5.4 Transponder

5.4.1 Memory

The memory in the transponder comprises four pages as shown in figure 5. Each page has a separate lock bit, which is either programmable by the user or set during manufacture. The data is accessed via serial shift registers during write and read functions.

5.4.1.1 Password EEPROM (Page 1)

The password EEPROM contains 8 password bits and a password lock bit. The password is used for selective programming, selective locking, selective reading and selective encryption. The password EEPROM is programmable by the user (as long as the password lock bit is not set) via the program page 1 function. The password lock bit can be set by the user, using the lock page 1 command (write address). Once set, the password lock bit cannot be reset. To activate the password feature, the user must write a password other than '11111111' into page 1. If the password in the EEPROM is not '11111111', it will be compared with the password received from the interrogator (write phase). If the password is '11111111' (default) no comparison is performed, password protection is disabled. When page 1,2 or 3 is addressed the password (page 1) is returned in a consecutive read phase together with the identification (page2), manufacturer code and serial number (page 3). The status of page 1 lock bit is returned only when page 1 is
addressed.

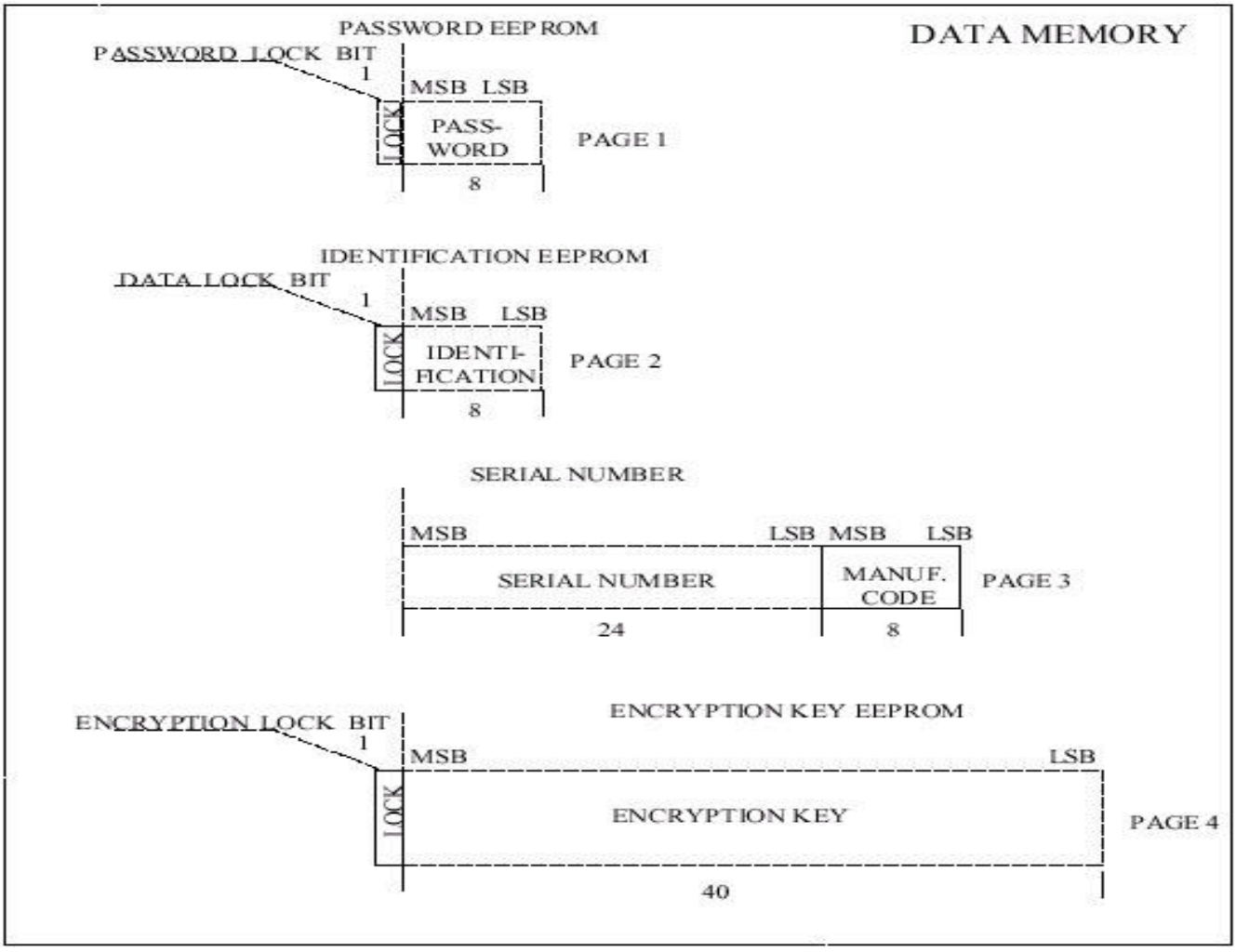

Figure 5: Memory Organization

5.4.1.2 Identification EEPROM (Page 2)

The identification EEPROM contains 8 identification bits and an identification lock bit. The identification is typically used for numbering of the keys within an application (for example: the key number per car). The identification EEPROM is programmable by the user (as long as the identification lock bit is not set) with program page 2 function. The identification lock bit can be set by the user, using the lock page 2 command (write address). Once set the identification lock bit cannot be reset. The contents of the identification EEPROM (read data) and the status (locked or unlocked) are returned during the read phase (read address), together with the password (page 1), the manufacturer code and the serial number (page 3) if page 1, 2 or 3 are addressed. The status of the lock bit is returned when page 2 is addressed.

5.4.1.3 Serial Number (Page 3)

The serial number memory portion contains an 8 bit manufacturer code and a 24-bit serial number. The manufacturer code is used for distinguishing transponders sold to a specific manufacturer, so that the transponder can only be used for applications for that manufacturer. The serial number is used for numbering the transponder within an application. The manufacturer code is programmed by TI, together with the serial number. The manufacturer code and serial number cannot be changed. The contents of the manufacturer code together with the serial number is returned when page 1, 2 or 3 are addressed, the status (locked) is returned when page 3 is addressed.

5.4.1.4 Encryption Key EEPROM (Page 4)

The encryption key EEPROM contains 40 encryption key bits and an encryption lock bit. The encryption key is used in the encryption logic to scramble the received random number (challenge) in order to generate the encrypted response (signature).
The encryption EEPROM must be programmed by the user during the initialization phase (program page 4). After it has been programmed, the encryption lock bit can then be set. The encryption lock bit can be set by the user using the lock page 4 command (write address). Once set the encryption lock bit cannot be reset. The content of the encryption EEPROM is never returned during read phase. To find out if the encryption key is correct or not, a challenge must be sent to the transponder and the response (signature) checked. The status of the encryption lock bit (locked or unlocked) is returned during the read phase (read address), if the general read page 4 (encryption mode), selective read page 4 (selective encryption mode), the program page 4 or the lock page 4 function is initiated.