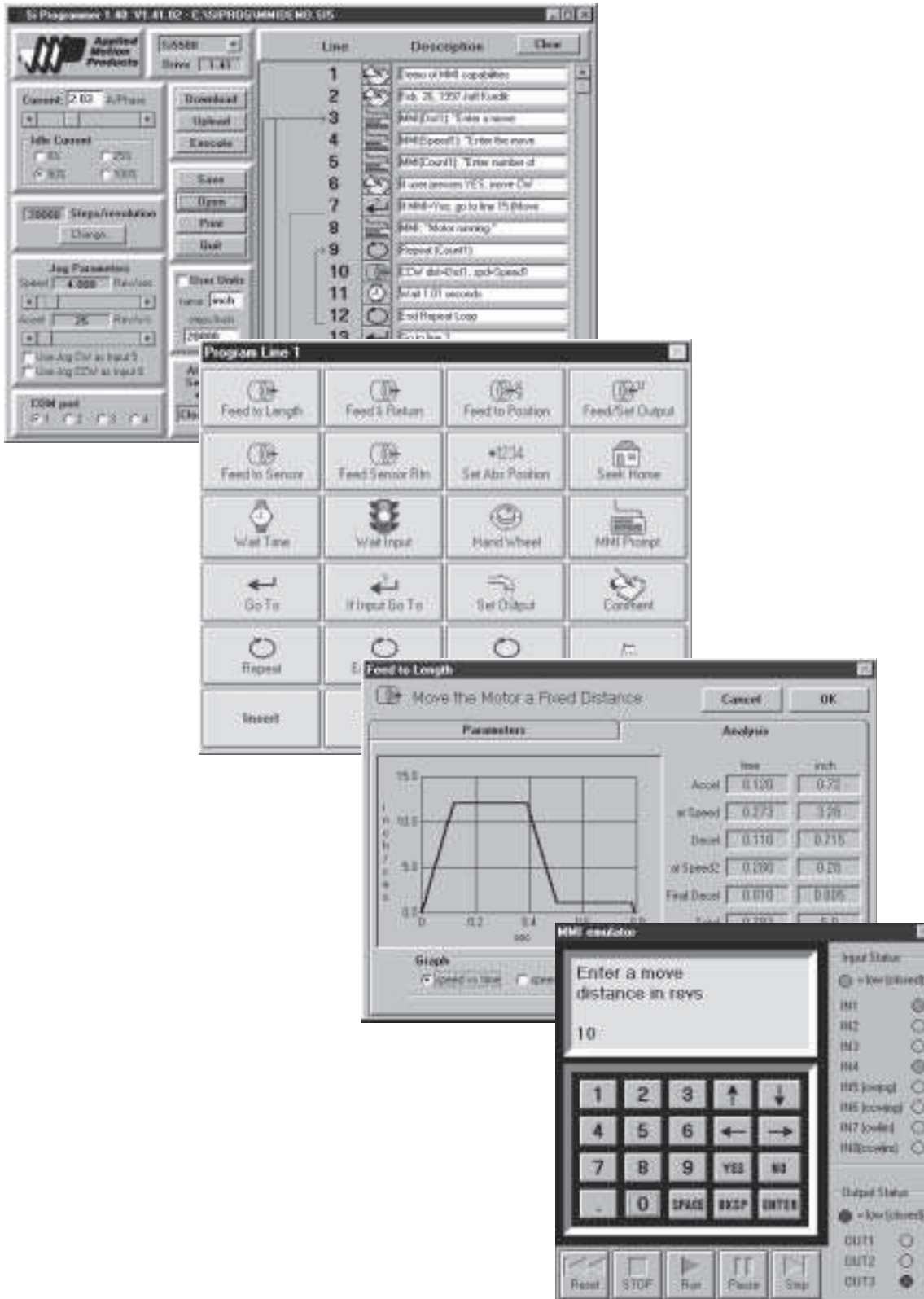


Si Programming Screens



The screenshot displays the Si Programming software interface, which includes a main window with a table of program lines and several floating dialog boxes.

Main Window Table:

Line	Description
1	Enter MMS jog values
2	Feb. 26, 1997 full feed
3	MMS[Dir1] "Take a name"
4	MMS[Pos1] "Enter the move"
5	MMS[Load1] "Enter number of"
6	If load answer YES, move Dir
7	If MMS-Yes, go to line 15 (Move
8	MMS: "Motor running"
9	Repeat (Load1)
10	Dir dir=Dir1, spd=Speed1
11	Wait 1.01 seconds
12	End Repeat Loop
13	End of line

Program Line 1 Dialog: A grid of icons for various motion control functions such as Feed to Length, Feed to Return, Feed to Position, Feed to Output, Feed to Sensor, Feed Sensor Ret, Set Abr Position, Seek Home, Wait Time, Wait Input, Hand wheel, MMS Prompt, Go To, If Input Go To, Set Output, Comment, Repeat, and Insert.

Feed to Length Dialog: A dialog box titled "Move the Motor a Fixed Distance" containing a graph and analysis parameters.

Graph: A plot of Acceleration (g) vs. Time (sec). The acceleration starts at 0, ramps up to 1.0g at 0.1s, remains constant at 1.0g until 0.4s, ramps down to 0.1g at 0.5s, and remains constant at 0.1g until 0.6s.

Analysis Parameters:

	mm	inch
Accel	0.100	0.70
w/Speed	0.273	3.26
Decel	0.110	0.716
w/Speed2	0.290	0.20
Feed Decel	0.010	0.006
Feed Accel	0.001	0.000

MMS Prompt Dialog: A dialog box titled "Enter a move distance in revs" with a numeric keypad and a display showing the value "10".

Input Status Dialog: A dialog box showing the status of various inputs and outputs, including IN1 through IN8 and OUT1 through OUT3.

Si Software Specifications

INDEXER PROGRAMMING:

Programmable by RS-232 connection to IBM compatible PC running Windows 95, 98, 2000, NT, XP or ME. Programming software and cable included. Programming is very easy to learn and requires no previous programming experience.



Main Programming Screen

Programs can be up to 100 lines long. Instructions are powerful, so 100 lines can provide the user with a sophisticated program. For example, in one program line the motor can be moved until a sensor changes state, then fed a precise distance to a stop, delayed and returned to the starting point. Distances, delays, feed and return speeds, acceleration and deceleration parameters are all included in the single program line. The same move can take 10 program lines or more on other indexers.

There are a total of 20 different instructions, including input/output, branches, loops and motion commands. These instructions can be combined to make a nearly infinite variety of programs, meeting the demands of a wide range of applications.

As you compose your program, you can test it by downloading to a drive and executing. A sophisticated control panel allows you to observe the status input and output ter-

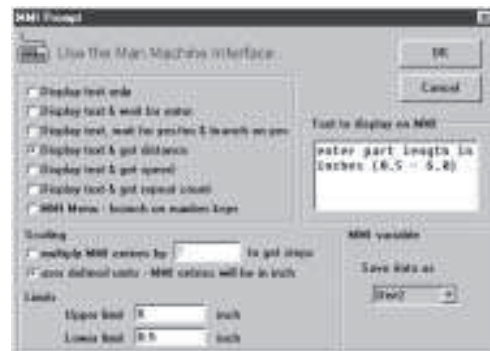
minals in real time, highlights the instruction that's executing, and allows you to pause and single step the program.

You can even emulate the optional Man Machine Interface on-screen. This allows you to try out the MMI before buying one, and eliminates the need to swap cables between the PC and MMI while you're testing your program.

You can also write programs without a drive connected to your PC and save them to your hard disk.

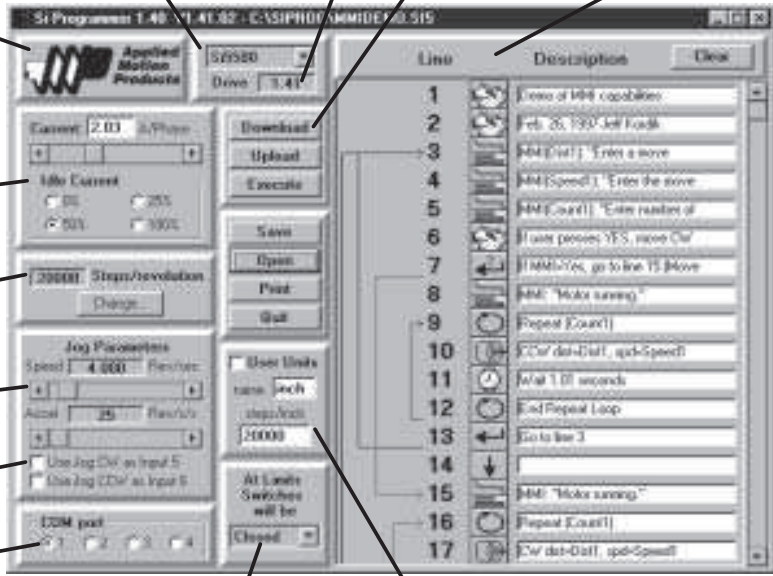
Once programmed, the cable can be removed and the indexer-drive will run stand alone. Programs and parameters are stored internally in nonvolatile memory. Upon power up, the drive automatically senses the connection to the Windows programming software. If no connection is detected, the program is automatically executed starting on line 1.

All Si products support an optional NEMA 4X operator interface (MMI) that allows the operator to enter variables such as speeds, distances and repeat counts. The MMI attaches to the RS-232 programming port, leaving all inputs and outputs free.



Typical Dialog Box
(for MMI prompt instructions)

Features of the Main Programming Screen



The screenshot shows the main programming interface with the following labeled features:

- Indexer-Drive Type**: A dropdown menu showing '52520' and 'Drive: 3.41'.
- Indexer-Drive Firmware Level**: A dropdown menu showing '3.41'.
- Indexer-Drive Control Buttons**: A vertical column of buttons including Download, Upload, Execute, Save, Open, Print, and Quit.
- Program Window**: A table with columns for Line number and Description. The description column contains G-code commands like G0, G1, G2, G3, G4, G5, G6, G7, G8, G9, G10, G11, G12, G13, G14, G15, G16, G17, G18, G19, G20, G21, G22, G23, G24, G25, G26, G27, G28, G29, G30, G31, G32, G33, G34, G35, G36, G37, G38, G39, G40, G41, G42, G43, G44, G45, G46, G47, G48, G49, G50, G51, G52, G53, G54, G55, G56, G57, G58, G59, G60, G61, G62, G63, G64, G65, G66, G67, G68, G69, G70, G71, G72, G73, G74, G75, G76, G77, G78, G79, G80, G81, G82, G83, G84, G85, G86, G87, G88, G89, G90, G91, G92, G93, G94, G95, G96, G97, G98, G99, G100, G101, G102, G103, G104, G105, G106, G107, G108, G109, G110, G111, G112, G113, G114, G115, G116, G117, G118, G119, G120, G121, G122, G123, G124, G125, G126, G127, G128, G129, G130, G131, G132, G133, G134, G135, G136, G137, G138, G139, G140, G141, G142, G143, G144, G145, G146, G147, G148, G149, G150, G151, G152, G153, G154, G155, G156, G157, G158, G159, G160, G161, G162, G163, G164, G165, G166, G167, G168, G169, G170, G171, G172, G173, G174, G175, 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G2149, G2150, G2151, G2152, G2153, G2154, G2155, G2156, G2157, G2158, G2159, G2160, G2161, G2162, G2163, G2164, G2165, G2166, G2167, G

Si Program Instructions



Feed to Length

A point to point move. Parameters are distance, direction, speed, accel and decel. Can also change speeds at a specified distance within the move.

Feed & Return

A point to point move that returns to the starting point after specified delay. Parameters include distance, feed speed, return speed, direction, accel, decel, and return delay time.

Feed to Position

A move to an absolute position. Parameters are position, speed, accel and decel.

Feed & Set Output

A point to point move. An output terminal can be turned on or off during the move, or can be turned on, off or pulsed at the end of the move.

Feed to Sensor

Moves the motor until an input (to which a sensor is connected) changes state, then stops at a specified distance beyond the sensor. Useful for applications like dispensing labels or moving objects on a conveyer. A safety distance can be given; if the motor moves beyond that distance without reaching the sensor, the motor stops and the program branches to a specified line.

Feed to Sensor & Return

Same as Feed to Sensor, but returns to the original starting point. Additional parameters are return speed and return delay time.

Set Abs Position

Assign a value, such as 0 inches, or 10 mm, to the present motor position.

Save Abs Position

Stores the present absolute position to an MMI variable so that it can be “learned” and returned to later by a feed to position instruction.

Si Program Instructions

Seek Home

Positions the motor at a home sensor (wired to one of the general purpose inputs) “bouncing off” the limits if necessary.

Wait Time

Delays a specified amount of time. Range is .01 to 300 seconds. Adding a loop around this instruction can extend the delay time to as much as 18 hours.

Wait Input

Pauses the program until an input, or set of inputs, reaches a given condition. The jog inputs are functional during this instruction. The Wait Input instruction can also display a prompt on the optional MMI and pause until the operator presses the ENTER key.

Hand Wheel

Allows the operator to precisely position the motor and load using an optional CNC hand wheel.

MMI Prompt

Displays a prompt on the optional man-machine interface (MMI) panel and accepts a parameter from the operator. This parameter is saved in nonvolatile memory and can be used as a move speed, move distance or repeat loop count. Speeds and distances can be entered in user defined units such as inches or gallons. The MMI Prompt instruction also allows the operator to choose a sub program from a menu of up to 8 sub programs.

Go To

Forces program to jump to a specific instruction. At the least, you’ll need one of these at the end of your program to return execution to the beginning.

If Input

Causes the program to branch to a given line number if an input, or set of inputs, meets a specified condition. The If Input instruction can also display a prompt on the optional MMI and branch if the operator presses the YES key.

Set Output

Set a given output to a high or low voltage state, or can emit a high or low pulse of 2 to 500 milliseconds. This instruction is useful for triggering other motor controllers, relays or cut-off knives. It can also be used to signal events to another indexer or PLC.

Comment

Allows the user to document the program by adding comments. Comments stay with the program even when downloaded to the drive.

Repeat

The beginning of a loop. Repeat a block of instructions a fixed number of times (up to 65,535 times). Loops can be extended by nesting loops around each other (two nested loops allow you to repeat the instructions within them more than 4 billion times).

End Repeat

Marks the end of a repeat loop. The programming software matches these up for you automatically. You don’t have to specify a line number. Connections are shown graphically on the screen.

Reset Repeat Loop

Resets a repeat loop counter to 0. Useful for resetting a loop that has been prematurely terminated by an If Input instruction.

Change Current

Allows the program to turn off the motor current, resume the previous current level, or change the current setting anytime.