Re-coding oe Remote Central Locking

by R. J. Bines
Mem.No. 629

Overview

The remote control central locking system employed by Renault up to ’91 (Separate fob, or “Plip”, not incorporated into the key) is controlled by an encrypted 24bit security code. The heart of the control is a TEA5500 Phase Lock Loop IC which has the ability to transmit & receive a complex code by infrared. The IC can operate an encoder (transmitter) or decoder (receiver) depending on the external circuitry connected to its data inputs.

The code is specified by the connections to 10 input pins, labeled E1 to E10, by either connecting them to the positive supply (HIGH), the negative supply (LOW), or by leaving them floating ((NO CON) no connection) This allows 1 x 3e10 –2 combinations. The 2 prohibited combinations being E1 to E10=HIGH & E1 to E9=HIGH, E10=LOW

Encoding (Transmitter)

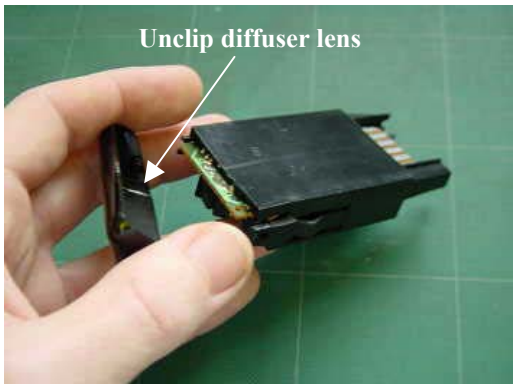
In encoding mode the data input is connected to the supply voltage & both outputs S1 & S2 are connected to an output transistor that drives an Infrared light emitting diode. After every start, or button push, the encoder will transmit the encrypted code 3 times then stop.

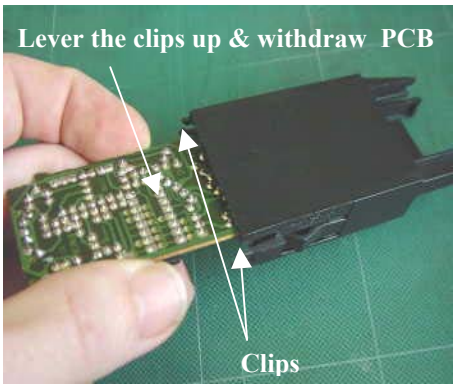
Decoding (Receiver)

In decoding mode, infrared sensitive diodes are connected to the data input, via an amplifier. If the data is recognized, the data input is temporarily closed (disregarding any following data) & one of the outputs is activated for a predetermined time, after which the following start will activated the other output, i.e. open & close. If the data is not recognized, neither if the outputs will be activated & the data input will be closed for a predetermined time, & hence will not allow even the correct data to be received, until the reset time is achieved.

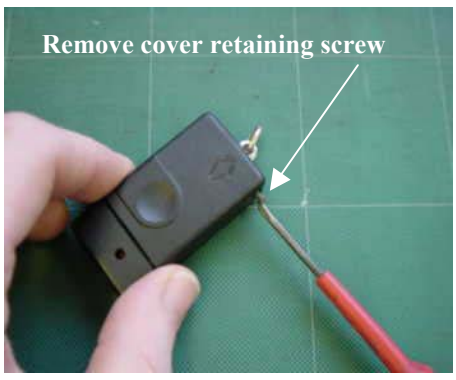
Method

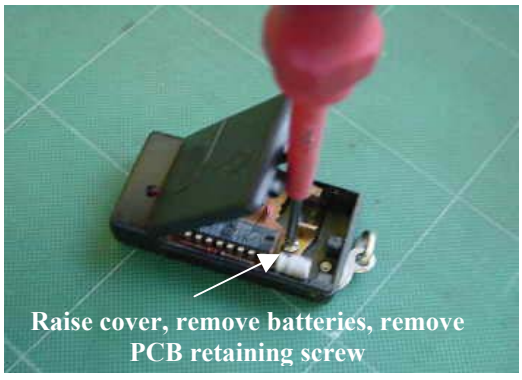
1. Remove the receiver unit from the overhead consul.

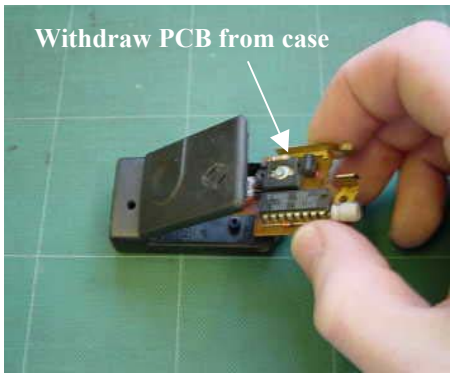




2. Dismantle the Plip.

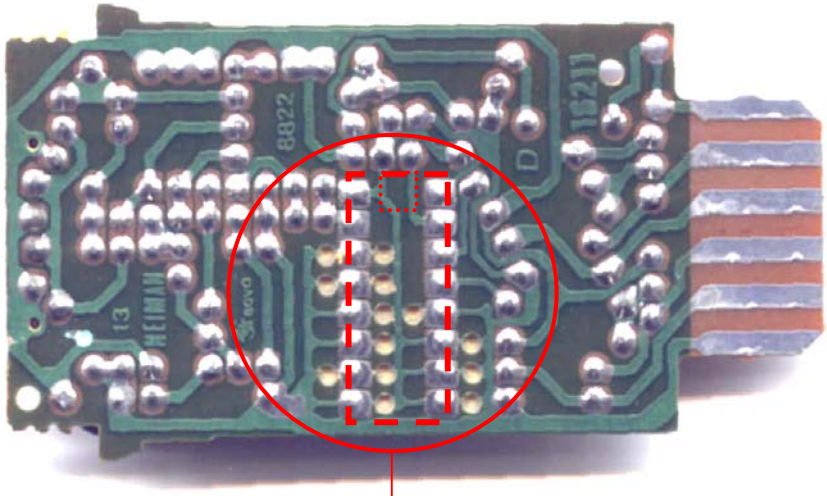


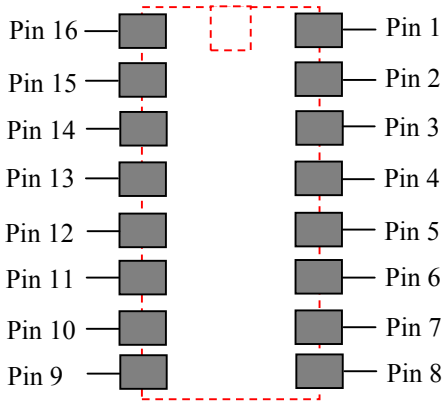




3. ***Orientate the receiver as in Fig.1 & observe the IC pin-outs. Fig.2 shows a diagrammatic example of a coded receiver.***

Fig.1

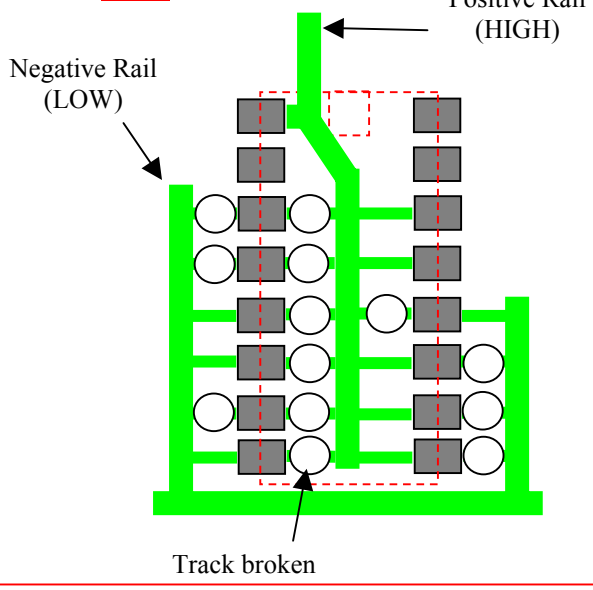




TEA5500 Phase Lock Loop IC Pinout
Viewed from trackside

Pin 01	-ve Supply
Pin 02	Oscillator
Pin 03	Output 2
Pin 04	Output 1
Pin 05	**E10 coding i/p**
Pin 06	**E09 coding i/p**
Pin 07	**E08 coding i/p**
Pin 08	**E07 coding i/p**
Pin 09	**E06 coding i/p**
Pin 10	**E05 coding i/p**
Pin 11	**E04 coding i/p**
Pin 12	**E03 coding i/p**
Pin 13	**E02 coding i/p**
Pin 14	**E01 coding i/p**
Pin 15	Data i/p
Pin 16	+ve Supply

Fig.2



Receiver Decoding	*I/p status*	*Details*
P14, E01	NOCON	Both +ve & -ve tracks broken
P13, E02	NOCON	Both +ve & -ve tracks broken
P12, E03	LOW	+ve track broken
P11, E04	LOW	+ve track broken
P10, E05	NOCON	Both +ve & -ve tracks broken
P09, E06	LOW	+ve track broken
P08, E07	HIGH	-ve track broken
P07, E08	HIGH	-ve track broken
P06, E09	HIGH	-ve track broken
P05, E10	LOW	+ve track broken

4 ***In order to obtain the encoding / transmitting code for the plip, the receiver code must be transposed by reversing the order of the input pins, then interchanging the LOW & NOCON status of the pins, HIGH remains the same. See Fig.3.***

Fig.3

Decoding	E01	E02	E03	E04	E05	E06	E07	E08	E09	E10	HIGH	LOW	NOCON
	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕
Encoding	E10	E09	E08	E07	E06	E05	E04	E03	E02	E01	HIGH	NOCON	LOW

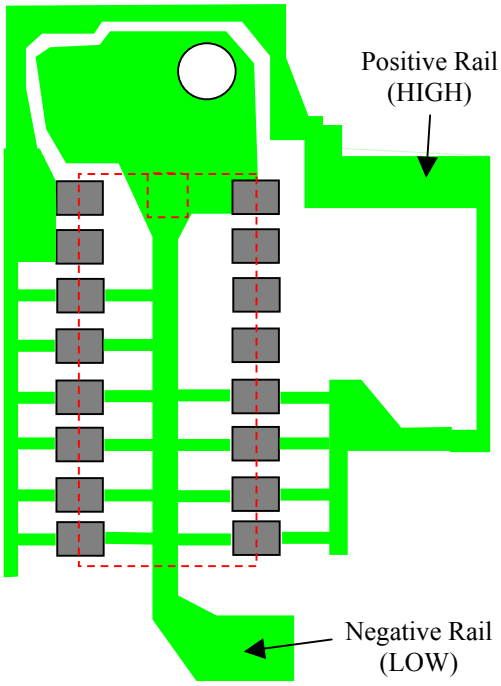
5 ***Using the above transposition, the encoding (plip) details for the example would be as follows, see Fig. 4.***

Fig.4

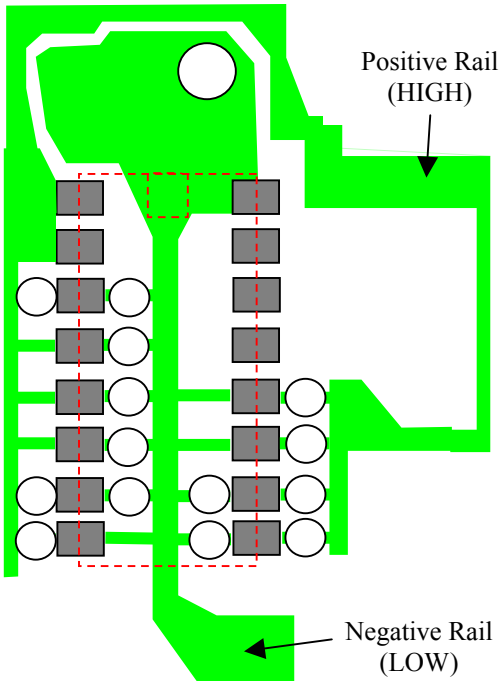
Receiver Decoding	***I/p status***	***Transposition***	***I/p status***	***Transmitter Encoding***
P14, E01	NO CON	⟺	LOW	P05, E10
P13, E02	NO CON		LOW	P06, E09
P12, E03	LOW		NOCON	P07, E08
P11, E04	LOW		NOCON	P08, E07
P10, E05	NO CON		LOW	P09, E06
P09, E06	LOW		NOCON	P10, E05
P08, E07	HIGH		HIGH	P11, E04
P07, E08	HIGH		HIGH	P12, E03
P06, E09	HIGH		HIGH	P13, E02
P05, E10	LOW		NOCON	P14, E01

Fig.5

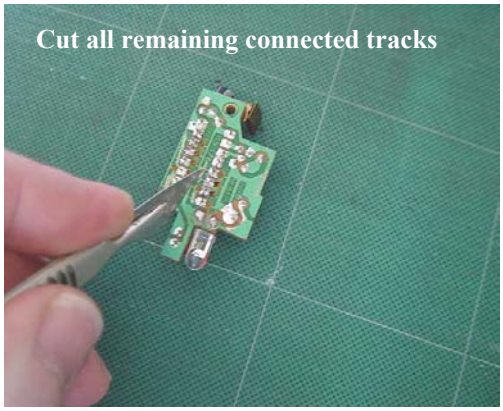
Track layout of virgin PCB before any coding (for reference)

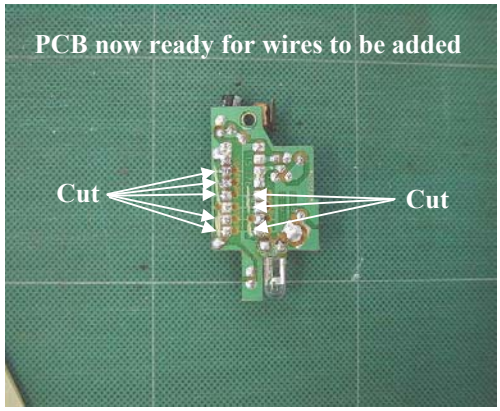


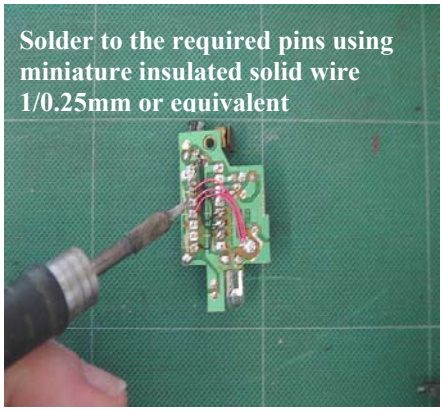
Tracks broken (drilled) to achieve required coding

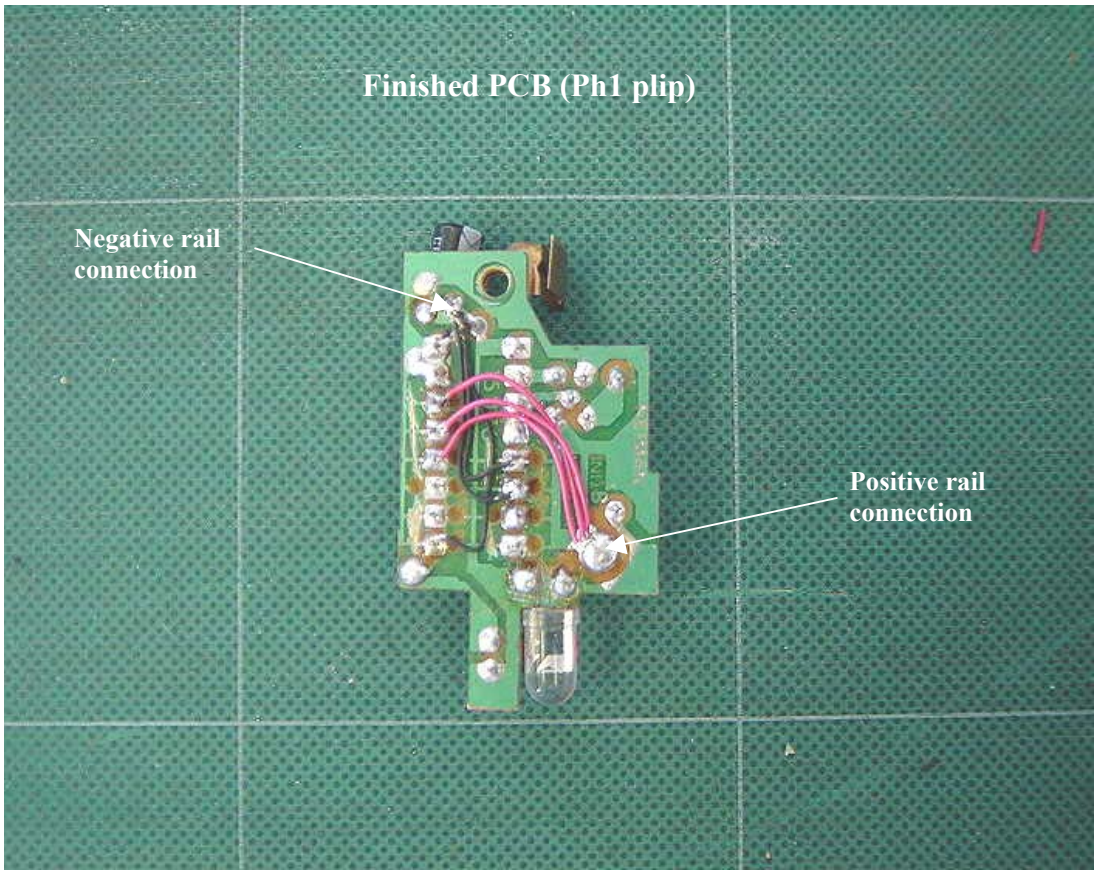


6 *The transposed code can now be applied to the plip pcb (as in Fig.5). The easiest way to do this is to cut all of the remaining code tracks that are connected with a scalpel, sharp knife or 1mm drill bit, this will eradicate the risk of a duel connection & hence a mistake. Then solder wires to the corresponding pins to achieve the required code .ie Connect Pins 11,12 & 13 to the positive rail & pins 5,6 & 9 to the negative rail.*









7 ***Reassemble the plip, then reconnect the reciever into the overhead consul & test. If the unit does not operate check all connections & ensure that you have read the reciever code , transposed & modified the plip PCB correctly.***