Document	**Functional description for Homologation**
Customer	**VOLKSWAGEN Automóveis S/A.**
Manufactory	**Magneti Marelli Sistemas Automotivos.**
Product	**MQBA0**

Version	Date	Comment	Author
1.0	03/04/2017	First Issue	Philipe Mandaji Piaia
1.1	15/09/2017	Update Part Number	Danilo Trinetta Xavier
2.0	25/06/2018	Added §2.6 and 2.7 related to label. (FCC requirement)	Luis Gustavo Casteletti
3.0	25/06/2018	Added FCC statements	Luis Gustavo Casteletti
4.0	02/07/2018	Update block diagram with frequency of all oscilators	Luis Gustavo Casteletti
5.0	15/08/2018	Removed block diagram and photos	Luis Gustavo Casteletti

Summary ***Page***

1. Customer Part Numbers

1.1 MQBA0 Part Number's	
Magneti Marelli Part Number	**VW Part Number**
503.006.001.XXX	6EA.920.7XX.X

Note 1: The character "X" represents versions and modifications that accompany this project. All part numbers with its variations have the same RF circuit.

Note 2: For Homologation purposes, any MQBA0 cluster with Part Number described above can be used, and the results considered for others Part Numbers. It is possible because for the entire family of MQBA0 cluster, the IMMOBILIZER circuit is the same.

2. System Specification

2.1 General Product Data

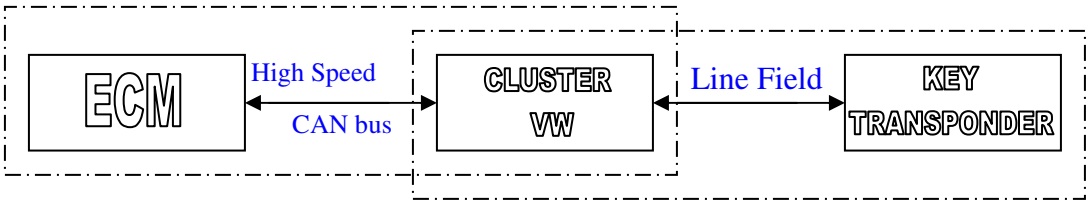
The MQBA0 Instrument Cluster embeds an integrated immobilizer system, which works with a security transponder assembled into the body of the car keys and interfaces to the Engine Management System via CAN Bus. This system uses the Challenge/Response principle from the base station to the transponder and vice versa. The antenna is assembled out side the instrument cluster and it is connected through the harness cable of the vehicle (length of the cable ~0,9m).

2.2 General System Description

The immobilizer system is to prevent unauthorized people from starting the vehicle engine to steal it. The system is based on a crypto coded data exchange between the engine control unit and a transponder via the immobilizer.

The transponder (transponder = transmitter + responder) is an electronic module integrated in the top of the car key. The information stored in it decides whether or not the person in question is authorized to use the car. The transponder supports the write, read and calculating functions required for the alternating code process which is to be implemented without battery.

The intervention into the engine control unit is done via an electronically coded signal. A consistent alternating code process is used for the communication between the transponder and the engine management system (ECM). When the ignition is switched ON, the engine control unit enables the engine functions for a predefined period (= pre-enable time, max 1.8s after engine is running).



As consequence, the engine function remains enabled only if a correct transponder code is detected within the pre-enable time. In all the others cases, the engine functions are inhibited and the vehicle cannot be started.

Access to safety-related functions and data of the immobilizer and of the engine control unit – e.g. programming of a new transponder – is protected by a password function. Access to these functions is only possible after correct entry of the Security Code which has been programmed previously; this entry is possible via a tester (e.g. VAS Tool from VW).

This Security Code is documented in the so-called SECURITY CAR PASS which is in the possession of the vehicle owner.

2.3 Frequency of Operation

The operating frequency of the immobilizer system is 125KHz.

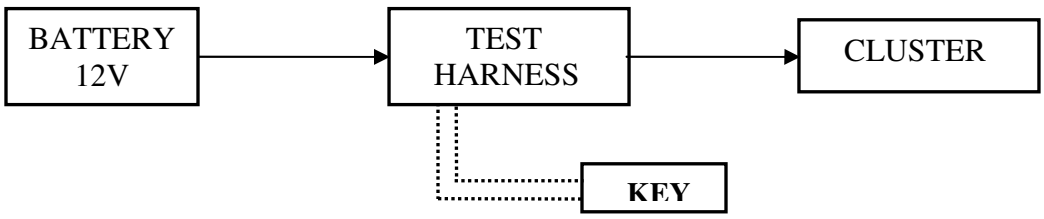
3. Functional Simulation Conditions

3.1 List of Equipment

The functional operation of MQBA0 is provided using the following list of equipment:

- Vehicle battery 12V;
- Test harness;
- Key with transponder;
- Ignition switch with immobilizer antenna coil.

3.2 General Simulation Setup



3.3 Functional Operation Description

The immobilizer function of MQBA0 starts to work when the key (KL15) is turned on. The modulate frequency, AM 125 KHz, is emitted and the Cluster do the recognition of the transponder code. If the answer is positive, the cluster tells ECM that key was recognized.

4. FCC Statement

Federal Communication Commission Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

IMPORTANT NOTE:
Radiation Exposure Statement:
This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Country Code selection feature to be disabled for products marketed to the US/CANADA