MP3300 Demo Project Reference

Version 2

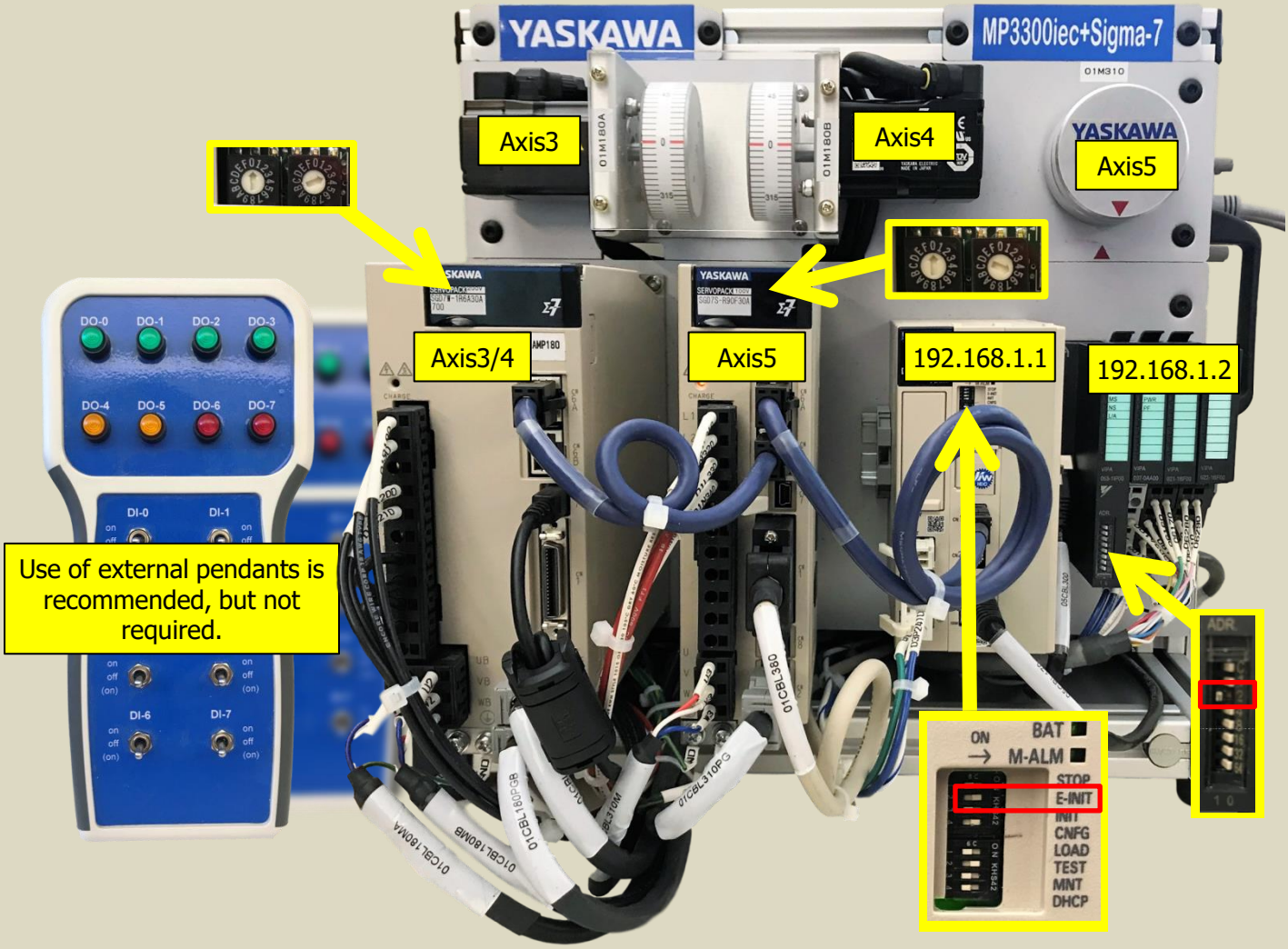
July 3, 2018

Demo Configuration

The demo project is written for the controller at 192.168.1.1 (turn on E-INIT switch) and the VIPA at 192.168.1.2 (turn on ADR switch 2). The IP address of the router may also need to be set to the .1.x network.

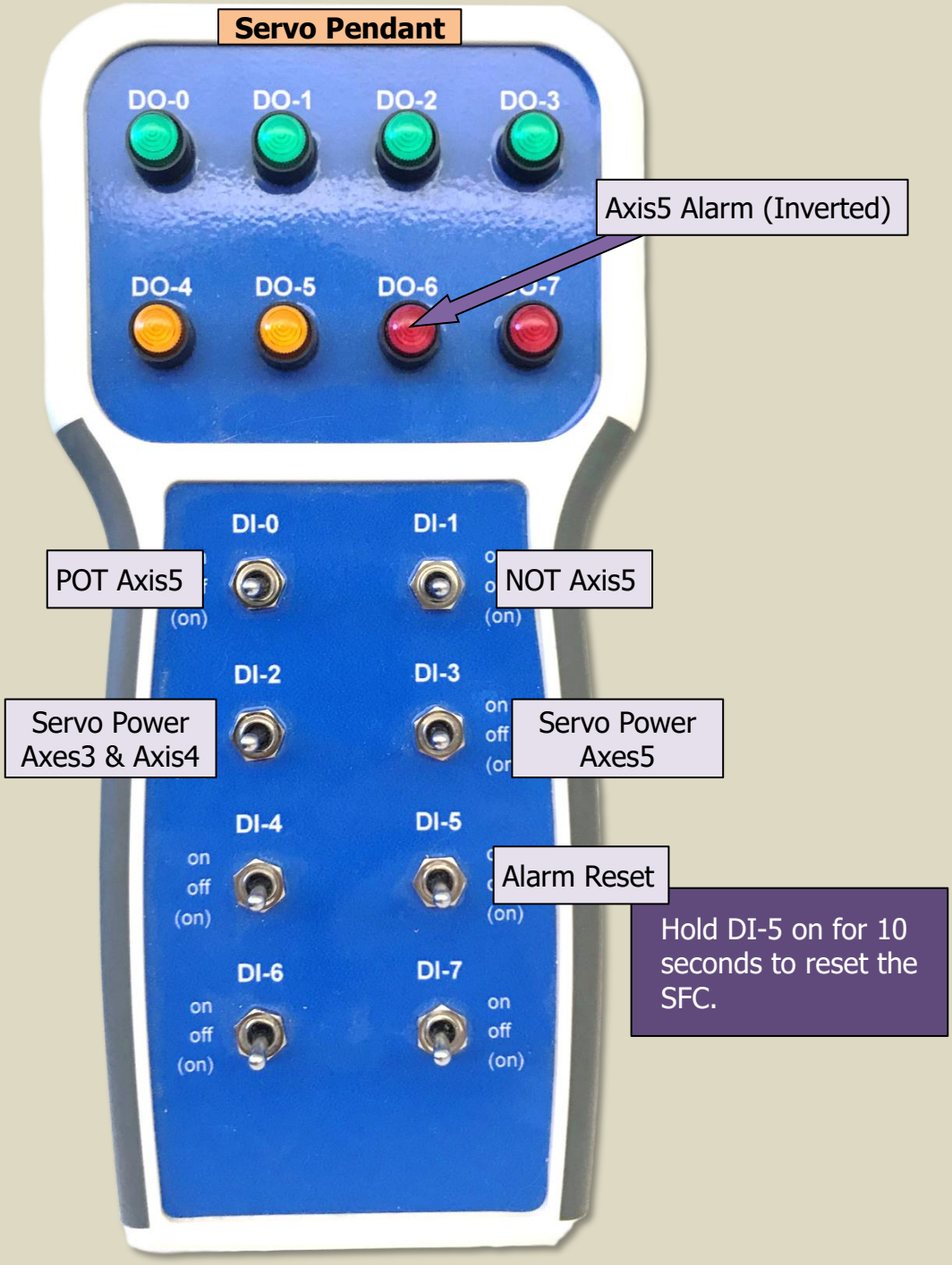
For the servopacks, set the rotary switches on the Sigma-7W to 0 & 3 and on the Sigma-7S to 0 & 5.

- **Axis3**: 360 units/rev, linear
- **Axis4**: 360 units/rev, linear
- **Axis5**: 360 units/rev, rotary (machine cycle 360 units)



Servo Pendant

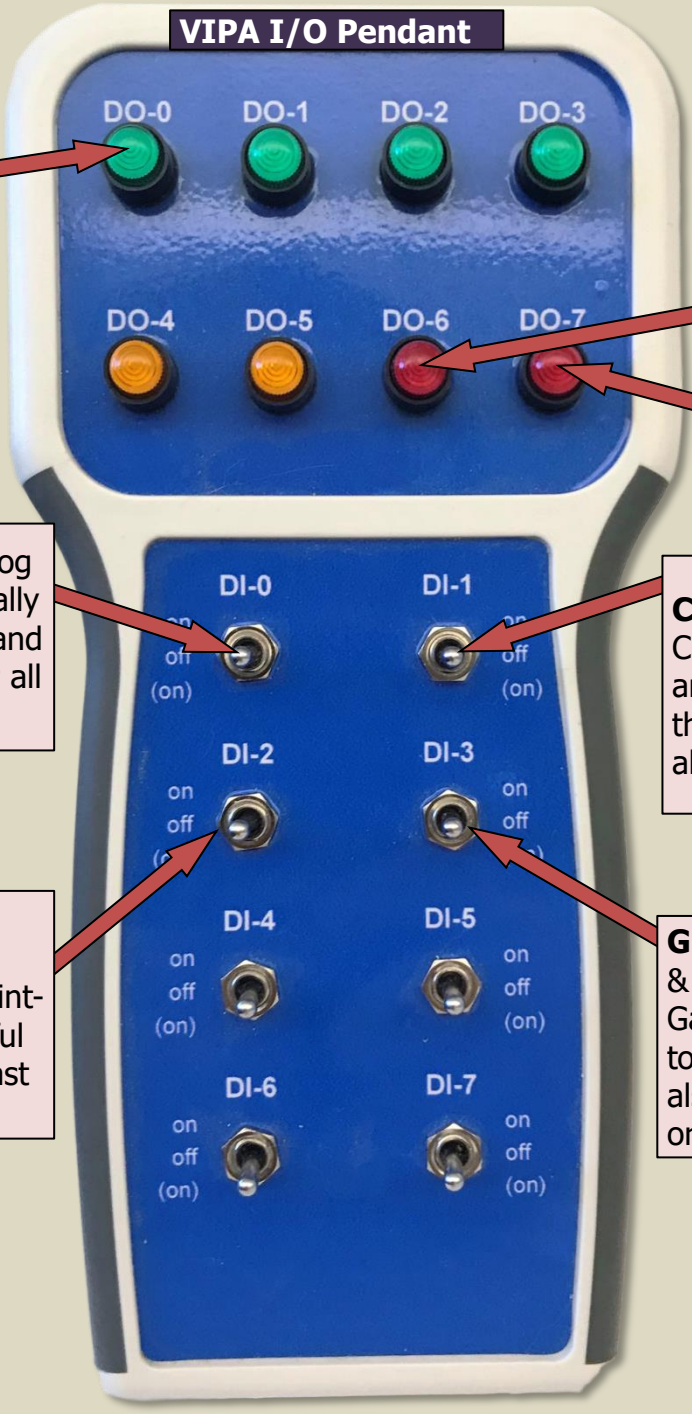
The functions controlled by the servo pendant are always active regardless of demo mode. Outputs depend on configuration of Axis5 drive.



Idle Mode

Idle mode means that none of the active demo modes are operating. It is the "home" state when all inputs on the VIPA I/O Pendant are off. If all inputs are off and the Mode Indicator DO-0 is still blinking, the system is stuck in a state (usually cam state because CamOut wasn't executed properly). Hold on DI-5 of the SERVO pendant for 10 seconds to reset the SFC.

When in Idle Mode, Mode Indicator lamp (DO-0) will not blink.



Axis3 and/or Axis4 NOT enabled

Axis5 NOT enabled.

Jog/Zero Mode: Jog the motors individually forward or reverse and set zero position for all axes.

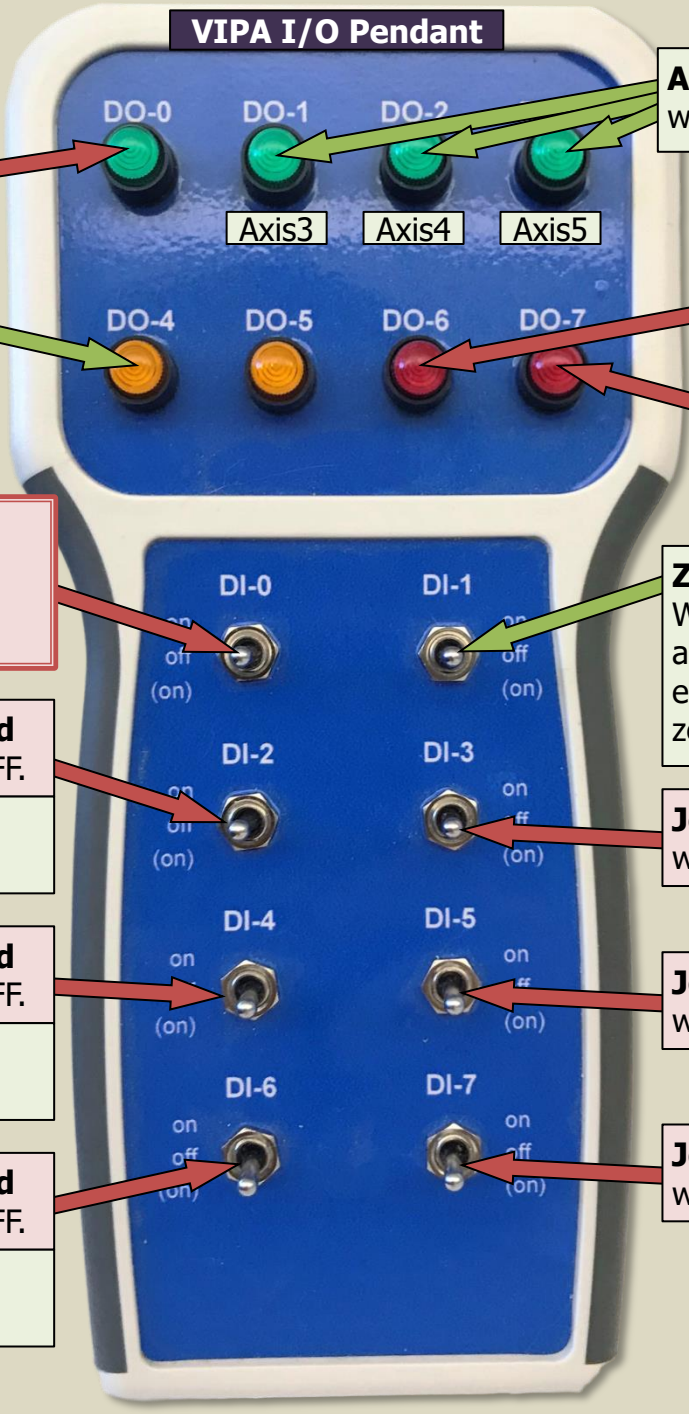
Cam/Gear Mode: Cam or Gear Axis 3 and/or Axis 4. Axis5 is the master. Cam shift also available.

Point-to-Point Mode: Each of the axes has a quick point-to-point move. Useful for tuning or very fast operation.

Group Mode: Axes 3 & 4 act as a 2D Gantry. Several shapes to choose from. Can also execute blending or tangent matching.

Jog/Zero Mode

When in Jog/Zero mode, each axis can be jogged forward or reverse. Speeds, accelerations, and decelerations are set in the project. Turning on input DI-1 enables Zero Mode, which allows the individual axes to have their actual positions set to zero.



Blinks Once when in Jog/Zero Mode

AxisN at zero position when in Zero Mode only.

Zero Mode Active (blink)

Axis3 and/or Axis4 NOT enabled

Axis5 NOT enabled.

Jog/Zero Mode: Turning this off will exit Jog/Zero Mode.

Zero Mode On: When on, Zero Mode allows the position of each axis to be set to zero.

Jog Axis3 Forward when Zero Mode OFF.

Zero Axis3 when Zero Mode ON.

Jog Axis3 Reverse when Zero Mode OFF.

Jog Axis4 Forward when Zero Mode OFF.

Zero Axis4 when Zero Mode ON.

Jog Axis4 Reverse when Zero Mode OFF.

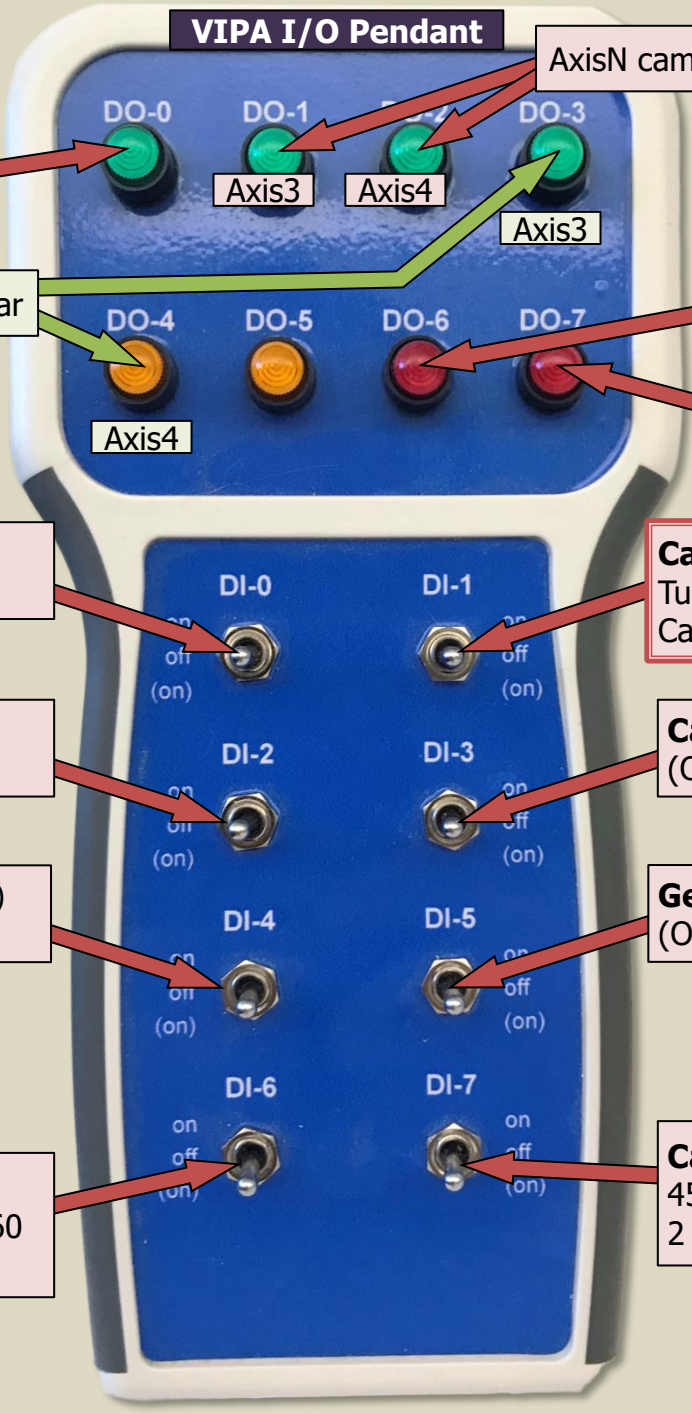
Jog Axis5 Forward when Zero Mode OFF.

Zero Axis5 when Zero Mode ON.

Jog Axis5 Reverse when Zero Mode OFF.

Cam/Gear Mode

In Cam/Gear Mode, Axis3 and Axis4 can either cam or gear with the master, Axis5. Axis5 can be jogged through the pendant, or disabled and spun manually.



Blinks twice when in Cam/Gear Mode

AxisN camming InSync

AxisN gearing InGear

Axis3 and/or Axis4 NOT enabled

Axis5 NOT enabled.

Jog Master
Jog Axis5

Cam/Gear Mode:
Turning this off will exit Cam/Gear Mode.

CamIn Axis3
(OFF: CamOut)

CamIn Axis4
(OFF: CamOut)

GearIn Axis3 (1:1)
(OFF: Stop gearing)

GearIn Axis4 (2:1)
(OFF: Stop gearing)

CamShift Axis3
45 unit shift over 360 unit distance.

CamShift Axis4
45 unit shift over a 2 second duration

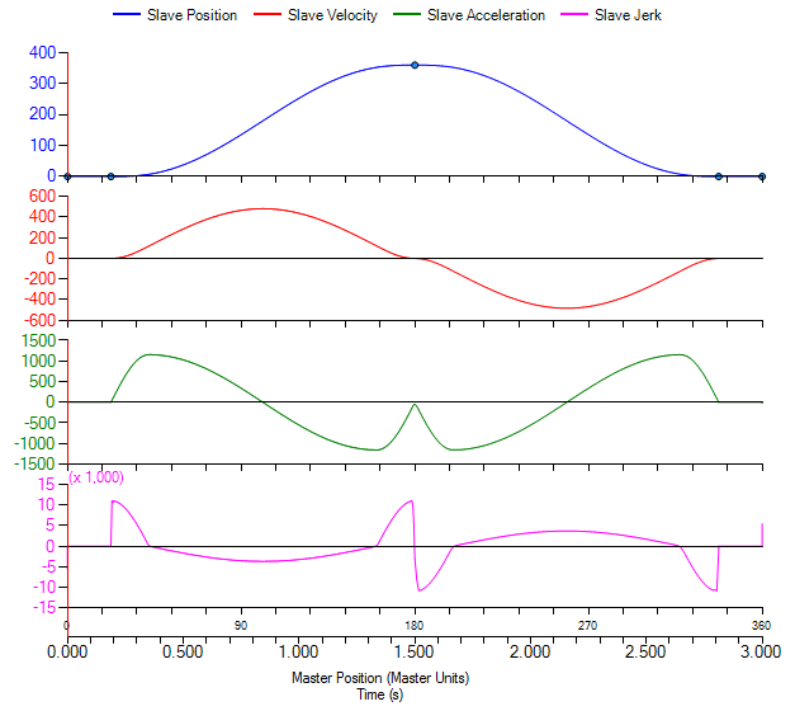
Cam/Gear Mode

Axis3 is a two-way cam.

Cam Editor:
DemoSineCam.mce

CSV:
/flash/user/data/cam/DemoSineCam.csv

Row	Master	Slave	Curve Type	Resolution
0	0	0		
1	22.5	0	Straight Line	0
2	180	360	Modified Sine	0.5
3	337.5	0	Modified Sine	1
4	360	0	Straight Line	0

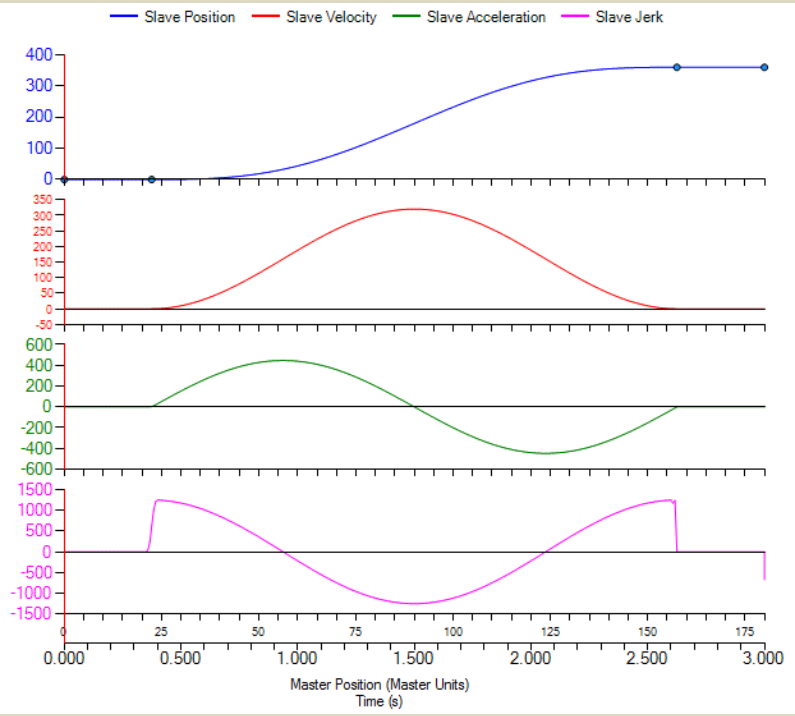


Axis4 is a one-way cam.

Cam Editor:
DemoKnifeCam.mce

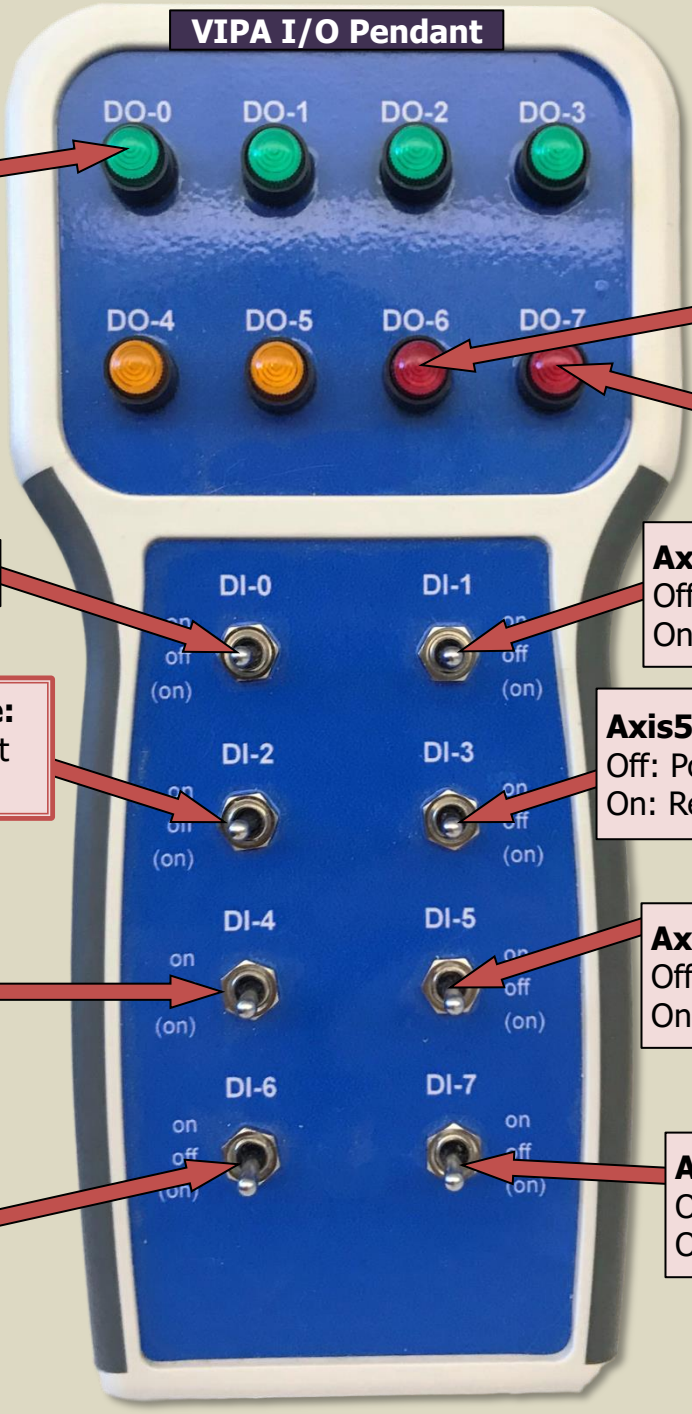
CSV:
/flash/user/data/cam/DemoKnifeCam.csv

Row	Master	Slave	Curve Type	Resolution
0	0	0		
1	22.5	0	Straight Line	0.5
2	157.5	360	Tangent Matching	0.5
3	180	360	Straight Line	0



Point-to-Point Mode

In Point-to-Point Mode, each axis is programmed to do a series of short quick moves. Starts with a MC_MoveAbsolute to zero, delays, then increments around for one revolution, and repeats. **Note**: A quick way to get all motors to zero position is to enter Point-to-Point Mode and pulse each of the index switches to force the initial absolute move to zero position.



Blinks three times when in Point-to-Point Mode

Axis3 and/or Axis4 NOT enabled

Axis5 NOT enabled.

Index Axis5

Axis5 Increment
Off: 45° increments
On: 15° increments

Point-to-Point Mode:
Turning this off will exit Point-to-Point Mode.

Axis5 Reverse
Off: Positive direction moves
On: Reverse direction moves

Index Axis3

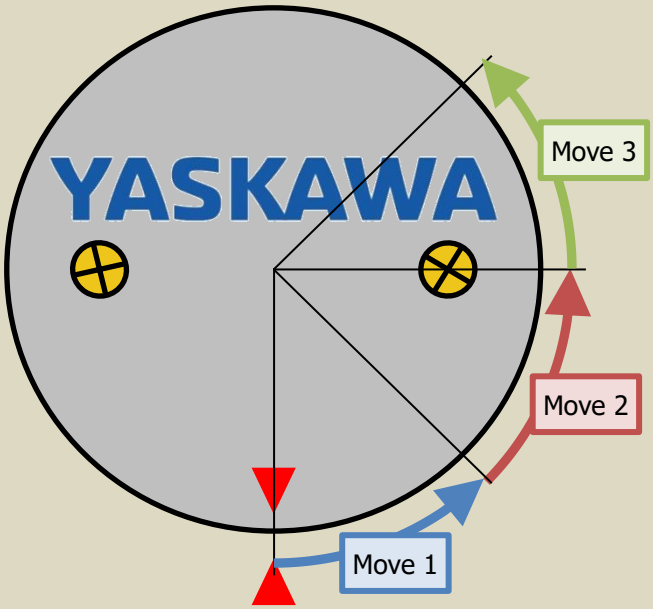
Axis3 Increment
Off: 45° increments
On: 30° increments

Index Axis4

Axis4 Increment
Off: 45° increments
On: 22.5° increments

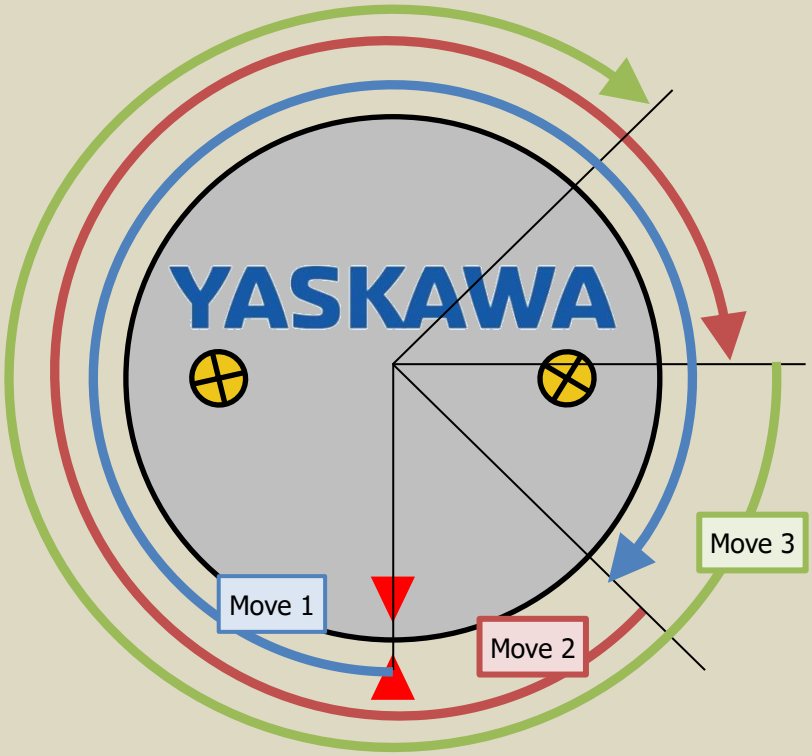
Point-to-Point Mode

When Axis5 Reverse input is activated, the commanded positions are the same. Only the direction of rotation of the motor is reversed.



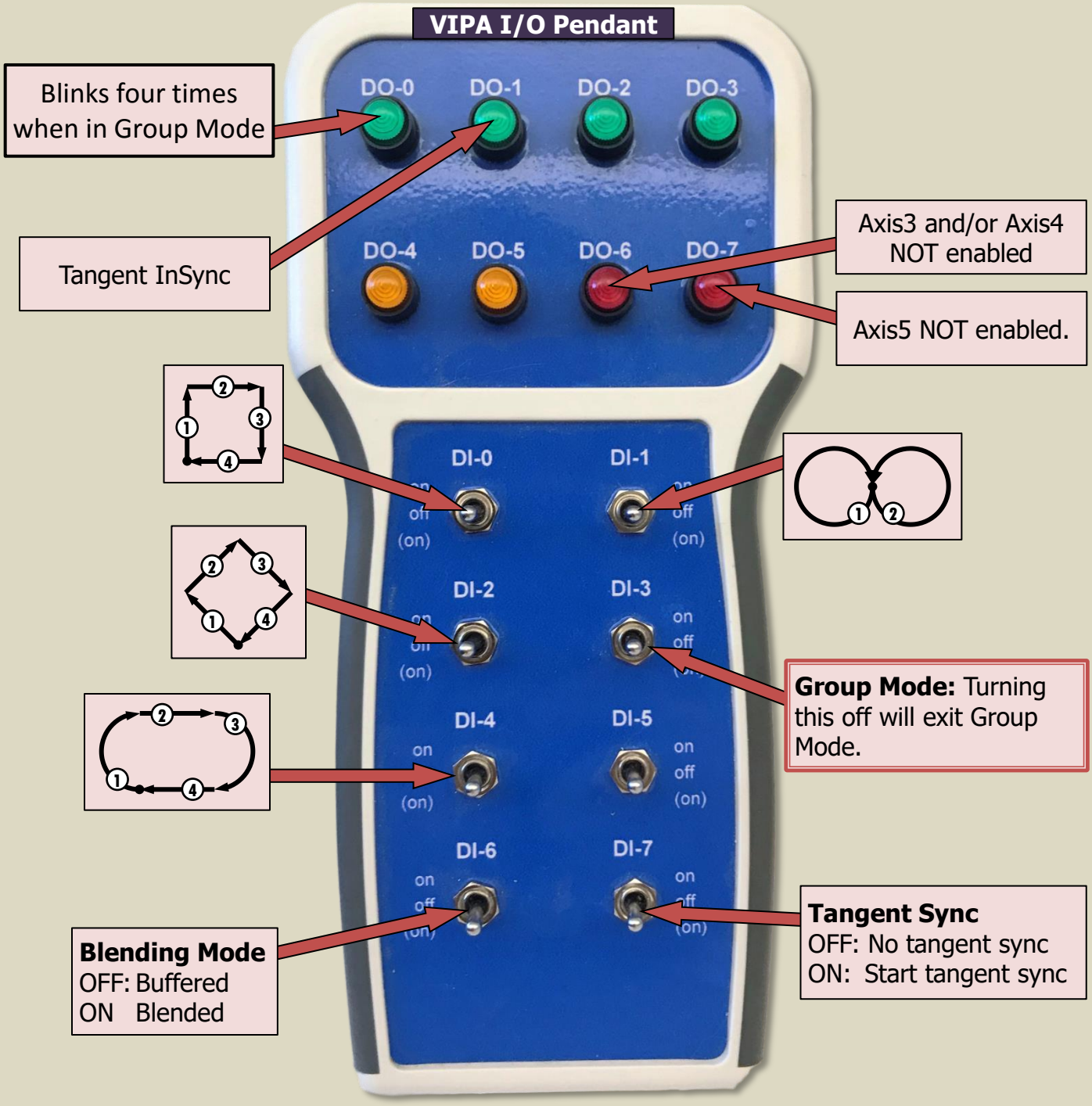
Input DI-3 OFF
(Axis5 not reversed)

Input DI-3 ON
(Axis5 Reverse)



Group Mode

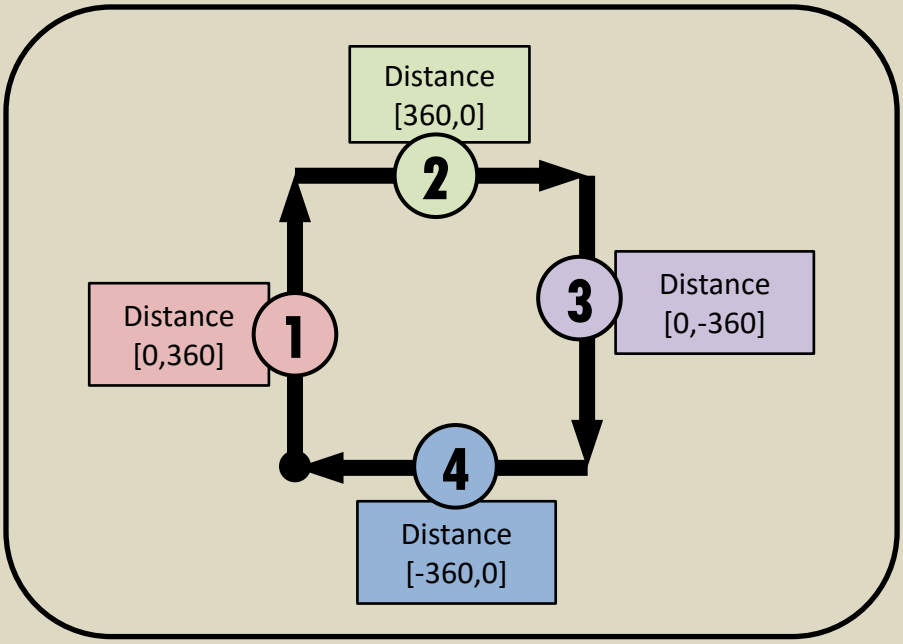
Group Mode uses Axis3 and Axis4 as a 2D gantry group. If more than one of the move shapes is ON, the system will cycle through the moves without pausing. If only one is on, it will pause for a couple of seconds after the move is completed. Move blending and tangent synchronization can also be applied.



Group Mode

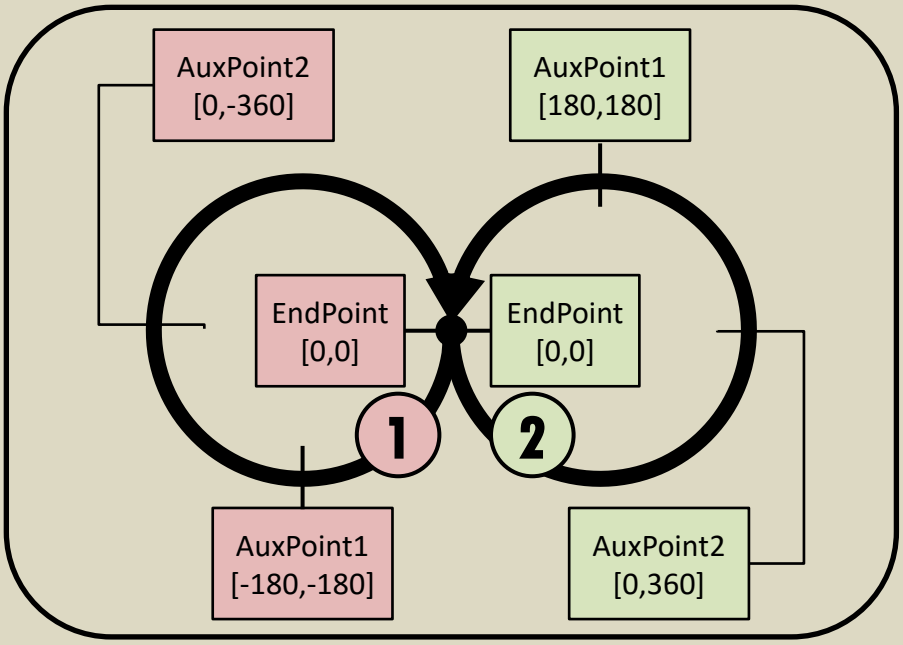
Moves

All moves are MC_MoveLinearRelative or MC_MoveCircularRelative.



DI-0
(Square)

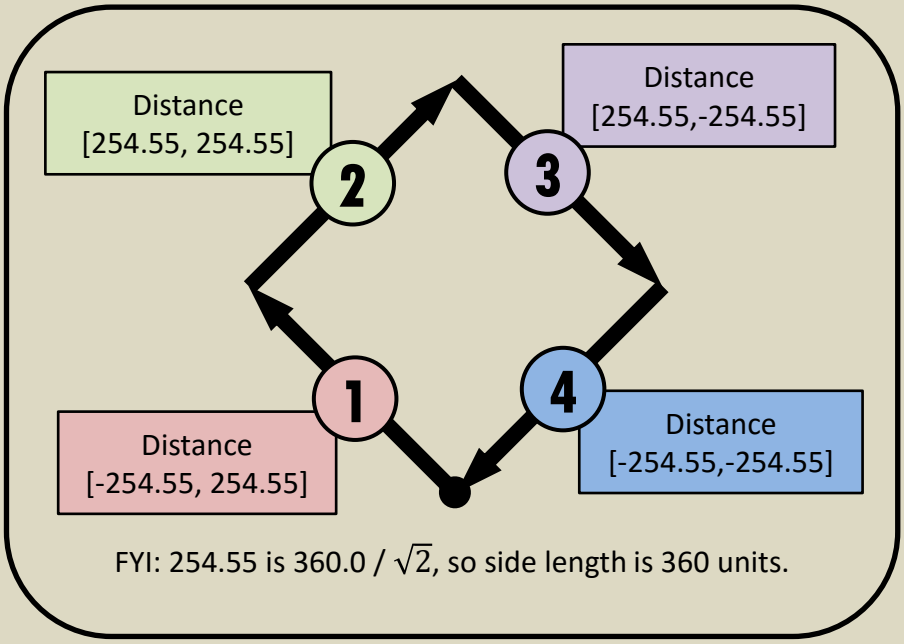
DI-1
(Dual Circles)



Group Mode

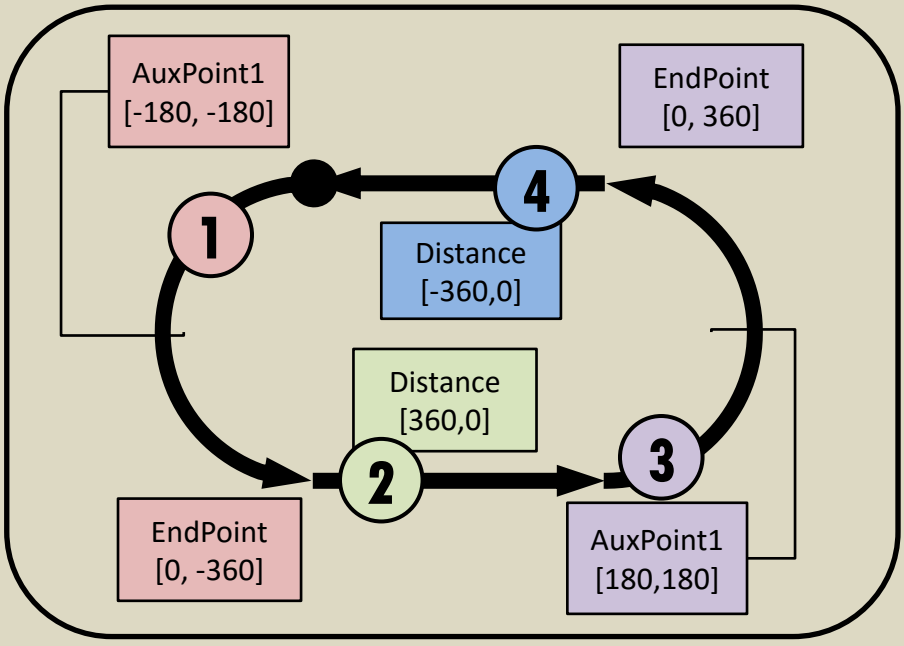
Moves

All moves are MC_MoveLinearRelative or MC_MoveCircularRelative.



DI-3
(Diamond)

DI-5
(Racetrack)



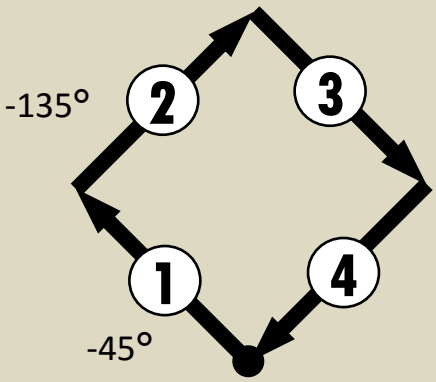
Group Mode

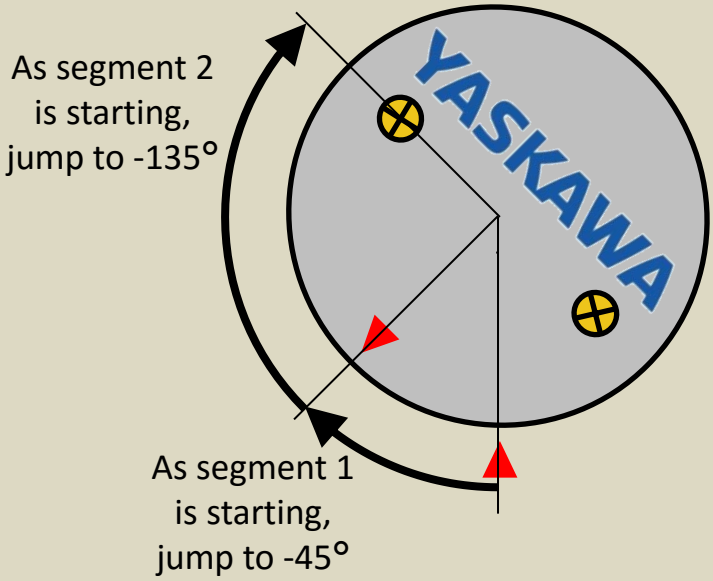
Tangent Sync

Tangent sync on Axis5 tracks the tangent of the current XY group. It works with all indexes except unblended square move (DI-0 with DI-6 off).

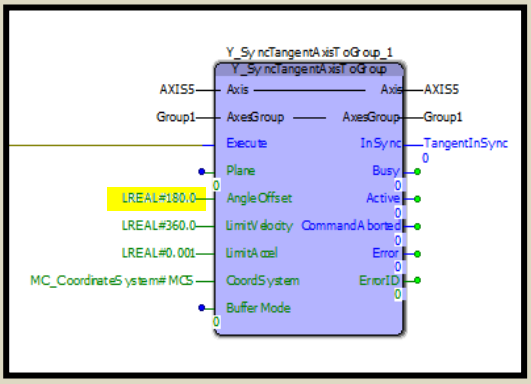
You may notice the tangent axis jump suddenly. There are two reasons why this may happen:

1. Axis5 did not start at zero position
2. The tangent at the beginning of a move is a big jump from the starting position.
   a) On an unblended diamond shape (DI-2), the jump will occur on all moves because the tangent changes instantly.
   b) In a blended diamond move, it will jump before the first move due to the instantaneous change, but the subsequent blended moves will result in a smoother tangent.





Note: Segment 1 is actually at a vector angle of 135°. However, Axis5 has been offset by 180° by the Angle Offset input of the Y_SyncTangentToGroup function block.



Quick Reference

VIPA I/O Pendant

Idle Mode			
DI0	Jog/Zero	DO0	(Mode indicator)
DI1	Cam/Gear Mode	DO1	
DI2	Point-to-Point Mode	DO2	
DI3	Group Mode	DO3	
DI4	(Future)	DO4	
DI5		DO5	
DI6		DO6	Ax3&4 NOT enabled
DI7		DO7	Ax5 NOT enabled
Jog/Zero Mode			
DI0	(Jog/Zero Mode)	DO0	Blinks 1x
DI1	Enter Zero Mode	DO1	Ax3 At Zero Pos (Zero Mode)
DI2	Ax3 Jg Fwd / Zero Ax3	DO2	Ax4 At Zero Pos (Zero Mode)
DI3	Ax3 jg Rev	DO3	Ax5 At Zero Pos (Zero Mode)
DI4	Ax4 Jg Fwd / Zero Ax4	DO4	In Zero Mode (Blinks)
DI5	Ax4 jg Rev	DO5	
DI6	Ax5 Jg Fwd / Zero Ax5	DO6	Ax3&4 NOT enabled
DI7	Ax5 jg Rev	DO7	Ax5 NOT enabled
Cam/Gear Mode			
DI0	Jog Master	DO0	Blinks 2x
DI1	(Cam/Gear Mode)	DO1	
DI2	CamIn Ax3	DO2	CamInSync Ax3
DI3	CamIn Ax4	DO3	CamInSync Ax4
DI4	GearIn Ax3	DO4	GearInSync Ax3
DI5	GearIn Ax4	DO5	GearInSync Ax4
DI6	CamShift Ax3	DO6	Ax3&4 NOT enabled
DI7	CamShift Ax4	DO7	Ax5 NOT enabled
Point-to-Point Mode			
DI0	Ax5 Index	DO0	Blinks 3x
DI1	Ax5 Increment Select	DO1	Ax3 Index Complete
DI2	(Point-to-Point Mode)	DO2	Ax4 Index Complete
DI3	Ax5 Reversing	DO3	Ax5 Index Complete
DI4	Ax3 Index	DO4	
DI5	Ax3 Increment Select	DO5	
DI6	Ax4 Index	DO6	Ax3&4 NOT enabled
DI7	Ax4 Increment Select	DO7	Ax5 NOT enabled
Group Mode			
DI0	Draw a square	DO0	Blinks 4x
DI1	Draw a circle	DO1	Tangent In Sync
DI2	Draw a diamond	DO2	
DI3	(Group Mode)	DO3	
DI4	Draw a Racetrack	DO4	
DI5		DO5	
DI6	Activate Blending	DO6	Ax3&4 NOT enabled
DI7	Activate Tangent Match	DO7	Ax5 NOT enabled

Servo Axis 5 Pendant

Universal			
DI0	POT Axis5	DO0	
DI1	POT Axis5	DO1	
DI2	Servo Power Axis3 & Axis4	DO2	
DI3	Servo Power Axis5	DO3	
DI4		DO4	
DI5	Alarm Reset All Axes	DO5	
DI6		DO6	Axis5 Alarm (inverted)
DI5	Hold on for 10s to reset SFC	DO7	