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Product description

and

Technical specification

Type

NBC AI 012

Alarm system with immobilizer for

FERRARI as NBC AI 012.21

MASERATI as NBC AI 013.21

Abstract

This document summarizes the technical characteristics of device providing information of both a specific and general nature.

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TABLE OF CONTENTS

GENERAL DESCRIPTION

1.1 BLOCK DIAGRAM

PIN DESCRIPTION GENERALTY

BRIEF DESCRIPTION

ALARM FUNCTION

2.1 DEACTIVATED

2.2 SLEEP

2.2.1 Volumetric Exclusion

2.2.2 Anti-Lifting Exclusion

2.3 INSERTION

2.3.1 Auto-Insertion

2.3.2 Reinsertion

2.4 SURVEILLANCE

2.4.1 Control of +15 signal

2.4.2 Exclusion of the External Modules far Vehicle Battery Low Tension

2.4.3 Perimetral Surveillance

2.4.4 Boot's Unlocking by the remote

2.5. ALARM

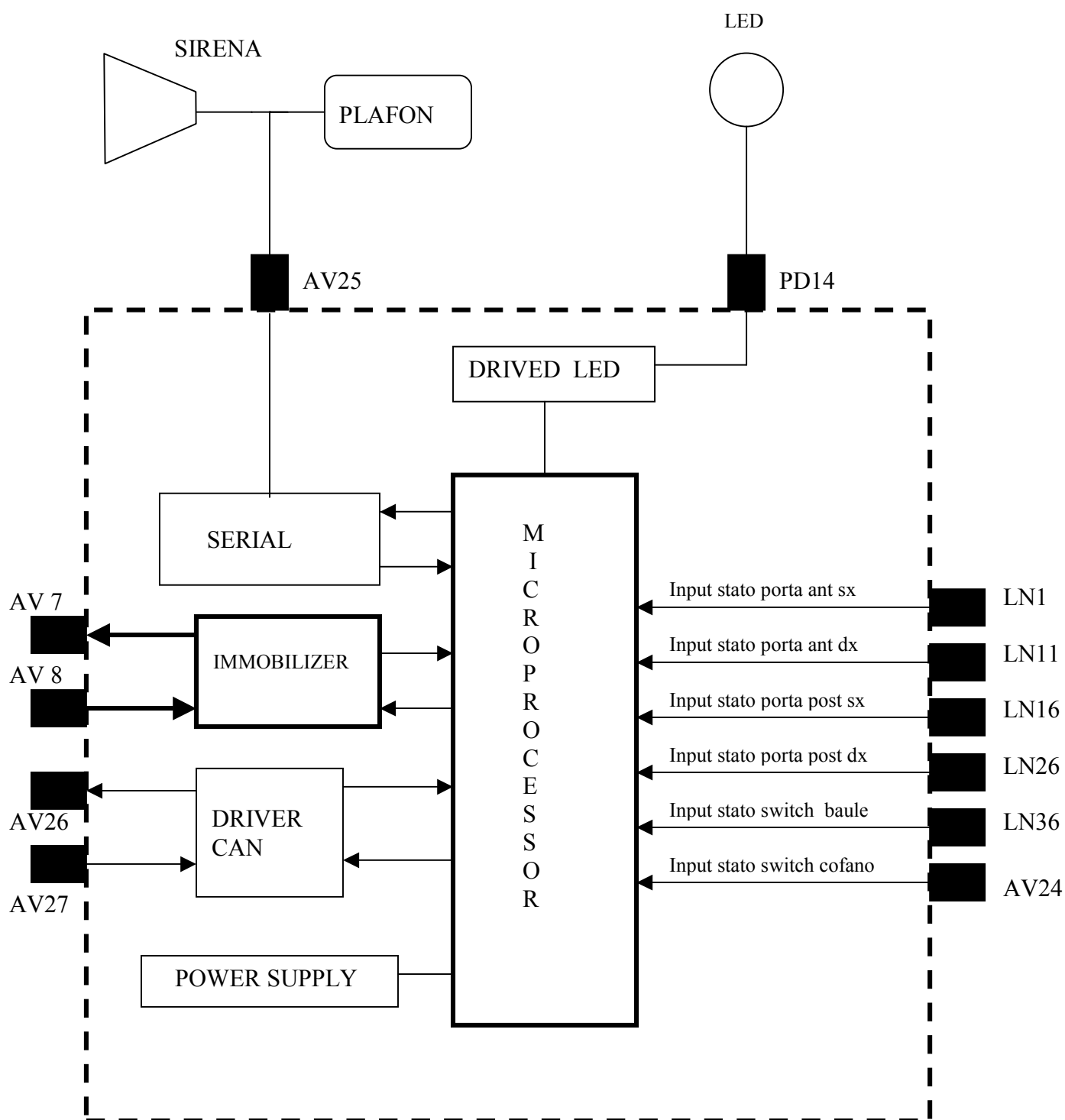
2.6. DISCONNECTION

2.7. GENERAL SPECIFICATIONS

1

GENERAL DESCRIPTION

1.1 BLOCK DIAGRAMM



1.2 PIN DESCRIPTION

Pin Idendification	Pin name	Function
AV 25 LN 7	Ser_siren	Serial line to central unit siren
LN 1	In_pa-mig	Left front door input
LN 11	In_pa-mip	Right front door input
LN 16	In_pa-psx	Left rear door input
LN 26	In_pa-pdx	Right rear door input
LN 36	In_baule	Boot switch-state input
AV 24	In_cofano	Bonnet switch-state input
PD 14	Led	Output alarm led
AV 26 AV 27	CAN A CAN B	Line CAN slow speed
AV 7 AV 8	Antenna Immobilizer	Immobilizer antenna signal Hi/Low

1.3

GENERALITY

The aim of the device is to prevent intrusions and thefts to the vehicle. To do this, the device monitor and drive the following signals:

DIRECT INPUT:

- negative signal from the switch front door driving side opened (NA)
- negative signal from the front door passenger side opened (NA)
- negative signal from the switch rear left door opened (NA)
- negative signal from the switch rear right door opened (NA)
- negative signal from the switch, boot opened (NA)
- negative signal from the switch bonnet opened (N C)
- state of the +15 signal
- serial line with external US and anti-lifting .

DIRECT OUTPUT:

- Serial line with external siren
- Serial line with external US and anti-lifting module
- command of direction indicator right front
- command of direction indicator left front
- command of direction indicator right rear
- command of direction indicator left rear
- command of direction indicator right side
- command of direction indicator left side
- command of the internal curtsey light
- command of the LED (deterrence light) A-bus serial line
- command of central door locking

The main componets of the device are:

NBC AI 012 (Body computer) (variant of the project based on NBC 194.2X wiring diagrams)

Stand-alone siren

Ultrasonic sensors

Anti-lifting sensor

Radio control: Ferrari by customer project and Maserati by MMSE code TRF 841

Transponder of vehicles : Key SOKYMAT 942020

Immobiliser : MMSE project IMM 100.01

BRIEF DESCRIPTION

The alarm system is able to monitor the perimetric inputs, volumetric and inclination sensors, wires disconnection and the state of the ignition key.

If the alarm system detects an intrusion's attempt, it emits an optical alarm (blinking with direction indicators) and an acoustic alarm (with siren).

The activation of the alarm system is indicated by the direction indicators ("on" for about 2,5s). The system commands to lock the doors and the boot compartment.

During the insertion procedure it is possible to exclude the volumetric and the anti-lifting protection for the following surveillance. It is automatically re-activated during the next activation of the alarm system.

Surveillance state is indicated by the LED in the passenger compartment. The LED indicates all so possible intrusions occurred during the surveillance, indicating the sensor which has detected the intrusion. Furthermore it indicates the transmitters battery state.

The disconnection of the alarm system is indicated by a double flash of direction indicators. The system commands to unlock of the doors and boot compartment.

In emergency cases the alarm system can be deactivated by inserting the key recognised by the immobilizer.

ALARM FUNCTION

The alarm systems can work in the following states

deactivated state sleep state
insertion state surveillance state alarm state disconnection state

Please find enclosed a description for each state.

DEACTIVATED

The deactivated state is the state of the NBC in case of recognition of a qualified key by the immobiliser. This operation realises the disconnection of the alarm.

During the deactivated state the alarm system doesn't recognise receiver commands

You can pass from the deactivated state to the sleep state turning the ignition-key in KEY-OFF.

SLEEP

The sleep state is the basic state of the alarm system. You can pass from this state to the following ones:

Surveillance:

Deactivated

when, by an insertion order (passing through the insertion state), you want to protect the vehicle.
when the immobilizer recognises a qualified key.

During the sleep state the NBC controls continuously the +15 state, in order to avoid undesirables passing to the surveillance state and, especially, to the alarm state.

2.2.1. Volumetric Exclusion

During the sleep state is possible to exclude the volumetric protection.
The exclusion is possible if during the 60s successively at the key off of the vehicle, the dedicated switch placed on the front ceiling light must be pressed.

2.2.2. Anti-Lifting Exclusion

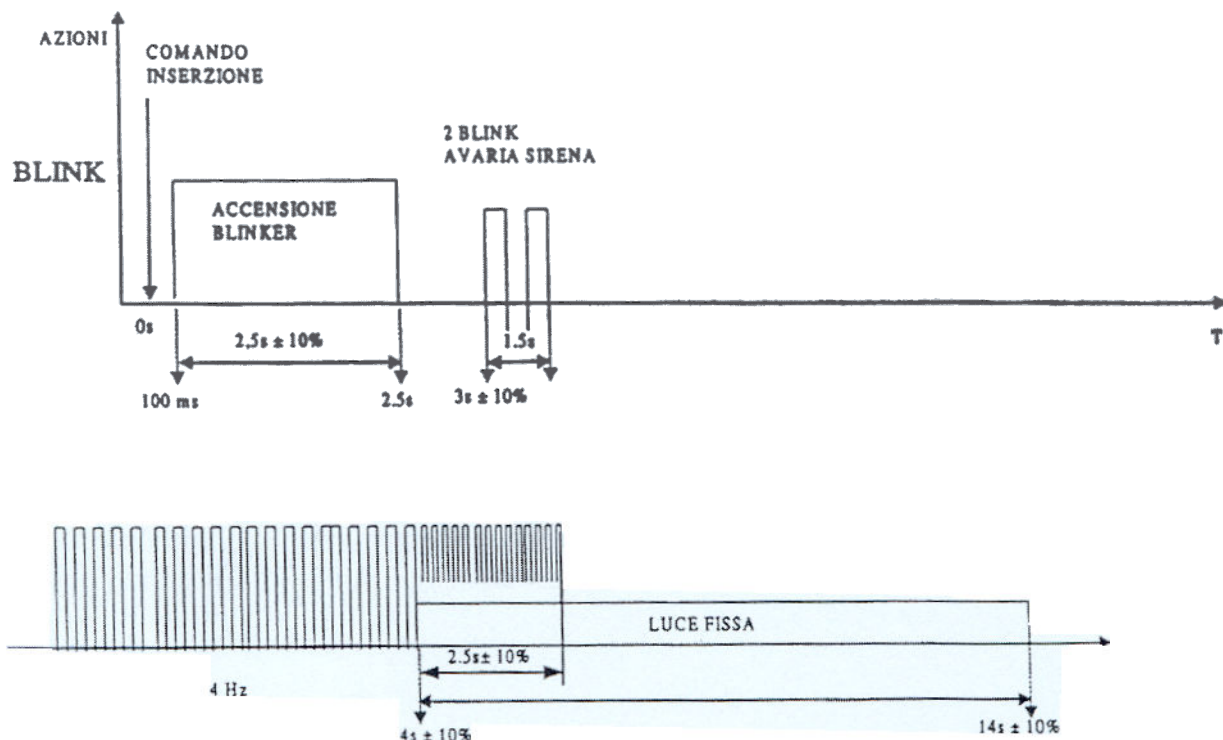
During the sleep state is possible to exclude the anti-lifting protection.
The exclusion is possible if during the 60s successively at the key off of the vehicle, the dedicated switch placed on the front ceiling light must be pressed.

INSERTION

The operation of insertion permits to pass from the sleep state to the surveillance state. This operation is always inhibited in presence of +15 signal.
Insertion order is activated by the radio control and indicated through the direction indicators ("on" for 2.5s).

The insertion procedure described as follow, starts if NBC has received insertion order:

- 1) insertion signalling is indicated by a fixed switch-on of direction indicators for 2.5s, and by the 4 kHz flashing of the LED
- 2) the system verifies the plausibility state of the door/boot/bonnet switches
- 3) the system verifies the sensor state:
 - if after 35 the serial line doesn't work, the system signals the malfunction by two blinks.
 - direction indicators (0.5 s ON, 0.5 s OFF) - signalling so the sirens malfunction
 - modules are considered damaged)
 - if after 45 no acknowledge signal has been received from the external modules (US or anti-lifting), the correspondent sensor is considered unable to work.
- 4) verify the state of the control door locking .
- 5) signalling of plausibility state by a 8Hz flashing for 2.5 s of the LED, if one or more doors or boot / bonnet are open or the volumetric sensors doesn't work; alternatively the LED is switched on for 10s if siren or anti-lifting sensor doesn't work.
- 6) after inserting, the LED will flash at 0.8Hz .



2.3.1 Auto-Insertion

During the auto-insertion the alarm system pass automatically (delayed by timer) tram sleep state to surveillance state.

The system activates the auto insertion, named PASSIVE, in automatic 28 s after the last activation of doors/boot bonnet contact, if activation (of these contacts) occurs within 2 min after tuning oft the ignition key.

2.3.2. Reinsertion

The reinsertion function permits to the alarm system to pass automatically (delayed by timer) sleep state to surveillance state after receiving the disconnection signal tram the remote control.

The reinsertion is activated, after disconnecting with a correct code received tram radio control, it no doors/boot/bonnet has been activated during 28s.

2.4 SURVEILLANCE

2.4.1. Control of +15 Signal

The NBC acquires the information about the presence of +15 signal: if it detects the presence of +15 for more than 100 ms (permanency of the state and not a debauching) without previous disconnection order the NBC reads this operation as an attempt theft and orders the passage to alarm state.

2.4.2. Exclusion of the External Modules far Vehicle Battery Low Tension

If the low tension of the battery continues far more than 30 minutes and it is less than 8,5V:t5%, the NBC disconnects the external modules (volumetric sensors, anti-inclination, input outside modules) to preserve the battery's life and the possibility to start up again the engine.

2.4.3. Perimetric Surveillance

The N8C monitors the state of the input signals from the doors/bonnet and boot: if one of these changes the state for more than 100ms (the permanency of the state is not debauching) the N8C passes to alarm state.

2.4.4. Boot's Unlocking by the remote control

The unlocking order of the boot using the remote control is possible during the following states'

deactivated sleep surveillance alarm

During the insertion and disconnection states any order from the unlocking boot key is ignored. It during the surveillance state the system receives the order of boot unlocking, it excludes the external modules (volumetric and anti-inclination) and signals it with the direction indicators. If the boot compartment switch doesn't change its state (from lock boot to open boot) within one second after receiving the opening order from the remote control, the system will connect again the volumetric and anti-inclination sensors so as boot entry protections.

Otherwise if the boot has been opened correctly. after closing the boot's the system connects again the boot's entry protection and the external sensors (volumetric/anti-inclination) and carries out the signalling with the blinkers.

ALARM

If one of the sensors used for the surveillance detects an irregular situation, the alarm system passes to alarm state.

The alarm state is characterised by optical acoustic signals generated by the activation of the siren and of all direction indicators. During the alarm the acoustic signal so as the optical one is activated for 26s.

DISCONNECTION

The disconnection operation can be carried out during the surveillance and the alarm states

Radio Control generates the disconnection of the alarm system.

The disconnection is signalled with a 1 Hz double flash of direction indicators

During the first key-on after the disconnection, the following information's (if occurred) are signalled by the LED for 120s:

transmitter flat battery

sensor, which has caused the activation of the alarm (volumetric, anti-inclination, perimetric, +15, wires disconnection alarms).

LED status check (cause of activation) :

- | | | |
|---|---------------|--|
| - | fixed light's | battery flat T x (cover the other signals) |
| - | 1 impulses | door(s) |
| - | 2 impulses | boot |
| - | 3 impulses | bonnet |
| - | 4 impulses | ultrasonic module |

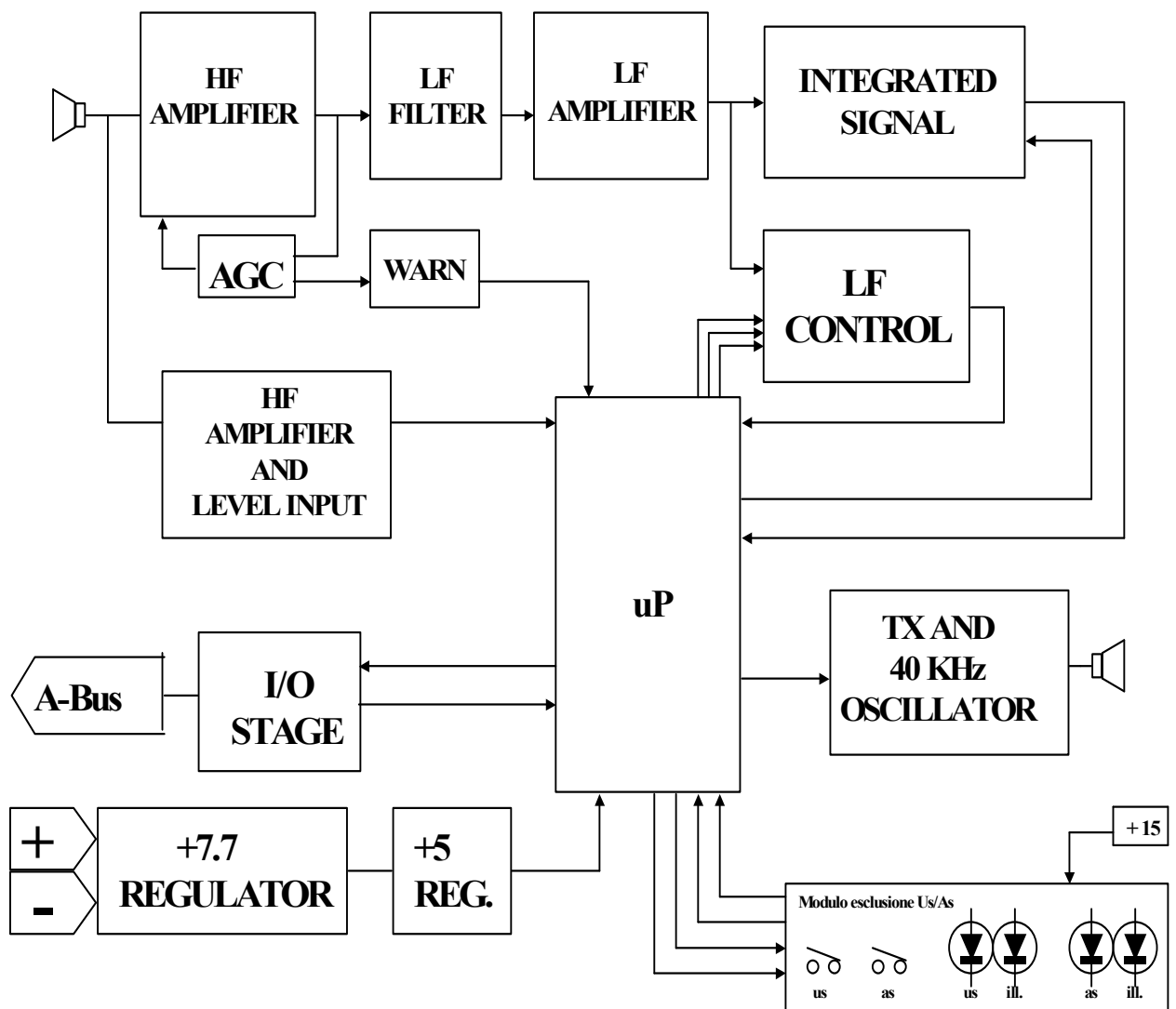
- 5 impulses anti-inclination
- 6 impulses +15
- 7 impulses +30/ground (wires disconnection)
- 8 impulses serial line
- 9 impulses more then three alarm causes

The impulses goes on with the 0,5s at, 0,5s OFF cycle followed by a 1,5s pause time. If there were two different alarm causes they will be cyclical visible.

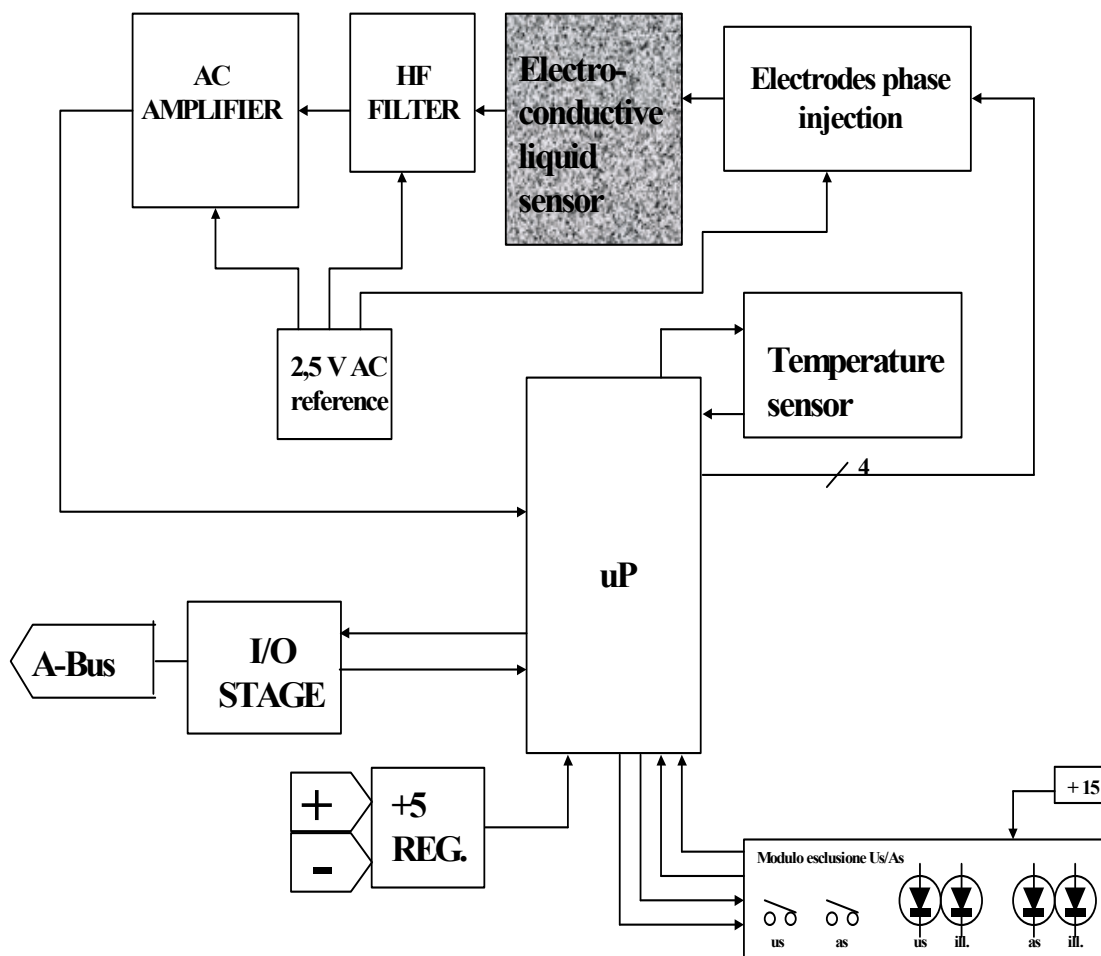
2.7 General Specifications

Nominal rated operating voltage:	+12V
Maximum operating temperature:	+85°C
Minimum operating temperature :	-40°C
Current consumption :	< 20mA
No. of alarm cycles far each activation period :	max 10
No. of alarm cycles far each sensor during one activation period:	max 10
Duration of acoustic alarm :	26 s
Duration of optical alarm :	26 s
Panic Facility :	not available
Plausibility control:	correct function of all sensors so as correct state (far instance doors closed)
Status display:	led in the passenger compartment
Courtesy facility:	activation of compartments light in case of deactivation

ULTRASONIC SENSOR - BLOCK DIAGRAM



ANTILIFTING SENSOR - BLOCK DIAGRAM



IMMOBILIZER

1. Part list of the main components

<i>Commercial name</i>	<i>Manufacturer</i>	<i>Notes</i>
L4949ED013TR	ST	Power supply
TY93051ADR2	MOTOROLA	Serial interface
HC908AT60	MOTOROLA	Microprocessor with internal memory
PCF7991AT	PHILIPS	Transponder interface

Characteristics of the Microprocessor :

Power supply	5 Vdc
Clock frequency	2 MHz
Program memory	60 kbytes
RAM	512 bytes
E2PROM	512 bytes

The reference of the Wiring Diagram for the Immobilizer system is identify with : IMM1X0 variant 02 issued on date 13/10/97, integrated by the Customer prototype board IMM100 PTP3 for customisation B Rev. 0 of 16/01/98

2. Electrical specification

Interface type	0 – 12 Vdc
Transmission / Receiver mode	Asynchronous Bidirectional Single wire
Standard	NRZ
Operating voltage (+15K1)	6 – 16 Vdc
Cabling unit length	Max 4 meters
Format of the string	10 bit (1 bit of Start + 8 bit stream data + 1 bit of Stop)
Baud rate	4800 baud ($\pm 2\%$)
Modulation type	Manchester
Carrier frequency of inductive transponder	125 kHz

3. Technical Description

1. Main Performance

The Immobilizer has to read out the data code from a Transponder, located inside the key, and checks whether that key is authorized to start the engine of the vehicle.

In case of an authorized key, a start-enable code is sent to the requested Engine Management System (EMS) via CAN-line. Else, the starting of the engine is disabled by sending a negative answer to the request of the EMS.

2. System Components

2.1 Transponder inside key

The Transponder is composed of a receiver/transmitter coil and an electronic circuit, featuring rectifier, voltage regulator, sequencer and memory. The Transponder is power-supplied by means of the 125kHz electro-magnetic field. The Crypt-(security)-Transponder is based on a bidirectional communication (amplitude modulation and demodulation).

2.2 Transmitter/Receiver coil (Antenna) at the ignition lock

The Antenna supplies the transponder with energy, sends commands and data to the Transponder and receives codes from the transponder.

2.3 Immobilizer Unit of the Bodycomputer

The Immobilizer unit of the Bodycomputer is directly connected to the Immobilizer Antenna and stores the authorised key codes in a nonvolatile memory. The Bodycomputer is permanently supplied with battery voltage (KL30). The Immobilizer function operates with ignition (KL15) on.

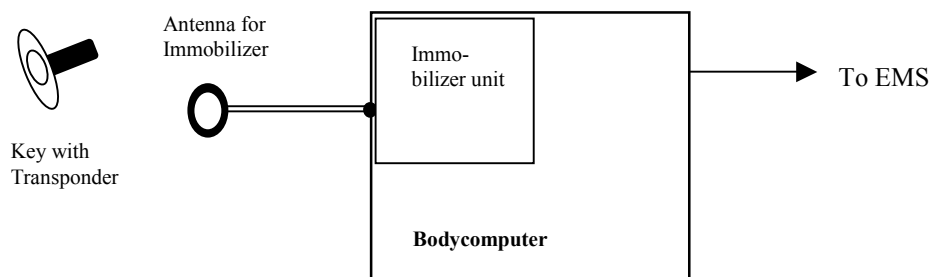
3. Normal Starting Sequence

1. Initialize the immobilizer function of the Bodycomputer with key on (ignition, KL15 on)
2. The 125kHz electromagnetic field is switched on
3. The Immobilizer read out the fixcode of the Transponder
4. If the fixcode is recognized a bidirectional authentication protocol is proceeded (max. 300ms)
5. The received authentication code is verified (the received codes are verified)
6. If the verification procedure is passed , wait for request from EMS

4. Pinning of the Body Computer immobilizer unit

AV-4	signal from coil
AV-5	reference coil
KK-4, KK-5	GND
KK-6	CAN (H)
KK-14	CAN (L)
CY-9	switched power supply (KL15)
CY-17, CY-18	battery voltage

Block diagram for the Body Computer with immobilizer unit



Antenna identification

