

SMB2 via SMW in SMAS+SMW

Introduction

This is a speedrun route for completing SMB2 by using SMW to jump straight into the middle of 7-2 with debug mode enabled. Most of the technical research was done by MrCheeze, and most of the routing by SethBling.

Setup

- USA Super Mario All-Stars + Super Mario World Cartridge
- Two multitaps in 5P mode, each with two controllers plugged into the first two slots.
 - Port 1 Controller 1: Gameplay controller
 - Port 2 Controller 1: A0 2A = A + L + Select + Up + Left
 - Port 1 Controller 2: 20 E4 = L + B + Y + Select + Down
 - Port 2 Controller 2: 00 60 = Y + Select
- Multitap controllers form code: LDY #\$2A; JSR \$00E4; RTS
 - A0 2A 20 E4 00 60
- If you're using the Bizhawk emulator, you must menu Config->Cores->SNES->BSNES to select the BSNES core, then menu SNES->Controller Configuration menu to enable multitaps in both ports. Then:
 - Player 1 = Port 1 Controller 1
 - Player 2 = Port 1 Controller 2
 - Player 5 = Port 2 Controller 1
 - Player 6 = Port 2 Controller 2

Instructions

1. Complete YI2, getting Yoshi and passing through the midway checkpoint to become big.
2. Complete YI3, getting fire power.
3. Perform [Powerup Incrementation](#) twice in YI3. Ditch Yoshi before start+selecting out of the level with powerup 5.
4. Enter YI2 without Yoshi.
5. Jump on the leftmost koopa on the ledge and grab its shell
 - a. You can use the shell from the ground at the beginning of the level to clear out as many koopas as you want besides the target koopa.
6. Hit the Yoshi block
7. Stand at this pixel under the Yoshi block



8. Hold **down** and let go of **run** to drop the shell.
9. Hold **R** and let go of all other buttons to scroll the screen all the way right.
10. **Run** left 17 pixels to this location (holding **left** for exactly 12 frames will usually accomplish this).



11. Throw the shell up and immediately run right so that you don't pick it up. This will create a white splat that sets RAM address \$2F4 to \$18.
12. Get on Yoshi
13. Jump left to the hill beside these blocks.
14. Jump back right onto the blocks, letting go of **run** but holding **right** to slow your speed down as you approach (so that you don't overshoot them). This will reset the camera scroll. Yoshi's head should be under the item box now.
15. Come to a stop on this pixel without overshooting
 - a. If you overshoot, get back to this pixel then screen scroll all the way left, then screen scroll right so that you're centered again. This will reset the screen scroll.



16. Press start+select. This will despawn the shell on the ground to set RAM address \$3D8 to \$4C.
17. Re-enter Y12
18. You'll be grabbing red koopas/shells and spitting them out at certain pixels. Always grab the last koopa/shell to load, as it's got the lowest sprite slot.
19. Grab the rightmost koopa and spit here. Ram address \$E4=\$8B



20. Reload all the koopas and grab the shell on the ground. Spit here. \$E5=\$44



21. Grab the leftmost koopa and spit here, near the beginning of the level. \$E6=\$70



22. Grab the rightmost koopa and jump and spit here (jumping so you don't turn the other koopas into coins).
\$E7=06



23. Grab the next rightmost koopa and jump and spit here. \$E8=\$AB



24. Grab the next rightmost koopa and spit here. \$E9=\$60



25. Run right and position Yoshi facing left at this pixel.



26. Jump off and stand at this pixel under the Yoshi block, facing either direction



27. Screen scroll all the way left.

28. Hold **down** and **run**, then hold **left**, then hold **B**. Don't let go of any of those buttons until you come to a stop. This will set up the screen scroll so that the top right Yoshi egg fragment will despawn on a certain animation frame, with a specific vertical velocity. When it does, \$1829=\$18 and \$182A=\$42.



29. As the top right fragment is about to despawn, start running right.



30. A tile before you touch Yoshi, hold **B** to perform a tall jump. Your goal is to hit the left side of the message box to halt Mario's rightward progress.



31. As you approach the message box, let go of all buttons and hold the two shoulder buttons **L** and **R**.
32. When the mushroom touches you, the first ACE will happen. If Yoshi is positioned correctly, \$3D0=\$05 and \$3D4=\$0F. These can be off by 1 if you got unlucky and the screen overscrolled by a pixel when you ran into the message box, in which case the game will crash.
 - a. This sets SRAM \$08 to \$06 and SRAM \$07 and \$06 to nonzero values.
33. Get back on Yoshi and start+select.
34. Reclamp the buttons on port 2 controller 1.
Change them from **A + L + Select + Up + Left** to **A + L + Down + Right**
35. Re-enter Y12.
36. Grab the rightmost koopa and spit at this pixel. \$E4=\$98



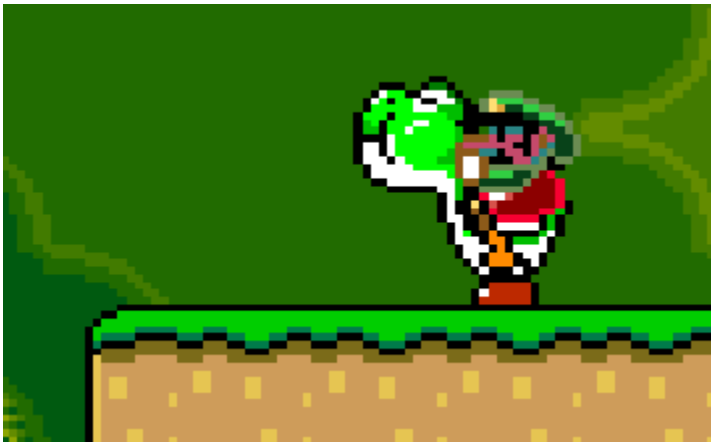
37. Respawn the koops and grab the shell on the ground. Spit at this pixel near the beginning of the level in front of the bigger bush. \$E5=\$87



38. Grab the rightmost koopa. Spit here. \$E6=\$92



39. Respawn the koopas and grab the leftmost. Spit here. \$E7=\$4A



40. Grab the next leftmost koopa and jump and spit here. \$E8=\$5C



41. Grab the next leftmost koopa and spit here in front of the big bush. \$E9=\$CE



42. Grab the rightmost koopa and spit here. \$EA=\$81



43. Run right and position Yoshi facing left at this pixel.



44. Jump off and stand at this pixel under the Yoshi block, facing either direction



45. Screen scroll all the way left.
46. Hold **down** and **run**, then hold **left**, then hold **B**. Don't let go of any of those buttons until you come to a stop. This will set up the screen scroll so that the top right Yoshi egg fragment will despawn on a certain animation frame, with a specific vertical velocity. When it does, \$1829=\$18 and \$182A=\$42.



47. As the top right fragment is about to despawn, start running right.



48. About a tile before you touch Yoshi, hold **B** to perform a tall jump. Your goal is to hit the left side of the message box to halt Mario's rightward progress.



49. As you approach the message box, let go of all buttons and hold the two shoulder buttons **L** and **R**.
50. When the mushroom touches you, the first ACE will happen. If Yoshi is positioned correctly, $\$3D0 = \05 and $\$3D4 = \$0F$. These can be off by 1 if you got unlucky and the screen overscrolled by a pixel when you ran into the message box, in which case the game will crash. $\$EB$ will also be $\$00$ because of the message box.
51. Super Mario Bros 2 should load, looking very glitchy. Debug mode is enabled, as is control scheme B. Press B to run etc, and press A to toggle debug mode (and also jump if you're exiting debug mode). Note that you need to be out of debug mode to pickup/throw items (though you can catch Wart vegetables while in debug mode).
52. Press start twice to enter the level using any character. Enter the door to the left, then enter it again. Fall to your death.
53. Pick your character (it probably doesn't matter much, since you'll be moving in debug mode mostly).
54. Press A to enter debug mode, then move to the right under the level.
55. Defeat and enter Hawkmoth.
56. Defeat Wart.
 - a. With debug mode, you can hover right about where the veggies spawn and pick them up immediately when they spawn.
 - b. Once you've hit Wart with a veggie, he's vulnerable to star power for a little bit if you have noclip off.

Technical Information

The two ACEs run this code:

First ACE:

Multitaps:

LDY #\$2A

JSR \$00E4

RTS

$\$00E4$:

PHB

```
MVP $06 $70
PLB
RTS
```

Second ACE:

```
Multitaps:
LDY #$05
JSR $00E4
RTS
```

```
$00E4:
TYA
STA [$92]
LSR A
JSL $0081CE
```

The first ACE sets the Y register to \$2A, X is \$09 because the 1-up we collect is in sprite slot 9, and the 16-bit accumulator is about \$03D0 (because of the jump to \$03D0 when a 1-up touches Mario in powerup state 5). Because X and Y are in 8-bit mode, the MVP instruction copies the entire first page of bank \$06 over the entire first page of bank \$70 (which is SRAM). However, the values are offset by \$21 (wrapping around), so that the \$06 at \$E7 in the shellcode is written to \$700008. This is because the source address is determined by the X register and the destination address is determined by the Y register. This instruction also copies nonzero values to \$700007 and \$700006, setting the debug flag and control mode B for SMB2. The PHB and PLB are used to restore the data bank, which gets set to \$70 during MVP. The game actually does not crash when returning from the ACE if data bank is set to \$70, but it does change how the game draws sprites in the next frame, and the shell OAM at \$03D8 gets overwritten by Yoshi's head, which means we'd have to do that setup again.

The second ACE stores \$05 to \$700009, because the data data \$92 is \$F10009 and bank \$F1 is a mirror of \$70. These values at \$92 are only there when using the message box as a backstop for setting up the screen scroll during the ACE. The \$F1 is the low byte of Mario's x-coordinate in the level, and the \$09 is Mario's x-coordinate within the block. Then LSR A shifts the accumulator to \$02 and the code jumps to \$0081CE, which is a procedure that changes games.

The state of the accumulator determines what game will be loaded, in this case \$02 dictates that SMB2 is loaded. The procedure also looks at \$700008 and \$700009 to determine the world and level number to load, in this case \$06 and \$05, which loads level 7-6. 7-6 is not a real level, but it happens to pull level data from 7-2. If you move around too much, the level starts getting corrupted, but that can be prevented by entering any doorway and dying. Then the game will load 7-2 proper. You can use debug mode to complete the rest of the game very quickly, clipping through walls. You can't kill Hawkmoth with star power, or you won't be able to use it to transition to the Wart fight. However, after hitting Wart with a veggie, he becomes vulnerable to star power for a little bit, and can be killed quickly. Normally the game will wait for the current music to end before unfreezing the game and letting you enter the credits door, but the star power music ending can trigger that much more quickly than normal.