

Digital Logic

CLOSED BOOK, CLOSED NOTES, ONE 8½" × 11" SHEET PERMITTED

Name: _____

Section: 3311Date: 22 October 2002

Use the back of this sheet if necessary.

1. Write minimal logic equations (using a Karnaugh map) for a function M which will be low when a missile is to fire. The missile should fire only if two operators agree. They do this by each turning one key to assert two variables, F_1 and F_2 , which are high if the operators want to fire the missile. There is a safety interlock that precludes firing if the missile's internal checks indicate the missile is not safe. This signal is called C and is active-low (low when asserted, high otherwise.) There also is an interlock which precludes firing if the missile is not armed. The signal I is high if the missile is armed. Finally, there is an operator override which permits the missile to be fired even if C is asserted, provided that the missile is armed. The override signal is called V and is asserted when low.

M		$C I$			
		00	01	11	10
$F_1 F_2$	00	1	1	1	1
	01	1	1	1	1
	11	1	0	0	1
	10	1	1	1	1

$V=0$

M		$C I$			
		00	01	11	10
$F_1 F_2$	00	1	1	1	1
	01	1	1	1	1
	11	1	1	0	1
	10	1	1	1	1

$V=1$

$$\overline{M} = F_1 F_2 \overline{I} \overline{V} + F_1 F_2 C I$$

$$M = \overline{F_1 F_2 \overline{I} \overline{V} + F_1 F_2 C I}$$

$$= \overline{F_1 F_2 \overline{I} \overline{V}} \overline{F_1 F_2 C I}$$

$$= (\overline{F_1} + \overline{F_2} + \overline{I} + \overline{V})(\overline{F_1} + \overline{F_2} + \overline{C} + \overline{I})$$

2. Draw a schematic for the function M

