

PERIPHERAL PROCESSOR

HIGH-SPEED • HIGH-ACCURACY

# Floating Point Processor

FOR DEC MODEL PDP-8/9 COMPUTERS\*



COMPUTING CORPORATION

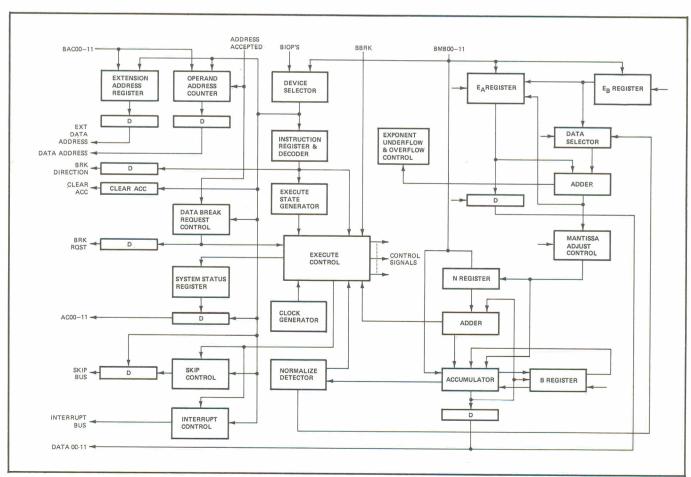
Manufacturers of Peripheral Processors for Increased Computer Efficiency



# GENERAL DESCRIPTION

The PP-1-8 peripheral processor is a high-speed floating-point arithmetic computing unit. It is adaptable to both the PDP-8 and PDP-9 family of computers via the direct memory access channel (DMA) and the I/O bus.

The PP-1-8's data path is either 12- or 18-bit binary, depending upon the DEC computer family (PDP-8 or PDP-9 respectively) to which it is connected. All necessary command logical intelligence is designed into the unit to fully communicate with the computer, to fetch operands from memory, and to execute the following floating-point instructions: LOAD, STORE, ADD, SUBTRACT, MULTIPLY, DIVIDE and FLOAT. The word format is 36 bits, comprised of 9 bits of exponent (including sign) and 27 bits of mantissa (including sign). The PP-1-8 affords a hitherto unrecognizable throughput for your "mini-system", previously attainable only on much larger, expensive computer systems.

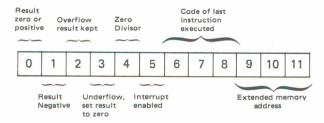


PP-1-8 BLOCK ORGANIZATION

### HARDWARE DESCRIPTION

Hardware implementation of the PP-1-8 logic is with the latest TTL medium-scale integrated circuit (MSI). Discrete component use is minimized (they are not used in the active/logic paths of the system). Only one power supply (+5V) is needed. There are no adjustments in the system. The I.C.'s are packaged on large printed circuit boards minimizing the need for manual interconnects. Contemporary manufacturing techniques are used in construction to assure a high degree of reliability with computer quality.

Interface to the PP-1-8 is via the programmed I/O and the single-cycle data break (DMA). A two channel DMA multiplexer with priority is included in the basic configuration permitting computer systems, with various peripherals, for example discs and MTU's, that have DATA BREAK implemented to plug-in directly without having to buy a DMA expander. NOTE: DATA BREAK IS REQUIRED! Extended memory addressing is provided. A 12-bit status register is provided in the basic configuration to hold the following status information, the command being executed, extended addressing, and interrupt enable. The register bit designation are as follows:



Sequentially the PP-1-8 decodes IOT 636X where X is Octal 1-7. Then command execution occurs followed by the generation of a busy signal, and argument fetch. The PP-1-8 accepts the 12-bit address that is located in the CPU's A register and returns it to CPU's DMA channel. The address then becomes the beginning address of the argument to be fetched from or returned to core memory. After completion of the IOT, the PP-1 will request a data break from the CPU. When the CPU acknowledges the break request, the PP-1-8 increments the beginning address by one and requests a second data break. Sequentially, when the CPU acknowledges the second break request, the PP-1-8 increments the address again by one and requests the third data break. When the CPU acknowledges the third request, the PP-1-8 executes the instruction and releases its BUSY signal. Before the PP-1-8 is reset or advanced to a not busy condition, all status information is updated on the current condition. In the Power-Up condition, all registers and status conditions are reset.

#### SOFTWARE

The PP-1-8 peripheral processor comes complete with its own floating-point software package to replace DEC-08-YO4B-PB. This package includes an interpreter that will allow direct execution of existing floating-point programs. The exception is for those floating-point programs that specifically use or rely upon the existing floating-point format. These formats will require reprogramming to the PP-1-8 format. The reprogramming will usually be simplified because of the existence of the status register in the PP-1-8. In addition, the functions furnished with the interpreter are in subroutine form. Thus, the functions may be extracted for separate use with direct programming applications. Using a parameter assignment in PAL III, the assembly language coding becomes: TAD ADDR; OPERATION. Diagnostic programs are provided to aid preventive and corrective maintenance.

The PP-1-8 instruction decoding is given below. BMB 9, 10 and 11 are used to decode the instruction to the PP-1-8.

OP CODE	DEVICE ADDRESS	BMB 9, 10, 11
6	37	0 Not Applicable
		1 Add
		2 Subtract
		3 Load
		4 Store
		5 Multiply
		6 Divide
		7 Float
6	36	1 Skip if not busy
		2 Read status
		register and
		skip if error
		4 Load extended
		address and enable
		program interrupt
6	35	1 skip if zero
		2 skip if negative
		4 clear accumulator

#### APPLICATION FOR INCREASED THROUGHPUT

- Time Sharing
- Fast Fourier Transforms
- Statistical Analysis
- Floating-Point Arithmetic Operations
- Data Reduction
- Simulation
- Graphic Systems
- Stand Alone Computing
- Matrix Inversion

#### **SPECIFICATIONS**

INTERFACE: Logic Levels: Positive True DTL/TTL/DEC Compatible

Logical "0": 0 to 0.8 V input; 0 to 0.4 V output Logical "1": 2 to 5 V input; 2.4 to 5 V output

(Negative true interface option available)

ELECTRICAL: Power 95-130 Vac, 47-400 Hz, 1\$\phi\$, less than 300 watts

Power Cord: 8-foot long - 3-wire grounding connector

CHASSIS: 1. Blank front panel with on-off lighted switch

2. Fans for self cooling

3. 8¾" Height, Retma Rack Mounted, Depth less than 24 inches

including cable extension

ENVIRONMENTAL: Operating temperature: 0 to +55°C Storage temperature: -62 to +85°C

Relative Humidity: 10-90% without condensation

INPUT/OUTPUT CABLES: PDP-8 plug-compatible, paddleboard terminated, 5-foot long

cables are supplied for both the computer and a second peripherai. When ordering a PP-1-8, the user can specify one of three PDP-8 interface systems:

PDP-8/L, PDP-8/I positive bus, and PDP-8/I, negative bus

WEIGHT: Unit: 45 pounds maximum with all options

Shipping: 75 pounds, maximum

## APPLICATIONS ENGINEERING:

Available for consultation and quotation on special interfaces and custom features. Systems analysis and programming services made available on a time basis.

Other PERIPHERAL PROCESSORS by L-S Computing Corporation:

PP-1-DEC 11 for DEC PDP-11 PP-1-9 for DEC PDP-9 PP-1-15 for DEC PDP-15

For information on Peripheral Processors for other popular minicomputers, contact the factory.



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