

# E21S Operation Manual

(Version: V1.06)



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## 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>  |
| 7   | V1.06   | 2015-03-05 | <ul style="list-style-type: none"><li>• Update the section <b>Manual adjustment.</b></li><li>• Update the <b>Teach Page.</b></li></ul>  |

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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 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











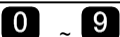






Operation panel is shown in Figure 1-1.



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 |
| XP:                   | 20.00   |
| 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.

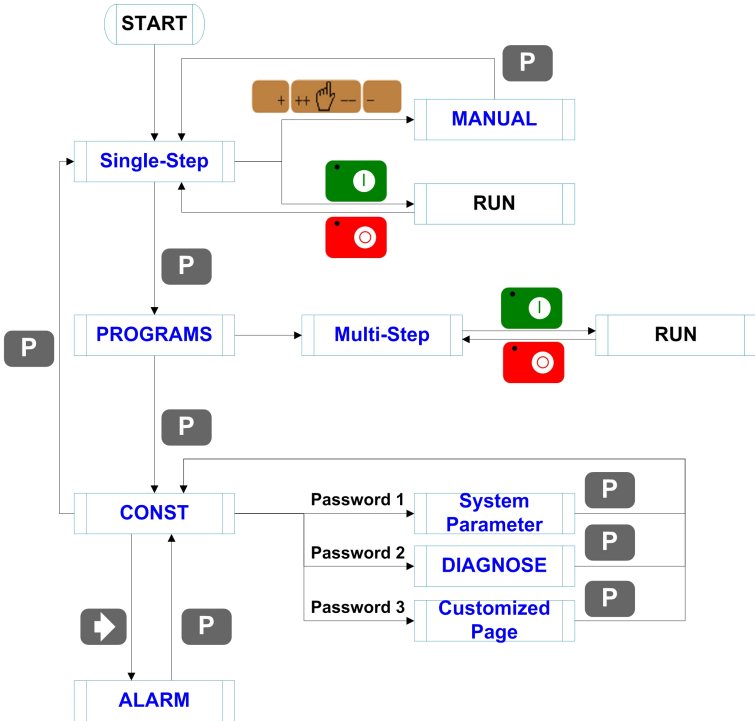
**Table 1-2** The paraphrases of shortening

| 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 axis.                        |
| DX             | mm/inch | 0~9999.999 | Retract distance of X axis;                        |

| Parameter name | Unit | Range  | Remarks  |
|----------------|------|--------|--|
| DLY            | s    | 0~9.99 | In case of single step, delay time for X axis 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.<br><br>[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.

























| PROGRAMS  |   |   |   |   | 0P  |
|---|---|---|---|---|-----|
|  |  |  |  |  |     |
|  |  |  |  |  |     |
|  |  |  |  |  |     |
|  |  |  |  |  |     |
| 🔗: 1program   |   |   |   |   | 5ST |



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.

| PROGRAM1       |      |
|----------------|------|
| ST:            | 5    |
| PP:            | 20   |
| CP:            | 9    |
| DLY:           | 0.00 |
| CtDly:         | 0.00 |
| 🔗: Range: 0~25 |      |



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.  |
| 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.<br><br>[Note] Only the parameter <b>CutDelay En.</b> is set to 1, displaying this parameter. |
| X              | mm/inch | None       | Current position of X axis, can't be modified.   |
| XP             | mm/inch | 0~9999.999 | Program position of X axis.  |

| Parameter name | Unit    | Range      | Remarks                             |
|----------------|---------|------------|-------------------------------------|
| DX             | mm/inch | 0~9999.999 | Distance of X axis 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 axis position is 50.0mm, concession 50mm;
- The second shear: X axis position is 100.0mm, concession 50mm;
- The third shear: X axis 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.                         |

| Operation step | Operation  |
|----------------|--|
| 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 Constant

User can setup the general parameters for the device, including the metric or imperial and the language.

**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:   | 0.200 |
| Version:      | V1.11 |
| ↺: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 axis 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>                                   |
| Pulse Time     | s    | 0.000~1.000 | 0.200   | 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 **Teach Page**, as shown in **Figure 2-9**.

| TEACH                |     |
|----------------------|-----|
| X-tea.in:            | 200 |
| G-tea.in:            | 5   |
| ✎ Range: 0 ~ 9999.99 |     |

**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-tea. In | mm   | 0~9999.999 | 10      | Input current X axis position when teach enable. |
| G-tea. In | mm   | 0~9.99     | 0       | Input current G axis position when teach enable. |

### <How to Teach>:




You can directly measure the positions of slider and back gauge. If the measurement is difficult, you can program and operate any one process, and then measure the accomplished workpiece.

**Step 4** Click , return to programming constant page.

----End

## 2.4 Manual movement



In single-step mode, axis 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** According to your actual requirement, following the above table to adjust the position of the axis.

A-axis and G-axis are controlled by the relays, press  to move them at low speed in increasing direction; press  to move them at low speed in decreasing direction.




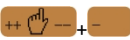
Button  is of no effect on them.


- If the drive mode of X-axis is **common motor**:

| Press Key   | Status | Direction  | Running Time   | Speed |
|---|--------|------------|--|-------|
|    | Stop   | increasing | Press time   | Slow  |
|   | Run    | increasing | <ul style="list-style-type: none"> <li>Press time (if it is less than "Pulse Time")</li> <li>Pulse Time (If it is less than Press time)</li> </ul> | Slow  |
|    | Stop   | decreasing | Press time   | Slow  |
|   | Run    | decreasing | <ul style="list-style-type: none"> <li>Press time (if it is less than "Pulse Time")</li> <li>Pulse Time (If it is less than Press time)</li> </ul> | Slow  |
|   | Stop   | increasing | Press time   | Slow  |
|   | Run    | increasing | Press time   | Slow  |
|   | Stop   | decreasing | Press time   | Slow  |
|   | Run    | decreasing | Press time   | Slow  |

**<Note>:** When the system is on run status, the operation of manual adjustment is just valid for the X-axis.

- If the drive mode of the corresponding axis is **frequency**:


| Press Key   | Status | Direction    | Running Time | Speed |
|---|--------|--------------|--------------|-------|
|  | Stop   | increasing   | Press time   | Slow  |
|   | Run    | Cannot do it |              |       |
|  | Stop   | decreasing   | Press time   | Slow  |
|   | Run    | Cannot do it |              |       |
|  | Stop   | increasing   | Press time   | Fast  |
|   | Run    | Cannot do it |              |       |
|  | Stop   | decreasing   | Press time   | Fast  |
|   | Run    | Cannot do it |              |       |

**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.                       | Move X-axis forwards in Manual Movement.   |
| A.03         | X.Pos > max.                       | Move X-axis forwards in Manual Movement.   |
| A.04         | -                                  | The current position of X-axis exceeds 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   |
| A.11         | Count reached<br>shut-down         | Rerun, the alarm is cleared automatically.   |
| A.12         | Beam is not on upper<br>dead point | Step on the Foot Up Switch, moving the slider to the TDC, and the alarm will be cleared automatically. |
| A.22         | Encoder failure                    | Check whether the encoder wiring is normal.  |
| A.25         | Angle Abnormal                     | Angle input error  |

| <b>Alarm number</b> | <b>Alarm name</b> | <b>Alarm description</b>                                      |
|---------------------|-------------------|---|
| A.26                | X Stop Err        | Check whether the back gauge motor is run normally.           |
| A.28                | X V2 Err          | Check whether the back gauge motor is run normally.           |
| A.29                | X V3 Err          | Check whether the back gauge motor is run normally.           |
| A.32                | XPos < 0          | Move X-axis forwards to the setting range in Manual Movement. |
| A.41                | Para. Error       | Back to factory for repairing.                                |

## Appendix Common fault and troubleshooting

| Fault  | Trouble shooting  |
|--|---|
| The screen don't display when power on.  | <ul style="list-style-type: none"> <li>• The terminal of power supply wiring is error. Follow the nameplate to rewire.</li> <li>• The source voltage is too low.</li> <li>• The connector is not connected well.</li> </ul> |
| The back gauge motor doesn't run when X-axis is operated, but the slider motor runs. | The wires of these two motor are in reverse, please rewire.   |
| The motor doesn't run when operating.  | <ul style="list-style-type: none"> <li>• Check whether the machine is impeded, or whether the slider is back to TDC</li> <li>• Check whether the motor wire is connected well.</li> </ul>                                   |
| The motor can't mutually convert from high to low                                    | <ul style="list-style-type: none"> <li>• Check whether the signal is in effect, or whether frequency converter is normal.</li> <li>• Check whether parameter <b>Mute Dis.</b> is programmed correctly.</li> </ul>           |
| The step can't be changed in Multi-Step mode.  | Check the <b>STEP</b> terminal is connected to +24V when the slider is on TDC.  |
| The counter doesn't work in Multi-Step mode.   | Check the <b>STEP</b> terminal is connected to +24V when the slider is on TDC.  |
| Lose control of the system   | <ul style="list-style-type: none"> <li>• Check whether the encoder cable is connected well.</li> <li>• Check whether the motor direction wiring (X+, X-, A+, A-, G+, G-) is correct.</li> </ul>                             |
| The actual position of X-axis is unchanged or unshown.                               | Check whether the encoder cable is connected well or correctly.   |



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