

E21S Shear Numerical Control Device Operation Manual

V1.00

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Preface

This manual describes operation of E21S numerical control device and is meant for operators who are instructed for operation of the device. Operator shall read through this manual and know operation requirements before using this device.

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E21S device provides complete software control and has no mechanical protection device for operator or the tool machine. Therefore, in case of malfunction, machine tool must provide protection device for operator and external part of the machine tool. ESTUN is not responsible for any direct or indirect losses caused by normal or abnormal operation of the device.

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1 Product Overview

1.1 Product introduction

This product is equipped with the shear machine dedicated numerical control device which is applicable to various users. On the basis of ensuring work precision, the cost of numerical control shearing machine is reduced significantly.

Features of this product are listed below:

- Positioning control of back gauge.
- Intelligent positioning control.
- One-side and two-side positioning which eliminates spindle clearance effectively.
- Retract functions.
- Automatic reference searching.
- One-key parameter backup and restore.
- Fast position indexing.
- 40 programs storage space, each program has 25 steps.
- Power-off protection.

1.2 Operation panel












Operation panel is shown in Figure 1-1.









Figure 1-1 Operation panel



Functions of panel keys are described in Table 1-1.

Table 1-1 Description of key functions

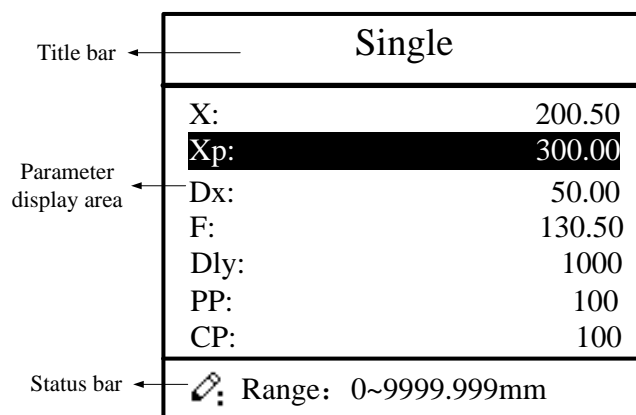
Key	Function description
	Delete key: delete all data in input area on left bottom of displayer.
	Enter key: confirm the input content. If no content is input, the key has the similar function to direction key  .
	Start key: automatic start-up, in which  is operation indicator LED. When operation is started, this indicator LED is on.
	Stop key: stop operation, in which  is Stop indicator LED. When initialize normal start-up and no operation, this indicator LED is on.
	Left direction key: page forward, cursor remove
	Right direction key: page backward, cursor remove
	Down direction key: select parameter downward
	Function switch: switch over different function pages

Key	Function description
	Symbolic key: user input symbol , or start diagnosis.
	Numeric key: when setting parameter, input value.
	Decimal point key: when set up parameter, input decimal point.
	Manual movement key: in case of manual adjustment, make adjustment object move in forward direction at low speed.
	Manual movement key: in case of manual adjustment, make adjustment object move in backward direction at low speed.
	High speed selection key: in case of manual adjustment, press this key and press  simultaneously, make adjustment object move in increasing direction at high speed, then press  , make adjustment object move in decreasing direction at high speed.

1.3 Displayer

E21S numerical control device adopts 160*160 dot matrix LCD displayer. The display area is shown in Figure 1-2.

Figure 1-2 Display area



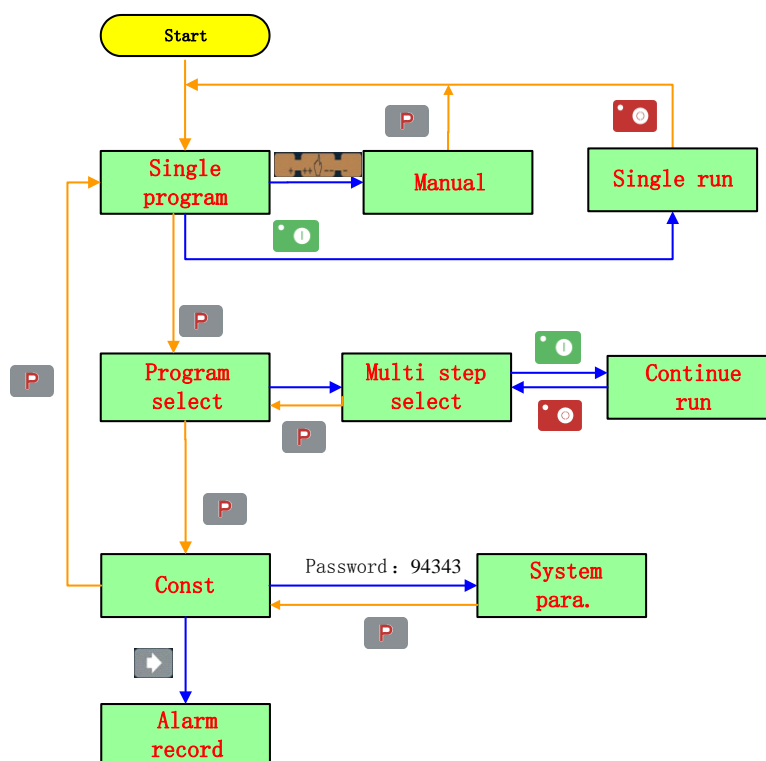
- Title bar: display relevant information of current page, such as its name, etc.
- Parameter display area: display parameter name, parameter value and system information.
- Status bar: display area of input information and prompt message, etc.

2 Operation Instruction

2.1 Basic operation procedure

Basic switch over and operation procedure of the system is shown in Figure 2-1.

Figure 2-1 Basic Operational Flow Chart



2.2 Programming

The system has two programming methods, which are single-step programming and multi-step programming. User can set up programming according to actual demand.

2.2.1 Single-step programming



Single-step programming is generally used for processing single step to finish work piece processing. When controller is power on, it will automatically enter single-step program page.

Operation steps

- Step 1** After starting up, the device will enter setting up page of single-step program automatically, as shown in Figure 2-2.

Figure 2-2 Single-step program setting page

Single	
X:	200.50
Xp:	300.00
Dx:	50.00
F:	1
Dly:	1000
PP:	100
CP:	100
✎ Range: 0~9999.999mm	

- Step 2** Click , select parameter which needs to be set up, press numerical key to input program value, press  to complete input.



NOTE

Parameter can only be set when Stop indicator is on.

Setting range of single step parameter is shown in Table 2-1.

Table 2-1 Set up range of single step parameter

Parameter name	Unit	Set up range	Remarks
X	mm/inch	None	Current position of X axis;
XP	mm/inch	0~9999.999mm	Program position of X axle.
DX	mm/inch	0~9999.999mm	Retract distance of X axle;
DLY	ms	0~99999ms	In case of single step, delay time for X axle concession.
F	None	0~3	F function configure output.

Parameter name	Unit	Set up range	Remarks
PP	None	0~99999	Number of preset work piece.
CP	None	0~99999	Number of current work piece.




Step 3 Press , system will execute according to this program, as shown in Figure 2-3.

Figure 2-3 Single step operation page




Single	
X:	200.50
C:	1
PP:	1000 mm



Operation example

Requirements: on single-step program page, program back gauge position to 80.00mm, retract distance to 50mm, concession waiting time to 200ms, and work piece to 10.

Operation steps are shown in Table 2-2.

Table 2-2 Operation steps of single step example

Operation steps	Operation
Step 1	Click  , select “XP” parameter.
Step 2	Input 80.00 by numerical key.
Step 3	Click  , confirm setting of this parameter.
Step 4	Click  , select “DX” parameter, “DLY” parameter, “PP” parameter respectively.
Step 5	Set up parameter to 50mm, 200ms, 10 by numerical key.

Operation steps	Operation
Step 6	 Click  , system execute according to this program.

2.2.2 Multi-step programming





















Multi-step program is used for processing single work piece of different processing steps, realize consecutive implementation of multi-steps, and improve processing efficiency.


Operation step

Step 1 Power on, system enters to single-step parameter set up page automatically.

Step 2 Click , switch to program manage page, as shown in Figure 2-4.

Figure 2-4 Program management page

PROGRAMS					OP
					
					
					
					
✎ 1program					5ST

Step 3 Click , select program serial number, or input program number directly, such as input “1”.




Step 4 Click , enter multi-step program setting page, as shown in Figure 2-5.

Figure 2-5 Multi-step program setting page



PROGRAM1	
ST:	1
PP:	99
CP:	99
DLY:	100
✎Range: 0~25	

Step 5 Click , select multi-step programming parameter which requires set up, input setting up value, click , the set up takes effect.

Step 6 In completion of set up, click , enter step parameter set page, as shown in Figure 2-6.

Figure 2-6 Step parameter set page

PROGRAM1	1/ 5ST
X:	50.00
XP:	9.000
DX:	25.00
RP:	54
F:	1
✎ Range: 0~9999.999mm	

Step 7 Click , select step parameter that needs to be set up, input program value, click , the setup takes effect.





Step 8 Click   to switch over between steps. If the current step is the first step, click  to enter the last page of step parameter setting; if the current step is the last one, click  to enter the first page of step parameter setting. Multi-step parameter setting range is shown in Table 2-3.

Table 2-3 Multi-step parameter setting range

Parameter name	Unit	Setting range	Remarks
Step number of program	None	0-25	Set up total processing step number of this program
Preset work piece number	None	0~99999	Number of work piece to be processed, decreasing piece when more than zero; negative increasing count.

Parameter name	Unit	Setting range	Remarks
Current work piece number	None	0~99999	Number of finished work piece
Concession delay	ms	0~99999ms	Time between retract signal and concession execution.
X	mm/inch	None	Current position of X axle, can't be modified.
X target position	mm/inch	0~9999.999mm	Program position of X axle.
concession distance	mm/inch	0~9999.999mm	Distance of X axle concession.
Repeat times	None	1~99	Repeat times required by this step.
F	None	0~3	F function configure output




Step 9 Click , system will operate according to this program, as shown in Figure 2-7.

Figure 2-7 Multi-step programming operation page

PROGRAM 1	Rp: 1/1
X:	5.000
C:	9
PP: 20	St: 1/ 1

----End

Operation example

Requirements: one work piece requires processing 50 as shown below;

First shear: 50mm;

Second shear: 100mm;

Third shear: 300mm;

Analysis: according to work piece and technological conditions of machine tool:

First shear: X axle position is 50.0mm, concession 50mm;










The second shear: X axle position is 100.0mm, concession 50mm;



The third shear: X axle position is 300.0mm, concession 50mm;

Edit processing program of this work piece on No. 2 program.

Operation procedure is shown in Table 2-4.

Table 2-4 Operation steps of multi-step programming example

Operation step	Operation
Step 1	On single step parameter setting page, press  to enter program selection page.
Step 2	Input “2”, click  , enter multi-step general parameter setting page of program 2.
Step 3	Select “Program step”, input “3”, click  , the setting takes effect.
Step 4	Select “PP”, input “50”, click  , the setup takes effect.
Step 5	Similar to step 3 and step 4, set “DLY” to 400 respectively.
Step 6	Click  to enter first step setup page of step parameter.
Step 7	Select “XP”, input 50, click  , the setup takes effect.
Step 8	Similar to step 7, set up “concession distance” and “repeat times” to 50, 1 respectively.
Step 9	Click  to enter second step setup page of step parameter, the setup method is similar to that of step one.
Step 10	Click  again, to enter third step setup page of step parameter, the setup method is similar to that of step one and step two.
Step 11	Click  , return to setup page of the first step.

Operation step	Operation
Step12	 Click  , system will operate according to this program.

 **NOTE**

- In completion of multi-step programming, return to start step before launching the system; otherwise, the program will start position processing at current step.
- Press left and right direction key to circulate page turning and browsing among all step parameters.
- Program can be called and revised again.
- In completion of processing all work pieces (50 in the example), system come to stop automatically. Restart directly will start another round of processing 50 work pieces.


2.3 Parameter setting

User can setup all parameters required for normal operation of the system, including system parameter, X axle parameter.

Operation steps

- Step 1** On program management page, click  to enter programming constant page, as shown in Figure 2-8. On this page, programming constant can be set.

Figure 2-8 Programming constant page

CONST	
mm/inch:	0
中文/English:	1
X-tea.in:	1.000
Version:	V1.00
 Range: 0~9999.999mm	

Range of programming constant setup is shown in Table 2-5.

Table 2-5 Range of programming constant setup

Parameter name	Unit	Setup range	Default	Remarks
X axle indexing	mm	0-9999.99mm	0	In teach enable, input current position of X axle
Metric/English system	None	0 or 1	0	<ul style="list-style-type: none"> • 0: Metric • 1: English system
Chinese/English	None	0 or 1	0	<ul style="list-style-type: none"> • 0: Chinese, • 1: English
Version number	None	None	None	Software version information, V refers to version, 1 indicates version number, and 0 indicates version level.

Step 2 Input password “94343”, click  to enter system parameter setting page, as shown in Figure 2-9.

Figure 2-9 System parameter setting page


SYS PARA		1/ 1PG
X-digits:		3
X-safe:		1.000
Step delay:		300
✎Range: 0~3		

Step 3 Step up parameter, parameter setup range is shown in Table 2-6.

Table 2-6 System parameter setup range

Parameter range	Unit	Setup range	Default	Remarks
Decimal point of X axle	None	0-3	2	Decimal point displayed by X axle position parameter

Parameter range	Unit	Setup range	Default	Remarks
Safe distance of X axle	mm	0-9999.999mm	0	X axle keeps low speed in this range
Change step delay	ms	0-9999ms	0	Interval between valid change step signal and change step operation executed

Step 4 Click , return to programming constant page.

----End

2.4 Manual movement

In single-step mode, axle movement can be controlled by pressing key manually. This method helps user to adjust machine tool and work piece.

Operation steps



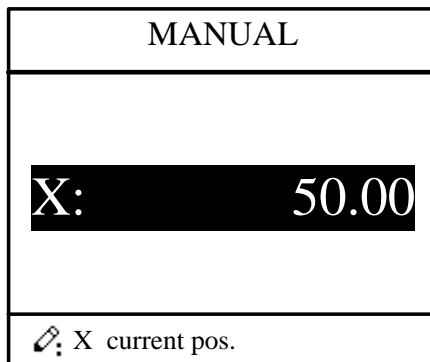




Step 1 On single step parameter setup page, click  or  to enter manual page, as shown in Figure 2-10.

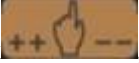

Figure 2-10 Manual page




Step 2 Click , operate at low speed in increasing direction.

Click , operate at low speed in decreasing direction.

Click , click  at the same time, operate at high speed in increasing direction.

Click , click  at the same time, operate at high speed in decreasing direction.


Step 3 Click  return to single step parameter setting page.

----End

3 Alarm

The device can detect internal or external abnormality automatically and send out alarm prompt. Alarm message is available on alarm list.

Operation steps

Step 1 On programming management page, click  to enter programming constant page.

Step 2 On programming constant page, click  to enter “Alarm history” page to view all alarm history.

As shown in Figure 3-1, the latest 6 alarms, alarm number and causes can be viewed on this page.

Figure 3-1 Alarm history page

ALARM RECORD	
A.24	Mach. Not ready

Alarm history and message is shown in Table 3-1.

Table 3-1 Alarm number and alarm message

Alarm number	Alarm name	Alarm description
A.01	Count reached prompt	Count reaches preset value
A.02	Minimum soft limit	Minimum soft limit
A.03	Maximum soft limit	Maximum soft limit

A.11	Count reached shut-down	When count reaches preset value, system shut down automatically.
A.12	Beam is not on upper dead point	In single step and multistep mode, slider is not on upper dead center.
A.21	Limit switch abnormal	None
A.22	Encoder failure	Encoder voltage is too low
A.23	Communication abnormal	None
A.24	Oil pump not started	Oil pump signal loss
A.41	Parameter storage error	None
A.42	Abnormal power failure	None
A.43	System self-checking error	None

----End

Appendix 1 Common fault and troubleshooting

Fault phenomena	Trouble shooting
When power on, system will not display.	Check whether No. 1 (24V) and No. 2 (0V) terminal is connected or not, or signal is reversed.
When X axle programming is operating, back gauge motor does not move, Y AXIS motor moves.	Two motors are reversed. Reconnect.
When program is operating, motor does not move.	Check whether mechanical part has been locked
Motor can't switch from high speed to low speed.	Check whether high-low speed signal has been sent or motor power is too small.
When system is in multi-step programming, the program can't change step.	Check when slider is on upper dead center, No. 1 (START) terminal is connected to +24V or not.
When system is in multi-step programming, the program can't count.	Check when slider is on upper dead center, No. 5(COUNT) terminal is connected to +24V or not.
When programming is operating, the system loses control.	Check whether encoder cable is connected or not.
When programming is operating, system actual position will not display or change.	Check whether encoder wiring is correct or encoder cable is connected well.

Appendix 2 Acronym

Acronym	English interpretation
C	
C	COUNT
CP	Current Pieces
D	
DX	Retract
DLY	Delay time
F	
F	Function
P	
PP	Preset Pieces
S	
ST	STEP
X	
X	X-axis
XP	X-axis position