

# E21S Operation Manual

(Version: V1.05)



**ESTUN AUTOMATION CO., LTD**

— Total Solution Supplier

## Revision Record

No.	Version	Date	Description
1	V1.00	2012-06-04	Initial release.
2	V1.01	2013-03-14	The password of entering to <b>SYS PARA</b> page is modified.
3	V1.02	2013-03-27	Revise some expression in this document.
4	V1.03	2014-06-20	<ul style="list-style-type: none"><li>• Part of interface definition is modified.</li><li>• Parameters <b>CutDelay En.</b> and <b>MaxCut Delay</b> are added on <b>SYS PARA.</b> page.</li><li>• Parameter <b>Pulse</b> Time is added on the <b>CONST</b> page.</li><li>• Cut-Angle (A-axis) is added.</li><li>• Cut-Gap (G-axis) is added.</li></ul>
5	V1.04	2014-07-31	<b>Monitor-Speed Detection</b> function is added.
6	V1.05	2014-11-14	<ul style="list-style-type: none"><li>• The parameters <b>X-tea.in</b> and <b>G-tea.in</b> move to page <b>SYS PARA.</b></li><li>• Add the alarm info.</li></ul>

# Contents

<b>Preface .....</b>	<b>1</b>
<b>Chapter 1 Product Overview.....</b>	<b>2</b>
1.1 Product introduction.....	2
1.2 Operation panel .....	2
1.3 Displayer.....	4
<b>Chapter 2 Operation Instruction.....</b>	<b>5</b>
2.1 Basic operation procedure .....	5
2.2 Programming .....	6
2.2.1 Single-step programming .....	6
2.2.2 Multi-step programming.....	8
2.3 Parameter setting .....	11
2.4 Manual movement .....	14
<b>Chapter 3 Alarm .....</b>	<b>15</b>
<b>Appendix Common fault and troubleshooting.....</b>	<b>17</b>

## 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 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.

ESTUN preserves the right to modifying this manual in the event of function adding or print error.

# Chapter 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. Based on ensuring work precision, the cost of numerical control shearing machine is reduced significantly.

Features and functions of this product are as following:

- Back gauge can be controlled.
- Cut-angle can be controlled.
- Cut-gap can be controlled.
- Stroke time can be controlled.
- Intelligent positioning control.
- Unilateral and bidirectional 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











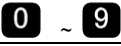






Operation panel is shown in Figure 1-1.



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, top left corner of the key is operation indicator LED. When operation is started, this indicator LED is on.
	Stop key: stop operation, top left corner of the key 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
	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**.

<b>Single</b>	
X:	200.00
A: 50.00	G: 9.98
<b>XP:</b>	<b>20.00</b>
DX: 2	F: 0
CUT: 3.00	PP: 0
DLY: 1.00	CP: 14
✎ Range: 0~9999.999mm	

**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.

The paraphrases of shortening on this page are as shown in Table 1-2.

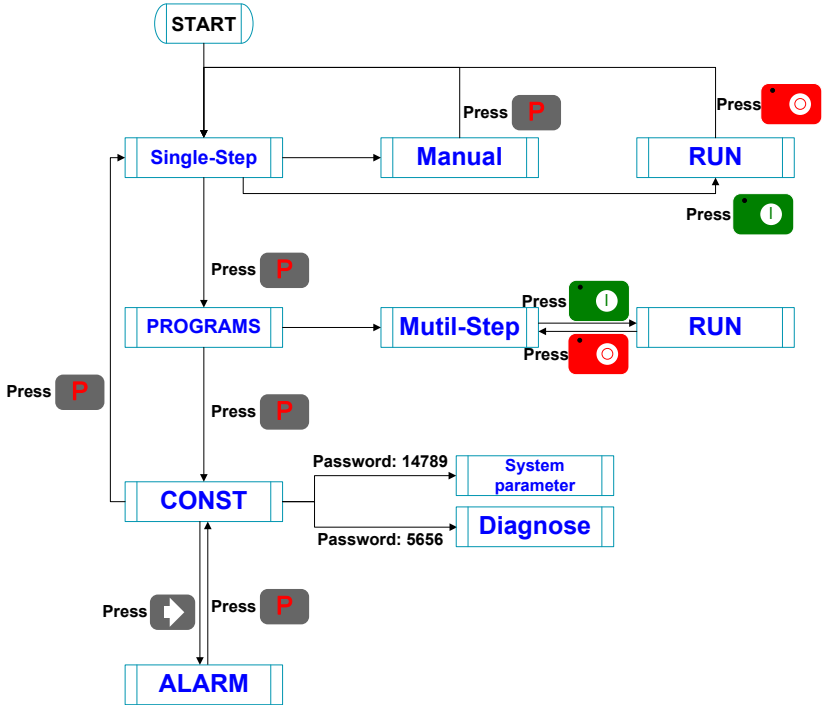
**Table 1-2** The paraphrases of shortening

Shortening	Description
X	The current backgauge position
A	The current cutting angle
G	The current gap distance
XP	The desired backgauge position
DX	Backgauge retract distance
CUT	Cutting delay
DLY	Retracting delay
F	Function output value
PP	Preset workpiece
CP	Current workpiece

## Chapter 2 Operation Instruction

### 2.1 Basic operation procedure

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



**Figure 2-1** Basic Operational Flow



## 2.2 Programming

The device 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**.

Single			
X:			200.00
A:	50.00	G:	9.98
XP:			20.00
DX:	2	F:	0
CUT:	3.00	PP:	0
DLY:	1.00	CP:	14
✎ Range: 0~9999.999mm			

**Figure 2-2** Single-step program setting page

**Step 2** Click , select parameter that 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	Range	Remarks
X	mm/inch	-	Current position of X axis, unable to be modified.
A	°	-	Current position of A axis, unable to be modified.
G	mm/inch	-	Current position of G axis, unable to be modified.
XP	mm/inch	0~9999.999	Program position of X axle.
DX	mm/inch	0~9999.999	Retract distance of X axle;

Parameter name	Unit	Range	Remarks
DLY	s	0~9.99	In case of single step, delay time for X axle concession.
CUT	s	0~9.99	There is a delay time for the cutter goes to the next work-step, after it leaves the top dead center.  [Note] Only the parameter <b>CutDelay En.</b> is set to 1, displaying this parameter.
F	None	0~3	Functions configure output.
PP	None	0~9999	Number of preset work piece.
CP	None	0~9999	Number of current work piece.

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

Single	
X:	200.0
A:	3.0
G:	9.99
C:	0
PP:	0 metric

**Figure 2-3** Single step operation page



---End



**Operation example**

On single-step program page, program back gauge position to 80.00mm, retract distance to 50mm, concession waiting time to 2s, 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.


Operation steps	Operation
Step 4	Click  , select "DX" parameter, "DLY" parameter, "PP" parameter respectively.
Step 5	Set up parameter to 50mm, 2s, 10 by numerical key.
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, the device enters to single-step parameter set up page automatically.

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

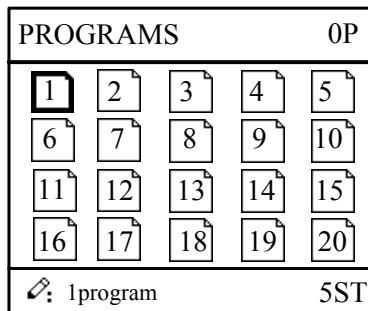






Figure 2-4 Program management page

**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.

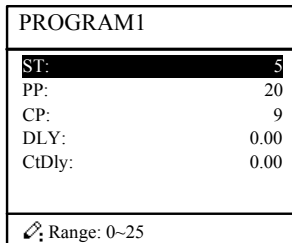








Figure 2-5 Multi-step program setting page





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

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

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

**Figure 2-6** Step parameter set page

**Step 7** Click , select step parameter that needs to be set up, input program value, click , and 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	Range	Remarks
ST	None	0-25	Set up total processing step number of this program
PP	None	0~99999	Number of work piece to be processed, decreasing piece when more than zero; negative increasing count.
CP	None	0~99999	Number of finished work piece
DLY	s	0~9.99	Time between retract signal and concession execution.

Parameter name	Unit	Range	Remarks
CtDly	s	0~9.99	There is a delay time for the cutter goes to the next work-step, after it leaves the top dead center.  [Note] Only the parameter <b>CutDelay En.</b> is set to <b>1</b> , displaying this parameter.
X	mm/inch	None	Current position of X axle, can't be modified.
XP	mm/inch	0~9999.999	Program position of X axle.
DX	mm/inch	0~9999.999	Distance of X axle concession.
RP	-	1~99	Repeat times required by this step.
F	-	0~3	F function configure output

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

PROGRAM1	Rp: 1/54
X:	200.0
A:	3.0
G:	9.99
C:	0
PP: 12345	St: 1/ 5

**Figure 2-7** Multi-step programming operation page

----End

**Operation example**

**[Background]** 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 3 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.
Step11	Click  , return to setup page of the first step.
Step12	Click  , system will operate according to this program.

**[Note]**

- In completion of multi-step programming, you should back to starting 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), the system stops 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.

**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.


CONST	
mm/inch:	0
中文/English:	0
Pulse Time:	0.020
Version:	V1.10
✎: 0:mm 1:inch	

**Figure 2-8** Programming constant page

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

**Table 2-5** Range of programming constant setup

Parameter name	Unit	Range	Default	Remarks
X-tea. in	mm	0-9999.99	0	Input current X axle position when teach enable.
mm/inch	-	0 or 1	0	<ul style="list-style-type: none"> <li>• 0: mm</li> <li>• 1: inch</li> </ul>
中文/English	-	0 or 1	0	<ul style="list-style-type: none"> <li>• 0: 中文</li> <li>• 1: English</li> </ul>
X-tea. In	mm	0~9999.999	10	Input current X axle position when teach enable.
G-tea. In	mm	0~9.99	0	Input current G axle position when teach enable.
Pulse Time	s	0.000~1.000	0.020	The duration of the pulse signal.
Version	-	None	-	Software version information, V refers to version, 1 indicates version number, and 0 indicates version level.

**Step 2** Input password "1212", click  to enter system parameter setting page, as shown in **Figure 2-9**.


SYS PARA		1/ 2PG
X-digits:		3
X-safe:	1.000	
Step delay:	3.33	
CutDelay En.:	1	
MaxCut Delay:	9.99	
X-tea.in:	200	
G-tea.in:	5	
✎ Range: 0~3		

**Figure 2-9** System parameter setting page

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

**Table 2-6** System parameter description

Parameter	Unit	Range	Default	Description
X-digits	-	0-3	1	Decimal point displayed by X axle position parameter
X-safe	mm	0-9999.999	10	X axle keeps low speed in this range
Step delay	s	0-9.99	0.5	Interval between valid change step signal and change step operation executed
CutDelay En.	-	0 or 1	0	<ul style="list-style-type: none"> <li>• 0: disable</li> <li>• 1: enable</li> </ul>
MaxCut Delay	s	0~9.99	0	Set the maximum cut delay time.
A-Enable	-	0 or 1	1	<ul style="list-style-type: none"> <li>• 0: disable</li> <li>• 1: enable</li> </ul>
A-Max	°	2.50 or 3.00	3.00	The max value of the Cut-Angle.
G-Enable	-	0 or 1	1	<ul style="list-style-type: none"> <li>• 0: disable</li> <li>• 1: enable</li> </ul>
G-Encoder Dir.	-	0 or 1	0	<ul style="list-style-type: none"> <li>• 0: Decrease</li> <li>• 1: Increase</li> </ul>
GMF	-	1~99999999	40	Multiplication factor of G-axis, used for the convert between pulses and mm.
GDF	-	1~99999999	1	Division factor of G-axis, used for the convert between pulses and mm.




**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.

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

MANUAL	
X:	50.00
A:	0.00
G:	9.98
✎ X current pos.	


**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, and operate at high speed in increasing direction (this operation is valid only when using frequency converter as the drive).  
 Click  , click  at the same time, and operate at high speed in decreasing direction (this operation is valid only when using frequency converter as the drive).
- Step 3** Click  return to single step parameter setting page.

---End

## Chapter 3 Alarm

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

**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.

ALARM RECORD	
A.24	Mach. Not ready

**Figure 3-1** Alarm history page

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	Pieces reached	Count reaches preset value
A.02	X.Pos < min.	X-axis current position beyond the minimum limit
A.03	X.Pos > max.	X-axis current position beyond the maximum limit
A.04	-	The current position of the X-axis beyond the soft limit
A.05	A Axis MAX	A-axis current position beyond the maximum limit
A.06	A Axis MIN	A-axis current position beyond the minimum limit
A.07	G Axis MAX	G-axis current position beyond the maximum limit
A.08	G Axis MIN	G-axis current position beyond the minimum limit

Alarm number	Alarm name	Alarm description
A.11	Finished work	When count reaches preset value, system shut down automatically.
A.12	Out of UDP	In single step and multistep mode, slider is not on upper dead center.
A.22	Encoder abnor.	Encoder voltage is too low
A.24	Mach. not ready	The pump signal is invalid
A.25	Angle Abnormal	Angle input error
A.26	X Stop Err	The backgauge motor is abnormal stop.
A.28	X V2 Err	The speed of backgauge motor is abnormal on the Low-Speed Mode.
A.29	X V3 Err	The speed of backgauge motor is abnormal on the High-Speed Mode.
A.32	XPos < 0	X-axis position has exceeded the zero point in manual mode, you should turn back.
A.41	Para. error	-
A.42	Power off	-
A.43	System fault	-

## Appendix Common fault and troubleshooting

Fault phenomena	Trouble shooting
When power on, the device will not display.	<ul style="list-style-type: none"> <li>• The electrode of power supply terminal is connected error; please see the information of power nameplate.</li> <li>• Voltage is too low.</li> <li>• Electrical outlet is not connected.</li> </ul>
When X axle programming is operating, back gauge motor does not move, but Y AXIS motor moves.	Two motors are reversed. Reconnect.
When program is operating, motor does not move.	<ul style="list-style-type: none"> <li>• Check whether mechanical part has been locked or slider returns to upper dead center.</li> <li>• Check whether the motor wiring is connected well.</li> </ul>
Motor can't switch from high speed to low speed.	<ul style="list-style-type: none"> <li>• Check whether high-low speed signal has been sent or motor power is too small.</li> <li>• Check whether the parameter of distance conversion is correct.</li> </ul>
When system is in multi-step programming, the program can't change step.	Check when slider is on upper dead center, <b>STEP</b> 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, <b>STEP</b> terminal is connected to +24V or not.
When programming is operating, the device loses control.	<ul style="list-style-type: none"> <li>• Check whether encoder cable is connected or not.</li> <li>• Check whether the motor-direction wiring is correct (X+, X-, A+, A-, G+, G-).</li> </ul>
When programming is operating, system actual position will not display or change.	Check whether encoder wiring is correct or encoder cable is connected well.



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