USER MANUAL STP1-S02 and STP1-S03

Z-Motions
Intelligent Controllers and Drivers

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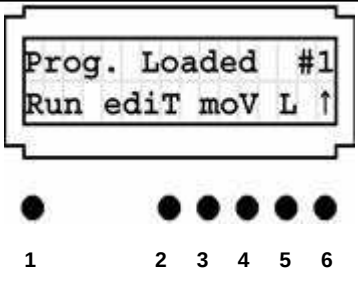
This Stand alone Stepper Motor Controller is a true stand alone controller; no computer or serial cable are required. There are no programming languages or codes to enter. Only 17 self-explain screens for you to enter NUMBER and YES or NO, it's very simple to use. So, let start to look at each of the screens.

S03 Main Screen :

When first turn on the controller, main screen will displays the program number of the last run before turned off. It then waits for you to select 1 of 5 options.

1. **RUN** a program (press button 1)
2. **EDIT** a program (press button 2 will go to screen 01)
3. **MOVE** manually to left or right (press



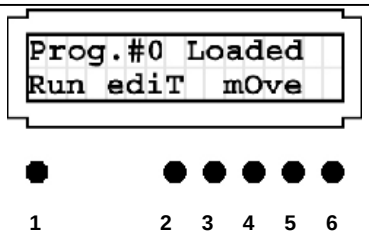
Notice the active buttons are under

button 4 will go to screen 20)
4. **LEARN** put the controller in smart LEARN mode (press button 5 will go to screen 21)
5. **Change** program number from 1 to 9 (press button 6)

the Capitalized letters (button 1, 2, 4, 5 and 6)

S02 Main Screen :

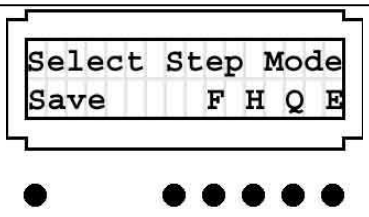
When first turn on the controller, main screen will displays the program number of the last run before turned off. It then waits for you to select 1 of 4 options.
1. **RUN** a program (press button 1)
2. **EDIT** a program (press button 2 will go to screen 02)
3. **MOVE** manually to left or right (press button 4 will go to screen 20)
4. **Change** program number from 1 to 9 (press button 6)



Notice the active buttons are under the Capitalized letters (button 1, 2, 4 and 6)

Screen #01: Not applied for S02

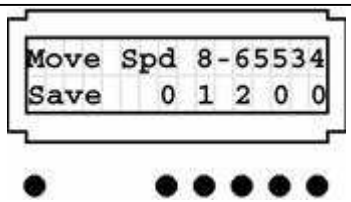
Press button under T for edit, then this screen will display. It allows you select 1 of four step modes.
F for full, **H** for half, **Q** for quarter and **E** for eight step. Two pins of the STP1-S03 (pin 7 & 6) will generate logic signal to direct control micro-step on the STP-D150 and STP-D250. See true table for logic.



If Microstep not use, MS1 & MS2 can be use as output pins.

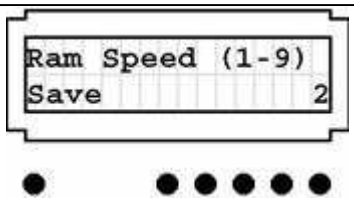
Screen #02:

Here you can enter Moving Speed.
Any speed from 8 to 65534. The number is relative to time, from 100 Hz up to 20 kHz. The smaller the number, the higher the speed. Experiment to get best speed for your system



Screen #03:

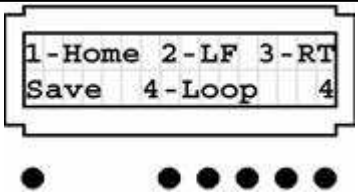
Enter Ramping speed from 1 to 9. 1 is the fastest and 9 is the slowest. The ramping STEP is automatic calculated by the moving speed. Usually you would select fast ramping speed for slow moving speed and slow ramping speed for fast moving speed (normally 2 to 4 on most system).



Experiment with different speed and select the speed that works best for your system.

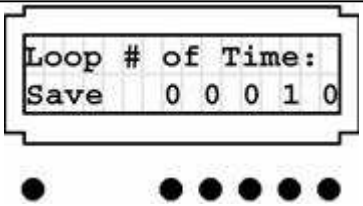
Screen #04:

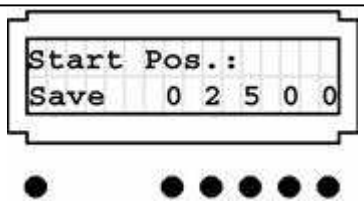
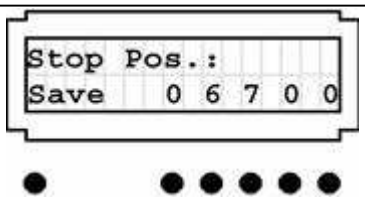
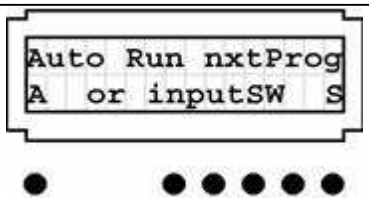
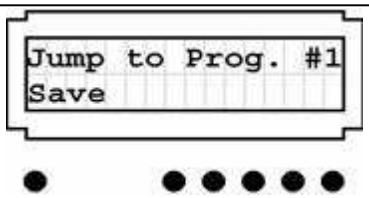
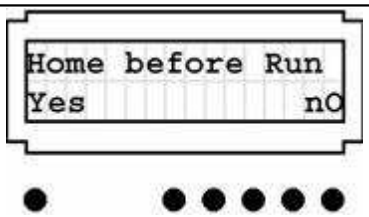
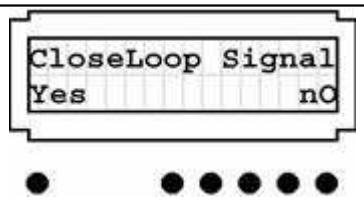
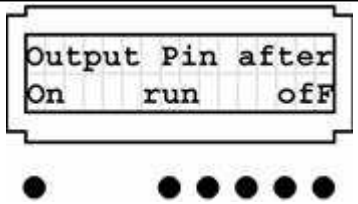
This screen gives you 4 selections for the movement.
1_ Move Head home
2_ Move Head to Left
3_ Move Head to Right
4_ Move Head in Continuous Loop
Enter your selection then press SAVE button



Screen #05:

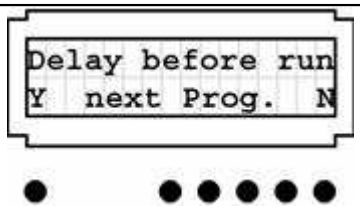
Enter number of time for looping (1 – 65534). Looping will move the head from start to stop then from stop to start number of times. You will have an option to choose whether OPEN-LOOP or CLOSED-LOOP on screen #11.



Screen #06: Enter Start-Position from 1 to 65534 for Move Left, move Right or Looping. Press SAVE when done	
Screen #07: Enter Stop-Position from 1 to 65534 for Move Left, move Right or Looping. Press SAVE when done	
Screen #08: **A** for **A**uto jump to next program and run. **S** to manually set the **S**witch combination. The switch combination will store in this program and will be comparing to the switch combination logic when this program stop. If the logic on the switches matches the combination stored in this program then next program will be load and run. Press **A** for auto and go to screen09.	 **Press S for manual and go to screen16.**
Screen #09: Jump to program #(1 – 9) and run after this program done. If you want next program to run after this program done then enter 1 to 9. If not then enter number 0, the program will stop when done. **Program #0 is not used; it's for entering ramping and moving speed when you want to move the Head manually with very slow speed for seeking an unknown Position.**	 **Any program from 1 to 9 can be a next program to jump, including itself.**
Screen #10: Enter Yes or No for this screen. Each program has an option whether Go-Home before Run or not. It's good practice to tell the controller to Go-Home before each RUN. **Note: It will always go to home position before Looping**.	
Screen #11: Close-Loop when you want the controller output Busy/Ready signal when it run; In return the system output ACK signal when it want the controller to run. If YES then the controller will wait for ACK (Low) signal from system. It will not run until ACK signal goes LOW on pin 1 of connector 1. If NO then the controller will run as soon as you press RUN button.	
Screen #12: One programmable Output-Pin can be set to Hi or LOW on this screen. Select On for Hi Select Off for LOW After program Run and the motor comes to stop, the controller will set this pin On or Off depends on this setup.	

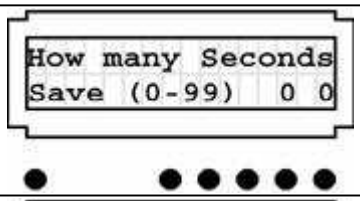
Screen #13: **Not applied for S02**

Some applications need a time delay before run next program. This screen allows entering Yes or No.
Press Yes to go to screen14 for enter time delay.
Press No for no delay and skip screen14.



Screen #14: Not applied for S02

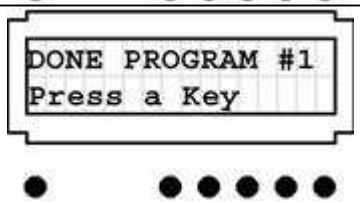
Enter number of second for time delay (0 – 99) before run next program.
Press Save when done.



Screen #15:

After all information's you have put in, the screen then prompts you that there is no more information needed.
Just press any button to go to main screen.

All input information is saving in the memory for future use.
Z-Motions designed this Controller to make complex programming be a simple task. User can enter all information in under one minute, while other controller may take hours.

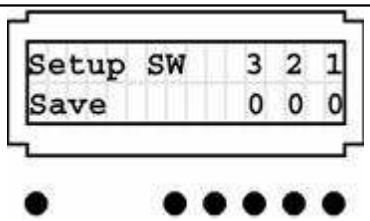


User question: Can other controller on the market program a program less than 1 minute with out a PC?
Z-Motions answer: No, they will need specific software in the PC and a serial cable, and an engineer to program the controller.

Screen #16:
This screen for Controller with option S.

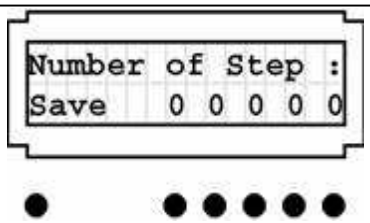
On screen #08 if press S you will get to this screen for setup switch combination. See true table below

SW3	SW2	SW1	
0	0	0	= 0
0	0	1	= 1
0	1	0	= 2
0	1	1	= 3
1	0	0	= 4
1	0	1	= 5
1	1	0	= 6
1	1	1	= 7



Screen #17:

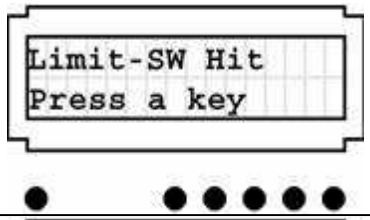
When select to move Left or move Right, The controller will ask you to input Number Of Step to move.
Just input a number between 1 and 65534
Then press SAVE. This will bring you back to screen # 05



Screen #18:

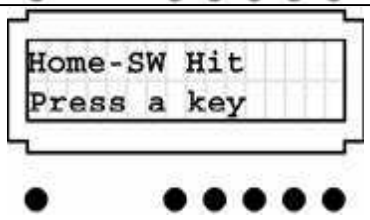
This screen display only when an error occurs. Such as during move from one position to another and the HEAD is hitting the Limit-Switch.

Press any key and correct the problem.



Screen #19:

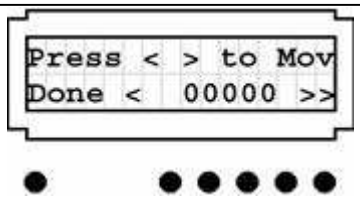
This screen display only when an error occurs. Such as during move from one position to another and the HEAD is hitting the Home-Switch.
Press any key and correct the problem.



Screen #20:

On this screen user can move the head left or right with the preprogrammed Move-Speed. User can move the head from home to end limit.

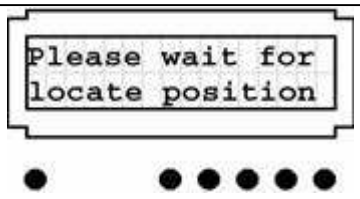
Press Done when finish to return to Main Screen.



Learning Mode Screens

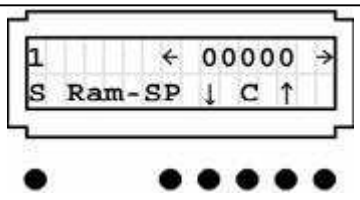
Screen #21: Not applied for S02

When press L from Main Screen, the controller will move the head to Home, than move the head to Start Position (using the information from current Program).



Screen #22: Not applied for S02

This is the 1st screen of Learn. It displays Ram-Speed (on the top left) and current position.
- Press Up arrow to increase Ram-Speed (1 to 9)
- Press Down arrow to decrease Ram-Speed (1 to 9)
- Press Right arrow to move the head to Right
- Press Left arrow to move the head to Left
- Press C (for **C**hange) to advance to next Learn screen (will be learn move-speed)
- Press S to save all information from learn for this program and return to screen1

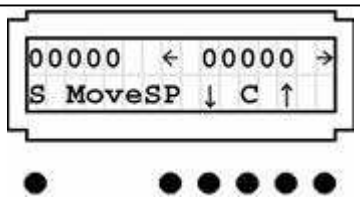


To save and quit Learn Mode press S. Note that S for save only allow on Ram-SP and MoveSP screen.

Note: Ram-SP, Move-SP, Start-Pos and Stop-Pos always displayed on 2nd line.

Screen #23: Not applied for S02

This screen displays Move-Speed (on the top left) and current position.
- Press Up arrow to increase Move-Speed (8 to 65534)
- Press Down arrow to decrease Move-Speed (8 to 65534)
- Press Right arrow to move the head to Right
- Press Left arrow to move the head to Left
- Press C (for **C**hange) to advance to next Learn screen (will be learn Start-Position)
- Press S to save all information's from learn for this program and return to Main Screen.

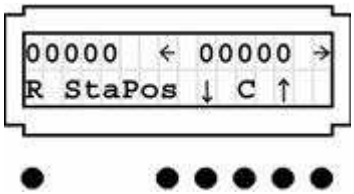


Note: The Move-Speed and Ram-Speed will take effect instantly. When you move the head the new Move-Speed Ram-Speed and is applied

Screen #24: Not applied for S02

This screen displays Start-Position (on the top left) and current position.

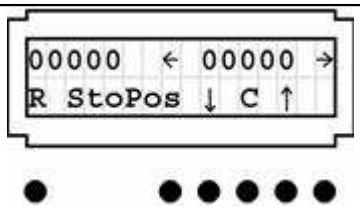
- Press Up arrow to increase Start-Position (8 to 65534)
- Press Down arrow to decrease Start-Position (8 to 65534)
- Press Right arrow to move the head to Right
- Press Left arrow to move the head to Left
- Press C to advance to next Learn screen (will be learn Stop-Position)
- Press R to **R**ecord new start position for this program



Note: The new Start-Position only saves when you press R. If you want to end Learning mode, you must go to Ram-Speed or Move-Speed. The S for save in Ram and Move speed allow you to press S and go to screen #01.

Screen #25: Not applied for S02

This screen displays Stop-Position (on the top left) and current position.
- Press Up arrow to increase Stop-Position (8 to 65534)
- Press Down arrow to decrease Stop-Position (8 to 65534)
- Press Right arrow to move the head to Right
- Press Left arrow to move the head to Left
- Press C to advance to next Learn screen (will be learn Ram-Speed)
- Press R to **R**ecord new stop position for this program

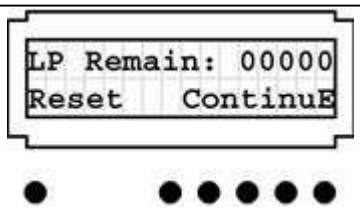


Note: The new Stop-Position only saves when you press R. If you want to end Learning mode, you must go to Ram-Speed or Move-Speed. The S for save in Ram and Move speed allow you to press S and go to screen #01.

Interactive Screens

Screen #26:

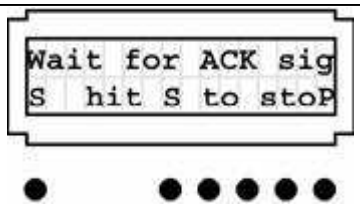
If, the STOP button was press during Looping, this screen will display. It gives you two options, whether **R**eset to stop or Continu**E** to loop where it stops. The remaining loop will not loose.
If Reset, it will go to screen #01 with previous program number and wait for button to press. If continue the head will go home, go to start-Pos. and continue with the previous loop number



Display remaining loop

Screen #27:

If you were selected Close-Loop Signal from screen11, then before running next program the controller will wait for ACK signal from the system. As soon as ACK signal appear on pin 1 of connector 1, the controller will output BUSY (Low) signal on pin 2, BUSY signal will stay LOW until the head reach Stop-Position. The system can do something, when the system done, it must bring ACK signal LOW for the controller to run next program. For any reasons you want to STOP. Press button 1 (under S) to stop.

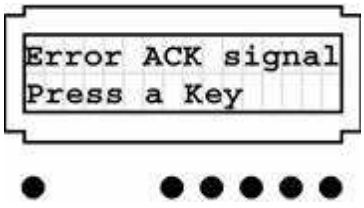


NOTE for S03: The controller is programmed for time-out after about 1 minute. It then displays error massage on screen #28.

NOTE for S02: The controller will wait for ACK signal to go LOW before it run next program. No time-out.

Screen #28:

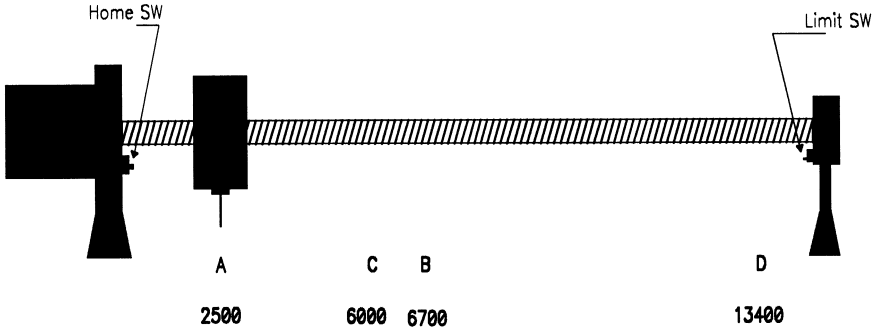
This screen only displays when the controller time-out from waiting for ACK signal. When

programmed to be Closed-Loop from screen #11, the controller is expected a LOW logic on ACK pin (pin 1 of connector 1) before it start to run next program.	 **Press any key to return to Main Screen and solve the problem.**

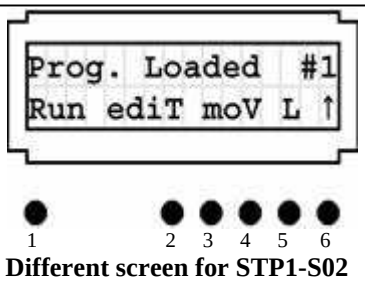
EXAMPLES

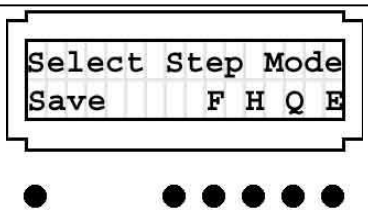
Let set up 2 programs that will do the following motions.

We want the drill to drills 10 holes at point A
and 10 holes at point B, then go HOME, go to C.
Drill 35 hole at C and 35 holes at D.

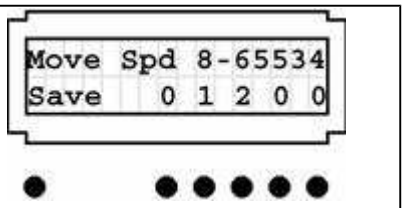


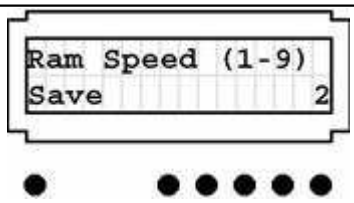
If, the controller is not ON, turn it on. We should see screen #01

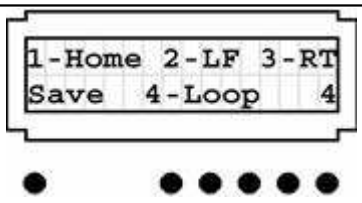
Program #x could be any number from 0 to 9, if this is the first time we turn on. Press on button #6 to change the program #x to 1. We will program our motions in program number 1 and program number 2. Press button under capital **T** for edi**T** (button 2). We will edit program #1 with new parameters	 **Different screen for STP1-S02**

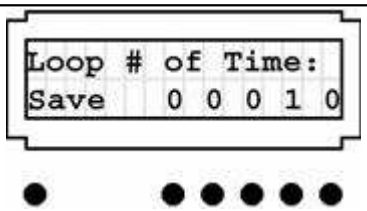
After press on button under **T** (for edi**T**) we will see this screen. It's asking user to select step-mode. For now, We will select Full Step. Depend on your application, you may choose Eight Step for smooth operation (on 1.8 degree stepper motor, one revolution equal 1,600 steps in Eight-step-mode).	

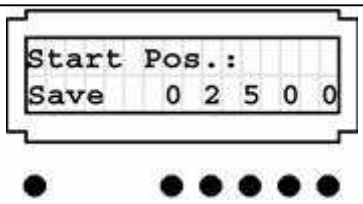
Press **Save** when done.	**Not applied for STP-S02**

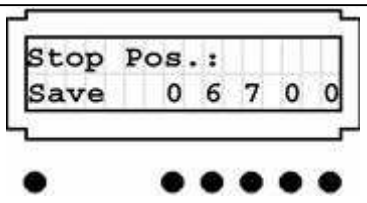
After press on button under **T** (for edi**T**) we will see this screen. It's asking for moving speed. We will put in 1200 (for starting we put 1200. You can chose different speeds, experiment with them to get the speed that run best for your system). Press **Save** when done.	

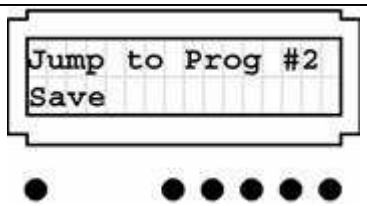
Use button 6 to enter Ramping Speed. For now, we will use 2 for Ramping. Ramping speed can vary from system to system; depend on moving speed, friction, mass and motor size. Keep in mind that; faster moving speed needs longer ramping time and slower moving speed need faster ramping time.	

In this example, we want the drill to move from A to B then from B to A 10 times. So, we will chose option #4 for Looping. Press button 6 until we see 4 at the right lower corner. Then press Save to go to next screen.	

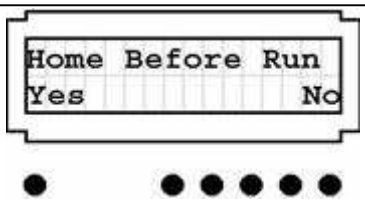
Input number 10 for 10 times. **Note**: When you press the button, the number increase upward. Keep press until the correct number display on the LCD. Press Save button to save into memory and go to next screen.	

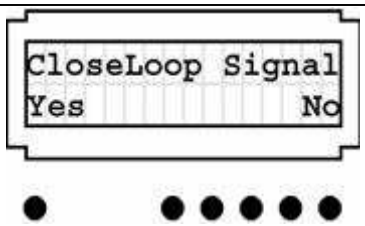
Now is time to put in Start-Position. Input number 2500 then press Save and go to next screen.	

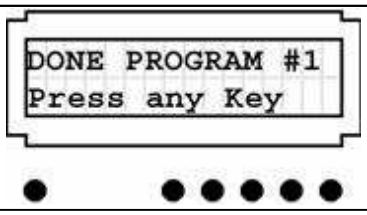
Input number 6700 for Stop-Position (at point B) Press Save and go to next screen.	

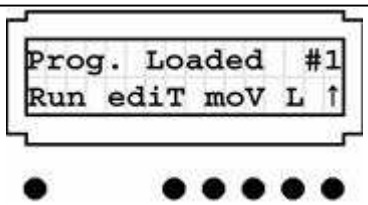
Now the controller is asking for what program will be jump to after program number 1 in done. Any program from 1 to 9 we can use (including it own) to jump to. In this case, we use program number 2 to hold the information to move the drill from C to D and from D to C 35 times. Press button 6 until we get #2. Press Save to	

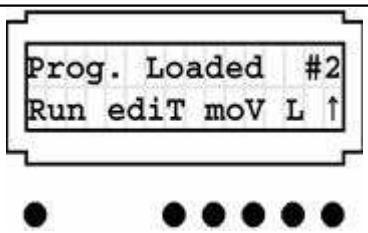
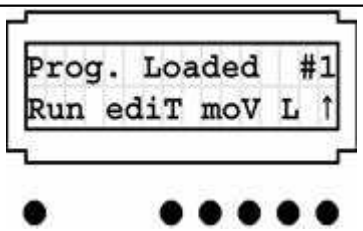
store program information in memory.	

This screen gives you an option of whether the drill should seek home position or not before run. It is good practice to let the drill go home before run, that way, the drill will go to same position every times.	

We will enter Yes for closed loop, because we want to let the system know that the drill is in position to drill. We Also want to have ACK signal to send back to the controller to tell the controller that's OK to move. Press button 1 for Yes.	

This screen lets you know you are about done programming program 1 and ask you to press any key. Press any key to go to Main Screen.	

Main Screen is HOME screen. Here, you can **RUN** a program, **EDIT** an existing program (or enter new program), **MOVE** manually or press **L** to put the controller into **LEARNING** mode. You can move the drill to any position from Home to end Limit. Use move feature to determine step position in number of step. For full step, each 2000 step is equal 1 inch. We already did enter program number 1 parameters. Next, we will enter information's for program number 2.	

Press button 6 to change from program 1 to program 2. Entering information of program number 2 in the same way as we enter information for program number 1. Let enter the following parameters for program number 2. Move speed = 2400, Ram speed = 3, 4 for Looping, Loop # of time = 35, Start-Pos = 4000, Stop-Pos = 5000, Jump to Prog #1, Home before Run = Yes, CloseLoop signal = Yes .	 **Different screen for STP1-S02**
After you enter all information, the controller will bring you back to Main Screen (different screen for STP1-S02). Press button 6 to change to Prog number 1 Press on button 1 for RUN. That is all. Programming the STP-S0X is so easy; each program should take about 1 minute.	 **Different screen for STP1-S02**

SPECIFICATIONS

ELECTRICAL

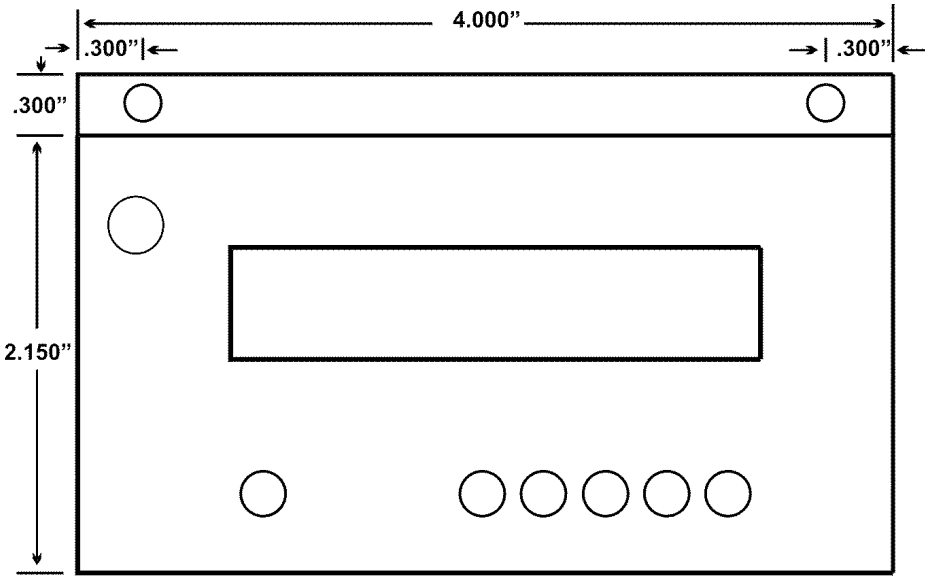
Input Voltage on pin 14 _____ + 5 VDC (+/- .5V)
Voltage on any pin with respect to GND _____ - .3V to (Vcc +.3V)

Maximum current Sourced or Sunk on any I/O pin _____ +/- 20mA
Maximum current Draw _____ 250mA
Step Frequency (Min) _____ 100 Hz
Step Frequency (Max) _____ 20 KHz

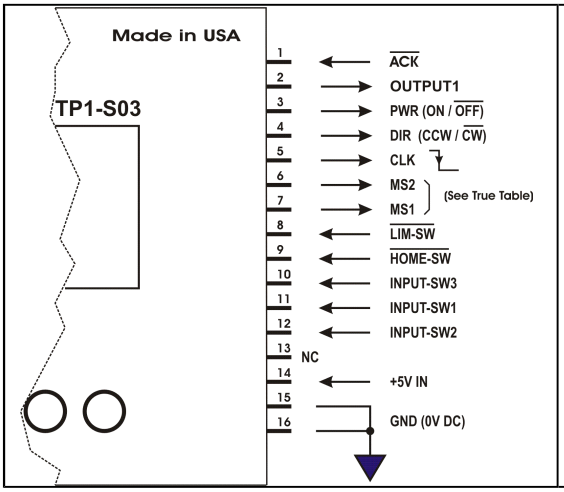
TEMPERATURE

Operating _____ 0^C to 50^C
Storage _____ - 20^C to 80^C

MECHANICAL DIMENSIONS



PIN FUNCTIONS FOR S03

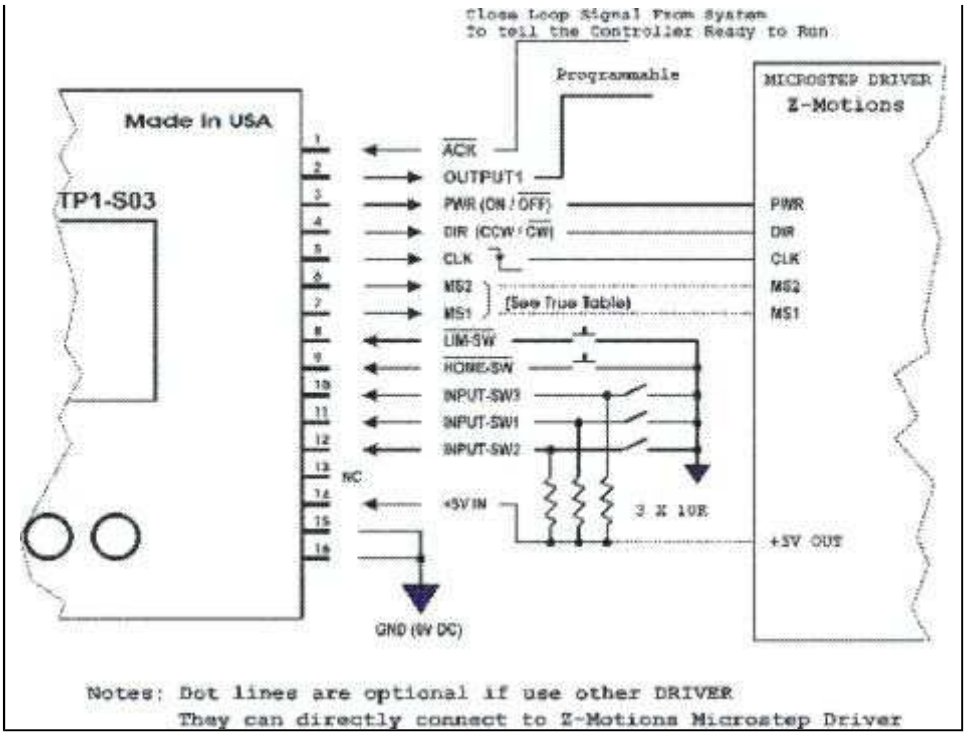


MS1 & MS2 True table

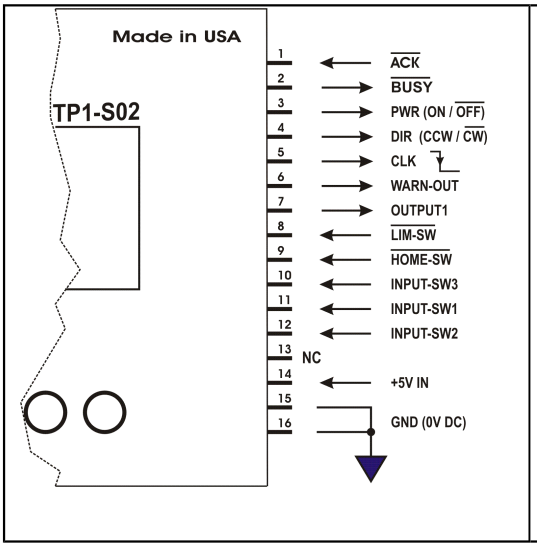
MS2	MS1	Step Mode
0	0	Full
0	1	Half
1	0	Quarter
1	1	Eight

For Input Switches see **Input SW True table next page.**

TYPICAL SYSTEM CONNECTIONS FOR S03



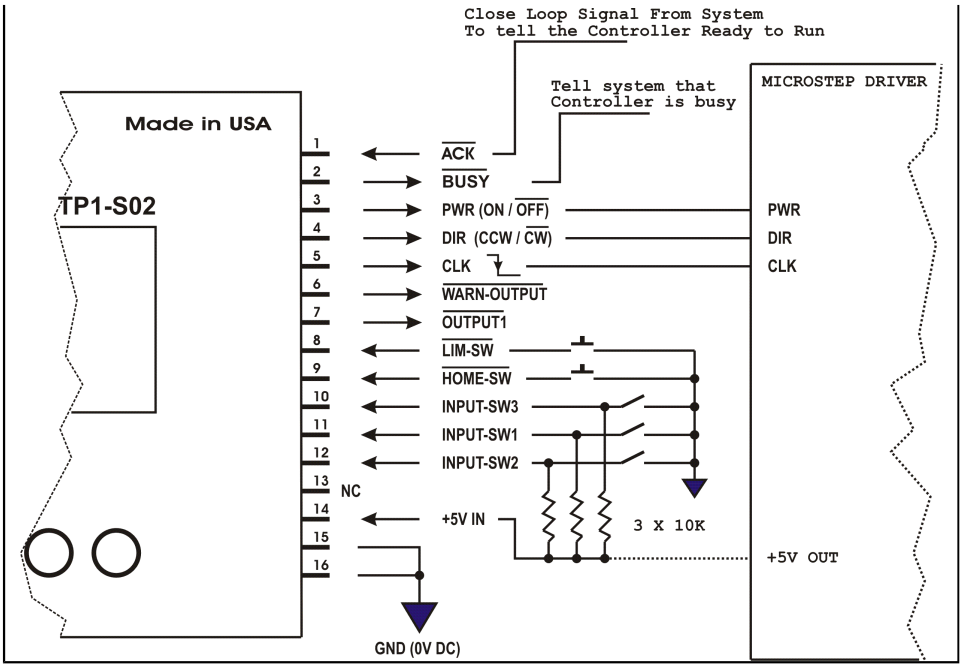
PIN FUNCTIONS FOR S02



Input SW True table

SW3	SW2	SW1	VALUE
0	0	0	0
0	0	1	1
0	1	0	2
0	1	1	3
1	0	0	4
1	0	1	5
1	1	0	6
1	1	1	7

TYPICAL SYSTEM CONNECTIONS FOR S02



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