Control Word and BSR Mode Format

Control Word Format

Control Word format in input/output mode
- The figure shows the control word format in the input/output mode. This mode is selected by making $D_7 = '1'$.

- **$D_0, D_1, D_3, D_4$** are for lower port C, port B, upper port C and port A respectively. When $D_0$ or $D_1$ or $D_3$ or $D_4$ are "SET", the corresponding ports act as input ports. For eg, if $D_0 = D_4 = '1'$, then lower port C and port A act as input ports. If these bits are "RESET", then the corresponding ports act as output ports. For eg, if $D_1 = D_3 = '0'$, then port B and upper port C act as output ports.

- **$D_2$** is used for mode selection for group B (Port B and Lower Port C). When $D_2 = '0'$, mode 0 is selected and when $D_2 = '1'$, mode 1 is selected.

- **$D_5, D_6$** are used for mode selection for group A (Upper Port C and Port A). The format is as follows:

```
D6 D5   mode
0  0    0
0  1    1
1  x    2
```

**Example:** If port B and upper port C have to be initialised as input ports and lower port C and port A as output ports (all in mode 0), what is the control word?

- 1. Since it is an input/output mode, $D_7 = '1'$.
- 2. Mode selection bits, $D_2, D_5, D_6$ are all '0' for mode 0 operation.
- 3. Port B should operate as input port, hence, $D_1 = '1'$.
- 4. Upper port C should also be an input port, hence, $D_3 = '1'$.
- 5. Port A has to operate output port, hence, $D_4 = '0'$.
- 6. Lower port C should also operate as output port, hence, $D_0 = '0'$.

Applying the corresponding values to the format in input/output mode, we get the control word as "8A (hex)"

**BSR mode format**

File:8255ctrlformat bsr.gif

Control Word format in BSR mode

- The figure shows the control word format in BSR mode. This mode is selected by making $D_7 = '0'$.

- **$D_0$** is used for bit set/reset. When $D_0 = '1'$, the port C bit selected (selection of a port C bit is shown in the next point) is **SET**, when $D_0 = '0'$, the port C bit is **RESET**.
- D1, D2, D3 are used to select a particular port C bit whose value may be altered using D0 bit as mentioned above. The selection of the port C bits are done as follows:

<table>
<thead>
<tr>
<th>D3 D2 D1</th>
<th>bit/pin of port C selected</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 0 0</td>
<td>PC0</td>
</tr>
<tr>
<td>0 0 1</td>
<td>PC1</td>
</tr>
<tr>
<td>0 1 0</td>
<td>PC2</td>
</tr>
<tr>
<td>0 1 1</td>
<td>PC3</td>
</tr>
<tr>
<td>1 0 0</td>
<td>PC4</td>
</tr>
<tr>
<td>1 0 1</td>
<td>PC5</td>
</tr>
<tr>
<td>1 1 0</td>
<td>PC6</td>
</tr>
<tr>
<td>1 1 1</td>
<td>PC7</td>
</tr>
</tbody>
</table>

- D4, D5, D6 are not used.

Example: If the 5th bit (PC5) of port C has to be "SET", then what is the control word?

- 1. Since it is BSR mode, D7 = '0'.
- 2. Since D4, D5, D6 are not used, assume them to be '0'.
- 3. PC5 has to be selected, hence, D3 = '1', D2 = '0', D1 = '1'.
- 4. PC5 has to be set, hence, D0 = '1'.

Applying the above values to the format for BSR mode, we get the control word as "0B (hex)".

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