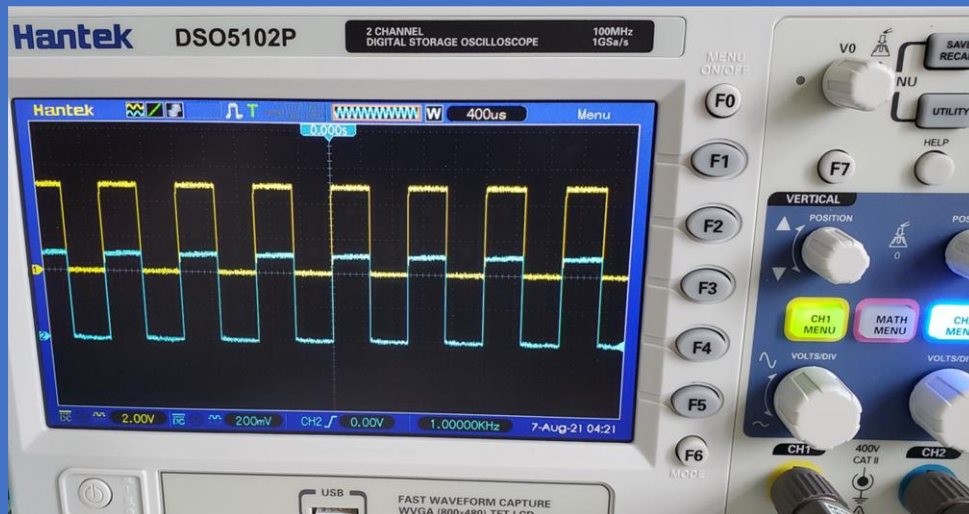# Rudy's Retro Intelligence

Apple IIe Personal Computer Diagnostics and Repair Manual

The purpose of this manual is help diagnose and repair the Apple IIe computers and is based on my work from over the years of repairs and input from others. Future versions will be available as more information is collected, tested and verified.

Included is the diagnostic section with suggested repairs based on the conditions present. Diagrams and pinouts are also proved. Schematics for the Apple IIe computer itself can be found online and are *not* included here as there are some differences between revisions of the motherboard.

For Apple IIe clone computers, the diagnosis should work on these computers, however the placements of the IC and other parts my not line up with the diagram at the end of this documentation. You will have to some additional research.

For the latest version of this document and other Apple II\II+ related information, use the links below.

https://github.com/RudyRetroIntel/Vintage-Computer-Diagnostics

You can find my video on the monitoring board here.

https://www.youtube.com/@RudysRetroIntel

"Sharing knowledge, so we can ensure that the Apple IIe computer can be repaired and enjoyed now and into the future. Rudy's Retro Intel"

Manufacturer	Apple Computer Co. 1983
Processor	CPU MOS Technology/SynerTek 6502
Speed	1.02Mhz
ROM	16K or 32K
Onboard RAM	64KB
Max RAM	128KB with 80 column card
Number of slots	8
Operating System	DOS 3.3, ProDOS and CP/M with Z80 card
Max video resolution	Apple II video: 140x192, 280x192 and others, 16 colors, TV or composite monitor
Input\Output	Serial and Parallel
Speaker	Mono speaker
Diagnostic Software	Apple-Cillian II - XPS Inc
	Apex II
	XPS Diagnostics IIe
	Apple IIe Diagnostics V2.1

Note. After repairs are completed, always run the diagnostic software and loop through all the tests as there may be other issues with the computer. Recommend that tests run at least 10 times without errors

Apple IIe Built in Diagnostics

To start the test, both the closed and the open Apple keys must be pressed during boot. It is also possible to press the closed apple while pressing the CONTROL-OPEN APPLE-RESET keys to start the test at any time. The test is also performed automatically if the keyboard is detached when the computer boots.

Tests performed: Following components are tested:

> Main RAM and aux. RAM.
> MMU
> IOU
> GLU

If a problem is detected at any point of the test sequence the test stops and a failure message is displayed

Interpreting the results
If the MMU, IOU or the GLU are detected as faulty, the corresponding component name is displayed. RAM Chips are tested sequentially starting with the least significant bit of main RAM and working through the most significant bit. Then the auxiliary RAM is tested.

A RAM fault is shown as a 1 in a series of zeroes. The faulty RAM chip corresponds to the bit position of the 1. This means the rightmost number corresponds to the memory chip labeled as MDR0 for the main RAM

A fault on the auxiliary RAM is indicated with an asterisk. A fault on the first 255 bytes of ram is additionally marked with a ZP which stands for zero pointer.

When finished a SYSTEM OK message or KERNEL OK (Apple IIe Enhanced) appears.

**** NOTE **** Built in RAM test display is backwards, so to locate bad RAM indicated, you must have the slots of the board nearest to you. If you view with slots farthest from you, you will replace the wrong RAM IC

Card configuration - Viewed left to right from power supply

Auxiliary Slot	80 Column Card
Slot 1	Printer Card
Slot 2	Modem or Serial Card
Slot 3	80 Column Card
Slot 4	CP/M Card
Slot 5	Disk Drive Card 3 and 4
Slot 6	Disk Drive Card 1 and 2
Slot 7	Disk Drive Card 5 and 6

Quick Bad IC Connection Repair

Sometimes the Apple II series computer has a bad connection issue with the chips and the sockets. Before you start your diagnostics, open the computer and re seat all the chips. This is done by pressing down on all the chips to re seat them. You may hear a small cracking sound which is normal. Once done try to boot up the computer. Chips can get loose in the socket over time due to heat.

Peripheral Connector Signal Description

Signal	Description
I/O SELECT	This line, normally HIGH, becomes LOW when the MPU references page $Cn, where n is the slot number.
A0-A15	Buffered address bus.
R/$\overline{W}$	Read/Write signal.
SYNC	On peripheral connector 7 only, connected to video timing generator's SYNC signal.
$\overline{I/O\ STROBE}$	This line goes LOW during Φ0 when the address bus contains an address between $C800 and $CFFF.
RDY	RDY input on 6502.
$\overline{DMA}$	Pulling this line LOW disables the 6502's address bus and halts the MPU.
INT OUT	Daisy-changed interrupt output to lower priority devices.
DMA OUT	Daisy-changed DMA output to lower priority devices.
+5v	+5v power supply. 500 ma is available for all peripheral devices.
GND	System ground.
DMA IN	Daisy-chained input from higher priority devices.
INT IN	Daisy-changed input from higher priority devices.
$\overline{NMI}$	Nonmaskable interrupt.
$\overline{IRQ}$	Interrupt request.
$\overline{RES}$	System reset input.
$\overline{INH}$	When this line is pulled LOW, all ROMs on Apple board are disabled
−12v	−12v power supply. Maximum current for all peripheral boards is 200 ma.
−5v	−5v power supply. Maximum current for all peripheral boards is 200 ma.
COLOR REF	On connector 7 only, this pin is connected to color refrence signal.
7M	7 MHz clock.
Q3	2 MHz asymmetrical clock.
Φ1	MPU's phase one clock.
USER 1	This line, when pulled LOW, disables all internal I/O address decoding.
Φ0	MPU's phase 0 clock.
$\overline{DEVICE\ SELECT}$	This line becomes active LOW on each peripheral connector when the address bus is holding an address between $C0n0 and $C0nF, where n is the slot number plus $8.
D0-D7	Buffered bidirectional data bus.
+12v	+12v power supply. Maximum current for all peripheral boards is 250 ma.

GND	26		25	+5 V
DMA IN	27		24	DMA OUT
INT IN	28		23	INT OUT
$\overline{\text{NMI}}$	29		22	$\overline{\text{DMA}}$
$\overline{\text{IRQ}}$	30		21	RDY
$\overline{\text{RES}}$	31		20	$\overline{\text{I/O STROBE}}$
$\overline{\text{INH}}$	32		19	SYNC
−12 V	33		18	R/W
−5 V	34		17	A15
COLOR REF	35		16	A14
7M	36		15	A13
Q3	37		14	A12
ϕ1	38		13	A11
USER 1	39		12	A10
ϕ0	40		11	A9
$\overline{\text{DEVICE SELECT}}$	41		10	A8
D7	42		9	A7
D6	43		8	A6
D5	44		7	A5
D4	45		6	A4
D3	46		5	A3
D2	47		4	A2
D1	48		3	A1
D0	49		2	A0
+12 V	50		1	$\overline{\text{I/O SELECT}}$

[1]

[1]

[2]

FRONT
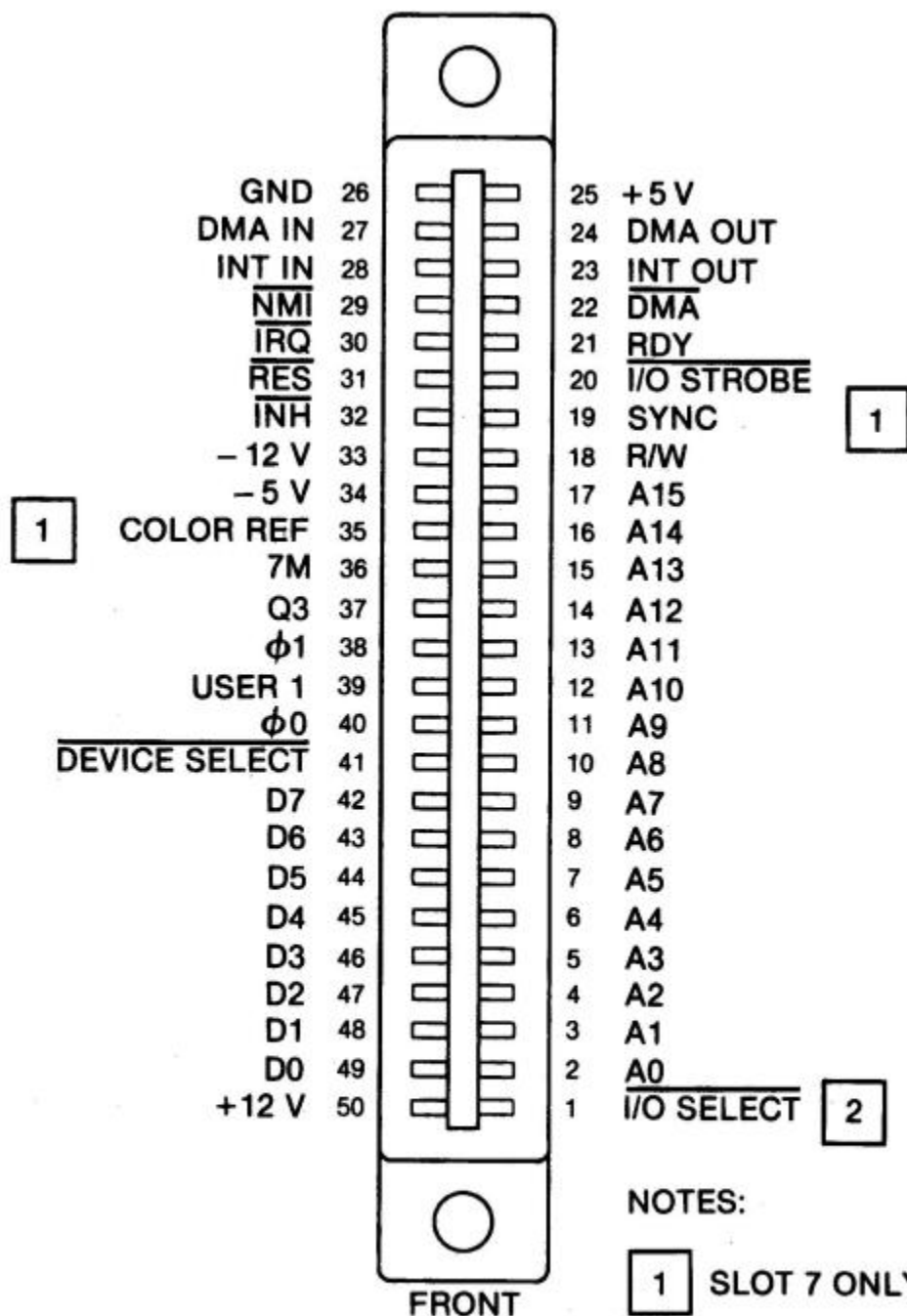
NOTES:

[1] SLOT 7 ONLY

[2] SLOTS 1-7 ONLY

6

Apple IIe Symptoms and Diagnostics

Read the symptoms column and find the condition present. Next read across the row for the diagnostics.

Diagnostics of Apple IIe and Enhanced - Symptom(s)	Boot	Power Light	Beep	Screen	Floppy Drive	Cassette	Diagnosis	IC Location
Boot and Startup Issues								
Will not boot, no power light, no beep and disk drive won't run	No	No	No	No	No	Unknown	No power - Check power cord, check power supply	
Will not boot, no power light, no beep and disk drive won't run	No	No	No	No	No	Unknown	74LS125	E1
Will not boot, no power light, no beep and disk drive won't run	No	No	No	No	No	Unknown	74S109	C1
Will not boot, no power light, no beep and disk drive won't run	No	No	No	No	No	Unknown	74S02	B8
Will not boot, no power light, no beep and disk drive won't run	No	No	No	No	No	Unknown	Programmed Array Logic PAL 16R8\8323T	D1
Will not boot, no power light, no beep and disk drive won't run	No	No	No	No	No	Unknown	IOU Input Output Unit	E5
Will not boot, no power light, no beep and disk drive won't run	No	No	No	No	No	Unknown	2N4258	Q6, Q4
Will not boot, no power light, no beep and disk drive won't run	No	No	No	No	No	Unknown	Bad Crystal	
Will not boot, no power light, no beep and disk drive won't run	No	No	No	No	No	Unknown	14.318 MHz Lower left side of motherboard	
No system message and no beep	No	Yes	No	Blank	Unknown	Unknown	74S02	B8
No system message and no beep	No	Yes	No	Blank	Unknown	Unknown	74S109	C1
No system message and no beep	No	Yes	No	Blank	Unknown	Unknown	PAL 16R8\8323T	D1
Message appears and no beep	Unknown	Yes	No	Apple	Unknown	Unknown	Programmed Array Logic PAL 16R8\8323T	D1
Message appears and no beep	Unknown	Yes	No	Apple	Unknown	Unknown	IOU Input Output Unit	E5
Message appears and no beep	Unknown	Yes	No	Apple	Unknown	Unknown	Transistor MPSA13	A14
Will not boot, power light on, no beep, drive will not run(spin) and garbage on the screen	No	Yes	No	Garbage	No	Unknown	Monitor read-only memory EF ROM	E10
Will not boot, power light on, no beep, drive will not run(spin) and garbage on the screen	No	Yes	No	Garbage	No	Unknown	CPU – 6502B	C4
Will not boot floppy, power light on, beeps and screen shows APPLE message but floppy will not run	No	Yes	Yes	Apple	No	Unknown	ULN2003 Disk Card	
Will not boot floppy, power light on, beeps and screen shows APPLE message but floppy will not run	No	Yes	Yes	Apple	No	Unknown	Bad disk card Disk Card	
Will not boot floppy, power light on, beeps and screen shows APPLE message but floppy will not run	No	Yes	Yes	Apple	No	Unknown	Bad stepper motor	Floppy Drive
Will not boot floppy, power light on, beeps and screen shows APPLE message but floppy will not run	No	Yes	Yes	Apple	No	Unknown	Bad ribbon cable	Disk Card
Will not boot floppy, power light on, beeps and screen shows APPLE message but floppy will not run	No	Yes	Yes	Apple	No	Unknown	Bad regulator on floppy drive Floppy Drive	
Will not boot floppy, power light on, beeps and screen shows APPLE message but floppy drive keeps running	No	Yes	Yes	Apple	Spins	Unknown	Bad disk, bad program, bad DOS	
Will not boot floppy, power light on, beeps and screen shows APPLE message but floppy drive spins and then stops	No	Yes	Yes	Apple	Spin and stops	Unknown	Bad disk, bad program, bad DOS	
Will not boot floppy, power light on, beeps and screen blank but floppy drive spins and then stops	No	Yes	Yes	Blank	Spin and stops	Unknown	Video cable bad	
Will not boot floppy, power light on, beeps and screen blank but floppy drive spins and then stops	No	Yes	Yes	Blank	Spin and stops	Unknown	Monitor bad Monitor	
Will not boot floppy, power light on, beeps and screen blank but floppy drive spins and then stops	No	Yes	Yes	Blank	Spin and stops	Unknown	Monitor brightness low	Monitor
Will not boot floppy, power light on, beeps and screen blank but floppy drive spins and then stops	No	Yes	Yes	Blank	Spin and stops	Unknown	Bad ICs	Motherboard
Will not boot floppy, power light on, beeps and screen blank but floppy drive spins and then stops	No	Yes	Yes	Blank	Spin and stops	Unknown	74LS02	B8
Will not boot floppy, power light on, beeps and screen blank but floppy drive spins and then stops	No	Yes	Yes	Blank	Spin and stops	Unknown	74SL10	C5
Will not boot floppy, power light on, beeps and screen blank but floppy drive spins and then stops	No	Yes	Yes	Blank	Spin and stops	Unknown	74LS166	F5
Will not boot floppy, power light on, beeps and screen blank but floppy drive spins and then stops	No	Yes	Yes	Blank	Spin and stops	Unknown	IOU Input Output Unit	E5
Will not boot floppy, power light on, beeps and screen blank but floppy drive spins and then stops	No	Yes	Yes	Blank	Spin and stops	Unknown	Character ROM 2732	E5
Will not boot floppy, power light on, beeps and screen blank but floppy drive spins and then stops	No	Yes	Yes	Blank	Spin and stops	Unknown	2N3904	A14
Will not boot floppy, power light on, beeps and screen blank but floppy drive spins and then stops	No	Yes	Yes	Blank	Spin and stops	Unknown	2N3906	A14
Issues with running								
Disk drive just spins or I/O error message appears	Yes	Yes	Yes	IO error message	No	Unknown	Bad diskette -	
Disk drive just spins or I/O error message appears	Yes	Yes	Yes	IO error message	No	Unknown	Read Head - clean	
Disk drive just spins or I/O error message appears	Yes	Yes	Yes	IO error message	No	Unknown	Bad drive card Floppy Card	
Disk drive just spins or I/O error message appears	Yes	Yes	Yes	IO error message	No	Unknown	Bad ribbon cable	Floppy Card
Disk drive just spins or I/O error message appears	Yes	Yes	Yes	IO error message	No	Unknown	Floppy drive read amplifier MC3470	
Disk drive just spins or I/O error message appears	Yes	Yes	Yes	IO error message	No	Unknown	NPN Transistors CA3146	
Disk drive just spins or I/O error message appears	Yes	Yes	Yes	IO error message	No	Unknown	Bad floppy drive	Floppy Card

Symptom							Cause	Location
Disk drive will read but not write	Yes	Yes	Yes	Good	Read, not write	Unknown	Disk not formatted or Write tab	
Disk drive will read but not write	Yes	Yes	Yes	Good	Read, not write	Unknown	Drive able loose on disk card	Disk Card
Disk drive will read but not write	Yes	Yes	Yes	Good	Read, not write	Unknown	Connector dirty	Disk Card
Disk drive will read but not write	Yes	Yes	Yes	Good	Read, not write	Unknown		Floppy Drive
Disk drive will read but not write	Yes	Yes	Yes	Good	Read, not write	Unknown	74LS125	Floppy Drive
Disk drive will read but not write	Yes	Yes	Yes	Good	Read, not write	Unknown	CA3146	Floppy Drive
Disk drive will read but not write	Yes	Yes	Yes	Good	Read, not write	Unknown	MC3470	Floppy Drive
Disk drive will read but not write	Yes	Yes	Yes	Good	Read, not write	Unknown	ULN2003	Floppy Drive
Disk drive will read but not write	Yes	Yes	Yes	Good	Read, not write	Unknown	Write head dirty or damaged	Floppy Drive
Floppy drive operates intermittently for reads and writes connectors	Yes	Yes	Yes	Yes	R\W intermittent	Unknown	Disk card connector dirty. Clean edge	
Floppy drive operates intermittently for reads and writes	Yes	Yes	Yes	Yes	R\W intermittent	Unknown	Overheating. Install fan	Motherboard
Floppy drive operates intermittently for reads and writes	Yes	Yes	Yes	Yes	R\W intermittent	Unknown	diskette tracking misalignment.	
Computer locks up and keyboard not responding	Yes	Yes	Yes	Frozen	Yes	Unknown	Bad keyboard character ROM - 2716 ROM	E12
Computer locks up and keyboard not responding	Yes	Yes	Yes	Frozen	Yes	Unknown	Bad Character data block AY3600	E14
Computer locks up and keyboard not responding	Yes	Yes	Yes	Frozen	Yes	Unknown	Defective CPU - 6502	C4
Computer locks up and keyboard not responding	Yes	Yes	Yes	Frozen	Yes	Unknown	Memory management unit MMU	E4

Issues with Display

Symptom							Cause	Location
White screen and no other display	Unknown	Unknown	Unknown	White	Unknown	Unknown	74LS166	F5
White screen and no other display	Unknown	Unknown	Unknown	White	Unknown	Unknown	Bad Character generator ROM	F4
No display and no video	Unknown	Unknown	Unknown	None	Unknown	Unknown	Video cable bad	
No display and no video	Unknown	Unknown	Unknown	None	Unknown	Unknown	Video connector bad	Motherboard
No display and no video	Unknown	Unknown	Unknown	None	Unknown	Unknown	Monitor bad	Monitor
No display and no video	Unknown	Unknown	Unknown	None	Unknown	Unknown	Monitor brightness low	Monitor
No display and no video	Unknown	Unknown	Unknown	None	Unknown	Unknown	Bad ICs	Motherboard
No display and no video	Unknown	Unknown	Unknown	None	Unknown	Unknown	74LS02	B8
No display and no video	Unknown	Unknown	Unknown	None	Unknown	Unknown	74LS10	C5
No display and no video	Unknown	Unknown	Unknown	None	Unknown	Unknown	74LS166	F5
No display and no video	Unknown	Unknown	Unknown	None	Unknown	Unknown	74LS374	D3
No display and no video	Unknown	Unknown	Unknown	None	Unknown	Unknown	Programmed Array Logic PAL 16R8\8323T	D1
No display and no video	Unknown	Unknown	Unknown	None	Unknown	Unknown	IOU Input Output Unit	E5
No display and no video	Unknown	Unknown	Unknown	None	Unknown	Unknown	2N3904	A14
No display and no video	Unknown	Unknown	Unknown	None	Unknown	Unknown	2N3906	A14
No display with a blank screen	Unknown	Unknown	Unknown	Blank	Unknown	Unknown	Video cable bad	
No display with a blank screen	Unknown	Unknown	Unknown	Blank	Unknown	Unknown	Video connector bad	Motherboard
No display with a blank screen	Unknown	Unknown	Unknown	Blank	Unknown	Unknown	Monitor bad	Monitor
No display with a blank screen	Unknown	Unknown	Unknown	Blank	Unknown	Unknown	Monitor brightness low	Monitor
No display with a blank screen	Unknown	Unknown	Unknown	Blank	Unknown	Unknown	IOU Input Output Unit	E5
No display with a blank screen	Unknown	Unknown	Unknown	Blank	Unknown	Unknown	Bad Character generator ROM	F4
No colour	Yes	Yes	Yes	No colour	Good	Unknown	Bad ICs	Motherboard
No colour	Yes	Yes	Yes	No colour	Good	Unknown	IOU Input Output Unit	E5
No colour	Yes	Yes	Yes	No colour	Good	Unknown	Bad Capacitor	C32
No colour	Yes	Yes	Yes	No colour	Good	Unknown	Bad Inductor	L3
No video synchronization (Sync)	Yes	Yes	Yes	No sync	Unknown	Unknown	Bad ICs	Motherboard
No video synchronization (Sync)	Yes	Yes	Yes	No sync	Unknown	Unknown	IOU Input Output Unit	E5
No video synchronization (Sync)	Yes	Yes	Yes	No sync	Unknown	Unknown	Monitor bad	Monitor
No cursor or bad cursor being shown	Yes	Yes	Yes	Bad cursor	Yes	Unknown	Monitor read-only memory EF ROM	E10
No cursor or bad cursor being shown	Yes	Yes	Yes	Bad cursor	Yes	Unknown	Bad Character generator ROM	F4
Bad flash or bad inverse	Yes	Yes	Yes	Bad Flash\Inverse	Yes	Unknown	Bad Character ROM	F4
No text on screen	Yes	Yes	Yes	No text	Yes	Unknown	Bad Character generator ROM	F4
No text on screen	Yes	Yes	Yes	No text	Yes	Unknown	IOU Input Output Unit	E5
Wrong characters shown	Yes	Yes	Yes	Wrong Characters	Yes	Unknown	Bad Character ROM	F4
Wrong characters shown	Yes	Yes	Yes	Wrong Characters	Yes	Unknown	Bad keyboard ROM	E12
Bad video colour	Yes	Yes	Yes	Bad colour	Yes	Unknown	Programmed Array Logic HAL\PAL 16R8	D1
Bad graphics no hi or low resolution but text OK	Yes	Yes	Yes	No graphics	Yes	Unknown	IOU Input Output Unit	E5
Bad graphics no hi resolution but low resolution and text OK	Yes	Yes	Yes	Bad Hi Res	Yes	Unknown	IOU Input Output Unit	E5
Getting APPLE II prompt with double lines of inverse characters	No	Yes	Yes	Bad	Unknown	Unknown	Memory management unit MMU	E4

Issues with Keyboard

Issue							Cause	Location
Keys with no response or some key with press	Yes	Yes	Yes	Bad key press	Yes	Unknown	Loose or bad keyboard ribbon cable	Keyboard
Keys with no response or some key with press	Yes	Yes	Yes	Bad key press	Yes	Unknown	Bad character generated	Motherboard
Keys with no response or some key with press	Yes	Yes	Yes	Bad key press	Yes	Unknown	Bad Character generator ROM	F4
Keys with no response or some key with press	Yes	Yes	Yes	Bad key press	Yes	Unknown	Bad keyboard character ROM	E12
Keyboard shows wrong characters	Yes	Yes	Yes	Wrong Characters	Yes	Unknown	Bad Character ROM	F4
Keyboard shows wrong characters	Yes	Yes	Yes	Wrong Characters	Yes	Unknown	Bad keyboard ROM	E12
Keyboard shows wrong characters	Yes	Yes	Yes	Wrong Characters	Yes	Unknown	Bad AY3600	E14
keyboard shows repeated characters	Yes	Yes	Yes	Repeat char	Yes	Unknown	Key bounce	Keyboard
keyboard shows repeated characters	Yes	Yes	Yes	Repeat char	Yes	Unknown	Bad Character generator ROM	F4
keyboard shows repeated characters	Yes	Yes	Yes	Repeat char	Yes	Unknown	Bad keyboard character ROM	E12
keyboard shows repeated characters	Yes	Yes	Yes	Repeat char	Yes	Unknown	Bad AY3600	E14
Keyboard repeat not working	Yes	Yes	Yes	Not repeating	Yes	Unknown	Bad key contact	Keyboard
Keyboard repeat not working	Yes	Yes	Yes	Not repeating	Yes	Unknown	Bad AY3600	E14
Keyboard repeat not working	Yes	Yes	Yes	Not repeating	Yes	Unknown	Bad Capacitor	C71

Sound issues with speaker

Issue							Cause	Location
Speaker volume very low	Yes	Yes	Low volume	Yes	Yes	Unknown	MPSA13 – Q5	E14
Speaker has no sound	Yes	Yes	No	Yes	Yes	Unknown	Bad speaker	Speaker
Speaker has no sound	Yes	Yes	No	Yes	Yes	Unknown	Speaker wire bad or disconnected	
Speaker has no sound	Yes	Yes	No	Yes	Yes	Unknown	Transistor	Motherboard
Speaker has no sound	Yes	Yes	No	Yes`	Yes	Unknown	MPSA13 – Q5	E14

Cassette tape Issues

Issue							Cause	Location
Cassette will not load data	Yes	Yes	Yes	Good	Unknown	Not loading	Bad cassette drive	Cassette
Cassette will not load data	Yes	Yes	Yes	Good	Unknown	Not loading	Bad cassette cable	
Cassette will not load data	Yes	Yes	Yes	Good	Unknown	Not loading	Cassette volume too low	
Cassette will not load data	Yes	Yes	Yes	Good	Unknown	Not loading	Bad cassette tape	
Cassette will not load data	Yes	Yes	Yes	Good	Unknown	Not loading	LM741	A11
Cassette will not load data	Yes	Yes	Yes	Good	Unknown	Not loading	74LS251	C12
Cassette will not load data	Yes	Yes	Yes	Good	Unknown	Not loading	74LS154	C10
Cassette will not save data	Yes	Yes	Yes	Good	Unknown	Not saving	Bad cassette drive	Cassette
Cassette will not save data	Yes	Yes	Yes	Good	Unknown	Not saving	Bad cassette cable	
Cassette will not save data	Yes	Yes	Yes	Good	Unknown	Not saving	Cassette tape bad	
Cassette will not save data	Yes	Yes	Yes	Good	Unknown	Not saving	Signal not sent. Data out error	Motherboard
Cassette will not save data	Yes	Yes	Yes	Good	Unknown	Not saving	IOU Input Output Unit	E5

Game Paddle Issues

Issue							Cause	Location
Game paddle not working. No response	Yes	Yes	Yes	Good	Good	Good	Bad paddle cable	Game Paddle
Game paddle not working. No response	Yes	Yes	Yes	Good	Good	Good	Bad timer circuit 558	A12
Game paddle not working. No response	Yes	Yes	Yes	Good	Good	Good	74LS251	C12
Game paddle not working. No response	Yes	Yes	Yes	Good	Good	Good	74LS154	C10

Peripheral Cards Issues

Issue							Cause	Location
Card in peripheral slot does not work	Yes	Yes	Yes	Good	Good	Good	Slot not being accessed	Motherboard
Card in peripheral slot does not work	Yes	Yes	Yes	Good	Good	Good	74LS138	B5
Card in peripheral slot does not work	Yes	Yes	Yes	Good	Good	Good	74LS154	C10
Card in peripheral slot does not work	Yes	Yes	Yes	Good	Good	Good	74LS10	C5
System ok, strange prompt no][symbol	Yes	Yes	Yes	Good	Good	Good	Apple IIe has English\ French keyboard. Remove jumper J19	

Apple II Card Diagnostics

*** Ensure Apple IIe works without card installed first ***

Symptom(s) and Diagnostics	IC Location	Comments
ROM Card		
Computer will not restart\reset	74LS09 74LS244 74S74 74LS11	
FP will not work or INT	74S74 D0 ROM 74LS138	
ROM test failure	74LS09 74LS138	
Apple reset when switch is up	Clean or replace switch	
Serial Card		
Will not boot	74LS109 P8 Prom P7 Prom 74LS365	
Prom test fails even after replacement	Q6-MPSU51 Q1,Q2-2N3906	
Receiving error	Q7-2N3904 74LS125	
Transmit error	Q4-2N3904 74LS109 Q3-2N3906	
Parallel Card		
Computer will not reset	P9 Prom P1 Prom 74LS74 Q1-2N3906 Q2-MPSU51	
Floppy drive will not boot	74LS74 Ensure Apple works without card installed	

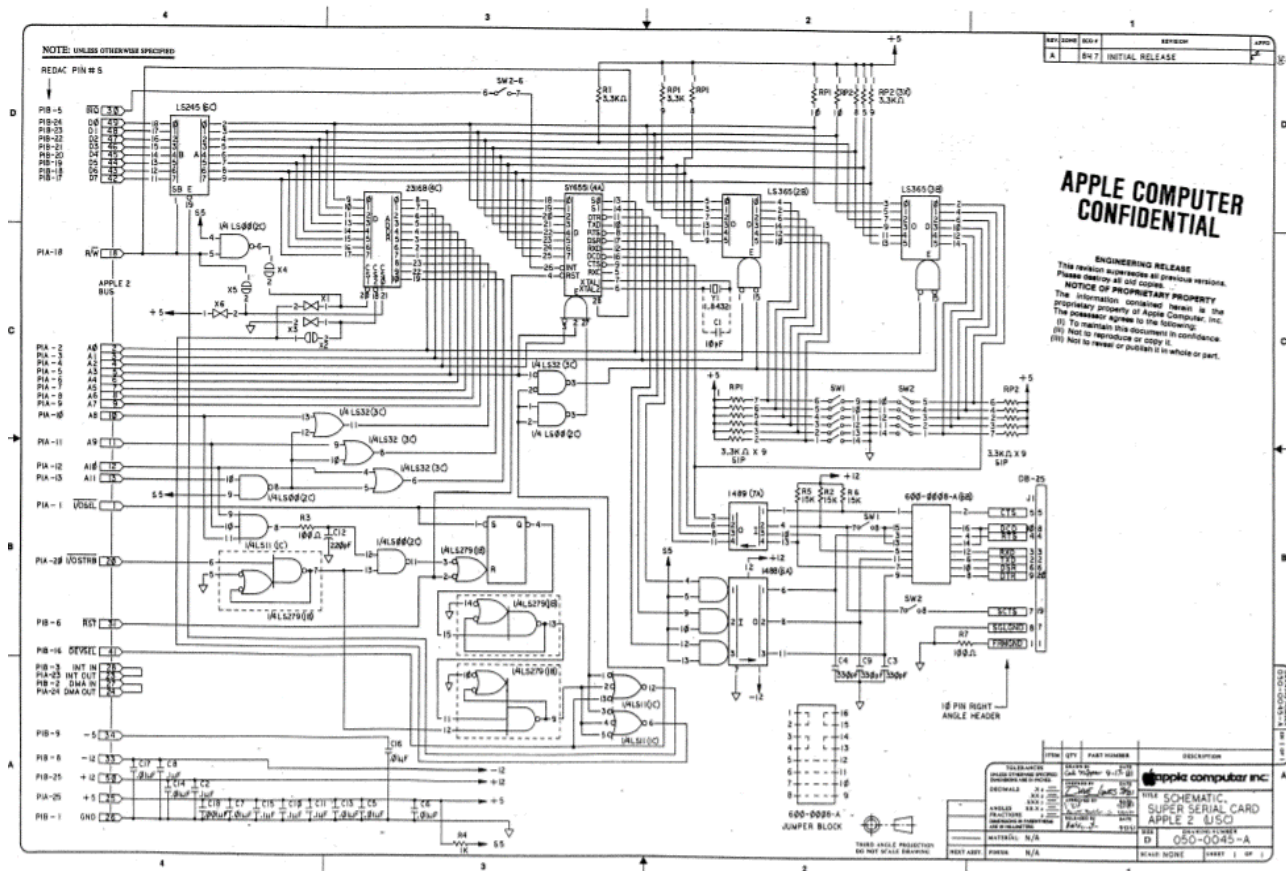|		
PR#n command prompt doesn't return cursor	Q2-MPSU51	
Incorrect data being printed	74LS174	
Will not acknowledge data	B2 -74LS74	
Data not ready error	B2 -74LS74	
Language Card		
Computer will not reset	74LS09 D0 ROM	
Runs Integer but not Apple soft	74LS09	
Will not rest	AutoStart ROM Bad RAM 74LS02 74LS175	
RAM fails tests	Bad cable Bad RAM	
Bank switching not working	74LS86 74LS00 74LS09 74LS08 74LS74 74LS20 74LS175	
Apple Floppy Drive and Disk II controller		
Computer will not boot	74LS259 74LS323 74LS05 PROM P5 74LS259 74LS05 74LS323 NE556	Controller board Controller board Controller board Controller board Controller board Controller board Controller board Controller board
Drive motor runs continuously	74LS174 74LS125	Controller board Analog board, behind drive
Drive motor not working	10K Pot	Controller board

Stepper motor	ULN2003	Analog board, behind drive
	Cable	
Drive will not boot\load OS	PROM P5	Controller board
	Q1	Analog board, behind drive
	PROM P6	Controller board
	74LS125	Analog board, behind drive
	Q2	Controller board
	74LS132	Controller board
	74LS05	Controller board
	74LS259	Controller board
	Head alignment	
Diskette write issues	CA3146	Analog board, behind drive
	74LS125	Analog board, behind drive
	CR3 (IN4148-analog)	Analog board, behind drive
	ULN2003	Analog board, behind drive
	74LS05	Controller board
	P6	Controller board
Floppy motor speed test shown no information	MC3470	Analog board, behind drive
	74LS125	Analog board, behind drive
	74LS174	Controller board
	74LS132	Controller board
Floppy motor speed extremely high	74LS05	Controller board
	CA3146	Analog board, behind drive
Cannot write, protect is always enabled	Cable	
	74LS323	Controller board
	PROM P6	Controller board
Read and write errors	74LS05	Controller board
	ULN2003	Analog board, behind drive
	PROM P5 or PROM P6	Controller board

Apple II Card Schematics

ROM Card
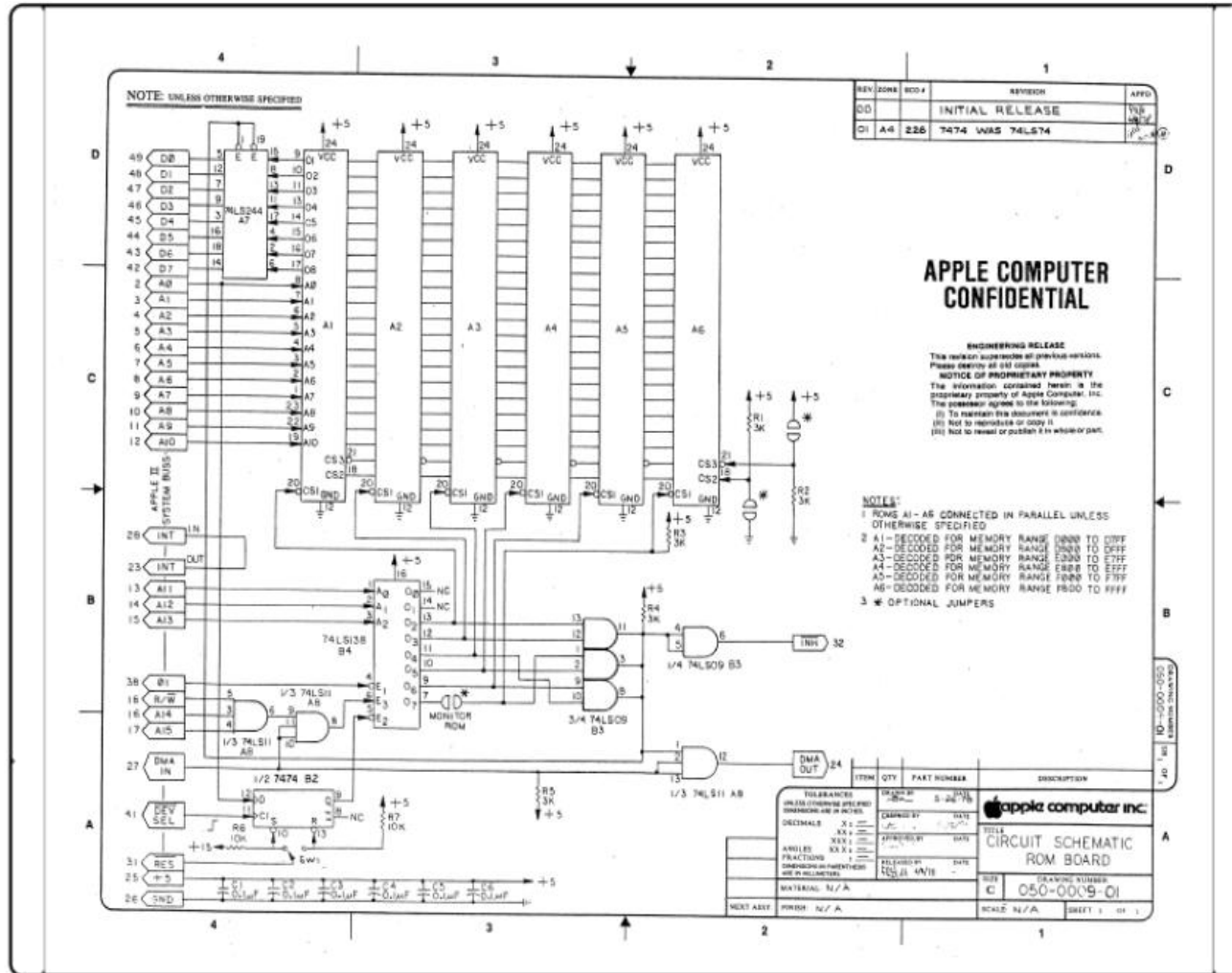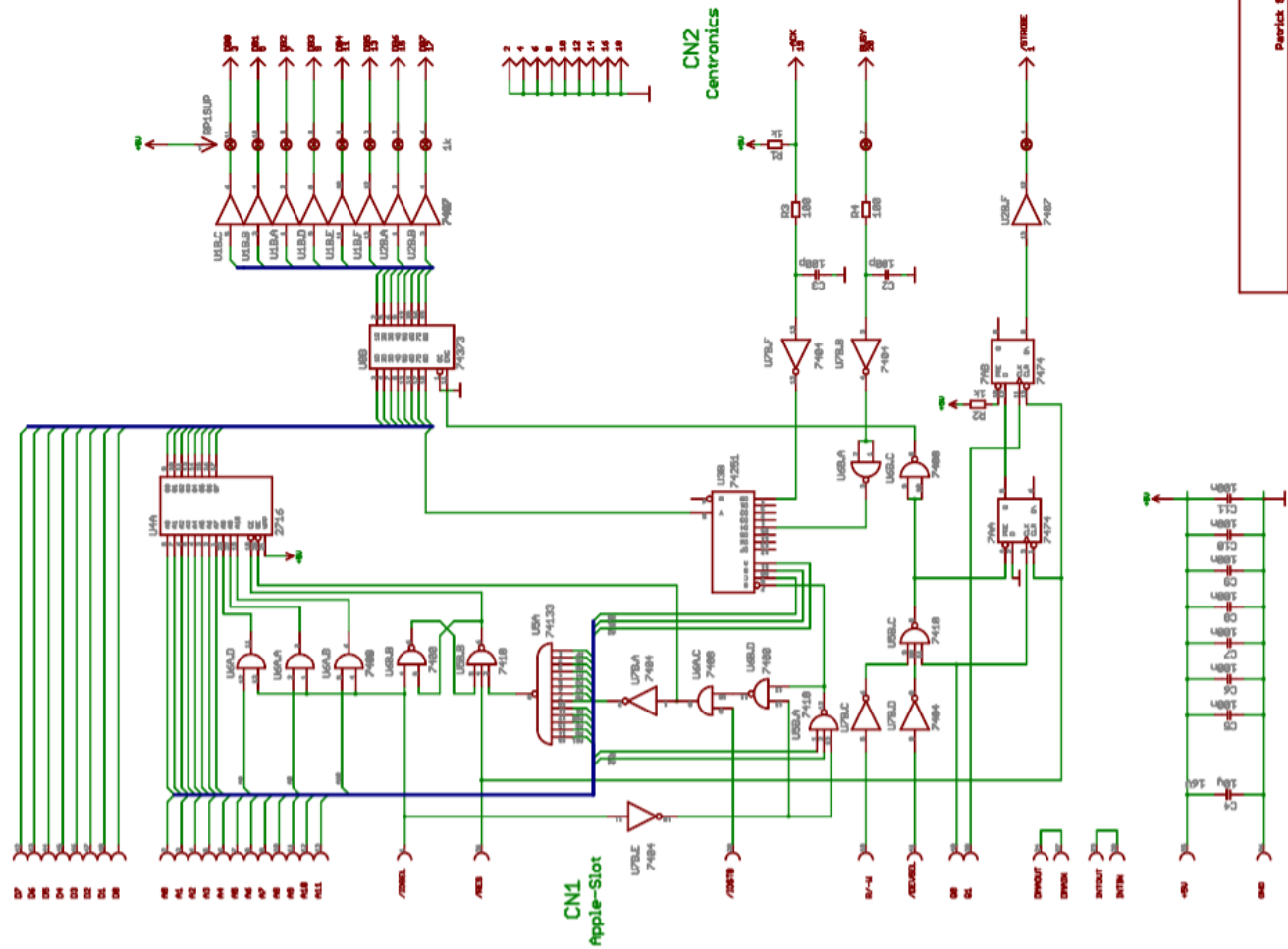
APPLE COMPUTER
CONFIDENTIAL

SCHEMATIC, SUPER SERIAL CARD
APPLE 2 (USO)
050-0045-A

Parallel Card

80 Column Card

Document: Apple //e
Erweiterte 80-Zeichenkarte
REV: A

Patrick Schäfer

Date: 25.03.1994 1:01:56 Sheet: 1/1

Z80 Card

Schalter offen:
'138 disable, Adressen
werden durchgeschaltet

Schalter geschlossen:
C0 H; alle Adressen
werden um 4k0 nach oben
verschoben; 8xxx wird
vorher in Bxxx umcodiert,
bei Bxxx - Dxxx ist zusätz-
lich B: H, d.h. diese
Adressen werden um 8k0
verschoben.
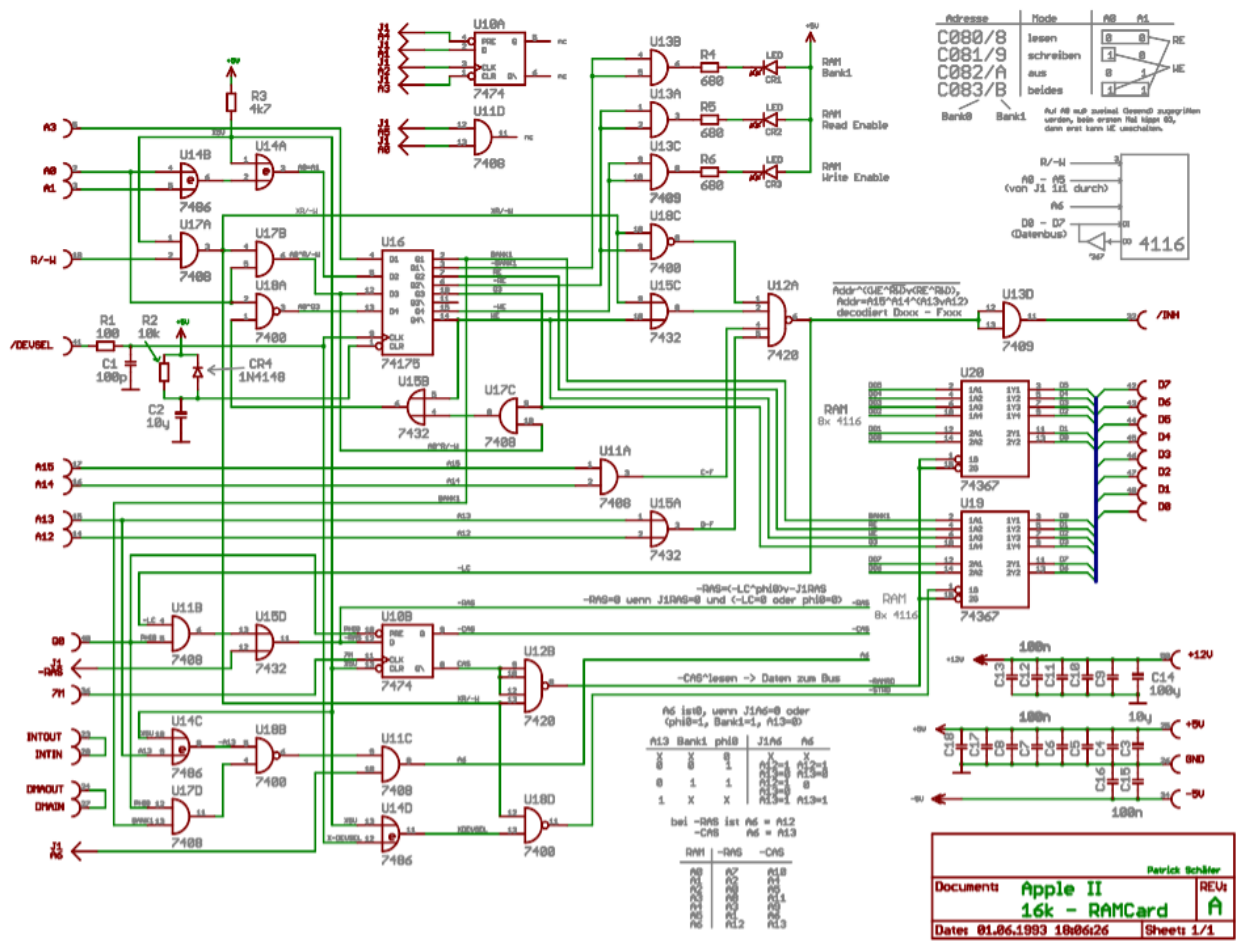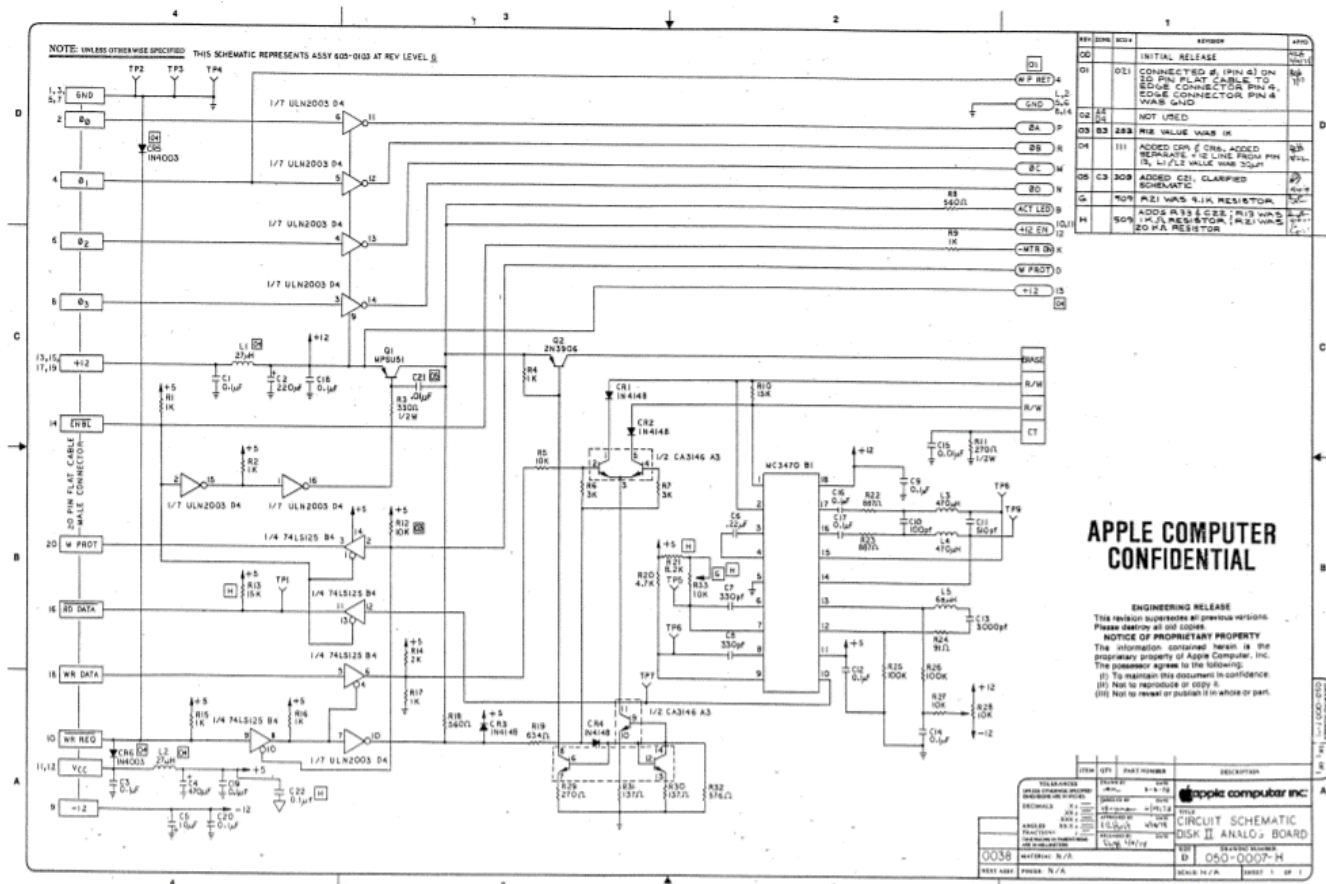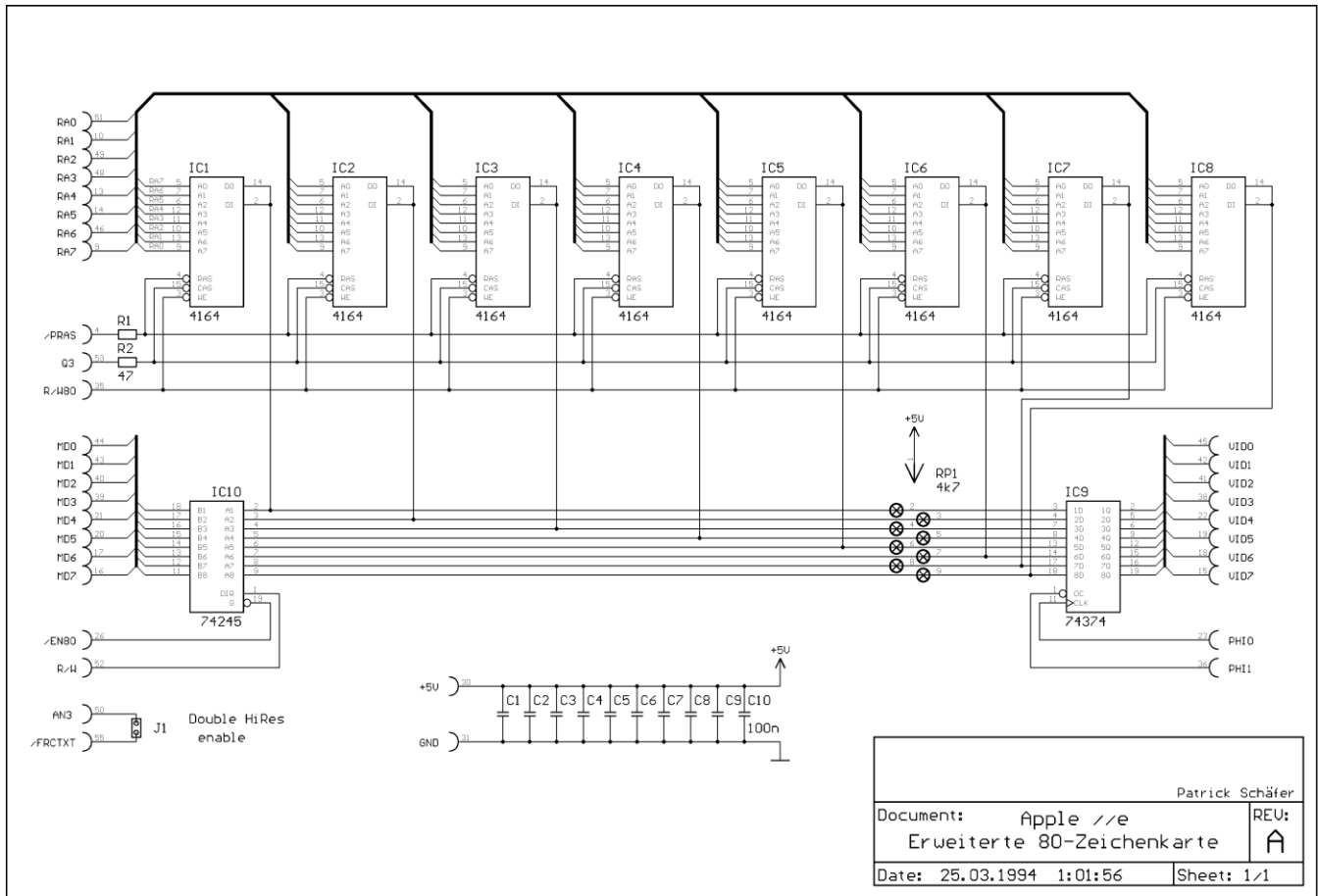
DIP- Schalter:
S1: Z80-Busreq mit -DMA verbinden
S2: Adressen umcodieren
S3: Z80-NMI mit -NMI verbinden
S4: Z80 INT mit IRQ verbinden

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	Z80 Softcard	
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Patrick Schäfer

Joystick Connection

9-pin Male Connector	Function	16-pin IC-style Connector
Pin 2	+5V	Pin 1
Pin 7	Button 0	Pin 2
Pin 5	X-axis	Pin 6
Pin 8	Y-axis	Pin 10
Pin 1	Button 1	Pin 3
Pin 3	Ground	Pin 8

Apple IIe Mother Board Layout – Search the internet for full Apple II schematics

Rudy's Retro Intelligence

Apple IIe Personal Computer
Diagnostics and Repair Manual