

AccessionIndex: TCD-SCSS-T.20121208.082

Accession Date: 8-Dec-2012

Accession By: Dr.Brian Coghlan

Object name: Corollary XM SMP

Vintage: c.1992

Synopsis: Second-generation of first commercial IBM-PC-compatible symmetric multiprocessor (SMP).

Description:

George White was an MIT-graduate who became an influential designer, and who with Dave Godeau and Jeff Arnold created the elegant IEEE 1196-1987 32-bit NuBus standard, originally developed at MIT for the NuMachine built under subcontract by Western Digital (and LMI), then built into the LMI Lambda, and into Texas Instruments Explorer AI machines after they took over that part of Western Digital, and ultimately used by Apple for Macintosh-II products. Both White and Alan Slipson worked at the Western Digital division that was taken over by Texas Instruments. When it was closed they and venture capitalist Charles Hobbs then started Corollary Inc in the same factory in Irvine, California, with the aim to manufacture IBM-PC-compatible symmetric multiprocessors. The company, along with others like Sequent and Encore, became pioneers of symmetric multiprocessing, which with contemporary advances in cache coherency protocols had become a very hot topic.

Corollary's first-generation SMPs were based around a proprietary *C-bus*, which transferred up to 64MB/s using 4 x 32-bit block transfers. The machines could run SCO UNIX, but unlike Sequent and Encore SMPs, all system calls were handled by a 'master CPU', so they were not truly symmetric. This became an issue as Windows NT was implicitly symmetric, requiring OEM drivers if it were to run on asymmetric multiprocessors.

The Corollary XM SMP was introduced in 1992 as a second-generation commercial IBM-PC-compatible symmetric multiprocessor (SMP). It was based on an early version of their new proprietary Cbus-II bus. The XM allowed up to four Intel x86 CPUs, 3GB of shared memory, and up to two bus bridges to EISA or MCA I/O busses. The system in this collection has three CPU cards (and a spare), a serial I/O card (and a spare), a <??> I/O card, <??>MB memory, four system disks, a cartridge tape drive, and a dual 3.5"/5.25" floppy disk drive. The serial I/O card was effectively another CPU, but with four serial I/O ports. The system ran the OSF1/mk5 operating system. It was used to develop the *Stable Disk*, see elsewhere in this catalog.

Dr.Jeremy Jones (of the Dept.Computer Science, Trinity College Dublin) and his postgraduate student Danny Keogh discovered a flaw in the behaviour of the early Cbus-II cacheing protocol, confirmed this with logic analysis, and alerted Corollary, who then fixed the protocol.

The Cbus-II technology was targeted for 50MHz i80468 microprocessors, but Intel clock doubling CPUs forestalled that market, so eventually Corollary added another 32-bit data path exchange (DPE) chip and redesigned its integrated cache bus to enable use with the Intel P5 and Windows NT 5.0 (via NT's hardware abstraction layer, or HAL). The result was a 400MB/s 64-bit Cbus-II, with integrated ECC

memory and an ECC bus for data integrity, that could support up to eight CPUs and fully symmetric multiprocessing.

Various manufacturers entering the multiprocessing market licensed Corollary technology, such as Digital Equipment Corp, Compaq Computer Corp, Advanced Logic Research Inc, and Mitac (the Dept.Computer Science had a Mitac machine, now lost, beside their Corollary machine). In Aug-1996 Corollary became a wholly owned subsidiary of Intel, with the aim to accelerate the availability of eight-way server solutions based on the Intel architecture. George White remained the president of Corollary.

The Corollary XM documentation is properly part of the Literature category of this catalog, but is listed here too for convenience.

Accession Index	Slot	Object with Identification
TCD-SCSS-T.20121208.082.01		Corollary XM Chassis. S/N: ???
TCD-SCSS-T.20121208.082.02	1	Corollary <??> I/O card. S/N: ???
TCD-SCSS-T.20121208.082.03	2	Corollary CPU card (1). S/N: ???
TCD-SCSS-T.20121208.082.04	3	Corollary CPU card (2). S/N: ???
TCD-SCSS-T.20121208.082.05	4	-
TCD-SCSS-T.20121208.082.06	5	Corollary CPU card (3). S/N: ???
TCD-SCSS-T.20121208.082.07	6	Corollary Serial I/O card (1). S/N: ???
TCD-SCSS-T.20121208.082.08	7	Tolsys RAID card. S/N: ???
TCD-SCSS-T.20121208.082.09	8	-
TCD-SCSS-T.20121208.082.10	9	-
TCD-SCSS-T.20121208.082.11	10	-
TCD-SCSS-T.20121208.082.12	11	-
TCD-SCSS-T.20121208.082.13	12	Tolsys Stable Memory card. S/N: ???
TCD-SCSS-T.20121208.082.14	13	Corollary DRAM Memory card. S/N: ???
TCD-SCSS-T.20121208.082.15		Disk Drive (1). S/N: ???
TCD-SCSS-T.20121208.082.16		Disk Drive (2). S/N: ???
TCD-SCSS-T.20121208.082.17		Disk Drive (3). S/N: ???

TCD-SCSS-T.20121208.082.18		Disk Drive (4). S/N: ???
TCD-SCSS-T.20121208.082.19		Cartridge Tape Drive (1). S/N: ???
TCD-SCSS-T.20121208.082.20		Dual 3.5"/5.25"Disk Drive (1). S/N: ???
TCD-SCSS-T.20121208.082.21		spare Corollary CPU card (4). S/N: 886333C0190, P/N: 91-00554-001-02
TCD-SCSS-T.20121208.082.22		spare Corollary Serial I/O card (2). Assy. 411630814004 R0A-C486-25/33 BD
TCD-SCSS-V.20150617.002.01		Corollary XM Documentation ???.

<Corollary Inc, 18011 E.Skypark Circle, Irvine, California 92714 ?>

<Documentation ???>



*Figure 1: Corollary XM front three-quarter view
Cables are Stable Disk connections to external RAID chassis*



Figure 2: Corollary XM upper front closeup



Figure 3: Corollary XM middle front closeup



Figure 4: Corollary XM lower front closeup



Figure 5: Corollary XM front internal view



Figure 6: Corollary XM rear three-quarter view

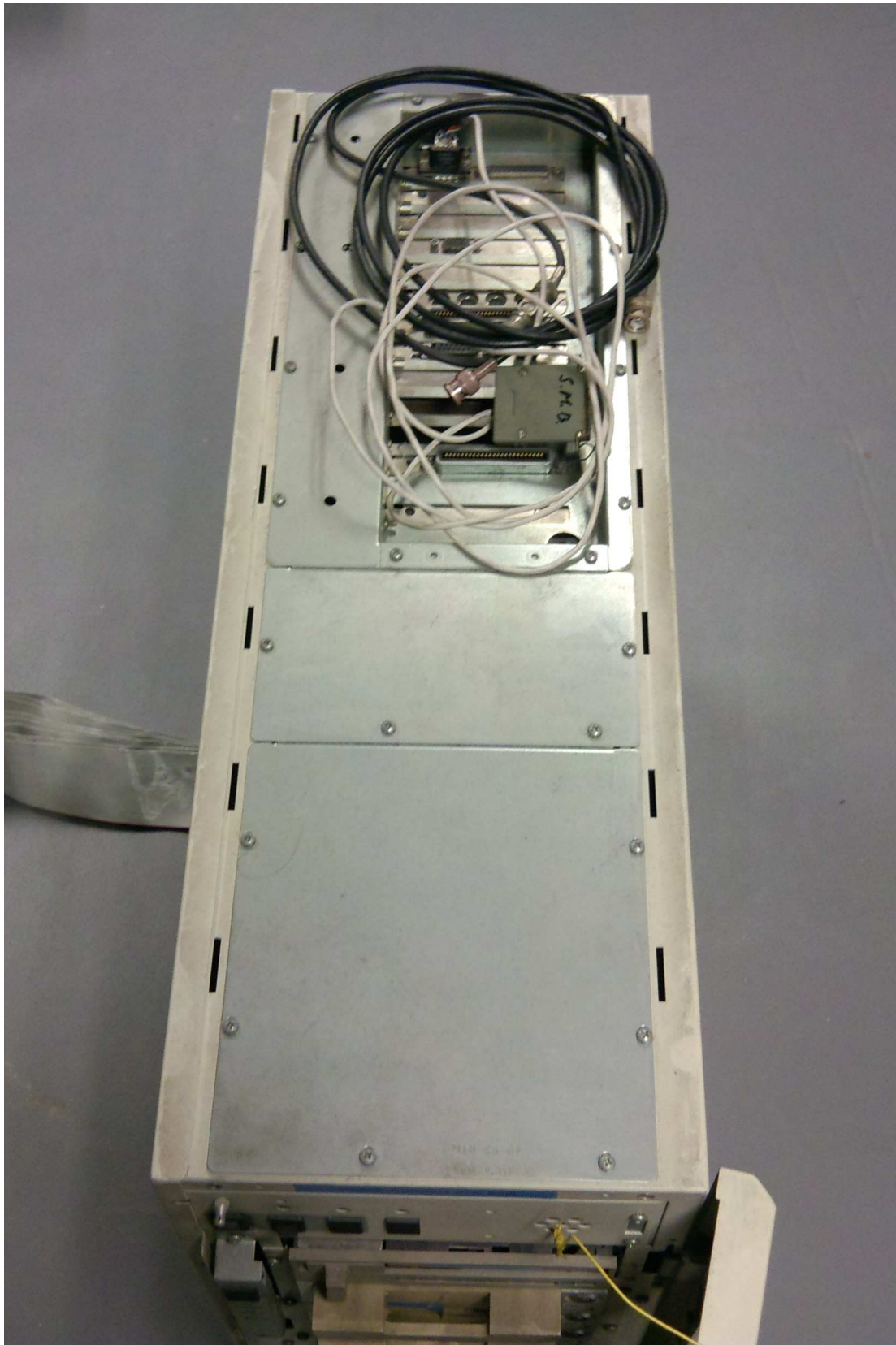


Figure 7: Corollary XM top view with cover removed

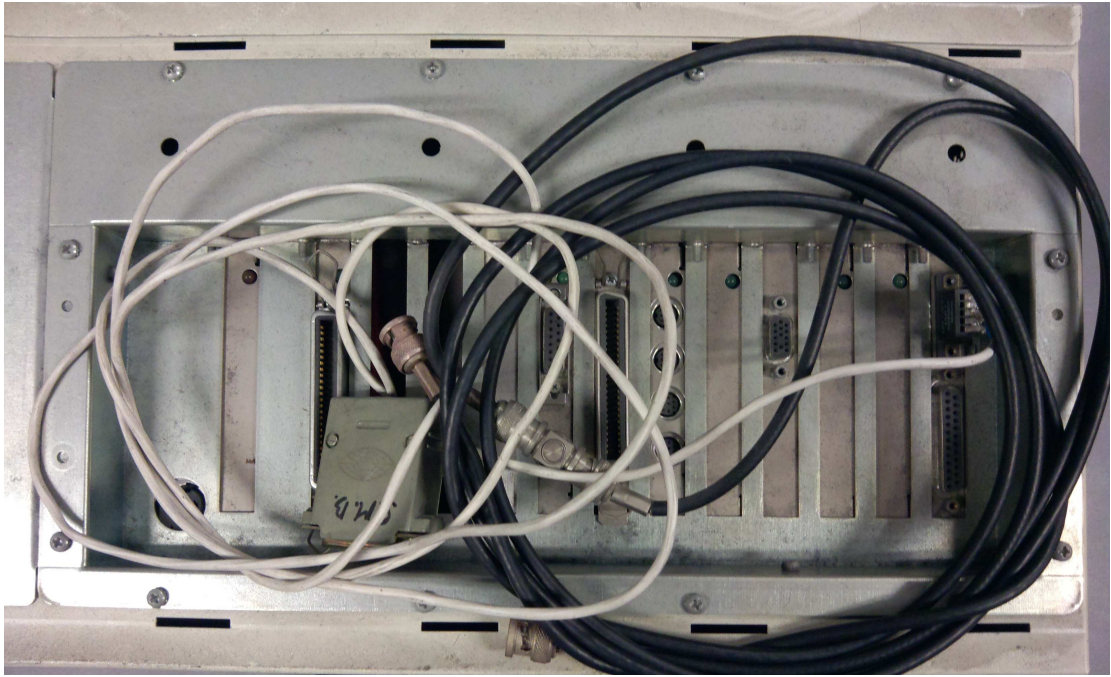


Figure 8: Corollary XM I/O chassis closeup with cover removed



Figure 9: Corollary XM left side internal view

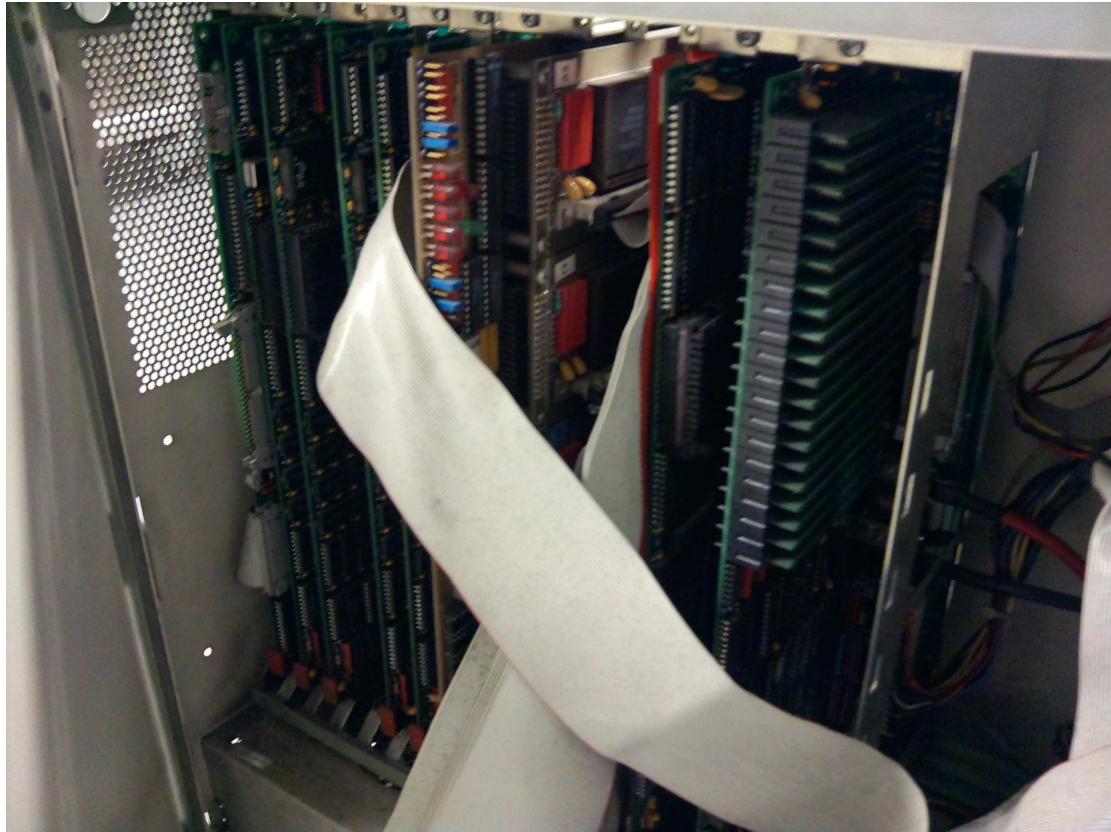


Figure 10: Corollary XM left side internal closeup
Left: CPU and I/O cards
Middle: Stable Disk RAID card and stable memory card
Right: DRAM Memory card

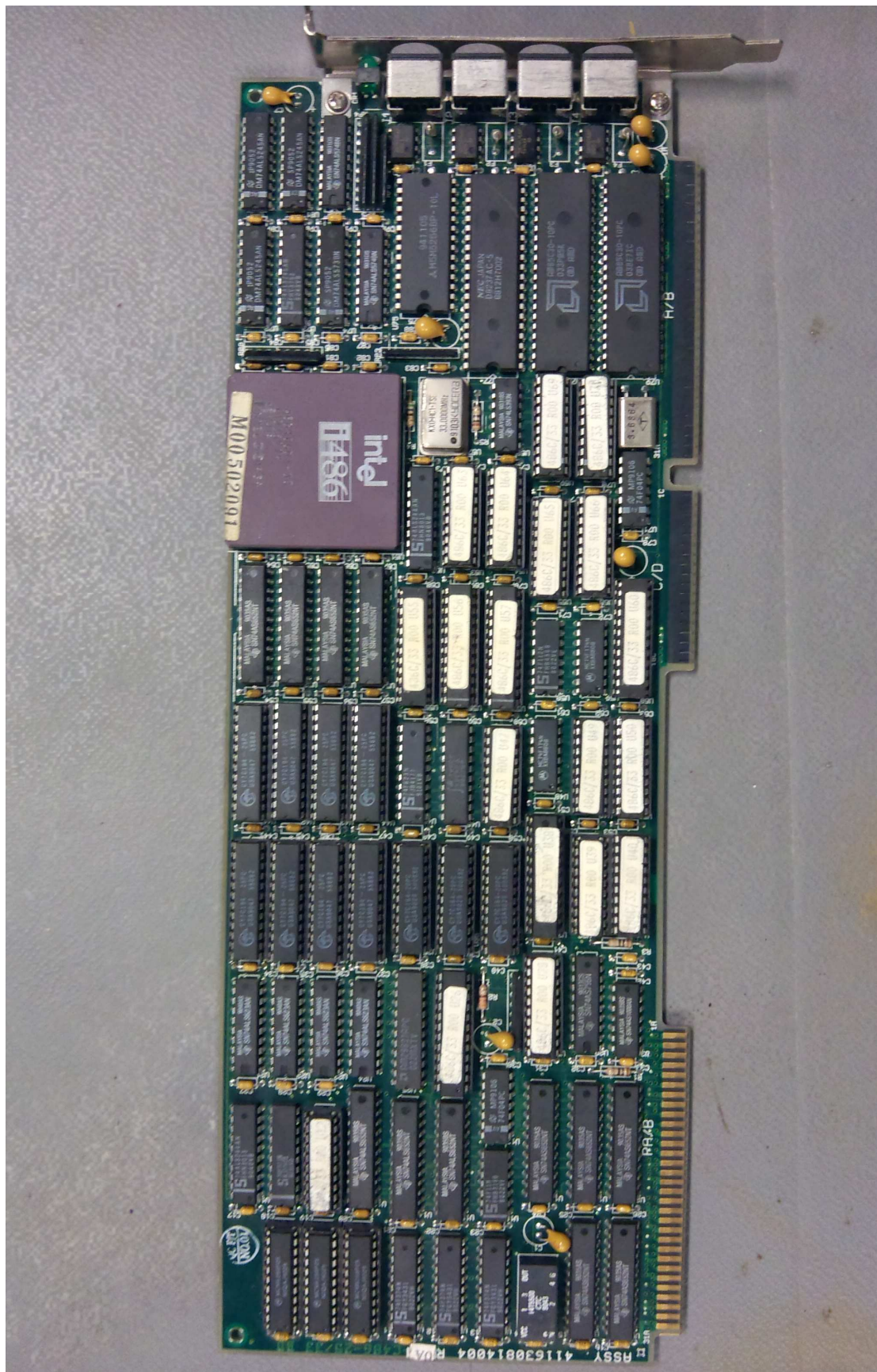


Figure 11: Corollary XM spare serial I/O card (2) top view
Top right: unused EISA bus connector, bottom right: Cbus-II connector

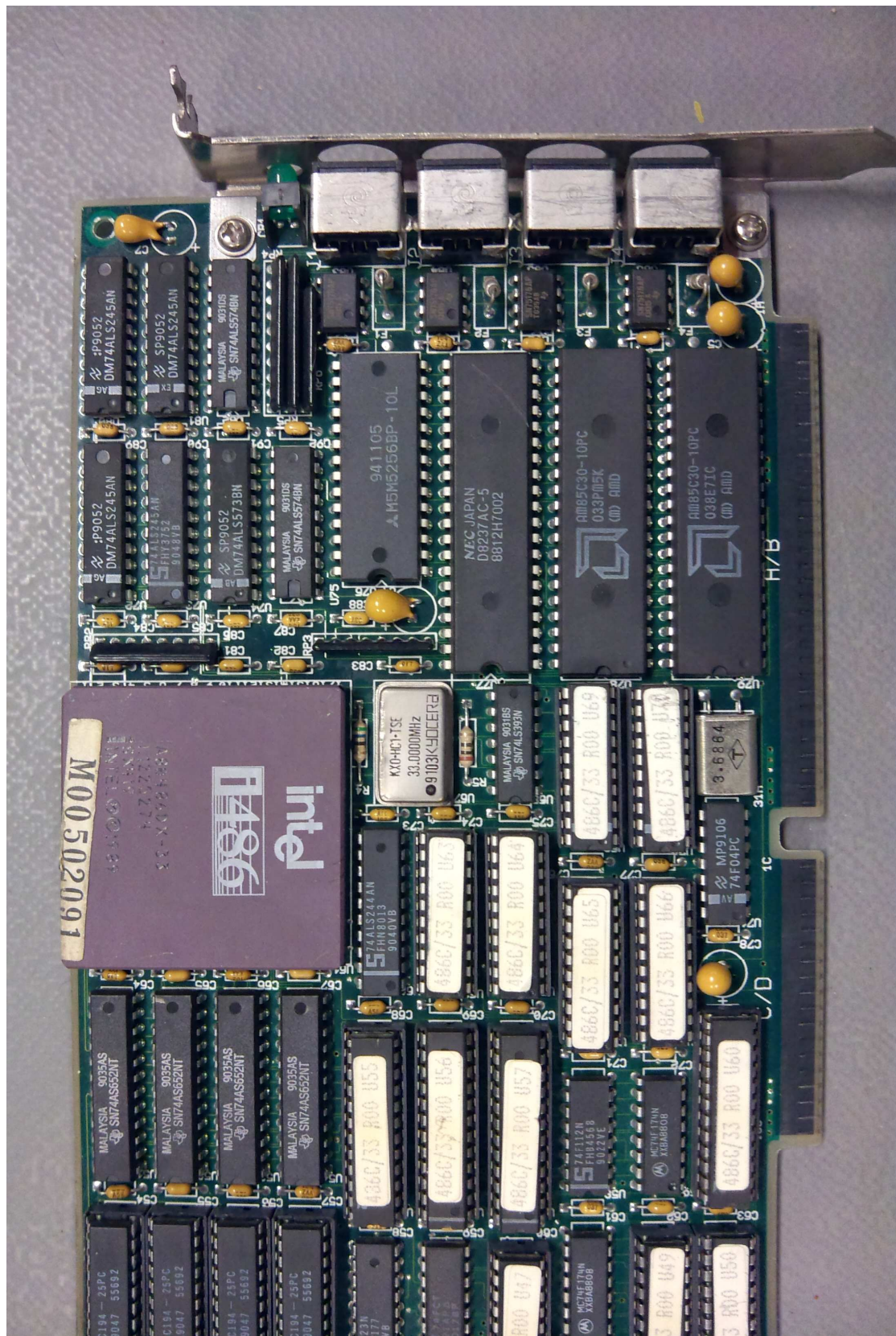


Figure 12: Corollary XM spare serial I/O card (2) closeup

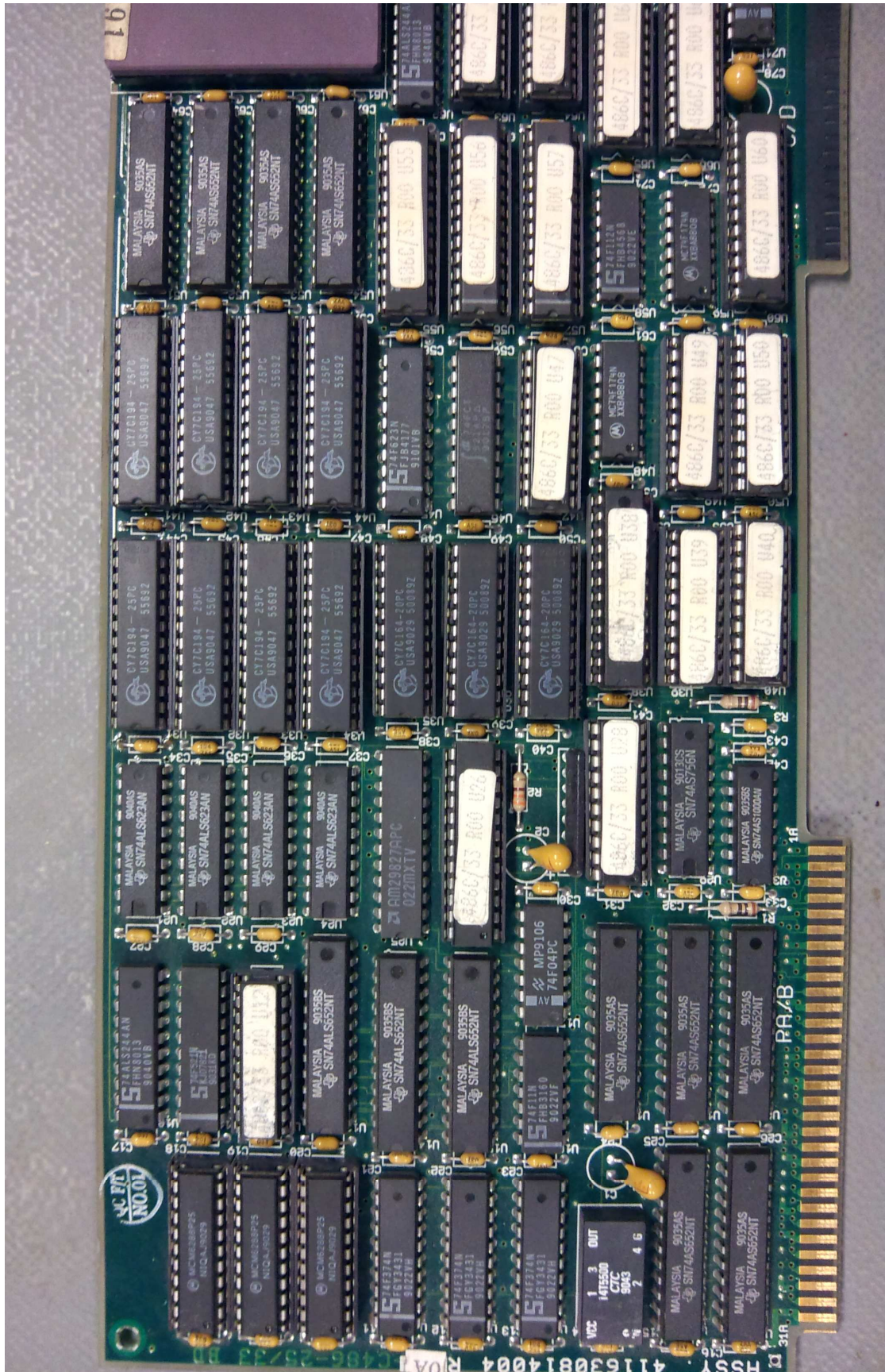


Figure 13: Corollary XM spare serial I/O card (2) closeup
 “Assy. 411630814004 R0A-C486-25/33 BD”

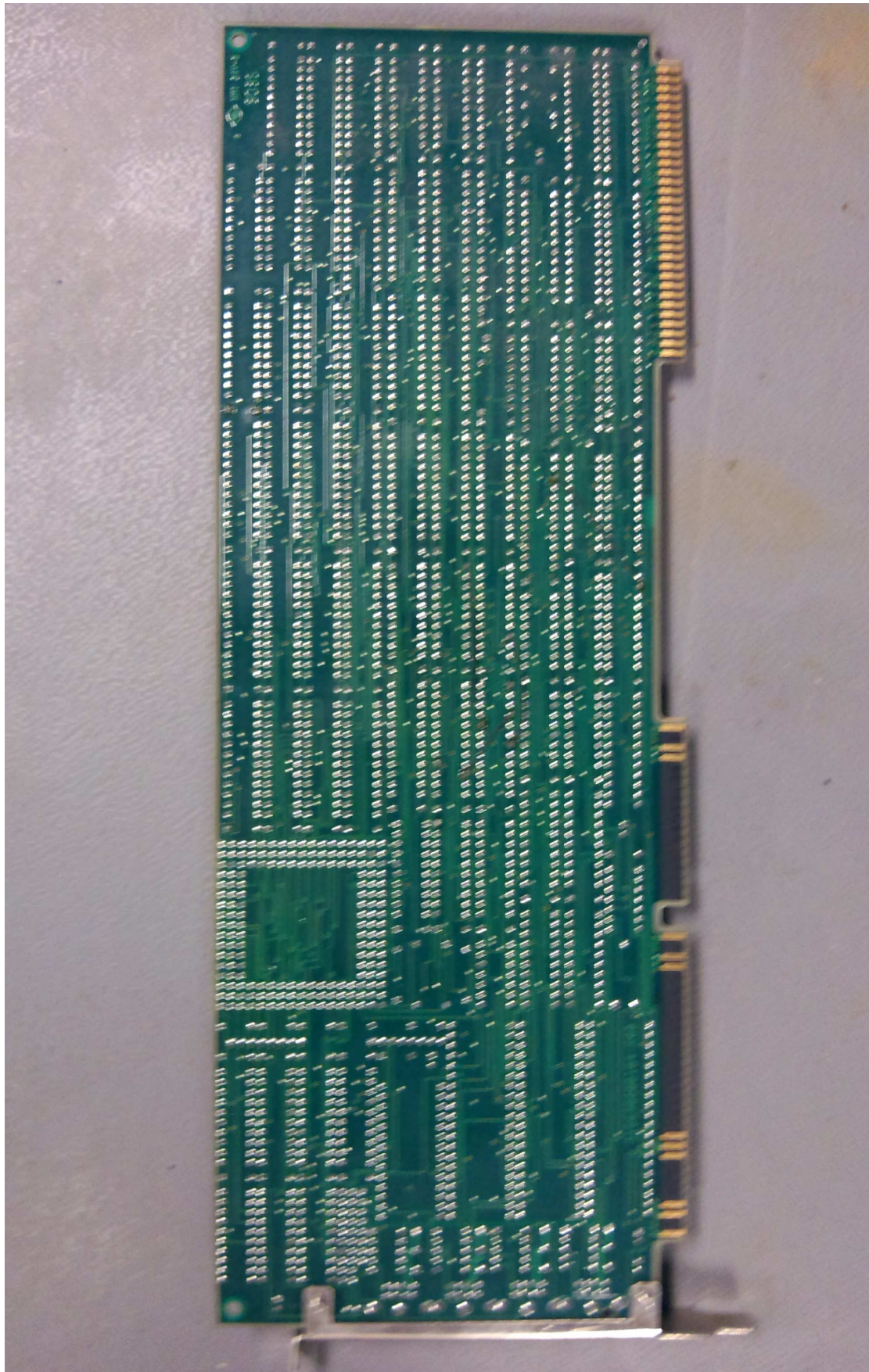


Figure 14: Corollary XM spare serial I/O card (2) bottom view

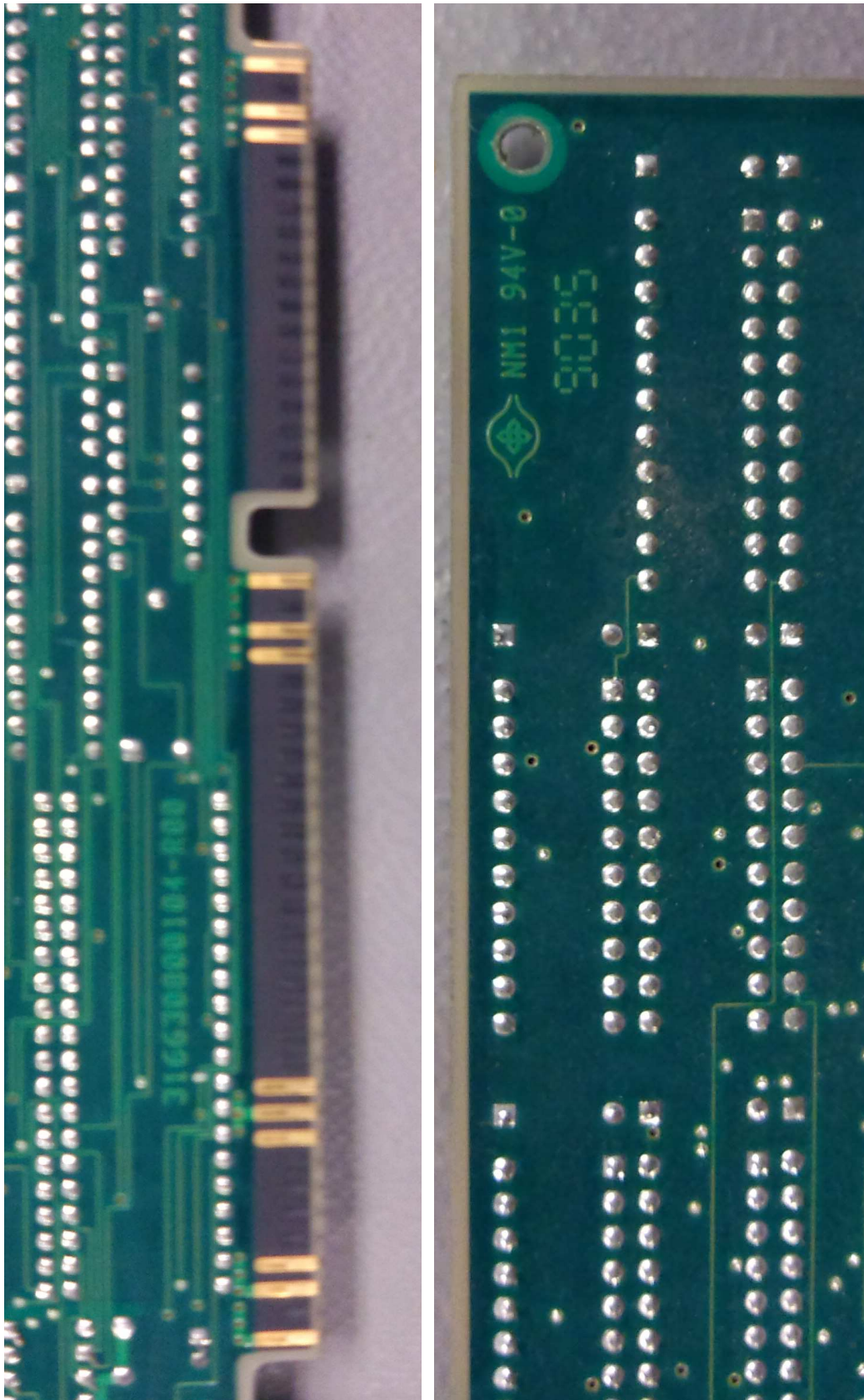


Figure 15: Corollary XM spare serial I/O card (2) bottom view closeups

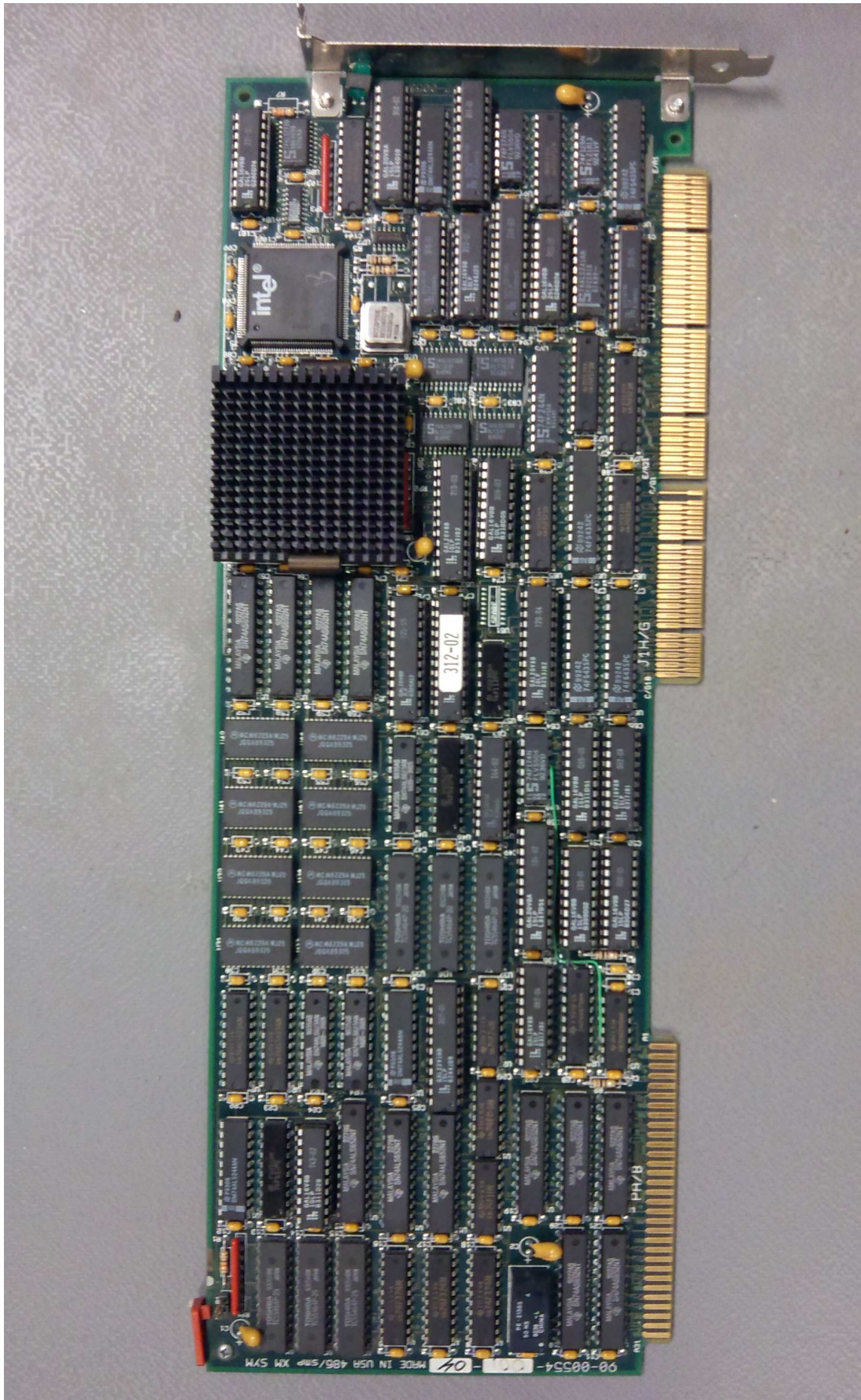


Figure 16: Corollary XM spare CPU card (4) top view
 Top right: EISA bus connector, bottom right: Cbus-II connector

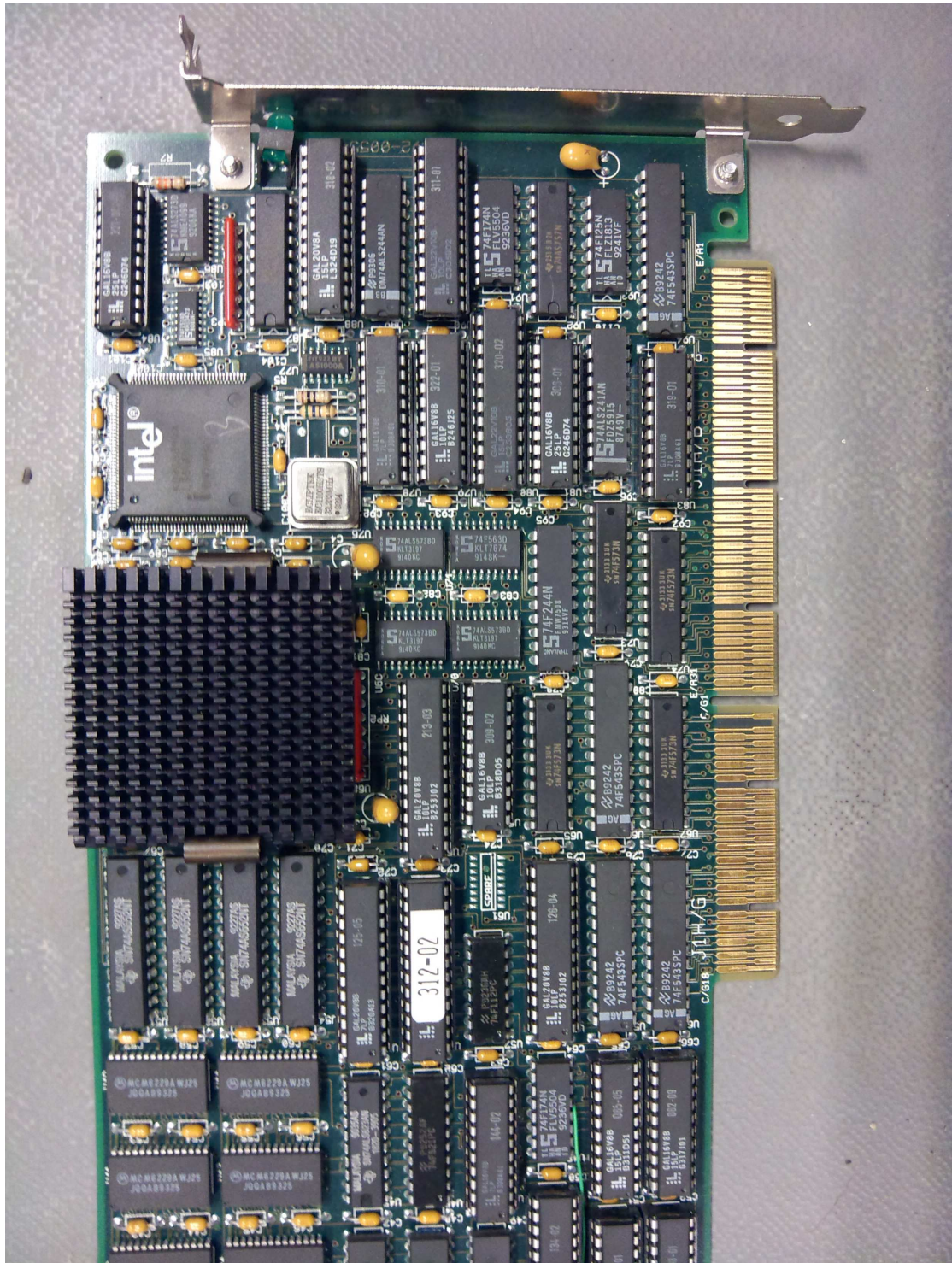


Figure 17: Corollary XM spare CPU card (4) closeup

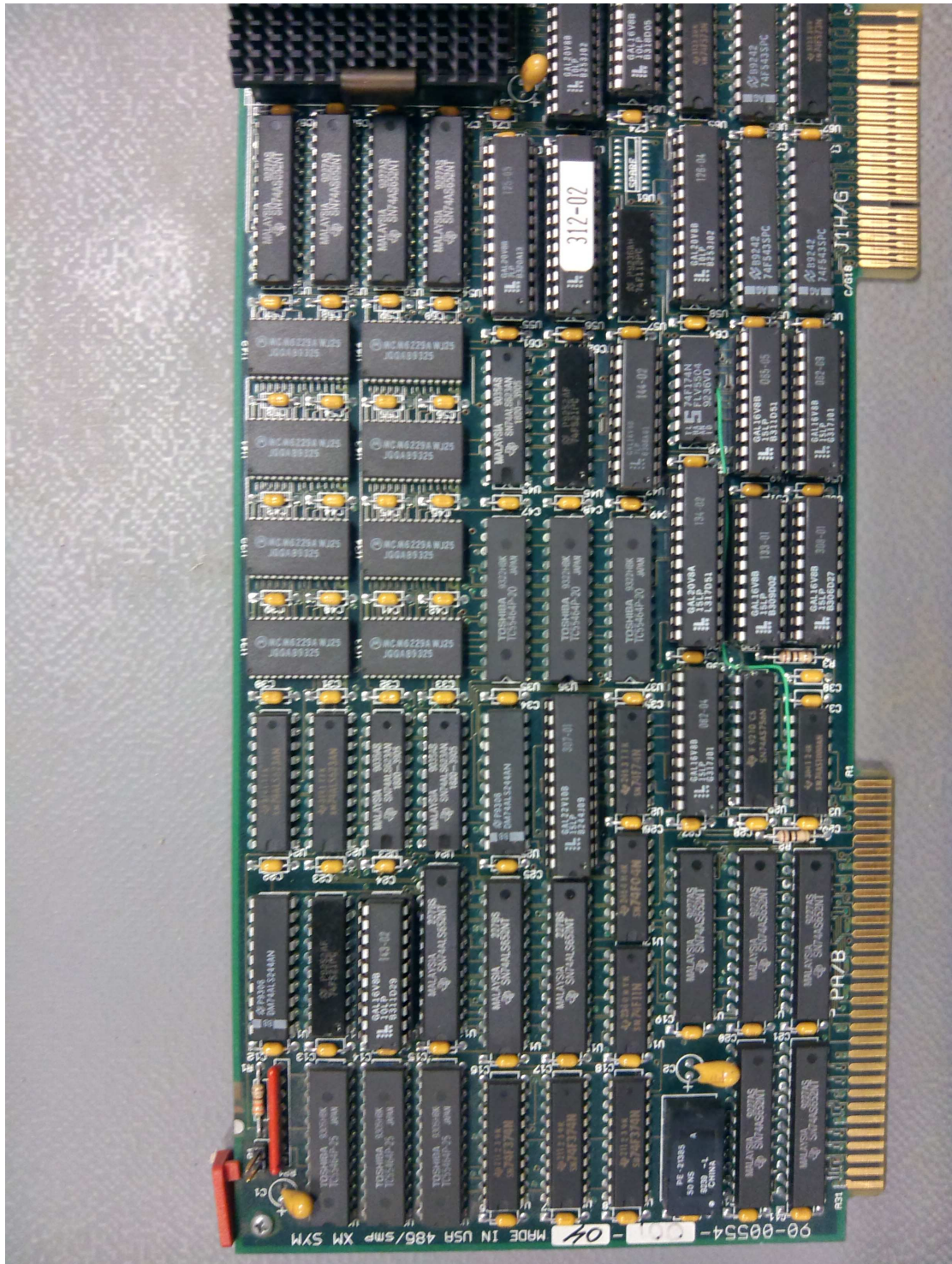


Figure 18: Corollary XM spare CPU card (4) closeup
 “90-00554-001-04 Made in USA 486/SMP XM SYM”

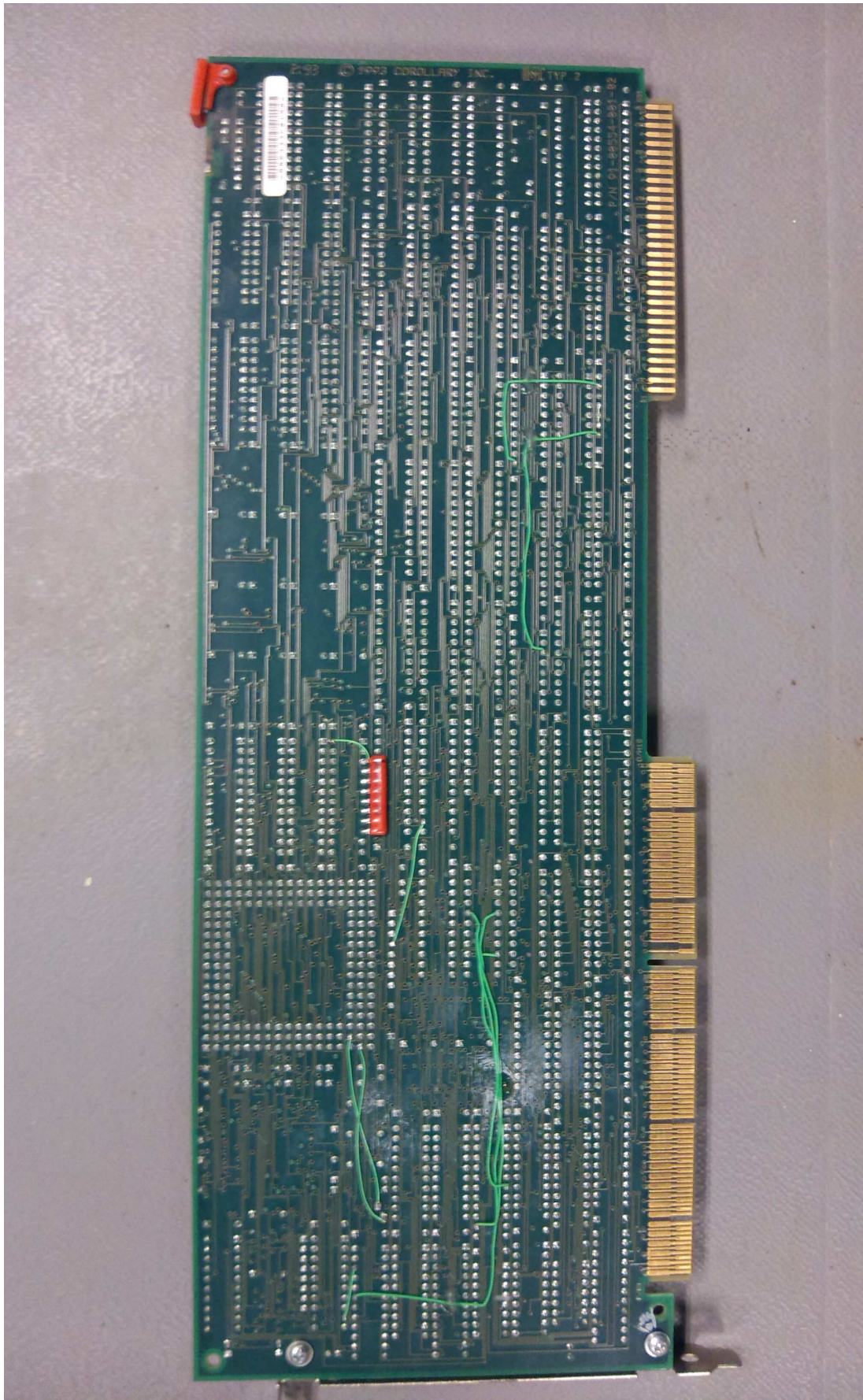


Figure 19: Corollary XM spare CPU card (4) bottom view

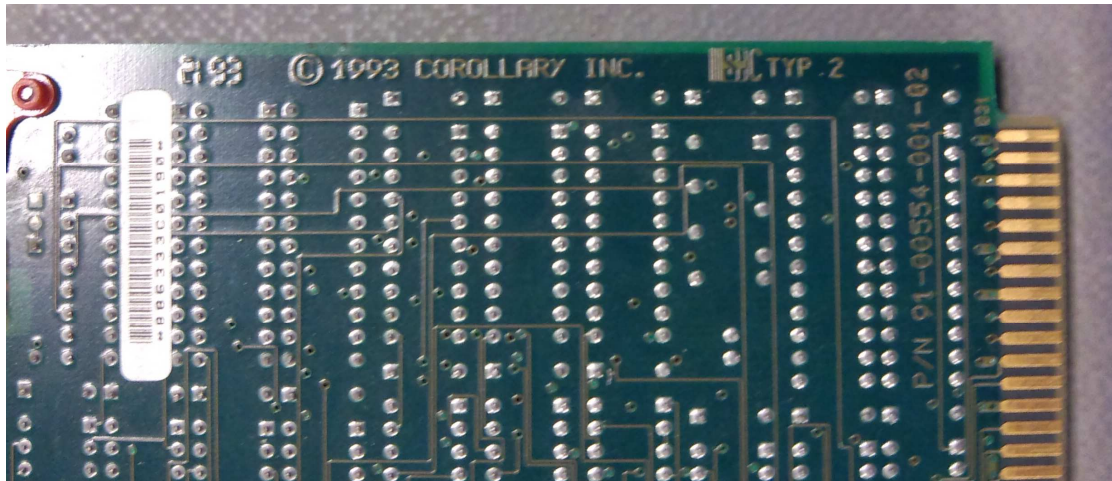


Figure 20: Corollary XM spare CPU card (4) bottom closeup

“Copyright 1993 Corollary Inc

S/N: 886333C0190, P/N: 91-00554-001-02”

Note that last digit of P/N is different from that shown on top label

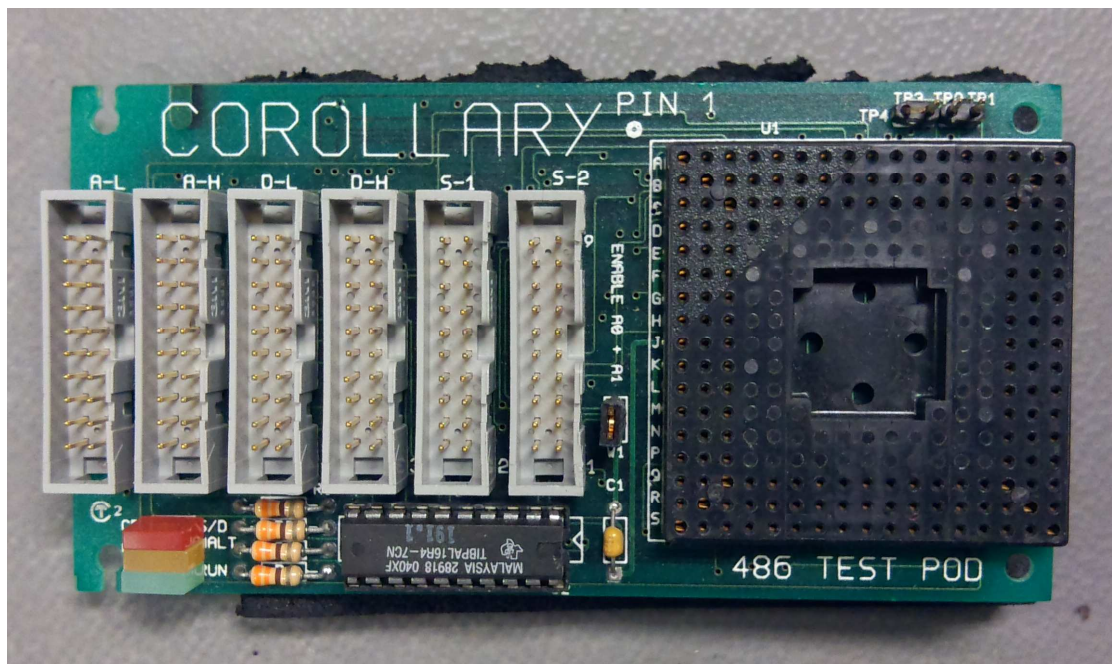


Figure 21: Corollary XM 486 Test Pod front view

Used to trace/debug Cbus-II cacheing transactions