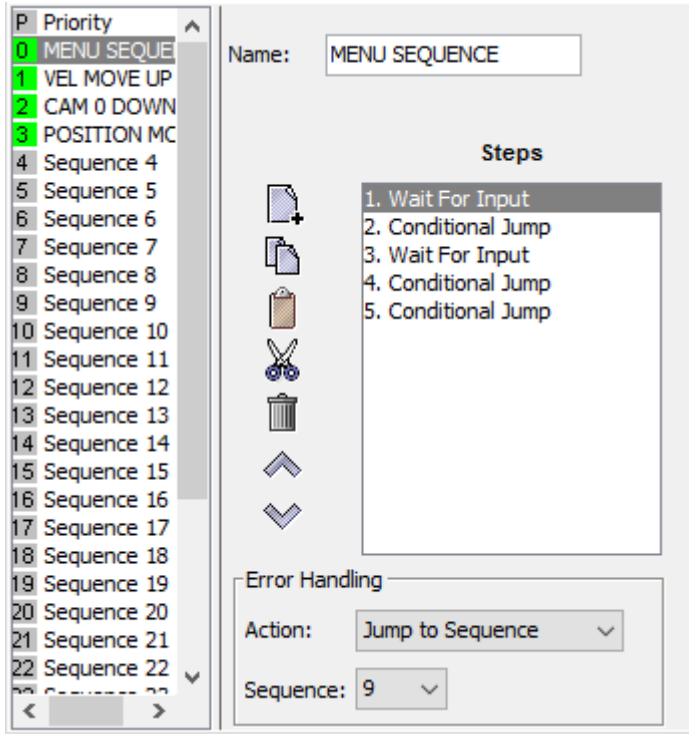


# Servo Components and systems App Note.

Introduction.

The purpose of this example is to demonstrate how to use the CME2 indexing functions to provide a method switching between CAM mode and Velocity or Position moves.

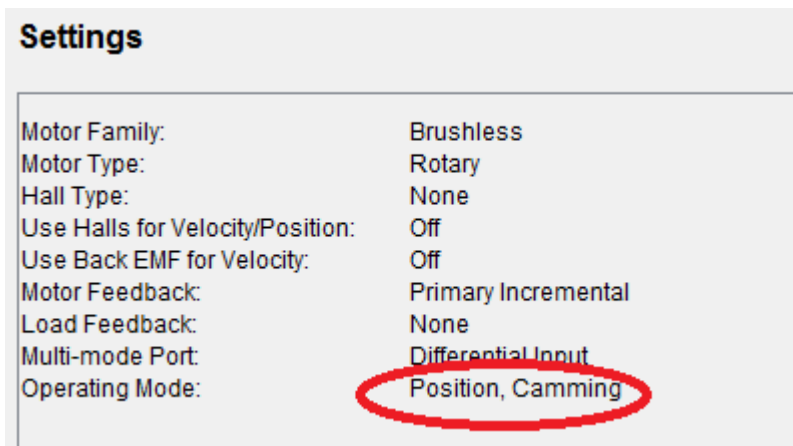
A menu program selects which program to run.



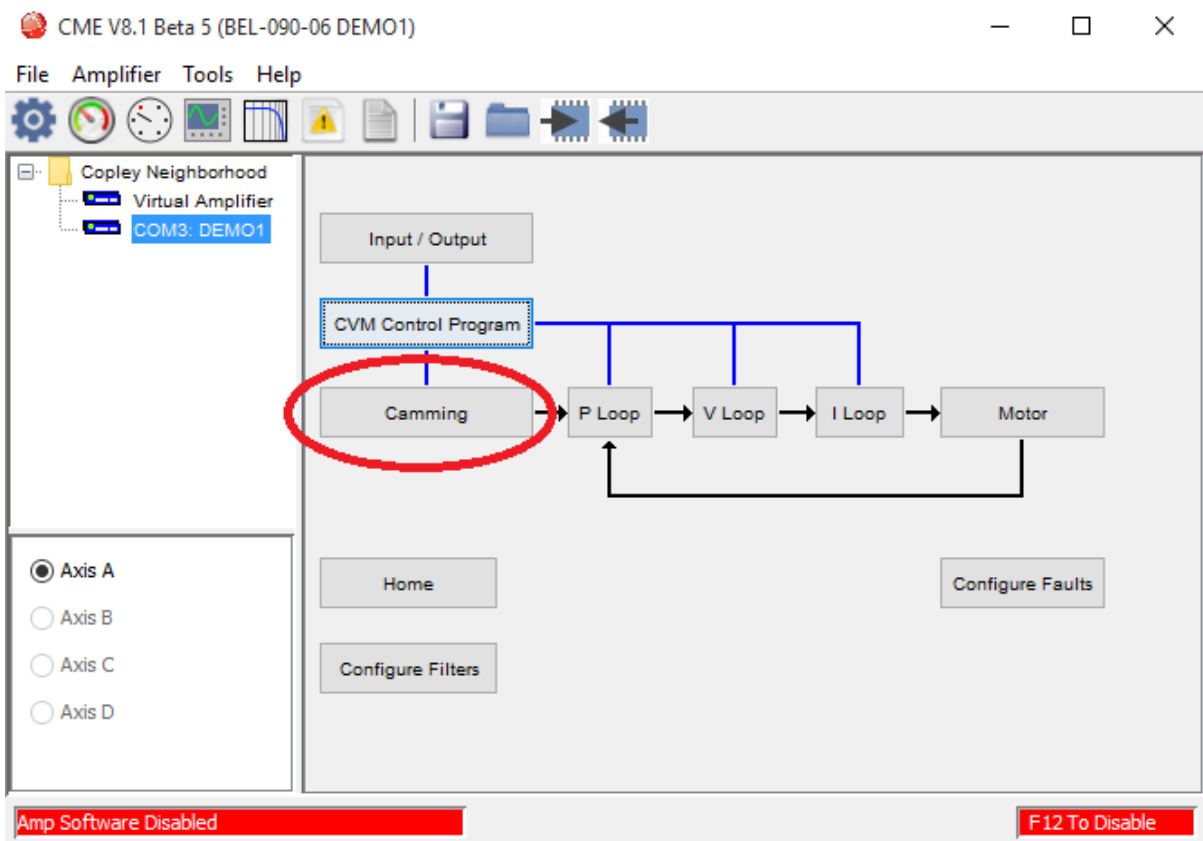
Here the menu sequence looks at inputs 2 and 3, and selects CAM 0 DOWN, or POSITION MOVE.

The system should be homed prior to running this sequence, and a CAM Profile previously generated, and saved in CAM 0 table as shown below. The data in this Table is for an example only, and notes on Camming should be read prior to attempting this. The motor should also be phase and tuned. See CME 2 manual.

The drive should be set in CAMMING mode to provide access to the CAM tables



# Servo Components and systems App Note.



Define a CAM0 table....

Camming

File Edit

Config Tables

Cam Tables

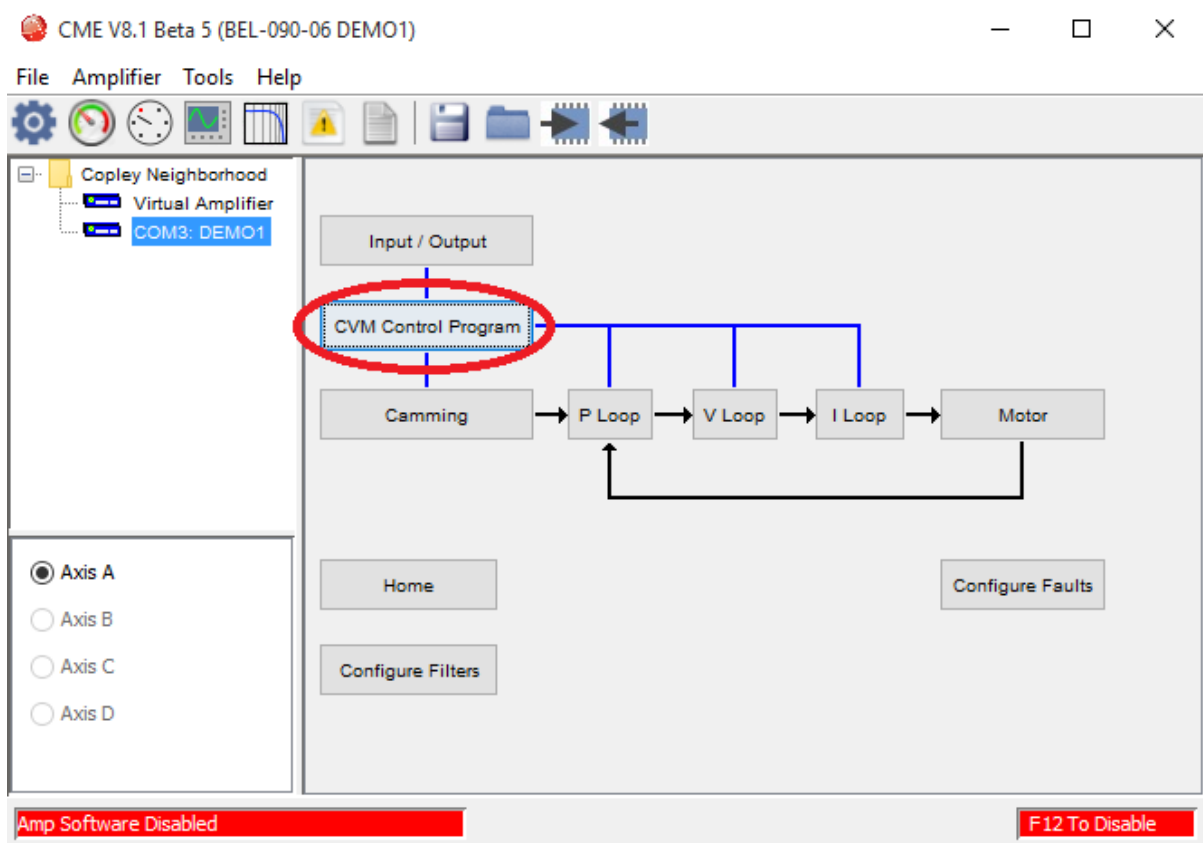
	Master Position	Slave Position
0	50	0
1	100	10000
2	200	20000
3	300	30000
4	400	40000
5	500	50000
6	600	55000
7	700	60000
8	800	65000
9	900	70000

CVM memory usage: 1%

Close

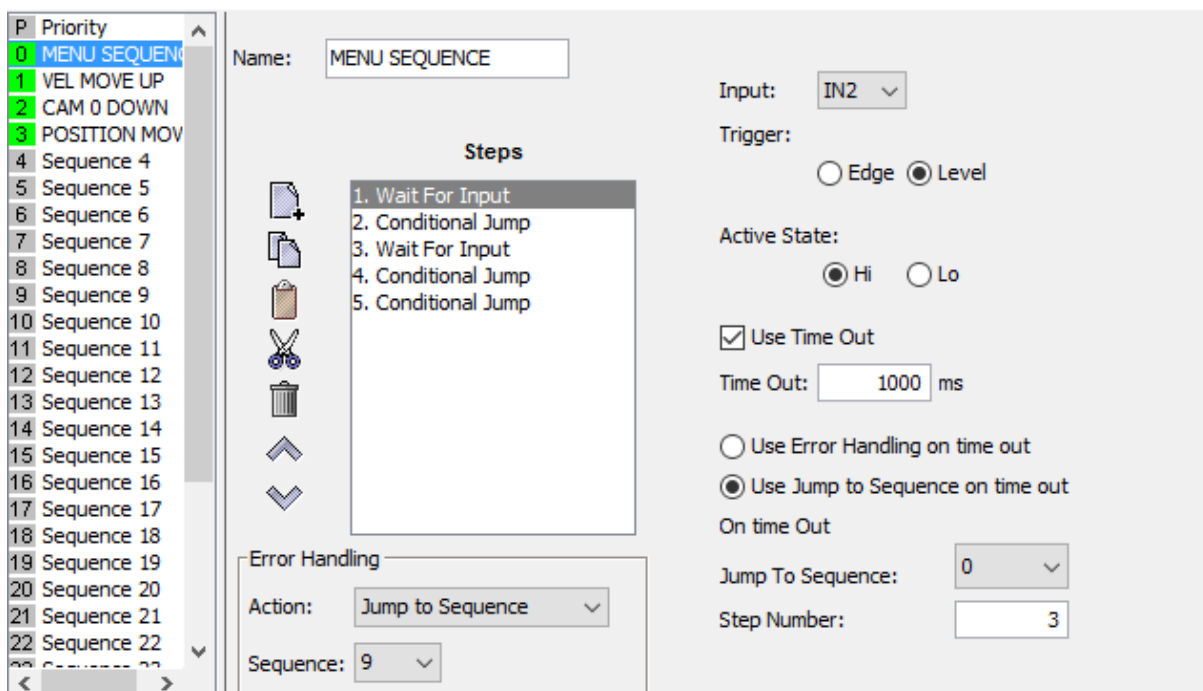
Now enter the sequences in the CVM section...

# Servo Components and systems App Note.



So the menu program in detail..

Step 1 – Wait for input 2:- If timeout got to Step 3. This is a kind of “IF GOTO”.



If Input 2 on the call sequence 2 – run CAM 0 routine..

## Servo Components and systems App Note.

The screenshot shows the 'MENU SEQUENCE' configuration in the Copley environment. The sequence steps are:

1. Wait For Input
2. Conditional Jump
3. Wait For Input
4. Conditional Jump
5. Conditional Jump

The 'Error Handling' section is configured with:

- Action: Jump to Sequence
- Sequence: 9

The 'If' condition is set to:

- Value 1: 1
- Operator: >
- Value 2: 0

The 'Then Jump to Sequence' is set to 2, and the 'Step Number' is 1.

If Wait for Input 2 times out we jump her, to look at input 3. If this times out we loop....

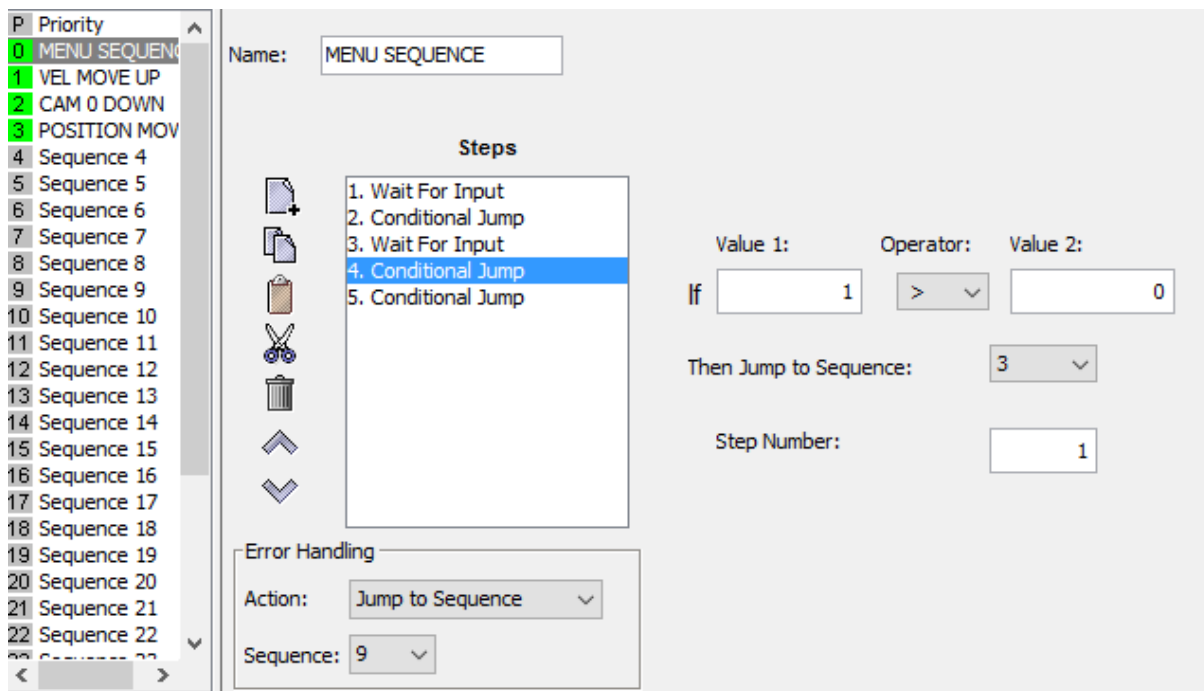
The screenshot shows the configuration for the 'Wait For Input' step in the 'MENU SEQUENCE'. The configuration is as follows:

- Input: IN3
- Trigger:  Edge  Level
- Active State:  Hi  Lo
- Use Time Out
- Time Out: 1000 ms
- Use Error Handling on time out
- Use Jump to Sequence on time out
- On time Out
- Jump To Sequence: 0
- Step Number: 5

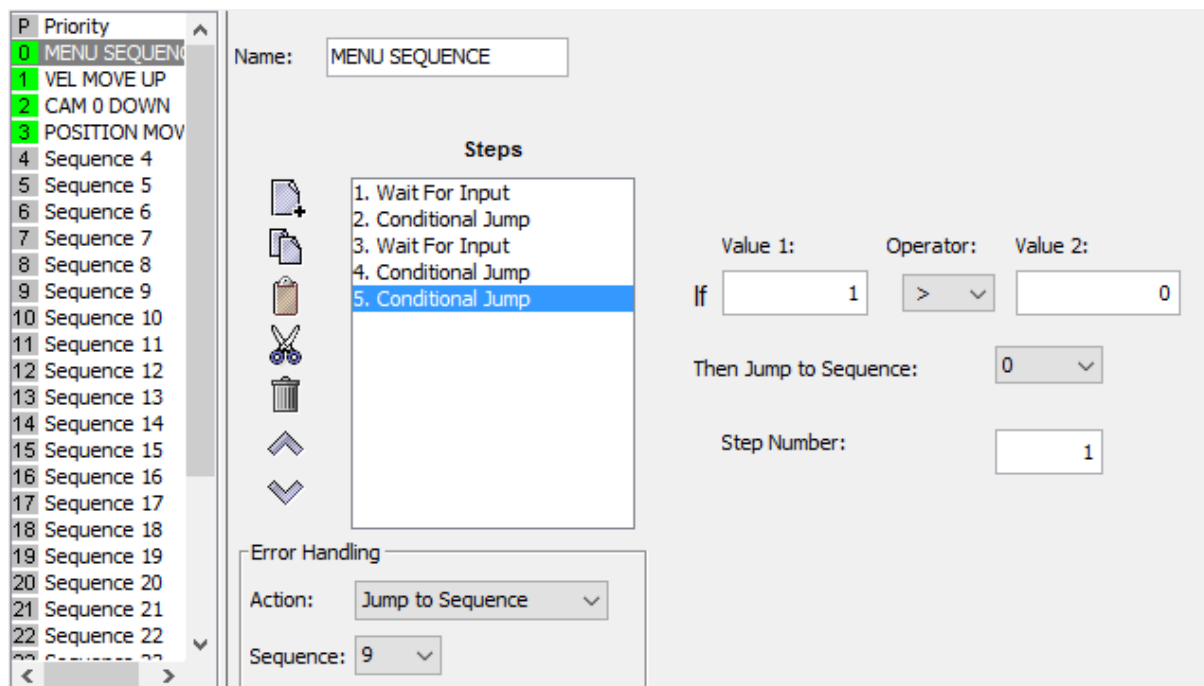
The 'Error Handling' section is configured with:

- Action: Jump to Sequence
- Sequence: 9

## Servo Components and systems App Note.



The conditional jumps are made to work like GOTO's!



Sequences 1, 2 and 3 are examples, Sequence 1 is not linked in on this example, but is an example of linked Velocity times moves which could be used in place of a CAM.

Sequence 2 call CAM 0 which move the motor in a position direction (Depending upon the setup)

Sequence 3 Moves the motor back to 0 using a single Absolute MOV instruction.

# Servo Components and systems App Note.

Sequence 2:-

The screenshot shows the configuration interface for a sequence named "CAM 0 DOWN". On the left, a list of sequences is shown with "CAM 0 DOWN" selected. The main area displays the sequence steps: 1. Set Output, 2. Set Output, 3. Camming, 4. Wait For Position, 5. Wait For Delay Time, 6. Velocity Move Position Mode, 7. Set Output, 8. Set Output, 9. Wait For Input, and 10. Conditional Jump. The "Error Handling" section is set to "Jump to Sequence" with "Sequence" 3. On the right, the "Output" is set to 2, "Active" is set to "On", and "State" is set to "On".

This screenshot shows the same configuration interface for "CAM 0 DOWN". In this view, step 2 "Set Output" is highlighted in blue. The "Error Handling" section remains the same. On the right, the "Output" is now set to 3, "Active" is set to "Off", and "State" is set to "Off".

# Servo Components and systems App Note.

The screenshot shows the configuration for step 3, 'Camming', in the 'CAM 0 DOWN' sequence. The left sidebar lists sequences from 0 to 22, with sequence 3 highlighted. The main panel displays the following settings:

- Name: CAM 0 DOWN
- Steps:
  1. Set Output
  2. Set Output
  3. Camming
  4. Wait For Position
  5. Wait For Delay Time
  6. Velocity Move Position Mode
  7. Set Output
  8. Set Output
  9. Wait For Input
  10. Conditional Jump
- Error Handling:
  - Action: Jump to Sequence
  - Sequence: 3
- Master Input:
  - External
  - Internal: 1000 counts/s
- Trigger Type:
  - None (Continuous)
  - Use Master (Secondary) Encoder Index
  - Use Input: IN2
  - Edge  Level
- Offset:
  - Forward: 0 counts
  - Reverse: 0 counts
- Active Cam Table: CAM 0

The screenshot shows the configuration for step 4, 'Wait For Position', in the 'CAM 0 DOWN' sequence. The left sidebar lists sequences from 0 to 22, with sequence 4 highlighted. The main panel displays the following settings:

- Name: CAM 0 DOWN
- Steps:
  1. Set Output
  2. Set Output
  3. Camming
  4. Wait For Position
  5. Wait For Delay Time
  6. Velocity Move Position Mode
  7. Set Output
  8. Set Output
  9. Wait For Input
  10. Conditional Jump
- Error Handling:
  - Action: Jump to Sequence
  - Sequence: 3
- Positioning:
  - Actual Position
  - Limited Position
  - Position:  $\geq$  67000 counts
  - Issue Trajectory Update
  - Use Time Out
  - Time Out: 250 ms
  - On time out:
    - Jump To Sequence: 0
    - Step Number: 1

## Servo Components and systems App Note.

The screenshot shows the 'CAM 0 DOWN' sequence configuration. The left sidebar lists sequences from 1 to 22, with 'CAM 0 DOWN' selected. The main area displays the sequence name, a list of 10 steps, and an 'Error Handling' section. Step 5, 'Wait For Delay Time', is selected, and its 'Delay Time' is set to 250 ms.

Name: CAM 0 DOWN

Steps

1. Set Output
2. Set Output
3. Camming
4. Wait For Position
5. Wait For Delay Time
6. Velocity Move Position Mode
7. Set Output
8. Set Output
9. Wait For Input
10. Conditional Jump

Delay Time: 250 ms

Error Handling

Action: Jump to Sequence

Sequence: 3

The screenshot shows the 'CAM 0 DOWN' sequence configuration with velocity and acceleration parameters. The left sidebar lists sequences from 1 to 22, with 'CAM 0 DOWN' selected. The main area displays the sequence name, a list of 10 steps, and an 'Error Handling' section. Step 6, 'Velocity Move Position Mode', is selected, and its parameters are set: Velocity: 0 rpm, Acceleration: 333 rps<sup>2</sup>, and Deceleration: 333 rps<sup>2</sup>. The 'Direction of Motion' is set to Positive, and the 'Wait for at velocity' checkbox is checked.

Name: CAM 0 DOWN

Steps

1. Set Output
2. Set Output
3. Camming
4. Wait For Position
5. Wait For Delay Time
6. Velocity Move Position Mode
7. Set Output
8. Set Output
9. Wait For Input
10. Conditional Jump

Velocity: 0 rpm

Acceleration: 333 rps<sup>2</sup>

Deceleration: 333 rps<sup>2</sup>

Direction of Motion:

Positive  Negative

Wait for at velocity

Error Handling

Action: Jump to Sequence

Sequence: 3



# Servo Components and systems App Note.

This screenshot shows the Copley environment interface. On the left, a vertical list of sequences is visible, with 'CAM 0 DOWN' selected. The main area displays the 'Steps' list for 'CAM 0 DOWN', with step 7, 'Set Output', highlighted. The 'Error Handling' section shows the action set to 'Jump to Sequence' and the target sequence set to '3'. On the right, the 'Output' is set to '3', and both 'Active' and 'State' are set to 'Off'.

This screenshot shows the Copley environment interface. On the left, a vertical list of sequences is visible, with 'CAM 0 DOWN' selected. The main area displays the 'Steps' list for 'CAM 0 DOWN', with step 8, 'Set Output', highlighted. The 'Error Handling' section shows the action set to 'Jump to Sequence' and the target sequence set to '3'. On the right, the 'Output' is set to '2', and both 'Active' and 'State' are set to 'Off'.

# Servo Components and systems App Note.

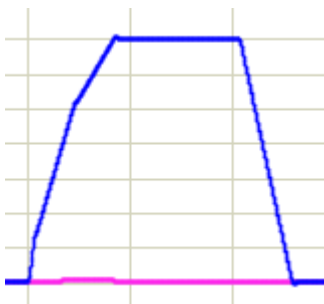
The screenshot shows the configuration interface for a sequence named "CAM 0 DOWN". On the left, a priority list shows steps 0 through 22, with steps 0-3 highlighted in green. The main area displays the sequence steps: 1. Set Output, 2. Set Output, 3. Camming, 4. Wait For Position, 5. Wait For Delay Time, 6. Velocity Move Position Mode, 7. Set Output, 8. Set Output, 9. Wait For Input (highlighted in blue), and 10. Conditional Jump. The "Error Handling" section is set to "Action: Jump to Sequence" and "Sequence: 3". On the right, the "Input" is set to "IN2", the "Trigger" is set to "Level", and the "Active State" is set to "Lo". The "Time Out" is set to 1000 ms, and "Use Error Handling on time out" is selected. The "Jump To Sequence" is set to 0 and the "Step Number" is set to 1.

The screenshot shows the configuration interface for a sequence named "CAM 0 DOWN". On the left, a priority list shows steps 0 through 22, with steps 0-3 highlighted in green. The main area displays the sequence steps: 1. Set Output, 2. Set Output, 3. Camming, 4. Wait For Position, 5. Wait For Delay Time, 6. Velocity Move Position Mode, 7. Set Output, 8. Set Output, 9. Wait For Input, and 10. Conditional Jump (highlighted in blue). The "Error Handling" section is set to "Action: Jump to Sequence" and "Sequence: 3". On the right, the "Value 1" is set to 1, the "Operator" is set to ">", and the "Value 2" is set to 0. The "Then Jump to Sequence" is set to 0 and the "Step Number" is set to 1.

# Servo Components and systems App Note.

The screenshot shows the 'POSITION MOVE' configuration window. On the left, a sequence list has '3 POSITION MOVE' selected. The main window has the following settings:

- Name: POSITION MOVE
- Steps: 1. Move, 2. Conditional Jump
- Move:  Absolute,  Relative
- Type:  Trap,  S Curve
- Position: 0 counts
- Velocity: 1000 rpm
- Accel: 333 rps<sup>2</sup>
- Decel: 333 rps<sup>2</sup>
- Do not issue Trajectory Update
- Wait Move Done
- Use Time Out Time Out: 1000 ms
- Error Handling: Action: Abort Sequence, Sequence: [dropdown]



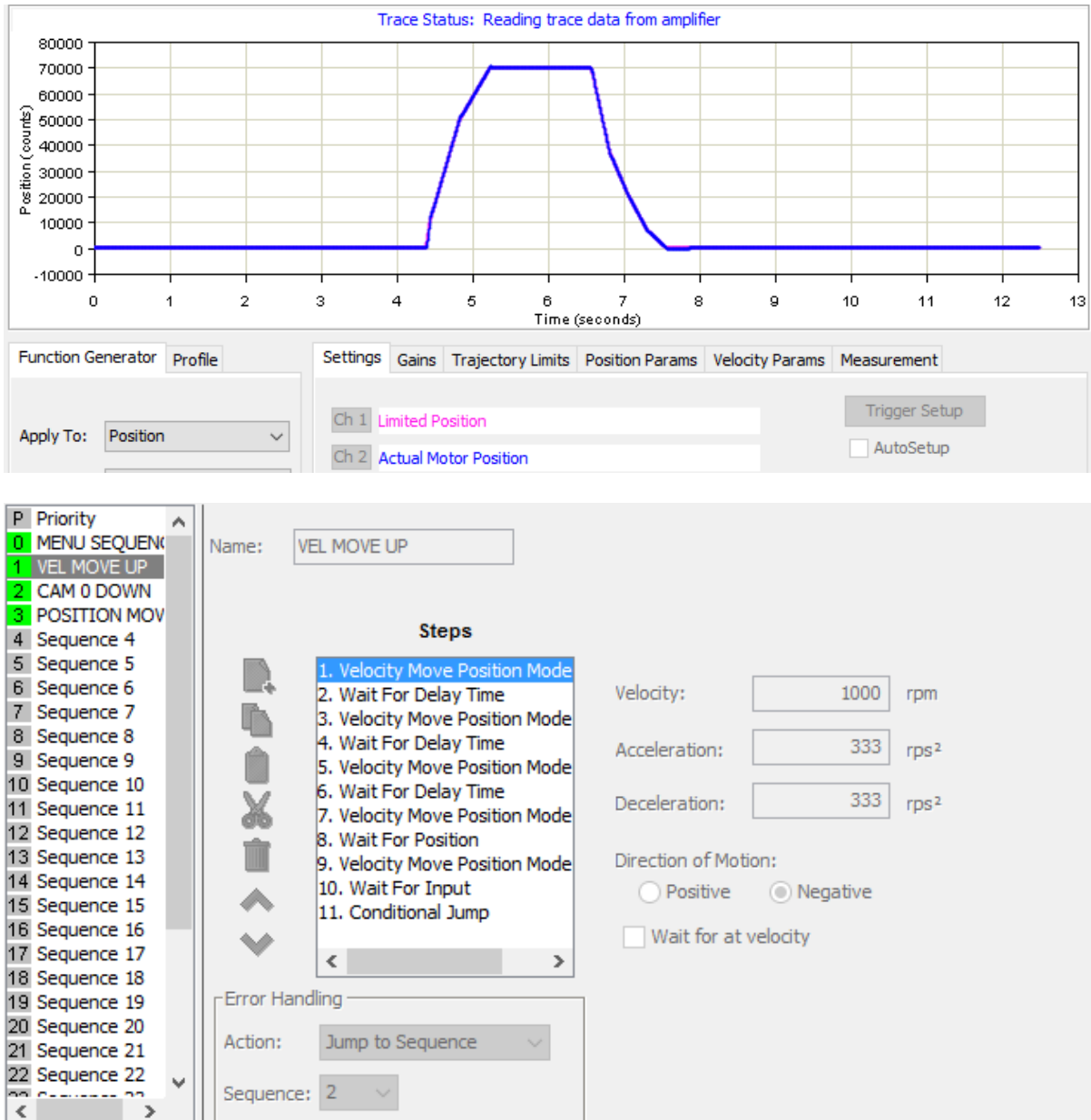
The down slope here is the MOVE back to 0.

This screenshot shows the same 'POSITION MOVE' configuration window, but with the '2. Conditional Jump' step selected. The configuration is as follows:

- Name: POSITION MOVE
- Steps: 1. Move, 2. Conditional Jump
- Value 1: 1, Operator: >, Value 2: 0
- Then Jump to Sequence: 0
- Step Number: 1
- Error Handling: Action: Abort Sequence, Sequence: [dropdown]

# Servo Components and systems App Note.

## Velocity Move Sequence



# Servo Components and systems App Note.

The screenshot shows a software interface for editing a sequence. On the left is a vertical list of sequences, with '0 MENU SEQUENC', '1 VEL MOVE UP', and '3 POSITION MOV' highlighted. The main area is titled 'Name: VEL MOVE UP'. Below this is a 'Steps' list with 11 items: 1. Velocity Move Position Mode, 2. Wait For Delay Time (highlighted), 3. Velocity Move Position Mode, 4. Wait For Delay Time, 5. Velocity Move Position Mode, 6. Wait For Delay Time, 7. Velocity Move Position Mode, 8. Wait For Position, 9. Velocity Move Position Mode, 10. Wait For Input, and 11. Conditional Jump. To the right of the steps is a 'Delay Time: 250 ms' field. Below the steps is an 'Error Handling' section with 'Action: Jump to Sequence' and 'Sequence: 2'.

This screenshot shows the same sequence editor as above, but with additional motion parameters. The 'Steps' list is identical, with '3. Velocity Move Position Mode' highlighted. To the right of the steps are three input fields: 'Velocity: 500 rpm', 'Acceleration: 333 rps<sup>2</sup>', and 'Deceleration: 333 rps<sup>2</sup>'. Below these is a 'Direction of Motion' section with radio buttons for 'Positive' and 'Negative' (selected), and a checkbox for 'Wait for at velocity' which is currently unchecked. The 'Error Handling' section remains the same as in the previous screenshot.

# Servo Components and systems App Note.

Name: VEL MOVE UP

**Steps**

1. Velocity Move Position Mode
2. Wait For Delay Time
3. Velocity Move Position Mode
4. Wait For Delay Time
5. Velocity Move Position Mode
6. Wait For Delay Time
7. Velocity Move Position Mode
8. Wait For Position
9. Velocity Move Position Mode
10. Wait For Input
11. Conditional Jump

Delay Time: 250 ms

Error Handling  
Action: Jump to Sequence  
Sequence: 2

Name: VEL MOVE UP

**Steps**

1. Velocity Move Position Mode
2. Wait For Delay Time
3. Velocity Move Position Mode
4. Wait For Delay Time
5. Velocity Move Position Mode
6. Wait For Delay Time
7. Velocity Move Position Mode
8. Wait For Position
9. Velocity Move Position Mode
10. Wait For Input
11. Conditional Jump

Velocity: 400 rpm  
Acceleration: 333 rps<sup>2</sup>  
Deceleration: 333 rps<sup>2</sup>

Direction of Motion:  
 Positive  Negative  
 Wait for at velocity

Error Handling  
Action: Jump to Sequence  
Sequence: 2

# Servo Components and systems App Note.

The screenshot shows the 'VEL MOVE UP' sequence configuration. The 'Steps' list is as follows:

1. Velocity Move Position Mode
2. Wait For Delay Time
3. Velocity Move Position Mode
4. Wait For Delay Time
5. Velocity Move Position Mode
6. Wait For Delay Time
7. Velocity Move Position Mode
8. Wait For Position
9. Velocity Move Position Mode
10. Wait For Input
11. Conditional Jump

The 'Error Handling' section is set to:

- Action: Jump to Sequence
- Sequence: 2

The 'Delay Time' is set to 250 ms.

The screenshot shows the 'VEL MOVE UP' sequence configuration with step 7 highlighted. The 'Steps' list is as follows:

1. Velocity Move Position Mode
2. Wait For Delay Time
3. Velocity Move Position Mode
4. Wait For Delay Time
5. Velocity Move Position Mode
6. Wait For Delay Time
7. Velocity Move Position Mode
8. Wait For Position
9. Velocity Move Position Mode
10. Wait For Input
11. Conditional Jump

The 'Error Handling' section is set to:

- Action: Jump to Sequence
- Sequence: 2

Additional settings for step 7:

- Velocity: 200 rpm
- Acceleration: 333 rps<sup>2</sup>
- Deceleration: 333 rps<sup>2</sup>
- Direction of Motion:  Positive  Negative
- Wait for at velocity

# Servo Components and systems App Note.

**Priority**

- 0 MENU SEQUENC
- 1 VEL MOVE UP
- 2 CAM 0 DOWN
- 3 POSITION MOV
- 4 Sequence 4
- 5 Sequence 5
- 6 Sequence 6
- 7 Sequence 7
- 8 Sequence 8
- 9 Sequence 9
- 10 Sequence 10
- 11 Sequence 11
- 12 Sequence 12
- 13 Sequence 13
- 14 Sequence 14
- 15 Sequence 15
- 16 Sequence 16
- 17 Sequence 17
- 18 Sequence 18
- 19 Sequence 19
- 20 Sequence 20
- 21 Sequence 21
- 22 Sequence 22
- 23 Sequence 23

Name: VEL MOVE UP

**Steps**

1. Velocity Move Position Mode
2. Wait For Delay Time
3. Velocity Move Position Mode
4. Wait For Delay Time
5. Velocity Move Position Mode
6. Wait For Delay Time
7. Velocity Move Position Mode
8. Wait For Position
9. Velocity Move Position Mode
10. Wait For Input
11. Conditional Jump

**Error Handling**

Action: Jump to Sequence

Sequence: 2

Actual Position

Limited Position

Position: ≤ 10 counts

Issue Trajectory Update

Use Time Out

Time Out: 250 ms

On time out

Jump To Sequence: 0

Step Number: 1

**Priority**

- 0 MENU SEQUENC
- 1 VEL MOVE UP
- 2 CAM 0 DOWN
- 3 POSITION MOV
- 4 Sequence 4
- 5 Sequence 5
- 6 Sequence 6
- 7 Sequence 7
- 8 Sequence 8
- 9 Sequence 9
- 10 Sequence 10
- 11 Sequence 11
- 12 Sequence 12
- 13 Sequence 13
- 14 Sequence 14
- 15 Sequence 15
- 16 Sequence 16
- 17 Sequence 17
- 18 Sequence 18
- 19 Sequence 19
- 20 Sequence 20
- 21 Sequence 21
- 22 Sequence 22
- 23 Sequence 23

Name: VEL MOVE UP

**Steps**

1. Velocity Move Position Mode
2. Wait For Delay Time
3. Velocity Move Position Mode
4. Wait For Delay Time
5. Velocity Move Position Mode
6. Wait For Delay Time
7. Velocity Move Position Mode
8. Wait For Position
9. Velocity Move Position Mode
10. Wait For Input
11. Conditional Jump

**Error Handling**

Action: Jump to Sequence

Sequence: 2

Velocity: 0 rpm

Acceleration: 333 rps<sup>2</sup>

Deceleration: 333 rps<sup>2</sup>

**Direction of Motion:**

Positive  Negative

Wait for at velocity



# Servo Components and systems App Note.

**Sequence List:**

- 0 MENU SEQUENC
- 1 VEL MOVE UP
- 2 CAM 0 DOWN
- 3 POSITION MOV
- 4 Sequence 4
- 5 Sequence 5
- 6 Sequence 6
- 7 Sequence 7
- 8 Sequence 8
- 9 Sequence 9
- 10 Sequence 10
- 11 Sequence 11
- 12 Sequence 12
- 13 Sequence 13
- 14 Sequence 14
- 15 Sequence 15
- 16 Sequence 16
- 17 Sequence 17
- 18 Sequence 18
- 19 Sequence 19
- 20 Sequence 20
- 21 Sequence 21
- 22 Sequence 22

**Name:** VEL MOVE UP

**Input:** IN3

**Trigger:**  Edge  Level

**Active State:**  Hi  Lo

Use Time Out

**Time Out:** 1000 ms

Use Error Handling on time out

Use Jump to Sequence on time out

**On time Out**

**Jump To Sequence:** 0

**Step Number:** 1

**Steps:**

1. Velocity Move Position Mode
2. Wait For Delay Time
3. Velocity Move Position Mode
4. Wait For Delay Time
5. Velocity Move Position Mode
6. Wait For Delay Time
7. Velocity Move Position Mode
8. Wait For Position
9. Velocity Move Position Mode
10. Wait For Input
11. Conditional Jump

**Error Handling**

**Action:** Jump to Sequence

**Sequence:** 2

**Sequence List:**

- 0 MENU SEQUENC
- 1 VEL MOVE UP
- 2 CAM 0 DOWN
- 3 POSITION MOV
- 4 Sequence 4
- 5 Sequence 5
- 6 Sequence 6
- 7 Sequence 7
- 8 Sequence 8
- 9 Sequence 9
- 10 Sequence 10
- 11 Sequence 11
- 12 Sequence 12
- 13 Sequence 13
- 14 Sequence 14
- 15 Sequence 15
- 16 Sequence 16
- 17 Sequence 17
- 18 Sequence 18
- 19 Sequence 19
- 20 Sequence 20
- 21 Sequence 21
- 22 Sequence 22

**Name:** VEL MOVE UP

**Steps:**

1. Velocity Move Position Mode
2. Wait For Delay Time
3. Velocity Move Position Mode
4. Wait For Delay Time
5. Velocity Move Position Mode
6. Wait For Delay Time
7. Velocity Move Position Mode
8. Wait For Position
9. Velocity Move Position Mode
10. Wait For Input
11. Conditional Jump

**Error Handling**

**Action:** Jump to Sequence

**Sequence:** 2

**If** Value 1: 1 Operator: > Value 2: 0

**Then Jump to Sequence:** 0

**Step Number:** 1