MNEMONIC	Function: Setup I/O Points 1 - 4	
S1-S4	Type: I/O Instruction	
	Usage: P/I, R/W	
	Syntax: S<1-4>=<type>,<active>,<sink/source>	Related: I1-4, IN, O1-4, OT, D1-D4

Description:

This instruction is used to setup the I/O type and active states, and sink/source setting for I/O points 1 - 4. Each of the device I/O points 1- 4 may be programmed as either general purpose inputs and outputs, or to one of nine dedicated input functions or one of two dedicated output functions.

When programmed as inputs, these points can be sinking or sourcing, and may be programmed such that they are active when pulled to ground, or active when left floating. By default each point is configured as a general purpose input, active when LOW.

There are three parameters attached to this instruction:

1) The type specifies the function of the I/O point (see tables - following page).
2) The second parameter sets the active state, which defines the point as (0 - Default) LOW or (1) HIGH ACTIVE.
3) The third parameter specifies whether the point will be (0 - Default) sinking or sourcing (1).
Please see the tables on the following page for a definition of all of the I/O type parameters.

Usage Example

```
S1=1,0,0    'Set IO1 to homing input, active when LOW, sinking
S2=4,1,1    'Set IO2 to be a G0 input active when HIGH, sourcing
S3=17,1,0   'Set IO3 to be a moving output, active when HIGH, Sinking
```

NOTE: Output Types are SINKING ONLY on Plus devices.

NOTE: Once set wait debounce time before using.

Refer to the Hardware Reference Section dealing with the I/O for the device purchased for more examples.

Input Functions					
Function	**Description**	**Parameter (S1-S4, S9-S12)**	**Active**	**Sink/Source**	
General Purpose	General Purpose Input function used to control program branches, subroutine calls or BCD functions when input bank is used as a group	0	0/1	0/1	
Home	Homing input. Will function as specified by the Home (HM) command.	1	0/1	0/1	
Limit +	Positive Limit Input. Will function as specified by the Limit (LM) Command.	2	0/1	0/1	
Limit −	Negative Limit Input. Will function as specified by the Limit (LM) Command.	3	0/1	0/1	
G0	G0 Input. Will run program located at address 1 on activation.	4	0/1	0/1	
Soft Stop	Soft Stop input. Stops motion with deceleration and stops program execution. Note that Soft Stop is Ignored if Pause is enabled.	5	0/1	0/1	
Pause	Pause/Resume program with motion.	6	0/1	0/1	
Jog +	Will Jog motor in the positive direction at Max. Velocity (VM). The Jog Enable (JE) Flag must be set for this to function.	7	0/1	0/1	
Jog −	Will Jog motor in the negative direction at Max. Velocity (VM). The Jog Enable (JE) Flag must be set for this to function.	8	0/1	0/1	
Reset	When set as RESET input, then the action is equivalent to a ^C entered into a terminal. Note: If setting the input to sourcing, active true, ground the input first or a reset will occur.	11	0/1	0/1	

Output Functions					
Function	Description	Parameter (S1-S4, S9-S12)	Active	Sink/Source
General Purpose User	A general purpose output can be set in a program or in immediate mode to trigger external events. When used as a group they can be a BCD output.	16	0/1	0/1
Moving	Will be in the Active State when the motor is moving.	17	0/1	0/1
Fault	Will be in the Active State when a error occurs. See Software Manual for error code listing.	18	0/1	0/1
Stall	Will be in the Active State when a stall is detected. Encoder Required, Stall Detect Mode (SM) must be enabled.	19	0/1	0/1
Velocity Changing	Will be in the Active State when the velocity is changing. Example: during acceleration and deceleration.	20	0/1	0/1
Moving To Position	Will be in an active state while moving to an absolute position.	23	0/1	0/1

Table 3.4: I/O Types and Settings

Output Circuit Conditions

S1=16,1,0	O1 = 1 (Sink OFF, High Impedance)
Output, Active High, Sinking	O1 = 0 (Sink ON)
S1=16,0,0	O1 = 1 (Sink ON)
Output, Active Low, Sinking	O1 = 0 (Sink OFF, High Impedance)
S1=16,1,1 (Plus[2] Only)	O1 = 1 (Source ON)
Output, Active High, Sourcing	O1 = 0 (Source OFF, High Impedance)
S1=16,0,1 (Plus[2] Only)	O1 = 1 (Source Source OFF, High Impedance)
Output, Active Low, Sourcing	O1 = 0 (Source ON)

Table 3.5: Output Circuit Conditions

MNEMONIC **S5**	Function: Setup I/O Point 5 (Analog Input)	
	Type: Instruction	
	Usage: P/I, R/W	
	Syntax: S5=<type>,<0/1>	Related: I5, JE

Description:

This I/O point configures the analog input reference as either a current or voltage source. The value of this input will be read using the I5 instruction, which has a range of 0 to 1023, where 0 = 0 volts and 1023 = 5.0 volts. The device may also be configured for a 4 to 20 mA or 0 to 20 mA Analog Input (S5 = 10).

The second parameter specifies the voltage/current range:

0 (default) = 0-5 VDC/0-20 mA

1= 0-10 VDC/4-20 mA

Ranges if setting S5 as 0 - 20 mA: Resolution 0 - 1023

Ranges if Setting S5 as 4 - 20 mA: Resolution 0 - 800

Usage Example

```
S5=9,0     'Analog Input set to voltage reference, 0-5 VDC (Default)
S5=9,1     'Analog Input set to voltage reference, 0-10 VDC
S5=10,0    'Analog Input set to current reference, 0-20 mA
S5=10,1    'Analog Input set to current reference, 4-20 mA
```

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MNEMONIC **LM**	Function: Limit Stop Mode	Units: Modes
	Type: I/O Variable	Range: 1-6
	Usage: P/I, R/W	Default: —
	Syntax: LM=<1-6>	Related: H,I, HM, JE, MA, MR, SL

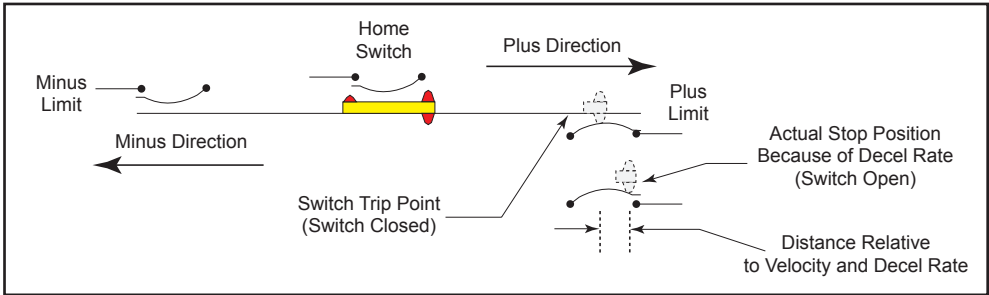See Description and Examples on Following Page

Figure 3.2: Limit Mode Operation

Description:

The LM variable specifies the Limit Stop Mode for the MCode compatible device. There are six LM modes. They are as follows.

LM=1: Normal Limit function with a decel ramp.

The I/O must be set for Limits (S1-S4, S9-S12 Command). If the limit switch in the direction of travel is reached, the motion will decel to a stop. That is, the plus limit works only in the plus direction of travel and the minus limit works only in the minus direction of travel.

In the illustration above, the Limit is activated at a given position but because of the deceleration rate the motion continues for the duration of the deceleration time. This position may be beyond the trip point of the limit and a subsequent move in the same direction will not stop. A crash may be imminent. If the limit is activated and maintained the software will allow motion _only_ in the opposite direction. If Homing (HM) is active and a limit is reached, the motion will decel to a stop and then reverse direction and seek the Homing Switch. If the Homing Switch is not activated on the reverse and the opposite limit is reached all motion will stop with a decel ramp. (See HM)

LM=2: A Limit stops all motion with a deceleration ramp but no Homing.

LM=3: A Limit will stop all motion with a deceleration ramp and stop program execution.

LM=4: Functions as LM=1 but with no deceleration ramp.

LM=5: Functions as LM=2 but with no deceleration ramp.

LM=6: Functions as LM=3 but with no deceleration ramp.

Note the MT, Motor Settling Delay Time will be applied upon LM.

Usage Example

```
LM=2    'Set Limit stop with a decel ramp, no homing.
```

MNEMONIC **LR**	For Internal IMS Use Only: Will return an error if used. Do Not use for a program label or user variable or flag.