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SERVO**STAR**® S600
Graphical Motion Tasking

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Introduction

Graphical Motion Tasking (GMT) is an advanced feature that lets you program the SERVO**STAR**® S600 as a single-axis positioner. You can command multiple motions, process I/O, make decisions, add time delays, and modify drive process variables. The environment is easy to use, allowing you to program in an intuitive flow-chart.

The SERVOSTAR S600 has supported motion Tasking (MT) since the product's introduction in 1998. In its original form, Motion Tasking supported only chained moves in sequences executed either once or in infinite loops. Graphical Motion Tasking extends the capabilities of Motion Tasking by adding new blocks for looping, comparing (<, =, >, etc.), calling functions, and setting process variables. Additionally, Graphical Motion Tasking adds a programming environment where motion programs are built by adding and connecting blocks on a palette. After creating a GMT program, the user downloads it into the S600.

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Graphical Motion Tasking (GMT) is not available in SERVOSTAR S600 firmware versions prior to version 5.53.

Option Card Installation

Graphical Motion Tasking requires that one of the following option cards be installed:

Extended I/O (OPT-EI)

Profibus (OPT-PB) DeviceNet (OPT-DN)

If no option card is installed, attempting to execute GMT programs with non-motion blocks generates an n08 Error on the SERVO**STAR** S600.

The n08 warning occurs only when running GMT. An option card is not required to program GMT.

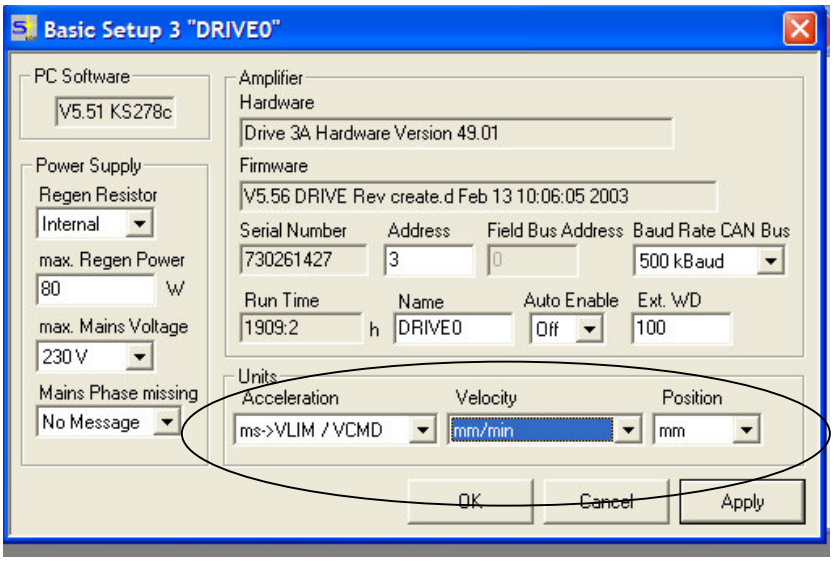
Programming Units, Machine Setup, Homing

The S600 required the following setup prior to executing a GMT application:

Select User Units

DO THIS FIRST. The units set in this screen will appear in other screens described in this application note.

User units are defined in the Basic Setup Screen in the Drive.exe Software. To access this screen click on the "Basic Setup" button on the main screen. Then select units for position, velocity and acceleration that will be used when creating motion task.

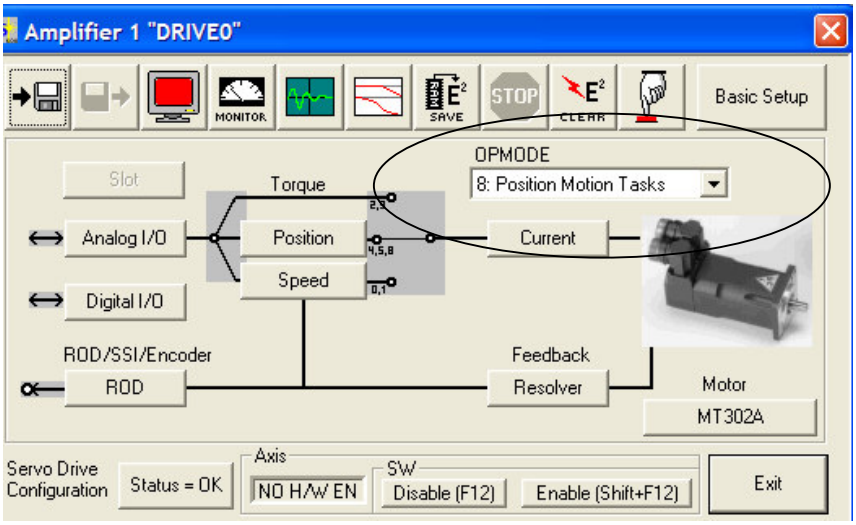


Note:

- In the Velocity and Acceleration Units the selections with “PUNIT” refer to the position units selected in the “Position” (incr, mm, mils, etc).
- For individual motion task the maximum number that can be entered for acceleration/deceleration is 15 bits (32766). Therefore applications with high acceleration rates will need to use acceleration units of “ms -->VCMD” where very high accelerations are possible (Example: value of 10 means the motor will accel from 0 rpm to commanded rpm in 10 msec).

Set Opmode

Set the Drive operating mode (OPMODE) in the main screen. The S600 must be in Opmode 8 (Motion Tasking) to run a GMT program



Machine Limits

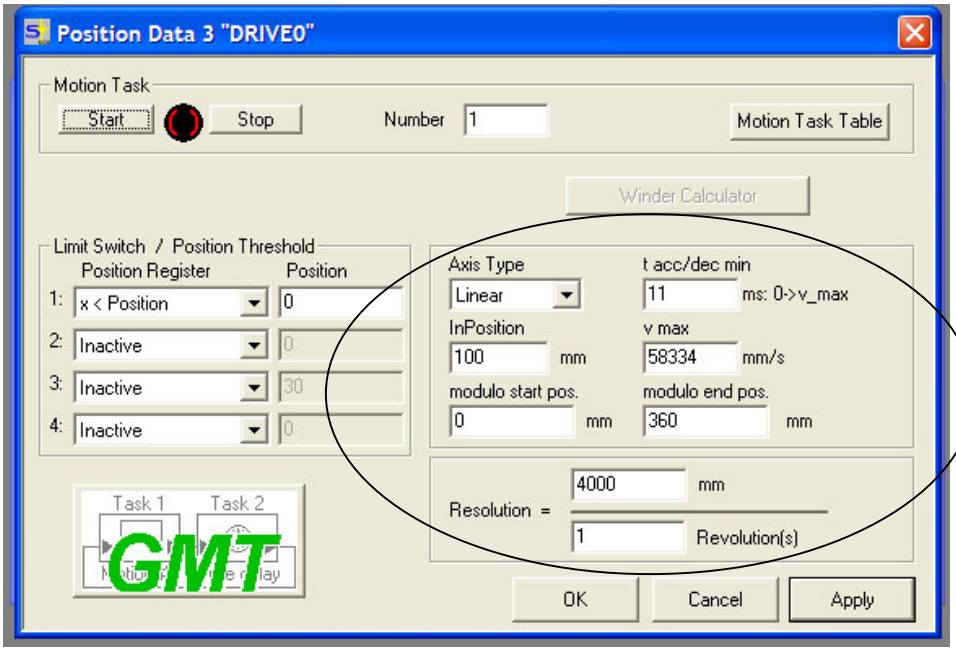
This screen sets up:

- The rotary to linear conversion of the machine. specifically it sets how much linear motion will there be per revolution of the motor.
- The max accel/decel rate allow by the machine. Note this parameter can either be in time (Displayed as: t acc/dec Min) or distance/time^2 (Displayed as: amax) depending on the acceleration units selected in the Basic Setup Screen.
- The max speed allowable by the machine.
- Axis type: Linear (used in most applications), Rotary, or Modulo. Linear is used in linear and most rotary motion applications. It requires that homing be done before other motion can occur. Rotary is a specific mode for applications requiring continuous motion in one

direction. Modulo mode (usually preferred to Rotary) sets up the limits of the feedback counter. These limits are determined by the modulo start position (SRND) and modulo End position (ERND). The position counter will automatically roll over to the start position once the end position is reached.

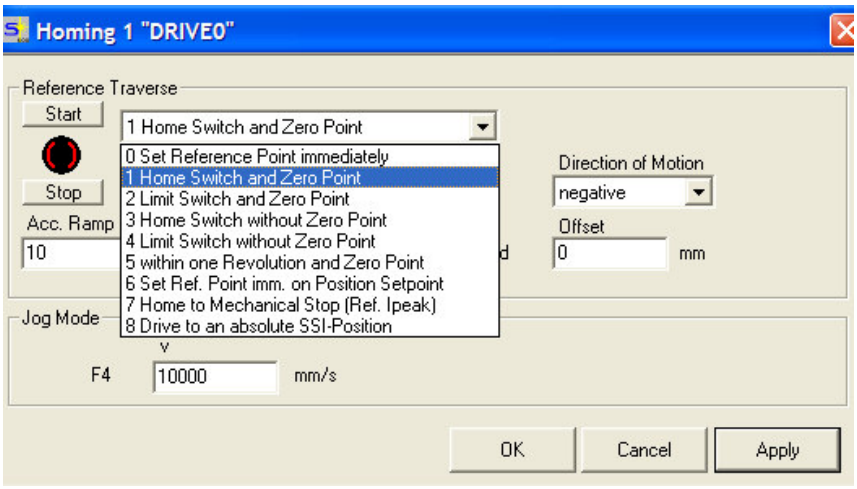
To access this screen, click on Position button on the main screen. Then click on Position data in when in the position screen

Note: It is Possible to set the accel/decel or speed of a motion block to a value higher than the limits set Position Data Screen but the motion task when run will not go above the limits set in this screen.



Homing (Reference Traverse)

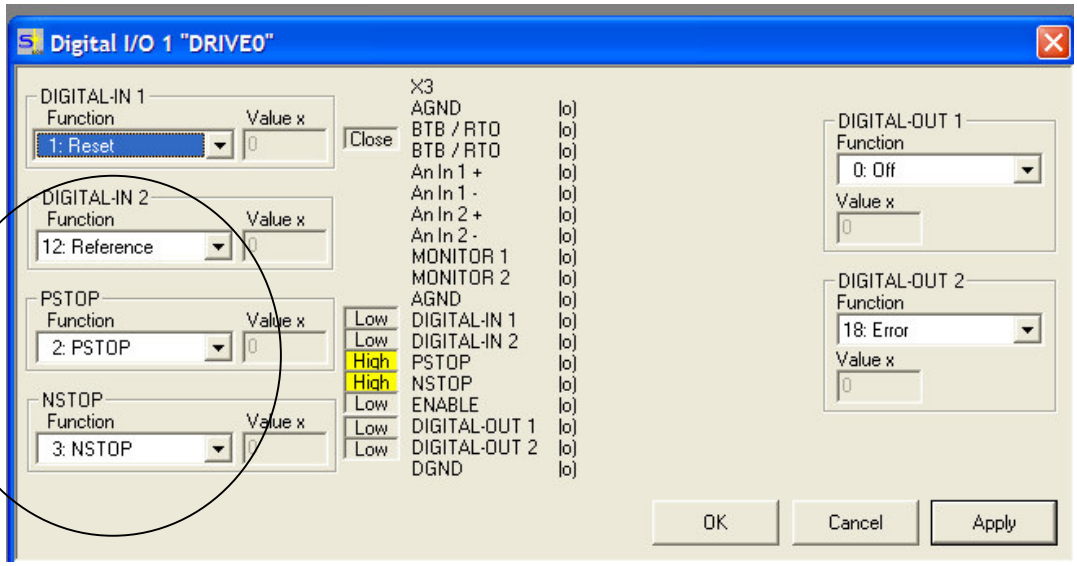
Many applications require the mechanism to be homed first to establish a known reference point. This can be down outside the GMT program. To get to the homing screen, click on the position button from the main screen. Then click on “Homing” in the position screen. The SERVO**STAR** S600 supports a wide variety of homing methods (consult product documentation for details). The simplest homing sequence is to select homing mode 0 (Set Reference Point Immediately). This sets the current position to home and generates no motion. To test you can click on the Home *Start* button. Note. If you attempt to execute motion tasking without homing the drive, an n09 error is generated.



Other homing types that have movement require additional setup on this screen: Velocity, Acceleration, Deceleration, Move Direction, and Home Position Offset. IF the home type requires a home switch and/or limit switch, the digital inputs on connector X3 must be configured for this functionality. If the OPT-IO option card is used the home input is also available on this connector.

Selecting a Digital Input for the Home Switch

The Digital I/O screen can be used for selecting a digital input to be used for a home or a travel limit switch:

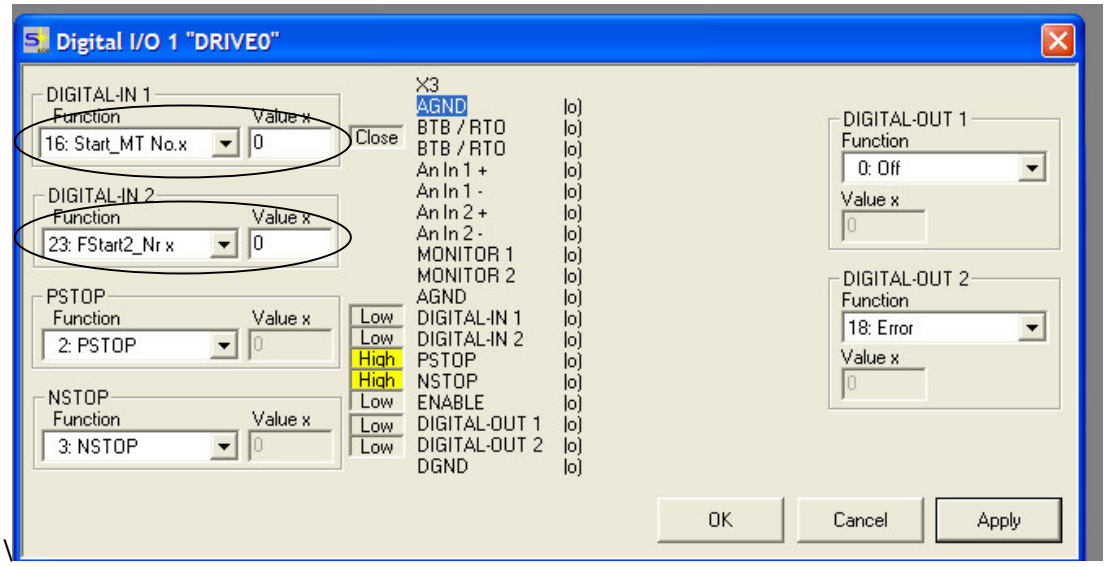


Also if the I/O Extension card is used

Starting a Home Move

A homing move can be started as follows through an input on connector X3:

Input Function #	Description
16 (Standard)	A rising edge starts the motion task; a falling edge cancels the motion task. "Value x" must = 0
23	Start of a GMT program stored in the S600. "Value x" must = 0. A rising edge starts the motion task. The motion task does not stop automatically if the start signal is removed! The motion task must be stopped by - a falling edge on another digital input (configured with 16, FStart_Nr x) - the ASCII command **STOP** - the STOP function via Bus or digital input
17	Start of a GMT program stored in the S600. A home move is selected when all inputs defined as " 9: MT_No_Bit" = 0

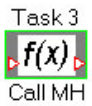


Other ways to start a homing move are:

a. Digital input on Connector X11B. Use "Start_MT I/O" input (pin 2). When Inputs AO to A7 are all zero (low) a home move will be executed

b. Automatically on Drive Enable. Set "AUTOHOME=1" in the Terminal screen

c. As a block in a GMT program:

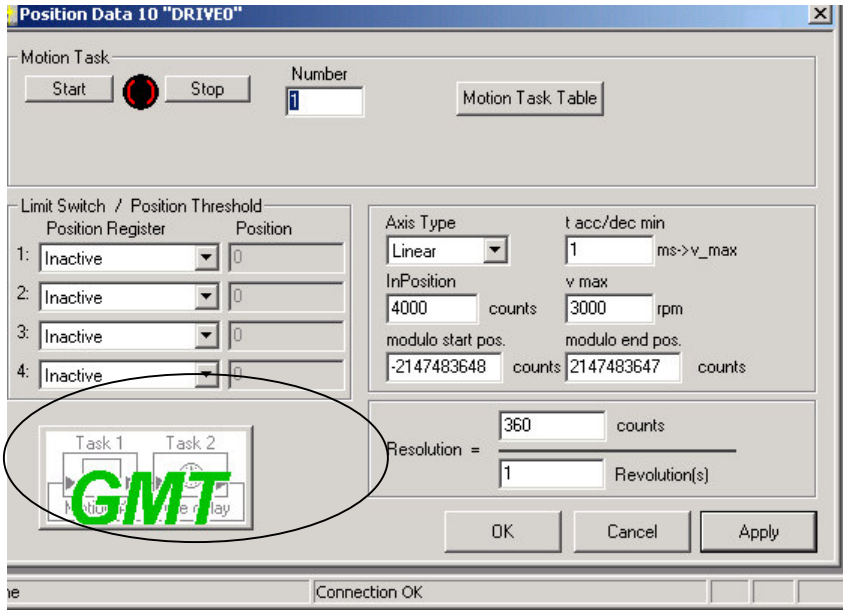


The GMT Programming Environment

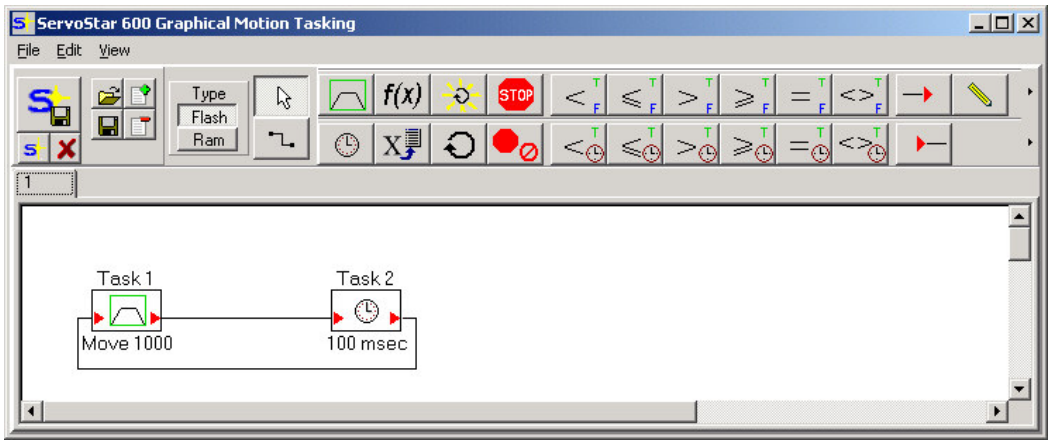
After installation, start the SERVO**STAR** S600 user interface software. Click on the *Position* button from the main screen. At the top right, click on *Position Data* button and the Position

Data dialog box (below) should appear. From this screen, click the *GMT* button at the bottom left to open the GMT programming environment.

Anytime you open the GMT environment while motion tasking is executing, the motion tasks automatically stop.



The Graphical Motion Tasking programming environment shown below has several controls at the top left, motion tasking blocks at the top right, and the GMT canvas at the bottom. The figure below includes a simple GMT program that indefinitely repeats a 1000-count move followed by a 100 msec time delay.



Controls

Return to Drive

Click either of the *Return to Drive* icons to return to the SERVO**STAR** S600 user interface, and download your motion task program to the drive. The icon with the diskette automatically saves the file. The other icon provides an option to save the file. Normally, you should save your program before exiting. GMT requires the original GMT file to produce the block diagram. GMT cannot produce a diagram from the data stored in the drive.

Cancel

Click the *Cancel* icon to discard program changes and return to the SERVO**STAR** S600 user interface.

File Open

The *File Open* icon allows you to open a GMT program. GMT programs must be read from GMT files rather than the program memory of the SERVO**STAR** S600.

File Save

The *File Save* icon allows you to save the current GMT program to a GMT file.

Add Page

The *Add Page* icon allows you to add pages for programs that are too large to fit well on one page. Pages are automatically numbered, but you can rename pages. Double-click on the page tab and a dialog box appears where you can enter the new name. The figure below shows the tabs of a two-page program with pages named “Main Page” and “Aux Page.” You can interconnect GMT diagrams between pages using Extenders.

Delete Page 

The *Delete Page* icon allows you to delete program pages.

Flash/Ram 

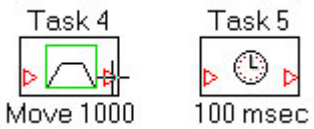
Motion blocks are transmitted to the SERVO**STAR** S600 to either be saved to flash or RAM memory. Flash memory is non-volatile. When the drive is powered down, the SERVO**STAR** S600 retains flash blocks. However, the drive must be disabled when downloading blocks to flash. RAM memory is volatile and does not require the drive to be disabled. Downloading to RAM is faster. Flash blocks occupy order blocks 1-180. RAM blocks occupy 181-255. Order numbers for new blocks are chosen according to the position of the *Flash/Ram* button. If you want to change an existing block to flash or RAM, place the cursor over the block and right click to bring up a pop-up menu. From the menu, choose either "Convert to Flash Block" or "Convert to RAM Block."

Select 

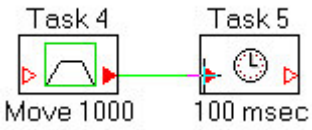
The *Select* icon enables the mouse to select new blocks for placement in the GMT canvas. It also enables the mouse to select blocks on the palate for deleting, moving, or for process variable initialization. To process variable initialization; double-click on a block to setup parameters for that block.

Flow Path 

The *Flow Path* icon enables flow interconnection between blocks. When this icon is down, you can start a flow path by placing the mouse over a *flow-source* or *flow-destination* (red triangle):



Move the mouse to the termination point and click to finish the flow path:

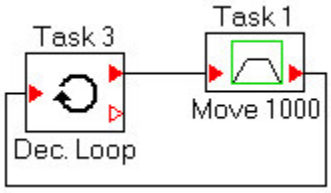


Click either the *Select* icon or the escape key to terminate the path.

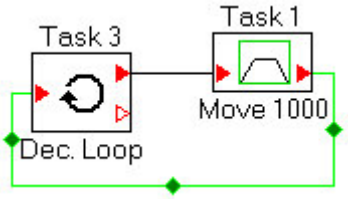
The most common flow path is to connect a flow-source from one block to a flow-destination of another. Multiple sources can be connected together; however, multiple destinations cannot be interconnected. Operation is not affected by the order of connection

Flow-Path Routing

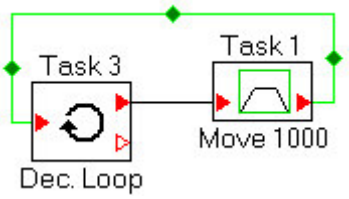
GMT automatically routes the flow path. You can adjust routing for the path that has two or more bends. To adjust routing, deselect the flow path. Start with an existing flow-path connection (shown below). Click on the *Select* icon.



Click on the flow path icon to show green diamond "handles:"



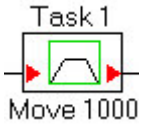
Click and drag adjustments to new position as shown below:



If you move both blocks that have the adjusted flow-path attached, the routing does not change. However, if you move only one block, the routing reverts to the default.

Task or Block Order Number

The task order number is automatically displayed above the blocks that represent tasks. The order number of a task can be changed by placing the cursor over the block and right clicking. A pop-up menu appears from which you can select "Set Order Number." You can select any ***unused*** order number as the new order number.

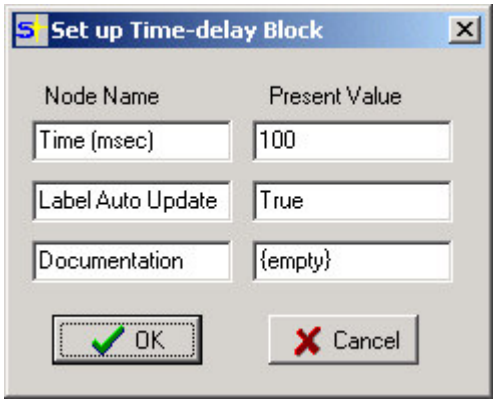


Block Labels and Documentation

Block labels are printed below most blocks. A label is a short description of the function of the block. For example, the figure above shows a motion block with the label, "Move 1000" indicating this is a 1000-count move. Labels are automatically updated when block parameters change. If you want to modify a label, double-click on the label and a dialog box appears that allows you to change the label. Changing labels turns off automatic label updating.

Labels are for convenience and do not change the function of a block. The only exceptions are the Extender blocks that use the block label to indicate which Extenders should be connected.

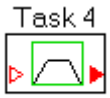
If you want to re-enable Label Auto Update, double click on the block and change the Present Value of the Node "Label Auto Update" to True (middle right of edit box shown below).



Most blocks support user documentation. You can write documentation by clicking in the edit box to the right of the Documentation edit box (bottom right of edit box shown above). Documentation has no effect on the operation of motion tasks.

Graphical Motion Task Blocks

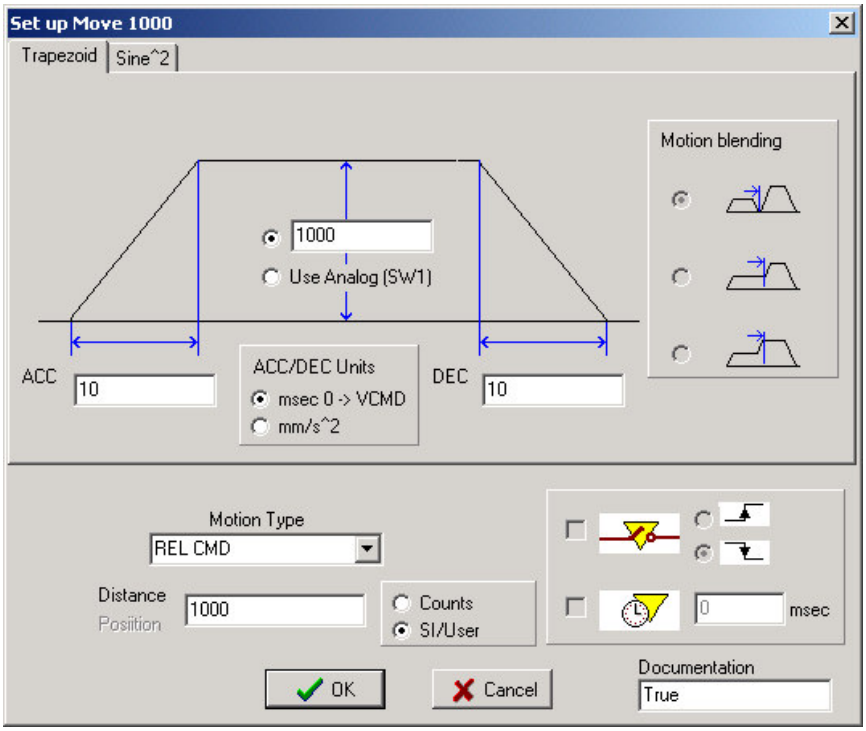
Motion tasks are composed of motion blocks interconnected by flow paths. Each motion block occupies one motion task.



Motion

The motion block supports multiple motion types, including trapezoidal and Sine^2 profiles, blended moves, time delays, and I/O delays. It supports all SERVO**STAR** S600 motion types. Program flow enters from the input flow connection (normally on the left) and stays within the block until the move is completed. At that time, flow proceeds to the output flow path.

The Motion Block Set-up screen for trapezoidal moves is shown below.



Using this screen, you can set acceleration and velocity variables in the top left area. The motion type (Relative, Absolute, etc.) and the target position/distance are set at the bottom left of the screen. Normally, you select SI/User units. “Counts” are internal units. Consult product documentation for more information on SERVO**STAR** S600 units.

When this Motion block is connected so it flows to another Motion block, several options are enabled. First, you set Motion Blending at the top right of the window.

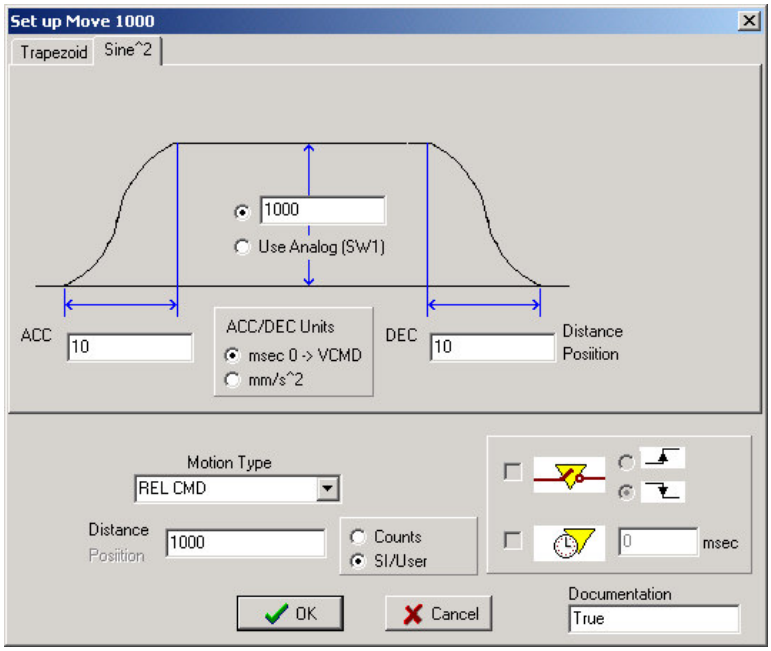
Here, you can choose between non-blended moves (top radio button), blending where speed change to next move begins at the target position of this move (middle radio button), and blending where speed change to next move is completed at the target position of this move (bottom radio button).

Blending is used only when the succeeding block is another motion block. Otherwise, blending is disabled.

For non-blended moves, you can add delays for I/O and time at the bottom right of the screen.

The Motion Block Set-up screen for Sine^2 moves is shown below. The Sine^2 screen is similar to trapezoidal-move set-up except Sine^2 moves cannot be blended.

If you load special profiles using the UPDATE LOOKUP command, selecting Sine^2 selects your special profile.

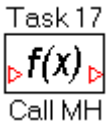


Stop

The *Stop* block stops the motor and ends motion tasking. The drive is left enabled after a stop block. This block is the same as using Set Process Variable block with the STOP command (see ASCII.chm Parameter document. The block has a single input flow connection. There is no output flow because motion tasking ends upon execution of this command.

Stop and Disable

The *Stop and Disable* block stops the motor and ends motion tasking. The drive is left disabled after a stop block. This block is the same as using Set Process Variable block with the S command (see ASCII.chm parameter document). The block has a single input flow connection. There is no output flow because motion tasking ends at execution of this command.

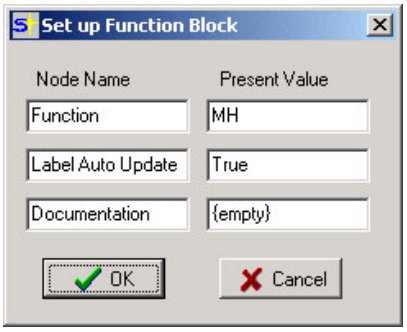


Call Function

The *Call Function* block allows you to call the following functions at any time (see the ASCII .chm parameter document for detail on these functions):

MH
S
SETREF
STOP

To select the function to be called, place the Set Call Function block on the canvas and double-click on it. The Set up dialog below appears.



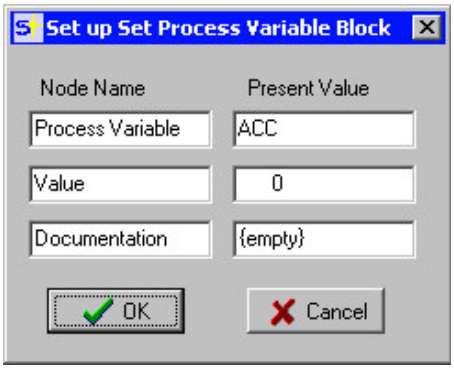
Click in the edit box to the right of Function and a combo box appears from which you can select the function to call.

Set Process Variable

The Set Process Variable block allows you to set the values of the following drive process variables at any time (see ASCII.chm parameter document for detail on these variables):

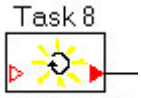
ACC	DEC	DECDIS	DECSTOP
DOVRIDE	DREF	ENCMODE	ENCZERO
ERND	GEARI	GEARO	GV
IN1TRIG	IN2TRIG	IN3TRIG	IN4TRIG
NREF	O1	O1TRIG	O2
O2TRIG	OS1	OS2	OS3
OS4	OS5	PEMAX	PVMAX
PVMAXN	REFIP	SWEO-5	SWEON-5N
SPSET	VLIM	VLIMN	VREF

To set the variable value, place the Set Process Variable block on the canvas and double-click on it. The Set up dialog box (shown below) appears. Click in the edit box to the right of Process Variable and a combo box appears from which you can select the variable. Click in the edit box to the right of the Value box to set the value.



Process variables in GMT only take integer values.

Many variables have weighting, which allows them to be entered as floating point numbers from the serial interface used by the user interface. However, these entries are stored in the drive as integer numbers after being scaled by 1000. These variables include: GV, IPEAK, IPEAKN , REFIP, VLIM, and VLIMN. For example, setting the process variable GV to 2200 in GMT is equivalent to setting the variable GV to 2.2 in the user interface.



Initialize Loop

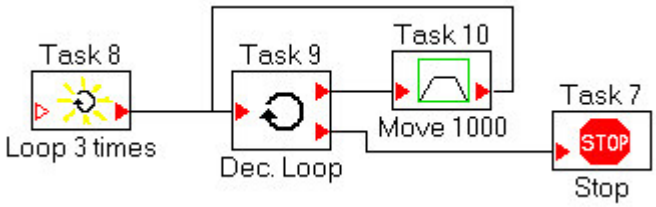
The *Initialize Loop* block initializes the SERVO**STAR** S600 loop counter. The only parameter is the number of counts. Place the *Initialize Loop* block on the canvas and double-click to cause the Set up dialog to appear. Specify the number of loops using the *Initial Value* parameter.

***The number of loops executed is one more than* Initial Value.**

There is one counter so only one loop can be executing at a time.

Decrement Loop

The *Decrement Loop* block decrements the loop counter. There is one input flow connection to decrement the loop counter, and two output flow connections: one during looping (at top right) and the other if the loop is complete (at bottom right). If the loop counter is greater than 0, flow continues through the looping output (top right) after the decrement upon entering the loop. Otherwise, flow continues through the loop to complete output (bottom right). Normally, a Decrement Loop block immediately follows an Initialize Loop block. In the example below, a program moves 1000 counts three times each time Task 8 is executed.



A Decrement Loop Block is normally placed immediately after an Initialize Loop Block

Input Extender

Extenders are provided to support connections of two points that are far apart (when wiring is inconvenient or confusing) or on different pages. Extenders are eliminated when the motion task program is compiled so Extenders do not affect normal operation. When two extenders have identical names, they are treated as being connected together.

Output Extender

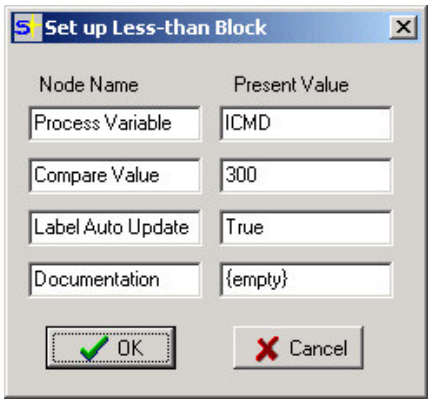
Output Extenders behave similarly to Input Extenders, except they are drawn with the arrow facing the opposite direction. Providing both input and output extenders is a convenience for the user and does not affect the operation of the motion task.

Comparison Blocks (LT, LE, GT, GE, EQ, NE)

Comparison blocks compare a parameter to a value and flow continues according to the comparison. There is a single input flow path and two output flow paths, True (T) and False (F).

The True output must be connected to a block. The false block may be left unconnected. If flow follows an unconnected false path, motion tasking is ended.

To select the variable, place the block on the canvas and double click to bring up the Set up dialog.



The following parameters can be used for comparison (see the ASCII.chm parameter document for detail on these variables):

ACC	DEC	DECDIS	DECSTOP
DOVRIDE	DREF	ENCMODE	ENCZERO
ERND	GEARI	GEARO	GV
I	ICMD	IN1	IN1TRIG
IN2	IN2TRIG	IN3	IN3TRIG
IN4	IN4TRIG	INS0	INS1
INS2	INS3	INS4	INS5
INS6	INS7	INS8	LATCH16
LATCH16N	LATCH32	LATCH32N	LATCHX32
LATCHX32N	MONITOR1	MONITOR2	NREF
O1	O1TRIG	O2	O2TRIG
OS1	OS2	OS3	OS4
OS5	PEMAX	PE	PFB
PFB0	PRD	PVMAX	PVMAXN
REFIP	SWEO-5	SWEON-5N	SPSET
VLIM	VLIMN	VREF	

Process variables can only be compared to integer values in GMT.

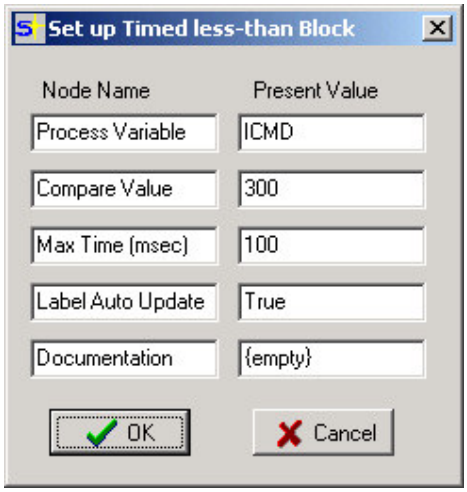
Many variables have weighting. This allows them to be entered as floating-point numbers from the serial interface used by the SERVOSTAR S600 user interface. However, these entries are stored in the drive as integer numbers after being scaled by 1000. These variables include: GV, I, ICMD, IPEAK, IPEAKN , REFIP, VLIM, and VLIMN. For example, comparing the process variable ICMD to 3500 in GMT is equivalent to setting the variable ICMD to 3.5 using the serial port.

Timed Comparison Blocks (LT, LE, GT, GE, EQ, NE)

Timed comparison blocks compare a parameter to a value and flow continues according to the comparison. There is a single input flow path and two output flow paths, True (T) and False (F). Flow continues through the false path only after the false condition is present for the timeout period.

The True output must be connected to a block. The false block may be left unconnected. If flow follows an unconnected false path, motion tasking is ended.

To select the variable, place the block on the canvas and double-click to bring up the Set up dialog.



The same variables are available for timed and standard comparison blocks. The compare value is set the same way. Set "Max Time" as the timeout period (that period for which the condition must be false before flow can continue through the false path). If Max Time is set to 0, these blocks behave like the standard (non-timed) comparison blocks.

Delay for Time

The *Delay for Time* block allows you to place a delay in the motion tasks. Flow remains in the block during the delay time.

Note

The *Note* block is provided for user documentation. *Note* blocks do not affect operation of motion tasking.

Execution Time

The following table lists execution times by command name:

Command name		Execution time
Call	MH	Length of homing command
	S	Ends motion tasking
	SETREF	1 ms
	STOP	Ends motion tasking
Comparison		1 ms
Extenders		0 ms
Initialize Loop		1 ms
Decrement Loop		2 ms
Motion		Length of motion command
Note		0 ms
Stop		Ends motion tasking
Stop and Disable		Ends motion tasking
Set Process Variable		1 ms
Timed comparison		1 ms if true; delay time + 1 ms if false
Delay for time		Delay time + 1 ms

Using Digital and Analog I/O

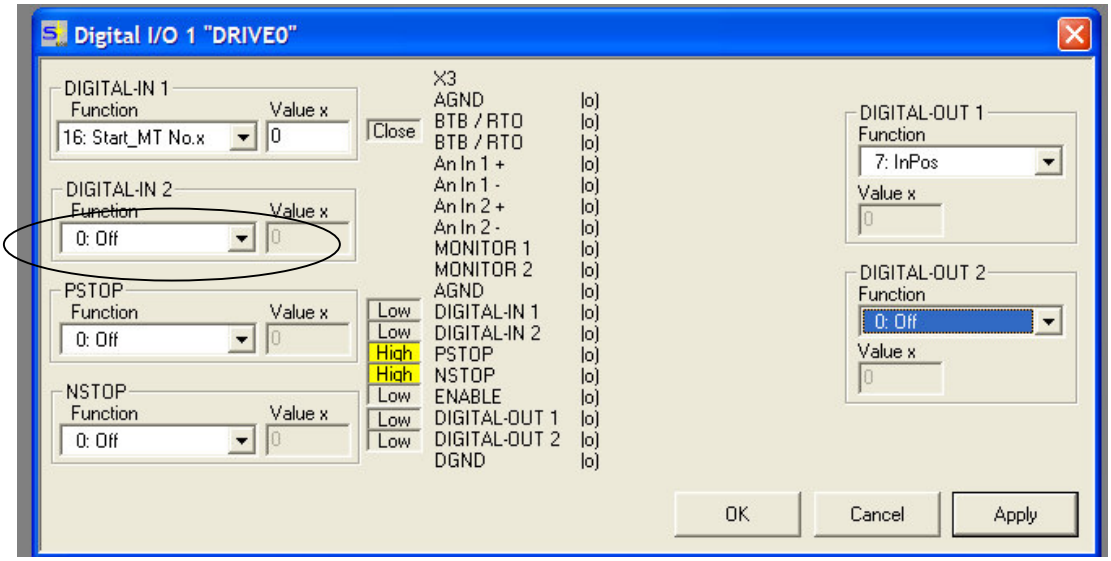
These I/O are very flexible and are settable to a variety of functions independend of a GMT program. They can also be integrated into a GMT program, for example to set an output or read an input during a GMT program execution.

Base I/O – Connector X3

Connector X3 contains 4 Digital Inputs, 2 Digital Outputs, 2 Analog inputs and 2 analog outputs. Any of these I/O used in a GMT program should be set to "0: Off" in the User Interface Digital and Analog I/O screens except as noted below:

1. When Starting a GMT program.

2. When indicating a GMT program has ended. Set one of the two digital outputs to "7: Inpos"



Extended I/O (EI) Card – Connector X11

The Extended I/O option card if installed adds 14 digital inputs and 8 digital outputs to the S600. These I/O are dedicated for specific functions. With GMT several of the I/O can be reconfigured for general-purpose use in a GMT program. To use up either four or nine inputs on the EI card as general-purpose inputs, set the parameter IO11IN as shown below:

	General purpose inputs available from EI card.	Inputs available to automatically start tasks from EI card.
IO11IN = 0 (default)	None	A0-A7 START_MT
IO11IN = 1	INS4-INS7 (A4-A7 on the EI card)	A0-A3 START_MT
IO11IN = 2	INS0-INS7 (A0-A7 on the EI card) INS8 (START_MT)	None

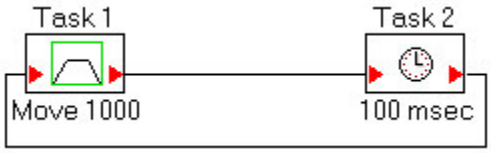
Up to five of the outputs on the EI option card can be configured as general-purpose outputs for use in a GMT program. Four of these outputs are named OS1-OS4 and are shared with PosReg1-4 on the EI card. The fifth is OS5 and is shared with PosReg5 (X11B-10). Configure these outputs using SWCNFG to configure SWE1 – SWE4 and SWCNFG2 to configure SWE5. For every SWE*x* line configured to be disabled, the corresponding output on the EI card can be controlled with the variable OS*x*.

General Purpose Output on EI card.	Drive.exe Position Data Screen Setting	Cooresponding ASCII Parameter set
OS1 (PosReg1 on the EI card)	Position Register 1= Inactive	SWCNFG Bit 1 = 0
OS2 (PosReg1 on the EI card)	Position Register 2= Inactive	SWCNFG Bit 4 = 0
OS3 (PosReg1 on the EI card)	Position Register 3= Inactive	SWCNFG Bit 8 = 0
OS4 (PosReg1 on the EI card)	Position Register 4= Inactive	SWCNFG Bit 12 = 0
OS5 (PosReg1 on the EI card)	NOT SUPPORTED	SWCNFG2 Bit 4 = 0

The digital input START_MT on the I/O option card is used to start a motion task defined by A0 to A7. This input works as follows: A rising edge starts the motion task a falling edge cancels the motion task by an internal STOP– command. If it is desired to not cancel motion if the input is removed, Start MT_Next input on the I/O option card can be used.

Running a GMT Program

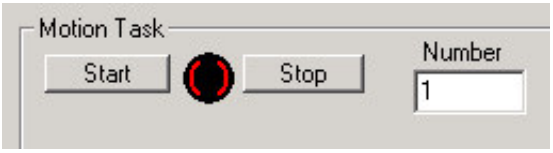
A GMT program is started by selecting one block (typically located on the left side of the pallet) in a GMT program. It is possible to start a GMT program at another place in the program. This is done by selecting and starting from that particular block. Example: typically the following GMT program would be started with Task 1 but it could be start by Task 9or block) 2 by selecting task 2 as the block to begin execution.



A GMT program can be started in Drive.exe User Software, by a digital I/O, or through a bus network supported by the S600.

Starting From The User Interface Software (Drive.exe)

Use the Motion Task *Start* and *Stop* buttons at the top left of the *Position Data* screen to start and stop your motion tasks (this dialog appears when you close the GMT programming environment). Enter the desired starting motion block number in the edit box under "Number."



Specify the starting task order number using the edit box marked *Number* to the right of the Motion Task *Stop* button. The order number is shown above each block that represents a motion task.

The program can also be started in the Terminal screen in Drive.exe. Example: Enter "Move" followed by the number of the desired starting motion block number. Example: To start Motion task 5 enter: MOVE 5 <enter>.

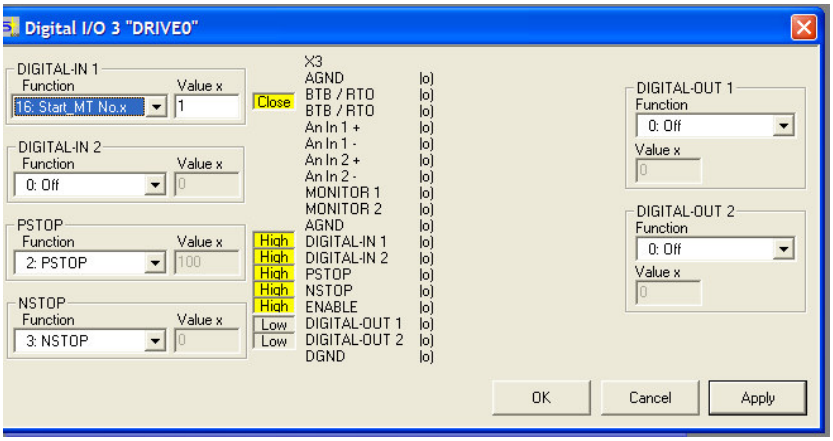
Starting From Digital I/O (on Connector X3)

The S600 has digital inputs on connector X3 front face connector and connector X11a on the Extended I/O option card. There are several predefined input functions on connector X3 that can be used to start motion tasking:

Input Function #	Description
16 (Standard)	Start of a GMT program stored in the S600 . A rising edge starts the motion task, a falling edge cancels the motion task.
23	Start of a GMT program stored in the S600. A rising edge starts the motion task. The motion task does not stop automatically if the start signal is removed ! The motion task must be stopped by

	- a falling edge on another digital input (configured with 16, FStart_Nr x) - the ASCII command **STOP** - the STOP function via Bus or digital input
17	Start of a GMT program stored in the S600. The motion task that is executed is selected by 1,2,or 3 other digital inputs defined with Input Function 9: MT_No_Bit

Also connector X3 digital inputs can be configured in the terminal using the INxMODE parameter where x =1,2,3, or 4 to define a specific input

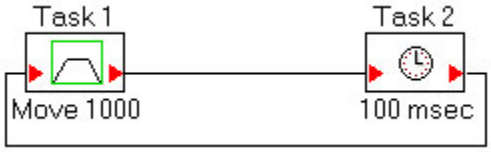


Starting From OPT-EI Option Card (Connector X11)

The OPT-IO option card has connector X11B pin 2 to start a GMT program. BCD Inputs AO to A7 must be configured for the number of the first task to be executed in the GMT program

Starting From a Field Bus

A GMT program can be started through the Profibus, Device Net, and CanOpen Networks available on the S600. See the manual for each Network for more detail.



Starting On Drive Enable (Start-up)

The SERVO**STAR S600** can be configured to execute your GMT program automatically on power-up using a three-step process:

1. **Set the drive to automatically enable on power up.**
   Either set “Auto Enable” to “ON” in the Basic Setup screen (accessed from the main SERVO**STAR** S600 user interface screen) or by typing “AENA = 1” in the terminal screen.
2. **Set the drive to home automatically after enabling.**
   Type “AUTOHOME = 1” in the terminal screen. Select the homing sequence appropriate for your application (see product documentation for more information). If you do not require homing, you still need to initiate a "Reference Point immediately" home sequence. This sets the current position to home but generates no motion. This is accomplished by either selecting NREF = 0 in the homing screen in the user interface (accessed from the Position screen inside the main screen) or typing “NREF = 0” in the terminal screen.
3. **Set motion tasks to begin immediately after homing.**
   Set NREFMT equal to the task you wish to start. For example, if you want Motion Task 5 to begin after homing, type “NREFMT = 5” in the terminal screen.

Be sure to save your configuration to EEPROM before powering down the SERVO**STAR** S600 using the “Save to EEPROM” button at the top (near the center) of the main screen.

Dynamically Limiting Acc/Dec or the Speed of Motion

These parameters which are part of the S600 setup described earlier in this document can be change will motion is running. New values entered will take affect when the next motion starts. This is a nice feature allowing the user to change the speed in a motion task easily and without disabling the drive.

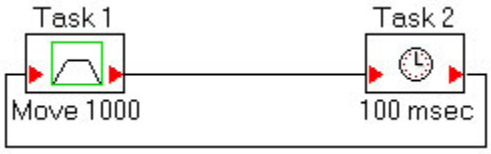
Monitoring a GMT Program during Execution

During execution, the SERVO**STAR** S600 variable, TASKNUM, holds the current task number. You can use the terminal screen to view the value of TASKNUM. If TASKNUM is –1, motion tasking is not executed.

Examples

Infinite Loop: Move Followed by a Delay

An infinite loop with a delay:

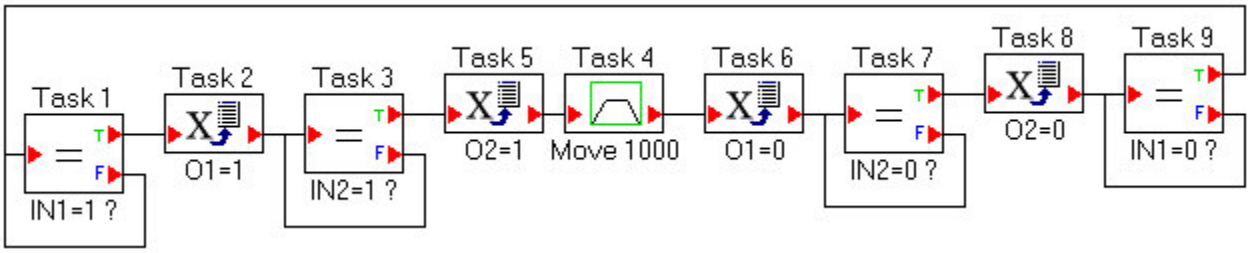


Mixing I/O Control and Motion

This example controls an auxiliary device with digital I/O. The sequence is:

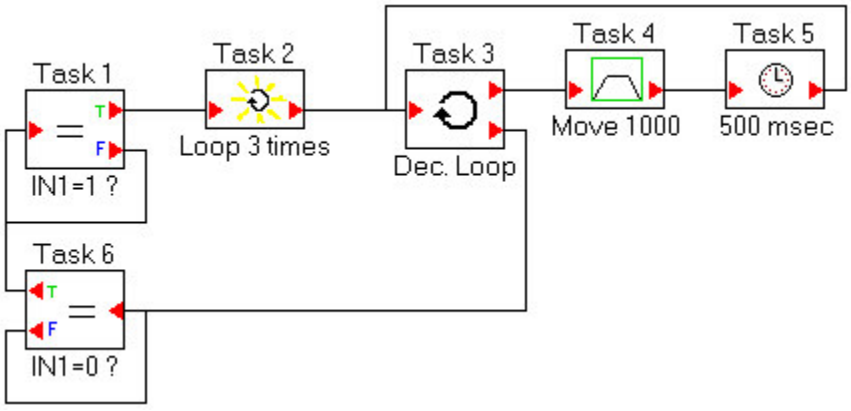
1. IN1 is used to start the process.

2. Turn on auxiliary device with O1.
3. Wait for auxiliary device to come into ON position as indicated by IN2.
4. Indicate motion is executing to outside device with O2.
5. Make move.
6. Turn off auxiliary device with O1.
7. Wait for auxiliary device to come into OFF position as indicated by IN2.
8. Indicate motion is complete to outside device with O2.
9. Wait for sequence start (IN1) to cycle off.
10. Restart sequence

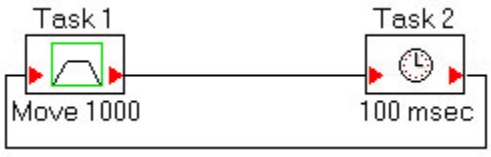


Looping and Motion

This example executes a 1000-count move followed by a 500 ms delay three times each time IN2 is cycled.



GMT Program Storage in S600

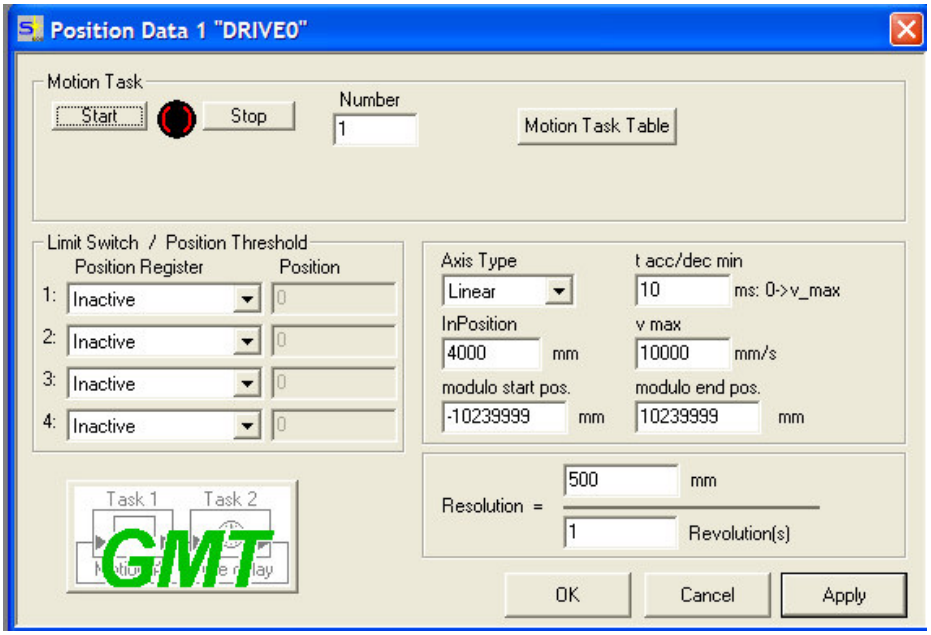


When the download to drive button is clicked on in GMT the program is first converted into ORDER commands, displayed in the Motion Task Table, and loaded into the S600 memory. Each block in GMT is converted into one ORDER command. The S600 can store 255 ORDER

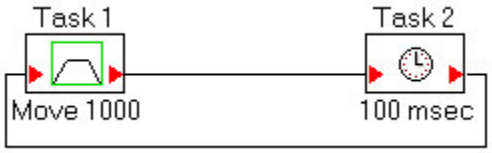
commands. ORDER 1 to ORDER 180 are stored in Flash memory and are save when S600 24 volt logic power is removed. ORDER 181 to ORDER 255 are stored in RAM Memory and are lost when S600 24 volt logic power is removed. For complete details on the ORDER command see the ASCII.chm command reference guide.

Motion Task Table

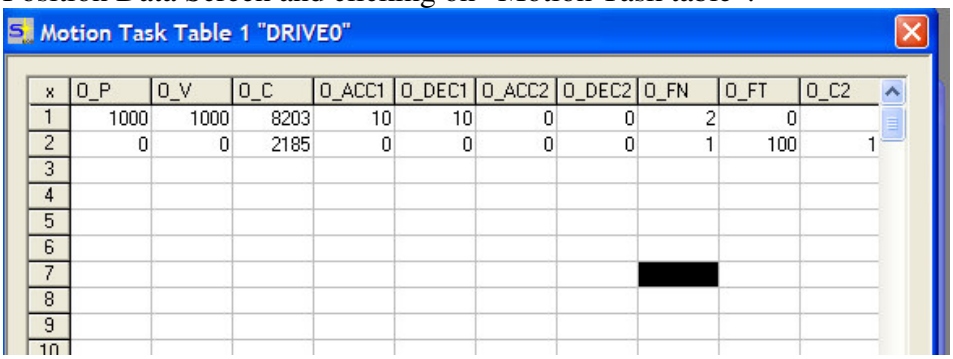
An example of how a Motion Task Block is converted to an ORDER command is as follows:



Example: GMT program with 2 Motion Task or Blocks



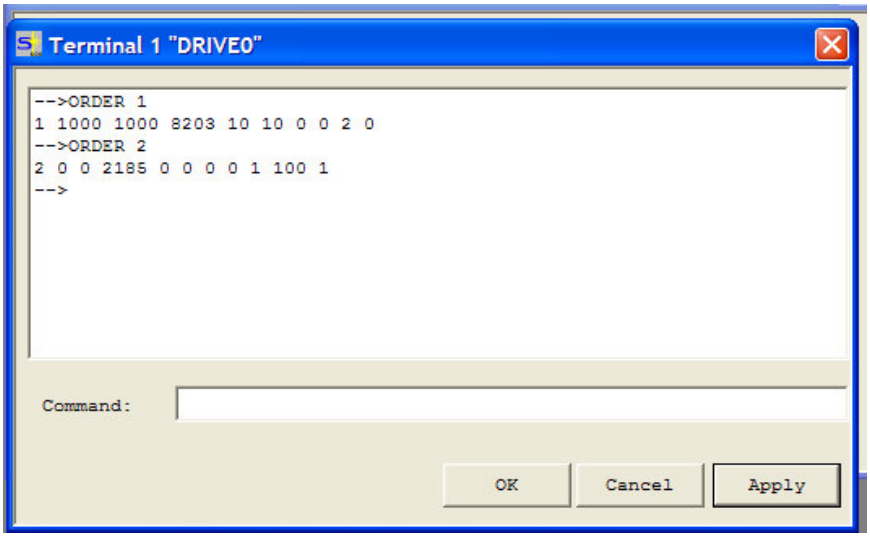
This program is stored in the Drive.exe Motion Task Table. It can be viewed by going to the Position Data Screen and clicking on “Motion Task table”:



x	0_P	0_V	0_C	0_ACC1	0_DEC1	0_ACC2	0_DEC2	0_FN	0_FT	0_C2
1	1000	1000	8203	10	10	0	0	2	0	
2	0	0	2185	0	0	0	0	1	100	1
3										
4										
5										
6										
7										
8										
9										
10										

ORDER Command

Each Task or Block is stored in S600 Flash memory as order commands. They can be viewed in the terminal screen in Drive.exe as follows:



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See Assii.chm document for more information on the order command

Troubleshooting

Issue	Explanation
no8 warning	A faulty motion task was started
n09 warning	Homing must be done first before a GMT program can be run
n18 warning	I/O, or Profibus, or Device Net Option card is not plugged into the option slot
n19 warning	Accel ramp limited in motion task. Changing velocity or index distance to eliminate
n20 warning	Starting a non-valid GMT program, either a motion block is faulty or no option card is installed
Motor will not accelerate fast enough	- Accel/decal rate in Motion Block too low a value - AMAX on Position Data screen set to low. (tacc min set too high if using time based accel units)
Motor not accelerating at the correct rate	Verify Sept+ ramp or Sept- ramp on Speed screen not set correctly. Note: When running a Motion Task (opmode 8), this value must be set for very quick accel/decel. In OPMODE 8 these values when set for a slow accel/decel will clamp the performance of the velocity loop and thus the performance of a motion task.
Motor with not go up to the speed required	Traverse Speed in Motion Block too low a value VMAX on Position data screen set to low. (tacc min set too high if using time based accel units)
Unexpected operation when state of digital input (on connector X3) is changed	Digital Input is set to another function other than desired in the GMT program. Go to Digital I/O screen to check
Can not upload from Drive memory to GMT	A compiled GMT program stored in the drive cannot be uploaded back into GMT. GMT programs must be stored on the PC's hard drive (uncompiled) for retrieval back into the GMT environment