## HP85 Disk Project v1.0 by ©Mike Gore Feb 2015

## Schematics and Pin-out information for HP85 Disk Project

| PIN | CPU Function | Role | CPU to component connection notes | GPIB Name | GPIB Pin |
|---|---|---|---|---|---|
| **1** | PB0 | GPIB | **120R to 5 GPIB pin, GPIB pin 10K to VCC**<br>2 HC32 Parallel Poll Circuit | **EOI** | **5** |
| **2** | PB1 | | **120R to 6 GPIB pin, GPIB pin 10K to VCC** | **DAV** | **6** |
| **3** | PB2 | PP | 12 RCLK HC595 Parallel Poll Circuit Latch | | |
| **4** | PB3 | /CS | /CS 1 Micro SD | | |
| **5** | PB4(SS SPI) | NC | | | |
| **6** | PB5(MOSI SPI) | SPI | 1K to 3 'MOSI Micro SD<br>4 ISP<br>14 SER HC595 Parallel Poll Circuit | | |
| **7** | PB6(MISO SPI) | SPI | 1K to 4 'MISO Micro SD<br>1 ISP | | |
| **8** | PB7(SCK SPI)) | SPI | 1K to 2 'SCK Micro SD<br>11 SRCLK HC595 Parallel Poll Circuit<br>3 ISP | | |
| **9** | /RESET | | 1K to VCC<br>5 ISP<br>Reset button | | |
| **10** | VCC | 5V | 4 VCC 5V FT232RL<br>5 VCC Micro SD<br>2 VCC ISP<br>5 VCC DS1307 RTC BOARD<br>16 VCC HC 595 Parallel Poll Circuit<br>14 VCC HC 32 Parallel Poll Circuit<br>14 VCC HC 05 Parallel Poll Circuit<br>0.1uf GND<br>22uf GND | | |
| **11** | GND | GND | 6 GND FT232RL<br>6 GND Micro SD<br>6 ISP<br>4 GND DS1307 RTC BOARD<br>8 GND HC 595<br>7 GND HC 32<br>7 GND HC 05<br>**12,18,19,20,21,22,23,24 GPIB GND** | **GND** | **12**<br>**18**<br>**19**<br>**20**<br>**21**<br>**22**<br>**23**<br>**24** |
| **12** | XTAL2 | | 20MHZ<br>22pf GND | | |
| **13** | XTAL1 | | 20MHZ<br>22pf GND | | |
| **14** | PD0 (RXD0) | RS232 | 3 TXD FT232RL | | |
| **15** | PD1 (TXD0) | RS232 | 2 RXD FT232RL | | |
| **16** | PD2 | GPIB | **120R to 7 GPIB pin, GPIB pin 10K to VCC** | **NRFD** | **7** |

| | | | | | |
|---|---|---|---|---|---|
| **17** | PD3 | GPIB | **120R to 8 GPIB pin, GPIB pin 10K to VCC** | **NDAC** | **8** |
| **18** | PD4 | GPIB | **120R to 9 GPIB pin, GPIB pin 10K to VCC**<br>10 /SRCLR HC595 Parallel Poll Circuit | **IFC** | **9** |
| **19** | PD5 | GPIB | **120R to 10 GPIB pin, GPIB pin 10K to VCC** | **SRQ** | **10** |
| **20** | PD6 | GPIB | **120R to 11 GPIB pin, GPIB pin 10K to VCC**<br>3 HC32 Parallel Poll Circuit | **ATN** | **11** |
| **21** | PD7 | GPIB | **120R to 17 GPIB pin, GPIB pin 10K to VCC** | **REN** | **17** |
| **22** | PC0(SCL) | **I2C** | 1 SDA DS1307 RTC BOARD | | |
| **23** | PC1(SDA) | **I2C** | 2 SCL DS1307 RTC BOARD | | |
| **24** | PC2(TCK JTAG) | NC | | | |
| **25** | PC3(TMS JTAG) | NC | | | |
| **26** | PC4(TD0 JTAG) | NC | | | |
| **27** | PC5(TDI JTAG) | NC | | | |
| **28** | PC6(TOSC1) | **NC** | | | |
| **29** | PC7(TOSC2) | **NC** | | | |
| **30** | AVCC | | **VCC 10** | | |
| **31** | GND | | **GND 11** | | |
| **32** | AREF | 0.1uf | 0.1uf to GND 11 | | |
| **33** | PA7 | GPIB | **120R to 16 GPIB pin, GPIB pin 10K to VCC** | **D8** | **16** |
| **34** | PA6 | GPIB | **120R to 15 GPIB pin, GPIB pin 10K to VCC** | **D7** | **15** |
| **35** | PA5 | GPIB | **120R to 14 GPIB pin, GPIB pin 10K to VCC** | **D6** | **14** |
| **36** | PA4 | GPIB | **120R to 13 GPIB pin, GPIB pin 10K to VCC** | **D5** | **13** |
| **37** | PA3 | GPIB | **120R to 4 GPIB pin, GPIB pin 10K to VCC** | **D4** | **4** |
| **38** | PA2 | GPIB | **120R to 3 GPIB pin, GPIB pin 10K to VCC** | **D3** | **3** |
| **39** | PA1 | GPIB | **120R to 2 GPIB pin, GPIB pin 10K to VCC** | **D2** | **2** |
| **40** | PA0 | GPIB | **120R to 1 GPIB pin, GPIB pin 10K to VCC** | **D1** | **1** |

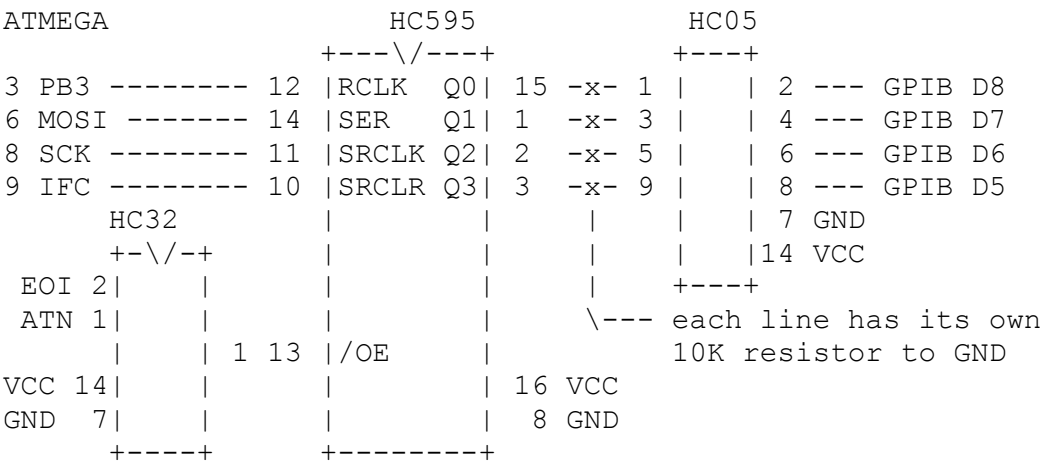
## AVR ATMEGA1284P pin assignments for HP85 Disk

- **GPIB**: Each GPIB pin (8 data and 8 control lines ) attach to CPU with a 120 ohm current limit resistor .
    - Each GPIB pin (8 data and 8 control lines ) have a 10K pull-up resistor to VCC.
- **ISP header:** MOSI,MISO,SCK,/Reset connects directly to ISP header
- **Micro SD Interface:** MOSI,MISO,SCK attach to CPU function via a 1k series resistor.
    - **Micro SD interface has level shifters and internal 5V to 3.3V regulator**
- **RS232 TTL:** connect to FTDI232 **USB** board which also provides **5V VCC** power to all circuits..
- **I2C:** SCL,SDA connect to optional DS1307 RTC board with each line having a 2k2 pull-up

```
                    ATMEGA1284P (and ATMEGA644P)
                    +---\/---+
 5 EOI INT0  PB0  1|        |40  PA0      D1  1
 6 DAV INT1  PB1  2|        |39  PA1      D2  2
   PP  INT2  PB2  3|        |38  PA2      D3  3
SD /CS  PWM  PB3  4|        |37  PA3      D4  4
   NC   PWM  PB4  5|        |36  PA4      D5 13
SD     MOSI  PB5  6|        |35  PA5      D6 14
SD     MISO  PB6  7|        |34  PA6      D7 15
SD      SCK  PB7  8|        |33  PA7      D8 16
10K pullup  /RST  9|        |32  AREF     0.1uf
   +5        VCC 10|        |31  GND      GND
   GND       GND 11|        |30  AVCC     +5
20MHZ      XTAL2 12|        |29  PC7      NC
20MHZ      XTAL1 13|        |28  PC6      NC
   RX   RX0  PD0 14|        |27  PC5  TDI JTAG
   TX   TX0  PD1 15|        |26  PC4  TDO JTAG
 7 NRFD RX1  PD2 16|        |25  PC3  TMS JTAG
 8 NDAC TX1  PD3 17|        |24  PC2  TCK JTAG
 9 IFC  PWM  PD4 18|        |23  PC1  SDA I2C
10 SRQ  PWM  PD5 19|        |22  PC0  SCL I2C
11 ATN  PWM  PD6 20|        |21  PD7  PWM REN 17
                    +--------+
```

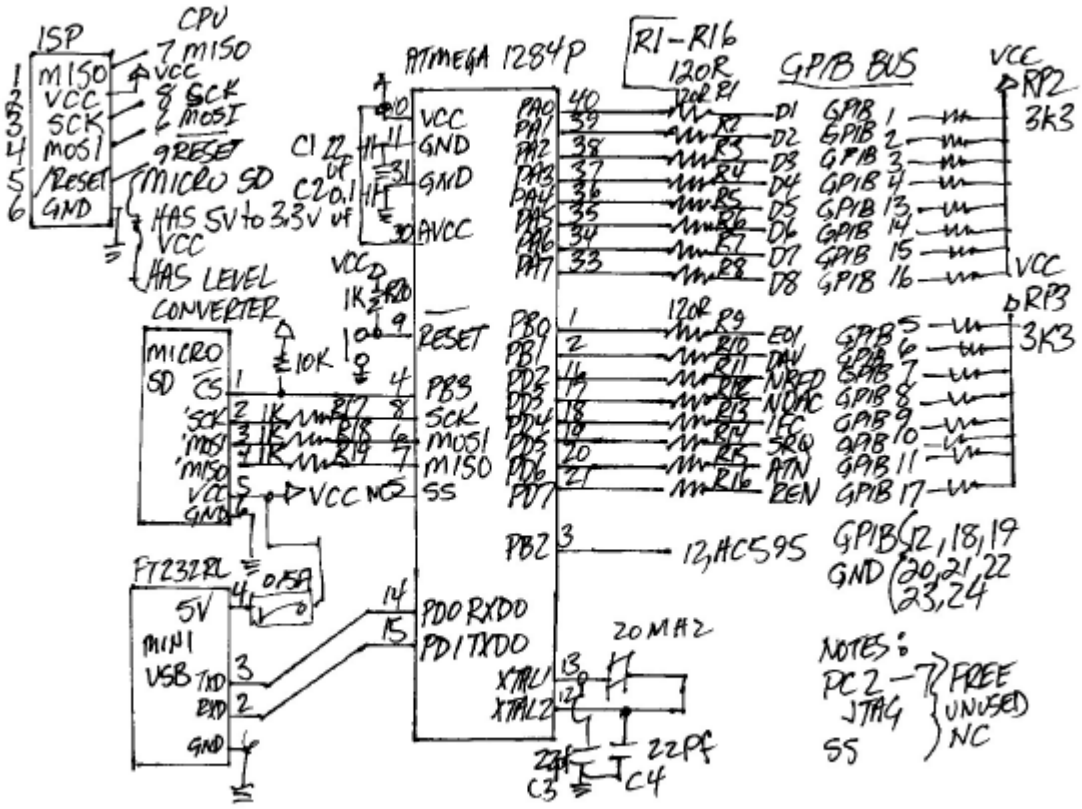
## Parallel Poll Response circuit

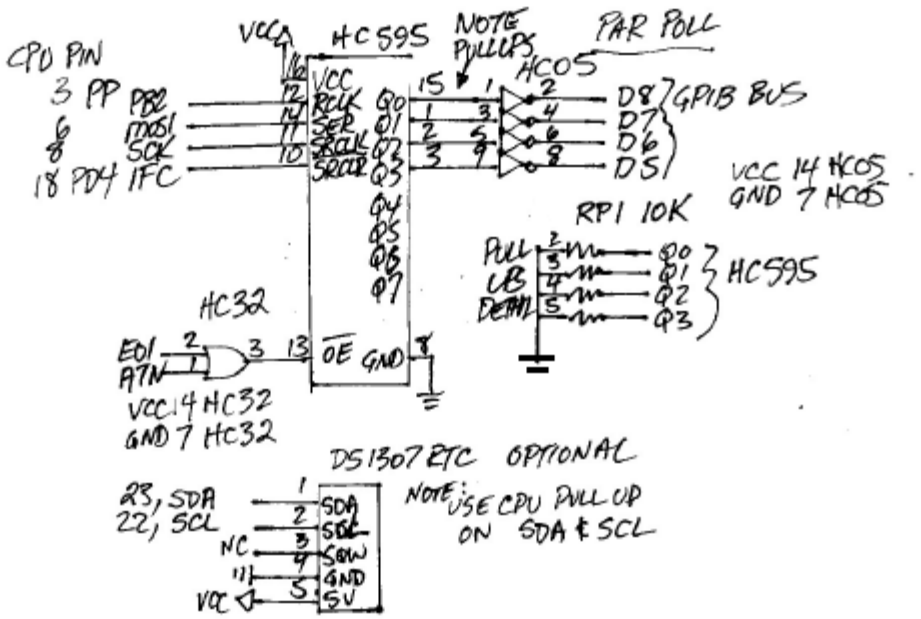
- Uses: Three chips 74HC05, 74HC32, 74HC595
- Parallel Poll Response must be less then 2 Microseconds therefore we use hardware to do it!




Notes: When both EOI and ATN are low the HC32 enables HC595 outputs

- If any HC595 output is high the GPIB bus bit will be pulled low
- IFC low resets the outputs low


ISP
CPU
MISO
VCC
SCK
MOSI
RESET
GND
MICRO SD
HAS 5V to 3.3V VCC
HAS LEVEL CONVERTER
ATMEGA 1284P
VCC
GND
AVCC
RESET
PB3
SCK
MOSI
MISO
SS
PD0 RXD0
PD1 TXD0
XTAL1
XTAL2
PA0
PA1
PA2
PA3
PA4
PA5
PA6
PA7
PB0
PB1
PD2
PD3
PD4
PD5
PD6
PD7
PB2
C1 22uF
C2 0.1uF
10K
1K
120R
R1-R16
GPIB BUS
VCC
RP2 3K3
RP3 3K3
D1
D2
D3
D4
D5
D6
D7
D8
EOI
DAV
NRFD
NDAC
IFC
SRQ
ATN
REN
GPIB 1
GPIB 2
GPIB 3
GPIB 4
GPIB 13
GPIB 14
GPIB 15
GPIB 16
GPIB 5
GPIB 6
GPIB 7
GPIB 8
GPIB 9
GPIB 10
GPIB 11
GPIB 17
12, HC595
GPIB 12, 18, 19
GND 20, 21, 22, 23, 24
FT232RL
5V
MINI USB
TXD
RXD
GND
0.5A
20MHz
22pF
Z5K
C3
C4
NOTES:
PC2 — JTAG
SS
FREE
UNUSED
NC
v1.0 HP-85 DISK MIKE GORE FEB 2015

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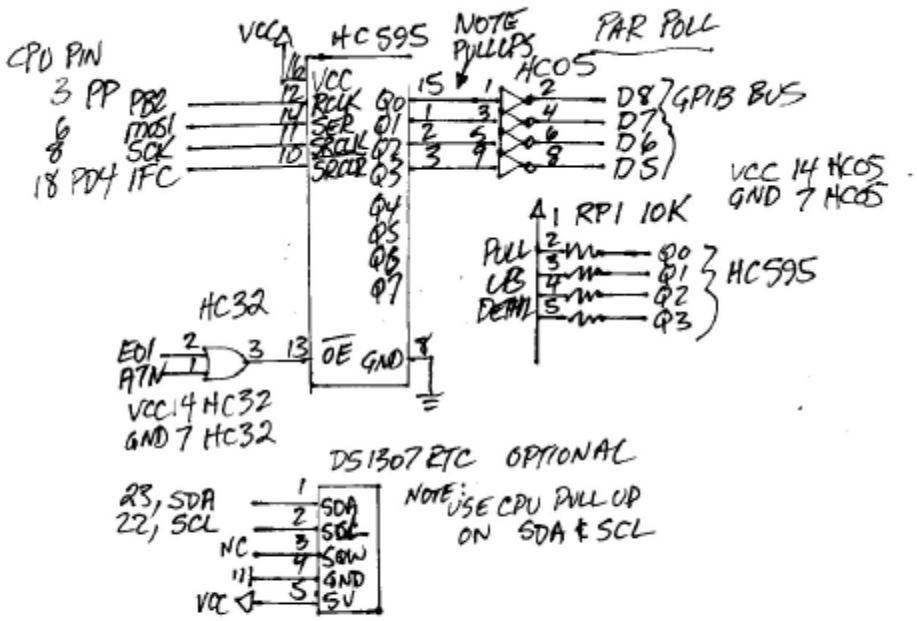


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