

X/Y Pick and Place Application

The following program example is written to control a two axes “pick and place” machine using AMS step motor controllers. This particular example uses two MAX-410’s (or one MAX 420).

The object is for a better understanding of how to control two axes using the non-volatile memory and the input/output ports of the MAX-410. After programming, no computer or external program is required.

This program utilizes the following commands:

- 1) The auto start sequence.
- 2) The A command for turning ports on or off.
- 3) The F (Find Home) command.
- 4) The W (Wait) command.
- 5) The T (Trip Point) command.
- 6) The k (Trip Output Value) command.
- 7) The O (Origin) command.
- 8) The G2048 (Special Case “Go”) command.
- 9) The + (Plus Index) and (Minus Index) commands.

The MAX-410’s need to be wired as follows (see page 7):

- 1) A home switch for each axis.
- 2) Output port 4 of the Y-axis needs to be wired to input port 1 of the X-axis.
- 3) Output port 4 of the X-axis needs to be wired to input port 2 of the Y-axis.
- 4) A Go switch must be wired up to the Y-axis.
- 5) Output port 5 of the Y-axis needs to be wired to input port 2 of the X-axis.
- 6) Output port 5 of the X-axis needs to be wired to input port 3 of the Y-axis.
- 7) Output Port 6 of the X-axis needs to be wired to input Port 3 of the X-axis and to input port 1 of the Y-axis.

Program Example: (one axis will be named X the other named Y).

- 1) In dumb terminal mode for the X-axis type in the following:

<u>Command</u>	<u>Comment</u>
P0 <CR>	Start programming at location 0.
F5000 0 <CR>	Find Home.
-2000 <CR>	Back off home 2000 steps.
A8 <CR>	Turn on output port 4.
W5 <CR>	Wait 5 mS.
A0 <CR>	Turn off all ports.
O0 <CR>	Set origin to 0.
T -35000 <CR>	Set trip point for -35000 steps.
k32 <CR>	Turn on output port 6 when at the trip point.
G2048 <CR>	Start watching input ports for a low condition.
P0 <CR>	Exit program mode.

P30	<CR>	Start programming at location 30.
-10000	<CR>	Move -10000 steps.
A16	<CR>	Turn on output port 5.
W5	<CR>	Wait 5 mS.
A0	<CR>	Turn off all ports.
G2048	<CR>	Start watching input ports for a low condition.
P0	<CR>	Exit program mode.
P55	<CR>	Start programming at location 55.
G2048	<CR>	Start watching input ports for a low condition.
P0	<CR>	Exit program mode.
P256	<CR>	Address for all input ports high of Branch Command.
G2048	<CR>	Start watching input ports for a low condition.
P0	<CR>	Exit program mode.
P272	<CR>	Address for input port 1 low of Branch Command.
G55	<CR>	Tell the controller to start program at location 55.
P0	<CR>	Exit program mode.
P288	<CR>	Address for input port 2 of Branch Command.
G30	<CR>	Tell the controller to start program at location 30.
P0	<CR>	Exit program mode.
P304	<CR>	Address for input ports 1 and 2 low of Branch Command.
G2048	<CR>	Start watching input ports for a low condition.
P0	<CR>	Exit program mode.
P320	<CR>	Address for input port 3 of Branch Command.
A0	<CR>	Turn off all ports.
G0	<CR>	Tell the controller to start program at location 0.
P0	<CR>	Exit program mode.
P336	<CR>	Address for input ports 1 and 3 low of Branch Command.
G2048	<CR>	Start watching input ports for a low condition.
P0	<CR>	Exit program mode.
P352	<CR>	Address for input ports 2 and 3 low of Branch Command.
G2048	<CR>	Start watching input ports for a low condition.
P0	<CR>	Exit program mode.
P368	<CR>	Address for input ports 1,2,and 3 low of Branch Command.
G2048	<CR>	Start watching input ports for a low condition.
P0	<CR>	Exit program mode.

P384 <CR> Address for input port 4 low of Branch Command.
G2048 <CR> Start watching input ports for a low condition.
P0 <CR> Exit program mode.

P400 <CR> Address for input ports 1 and 4 low of Branch Command.
G2048 <CR> Start watching input ports for a low condition.
P0 <CR> Exit program mode.

P416 <CR> Address for input ports 2 and 4 low of Branch Command.
G2048 <CR> Start watching input ports for a low condition.
P0 <CR> Exit program mode.

P432 <CR> Address for input ports 1,2 and 4 low of Branch Command.
G2048 <CR> Start watching input ports for a low condition.
P0 <CR> Exit program mode.

P448 <CR> Address for input ports 3 and 4 low of Branch Command.
G2048 <CR> Start watching input ports for a low condition.
P0 <CR> Exit program mode.

P464 <CR> Address for input ports 1,3 and 4 low of Branch Command.
G2048 <CR> Start watching input ports for a low condition.
P0 <CR> Exit program mode.

P480 <CR> Address for input ports 2, 3 and 4 low of Branch
Command.
G2048 <CR> Start watching input ports for a low condition.
P0 <CR> Exit program mode.

P496 <CR> Address for all input ports low of Branch Command.
G2048 <CR> Start watching input ports for a low condition.
P0 <CR> Exit program mode.

P1600 <CR> Start programming at address 1600.
G55 <CR> Tell the controller to start program at location 55.
P0 <CR> Exit program mode.

2) In dumb terminal mode for the Y-axis type in the following:

<u>Command</u>	<u>Comment</u>
P25 <CR>	Start programming at location 25.
F5000 0 <CR>	Find Home.
-2000 <CR>	Back off home 2000 steps.
W0 <CR>	Wait for movement to stop.
A8 <CR>	Turn on output port 4.
W5 <CR>	Wait 5 mS.
A0 <CR>	Turn off all ports.
G2048 <CR>	Start watching input ports for a low condition.
P0 <CR>	Exit program mode.
P50 <CR>	Start programming at location 50.
-8000 <CR>	Move -8000 steps.
W500 <CR>	Wait 500 mS.
+8000 <CR>	Move +8000 steps.
W0 <CR>	Wait until move is finished.
A16 <CR>	Turn on output port 5.
W5 <CR>	Wait 5 mS.
A0 <CR>	Turn off all ports.
G2048 <CR>	Start watching input ports for a low condition.
P0 <CR>	Exit program mode.
P256 <CR>	Address for all input ports high of Branch Command.
G2048 <CR>	Start watching input ports for a low condition.
P0 <CR>	Exit program mode.
P272 <CR>	Address for input port 1 of Branch Command.
G25 <CR>	Tell the controller to start program at location 25.
P0 <CR>	Exit program mode.
P288 <CR>	Address for input port 2 of Branch Command.
-8000 <CR>	Move -8000 steps then wait until user presses Go Switch.
P0 <CR>	Exit program mode.
P0 <CR>	Start programming at location 0.
+8000 <CR>	Move +8000 steps.
W0 <CR>	Wait until move is finished.
A16 <CR>	Turn on output port 5.
W5 <CR>	Wait 5 mS.
A0 <CR>	Turn off all ports.
G2048 <CR>	Start watching input ports for a low condition.
P0 <CR>	Exit program mode.

P304	<CR>	Address for input ports 1 and 2 low of Branch Command.
G2048	<CR>	Start watching input ports for a low condition.
P0	<CR>	Exit program mode.
P320	<CR>	Address for input port 3 of Branch Command.
G50	<CR>	Tell the controller to start program at location 50.
P0	<CR>	Exit program mode.
P336	<CR>	Address for input ports 1 and 3 low of Branch Command.
G2048	<CR>	Start watching input ports for a low condition.
P0	<CR>	Exit program mode.
P352	<CR>	Address for input ports 2 and 3 low of Branch Command.
G2048	<CR>	Start watching input ports for a low condition.
P0	<CR>	Exit program mode.
P368	<CR>	Address for input ports 1,2,and 3 low of Branch Command.
G2048	<CR>	Start watching input ports for a low condition.
P0	<CR>	Exit program mode.
P384	<CR>	Address for input port 4 low of Branch Command.
G2048	<CR>	Start watching input ports for a low condition.
P0	<CR>	Exit program mode.
P400	<CR>	Address for input ports 1 and 4 low of Branch Command.
G2048	<CR>	Start watching input ports for a low condition.
P0	<CR>	Exit program mode.
P416	<CR>	Address for input ports 2 and 4 low of Branch Command.
G2048	<CR>	Start watching input ports for a low condition.
P0	<CR>	Exit program mode.
P432	<CR>	Address for input ports 1,2 and 4 low of Branch Command.
G2048	<CR>	Start watching input ports for a low condition.
P0	<CR>	Exit program mode.
P448	<CR>	Address for input ports 3 and 4 low of Branch Command.
G2048	<CR>	Start watching input ports for a low condition.
P0	<CR>	Exit program mode.
P464	<CR>	Address for input ports 1,3 and 4 low of Branch Command.
G2048	<CR>	Start watching input ports for a low condition.
P0	<CR>	Exit program mode.

P480	<CR>	Address for input ports 2, 3 and 4 low of Branch Command.
G2048	<CR>	Start watching input ports for a low condition.
P0	<CR>	Exit program mode.
P496	<CR>	Address for all input ports low of Branch Command.
G2048	<CR>	Start watching input ports for a low condition.
P0	<CR>	Exit program mode.
P1600	<CR>	Start programming at address 1600.
G25	<CR>	Tell the controller to start program at location 25.
P0	<CR>	Exit program mode.

The program is now complete.

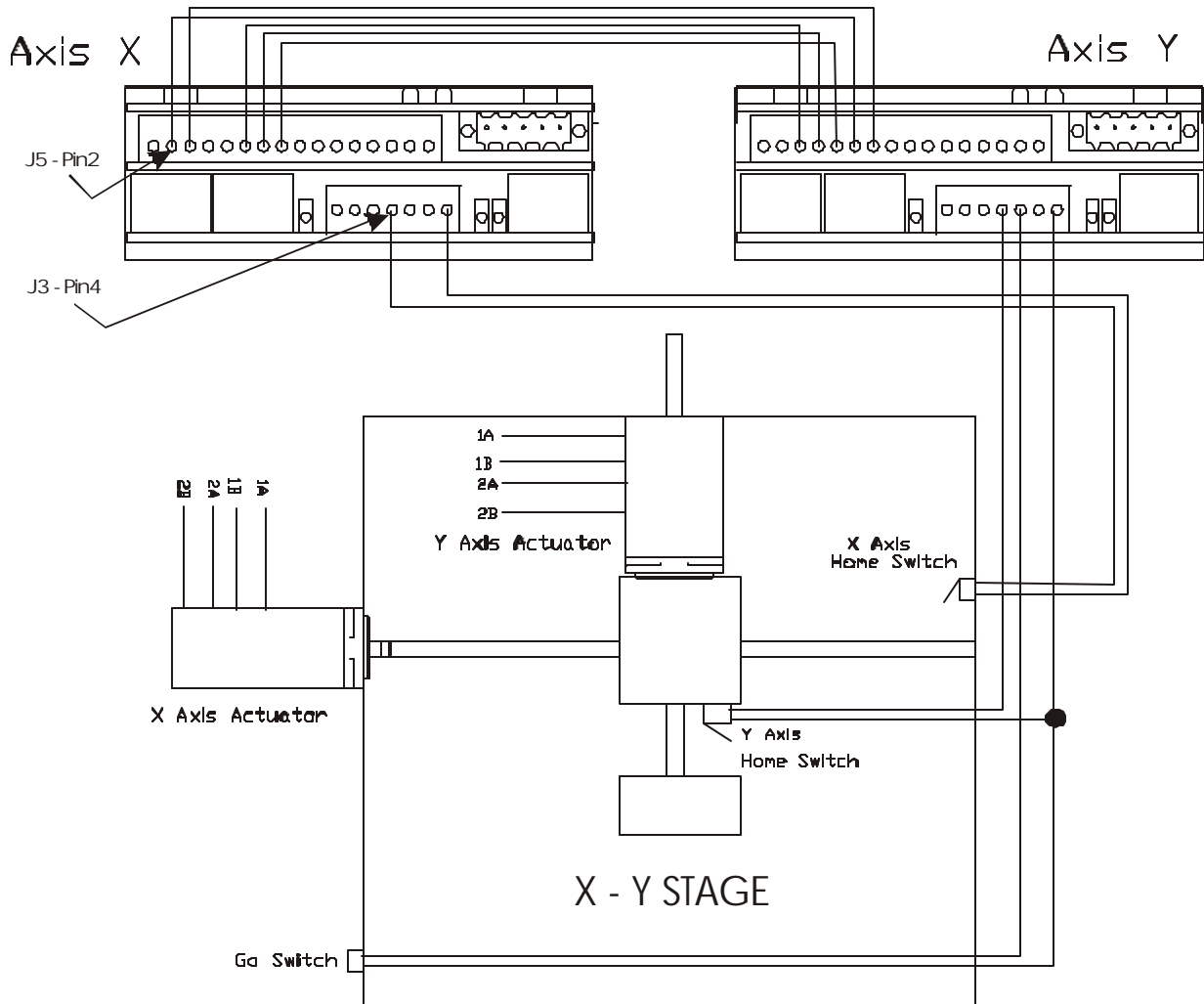
When you turn on both controllers simultaneously, the following movements will occur:

- 1) The Y-axis will go to its home position then wait for an input.
- 2) The X-axis will go to its home position then wait for an input.
- 3) The Y-axis will move -8000 steps then both will wait until the Go switch is activated.

After the Go switch is activated the following movements will occur:

- 1) The Y-axis will move +8000 steps.
- 2) The X-axis will move -10000 steps.
- 3) The Y-axis will move -8000 steps
- 4) The Y-axis will wait 500 mS.
- 5) The Y-axis will move +8000 steps.
- 6) Steps 1 through 5 will repeat until the Trip point, set at -35000 is hit, then the entire procedure re-starts.

MAX-410 Front Panel Connectors



Wiring Legend	
From	To
Axis X J5-2	Axis Y J5-6
Axis X J5-3	Axis Y J5-7
Axis X J5-6	Axis Y J5-3
Axis X J5-7	Axis Y J5-4
Axis X J5-8	Axis Y J5-5
Axis X J3-4	Axis X Home Switch
Axis Y J3-4	Axis Y Home Switch
Axis Y J3-5	Go Switch
Axis X Home Switch	Ground
Axis Y Home Switch	Ground
Go Switch	Ground