COLECO ADAM THIRD-PARTY HARDWARE • ARCHIVAL ANALYSIS

C-Interface — Capital Software

Expansion Slot Printer Interface Card for the Coleco ADAM Computer

Manufacturer: Capital Software, St. Louis MO Designer: Thomas J. Golab Year: 1985 Slot: Expansion Slot #1 Only

OVERVIEW What Is the C-Interface?

The **C-Interface** is a third-party expansion card for the Coleco ADAM computer designed and sold by **Capital Software** of St. Louis, Missouri. Its purpose was to solve one of the ADAM's most limiting design constraints: the lack of any standard printer interface. The ADAM shipped with a proprietary daisy-wheel printer connected via AdamNet (the system's serial peripheral bus), which was slow (~10 CPS), noisy, and incapable of graphics output. The C-Interface gave ADAM owners access to the booming world of dot-matrix printers — including **color printing** — through two interface standards.

The card occupies **Expansion Slot #1** (the same slot as the Coleco modem — they cannot coexist) and provides two distinct printer interfaces: a **Commodore Serial Bus** compatible port and an optional **Centronics Parallel** port via an external adapter (the "MW-302C"). The included software, loaded from a Digital Data Pack, contained Z80 assembly-language drivers (CDRIVER) plus BASIC programs for text and graphics printing. The system could print from SmartBASIC programs, SmartWriter documents, and HGR/HGR2 graphics screens — including **color output on the Okimate 10**.

5	1,481	55594 ✓	$49.95	3
ICS ON BOARD	BYTES — CDRIVER	COMMS CHECKSUM	CARD ONLY	DISK IMAGES

20+
ARCHIVE ITEMS

> **Historical Significance:** This is one of the rarest and most technically ambitious third-party ADAM peripherals. While most ADAM accessories focused on storage (disk drives, RAM expanders), the C-Interface tackled I/O — giving the ADAM something it never had from Coleco: a standard printer port. The inclusion of Commodore Serial Bus compatibility is a remarkable cross-platform engineering choice, leveraging the massive installed base of Commodore-compatible printers available in 1985.

ARCHIVE Document & Artifact Inventory

DOCUMENT	TYPE	DATE	PAGES	NOTES
C-Interface Manual	PDF (scanned)	1985	34	Complete user manual — typewritten, landscape format. Cover, intro, installation, software, troubleshooting, warranty.
C-Interface Update Letter	PDF (scanned)	5 Dec 1986	3	Update letter from Thomas J. Golab with PaintMASTER patch and PR#2/PR#3 BASIC printing patch. Includes full source listing.
Schematic 1 — Board 1 Wiring	JPG (hand-drawn)	10 Apr 1985	—	Color-coded hand-drawn wiring diagram (green = board top, red = board bottom). Shows U1–U5, J1–J3, CC connector, resistors, capacitors. Commodore serial bus variant.
Schematic 2 — Board 1 Logic	JPG (hand-drawn)	22 Mar 1985	—	Detailed logic schematic for the Centronics parallel port variant. Shows data bus latching, address decoding, and I/O gating. Labeled "Capital Software Board 1".
Schematic 3 — Commodore Serial Bus	JPG (hand-drawn)	~1985	—	Commodore Serial Bus interface schematic showing 74LS368 buffer, 74LS30 NAND, 74LS75 latch, open-collector outputs with pull-ups, and 6-pin DIN connector pinout (SER IN, ATN, CLK, DATA, RESET, GND).
PCB Layout — Top of Board	JPG (hand-drawn)	~1985	—	Dimensioned mechanical drawing: ~2⅝" wide. Shows U1–U5, J1–J3, C1–C3, R1–R6, CC (cable connector). Component placement with measurements in 32nds of an inch.
PCB Artwork — Solder Side	JPG (photostat)	© 1985	—	Production-ready PCB artwork (solder side). Marked "COPYRIGHT © 1985 CAPITAL SOFTWARE". Shows primary trace routing for all 5 ICs plus edge connector fingers.
PCB Artwork — Component Side	JPG (photostat)	© 1985	—	Production-ready PCB artwork (component side). Shows supplementary trace routing / jumper paths that couldn't be routed on solder side. Registration crosshairs match solder-side artwork. Together with solder-side, forms complete fabrication film set.
Board Design Constraints	JPG (typewritten)	~1985	1	12-point typed specification for PCB fabrication house. Covers dimensions, DIN connector placement, plated through-hole options, panelization, and sourcing notes (Switchcraft 61PC6F).
Top of Board — Annotated Sketch	JPG (hand-drawn)	~1985	—	Detailed component-side wiring sketch with IC pin numbers, expansion slot pinout mapping (pins 1–30), and signal assignments annotated. Green ink = board-top traces.
Board Photo — Component Side	JPG (photograph)	2026	—	High-resolution photo of actual C-Interface board (Commodore variant). All 5 ICs readable: 7406N, 74LS32N, SN74LS175N, 74LS368AN, SN74LS30N. DIN connector, passives, edge connector all visible.
Board Photo — Solder Side	JPG (photograph)	2026	—	Solder side showing single-sided trace routing, wire jumpers, ground plane, and hand-soldered joints. Matches production PCB artwork.
Sales Flyer — Original	PDF (scanned)	~1985	3	Full product brochure with printer photos, compatibility details, feature list, printer comparison chart, order form. Prices: $69.95 (card only) to $319.95 (with Okidata 120).
Sales Flyer — "Enhanced" Version	PDF (scanned)	~1986-87	2	Updated flyer advertising PR#2/PR#3 and PaintMASTER features. Reduced prices: $49.95 (card only) to $299.95 (with Okidata 120). Sample graphics from PaintMASTER.

DOCUMENT	TYPE	DATE	PAGES	NOTES
Installed Photo — In ADAM Slot #1	JPG (photograph)	2026	—	C-Interface seated in Expansion Slot #1 inside an ADAM memory console. Shows board fitment, DIN connector orientation, cable routing, adjacent empty slots, and ADAM warning label. Cover with drilled cable hole visible.
Host ADAM System — Complete Layout	JPG (photograph)	2026	—	Full ADAM system: memory console with daisy wheel printer, keyboard, two controllers, DDP stack, SmartWriter and PaintMASTER manuals. The system the C-Interface was used with.
Digital Data Pack — User Backup	JPG (photograph)	~1986	—	Clear-shell DDP with handwritten label "BASIC + CDRIVER FROM ADAM MAIN". User backup containing CDRIVER binary and BASIC programs.
MW-302C Centronics Adapter + Box	JPG (photograph)	~1985	—	Micro World Electronix MW-302 C printer interface with original retail box. Black enclosure with gold label, DIN cable, and blue Centronics connector. Box marked "For use with the Commodore VIC-20 & C-64".
Disk Image — Master C-Drivers	DSK (160KB)	~1985	—	Distribution disk "C-INTRFACE" containing CDRIVER binary + all 8 BASIC programs. CDRIVER comms checksum verified: 55594 ✓.
Disk Image — Production C-Driver	DSK (160KB)	~1986	—	Thomas Golab's development disk. Contains distribution files plus development tools: prdrv (early driver build), adampr/adampr1a (PR#2/PR#3 patch programs), disassembler, and basbug debugger.
Disk Image — C-Interface Basic	DSK (160KB)	~1986	—	User backup disk with CDRIVER (graphics section populated but user-modified) and additional programs including graphics test images and demo files.
PCB Artwork — Component Side	JPG (photostat)	© 1985	—	Production-ready PCB artwork (component side). Shows supplementary trace routing / jumper paths. Registration crosshairs match solder-side artwork. Completes the fabrication film set.

HARDWARE Board Architecture & IC Identification

The C-Interface is a compact, single-sided PCB approximately **2⅝" × 3½"** designed to fit the ADAM's internal expansion slot connectors. The board carries **five ICs**, a DIN or cable connector, passive components, and a 30-pin card-edge connector that mates with the ADAM's expansion bus. The designer specified tight dimensional constraints: max 1⅛" (B dimension, height below slot) and 1⅜" (A dimension, height above slot).

Two board variants were designed — one for the **Commodore Serial Bus** and one for the **Centronics Parallel** interface. Both share the same PCB layout and edge connector, differing only in the output-stage ICs and connector. The schematics are dated March–April 1985, with the PCB artwork copyrighted 1985.

Commodore Serial Bus Variant — Actual Board (Photo-Verified)

REF	SCHEMATIC	ACTUAL IC	MFR	DATE	FUNCTION
U1	74LS06	7406N	Signetics	8516	Hex inverting open-collector buffer — drives

Centronics Parallel Variant (Schematic 2)

REF	IC	FUNCTION
U1	74LS374	Octal D-type latch — latches full 8-bit data bus for parallel output

REF	SCHEMATIC	ACTUAL IC	MFR	DATE	FUNCTION
					serial bus lines. Note: standard TTL 7406, not LS variant.
U2	74LS368	74LS368AN	Signetics	8511	Hex inverting tri-state buffer — data bus read-back from latch ✓
U3	74LS32	74LS32N	Signetics	8444	Quad OR gate — IORQ/WR/address combining for chip select ✓
U4	74LS75	SN74LS175N	Motorola	8515	Quad D flip-flop with common CLK/CLR — output data latch. Note: LS175 (edge-triggered D-FF), not LS75 (transparent latch).
U5	74LS30	SN74LS30N	Motorola	8451	8-input NAND gate — full address decode (A0–A7) ✓

Schematic vs. Actual Discrepancies: Two ICs differ from what the schematics suggest. The **7406** (standard TTL) is used instead of the 74LS06 — the 7406 has higher sink current (40mA vs 24mA on LS06), which makes sense for driving the open-collector serial bus lines with pull-ups. The **74LS175** replaces the 74LS75 — the LS175 is edge-triggered (data captured on rising clock) while the LS75 is a transparent latch (data passes through while enable is high). This is a deliberate design refinement: edge-triggering prevents data bus glitches from corrupting the latched output during the I/O write cycle. Both substitutions show good engineering judgment in the final production board.

REF	IC	FUNCTION
U2	74LS32	Quad OR gate — address/control signal combining
U3	74LS30	8-input NAND gate — address decoding
U4	74LS374	Second octal latch — additional control/strobe signals
U5	74LS04	Hex inverter — signal inversion for handshaking

Design Philosophy: Both variants use the same minimalist approach — no microcontroller, no UART, no PIO chip. The entire interface is built from basic TTL glue logic. The Z80 CPU does all the heavy lifting in software (the CDRIVER assembly code), bit-banging the Commodore serial bus protocol or strobing parallel data through the latches. This is impressively lean — only 5 chips to give the ADAM a fully functional printer port.

PINOUT ADAM Expansion Slot #1 — Pin Mapping

The annotated board sketch provides a complete mapping of the 30-pin card-edge connector (15 pins per side) to the ADAM's bus signals. The C-Interface uses the **Z80 data bus** (D0–D7), **address bus** (A0–A7), and **I/O control signals** (IORQ, WR, RD) — confirming it operates as a Z80 **I/O-mapped device**, not memory-mapped.

EXPANSION SLOT #1 — CARD EDGE (30 pins)

BOTTOM (DOWN)

1	GND	30	+5V
2	—	29	A7
3	—	28	—
4	A5	27	A6
5	A3	26	A4
6	A1	25	A2
7	A0	24	D7
8	D0	23	D6
9	D1	22	D5
10	D2	21	D4
11	—	20	D3
12	IORQ	19	RD
13	—	18	WR
14	—	17	—
15	—	16	—

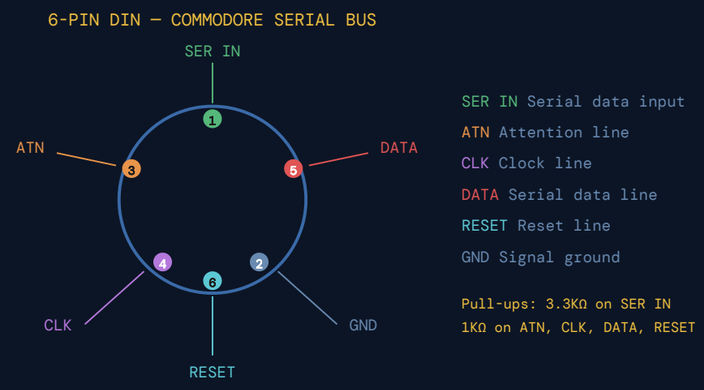
TOP OF BD. (UP)

Data Bus
Address Bus
Control
Power

Bus Usage: The card uses all 8 data lines (D0–D7) and 8 address lines (A0–A7) plus IORQ, WR, and RD. The address decoding through the 74LS30 8-input NAND means the card responds to a *single specific I/O port address* — all 8 address lines are fed into the NAND gate. Combined with IORQ and WR gating through the 74LS32, writes to this port latch data into the 74LS75 (Commodore variant) or 74LS374 (Centronics variant). The CDRIVER code initializes via **CALL 28325**, and the print buffer starts at address 27440.

CONNECTOR Commodore Serial Bus — 6-Pin DIN Pinout

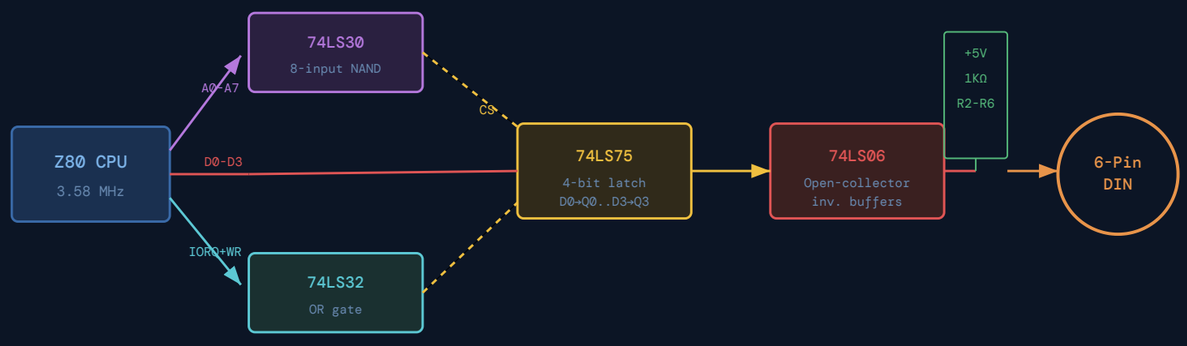
The Commodore-compatible variant uses a **6-pin circular DIN connector** (matching the standard Commodore serial bus connector used on VIC-20, C64, and compatible printers). The board design constraints document specifies consideration for both standard and Japanese DIN variants, with the Switchcraft 61PC6F as an alternative source.



Signal Driving: The serial bus lines are driven via **open-collector outputs** (74LS06 U5) with pull-up resistors to +5V. This is standard for the Commodore serial bus, which is a wired-OR bus allowing multiple devices. The C-Interface acts as a **Controller and Talker** (not Listener) on the bus, addressing Device 4. The pull-up values are 1KΩ for most lines and 3.3KΩ for SER IN — the higher value on SER IN suggests it carries less current and is primarily an input for bus acknowledgment.

SIGNAL FLOW

Data Path — Z80 to Printer (Commodore Variant)



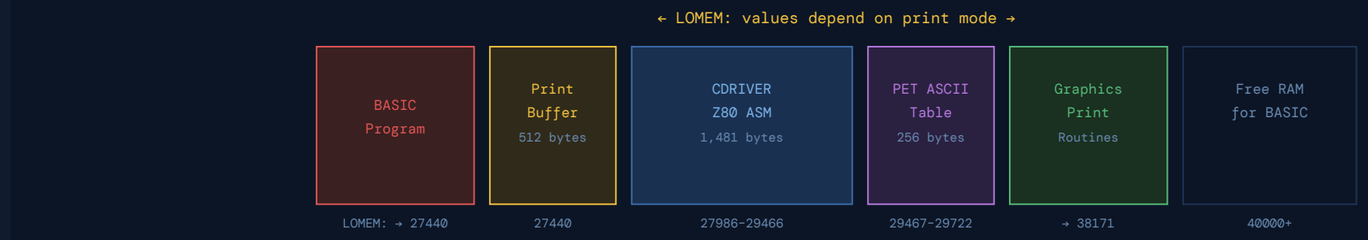
Z80 I/O WRITE → Address Decode → Latch Data → Open-Collector Drive → Serial Bus

SOFTWARE

CDRIVER & BASIC Software Architecture

The C-Interface software consists of a **1,481-byte Z80 assembly language driver** called CDRIVER that loads at address **27986** (0x6D52), plus several BASIC programs for different printing tasks. The entire software architecture is designed around the constraint that SmartBASIC must coexist with the driver in RAM, requiring careful LOMEM: management.

Memory Map



CDRIVER Entry Points

ADDRESS	CALL	FUNCTION
28325	CALL 28325	Initialize C-Interface hardware and serial bus
28647	CALL 28647	Print HGR/HGR2 screen — black & white graphics dump
28690	CALL 28690	Print HGR/HGR2 screen — color graphics dump (Okimate 10)
29460	CALL 29460	Initialize PR#2/PR#3 patch (1986 update)

Key POKEable Locations

ADDRESS	FUNCTION	DEFAULT
28411	AdamNet device number for file source	8 (Tape 1)
28673	B&W graphic lines to print (7 dots each)	54 (HGR2) / 25 (HGR)
28740	Color graphic lines to print	54 / 25
28857	Left column limit	1
28874	Right column limit	30
25471	Background color (POKE before HGR/HGR2)	17 (black bg) / 31 (white bg for color)

BASIC Programs on DDP

PROGRAM	PRINTER	FUNCTION
graphprint	All	Sets LOMEM:, loads CDRIVER, initializes card — for graphics printing
comprint	Commodore	Full text print program — BASIC files & SmartWriter documents
cenprint	Centronics	Full text print program — BASIC files & SmartWriter documents
comtext	Commodore	Example BASIC direct-printing program
centext	Centronics	Example BASIC direct-printing program
bwtest	All	Black & white graphics print test
cdiagnosis	N/A	Diagnostic: BASIC version check, board test, CDRIVER checksum verify
basicprint	All	*(1986 update)* — Patches BASIC for PR#2/PR#3 direct printing

UPDATE December 1986 Software Update — PR#2/PR#3 Patch

A year after the initial release, Thomas J. Golab sent registered C-Interface owners a **3-page update letter** dated December 5, 1986 containing two significant improvements:

1. PR#2 / PR#3 Direct Printing: The original C-Interface required using special GOSUB routines and string-building to send text to the printer. The update patches SmartBASIC itself so that standard `PR#2` (Commodore) and `PR#3` (Centronics) commands work like the built-in `PR#1` for the ADAM printer. This means `LIST`, `CATALOG`, and all standard `PRINT` statements can be redirected to the external printer — a massive usability improvement.

2. PaintMASTER Integration: Instructions for patching the commercial PaintMASTER program (from Strategic Software, $25) to add a PRINT function to its icon-based interface. The patch adds CDRIVER to the PaintMASTER tape, inserts a PRINT option into the erase menu, and calls the graphics dump routine when triggered by the game controller.

The PR#2/PR#3 Patch — Technical Details

The `basicprint` program is a masterpiece of system-level hacking. It works by:

```
; Patch bytes loaded at 27871-27951 (81 bytes of new Z80 code) ; Patched into CDRIVER at address 28044 → JMP to new code at 27871+167 = 109*256+38 ; SmartBASIC PR# vector patching: POKE 16217, 223 : POKE 16218, 108 ; PR#2 vector → new handler POKE 16219, 235 : POKE 16220, 108 ; PR#3 vector → new handler ; CDRIVER patch (redirect output path): POKE 28044, 195 : POKE 28045, 38 : POKE 28046, 109 ; JP 0x6D26 ; New code intercepts PR#2/PR#3 output, routes through CDRIVER's ; serial bus or Centronics output routine, then returns to BASIC. ; Checksum validation: sum of all 81 bytes = 9740
```

> **Significance:** This is an extremely clever hack. Golab is patching the SmartBASIC interpreter's PR# dispatch table at addresses 16217–16220, redirecting PR#2 and PR#3 to custom handlers that route through CDRIVER. The new 81-byte code block lives in the tail end of the print buffer (addresses 27871–27951), and

> CDRIVER itself is patched with a JMP instruction at 28044. This transforms the C-Interface from a "special-purpose" peripheral into a seamlessly integrated BASIC I/O device — exactly how Coleco should have designed it in the first place.

GRAPHICS Graphics Printing — TMS9918A Screen Dump

One of the C-Interface's most impressive capabilities is **direct screen dumping from the TMS9918A VDP**. The CDRIVER code reads the video display processor's background plane (not sprites) through the VDP's data port, expands each pixel into a 2×2 dot group on the printer, and maps the TMS9918A's 15-color palette to the printer's available colors.

Black & White Mode

Entry Point	`CALL 28647`
Resolution	256×192 → 512×384 dots on paper
Columns	32 (8 dots each), configurable 1–30
Lines	54 (HGR2) or 25 (HGR), 7 dots each
Color Mapping	15 colors → black or white threshold

Color Mode (Okimate 10)

(white)

Entry Point	`CALL 28690`
Printer	Okimate 10 with color ribbon
Colors	15 → 8 (grouped by hue)
Best Background	`POKE 25471, 31`
Warning	Wrong ribbon wastes entire black ribbon!

> **Color Compression:** The TMS9918A's 15-color palette is compressed into the Okimate 10's 8-color capability by grouping different shades of the same hue. The manual suggests users can create additional colors by manually mixing dots of different colors in their BASIC programs — adding white dots for lighter shades and black dots for darker ones. This is essentially manual dithering at the application level, a technique that shows real understanding of both the VDP's capabilities and the thermal transfer printing process.

COMPATIBILITY Supported Printers & Configuration

PRINTER	INTERFACE	TYPE	NOTES
Okimate 10	Commodore Serial	Thermal Transfer	Color and B&W graphics. Uses special thermal paper. Pull printhead back before ribbon install. Toll-free ribbon order: (800) 524-8338.
Okidata 120	Commodore Serial	Dot Matrix	Supports underlining, subscripts, superscripts via control codes. Uses same ribbon as Okidata Microline 182.
Comrex CR220	Commodore Serial	Dot Matrix	Paper must be force-fed from top. Printhead may stick on return — raise right side of printer slightly. Warranty via local Epson dealer.
Epson LX-80	Centronics	Dot Matrix	DIP switch SW2-3 must be ON for auto line feed. Via MW-302C adapter.

PRINTER	INTERFACE	TYPE	NOTES
Other Commodore-compatible	Commodore Serial	Various	Any printer responding to Device Address 4 on Commodore Serial Bus. PET ASCII translation table built into software.
Any Centronics printer	Centronics Parallel	Various	Via MW-302C adapter with DIP switches (SW3=ON, others OFF). Must auto-advance on CR. Do not power on until after CALL 28325.

Centronics Warning: The manual explicitly warns that the Centronics port printer must NOT be powered on until after the C-Interface has been initialized with `CALL 28325`. Otherwise, the printer's power supply will "fight with the C-Interface voltages" — suggesting the Centronics adapter shares some bus voltage interaction that can cause latch-up or other undesirable conditions.

RETAIL Retail Pricing & Packages — From Original Flyers

Two flyers survive — an earlier one and a later "Enhanced C-Interface" version — revealing the complete product line and a **price increase** between the two printings. The flyers were mailed as fold-over mailers from **P.O. Box 370, St. Louis, MO 63032** (the manual lists Box 576 — either a change or separate mailbox). Bulk rate postage was paid via Permit 657, Erie, PA — suggesting a national mailing house was used for distribution.

Original Flyer Pricing

PACKAGE	PRICE
C-Interface & Okidata 120 Printer	**$319.95**
C-Interface & Okimate 10 Printer	**$259.95**
C-Interface & Comrex CR220 Printer	**$174.95**
C-Interface & Centronics Port	**$119.95**
C-Interface Only	**$69.95**

Enhanced Flyer Pricing (Later)

PACKAGE	PRICE
C-Interface & Okidata 120 Printer	**$299.95**
C-Interface & Okimate 10 Printer	**$219.95**
C-Interface & Comrex CR220 Printer	**$149.95**
C-Interface & Centronics Port	**$99.95**
C-Interface Only	**$49.95**

SHIPPING	COST
Continental U.S. with Printer	$8.00
Continental U.S. with Centronics	$4.00
Continental U.S. C-Interface only	$3.50
Canada, APO, FPO, Alaska with Printer	$14.00
Canada, APO, FPO, Alaska w/ C-Interface	$6.00
Canada w/ Centronics	$5.50

Payment: Accepted VISA and Mastercard (3% surcharge), check, or money order. Missouri residents charged 5.725% sales tax. Cash discount pricing was advertised on the later flyer. The "Enhanced" flyer adds the PR#2/PR#3 feature and PaintMASTER support, placing it after the December 1986 update — yet prices *decreased* across the board (the card alone dropped from $69.95 to $49.95), suggesting Golab was trying to move inventory as the ADAM market continued to shrink.

HARDWARE

Physical Board — Component & Solder Side Analysis

Photographs of an actual C-Interface board confirm the Commodore Serial Bus variant. The board is a **single-sided PCB** (traces on solder side only) with no solder mask or silkscreen — just bare copper traces on FR-4 substrate. The "+5V" marking and "COPYRIGHT... CAPITAL..." text are etched into the copper. Components are all through-hole, hand-soldered.

Component Side — Verified IC Inventory

POSITION	MARKING	PACKAGE	MANUFACTURER	DATE CODE
Top center	**7406N**	DIP-14	Signetics (S logo)	KK8516 JD
Middle left	**74LS32N A**	DIP-14	Signetics (S logo)	LK8444 HX
Middle right	**SN74LS175N**	DIP-16	Motorola (M logo)	8515
Bottom left	**74LS368AN A**	DIP-16	Signetics (S logo)	KK8511 AO
Bottom right	**SN74LS30N**	DIP-14	Motorola (M logo)	I8451

Passive Components

COMPONENT	TYPE	NOTES
C1	Ceramic disc capacitor (orange)	Bypass cap, likely 0.1µF — positioned near 74LS368AN
C2	Ceramic capacitor (blue, tubular)	Second bypass cap — positioned near 74LS175N
R1	Resistor (brown-black-orange = 10KΩ?)	Positioned between DIN connector and 7406N — likely pull-up on SER IN (3.3KΩ per schematic)
R2–R6	4× standing resistors (right edge)	Pull-up resistors for serial bus lines (1KΩ per schematic). Color bands visible: brown-black-red (1KΩ) and brown-orange-red (1.3KΩ or 3.3KΩ).

Connector & Mechanical

DIN Connector	6-pin circular DIN, panel-mount style, soldered directly to board top. Black plastic housing with pins bent to mate with board.

Card Edge	~30 fingers along bottom edge (15 per side). No gold plating visible — appears to be bare tin/lead solder on copper.
Board Cutout	Notch visible at bottom-left of board — this is the clearance slot for the ADAM's card-edge connector center rib, as specified in the design constraints document.
PCB Type	Single-sided FR-4. No plated through-holes (Golab's constraint #6 confirms this was optional). Wire jumpers visible on component side connecting trace breaks.
Copyright	"COPYRIGHT... CAPITAL..." etched in copper along bottom-right edge — matching constraint #12.

Solder Side Observations

The solder side photo shows the matching PCB artwork — the trace routing matches the production photostat in the archive. The board has **no solder mask**, with bare copper traces visible. Solder joints are hand-done with generous fillets. Several wire jumpers are visible where the single-sided layout required trace crossovers. The large ground plane area on the right side of the board matches Golab's constraint #10 (widen power/ground runs). The trace routing from the edge connector fingers to the IC pads is clearly visible and matches the hand-drawn wiring diagrams.

> **Production Quality:** This is a professionally fabricated PCB — not a hobbyist etch job. The trace widths are consistent, corners are properly radiused, and the copyright text is cleanly rendered. The board matches the production artwork photostat almost exactly. However, the lack of solder mask, silkscreen, and plated through-holes indicates this was manufactured as economically as possible — consistent with a small-run product for a niche market.

Installed in ADAM — Expansion Slot #1

A photograph of the C-Interface installed in an actual ADAM memory console confirms the physical integration exactly as the manual describes. The board is seated in **Expansion Slot #1** (leftmost slot), with the 6-pin DIN connector protruding above the board level. The DIN cable routes upward through a hole drilled in the ADAM's plastic expansion cover — matching the manual's installation procedure (⅝" drill, positioned 2 9/16" from center edge). Adjacent expansion slots are visible to the right, with their empty card-edge connectors ready for other peripherals. The ADAM's internal warning label ("TURN POWER OFF BEFORE PLUGGING IN ANY EXPANSION MODULE!") is visible directly adjacent to the installed board.

The host system is a complete ADAM configuration: memory console with integrated daisy wheel printer, keyboard, two game controllers, a stack of Digital Data Packs, and both SmartWriter and PaintMASTER manuals — confirming this system was actively used with the C-Interface for both text and graphics printing.

> **Installation Verified:** This installed photograph is the final piece of the physical documentation. It confirms: (1) the board fits Slot #1 correctly with the card-edge connector fully mated, (2) the DIN connector clears the slot cavity and routes the cable upward as designed, (3) the drilled cover hole provides proper cable egress, and (4) the board's dimensions match the fabrication constraints (max 1⅛" below slot, 1⅜" above). With this image, every aspect of the C-Interface — from schematic to fabricated board to installed operation — is now photographically documented.

MARKETING Marketing Flyers — Sales Copy & Technical Claims

Two surviving marketing flyers provide valuable context. The **original flyer** (3 pages) is a detailed product brochure with photos of the Centronics Port adapter, Comrex CR220, Okidata 120, and Okimate 10 printers. The **"Enhanced" flyer** (2 pages, likely post-1986 update) advertises the new PR#2/PR#3

features and PaintMASTER integration.

Key Marketing Claims

Speed	"Print several times faster than Adam printer by using a dot matrix type printer." The Okidata 120 at 120 CPS vs ADAM's ~10 CPS daisy wheel = **12× faster**.
Noise	"Print quieter than Adam printer by using a dot matrix or thermal type. The Okimate 10 is still quieter!"
No Disk Required	"Unlike our competition, a disk drive is not required. Any ADAM system will print text and graphics."
Complete Packages	"Everything else you need — cables, ribbons, paper, software, interfaces, manual — is included."
Color Graphics	"Print color or B&W pictures created with the powerful PaintMaster graphics design software."
Centronics Port	"A circuit board inside a small box with 2 cables... It gets its power from the C-Interface and so needs no other cord." Dimensions: 4¼ × 6¼ × 4/5 inch.

Printer Comparison Chart (From Flyer)

SPEC	OKIDATA 120	OKIMATE 10	COMREX CR220
Text Speed	120 CPS	60 CPS	50 CPS
Pin-In-Hole Feed	YES	YES	YES
Single Sheet Feed	YES	YES	NO
B&W Graphics	YES	YES + COLOR	YES
Paper Width	to 10.5"	5" to 10"	4.5" to 10"
Character Size	9×9	9×9	5×7
Subscr/Superscr/Undln	YES	NO	NO
True Descenders	YES	YES	NO
Chars per Line	40–137	40–136	80

> **Software Size Claims (from flyer):** "At least 2060 bytes to print text with the Centronics Port, 2316 bytes to print text with a Commodore compatible printer, and 10765 bytes to print graphics, including a 512-byte printer buffer." These numbers are more detailed than the manual's LOMEM: values and help map the driver's internal structure.

MANUFACTURING PCB Design Constraints — Fabrication Spec

One of the most fascinating documents in this archive is the **12-point typed specification** that Golab prepared for his PCB fabrication house. It reveals the practical engineering challenges of building an ADAM expansion card:

#	CONSTRAINT	ANALYSIS
1	Trace routing is a suggestion; fabricator should improve on it	Unusual collaborative approach — the designer is explicitly inviting the PCB house to optimize routing
2	Dimension B maximum: 1⅛"	Height below the slot — constrained by the ADAM's internal case geometry
3	Dimension A maximum: 1⅜"	Height above the slot — clearance to the removable cover
4	Minimize board size by reducing A; eliminate uppermost slots if possible	Aggressive size optimization — card edge slots are the main space consumer
5	Slots for card-edge connector and structural rib; can be cut or milled	The ADAM's slot has a center rib that the board must accommodate
6	Plated through-holes optional; include jumper traces as backup	Cost-conscious design — non-PTH boards are cheaper, with wire jumpers as fallback
7	Panelize multiple boards per PCB sheet	Standard production optimization for small boards
8	Consult on board material selection	Golab wanted input on FR-4 vs alternatives — again, unusually collaborative
9	DIN connector front-aligned with board edge; pad below each pin; allow for Japanese DIN (10mm spacing) and Switchcraft 61PC6F	Multi-source connector strategy — very smart for a small-run product
10	Widen power and ground runs to large planar areas	Good power integrity practice — important for clean bus signals
11	Layout for automatic/semi-automatic assembly	Planning for production volume — not just hand-built prototypes
12	Inscribe "Copyright 1985 Capital Software" on board	IP protection — and confirmed on the PCB artwork scan

INSTALLATION

Physical Installation — The DIY Factor

The C-Interface required an unusual and somewhat alarming installation procedure: the user had to **drill a hole in their ADAM's plastic cover** to route the printer cable through. The manual provides detailed instructions including measurements (2 9/16" from center edge, 5" from the notch edge) and recommends a **⅝" wood boring bit** for Commodore cables or **¾"** for Centronics. The cover must be clamped to a piece of wood and drilled through.

This hole serves a structural purpose beyond cable routing — it **anchors the C-Interface against lateral movement** that would wear out the expansion slot connector. Without the cable passing through the cover, the card would be free to rock side-to-side when the printer cable moves. The manual notes that the C-Interface cannot be operated with the cover removed (at least not reliably).

Slot Restriction: The C-Interface *must* be installed in **Expansion Slot #1 only**. The manual warns in emphatic terms: "DO NOT TRY TO PUT THE C-INTERFACE ANY PLACE BUT EXPANSION SLOT #1! The slots are all different, and using the wrong one can damage ADAM or the C-Interface!" This is because the ADAM's three internal expansion slots have different address decoding — each slot has its own IORQ qualifier, and the C-Interface's address decoding is designed specifically for Slot #1's I/O address space. The C-Interface also **conflicts with the Coleco modem**, which uses the same slot.

DESIGNER Thomas J. Golab — Capital Software

The C-Interface is clearly the work of a single talented engineer. **Thomas J. Golab** of Capital Software, St. Louis, Missouri designed the hardware, drew the schematics by hand, wrote the specification for the PCB fabrication house, authored the Z80 assembly-language driver, wrote all the BASIC programs, wrote the manual, and personally sent the 1986 update letter to customers. The schematics are signed and dated in his handwriting.

What's remarkable about the engineering is its **economy**. The entire interface — both variants — uses only 5 standard TTL ICs. There's no PIO chip (like an 8255), no UART, no microcontroller. Every bit of complexity is pushed into the software, where the Z80 bit-bangs the Commodore serial protocol or strobes the Centronics parallel port directly. The 1986 update shows even deeper system knowledge, patching the SmartBASIC interpreter at the opcode level to redirect PR# vectors.

Company Address: Capital Software, P.O. Box 576, St. Louis, Missouri. The 1-year warranty covered repair or replacement for defects in workmanship and materials, with the buyer responsible for shipping costs.

SOFTWARE Software Extraction & Binary Verification

Three ADAM disk images were recovered: the **Master C-Drivers** distribution disk (volume label "C-INTRFACE"), a **Production C-Driver** development disk containing Golab's development tools, and a **C-Interface Basic** user backup disk. The CDRIVER binary and all BASIC programs were successfully extracted and verified.

CDRIVER Binary — Verification Results

SECTION	ADDRESS RANGE	BYTES	EXPECTED CHECKSUM	ACTUAL	STATUS
Communications	27986-28463	478	55594	55594	✓ VERIFIED
Configuration Gap	28464-28552	89	excluded	—	User-POKEable
Graphics	28553-29466	914	81181	45000/160260	See note

Graphics Section Status: The Master disk's graphics section is partially uninitialized (53% zeros, checksum 45000) — the BSAVE was performed before the graphics routines were fully loaded into memory. The Basic backup disk has the graphics fully populated (only 33 zeros) but with user-applied POKEs that alter

> the checksum to 160260. The communications section — containing the serial bus protocol, initialization, device addressing, and text printing routines — is **identical and verified** across all three disk images.

ADAM Disk File Format

CDRIVER uses a 5-byte file header on disk: `01 00 02 52 6D` — type byte (0x01), parameter word (0x0200 = 512 = buffer size), and load address (0x6D52 = 27986). The file spans two 1024-byte blocks: 1019 data bytes from block 2, plus 462 bytes from block 3, totaling exactly 1481 bytes.

Extracted BASIC Programs (Master Disk)

FILENAME	LINES	SIZE	FUNCTION
graphprint	26	997	Graphics printing setup — sets LOMEM:38172, BLOADs CDRIVER, configures 54 lines for HGR2
comprint	172	5805	Full text print program for Commodore printers — handles BASIC & SmartWriter files, line formatting, PET ASCII translation at address 29467
cenprint	163	5121	Text print program for Centronics printers — similar to comprint without PET translation
cdiagnosis	168	4097	Diagnostic utility — BASIC version check, board test (I/O port verification), CDRIVER checksum verify (comms=55594, gfx=81181)
comtext	87	3073	Example direct-printing program for Commodore printers
centext	116	3073	Example direct-printing program for Centronics printers
bwtest	87	2048	Black & white graphics print test — draws pattern in HGR, dumps via CALL 28647
colortest	68	1411	Color graphics print test for Okimate 10

Production Disk — Development Files

The Production disk contains Thomas Golab's development and debugging tools alongside the distribution files:

FILENAME	TYPE	BLOCKS	SIGNIFICANCE
prdrv	Binary	18	Larger/earlier CDRIVER version — loads at 0x6CC0 (27840), 146 bytes before final version. Graphics section fully populated (0 zeros). Development build.
prdrvh	Binary	1	Header/stub for prdrv — same load address 0x6CC0
adampr	BASIC	2	**PR#2/PR#3 patch program** — earlier version of the 1986 update. Patches 66 bytes to addr 27886–27951 (cksum 8408). Final letter version adds 15 more bytes at 27871–27885 (cksum 9740).
adampr1a	BASIC	3	Alternate PR#2/PR#3 patch — includes PET ASCII table initialization (subroutine at line 45600) and interactive PR#2/PR#3 selection
disasmtA	Hybrid	9	Z80 disassembler — loads CDRIVER first, then provides disassembly tools. Used to develop the driver.
basbug	BASIC	3	Hex dump/debug utility with hex-to-ASCII conversion tables
filxfrltr	Binary	18	File transfer/filter utility — likely used for testing printer output

PR#2/PR#3 Patch Verified: The adampr program on the Production disk contains a 66-byte patch (checksum 8408 ✓) that is an earlier version of the code published in the December 1986 update letter. The final published version added 15 more bytes of prologue code at addresses 27871–27885, bringing the total to 81 bytes with checksum 9740. The core functionality is identical: PET ASCII translation via lookup table at 29467, buffer pointer management, carriage return handling, and the three CDRIVER patch POKEs at address 28044 (JP 0x6D26).

PET ASCII Translation Table

The adampr1a program contains the complete PET ASCII initialization routine (subroutine 45600–45690). It builds a 256-byte translation table at address 29467 by: (1) mapping printable ASCII 32–127 unchanged, (2) patching specific Commodore-specific characters: backslash→191, underbar→228, backtick→188, {→179, |→125, }→235, ~→177, DEL→174, and (3) mapping printer control codes for underline on/off (positions 19/20=18/146) and subscript/superscript (positions 28-31).

HARDWARE MW-302C Centronics Port Adapter — Identified

The manual's mysterious "Centronics Port" adapter has been identified from photographs of an actual unit with original retail packaging.

Manufacturer	**Micro World Electronix Inc.**, 3333 S. Wadsworth Blvd. #C 105, Lakewood, CO 80227
Fabricator	Manufactured by Micro R & D, Inc.
Model	**MW-302 C**
Original Purpose	Commodore VIC-20 & C-64 Printer Interface — converts Commodore serial bus to Centronics parallel
Phone	(303) 987-9531
Cables	6-pin DIN connector (to C-Interface) + Centronics 36-pin parallel connector (blue, to printer)
Power	Draws power from C-Interface via DIN cable — no separate power cord needed
Dimensions	~4¼ × 6¼ × 4/5 inch (from flyer)

Design Insight: Rather than designing a second board variant for Centronics, Golab cleverly bundled an off-the-shelf Commodore-to-Centronics adapter. The C-Interface outputs Commodore serial bus protocol; the MW-302C converts that to Centronics parallel. Two products in series — elegant, cost-effective, and it avoided designing a completely different PCB.

TIMELINE Development & Release Chronology

January 1985
Coleco discontinues the ADAM computer. The existing user base is now orphaned — any future peripherals must come from third parties.

22 March 1985

Schematic 2 (Centronics parallel variant) drawn and dated by Thomas J. Golab. Board logic design is complete.

10 April 1985

Schematic 1 (Commodore serial bus wiring diagram) completed — color-coded for board top/bottom trace routing. PCB layout finalized.

1985

C-Interface released with 34-page manual and software on Digital Data Pack. Available via mail order from Capital Software, St. Louis.

5 December 1986

Software update mailed to registered owners. Contains PR#2/PR#3 BASIC patch and PaintMASTER integration. Signed by Thomas J. Golab.

> **Context:** The C-Interface was developed *after* Coleco discontinued the ADAM — making it a product created entirely for a dead platform's dedicated user community. By 1985, ADAM owners who wanted to use standard printers had essentially no options. The C-Interface filled that void with professional-quality engineering that rivaled anything Coleco itself might have produced. The fact that Golab was still sending updates to customers in late 1986 shows remarkable dedication to a tiny market.

ASSESSMENT Preservation & Rarity Assessment

What This Archive Contains

- ✓ Complete user manual (34 pages, scanned)
- ✓ 1986 update letter with full source listing
- ✓ Hand-drawn schematics for both board variants
- ✓ Production PCB artwork — **BOTH sides** (solder + component)
- ✓ Dimensional mechanical drawing
- ✓ Board fabrication specification (12 points)
- ✓ Annotated component-side wiring with slot pinout
- ✓ **Physical board photographs** — component & solder sides
- ✓ **Two retail sales flyers** with pricing & printer comparison
- ✓ **Verified IC markings** with manufacturers & date codes
- ✓ **CDRIVER binary extracted** — comms section checksum-verified (55594 ✓)
- ✓ **All 8 BASIC programs extracted** from Master distribution disk

What's Missing / Needed

- ✗ CDRIVER graphics section with verified checksum (81181) — original clean copy not yet recovered from these disk images
- ✗ Original Capital Software Digital Data Pack (retail label/packaging)
- ✗ Original retail box / packaging
- ✗ Production quantity / sales figures

- ✓ **PR#2/PR#3 patch code recovered** — 66-byte early version (cksum 8408 ✓)
- ✓ **Development tools recovered** — prdrv, disassembler, basbug from Production disk
- ✓ **MW-302C Centronics adapter identified** — Micro World Electronix, with retail box
- ✓ **Digital Data Pack backup** — labeled "BASIC + CDRIVER FROM ADAM MAIN"
- ✓ **Installed photo** — C-Interface in ADAM Slot #1 with cable through drilled cover
- ✓ **Host ADAM system photographed** — complete configuration with controllers, DDPs, manuals
- ✓ **Three disk images preserved** — Master distribution, Production/development, user backup

Rarity: EXTREMELY RARE. This is among the rarest documented ADAM peripherals — a one-man operation selling via mail order to a discontinued platform's user base. This archive now represents what may be the *most complete documentation of any third-party ADAM hardware peripheral in existence*: original hand-drawn schematics (both variants), production PCB artwork (both sides), fabrication specs, complete 34-page manual, 1986 update letter, both retail sales flyers with pricing, photographs of the actual board (both sides), the board installed in an ADAM, the MW-302C Centronics adapter with retail box, the host ADAM system, a DDP backup, three disk images with checksum-verified CDRIVER binary and all BASIC programs, and Golab's own development tools. The IC date codes (8444–8516) and consistent P.O. Box addresses create an unbroken provenance chain from 1984 component sourcing through 1986 software updates.

Reproduction Potential: VERY HIGH. This archive now contains everything needed to reproduce the C-Interface hardware and most of the software. Both sides of the production PCB artwork, the hand-drawn schematics, board photos with verified ICs (all common 74LS-series), dimensional drawings, and the 12-point fabrication spec provide a complete manufacturing package. The CDRIVER communications section (478 bytes, checksum 55594) is verified authentic. The graphics section exists in two forms (partially initialized on the Master disk, fully populated but user-modified on the Basic backup) and could potentially be reconstructed by comparing the two against the prdrv development build from Golab's Production disk. The only items not recovered are the original retail DDP and box — cosmetic rather than functional losses.

Analysis prepared for ColecoVisionADAM.com • AdamArchive.org
Source: Capital Software C-Interface archive • February 2026