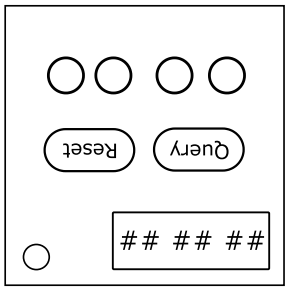
On the Subject of Mastermind Restricted



We sent Mastermind Simple to an Australian implementer and he brought us back this.

This module may look familiar to Mastermind Simple (Mastermind%20Simple.html) however there are some changes the implementer performed on this module.

- The entire module is rotated 180°.
- The "Submit" button has been replaced with a "Reset" button.
- The "Query" and "Reset" buttons are aligned at the center of the module rather than on the edge. Likewise, the LEDs are aligned near the edge of the module rather than the center.
- There are 4 LEDs to cycle between 6 different colors rather than 5 LEDs to cycle between 6 different colors.
- The display has the gray borders on the top and bottom of the screen rather than on the left and right of the screen.
- When pressing the "Query" button, 3 numbers will be shown on the upside-down display. When read right-side-up, the left number refers to the number of correct colors in the correct positions; the middle number refers to the number of correct colors not in the correct positions; the right number refers to how many distant queries the defuser has left before the module attempts to strike.
- The defuser has 12 distant queries to submit the correct sequence of colors to disarm the module. Using all 12 distant queries without a correct sequence of colors will result in a strike and reset the module from the beginning. The reset button can be used to achieve the same effect without a strike.

When the module resets, a new correct sequence will be generated alongside resetting the number of distant queries left to 12. All queries relating to the previous correct sequence will also be cleared. The module will always reset when it is loaded in.

A distant query is defined as a set of colors that is not yet been checked by the module after the reset. In fact, the defuser may use the same sequence of colors from previous queries to recheck the result.

The module will reveal the correct answer if all 12 distant queries have been used up or if the defuser manages to get 4 correct colors in their correct positions.

The Strategy of Beating Mastermind Restricted

The Base Strategy

You may have been familiar with brute forcing the original module before by querying individual LEDs. Unfortunately, this module will punish that technique due to the limited amount of queries required to solve. Luckily there are some tips that can help you solve it more efficiently. This page will go step-by-step of the method the tester used to disarm this module. On average this can take 6 - 8 queries.

1. Start by just pressing the query button on all whites.
2. Take note of how many whites are in their correct positions. This will be refered to as X for this next step.
3. Now query 4 - X magenta LEDs of any combination on the module.
4. If the middle screen now displays a non-zero value, swap the white LED(s) and the magenta LED(s) until the middle screen displays 0. Refer to the left number now as a new X value. Otherwise, skip to step 5.
5. Do not modify the white LEDs now as these are now in their correct positions. Query 4 - X yellows, while avoiding to toggle the white LEDs.
6. Repeat step 4 except with the yellow and magenta LEDs.
7. Keep repeating this procedure with a different color until you get the left number to display a 4.

You may swap to use different sets of colors in the technique mentioned before (I.E swapping white with red, magenta with blue, etc.) however failing to follow the steps correctly may result in wasted queries which can lead to a strike.

Other Tips

If you know that in one of the queries, you get 2 correct colors in the correct positions that are colored the same and somewhere in the next batch of queries, you get 2 correct colors not in the correct positions, like in queries 3 and 4 from the table provided, you should already know where the correct colors are in the respective positions. Likewise, if you know if there are 0 of 1 set of correct colors, it is invaluable to query extras of those colors and just move on to the next color.

Query				Result
W	W	W	W	0, 0
M	M	M	M	2, 0
Y	M	M	Y	0, 2
M	Y	Y	M	2, 0
M	G	G	M	3, 0
M	G	R	M	2, 1
M	R	G	M	2, 1
M	B	G	M	4, 0

Mastermind Restricted Example Scenarios

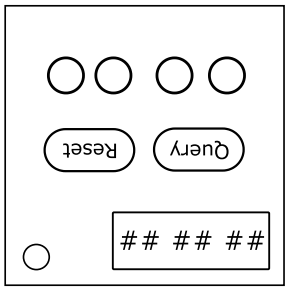
Example procedures will refer the result of the query as "A, B", where A is the number of correct colors in their correct positions and B is the number of correct colors not in their correct positions. Any "*" give out major clues to the correct sequence in those example procedures.

Example Procedure #1					
Query				Result	Thought Process
W	W	W	W	0, 0	*No whites anywhere. I should query all magentas then.*
M	M	M	M	1, 0	*1 M. I should do 3 Y next and work with the 1 M.*
Y	Y	Y	M*	1, 2	*Okay. My magenta is definitely not in that location. I think that one contains yellow for sure.*
Y	Y	M*	Y	1, 2	*That one is also yellow.*
Y*	M	Y	Y	2, 1	*I think I know where magenta should go. Let's query the rest of the colors and hope for the best.*
M	G	Y	Y	3, 0	
M	R	Y	Y	4, 0 (solved)	

Example Procedure #2					
Query				Result	Thought Process
B	B	B	B	3, 0	*3 blues right off the bat. There is only 1 color left on this.*
W*	B	B	B	2, 1	*I think 1st LED there is blue.*
B	W	B*	B*	3, 0	*Okay. All of my blues are now set. All that is left is the missing color.*
B	M	B	B	3, 0	
B	Y	B	B	4, 0 (solved)	

Expert's Mastermind Restricted Sheet

In case the expert is out of work, here is something for them to use to assist the defuser.



Query				Result	Notes