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This page is intended to publish and share results on magic factors and shifts (64 - **Bits used**) for most dense magic bitboards tables. [Little endian file and rank mapping](#) is used (a1 = 0), for other mappings simply transform the square.

If you prefer your own magics, see [Looking for Magics](#).

## Legende

- **sq** - the square of a rook or bishop considering little endian file and rank mapping
- **#sq** - index of that square in the 0..63 range
- **premask** - the mask to get all relevant occupied bits, considering the [inner six bits](#).
- **bits** - the [population count](#) of premask
- **used** - hopefully less than **bits**, determines the **shift** (64 - **used**)
- **magic** - the magic factor
- **postmask** - attacks on the otherwise empty board
- **found by** (optional) - the person who found that number.

## Rook Magics

| sq | #sq | premask                           | bits | used | magic | postmask                          | found by |
|----|-----|-----------------------------------|------|------|-------|-----------------------------------|----------|
|    | a1  | 0 0x00010101<br>0101017E<br>..... | 12   |      |       | 0x01010101<br>010101FE<br>1 ..... |          |

|    |                          |    |                        |
|----|--------------------------|----|------------------------|
|    | 1 . . . . .              |    | 1 . . . . .            |
|    | 1 . . . . .              |    | 1 . . . . .            |
|    | 1 . . . . .              |    | 1 . . . . .            |
|    | 1 . . . . .              |    | 1 . . . . .            |
|    | 1 . . . . .              |    | 1 . . . . .            |
|    | 1 . . . . .              |    | 1 . . . . .            |
|    | . 1 1 1 1 1 1 .          |    | . 1 1 1 1 1 1<br>1     |
| b1 | 1 0x00020202<br>0202027C | 11 | 0x02020202<br>020202FD |
| c1 | 2 0x00040404<br>0404047A | 11 | 0x04040404<br>040404FB |
| d1 | 3 0x00080808<br>08080876 | 11 | 0x08080808<br>080808F7 |
| e1 | 4 0x00101010<br>1010106E | 11 | 0x10101010<br>101010EF |
| f1 | 5 0x00202020<br>2020205E | 11 |                        |
| g1 | 6 0x00404040<br>4040403E | 11 |                        |
| h1 | 7 0x00808080<br>8080807E | 12 | 0x80808080<br>8080807F |
| a2 | 8 0x00010101<br>01017E00 | 11 | 0x01010101<br>0101FE01 |
| b2 | 9 0x00020202<br>02027C00 | 10 | 0x02020202<br>0202FD02 |
| c2 | 10                       | 10 |                        |
| d2 | 11                       | 10 |                        |
| e2 | 12                       | 10 |                        |
| f2 | 13                       | 10 |                        |
| g2 | 14                       | 10 |                        |

|    |    |    |
|----|----|----|
| h2 | 15 | 11 |
| a3 | 16 | 11 |
| b3 | 17 | 10 |
| c3 | 18 | 10 |
| d3 | 19 | 10 |
| e3 | 20 | 10 |
| f3 | 21 | 10 |
| g3 | 22 | 10 |
| h3 | 23 | 11 |
| a4 | 24 | 11 |
| b4 | 25 | 10 |
| c4 | 26 | 10 |
| d4 | 27 | 10 |
| e4 | 28 | 10 |
| f4 | 29 | 10 |
| g4 | 30 | 10 |
| h4 | 31 | 11 |
| a5 | 32 | 11 |
| b5 | 33 | 10 |
| c5 | 34 | 10 |
| d5 | 35 | 10 |
| e5 | 36 | 10 |
| f5 | 37 | 10 |

|    |                           |    |    |  |                               |
|----|---------------------------|----|----|--|-------------------------------|
| g5 | 38                        | 10 |    |  |                               |
| h5 | 39                        | 11 |    |  |                               |
| a6 | 40                        | 11 |    |  |                               |
| b6 | 41                        | 10 |    |  |                               |
| c6 | 42                        | 10 |    |  |                               |
| d6 | 43                        | 10 |    |  |                               |
| e6 | 44                        | 10 |    |  |                               |
| f6 | 45                        | 10 |    |  |                               |
| g6 | 46                        | 10 |    |  |                               |
| h6 | 47                        | 11 |    |  |                               |
| a7 | 48 0x007E0101<br>01010100 | 11 | 10 | 0x48FFFE99 0x01FE0101<br>FECFAA00 01010101 | <a href="#">Grant Osborne</a> |
| b7 | 49 0x007C0202<br>02020200 | 10 | 9  | 0x48FFFE990x02FD0202<br>FECFAA00 02020202  | Grant Osborne                 |
| c7 | 50                        | 10 | 9  | 0x497FFFA<br>DFF9C2E00                     | <a href="#">Grant Osborne</a> |
| d7 | 51                        | 10 | 9  | 0x613FFFD<br>DFFCE9200                     | Grant Osborne                 |
| e7 | 52                        | 10 | 9  | 0xffffffe9ff<br>e7ce00                     | <a href="#">Volker Anuss</a>  |
| f7 | 53                        | 10 | 9  | 0xffffffff5fff<br>3e600                    | Volker Anuss                  |
| g7 | 54                        | 10 | 9  | 0x3ff95e5e6<br>a4c0                        | <a href="#">Niklas Fiekas</a> |
| h7 | 55 0x007E8080<br>80808000 | 11 | 10 | 0x510FFFF5 0x807F8080<br>F63C96A0 80808080 | Grant Osborne                 |
| a8 | 56 0x7E010101<br>01010100 | 12 | 11 | 0xEBFFFFB 0xFE010101<br>9FF9FC526 01010101 | Grant Osborne                 |

|    |                           |    |    |   |                                     |
|----|---------------------------|----|----|---|-------------------------------------|
| b8 | 57 0x7C020202<br>02020200 | 11 | 10 | 0x61FFFD0xFD020202<br>DFEEDAEA 02020202<br>E  | Grant<br>Osborne                    |
| c8 | 58 0x7A040404<br>04040400 | 11 | 10 | 0x53BFFFE0xFB040404<br>DFFDEB1A 04040404<br>2 | Grant<br>Osborne                    |
| d8 | 59 0x76080808<br>08080800 | 11 | 10 | 0x127FFFB9 0xF7080808<br>FFDFB5F6 08080808    | Grant<br>Osborne                    |
| e8 | 60 0x6E101010<br>10101000 | 11 | 10 | 0x411FFFD0xEF101010<br>DFFDBF4D 10101010<br>6 | Grant<br>Osborne                    |
| f8 | 61                        | 11 |    |   |                                     |
| g8 | 62 0x3E404040<br>40404000 | 11 | 10 | 0x0003ffef2 0xBF404040<br>7eebe74 40404040    | <a href="#">Peter<br/>Österlund</a> |
| h8 | 63 0x7E808080<br>80808000 | 12 | 11 | 0x7645FFFE 0x7F808080<br>CBFEA79E 80808080    | Grant<br>Osborne                    |

## Bishop Magics

| sq | #sq | premask  | bits | used | magic                       | postmask  | found by                          |
|----|-----|--|------|------|-----------------------------|---|-----------------------------------|
| a1 | 0   | 0x00402010<br>08040200<br>.....<br>.....1.<br>.....1..<br>....1..<br>....1..<br>...1....<br>..1.....<br>.1.....<br>..... | 6    | 5    | 0xffedf9fd7<br>cfcffff      | 0x80402010<br>08040200<br>.....1<br>.....1.<br>.....1..<br>....1..<br>....1..<br>...1....<br>..1.....<br>.1.....<br>..... | <a href="#">Gerd<br/>Isenberg</a> |
| b1 | 1   |  | 5    | 4    | 0xfc0962854<br>a77f576      |   | <a href="#">Gerd<br/>Isenberg</a> |
| c1 | 2   |  | 5    | 5    | 0xE433BF9<br>FF9BD3C0<br>DL |   |                                   |

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|    |    |   |   |                             |                              |
|----|----|---|---|-----------------------------|------------------------------|
| d1 | 3  | 5 | 5 | 0x8F0BBE9<br>CF98C0405<br>L |                              |
| e1 | 4  | 5 | 5 | 0x7E11DFD<br>9DDFBDBF<br>0L |                              |
| f1 | 5  | 5 |   |                             |                              |
| g1 | 6  | 5 | 4 | 0xfc0a66c64<br>a7ef576      | Gerd<br>Isenberg             |
| h1 | 7  | 6 | 5 | 0x7ffdfdfcb<br>d79ffff      | Gerd<br>Isenberg             |
| a2 | 8  | 5 | 4 | 0xfc0846a64<br>a34fff6      | Gerd<br>Isenberg             |
| b2 | 9  | 5 | 4 | 0xfc087a874<br>a3cf7f6      | Gerd<br>Isenberg             |
| c2 | 10 | 5 | 5 | 0x00400200<br>42188680L     |                              |
| d2 | 11 | 5 | 5 | 0x00800001<br>08D80200L     |                              |
| e2 | 12 | 5 | 5 | 0xF2048D48<br>B0240820L     |                              |
| f2 | 13 | 5 | 5 | 0x810040B9<br>21030010L     |                              |
| g2 | 14 | 5 | 4 | 0xfc0864ae5<br>9b4ff76      | Gerd<br>Isenberg             |
| h2 | 15 | 5 | 4 | 0x3c0860af4<br>b35ff76      | Gerd<br>Isenberg             |
| a3 | 16 | 5 | 4 | 0x73C01AF<br>56CF4CFB       | <a href="#">Richard Pijl</a> |
| b3 | 17 | 5 | 4 | 0x41A01CF<br>AD64AAFF<br>C  | Richard Pijl                 |

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|    |    |   |   |                        |                  |
|----|----|---|---|------------------------|------------------|
| c3 | 18 | 7 |   |                        |                  |
| d3 | 19 | 7 |   |                        |                  |
| e3 | 20 | 7 |   |                        |                  |
| f3 | 21 | 7 |   |                        |                  |
| g3 | 22 | 5 | 4 | 0x7c0c028f5<br>b34ff76 | Gerd<br>Isenberg |
| h3 | 23 | 5 | 4 | 0xfc0a028e5<br>ab4df76 | Gerd<br>Isenberg |
| a4 | 24 | 5 |   |                        |                  |
| b4 | 25 | 5 |   |                        |                  |
| c4 | 26 | 7 |   |                        |                  |
| d4 | 27 | 9 |   |                        |                  |
| e4 | 28 | 9 |   |                        |                  |
| f4 | 29 | 7 |   |                        |                  |
| g4 | 30 | 5 |   |                        |                  |
| h4 | 31 | 5 |   |                        |                  |
| a5 | 32 | 5 |   |                        |                  |
| b5 | 33 | 5 |   |                        |                  |
| c5 | 34 | 7 |   |                        |                  |
| d5 | 35 | 9 |   |                        |                  |
| e5 | 36 | 9 |   |                        |                  |
| f5 | 37 | 7 |   |                        |                  |
| g5 | 38 | 5 |   |                        |                  |
| h5 | 39 | 5 |   |                        |                  |

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|    |    |   |   |                            |                  |
|----|----|---|---|----------------------------|------------------|
| a6 | 40 | 5 | 4 | 0xDCEFD9<br>B54BFCC09<br>F | Richard Pijl     |
| b6 | 41 | 5 | 4 | 0xF95FFA7<br>65AFD602B     | Richard Pijl     |
| c6 | 42 | 7 |   |                            |                  |
| d6 | 43 | 7 |   |                            |                  |
| e6 | 44 | 7 |   |                            |                  |
| f6 | 45 | 7 |   |                            |                  |
| g6 | 46 | 5 | 4 | 0x43ff9a5cf<br>4ca0c01     | Gerd<br>Isenberg |
| h6 | 47 | 5 | 4 | 0x4BFFCD8<br>E7C587601     | Richard Pijl     |
| a7 | 48 | 5 | 4 | 0xfc0ff2865<br>334f576     | Gerd<br>Isenberg |
| b7 | 49 | 5 | 4 | 0xfc0bf6ce5<br>924f576     | Gerd<br>Isenberg |
| c7 | 50 | 5 |   |                            |                  |
| d7 | 51 | 5 |   |                            |                  |
| e7 | 52 | 5 |   |                            |                  |
| f7 | 53 | 5 |   |                            |                  |
| g7 | 54 | 5 | 4 | 0xc3ffb7dc3<br>6ca8c89     | Gerd<br>Isenberg |
| h7 | 55 | 5 | 4 | 0xc3ff8a54f<br>4ca2c89     | Gerd<br>Isenberg |
| a8 | 56 | 6 | 5 | 0xfffffcfcfd<br>79edff     | Gerd<br>Isenberg |
| b8 | 57 | 5 | 4 | 0xfc0863fcc<br>b147576     | Gerd<br>Isenberg |

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|    |    |   |   |                        |  |                  |
|----|----|---|---|------------------------|--|------------------|
| c8 | 58 | 5 |   |                        |  |                  |
| d8 | 59 | 5 |   |                        |  |                  |
| e8 | 60 | 5 |   |                        |  |                  |
| f8 | 61 | 5 |   |                        |  |                  |
| g8 | 62 | 5 | 4 | 0xfc087e8e4<br>bb2f736 |  | Gerd<br>Isenberg |
| h8 | 63 | 6 | 5 | 0x43ff9e4ef<br>4ca2c89 |  | Gerd<br>Isenberg |

## Forum Posts

- [Looking for dense magics](#) by Lucas Braesch, [CCC](#), July 11, 2017
- [Disproving the existence of some magics](#) by [Niklas Fiekas](#), [CCC](#), September 16, 2017
- [No bishop magics with fixed shift 8](#) by [Niklas Fiekas](#), [CCC](#), April 09, 2018

## External Links

- [Tehran Wind Orchestra - Mission Impossible](#), [Vahdat Hall](#), [Tehran](#), [Iran](#), [YouTube](#) Video

## What links here?

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| <a href="#">Best Magics so far</a> | Apr 13, 2018 |
| <a href="#">Grant Osborne</a>      | Dec 2, 2011  |
| <a href="#">Home</a>               | Jul 2, 2018  |
| <a href="#">Looking for Magics</a> | Apr 13, 2018 |
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