

2100 HAS SET OF ROMS

2200 SUPERSET OF 2100

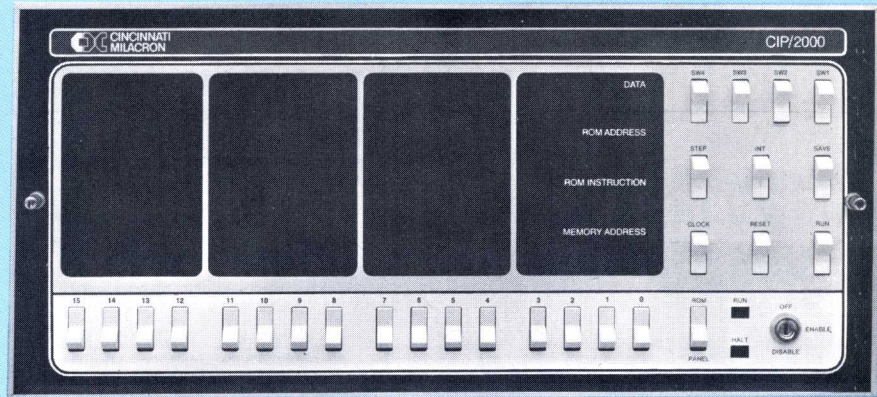
STRING MANIP

PUSH ON

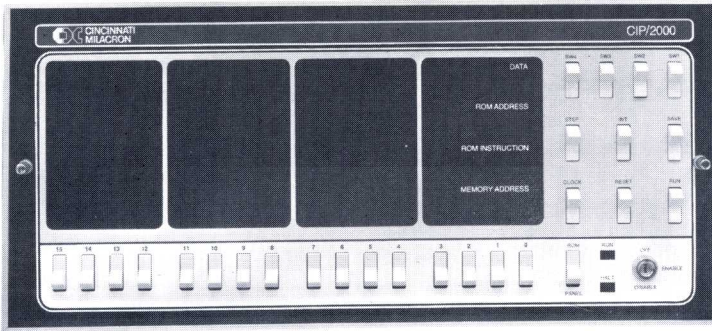
NOV 18 1971

2200: 5 ROMS OVER 2100

CIP/2100  
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**CIP/2100 MINICOMPUTER ...**

reliable, rugged, flexible, easy to use, economical.

Not just words to catch your eye, but the reasons why the CIP/2100 is the best general-purpose mini-computer for you.

The CIP/2100 was designed with the OEM user in mind. That's why the hardware is rugged and reliable, and the programming so flexible. "Easy to use" comes naturally with well-designed software, complete documentation, a people-oriented front panel, and for good measure, training courses in programming and maintenance. As for economical, a CIP/2100 is surprisingly low cost and a liberal OEM discount is available.

Good service isn't just a word either. Whether it's help with programming problems or on-time delivery you want or prompt field service, we've got the people and the skills to meet your needs.

**FEATURES**

- Full memory cycle speed of 1.1 microseconds
- Hardware multiply and divide
- Expandable priority interrupt system
- 89 standard instructions
- I/O — serial, parallel, DMA
- Concurrent I/O data transfer
- Modular design for economical expansion

**OPTIONS**

- Real-time clock
- Automatic power-fail/restart
- Memory parity
- Memory protect
- Communications interfaces
- Peripheral controllers

OPERATION CODE	MNEMONIC	INSTRUCTION NAME	TIME (microseconds)
0 0	HLT	Halt	5.72
0 1	TRP	Trap	15.84
0 2	ESW	Enter Sense Switches	4.84
0 3	PMP	Protect Memory Page	5.72
0 4	DIN	Disable Interrupt System	4.84
0 5	EIN	Enable Interrupt System	4.84
0 6	DRT	Disable Real Time Clock	4.84
0 7	ERT	Enable Real Time Clock	4.40
0 8	RO1	Reset Overflow and Set Word Length to 1	5.28
0 9	RO2	Reset Overflow and Set Word Length to 2	5.28
0 A	RO3	Reset Overflow and Set Word Length to 3	5.28
0 B	RO4	Reset Overflow and Set Word Length to 4	5.28
0 C	SO1	Set Overflow and Set Word Length to 1	5.28
0 D	SO2	Set Overflow and Set Word Length to 2	5.28
0 E	SO3	Set Overflow and Set Word Length to 3	5.28
0 F	SO4	Set Overflow and Set Word Length to 4	5.28
3 4	NOP	No Operation	

Conditional Jump

1 0	JOV	Jump if Overflow Set	Jump	8.58
			No Jump	6.82
1 1	JAZ	Jump if A Equal to Zero	Jump	8.58
			No Jump	7.70
1 2	JBZ	Jump if B Equal to Zero	Jump	8.36
			No Jump	7.48
1 3	JXZ	Jump if X Equal to Zero	Jump	8.14
			No Jump	7.26
1 4	JAN	Jump if A Negative	Jump	8.36
			No Jump	7.48
1 5	JXN	Jump if X Negative	Jump	8.14
			No Jump	7.26
1 6	JAB	Jump if A Equals B	Jump	9.24
			No Jump	8.36
1 7	JAX	Jump if A Equals X	Jump	9.02
			No Jump	8.14
1 8	NOV	Jump if Overflow not Set	Jump	7.70
			No Jump	7.70
1 9	NAZ	Jump if A not Equal to Zero	Jump	8.58
			No Jump	7.70
1 A	NBZ	Jump if B not Equal to Zero	Jump	8.36
			No Jump	7.48
1 B	NXZ	Jump if X not Equal to Zero	Jump	8.14
			No Jump	7.26
1 C	NAN	Jump if A not Negative	Jump	8.36
			No Jump	7.48
1 D	NXN	Jump if X not Negative	Jump	8.14
			No Jump	7.26
1 E	NAB	Jump if A not Equal to B	Jump	9.24
			No Jump	8.36
1 F	NAX	Jump if A not Equal to X	Jump	9.02
			No Jump	8.14

Shift

2 0	LLA	Logical Left A		5.94
2 1	LLB	Logical Left B		5.94
2 2	LLL	Logical Left Long		5.94
2 4	LRA	Logical Right A		5.94
2 5	LRB	Logical Right B		5.94
2 6	LRL	Logical Right Long		5.94
2 8	ALA	Arithmetic Left A		5.94
2 9	ALB	Arithmetic Left B		5.94
2 A	ALL	Arithmetic Left Long		5.94
2 C	ARA	Arithmetic Right A		5.94
2 D	ARB	Arithmetic Right B		5.94
2 E	ARL	Arithmetic Right Long		5.94

Input/Output

3 0	IBS	Input Byte Serially		86 ms
3 1	IBA	Input Byte to A		8.36
3 2	IBB	Input Byte to B		8.80
3 3	IBM	Input Byte to Memory		14.30
3 4	NOP			3.52
3 8	OBS	Output Byte Serially		100 ms
3 9	OBA	Output Byte from A		8.36
3 A	OBB	Output Byte from B		9.24
3 B	OBM	Output Byte from Memory		14.52

Register Operate

4 0	ORA	OR B with A		6.38
4 1	XRA	Exclusive — OR B with A		6.38
4 2	ORB	OR A with B		6.60
4 3	XRB	Exclusive — OR A with B		6.60
4 4	INX	Increment X		7.04
4 5	DCX	Decrement X		7.04
4 6	AWX	Add Word Length to X		7.04
4 7	SWX	Subtract Word Length from X		7.04
4 8	INA	Increment A		7.04
4 9	INB	Increment B		7.04
4 A	OCA	One's Complement A		6.60
4 B	OCB	One's Complement B		6.60
4 C	TAX	Transfer A to X		7.04
4 D	TBX	Transfer B to X		7.04
4 E	TXA	Transfer X to A		7.26
4 F	TXB	Transfer X to B		7.26

# IONS SET

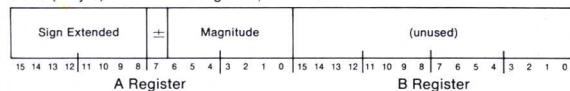
OPERATION CODE	MNEMONIC	INSTRUCTION NAME	TIME (microseconds)
Memory Referencing Instruction			
Fixed Word Length			
6 0	JMP	Jump	3.52
6 8	RTJ	Return Jump	6.38
7 0	IWM	Increment Word in Memory	5.94
7 8	DWM	Decrement Word in Memory	5.94
8 0	LDX	Load X	5.94
8 8	STX	Store X	5.94
9 0	MUL	Multiply	55.66
		(Minimum)	63.36
		(Average)	
		(Maximum)	70.40
9 8	DIV	Divide	83.60
		(Minimum)	
		(Maximum)	90.86
Variable Word Length			
A 0	ADA	Add to A	5.06
A 8	ADV	Add Variable	6.82
		(1 Byte)	6.38
		(2 Bytes)	9.46
		(3 Bytes)	9.02
		(4 Bytes)	5.50
B 0	SBA	Subtract from A	7.26
B 8	SBV	Subtract Variable	6.82
		(1 Byte)	9.90
		(2 Bytes)	9.46
		(3 Bytes)	4.84
		(4 Bytes)	4.84
C 0	CPA	Compare A	5.72
C 8	CPV	Compare Variable	7.48
		(1 Byte)	8.58
		(2 Bytes)	5.50
		(3 Bytes)	7.26
		(4 Bytes)	6.82
D 0	ANA	And A	9.90
D 8	ANV	And Variable	9.46
		(1 Byte)	5.50
		(2 Bytes)	6.82
		(3 Bytes)	9.90
		(4 Bytes)	9.46
E 0	LDA	Load A	5.50
E 8	LDV	Load Variable	7.26
		(1 Byte)	6.82
		(2 Bytes)	9.90
		(3 Bytes)	9.46
		(4 Bytes)	4.62
F 0	STA	Store A	3.74
F 8	STV	Store Variable	5.06
		(1 Byte)	8.80
		(2 Bytes)	10.12
		(3 Bytes)	
		(4 Bytes)	

## Addressing Modes

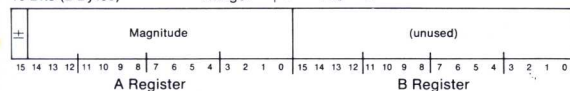
A 0	ADA	Direct Page 0	Add to A—Page 0	5.50
A 1	ADA	Direct Relative	Add to A—Relative	6.60
A 2	ADA*	Indirect Page 0	Add to A—Indirect Page 0	8.80
A 3	ADA*	Indirect Relative	Add to A—Indirect Relative	9.90
A 4	ADA—	Indexed	Add to A—Indexed	5.06
A 5	ADA+	Indexed with Bias	Add to A—Indexed With Bias	5.94
A 6	ADA/	Extended	Add to A—Extended Address	6.60
A 7	ADA=	Literal	Add to A—Literal	7.92
		Fixed Length		8.36
		Two Byte with A		7.92
		Variable		10.78
		Indirect Jumps		

## DATA FORMATS

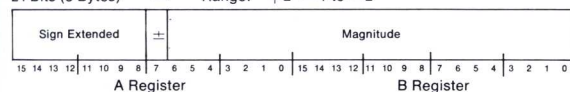
8 Bits (1 Byte) — Range:  $+2^{-1}$  to  $-2^{-7}$



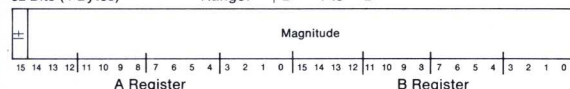
16 Bits (2 Bytes) — Range:  $+2^{15}$  to  $-2^{15}$



24 Bits (3 Bytes) — Range:  $+2^{23}$  to  $-2^{23}$



32 Bits (4 Bytes) — Range:  $+2^{31}$  to  $-2^{31}$



## SPECIFICATIONS

- **Clock Rate** 4.55 mHz (crystal controlled)
- **Core Memory** 1.1 microsec full-cycle. Modules of 4,096 bytes (8, or 9-bit) to maximum of 32,768 bytes.
- **Arithmetic** Multiprecision, parallel, binary, fixed point, two's complement.
- **Addressing** Eight modes including relative, index, indirect, and literal.
- **Input/Output** 8-bit parallel byte I/O bus for programmed and fully automatic concurrent transfers. Serial I/O interface for teletypes or similar devices. Direct Memory Access (DMA) channel with maximum transfer rate of 909,000 bytes per second.
- **Interrupts** A priority interrupt system allows internal interrupt on power failure, real-time clock, memory parity error, and external interrupts on the byte I/O bus. Up to 64 interrupts expandable in groups of 8.
- **Logic** TTL logic elements including MSI types, in DIP ceramic packages. DTL circuitry for I/O interfaces.
- **Registers** Six operational registers including A-accumulator, B-auxiliary accumulator, X-indexed, P-program counter, W-2-bit word length mode and O-1-bit overflow flag.
- **Instructions** 89 standard instructions including 17 control, 16 conditional jump, 12 shifts, 8 input/output, 16 register operate, 18 memory reference, 1 multiply, and 1 divide.
- **Cabinet** The processor, memory to 16K, I/O interfaces, power supply and fan are enclosed in a cabinet 8¾" high, 19" wide, and 23" deep. Fully expanded cabinet weighs 75 pounds.
- **Power** 115/230 vac, 50-60 Hz. 340 watts.
- **Environment** 0 - 50 C (32 - 122 F)
- **Panels** The *system control panel* displays all registers, manual command execution, and control switches. The *basic control panel* provides only the basic control switches.
- **Software** Cross assembler in Fortran IV, Two-Pass Assembler, Teletype Operating System, Tape Editor, CIP/2000 Simulator.

## AVAILABLE PERIPHERAL INTERFACES

- Teletype
- 300 LPS Paper Tape Reader
- DRPE Paper Tape Punch
- 400 CPM Card Reader
- 300 LPM Line Printer
- Tape Cassette
- CRT

4000 Series DRUPON  
NONV SOLA

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