

Instruction Cycle, Fetch



This module consists of a few parts: an 8-bit register, a 5-bit binary counter, and logic gates for multiplexing the input source. Together, their values combine to form the microcode address.

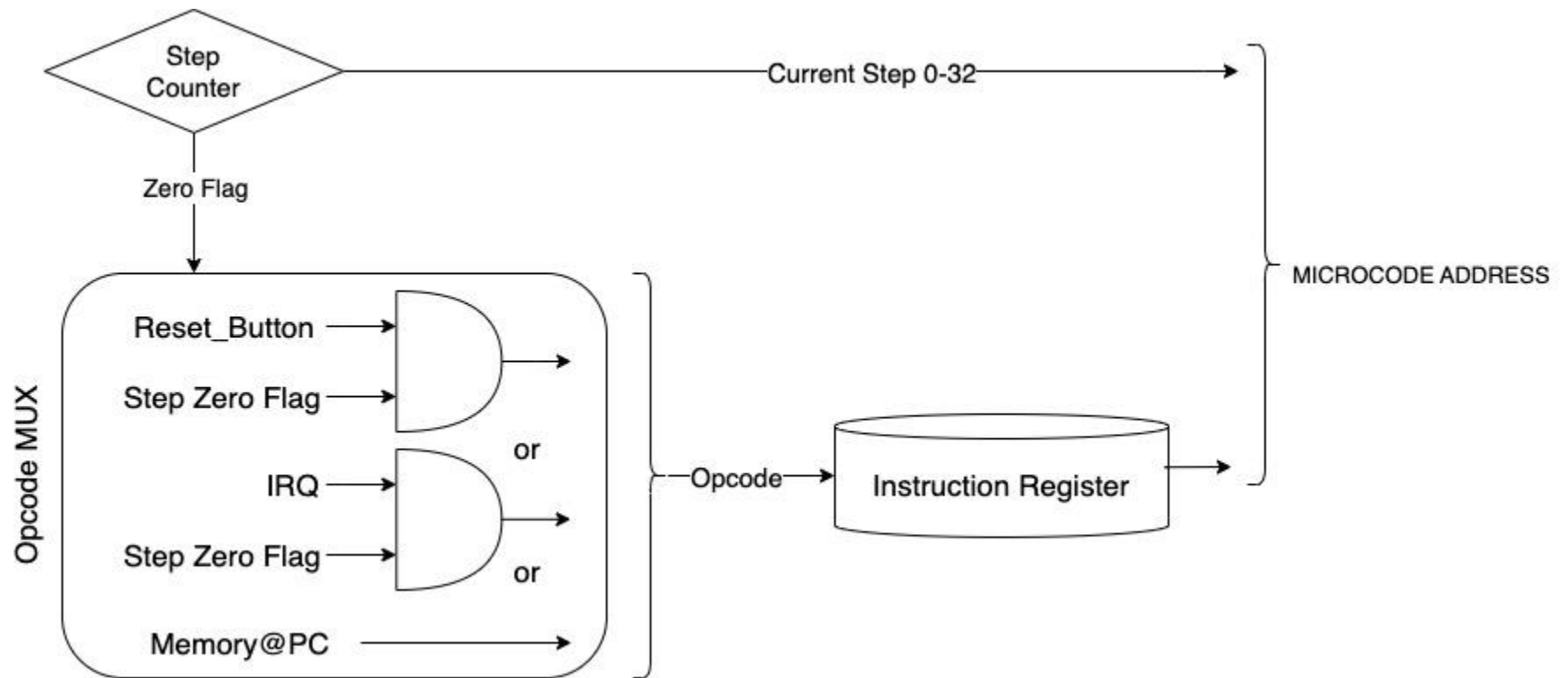
Inputs to this module include the 8-bit *memory bus*, the *interrupt request flag*, and a *reset line*.

A momentary push-button is built into the board as another source for a CPU reset. Connected to this button is also a resistor-capacitor circuit that will fire off a reset signal once on power up.

- Instruction Register
- Step Counter
- Opcode Multiplexer
- Hardwired Reset Vector
- Hardwired IRQ Addresses

Power: **5V V_c**

Block Diagram



Instruction Register

Current Instruction Register

This is an *8-bit register* that stores the current instruction from the data bus (typically from memory).

The input of the instruction register has three potential values: a *hardwired reset vector*, an *interrupt request vector*, or an *instruction opcode*.

The reset or interrupt request addresses will only be latched when there is an active interrupt or the reset line was pulled low, as well as the *step zero flag* (SZF) is active. Otherwise, the instruction register will load its value from the data bus (memory).

Step Counter

The step counter makes up the lower *5-bits* of the microcode address. This gives every instruction the ability to use up to *32 steps* to complete its cycle. Most instructions though however have much fewer steps needed. To avoid wasted clocks or NOPs, each instruction's microcode should include setting the *reset step counter* control line.



Schematics



Parts & Components List

Part #	Description	Qty	Datasheet	Link
74HC173	8-Bit, Edge-Triggered, flip-flops	2	DATA	Mouser
74HC245	8-bit, Tri-State Transceiver	2	DATA	Mouser
74HC161	4-bit, Binary Counter	2	DATA	Mouser
74HC08	Quad, 2-input AND gates	11	DATA	Mouser
74HC32	Quad, 2-input OR gates	7	DATA	Mouser
74HC04	6, 1-input, NOT (invert) gates	5	DATA	Mouser
CD4072	Dual, 4-input OR gates	2	DATA	Mouser
-	Momentary Push Button	1	-	-
-	Pull Up Resistor	1	-	-
-	Capacitor (for switch)	1	-	-
-	Decoupling Capacitors	4	-	-
-	LEDs / Resistors	13	-	-



