

## M159

# 4-Bit Arithmetic Logic Unit

The M159 4-Bit Arithmetic Logic Unit (ALU) module contains a single DEC74181 integrated circuit. Nine of these ALU modules are used in the FP15 Floating-Point Processor to perform 36-bit arithmetic and logic operations, as shown on D-BS-FP15-0-19 through -28 of the FP15 drawings.

The integrated circuit is capable of performing 16 4-bit arithmetic operations when the MODE control and CN inputs are low and 16 logic functions when the MODE control input is high. The functions are selected by applying combinations of function select inputs S0 through S3. For FP15 applications, the function select and MODE control inputs are generated by the adder control logic shown on D-BS-FP15-0-33 of the FP15 drawings.

Only two arithmetic operations, A plus B and A minus B minus 1, are selected. Five logic functions, A, -A, B, -B, and logical 0, are performed. The combined ALU truth table for FP15 arithmetic operations and logic functions is listed as follows:

MODE Control	Function Select Inputs				Output Function
	S3	S2	S1	S0	
0	1	0	0	1	A plus B (arithmetic operation)
0	0	1	1	0	A minus B minus 1 (arithmetic operation)
0	0	0	0	0	A (logic function)
1	0	0	0	0	-A (logic function)
1	1	0	1	0	B (logic function)
1	0	1	0	1	-B (logic function)
1	0	0	1	1	Logical 0 (logic function)

In addition, a comparator output, A=B, is provided when the four A inputs are equal to the four B inputs. A full carry look ahead capability is provided for fast, simultaneous carry generation.

- INPUTS:** Each input presents 1 unit load.
- OUTPUTS:** All outputs are capable of driving 10 unit loads.
- POWER:**