

AccessionIndex: TCD-SCSS-T.20250918.001

Accession Date: 18-Sep-2025

Accession By: Dr.Brian Coghlan and Erturk Kocalar

Object name: Intel 8008 microprocessor

Vintage: 1972

Synopsis: Intel's first and very early 8-bit microprocessor.

### **Description:**

The Intel 8008 [1] is one of the earliest microprocessors, and Intel's first 8-bit microprocessor. Its design had a very convoluted history [2][3][4][5]. *Computer Terminal Corporation (CTC)* proposed the architecture as a single-chip replacement of the logic of their *Datapoint 3300* desktop calculator, and approached Intel, where Stan Mazor suggested a single-chip 8-bit microprocessor instead. Although not enthusiastic, Intel contracted in early 1970 to make the *Intel 1201*, with Texas Instruments for a second source *TMX1795*. Intel's samples were delayed, and T.I.'s were rejected, so CTC reverted to discrete logic for their *Datapoint 2200*, and halted the 1201 contract with Intel. Then in 1971, after interest from Seiko, Federico Faggin, the designer of the 4004, became the 1201 project leader, supervising Hal Feeney, and after some redesign the new 1201 was completed in late 1971. As happened with Intel's 4004 contract with Busicom, CTC gave the 1201 intellectual property to Intel in exchange for waiving the contract fees due to Intel. Intel then renamed it the 8008, an 8-bit echo of the 4-bit 4004.

The 8008 used 3,500 transistor in 10µm silicon-gate enhancement-mode pMOS logic. The early 8008 ran at 500kHz (the later 8008-1 at 800kHz), and while instructions executed slower, applications ran faster than on the 4-bit 4004. Intel had a policy of using small packages, so chose to multiplex address and data for both the 16-pin 4004 and 18-pin 8008, meaning even a simple 8008 memory interface needed about 30 external logic chips (the 4004 had its 4003 memory chip, whereas the next generation, the 8080, overcame this disadvantage by using a 40-pin package, but was not binary compatible with the 8008, while the next generation again, the 8086, was a non-strict extension of the 8080). Another disadvantage was that when an interrupt was signaled on the INT pin, there was no way to save the 8008 state; again external hardware was needed. Furthermore the 8008 didn't have a reset input so when powered-up, it just halted; the interrupt line had to be used to inject the start-up code, usually a JUMP to the reset routine. Nonetheless it became a successful product, and, much more importantly, the philosophical foundation of the hugely successful x86 family that has powered and still does power a large proportion of personal computers (PCs), laptop derivatives, and computer-centre and datacenter servers.

There were and are many demonstration/development boards or systems for the 8008. In this Collection these are represented by a *Retrosshield* designed by Erturk Kocalar, which uses an Arduino host to mimic the original 8008 external environment, such that it can execute original 8008 software. Such software began as simple debug kernels but then gradually evolved to include simple operating systems and languages, e.g. SCALBAL (SCientific ELementary BASIC Language) was released in 1976 (its last living author is Mark G. Arnold or 'MGA').

Many thanks to Brian Coghlan and Erturk Kocalar for donating these items.

The homepage for this catalog is at: <https://www.scss.tcd.ie/SCSSTreasuresCatalog/>  
 Click 'Accession Index' (1st column listed) for related folder, or 'About' for further guidance.  
 Some of the items below may be more properly part of other categories of this catalog,  
 but are listed here for convenience.

Accession Index	Object with Identification
<a href="#">TCD-SCSS-T.20250918.001</a>	Intel 8008 microprocessor. Intel's first and very early 8-bit microprocessor. 1972.
<a href="#">TCD-SCSS-T.20250918.001.01</a>	Intel D8008 microprocessor [Erturk Kocalar].
<a href="#">TCD-SCSS-T.20250918.001.02</a>	Intel D8008-1 microprocessor [Brian Coghlan].
<a href="#">TCD-SCSS-T.20250918.002</a>	Arduino shield for Intel 8008. A board that enables execution of software by the 8008, Intel's first and a very early 8-bit microprocessor, 2025.
<a href="#">TCD-SCSS-X.20250916.001</a>	Dr.Brian Coghlan's Collection of Early Microprocessors. An extensive and nearly complete set of unused 1970s microprocessor chips, most accompanied with documentation, some with demonstration boards. 1971.

### References:

1. Wikipedia, *Intel 8008*, see:  
[https://en.wikipedia.org/wiki/Intel\\_8008](https://en.wikipedia.org/wiki/Intel_8008)  
 Last browsed to on 18-Sep-2025.
2. Roger Arrick, *Interview of Ken Burgett on 1972 interest in 8008*, 10<sup>th</sup> November, 2017, see:  
<https://www.rogerarrick.com/osiris/burgett.txt>  
 Also: <https://treasures.scss.tcd.ie/hardware/TCD-SCSS-T.20250918.001/Interview-KenBurgett-on-1972-interest-in-8008-by-RogerArrick-10Nov2017.pdf>  
 Last browsed to on 18-Sep-2025.
3. Don Hoefler, *Silicon Valley U.S.A.*, Electronic News, 11<sup>th</sup> January, 1971, see:  
<https://treasures.scss.tcd.ie/hardware/TCD-SCSS-T.20250918.001/SiliconValleyUSA-DonHoefler-11Jan1971-ElectronicNews-102689013-01-05-acc.pdf>  
 Last browsed to on 18-Sep-2025.
4. Stan Mazor, *The History of the Microcomputer Invention and Evolution*, Vol.83, No.12, Proc.IEEE, December, 1995, see:  
<https://treasures.scss.tcd.ie/hardware/TCD-SCSS-T.20250918.001/The-History-of-the-Microcomputer-Invention-and-Evolution-StanMazor-ProcIEEE-Vol83-No12-Dec1995.pdf>  
 Last browsed to on 18-Sep-2025.
5. David Laws, *Who invented the microprocessor*, Computer History Museum, 16<sup>th</sup> September, 2025, see:  
<https://treasures.scss.tcd.ie/hardware/TCD-SCSS-T.20250918.001/Who-invented-the-microprocessor-DavidLaws-CHM-20250916.pdf>  
 Last browsed to on 18-Sep-2025.

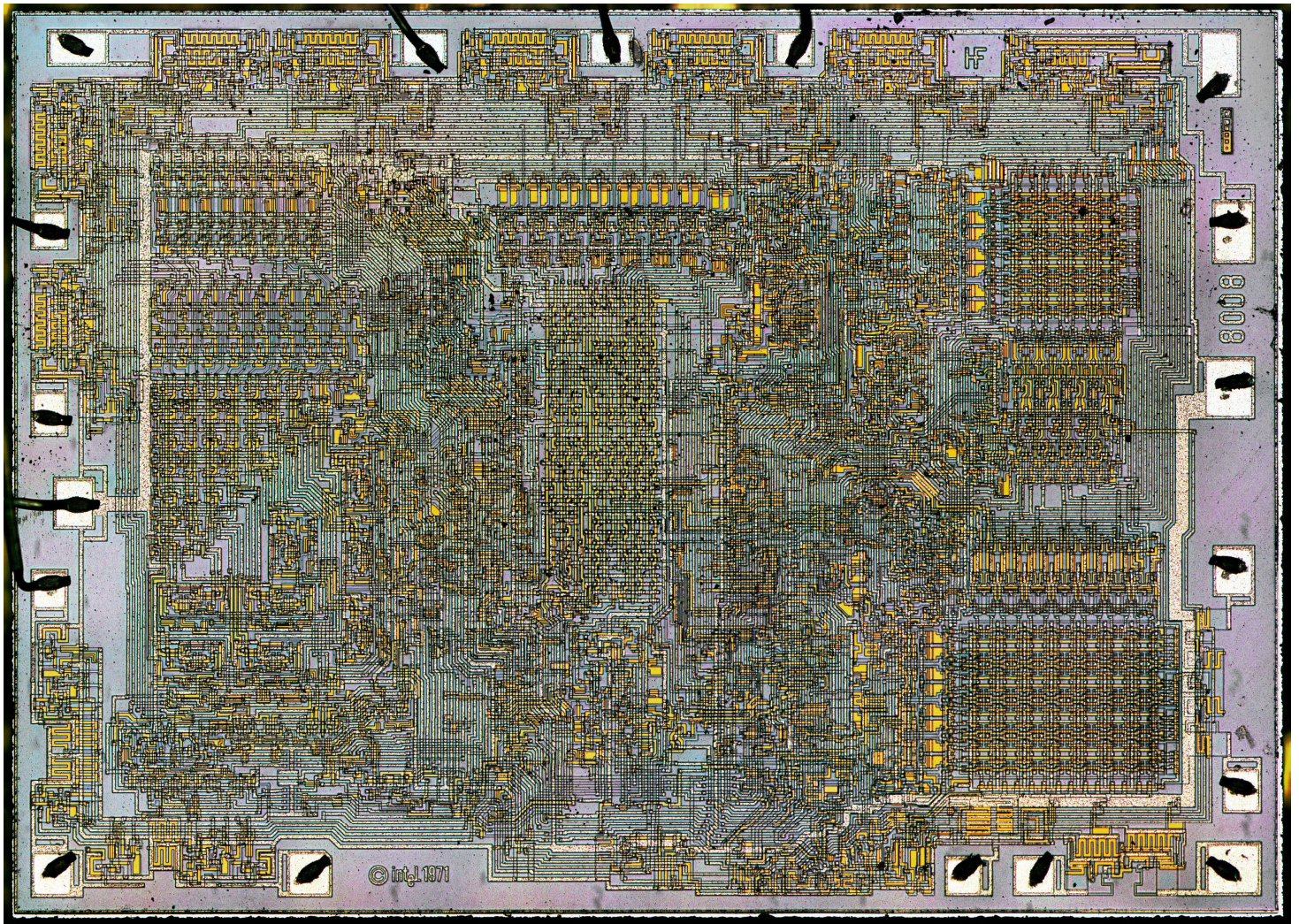


Figure 1: Intel 8008 chip die micrograph (from Ken Shirriff).

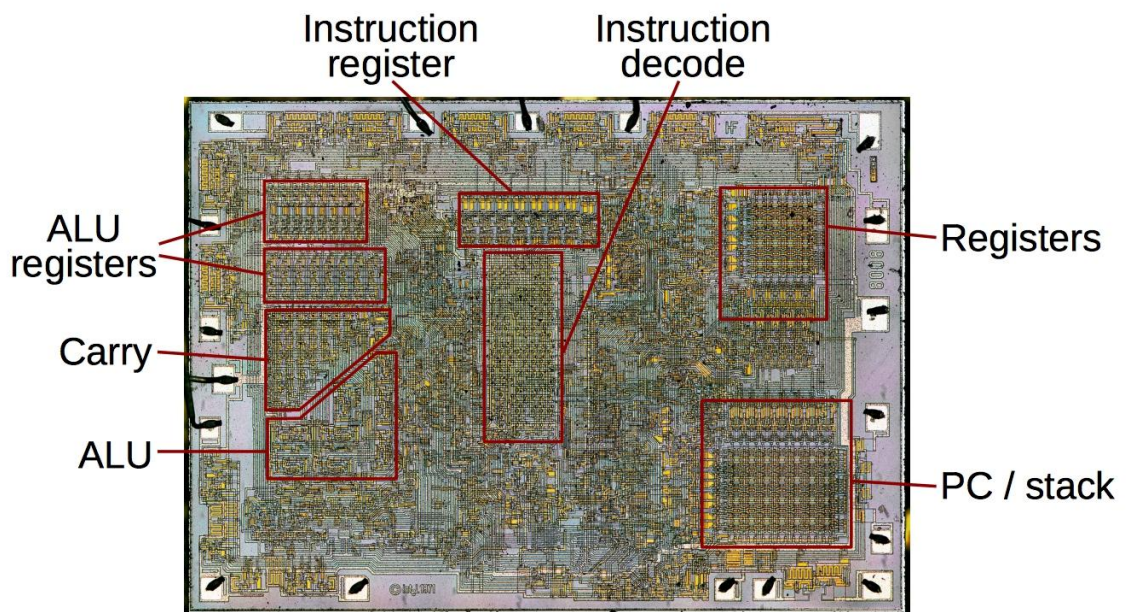


Figure 2: Intel 8008 annotated chip die micrograph (from Ken Shirriff).

**Intel 8008 Microarchitecture**

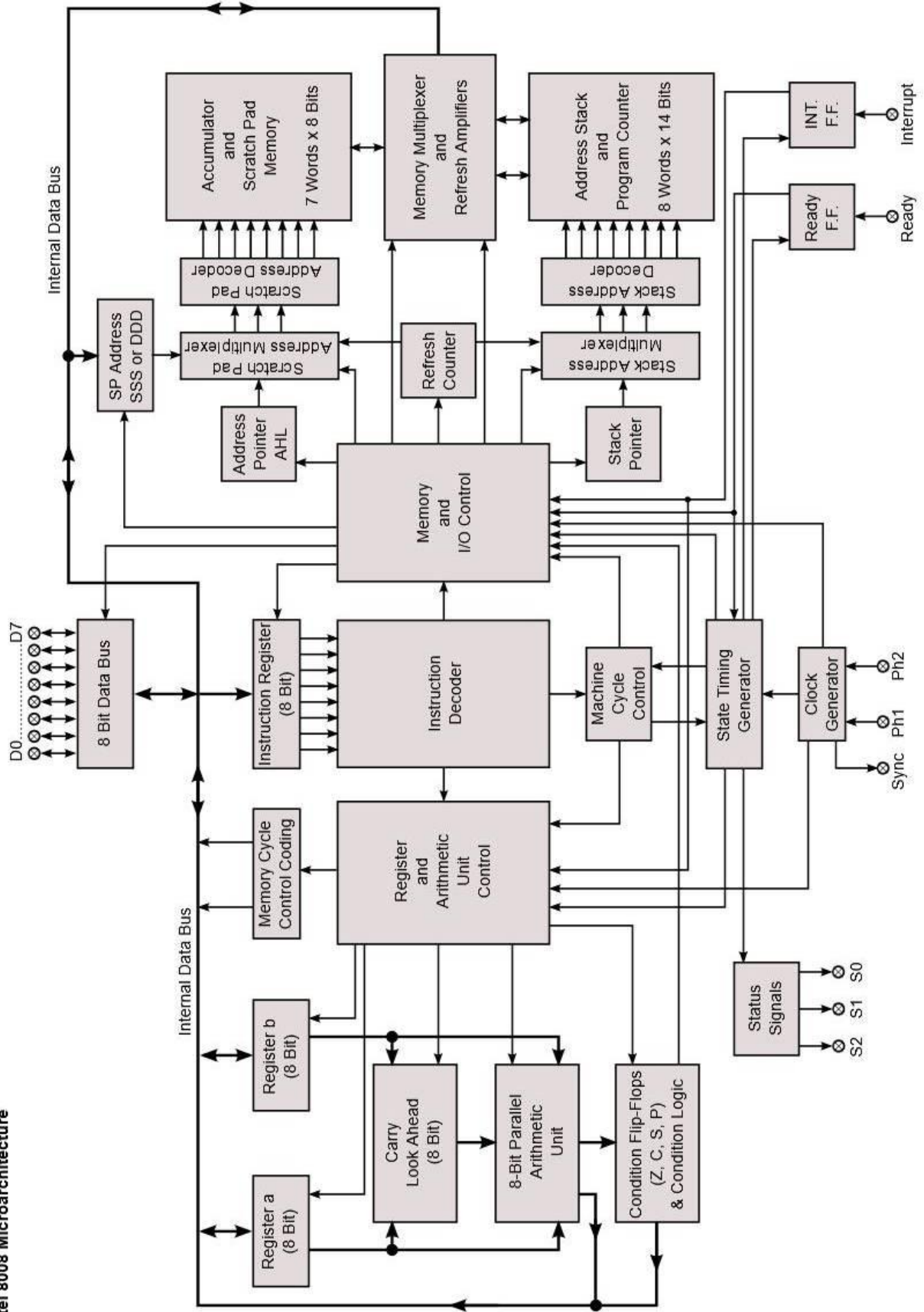


Figure 3: Intel 8008 architecture (from Wikipedia).

## Intel 8008 registers

1 3 2 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 (bit position)	
<b>Main registers</b>	
	A      Accumulator
	B      B register
	C      C register
	D      D register
	E      E register
	H      H register (indirect)
	L      L register (indirect)
<b>Program counter</b>	
PC	Program Counter
<b>Push-down address call stack</b>	
AS	Call level 1
AS	Call level 2
AS	Call level 3
AS	Call level 4
AS	Call level 5
AS	Call level 6
AS	Call level 7
<b>Flags</b>	
C P Z S Flags <sup>[13][a]</sup>	

Figure 4: Intel 8008 registers (from Wikipedia).

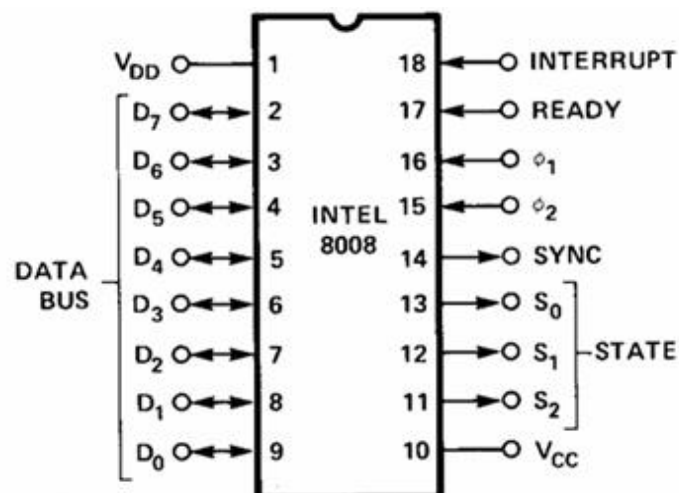


Figure 5: Intel 8008 pinout (from Wikipedia).

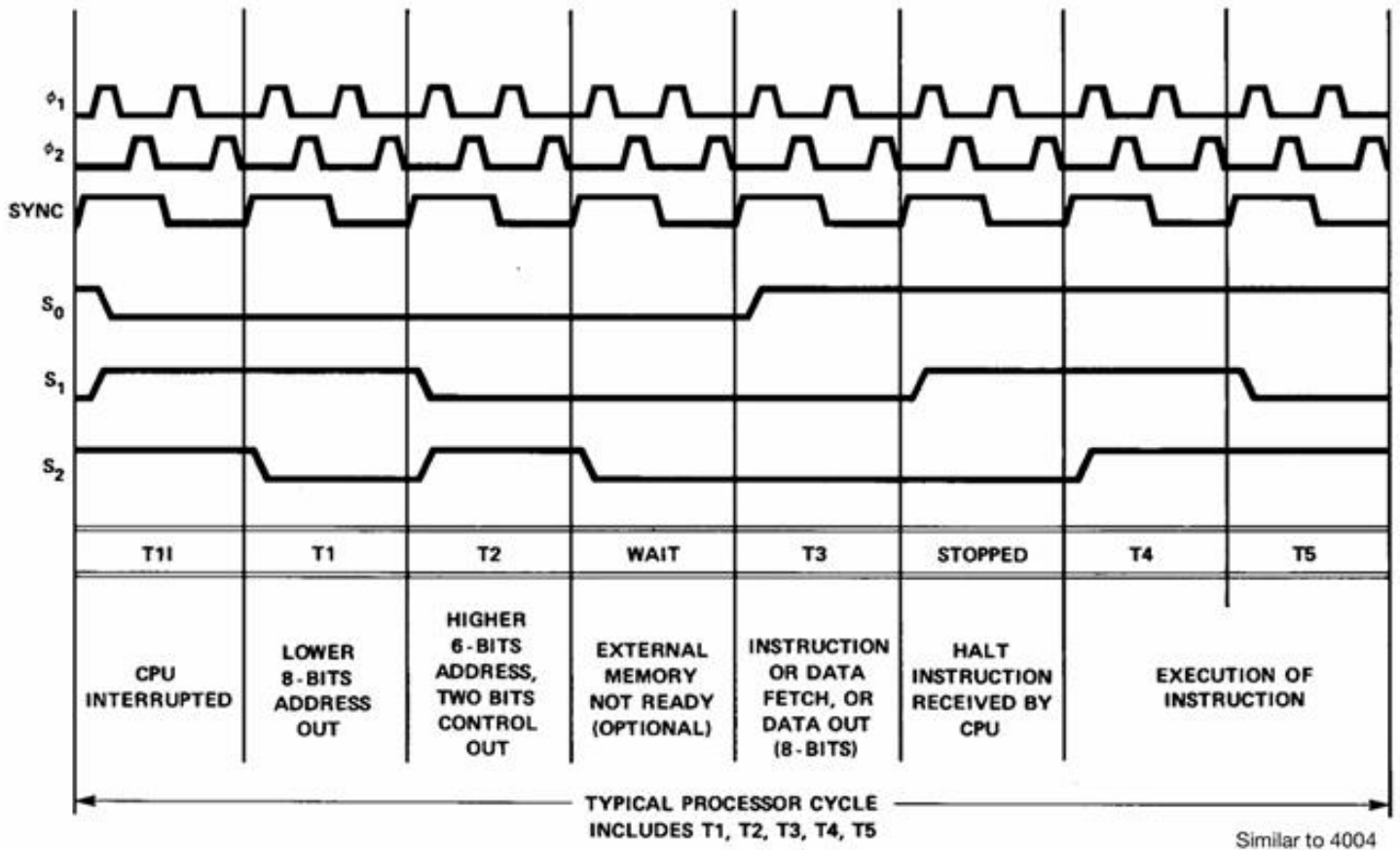


Figure 6: Intel 8008 instruction cycle (from 8bitforce).

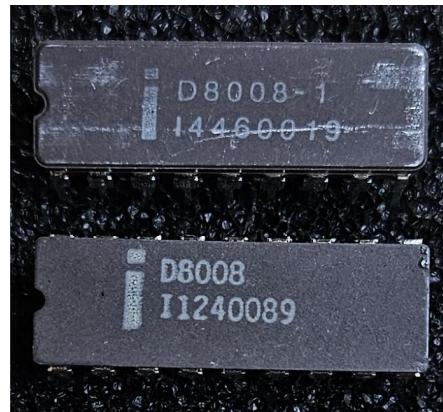


Figure 7: Intel 8008 (500kHz clock) and Intel 8008-1 (800kHz clock) top view.