Microcontrollers on the PC Bus

Microcontroller cards—our 5080 series cards—for the PC Bus are used for small tasks where the expense of a full blown PC system is not cost–effective. With few exceptions, microcontroller cards use the same hardware as the PC Bus. The advantage to you is that application problems can be solved on different performance levels using common hardware.

Microcontroller cards contain the following building blocks:

- The CPU (microprocessor)
- Program and datalogging memory
- CAMBASIC™ IV multitasking language
- "C" or ssembly language
- Solid–state disk for program storage
- Serial and parallel I/O; other I/O
- Calendar/clock
- Watchdog timer

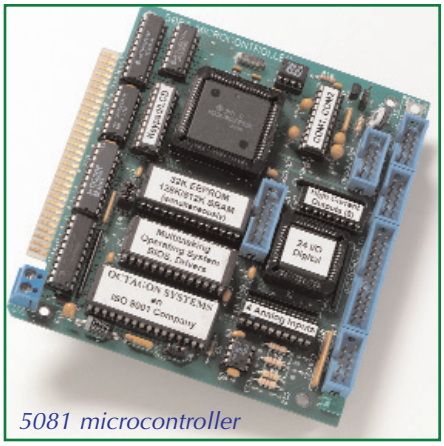
Expansion compatibility

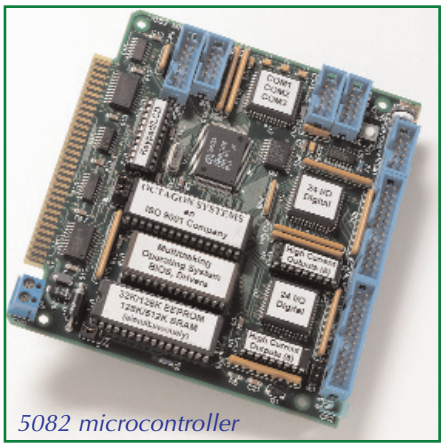
The I/O capability of the microcontroller cards can be increased using expansion cards. A list of compatible I/O cards, power supplies and cages is available on page 5 of this datasheet.


5083 microcontroller

Programming microcontroller cards

The Microcontroller cards are self–contained development systems; that is, they have an embedded, high level, control language and a means to save programs. Programs are usually developed using Windows® Hyperterminal or a similar serial console program to enhance debug capabilities. During program development, the program will reside in RAM on the microcontroller. You then may upload your program to the PC and save it on disk. First–time users will need to buy the CAMBASIC IV programming guide.


5081 microcontroller


5082 microcontroller

Selection guide

For a list of microcontroller features and pinout charts turn to page 2. Compatible cables, memory, keypads and displays guides are also found on page

SELECTION CHART

Microcontroller:	5081	5082	5083
CAMBASIC IV included	✔	✔	✔
Max. RAM	512K	512K	512K
RAM supplied	32K	128K	128K
Max. EEPROM	32K	32K	32K
Max. program size	32K	32K	32K
EEPROM supplied	32K	32K	32K
Keypad port	✔	✔	✔
Display port	✔	✔	✔
High current outputs	8	16	8
Total digital I/O	24	64	39
*Independent digital I/O	8	48	24
Analog inputs	4	0	8
Input resolution	8	0	12
Analog outputs	0	0	1
Output resolution	–	–	12
Serial ports	2	3	3
Watchdog timer	✔	✔	✔
5V operation	✔	✔	✔
Supply current (mA)	125	130	270.
Serial EEPROM	–	–	✔

*Some digital I/O can serve two functions, such as keypad or digital I/O. Independent I/O has only one function.

ACCESSORY GUIDE

Microcontroller:	5081	5082	5083
128K/512K RAM	✔	✔	✔
29C256 EEPROM	✔	✔	✔
29C010 EEPROM	–	–	–
DS–1216FM SmartWatch	–	–	–
DS–1216EM SmartWatch	✔	✔	✔
KP–1 keypad	✔	✔	✔
Keypad port	✔	✔	✔
KP–3 keypad	✔	✔	✔
*CMA–10–24 cable	2	1	1
*CMA–14–24 cable	1	1	1
*CMA–20–24 cable	–	–	1
*CMA–26–24 cable	1	2	1
*VTC–9F, VTC–9M cables	2	3	3
LCD–4x20/4x40** displays	✔	✔	✔

*Shows maximum number of cables of a type for card. Your application may need none, or fewer.
**LCD–4x40 requires using an LCD–IFB adapter board.

Connector pinouts

These pinouts are universal to all cards that have the features. Only the 5082/83 have COM3.

Digital I/O port

I/O line	Port A	Port B	Port C
Line 0	19	10*	13
Line 1	21	8*	16
Line 2	23	4*	15
Line 3	25	6*	17
Line 4	24	1*	14
Line 5	22	3*	11
Line 6	20	5*	12
Line 7	18	7*	9
+5V—Pin 2			
Gnd—Pin 26			
* These lines are also high current.			

COM1, 2, 3 serial ports

Func.	Pin #	Dir.	1	2	3
DCD	1	In			•
DSR	2	Out			
TxD	3	Out	•	•	•
RTS	4	Out		•	•
RxD	5	In	•	•	•
CTS	6	In	•	•	•
DTR	7	In			•
RI	8	In			
Gnd	9	Out	•	•	•
+5V	10	Out	•	•	•

Keypad port

Func.	Pin #	Func.	Pin #
Row 1	1	Col. 1	6
Row 2	4	Col. 2	3
Row 3	5	Col. 3	2
Row 4	8	Col. 4	7
Gnd	10	NC	9
NC = No connection			

LCD display port

Func.	Pin #	Func.	Pin #
+5V	1	NC	8
Gnd	2	NC	9
PA4	3	NC	10
Contrast	4	PA1	11
PA6	5	PA0	12
PA5	6	PA3	13
NC	7	PA2	14
NC = No connection			

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CAMBASIC: multitasking language

CAMBASIC IV is a multitasking, high performance, industrial control language. It uses the standard BASIC syntax and is optimized for real time applications requiring data acquisition, data reduction, control, and communications functions. It has a built–in editor, single–step debugger, and the ability to save programs in nonvolatile memory. Because it is contained in ROM, CAMBASIC IV provides an "instant on" system; that is, you can start programming immediately.

High performance language

CAMBASIC IV is designed for the execution speed needed in the industrial environment. It executes a foreground program at the rate of about 1,800 commands per second while doing background task checking at the rate of 3,000 tasks per second.

Modify your program on–site

Programs often must be changed on the production floor. With CAMBASIC IV ROM–based systems, programs can be developed and modified on–site using only a handheld terminal or lap–top computer. After the program is modified, you type SAVE and the new program is stored in nonvolatile memory. The program then runs on power–up.

CAMBASIC IV with Event Multitasking

Event Multitasking™ lets you do a number of system tasks in the background while executing your program. For example, the following tasks are available:

- Calling subroutines periodically— every 0.01 to 655 sec.
- 8 counters with an interrupt on a preset count
- 8 programmable timed outputs
- 8 interrupts on changes in digital inputs
- Keypad scanning and debounce
- Capturing serial input without slowing or stopping the program
- Printing data without slowing the program

CAMBASIC IV Features

- Multi–dimensioned string and numeric arrays
- Floating point, numbers over the ±10±38 range
- Full screen editor with Windows Hyperterminal
- Interrupt driven serial ports
- 1 Mbyte address range with PEEK, POKE
- Line renumbering
- Subroutines called by names instead of line numbers
- 48 error messages to pinpoint problems
- Interrupts handled directly
- Bit manipulation instead of bit masking
- Periodic interrupts
- Calendar/clock support
- Assembly and C programs supported
- Octagon's Micro PC expansion cards supported
- Windowed single–step debug

Industrial commands

CAMBASIC IV has more than 130 commands, many of which are tailored to the industrial environment. For example, CAMBASIC can:

- Read switch inputs individually or in groups;
- Write to lamps, relays and opto–isolator modules one at a time or in groups;
- Read analog data from pressure transducers, RTDs, thermocouples, strain gauges, and other devices;
- Write analog data to motor controllers, linear actuators, linear indicators and other devices;
- Send position and velocity profile information to smart motion control cards;
- Measure elapsed time and frequency and generate frequency outputs;
- Support a keypad and multiline operator interface.

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CAMBASIC INDUSTRIAL EXTENSIONS

AIN .....reads an analog input, like a thermocouple
AOT .....writes an analog output, like a motor command
BCD .....used with BCD inputs, like a thumbwheel switch
BIN .....used with BCD outputs, like a digital display
BIT .....reads the status of a single digital input
BIT .....writes to a single digital output
COM$ .....returns the string of characters in the serial buffer
COUNT .....reads the count from software or hardware counters
DELAY .....creates a delay from 0.01 to 655.35 sec.
DPEEK .....reads a 16–bit value from memory
DPOKE.....writes a 16–bit value to memory
DINP .....reads 16 I/O lines simultaneously
DISPLAY.....writes information to LED displays
DOUT .....writes to 16 I/O lines simultaneously
ITR .....handles hardware interrupts
KEYPAD$ .....reads the keypad
ON BIT .....calls a subroutine when a digital input line changes
ON COM$ .....calls a subroutine on serial input
ON COUNT.....calls a subroutine on a reset count
ON KEYPAD$ ..calls a subroutine when the key is pressed
ON INP .....calls a subroutine on a combination of digital events
ON ITR .....calls a subroutine when a hardware interrupt occurs
ON TICK .....calls a subroutine on a periodic basis
OUT.....writes to 8 I/O lines simultaneously
PEEK! .....reads 4 bytes of memory at a time
POKE! .....writes 4 bytes to memory
PRINT$ .....talks to GPIB, OPTOMUX and RS–485 devices
SAVE .....saves a program or array to nonvolatile memory
TICK.....reads the process clock
TIMER .....generates timed digital outputs

MICROSOFT COMPATIBLE COMMANDS

ABS	DIM	INKEY$	OUT	SQR	+
AND	DO	INP	PEEK	START	–
ASC	EDIT	INPUT	POKE	STEP	/
ATN	END	INSTR	PRINT	STOP	\
CALL	ELSE	INT	PRINT!	STR$	=
CHR$	ERL	LEFT$	READ	TAB	>
CLEAR	ERR	LEN	REM	THEN	<
CLS	EXIT	LIST	RENUM	TIME	>=
CONT	EXP	LOAD	RESTORE	TIME$	<=
COS	FILES	LOG	RESUME	UNTIL	<>
DATA	FOR	MID$	RETURN	VAL	*
DATE	GOSUB	MOD	RIGHT$	VAR	#
DATE$	GOTO	NEW	RND	XOR	$
DEBUG	HEX$	NOT	RUN		&
DEC	IF	ON	SAVE		
DELETE	INC	OR	SIN		

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Packaging: 508x system components

The following I/O cards,card cages, power supplies, cables,opto racks,interface and terminal boards, keypads and displays are part of the packaging options available for our 508x series. Photos are available on our web site at www.octagonsystems.com.

- 5600/5600–48 digital I/O card
- 5624 digital I/O card
- 5700 13–bit analog card
- 5710 12–bit A/D card
- 5720 analog & digital I/O
- 5750 octal DAC card for analog input & digital control
- 5540 multifunction card to integrate several I/O functions
- 5554/58 quad/octal serial port card
- 5300 counter/timer card
- 5805 4–MB solid–state disk card
- 51xx series power modules
- 7155 power module
- 52xx series 8–bit card cages
- 5253 economy card cages
- 5254 low–profile enclosure
- Flex backplanes
- VTC–9 serial cables
- CMA cables
- ATB–20 terminal board
- STB–26 space–saving terminal board
- TBD–100 termination/status board
- ITB–16/8 & 8/16 high voltage interface boards
- MUX–16 analog input expansion
- Opto racks
- Matrix keypads, KP–1 & KP–3
- Vacuum fluorescent displays
- LCD displays
- IFB interface cards for keypads and displays

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