

**IB-11B029**

**MOTIONPRO**

**FEBRUARY 1998**

# MOTIONPRO

## INSTRUCTION BOOK

**INDUSTRIAL INDEXING SYSTEMS, Inc.**

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## SECTION 1 - INTRODUCTION

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## Introduction

### Overview

This is an on-line documentation describing a software package used to program Industrial Indexing Systems DeltaPro Controller from a compatible Personal Computer. This software package is referred to as MotionPro '97.

The MotionPro '97 Development System is intended to be used with the DeltaPro programmable motion controllers.

The MotionPro '97 Development System runs under the Microsoft Windows '97 environment, providing users a very powerful, flexible and intuitive software approach to program generation and servo controller testing.

This on-line documentation was written with the assumption that you are somewhat familiar with Personal Computers, and Microsoft Windows environment.

## Key Features

The MotionPro Development Environment provides access to the following major MotionPro '97 features :-

### **Gives user ability to program multiple steps**

- There is a maximum of 132 blocks and a maximum of 200 steps.
- Blocks may contain any number of steps, as long as the total number of steps in *all* blocks does not exceed 200.

### **Gives user ability to run a block automatically, without any inputs**

- The 'Special Blocks', block 128 to block 132 are used for this purpose.
- This blocks can execute any instruction.

### **Gives user access to define system function values in the Control system**

- The user has the ability to define system function values through the Setup Parameters.
- The Setup Screen gives the user the ability to change Setup Parameters such as Engineering Units, Motor Direction, and Torque Limit.

### **Programs are interpreted during run time**

- The program instructions are simply downloaded to the controller and then executed by the Operating System.

### **Gives user access to the MotionPro help system**

- The user has the ability to access the on-line help documentation directly from the MotionPro Development System.

## Manual Conventions

Throughout this manual, the following typeface conventions are used:

- Program instruction/command names appear in **bold** print.
- Optional instruction parameters appear in *italics*.

### Example

The following program line defines a timer (**Wait Time** instruction) with a time of 100.

<b>Block/Step</b>	<b>Instruction</b>	<b>Parameters</b>	<b>Comments</b>
Block 1.1	<b>Wait Time</b>	<i>100</i>	! Hello

The comment is optional, however the parameters are required. Each individual instruction has ranges which the software checks. The software needs to make sure the values meet the instruction specifications before the program can be sent to the controller.

## **System Requirements**

### ***System***

A 486 class machine or Pentium based system is required minimally. A Pentium class machine is recommended. Performance will also vary depending on the video adapter, driver and video mode you have selected. A screen resolution of 800 x 600 pixel is suggested.

### ***Memory***

MotionPro '97 requires between 8MB - 16MB of memory to operate. Additional memory may be required depending on the size of the programs being developed.

### ***Disk Space***

When fully installed, MotionPro '97 uses approximately 8MB of disk space. Additional disk space may be required depending on your applications.

### ***Operating System***

Since MotionPro '97 is a 32-bit application written for the Windows Platform, the user must be running Microsoft Windows '95 or greater.

## Installing MotionPro

Like many Windows based applications, a program called SETUP.EXE resides on the MotionPro '97 Installation Disk and will guide you through the installation process. Do the following steps:

1. Begin Windows and make sure the user can see the Windows Desktop. Select the **START** button and click **RUN** on the **START** menu.
2. Insert the floppy disk labeled Disk 1 in your floppy disk drive.
3. Type **a:setup** and press the Enter key (or **b:setup** if using the drive b: ).
4. Follow the instructions on the screen and provide the appropriate responses to the installation options as needed.

Once the installation process is complete, you should be able to run the MotionPro '97 Development System by selecting the corresponding icon in the Programs section of the **START** menu.

## SECTION 2 - CONTROL AND MOTION CONCEPTS

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## Control And Motion Concepts

### Arithmetic Functions

Integer Arithmetic functions are available in MotionPro. The arithmetic functions allowed are addition, subtraction, multiplication and division. The format for this function is similar to that of the LET statement used in BASIC.

*Instruction*    *Syntax*

**Let**            *Values, Function*

### Branching

MotionPro offers users an ability to jump to a specific step within the current block when a specified condition is true, conditional branching. The instructions, 'If I/O' and 'If Variable' are used for this purpose.

Conditional branching instructions are handled as follows:

- Test the specified condition.
- If the condition is true, transfer program control to the specified step.
- If the condition is false, continue by executing the next sequential instruction.

*Instruction*    *Syntax*

**If I/O**            *I/O # or PLS#, Step #*

**If Variable**    *Values, Function, Step #*

## Master Slave Concepts

MotionPro working with DeltaPro Motion Controllers provides a mode of operation whereby the motor/drive unit ( an axis) is controlled by a Fiber Optic Network, used as the master.

The slave axis will be locked to the master based on ratio. When a lock is executed, the axis controller calculates the instantaneous offset between the master angle processed by the ratio and the slave command position. Once the offset is calculated, master slave lock is accomplished.

The slave uses the master position to determine its position and speed based on the ratio set in the '**Follower**' instruction. This instruction sets the electronic gear ratio between the master follower and servo and method of engaging and disengaging servo lock. The instruction also limits the motion of the slave by the set accel/decel limit.

### *Instruction    Syntax*

**Follower**      *Master gear, Slave gear, Lock/Unlock, Accel/Decel*

## Programmable Limit Switch (PLS)

Programmable Limit Switch provides a means of switching output modules on and off in relation to the position of a master axis. The MotionPro Development System working with the DeltaPro Controllers provides basic PLS functions. The PLS features are described below.

- A total of eight PLS output flags are available. These flags can be switched on and off depending on the position of the master axis being used to drive the PLS functions.
- Flags 1 to 5 are hardware outputs and flags 6 to 8 are software outputs.
- The command 'Set PLS Angle' defines the output to be used and when to turn that output ON and OFF.
- Only one ON and OFF angle may be programmed for each PLS output. If a second set of data is defined for an output, it will replace the existing data. The maximum allowable angle for a PLS output is 4096 bits ( one revolution of the master, 360 degrees).
- The source for the PLS is defined in the setup section of the program.

## Programmable Limit Switch Instructions



<i>Instruction</i>	<i>Syntax</i>
<b>If I/O</b>	<i>I/O # or PLS #, ON/OFF</i>
<b>Set PLS Angle</b>	<i>PLS #, Enable/Disable, ON Angle, OFF Angle, I/O #</i>
<b>Wait I/O</b>	<i>I/O # or PLS #, ON/OFF</i>

## S-Curve

The user has capability of programming the DeltaPro Motion Control System to alter the normal trapezoidal ramp shape. This is done during *Index* or *Position* commands. ‘Degree’ of the sine angle, relative amount of modification, modifies the transitions between acceleration and deceleration and steady-state speeds of the motor. MotionPro allows nine different ‘degrees’ of modified sine ramp rates. Degree 0 is the normal trapezoidal shape with no modification. Degree 1 through 9 increasingly modify the ramp shape with Degree 9 being the maximum modification, fully modified S-curve profile.

## Special Blocks

One of the features of MotionPro is the ability to program special Blocks which are run automatically, without any inputs. Blocks 128 to 132 are defined as Special Blocks. This blocks can execute any instructions and can be run at program start, program stop, fault sensing or on PLS trigger angles. The following shows the different modes used to run the special blocks:

- When the user goes to Run Mode by clicking , from MotionPro Development System and the DeltaPro is in Manual Mode (input #13 = OFF), block # 128 is executed.
- When the user goes from Manual Mode to Auto Mode (input #13 = ON), block # 129 is executed.
- When the user goes from Auto Mode to Manual Mode, block # 130 is executed.
- If the DeltaPro is in Manual Mode, and the user goes from Run Mode to Program Mode by clicking , block # 131 is executed.
- If there is a fault and the user goes to Manual Mode, block # 132 is executed.

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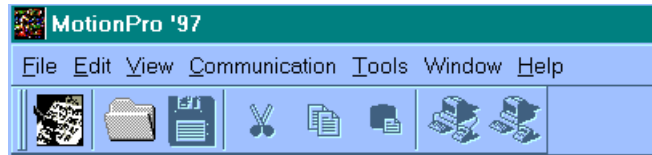
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## MotionPro Development System

The MotionPro '97 Development System provides you with the necessary tools for creating, running and testing your motion control programs.

### Menu Items

Click on the individual menu items and tool bars for help on that particular option.



### File

Click on the individual options for help on that particular selection.



### New

New will display the [Project Dialog Box](#) which allows you to create a new default program or to select from a list of recent projects.

### Open

Prompts the user to open a MotionPro program. The standard windows open dialog box will appear for the user to enter in a file name.

### Save

Saves the currently opened program.

## Save as

Prompts user to enter a name for the currently opened program.

## Exit

Closes the active MotionPro Development System.

## Edit

Click on the individual options for help on that particular selection.



## Edit Step

Allows you to edit a specific step (instruction).

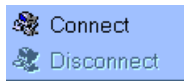
## Delete Step

Allows you to delete a specific step (instruction).

## View

Gives user an option not to display the Tool Box.

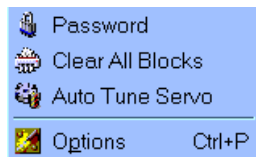
## Communication



Using this menu, the user can either Connect to or Disconnect (if already connected) from, the DeltaPro Controller.

## Tools

Click on the individual options for help on that particular selection.



## Password

(New topic text goes here.)

## Clear All Blocks

Clears all of the steps (instructions) in all of the program blocks.

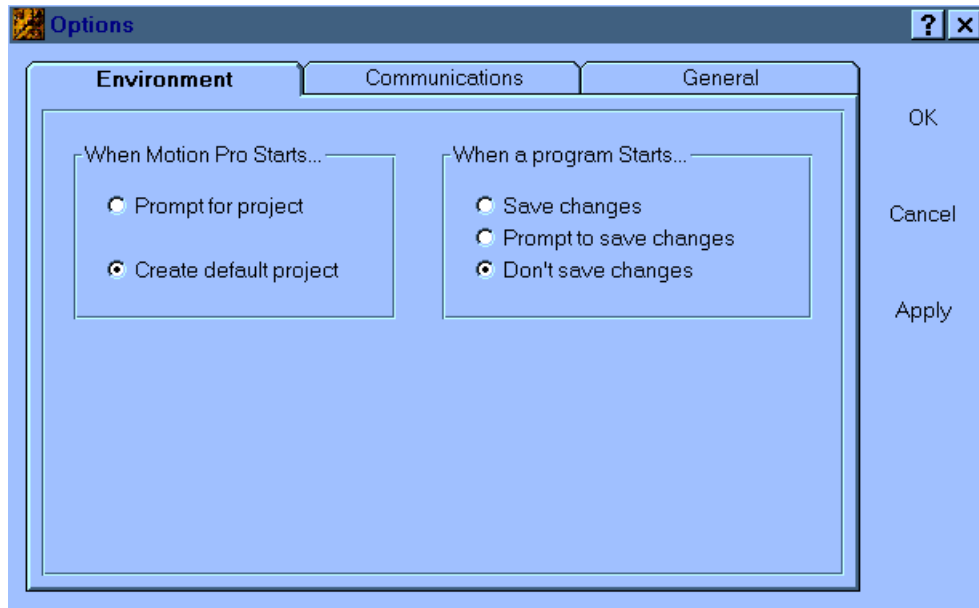
**Note:** This option destroys all program block information. Program blocks will need to be re-programmed before automatic operations can resume.

## Auto Tune Servo

(New topic text goes here.)

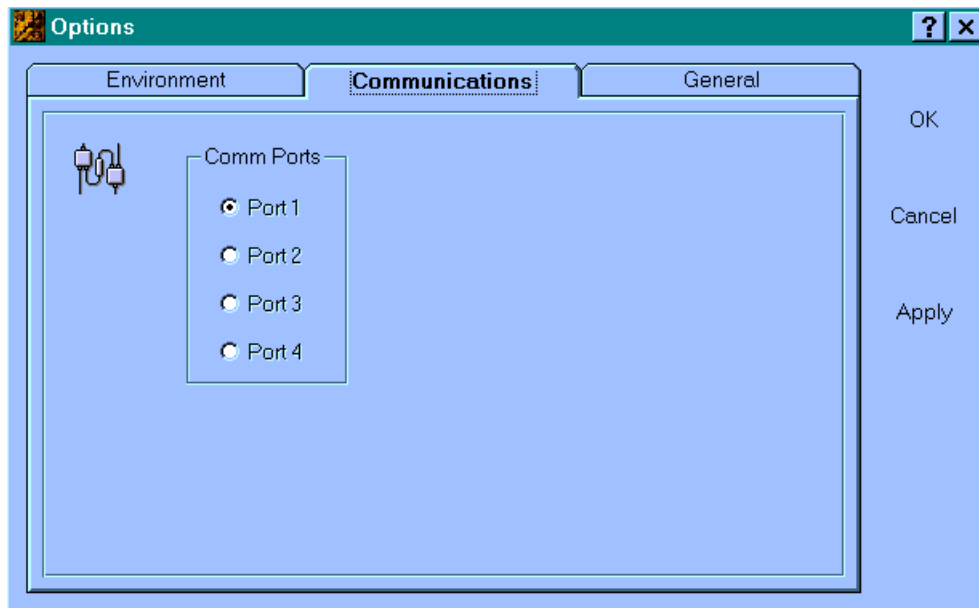
## Environment

The Environment tab gives the user the following options about MotionPro.

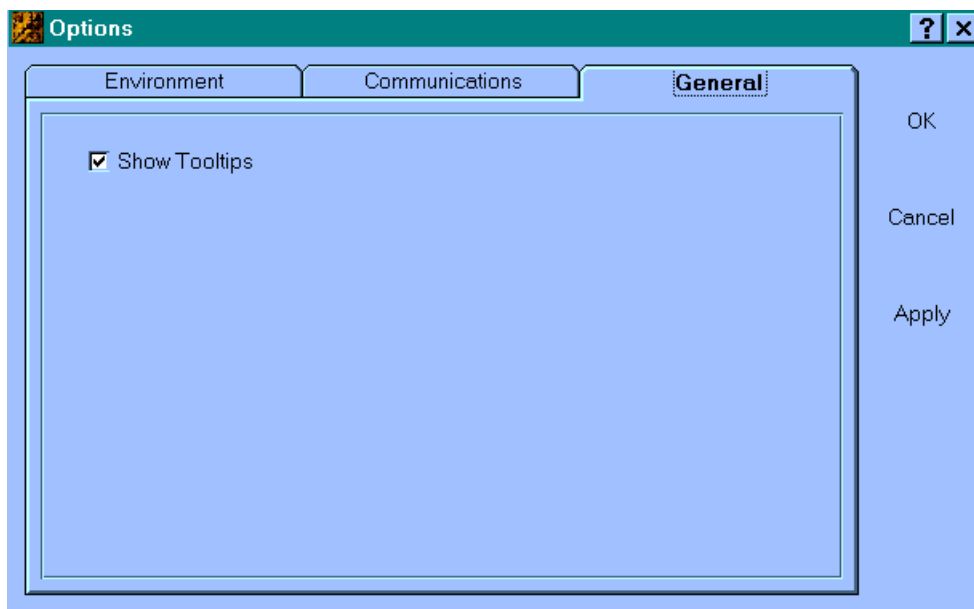


## Communications


Allows the user to choose communication port. The following is displayed when the Communications Tab is clicked.



## General




## Creating Your Program

- Click  or click **New** from the **File** menu to open a new program.
- Double Click on 'New Program', from the [Project Dialog Box](#)
- Enter your program in the space provided. The actual text you enter is often referred to as the **source** file.
  - From the Tool Box, double click on the command you would like to implement.
  - Enter the correct parameters. (refer to Instruction Reference)
- Enter all the desired setup information in the [Setup Screen](#) .
- Save your program as **xxxxx.mps**, where xxxxx is any filename.

## Block Step programming

- A *Block* is defined as a series of motion control Steps.
- A *Step* is a command to the DeltaPro Controller to do a function related to motion (such as Position, Index, or Wait Time).
- The *Block number*, in Input Trigger Mode, is the number of the I/O (1-8) which will signal the DeltaPro to begin execution of the Block. In Binary Trigger Mode, the block number is the sum of the binary weights of the I/O (1-7) which will signal the DeltaPro to begin execution of the Block. Refer to [Block Trigger Mode](#) .

- Before starting to write your program, make sure the DeltaPro Motion Control System is in Program Mode. Clicking  icon gets you in Program Mode. This mode is used to program blocks of steps ( commands) that define a sequence of actions which the DeltaPro Motion Control System may execute during automatic operations.
- A maximum of 132 blocks and a maximum of 200 steps may be programmed. Blocks may contain any number of steps as long as the total number of steps in *all* blocks does not exceed 200. There could be 132 blocks defined with one steps each, or there could be 1 block defined with 200 steps, or any combination in between.
- Block 128 to 132 are defined as *special blocks*. Any of the commands may be used in these special blocks with the exception of block 132 which is a 'fault recovery' block. Motion commands are ignored in this block.
- The 'End Of Block' command is automatically inserted into every block and cannot be deleted.
- You can get to the menus of Block Step programming by placing the cursor on the program area of the [Program](#) screen and clicking the right mouse button.

## Editing a Block

The following is displayed when you click on the right mouse button :-  
Click on the individual menu option for help on that particular subject.



## Goto Block

Prompts the user to enter the desired Block number to go to.

## Goto Step

Prompts the user to enter the desired Step number to go to.

## Connect

Allows user to connect to the DeltaPro Motion Controller.

## Disconnect

Allows user to disconnect from the DeltaPro Motion Controller.

## About Running Your Program

(New topic text goes here.)

## Uploading





(New topic text goes here.)

## Downloading

(New topic text goes here.)

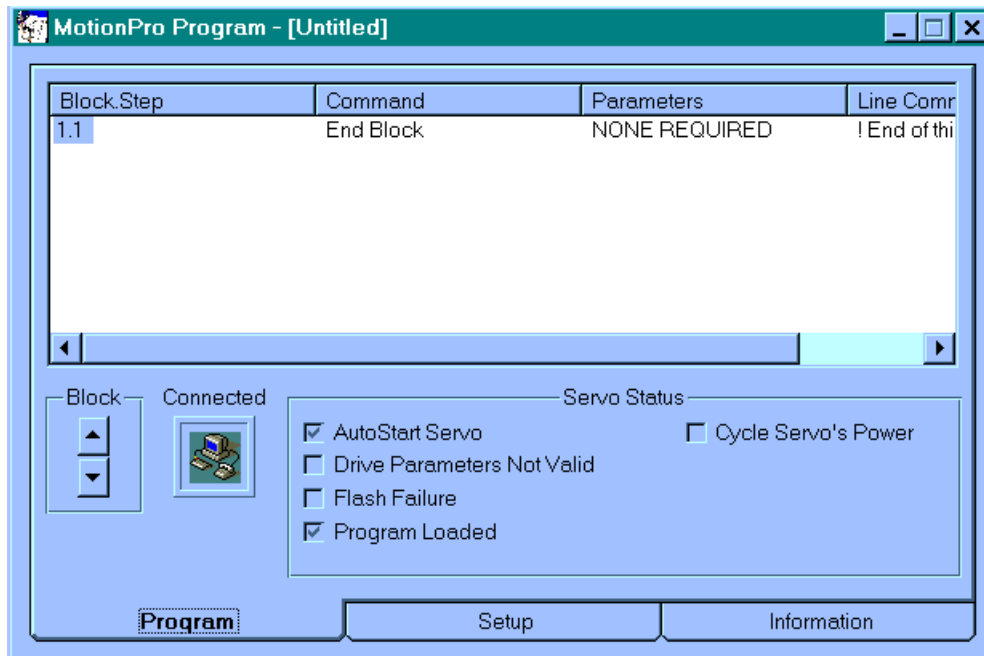
## Running Program

Once your program has been successfully completed do the following steps to run your program:-

- Select a motor code from the 'Setup' screen.
- Click  or 'connect' from the **Communication** menu to connect to the DeltaPro Controller. Additional icons like Program Mode, Run Mode, Upload, Download and Test Mode will appear on the tool bar.
- Click  to set the controller to Program Mode.
- Click  to download your program.
- Click  to set the controller to run mode
- Set the DeltaPro to Auto Mode (Input 13)
- Select the block you want to run by turning on the appropriate input.  
Refer to [Block Trigger Mode](#)

## Program

Click on the individual menu for help on that subject.



## Setup

Allows you to go to the setup screen

## Information

Allows you to go to the information screen


## Program Area

## Block

Allows you to increment or decrement block

## Connected

Shows status of communication to the DeltaPro controller

*Note:* If there is no communication, the disconnect button,  will be displayed.

## Servo Status

Shows the status of the servo.

*Note:* This is displayed only after a connection with the DeltaPro is established.

### *AutoStart Servo :*

Used to indicate whether the controller will automatically start in run mode the next time the unit is powered up. If this status is checked then the unit will automatically start in run mode, if it is not checked then it will just power up.

### *Drive Parameters Not Valid :*

If this is checked, it indicates that the parameters that the controller utilizes to perform motion instructions have been changed. When the controller is cycle powered the unit's parameters will return to normal.

### *Flash Failure :*

If this is checked, the flash memory has been compromised and needs to be replaced.

### *Program Loaded :*

If this is checked, a program has been loaded into the controller.

### *Cycle Servo's Power :*

If this is checked, the units power must be cycled. Cycling of the unit's power is generally required when the user downloads a new set of parameters.

## Setup Screen

Click on the individual menu for help on that subject.

The screenshot shows a software interface with three tabs: "Initial", "Controller", and "Delta Compensation". The "Initial" tab is active. It contains the following settings:

- Engineering Units (units/rev): 1.000
- Brake Mode: None
- Block Trigger Mode: Input
- Torque Limit: 100
- Jog Speed: 50
- Test Point Function: Speed
- Jog Ramp: 50

## Controller Screen

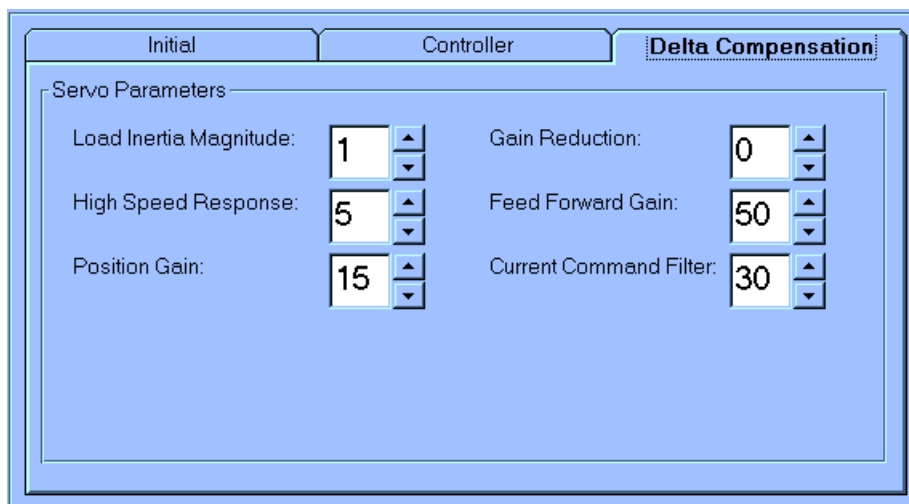
Click on the individual menu for help on that subject.

The screenshot shows a software interface with three tabs: "Initial", "Controller", and "Delta Compensation". The "Controller" tab is active. It contains the following settings:

- Motor Code: No Motor Selected
- Servo Direction:
  - ClockWise
  - Counter ClockWise
- Servo Ascii Mode:
  - Enabled
  - Disabled

## Delta Compensation

Click on the individual menu for help on that subject.



## Engineering Unit

Engineering units are defined as any conversion which can be expressed as units per motor shaft revolution. Movement data is communicated with the DeltaPro Motion Control System in terms of 'Engineering Units'.

**Valid Range:** 0.00010 to 999999

## Block Trigger Mode

Defines how the DeltaPro Motion Control System begins execution of the programmed blocks during automatic operations.

### *Input Trigger Mode:*

The twelve programmable input locations will be scanned for a change of state from OFF to ON. The block number corresponding to the input number which changed state will start execution.

### *Binary Trigger Mode:*

When the MOVE input (input #8) changes state from OFF to ON, the block number corresponding to the binary code on programmable input #1 through #7 will start execution.

**Example:** If input #2 and input # 6 are ON when MOVE changes from OFF to ON, block number 34 (binary 2 for input #2 plus binary 32 for input #6) will start execution.

## Binary Code

<i>User Input #</i>	<i>Binary Code</i>
1	1
2	2
3	4
4	8
5	16
6	32
7	64

## Jog Speed

Maximum speed at which the motor will turn when it is under a 'Jog CW' or 'Jog CCW' command

**Valid Range:** 5 to 5600 rpm

## Jog Ramp

The rate of both acceleration and deceleration when the controller is executing a jog command.

**Valid Range:** 5 to 1600 revs/sec/sec

## Brake Mode

Selects the type of brake sequencing to be done when the drive is disabled:-

**None:** No Braking mechanism is employed.

**Static:** External Braking mechanism is applied after a controlled deceleration to a speed indicated by the value of UP-28.

**Dynamic:** Braking mechanism is applied immediately.

## Torque Limit

Allows user to change the Torque Limiting.

Current becomes limited in proportion to the voltage of current limit.

**Valid Range:** 0 to 100

## Test Point Function

Allows user to change to desired Monitor Output.

Outputs the speed or current with analog voltage.

**Speed:** motor rated revolutions per minute (rpm) +/- 3v

**Torque:** motor maximum current +/- 3v

## Motor Code

Provides a specific product motor code to the drive.

**Note:** This is important to do in order for the motor and drive to function properly. The drive can blow up if the right motor code is not selected.

## Servo Direction

Selects direction of motor.

## Servo Ascii Mode

**Note:** The Ascii Mode must be *disabled* before the program is sent to the DeltaPro Controller.

## Load Inertia Magnitude

Sets the baseline frequency response of the driver using the ratio of the load inertia/motor for a rigidly coupled load.

**Valid Range:** 0 to 100

## High Speed Response

Sets the high frequency response of the driver.

**Valid Range:** 0.1 to 20

## Position Gain

Sets the DC gain of the position control loop.

**Valid Range:** 1 to 200 rad/sec

## Gain Reduction

Sets the amount of gain reduction at zero speed.

**Valid Range:** 0 to 10000

## Feed Forward Gain

Sets the feed forward gain in the position loop.

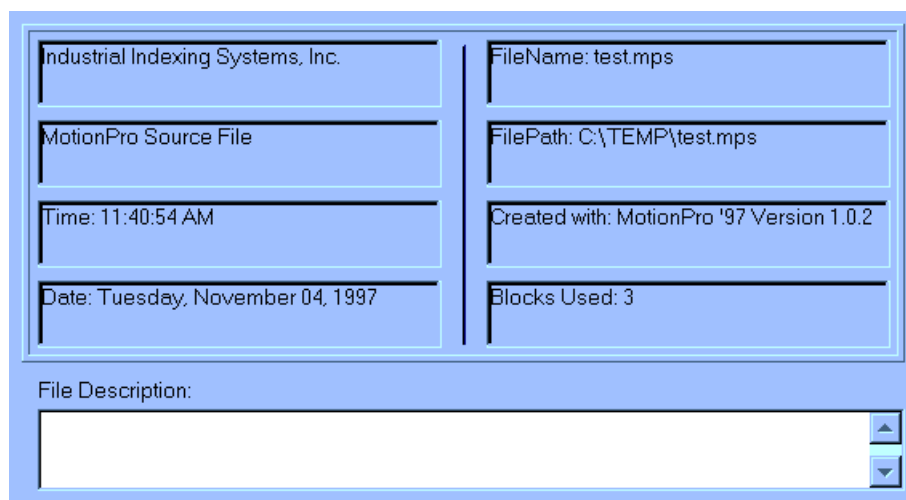
**Valid Range:** 0 to 2

## Current Command Filter

(New topic text goes here.)

## Information Screen

This screen gives the following informations about the file created.



## File Description

Allows you to put in the file information

## Initial

Allows you to go to 'Initial' screen

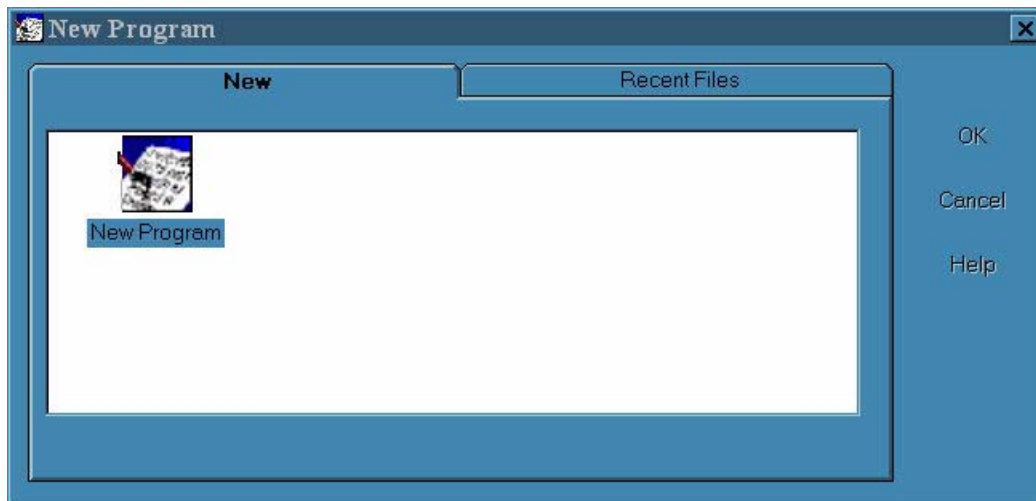
## Controller

Allows you to go to the 'Controller' screen

## Delta Comp

Allows you to go to the 'Delta Compensation' screen

## Project Dialog Box



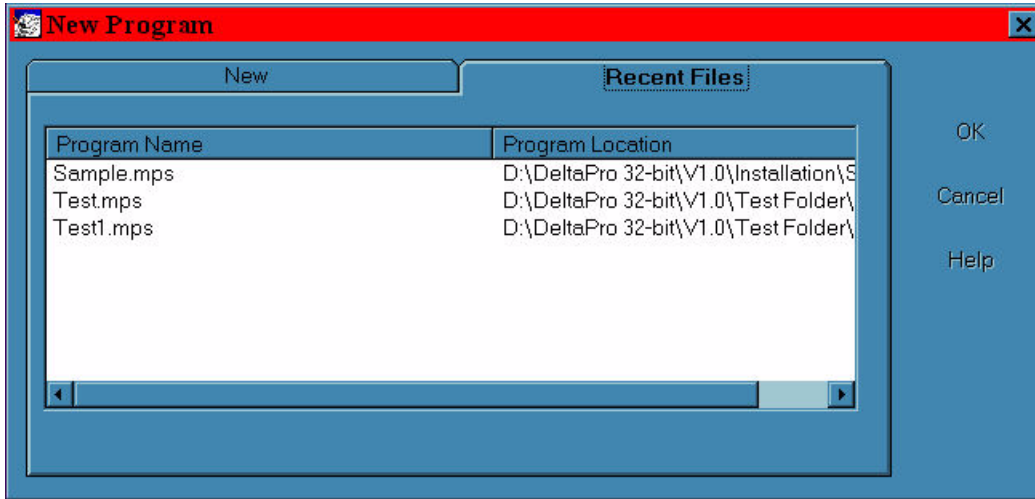
The first tab in the dialog box, captioned as “**New**” will allow you to create a new default program with all of the setup information set to recommended values. A new default program is created by double clicking on “New Program”.

The second tab in the dialog box, captioned as “**Recent Files**” allows you to select a file from a list of recent projects.

This feature allows you to pull files from the same project without having to hunt through your hard drive for it.

## Recent Files

















(New topic text goes here.)












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## **Clear 0.0**

### ***SYNTAX:***

Clear 0.0

### ***PARAMETERS:***

None

### ***DESCRIPTION:***

Clears the current set zero position and returns system to absolute 0.0



## ClockWise Limit

***SYNTAX :***

ClockWise Limit

***PARAMETERS:***

Disable/Enable

*Entry Option:* Program Mode

***DESCRIPTION:***

Enables or disables the CW limit input # 10.



## CounterClockWise Limit

***SYNTAX:***

CounterClockWise Limit

***PARAMETERS:***

Disable/Enable

*Entry Option:* Program Mode

***DESCRIPTION:***

Enables or disables the CCW limit input # 11



## Do While

### **SYNTAX:**

Do While                                    I/O state, Input  
    Count, # of Count  
    Until Exit  
    Batch, # of Batch

### **PARAMETERS:**

Input:                                    The number of defined input.  
    *Range:* 1 to 12  
    *Entry Option:* Program Mode

Count:                                    The number of times to repeat the Do While  
    loop.  
    *Range:* 1 to 32767  
    *Entry Option:* Program or Run Mode

Until Exit                                    None  
    *Entry Option:* Program Mode

Batch                                    The count value to be used if BATCH  
    COUNTER is zero.  
    *Range:* 1 to 32767  
    *Entry Option:* Program or Run Mode

### **DESCRIPTION:**

Repeat the steps between Do While and End While until conditions is met.



## End While

***SYNTAX:***

End While

***PARAMETERS:***

None

***DESCRIPTION:***

End of Do While Loop.



## Exit Block

***SYNTAX:***

Exit Block

***PARAMETERS:***

None

***DESCRIPTION:***

Terminates block execution.



## Exit Block If I/O

### **SYNTAX:**

Exit Block If I/O      Input, I/O state

### **PARAMETERS:**

Input	The number of the defined input. <i>Range:</i> 1 to 12 <i>Entry Option:</i> Program Mode
I/O state	The state in which the defined input is considered energized. <i>Range:</i> ON or OFF <i>Entry Option:</i> Program Mode

### **DESCRIPTION:**

Terminates block execution if input is energized.



## **Follower**

This instruction is not available at the present time.



## **If I/O**

This instruction is not available at the present time.



## **If Variable**

This instruction is not available at the present time.



## Index

### **SYNTAX:**

Index                      index,speed,accel,degree

### **PARAMETERS:**

index	The position desired relative to the current position. <i>Range:</i> -2000 to 2000 revs <i>Entry Option:</i> Program or Run Mode
speed	The maximum speed the motor will turn during an index move. <i>Range:</i> 5 to 5600 rpm <i>Entry Option:</i> Program or Run Mode
accel	The rate of both acceleration and deceleration. <i>Range:</i> 5 to 1600 revs/sec/sec <i>Entry Option:</i> Program or Run Mode
degree	The degree of the sine angle modifying the transitions between acceleration and deceleration and the steady-state speeds of the motor. <i>Range:</i> 0 to 9 degrees <i>Entry Option:</i> Program Mode

### **DESCRIPTION:**

An incremental move to the index relative to the current position.  
A degree of zero specifies trapezoidal indexing and a degree of 1-9 specifies “Modified Sine Indexing”.



## Initialize

### **SYNTAX:**

Initialize                      Zrev,speed,accel

### **PARAMETERS:**

Zrev	Enable/Disable input # 12 <i>Entry Option:</i> Program Mode
speed	The speed the motor will turn to initialize. <i>Range:</i> 5 to 5600 rpm <i>Entry Option:</i> Program Mode
accel	The rate of both acceleration and deceleration during initializing. <i>Range:</i> 5 to 1600 revs/sec/sec <i>Entry Option:</i> Program Mode

### **DESCRIPTION:**

Initializes the motor to a marker position. There are two markers per motor revolution.



## Let Variable

This instruction is not available at the present time.



## Position

### SYNTAX:

Position                      position,speed,accel,degree

### PARAMETERS:

position	The position desired relative to the 'home' position. <i>Range:</i> -2000 to 2000 revs <i>Entry Option:</i> Program or Run Mode
speed	The maximum speed the motor will turn during positioning. <i>Range:</i> 5 to 5600 rpm <i>Entry Option:</i> Program or Run Mode
accel	The rate of both acceleration and deceleration during positioning. <i>Range:</i> 5 to 1600 revs/sec/sec <i>Entry Option:</i> Program or Run Mode
degree	The degree of the sine angle modifying the transitions between acceleration and deceleration and the steady-state speeds of the motor. <i>Range:</i> 0 to 9 degrees <i>Entry Option:</i> Program Mode

### DESCRIPTION:

An absolute move to the position relative to zero position.  
A degree of zero specifies trapezoidal positioning and a degree of 1-9 specifies "Modified Sine positioning".

## **Preset Batch**

### ***SYNTAX:***

Preset Batch                      batch count

### ***PARAMETERS:***

batch count

*Range:*

*Entry Options:* Program or Run Mode

### ***DESCRIPTION:***

Sets the counter to be used by the Do While Batch command.



## Search for I/O

### **SYNTAX:**

Search for I/O            search dist.,post dist.,speed,I/O state

### **PARAMETERS:**

search dist.	The distance the search will continue for if the defined input is not energized. <i>Range:</i> -2000 to 2000 revs <i>Entry Option:</i> Program or Run Mode
post dist.	The distance that will be traveled after the defined input is energized. <i>Range:</i> -2000 to 2000 revs <i>Entry Option:</i> Program or Run Mode
speed	The maximum speed of the motor during the Search for I/O function. <i>Range:</i> 5 to 5600 rpm <i>Entry Option:</i> Program or Run Mode
I/O state	The state in which the defined input is considered energized. <i>Range:</i> 1 to 12 <i>Entry Option:</i> Program Mode

### **DESCRIPTION:**

Moves motor at the set speed until input is on/off or maximum search distance is traveled.

Travels post distance after input is on/off.



## **Set 0.0**

***SYNTAX:***

Set 0.0

***PARAMETERS:***

None

***DESCRIPTION:***

Forces current position to be 0.0



## Set Pls Angle

This instruction is not available at the present time.



## Turn On/Off

### **SYNTAX:**

Turn On/Off                      output, I/O state

### **PARAMETERS:**

output                              The number of the defined output.

*Range:* 1 to 5

*Entry Option:* Program Mode

I/O state                            Specifies the output to be turned on or off.

### **DESCRIPTION:**

Turns on/off an output.



## Wait Distance

### **SYNTAX:**

Wait Distance            distance

### **PARAMETERS:**

distance                      The incremental distance to travel relative to the  
start of the previous motion.

*Range:* -2000 to 2000 revs

*Entry Option:* Program or Run Mode

### **DESCRIPTION:**

Waits to execute next step until distance is traveled.



## Wait I/O

### **SYNTAX:**

Wait I/O                      Input, I/O state

### **PARAMETERS:**

Input                      The number of the defined input.

*Range:* 1 to 12

*Entry Option:* Program Mode

I/O state                      The state in which the defined input is considered energized.

### **DESCRIPTION:**

Waits for specified input condition.



## Wait Position

### **SYNTAX:**

Wait Position                      Position

### **PARAMETERS:**

Position                      The position desired relative to the 'home' location.  
*Range:* -2000 to 2000 revs  
*Entry Option:* Program or Run Mode

### **DESCRIPTION:**

Waits to execute next step until position is reached.



## **Wait Till Stop**

***SYNTAX:***

Wait Till Stop

***PARAMETERS:***

None

***DESCRIPTION:***

Waits to execute next step until motion is done.



## Wait Time

### **SYNTAX:**

Wait Time                      time

### **PARAMETERS:**

time

The number of milliseconds the system will wait before execution of the next command.

*Range:* 1 to 10,000 ms

*Entry Option:* Program or Run Mode

### **DESCRIPTION:**

Programmed delay.



## SECTION 5 - EXAMPLES

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## Examples

The following examples are available

### Arithmetic Functions Example

**Description:**

The following example illustrates the different arithmetic functions used in MotionPro.

<b>Blk.Stp</b>	<b>Instruction</b>	<b>Parameter</b>	<b>Comments</b>
10.1	Set 0.0		! set current position to zero
10.2	Let Variable	Temp1 = 2	
10.3	Let Variable	Temp2 = Temp1 *	
10.4	Turn On/Off	1,On	
10.5	If Variable	,Step # 10.7	
10.6			
10.7	Turn On/Off	1,Off	
10.8			
10.9	Exit Block		

## Branching Example

### *Description:*

The following example illustrates the use of 'If I/O' instruction. An axis is indexed for ten turns and an output is turned on during indexing. If input #3 is turned on during this index, the program will stop the index, turn off the output and exits the current block. When the user goes from Program Mode to Run Mode and input # 2 is turned on, the following program sequence is executed (block # 2).

### Example 1 ('If I/O')

Blk.Stp	Instruction	Parameter	Comments
2.1	Set 0.0		! set current position to zero
2.2	Turn On/Off	1,On	! turn on output #1
2.3	Wait Time(ms)	50	! wait for 50ms
2.4	Index	10.000,50,25,0	! index motor 10 turns at a speed of 50revs/min and ! accel/decel of 25 revs/sec/sec using normal trapezoidal ! profile (degree = 0).
2.5	If I/O	3,Off,Step 2.5	! stay in this loop until input #3 is On
2.7	Turn On/Off	1,Off	! turn off output #1
2.8	Exit Block		

### Example 2 ('If Variable')

Blk.Stp	Instruction	Parameter	Comments
2.1			
2.2			
2.3			
2.4			
2.5			
2.7			
2.8			

## Master/Slave Example

### *Description:*

The following example shows a typical master/slave application of MotionPro . The motion is controlled using the electronic gearbox, ratio lock feature of the MotionPro. A resolver or encoder is used as the master that controls movement of the slave axis. The slave will track the master proportional to the currently set ratio. When the user goes from Program Mode to Run Mode and input # 1 is turned on, the following program sequence is executed (block # 1).

Blk.Stp	Instruction	Parameter	Comments
1.1	Set 0.0		! set current position to zero.
1.2	Do While	Count,10	! repeat the following until Count = 10.
1.3	Follower	10,100,Lock,300	! use electronic gear box with ratio of 10:1 to drive slave axis. ! use accel/decel limit on the slave of 300 revs/sec/sec.
1.4	Wait Position	4.000	! keep moving forward until the axis has turned 4.000°.
1.5	Follower	-10,100,Lock,300	! reverse motion of slave (-10).
1.6	Wait Position	0.000	! keep moving the axis towards the zero position.
1.7	End While		! go back to step # 1.2 and check Count.
1.8	Follower	- 10,100,Unlock,300	! stop motion by unlocking the slave from the master.
1.9	Exit Block		

## Programmable Limit Switch Example

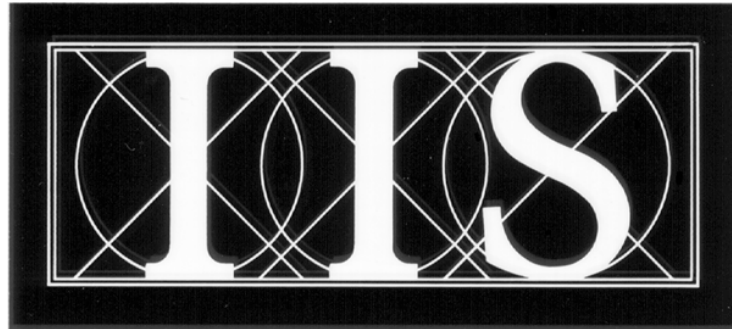
### *Description:*

The following example

<b>Blk.Stp</b>	<b>Instruction</b>	<b>Parameter</b>	<b>Comments</b>
3.1	Let Variable	Pos1 = 2	! let Pos1 (ON angle) = 2 revs of the motor
3.2	Let Variable	Pos2 = 4	! let Pos2 (OFF angle) = 4 revs of the motor
3.3	Set PLS Angle	Enable,1,Pos1,Pos2,	! turn on PLS #1 when the motor position is between Pos1
3.4	Do While	Count,20	! and Pos2 ! do the following steps until input #2 is ON
3.5	Index	10.000,50,25,0	
3.6	Wait I/O	1,On	! wait until PLS #1 is On
3.7			
3.8	End While		
3.9	Set PLS Angle	Disable,1,Pos1,Pos2	
3.10	Exit Block		



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