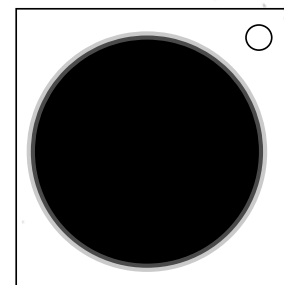# On the Subject of Black Holes

Ground control to Major Tom, do you read?

- To disarm all Black Hole modules on a bomb, obtain a code consisting of digits 0-4. The length of the code is 7 times the total number of Black Hole modules on the same bomb. At any point, you may enter the next digit of the code on any unsolved Black Hole module.

- If you solve a different module on the bomb after entering a digit of the code, the code gets shortened by two digits, except when your digit caused a Black Hole module to become solved. This way the code for a single Black Hole can be reduced from 7 to 3 digits by solving other modules between entering digits. The code for two Black Holes can be shortened from 14 to 6, etc.

- In the 10×10 grid on the next page, your starting location is given by the third and sixth characters of the serial number, which are the x- and y-coordinates, respectively. Columns and rows are counted left-to-right/top-to-bottom from 0.

- Your initial direction of movement is 45° times the number of ports on the bomb clockwise from north.

- Obtain the first digit of the code from that grid location, then move one space in your initial direction, then rotate your direction 45° clockwise.

- The next digit is the sum, modulo 5, of two consecutive grid locations in your current direction. Obtain the two numbers, move one space beyond them, then rotate 45° clockwise.

- Proceed likewise for every subsequent digit, adding one more grid location each time. The nth digit of the code is the sum (modulo 5) of n consecutive grid locations.

- Every time you move beyond the edge of the grid, wrap around to the opposite side.

- The following page explains how to enter each digit.

0	1	2	3	4
● ● ●	● ● ●	● ● ● ●	● ● ● ●	● ● ● ●
⎵	I I	I ⎵	⎵⎵	⎵
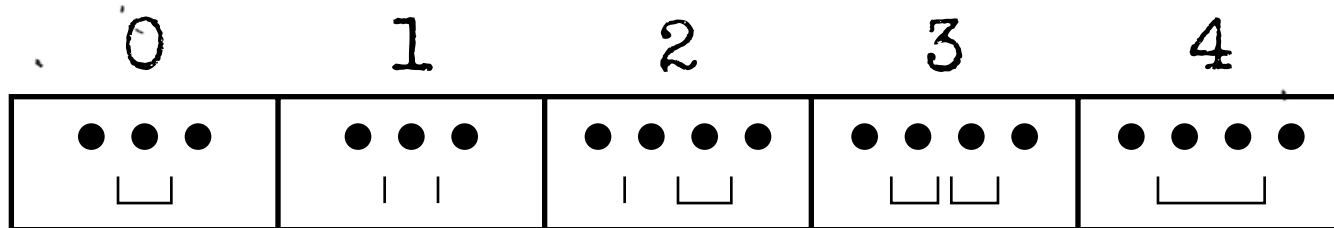
- In the above diagrams, a dot represents a tick of the bomb's countdown timer (i.e., a change in the seconds value) going from left to right.

- A vertical line represents a tap on the module. Make sure that you press and release the module between two ticks.

- A bracket indicates holding the module across one or more ticks.

3	4	1	0	2	3	1	2	0	4
1	3	0	2	4	1	2	3	4	0
3	2	4	2	1	3	0	0	1	4
4	0	0	1	3	4	2	2	1	3
1	2	1	3	0	0	4	3	4	2
4	0	2	3	4	1	3	0	2	1
2	1	3	1	3	0	4	4	0	2
2	4	4	0	0	2	1	1	3	3
0	1	3	4	2	2	0	4	3	1
0	3	2	4	1	4	3	1	2	0