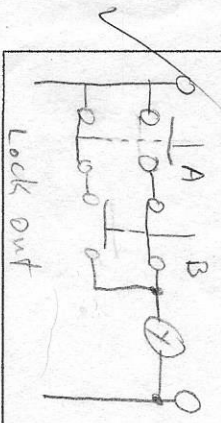


HP TECH PROGRAM

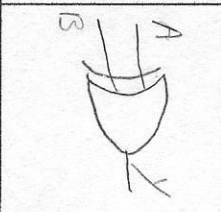
LADDER DIAGRAM	DESCRIPTION <i>What does it take to energize</i>	LOGICAL NAME	TRUTH TABLE	LOGICAL SYMBOL	BOOLEAN EXPRESSION															
	If button A + B are pressed, light comes on	AND	<table border="1"> <tr><th>A</th><th>B</th><th>Y</th></tr> <tr><td>0</td><td>0</td><td>0</td></tr> <tr><td>0</td><td>1</td><td>0</td></tr> <tr><td>1</td><td>0</td><td>0</td></tr> <tr><td>1</td><td>1</td><td>1</td></tr> </table>	A	B	Y	0	0	0	0	1	0	1	0	0	1	1	1		$Y = A \cdot B$ (Y is A and B)
A	B	Y																		
0	0	0																		
0	1	0																		
1	0	0																		
1	1	1																		
	If button A or B is pressed, then Y is energized	OR	<table border="1"> <tr><th>A</th><th>B</th><th>Y</th></tr> <tr><td>0</td><td>0</td><td>0</td></tr> <tr><td>0</td><td>1</td><td>1</td></tr> <tr><td>1</td><td>0</td><td>1</td></tr> <tr><td>1</td><td>1</td><td>1</td></tr> </table>	A	B	Y	0	0	0	0	1	1	1	0	1	1	1	1		$Y = A + B$ (Y is A or B)
A	B	Y																		
0	0	0																		
0	1	1																		
1	0	1																		
1	1	1																		
	If button A is not pressed, then Y is energized	NOT (Inverter)	<table border="1"> <tr><th>A</th><th>B</th><th>Y</th></tr> <tr><td>0</td><td></td><td>1</td></tr> <tr><td>1</td><td></td><td>0</td></tr> </table>	A	B	Y	0		1	1		0		$Y = \bar{A}$						
A	B	Y																		
0		1																		
1		0																		
	If neither A nor B are pressed, then Y is energized	NOR	<table border="1"> <tr><th>A</th><th>B</th><th>Y</th></tr> <tr><td>0</td><td>0</td><td>1</td></tr> <tr><td>0</td><td>1</td><td>0</td></tr> <tr><td>1</td><td>0</td><td>0</td></tr> <tr><td>1</td><td>1</td><td>0</td></tr> </table>	A	B	Y	0	0	1	0	1	0	1	0	0	1	1	0		$Y = \overline{A + B}$
A	B	Y																		
0	0	1																		
0	1	0																		
1	0	0																		
1	1	0																		
	If both A and B are not pressed, then Y is energized	NAND	<table border="1"> <tr><th>A</th><th>B</th><th>Y</th></tr> <tr><td>0</td><td>0</td><td>1</td></tr> <tr><td>0</td><td>1</td><td>1</td></tr> <tr><td>1</td><td>0</td><td>1</td></tr> <tr><td>1</td><td>1</td><td>0</td></tr> </table>	A	B	Y	0	0	1	0	1	1	1	0	1	1	1	0		$Y = \overline{A \cdot B}$
A	B	Y																		
0	0	1																		
0	1	1																		
1	0	1																		
1	1	0																		
	If either A or B are pressed (but not both), then Y is energized	XOR	<table border="1"> <tr><th>A</th><th>B</th><th>Y</th></tr> <tr><td>0</td><td>0</td><td>0</td></tr> <tr><td>0</td><td>1</td><td>1</td></tr> <tr><td>1</td><td>0</td><td>1</td></tr> <tr><td>1</td><td>1</td><td>0</td></tr> </table>	A	B	Y	0	0	0	0	1	1	1	0	1	1	1	0		$Y = A \oplus B$
A	B	Y																		
0	0	0																		
0	1	1																		
1	0	1																		
1	1	0																		



If either A or B are pressed (but not both), then Y is energized

XOR

A	B	Y
0	0	0
0	1	1
1	0	1
1	1	0



$Y = A \oplus B$