Starting and Stopping a Motion Program

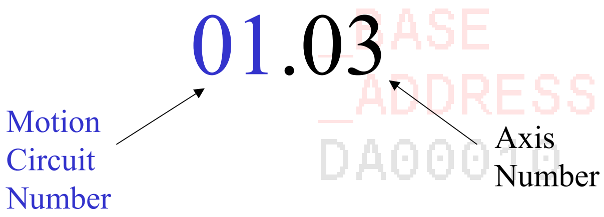
PREPARATION

- Application programmer must know the motion circuit number(s) of each module and the specific axis number to be used with motion programs.
- Group definition(s) must be completed.
- The “User constant self writing function” (Mechatrolink II option) must be disabled.

Motion Modules, axis and respective motion circuit numbers.

In general, the motion module is assigned a motion circuit number module either manually but he application programmer or the hardware's auto configuration function.

The designation of circuit and axis is as follows:



01.03

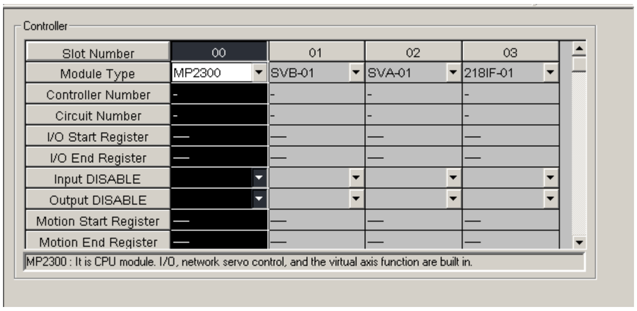
Motion Circuit Number

Axis Number

Motion Modules, axis and respective motion circuit numbers.

Note that from the Module configuration dialog box, this MP2300 has a total of 4 motion modules: Two built into the CPU, and two are added option modules.

The two built into the CPU are an SVB (Mechatrolink II) and an SVR (16 Virtual axis)
The other two is an extra SVB and a SVA (Analog servo I/F)



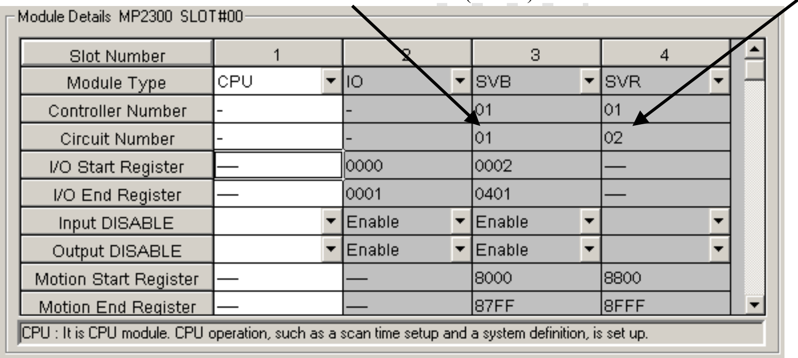
Slot Number	00	01	02	03
Module Type	MP2300	SVB-01	SVA-01	218IF-01
Controller Number	-	-	-	-
Circuit Number	-	-	-	-
I/O Start Register	—	—	—	—
I/O End Register	—	—	—	—
Input DISABLE				
Output DISABLE				
Motion Start Register	—	—	—	—
Motion End Register	—	—	—	—

MP2300 : It is CPU module. I/O, network servo control, and the virtual axis function are built in.

Motion Modules, axis and respective motion circuit numbers.

When the focus is on the CPU module (#00) the two built in Motion Modules are shown with some detail.

The SVB built in to the CPU is circuit #1. The SVR (virtual) built in to the CPU is circuit #2.



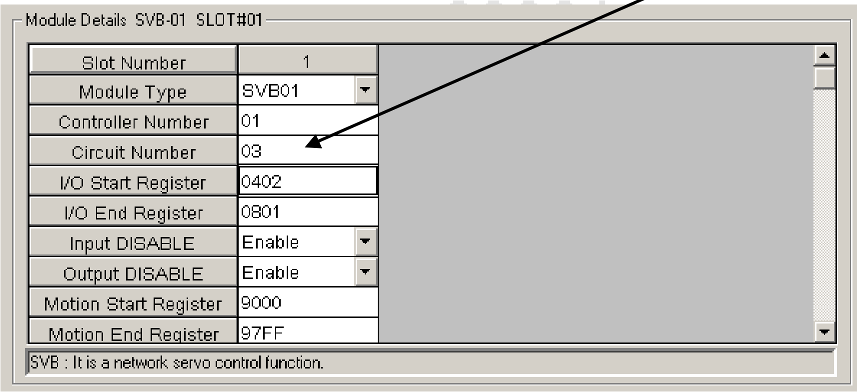
Module Details MP2300 SLOT#00

Slot Number	1	2	3	4
Module Type	CPU	IO	SVB	SVR
Controller Number	-	-	01	01
Circuit Number	-	-	01	02
I/O Start Register	—	0000	0002	—
I/O End Register	—	0001	0401	—
Input DISABLE		Enable	Enable	
Output DISABLE		Enable	Enable	
Motion Start Register	—	—	8000	8800
Motion End Register	—	—	87FF	8FFF

CPU : It is CPU module. CPU operation, such as a scan time setup and a system definition, is set up.

Motion Modules, axis and respective motion circuit numbers.

When the focus is on the SVB module (#01) the circuit number assigned can be seen: 3



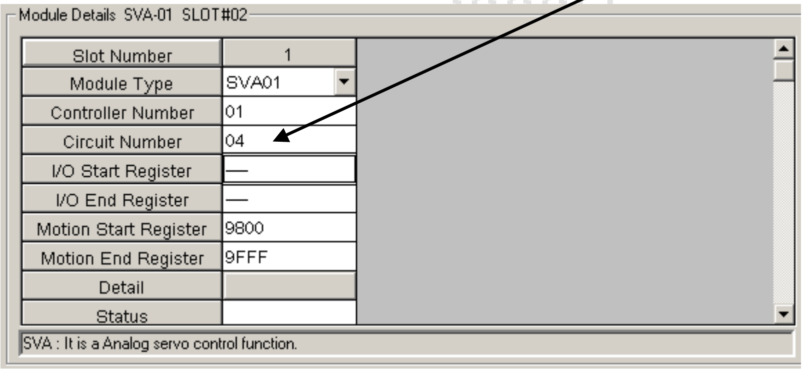
Module Details SVB-01 SLOT#01

Slot Number	1
Module Type	SVB01
Controller Number	01
Circuit Number	03
I/O Start Register	0402
I/O End Register	0801
Input DISABLE	Enable
Output DISABLE	Enable
Motion Start Register	9000
Motion End Register	97FF

SVB : It is a network servo control function.

Motion Modules, axis and respective motion circuit numbers.

When the focus is on the SVA module (#02) the circuit number assigned can be seen: 4

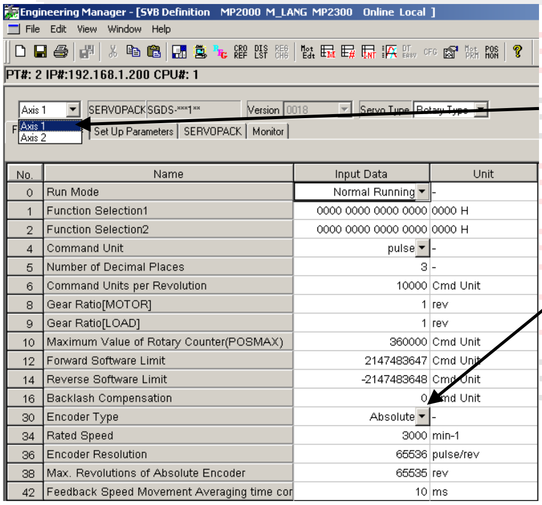


Module Details SVA-01 SLOT#02

Slot Number	1
Module Type	SVA01
Controller Number	01
Circuit Number	04
I/O Start Register	—
I/O End Register	—
Motion Start Register	9800
Motion End Register	9FFF
Detail	
Status	

SVA : It is a Analog servo control function.

Motion Modules, axis and respective motion circuit numbers.



Engineering Manager - [SVB Definition MP2000 M_LANG MP2300 Online Local]
File
Edit
View
Window
Help
Set Up Parameters
SERVOPACK
Monitor

PT#: 2 IP#:192.168.1.200 CPU#: 1

Axis 1 | SERVOPACK SGDS-***1** | Version 0018 | Servo Type Rotary Type

Axis 1
Axis 2

No.	Name	Input Data	Unit
0	Run Mode	Normal Running	-
1	Function Selection1	0000 0000 0000 0000	0000 H
2	Function Selection2	0000 0000 0000 0000	0000 H
4	Command Unit	pulse	-
5	Number of Decimal Places	3	-
6	Command Units per Revolution	10000	Cmd Unit
8	Gear Ratio[MOTOR]	1	rev
9	Gear Ratio[LOAD]	1	rev
10	Maximum Value of Rotary Counter(POSMAX)	360000	Cmd Unit
12	Forward Software Limit	2147483647	Cmd Unit
14	Reverse Software Limit	-2147483648	Cmd Unit
16	Backlash Compensation	0	Cmd Unit
30	Encoder Type	Absolute	-
34	Rated Speed	3000	min-1
36	Encoder Resolution	65536	pulse/rev
38	Max. Revolutions of Absolute Encoder	65535	rev
42	Feedback Speed Movement Averaging time cor	10	ms

This particular SVB is part of one built into the CPU of a MP2300.

It has two axis, the axis in view is a Sigma III, with ABS encoder on it.

If we were to specify the module and axis number 2 on this module it would be :

01.02

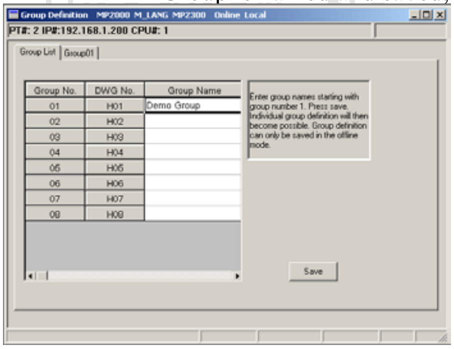
Motion Modules, axis and respective motion circuit numbers.

The table blow shows the designations and range of each axis/module for our sample.

Module Type	Rack Location	Circuit #	Max. for this module	Number of Axis	Designation
SVB	00 (On CPU)	1	16	16	01.01~01.16
SVR	00 (On CPU)	2	16	16	02.01~02.16
SVB	01	3	16	7	03.01~03.07
SVA	02	4	2	2	04.01~04.02

Group definition(s) must be completed.

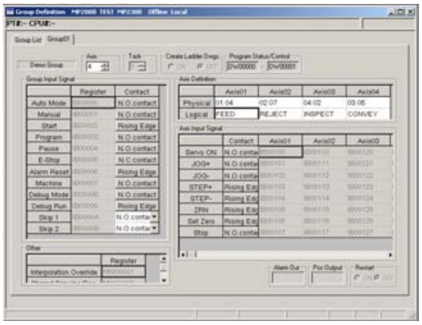
Group is named and saved, then the group's Tab is selected



PT#: 2 IP#:192.168.1.200 CPU#: 1

Group No.	DWG No.	Group Name
01	H01	Demo Group
02	H02	
03	H03	
04	H04	
05	H05	
06	H06	
07	H07	
08	H08	

Enter group names starting with group number 1. Press save. Individual group definition will then become possible. Group definition can only be saved in the offline mode.



PT#:- CPU#:-

Demo Group

Axis: 4

Program Status/Control: DW00000 - DW00001

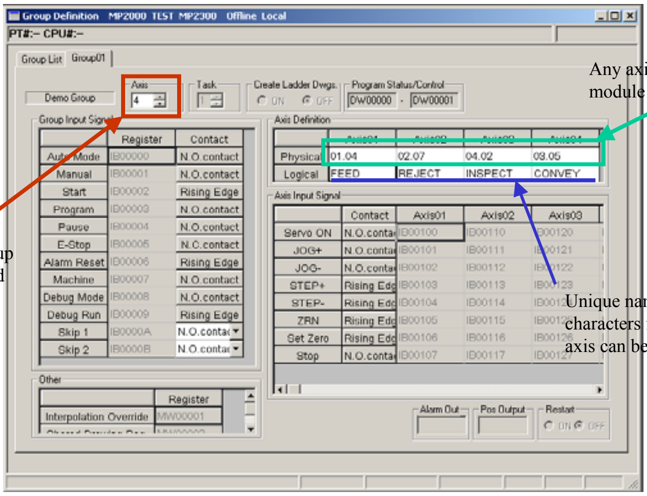
	Register	Contact
Auto Mode		N.O contact
Manual		N.O contact
Start		Rising Edge
Program		N.O contact
Pause		N.O contact
E-Stop		N.C contact
Alarm Reset		Rising Edge
Machine		N.O contact
Debug Mode		N.O contact
Debug Run		Rising Edge
Skip 1		N.O contac
Skip 2		N.O contac

	Axis01	Axis02	Axis03	Axis04
Physical	01.04	02.07	04.02	03.05
Logical	FEED	REJECT	INSPECT	CONVEY

	Contact
Servo ON	N.O conta
JOG+	N.O conta
JOG-	N.O conta
STEP+	Rising Ed
STEP-	Rising Ed
ZRN	Rising Ed
Set Zero	Rising Ed
Stop	N.O conta

	Register
Interpolation Override	

Group definition(s) must be completed.



Group Definition MP2000 TEST MP2300 Offline Local

PT#:– CPU#:–

Demo Group

Axis: 4

Task: 1

Create Ladder Dwgs.: ○ ON ● OFF

Program Status/Control: DW00000 - DW00001

Group Input Signal

	Register	Contact
Auto Mode	IB00000	N.O.contact
Manual	IB00001	N.O.contact
Start	IB00002	Rising Edge
Program	IB00003	N.O.contact
Pause	IB00004	N.O.contact
E-Stop	IB00005	N.C.contact
Alarm Reset	IB00006	Rising Edge
Machine	IB00007	N.O.contact
Debug Mode	IB00008	N.O.contact
Debug Run	IB00009	Rising Edge
Skip 1	IB0000A	N.O.contac
Skip 2	IB0000B	N.O.contac

Axis Definition

	Axis01	Axis02	Axis03	Axis04
Physical	01.04	02.07	04.02	03.05
Logical	FEED	REJECT	INSPECT	CONVEY

Axis Input Signal

	Contact	Axis01	Axis02	Axis03
Servo ON	N.O.conta	IB00100	IB00110	IB00120
JOG+	N.O.conta	IB00101	IB00111	IB00121
JOG-	N.O.conta	IB00102	IB00112	IB00122
STEP+	Rising Edg	IB00103	IB00113	IB00123
STEP-	Rising Edg	IB00104	IB00114	IB00124
ZRN	Rising Edg	IB00105	IB00115	IB00125
Set Zero	Rising Edg	IB00106	IB00116	IB00126
Stop	N.O.conta	IB00107	IB00117	IB00127

Other

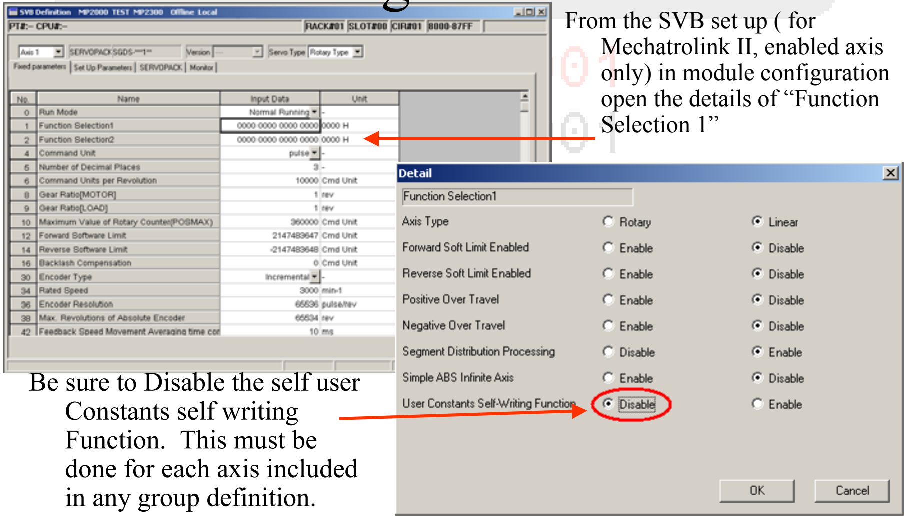
	Register
Interpolation Override	MW00001

Any axis from many module can be used.

Up to 16 axis/Group axis can be defined

Unique names up to 8 characters for each axis can be defined

Disabling The "User constant self writing function."



SVB Definition MP2000 TEST MP2300 Offline Local

PT#:– CPU#:– RACK#01 SLOT#00 CIR#01 8000-87FF

Axis 1 SERVOPACK SGDS-***1** Version Servo Type Rotary Type

No.	Name	Input Data	Unit
0	Run Mode	Normal Running	-
1	Function Selection1	0000 0000 0000 0000	0000 H
2	Function Selection2	0000 0000 0000 0000	0000 H
4	Command Unit	pulse	-
5	Number of Decimal Places	3	-
6	Command Units per Revolution	10000	Cmd Unit
8	Gear Ratio[MOTOR]	1	rev
9	Gear Ratio[LOAD]	1	rev
10	Maximum Value of Rotary Counter(POSMAX)	360000	Cmd Unit
12	Forward Software Limit	2147483647	Cmd Unit
14	Reverse Software Limit	-2147483648	Cmd Unit
16	Backlash Compensation	0	Cmd Unit
30	Encoder Type	Incremental	-
34	Rated Speed	3000	min-1
36	Encoder Resolution	65536	pulse/rev
38	Max. Revolutions of Absolute Encoder	65534	rev
42	Feedback Speed Movement Averaging time cor	10	ms

Detail

Function Selection1

Axis Type	○ Rotary	● Linear
Forward Soft Limit Enabled	○ Enable	● Disable
Reverse Soft Limit Enabled	○ Enable	● Disable
Positive Over Travel	○ Enable	● Disable
Negative Over Travel	○ Enable	● Disable
Segment Distribution Processing	○ Disable	● Enable
Simple ABS Infinite Axis	○ Enable	● Disable
User Constants Self-Writing Function	● Disable	○ Enable

From the SVB set up (for Mechatrolink II, enabled axis only) in module configuration open the details of "Function Selection 1"

Be sure to Disable the self user Constants self writing Function. This must be done for each axis included in any group definition.

RULES

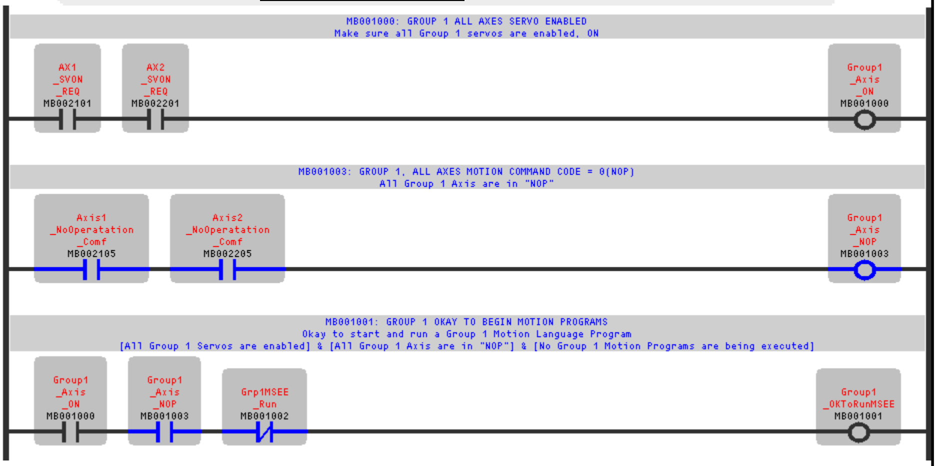
BEFORE A MOTION PROGRAM START
DURING A MOTION PROGRAM RUN
AFTER THE MOTION PROGRAM IS STOPPED

RULES

BEFORE the start

- Make sure all group axis servos are ON
- Make sure all group axis are in “NOP” (no operation) mode
- Make sure, for the specified group no motion program is running.
- No Alarms exist for any motion program in the specified group.

RULES
BEFORE the start



MB001000: GROUP 1 ALL AXES SERVO ENABLED
Make sure all Group 1 servos are enabled, ON

MB001003: GROUP 1, ALL AXES MOTION COMMAND CODE = 0(NOP)
All Group 1 Axis are in "NOP"

MB001001: GROUP 1 OKAY TO BEGIN MOTION PROGRAMS
Okay to start and run a Group 1 Motion Language Program
[All Group 1 Servos are enabled] & [All Group 1 Axis are in "NOP"] & [No Group 1 Motion Programs are being executed]

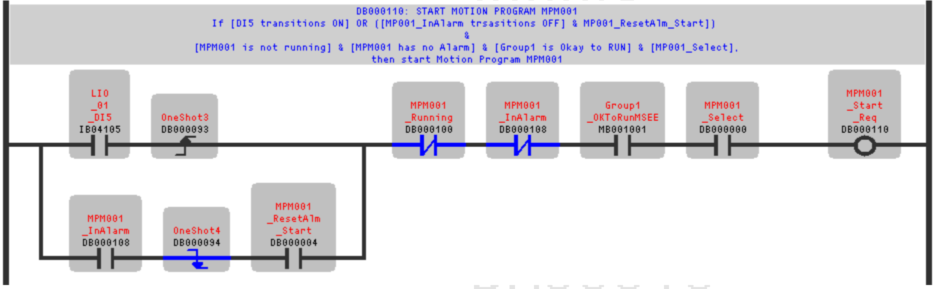
AX1 _SVON _REQ MB002101
AX2 _SVON _REQ MB002201
Group1 _Axis _ON MB001000
Axis1 _NoOperatation _Comf MB002105
Axis2 _NoOperatation _Comf MB002205
Group1 _Axis _NOP MB001003
Group1 _Axis _ON MB001000
Group1 _Axis _NOP MB001003
Grp1MSEE _Run MB001002
Group1 _OKToRunMSEE MB001001

RULES
BEFORE the start

Make sure no Motion programs in that group are running.

Make sure the Motion Program you want to start has no alarm.

Make sure the Motion Program you want to start is not running.



DB000110: START MOTION PROGRAM MPM001
If [DI5 transitions ON] OR ([MP001_InAlarm trsasitions OFF] & MP001_ResetAlm_Start])
&
[MPM001 is not running] & [MPM001 has no Alarm] & [Group1 is Okay to RUN] & [MP001_Select],
then start Motion Program MPM001

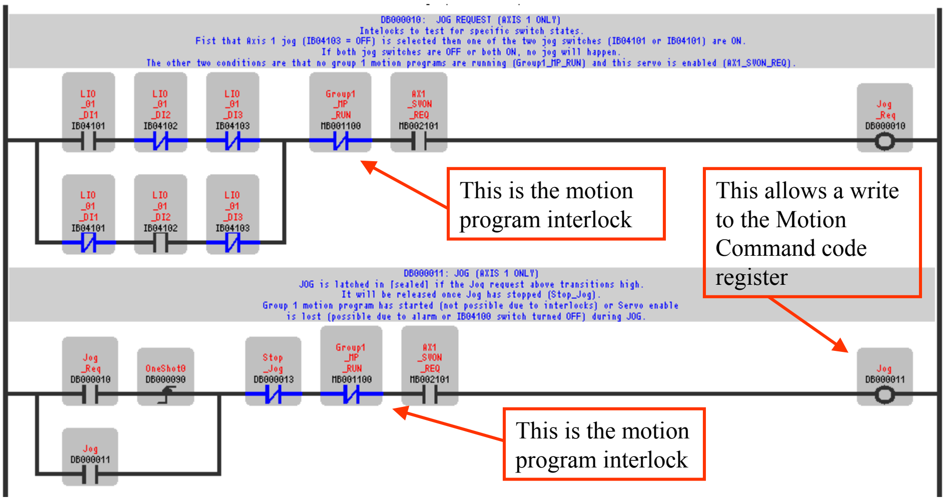
Make sure all servos are ON and Motion Command code is zero to all group axis.

Make sure that last time the Motion Program was stopped the alarm was cleared.

RULES
<u>DURING</u> the run

- Make sure interlocks exist that keep the ladder code from writing to <u>any</u> group axis output registers.

RULES
<u>DURING</u> the run



DB000010: JOG REQUEST (AXIS 1 ONLY)
Intelocks to test for specific switch states.
Fist that Axis 1 jog (IB04103 = OFF) is selected then one of the two jog switches (IB04101 or IB04101) are ON.
If both jog switches are OFF or both ON, no jog will happen.
The other two conditions are that no group 1 motion programs are running (Group1_MP_RUN) and this servo is enabled (AX1_SVON_REQ).

DB000011: JOG (AXIS 1 ONLY)
JOG is latched in [sealed] if the Jog request above transitions high.
It will be released once Jog has stopped (Stop_Jog).
Group 1 motion program has started (not possible due to interlocks) or Servo enable
is lost (possible due to alarm or IB04100 switch turned OFF) during JOG.

This is the motion program interlock

This allows a write to the Motion Command code register

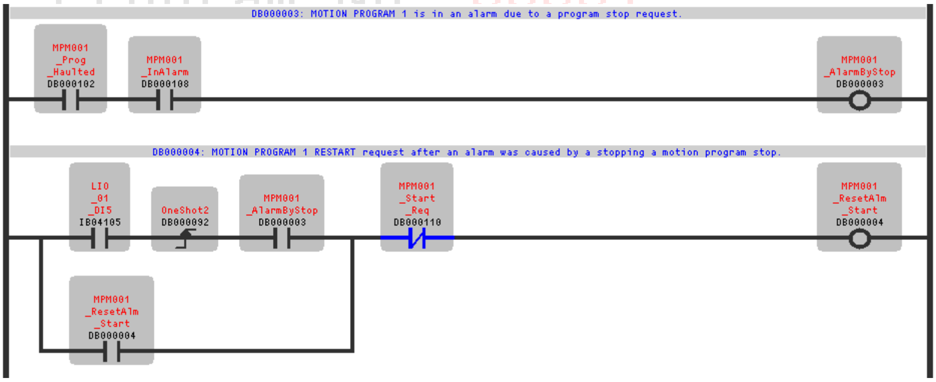
This is the motion program interlock

RULES - STOPPING

- Be sure to expect an alarm after stopping a motion program that was running continuously.
- Include logic to clear the alarm that occurs.

RULES – STOPPING

Be sure to expect an alarm after stopping a motion program that was running continuously.



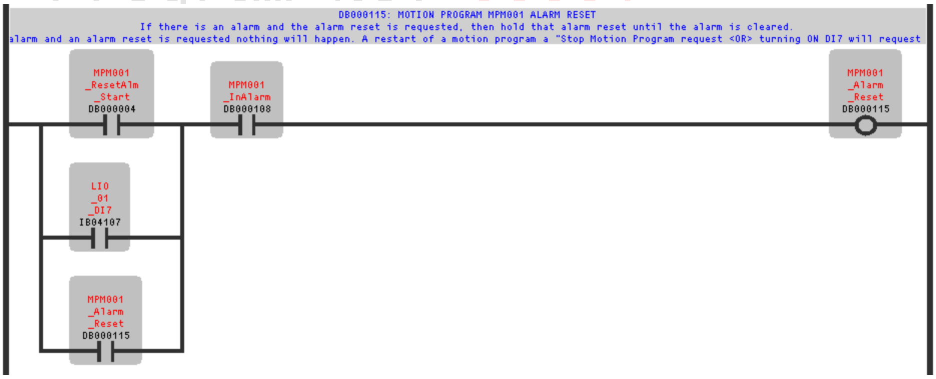
DB000003: MOTION PROGRAM 1 is in an alarm due to a program stop request.

DB000004: MOTION PROGRAM 1 RESTART request after an alarm was caused by a stopping a motion program stop.

MPM001 _Prog _Haulted DB000102
MPM001 _InAlarm DB000108
MPM001 _AlarmByStop DB000003
LIO _01 _DI5 IB04105
OneShot2 DB000092
MPM001 _AlarmByStop DB000003
MPM001 _Start _Req DB000110
MPM001 _ResetAlm _Start DB000004
MPM001 _ResetAlm _Start DB000004

RULES – STOPPING

Include logic to clear the alarm that occurs.



DB000115: MOTION PROGRAM MPM001 ALARM RESET

If there is an alarm and the alarm reset is requested, then hold that alarm reset until the alarm is cleared.

alarm and an alarm reset is requested nothing will happen. A restart of a motion program a "Stop Motion Program request <OR> turning ON DI7 will request