Appendix A

PROGRAMMING THE MODEL 430 WITH THE MODEL 431

A.1 DESCRIPTION

The Model 431 Input Panel is designed to plug directly into the Model 430 Indexer parallel programming interface terminals. Four thumbwheel switches provide the required BCD switch closures to **GROUND** to enter 430 data and commands. Five momentary switches provide both the data strobe signals required to enter data into the 430's internal data registers and the command strobe signal necessary to enter a command. Two 431 output connectors are provided. One connector allows for "low true" BCD interface signals, the other for "high true," thus allowing a match with programmable controllers.

> Note
>
> If the "high true" configuration is used, it is necessary to set the 430 for high true with Model 430 internal DIP switch SW5-4.

A.2 CONNECTION

Plug the connector end of the supplied ribbon cable into the appropriate connector on the 431. Use the "low true" connector if there is no requirement for "high true" data. Connect the other end to 430 screw terminals 1 through 22 so that the signal names match at each end of every wire in the cable. Be sure that the **CW** and **CCW LIMIT** terminals are still connected to the **GROUND** terminal.

A.3 PROGRAMMING

Refer to Chapters 5 and 6 for more details on programming. To enter a command, it is first necessary to load any data that the command requires. This is done by setting the thumbwheels to the appropriate value and activating the appropriate data strobe switch. The data strobe switches, DS1 through DS4, cause the Indexer to read the thumbwheel data and store it

internally in a corresponding register. Register data is used by the 430 whenever it executes a command (if the particular command requires data).

Commands are entered for execution by dialing up the command number on the thumbwheels and activating the command strobe switch (**CMD STB**).

Example 1: Make a 25,000-step/rev motor move clockwise one revolution at the current velocity and acceleration.

The operator would use Command [0051], **PERFORM AN INCREMENTAL MOVE**, for this move.

The command description in section 6.6.2.2 describes the data that must be entered for this command. This data consists of a 12-digit long number that specifies the direction of the move and distance in motor steps. In this example, the value required is

000000025000

For entry, the number is broken into three parts of four digits each to be loaded into internal 430 data registers R2, R3, and R4, as follows:

R2	R3	R4
0000	0002	5000

When the Indexer is instructed to execute the command, it will fetch these values and chain them together to reconstruct the 12-digit number.

A.4 LOADING THE EXAMPLE COMMAND

The three values in Example 1 must be loaded prior to entering the command identification number. (They need not be loaded in any particular order.) Proceed as follows:

>> Set the 431 thumbwheels to **0000**

>> Press switch **DS2** to load this number into register R2

>> Set the 431 thumbwheels to **0002**

>> Press switch DS3 to load this number into register R3

>> Set the 431 thumbwheels to **5000**

>> Press switch DS4 to load this number into register R4

The above steps load data. The next step is to enter the Command Identification Number.

>> Set the thumbwheels to the command number, **0051**

>> Press the **CMD STB** (command strobe) switch

The motor will rotate one revolution.

Once the data is loaded, it remains there. As long as the thumbwheels are set to **0051**, the Indexer will repeat this move each time the **CMD STB** switch is operated.

Example 2: Reverse the direction of motion selected in Example 1.

Changing the direction control digit in register R2 will reverse the direction function.

>> Set the 431 thumbwheels to **0100**

>> Press switch **DS2** to load this number into register R2

The contents of internal data register R2 have been changed from 0000 to 0100. The 12-digit number in the 430 working memory is now

010000025000

Set the thumbwheels back to 0051 and press the **CMD STB**. The motor will rotate in the reverse direction each time **CMD STB** is pressed.

Example 3: Change the move from one to five revolutions (from 25,000 to 125,000 steps).

The position data can be changed by altering the data in register R3 from 0002 to 0012.

>> Set the thumbwheels to **0012**

>> Press **DS3** to load this number into R3

The data in working memory is now

010000125000

and the motor shaft will rotate five revolutions each time **CMD STB** is pressed.

Appendix B

DIAGNOSTIC PROGRAM

The 430 is supplied with some preprogrammed functions to assist in testing. These include three predefined moves and one Sequence as detailed in Section 2.5 of the Operator's Manual. The moves are defined as numbers 2, 4, and 8, the Sequence is assigned number 8. The command and data values entered into the 430 to load these operations are listed below. Strobes "1" through "4" refer to DATA STROBE 1 through DATA STROBE 4, "C" refers to the COMMAND STROBE. The BCD value accompanying the COMMAND STROBE is the command number. Refer to the Command Description for details on each command by number.

REGISTER CONTENTS

Entry	BCD value	Strobe	R1	R2	R3	R4	
			0000	0000	0000	0000	
1	0100	3	0000	0000	0100	0000	(load R3)
2	0262	C	*this command defines the acceleration parameter as 1,000,000 steps/sec/sec				
3	0010	3	0000	0000	0010	0000	(load R3)
4	0261	C	*this command defines the velocity as 100,000 steps/sec				
5	0002	1	0002	0000	0010	0000	(load R1)
6	7777	4	0002	0000	0010	7777	(load R4)
7	0200	C	*this command defines Move #2 as 107,777 steps clockwise				
8	0000	1	0000	0000	0010	7777	(load R1)
9	0000	4	0000	0000	0010	0000	(load R4)
10	0700	3	0000	0000	0070	0000	(load R3)
11	0262	C	*this command defines the acceleration parameter as 700,000 steps/sec/sec				
12	0020	3	0000	0000	0020	0000	(load R3)
13	0261	C	*this command defines the velocity as 200,000 steps/sec				
14	0004	1	0004	0000	0020	0000	(load R1)
15	0100	2	0004	0100	0020	0000	(load R2)
16	0008	3	0004	0100	0008	0000	(load R3)
17	8888	4	0004	0100	0008	8888	(load R4)
18	0200	C	*this command defines Move #4 as 88,888 steps counterclockwise				

REGISTER CONTENTS (Continued)

Entry	BCD value	Strobe	R1	R2	R3	R4	
19	0000	1	0000	0000	0008	8888	(load R1)
20	0000	4	0000	0000	0010	0000	(load R4)
21	0010	3	0000	0000	0010	0000	(load R3)
22	0262	C	*this command defines the acceleration parameter as 100,000 steps/sec/sec				
23	0015	3	0000	0000	0015	0000	(load R3)
24	0261	C	*this command defines the velocity as 150,000 steps/sec				
25	0008	1	0008	0000	0040	0000	(load R1)
26	0000	3	0008	0000	0000	0000	(load R3)
27	0203	C	*this command defines Move #8 as a move to absolute position zero				
28	0217	C	* this command begins the Sequence				
29	0001	1	0001	0000	0000	0000	(load R1)
30	0116	C	* this command will stop the motor and the Sequence on TRIGGER 1				
31	0011	1	0011	0000	0000	0000	(load R1)
32	0005	3	0011	0000	0005	0000	(load R3)
32	0032	C	*this command starts an 11 command loop which will repeat 5 times				
33	0002	1	0002	0000	0000	0000	(load R1)
34	0064	C	*this command calls for execution of Move #2				
35	0002	1	0002	0000	0000	0000	(load R1)
36	0001	2	0002	0001	0000	0000	(load R2)
37	0044	C	*this command waits until TRIGGER 2 is off (high)				
38	0004	1	0004	0002	0000	0000	(load R1)
39	0064	C	*this command calls for execution of Move #4				
40	0064	C	*this command calls for execution of Move #4 again				
41	0003	1	0003	0002	0000	0000	(load R1)
42	0001	2	0003	0001	0000	0000	(load R2)
43	0044	C	*this command waits until TRIGGER 3 is off (high)				

REGISTER CONTENTS (Continued)

Entry	BCD value	Strobe	R1	R2	R3	R4	
44	0001	1	0001	0001	0000	0000	(load R1)
45	0011	C	*this command turns on OUT 1				
46	0002	1	0002	0001	0000	0000	(load R1)
47	0011	C	*this command turns on OUT 2				
48	0000	2	0002	0000	0000	0000	(load R2)
49	0002	3	0002	0000	0002	0000	(load R3)
50	0042	C	*this command causes a 2 second wait				
51	0012	C	*this command turns off OUT 2				
52	0001	1	0001	0000	0002	0000	(load R1)
53	0012	C	*this command turns off OUT 1				
54	0008	1	0008	0000	0002	0000	(load R1)
55	0064	C	*this command executes move #8				
56	0216	C	*this command ends the Sequence				

The sequence of characters required to implement these functions using the serial data feature is as follows:

1. 0 0 100 0 262
2. 0 0 10 0 261
3. 2 0 10 7777 200
4. 0 0 70 0 262
5. 0 0 20 0 261
6. 4 100 8 8888 200
7. 0 0 10 0 262
8. 0 0 15 0 261
9. 8 0 0 0 203
10. 8 0 0 0 217
11. 0 1 0 0 116
12. 110 5 0 32
13. 2 0 0 0 64
14. 2 1 0 0 44
15. 4 0 0 0 64
16. 4 0 0 0 64
17. 3 1 0 0 44
18. 2 0 0 0 11
19. 1 0 0 0 11
20. 0 0 2 0 42
21. 2 0 0 0 12
22. 1 0 0 0 12
23. 8 0 0 0 64
24. 0 0 0 0 216

Appendix C

JUMPER LOCATION AND IDENTIFICATION

See page 3-7 for current 430 Switch settings.

The drawing on the next page details the location of the jumpers on the earlier 430 circuit board. To access the board, remove the left hand side cover of the unit. The function of these jumpers is listed below.

NOTE: Jumpers JU1 through JU20 and JU25 through JU64 are arranged in sets of four, each representing one BCD digit. The jumpers are assigned the values 1, 2, 4, and 8 in order. The sum of the assigned values for jumpers in the on position determines the BCD value for those four jumpers. An example is shown on the next page.

JU1-JU4:	Go Home Velocity (percent of Velocity X 10)	(1)
JU5-JU8:	Least Significant Digit - Velocity Data	(0)
JU9-JU12:	2nd Digit - Velocity Data	(0)
JU12-JU16:	3rd Digit - Velocity Data	(0)
JU17-JU2:	Most Significant Digit - Velocity Data	(1)
		(1000)

(X 250 Range yields 250,000 steps/sec = 10 rev/sec)

JU21:	Velocity Range multiplier - OFF=X25, ON=X250	(ON)
JU22:	#3 Acceleration Range Multiplier - X 100	(OFF)
JU23:	#2 Acceleration Range Multiplier - X 1,000	(ON)
JU24:	#1 Acceleration Range Multiplier - X 10,000	(OFF)

(All OFF: #4 Acceleration Range Multiplier - X 10)
(Select one)

JU25-JU28:	Least Significant Digit - Acceleration Data	(5)
JU29-JU32:	Most Significant Digit - Acceleration Data	(2)
		(25)

(Range #2 yields 25,000 steps/sec/sec)

JU33:	Go Home Direction, ON=CCW, OFF=CW	(CW)
JU34:	Home Limit Signal Edge, ON=CCW, OFF=CW	(CW)
JU35:	Home Limit Polarity, ON=high true, OFF=low true	(OFF)
JU36:	BIT 0 TO 16 Polarity, ON=high true, OFF=low true	(OFF)

JU37-JU40:	Least Significant Digit - Position Data	(0)
JU41-JU44:	2nd Digit - Position Data	(0)
JU45-JU48:	3rd Digit - Position Data	(0)
JU49-JU52:	4th Digit - Position Data	(5)
JU53-JU56:	5th Digit - Position Data	(2)
JU57-JU60:	6th Digit - Position Data	(0)
JU61-JU64:	Most Significant Digit - Position Data	(2)
		(25,000)

(25,000 steps = 1 revolution std motor)

Jumpers JU65 through JU68 are Reserved: Do Not Remove

JU69:	Encoder Direction Polarity (clockwise)	(OFF)
JU70:	Z CHANNEL Polarity, ON=high true, OFF=low true	(OFF)
JU71:	Home Limit Polarity, ON=hight true, OFF=low true	(OFF)
JU72:	SHUTDOWN Out, ON=Differential, OFF=Single ended	(OFF)
JU73:	Direction Out, ON=Differential, OFF=Single ended	(OFF)
JU74:	Step Output, ON=Differential, OFF=Single ended	(OFF)
JU75:	Reserved Out	(OFF)
JU76:	Reserved Out	(OFF)
JU77:	Reserved Out	(OFF)

Example: Jumpers JU1 through JU4 represent one BCD digit. The following table indicates how to set them to get BCD values of seven and nine.

Jumper	Value	Setting (7)	Setting (9)
JU1	1	ON	ON
JU2	2	ON	OFF
JU3	4	ON	OFF
JU4	8	OFF	ON
		1+2+4=7	1+8=9