

# Control Program Block Definitions

5-3-03

Original file = enet\_mon\_cont\_block1.ex.doc

## DWELL BLOCK STRUCTURE

.001 D{a} { \_test input}{ \_set output}

e.g. .002 D100 #Dwell for 100 ms

### DWELL TIME

{a} = V0 ... V511 ----->Variable.

constant ----->Dwell time in mS.

## POSITION CONTROL BLOCK STRUCTURE

.001 LAab{Fc} { \_test input}{ \_set output}

### AXIS NUMBER

a = A1 or A2. Axes A3 and A4 may be supported in the future.

### POSITION TO MOVE TO

b = V0 ... V511 ----->Variable

constant -----> Position to move to in X4 counts.

### VELOCITY

{c} = V0 ... V511 ----->Variable

constant -----> Velocity setting in X1 pulses / sec.

## VELOCITY CONTROL BLOCK STRUCTURE

.001 VAab{ACc}{Pd} { \_test input}{ \_set output}

### AXIS NUMBER

a = 1 or 2. Possible future expansion to axes 3 and 4.

### VELOCITY SETTING

b = V0 ... V511 -----> Variable.

constant -----> Closed loop velocity setting in X1 pulses/sec. 32 bit word. The low 16 bits contain the setting. The acceptable range is +/-10000. A setting of 32767 (0x7FFF) indicates skip entire block. Bits 16 – 29 are reserved for expansion. Bit 31 indicates open loop percentage. If set, the setting value (low 16 bits) is a percentage of valve opening X 100 with the range being 0 - 10000. Bit 30 indicates this is a vacuum wait step.

### ACCELERATION COMMAND (Optional, if absent max. acceleration is assumed)

{c} = V0 ... V511 -----> Variable.

constant -----> Accel. or decel. Distance in X1 counts. 32 bit value. The low 16 bits contain the setting. The acceptable range is 0 – 65,535. Bits 16 –

30 are reserved for expansion. Bit 31 is the "Goose" bit. If set, the setting value (low 16 bits) is DAC voltage X 1000 which is equal to percentage of valve opening X 100 with the range being 0 - 10000. The valve is immediately opened to that percentage and then control is passed on the velocity setting.

END POSITION COMMAND (Optional, if absent movement will continue until stop)

{d} = V0 ... V511 -----> Variable.

constant -----> Position in X4 counts. Range is +8388607 to -8388608.

## JUMP BLOCK STRUCTURE

.001 {-}Ja.{+/-}b {\_test input}{\_set output}

RELATIVE INDICATOR

{-} = Relative jump, omit for absolute jump.

JUMP TYPE

a = Jump type, 0 == Normal, 1 == Subroutine, 2 == Return from subroutine.

RELATIVE JUMP DIRECTION INDICATOR

{+/-} = Omit sign for absolute jumps. If relative jump, + == forward jump,  
- == backward jump.

b = V0 ... V511 -----> Variable.

constant -----> If absolute jump, block to jump to. If relative jump, number of blocks  
to jump to, either forward or backward

\$ -----> Jump to current block, type normal, rel or abs only.

## UPDATE BLOCK STRUCTURE

.001 Ua{ACxxxx}=b{c}{d} {\_test input}{\_set output}

e.g. .001 UV501=V500&H00000001

ITEM TO UPDATE

a = V0 ... V511 ----->Variable

A1 ... A2 -----> Axis #1 or axis #2. Axes #3 and #4 may be supported in the future.

C -----> Execute command

D1 ... D4 -----> DAC output voltage X 1000 == percentage of valve opening X 100 ==  
range is +10000 to -10000 (+/- 10V, +/- 100%). Anything over  
10000 will cause the entire block to be skipped.

AC -----> DAC1...DAC4 acceleration in mV/uS. US saved in vtg.v[393]. Only  
used a DAC1...DAC4 update. If absent or zero DAC will be  
updated immediately. Can also specify a variable – (ACV87) – for  
example.

FIRST OPERAND

b = V0 ... V511 ----->Variable

D1 ... D4 -----> DAC output voltage X 1000 == percentage of valve opening X 100 ==  
range is +10000 to -10000 (+/- 10V, +/- 100%)  
N1 ... N20 -----> Analog input voltage X 1000.  
P -----> Position in X4 counts. Range is +8388607 to -8388608  
F -----> Velocity in X1 pulses/sec, with a range of 0 – 16383. Bit 15  
reserved for sign.  
constant -----> Direct integer, 32 bit value.

#### OPERATOR (Optional)

{c} = + -----> Addition operator  
- -----> Subtraction operator  
\* -----> Multiplication operator  
/ -----> Division operator  
& -----> AND operator  
| -----> OR operator  
^ -----> XOR operator

#### SECOND OPERAND (Optional, must include if an operator is used)

{d} = V0 ... V511 -----> Variable  
constant -----> Direct integer, 32 bit value.

#### {\_test input} CONDITIONAL EXECUTION (Optional).

Basic form = {I or W}{1 or 0}.{input#}

{I or W} = I -----> IF  
W -----> WHILE

{1 or 0} = 1 -----> Input ON  
0 -----> Input OFF

{input#} = V0 ... V511 -----> Variable, if the value the variable points to is zero, conditional  
execution is bypassed.  
constant -----> Input number to test.

Advanced form = {\_I or W}{a}{b}{c}

#### FIRST OPERAND

{a} = V0 ... V511 -----> Variable  
D1 ... D4 -----> DAC output voltage X 1000 == percentage of valve opening X 100 ==  
range is +10000 to -10000 (+/- 10V, +/- 100%)  
A1 ... A4 -----> Position in X4 counts. Range is +8388607 to -8388608  
F1 ... F4 -----> Velocity in X1 pulses/sec, with a range of 0 – 16383. Bit 31  
reserved for sign.  
N1 ... N20 -----> Analog input voltage in volts X 1000.

#### OPERATOR

{b} = > -----> Greater than  
>= -----> Greater than or equal to

< -----> Less than  
<= -----> Less than or equal to  
= -----> Equal to  
!= -----> Not equal to

## SECOND OPERAND

{c} = V0 ... V511 ----->Variable  
constant -----> Direct integer, 32 bit value.

**{\_set output}** SET DIGITAL I/O LINES (Optional).

$$\{B \text{ or } d \text{ or } E\}\{1 \text{ or } 0\}.\{\text{output}\# \}$$

{B or d or E} =

- B -----> At the beginning of the block
- D -----> During the block
- E -----> At the end of the block

$\{1 \text{ or } 0\} =$

1	----->	Turn on
0	----->	Turn off

{output#} = V0 ... V511 -----> Variable, if value the variable points to is zero, setting outputs is disabled.  
constant -----> Output number to control.

Braces indicate optional items.

Use a hash “#” symbol to delimit comments.

Numbers can be optionally expressed as hex. Prefix a hex number with an “h”, for example hffc2.

**Revisions:**

11-21-02: Original document.

12-3-02: Changed velocity control block specification.

Delimited conditional / set output with an underscore character. For example:  
UV123=34\_I1.22\_B1.1

Modified velocity block syntax to include an “A” before the axis number specifier, VA1546...

1-21-03

1, Changed V330 timeout period from seconds to milliseconds

5-2-03

- 1, Changed conditional check items
- 2, Changed dwell time from uS to mS.
- 3, Made bit 30 in the velocity block velocity specification indicate a vacuum wait step.
- 4, Added jump to \$ (current block).

6-30-03

- 1, Eliminated the variable descriptions from this doc. The are defined in the Ethernet board command spec.