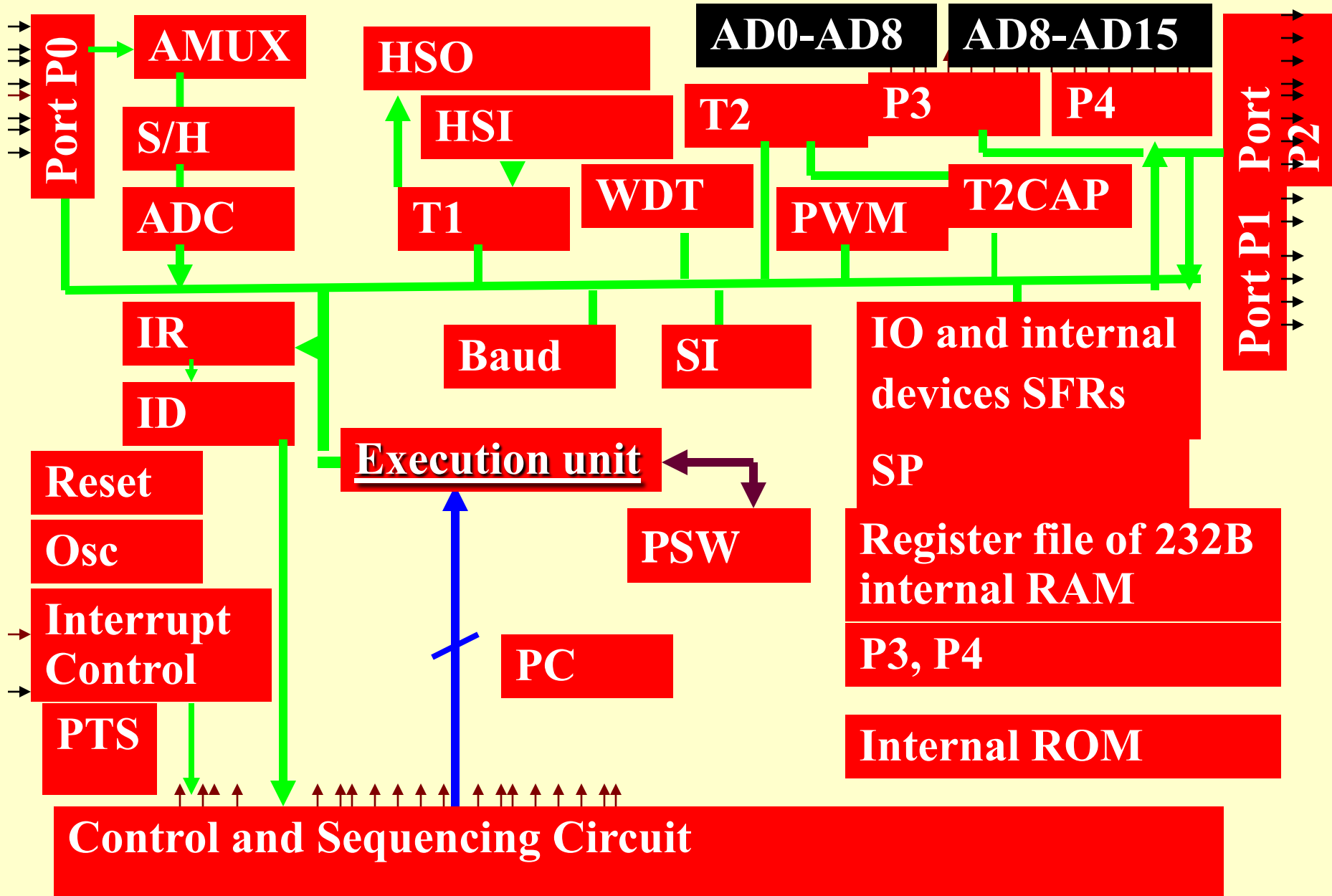# Chapter 14

80x96 Family Microcontrollers

Lesson 08 Part b
High Speed Outputs

High Speed Outputs On successful comparisons of programmed counts with counts in a timer

- Six or four pins can be used HSO.0 to HSO.3 or HSO.0 to HSO.5

- At an HSO.x pin an output (1) or (0) occurs when timer counts equal to preset counts in HSO_time 16-bits

- HSO.x interrupt occurs on comparison

HSO interrupt action and (or) output on HSO.0 to HSO.5 Pins on successful comparison

- HSO interrupt action and (or) output on HSO.0 to HSO.5 Pins

- HSO.4 and HSO.5 can also be used as HSI.2 and HSI.3 when four input captures HSI pins and four HSO needed

- HSO unit has a CAM and CAM entries and commands control the actions

Uses of HSO_CAM content addressable memory

• Store (preset) lower 16-bits for comparing set time with the running timers

• Preset upper 8 bits for a command,for example, choose Timer 1 or 2 contents for comparing equality, select HSO channel

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HSO_CAM content addressable memory

- Eight entries maximum
  Each CAM entry 23 bits
  Write at HSO_Command (06H) and
HSO_Time (04-05H) SFRs

HSO_CAM content addressable memory

• CAM feature is that the entries can be saved in it in any order because HSO_Command and HSO_Time are 24-bits together
Just like entries of name and telephone number noted together in a diary.

clock inputs

Select Free running counter T1 or T2

Write 16-bits

HSO_Command 8-bits

HSO_Time

Write 8- bits

Each comparison equality results interrupt if not masked by command and results in HSO output(s) or other action(s)

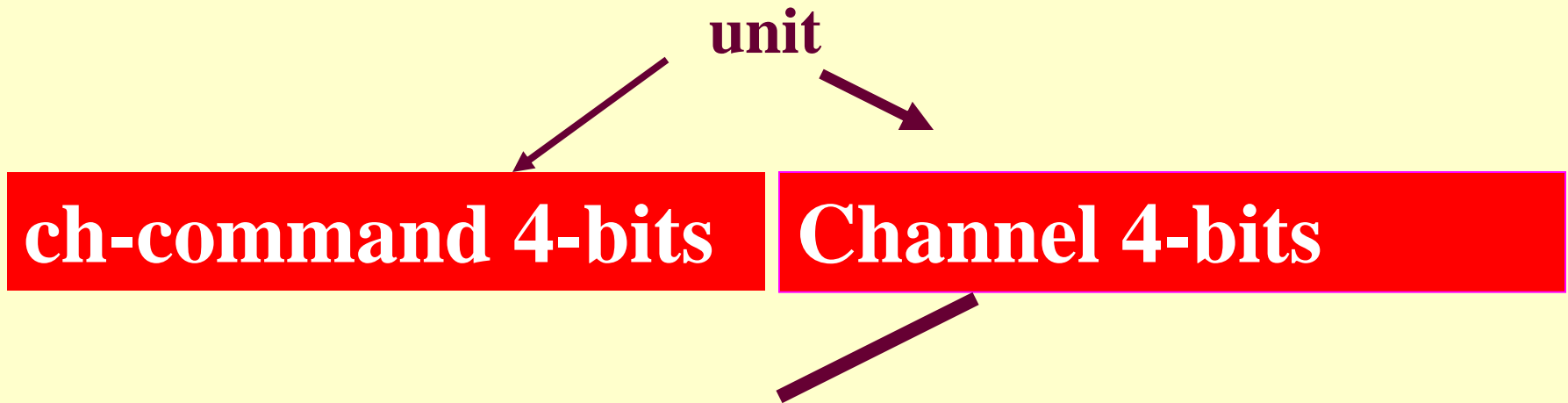**T2 used for ADC or Pulse accumulator and T1 for out-compare real time actions**

HSO_CAM content addressable memory HSO_Command

Write 4 channel bits in 8-command bits for the HSO outputs select or SWT select or ADC select or T2 reset select after a comparison of preset time 16-bit with T1 or T2.

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CAM Command and channel bits for HSO unit

ch-command 4-bits | **Channel 4-bits**
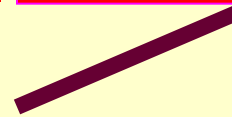
0000:HSO.0; 0001:HSO.1
0010:HSO.2; 0011:HSO.3;
0100:HSO.4/HSI.2;0101: HSO.5/HSI.3;
0110:HSO.0 and HSO.1;
0111: HSO.2 and HSO.3;
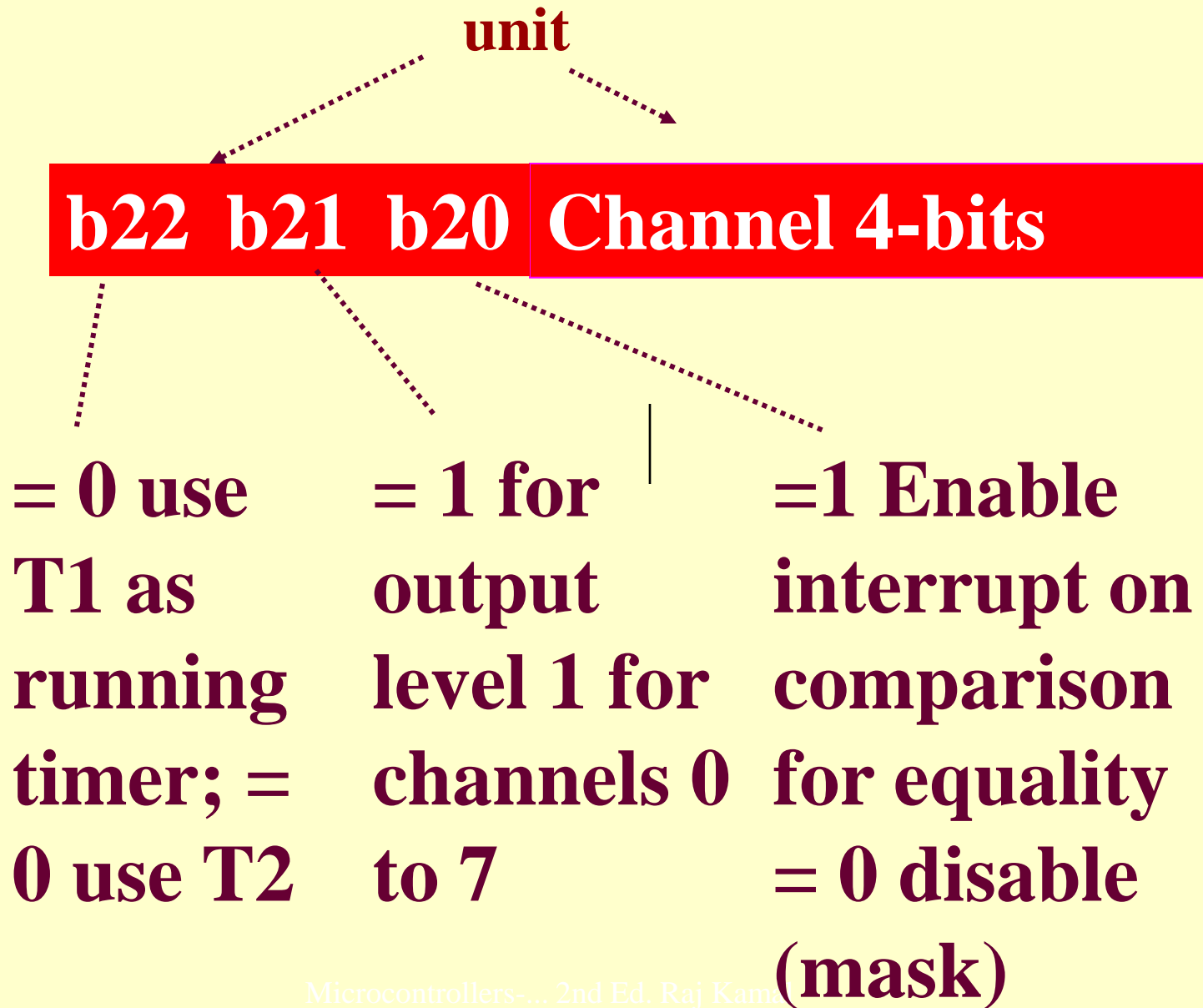
channel bits
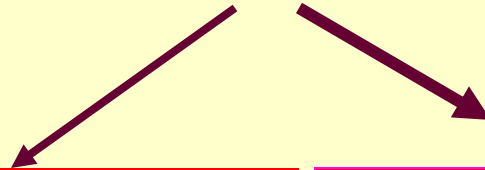
ch-command 4-bits	Channel 4-bits

1110:Reset the timer 2 on comparison ;
1111:Start a ADC-channel at P0 port conversion
1100: No meaning
1101: No meaning

CAM Command and channel bits for HSO unit

b22 b21 b20	Channel 4-bits

= 0 use T1 as running timer; = 0 use T2

= 1 for output level 1 for channels 0 to 7

=1 Enable interrupt on comparison for equality = 0 disable (mask)

Summary

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We learnt

Timer Devices s

- HSO unit

- HSO CAM

16-bit Timers T1 and T2 Actions

- 4 or 6 Out compare options at the HSO units

End of Lesson 8 Part b on
High Speed Outputs On successful comparisons of programmed counts with counts in a timer