

eeschema (2011-07-12 BZR 3047)-stable >> Creation date: Wed 10 Jun 2015 07:59:07 PM PDT

1. 17-Jun-2015 schematic 005 John R Coffman <johninsd@gmail.com>
2. *** updates 7/22/2015
3. @ marks updates on 06-Aug-2015 @@@ urgent
4. % marks updates on 05-Sep-2015 %% 07-Sep additions

% speed considerations %

U805 is CPU clock - 16Mhz up to 25Mhz (pushed to 32Mhz by some builders)

U401 is DRAM clock - twice CPU clock, or higher, up to 66Mhz (40Mhz, 50Mhz, or 64Mhz usually used)

schematic calls for 16/64Mhz CPU/DRAM combo clocks (runs at 0 w.s.)

can use 25/50Mhz or 25/64Mhz CPU/DRAM clocks (runs at 1 w.s.)

boards running >25Mhz: 32/64Mhz successful, if U403 is 74F195A (note -A suffix) and GAL22v10's are -7 speed.

Updating U802,03,04 from 74F257 (or 74AS257) to 74F257A (-A suffix) seems to aid DRAM stability with 64Mhz

DRAM clock. %%% the -A suffix chips may be hard to find%%%

%speed considerations%

%memory configurations%

JEDEC pinout 5volt 60ns SIMM(s), FPM or EDO, CBR refresh, non-Parity. (Parity OK, but uses more refresh current)

Single SIMM 16Mb is minimum memory. Add memory in increments of 16Mb up to 4 x 16Mb == 64Mb.

Single SIMM 64Mb memory supported. Add memory in increments of 64Mb up to 4 x 64Mb == 256Mb.

%memory configurations%

#Cmp (order = Reference)

%| C501 47uF 10v *** this is part of the reset circuit, 33uF on schematic, but 47uF is better

@| C901,C928-30 CP 470uF 10-16v electrolytic 0.1" lead spacing increase from 22uF to 470uF @@@

@ C926 & C950 converted to 47uF Tantalum (watch out for polarity, the board is not marked)

% C904 converted to 10uF Tantalum (47uF did not fit); choose for small physical size, 3.3uF or more

% 0.47uF ceramics may be overkill; recommend now to update 0.1's to 0.22. Note that my board with 0.1uF and updated electrolytic caps (470uF) is working fine at 25Mhz/50Mhz and 25Mhz/64Mhz.

%@| C902-927, C931-951 C 0.47 uF ceramic 0.2" lead spacing increase from 0.1uF to 0.47uF @@@

(3-4 dozen -- not all on schematic were placed on the board)

| D501 DIODE any of BAT43, 1N914, 1N4148

| D601 LED 3mm/5mm GREEN LED

@| D602 LED 3mm/5mm RED LED use a dim one!

| ECB901 C96ABC DIN 41612 rt angel male (Jameco 859430, AMP 650913-?) AMP part# recommended, w/ solder tabs

| K701 DOUBLE 3x1-pin header

| P301 DRAM WS 3x2 pin header

| P302 I/O WS 4x2 pin header

| P303 ROM WS 3x2 pin header (bunch of 0.1" jumper blocks, too)

| P501 RESET IN 2x1 pin header

| P801 16M/64M 2x1 pin header

| P802 CDIS 2x1 pin header

| P803 MMUDIS 2x1 pin header

| R501 10 10ohm resistor, 1/8 watt (or 1/4 watt)

| R601 330 330ohm resistor, 1/8 watt (or 1/4 watt)

| RP801 10K 10-pin SIP bussed resistors (9 resistors)

| RP802 22K 10-pin SIP bussed resistors (9 resistors)

%| SIMM701 MT16D832 Micron memory (MT16D432, MT16D432 X, MT16D832, MT16D832 X) + 72socket SIMM

% see %memory configurations% above

%| SIMM702 MT16D832 AMP/Tyco 582-2021-? (Jameco 962074); AMP 82-2019 also; many others will fit hole pattern.

*** Note size of holes making the socket fit in only one orientation.

| SW501 SW_PUSH tactile switch (Jameco 162886 or similar)

| SW502 N8VEM / KONTRON 3x1 pin header

| U201 29F040 512K flash memory (AMD 29F040B-90, SST 39SF040-70[preferred]) + 32socket

| U203 SRAM-32K 28-pin 0.3" 32Kx8 static ram; e.g., Cypress CY7C199-35 + 28(skinny)socket

| U301-02 74F164 + 14socket (2)

| U303 74LS14 + 14socket

@| U304 74LS164 + 14socket 74ALS164 is a good choice, too

%| U401 OSC 64 Mhz full or half can, 60.0 to 66.67 Mhz (I use 64mhz) + 14socket or 8socket %%see above

| U402 74F133 + 16socket 74ALS133 (slower but more available)

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| U403 74F195A + 16socket %% -A suffix required if 64Mhz DRAM clock is to be used
| U404 GAL22V10-HIGH9 Lattice or Atmel ATF22v10-7 (7.5ns) + 24(skinny) socket
| U405 GAL22V10-DRAM9 same as U404
| U407 GAL22V10-BYTES9 same as U404
| U501,03,05,06 74LS244 + 20socket (4 places)
| U502 74F04 + 14socket
| U504 74LS245 + 20socket
| U601 74F08 + 14socket
| U602 OSC 8.000Mhz full or half can + 14socket or 8socket
| U603 74F195 + 16socket (c.f. U403)
| U604 GAL16V8-DIVIDE4 Lattice or Atmel, 15ns + 20socket; Atmel ATF16V8BQL-15 has low power advantage.
| U605 74F74 + 14socket
| U801 MC68030RC use -16,20,25 part, -33 part will not run at 16mhz; + 124/128 PGA socket
| U802-04 74F257A or 74F258A + 16socket (3 places); %% these chips or U403 need to have -A suffix if 64Mhz
%% DRAM clock is to be used
@| U805 OSC CPU 16mHz full or half can + 14socket or 8socket 20Mhz tested; 25Mhz needs 1 wait state.
% see speed considerations above
#End Cmp

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... and parts in different sort order:

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#Cmp ( order = Value )
; ** single row snappable header strip for the following:
| 16M/64M P801
| CDIS P802
| DOUBLE K701
| N8VEM / KONTRON SW502
| RESET IN P501
| MMUDIS P803
; ** double row snappable header strip for the following:
| DRAM WS P301
| I/O WS P302
| ROM WS P303
;*****
| 10 R501 1/8w or 1/4w 10ohm
| 10K RP801 SIP bussed 10pin
| 22K RP802 SIP bussed 10pin
| 29F040 U201 512K Flash memory; SST preferred over AMD
| 330 R601 1/8w or 1/4w 330ohm
| 33uF C501 10v
| 3 x 74AS257 U802-04 74AS258, 74F257, 74F258 are alternates
| 74F04 U502
| 74F08 U601
| 74F133 U402 slower but more available: 74ALS133
| 2 x 74F164 U301,02
| 74F195 U603
| 74F195A U403
| 74F74 U605
| 74LS14 U303
| 74LS164 U304
| 4 x 74LS244 U501,03,05,06
| 74LS245 U504
| C 0.1uf C902++ (3-4 dozen) monolithic (not all on schematic are placed on the board)
| C96ABC ECB901 rt angel 96-pin DIN 41612 Euro connector
| 4 x CP C901,28-30 10-22uF 10-16v electrolytic 0.1" lead spacing
| DIODE D501 any of BAT43, 1N914, 1N4148
| GAL16V8-DIVIDE1 U604
| GAL22V10-BYTES9 U407
| GAL22V10-DRAM9 U405
| GAL22V10-HIGH9 U404
| LED D601 GREEN LED 5mm/3mm

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| LED D602 RED LED 5mm/3mm
| MC68030RC U801
| MT16D832 SIMM701 16Mb or 32Mb 72-SIMM memory
| MT16D832 SIMM702 2nd slot may be empty
| OSC 64 Mhz U401 full or half can (60.0 to 66.67 Mhz)
| OSC 8.000Mhz U602 full or half can
| OSC CPU 16mHz U805 full or half can
| SRAM-32K U203 32Kx8 0.3" SRAM; e.g., CY7C199-35
| SW_PUSH SW501 tactile switch
#End Cmp

#End List

* BUYING A CPU -- read next:

* Design speed (to begin with) of the board is MC68030 at 16Mhz. A 33Mhz CPU will not work. Note that Motorola specifies maximum clock rate, and MINIMUM clock rate for 68030 CPUs. The minimum is typically about 60% of the maximum, so a 33Mhz CPU may run as slow as 20Mhz.

* Memory is 16Mb 60ns 72pin FPM or EDO SIMM. Micron spec used. Samsung & TI specs look to be the same.

* SIMM may be single-sided (16Mb) or double sided (32Mb). [SS or DS]

* One SIMM or two SIMMs may be used. First goes in slot A.

* DS goes in slot A, if of different sizes. "DOUBLE" jumper 1-2 for automatic determination of size.