

Figure 11.28 *Control field format for the different frame types*

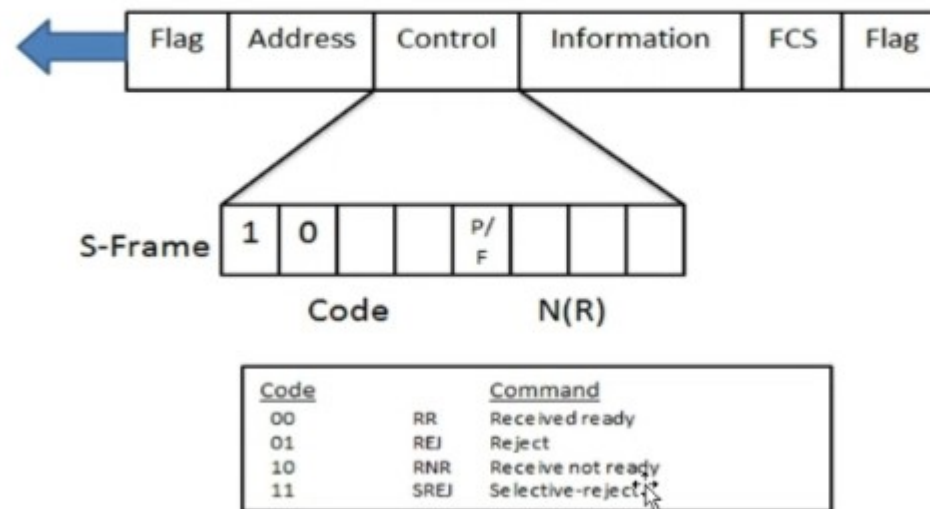
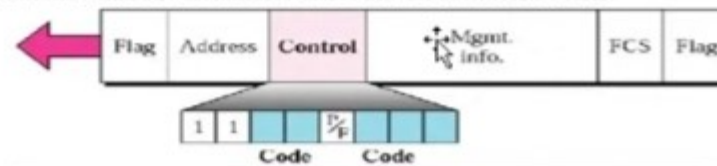


Figure 11.28 Control field format for the different frame types

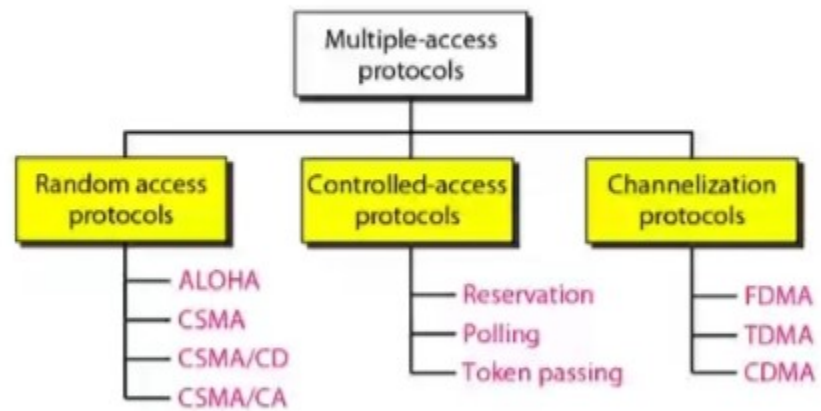
HDLC(cont'd)

- U-Frame is used to exchange session management and control information between connected devices



Code		Command	Response
00	001	SNRM	
11	011	SNRMH	
11	100	SABM	DM
11	110	SABMH	
00	000	UI	UI
00	110		UA
00	010	DISC	RD
10	000	SIM	RIM
00	100	UP	
11	001	RSET	
11	101	XID	XID
10	001		FRMR

Figure 12.2 *Taxonomy of multiple-access protocols discussed in this chapter*



Introduction

- A stepper motor, also known as step motor or stepping motor, is a brushless DC electric motor that divides a full rotation into a number of equal steps.
- A standard motor will have a step angle of 1.8 degrees with 200 steps per revolution.

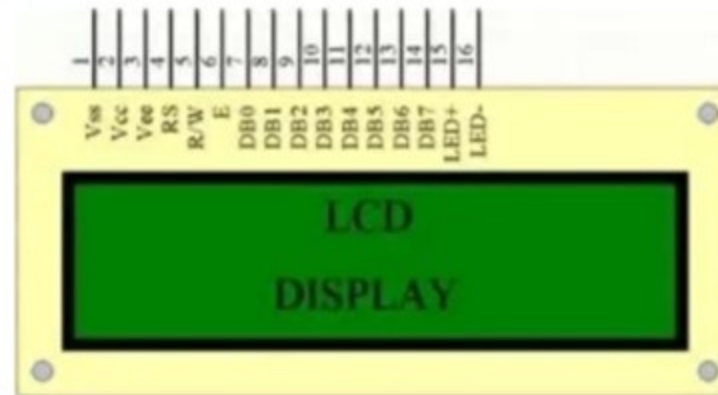


Permanent Magnet Motors

- Permanent magnet motors use a permanent magnet (PM) in the rotor and operate on the attraction or repulsion between the rotor PM and the stator electromagnets.



- LCD stands for ??????????????????



- Most LCDs with one controller have **14 pins or 16 pins**
- Two extra pins are for **back-light LED** connections while LCDs with two controllers have two more pins to enable the additional controller
- Most commonly used character based LCDs are based on **Hitachi's HD44780** controller or other which are compatible with **HD44580**.

RS & RW & DATA BUS ???

The **RS** line is the “**Register Select**” line. When RS is low (0), the data is to be treated as a command or special instruction (such as clear screen, position cursor, etc.). When **RS is high (1)**, the data being sent is text data which could be displayed on the screen. For example, to display the letter “T” on the screen you would set RS high.

The **RW** line is the “**Read/Write**” control line. When **RW is low (0)**, the information on the data bus is being **written to the LCD**. When **RW is high (1)**, the program is effectively querying (or reading) the LCD. Only one instruction (“Get LCD status”) is a **read command**. All others are write commands—so RW will almost always be low.

The data bus consists of **4 or 8 lines** (depending on the mode of

Keypad Interfacing



- Matrix keypads are very useful when designing certain system which needs **user input**.
- By arranging push button switches **in rows and columns**.
- To scan which button is pressed, we need to scan it column by column and row by row.
- Make **rows as input** and **columns as output**.
- For keypad wiring , need to **pull up or pull down** to avoid floating.

VCC ↑ **Pull-up R**



