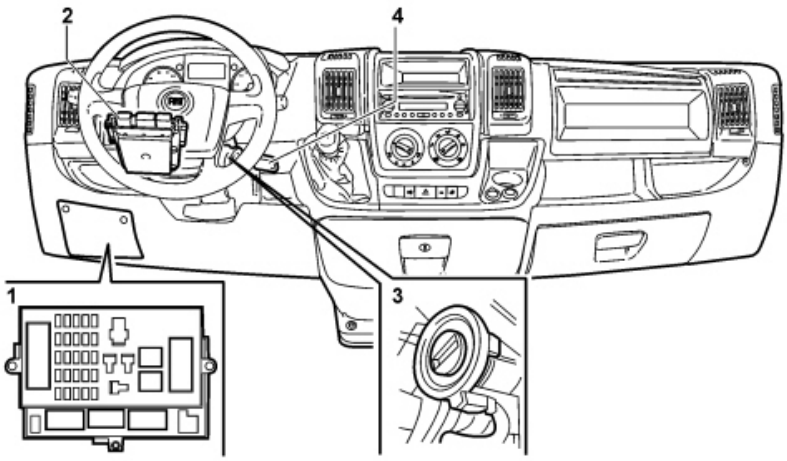
NUOVO DUCATO X250 2.2 JTD ANTI-THEFT DEVICE 5580E

back to CODE - DESCRIPTION

CODE SYSTEM

The anti-theft device comprises the CODE system that immobilizes the engine.
VIEW OF ASSEMBLY



1 - Body Computer (NBC)
2 - Engine management control unit (NCM)
3 - Aerial
4 - Key

SPECIFICATIONS

The vehicles are equipped with an electronic system known as the FIAT CODE II to produce the engine immobilizer function.
The FIAT CODE makes it possible (via the Body Computer) to start the engine using the engine management control unit (hereafter known as the NCM) only after a secret code memorized previously is received.

COMPOSITION

The FIAT CODE system comprises 5 basic components (in addition to the Body Computer which acts as a control unit):

- CAN line for dialogue with the NBC and the NCM;
- Body Computer control unit (NBC);
- electronic keys contained in a transponder with a secret code;
- an aerial that reads the code contained in the key transponders;
- engine management node (NCM).

OPERATION

INTRODUCTION

The FIAT CODE allows the start of the engine management by the NCM by means of a coded dialogue between the NBC and NCM during the stage that precedes starting.
After the key is turned to the ON position, the NCM sends a code request to the NBC which only responds after having recognized (via the aerial) a known electronic key in the ignition switch. If the secret code in the answer is valid, the NCM continues with the regular engine management activities, allowing the engine to be started up.
The NCM can only memorize the secret code through a special procedure.

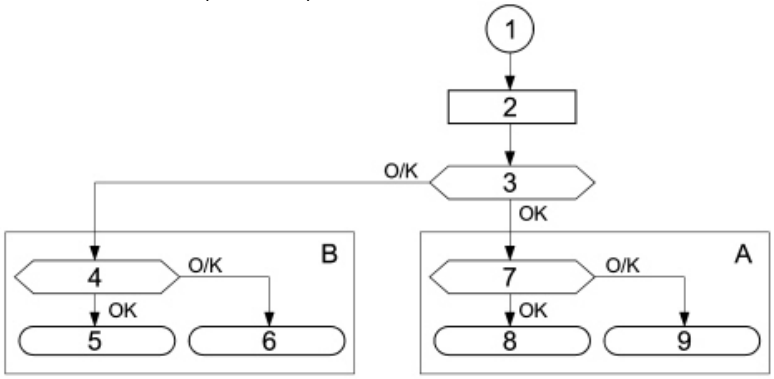
INTERACTION OF THE FIAT CODE WITH THE KEY

Each key contains a transponder with a SECRET CODE.
As soon as the key is turned ON, the transponder converses with the NBC which, having recognized it as one of the enabled ones, continues with the NCM recognition strategy.
If the identification code is not recognized, the procedure is aborted and the engine cannot be started.
The SECRET CODE is recognized by means of a challenge-response algorithm with an encrypted code exchange.
The code recognition time is less than 160 ms per attempt.
The FIAT CODE attempts the transponder acquisition for up to 1.3 seconds.

DIALOGUE BETWEEN THE ENGINE MANAGEMENT NODE AND THE FIAT CODE DIALOGUE BETWEEN THE ENGINE MANAGEMENT NODE AND THE FIAT CODE

The dialogue between the FIAT CODE (NBC) and the NCM contol units takes place via the CAN.
Every exchange of information between the FIAT CODE and the NCM is guided by the NCM (the NBC never interrogates the NCM but only

responds after a request).
After KEY-ON, the flow of code exchange operations between the NBC and the NCM depends on the status (blank or memorised) of the NCM.
If the NCM is pristine, the procedure involves sending the SECRET CODE request to the NBC: in this way the NCM learns the secret code and stores it in its memory.
This procedure is known as CODE RECORDING.
If the NCM has already been programmed, the procedure involves checking that the codes stored in the engine management control unit memory and the one memorized in the NBC correspond: This procedure is known as CODE VERIFY.



1 - Key-ON
2 - NCM initialisation
3 - NCM status memorized OK, pristine OK
A CODE VERIFY
7 is the code valid?
8 the operation of the engine is allowed
9 the operation of the engine is not allowed
B CODE RECORDING
4 is the recording completed correctly?
5 the operation of the engine is allowed
6 the operation of the engine is not allowed

CODE RECORDING

The CODE RECORDING procedure is the memorizing of the fix code in the engine control unit.
Only after the NBC has memorized the identification codes and the secret codes, is the NBC ready to satisfy the request to transmit a code to a pristine NCM.
After a key on, the engine management unit initialises its software and requests the secret codes if it is blank.
If the NBC is not pristine, it responds by sending the secret codes, but only after having recognized an authorized key. If the key is not authorized (unrecognized) or there is no key, the NBC does not respond.
If the NBC is pristine and there is no transponder in the key and a request is sent for secret codes from the NCM, the NBC does not respond.

CODE VERIFY

This is the standard procedure that is repeated during the life of the vehicle each time the user insesrts the key in the ignition and turns it ON. this procedure enables the starting of the engine if the key inserted is enabled.
If it is not completed, the Code Verify procedure continues even when the user turns the key to the starting position.
After the key is in the ON position, the NBC recognizes whether the transponder in the key is one of those that is enabled.
At the same time, with the ignition in the ON or starting position, the NCM initializes its software to check whether the secret codes have been memorized. If the answer is yes, it sends a request to the NBC.
In response to this request, it only sends the secret encrypted codes to the engine management control unit if the transponder is recognized as enabled.
If the result of the transponder recognition is negative (incorrect transponder, no transponder in the key, etc.), the NBC will sent a negative authorization response to the engine management control unit.
If the NBC is pristine and the NCM sends a request for secret codes, the NBC, after having recognized the presence of a recognized transponder, responds by sending a positive authorization reply.

PROTECTION CODES

The protection codes used by the NBC and NCM are listed below.
UNIVERSAL CODE: this is the code that an unprogrammed NBC sends to the NCM when it detects the presence of a transponder in the key.
The vehicle protection warning light comes on at a frequency of 1.6 Hz and duty cycle of 50%.
The warning light flashes to indicate that the system is properly connected but the vehicle is not protected by a code.
SECRET CODES: These are the codes in the transponder. They are is stored in the transponders contained in the keys when the transponders are programmed and in the NBC when the keys are programmed at the end of line.
ELECTRONIC CODE (PIN): This is printed on the CODE CARD, which is given to the vehicle owner. It takes the form of a 5-figure decimal code (0 is not permitted).
It is used to access the NBC memory in protected mode in order to reprogram or program new remote control keys and/or perform specific diagnostic functions.
IDENTIFIER: This is resident in the transponder and different for each transponder.
It is stored in the NBC during the programming procedure. The NBC manages a table of enabled identifiers and another table of disabled identifiers.

DESCRIPTION OF THE COMPONENTS

BODY COMPUTER

The main functions of the NBC are:

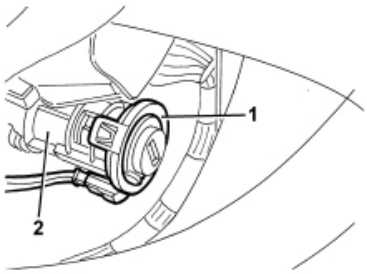
- recognizing the introduction and rotation of a key in the ignition (ON);
- conversing with the key transponder by means of the immobilizer aerial;
- to store up to 8 identification codes;

- memorizing the secret code;
- managing a list of 4 permanently disabled identifiers;
- managing the CAN line towards the engine management control unit;
- managing the activation of the warning light on the panel via communication with the instrument panel;
- carrying out the autodiagnosis for the CODE system functions.

Supply of Fiat Code as spares
If the FIAT CODE function has to be replaced, the entire Body Computer must be replaced.
To replace the Body Computer, request it from the Parts Dept. providing the vehicle chassis no.

AERIAL

Composition
The aerial assembly comprises an toroid type aerial with a connector built into the aerial body.
The wiring connected to the NBC is incorporated in the front cable loom
Operation
The aerial is supplied by the NBC to energize the key transponder.
Since the aerial needs to be as close as possible to the transponder (on account of electro-magnetic immunity, the limited range of the transponder and small dimensions) it is fastened axially to the ignition switch.



1 - CODE aerial
2 - Ignition switch

IGNITION KEY

Operation
The mechanical key contains a cipher transponder in the grip.
The moment the key is inserted in the ignition and turned to the ON position, the transponder is energized by the aerial and responds by emitting the rolling, encrypted secret code.
If the code is recognized as valid, the NBC sends the engine control unit, on request, a coded signal allowing the engine to be started.
Up to 8 keys can be programmed in the NBC.

The keys are supplied already memorised by the production plant. All the codes are also stored in a database managed by Parts. When the new vehicle is delivered to the customer, the service network does not need to carry out any memorisation procedure. If the keys are mislaid or additional keys are required, make the request to the Parts Dept.

Transponder in the key
The transponder in the key has the following stored in its memory:

- SECRET CODE;
- IDENTIFICATER which is different for each transponder produced;
- PROGRAMMING DATA for the secret code.

The identification code differs from transponder to transponder to guarantee that no two transponders have the same identification code even if there is a request for a duplicate in the Network.
Reprogramming keys
Reprogramming the keys involves storing the keys enabled upon vehicle start-up in the NBC.
Both the new keys to be programmed and those already programmed are inserted into the ignition to be recognized by the NBC: this memorizes the keys presented during the procedure in the enabled identification codes tables and transfers those no longer presented to the disabled identification codes table.
Disabled keys table
If an enabled key is no longer available (mislaid, stolen or no longer working), the subsequent key programming procedure (in which the key is no longer re-presented) disables its operation.
The NBC manages a table in the EEPROM that can contain data on 16 disabled keys: the identifiers of enabled keys not presented during the reprogramming procedure are transferred to this table.
If the disabled keys table is full, any new key will replace the first entered in the table.
This table also allows the traceability of keys used on the vehicle.
Key reprogramming procedure
The key reprogramming procedure is performed/guided by the EXAMINER Diagnostic Equipment: this procedure is activated by means of access protected by the vehicle PIN. Continue following the instructions for the diagnostic equipment.

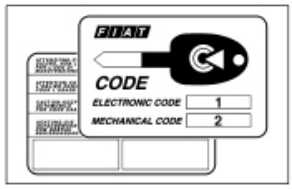
It is possible to program up to 8 enabled keys.

Deleting a lost key from the memory
At any time it is possible to delete a lost key from the memory using the EXAMINER Diagnostic Equpment. The identifier of this key is transferred to the disabled identifier table and will no longer be recognised.

CODE CARD

Composition
This card shows:

- The emergency code (electronic code) that allows the vehicle to be started using the EXAMINER. It is also designed to programme the keys and remote controls using the EXAMINER.
- The key mechanical code identifies the mechanical profile of the key and must be specified on the order to receive the key already cut.



1 - Electronic code
2 - Mechanical code

OPERATION

The electronic emergency code is also used for system diagnosis and for other operations using Examiner. Many of these operations (e.g. key programming) can be carried out only once this code has been entered.
Before any operation, it is therefore necessary to ask the Customer for their Code Card.

The Code Card must not be left in the vehicle in case it is stolen.

"VEHICLE PROTECTION" WARNING LIGHT

SPECIFICATIONS

The vehicle protection warning light is located in the instrument panel and is controlled by a message from the NBC on the B-CAN.
Vehicle protection warning light flashing mode
The NBC controls the switching on of the vehicle protection warning light in the panel, via the CAN, flashing to signal programming errors for the Body Computer or the NCM.
In this case the diagnostic equipment must be connected and the instructions followed.

FAULT DIAGNOSIS

The NBC allows self-diagnosis to be carried out for system components.
The NBC is capable of identifying and memorizing the presence of the following malfunctions in its EEPROM:
Transponder:

- defective or missing transponder or secret code incorrect;
- deleted/disabled;
- unknown/not memorized.

Transponder aerial:

- electrical connection defective (circuit open, short circuit to earth or to battery).

ALARM SYSTEM

SPECIFICATIONS

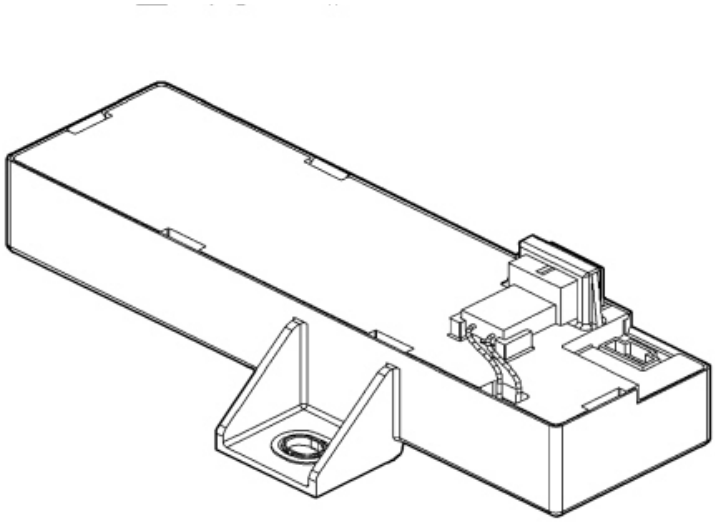
The alarm system includes the basic anti-theft and anti-break in functions (Fiat Code system, Dead Lock) and perimeter and anti-tilt protection.
The system consists of:

- Anti-lift control unit (CAV);
- Antit-heft siren control unit (CSA).

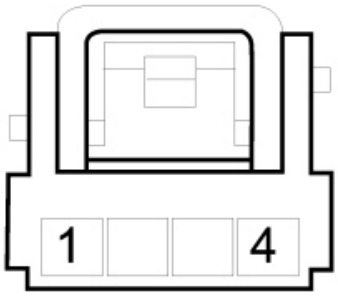
In addition, the system receives the status of the ignition switch and all accesses to the vehicle (cab doors, load compartment, engine compartment) from the Body Computer Node.

ANTI-LIFT CONTROL UNIT

The anti-lift control unit is an electronic component, connected to the A-bus serial line, including the anti-tilt sensors.
It is located near the passenger side running board.

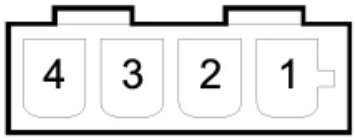


PIN OUT
Connector A



PIN	DESCRIPTION
1	Power supply +30
2	Earth
3	INT
4	A-Bus serial line

Connector B

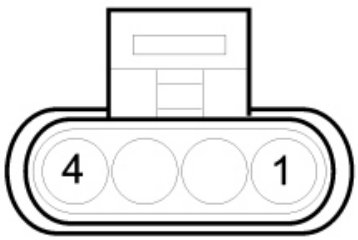


PIN	DESCRIPTION
1	Not connected
2	Anti-lift exclusion button
3	Anti-lift exclusion LED
4	Not connected

If the battery voltage remains below 8.5 V ± 5% for more than 30 minutes, the Body Computer Node NBC switches the control unit off in order not to run the battery down.
The anti-lift control unit recieves the function deactivation request directly through the button in the left control panel.
If there is a request with the alarm on, this is interpreted as a theft attempt.

ANTI-THEFT SIREN CONTROL UNIT

The CSA is an electronic component connected to the Body Computer Node NBC via the A-Bus serial line
This control unit is designed to manage the acoustic alarm operation.
It is located on the right front side member.
PIN OUT



PIN	DESCRIPTION
1	Power supply +30
2	A-Bus serial line
3	Earth
4	Not connected

ALARM SYSTEM OPERATION

The system works by detecting the following conditions:

- vehicle door opening status. This information is received by the Body Computer Node via direct connections with the switches in the door locks;
- bonnet opening status. This information is received from the Body Computer Node via the connection with the bonnet opening switch;
- igntion switch status;
- battery status;
- vehicle angle status.

The alarm intervenes in the following cases:

- wrongful opening of a door or the bonnet (perimeter protection);
- activation of the starting device (key ON) with the alarm on;
- cutting of the battery leads;
- irregular lifting/tilting of the vehicle.

The intervention of the alarm causes the activation of the siren and the direction indicators (for about 26 seconds).

The intevention mode and the number of alarm cycles may vary depending on the market.

There is a maximum number of acoustic/visual cycles, after which the system resumes its normal control function.

The engine immobilizer function is permanently ensured by the Fiat CODE which is automatically activated when the key is extracted from the ignition.

Switching the alarm on

To switch the alarm on, with the doors and lids closed and the ignition OFF (or the key extracted), point the key with the remote control in the direction of the vehicle, then press the "locking" button and release it.
The system will give out a "beep" and activate the door locking.

In some markets the versions do not produce this acoustic signal.

The switching on of the alarm is preceded by an autodiagnostic stage: if a fault is detected, the system produces another acoustic signal.
In this case, switch the alarm off by pressing the unlocking button and check that the doors and the bonnet are properly shut. Then try and turn the alarm back on by pressing the "locking" button again.

Doors that are not properly shut are automatically excluded from the system control.

If the alarm produces an acoustic signal even with the doors, bonnet and boot lid correctly shut, this means that a fault has been detected in the system operation.

The alarm does not come on when the central locking is activated using the metal insert in the key.

Switching the alarm off

when the "door unlocking / load compartment unlocking" button in the key with the remote control is pressed, the following actions takes place:

- the direction indicators flash briefly twice;
- there are two short acoustic signals (beeps);
- unlocking of the doors.

The alarm does not switch off when the central opening is activated using the metal insert in the key.

Specific versions in some markets have different signalling modes.

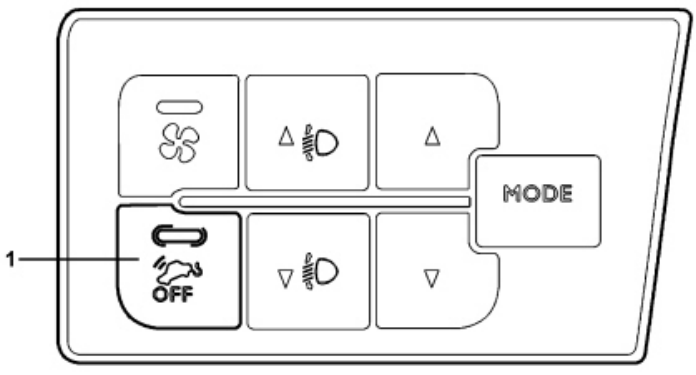
If the batteries in the remote control key are run down or if the system is faulty, the key must be inserted in the ignition and turned to the ON position to switch the alarm off.

ANTI-LIFT PROTECTION

The anti-lift protection comprises a sensor capable of detecting any variation in the vehicle angle to signal any possible lifting, even partial (e.g. removing a wheel).
The sensor detects even minimal variations in the vehicle geometry angle, both along the longitudinal axis and the transverse one.
Variations in geometry with speeds below 0.5°/min. are not taken into consideration (such as, for example, a slow puncture).

Protection deactivation

To deactivate the protection (for example, when towing a vehicle with the alarm on), press the button (1) shown in the diagram located in the left control panel.
The protection remains activated until the next time the door central opening is activated.



1 - Anti-tilt alarm function deactivation button

Switching the alarm off

To completely exclude the alarm, simply shut the vehicle by turning the metal insert in the key with the remote control in the lock.

Break in attempts signalling modes

Any break in attempt is signalled by the dedicated "Vehicle protection system - FIAT CODE failure" warning light in the instrument panel coming on together with a message in the display (where present).
If the alarm system has been activated, the warning light remains on for about 10 seconds, constantly, once the ignition has been turned ON.
If it has come on due to the activation of the alarm, when this time has elapsed, the warning light goes out.
If it remains on this indicates a vehicle protection system malfunction.

SYSTEM CONDITION CONTINUOUS CHECK

The Anti-theft Siren Control Unit checks that the system has not been damaged by a theft attempt whilst the alarm is activated.

Cable cutting detection

When the CSA detects that the cables connected to it have been cut, it sends a message to the NBC, at the same time setting itself in active alarm mode.

Heart Beat function

The Body Computer Node NBC constantly checks the condition of the communication with the CSA, sending a signal every 500ms via the A-BUS line and waiting for the response. This information travels encrypted with an algorithm capable of making the recognition of the sequences transmitted impossible.