

AccessionIndex: TCD-SCSS-T.20121208.064

Accession Date: 8-Dec-2012

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Object name: Sequent Symmetry S27

Vintage: c.1987

Synopsis: Second-generation commercial symmetric multiprocessor (SMP) minicomputer, i80386-based, running Dynix.

Description:

The Sequent Symmetry was introduced in 1987 as a second-generation commercial symmetric multiprocessor (SMP) minicomputer, i80386-based, with new caches and a wider memory bus, a successor to their first-generation Balance series based on the NS32000 microprocessors. The main competitor was the NS32000-based Encore Multimax machines. Both companies were pioneers of large-scale symmetric multiprocessing, which with contemporary advances in cache coherency protocols had become a hot topic.

The Symmetry S27 could include up to five identical dual-CPU modules with a two-way set-associative copy-back 64kB cache per CPU, all acting as peers, executing a single copy of the operating system kernel and sharing a single pool of memory. Only during system startup or diagnostics did the concept of a 'master CPU' apply. All CPUs, memory and I/O modules plugged into a single backplane (the 80MB/s 64-bit Sequent system bus, or SSB). I/O could be extended via an optional Multibus interface and chassis.

A user-accessible locking mechanism in a proprietary SLIC device provided hardware support for mutual exclusion. Each CPU had its own SLIC, as did each other module in the system. A high-speed synchronous 1-bit serial SLIC bus on the backplane, quite similar to the IEEE-896 Futurebus configuration bus, interconnected all the SLICs in the system to exchange interrupt, control, configuration and error information. The BIC, TAC and SLIC chips were made for Sequent under licence.

The S27 ran Sequent's Dynix, a port of Berkeley BSD 4.2 with demand-paged virtual memory, and supporting both BSD and System V command sets via *ucb* and *att* universes. Users could simultaneously operate both universes.

Trivia1: S27 indicates a performance of 27MIPS with ten CPUs.

Trivia2: Sequent was started in 1983 by ex-Intel staff after the failed iAPX432 object-oriented 'mainframe on a chip' project was cancelled.

The system in this collection was acquired after Oracle (Dublin) decommissioning. It included a CPU cabinet and disk cabinet. The latter had a Sequent dual-channel SMD Disk Multiplexor board and two Fujitsu SMD disks and was stripped and repurposed. The remaining CPU cabinet contains one dual-CPU module, two non-interleaved memory modules (one 40MB, the other 8MB), a SCSI/Ethernet (SCED) module, a dual-channel disk controller (DCC) module, a Multibus module (MBA), and a Multibus chassis. Dynix 3.1.2#3 was installed. Documentation was also acquired.

On boot the system found the following modules:

Module	SLIC	Function
MEM 0	10	40MB memory
MEM 1	12	8MB memory
MBAD 0	24	Multibus interface
SCED 0	22	SCSI/Ethernet interface
ZDC 0	20	Dual-channel Disk Controller (DCC)
CPU 0/1	2/3	Dual 20MHz i80386 CPUs with 2 x 64kB cache

On boot the system found the following devices. Device /dev/rzd0 is an 'm2344k'.

Module	Function	Devices
MBAD 0	Multibus interface	st0: not responding zt0: responding xt0 zt0 drive 0 xt1: zt0 drive 1
SCED 0	SCSI/Ethernet interface	co0-3: serial lines 0-3 se0-1: Ethernet ts0: SCSI tape cartridge drive sm0: ???
ZDC 0 (DCC)	Dual-channel Disk Controller	zd0: zd(0,0) Fujitsu M2344k (Dynix boot)

For posterity, the original SCSI boot disk for Dynix has been duplicated onto a Fujitsu 330MB SCSI disk, and verified to boot correctly. Its partitions are as follows:

Partition	Usage	Configuration
zd0a	4.2	rw 1 1
zd0b	swap	
zd0c	/usr	
zd0d	/dev/demo/tables2	

The 70MB SCSI tape cartridge drive device /dev/rts0 automatically rewinds after each operation, while the same tape drive on /dev/rts8 does not. Commands *mt*, *rdump*, *tar* use /dev/rts8 correctly. The *restore* command seems to rewind even if /dev/rts8 is used.

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
TCD-SCSS-T.20121208.064	Sequent Symmetry S27. Second-generation commercial symmetric multiprocessor (SMP) minicomputer, i80386-based, running Dynix, 1987.
TCD-SCSS-T.20121208.064.01	Sequent Symmetry S27 Chassis. S/N: ???
TCD-SCSS-T.20121208.064.02	Sequent Symmetry S27 Dual-CPU Module. Principal components: i80386 DX-20 i80387 DX-20 16 x Fujitsu MB81C79B-35 8 x 5C6408-25 2 x CY7C150-15 1k x 4 SRAM 2 x MK41H69-20 LIA2945 SLIC 2 x BDP BG 1003-45201 MK SC13AG-20A 2 x BIC TDL 1003-46939 MKJG07YG-20C CMC PRG 1003-47828 MKJF09YG-20C 40MHz CTAL Oscillator PCB No: 1003-49101 S/N: ???
TCD-SCSS-T.20121208.064.03	Sequent Symmetry S27 Memory 40MB Module. Principal components: 4 x 39 x KM41C1000AP-8 DRAM chips 2 x IDT 49C460CE 32-bit EDC LIA2945 SLIC 2 x BDP BG 1003-45201 MK SC13AG-20A BIC TDL 1003-46939 MKJG07YG-20C S/N: ???
TCD-SCSS-T.20121208.064.04	Sequent Symmetry S27 Memory 8MB Module. Principal components: ??? S/N: ???
TCD-SCSS-T.20121208.064.05	Sequent Symmetry S27 SCED Module. Principal components: N x Am29C520 (NS32016?) CPU NS32C201N-10 TCU NS32202 ICU Intel i82C54 Timer Zilog Z8530H-6PC dual serial I/O SEEQ DQ8023A SEEQ DQ8003 Ethernet Dallas DS1000-100, NCR5386 SCSI

	4 x TC5565-15 2 x 27512 EPROMs Sep-1991 2 x IDT 7201 IDT 7204 LIA2945 SLIC S/N: ???
TCD-SCSS-T.20121208.064.06	Sequent Symmetry S27 DCC Module. Principal components: 2 x DP8466 AN-25 2 x AM2910-ADC 8 x Am29818-APC 16 x MCM6268P35 5 x MM2018AP-35 20 x 29F52 8 x 74F280 XICOR X28256-25 Flash ROM LIA2762 TAC LIA2945 SLIC S/N: ???
TCD-SCSS-T.20121208.064.07	Sequent Symmetry S27 MAB Module. Principal components: 4 x 93L422APC-25 11 x Am27S21 Intel i8031 LIA2945 SLIC S/N: ???
TCD-SCSS-T.20121208.064.08	Multibus Chassis. S/N: ???
TCD-SCSS-T.20121208.064.09	<Make?> <Model?> SCSI disk drive. S/N: ???
TCD-SCSS-T.20121208.064.10	Fujitsu M2622S-512 330MB SCSI disk drive. S/N: ???
TCD-SCSS-T.20121208.064.11	<Make?> <Model?> 70MB tape cartridge drive. S/N: ???
TCD-SCSS-V.20150617.001.01	Sequent Symmetry S27 Logbook. First entry 22-Nov-1990 Oracle, last entry Mar-1996 TCD.
TCD-SCSS-V.20150617.001.02	Sequent Symmetry Technical Summary. ID: 1003-44447 Rev.A, 4-Dec-1987
TCD-SCSS-V.20150617.001.03	Sequent Dynix System Administration Guide. ID: ???? Rev.1.2, 20-Nov-1989
TCD-SCSS-V.20150617.001.04	Sequent Symmetry Diagnostic Supervisor User's Guide. ID: 1003-47747-01 Rev.A, 2-Nov-1989
TCD-SCSS-V.20150617.001.05	Sequent Symmetry SCED Power-Up Monitor Guide, p1-39/40/41. ID: 1003-53553-00
TCD-SCSS-V.20150617.001.06	Sequent Parallel Processing System, Campus Timesharing and Scientific Research. Brochure ID: TR-1000 9/88
TCD-SCSS-V.20150617.001.07	Sequent S27 and S81 Parallel Computing Systems. Brochure ID: 1003-44915 Feb-1988

TCD-SCSS-V.20150617.001.08	ATS FORTRAN Compiler for Sequent Symmetry Series Parallel Computers. Brochure ID: PD-1025-4/89
TCD-SCSS-V.20150617.001.09	The X Window System Standard for Sequent Parallel Computers. Brochure ID: PD-1013 12/88
TCD-SCSS-V.20150617.001.10	Sequent Academic and Research Accounts. Brochure ID: TR-1000A 9/88
TCD-SCSS-V.20150617.001	Sequent Symmetry S27 Documentation, Sequent Symmetry S27 Logbook, Technical Summary, Dynix System Administration Guide, Diagnostic Supervisor User's Guide, SCED Power-Up Monitor Guide p.1-39/40/41, and brochures on Campus Timesharing and Scientific Research, S27 and S81 Parallel Computing Systems, ATS FORTRAN Compiler, X Window System, and Academic and Research Accounts. c.1987.
TCD-SCSS-V.20221015.004	Multimax Technical Summary. Encore Computer Corporation, 726-01759, Rev E, Jan-1989. 1989.



Figure 1: Sequent Symmetry S27 front view

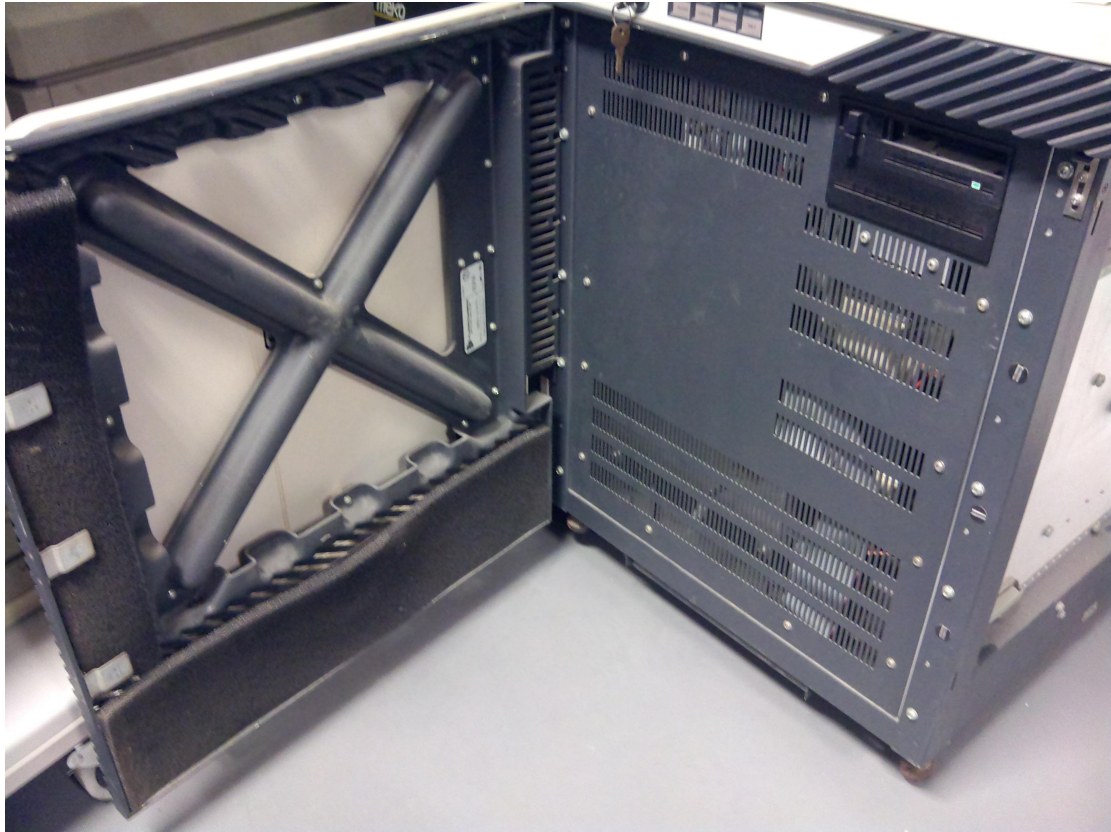


Figure 2: Sequent Symmetry S27 inside front view

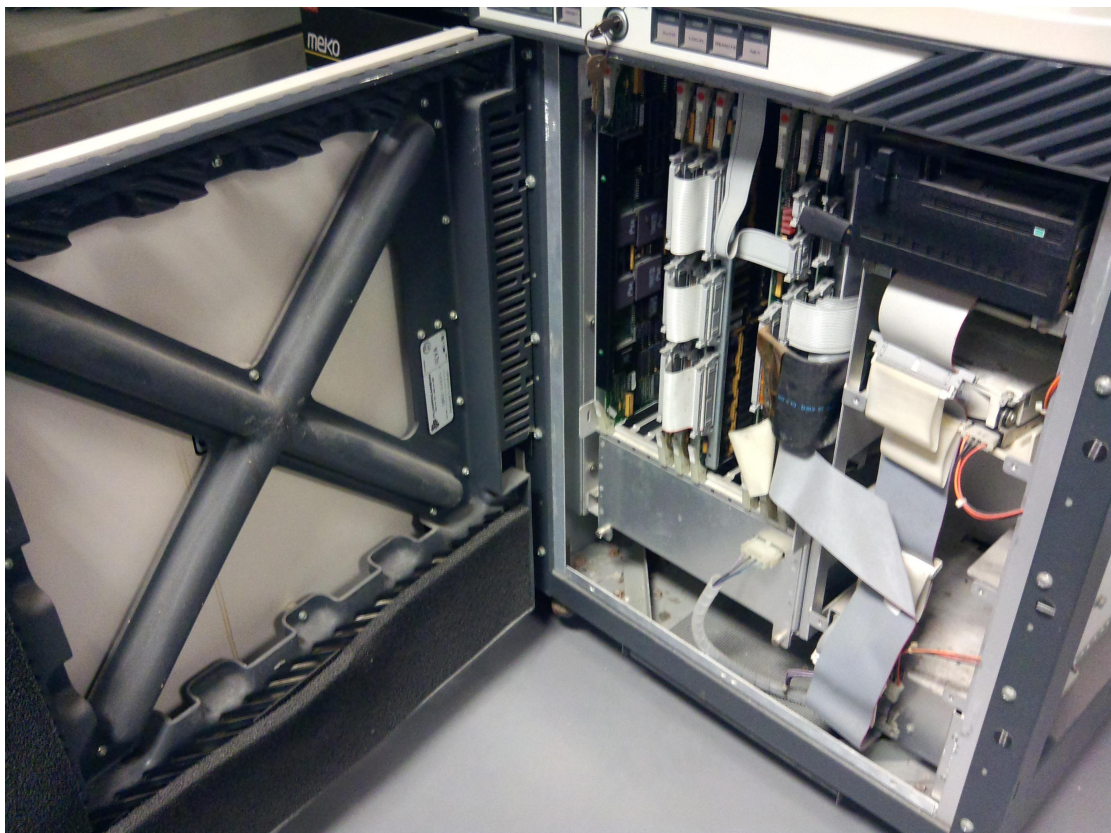


Figure 3: Sequent Symmetry S27 inside front view with cover removed

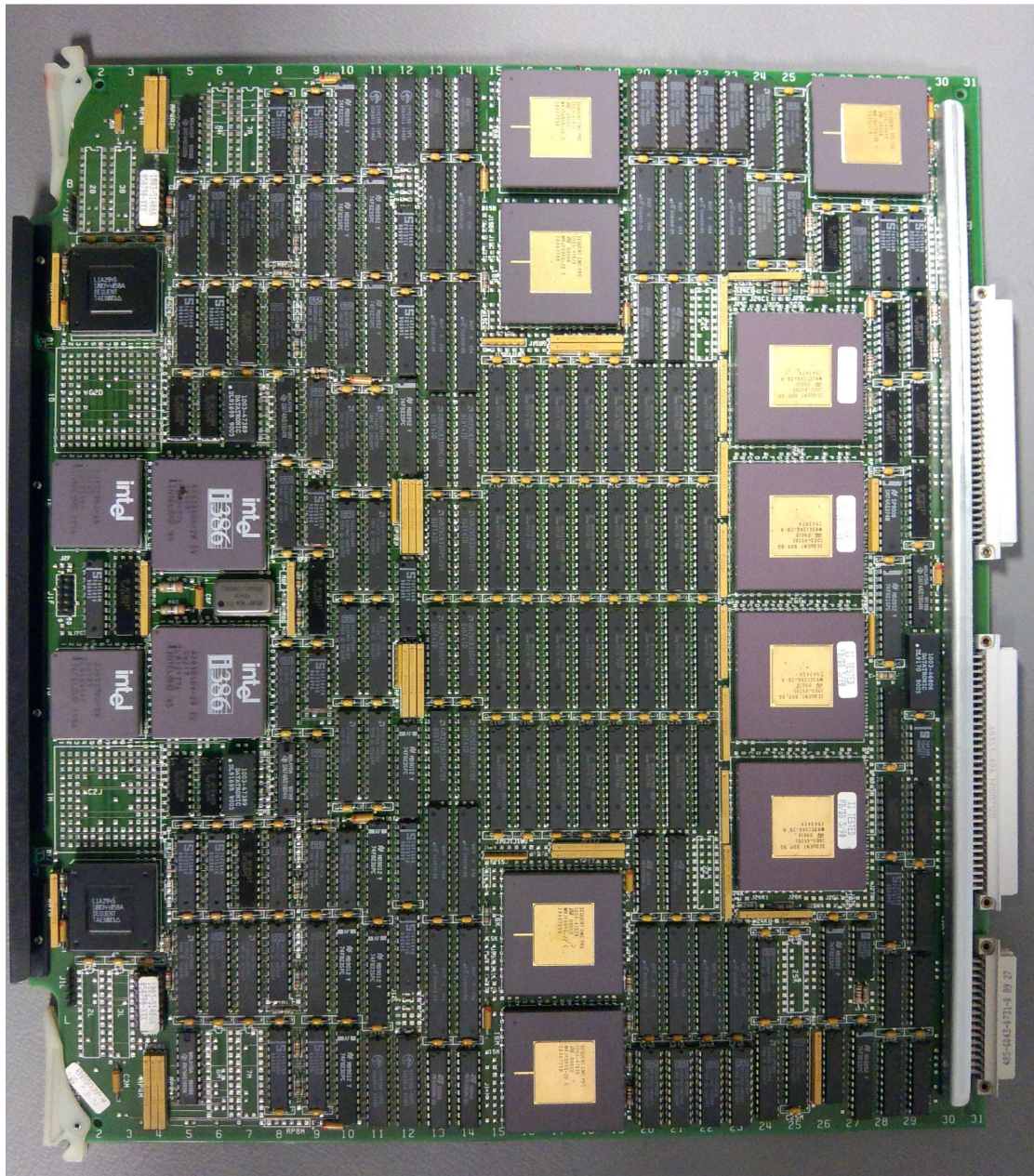


Figure 4: Sequent Symmetry S27 Dual-CPU Module top view

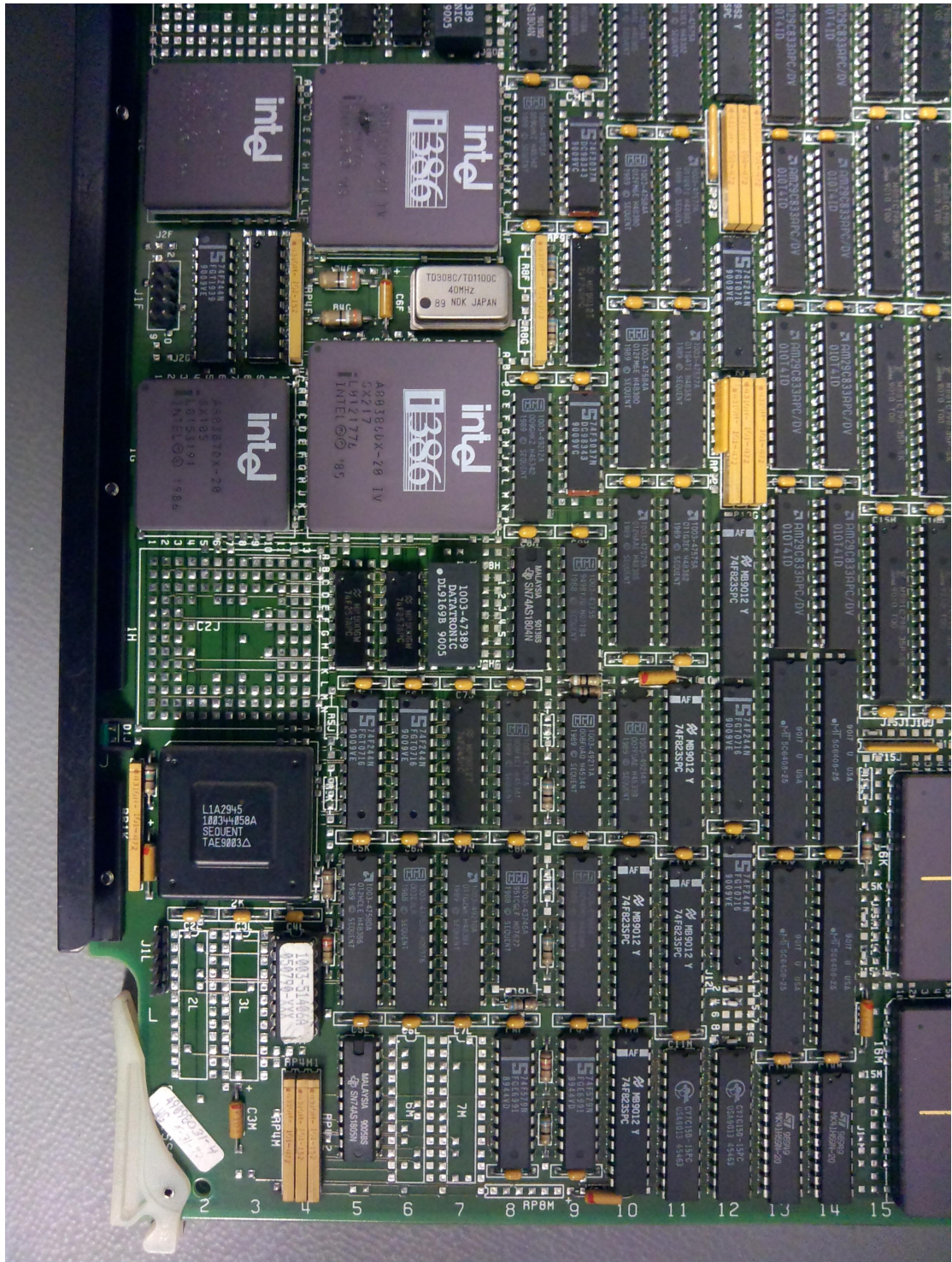


Figure 5: Sequent Symmetry S27 Dual-CPU Module top view closeup

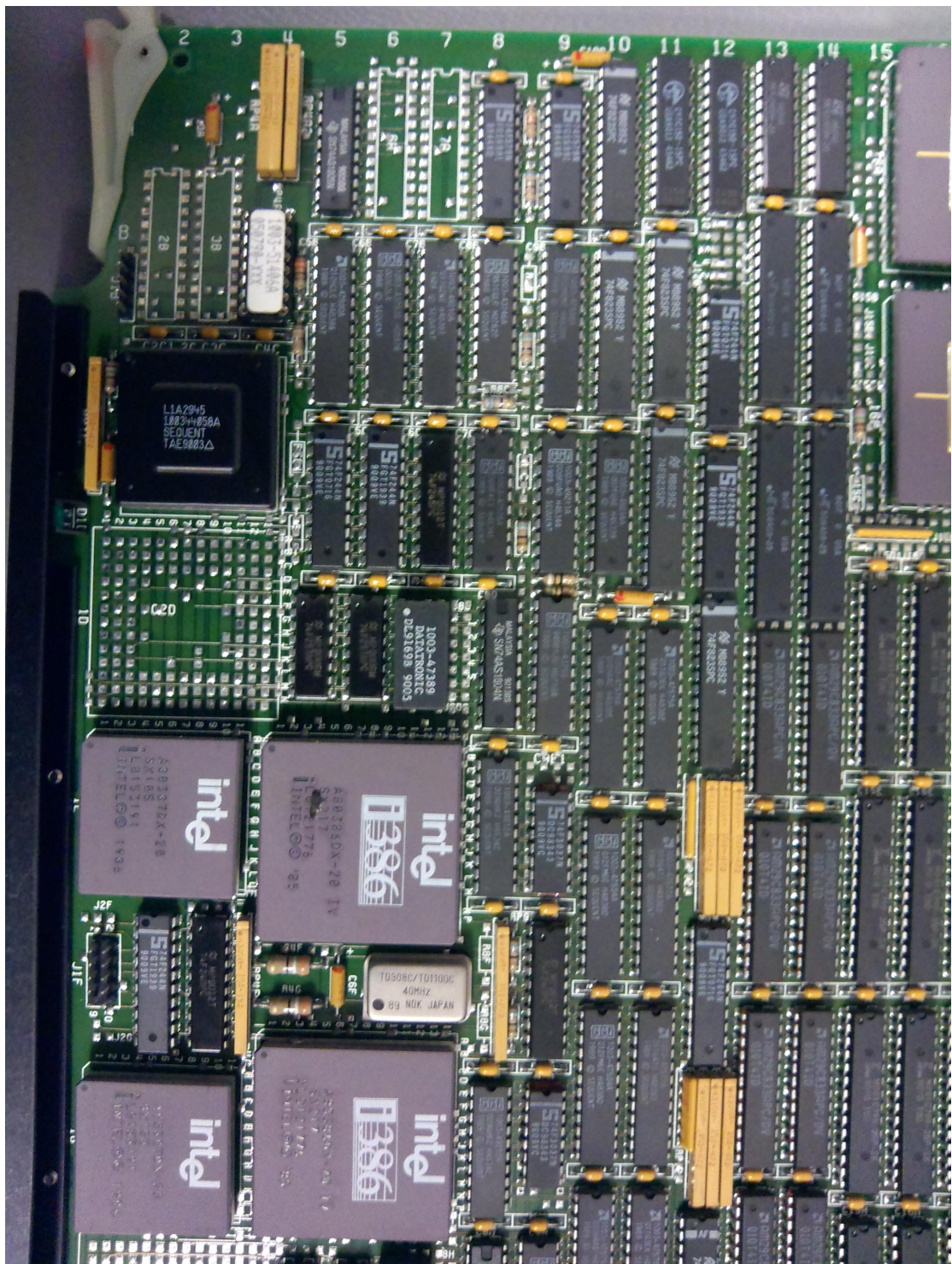


Figure 6: Sequent Symmetry S27 Dual-CPU Module top view closeup

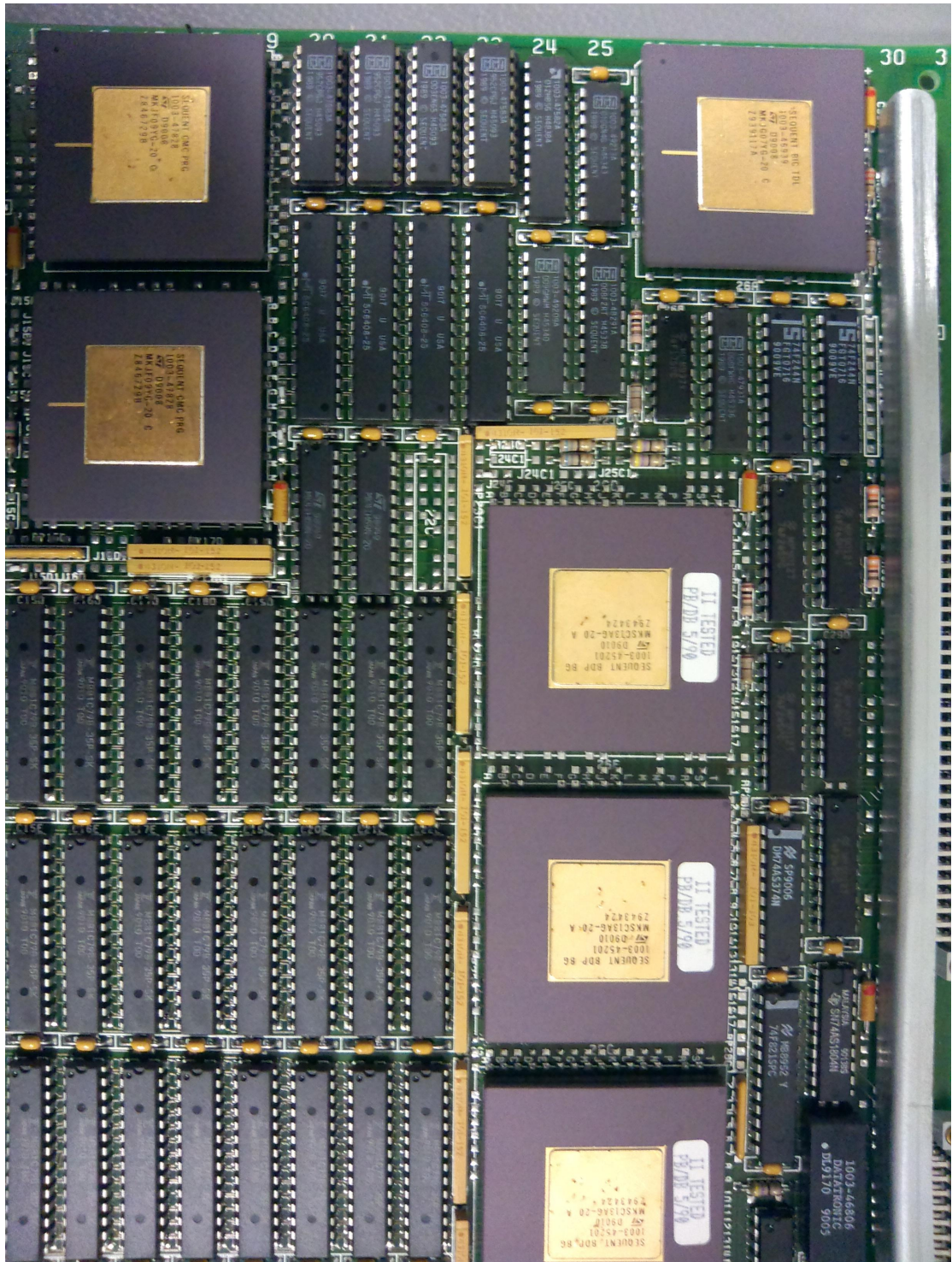


Figure 7: Sequent Symmetry S27 Dual-CPU Module top view closeup

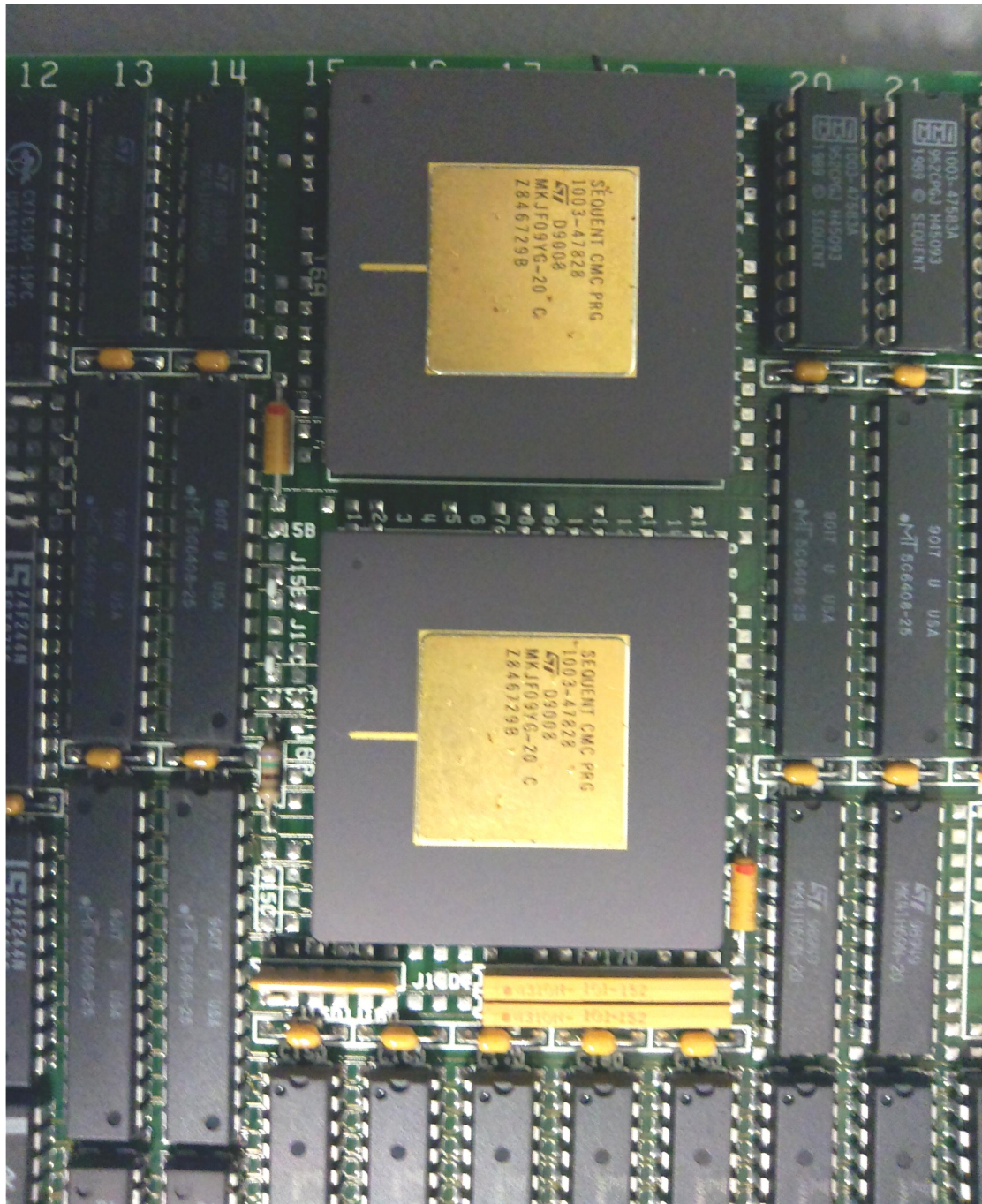


Figure 8: Sequent Symmetry S27 Dual-CPU Module top view closeup

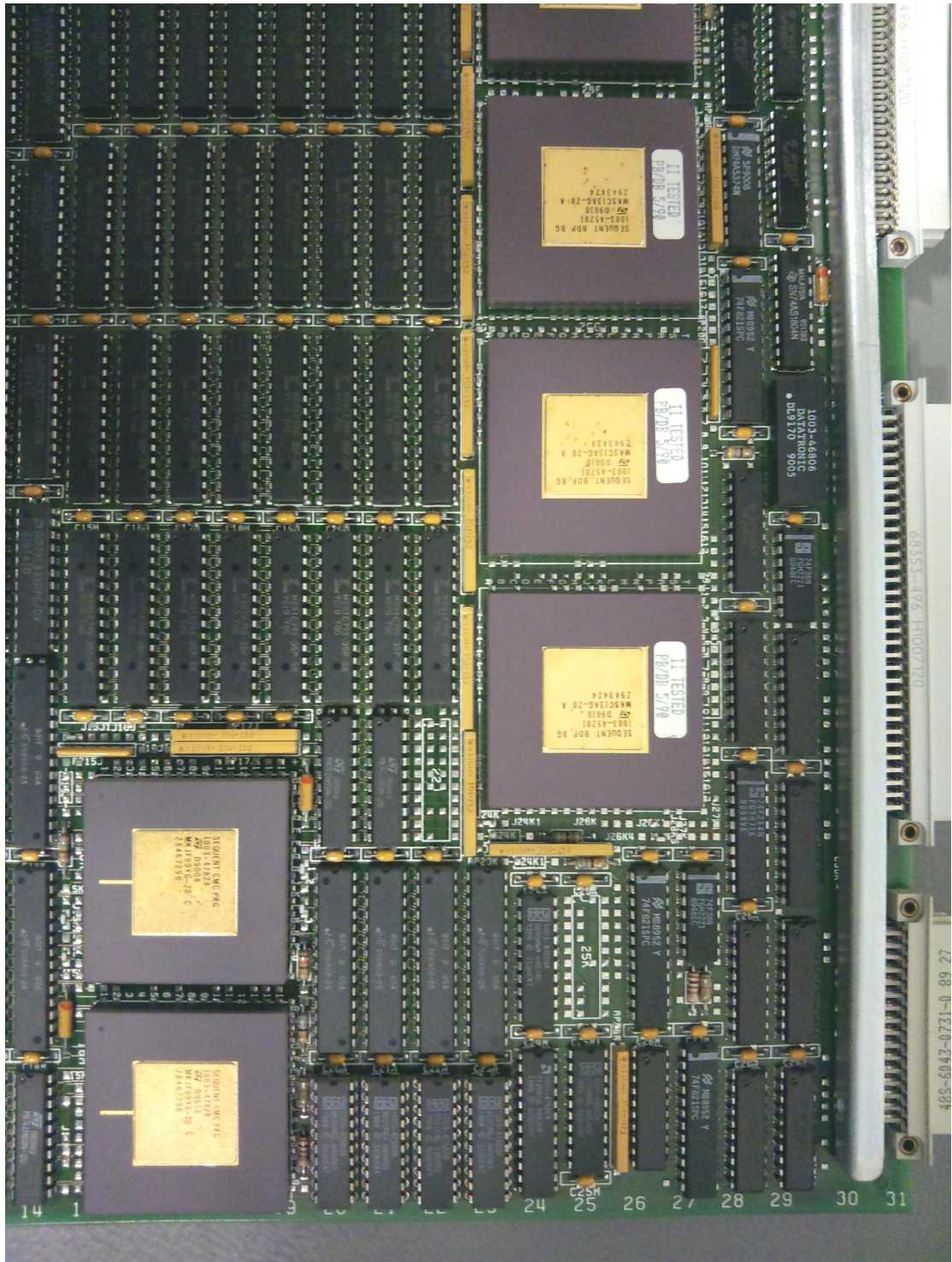


Figure 10: Sequent Symmetry S27 Dual-CPU Module top view closeup

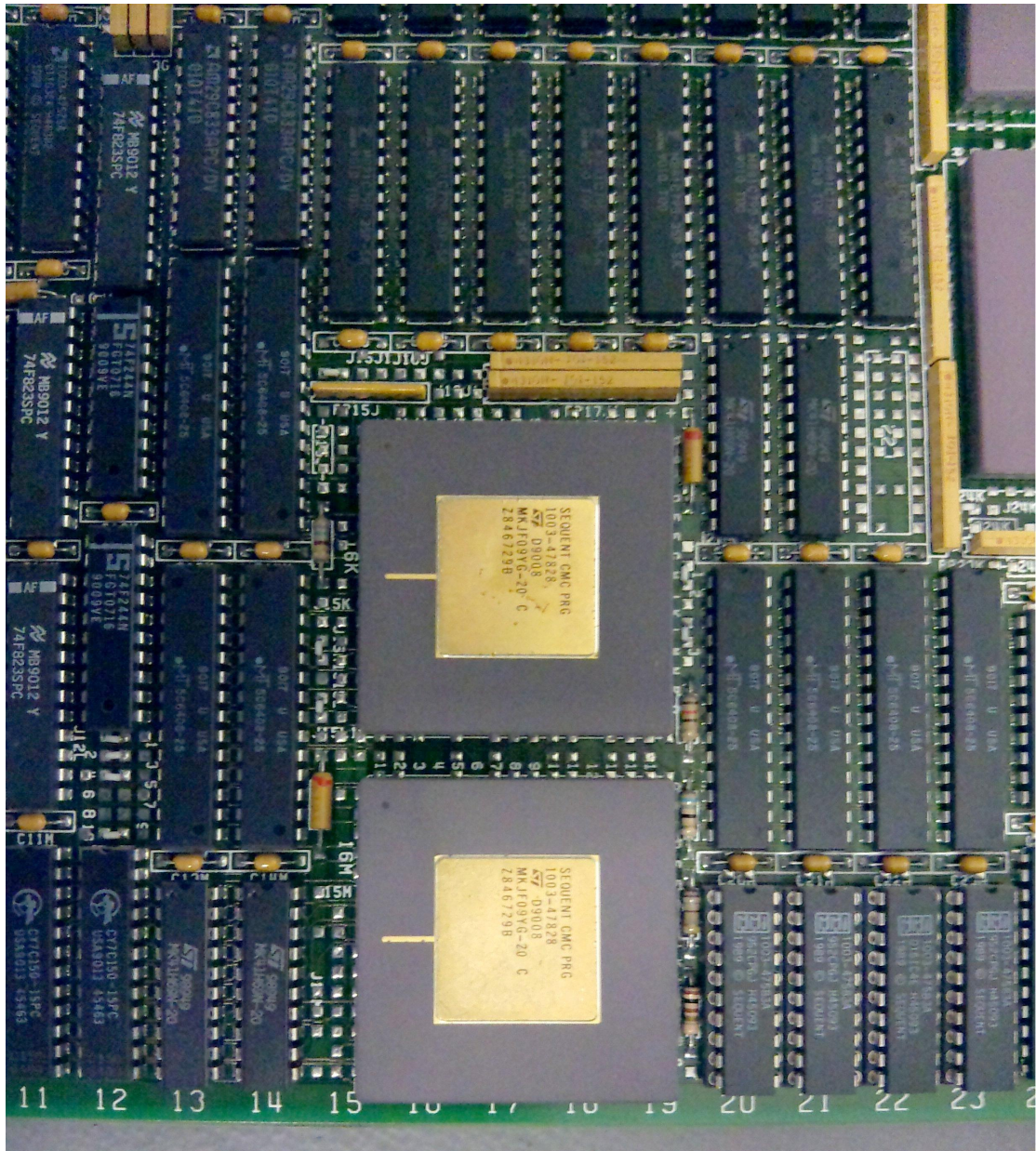


Figure 11: Sequent Symmetry S27 Dual-CPU Module top view closeup

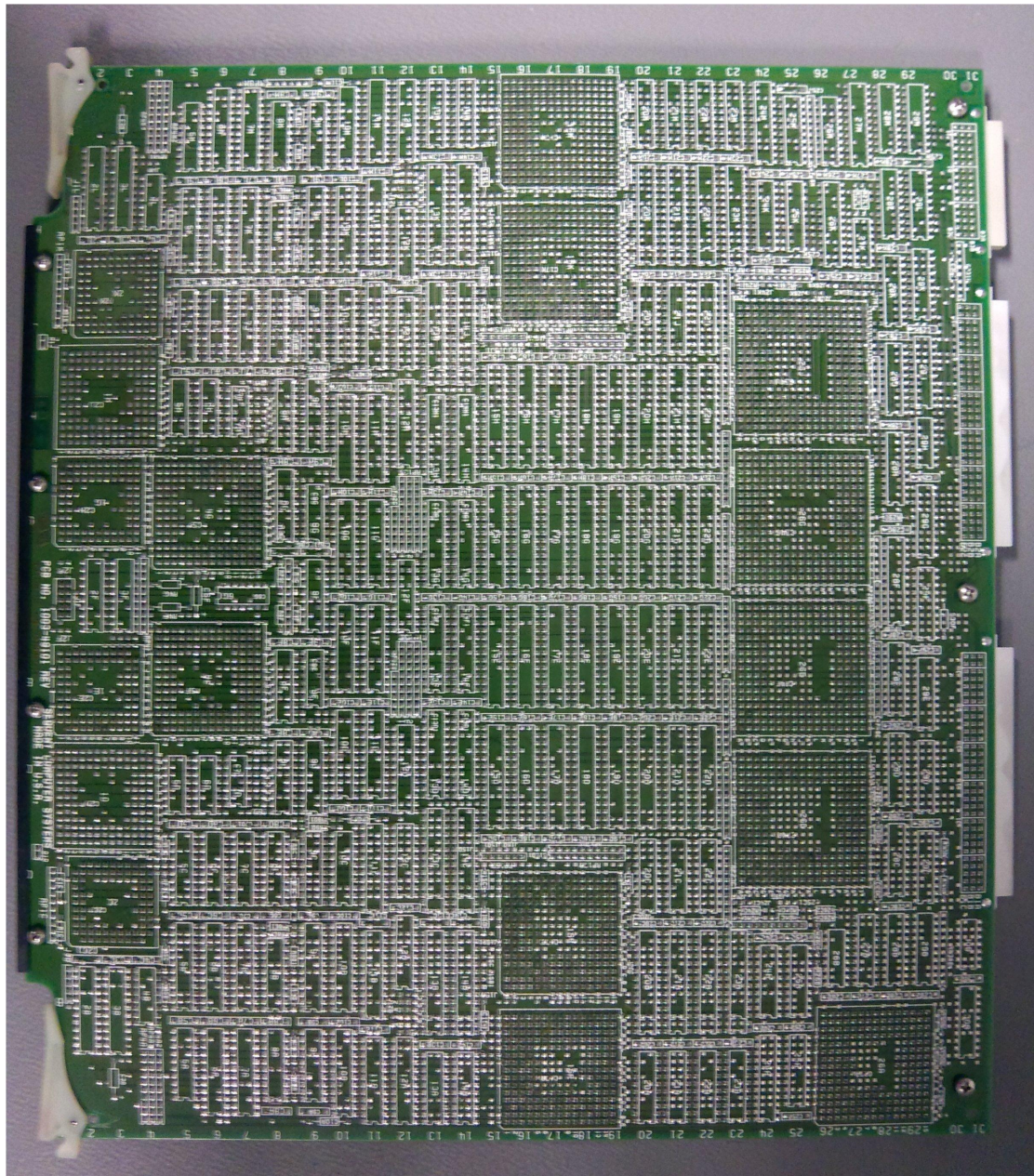


Figure 12: Sequent Symmetry S27 Dual-CPU Module rear view

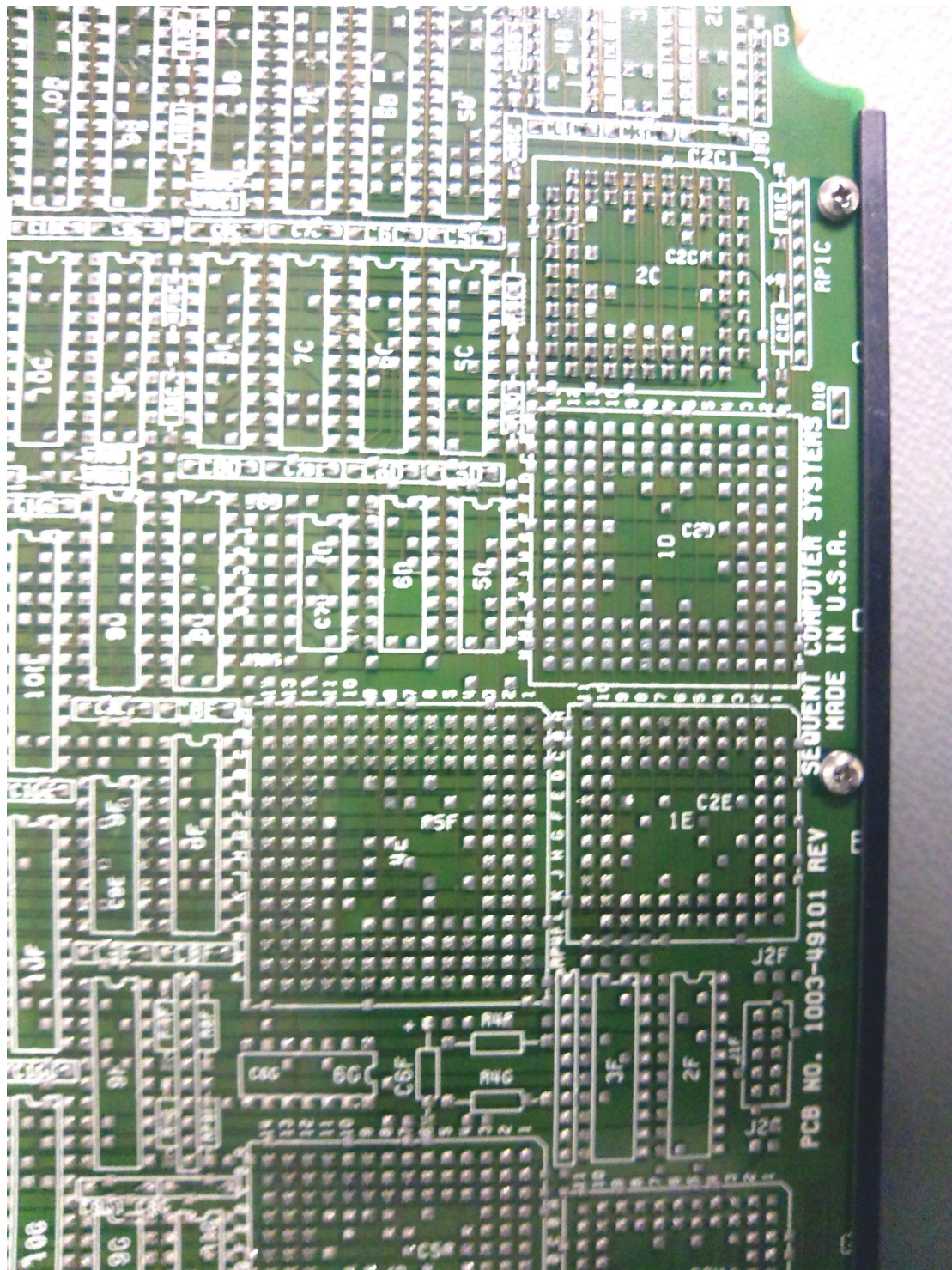


Figure 13: Sequent Symmetry S27 Dual-CPU Module manufacturing label closeup
 'PCB No. 1003-49101
 Sequent Computer Systems
 Made in U.S.A.'