FEATURES OF MEKATRONIX MICROCONTROLLER SYSTEMS

For a turnkey microcontroller system for embedded systems design, education and laboratory work, refer to the MindStamp product described elsewhere on the Mekatronix web site. MindStamp takes the guesswork out of configuring a powerful microcontroller system. It comes with an applications manual and some example programs.

Recommended: MindStamp for embedded microcontroller development.

General
All Mekatronix Microcontroller Systems employ the Motorola MC68HC11 family of microcontrollers with all the support logic and discrete components to realize a complete system. Each microcontroller supports 8 analog input channels requiring 16microsecond per conversion. The microcontroller systems all operate at 8MHz clock frequency that produces, typically, a 2microsecond average instruction execution time. Each system dedicates 4 pins to clocked-serial and 2 pins to asynchronous-serial communication. An onboard voltage regulator provides five volts regulated power for each system.

Mekatronix supplies support software and a plethora of actuators and sensors for its microcontroller systems. Explore the Mekatronix web site to get more information on:

Microcontroller Software
C-compiler, C-interpreter, utilities (high-speed program and data downloader), interrupt driven device drivers, Education tutorials and manuals.

Recommended: Mekatronix ICC11 compiler and Integrated Development Environment for all microcontroller systems.

Actuators and Sensors for IO Devices
Remote color camera with RF transmission, sonar, infrared lights and detection, RF data communication, photoresistors, switches, LEDs, geared dc motors, servos, LCD displays.

Microcontroller Configuration Support
Battery power packs, batteries, trickle charge AC adapters, serial cables, serial communications board (MB2325), switches, visible and IR LEDs, protoboards. Check the MindStamp.

Manuals
Each Mekatronix microcontroller system is used in at least one Mekatronix robot. See table below to determine which robot assembly and users manuals to download. Under Manuals on this web site toolbar, download the appropriate free manuals to get complete circuit descriptions and configuration help as well as instructions for programming.

Table 1 Mekatronix Microcontroller Systems: Assembly and Users Manuals

Microcontroller	Robot Assembly and Users Manuals
MSCC11	TJ and Robobug
MTJPRO11	TJ Pro
MRC11/MRSX01 Combination	Talrik II

Feature Specifications
 The charts below detail the features of each Mekatronix Microcontroller System.

Table 2 Mekatronix Microcontroller Systems: General Features

Minimum Input Voltage	6volts d.c.
Maximum Input Voltage	10volts d.c.
Maximum Current Draw	200milliamps
Operating Frequency	8MHz
Clocked-Serial Communications	4 PINS
Asynchronous-Serial Communications	2 PINS
Instruction Execution Time	2microseconds (average)

Table 3 Mekatronix Microcontroller Systems: Memory Chart

Mekatronix Microcontroller	RAM Bytes	ROM Bytes	EEPROM Bytes
MTJPRO11	32K	0	512
MRC11-32	32K	32K	512
MRC11-64	64K	0	512
MSCC11	256	0	2K

Table 4 Mekatronix Microcontroller Systems: IO Chart

Mekatronix Microcontroller	8-Bit IO/Memory Bus	Digital Input Enables	Digital Output Enables	Bi-directional	Digital Inputs	Digital Outputs	Analog Inputs
MTJPRO11	Data Only	4	3	2	3^1	$11=8^2 + 3$	7^1
MRC11-32	Yes	None	None	2	3^1	3	8^1
MRC11-64	Yes	None	None	2	3^1	3	8^1
MSCC11	No	None	None	10	3^1	11	8^1

[1]An Analog Input can be configured as Digital Input. For example, converting 5 Analog Inputs to Digital Inputs reduces the Analog inputs from 8 to 3 and increases the digital inputs from 3 to 8.
[2]The block of 8 digital outputs can be modulated at 40KHz with an appropriate jumper and also have current limiting resistors on the printed circuit board which can be used or cut out, as desired.

Only the MRC11 Microcontroller Systems brings out the full Address and Data bus of the Motorola MC68HC11 microcontroller in expanded mode. This permits you to map any input or output device into a memory location or to extend memory beyond 64Kbytes using external hardware with appropriate software to implement memory bank access.

Table 5 Mekatronix Microcontroller Systems Special Features

Mekatronix Microcontroller	Special 4-Bit Digital Input[1]	Separate Servo Power Bus	Separate Male Headers for IO with Adjacent Ground/Power	IO/Memory Data Bus and Address Bus Headers
MTJPRO11	Yes	Yes	Yes	No
MRC11-32	No	External Option	External Option	Yes
MRC11-64	No	External Option	External Option	Yes
MSCC11	No	Yes	Yes	No

[1]The 4 bit input converts internally to an analog signal which the processor converts back to digital, yielding 4 digital inputs at the cost of one Analog Input. The results yields 16 digital levels, but the conversion does not create a straight binary code. A simple table look-up can convert the converted digital value into the original 4 bit digital inputs if the application requires straight binary.

MSCC11 Special Features

Besides the ease of interfacing up to 16 servos and 8 analog channels with convenient 3-pin male headers, you can drop an E9 chip into the processor socket. The E9 gives an additional 12K of EPROM in which you can install any program that fits, for example, the BUFFALO monitor. All the microcontroller pins come out to headers, so you can also develop a fully expanded system to include external memory and IO.

The MSCC11 is the ideal system for simple, low-cost, embedded microcontrollers.

MRC11/MRSX01 High Performance Microcontroller System

The MRC11 and MRSX01 sensor expansion board combine to form our most powerful microcontroller system. The table below provides the features.

Table 6 Mekatronix MRC11/MRSX01Microcontroller Systems: Memory Chart

Mekatronix Microcontroller	RAM Bytes	ROM Bytes	EEPROM Bytes
MRC11-32	32K	32K	512
MRC11-64	64K	0	512

Table 7 Mekatronix MRC11/MRSX01Microcontroller Systems: IO Chart

Full 8-Bit IO/Memory Bus	Digital Input Enables	Digital Output Enables	Digital Inputs	Digital Outputs[1]	Analog Inputs
8 data 16 address E-clock Address Strobe	3	2	12[2]	8[1] (Option: Modulated at 40KHz)	24

[1]Jumper option to modulate all outputs at 40KHz.
[2]This splits into 3 direct digital inputs and a special 4 and 5-bit digital input ports which convert digital to analog and then back to a coded digital input. See next chart.

Table 8 Mekatronix MRC11/MRSX01Microcontroller Systems: Special Features

Special Feature Description
4-Bit Digital Input[1] (Digital-to-Analog-to-Coded Digital)
5-Bit Digital Input[1] (Digital-to-Analog-to-Coded Digital)
IO: 8 three pin male analog input headers with adjacent ground , power, and signal
IO: 6 two pin male analog input headers with signal and ground, signal across a voltage divider.
IO/Memory Data Bus and Address Bus Headers (60-pins)
MRC11 60-pin header brings out entire bus and functional pins of the MC68HC11
MRSX01 60-pin header connects to the MRC11 header
Two, 2-pins dc motor male headers: ground and power
Separate Motor Power Bus
Two, 3-pins servo male headers: ground, power, and signal
Piezo speaker driver with 2-pin male header: ground and signal
4-pin male charge header
4-pin male battery header

[1]The 4 bit input converts internally to an analog signal which the processor converts back to digital, yielding 4 digital inputs at the cost of one Analog Input. The result yields 16 digital levels, but the conversion does not create a straight binary code. A simple table look-up can convert the converted digital value into the original 4 bit digital inputs if the application requires straight binary. The 5-bit works in a similar fashion with 5 digital inputs.