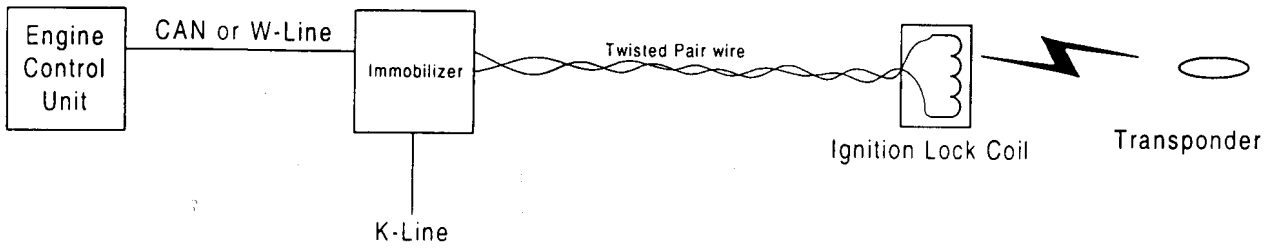
C) Immobilizer Theft Deterrent System



General Description of Operation:

The Engine control unit (ECU) requests permission to start the engine from the immobilizer in the Kombi. The immobilizer will interrogate the transponder in the key for correct information. If correct, the Kombi will reply to the engine control unit with permission to start. The ECU always initiates a release request. The immobilizer cannot respond without a release request.

Communication:

The ECU communicates to the immobilizer (kombi) using either CAN or ISO 9141 depending on the engine type.

The immobilizer transceiver communicates with the transponder at 125 kHz, and includes a QAM demodulator. The immobilizer receiver / exciter uses a coil remotely mounted at the ignition lock cylinder. The transponder is passive and is powered by rectifying the 125 kHz field from the ignition lock coil. The ignition lock coil, twisted pair wire, transponders (keys), and ECU are supplied by VW, and are not shipped as part the kombi.

Security:

Each key (transponder) manufactured contains it's own unique 32 bit ID number. The immobilizer system is 'taught' the ID number of each key(s) assigned to a vehicle. The immobilizer can learn 0 to 8 keys. VW has specified that the A4 will be setup to learn 3 keys (default).
The ECU, immobilizer, and transponder(s) in each vehicle are each given a unique 56 bit 'secret key'. This secret key (SKC) is used as part of a challenge and response system between all three components. All three components must be in possession of the same secret key or the engine release will not be granted.

The immobilizer also additionally requires that it recognizes the key ID as being valid.

The following is an example of the encryption between the ECU and the immobilizer. Functions f & g use the secret key to encrypt the communication.