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Arithmetic Processor

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January 24, 2019 - 7:48pm		#1
macnoidy  Online Last seen: 1 hour 39 min ago Joined: Oct 15 2012 - 08:59 Posts: 480	Arithmetic Processor <p>Does anyone here know anything about this board: Arithmetic Processor AP-1. It's an oldie. I've had this for quite a while now and have virtually no information or software on it. The photo here was taken off the web in my search but I have virtually the same board with a different S/N.</p> <p>[UPDATE]</p> <p>I found the manual to the board, but there is a program disk called " CCSOFT" that operates it. If anyone has this, I'm happy to share the collection (though limited) of what I've found so far.</p> <p>Attachment</p> <p> Apple][Arithmetic Processor</p>	Size 99.82 KB

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January 25, 2019 - 3:23am		#2
speedyG  Offline Last seen: 4 months 2 days ago Joined: Nov 16 2011 - 07:45 Posts: 2495	I doubt the card to operate <p>I doubt the card to operate even with correct software in correct mode without the missing firmware on the PCB (missing ROMs at lower left side of the picture)....</p> <p>SpeedyG</p>	

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January 25, 2019 - 8:37am		#3
macnoidy  Online Last seen: 1 hour 39 min ago Joined: Oct 15 2012 - 08:59 Posts: 480	Speedy, the manual says it will ... <p>Thanks for responding Speedy. Those ROMS are to hold a small machine language routine for running the card WITHOUT the disk, according to the manual. So you are half correct. :-)</p> <p>But there is no reference as to where or how to get the ROMS in the manual. They only specify that they are 256 by 8 bytes. (not very big!) Likely an MMI 6300 series fuse link PROM. There is also reference to putting RAM in those sockets as well, but for unknown reasons not described in the manual. (The manual is somewhat vague regarding ROM or RAM usage) But the software is most important for running the card, and they address it as being Integer and AppleSoft compatible. Reverse engineering the card will be a significant hassle, as the designer/builder made this card to perform scientific calculations by setting an interrupt at a specified location and jumping to a routine (located on that CCSOFT Disk) that executes the calculation(s) and returns the value & status back to the Apple II for display or whatever. I don't think I would be able to make this card work without that disk. At least, not very well.</p>	

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January 26, 2019 - 10:30am		#4
tokabln	Dear macnoidy,	



Offline

Last seen: 14 hours 18 min ago**Joined:** Dec 30 2015 - 10:48**Posts:** 191

Dear macnroyd,

I'm probably able to give you some hints because of... a couple of weeks ago I started to build a Sinclair ZX / ZX81 APU Prototyp card based on an article of an old German computer magazin.

So even that the ROM seems to be missing on your card you are probably able to use the card with some Basic coding as we started here in Germany to do some simple tests.

APU Intel 8231A or AMD AM9511A are pin compatible

So beside some coding we started with using the original Spectrum ZX ROM without any changes:

Used I/O Addresses to communicate with the APU are as follows, while the APU is using two registers for the calculation(s): a Data- and a Command Register

D=Data-Adresse = 31d -> 1Fh (or 125d -> 7Dh)

C=Command-Adresse = 95d -> 5Fh (or 127d -> 7Fh)

in our case we toggle address bit A6 to switch between Data and Command register (see my attached schematic snapshot), so the Apple I/O Addresses needs to be used here, instead.

APU Testprogramm using the Standard Speccy 48K ROM

Arithmetic APU Operation -> 16 Bit Addition: Command 108d -> 6Ch

PROGRAM: APU-Test

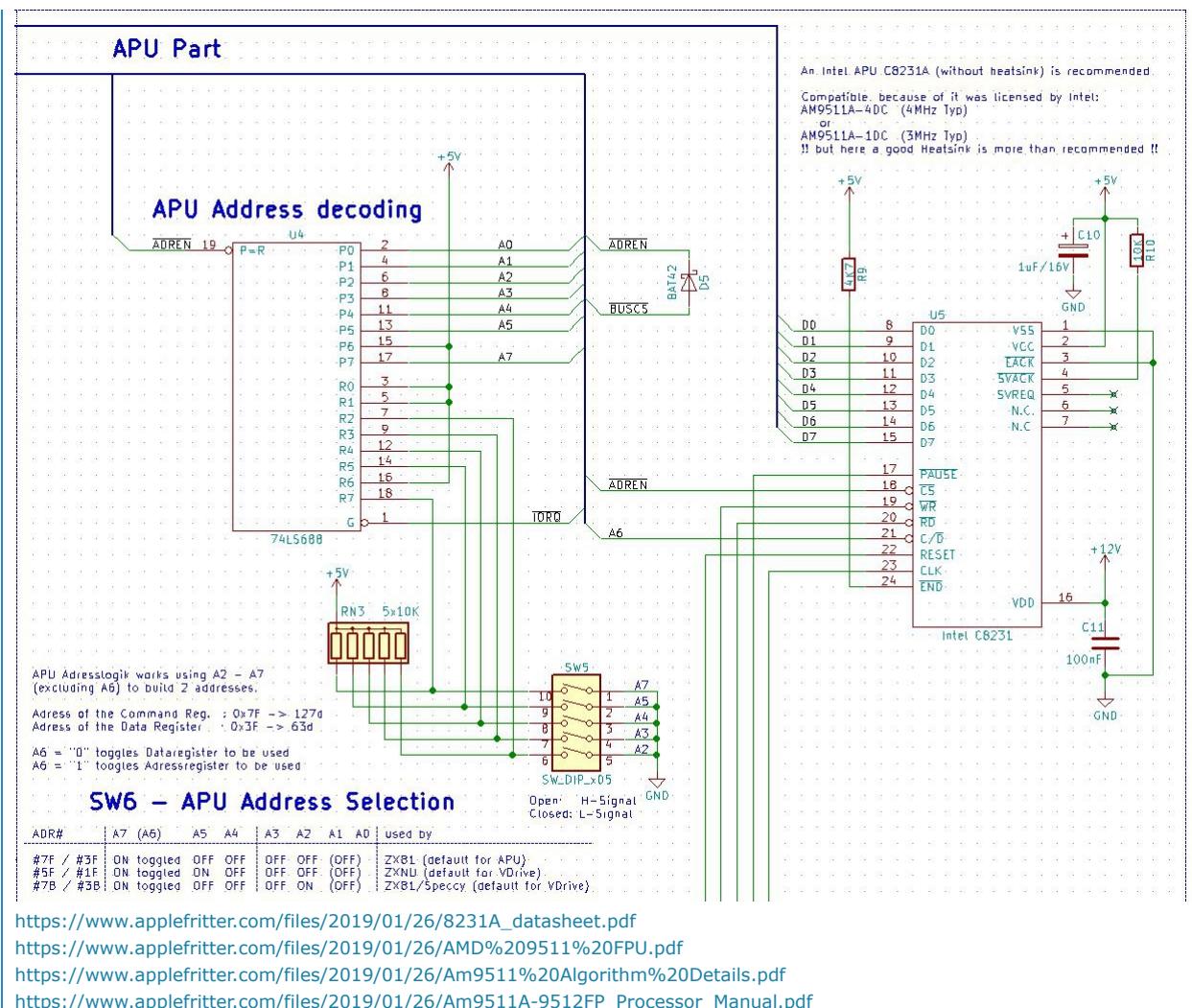
```
100 REM TESTPGM 8231A or AM9511A APU
110 LET C=95: LET D=31      REM 95d = Command Register; 31d = Data Register
120 OUT D,10: OUT D,0      REM load value 10 to the APU
130 OUT D,20: OUT D,0      REM load value 20 to the APU
140 OUT C,108              REM use APU command 108d -> 6Ch to do a 16nd Bit Addition
150 LET A=IN D: LET B=IN D  REM get calculation result(s)
160 PRINT A                REM A should held 0
160 PRINT B                REM B should held 30 -> which is the result of 10 + 20 (see
above)
```

So I hope that you are able to adopt this to get the Apple card running. Maybe you could upload an image of the backside of your card, so we might be able to re-engineer ? If you could share a BOM that would be great as well.

:**Update:** maybe you can take off all ICs and take a new picture of the Top layer, too? This might help to see the pcb tracks and to reengineer the card to create a schematic.

Have fun...

Torsten (Berlin - Germany)



https://www.applefritter.com/files/2019/01/26/8231A_datasheet.pdf
<https://www.applefritter.com/files/2019/01/26/AMD%209511%20FPU.pdf>
<https://www.applefritter.com/files/2019/01/26/Am9511%20Algorithm%20Details.pdf>
https://www.applefritter.com/files/2019/01/26/Am9511A-9512FP_Processor_Manual.pdf

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January 26, 2019 - 10:43am

#5

macnloyd

Online

Last seen: 1 hour 39 min ago
Joined: Oct 15 2012 - 08:59
Posts: 480

TokabIn,

TokabIn,

Thank you very much for your response.

Maybe late today (if I'm lucky) I will desolder all the parts on the board and take a snapshot of the front and back of the card.

Stay tuned...

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January 26, 2019 - 11:35am

#6

tokabIn

Offline

Last seen: 14 hours 18 min ago
Joined: Dec 30 2015 - 10:48
Posts: 191

Hi macnloyd,

Hi macnloyd,

glad to share you the information's, while I don't believe that you need to desolder all ICs, just removing them from their sockets might be enough... to see the trace routing.

So it's up to you

Have fun...

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January 28, 2019 - 7:31am

#7

tokabln

Offline

Last seen: 14 hours 18 min ago**Joined:** Dec 30 2015 - 10:48**Posts:** 191**Hi macnroyd,**

Hi macnroyd,

I just found and downloaded the AP-1 manual and took a look...

so command 6C, as used above at the shared code, is mentioned at page 1-7, so I do believe that you should be able to address the card via BASIC as we did with our ZX Spectrum computers. To understand how this works, please use the shared PDFs.

And I do found a company using the same name as referenced in the manual, so maybe it's worth to contact them.

Update: the following link is wrong... this company stays in Saudi Arab and not in California, so it has nothing to do with the Apple II products company<https://www.californiacomputers.net/>

Kind regards

Torsten

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January 28, 2019 - 7:32am

#8

tokabln

Offline

Last seen: 14 hours 18 min ago**Joined:** Dec 30 2015 - 10:48**Posts:** 191**Hi macnroyd,**

Hi macnroyd,

as I thought myself... CCS did something similar as some folks of our Sinclair community did... patching the ZX Spectrum / ZX81 ROM. CCS "patched" Applesoft to use the APU instead of the 65(C)02 when using some specific mathematical instructions which are supported by the APU.

"Apple APU. The Model 7811 B Arithmetic Processor Unit is intended to increase the execution speed of Applesoft II programs and the number of math functions available. The system employs an AMD9511 APU and plugs into one of the Apple expansion slots. The CCS interpreter is loaded from the diskette provided, and the system is ready to go. The CCS interpreter is identical to Applesoft, except that CCS sends arithmetic functions to the APU for fast execution. Additional functions include ASIN(x), ACOS(X), LOGO(X), SINH(x), COSH(x), TANH(X), INVERSE(x) and PI."

Address:

California Computer Systems,
250 Caribbean Dr.,
Sunnyvale, CA 94086
(Tel: 408-734-5811)

So you need someone (or yourself) who's able to implement such patches into Applesoft.

Source: <https://www.americanradiohistory.com/Archive-Poptronics/80s/1980/Poptronics-1980-06.pdf>

(page 40)

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January 26, 2019 - 7:03pm

#9

macnroyd

Online

Last seen: 1 hour 39 min ago**Wow! Really good information!**

Wow! Really good information! Very much appreciated! You spent a bit of time on this. Thank you again!

While you were finding all this, I decided to go ahead and desolder the board and photograph it to share with you and others. While the IC's are all marked on the component side of the PCB, the resistor & cap values are not, so I will divulge them here so everyone knows.

All discrete resistors are 220 ohms except R6, which is a 2.7K ohm.

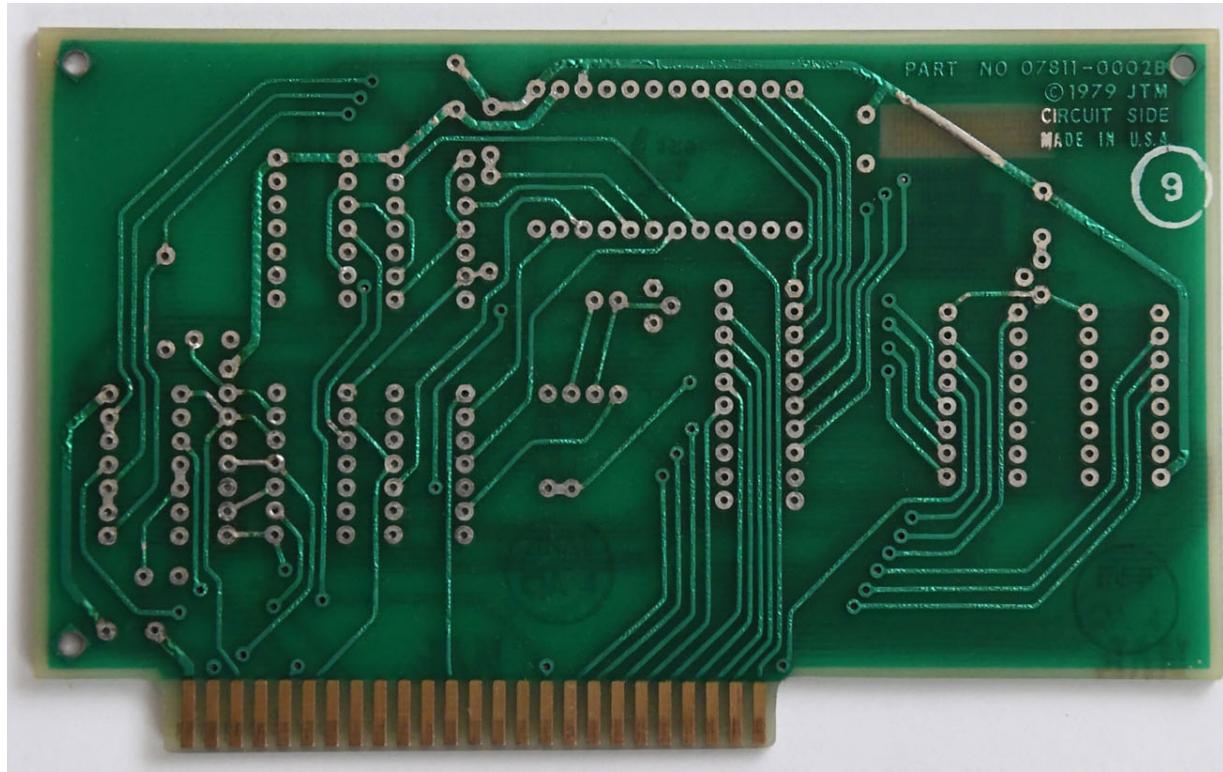
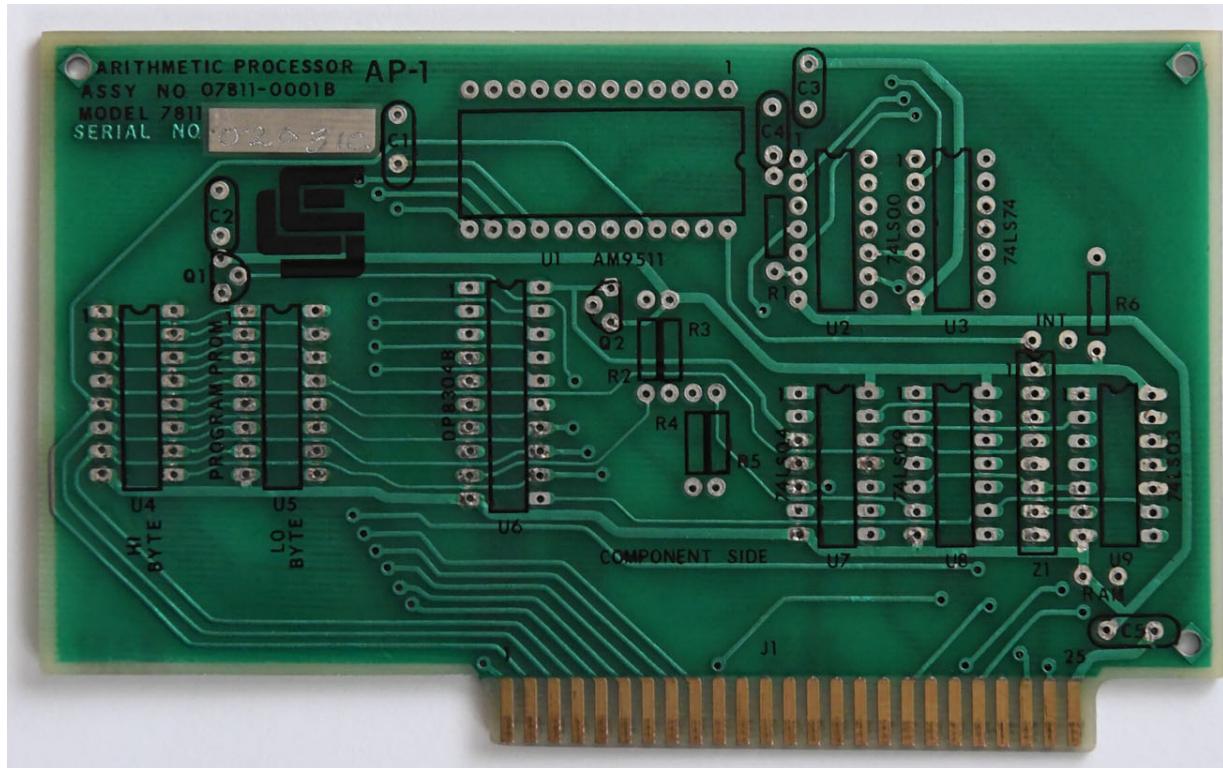
All capacitors are 0.1uf decoupling, except C4, which is a 270pf silver mica type.

9/27/2019

Arithmetic Processor | Applefritter

Joined: Oct 15
2012 - 08:59
Posts: 480

Q1 & Q2 are FPN2907, and the 8-lead resistor pack is 2.7k. Pretty much covers it.
Photos: Larger versions are available upon request.



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January 27, 2019 - 4:14am

#10

tokablin



Hi macnoid,

Hi macnoid,

that's great... many thanks for that. In between I found the schematic of the board which is attached to the Documentation. So yesterday I started to redraw the schematic using KiCAD. Your pictures are more than welcome as this will help to place the

9/27/2019

Arithmetic Processor | Applefritter

Offline

Last seen: 14 hours 18 min ago**Joined:** Dec 30 2015 - 10:48**Posts:** 191

traces as done by CSS. It will take some time to have this finished. There's also one IC which is an Octal Transmitter/Receiver and which seems to be very rare... so maybe another one needs to be used here. All other components should be available... while for the Transistors a BC556 should be used instead of the one used by CCS.

I also found additional information about the company... if these are right they seemed to start with S100 Bus System components. Will share the link when I'm at my desktop computer.

Stay tuned

Torsten

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January 27, 2019 - 9:58am

#11

tokabln

Offline

Last seen: 14 hours 18 min ago**Joined:** Dec 30 2015 - 10:48**Posts:** 191

A California Computer Systems

A California Computer Systems history

I hope that this is the right company who has developed and build these cards... because of most stuff I found is related to S100 Bus systems

http://www.retrotechnology.com/herbs_stuff/CCS_mason.html

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January 27, 2019 - 10:46am

#12

RalfK

Online

Last seen: 1 hour 20 min ago**Joined:** Aug 18 2017 - 16:53**Posts:** 64

There were some more Applebus

There were some more Applebus cards from CCS, i.e. a serial card (CCS 7710):

<http://mirrors.apple2.org.za/Apple%20II%20Documentation%20Project/Interface%20Cards/Serial/CCS%207710/>

A parallel card (CCS 7720):

<http://www.ralf-kiefer.de/A2/CCS7720.JPG>

A Clock card (CCS 7724):

<http://mirrors.apple2.org.za/Apple%20II%20Documentation%20Project/Interface%20Cards/Clock/CCS%207724/>

A ROM card:

<http://mirrors.apple2.org.za/Apple%20II%20Documentation%20Project/Interface%20Cards/ROM%20Cards/CCS%207724/>

Regards

Ralf

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January 27, 2019 - 1:28pm

#13

macnroyd

Online

Last seen: 1 hour 39 min ago**Joined:** Oct 15 2012 - 08:59**Posts:** 480

Tokabln, looking at the schematic ...

Tokabln, looking at the schematic and comparing it to the actual board, you're going to see many differences, so you might want to re-draw the schematic from the board. (just saying...) I found a lot of differences when I drew the schematic from a WildCard board. Other boards as well. I will eventually re-draw this one but I want to finish up a previous project first.

It would be really nice if someone had that CCSsoft disk they would share... (calling out all AF members...) :-)

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January 27, 2019 - 4:07pm

#14

tokabin

Offline

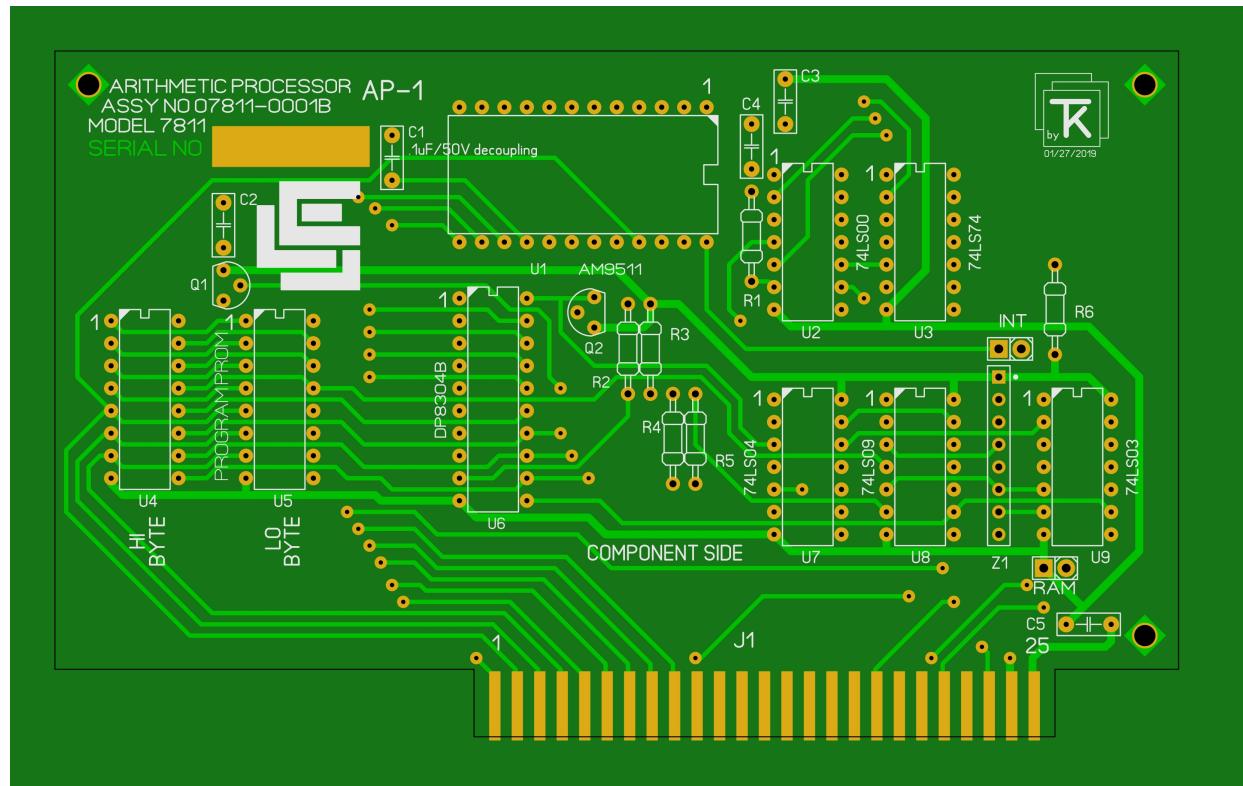
Last seen: 14 hours 18 min ago**Joined:** Dec 30 2015 - 10:48**Posts:** 191**Beside the first version**

Beside the first version using ABACOM SPRINT using the uploaded PCB pictures as template. Hope I didn't miss any trace.

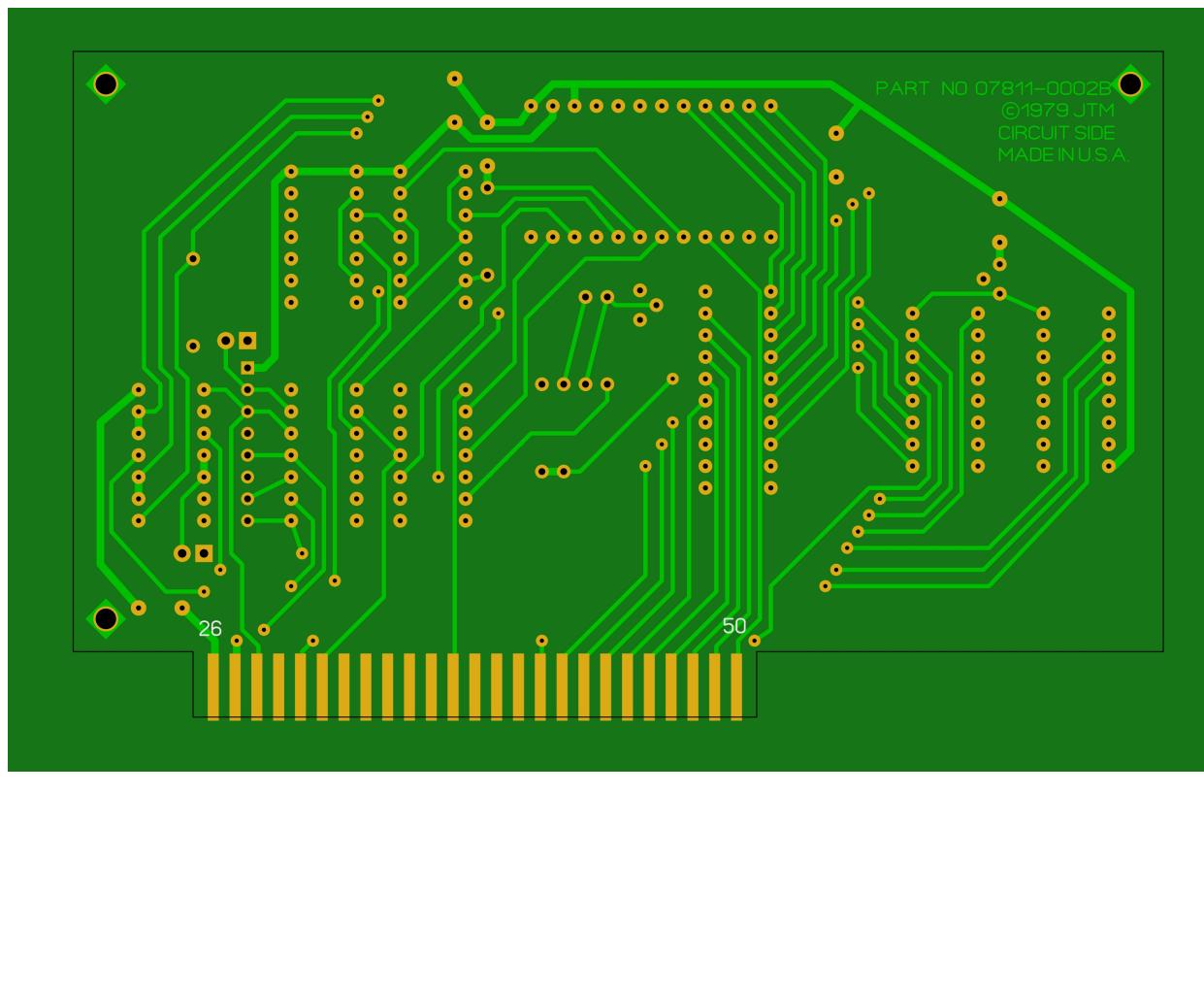
Schematic needs to be redrawn using KiCAD...

UPDATE: both pictures are showing the final version now:

Top view



Bottom view

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January 27, 2019 - 2:27pm

#15

RalfK
Online
Last seen: 1 hour 20 min ago
Joined: Aug 18 2017 - 16:53
Posts: 64

tokabin wrote:Schematic needs**tokabin wrote:**

Schematic needs to be redrawn using KiCAD..

Are you planning to produce some boards? If yes, what about a more "modern" version with replacement of the DP8304 to 74LS245 or similar and a RAM chip which is available now?

Regards

Ralf

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January 27, 2019 - 2:32pm

#16

macnoid

Online
Last seen: 1 hour 39 min ago
Joined: Oct 15 2012 - 08:59
Posts: 480

Amazing!!

Amazing!!

I can't believe how fast you put that together.

I just did a visual trace and it looks like you've got everything there.

If I were to suggest anything at all, I would set the RAM jumper and INT jumper to accept a 2.54mm (0.1) spacing molex pins rather than a solder bridge.

That way, you can use those convenient molex jumpers.

JOB WELL DONE!!!! WOW!!!

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January 27, 2019 - 3:04pm

#17

tokabln

Offline

Last seen: 14 hours 18 min ago**Joined:** Dec 30 2015 - 10:48**Posts:** 191

Hi Ralf,

Hi Ralf,

well I'm actually not sure if I'm willing to setup a batch of boards. First task was, to preserve what was done in the past by CCS.

Next step might be to change the DP... to a more modern Transceiver/Receiver stuff. I'm also not sure yet how to address this card, as only Addressline A0 is used here to toggle between the Command-/Dataregister. But that's it, so it's very different to what we did with the ZX Spectrum. Here we used a fixed address to load/unload the mathematical stuff, toggling between Data- and Command Register as shown above within the shared Basic code.

So I believe we need to understand the philosophie behind what was done for the Apple, which I haven't done yet... because I'm not very familiar with the Apple Bus.

@macnloyd... yes you are right, INT / RAM should be using a small Jumper instead of a wired bridge. I will change this and will make the GERBER files available. It doesn't make any sense to produce boards and to ship them to worldwide afterwards as the costs are to high than. So if someone like to (re-)build the original card, he can do that and maybe have some spare for folks within his country.

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January 27, 2019 - 3:43pm

#18

tokabln

Offline

Last seen: 14 hours 18 min ago**Joined:** Dec 30 2015 - 10:48**Posts:** 191**CCS APU AP-1 - Clone - Gerber, BOM & Pictures**

So I just finalized the SPRINT layout and build a ZIP file containing

- GERBER files for manufacturing
- BOM
- Pictures of the board

If someone is interested please send me a PM with your eMail Address and I will share the file, because I can't upload the ZIP here.

Those who are interested in, please double check the included board pictures with the original pcb pictures shared by macnloyd, just to prevent mistakes. Even that macnloyd has done a precheck, it's not my fault if you are getting wrong pcbs.

@macnloyd: I will send it to you in a few minutes using your shared eMail address.

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January 27, 2019 - 4:06pm

#19

RalfK

Online

Last seen: 1 hour 20 min ago**Joined:** Aug 18 2017 - 16:53**Posts:** 64**tokabln wrote:**First task was,**tokabln wrote:**

First task was, to preserve what was done in the past by CCS.

Thanks. Gut gemacht :-)

tokabln wrote:

I'm also not sure yet how to address this card, as only Addressline A0 is used here to toggle between the Command-/Dataregister. But that's it, so it's very different to what we did with the ZX Spectrum.

The /DEVSEL line addresses the FPU. /IOSEL addresses the SRAMs. Means in slot 1 the addresses of the FPU are \$C09n.

SRAM: there are two SRAMs 256*4 in two 16pin sockets. I can only find one chip that fits: Intel 2112. Very rare?

Regards

Ralf

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January 27, 2019 - 4:51pm

#20

tokabIn

Offline

Last seen: 14 hours 18 min ago
Joined: Dec 30 2015 - 10:48
Posts: 191

Hi Ralf,

Hi Ralf,

thanks for the explanation... so that make sense... because CCS talks about using additional RAM or additional ROM within the manual. So maybe I can change the RAM part from 2 x 2112 to another 256 Byte RAM type. Let's see.

Also thanks for the card address... I found it in the doc right now... but just one question left... how would this address (\$C09n) change when A0 is toggled...

- are we then talking about \$C090 when A0 is low
- and \$C091 when A0 is high?

The reason why I'm asking is, that A0 is toggling between the Data-/Command Register of the FPU. In such case recreating the above ZX Spectrum code shouldn't be a problem, so macnoyd could start some testing when he's resoldering the card ;-)

As a DP8304B Octal Bus driver replacement a 74LS244 (not pin compatible) seems to be okay to do that job.

Thanks again and maybe we can discuss offline (in German) how to enhance the card. I will send you my eMail Address via PM.

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January 27, 2019 - 7:51pm

#21

macnoyd

Online

Last seen: 1 hour 39 min ago
Joined: Oct 15 2012 - 08:59
Posts: 480

Fantastic job well done by TokabIn,

Also want to note that the buss driver IC is readily available, so not worth changing unless you do a board re-design.

<https://www.ebay.com/itm/282106996683/>

The 2112 sram are rare.

[EDIT] But not too rare ... <https://www.ebay.com/itm/323529866297>

I was going to check the datasheet of MMI 6301 and see if the pinout is compatible.

[EDIT] The MMI-6301 (256x4) seems to be compatible right down to CE, so I believe a pair of these would be required for resident Apple][code.

I've gotta guess these would be "fun" to program, LS nibble in one & MS nibble in the other. That and these are fuse link PROMS, no room for error.

But they were (at the time) what was available at reasonable cost. EPROMS were much more expensive in the late '70's.

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January 28, 2019 - 7:46am

#22

tokabIn

Offline

Last seen: 14 hours 18 min ago
Joined: Dec 30 2015 - 10:48
Posts: 191

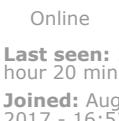
That's great, just purchased

That's great, just purchased a couple [EDIT:] of the DP8304 ... probably for the German community ;-)

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January 27, 2019 - 7:01pm

#23

RalfK

Online

Last seen: 1 hour 20 min ago
Joined: Aug 18 2017 - 16:53
Posts: 64

macnoyd wrote:The 2112 sram

macnoyd wrote:

The 2112 sram are rare.

After reading (and understanding?) the manual I think having this RAM is not necessary. It's a nice feature to have 256 bytes of RAM (or ROM) for 6502 code, but now in 2019 it's expensive to get these obsolete chips. Means: no need to populate Q1, R4, R5 and the jumper for RAM.

Regards
Ralf

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January 28, 2019 - 3:52am

#24

tokabln

Offline

Last seen: 14 hours 18 min ago**Joined:** Dec 30 2015 - 10:48**Posts:** 191

Hi Ralf,

Hi Ralf,

yes you are right. I will put this hint onto the schematics including that 2112 RAMs are used at position U4 / U5.

Have fun

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January 28, 2019 - 8:13am

#25

tokabln

Offline

Last seen: 14 hours 18 min ago**Joined:** Dec 30 2015 - 10:48**Posts:** 191

Hi macnroyd,

Hi macnroyd,

as long we do not have any content to program the PROMs, there isn't any demand to find a programmer ;-)

Btw: just sent an email to a guy while hoping he's able to help us here... you are on bcc:

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January 28, 2019 - 10:16am

#26

macnroyd

Online

Last seen: 1 hour 39 min ago**Joined:** Oct 15 2012 - 08:59**Posts:** 480

Got it ...

tokabln wrote:*As long we do not have any content to program the PROMs, there isn't any demand to find a programmer ;-)**Btw: just sent an email to a guy while hoping he's able to help us here... you are on bcc:*

Yes, got it. Thanks for keeping me in copy. I hope he responds and has something for us. That would be great if he does.

Regarding the ROM / RAM sockets, I think it would be relatively easy to change this to a single 2K x 8 socket instead of the (2) 256 byte by 4 configuration that currently exists. At the time, the 2112 and 6301 were good choices, though today, maybe not so much. Fortunately, there's a 2K x 8 RAM & EPRom that closely matches, pin for pin. For me though, there's something nostalgic in keeping the design like it is. Not all would share this opinion, but that's OK.

I can draw up a schematic using 2716 EPROM or 6116 SRAM layout if it's a consideration, but I'd like to do it only after we obtain the CCS soft disk. Without that disk, we would need to re-engineer the software, and I'm not in a good place to do that right now. Too many other projects in the works. The CCS soft disk is what makes this board desirable, in my honest opinion. I'm hopeful that this disk exists somewhere and is discovered.

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January 28, 2019 - 10:31am

#27

tokabln

Yes... indeed. The first

Yes... indeed.

9/27/2019

Arithmetic Processor | Applefritter



Offline

Last seen: 14 hours 18 min ago
Joined: Dec 30 2015 - 10:48
Posts: 191

The first Gerbers are for the nostalgic folks... while I'm actually in contact with RalfK. He has some good ideas and some requests that such a "new" card should offer. Nevertheless I believe that I will produce up to 5 cards (maybe 10) for the German community based on the old design. For my personal card I just ordered some RAM, to have a more historical version ;-)

So when I'm done with the CCS original schematic (while I will take care to use the card as reference), I probably will start to do a redesign (probably with Ralf) and will share and discuss with you folks if something else is needed or requested.

Torsten

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January 28, 2019 - 10:47am

#28

macnloyd



Online

Last seen: 1 hour 39 min ago
Joined: Oct 15 2012 - 08:59
Posts: 480

If you are ordering cards

If you are ordering cards and are getting them with gold immersion on the card edge, I'd like to buy one from you if you have one to spare. :-)

Please keep us posted when something new comes about. Great work!

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February 1, 2019 - 4:53pm

#29

tokabin



Offline

Last seen: 14 hours 18 min ago
Joined: Dec 30 2015 - 10:48
Posts: 191

Folks,

Folks,

today I received some interesting hints and links from the German C64 community where I'm a forum member, too...

Write your own 9511 software ?

NASA paper - <https://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/19850026198.pdf>

Compute 11/1980 magazine

Compute 11/1980 - <https://www.commodore.ca/gallery/magazines/compute/Compute-007.pdf>

Have fun... while I'm still seeking to get more updates... so stay tuned.

Torsten

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February 26, 2019 - 3:17am

#30

tokabin



Offline

Last seen: 14 hours 18 min ago
Joined: Dec 30 2015 - 10:48
Posts: 191

Just to let you know... the

Just to let you know... the cards seems to be shipped by the manufacturer seeed... so I will keep you posted when the raw pcbs arrived.

Torsten

Update: I ordered 20 pcs. of raw pcbs (5 are already reserved) and I do have preorders from

Preorders as of: 02/26/2019

1 raw pcb by macnloyd

1 raw pcb by stynx (not sure if I'm able to deliver incl. parts)

1 raw pcb by ralfk

1 raw pcb by speedyG

2 raw pcb by myself

I too ordered 10 pcs. of the DP8304B for the German community while I will take at least 2 pcs., but not sure when they will arrive.

Update: 02/26/2019
added speedyG to the preorder list

[Top](#)[Log in or register](#) to post comments**February 25, 2019 - 9:07pm****#31****speedyG**

Offline

Last seen: 4 months 2 days ago**Joined:** Nov 16 2011 - 07:45**Posts:** 2495**I will add an order for one**

I will add an order for one aw old card too.
SpeedyG

[Top](#)[Log in or register](#) to post comments**March 14, 2019 - 9:58am****#32****tokabin**

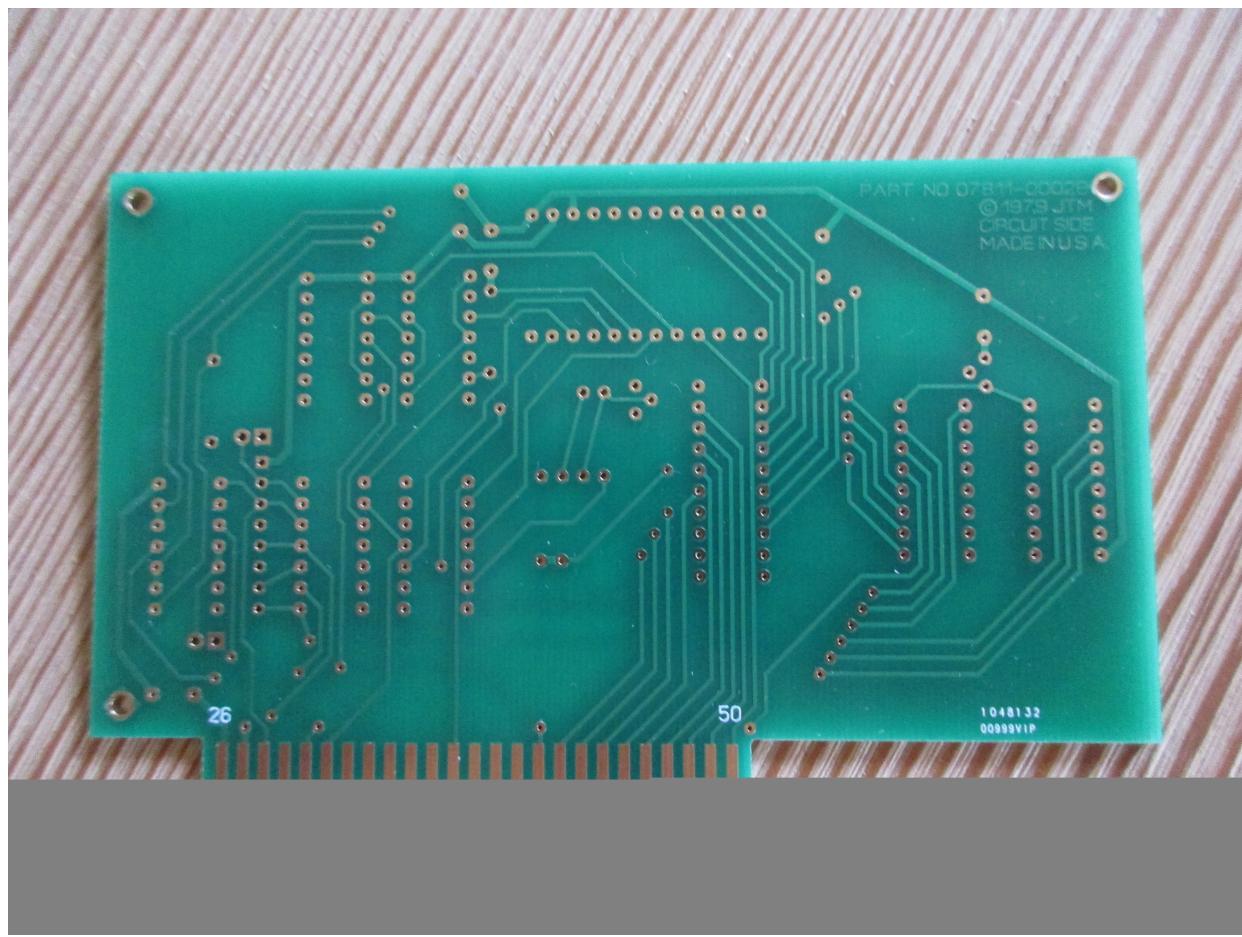
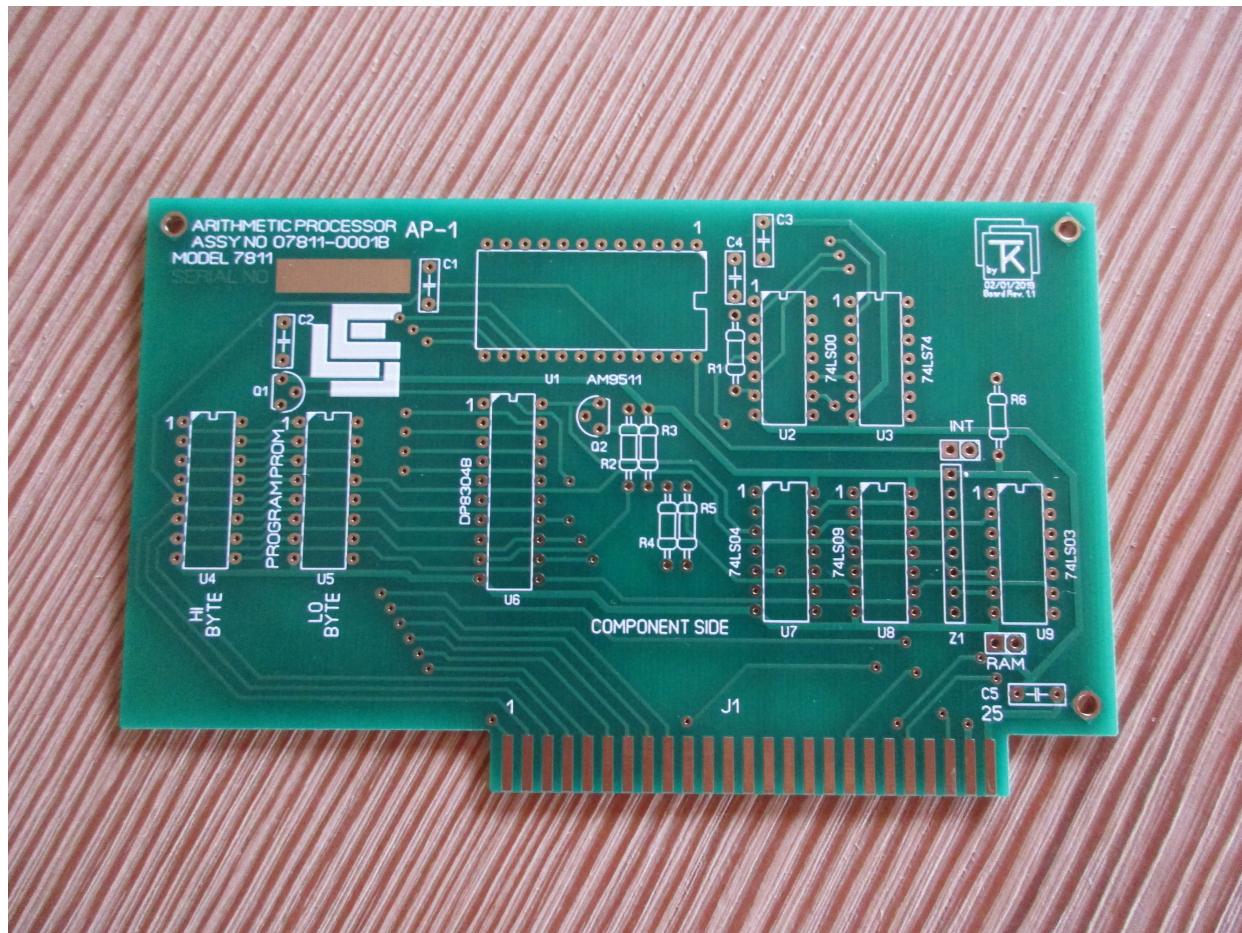
Offline

Last seen: 14 hours 18 min ago**Joined:** Dec 30 2015 - 10:48**Posts:** 191**Folks,**

Folks,

the raw pcbs arrived today. So I need to build at least one card to see if they will work. Beside two pictures of the card.

Will keep you posted.



Have fun...

[Top](#)[Log in or register to post comments](#)**March 14, 2019 - 11:21am**

#33

RalfK

Online

Last seen: 1

hour 20 min ago

Joined: Aug 18
2017 - 16:53**Posts:** 64

Great :-)

Great :-)

[Top](#)[Log in or register to post comments](#)**March 14, 2019 - 11:26am**

#34

macnoidy

Online

Last seen: 1
hour 39 min ago**Joined:** Oct 15
2012 - 08:59**Posts:** 480

Nice work

Looks pretty authentic. Well done!

[Top](#)[Log in or register to post comments](#)**March 14, 2019 - 12:00pm**

#35

softwarejanitor

Offline

Last seen: 4
hours 54 min ago**Joined:** Jul 5
2018 - 09:44**Posts:** 343

That board looks great! I

That board looks great! I hope it works as good as it looks!

[Top](#)[Log in or register to post comments](#)**March 18, 2019 - 12:02pm**

#36

tokabin

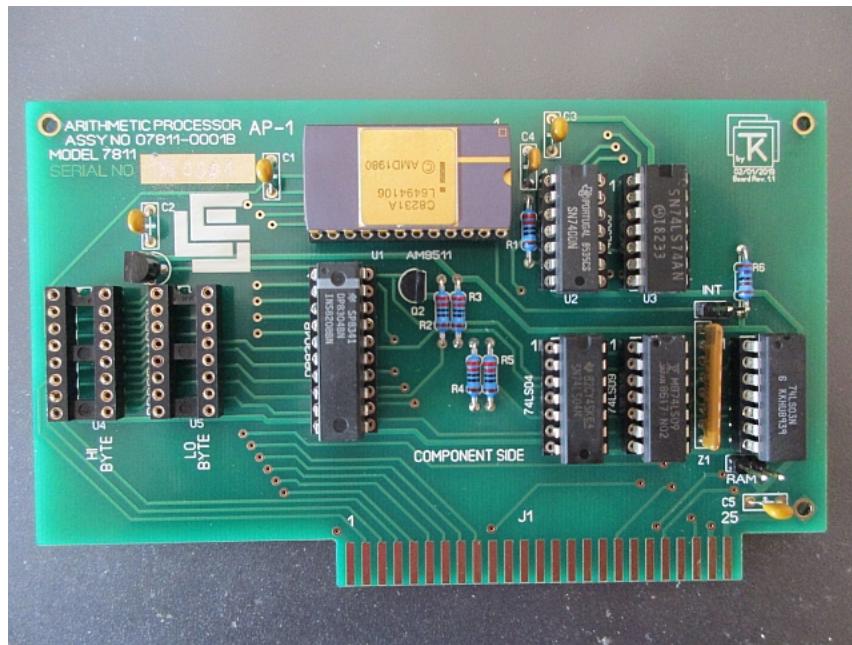
Offline

Last seen: 14
hours 18 min ago**Joined:** Dec 30
2015 - 10:48**Posts:** 191

Folks,

Folks,

beside the populated CCS 7811 Clone card (except the RAM/PROM chips).



Next step will be to do some testing and to document the building and some technical stuff.

Some additional words.

I do have a couple of raw boards available and a few spare parts to serve the above requests.

I'm not able to sell the APU (Intel C8231A) as I do not have them available anymore.

I can also share the transistors (if the testing will work), the R-pack and probably some TTL which are not typically available and only a small batch of the DP8304 gate.

I will setup a list of what's available and what's not in a few days.

Have fun...

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March 18, 2019 - 2:24pm

#37

tokabin



Offline

Last seen: 14 hours 18 min ago

Joined: Dec 30 2015 - 10:48

Posts: 191

Dear folks,

Dear folks,

the card is working... beside two test programs I used.

The first one is taken out of the CCS Owners manual, while the second once is a small basic program doing a short calculation, like $10 + 20 = 30$

This means I can offer the card and some (not all) parts to a couple of folks, while I will start with the above list.

I do need to do some calculation and to investigate relevant shipping costs, at least for the US folks.

Beside the two progs as well as the CCS owners manual.

<https://www.applefritter.com/files/2019/03/18/CCS%20Apple%20II%20APU%207781B%20Owners%20Manual.PDF>

[APU_TEST1.txt](#)

[APU_TEST2.txt](#)

[Top](#)

[Log in or register to post comments](#)

March 26, 2019 - 10:15pm

#38

Board has arrived.... (Thank-you!)

macnroyd

Online

Last seen: 1 hour 39 min ago**Joined:** Oct 15 2012 - 08:59**Posts:** 480

Spent some time to assemble. Photos of result tomorrow. Came out great & looks better than my original.

Awaiting the Math Coprocessor. More to come.

[Top](#)[Log in or register](#) to post comments**March 27, 2019 - 12:13pm****#39****tokabln**

Offline

Last seen: 14 hours 18 min ago**Joined:** Dec 30 2015 - 10:48**Posts:** 191**So my package arrived... that**

So my package arrived... that's good to know. Hope to see some pics soon ;-)

Enjoy programming ;-)

[Top](#)[Log in or register](#) to post comments**March 28, 2019 - 8:47am****#40****macnroyd**

Online

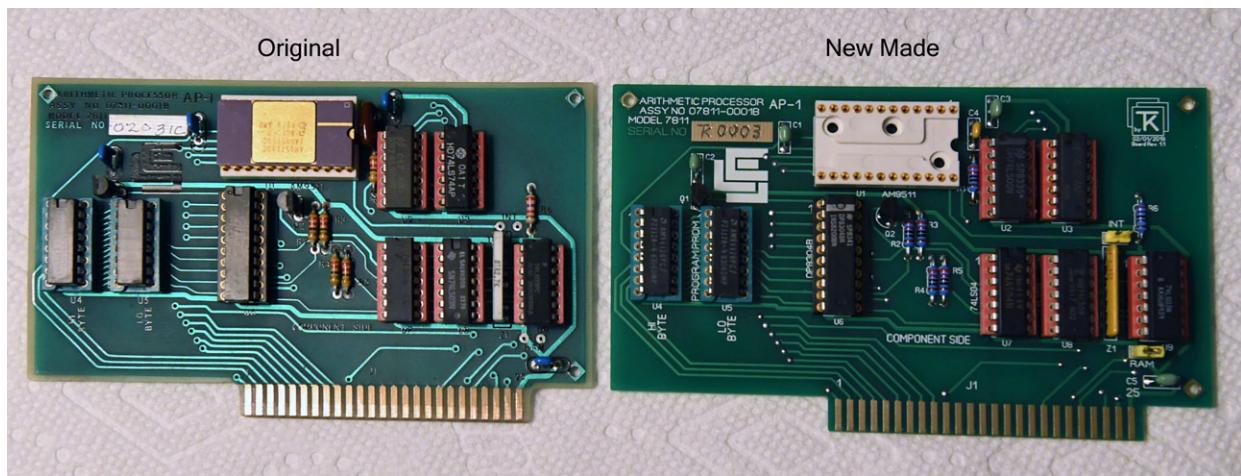
Last seen: 1 hour 39 min ago**Joined:** Oct 15 2012 - 08:59**Posts:** 480**Yes ... Not the best photo but ...**

Yes ... Not the best photo but you get the idea. Short on time tonight but wanted to post it as promised.

I decided to use some old style Augat gold machine pin sockets to keep it looking retro & add a little color.

On the left, the original board. On the right, Tokabln re-creation. (awaiting APU chip) I think it looks better than the original. :-)

Quality job on the PCB. Considering Tokabln never held the original board, I'd say very well done! The board dimensions are precisely the same.

[Top](#)[Log in or register](#) to post comments**March 28, 2019 - 8:42am****#41****Here2Learn**

Offline

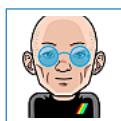
Last seen: 1 week 10 hours ago**Joined:** May 22 2013 - 20:37**Posts:** 162**WOW. Nice job!**

WOW. Nice job!

[Top](#)[Log in or register to post comments](#)

March 28, 2019 - 9:29am

#42

tokabln

Offline

Last seen: 14hours 18 min ago
In Germany we say: "DankeIn Germany we say: "**Danke für die Blumen**"which means, thanks for the compliment... while the correct translation is: "**thanks for the flowers**"**Joined:** Dec 30

2015 - 10:48

Posts: 191[Top](#)[Log in or register to post comments](#)

April 24, 2019 - 10:47am

#43

tokabln

Offline

Last seen: 14hours 18 min ago
Hi macnoid,

Hi macnoid,

have you received the missing APU chip already and does your card works ?

Joined: Dec 30

2015 - 10:48

Posts: 191

Just to let you know... RalfK and myself, we received some fake chips from a chinese supplier, so we purchased from another chinese source and these APUs seems to work. At least the "addition" test works fine. So I hope your card is working as expected.

I also received some RAM chips and added them to the board but didn't test them yet... because I'm short of time at the moment.

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April 24, 2019 - 10:52am

#44

tokabln

Offline

Last seen: 14hours 18 min ago
Some raw boards still available**Joined:** Dec 30

2015 - 10:48

Posts: 191

For those who are interested in this, I still have some raw boards left...

One raw PCB costs 5 EURO plus shipping... I'm probably able to offer additional (but not all) parts. Just ask.

Regards Torsten

[Top](#)[Log in or register to post comments](#)

April 24, 2019 - 10:59am

#45

macnoid

Online

Last seen: 1hour 39 min ago
Hi Tokabln,**Joined:** Oct 15

2012 - 08:59

Posts: 480

Yes, I received my missing APU chip that I ordered from eBay auction 283157894520. I installed it, ran your tests, and got expected results. The APU chip I received works fine.

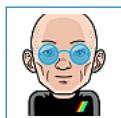
I also added the RAM chips to the board but I have not yet test the RAM. Maybe I should I update my photo.(?) The board looks quite nice.

Still looking for CCSsoft disk. Hopefully this will show up somewhere.

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April 27, 2019 - 3:14pm

#46

tokabln

Offline

Last seen: 14 hours 18 min ago**Joined:** Dec 30 2015 - 10:48**Posts:** 191**Folks,**

Folks,

beside a couple of documents I took together which should help you to program the APU (C8231A or AM9511A) and to understand how it's working. Hope this helps.

I will try to build a driver, while I'm not sure I'm able to do so... so I will not promise to have something available in the future.

The idea is, to redirect APPLE BASIC math routines, normally done by the Apple CPU, to be done by the APU instead.

I do believe that this is something what was done by CCS in the past, while we still not found the relevant piece of software.

<https://www.applefritter.com/files/2019/04/27/AMD%20-%20AM9511%20-%20Algorithm%20Details.pdf>
<https://www.applefritter.com/files/2019/04/27/AMD%20-%20AM9511A%20-%20Arithmetic%20Processing%20Unit%20-%20DIP24.pdf>

<https://www.applefritter.com/files/2019/04/27/AMD%20-%20AM9511A-9512FP%20Processor%20Manual%20-%20Steven%20Cheng.pdf>

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<https://www.applefritter.com/files/2019/04/27/Intel%20-%20C8231A%20-%20Datasheet.pdf>

<https://www.applefritter.com/files/2019/04/27/Intel%20-%20C8231A.pdf>

Have fun...

Torsten

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April 28, 2019 - 2:41am

#47

stynx

Offline

Last seen: 6 days 7 hours ago**Joined:** Apr 19 2012 - 09:41**Posts:** 205**tokabln wrote:** Folks, beside a**tokabln wrote:**

Folks,

beside a couple of documents I took together which should help you to program the APU (C8231A or AM9511A) and to understand how it's working. Hope this helps.

I will try to build a driver, while I'm not sure I'm able to do so... so I will not promise to have something available in the future.

The idea is, to redirect APPLE BASIC math routines, normally done by the Apple CPU, to be done by the APU instead.

I do believe that this is something what was done by CCS in the past, while we still not found the relevant piece of software.

...

Have fun...

Torsten

Hi Torsten,

the apple driver is a nice idea. It may take you a while to do this but i think even if it takes years, it is a good idea in my opinion. There is another coprocessor card based on the 80s Transputer (made by a german hobbyist) that has little to no software support. Maybe you could look into a driver for the transputer as well, if you are successful with the driver for the AM9511. I could send you a tranputer interface card for the Apple II, if you are interested.

My ebay AM9511A was a dud since it gets very hot and does not work at all.



I have to get new one.

-Jonas

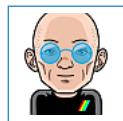
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April 28, 2019 - 3:32am

#48

tokabln



Offline

Last seen: 14 hours 18 min ago

Joined: Dec 30 2015 - 10:48

Posts: 191

Hi Jonas, well I'm interested

Hi Jonas, well I'm interested in your offered transputer card. Will send you a PM.

Regarding the APU... please look to get a C8231A from funkward-tech at ebay. I got working items from him.

<https://www.ebay.de/itm/INTEL-C8231A-Arithmetic-Processor-SBCDIP24-X-1PC/162137311483?hash=item25c02308fb:g:QosAAOSwKY9Xiosv>

Regards Torsten

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May 7, 2019 - 9:15am

#49

tokabln



Offline

Last seen: 14 hours 18 min ago

Joined: Dec 30 2015 - 10:48

Posts: 191

CCS APU PROMs

Folks,

I just received my ordered CCS Parallel Interface card, model 7720, from Israel. Taking a look at the used Interface circuit, it seems to be very similar as what we see at the APU card. The most important part is, the received card holds two (2) 256x4 Bit Bipolar PROMs from Fujitsu Type: MB7052

As I do believe that these are also used for the APU card... I just ordered some of these PROMs (for my personal experiments) from the following ebay seller: https://www.ebay.com/itm/152218225915?_sp=p2488212.m41214.l9765&_trkparms=itemid%3A152218225915

Item Description: FUJITSU MB7052 Integrated Circuit (IC) - Genuine

So my idea is, to readout the received PROMs from the CCS 7720 card, hopefully understanding what they did to be able to have something available which can be used (after some changes ?) to support the APU card.

Have fun...

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May 7, 2019 - 9:33am

#50

macnloyd



Online

Last seen: 1 hour 39 min ago

Joined: Oct 15 2012 - 08:59

Posts: 480

Nice! Hopefully, you should

Nice! Hopefully, you should be able to read these PROMS directly from the card.

Anxious to see your results.

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May 7, 2019 - 1:41pm

#51

stynx

Offline

Last seen: 6 days 7 hours ago**Joined:** Apr 19 2012 - 09:41**Posts:** 205**N82S129 = MB7052 = AM27S21 = MB7114 = 63S141 = 74S287**https://people.zeelandnet.nl/wgeeraert/pdf/TTL-BIPOLAR_PROM-RAM_REFERENCE_GUIDE_V5.pdf**256*4 = 1024 bit**
+---\---+

A6	 1	16	 Vcc
A5	 2	15	 A7
A4	 3	14	 /CE2
A3	 4	13	 /CE1
A0	 5	12	 D0
A1	 6	11	 D1
A2	 7	10	 D2
GND	 8	9	 D3
+-----+			

NEC	Fujitsu	Fairchild	Intersil	Mitsubishi
-----	-----	-----	-----	-----

TS	uPB423	MB7052	93427	IM5623	M54700
		MB7114			

OC	uPB403	MB7057	93417	IM5603	
		MB7113			

	Signetics	MMI	TI	Harris	Raytheon	AMD	National	Intel	OKI
TS	82S129 (50ns)	6301-1	TBP24S10	HM7611-5	29661	27S21	74S287	3621	MBL8521A
	82S129A(27ns)	63S141	TBP34S10	HM7611A	-	27S21A		-	
	82S27					27S11			
OC	82S126 (50ns)	6300-1	24SA10	HM7610-5	29660	27S20	74S387	3601	MBL8520A
	82S126A(30ns)	63S140	-	HM7610A	-	27S20A	-	-	
						27S10			

Mask programmed custom ROM version: TS= DM7597 / DM8597 / SN74S187 / 82S229
 OC= 82S226

<https://www.ebay.com/item/312490275089>

-Jonas

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