

SMINI Parts List (in order of recommended assembly)

Qty.	Symbol	Description
2	-	4-40 x 1/4" long pan head machine screws (Digi-Key H142)
2	-	4-40 hex nuts (Digi-Key H216)
1	R1	10K Ω resistor [brown-black-orange]
4	R2-R5	330 Ω resistors [orange-orange-brown]
1	D1	1A, 100V diode (Jameco 76961 or Digi-Key 1N4002)
1	S1	40-pin DIP socket (Jameco 112310)
1	S2	14-pin DIP socket (Jameco 112213)
3	S3-S5	20-pin DIP sockets (Jameco 112248)
6	S9-S14	20-pin DIP sockets (Jameco 112248)
1	RN1	2.2K Ω 7-element SIP resistor network (Digi-Key 770-81-R2.2K)
1	RN2	2.2K Ω 5-element SIP resistor network (Digi-Key 770-61-R2.2K)
3	RN3-RN5	2.2K Ω 9-element SIP resistor networks (Jameco 97893)
6	RN6-RN11	470 Ω 8-element DIP resistor networks (Jameco 108581)
6	RN12-RN17	4.7K Ω 9-element SIP resistor networks (Jameco 24660)
1	SW1	7-segment DIP switch (Digi-Key CT2067)
1	SW2	4-segment DIP switch (Digi-Key CT2064)
3	H4-H6	24-pin right angle headers (Mouser 538-26-48-1122)
15	C0-C14	.1 μ F, 50V monolithic capacitors (JDR .1UF-MONO)
2	C15,C16	18pF, 100V monolithic ceramic disk capacitors (Digi-Key P4840)
2	C17,C18	10 μ F, 16V tantalum capacitors (Jameco 94060)
48	Q1-Q48	2N4401 NPN small signal transistors (Jameco 38421) for standard current sinking or 2N4403 PNP small signal transistors (Jameco 38447) when using current sourcing
6	J1-J6	Jumpers (make from excess resistor leads and install either long jumper for current sinking or short jumper when using current sourcing – see text for details)
1	L1	Diffused green T1 $\frac{3}{4}$ size LED (Digi-Key P303)
1	L2	Diffused amber T1 $\frac{3}{4}$ size LED (Digi-Key P306)
1	L3	Diffused red T1 $\frac{3}{4}$ size LED (Digi-Key P300)
1	XL1	18.432MHz crystal (Digi-Key X179)
1	U1	Microcontroller PIC16F877-20/P with USIC programmed FLASH Memory (JLC U1A)
1	U2	74LS04 hex inverter (Jameco 46316)
3	U3-U5	74LS540 octal buffer/line drivers – inverting (Jameco 47861)
6	U9-U14	74HCT573 octal D-type latched flip-flops (Jameco 45090)

Used only for RS-485 and RS422

2	S6,S7	8-pin DIP sockets (Jameco 112192)
2	H1,H2	5-pin straight headers (cut from 24-pin straight header - Mouser 538-26-48-1241)
2	U6,U7	Dual RS485/RS422 transceivers (Digi-Key MAX487CPA)

Used only for RS-232

1	S8	16-pin DIP socket (Jameco 11222)
5	C19,C23	1.0 μ F, 35V tantalum capacitors (Jameco 33662)
1	H3	3-pin straight header (cut from 24-pin straight header – Mouser 538-26-48-1241)
1	U8	Dual RS232 transmitter & receiver MAX232CPE (Jameco 24811)

Mating connectors for cable to computer, to next node and to external hardware

1 or 2	—	One 3-pin terminal housing for RS232 or two 5-pin terminal housings for RS485/RS422 (cut from 12-pin terminal housing Mouser 538-09-50-31)
6	—	12-pin terminal housings (Mouser 538-09-50-3121)
82	—	Crimp terminals (Mouser 538-08-50-0106 for wire sizes 18-20 or 538-08-50-0108 for wire sizes 22-26)

Author's recommendations for suppliers given in parentheses above with part numbers where applicable. Equivalent parts may be substituted. Resistors are $\frac{1}{4}W$, 5 percent and color codes are given in brackets.

SMINI Parts List Continuation

Fixed resistor and most popular alternate capacitors for different levels of filtering (see text)

24	R6-R29	100 Ω resistors [brown-black-brown]
24	C24-C47	.1 μ F, 50V monolithic capacitors (JDR .1UF-MONO or Jameco 25523)
24	C24-C47	1.0 μ F, 35V tantalum capacitors (Jameco 33662)
24	C24-C47	10 μ F, 16V tantalum capacitors (Jameco 94060)
24	C24-C47	22 μ F, 16V radial lead electrolytic capacitors (Digi-Key P6224)
24	C24-C47	47 μ F, 16V radial lead electrolytic capacitors (Digi-Key P6226)
24	C24-C47	100 μ F, 16V radial lead electrolytic capacitors (Digi-Key P6227)

Author's recommendations for suppliers given in parentheses above with part numbers where applicable. Equivalent parts may be substituted. Resistors are $\frac{1}{4}W$, 5 percent and color codes are given in brackets.

General Information:

Assembly follows the same basic steps of a combined SUSIC, DOUT32 and DIN32 card or their classic counterpart theUSIC, DOUT and DIN cards as covered in the Second Edition Build Your Own Universal Computer Interface book and in the C/MRI User's Manual except that the parts legend is printed directly on the SMINI card making the assembly easier. If you have assembled these other C/MRI cards, assembling the SMINI should be straightforward. If you have never assembled a serial, input card, and output card, I recommend you review the appropriate instructions in the above noted references before assembling the SMINI card.

Information notes on SMINI card assembly:

1. Make sure that all the IC sockets and the ICs are installed with the correct pin 1 orientation. The pin 1 holes also have the square pad for easy identification.
2. The banded end of diode D1 must be installed with its band orientation as printed on the card.
3. Capacitors C0-C16 are not polarity sensitivity nor is the crystal XL1. Simply insert, solder and trim. Note however that C15, C16 are different valued parts than C0-C14.
4. Capacitors C17, C18 are polarity sensitivity. The longer + lead needs to be installed into their corresponding + holes. The + holes also have the square pad for easy identification. These capacitors are different values than C19-C23 so make certain that you have the correct values installed before you solder and trim.
5. The straight headers specified as H1-H3 are made from 24-pin straight headers. Simply cut and snap off the required sections from standard 24-pin headers to create the needed 3 and 5-pin headers.
6. When installing the straight headers, make sure you have the plastic part of the connector pushed firmly against the card before soldering. Solder only the center pin of each header. Then check to make sure that the complete plastic base is snugly pressed firmly against the card. If not, reheat the center connection to reseat the connector. Once you are certain that the total connector is firmly seated, then solder the remaining pins.
7. The SIP resistor networks (RN1-RN5, RN12-RN17) have a designated pin 1 orientation denoted by either a dot or a bar printed on the part. The designated pin 1 must be installed in the hole marked with a one as well as having the square pad. Note that RN3-RN5 have a resistance value different from RN12-RN17 so make certain that you get the correct value resistance in the correct locations before you solder.
8. Orientation of the DIP resistor networks RN6-RN11 isn't important but for consistency in appearance, it's best to align them just like the ICs.

9. When installing DIP switches (SW1, SW2) use your VOM to make certain that the switch is installed so its contacts are closed when thrown away from the U12 and U14. This position is absolutely critical to setting the correct USIC address and Baud rate.
10. LEDs L1-L3 must be installed with their + lead, the longer of the two leads, installed in the + hole. Check that you have the correct colored LED in the correct position before you solder and trim.
11. You need only install the parts for the RS485/RS422 or the RS232 dependent upon which interface you plan to use. To make your card compatible with both standards, you can install all the parts for both interfaces. However when using RS485/RS422 make sure that U6 and U7 are installed in their sockets and that U8 is not installed in its socket. Likewise, when using RS232 make sure that U8 is installed in its socket and that U6 and U7 are not installed in their sockets.
12. Capacitors C19-C23 are polarity sensitivity. The longer + lead needs to be installed into its corresponding + hole. The + holes also have the square pad for easy identification. These capacitors are different values than C17-C18 so make certain that you have the correct values installed before you solder and trim.
13. Before installing the transistors Q1-Q48 you need to decide if you want standard current sinking or alternate current sourcing. Review the instructions for the DOUT card in the references if unsure as to which is best for your particular application. The SMINI card's design provides for individual port selection. However, for the sake of keeping things simple, and being able to easily interchange cards of the same type, I recommend that you select the same port configuration for all your SMINI cards. To install the transistors bend the center lead back a bit so that each transistor fits into its designated three holes following the orientation printed on the card. Push each transistor into its corresponding holes until there is about a 1/8 inch space between the board and the bottom of the transistor. With all the transistors lined up evenly solder and trim the leads.
14. Install the long jumper in the J1-J6 locations corresponding to each port that uses the 2N4401 transistor, i.e. current sinking. Install the short jumper in the J1-J6 locations corresponding to each port that uses the 2N4403 transistor, i.e. current sourcing.
15. Typically, input line filtering isn't required so I generally recommend that you do not install resistors R6-R29 and capacitors C24-C47. To learn about input line filtering see the corresponding section on the DIN card in either the Second Edition Build Your Own Universal Computer Interface book or the C/MRI User's Manual.