PROGRAMMING INFORMATION
for
SLO-SYN® ENHANCED
OPEN-LOOP AND CLOSED-LOOP
PROGRAMMABLE INDEXERS
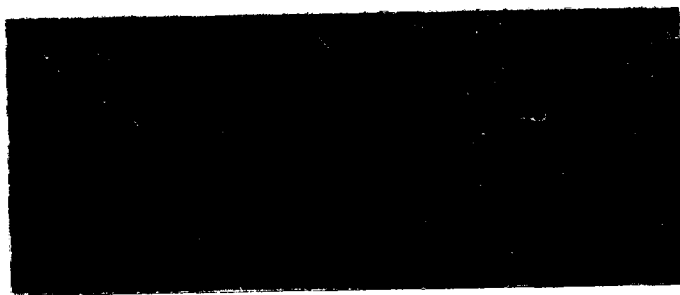
◆◆ Superior Electric

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CONTENTS

INTRODUCTION

SLO-SYN® Programmable Indexers are extremely powerful motion controllers. Their features include:

Programming
- Simple, easy to use format
- Up to 99 Indexers can be daisy chained via serial I/O port
- Nonvolatile, battery-backed memory for program storage
- Serial or parallel port operation

RS232 Communications
- Can be programmed to transmit designated characters over RS232 when certain conditions occur
- Status information can be continuously reported over RS232

Absolute or Incremental Motion Control
- Incremental mode - all moves specified from present location
- Absolute mode - all positioning information given relative to zero, or "Home" position

Index From Run
This feature, also called "Mark Registration", drives the motor until an output is activated to initiate an index of a designated distance

Velocity Change During Motion
Allows velocity to be increased or decreased during motion by a previously selected value or to a specified value

Choice Of Ramp Profile
Choose from Trapezoidal, "S" shaped or hyperbolic ramp profiles

Programmable Backlash Compensation
Allows the operator to compensate for play in the mechanical system

Auto Reverse
Automatically returns to the starting position at the end of each move

I/O Capability
Software parameters can be used to define up to 8 programmable inputs and 6 programmable outputs

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ADDED FEATURES, CLOSED LOOP MODELS

Position Maintenance
The Indexer will automatically correct for any error in final position

Following Error Detection and Correction
The Indexer will detect and report, and can be programmed to correct, any Following Error that occurs during motion

Selectable Encoder Scale Factor
The Indexer can be programmed to function with a variety of encoder resolutions

Dedicated Output for Position Error Detection Status
Indicates: Following Error Condition
            Unable To Correct situation
            Position Maintenance Error

SLO-SYN Programmable Indexers may be operated by either of two methods:

1. A Programmable Indexer may be operated through its serial RS232 interface from a host computer, a standard ASCII terminal or a Hand-Held Programmer. This is done by issuing various alphanumeric codes to program, and then run, the Indexer.

2. A Programmable Indexer may be operated through its parallel I/O port, via a switch panel such as the SLO-SYN Model SSP-100, or via a Programmable Logic Controller (PLC). In this mode, the Indexer responds to switch closures to activate various functions, and to binary-coded-decimal (BCD) inputs to load move data, such as distance and speed.

Typically, the Indexer is programmed through its serial port. Once programming is completed, the Indexer may be operated through either the serial or the parallel port.

This brochure is intended to give an overview of the two programming methods.

INDEXER COMMANDS

GENERAL PROGRAMMING INFORMATION

EIA (Electronic Industries Association) Standard RS274-D, the programming guide for numerically controlled machines, has been used as the basis for the Micro Series Indexer command structure. Although it was not technically feasible to conform to this standard in complete detail, it proved beneficial in the program structure to permit complex and varied operations to be performed using a simple format. The Indexer parameters and commands can be grouped into three general categories. Refer to the Programming Worksheets on page 15 for the order in which data are entered.

The three general categories of parameters and commands are:

1. **"L Codes"** are used to set parameters for each Indexer. These commands do not cause motion, but simply establish the motion parameters.

2. **"H Codes"** are used to set Indexer modes, to control manual motion and program execution, and to transmit parameters and Indexer status via the serial communications port.

3. **Line Data Codes** are the codes that define the motion that will be made (X Code), the speed at which it will be done (F Code) and G Code which can control program execution and modify the way it operates.

L CODE LISTING AND DEFAULTS
The following lists show all of the parameters which can be programmed by the user. In addition, all of the factory default values are listed on the following page.

Indexer Parameters

L07 nnnn	Strobe Delay
L13 nnnnnnnn	Step Increment
L16 nnnnnnnn	Index From Run Travel Limit
L18 snnnnnnnn	CW Software Travel Limit
L19 snnnnnnnn	CCW Software Travel Limit
L20 n	Up/Down Feed Rate Override
L41 nnn	Auto Start Line Number
L45 n	Limit Switch Enable
L57 nnn	Strobe 0, Strobe 1 Delay
L67 n	Auto Reverse
L70 nnn	Resolution

RS232 Parameters

L21 nn	Device Identification Number
L22 nnnn	Baud Rate
L23 n	Character Length
L25 n	RS232 Parity
L26 n	Command Acknowledgement
L48 nnn	Program Line Count Designator
L49 nn	Parameter Transfer Designator
L50 nn	Parameter Transfer Count
L52 nnn	Buffer Warning Character
L53 nnn	Following Error Exceeded Character
L54 nnn	Unable To Correct Character
L55 nnn	Line Done Character
L56 nnn	Program Done Character
L98 nnn	Delay Between Continuous H Code Transmissions

Program Parameters

L06 n	Execution Format
L44 nnnn	Program Line Delay

L47 nnnnnnnn	Repeat Count
L51 n	Input/Output Mode Select

Feed Rate Parameters

L09 nnnnnnn	Jog Speed
L12 nnnnnn	Low Speed
L14 nnnnnn	Home Speed
L73 nnnnnnnn	Deviation Frequency

Ramp (Accel/Decel) Parameters

L11 nnnnnnnn	Acceleration/Deceleration
L71 nnnnnnnn	Ramp Frequency Limit
L72 n	Ramp Profile Select

Mechanical Home Parameters

L08 s	Mechanical Home Direction
L17 snnnnnnnn	Offset From Mechanical Home

Backlash Compensation Parameters

L43 nnnn	Delay Between Index And Backlash
L66 snnnnnnnn	Backlash Compensation

Position Verification Parameters

L87 nnnnnn	Following Error
L90 n	Position Verification Enable/Disable
L93 nnnnn	In Position Bandwidth
L94 n	Invert Encoder Direction
L95 n	Encoder Quadrature Scale Factor
L96 nnnnnn	Number Of Times To Attempt A Position Correction
L97 nnnnnn	Delay Between Correction Attempts

L Code Factory Defaults Summary

Code	Function	L70=1*	L70=2*	L70=5*	L70=10*	L70=125*
L06	Execution Format	2	2	2	2	2
L07	Strobe Delay	0	0	0	0	0
L08	Mechanical Home Direction	+	+	+	+	+
L09	Jog Speed	1000	2000	5000	10000	125000
L11	Acceleration/Deceleration	1000	2000	5000	10000	125000
L12	Low Speed	300	600	1500	3000	37500
L13	Step Increment	1	2	5	10	125
L14	Home Speed	1000	2000	5000	10000	125000
L16	Index From Run Travel Limit	0	0	0	0	0
L17	Offset from Mechanical Home	+0	+0	+0	+0	+0
L18	CW Software Travel Limits	-0	-0	-0	-0	-0
L19	CCW Software Travel Limits	+0	+0	+0	+0	+0
L20	Up/Down Feedrate Override Enable	0	0	0	0	0
L21	Device Identification Number	01	01	01	01	01
L22	RS232 Baud Rate	9600	9600	9600	9600	9600
L23	Character Length	8	8	8	8	8
L25	RS232 Parity	1	1	1	1	1
L26	Command Acknowledgement	0	0	0	0	0
L41	Auto Start Line	1	1	1	1	1
L43	Delay between Index and Backlash	50	50	50	50	50
L44	Program Line Delay	50	50	50	50	50
L45	Limit Switch Enable	0	0	0	0	0
L47	Repeat Count	0	0	0	0	0
L48	Program Line Count Designator	20	20	20	20	20
L49	Parameter Transfer Designator	0	0	0	0	0
L50	Parameter Transfer Count	0	0	0	0	0
L51	Input/Output Mode Select	0	0	0	0	0
L52	Buffer Warning Character	0	0	0	0	0
L53	Following Error Character	0	0	0	0	0
L54	Unable to Correct Character	0	0	0	0	0
L55	Line Done Character	0	0	0	0	0
L56	Program Done Character	0	0	0	0	0
L57	Strobe 0 and Strobe 1 Delay	4	4	4	4	4
L66	Backlash Compensation	+0	+0	+0	+0	+0
L67	Auto Reverse	0	0	0	0	0
L71	Ramp Frequency Limit	115000	115000	115000	115000	1875000
L72	Ramp Profile Select	0	0	0	0	0
L73	Deviation Frequency	10	20	50	100	1250
L87	Following Error	10	20	50	100	1250
L90	Position Verification Enable	0	0	0	0	0
L93	In Position Bandwidth	0	0	0	1	12
L94	Encoder Direction	1	1	1	1	1
L95	Encoder Scale Factor	8	4	2	0	0
L96	Correction Attempts	100	100	100	100	100
L97	Delay between Correction Attempts	100	100	100	100	100
L98	Delay between continuous H Codes	100	100	100	100	100

* L70 programs the Indexer step resolution to match the drive as indicated below:

1 = Full-Step	2 = Half-Step	5 = 1/5 microstep
10 = 1/10 microstep	125 = 1/125 microstep	

Indexer defaults are factory programmed according to the type of drive supplied. For example, a 3180-PI10 uses defaults shown in the L70 = 10 column.

H CODE LISTING

H01	Cycle Start	H24	Program Trace Mode On
H02	Step Mode	H25	Program Trace Mode Off
H03	Jog Mode	H26	Transfer Error Count
H04	High Speed Mode	H27	Transfer Position Verification Status
H05	Low Speed Mode	H28	Transfer Switch Input Status
H06	CW Direction	H29	Transfer Program Execution Time
H07	CCW Direction	H30	Start Index From Run Cycle
H08	Return To Electrical Home	H31	Target Velocity Increase
H09	Set Electrical Home	H32	Target Velocity Decrease
H10	Return To Mechanical Home	H33	Incremental Position Mode
H11	Clear Program Line	H34	Absolute Position Mode
H12	Clear Program Lines Using L48	H35	Motor Windings On
H13	Transfer Program Line	H36	Motor Windings Off
H14	Transfer Program Lines Using L48	H37	Enable Boost Current
H15	Transfer Current Line Number	H38	Disable Boost Current
H16	Transfer Parameters	H39	Enable Reduce Current
H17	Transfer Absolute Electrical Position	H40	Disable Reduce Current
H18	Transfer Motion Status	H41	Transfer Remaining Repeat Value
H19	Transfer Mode Status	H60	Transfer Present Velocity
H20	Transfer Output Status	H85	Transfer Motion Error Status
H21	Transfer Conditional Input Status	H86	Transfer Data Error Status
H22	Transfer Absolute Encoder Position	H87	Transfer Program Error Line Number
H23	Transfer Software Revision Level	H88	Transfer Active Cycle

LINE DATA CODE LISTING

Nnnn	Line Number	G37	Strobe N Code Data
Xsnnnnnnnn	Program Index Distance or G Code data field	G38	Strobe F Code Data
		G47 Xnnnnnn	Set Output Condition
Fnnnnnnnn	Program Feed Rate or G Code Data	G48 Xs	Start Jog Cycle
		G49	Stop Jog cycle
G04 Xnnnnnn	Dwell Time	G64	Enable Reduce Current
G10 Xsnnnnnnn	Start Index From Run	G65	Disable Reduce Current
G11 Xnnn Fnnnn	Call a Subroutine	G66	Enable Boost Current
G12 Xnnn	Go To Line Number	G67	Disable Boost Current
G20 Xnnnnnnnn Fnnn	Conditional Branch	G68	Motor Windings Off
G22 Xnnnnnnnn	Wait For Input	G69	Motor Windings On
G23	Increment Jog Cycle Frequency	G76	Return To Electrical Home
		G77	Set Electrical Home
G24	Decrement Jog Cycle Frequency	G78	Return To Mechanical Home
		G79 Xsnnnnnnnn	Preload Absolute Position
G25 Xnnnn	Loop Start	G90	Absolute Position Mode
G26	Loop End	G91	Incremental Position Mode
G27	High Speed Mode		
G28	Low Speed Mode		
G29 Xsnnnnnnnn Fnn	Preload Designated Parameter		
G30	End Of Program		
G31	Program Stop		
G32	Return From Subroutine		
G36	Strobe X Code Data		

Notes: "s" is an ASCII sign (+ or -)
"n" is an ASCII number (0 - 9)
The remaining symbols are ASCII characters
(decimal value shown)

Line Format: Nnnn Gnn Xsnnnnnnnn Fnnnnnnnn

IMMEDIATE COMMAND LISTING
(Serial Port Only)

Certain commands can be processed as soon as they are issued, even when the Indexer is "busy". These commands, known as "Immediate" commands, include a subset of L codes, H codes and Line Data codes. To indicate that a command should be treated as an immediate command, simply precede it with an exclamation mark (!). A list of immediate commands is given below.

Command	Description	Command	Description
!Fnnnnnnn	Feed Rate Override		
!L47 nnnnnnnn	Repeat Count	!H16	Transfer Parameters
!L48 nnn	Program Line Count Designator	!H17	Transfer Absolute Electrical Position
!L49 nn	Parameter Transfer Designator	!H18	Transfer Motion Status
!L50 nn	Parameter Transfer Count	!H19	Transfer Mode Status
!L52 nnn	Buffer Warning Character	!H20	Transfer Output Status
!L53 nnn	Following Error Exceeded	!H21	Transfer Conditional Input Status
!L54 nnn	Unable To Correct Character	!H22	Transfer Encoder Position
!L55 nnn	Line Done Character	!H23	Transfer Software Revision Level
!L56 nnn	Program Done Character	!H24	Program Trace Mode On
!L57 nnn	Strobe 0, Strobe 1 Delay	!H25	Program Trace Mode Off
!L87 nnnnn	Following Error	!H26	Transfer Error Count
!L93 nnnnnn	In Position Bandwidth	!H27	Transfer Position Verification Status
!L96 nnnnnn	Number Of Times To Attempt A	!H28	Transfer Switch Input Status
	Position Correction	!H29	Transfer Program Execution Time
!L97 nnnnnn	Delay Between Correction Attempts	!H31	Target Velocity Increase
!L98 nnn	Delay Between Continuous H Code	!H32	Target Velocity Decrease
	Transmissions	!H41	Transfer Remaining Repeat Value
!H04	High Speed Mode	!H60	Transfer Present Velocity
!H05	Low Speed Mode	!H85	Transfer Motion Error Status
!H13	Transfer Program Line	!H86	Transfer Data Error Status
!H15	Transfer Current Line Number	!H87	Transfer Program Error Line Number
		!H88	Transfer Active Cycle

MISCELLANEOUS COMMAND LISTING
(Serial Port Only)

Command	Description	Command	Description
! (ASCII 33)	Immediate Command	? (ASCII 63)	Device Acknowledge ID
%Hnn	Activate Continuous H Code	* (ASCII 42)	Clear
	Transfer Mode	$ (ASCII 36)	Feed Hold
Xoff (ASCII 19)	Stop Transmission	# (ASCII 35)	Program Stop
Xon (ASCII 17)	Resume Transmission	/ (ASCII 47)	Transfer Normal Buffer Character
^H (ASCII 8)	Backspace And Delete		Count Remaining
^X (ASCII 24)	Delete RS232 Buffer	\ (ASCII 92)	Transfer Immediate Buffer
<00CR	All Devices Active Mode		Character Count Remaining
<00&	All Devices Listen Mode		
<00@	Cancel Listen Mode For All	Notes:	"s" is an ASCII sign (+ or -)
	Devices		"n" is an ASCII number (0 to 9)
<nnCR	Device Active		The remaining symbols are ASCII
<nn?	Device Active And Acknowledge ID		characters (decimal value shown)
nn&	Device Listen Mode		
nn@	Device Cancel Listen Mode And		
	Become Active		

SERIAL PORT OPERATION

SERIAL I/O CONNECTIONS

Serial I/O connections are made through a 9-pin, "D" type, female connector.

For maximum noise immunity, a cable with shielded, twisted pairs no longer than 50 feet (15.2 m) should be used.

The wire size should be 24 AWG.

The connector pin assignments are as follows:

Pin	Assignment
1	Signal Common (Vo)
2	RS232 Chain Out (Tx)
3	RS232 Receive Data (Rx)
4	Signal Common (Vo)
5	Signal Common (Vo)
6	RS232 Echo
7	RS232 Chain In
8	+5 Vdc *
9	+5 Vdc *

* Note that the +5 Vdc is brought out to the connector to power the Superior Electric hand-held programmer. These pins should not be populated on a cable to be used to connect the indexer to another serial device.

All commands listed in the Indexer Command Section can be used any computer or ASCII terminal via the RS232 port. This allows the user to program all parameters and move profiles through the serial port. A menu-driven Application Generator Software is available for use on an IBM PC. In addition, the SSP-525 Hand-Held Programming Pendant can be used for communication.

3 WIRE CONNECTION NO ECHO

3 WIRE CONNECTION WITH ECHO
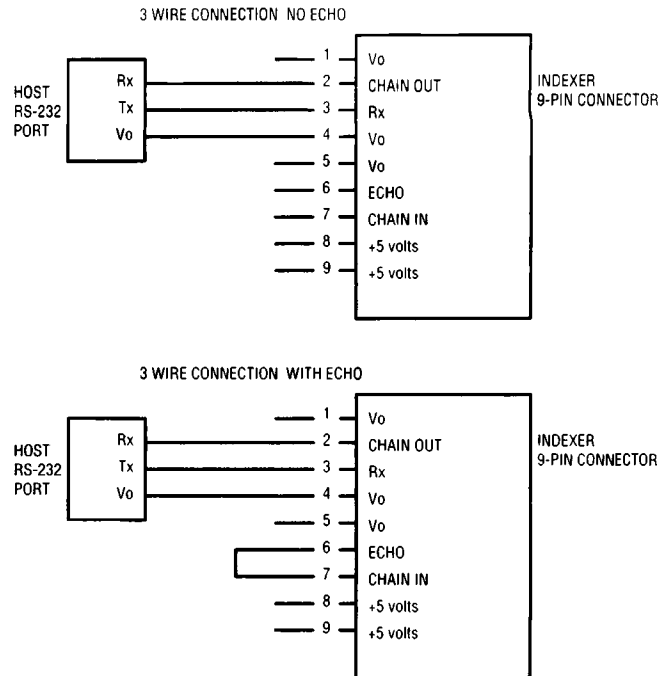
PARALLEL PORT OPERATION

Parallel I/O connections are made through a 25-pin, "D" type, female connector. For maximum noise immunity, a shielded, twisted cable no longer than 20 feet (6.1 m) should be used to connect a parallel device.

The connector pin assignments are as follows:

Pin	Assignment
1	Signal Common (Vo)
2	$\overline{D7}$ Input
3	$\overline{D5}$ Input
4	$\overline{D3}$ Input
5	$\overline{D1}$ Input
6	$\overline{\text{MOTION BUSY}}$ Output *
7	$\overline{\text{STROBE 7}}$
8	$\overline{\text{STROBE 5}}$
9	$\overline{\text{STROBE 3}}$
10	$\overline{\text{STROBE 1}}$
11	$\overline{\text{OUTPUT 2}}$ *
12	$\overline{\text{ALL WINDINGS OFF}}$ Output *
13	$\overline{\text{CW/CCW}}$ Output *
14	Signal Common (Vo)
15	$\overline{D6}$ Input
16	$\overline{D4}$ Input
17	$\overline{D2}$ Input
18	$\overline{D0}$ Input
19	$\overline{\text{POSITION ERROR}}$ Output *
20	$\overline{\text{STROBE 6}}$
21	$\overline{\text{STROBE 4}}$
22	$\overline{\text{STROBE 2}}$
23	$\overline{\text{STROBE 0}}$
24	$\overline{\text{OUTPUT 1}}$ *
25	PULSE Output *

* These output are open collectors. If monitored, they must be pulled up to an external voltage source (+24 Vdc Maximum) through a series resistor to limit the sink current to a maximum of 40 milliamperes.

I/O SIGNAL SPECIFICATIONS

Output Signal Parameters

High Level Output Voltage	+24 Vdc max., open collector
High Level Leakage Current	250 μA max.
High Level Output Voltage	+0.4 Vdc max. @ 16 mA sink
	+0.7 Vdc max. @ 40 mA sink
Maximum Sink Current	40 mA max.

Input Signal Parameters

High Level Input Voltage	+8.5 Vdc min.
	+15 Vdc max.
High Level Leakage Current	1 mA max.
Low Level Input Voltage	+0.0 Vdc min.
	+6.5 Vdc max.
Low Level Leakage Current	3.5 mA max.

Figure 1 shows the internal circuitry for using the inputs and outputs. The drawing in Figure 2 gives typical wiring for using an open collector output.
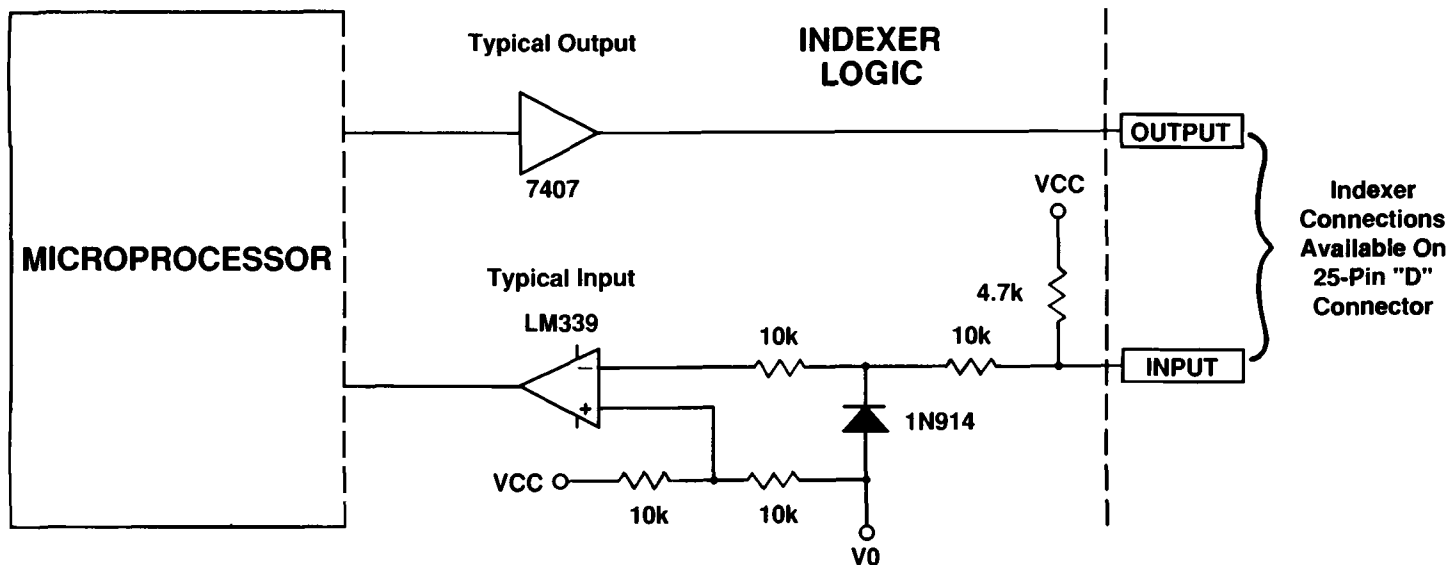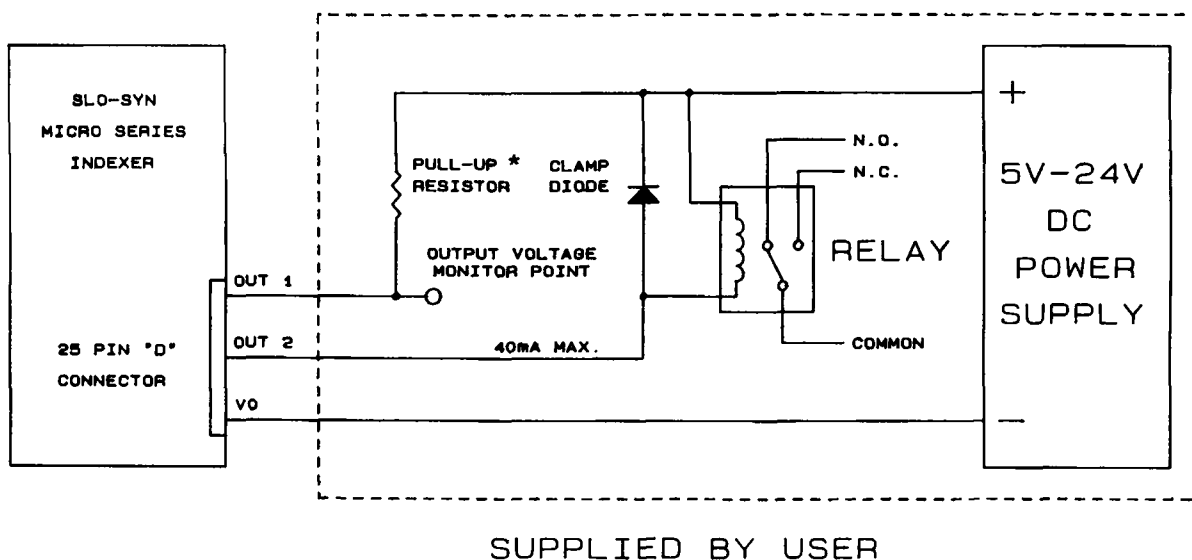

Figure 1, Equivalent Internal Circuits For The Indexer Inputs And Outputs

SUPPLIED BY USER

* Calculate pull-up resistor value based on voltage of external power supply to limit "sink" current to 40 mA into OUT 1 or OUT 2.

Example: $R = \dfrac{V}{I} = \dfrac{24}{0.040} = 600$ ohms for Vdc = 24 Vdc

Figure 2, Typical Wiring For An Open Collector Output

PARALLEL PORT DATA ASSIGNMENTS

The following chart shows the pin assignments for the indexer functions available via the parallel port. A function is activated by connecting one of the DATA 0 through DATA 7 pins to one of the STROBE 0 through STROBE 7 pins.

PARALLEL PORT I/O ASSIGNMENTS

INPUT	STROBE 0	STROBE 1	STROBE 2	STROBE 3	STROBE4	STROBE 5	STROBE 6	STROBE 7
D0	CW Limit	CW Dir	Code 1	Code 100	Data 1M	Data 10K	Data 100	Data 1
D1	CCW Limit	CCW Dir	Code 2	Code 200	Data 2M	Data 20K	Data 200	Data 2
D2	Home Limit	Load	Code 4	Code 400	Data 4M	Data 40K	Data 400	Data 4
D3	Clear Cycle	AWO	Code 8	Code 800	Data 8M	Data 80K	Data 800	Data 8
D4	Feed Hold	Low/High	Code 10	Sign	Data 10M	Data 100K	Data 1K	Data 10
D5	IN 1	Step/Jog	Code 20	Sel 1	Data 20M	Data 200K	Data 2K	Data 20
D6	IN 2	Cycle Start	Code 40	Sel 2	Data 40M	Data 400K	Data 4K	Data 40
D7	Stop Cycle	Ser/Par	Code 80	Sel 4	Data 80M	Data 800K	Data 8K	Data 80

NOTE: All functions are active low (connect appropriate data and strobe pins) except LOW, STEP and SER, which are active high (e. g., no connection between data and strobe pins).

For example, the CYCLE START function is shown in the Strobe 1 vertical column and in the Data 6 horizontal column. Therefore, the Cycle Start function can be activated by connecting the Data 6 pin (pin 15 on the 25-pin connector) to the Strobe 1 pin (pin 10 on the 25-pin connector) via a user supplied diode. A typical circuit for activating this input is shown.

1N914

(D6) 15 ●▶|◁‑● (Strobe 1)

Typical Circuit For Activating CYCLE START Function

All functions which are listed in the Strobe 0 and Strobe 1 columns are available whenever the Load function is not activated. The Indexer repeatedly strobes, In sequence, the inputs connected to Strobe 0 and then Strobe 1. The connection diagram for this strobed input cycle is given in Figures 3 and 4 and the timing diagram is given in Figure 5.
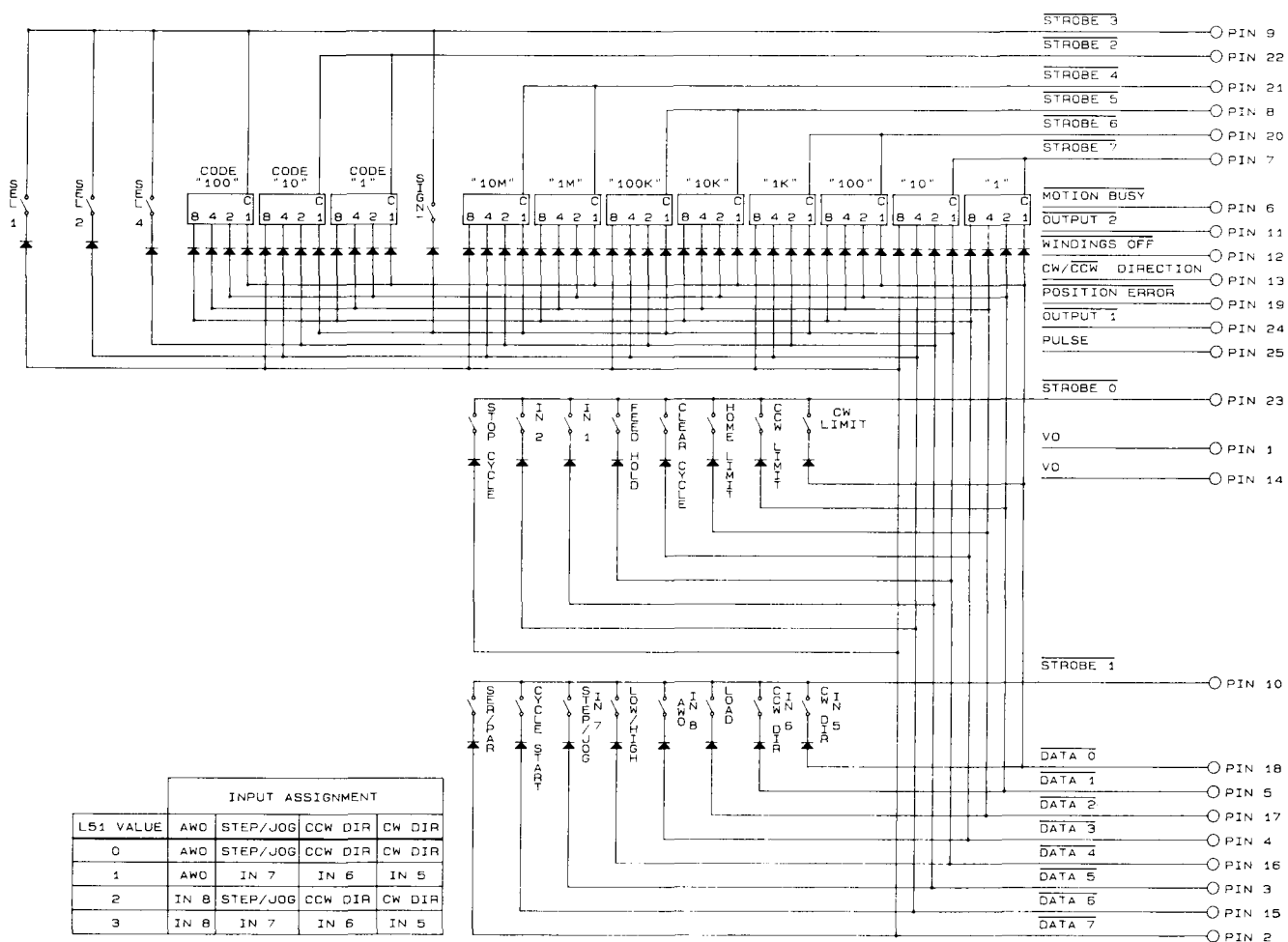
Figure 3, Connection Diagram, Strobed Inputs With L51 = 0 To 3

STROBE 3 — PIN 9
STROBE 2 — PIN 22
STROBE 4 — PIN 21
STROBE 5 — PIN 8
STROBE 6 — PIN 20
STROBE 7 — PIN 7
MOTION BUSY — PIN 6
OUTPUT 2 — PIN 11
WINDINGS OFF — PIN 12
CW/CCW DIRECTION — PIN 13
POSITION ERROR — PIN 19
OUTPUT 1 — PIN 24
PULSE — PIN 25
STROBE 0 — PIN 23
VO — PIN 1
VO — PIN 14
STROBE 1 — PIN 10
DATA 0 — PIN 18
DATA 1 — PIN 5
DATA 2 — PIN 17
DATA 3 — PIN 4
DATA 4 — PIN 16
DATA 5 — PIN 3
DATA 6 — PIN 15
DATA 7 — PIN 2

SEL 1   SEL 2   SEL 4

CODE "100"   CODE "10"   CODE "1"   SIGN

"10M"   "1M"   "100K"   "10K"   "1K"   "100"   "10"   "1"

8 4 2 1 (repeated for each code block)

STOP CYCLE   IN 2   IN 1   FEED HOLD   CLEAR CYCLE   HOME LIMIT   CCW LIMIT   CW LIMIT

SEPARATE   CYCLE START   STEP/JOG   SIN 7   LOW/HIGH   AW0 IN 8   LOAD   CCW IN 6 DIR   CW IN 5 DIR

INPUT ASSIGNMENT				
L51 VALUE	AW0	STEP/JOG	CCW DIR	CW DIR
0	AW0	STEP/JOG	CCW DIR	CW DIR
1	AW0	IN 7	IN 6	IN 5
2	IN 8	STEP/JOG	CCW DIR	CW DIR
3	IN 8	IN 7	IN 6	IN 5

11

STROBE 3 — PIN 9
STROBE 2 — PIN 22
OUTPUT 3 — PIN 21
OUTPUT 4 — PIN 8
OUTPUT 5 — PIN 20
OUTPUT 6 — PIN 7

MOTION BUSY — PIN 6
OUTPUT 2 — PIN 11
WINDINGS OFF — PIN 12
CW/CCW DIRECTION — PIN 13
POSITION ERROR — PIN 19
OUTPUT 1 — PIN 24
PULSE — PIN 25

STROBE 0 — PIN 23

VO — PIN 1
VO — PIN 14

STROBE 1 — PIN 10

DATA 0 — PIN 18
DATA 1 — PIN 5
DATA 2 — PIN 17
DATA 3 — PIN 4
DATA 4 — PIN 16
DATA 5 — PIN 3
DATA 6 — PIN 15
DATA 7 — PIN 2

SEL 1   SEL 2   SEL 4

CODE "100"   CODE "10"   CODE "1"
C   8 4 2 1   C   8 4 2 1   C   8 4 2 1

STOP CYCLE   IN 2   IN 1   FEED HOLD   CLEAR CYCLE   HOME LIMIT   CCW LIMIT   CW LIMIT

SER/PAR   CYCLE START   STEP/JOG IN 7   LOW/HIGH   AWO IN 8   LOAD   CCW DIR IN 6   CW DIR IN 5

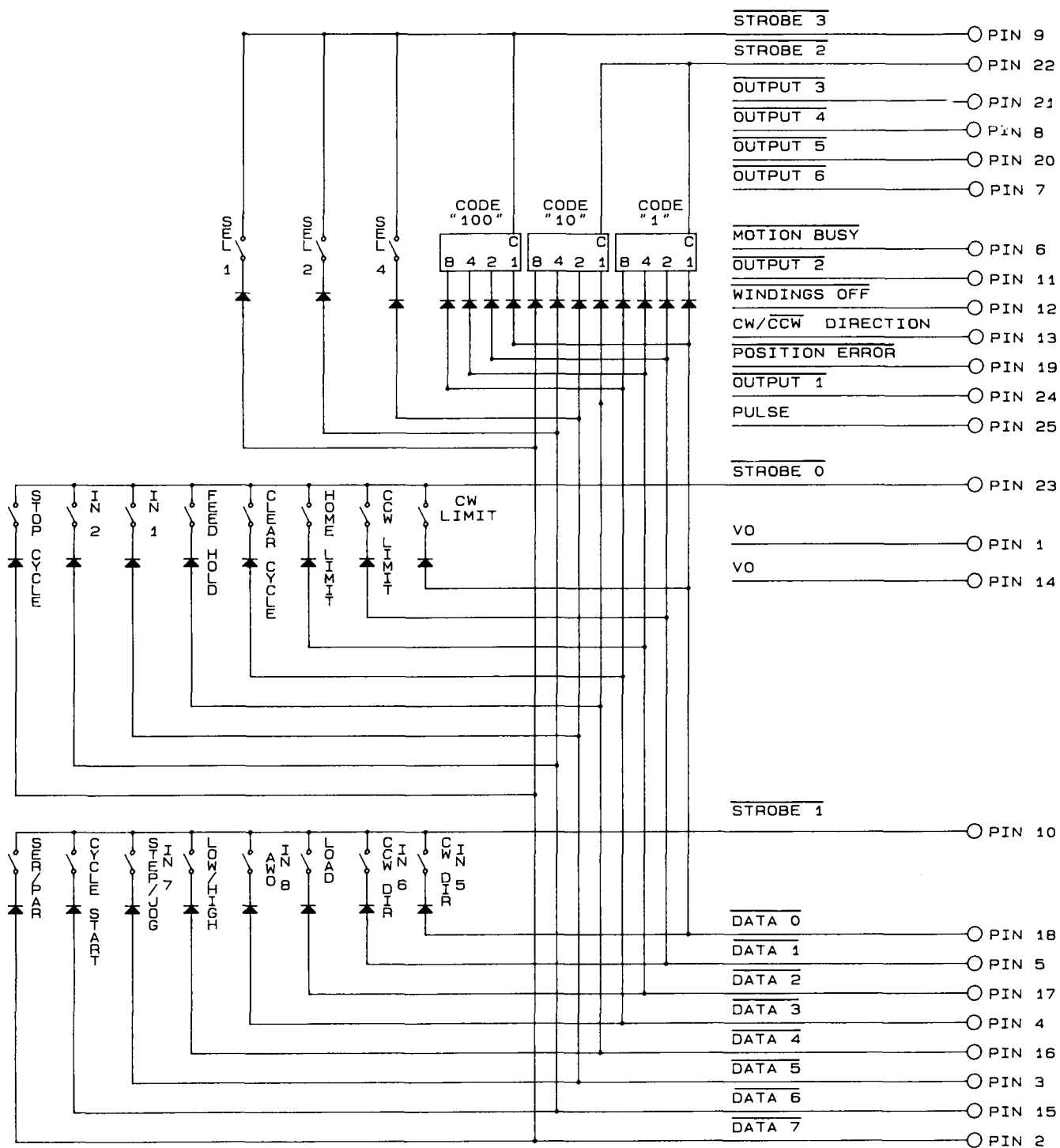|	INPUT ASSIGNMENT			
L51 VALUE	AWO	STEP/JOG	CCW DIR	CW DIR
4	AWO	STEP/JOG	CCW DIR	CW DIR
5	AWO	IN 7	IN 6	IN 5
6	IN 8	STEP/JOG	CCW DIR	CW DIR
7	IN 8	IN 7	IN 6	IN 5

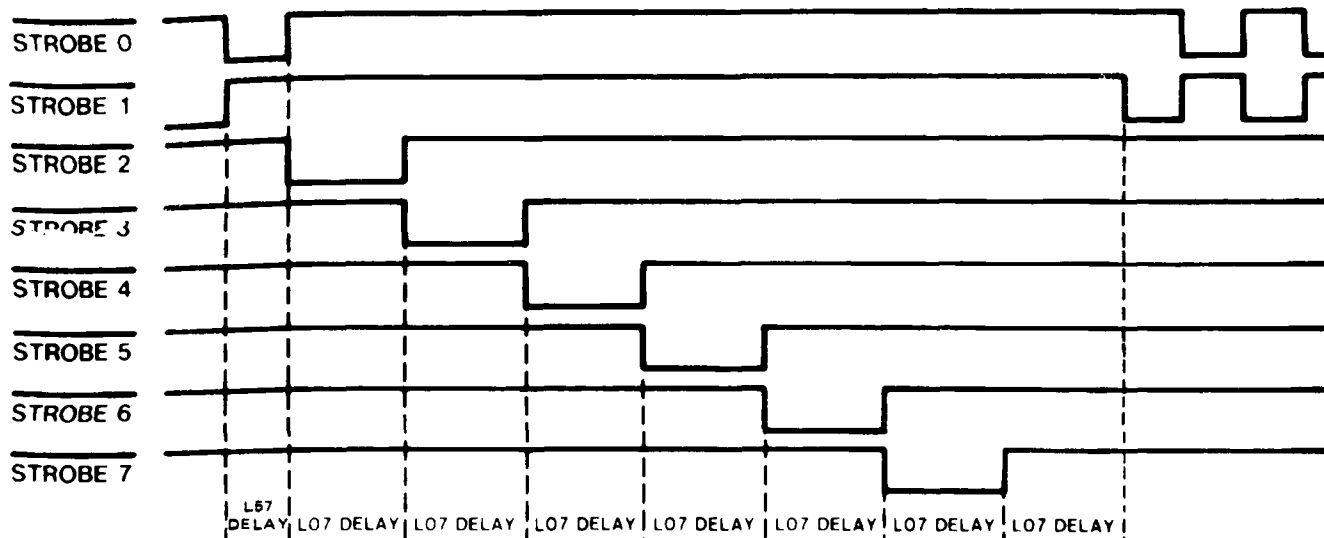**Figure 4, Connection Diagram, Strobed Inputs With L51 = 4 To 7**

Figure 5, Strobed Input Timing

Functions in the Strobe 2 through Strobe 7 columns are only activated during a Load cycle. When the Load command is given, the Indexer disables Strobes 0 through 1 and enables Strobes 2 through 7. All inputs connected to these strobe pins will then be input into the Indexer in sequence, beginning with those connected to Strobe 2.

After inputing the data connected to Strobe 7, the Indexer will return to sequencing the Strobe 0 and Strobe 1 inputs.

Selection of specific registers for entry of data during a Load cycle is done using the Select 1, Select 2 and Select 4 inputs. The data to be entered into a register is selected using the various Code and Field Data inputs. The Register Selection Chart shows how the Select inputs are used to select the available programmable registers.

REGISTER SELECTION CHART

SEL 4	SEL 2	SEL 1	Function Selected	Data
0	0	0	N Line Number	Code nnn
0	0	1	G Code	Code 0nn
0	1	0	X Code (Notes 1 & 2)	Field snnnnnnnn
0	1	1	F Code (Notes 1 & 2)	Field nnnnnnn
1	0	0	L Code (Notes 1 & 2)	Code 0nn, Field snnnnnnnn
1	0	1	H Code (Note 2)	Code 0nn
1	1	0	Initialization	Code 099, Field nnn
1	1	1	Not Used	None

0= input inactive; 1= input active; a= sign input; n= 0 to 9;
Code= Code Data Field; Field= Strobe 4 through Strobe 7 data inputs.

Note 1: This register will be ignored if L51 = 4 to 7.

Note 2: See Indexer Command Section for description of these commands.

TYPICAL PLC INTERFACE

A PLC can be used to provide the inputs required to run a SLO-SYN Indexer through the Parallel I/O interface. Figures 6 and 7 show how the typical switch panel connection can be translated to a PLC connection.
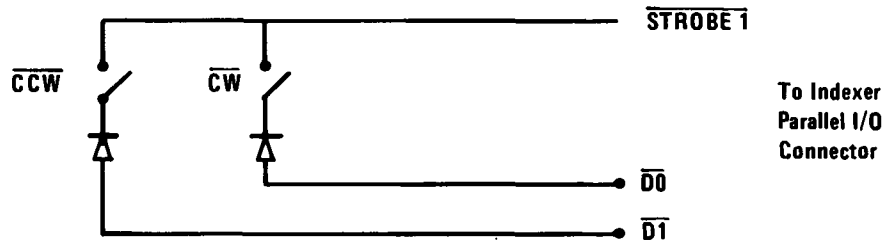

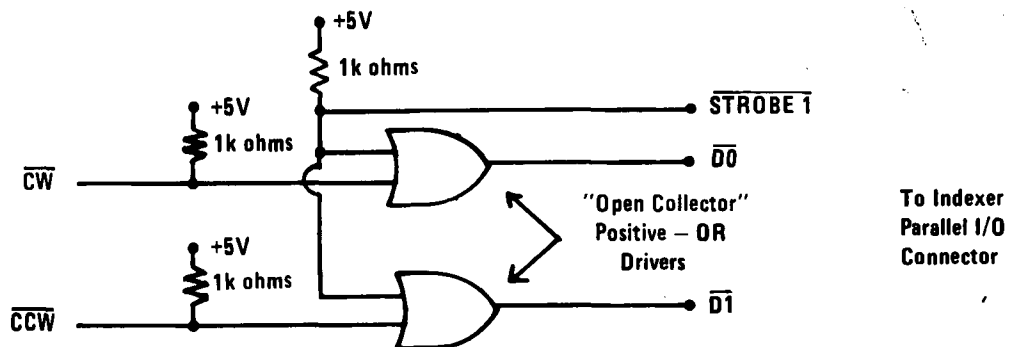**Figure 6, Typical Switch Panel Connection**

Figure 7, Corresponding PLC Interface

Note: An External +5Vdc is required for the Corresponding PLC Interface. The Common on this Supply (-) must be connected to pin 1 or 14 on the Parallel I/O connector.

PROGRAM WORKSHEETS

Indexer Parameters

L Code data	Function	L Code data	Function
L06 _	Execution Format	L48 _ _ _	Program Line Count Designator
L07 _ _ _ _	Strobe Delay	L49 _ _	Parameter Transfer Designator
L08 _	Mechanical Home Direction	L50 _ _	Parameter Transfer Count
L09 _ _ _2000	Jog Speed	L51 _	Input/Output Mode Select
L11 _ _ _ _ _ _ _	Acceleration/Deceleration	L52 _ _ _	Buffer Warning Character
L12 _ _ _ _ _ _	Low Speed	L53 _ _ _	Following Error Character
L13 _ _ _ _ _ _	Step Increment	L54 _ _ _	Unable to Correct Character
L14 _ _ _ _ _	Home Speed	L55 _ _ _	Line Done Character
L16 _ _ _ _ _ _	Index From Run Travel Limit	L56 _ _ _	Program Done Character
L17 _ _ _ _ _ _ _	Offset From Mechanical Home	L57 _ _ _	Strobe 0 and Strobe 1 Delay
L18 _ _ _ _ _ _ _	CW Software Travel Limit	L66 _ _ _ _ _ _	Backlash Compensation
L19 _ _ _ _ _	CCW Software Travel Limit	L67 _	Auto Reverse
L20 _	Up/Dn Feed Rate Override	L70 _ _ _	Resolution
L21 _ _	Device Identification Number	L71 _ _ _ _ _ _	Ramp Frequency Limit
L22 _ _ _ _	Baud Rate	L72 _	Ramp Profile Select
L23 _	Character Length	L73 _ _ _ _ _ _	Deviation Frequency
L25 _	RS232 Parity	L87 _ _ _ _ _ _	Following Error
L26 _	Command Acknowledgement	L90 _	Position Verification Enable
L41 _ _ _	Auto Start Line Number	L93 _ _ _ _ _ _	In Position Bandwidth
L43 _ _ _ _ _	Delay Between Index And Backlash	L94 _	Invert Encoder Detected Direction
L44 _ _ _ _	Program Line Delay	L95 _	Encoder Quadrature Scale Factor
L45 _	Limit Switch Enable	L96 _ _ _ _ _	Number of Correction Attempts
L47 _ _ _ _ _ _	Repeat Count	L97 _ _ _ _ _	Delay Between Corrections
L48 _ _ _	Program Line Count Designator	L98 _ _ _	Delay Between Continuous H Code Transmissions

Program

Line Number	G Code	Move Distance or Data	Feed Rate or Data	Line Number	G Code	Move Distance or Data	Feed Rate or Data
N _ _ _	G _ _	X _ _ _ _ _ _ _	F _ _ _ _ _	N _ _ _	G _ _	X _ _ _ _ _ _ _	F _ _ _ _ _ _
N _ _ _	G _ _	X _ _ _ _ _ _ _	F _ _ _ _ _	N _ _ _	G _ _	X _ _ _ _ _ _ _	F _ _ _ _ _ _
N _ _ _	G _ _	X _ _ _ _ _ _ _	F _ _ _ _ _	N _ _ _	G _ _	X _ _ _ _ _ _ _	F _ _ _ _ _ _
N _ _ _	G _ _	X _ _ _ _ _ _ _	F _ _ _ _ _	N _ _ _	G _ _	X _ _ _ _ _ _ _	F _ _ _ _ _ _
N _ _ _	G _ _	X _ _ _ _ _ _ _	F _ _ _ _ _	N _ _ _	G _ _	X _ _ _ _ _ _ _	F _ _ _ _ _ _
N _ _ _	G _ _	X _ _ _ _ _ _ _	F _ _ _ _ _	N _ _ _	G _ _	X _ _ _ _ _ _ _	F _ _ _ _ _ _
N _ _ _	G _ _	X _ _ _ _ _ _ _	F _ _ _ _ _	N _ _ _	G _ _	X _ _ _ _ _ _ _	F _ _ _ _ _ _
N _ _ _	G _ _	X _ _ _ _ _ _ _	F _ _ _ _ _	N _ _ _	G _ _	X _ _ _ _ _ _ _	F _ _ _ _ _ _
N _ _ _	G _ _	X _ _ _ _ _ _ _	F _ _ _ _ _	N _ _ _	G _ _	X _ _ _ _ _ _ _	F _ _ _ _ _ _
N _ _ _	G _ _	X _ _ _ _ _ _ _	F _ _ _ _ _	N _ _ _	G _ _	X _ _ _ _ _ _ _	F _ _ _ _ _ _
N _ _ _	G _ _	X _ _ _ _ _ _ _	F _ _ _ _ _	N _ _ _	G _ _	X _ _ _ _ _ _ _	F _ _ _ _ _ _
N _ _ _	G _ _	X _ _ _ _ _ _ _	F _ _ _ _ _	N _ _ _	G _ _	X _ _ _ _ _ _ _	F _ _ _ _ _ _
N _ _ _	G _ _	X _ _ _ _ _ _ _	F _ _ _ _ _	N _ _ _	G _ _	X _ _ _ _ _ _ _	F _ _ _ _ _ _
N _ _ _	G _ _	X _ _ _ _ _ _ _	F _ _ _ _ _	N _ _ _	G _ _	X _ _ _ _ _ _ _	F _ _ _ _ _ _
N _ _ _	G _ _	X _ _ _ _ _ _ _	F _ _ _ _ _	N _ _ _	G _ _	X _ _ _ _ _ _ _	F _ _ _ _ _ _
N _ _ _	G _ _	X _ _ _ _ _ _ _	F _ _ _ _ _	N _ _ _	G _ _	X _ _ _ _ _ _ _	F _ _ _ _ _ _
N _ _ _	G _ _	X _ _ _ _ _ _ _	F _ _ _ _ _	N _ _ _	G _ _	X _ _ _ _ _ _ _	F _ _ _ _ _ _
N _ _ _	G _ _	X _ _ _ _ _ _ _	F _ _ _ _ _	N _ _ _	G _ _	X _ _ _ _ _ _ _	F _ _ _ _ _ _
N _ _ _	G _ _	X _ _ _ _ _ _ _	F _ _ _ _ _	N _ _ _	G _ _	X _ _ _ _ _ _ _	F _ _ _ _ _ _
N _ _ _	G _ _	X _ _ _ _ _ _ _	F _ _ _ _ _	N _ _ _	G _ _	X _ _ _ _ _ _ _	F _ _ _ _ _ _

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