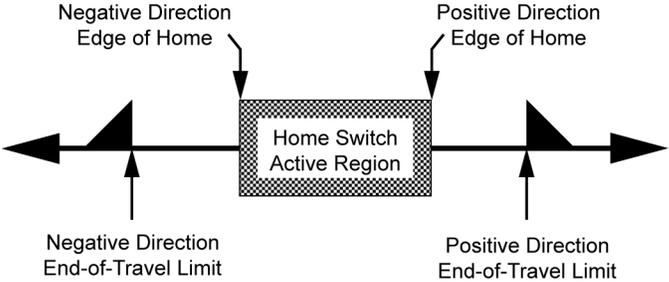# Homing

The *homing operation* is a sequence of moves that position an axis using assigned inputs and/or the Z Channel input of an incremental encoder. The goal of the homing operation is to return the load to a repeatable initial starting location.

Zero Reference After Homing: As soon as the homing operation is successfully completed, the absolute position register is reset to zero, thus establishing a zero reference. The homing operation has several potential homing functions you can customize to suit the needs of your application (illustrations of the effects of these commands are presented below):

Description	Command	Example	Example Comment
Initiate the homing move. To start the homing move in the positive direction, use JOG HOME {Axis Alias}**1**; to home in the negative direction, use JOG HOME {Axis Alias}**-1**	JOG HOME	JOG HOME X1	Positive Direction
		JOG HOME X-1	Negative Direction
		AXIS0 JOG HOME 1	Positive Direction, outside master program
		AXIS0 JOG HOME -1	Negative Direction, outside master program
Acceleration while homing.	JOG ACC	JOG ACC X100	within master assigned master
		AXIS0 JOG ACC100	outside master program
S-curve acceleration/deceleration while homing.	JOG JRK	JOG JRK X1000	within assigned master
		AXIS0 JOG JRK 1000	outside master program
Deceleration while homing.	JOG DEC	JOG DEC X100	within assigned master
		AXIS0 JOG DEC 100	outside master program
Back up to home. The load will decelerate to a stop after encountering the active edge of the home region, and then will move in the opposite direction at the JOG HOMVF velocity until the active edge of the home region is encountered.	CLR/SET Home Backup Enable Flag	CLR 16152	Axis0 backup disabled, default
		SET 16152	Axis0 backup enabled
Final approach direction —during backup to home	CLR/SET Home Negative Final Direction Flag	CLR 16154	Axis0, Postive Direction, default
		SET 16154	Axis0 Negative Direction
Specify the side of the home switch on which to stop	CLR/SET Home Negative Edge Select flag	CLR 16153	Axis0, Postive side of home switch, default
		SET 16153	Axis0, Postive side of home switch, default
Velocity while seeking the home position	JOG VEL	JOG VEL X10	within assigned master
		AXIS0 JOG VEL 10	outside master program
Velocity while in final approach to home position—during backup to home	JOG HOMVF	JOG HOMVF X2	within assigned master
		AXIS0 JOG HOMVF 2	outside master program

Automation

NOTES

- To better illustrate the direction changes in the backup-to-home operation, the illustrations in this section show the backup-to-home movements with varied velocities. In reality, the backup-to-home movements are performed at the same velocity (JOG HOMVF value).

- Program examples listed are for AXIS0. Assumes that the Axis Alias is "X" and that the program is run in the master where AXIS0 is attached.

- Backup flags settings are listed for all axes in each scenario.

- CLR statements are optional. Flags referenced below default to zero/clear state.

- For axes attached to the same master, home routines can be initiated simultaneously for multiple axes as follows: JOG HOME X1 Y1 Z1 A1

- If an end-of-travel limit is encountered during the homing operation, the motion will be reversed and the home switch will be sought in the opposite direction. If a second limit is encountered, the homing operation will be terminated, stopping motion at the second limit.

- Relevance of positive and negative direction:

Negative Direction
Edge of Home

Positive Direction
Edge of Home

Home Switch
Active Region

Negative Direction
End-of-Travel Limit

Positive Direction
End-of-Travel Limit

Figure A

Start home move in positive direction
Backup To Home disabled

```
PROGRAM
JOG VEL X10
JOG ACC X100
JOG DEC X100
JOG JRK X0
CLR16152
JOG HOME X1
ENDP
```

Figure B

Start home move in negative direction
Backup To Home disabled

```
PROGRAM
JOG VEL X10
JOG ACC X100
JOG DEC X100
JOG JRK X0
CLR16152
JOG HOME X-1
ENDP
```

Figure C

Start home move in positive direction
Backup To Home enabled
Final approach direction is positive
Stop on the positive-travel side of the home active region

```
PROGRAM
JOG VEL X10
JOG ACC X100
JOG DEC X100
JOG JRK X0
SET 16152 CLR 16153 CLR 16154
JOG HOMVF X1
JOG HOME X1
ENDP
```

Backup Bit settings
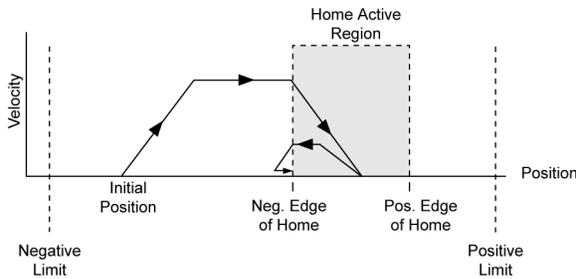|	
AXIS1	SET 16184 CLR 16185 CLR 16186
AXIS2	SET 16216 CLR 16217 CLR 16218
AXIS3	SET 16248 CLR 16249 CLR 16250
AXIS4	SET 16280 CLR 16281 CLR 16282
AXIS5	SET 16312 CLR 16313 CLR 16314
AXIS6	SET 16344 CLR 16345 CLR 16346
AXIS7	SET 16376 CLR 16377 CLR 16378

Figure D

Start home move in positive direction
Backup To Home enabled
Final approach direction is positive
Stop on the negative-travel side of the home active region

```
PROGRAM
JOG VEL X10
JOG ACC X100
JOG DEC X100
JOG JRK X0
SET 16152 SET 16153 CLR 16154
JOG HOMVF X1
JOG HOME X1
ENDP
```
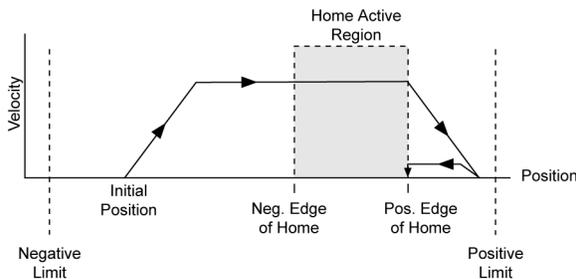
Backup Bit settings

AXIS			
AXIS0	SET 16152	SET 16153	CLR 16154
AXIS1	SET 16184	SET 16185	CLR 16186
AXIS2	SET 16216	SET 16217	CLR 16218
AXIS3	SET 16248	SET 16249	CLR 16250
AXIS4	SET 16280	SET 16281	CLR 16282
AXIS5	SET 16312	SET 16313	CLR 16314
AXIS6	SET 16344	SET 16345	CLR 16346
AXIS7	SET 16376	SET 16377	CLR 16378

Figure E

Start home move in positive direction
Backup To Home enabled
Final approach direction is negative
Stop on the positive-travel side of the home active region

```
PROGRAM
JOG VEL X10
JOG ACC X100
JOG DEC X100
JOG JRK X0
SET 16152 CLR 16153 SET 16154
JOG HOMVF X1
JOG HOME X1
ENDP
```

Backup Bit settings

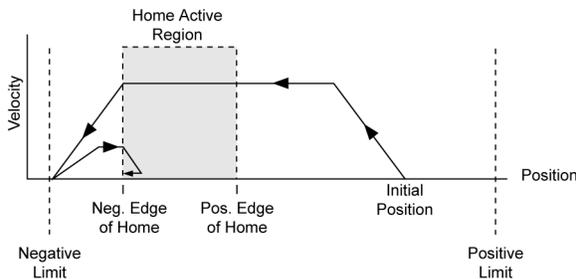| AXIS			
AXIS0	SET 16152	CLR 16153	SET 16154
AXIS1	SET 16184	CLR 16185	SET 16186
AXIS2	SET 16216	CLR 16217	SET 16218
AXIS3	SET 16248	CLR 16249	SET 16250
AXIS4	SET 16280	CLR 16281	SET 16282
AXIS5	SET 16312	CLR 16313	SET 16314
AXIS6	SET 16344	CLR 16345	SET 16346
AXIS7	SET 16376	CLR 16377	SET 16378

Figure F

Start home move in positive direction
Backup To Home enabled
Final approach direction is negative
Stop on the negative-travel side of the home active region

```
PROGRAM
JOG VEL X10
JOG ACC X100
JOG DEC X100
JOG JRK X0
SET 16152 SET 16153 SET 16154
JOG HOMVF X1
JOG HOME X1
ENDP
```

Backup Bit settings
AXIS0   SET 16152 SET 16153 SET 16154
AXIS1   SET 16184 SET 16185 SET 16186
AXIS2   SET 16216 SET 16217 SET 16218
AXIS3   SET 16248 SET 16249 SET 16250
AXIS4   SET 16280 SET 16281 SET 16282
AXIS5   SET 16312 SET 16313 SET 16314
AXIS6   SET 16344 SET 16345 SET 16346
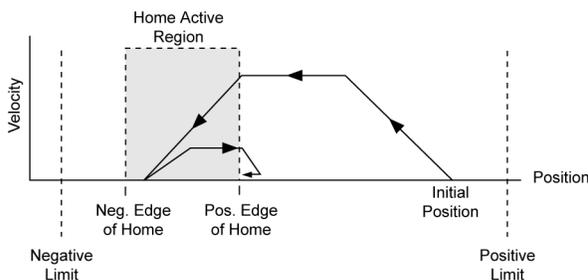AXIS7   SET 16376 SET 16377 SET 16378

Figure G

Start home move in negative direction
Backup To Home enabled
Final approach direction is negative
Stop on the negative-travel side of the home active region

```
PROGRAM
JOG VEL X10
JOG ACC X100
JOG DEC X100
JOG JRK X0
SET 16152 SET 16153 SET 16154
JOG HOMVF X1
JOG HOME X-1
ENDP
```

Backup Bit settings
AXIS0   SET 16152 SET 16153 SET 16154
AXIS1   SET 16184 SET 16185 SET 16186
AXIS2   SET 16216 SET 16217 SET 16218
AXIS3   SET 16248 SET 16249 SET 16250
AXIS4   SET 16280 SET 16281 SET 16282
AXIS5   SET 16312 SET 16313 SET 16314
AXIS6   SET 16344 SET 16345 SET 16346
AXIS7   SET 16376 SET 16377 SET 16378

Figure H

Start home move in negative direction
Backup To Home enabled
Final approach direction is negative
Stop on the postitive-travel side of the home active region

```
PROGRAM
JOG VEL X10
JOG ACC X100
JOG DEC X100
JOG JRK X0
SET 16152 CLR 16153 SET 16154
JOG HOMVF X1
JOG HOME X-1
ENDP
```

Backup Bit settings
AXIS0   SET 16152 CLR 16153 SET 16154
AXIS1   SET 16184 CLR 16185 SET 16186
AXIS2   SET 16216 CLR 16217 SET 16218
AXIS3   SET 16248 CLR 16249 SET 16250
AXIS4   SET 16280 CLR 16281 SET 16282
AXIS5   SET 16312 CLR 16313 SET 16314
AXIS6   SET 16344 CLR 16345 SET 16346
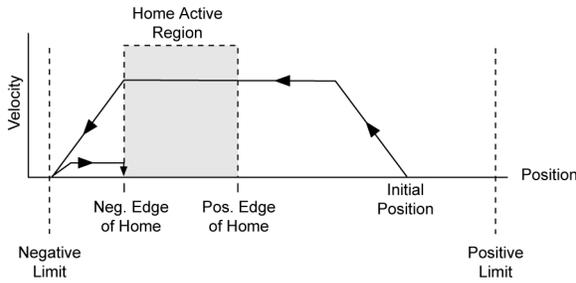AXIS7   SET 16376 CLR 16377 SET 16378

Figure I

Start home move in negative direction
Backup To Home enabled
Final approach direction is positive
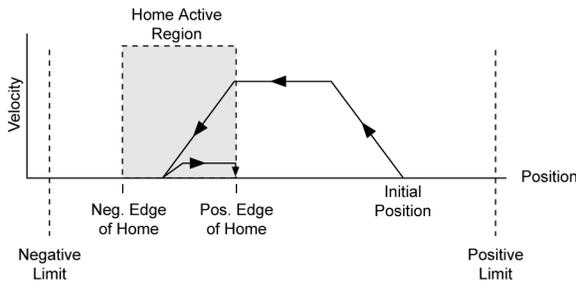Stop on the negative-travel side of the home active region

```
PROGRAM
JOG VEL X10
JOG ACC X100
JOG DEC X100
JOG JRK X0
SET 16152 SET 16153 CLR 16154
JOG HOMVF X1
JOG HOME X-1
ENDP
```

Backup Bit settings
AXIS0	SET 16152 SET 16153 CLR 16154
AXIS1	SET 16184 SET 16185 CLR 16186
AXIS2	SET 16216 SET 16217 CLR 16218
AXIS3	SET 16248 SET 16249 CLR 16250
AXIS4	SET 16280 SET 16281 CLR 16282
AXIS5	SET 16312 SET 16313 CLR 16314
AXIS6	SET 16344 SET 16345 CLR 16346
AXIS7	SET 16376 SET 16377 CLR 16378

Figure J

Start home move in negative direction
Backup To Home enabled
Final approach direction is positive
Stop on the postitive-travel side of the home active region

```
PROGRAM
JOG VEL X10
JOG ACC X100
JOG DEC X100
JOG JRK X0
SET 16152 CLR 16153 CLR 16154
JOG HOMVF X1
JOG HOME X-1
ENDP
```

Backup Bit settings
AXIS0	SET 16152 CLR 16153 CLR 16154
AXIS1	SET 16184 CLR 16185 CLR 16186
AXIS2	SET 16216 CLR 16217 CLR 16218
AXIS3	SET 16248 CLR 16249 CLR 16250
AXIS4	SET 16280 CLR 16281 CLR 16282
AXIS5	SET 16312 CLR 16313 CLR 16314
AXIS6	SET 16344 CLR 16345 CLR 16346
AXIS7	SET 16376 CLR 16377 CLR 16378
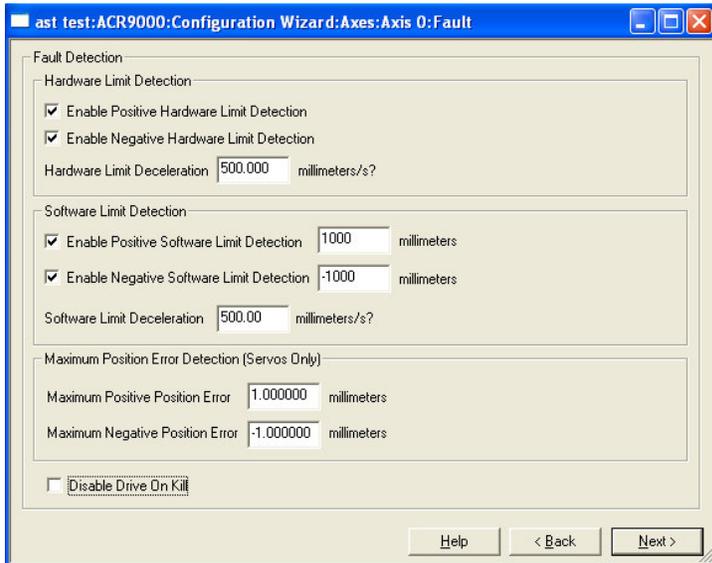
Hardware Limit Detection

The following commands are set during this opertation:

- HLDEC Hardware Limit Deceleration
    - HLDEC X500
- HLIM Hardware Limit Enable
    - Value   Description
        - 0   Disables positive limit and negative limit (default)
        - 1   Enables positive limit and disables negative limit
        - 2   Disables positive limit and enables negative limit
        - 3   Enables positive limit and negative limit
    - HLIM X3

If limits are enabled and the motor/load encounters a hardware limit, motion stops at the rate set by the HLDEC command. To clear the switch, motion must occur in the opposite direction.

Software Limit Detection

The following commands are set during this opertation:

- SLDEC Software Limit Deceleration
    - SLDEC X500
- SLIM Hardware Limit Enable
    - Value   Description
        - 0   Disables positive limit and negative limit (default)
        - 1   Enables positive limit and disables negative limit
        - 2   Disables positive limit and enables negative limit
        - 3   Enables positive limit and negative limit
    - SLIM X3

If limits are enabled and the motor/load encounters a hardware limit, motion stops at the rate set by the SLDEC command. To clear the switch, motion must occur in the opposite direction.
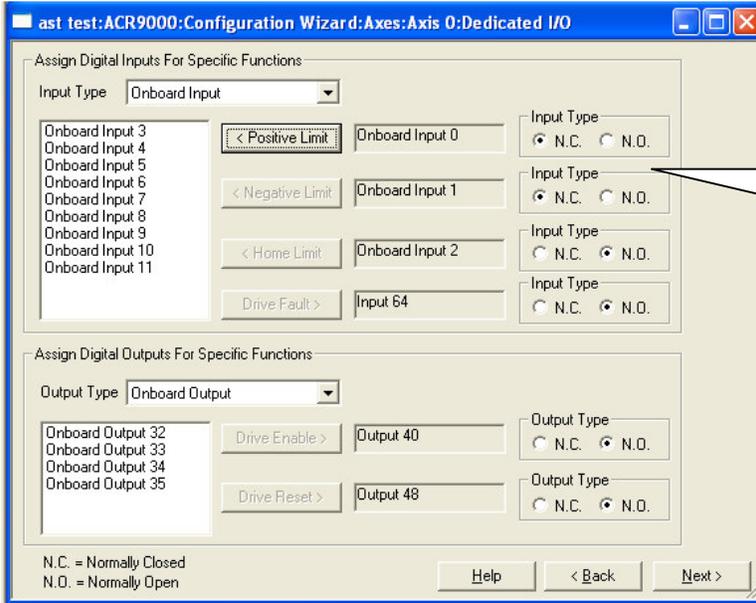
Default setting for an input is a physical open circuit. Configuration wizard assumes user will be using Normally closed switches for limits. Flags will be set to invert limit level

Assign Digital Inputs for Specific Functions

Hardware limits and home can be assigned to Onboard or Expansion Inputs. User can define any physical input for the positive limit. The controller automatically sets the next contiguous input for the negative hardware limit, and sets the next contiguous input for homing.

● HLBIT Hardware Limit Deceleration
     HLBIT X0   REM Positive Hardware Limit set to Onboard Input 0, negative limit to Input 1 & Home to input 3