

ACOL215

(08 Dec.)

Bit positions	1	2	3	4	5	6	7	8	9	10	11	12
stored →	0	0	1	1	1	0	0	1	0	1	0	0
read →	0	0	1	1	1	1	0	1	0	1	0	0

$$C_1 = \text{XOR}(1, 3, 5, 7, 9, 11) \quad 0$$

$$C_2 = \text{XOR}(2, 3, 6, 7, 10, 11) \quad 1$$

$$C_4 = \text{XOR}(4, 5, 6, 7, 12) \quad 1$$

$$C_8 = \text{XOR}(8, 9, 10, 11, 12) \quad 0$$

C

$C_8 C_4 C_2 C_1$

0 0 0 0

→ no error

0 1 1 0

n bit word

$$\underline{2^k} \geq n + k + 1$$

We can add another parity bit to detect double errors.

$$\begin{array}{r} 00\ 111\ 0010\ 100 \\ \hline 12 \end{array}$$

P \swarrow
13
 \downarrow
XOR of all the other bits

$$\underline{00\ 111\ 0010\ 100\ 1}$$

Whenever you read a word from the memory the check bits C and the extra parity bit P over the entire word is evaluated.

$C = 0$ and $P = 0 \rightarrow$ no error

$C = 0$ and $P = 1 \rightarrow$ error only in the final parity

$C \neq 0$ and $P = 1 \Rightarrow$ ^{bit} single error

$C \neq 0$ and $P = 0 \Rightarrow$ can be corrected double error detected