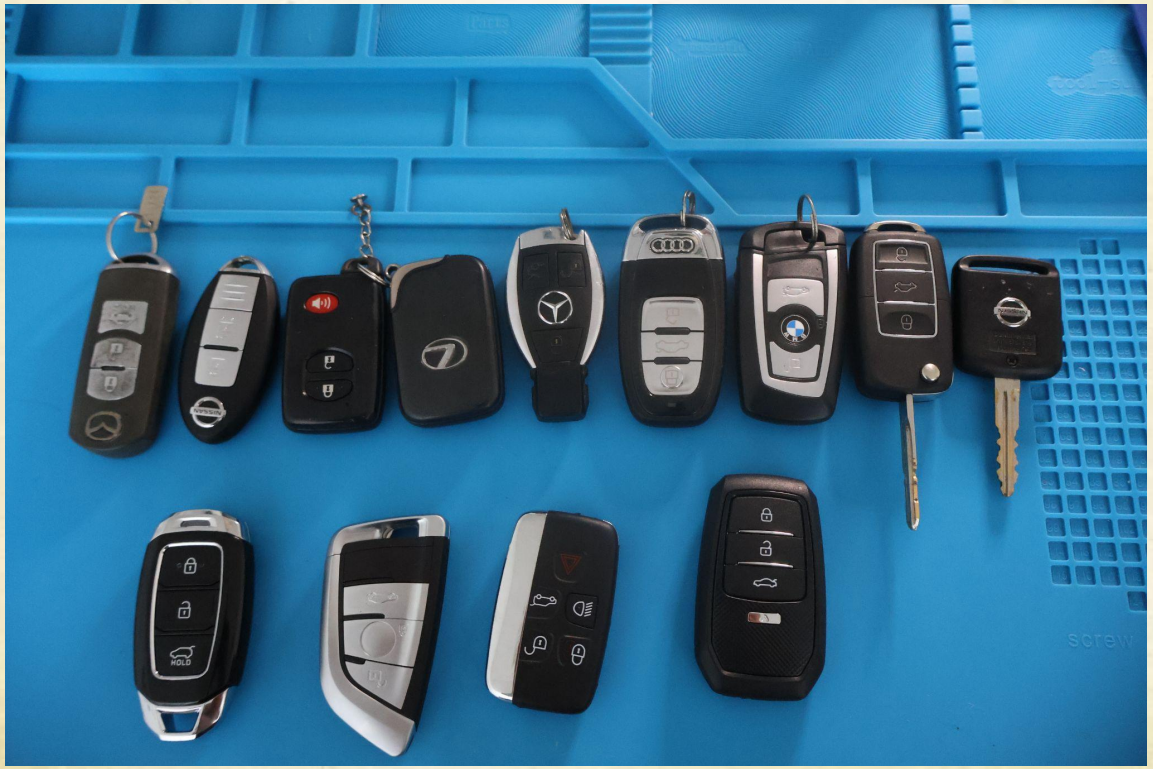
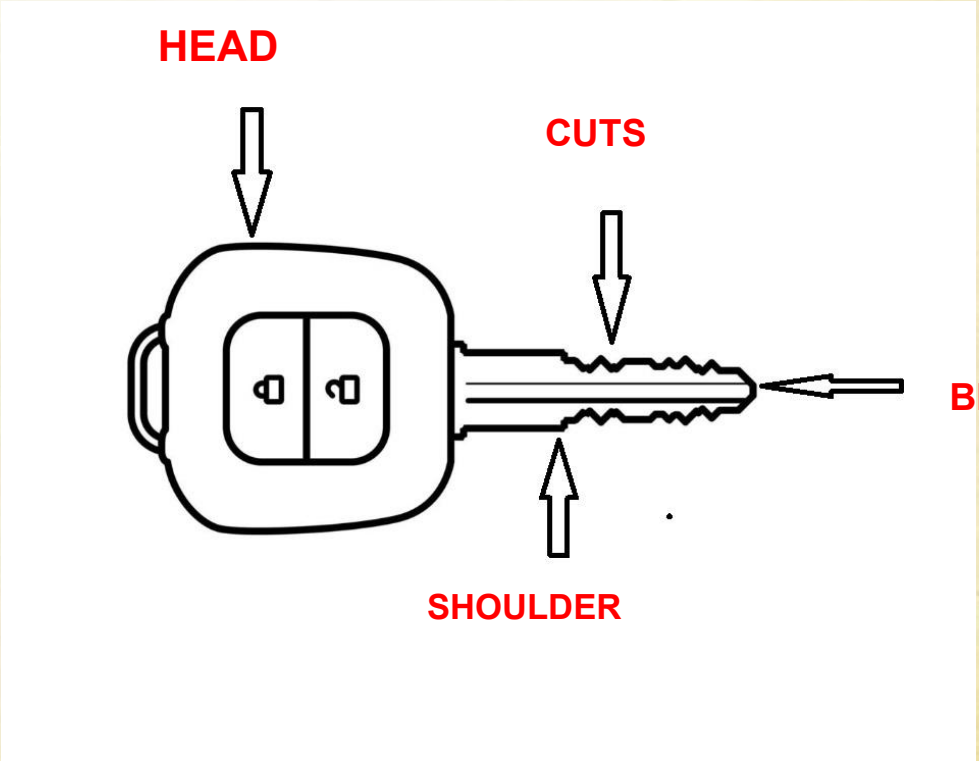
INTRODUCTION TO KEYS & LOCKS MECHANISM



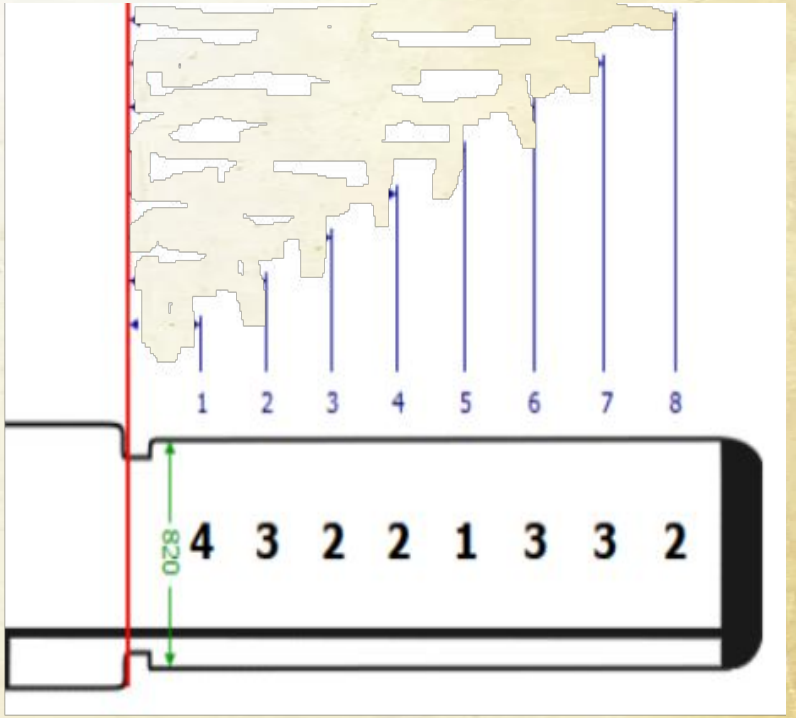
IMMOBILIZER SYSTEM COMPONENTS

Kindly note that:
The following information doesn't need to be memorized or mastered. It's just meant to provide a general understanding of car immobilizer systems and help you start building a basic familiarity with them. There's no need to stress about it.

THE KEY



KEY CUTTING/BITTING CONCEPT / CUTS, SPACING AND POSITION



ONE SIDE CUT CLASSIC MECHANICAL KEY

TIBBE KEY

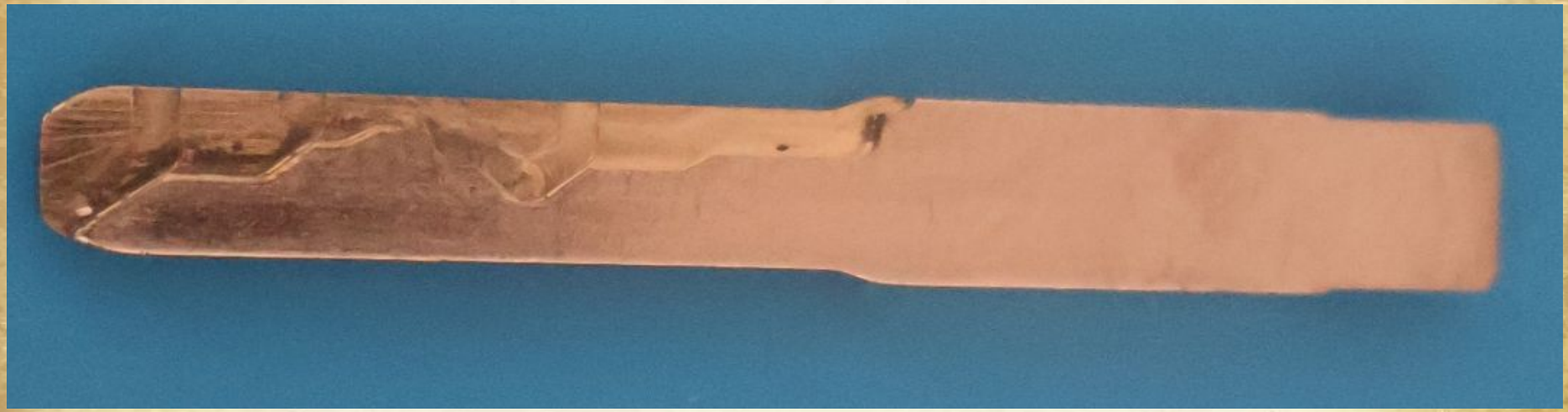
DOUBLE SIDE CUT TRANSPORTER MECHANICAL KEY

FOLDABLE KEY / REMOTE AND KEY COMBINATION

LASER KEYS

DOUBLE TRACK INTERNAL LASER CUT KEY

DOUBLE TRACK EXTERNAL LASER CUT KEY



MR. AUTO LOCKSMITH

FOUR TRACK INTERNAL LASER CUT KEY

FOUR TRACK EXTERNAL LASER CUT KEY

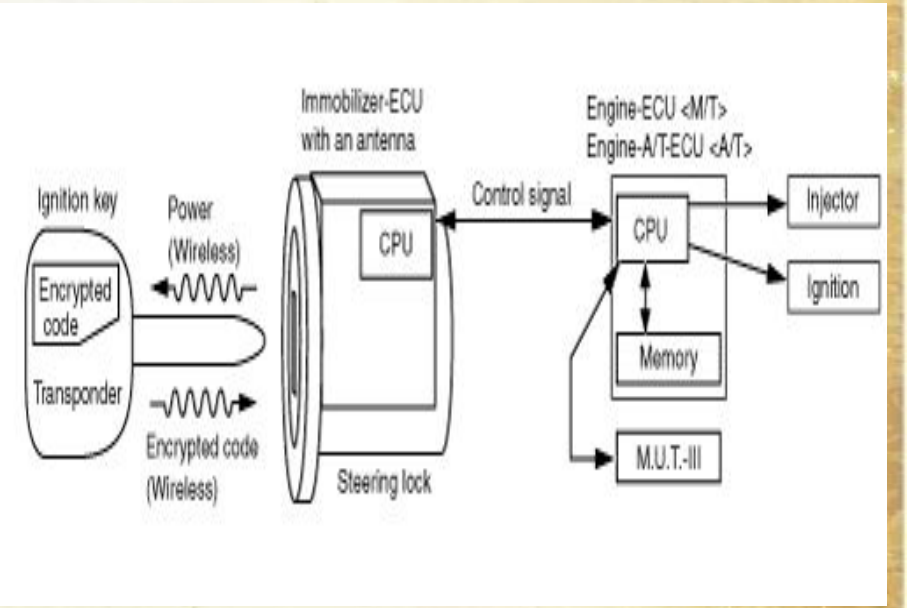
HU101/FORD,ROVER, VOLVO

HU66/VAG

HU162

IMMOBILIZER SYSTEM COMPONENTS

Since vehicle immobiliser systems were first introduced in the mid-1990s, they have undergone significant improvements. Most systems still rely on RFID transponders, though newer models from some manufacturers use proximity or smart keys. Over time, these transponders have advanced from basic hardcoded chips to more secure, fully encrypted ones. Modern vehicles typically feature a CAN-BUS wiring system and a standard 16-pin OBD socket, which allows for easy connection of programming and diagnostic tools like the Autel 608. This setup facilitates key programming and removal. However, it's important to note that some vehicles require the EEPROM method for programming, as they cannot be programmed through the OBD socket.



IMMOBILIZER SYSTEM COMPONENTS

A. The Transponder Chip

A transponder is a small computer chip with a tightly wound wire that enables it to send and receive electromagnetic signals. Known as "non-volatile memory," these chips retain their data without needing a power source, making them suitable for car keys. Operating at around 125 kHz, transceivers can transmit signals through materials like plastic and rubber, which allows them to function even when embedded in a key fob.

IMMOBILIZER SYSTEM COMPONENTS

B. The Transceiver

This component generates a high-frequency magnetic field that powers the transceiver chip in the key. The chip sends out a modulated RF signal, which is decoded by the transceiver and then forwarded to the control unit for verification. While the control unit handles the generation and decoding of RF signals, it relies on the ignition coil or antenna to transmit and receive these signals.

IMMOBILIZER SYSTEM COMPONENTS

C. The Ignition Coil

This antenna, located around the ignition cylinder, emits a high-frequency magnetic field when the key is inserted. The transceiver chip in the key receives this field and sends back its own signal. The antenna captures this response and sends it to the transceiver for decoding.

control unit

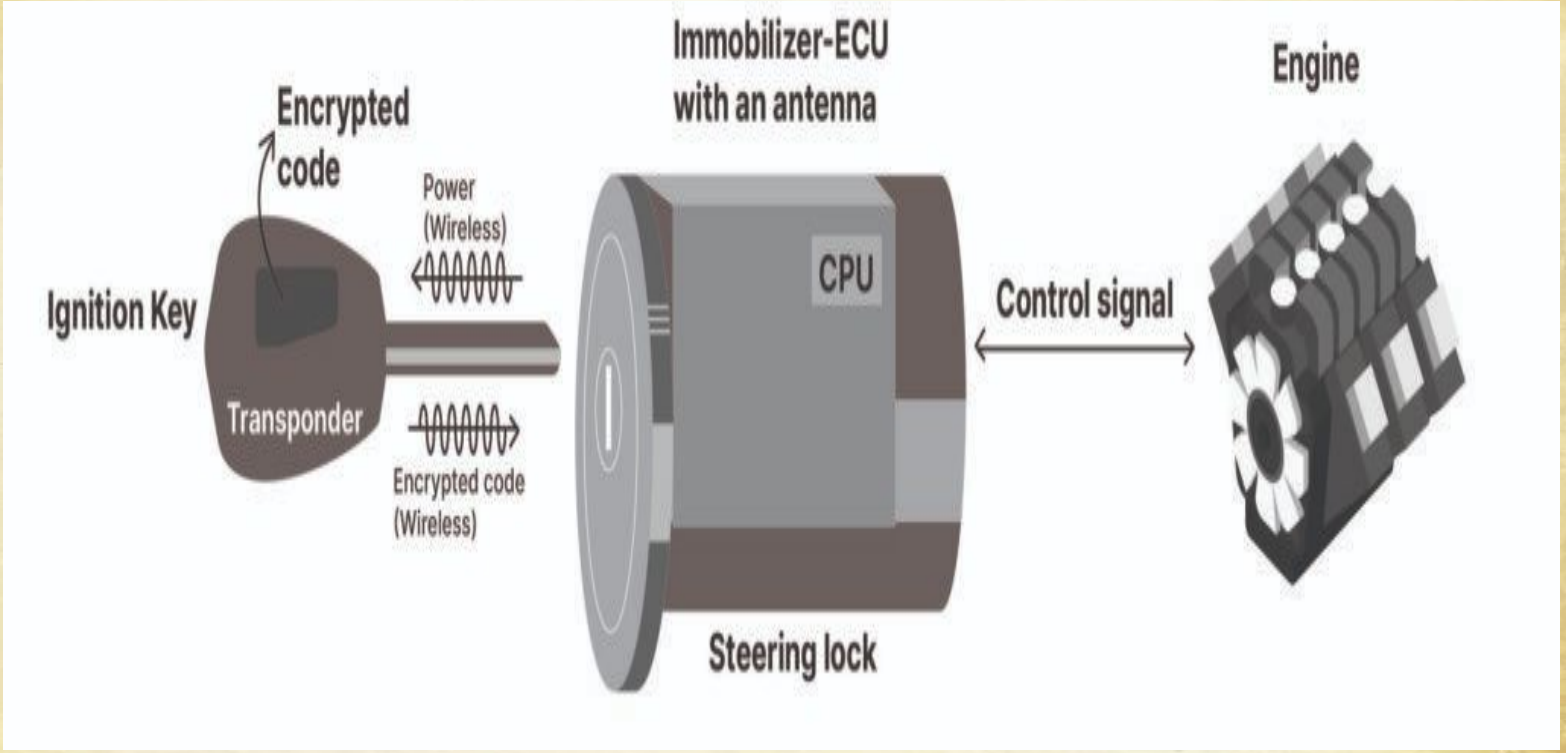
The control unit is the "brain" of the ignition system, holding all the key verification data. It may be a separate unit, like the BMW example shown, or integrated into another component that manages internal electronics. The control unit processes the high-frequency signal from the ignition coil and compares the key's response signal with its stored data to verify the key's validity. Next, I'll explain the entire ignition process to show how these components work together to authenticate the key.

HOW IMMO SYSTEM WORKS

How these components work together :

1. Insert the key into the ignition.
2. This action prompts the transceiver to send a signal to the transponder chip in the key through the ignition coil/antenna, based on data from the control unit.
3. The transponder chip receives the signal from the ignition coil and responds with its own signal that includes a password.
4. The ignition coil receives this response signal and forwards it to the transceiver, which then demodulates (translates) it into usable data.
5. This data is sent to the control unit, which verifies that the password matches the one stored in the system.
6. Once the control unit confirms the password is correct, it activates the starter motor and fuel injection system, allowing the vehicle to start.
7. For vehicles with a rolling code system, the transceiver will send a new password to the transponder chip for future use. This step is not necessary for vehicles with a fixed code system.

IMMOBILIZER SYSTEM



IMMOBILIZER SYSTEM

SUMMERY

TWO WAYS TRAFFIC FLOW, SEND, VERIFY, RECEIVE AND START ENGINE

Fixed Code V.s Rolling Code Transponder Chips:

The transponder is required to match the code generated by the vehicle's computer. Previously, fixed code transponders were used, which made them vulnerable to replication. Currently, a rolling code mechanism is implemented to ensure that a unique code is used each time the key is turned in the ignition. This means that the static transponder will use the same password every time you start the car, making it susceptible to theft, and making it easier for both the thief and locksmith to clone it and operate the car accordingly. The rolling code can be likened to a one-time password (OTP) received on your phone for online purchases, which further enhances the security of the vehicle.

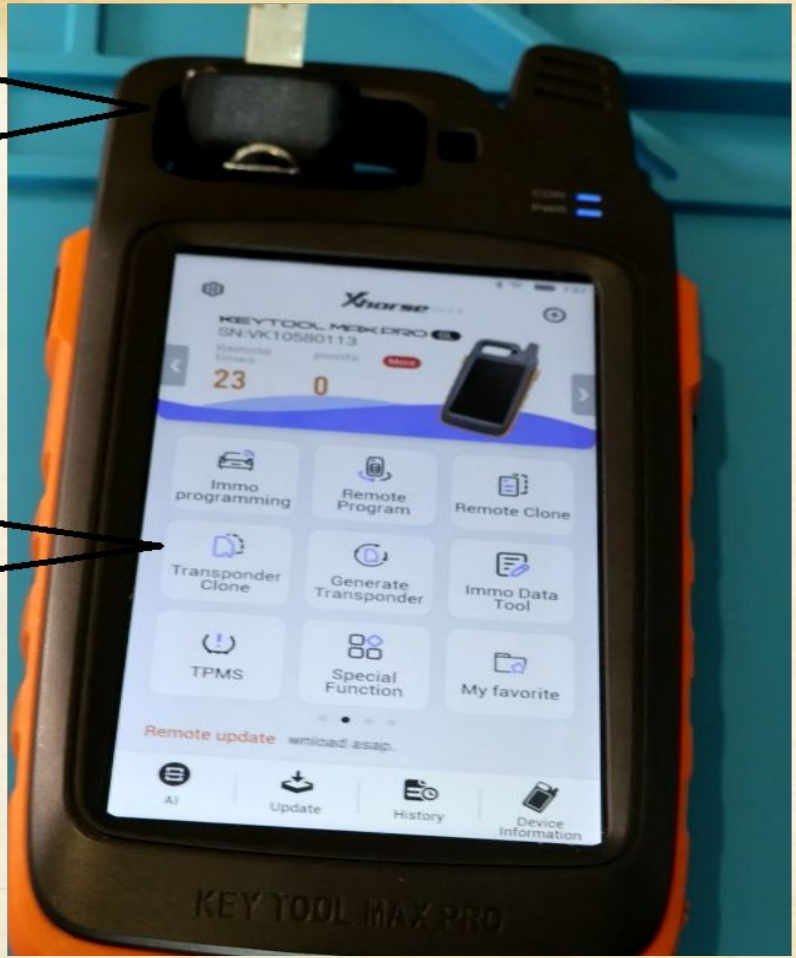
Noteworthy is that This type of non-fixed code could be programmed by your key programmer via OBD, devices like Autel 608 can do this job.

Ok! How do I know if that key contains a fixed or non-fixed code chip:

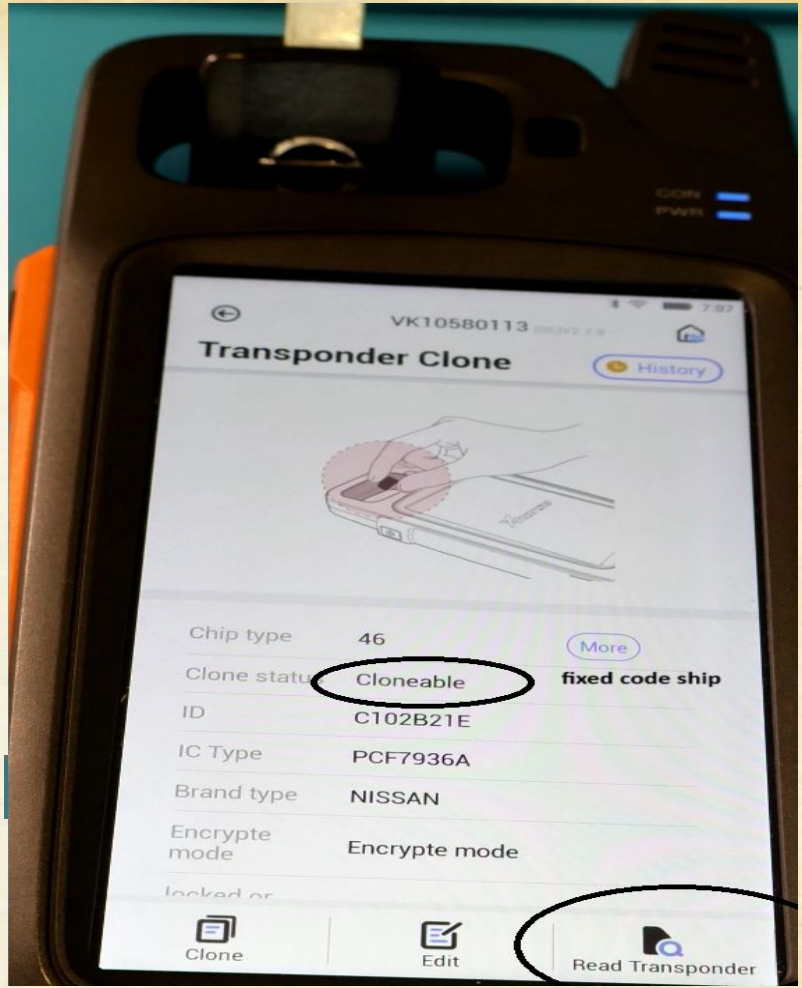
As simple as that, just use compatible tools such as KM100 or Xhorse key tool max pro can tell you the details of the chip and if it's clonable or unclonable, I've simplified it in the below pictures example using the Nissan key to be cleared out for you to get more familiar with the process. After some time during this course, you will learn about the vehicles that need programming via OBD.

place key here

press transponder clone



" Note: both chips could be programmed by your key programmer such as
Autel 608 or Zedfull or even Xhorse VVDI**, So no worries.**



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