

SYSTEM FUNCTIONS

- EX A Expunge or erase object(s) named by A, except labels or pendant functions. (A is an array of any rank.)
 OFF Terminate current session
 WC Clear entire contents of workspace

Units equipped with the Omniport* option also include:

- IN N Accept input from peripheral device number N (1 to 199)
 OUT N Direct output to peripheral device number N (1 to 199)

SYSTEM VARIABLES

- CT Comparison tolerance: for the functions < = > * [L
1 QWS 1 - FN Function names: An N by 4 matrix whose rows contain the names of functions currently in the workspace
Index origin: 0 or 1
 LO Line counter: line numbers of functions in execution innermost first
 LC Print precision: 2 to 16 significant digits
 PP Print time: display latency measured in tenths of a second
- PT Print width: 32 to 140 characters on the MCM/70 dependent on the output device
 RW Random link: seed for generating random numbers
2 QWS 2 - SI State indicator: N by 4 matrix whose rows contain the names of functions in execution—innermost first
1 QWS 10 - VA Variable names: N by 4 matrix whose rows contain the names of global variables, plus local variables and labels of executing functions
 WA Workspace available

TAPE RELATED FUNCTIONS

General

- (10) XI N Initialize or re-initialize tape (N is 0 or 1)
 XN 10 List group numbers on tape
 XN N List names of contents of group N
 XP 10 Close tape

EASY

- N XD A Delete object(s) named in array A from group N
N XR A Read object(s) named in array A from group N
N XW A Write object(s) named in array A in group N

AVS

- XA A Append the object name(s) contained in array A to the directory of group 0
N XC A Append the object name(s) contained in array A to the directory of group N (1 to 255)
 XS N Activate AVS, group 0 and group N
 XV indicate if AVS, and which group, is active

ERROR MESSAGES

- DOMAIN ERROR Function not defined for given values of the arguments
INDEX ERROR Indexing a non-existing dimension of an array
LENGTH ERROR Operation asked to be performed on arrays with nonconformable coordinate lengths
RANGE ERROR The result of the function performed cannot be represented
RANK ERROR Nonconforming or inappropriate array structure
SYNTAX ERROR Missing argument
Unbalanced parentheses
Two juxtaposed variables with no operator
Uneven number of quotation marks
Cannot access the tape cassette
Reference to an undefined variable
Instructions required more workspace than is available
- TAPE ERROR
VALUE ERROR
WS FULL

APPLIED BUSINESS SYSTEMS

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PRIMITIVE FUNCTIONS

SCALARS

Monadic

+Y	Y
-Y	0-Y
*Y	Signum Y
:Y	Reciprocal of Y
*Y	e to the Yth power
⌈Y	Ceiling of Y
⌊Y	Floor of Y
Y	Absolute value of Y
⊙Y	Natural logarithm of Y
!Y	Factorial Y
⊙Y	Pi times Y
YY	A random number from 1 to Y
~Y	Not Y

Dyadic

X+Y	X plus Y
X-Y	X minus Y
X*Y	X times Y
X/Y	X divided by Y
X^Y	X to the Yth power
X∩Y	Maximum of X and Y
X∪Y	Minimum of X and Y
X-Y	X-residual of Y
X⊙Y	Base-X logarithm of Y
X!Y	Binomial coefficient: Y items taken X at a time
X⊙Y	See trigonometric functions
X<Y	X less than Y
X≤Y	X less than or equal to Y
X=Y	X equal to Y
X≥Y	X greater than or equal to Y
X>Y	X greater than Y
X≠Y	X not equal to Y
X∨Y	X or Y
X∧Y	X and Y
X∨Y	Neither X nor Y
X∧Y	Not both X and Y (X nand Y)

TRIGONOMETRIC FUNCTIONS

Y is in radians

1⊙Y	Sine Y	-1⊙Y	Arcsin Y
2⊙Y	Cosine Y	-2⊙Y	Arccos Y
3⊙Y	Tangent Y	-3⊙Y	Arctan Y
4⊙Y	(1+Y*2)*.5	-4⊙Y	(-1+Y*2)*.5
5⊙Y	Sinh Y	-5⊙Y	Arcsinh Y
6⊙Y	Cosh Y	-6⊙Y	Arccosh Y
7⊙Y	Tanh Y	-7⊙Y	Arctanh Y

0⊙Y (1-Y*2)*.5

MIXED

⊙Y	Dimension of Y
X⊙Y	Reshape Y to have dimension(s) X
X!Y	First Y consecutive integers from origin (0 or 1)
X!Y	First location(s) of Y within vector X
X!Y]	Yth element(s) of X
X∈Y	Membership of X in Y
X∩Y	Representation of Y in number system X
X∪Y	Value of the representation Y in number system X
X?Y	X integers selected randomly without replacement from origin to Y
⊙[N]Y	Reversal along the Nth dimension of Y
⊙Y	Reversal along the first dimension of Y
X⊙[N]Y	Rotation by X along the Nth dimension of Y
X⊙Y	Rotation by X along the first dimension of Y
⊙Y	Transpose Y
X⊙Y	Transpose Y according to X
-Y	Revel Y (make Y a vector)
X.[N]Y	Catenate Y to the Nth dimension of X
X.Y	Catenate Y to the first dimension of X
X+Y	Take first or last X elements of Y as X is + or -
X-Y	Drop first or last X elements of Y as X is + or -
ΔY	Indices of values of the vector Y sorted in ascending sequence
∇Y	Indices of values of the vector Y sorted in descending sequence
⊙Y	Evaluate the literal vector Y as an APL statement
X⊙Y	Ignore Y; result is X
X.Y	Format numeric array Y according to X

GENERALIZED SCALAR DYADIC

In the entries below, the symbol ⊙ (not an APL symbol) represents any scalar dyadic function.

X⊙.⊙Y	Generalized inner product of X and Y
X⊙.⊙Y	Generalized outer product of X and Y
⊙/Y	Generalized reduction along the last dimension of Y
⊙/[N]Y	Generalized reduction along the Nth dimension of Y
⊙/Y	Generalized reduction along the first dimension of Y
⊙∩Y	Generalized scan along the last dimension of Y
⊙∩[N]Y	Generalized scan along the Nth dimension of Y
⊙∩Y	Generalized scan along the first dimension of Y

COMPRESSION AND EXPANSION

X/Y	(logical) compression along the last dimension of Y
X/[N]Y	(logical) compression along the Nth dimension of Y
XfY	(logical) compression along the first dimension of Y
X∧Y	(logical) expansion along the last dimension of Y
X∧[N]Y	(logical) expansion along the Nth dimension of Y
X∧Y	(logical) expansion along the first dimension of Y

SYMBOLS

()	Parentheses for nesting
⌈	Branch
←	Assign data to a variable
⊙	Quad for input and output
⌈	Quote-quad for literal input
⌈	Quote for literal data
⌈	Comment indicator
⌈	Del for mode change
-	Negative sign
E	Exponential notation
.	Period or decimal point
:	Label separator
:	Output and index separator
\$	Dollar sign
⌈	Underline
⌈	Cursor
⌈	Computer response indicator
⌈	Length of displayed line exceeds screen width
⌈	Additional rows of array being displayed await viewing

SPECIAL KEYS

START	Begin session
CTRL and --	Return control to user as soon as evaluation of current line is complete
CTRL and →	Return control to user immediately
RETURN	Return control to computer
CTRL-SPACE	Insert space(s) within displayed statement
CTRL-BKSP	Remove character(s) from displayed statement
SPACE	Retain displayed object(s) on screen until RETURN key is pressed (valid only when DPT is not set to infinity)

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