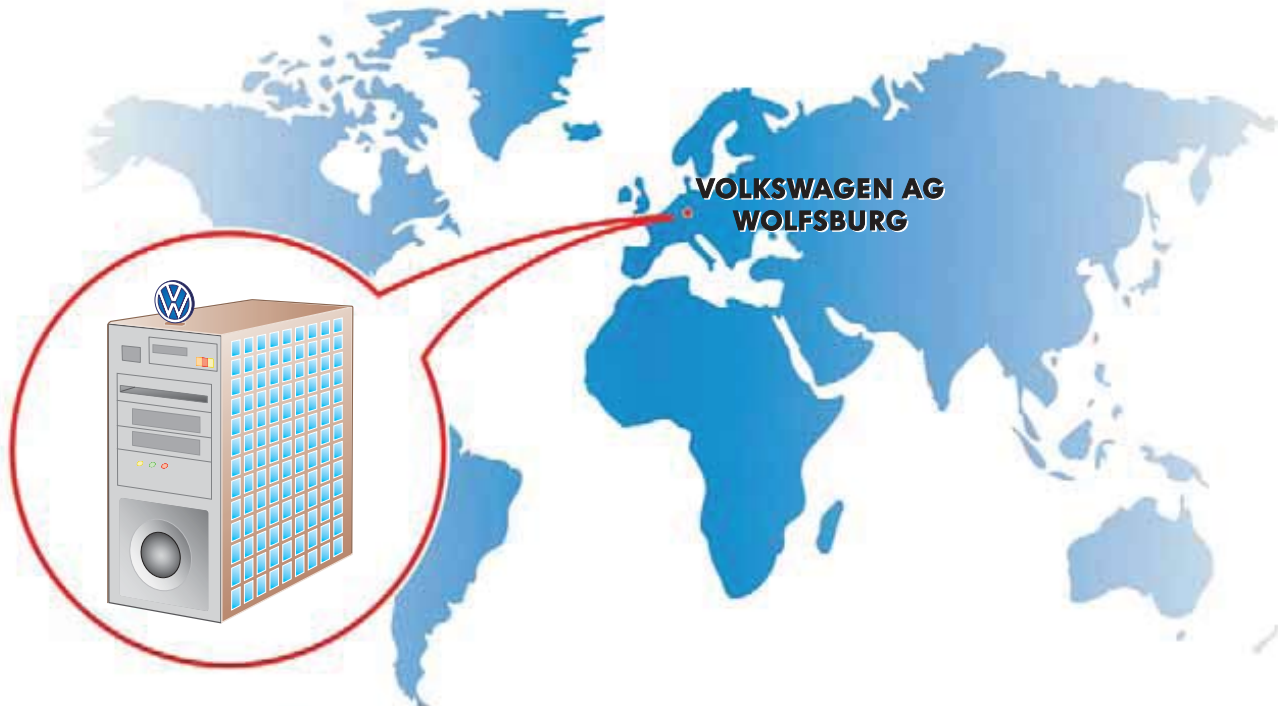
Components of Immobilizer IV with Adaptation can be adapted to the vehicle at the dealership using the just the scan tool.

Immobilizer IV with Download

Components of Immobilizer IV with Download utilizes additional security features. It includes:

- Filing all theft-related features of the control modules in the FAZIT central database in Wolfsburg
- Communication of the control modules in which the vehicle Immobilizer is integrated with the additional components involved
- Encryption of the data communication between the individual control modules

s, in part or in whole, is not permitted unless authorized by Volkswagen AG. Volkswagen AG does not guarantee the accuracy, completeness or availability with respect to the correct



Systems Overview

FAZIT Central Database

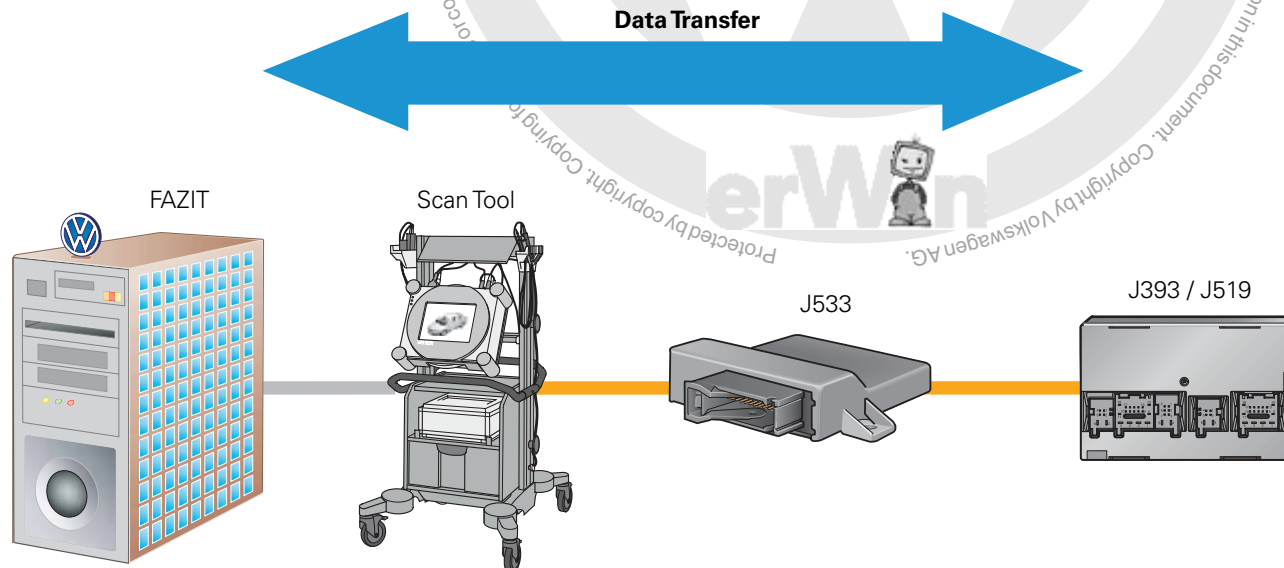
An essential component of Immobilizer IV is the FAZIT central database at Volkswagen in Wolfsburg, Germany.

FAZIT is an acronym for the German "Führungskraft Auf Zeit Im Team," which translates to "Vehicle Information and Central Identification Tool." All theft relevant data of the control modules that are integrated in the "Vehicle Immobilizer" function are stored in this database.

It is not possible to adapt the participating control modules without an online connection to FAZIT.

Data Transfer

- Only the online query by the diagnostic tester transfers the data safely, rapidly, and reliably into the vehicle
- All of the components participating in the vehicle Immobilizer must be learned online



Legend

- J393** Comfort System Central Control Module
- J519** Vehicle Electrical System Control Module
- J533** Data Bus On Board Diagnostic Interface

Operation

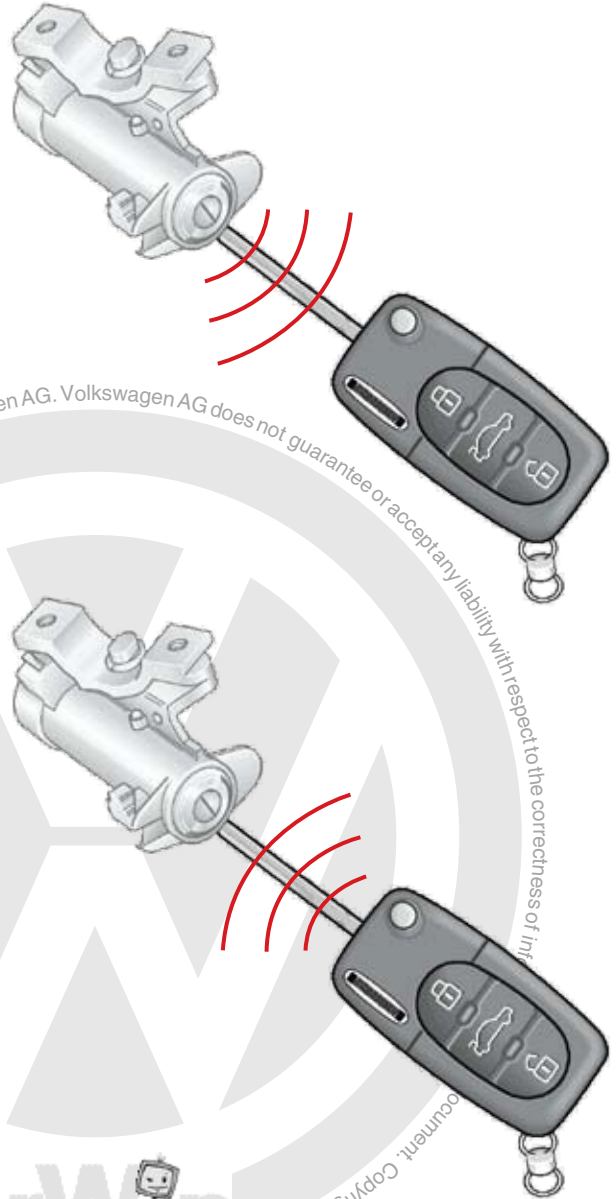
Immobilizer II

The Immobilizer authentication process begins with the vehicle key and the induction coil.

When the vehicle key is inserted into the ignition cylinder and rotated to the ON position, a signal is sent from the induction coil that energizes the electronic transponder in the key. The electronic transponder in the key responds to the induction coil with a fixed code signal.

The induction coil in the ignition cylinder receives and forwards the signal to the Immobilizer Control Module. If the fixed code signal sent by the key matches the code stored in the Immobilizer Control Module, the variable code transmission starts.

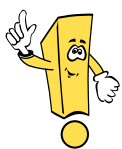
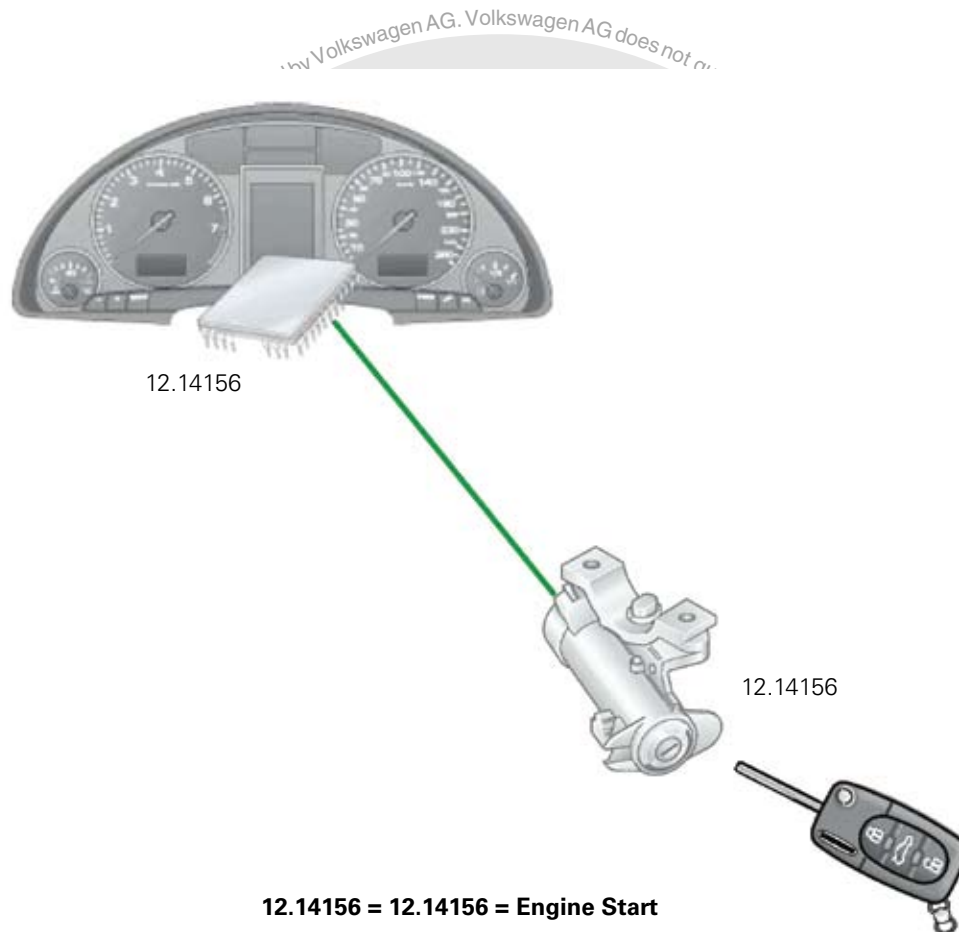
This step only recognizes the key as coded to the vehicle.



As soon as the Immobilizer Control Module recognizes the key, it generates a random number and sends it to the key. The vehicle key and Immobilizer Control Module then perform an algorithmic calculation on the number. After applying this algorithmic calculation, the vehicle key sends the result to the Immobilizer Control Module.

The Immobilizer Control Module compares the number it calculated to the number calculated by the vehicle key. If the numbers match, the Immobilizer Control Module sends a signal to the Engine Control Module (ECM) J220 to start the engine.

This entire process takes place nearly instantaneously.



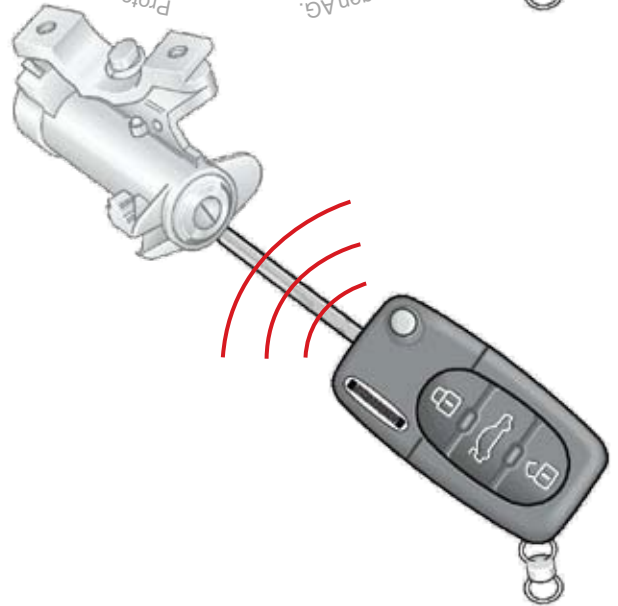
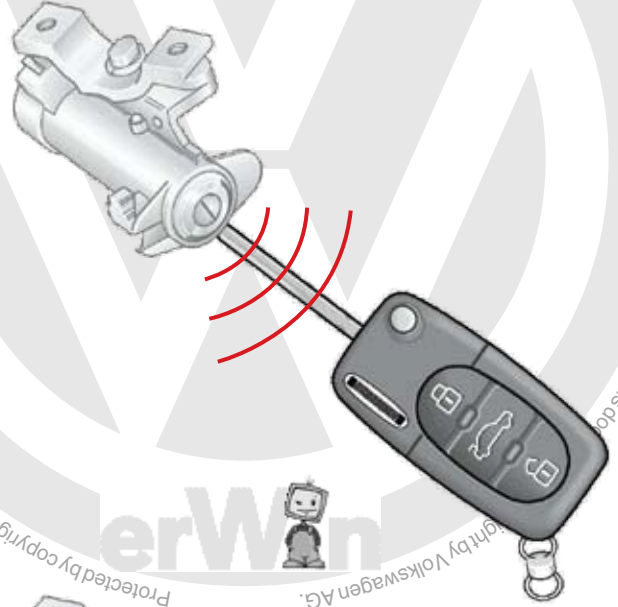
The Immobilizer Control Module and the vehicle key contain identical secret tables of formulae (cryptological formulae) and Secret Key Codes (SKC) which cannot be changed.

Operation

Immobilizer III

Immobilizer III operates in a way that is very similar to Immobilizer II, but adds the ECM to the algorithmic calculation process.

As with Immobilizer II, the process begins when the vehicle key is inserted into the Ignition Cylinder and rotated to the ON position. Signals are exchanged, verifying the key is coded to the vehicle.



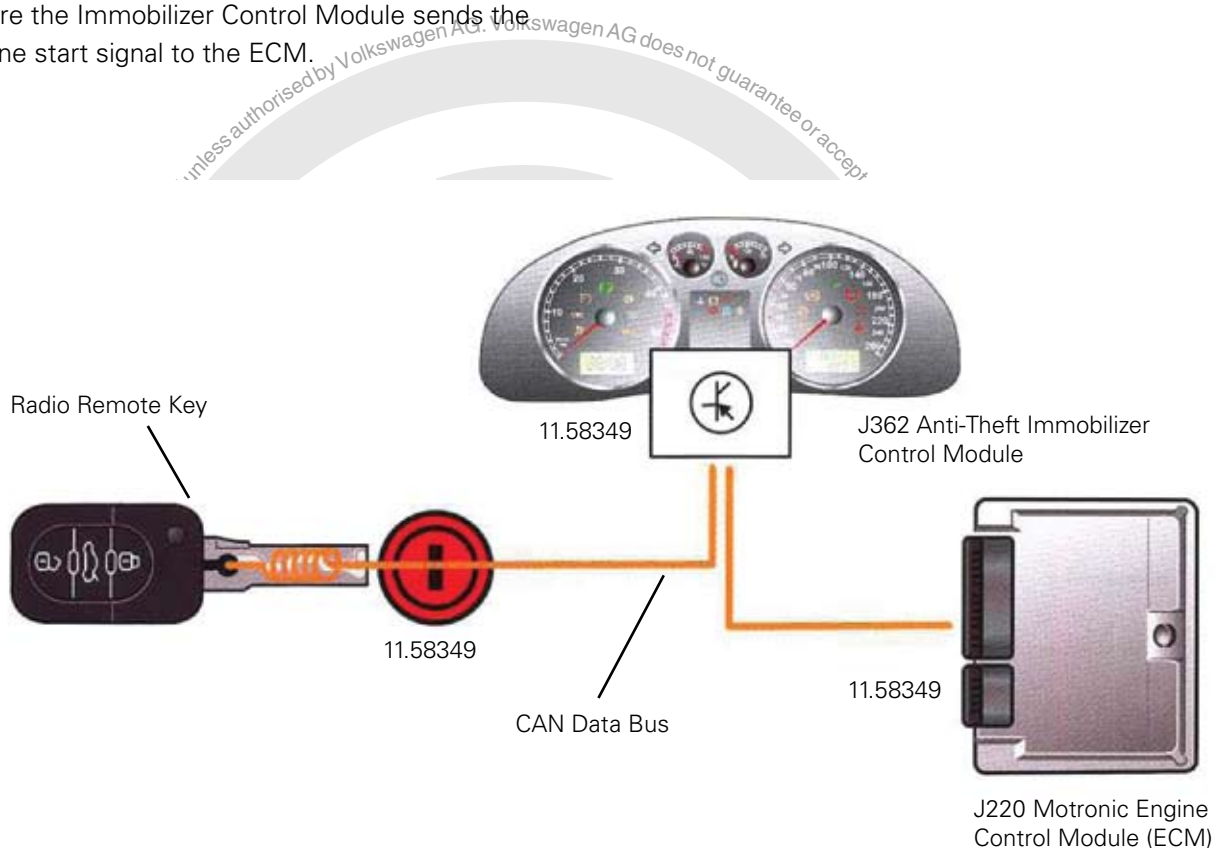
When the Immobilizer Control Module recognizes the key, it sends a random number to both the key and the ECM. The vehicle key, ECM, and Immobilizer Control Module perform an algorithmic calculation on the number. The vehicle key and ECM send their results back to the Immobilizer Control Module via the CAN data bus.

The Immobilizer Control Module compares the number it calculated to the numbers calculated by the vehicle key and the ECM.

With Immobilizer III, all three numbers must match before the Immobilizer Control Module sends the engine start signal to the ECM.



- For service personnel, the key adaptation procedure is the same as Immobilizer II. The keys are electronically locked while being adapted. As a result, they cannot be used to open any other vehicle.
- The key status can be determined using the Measured Value Block (MVB).
- Refer to ElsaWeb and Guided Fault Finding (GFF) for complete adaptation procedures.



Protekt...
...agen AG.

11.58349 = 11.58349 = 11.58349 = Engine Start

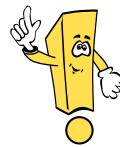
Operation

Immobilizer IV

As with previous versions, Immobilizer IV first verifies the key, then generates a random number. The random number is broadcast on the CAN Bus and read by multiple components.

These components perform an algorithmic calculation on the number and the results are compared by J362 or J334 Anti-Theft Immobilizer Control Module (varies by model).

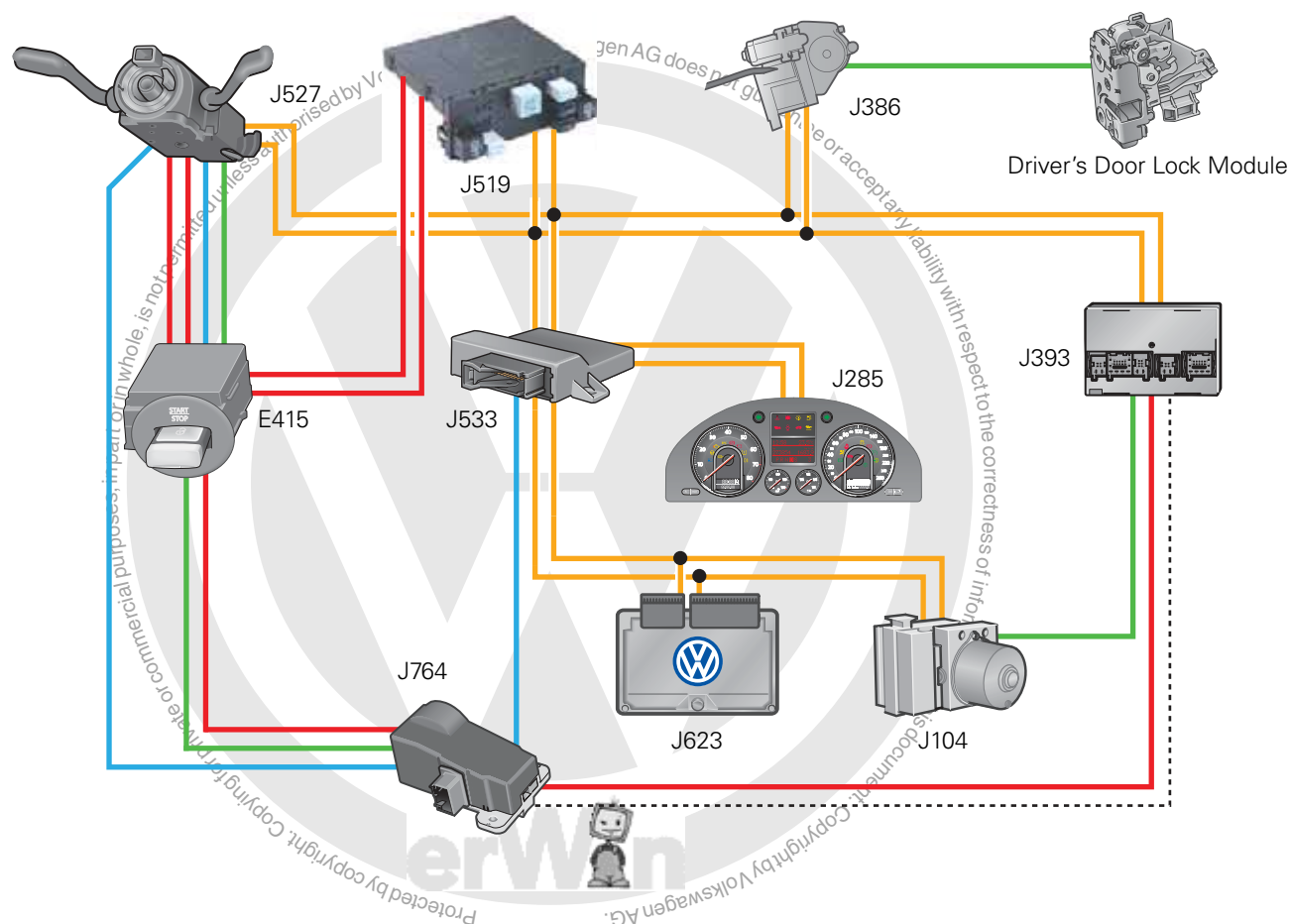
If the results are the same, the Anti-Theft Immobilizer Control Module broadcasts a message on the CAN Bus, allowing the engine to start.



Immobilizer IV with Adaptation and Immobilizer IV with Download operate the same way.



System Diagram



Legend

- E415** Access/Start Authorization Switch
- J104** ABS Control Module
- J285** Instrument Cluster Control Module
- J386** Driver's Door Control Module
- J393** Comfort System Central Control Module
- J519** Vehicle Electrical System Control Module
- J527** Steering Column Electronic Systems Control Module
- J533** Data Bus On Board Diagnostic Interface
- J623** Engine Control Module (ECM)
- J764** Electronic Steering Column Lock Control Module

- Orange line** CAN-Bus
- Blue line** Output Signal
- Green line** Input Signal
- Red line** Power
- Dashed line** Serial Data Bus

Operation

Electronic Steering Column Lock (ESCL)

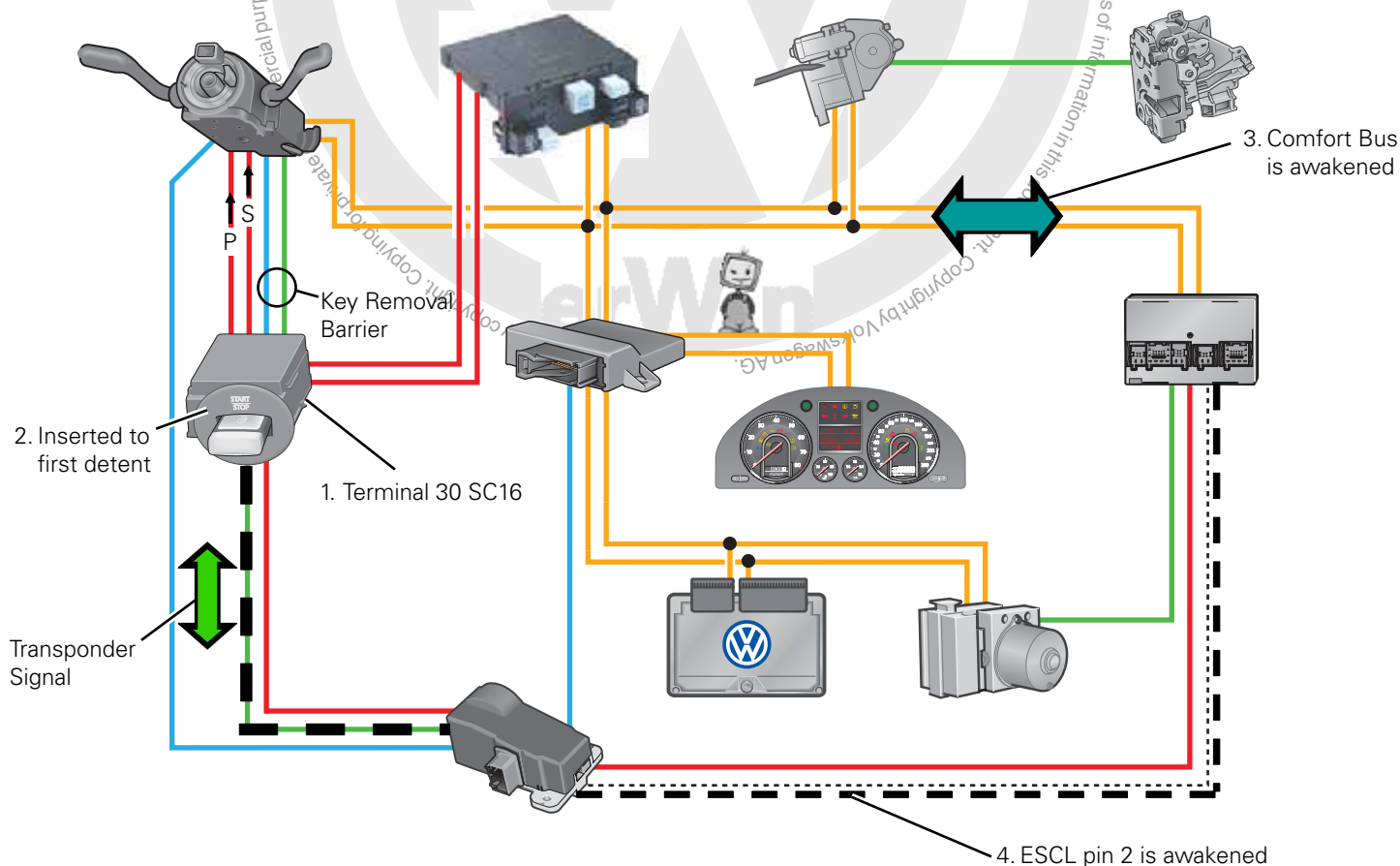
Some versions of Immobilizer IV incorporate the Electronic Steering Column Lock (ESCL) that prevents the steering wheel from turning until all parameters are met. ESCL is:

- Supplied with power by Comfort Control Module
- Communicates using serial single-wire interface (Local Interconnect Network [LIN])
- Controlled through J393 (locking, unlocking and diagnosis)

To satisfy increased safety requirements of ESCL system, three independent control modules for ESCL locking must first be enabled before locking is possible.

Chain of Events for ESCL Unlock

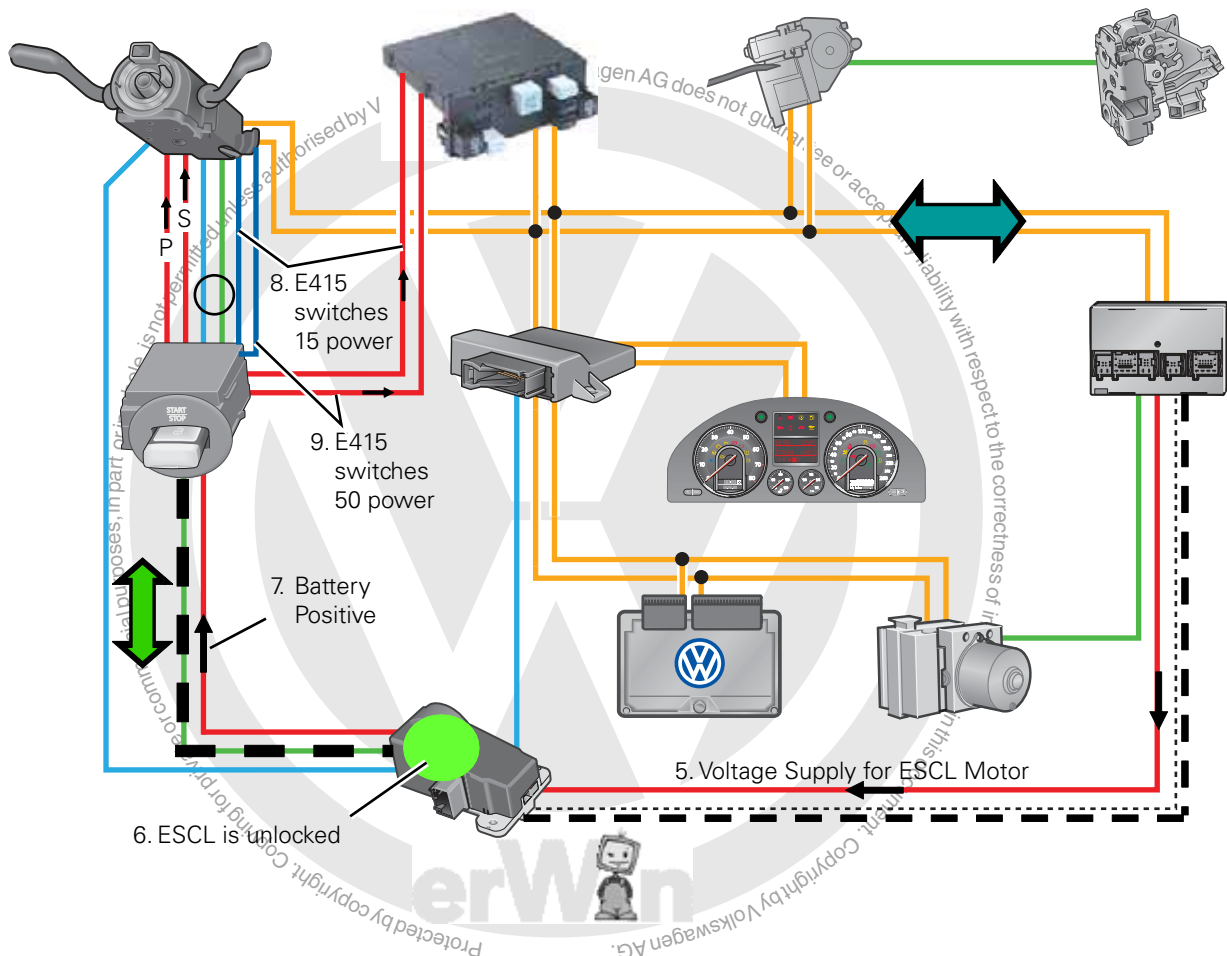
1. 30 power at pin 3 of E415 from SC16 always present.
2. ID-Sender inserted to first detent.
 - Contact P switched Off from E415 Pin 15 and
 - Contact S switched On from E415 Pin 16
3. Comfort Bus is awakened and S-Contact signal is transmitted.
4. ESCL pin 2 is awakened from Serial Data Bus.
 - The Transponder reads the ID – Sender. The data is transmitted from Pin 1 and Pin 9 of E415 to Pin 4 and Pin 5 of ESCL. The data is matched with the WPS in the ESCL via the serial data bus.



5. The power for the Endstate of the ESCL Motor is switched from Pin C3 of the comfort and convenience Module to Pin 10 at the ESCL.
6. ESCL is unlocked via internal Endstate.
7. ESCL switches power from Pin 6 to Pin 8 of E415 to facilitate the switching of Contact 15 and Contact 50.

8. E415 switches 15 power from Pin 13 to the SMLS and from Pin 5 to the BSG.
9. E415 switches 50 Power from Pin 14 to the SMLS and from Pin 6 to the BSG.


Note that on vehicles with Automatic Transmissions, Pin 2 and Pin 10 of E415 activate the key removal lock feature.



Components

Components by System

The following chart gives an overall view of the components use with each system. Note that Immobilizer IV with Adaptation and Immobilizer IV with Download have the same components.

Component	Immobilizer II	Immobilizer III	Immobilizer IV
Anti-Theft Immobilizer Warning Lamp K115	X*	X	X
Access/Start Authorization Switch E415			X*
Anti-Theft Immobilizer Reading Coil D2 (D3)	X	X	X*
Anti-Theft Immobilizer Control Module J362	X	X	
Electronic Steering Column Lock Control Module J764		X*	X*
Comfort System Central Control Module J393			X
Engine Control Module (ECM) J220		X	
Engine Control Module (ECM) J623			X
ABS Control Module J104			X
Access/Start Authorization Control Module J518			X
Vehicle Electrical System Control Module J519			X
Steering Column Electronic Systems Control Module J527		X*	X
Data Bus On Board Diagnostic Interface J533			X

* Some models

Key with Transponder

While the vehicle key for the Immobilizer II system is similar in appearance, it is not compatible with the keys used with the Immobilizer III or Immobilizer IV systems.

The vehicle key contains a secret table of formulae (cryptological formulae), identical to that contained in the Immobilizer Control Module, and a Secret Key Code (SKC) display that cannot be changed.

Signal Usage

The induction coil in the ignition cylinder induces a voltage in the transponder, generating a unique code. The code is read by the Immobilizer Control Module.

Effects of Failure

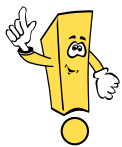
There are no backup functions for the transponder in the vehicle key. If the transponder fails, the engine does not start.



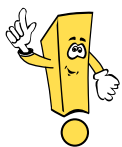
Key with Transponder (Passat and CC)



Key with Transponder (All except Passat and CC)



Order replacement keys by VIN to ensure the correct keys are received. Keys may look similar for different systems, but are not interchangeable.



Replacement keys for Immobilizer IV systems with Adaptation and with Download (all except Passat and CC) have the same part number.

Only the method with which the keys are adapted is different.

Components

Access/Start Authorization Switch E415

The read coil for reading the transponder in the vehicle key is part of the Access/Start Authorization Switch E415. It accepts or rejects the electronic identification of the ignition key by the read coil.

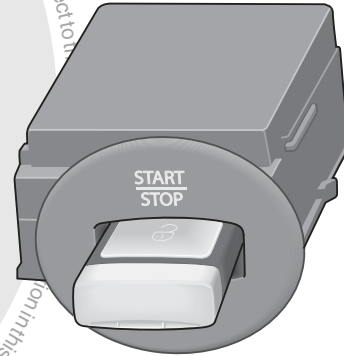
Signal Usage

The signal from the read coil is sent to the other control modules in the Immobilizer system over the CAN Bus. The Comfort System Central Control Module J393 uses the signal.

Effects of Failure

There are no backup functions for the read coil in the Access/Start Authorization Switch. If the read coil fails, no vehicle electrical components will operate.

E415 does not require initialization after replacement.



(Passat and CC)

Anti-Theft Immobilizer Reading Coil D2 (D3)

The reading coil induces a voltage into the key with transponder and sends the resulting unique code to the Immobilizer Control Module.

Signal Usage

The signal from the read coil is read by the Immobilizer Control Module for verification of correct key.

Effects of Failure

There are no backup functions for the read coil in the Access/Start Authorization Switch. If the read coil fails, the vehicle will not start.



All Except Passat and CC

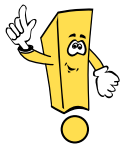
Anti-Theft Immobilizer Control Module J362 (J334)

- Integrated with Instrument Cluster Control Module J285 or J393
- Stand-alone module in the Eurovan and Cabrio
- Integrated with Instrument Cluster Control Module J285 and Data Bus On Board Diagnostic Interface J533 (Immobilizer III)

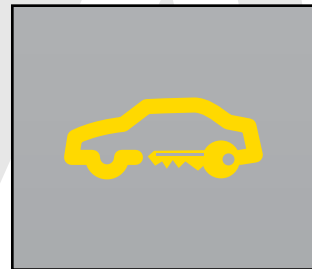


Anti-Theft Immobilizer Warning Lamp K117

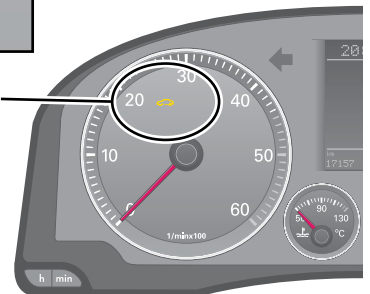
- Disguised as the decimal point in the odometers of the New Beetle and New Beetle Convertible
- Not used in the Eurovan and Cabrio



The vehicle owner's manual is the best source regarding the size, shape, and position of the Anti-Theft Immobilizer Warning Lamp K117.



Anti-Theft Immobilizer Warning Lamp K117



Components

Electronic Steering Column Lock Control Module J764

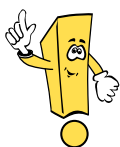
Control Module Operation

The Electric Steering Column Lock Control Module J764 receives power from the Comfort System Central Control Module J393. Release, locking and diagnosis are also controlled through a serial data bus connection to the Comfort System Central Control Module J393.

To provide the necessary margin of safety, authorization to the electrical steering column locking system must be provided by three independent control modules and the ignition lock.

- J533 Data Bus On Board Diagnostic Interface (Gateway Control Module):
 - Supplies ESCL locking relay with power only if there is zero engine and vehicle speed
- J527 Steering Column Electronic Systems Module:
 - Switches supply for ESCL locking relay only if terminal 15 is off and there is zero speed
- J393 Comfort System Central Control Module:
 - Locks ESCL only if terminal 15 is OFF and CAN status signals from gateway and SMLS are set accordingly
 - Unlocking ESCL is initiated if valid key is detected by Immobilizer

If the Electronic Steering Column Lock Control Module J764 is replaced, the Comfort System Central Control Module J393 must be replaced as well and the two modules must be initialized together.

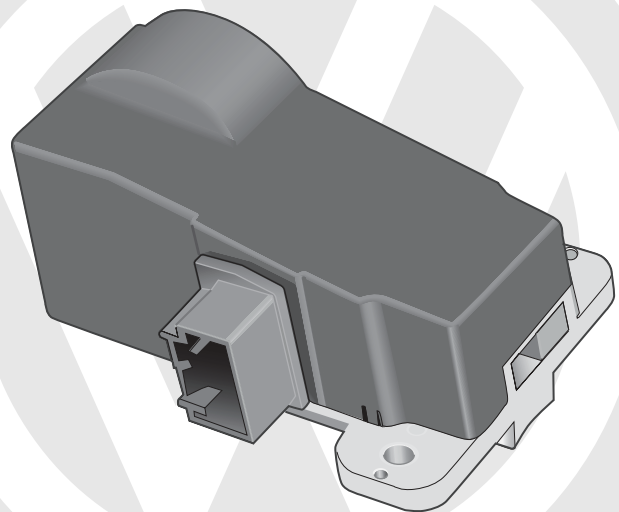


The ESCL releases only if the vehicle Immobilizer recognizes an authorized key. Terminals 15 and 50 are not activated until after the ESCL has been released.

Lock/Release

The following conditions must be met:

- The vehicle Immobilizer must recognize an authorized key
- Data Bus On Board Diagnostic Interface J533: speed = 0 mph; rpm = 0 rpm
- Steering Column Electronic Systems Control Module J527: terminal 15 off
- Comfort System Central Control Module J393: terminal 15 off; CAN signals from J533 and J527 are OK
- Access/Start Authorization Switch E415: S-contact off, terminal 15 off
- Electronic Steering Column Lock Control Module J764: checks if both speed signals from J533 and J527 are OK: speed = 0 km/hr



Comfort System Central Control Module J393

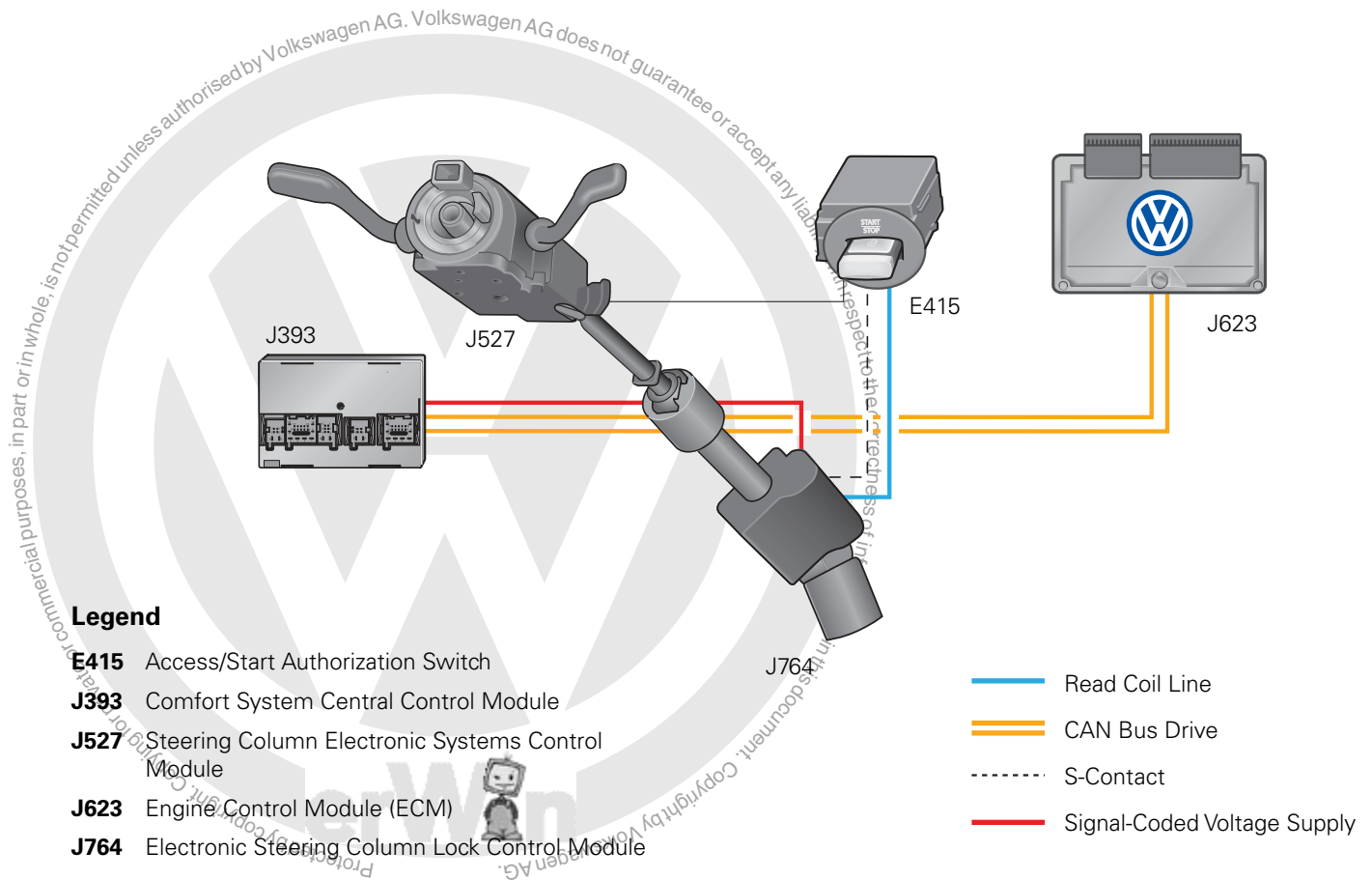
The vehicle Immobilizer function is part of the Comfort System Central Control Module J393.

If replaced, Comfort System Central Control Module J393 must be initialized.

The ESCL does not require replacing with the Comfort module, but does require adaptation to the existing ESCL.

Engine Control Module J623

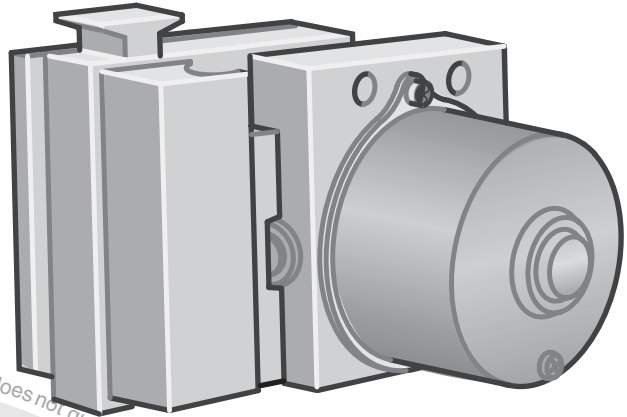
The Engine Control Module (ECM) J623 is part of the Vehicle Immobilizer. Engine operation requires clearance from the Comfort System Central Control Module J393 through the drivetrain CAN Bus. If replaced, the ECM J623 must be initialized.



Components

ABS Control Module J104

The ABS Control Module J104 supplies wheel speed information to the Electronic Steering Column Lock Control Module J764.



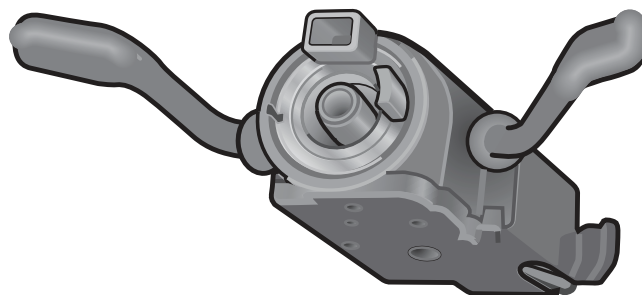
Vehicle Electrical System Control Module J519

As soon as the system recognizes a valid key, J764 unlocks the steering column and J519 energizes circuit 15 power in preparation of starting the vehicle.



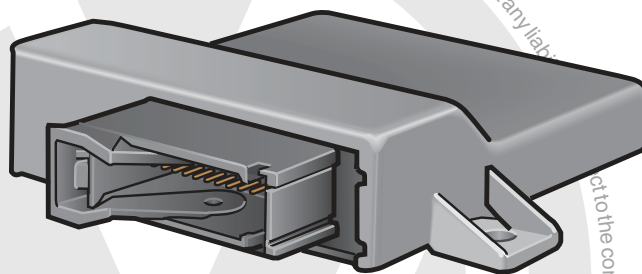
Steering Column Electronic Systems Control Module J527

J527 communicates Ignition Switch status to the Electronic Steering Column Lock Control Module J764.



Data Bus On Board Diagnostic Interface J533

The interface function of the Gateway that was previously part of the instrument cluster is now performed by J533. J533 acts as the interface for the various CAN-bus systems and allow information to be exchanged between the bus systems.



Diagnostics

System Identification

Determining the Immobilizer version is key to ensuring the proper procedures and components are used. Use the following table as a guide to the systems installed in Volkswagen models since 1999.



Always verify the Immobilizer version by using Guided Fault Finding.

Model	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Cabriolet	2	2	GFF	3								
CC										8	8	
EOS									5	7	7	
Eurovan	2	2	3	3	3							
Golf	1	1	GFF	4	4	4	4					
GTI	–	1	GFF	4	4	4	4	5	5	7	7	
Jetta	1	1	GFF	4	4	4	GFF	5	5	7	7	7
Jetta Sport Wagon										7	7	
New Beetle	1	1	GFF	4	4	4	4	GFF	5	7	7	
New Beetle Convertible					4	4	4	GFF	5	7	7	
Passat				4	4	4	4	8	8	8	8	
Passat Wagon				4	4	4	4	–	8	8	8	
Phaeton						6	6	6				
R32						4	–	–	–	7		
Rabbit									5	7	7	
Tiguan										7	7	
Touareg						6	6	GFF				
Touareg II								GFF	9	9	9	

Key

1	Immobilizer II
2	Immobilizer II Generation 2
3	Immobilizer II Generation 3
4	Immobilizer III
5	Immobilizer IV with Adaptation
6	Immobilizer IV with Adaptation, Access Start, and ESCL
7	Immobilizer IV with Download
8	Immobilizer IV with Download and ESCL
9	Immobilizer IV with Download, Access Start, and ESCL
GFF	Multiple systems used within the model year. Refer to Guided Fault Finding.

System Lockout Time

All Immobilizer systems have lockout time capability integrated as a theft deterrent. Lockout time prevents access to the Immobilizer areas of the scan tool for a varying time period.

Lockout time is typically imposed as a result of failures during the adaptation or because there was an attempt to start the vehicle when a failed, incorrect, or new component was used.

Lock-out time can also occur during successful adaptations. The test plan displays the lock-out time if this is the case.

Causes of Lockout Time

All systems are designed to store lock-out time whenever a failure occurs. Also, lockout time is stored after three unsuccessful attempts to adapt a new component.

If incorrect information is sent on-line during adaptation (incorrect Immobilizer serial number, VIN, scan tool date, dealer number, etc.), lockout time can be stored after repeated attempts to adapt the component. In these cases, it is possible for lockout time to be stored in other, unrelated systems such as the Passive Restraints system.

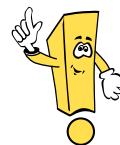
It is possible for lockout time to be stored simply by turning the key to the "run" position after installing a new Immobilizer component. This is typically a normal part of the test plan.

Some Immobilizer IV test plans are specifically designed to store a five-minute lockout when the adaptation procedure is successful.

Viewing Lockout Time

Most applications have an MVB available through the scan tool for viewing the current lockout time. This MVB, when available, varies by vehicle model and Immobilizer version:

- Cabrio/Eurovan
 - Address Word 25; Immobilizer; MVB 004
- New Beetle, Jetta, and Golf (Immobilizer II)
 - Lockout time MVB not available
- Immobilizer III systems (all)
 - Address Word 17; MVB 024
 - New Beetle and New Beetle Convertible display zero in all four fields regardless of the amount of lockout time stored
- New Beetle, New Beetle Convertible, Jetta, Golf, and GTI (Immobilizer IV with Download and Immobilizer IV with Adaptation)
 - Address Word 25; MVB 003
- Touareg/Phaeton (Immobilizer IV with Adaptation)
 - Address Word 25; MVBs 024 and 026
- Passat B6 (Immobilizer IV with Download, MY 2006 and later)
 - Address Word 25; MVBs 003 and 004
- Touareg II (Immobilizer IV with Download)
 - Address Word 25; MVBs 024 and 026



Pay close attention when inputting serial numbers, dates, dealer numbers, etc. Unexpected results, such as lockout time in unrelated systems, can occur when incorrect information is input.

Diagnostics

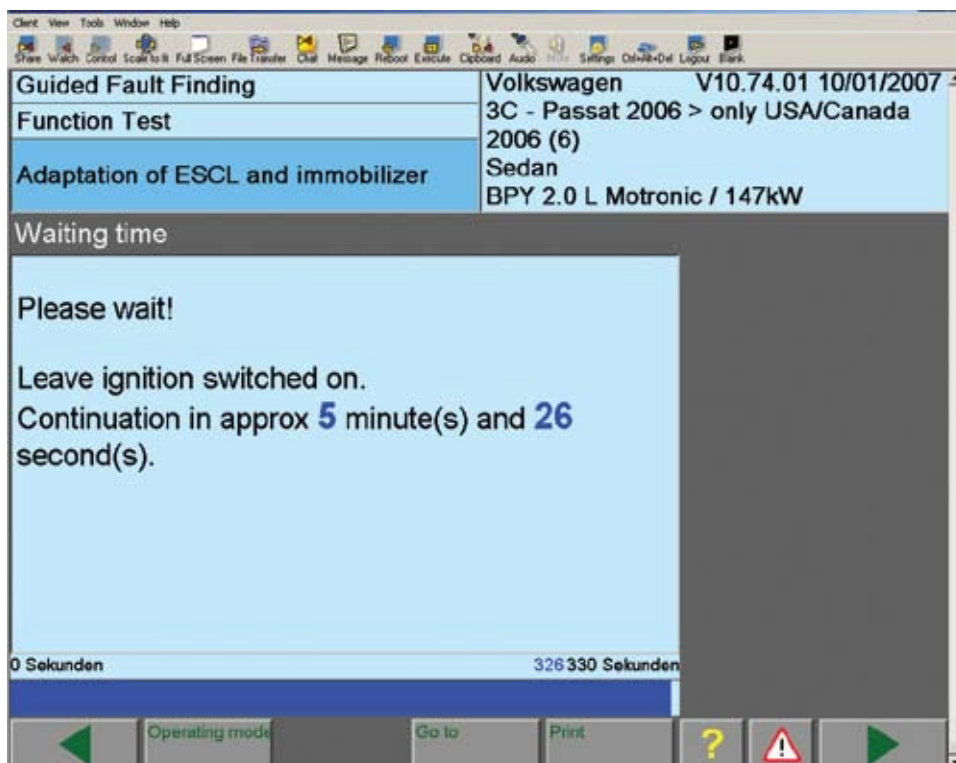
What is Displayed

It's best to view the MVBs whenever available to verify zero lockout time.

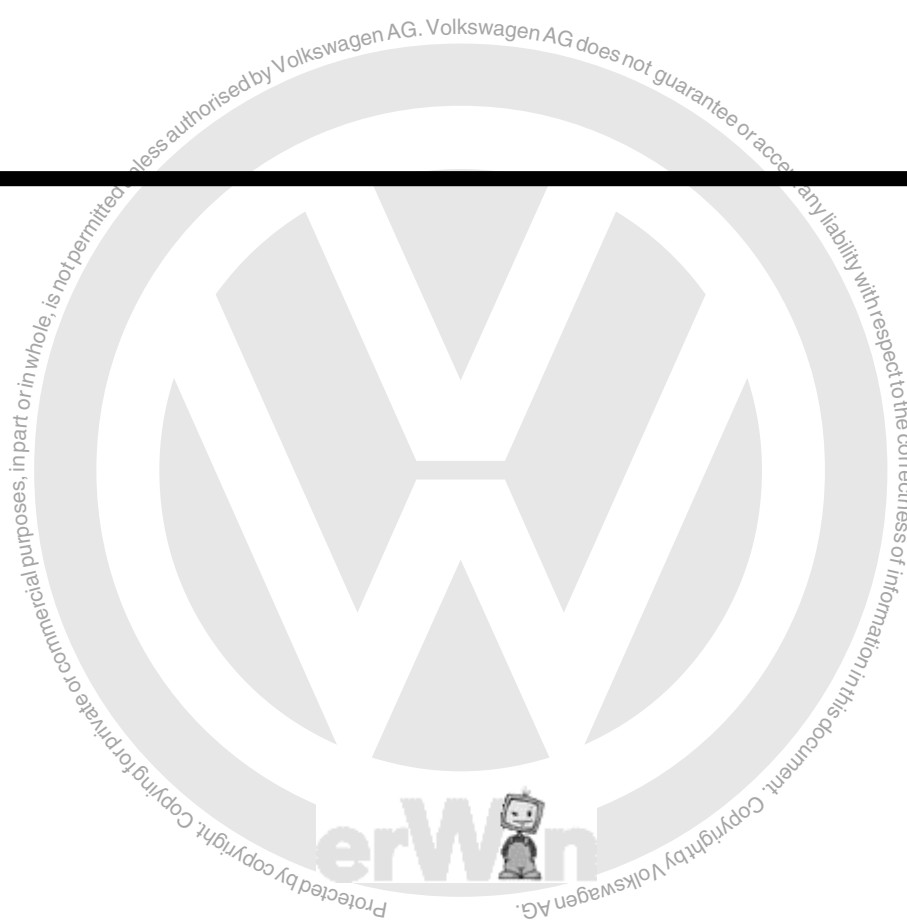
In most cases, there is a message displayed on the scan tool simply stating that there is lock-out time, or an actual counter is displayed showing the countdown.

The test plan normally provides instructions to eliminate lockout time. If not, leave the ignition ON while maintaining battery voltage. View the available MVB to display the lockout time. This real-time display eventually counts down to zero.

Immobilizer II and Immobilizer III, including Cabrio and Eurovan, can display the message "Adaptation Failed" (for no apparent reason) or "Adaptation was successfully performed". In either case, lockout time can be stored with no message. It becomes apparent when you attempt to start the vehicle and it starts and stalls.



Normal Lockout Time Displayed in a Test Plan



Diagnostics

Immobilizer II Service Procedures

Although the Immobilizer system can be serviced using Vehicle Self-Diagnosis, it is recommended that you use GFF whenever possible.

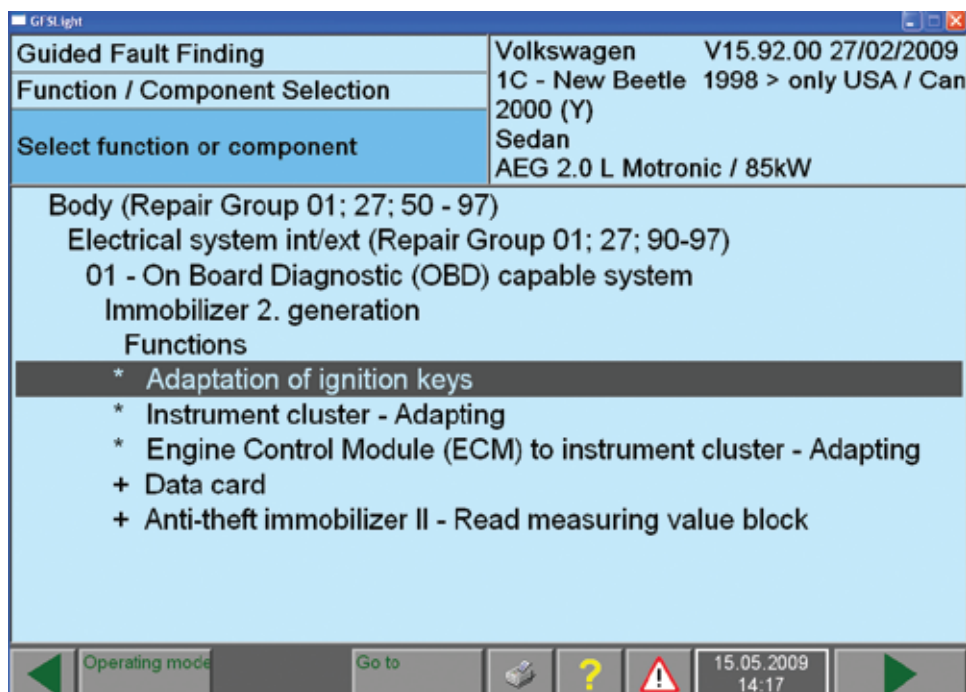
GFF has complete step-by-step procedures for:

- Vehicle Key Adaptation
- Instrument Cluster Exchange
- ECM Replacement

Programming New Keys

It is important to have all the keys available when checking, adapting, or replacing vehicle keys.

- When installing a new ECM, it is not necessary to adapt the keys to the vehicle. However, after replacing the ECM, all keys should be checked to verify that they operate correctly.
- When replacing an instrument cluster, all keys must be present so they can be **adapted** after the cluster has been replaced. If only one key is adapted after replacing the instrument cluster, the remaining keys will not start the vehicle.
- When replacing an ECM and an instrument cluster at the same time, all keys must be **replaced**.
- Whenever possible, avoid key replacement by adapting either the ECM or the instrument cluster before replacing the other part.



Function/Component Selection Screen (Immobilizer II)

Cabrio and Eurovan

The Cabrio and Eurovan are equipped with Immobilizer II, Generations 2 and 3. The adaptation procedures are the same for Generations 2 and 3, however, components are not interchangeable.

Generation 2 can be identified by the letter "H" in the 2nd position of the Immobilizer part number, while Generation 3 can be identified by the letter X in this position. Always check with your parts department when ordering components.

Replacement keys for Generation 2 are identified in the ETKA parts catalog with a W2 in the remarks column. Generation 3 is identified with W3.

An Immobilizer warning light is not available on Eurovan and Cabrio vehicles.

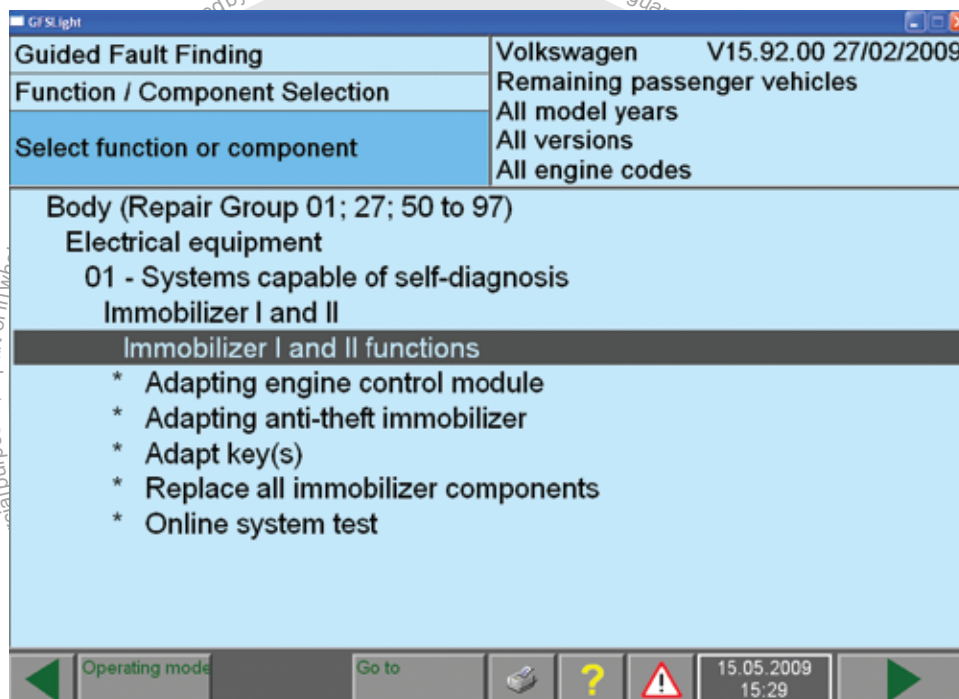
The Immobilizer control module J362 is located under the left side of the instrument panel and is not integrated with any other control module.

The Anti-Theft Immobilizer Reader Coil D2 is located on the ignition switch.

There is no specific vehicle selection in the scan tools for the Cabrio and Eurovan. For all diagnostics and adaptations, select:

- Remaining Passenger Vehicles
- All Model Years
- All Versions
- All Engine Codes

For component adaptations, select Immobilizer I and II.



Function/Component Selection Screen (Immobilizer II, Cabrio/Eurovan)

Immobilizer III Service Procedures

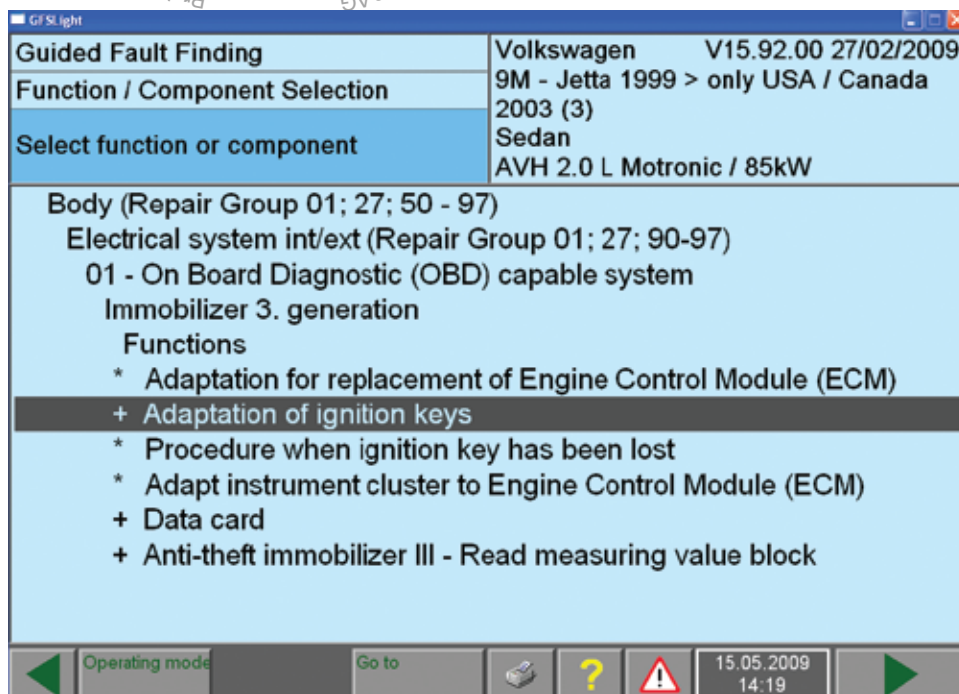
Just as the Immobilizer systems evolve, so too the support systems and adaptation processes. Immobilizer II and Immobilizer III systems originally required a 4-digit, and later a 7-digit, PIN to access the adaptation functions. This additional security process is now performed automatically and manual input is no longer required.

When working on an Immobilizer system, have all the vehicle keys available. Some repairs require the Adaptation of the keys. If you adapt only one key, the remaining keys will not start the vehicle.

Before replacing any Immobilizer system parts, use a Scan Tool to record the VIN and 14 digit Immobilizer number from the Instrument Cluster (Address Word 17) or the Engine Control Module (Address Word 01.)

If this is not possible, obtain the 14 digit Immobilizer number from the Instrument cluster label.

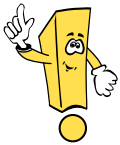
Record the coding for the Instrument Cluster and all the Adaptation numbers if possible.



Function/Component Selection Screen (Immobilizer III)

When replacing only an ECM, it is not necessary to adapt the vehicle keys. If you are replacing the Instrument Cluster, it is necessary to adapt all vehicle keys. If you replace both the ECM and Instrument Cluster at the same time, you must **replace** all the vehicle keys.

Whenever possible, complete the adaptation of the first component before replacing the second.



To avoid selecting an incorrect test plan, perform the GFF vehicle scan before attempting to adapt Immobilizer components. The scan tool then sets up the proper test plan automatically.

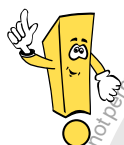


Important: Maintain battery voltage between 12.5 and 14.5 volts when performing any module or key adaptation procedure.

Diagnostics

Immobilizer IV with Adaptation Service Procedures

It is important to use GFF to access the correct Test Plan for the vehicle on which you are working. Following an incorrect Test Plan wastes time and can damage components.

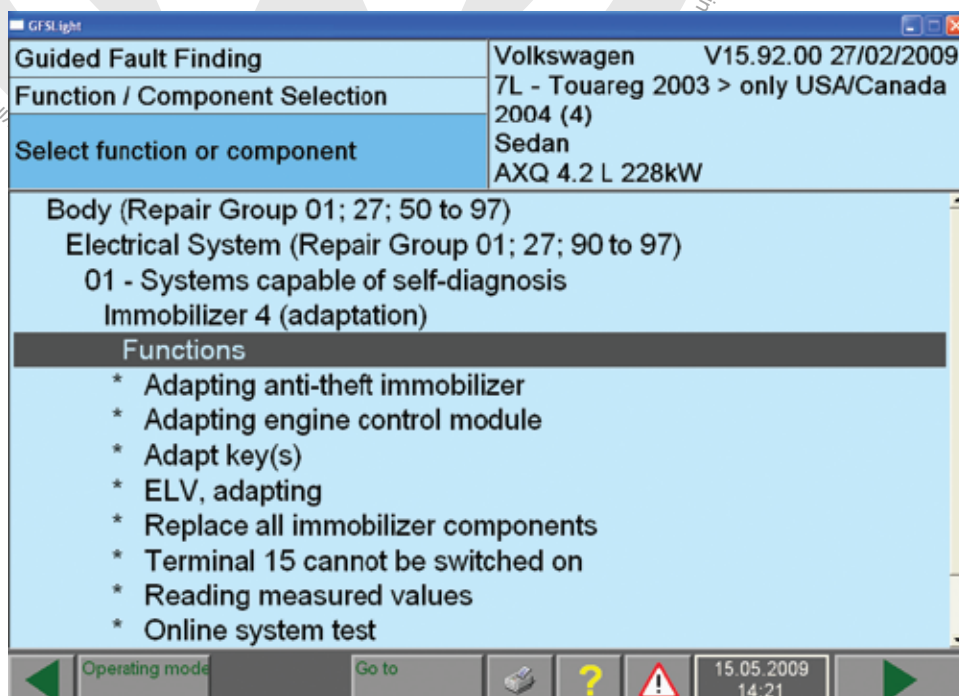


Never try to adapt parts or keys from other vehicles. The programming attempt will fail, you will have to start at the beginning, and you can also damage components.

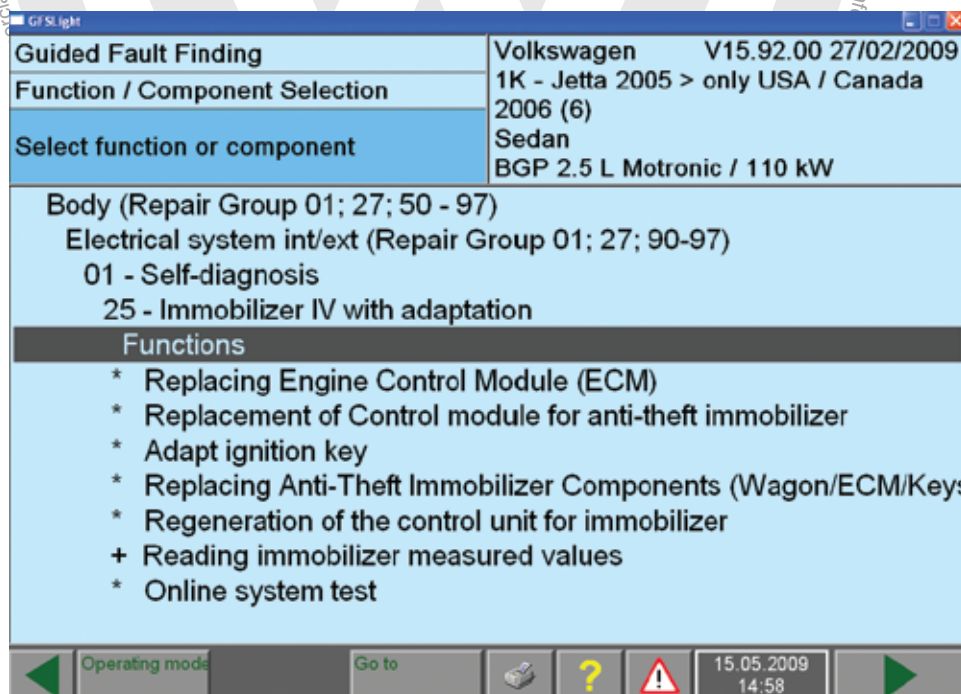
New Identity (All Immobilizer IV)

If all the vehicle keys are lost, a new identity may be required. A new identity consists of:

- New lock cylinders, keys, and key code
 - The lock cylinders must be physically changed with the new parts, not just electronically adapted, to prevent problems later
- J764 Electronic Steering Column Lock Control Module (Passat only)
- J393 Comfort System Central Control Module (Passat only)
- Perform "New Identity" test plan in GFF
- New emergency key code replaces original codes in EKTA



Function/Component Selection Screen (Immobilizer IV w/Adaptation; Touareg/Phaeton)



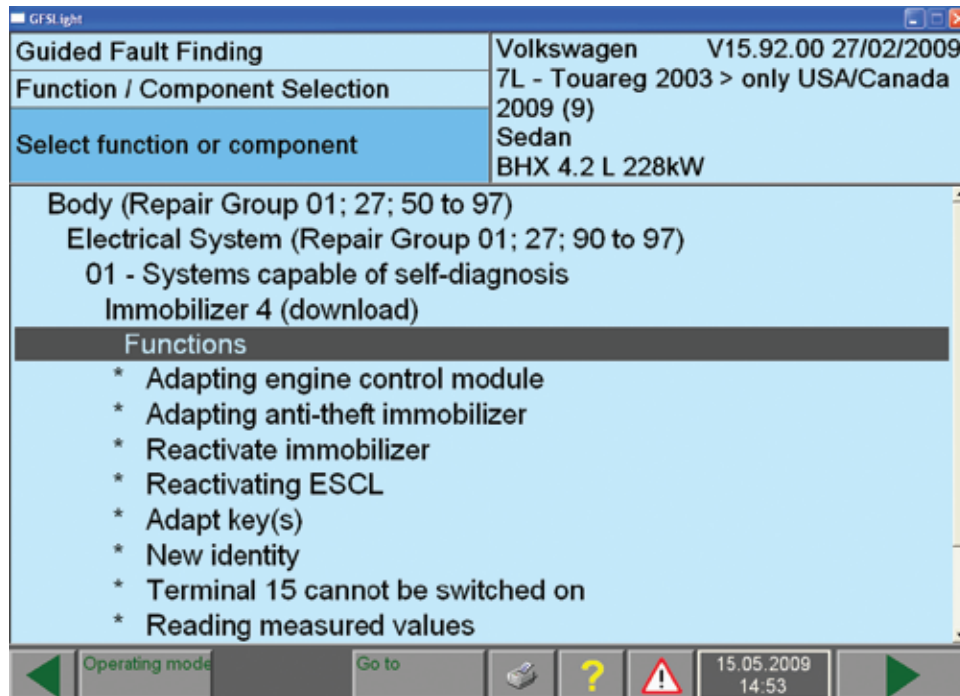
Function/Component Selection Screen (Immobilizer IV w/Adaptation; Jetta, MY 2006-2009)



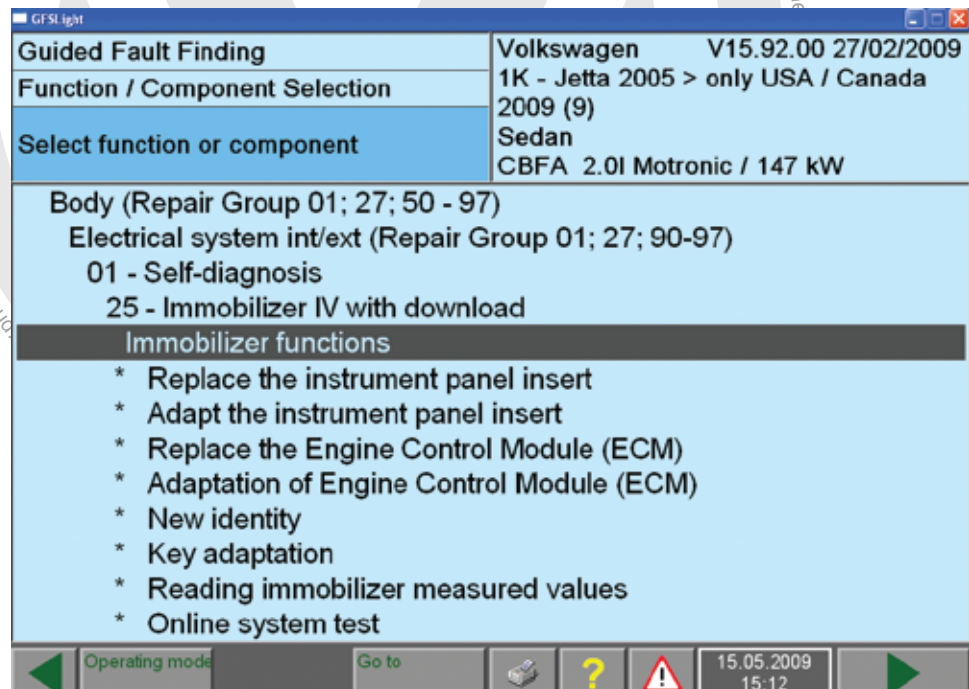
Important: Maintained battery voltage between 12.5 and 14.5 volts when performing any module or key adaptation procedure.

Diagnostics

Immobilizer IV with Download Service Procedures



Function/Component Selection Screen (Immobilizer IV w/Download; Touareg)



Function/Component Selection Screen (Immobilizer IV w/Download; Jetta, MY >2010)

Control Modules Replacement

Replacement control modules that are part of the Vehicle Immobilizer system must be initialized through the FAZIT database using GEKO.

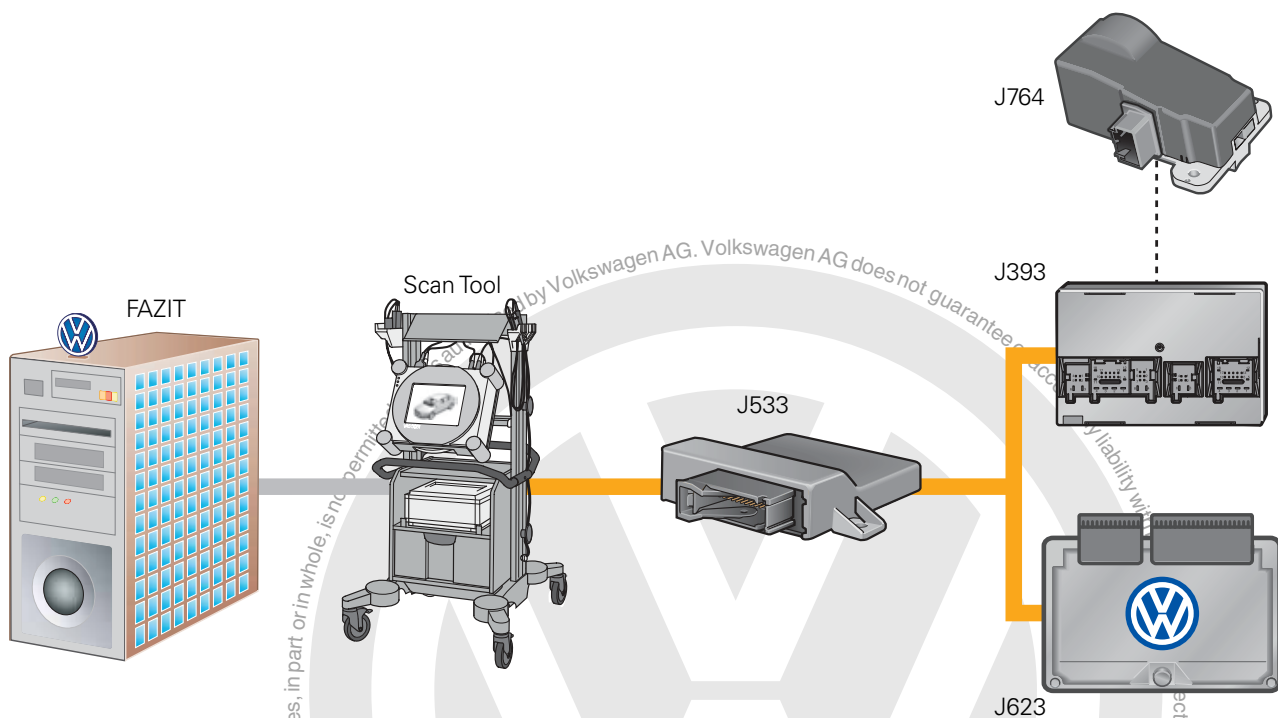
These modules are initialized as follows:

Comfort System Central Control Module J393

- Request data via online connection
- VAS tester receives the data
- Data downloaded into the control module
- Adapt the control module
- Adapt the vehicle key

Engine Control Module (ECM) J623, Electronic Steering Column Lock Control Module J764, and Comfort System Central Control Module J393

- Request data via online connection
- VAS tester receives the data
- Data downloaded into the control module
- Exchange of data between control module and FAZIT
- Adapt the vehicle key



Legend

- J393** Comfort System Central Control Module
- J533** Data Bus On Board Diagnostic Interface
- J623** Engine Control Module (ECM)
- J764** Electronic Steering Column Lock Control Module

Important: Battery voltage must be maintained between 12.5 and 14.5 volts when performing any module or key adaptation procedure.

Diagnostics

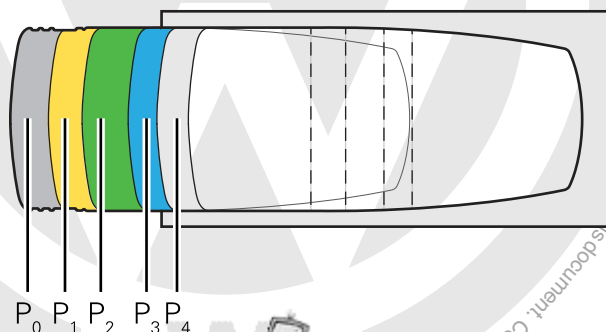
Key Positions (Passat and CC)

The various starting operations are activated by insertion of the ignition key into the Access/Start Authorization Switch E415.

Insertion Positions

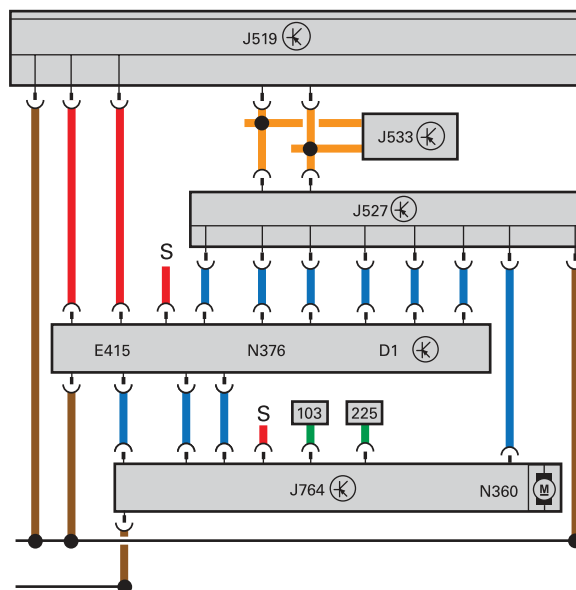
Insertion of the ignition key activates the following switch positions:

- P₀ Off
- P₁ S-contact on
- P₂ Terminal 15 on
- P₃ Terminal 15 Driving
(The ignition key automatically moves this position after startup)
- P₄ Terminal 50 on



Legend

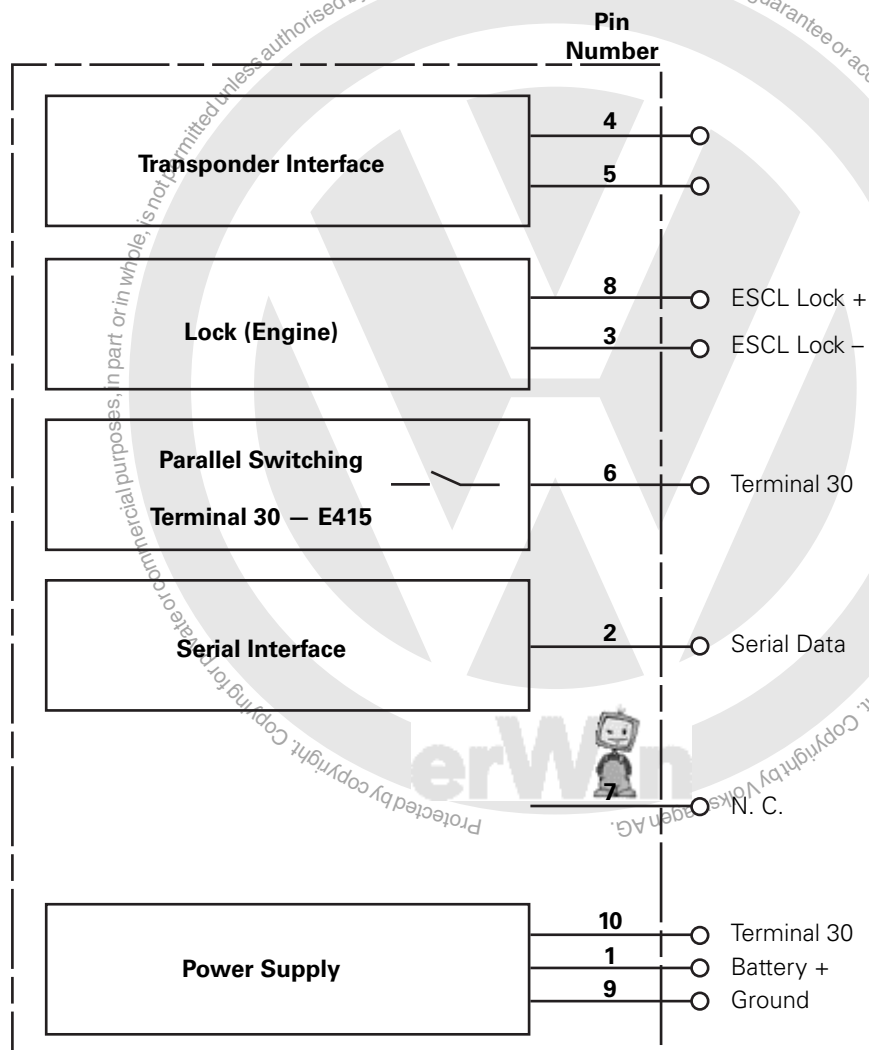
- D1** Anti-Theft Immobilizer Reading Module
E415 Access/Start Authorization Switch
J519 Vehicle Electrical System Control Module
J527 Steering Column Electronic Systems Control Module
J533 Data Bus On Board Diagnostic Interface
J764 Electronic Steering Column Lock Control Module
N376 Ignition Switch Key Lock Solenoid



Electronic Steering Column Lock (2006 Passat Shown)



Always refer to ElsaWeb for the latest service information.



Tips and Pitfalls

Tips and Pitfalls

There are several common issues and errors that you may encounter when servicing Immobilizer Systems.

Common Issues

Keys Won't Adapt

It may take up to six attempts to adapt vehicle keys, depending on various factors including, but not limited to, internet connection speed, RF interference at the repair facility, and other factors.

It is extremely rare for new replacement components to be at fault.

Programming Multiple Keys

When adapting multiple keys, ensure only one key at a time is near the Immobilizer induction coil in the ignition cylinder. Place additional keys to be programmed on the passenger seat to prevent the possibility of RF signals from the induction coil reaching the new keys.

Common Errors

Incorrect Diagnosis of Immobilizer Failure

Attempting to adapt an Immobilizer component while a faulty component remains installed is one of the worse case scenarios. Each time the adaptation of the new component is attempted and fails, lockout time is accumulated – up to 4½ hours in some cases.

Because lockout time cannot always be determined by viewing MVBs, when the failed component is finally identified and installed, you are not aware that the adaptation fails due to lockout time.

This can often and understandably lead to second guessing the replacement of the failed component.

Using an Incorrect Test Plan

This is a common mistake when GF is selected from the VAS start-up screen. With Immobilizer III systems, always select key adaptation initially. You'll be prompted to select the component you want to adapt later in the test plan.

Not Following the Test Plan Directions

This is often caused by impatience while performing the adaptation (we all do it sooner or later) or by misinterpreting the directions.

Selecting an Incorrect Vehicle Model or Year or Selecting "All Remaining Vehicles"

Make sure the correct parameters are entered when using the VAS scan tool. If you're on the wrong road, following the signs still won't take you where you want to go!

Voltage Supply Too High

Battery voltage above 14.5 volts can cause the adaptation to fail and can also damage components. In exceptional cases, it may be necessary to replace all Immobilizer components.

Voltage Supply Too Low

Voltage supply below 12 volts can cause adaptation failures. In some cases, it may be necessary to perform a capacitive discharge, which is essentially a complete reboot of the vehicle control modules.

To perform a capacitive discharge, disconnect the battery and jump the positive and negative battery cables together for about 15 seconds. This drains all control modules of their capacitive power or stored energy.

Battery voltage concerns commonly occur when a battery charger/maintainer is not properly used to maintain battery voltage during the repair. Battery voltage concerns also occur before the vehicle arrives at the repair facility. It's not uncommon for a customer to make repeated attempts to start the engine when the Immobilizer has been activated, thus draining the battery.

Occasionally, even if the battery is charged properly after being drained, the modules may need to be rebooted.

Installing Incorrect Components

Keys, instrument clusters and ECM are not interchangeable between different types of Immobilizer systems. Be wary of replacement components that you did not order.

If a customer provides the new component and there is no proof of purchase, especially new keys with no part number; you're probably wasting your time. All other components have a sticker with the part number.

The part number can also be viewed with the scan tool but you may not be able to determine if the parts are new or used.

Volkswagen does not endorse or support the adaptation of used components.

Adapting More Than One New Component

It is not possible to adapt two new components at the same time on Immobilizer II, Immobilizer III and Immobilizer IV with Adaptation. All components will need to be replaced and the vehicle will receive a new identity (Immobilizer serial number).

Parts must be ordered by a Volkswagen dealer.

Contact the Volkswagen Technical Helpline to receive the proper instrument cluster for all New Beetle, New Beetle Convertible, Golf, and Jetta vehicles.

Tips and Pitfalls

Scan Tool Improperly Set Up

Wrong dealer code, importer number, date, time and internet protocols can and will prevent Immobilizer adaptation. When adapting an Immobilizer component, the scan tool sends the VIN, Immobilizer serial number, dealer code, importer number, and current date to a server to retrieve a 7-digit code. This code is then converted to a 4-digit access code. The scan tool inserts this code where needed to unlock the Immobilizer and allow the new component to be adapted. If any one of these factors is incorrect, you have an incorrect access code.

In addition, if the internet security device is not set up properly or the scan tool is routing this information to the wrong server, the adaptation will also fail.

Date and time can be corrected in the administration menu of the scan tool. Dealer code and importer number can only be changed after downloading the scan tool base CD. Internet concerns often need I.T. personnel to remedy the concern.

Outdated Scan Tool Software

Keep the scan tool software current to include new vehicles and to correct previously installed software concerns.

Poor Internet Connection or Server Errors

Check your cables. Volkswagen does not recommend using a wireless connection. If you experience slow or interrupted connections, you'll more than likely run into problems with adaptations.

Volkswagen server errors are typically repaired within a reasonable amount of time (one hour). Try performing the adaptation again later.

System Lockout Time

All Immobilizer systems have lockout time capability integrated as a theft deterrent. Lock-out time can occur during successful adaptations and the test plan should display the lock-out time if this is the case.

Other reasons for lock-out time are due to failures during the adaptation or because there was an attempt to start the vehicle when a failed, incorrect, or new component was used.



Scan Tool Software Incorrectly Programmed

If you suspect that the test procedure is failing or was omitted due to a recently installed scan tool software, confirm all of the above procedures and check for tech tips and technical bulletins before contacting the Technical Helpline or the MSSP Helpline.

Tech Tips

Following is a list of the Immobilizer-related Tech Tips (TT) listed in VWHub. This partial list is reproduced here to provide insight as to the type of information available. Always check online for the most current information.

TT 90-00-02

2000 New Beetle Golf and Jetta – Loss of Dash Lights

Aftermarket installation of remote starter systems could cause the dash lights to fail due to feedback in the instrument cluster wiring harness, and it will also defeat the Immobilizer system. Aftermarket installation of the remote starter system is not recommended.

TT 90-08-03

2008> New Beetle – Immobilizer Adaptation

When adapting the Immobilizer, errors may occur. Due to the high priority transmissions from the air bag, a signal could interrupt the adaptation of the Immobilizer. It may be necessary to temporarily disconnect the air bag module to perform the adaptation. No safety concern should arise if the vehicle is not driven with the module disconnected. Connect the air bag module immediately after the adaptation process is complete.

TT 96-06-73

2002 New Beetle, Jetta, Golf, GTI, Immobilizer Adaptation

If the Immobilizer Adaptation Test Plan won't adapt the Instrument Cluster to the ECM or adapt the keys, the 2002 Test Plan is looking for an Immobilizer II system instead of an Immobilizer III.

Use the 2003 Test Plan instead of the 2002 to allow the Scan Tool to look for an Immobilizer III system on the vehicle.

TT 96-06-75

2000-2001 Golf, New Beetle, Immobilizer Adaptation

The Immobilizer Adaptation Test Plan asks for the Unit Number, Importer, VWZ and VIN; this information should transfer automatically. Instead, use the Immobilizer adaptation procedure in the Instrument Panel / Instrument Cluster Replacement Test Plan, or you can also try the 2000-2001 Jetta Immobilizer Adaptation Test Plan.

TT 96-06-76

1999-2002 Cabrio with Immobilizer II, Key Adaptation

If new keys cannot be adapted, they may possibly be the incorrect part number. Cabrios are equipped with two generations (Generation 2 and Generation 3) of Immobilizer II. Use the Immobilizer Part Number to distinguish between Generation 2 and Generation 3.

- Immobilizers starting with 6H0 are Generation 2
- Immobilizers starting with 6X0 are Generation 3

Order Main Key without logo light:

- Part Number 6N0837219H (Generation 2)
- Part Number 6N0837219N (Generation 3).

Do NOT order Main Key with colored logo light.

TT 96-07-42

All Models With Immobilizer III or IV, Immobilizer Adaptation When Replacing the ECM

When replacement of the ECM is required on a vehicle equipped with Immobilizer III or IV, adapt to the Immobilizer. Use the procedure for ECM adaptation to Immobilizer under the Immobilizer selection in GF or GFF. Do not use the procedure for ECM replacement under Engine Electronics.

Tips and Pitfalls

TT 96-08-01

2007 > Touareg II Models Only – Immobilizer Procedure Definitions

February 13, 2009 – UPDATE to “Terminal 15 ~ ~” test.

On the new Touareg II vehicles there are several new test plans for the Immobilizer adaptations. Following is a list of available function tests and their purpose:

- New Access/Start Control Module: Adapts a new access/start module.
- Used Access/Start Control Module: Adapts a used access/start module.
- Replacement Engine Control Module: Adapts a new ECM
- New Identity with old DAS and ECM: Used when a complete lock set is to be replaced for the vehicle to have a new identity. Access start module, ECM, 1 key, and ESCL must be adapted before using this test plan.
- New identity with new access/start system and ECM: Used when a complete lock set, access start module, and ECM have been replaced on a vehicle giving it a complete new identity
- New identity all parts new: Used when a complete lock set, access start module, ECM, and electronic steering column lock (ESCL) have been replaced on the vehicle giving it a new identity.
- Reactivating Access/Start Control Module: This re-adapts a previously adapted access start module. This test plan will seldom be used.
- Reactivating ESCL: Adapts an electronic steering column lock.
- Adapting Antenna parameters: Not used in this market
- Code Control Unit: Codes the access start module
- Terminal 15 cannot be switched on: Do Not Use with Scan Tool Software under version 12.89.

- Online test FAZIT (Vehicle Information and Central Identification Tool): Tests the online connection before performing an Immobilizer function test

Note: Ordering a complete lock set assigns a new identity to the vehicle. Depending on the situation, the appropriate identity test plan should be used.

TT 96-08-03

2006> Passat (B6) – Comfort Module Replacement Tip

April 4, 2008 – TT UPDATED

If diagnosis leads to replacement of the comfort module only, with Scan tool version 12.83.01 you can now successfully adapt a “Q” or “AK” module without replacing the steering column. The only exception to this rule is TB 97-06-02. (ElsaWeb number 2011776).

Always check Elsa for the latest information regarding Immobilizer replacement guidelines.

TT 96-08-06

2006-2007 Jetta – Immobilizer Adaptation After Replacement

If the adaptation of the Immobilizer fails during the GFF test plan after replacement, try using the test plan in Guided Functions and select vehicle as a Rabbit. Please send in failed diagnosis logs to the GFF feedback team.

TT 96-08-07

1998 – 2001 All Models / Vehicles Not Equipped with Immobilizer System

1998 and 1999 A4 vehicles (Golf/Jetta) and 1998 to 2001 Passats were not equipped with the Immobilizer system.

This can be verified by trying to go into MVB 22 under address word 17 – Instrument Cluster. If this value is not available, the vehicle may not have an Immobilizer installed. When attempting to program a key to this type of system, the error code MQS 1003E may be received because the system cannot find an Immobilizer. No repairs should be made to correct this condition. New keys do not have to be programmed to start the vehicle.

TT 96-09-01

2006–2007 2002-2006 New Beetle / New Beetle Convertible – Immobilizer Adaptation Tip

April 3, 2009 – UPDATED affected Model Years

When performing Immobilizer adaptations, such as programming ignition keys or replacing the instrument cluster, you encounter a “concern”, run the test plan and identify the vehicle as a (9M) Jetta. If there is no change, check the Immobilizer light operation. If the light is on solid, leave the ignition in the “run” position and disconnect the scan tool from the Data Link Connector. Wait until the light starts blinking again (within five minutes) and repeat the adaptation procedure.

TT 96-09-02

2006> Passat – Immobilizer Adaptation Tip

After the successful adaptation of keys or Immobilizer control unit, the vehicle may not start and/or Immobilizer active display on MFI. Run the test plan for “ECM adaptation” or “Reinstallation of the ECM” if available. This should reset communication between ECM and Immobilizer Control Module and allow the vehicle to start.

Tips and Pitfalls

When Should I Call the Helpline?

The Helpline technicians are available to help you with the diagnosis and repair of all Volkswagen vehicles.

Before making a call, complete your preliminary diagnosis: perform GFF collection services to check for DTCs and perform GFF test plans to diagnose the concern. This process will better enable the Helpline to assist you.

Call the Helpline:

- If no test plan is available, if the test plan is inconclusive, or if a part replaced according to the test plan did not repair the concern.
- If you think the vehicle has been damaged electrically (lightening strike, reversed polarity, overcharging the battery, etc.) and replacement of more than one Immobilizer component is necessary. Contact the Helpline for assistance before replacing any parts.
- If components are missing (Immobilizer, keys, ECM, etc.) or if used components are suspected to have been installed.

Generation 2, Generation 3

Two variations of Immobilizer II systems installed in the Cabrio and Eurovan.

NAR

North American Region. The Volkswagen sales and marketing area that includes the United States, Canada, and Mexico.

RF

Radio Frequency. Any one of the frequencies of electromagnetic radiation in the range between 10 KHz and 300 MHz, including those used for radio and television.

Notes



Knowledge Assessment

An on-line Knowledge Assessment (exam) is available for this Self-Study Program.

You can find this Knowledge Assessment at:

www.vwwebsource.com

For Assistance, please call:



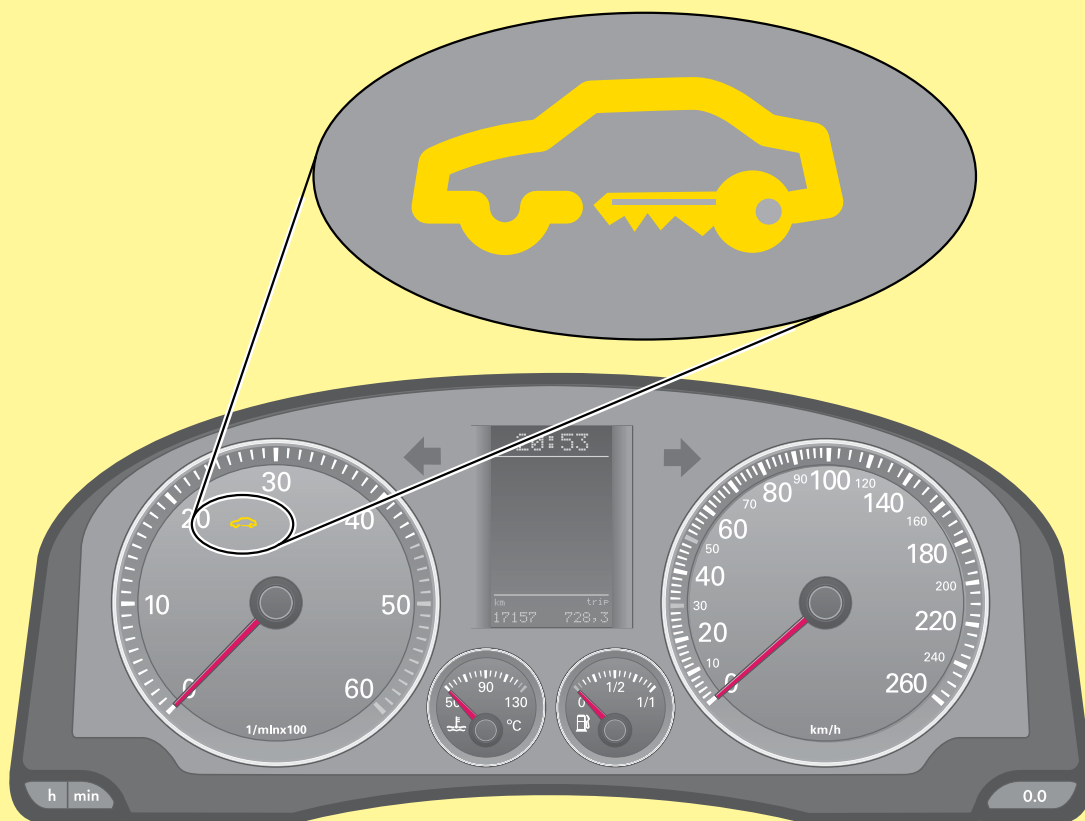
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Cautions & Warnings

Please read these WARNINGS and CAUTIONS before proceeding with maintenance and repair work. You must answer that you have read and you understand these WARNINGS and CAUTIONS before you will be allowed to view this information.

- If you lack the skills, tools and equipment, or a suitable workshop for any procedure described in this manual, we suggest you leave such repairs to an authorized Volkswagen retailer or other qualified shop. We especially urge you to consult an authorized Volkswagen retailer before beginning repairs on any vehicle that may still be covered wholly or in part by any of the extensive warranties issued by Volkswagen.
- Disconnect the battery negative terminal (ground strap) whenever you work on the fuel system or the electrical system. Do not smoke or work near heaters or other fire hazards. Keep an approved fire extinguisher handy.
- Volkswagen is constantly improving its vehicles and sometimes these changes, both in parts and specifications, are made applicable to earlier models. Therefore, part numbers listed in this manual are for reference only. Always check with your authorized Volkswagen retailer parts department for the latest information.
- Any time the battery has been disconnected on an automatic transmission vehicle, it will be necessary to reestablish Transmission Control Module (TCM) basic settings using the VAG 1551 Scan Tool (ST).
- Never work under a lifted vehicle unless it is solidly supported on stands designed for the purpose. Do not support a vehicle on cinder blocks, hollow tiles or other props that may crumble under continuous load. Never work under a vehicle that is supported solely by a jack. Never work under the vehicle while the engine is running.
- For vehicles equipped with an anti-theft radio, be sure of the correct radio activation code before disconnecting the battery or removing the radio. If the wrong code is entered when the power is restored, the radio may lock up and become inoperable, even if the correct code is used in a later attempt.
- If you are going to work under a vehicle on the ground, make sure that the ground is level. Block the wheels to keep the vehicle from rolling. Disconnect the battery negative terminal (ground strap) to prevent others from starting the vehicle while you are under it.
- Do not attempt to work on your vehicle if you do not feel well. You increase the danger of injury to yourself and others if you are tired, upset or have taken medicine or any other substances that may impair you or keep you from being fully alert.
- Never run the engine unless the work area is well ventilated. Carbon monoxide (CO) kills.
- Always observe good workshop practices. Wear goggles when you operate machine tools or work with acid. Wear goggles, gloves and other protective clothing whenever the job requires working with harmful substances.
- Tie long hair behind your head. Do not wear a necktie, a scarf, loose clothing, or a necklace when you work near machine tools or running engines. If your hair, clothing, or jewelry were to get caught in the machinery, severe injury could result.
- Do not re-use any fasteners that are worn or deformed in normal use. Some fasteners are designed to be used only once and are unreliable and may fail if used a second time. This includes, but is not limited to, nuts, bolts, washers, circlips and cotter pins. Always follow the recommendations in this manual - replace these fasteners with new parts where indicated, and any other time it is deemed necessary by inspection.

Cautions & Warnings

- Illuminate the work area adequately but safely. Use a portable safety light for working inside or under the vehicle. Make sure the bulb is enclosed by a wire cage. The hot filament of an accidentally broken bulb can ignite spilled fuel or oil.
- Friction materials such as brake pads and clutch discs may contain asbestos fibers. Do not create dust by grinding, sanding, or by cleaning with compressed air. Avoid breathing asbestos fibers and asbestos dust. Breathing asbestos can cause serious diseases such as asbestosis or cancer, and may result in death.
- Finger rings should be removed so that they cannot cause electrical shorts, get caught in running machinery, or be crushed by heavy parts.
- Before starting a job, make certain that you have all the necessary tools and parts on hand. Read all the instructions thoroughly; do not attempt shortcuts. Use tools that are appropriate to the work and use only replacement parts meeting Volkswagen specifications. Makeshift tools, parts and procedures will not make good repairs.
- Catch draining fuel, oil or brake fluid in suitable containers. Do not use empty food or beverage containers that might mislead someone into drinking from them. Store flammable fluids away from fire hazards. Wipe up spills at once, but do not store the oily rags, which can ignite and burn spontaneously.
- Use pneumatic and electric tools only to loosen threaded parts and fasteners. Never use these tools to tighten fasteners, especially on light alloy parts. Always use a torque wrench to tighten fasteners to the tightening torque listed.
- Keep sparks, lighted matches, and open flame away from the top of the battery. If escaping hydrogen gas is ignited, it will ignite gas trapped in the cells and cause the battery to explode.
- Be mindful of the environment and ecology. Before you drain the crankcase, find out the proper way to dispose of the oil. Do not pour oil onto the ground, down a drain, or into a stream, pond, or lake. Consult local ordinances that govern the disposal of wastes.
- The air-conditioning (A/C) system is filled with a chemical refrigerant that is hazardous. The A/C system should be serviced only by trained automotive service technicians using approved refrigerant recovery/recycling equipment, trained in related safety precautions, and familiar with regulations governing the discharging and disposal of automotive chemical refrigerants.
- Before doing any electrical welding on vehicles equipped with anti-lock brakes (ABS), disconnect the battery negative terminal (ground strap) and the ABS control module connector.
- Do not expose any part of the A/C system to high temperatures such as open flame. Excessive heat will increase system pressure and may cause the system to burst.
- When boost-charging the battery, first remove the fuses for the Engine Control Module (ECM), the Transmission Control Module (TCM), the ABS control module, and the trip computer. In cases where one or more of these components is not separately fused, disconnect the control module connector(s).
- Some of the vehicles covered by this manual are equipped with a supplemental restraint system (SRS), that automatically deploys an airbag in the event of a frontal impact. The airbag is operated by an explosive device. Handled improperly or without adequate safeguards, it can be accidentally activated and cause serious personal injury. To guard against personal injury or airbag system failure, only trained Volkswagen Service technicians should test, disassemble or service the airbag system.

Cautions & Warnings

- Do not quick-charge the battery (for boost starting) for longer than one minute, and do not exceed 16.5 volts at the battery with the boosting cables attached. Wait at least one minute before boosting the battery a second time.
- Never use a test light to conduct electrical tests of the airbag system. The system must only be tested by trained Volkswagen Service technicians using the VAG 1551 Scan Tool (ST) or an approved equivalent. The airbag unit must never be electrically tested while it is not installed in the vehicle.
- Some aerosol tire inflators are highly flammable. Be extremely cautious when repairing a tire that may have been inflated using an aerosol tire inflator. Keep sparks, open flame or other sources of ignition away from the tire repair area. Inflate and deflate the tire at least four times before breaking the bead from the rim. Completely remove the tire from the rim before attempting any repair.
- When driving or riding in an airbag-equipped vehicle, never hold test equipment in your hands or lap while the vehicle is in motion. Objects between you and the airbag can increase the risk of injury in an accident.

I have read and I understand these Cautions and Warnings.

