

PART 5 OF MACHINE AND CONTROLLER

30. Errors & Error codes
31. DEBUGGING PROGRAMS
32. DEBUGGING PRODUCTION RUNS.
33. EMERGENCY MOVE
34. MANUAL MODE AND DIAGNOSTICS.
35. Instruction FORMAT

31. Errors and Error Codes

EMARXORX DOCUMENTATION

1) RUNTIME ERRORS

Certain errors can be checked at run time. Here is a list. The error message format is :

ERROR nn

The user can switch to LINE NO MODE when this is displayed to examine his program and check his entry.

- | | | |
|----|---------|---|
| 00 | X, Y, Z | AXIS DESTINATION BEYOND MAXIMUM TRAVEL or GO r too big. |
| 01 | X, Y, Z | AXIS DESTINATION BEYOND MAXIMUM TRAVEL. This occurs most often when doing outside cuts with or without finish option with the part clamped too close to the home position, the part must be clamped to allow for the tool radius (+ option of 6.4 thou of finish cut) clear of the home position. |
| 02 | XA, XB | Too small for inside or on the line cut or tool diameter too large. |
| 03 | XA, XB | Values must be positive. |
| 04 | X, Y | Axis beyond minimum for finish cut. |
| 05 | | Repeating same axis in 2 or 3 axis move e.g.
GO x = 2.3 or GO x = 2.3
x = 3.4 r = 3.4 |
| 06 | | Tool diameter is zero. |
| 07 | | Z% is zero |
| 08 | | Zd must be positive. |
| 09 | | GO, r r must be positive. |
| 10 | | In circle function r1 - r2 too small for tool diameter with or without finish option. |

2) DEFAULT to mm ERROR

When the machine is switched on, the controller automatically defaults to mm unless the controller reads a PROGRAM START INS statement at location 000.

If there is no program start instruction at this address, the controller is in mm until the user passes through with the NEXT key, or line number entry, a program start instruction in inches. That is, the controller tries to make as intelligent a decision as possible as to the ins or mm setting for each program, either when running or entering information. The user can instantly determine the setting by looking at the number of digits behind the decimal place, 3 for mm 4 for inches.

However, it is possible to fool the controller. One example is on switch on to have location 000 blank, then to jump through line mode to the middle of a program or subroutine and start entering data in inches which will be taken by mistake as mm. Because the controller has not received any contrary information, the result will be a scaling down by 25.4 when the program is run.

32. DEBUGGING PROGRAMS

- 1) Make sure that the information on the drawing is adequate and correct. We have seen many contours that don't meet, blend radii unspecified and non tangent tangents.
- 2) It is best to start small and build up the program gradually. Check it out in plastic first. Add display X, Y, Z where necessary. Include spindle OFF / ON, END NEW PART, BUZZER, PAUSES once it is debugged.
- 3) Insert GO X 0.0, GO Y 0.0, GO Z 0.0 before the SET UP instruction. During SET UP, display the X, Y, Z values, note them down, then re-insert the values in the GO statements. This will preserve the SET UP, if the machine is switched off. When re-starting the program you only have to capitalize X Y Z and set C (Z Clear) to continue.

33. DEBUGGING PRODUCTION RUNS.

- 1) Watch temperature. A rise of 1 degree centigrade can produce a tenth of a thou. error.
- 2) Tools deflect and will deflect more as they become less sharp. Always use coolant where possible.
- 3) If something is not right in the part check:-
 1. Does it occur at random?
 2. Is it time dependent? These two suggest electrical line noise.
 3. Does it occur at a particular line in the program? Let us know.
 4. Does it do END NEWPART and reposition at SET UP correctly (if not check the limit switch).
 5. Does it drift in a particular axis consistently? if so there is a simple test to check the driver board by interchanging it with another axis to see if the problem follows the driver board.
- 4) Don't let lube pump run dry.

34. EMERGENCY MOVE

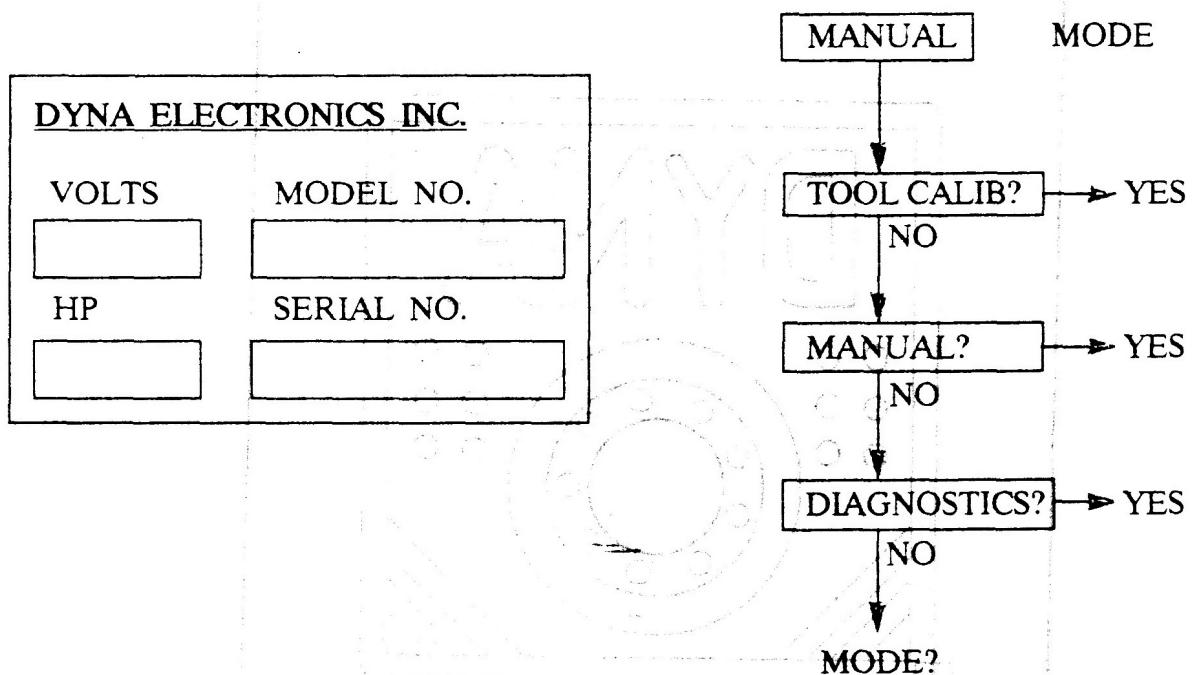
Sometimes a program move is made that hits the clamp, some jig, or the feedrate is too fast. THE USER SHOULD HIT THE EMERGENCY STOP SWITCH, free the spindle lock, clear the obstruction then re-start. It is not possible to recover from such a situation.

If the user has so jammed the machine up that re-initialization is impossible (e.g., a saw blade locked in horizontally so that the Z initialisation is inhibited) the user should answer NO to the READY? at switch on. This will enable the emergency movement. The user can then select the X, Y, or Z axis and use the jog keys to move the table to free the obstruction. Touching the NEXT key and answering YES to READY? will automatically re-initialize the machine. These moves should be used with extreme caution.

35. MANUAL MODE AND DIAGNOSTICS

Built into the MANUAL MODE is a set of diagnostics. To arrive at it, answer NO in MANUAL mode. Answer YES if this diagnostic is required.

CHECKSUM OF ROM



This value should agree with the value on the back of the controller. It is the software release number.

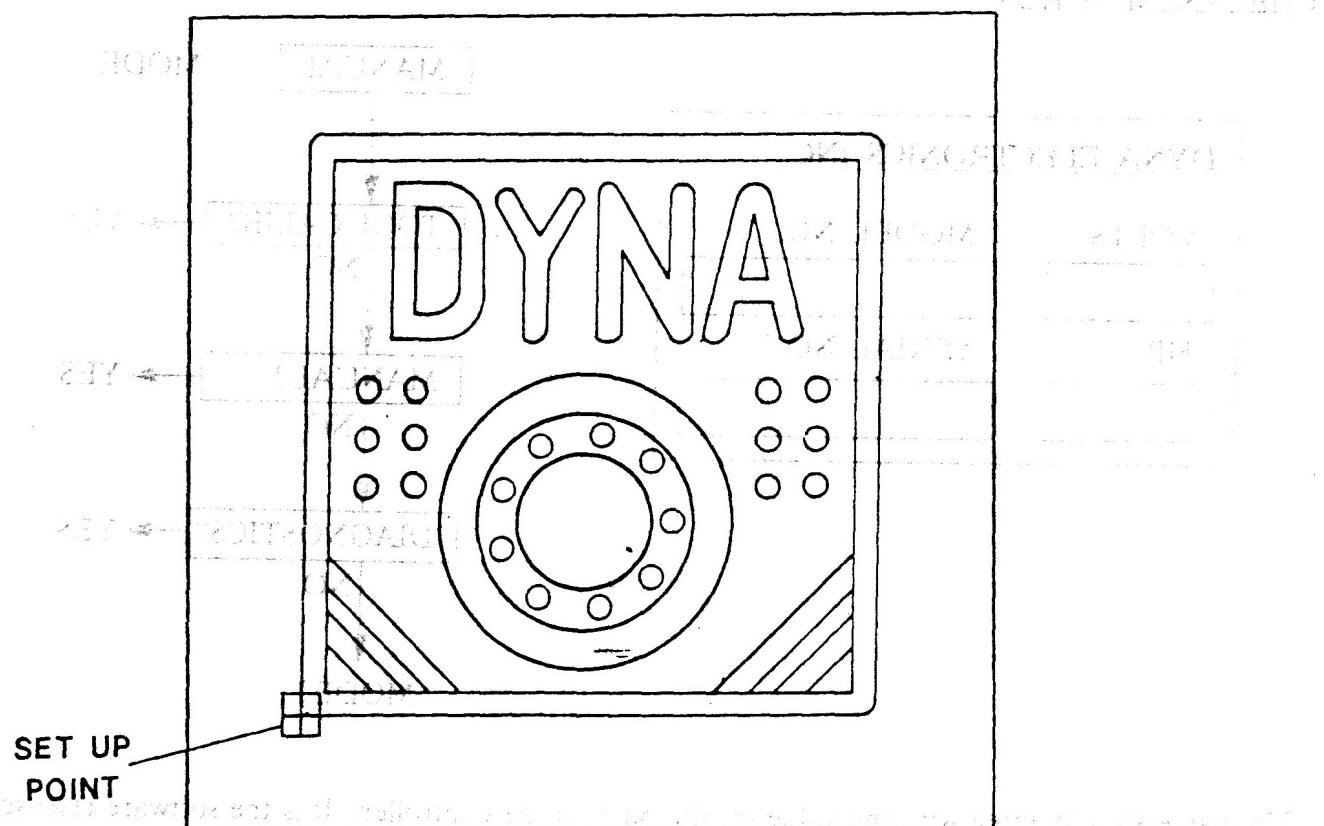
CMOS MEMORY CHECK This checks the CMOS memory. If bad, location and chip number will be indicated.

MOTOR CHECK At **AXIS TEST?** press any combination of X, Y, Z to be tested, then press the NEXT key. The axis will travel to its maximum distance and return to its home position. This is very useful in checking axis operation and in lubrication of slides.

DEMO

PROGRAMMING FOR THE DYNACUT

This is a Demo program which cuts the following geometry :-



The program is written for use with a .125 dia end mill and a 1/4 inch thick 6x6 inch acrylic, plexiglass or aluminum sheet. The sheet must be placed and clamped in the center of the table. This program is automatically dumped into program location 700 to 814 and will start automatically as well. It will stop at set-up to allow the user to position the tool in the center of the work piece. Put the spindle switch at local and on, then press the NEXT key. If called, it will destroy any programs residing in this space, so don't try it if you have any program on these lines.

DISTRIBUTION BOARD CHECK Say NO to this diagnostic as it is no longer applicable.

37. INSTRUCTION FORMAT

INSTRUCTION		LINE NUMBER	FORMAT														
START	(INCHES)	*	*	*		S	T	A	R	T		I	N	S		n	n
	(mm)	*	*	*		S	T	A	R	T		M	M			n	n
TOOL DIAMETER	(INCHES) FORMAT	*	*	*			T	D	=		n	n	.	n	n	n	n
	(mm) FORMAT	*	*	*			T	D	=		m	m	m	.	m	m	m
FEED RATE	(INCHES)	*	*	*		F	R	(X)	(Y)	(Z)	(U)						
	(mm)	*	*	*		F	R	(X)	(Y)	(Z)	(U)	=	n	n	.	n	
SET UP		*	*	*		S	E	T	U	P		>	z	c	x	y	u
GO ABS	1 AXIS MOVE	*	*	*		G	O	q	(X)								
						G	R	q	(Y)	(S)	n	n	.	n	n	n	n
									(Z)		m	m	m	.	m	m	m
GO REL (q)									(r)						d	d	d
ONLY ALLOWED ON 1 AXIS MOVE	2 AXIS MOVE ABOVE +	*	*	*+1					(u)		n	n	.	n	n	n	n
f c i q = o BLANK									(a)		m	m	m	.	m	m	m
	3 AXIS MOVE ABOVE +	*	*	*+2					(O)						d	d	d
Z -----> Z CLEAR		*	*	*		Z	>	C									
Z -----> Z MAX		*	*	*		Z	>	Z	M	A	X						
ZERO COODS		*	*	*		Z	E	R	O					(X)	(Y)	(Z)	(U)
ZERO AT		*	*	*		Z	E	R	O		A	T					
RECTANGULAR		*	*	*+1					(X)	(S)	n	n	.	n	n	n	n
		*	*	*+2					(Y)	(S)	n	n	.	n	n	n	n
		*	*	*+3					(Z)	(S)	n	n	.	n	n	n	n
POLAR		*	*	*		Z	E	R	O		A	T					
		*	*	*+1					(r)		n	n	.	n	n	n	n
		*	*	*+2					(a)		d	d	d	.	d	d	d
CS		*	*	*		C	-	S	I	G	N			X	Y	Z	U
CYCLE		*	*	*		C	Y	C	L	E		X	Y				
---->REF COODS		*	*	*		>	R	E	F		C	O	O	D	S		
XY ----> REF 0		*	*	*		X	Y	>	R	E	F	0					
PROG REF		*	*	*		P	R	O	G	.	R	E	F				

INSTRUCTION FORMAT COTD

FORMAT

				LINE NUMBER		FORMAT													
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
TOOL CHANGE	TOOL N	*	*	*		T	O	O	L				N						
2400 ONLY	TOOL CHANGE	*	*	*		T	C												
	TOOL CHANGE (NEW COOD)	*	*	*		T	C	N	E	W			C	O	O	D			
	X COOD	*	*	*		T	X	=	(S)	n	n	.	n	n	n	n			
	Y COOD	*	*	*		T	Y	=	(S)	n	n	.	n	n	n	n			
FUNCTION	00 (SCALE)	*	*	*		S	C	A	L	E		O	N						
		*	*	*				(X)				n	n	.	n	n	n	n	
		*	*	*				(Y)				n	n	.	n	n	n	n	
		*	*	*				(Z)				n	n	.	n	n	n	n	
		*	*	*		S	C	A	L	O	F	F		X	Y	Z			
RECT FRAME		*	*	*		F	R	A	M		(F)	(q)	Z	%	n	n	n		
		*	*	*		Z	H	=		n	n	.	n	n	n	n			
		*	*	*		Z	d	=											
		*	*	*		X	1	=											
		*	*	*		Y	1	=											
		*	*	*		X	A	=											
		*	*	*		Y	B	=											
		*	*	*		X	1	=											
		*	*	*		Y	1	=											
		*	*	*		X	A	=											
		*	*	*		Y	B	=											
REPEAT (OPTION)		*	*	*		R	E	P	E	A	T		X	n	n				
		*	*	*		X	i	=		n	n	.	n	n	n	n			
		*	*	*		R	E	P	E	A	T		Y	n	n				
		*	*	*		Y	i	=		n	n	.	n	n	n	n			
CIRCLE POCKET		*	*	*		C	I	R	C		(F)	(q)	Z	%	n	n	n		
		*	*	*				X	Y	C	U	T	%	n	n	n			
		*	*	*		Z	H	=		n	n	.	n	n	n	n			
		*	*	*		Z	d	=											
		*	*	*		X	C	=											
		*	*	*		Y	C	=											
		*	*	*		r	1	=											
		*	*	*		r	2	=											
		*	*	*		X	C	=											
		*	*	*		Y	C	=											
		*	*	*		r	1	=											
		*	*	*		r	2	=											
		*	*	*		R	E	P	E	A	T		X	n	n				
		*	*	*		X	i	=		n	n	.	n	n	n	n			
		*	*	*		R	E	P	E	A	T		Y	n	n				
		*	*	*		Y	i	=		n	n	.	n	n	n	n			
ELSEWHERE (OPTION)		*	*	*															
REPEAT (OPTION)		*	*	*															

INSTRUCTION FORMAT COTD

(CONTINUATION OF INSTRUCTION FORMAT)

				LINE NUMBER		FORMAT														
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
CONTROL	(BUZZER)	*	*	*				C	O	N	T	R	O	L				1		
	(PULSE OUT)	*	*	*				C	O	N	T	R	O	L				2		
	(PULSE IN)	*	*	*				C	O	N	T	R	O	L				3		
SPINDLE	OFF	*	*	*				S	P	I	N	D	L	E				OFF		
	ON	*	*	*				S	P	I	N	D	L	E				ON		
DISPLAY		*	*	*				D	S	P	L	Y			(r)	(a)	(X)	(Y)	(Z)	(U)
DWELL		*	*	*				D	W	E	L	L						n	n	
NOP (NO INSTRUCTION)		*	*	*																
END	END	*	*	*				E	N	D										
	END NEWPART	*	*	*				E	N	D										
	END NEW REF	*	*	*				E	N	D										
	.ELSEWHERE	*	*	*+1														n	n	
	POINT 1	*	*	*+2				X	1	=										
		*	*	*+3				Y	1	=										
	POINT 2	*	*	*+4				X	1	=										
		*	*	*+5				Y	1	=										
	POINT nn	*	*																	
		*	*					X	1	=										
		*	*					Y	1	=										
	REPEAT	*	*	*																
		*	*	*				R	E	P	E	A	T		X		n	n		
		*	*	*				X	i	=										
		*	*	*				R	E	P	E	A	T		Y		n	n		
		*	*	*				Y	i	=										
SKIP TO		*	*	*				S	K	I	P		T	O			n	n		
CALL		*	*	*				C	A	L	L		S	U	B		n	n		
SUBROUTINE		*	*	*				S	U	B							n	n		
SUB RETURN		*	*	*				S	U	B		R	E	T	U					
REPEAT		*	*	*				R	E	P	E	A	T				n	n		
REPEAT END		*	*	*				R	E	P	E	A	T		E	N	D			
HALT		*	*	*				H	A	L	T									

INSTRUCTION FORMAT COTD

		LINE NUMBER	FORMAT														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
BOLT CIRCLE		*	*	*		B	O	L	T		P	E	C	K	=	n	n
		*	*	*			Z	H	=		n	n	.	n	n	n	n
		*	*	*			Z	d	=		n	n	.	n	n	n	n
		*	*	*			X	C	=		n	n	.	n	n	n	n
		*	*	*			Y	C	=		n	n	.	n	n	n	n
		*	*	*			a	1	=		d	d	d	.	d	d	d
		*	*	*			n	=								n	n
		*	*	*			r	=			n	n	.	n	n	n	n
MILL		*	*	*		M	I	L	L		(q)	Z	%	n	n	n	n
(q) =		*	*	*		Z	H	=	(S)	n	n	.	n	n	n	n	n
		*	*	*		Z	d	=									
		*	*	*		X	1	=									
		*	*	*		Y	1	=									
		*	*	*		X	2	=									
		*	*	*		Y	2	=									
		*	*	*		X	1	=									
		*	*	*		Y	1	=									
		*	*	*		X	2	=									
		*	*	*		Y	2	=									
ELSEWHERE (OPTION)		*	*	*		R	E	P	E	A	T	X	n	n	n	n	n
		*	*	*		X	i	=			n	n	.	n	n	n	n
		*	*	*		R	E	P	E	A	T	Y	n	n	n	n	n
		*	*	*		Y	i	=			n	n	.	n	n	n	n
RECT POCKET		*	*	*		R	E	C	T	(F)	(q)	Z	%	n	n	n	n
		*	*	*			X	Y	C	U	T	%	n	n	n	n	n
		*	*	*		Z	H	=			n	n	.	n	n	n	n
		*	*	*		Z	d	=									
		*	*	*		X	1	=									
		*	*	*		Y	1	=									
		*	*	*		X	A	=									
		*	*	*		Y	B	=									
		*	*	*		X	1	=									
		*	*	*		Y	1	=									
		*	*	*		X	A	=									
		*	*	*		Y	B	=									
ELSEWHERE (OPTION)		*	*	*		R	E	P	E	A	T	X	n	n	n	n	n
		*	*	*		X	i	=			n	n	.	n	n	n	n
		*	*	*		R	E	P	E	A	T	Y	n	n	n	n	n
		*	*	*		Y	i	=			n	n	.	n	n	n	n
REPEAT (OPTION)		*	*	*													

INSTRUCTION FORMAT COTD

	LINE NUMBER															FORMAT					
	1	2	3	4	5	6	7	8	9	0	11	12	13	14	15	16					
ARC FRAME	*	*	*		A	R	C									n	n	.	n	n	n
					X	C	=									d	d	d	.	d	d
					Y	C	=									d	d	d	.	d	d
					a	=															
DRILL	*	*	*		D	R	I	L		P	E	C	K	=	n	n					
	*	*	*		Z	H	=	(S)	n	n	.	n	n	n	n						
	*	*	*		Z	d	=														
	*	*	*		X	=															
	*	*	*		Y	=															
	*	*	*		X	=															
ELSEWHERE (OPTION)	*	*	*		R	E	P	E	A	T		Y		n	n						
REPEAT (OPTION)	*	*	*		X	i	=			n	.	n	n	n	n						
	*	*	*		R	E	P	E	A	T		Y		n	n						
	*	*	*		Y	i	=			n	.	n	n	n	n						

NOTES:

- 1) If in INCHES then ENTRY is always nn . nnnn
If in METRIC then mmm . mmm
If in DEGREES then ddd . ddd
- 2) Sign (S) If POSITIVE then BLANK
If NEGATIVE then -