

MR-163

User Manual



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PART 1: MR-163

1. Introduction

MR-163 is a small pre-assembled CPU board, which has an ISP(In-System Programming) port, reset button, 8MHz X-tal, and 32 I/O port pins. The MR-163 uses an Atmega163(Atmel AVR series) CPU chip as a controller. The Atmega163 has 16K bytes In-System Programmable Flash memory, 1K bytes SRAM, 512 bytes EEPROM and many other peripherals. The user can download a program to the board without a ROM Writer using the ISP function. A free C-compiler (Microrobot AVR GCC) is provided.

2. Features

- Atmega163 (Atmel AVR series, 8MHz(8 MIPS))
- 16Kbyte ISP flash, 1K bytes SRAM, 512 bytes EEPROM, three Timers, ADC 8ch, UART
- ISP port
- Internal Calibrated RC Oscillator
- ISP download indicating LED
- 32 I/O port pins
- Reset button
- Free Windows C compiler(Microrobot AVR GCC)
- ISP downloader(Optional)

PART 2: BOARD

1. Placement Diagram(Silkscreen)

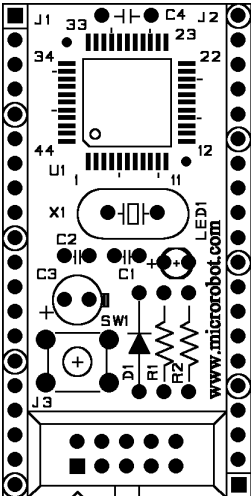
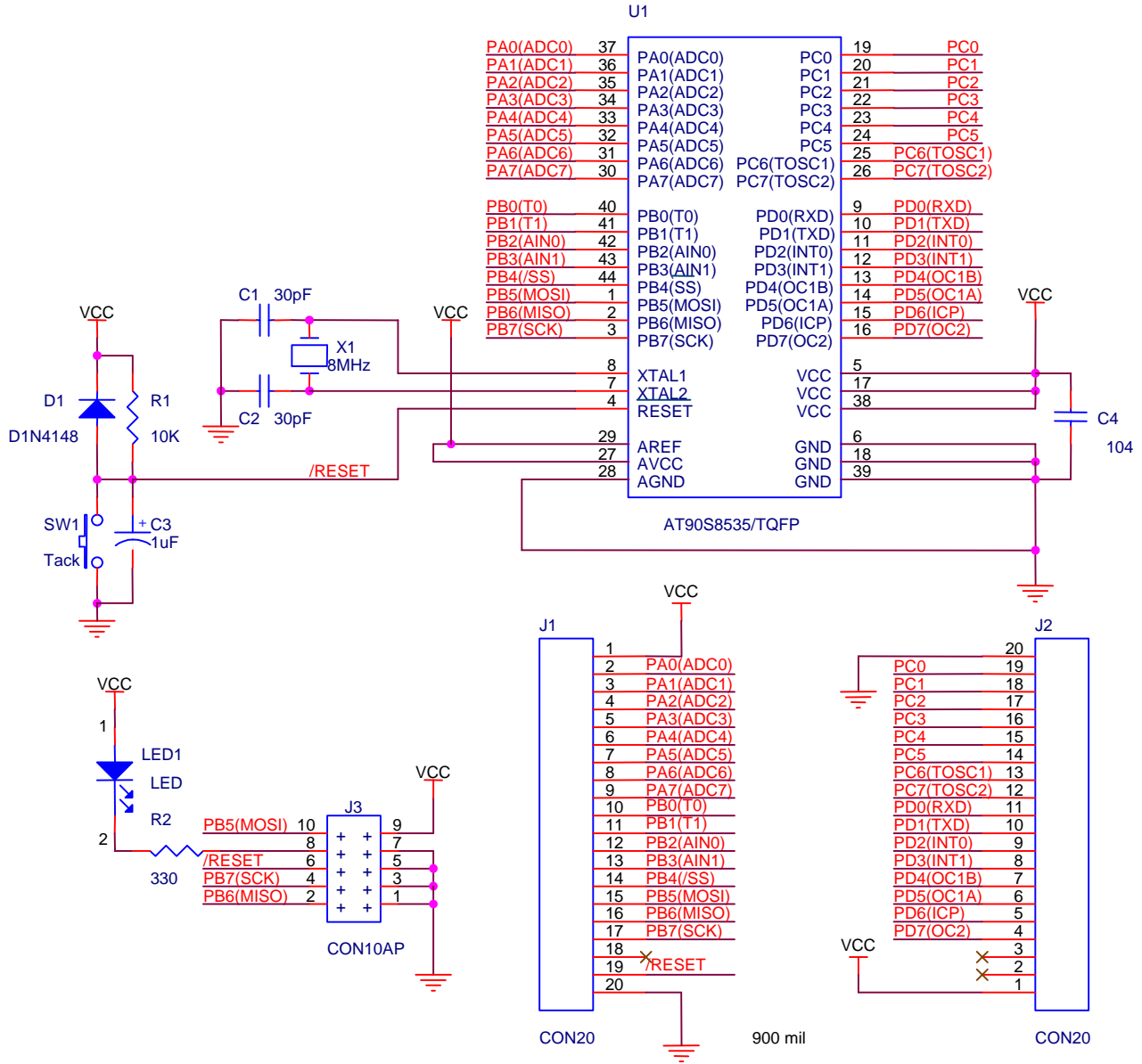


Fig 1.1 MR-163 CPU board silkscreen.

2. Circuit Diagram



3. Parts List

NO	Reference	Parts name	Value	Qty.	Remark
1	C1, C2	Capacitor	30pF	2	Ceramic Condenser
2	C3	"	1uF/16V	1	Electrolytic Condenser
3	C4	"	104	1	Monolithic Condenser
4	D1	Diode	D1N4148	1	DIP type
5	LED1	LED	RED 3ø	1	
6	J1, J2	Connector	CON20	1	1Line Header(male)
7	J3	"	CON10AP	1	HIF3F/10PIN
8	R1	Resistor	10KΩ	1	1/4W DIP type
9	R2	"	330Ω	1	1/4W DIP type
10	SW1	S/W	Tack S/W(Small)	1	
11	U1	MCU	ATmega163/TQFP	1	AVR Microcontroller
12	X1	X-TAL	8MHz	1	ATS type
13		PCB		1	Main PCB
14		Downloading Adapter		1	Option
15		Ribbon Cable		1	Option(1 m)



Fig 2.1 Downloading Adapter



Fig 2.2 Ribbon cable

PART 3 : Software Tools

1. AVR Development Program Installation

AVR Development Tools

There are many different kinds of development tools for AVR microcontrollers. Atmel, the AVR CPU manufacturer, provides some AVR development tools free. Microrobot Co. Ltd. also provides a free Windows C-compiler.

Wavrasm : AVR assembler, Atmel.

AVR Studio : AVR Emulator/Simulator, Atmel.

AVR ISP : ISP downloading program, Atmel.

PonyProg2000 : ISP downloading program, Lancos.

Microrobot AVR GCC : C-compiler, Microrobot.

The AVR ISP downloading program does not support ATmega163. Use a PonyProg2000 program.

System requirements for AVR development tools

- Windows 9X/ME or NT/2000
- Pentium-133 or higher
- At least 4 Mbytes of RAM
- CD-ROM Drive

PonyProg2000 installation:

Run setup.exe in the CD's ponyprogV203b folder.

Microrobot AVR GCC installation

Refer to the 'Microrobot AVR GCC User Guide.pdf' file in the CD's MaroGcc0.9C folder.

2. How to use Microrobot AVR GCC

Refer to the 'Microrobot AVR GCC User Guide.pdf' file in the CD's MaroGcc0.9C folder.

Current version of Microrobot AVR GCC does not support Atmega163. Use the following temporary method.

- 1) Open the 'C:\Program Files\Microrobot\Microrobot AVR GCC\Avr\include' folder.
- 2) Rename iom161.h to iom161_org.h.
- 3) Rename iom163.h to iom161.h.
- 4) Open the 'C:\Program Files\Microrobot\Microrobot AVR GCC\Avr\lib\avr5' folder.
- 5) Rename crtm161.o to crtm161_org.o.
- 6) Rename crtm163.o to crtm161.o.
- 7) Run the Microrobot AVR GCC.
- 8) Select 'ATmega161' as a microcontroller and 'avr161.x' file as a user link script.
- 9) Open and compile your source.

Warning : In case of using Atmega161, restore all filenames you changed above.(iom161.h → iom163.h, iom161_org.h → iom161.h, crtm161.o → crtm163.o, crtm161_org.o → crtm161.o)

3. How to use PongProg2000

Refer to the 'PonyProg Manual for Microrobot AVR Products.pdf' file.

PART 4 : Compile and Download

Compile the source file and download the executable file in the following order.

- Supply DC 5V to the J1' s (or J2' s) #1 pin and GND to the #20 pin.
- Connect the downloading adapter to the PC printer port. Then connect the downloading adapter and the CPU board by using the ribbon cable.
- Rename the filenames as mentioned above. (Refer to the ' 2. How to use Microrobot AVR GCCC').
- Run the Microrobot AVR GCC.
- Open your source file.
- Select ' Build → Build Option ... → General tab' . The Build Option window appears. Select ' Intel hex' as a Hex format, ' Atmega161' as a microcontroller. Check ' Object file' and ' Rom file' boxes in the Generation menu. Type the folder you want as an Output Directory and click on OK.
- Select ' Build → Build Option ... → Compiler tab' . Click on the ' Default' button and select ' Size' radio button in the Optimization box. Do not use ' Speed' optimization.
- Select ' Build → Build Option ... → Linker tab' . Click on the ' User Link script' radio button and select ' C:\Program Files\Microrobot\Microrobot AVR GCC\Avr\lib\ldscripts\avr161.x' and click on OK.
- Press F7 or select ' Build → Build' menu to build.
(The source-editing window you want to build must be selected before building it if there are more than two source-editing windows.)
- If you see the following message: ' warning: asm operand1 probably doesn't match constraints' in the output message window, press F7 again.
- ' Create ROM file. Build complete!' message appears in the output message window.
- Run the PonyProg2000.
- Select ' Device → AVR micro → ATmega163' .
- Select ' File → Open Program File' and load the *.rom(or *.hex) file.
- Select ' Command → Program' or press Ctrl + P to start the downloading. If no ' Program Failed' message appears, it means the downloading has been completed successfully.
- Remove the ribbon cable from the CPU board and restart the board.

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