

XY1 Strain Load Cell Simulator

USER'S GUIDE

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Chapter 1 Main Specification

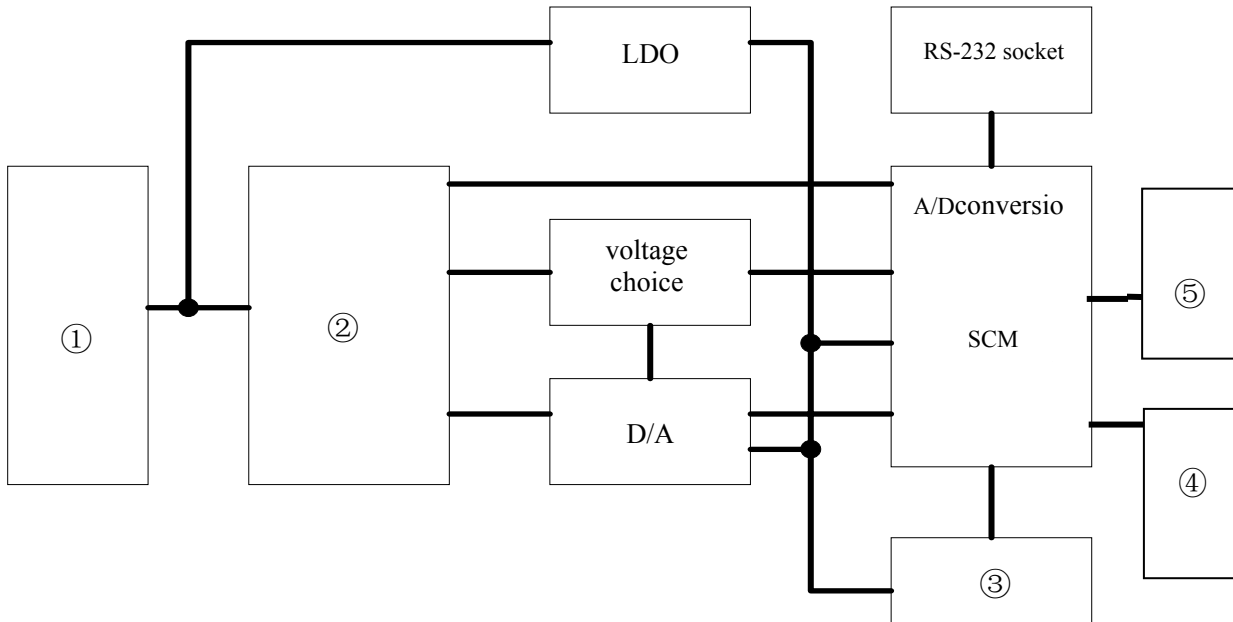
1. Type : XY1 Load cell simulator
X for signal emitter, Y for load cell, 1 for design serial number.
2. Technical index:
 - Non-linearity: $\leq 0.005\%$ F.S.
 - Accuracy of F.S: $\leq 0.01\%$ F.S. (25°C)
 - Temperature output coefficient of F.S $\leq \pm 5\text{ppm}/^\circ\text{C}$
 - Stimulating voltage: DC 5-10 V, 10-20 V two level
 - Output: 0~2 mV/V
 - Division (sensitive of the load cell): 0.0001 mV/V
 - Operating temperature : 0~40°C
 - Long period stability: $\leq 50\text{ppm}/\text{Month}$
 - Input current of the simulator stimulating voltage: $\approx \text{stimulating voltage(V)}/700(\Omega) + 5\text{mA}$
 - Output resistance of the simulator: $\approx 360 \Omega$
 - Maximum bits of the customer program: 16K, can extend to 32K
3. Shape:
 - Outside: 145mm \times 85mm \times 30mm
 - Weight: 158g
 - Description: refer to picture 1



Picture 1: XY1 Strain load cell simulator

Chapter 2 Work Theory

Refer to picture 2 for work theory scheme of the simulator



Note: ① load cell socket; ② network of precise resistance; ③ temperature load cell ; ④ memorizer; ⑤ keyboard

Picture 2: Work theory scheme of simulator

Through the stimulating voltage interface of load cell which connect to the LDO manostat and the precise resistance network. The manostat produce the stable voltage for the work of the circuitry. The reference voltage of precise resistance network is sent to the D/A diversion for basic voltage by the voltage select switch. Under the control of the SCM, the D/A diversion output the relative stimulating voltage to the resistance network. The output voltage of simulator is transmitted by the load cell interface after the diverse of the resistance network. The temperature load cell offer the temperature compensation data for the temperature amend. The A/D diversion of the SCM measures the data of the stimulating voltage. The position of voltage select switch is sent to the SCM by the I/O interface. The SCM checks whether the position of voltage select switch and the current stimulating voltage match. The SCM communicates with the upper-machine through the RS-232 interface. The operator controls the simulator by keyboard. The memorizer is used to save the program input by keyboard or loaded down through RS-232 interface.

Chapter 3 Operation

3.1 Function

- 3.1.1 Simulate the standard signal output of the strain weight, pressure or torque load cell
- 3.1.2 Set the output bound, 0~2mV/V when leaving manufacture
- 3.1.3 Set step length of the output, 0.1mV/V when leaving manufacture
- 3.1.4 Output stepwise increase or deduce according to the step length set
- 3.1.5 Output of the simulator can be set by the keyboard
- 3.1.6 Measure the surround temperature
- 3.1.7 Measure the stimulating voltage of the instrument under measuring
- 3.1.8 Modifiable zero and F.S output and can reduce step by step the calibrate non-linearity
- 3.1.9 Write the customer program by the keyboard
- 3.1.10 Write program by upper-computer and load down the program by the serial interface.
- 3.1.11 Execute the user's program, change the output and stimulate the process of the auto weigh equipment according to the user command. In course of executing, the input of the switch can be by the keyboard and serial interface.

3.2 Connection Method

3.2.1 Load cell interface

Connect the load cell interface to the relative interface of the simulator. Adjust the voltage select switch according to the stimulating voltage of the measured instrument. The bridge voltage can not be reverse-connection, otherwise the 'Reverse-Con' indicating light on or the simulator can not work.

Note: It can not work normally, if the stimulating voltage exceeds 20.5 V. It may break the simulator if the stimulate voltage exceed 220V.

3.2.2 RS-232 interface

Connect the offered communication cable to the RS-232 interface of the simulator and the RS-232 interface of the computer. The fifth pin of the DB9 which connect to the computer is grounded, the second pin is RXD and the third is TXD. The communication indicating is light on after connecting with the computer.

3.3 Keyboard

There are 16 keys on keyboard. Please refer to the following sketch map

1 Adjust	2 Set	3 Start Pro	Fun
4 Ext	5 Temp	6 Pause Pro	Check
7 Up	8 F.S	9 Continue Pro	Back
-/+ Down	0 Zero	• Stop Pro	Enter

Picture 3: keyboard sketch map

3.4 Key Function

- 3.4.1 **‘Up’**: under the status of F0/F2, output increase one level
- 3.4.2 **‘Down’**: under the status of F0/F2, output reduce one level
- 3.4.3 **‘F.S’**: under the status of F0/F2, output the full span/set the maximum output
- 3.4.4 **‘Zero’**: under the status of F0/F2, output to be zero/ set the minimum output
- 3.4.5 **‘Temp’**: temperature display
- 3.4.6 **‘Ext’**: stimulating voltage display
- 3.4.7 **‘Start Pro’**: start to execute the customer program
- 3.4.8 **‘Pause Pro’**: the customer program pause
- 3.4.9 **‘Continue Pro’**: continue the program from the pause
- 3.4.10 **‘• /Stop’**: Stop the customer program
- 3.4.11 **‘Fun’**: choose the function status
- 3.4.12 **‘Check’**: check the rate change of the simulator and the modified data etc.
- 3.4.13 **‘Back’**: delete the number just been input in the number input status, withdraw from the current work status and back to the F0 status if do not input the figure.
- 3.4.14 **‘Enter’**: make the operation or number input into effect
- 3.4.15 **‘Set’**: set the work parameter
- 3.4.16 **‘Adjust’**: began the calibration
- 3.4.17 **‘0’ ~ ‘9’, ‘•’, ‘-/+’**: input the figure

3.5 Operation

3.5.1 Output stepwise according to the step length

Turn on the indicator after connecting with the load cell simulator. The simulator checks the initial data. If the initial data=0.0000mV, the simulator enter into the initial status, which is the Function 0. If the initial data≠0.0000mV, the simulator come into the Function 2 status. At the status of Function 0, it

displays:

F0	0.0000
-----------	---------------

Under this status, output increases by a step length every time pressing 'Up', until it arrives the maximum output 2.0000mV/V. Every time press 'Down', the input reduce by a step length until it arrives the minimum output 0.0000mV/V. The step length can be set and the step length is 0.1000mV/V when leaving factory. The output is the maximum signal output when press 'F.S', and the output return back to 0.0000mV/V when press 'Zero'.

Under other work status , press 'Back' or press several times of 'Back' to return the Function 0

3.5.2 Output the signal according to the input data

Under the Function 0 status, press 'Func', '1' to enter the Function 1 status, the simulator output the signal according to the input data. It displays:

F1	0.0000
-----------	---------------

0.0000 is the current output. Press the numerical key and 'Enter' to input the set output with the unit of mV/V. Press 'Back' to return to the Function 0 status.

3.5.3 Output the signal stepwise according to the set bound

If the initial data has been set, it enters into Function 2 after turn on. Under other work status, press 'Func' and '2' to enter into Function 2 status. The simulator transmits the signal stepwise according the set parameter of the initial data and the full span divided by 10 steps. It displays:

F2	0
-----------	----------

0 is the current output. Every time press 'Up', the output increases by a step say 1000, until the output data arrives the full span; Every time press 'Down', the output reduce by a step say 1000 , until the input data arrives the original data been set. Every time press '• ,end' , the step length reduce to the 1/10 of the previous step length. The forth time press '• ,end' , it returns to the original step length. Press 'F.S' to transmit the full span been set, it displays 10000. Press 'Zero', output return to the set original data, it displays 0.

Press 'Back' to withdraw and back to the Function 0.

3.5.4 Work parameters set

3.5.4.1 Step length set

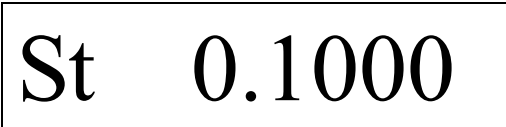
It is effective only under the Function 0

Press 'Set', it displays:



SE

Then press 'Up', it displays:



St 0.1000

0.1000 is the current step length 0.1000mV/V.

Then press the numeral key and 'Enter' to set the new step length. The numeral key is the step length with the unit of mV/V. The data been set is been saved in case of power off. Press 'Back' to back to the Function 0.

3.5.4.2 Original data set

It is effective only under the Function 2. It shows the initial load cell output signal when the input is 0 of the load cell. For scale, it is the output of the load cell when empty loaded which the same status of 0.

Press 'Set', it displays:



SE

Then press 'Zero', it displays:



S0 0.0000

0.0000 means the current original data is 0.0000mV/V. Then press the numeral key and 'Enter' to set the new original data. The numeral key is the initial data with the unit of mV/V. The data been set is been saved in case of power off. Press 'Back' to return to the Function 0.

3.5.4.3 Full span set

It is effective only under the Function 2. It is the output signal of the load cell when the input of the load cell is full span. As for scale, it is the output of the load cell when full loaded.

The gap between full span and initial data should not less than 0.5mV/V, otherwise it may lead to big error. If need smaller signal input, please refer to chapter 6.3

Press 'Set' and 'F.S', it displays

FS	2.0000
----	--------

2.0000 means the full span is 2.0000mV/V. Press the numeral key and 'Enter' can set the new full span. The numeral key is the full span output with the unit of mV/V and should not exceed 2mV/V. The data been set is been saved in case of power off. Press 'Back' to return to the Function 0.

F0	0.0000
----	--------

3.5.5 Measure the stimulating voltage

Press the 'Ext' to display the stimulating voltage of the indicator which under measuring.

U	5.05
---	------

5.05 means the current stimulating voltage of indicator under measuring is 5.05V. Press 'Back' to withdraw and back to the Function 0. It can not get correct measurement if the stimulating voltage less then 4.9V or exceed 20 V.

3.5.6 Temperature measure

Press 'Temp', it displays the surrounding temperature.

t	25.5
---	------

25.5 means the current surrounding temperature (actually the temperature of the circuit board) is 25.5 °C. Press 'Back' to back to the Function 0.

3.5.7 Program function

Press 'Func' and '3' to enter into the program write status. It displays:

0000	0
------	---

0000 means the current command serial number of the program. 0 is the current command code. Please refer to Chapter 4 for user's program write.

3.5.8 Program method

Two ways of writing program: input the program by the keyboard or load down through the RS-232 interface after it is written by the computer.

3.5.9 User's program start

Press 'Start Pro' , enter into the user's program running status. It displays:

P r	0000
-----	------

User program begin to run. It displays the hexadecimal data such as: 0001, 0002 etc. It can not see the change of the data if the program does not have the time-lapse command. The program pause when gets the pause commands, it displays:

b r	00A0
-----	------

The number 00A0 means the serial number of the hexadecimal command. Press 'Pause Pro', the program pause, the number will not change. The program does not began until press 'Continue Pro' or input a signal which the width more then 10mS and +5~24V through the RXD port of the RS232 interface. It returns to the Function 0 when the program finish or press 'Stop Pro'/'Back' to stop the program. It displays:

F0	0.0000
----	--------

3.5.10 Zero adjust

Zero adjust function is to adjust the zero output of the simulator. Press 'Adjust', it displays:

CL

Then press '0', '0', '0', '0' and 'Enter' to enter into the zero adjust status. It displays:

C0	0.0000
----	--------

Press 'Up' or 'Down' to adjust the output of the simulator until it transmits the standard 0.0000mV/V. It displays:

C0	XXXX
----	------

XXXX is the internal statement number of the simulator output by hexadecimal. Every 0.5 second or press one time, it increase or reduce by 1. Press 'Enter' to save the adjusted data and back to the Function 0.

3.5.11 Full span adjust

Full span adjust is to adjust the Zero and full span output. High (10~20V) and low (5~10V) should be adjust under the 10V stimulating voltage. The simulator has been adjusted when leaving factory. If need the accurately full span output after a use period, it can be adjusted again as follows:

Add 10.0000V stable voltage at the stimulating voltage interface by the precise stable power supply.

Connect the signal output to the 6 bits and half digital multimeter. Press 'Adjust', it displays:

CL	11
----	----

Press '8', '8', '8', '8' and 'Enter' to enter the full span adjust status, it displays:

CA 0.0000

Press 'Up' or 'Down' to adjust transmitting of the simulator to the 6 bits and half digital multimeter until it display $0.0000 \pm 0.0002\text{mV}$, Press 'Enter' to confirm. It displays:

CA 2.0000

Press 'Up' or 'Down' to adjust the simulator to the standard data which display $0.0000 \pm 0.0002\text{mV}$ on the 6 bits and half digital multimeter, Press 'Enter' to back to the step-walking status.

The left 4 hexadecimal number is the D/A internal statement number of the current output during the adjust.

3.5.12 Linearity adjust

The simulator can get 0.005% F.S linearity degree without linearity amend. If the non-linearity exceeds 0.0001nV/V , then the linearity amend can be taken. It needs to adjust the full span; measure and record the error of every step before linearity amend. The gap between two level is 0.1mV/V .

Operation as follows:

Press 'Adjust', '2', '2', '2', '2', 'Enter' to enter into the linearity adjust status. It displays:

0.0 0.0

The left data means the amend port with the unit mV/V . The right data means the original non-linearity amend. Press the numeral key and 'Enter' to input the 0.0 level non-linearity amend data with the unit 0.0001mV/V . The amend data is the reverse error of the non-linearity with the bound $< \pm 4$. Adjust it on base of the original data. Press 'Enter' if do not to change the original amend data. It displays:

0.1	0.0
-----	-----

Same as above, input the different non-linearity data using the numeral key and 'Enter' key. After input the whole non-linearity amend data of 0.0 to 2.0mV/V or press 'Back' in course of adjust can back to the step-walking status.

In general the amend data of the 0.0 level and 2.0 level is 0.

3.5.13 Effecton of the temperature and the voltage to the adjust

Amend the temperature effecton to the zero output and full span output, and amend the voltage effecton to the full span output. The amend data is the reverse effecton data of the temperature/voltage. Before the operation of amending, work out the amend data by the experiment which to confirm the effecton data of the temperature and voltage.

Press 'Adjust', it displays:

CL

Press '5' , '5' , '5' , '5' , 'Enter' to enter into the temperature/voltage adjust status. It displays:

P7	25.0
----	------

The right data means the original norm amend temperature which is the adjust temperature of the full span. The temperature should $< 32^{\circ}\text{C}$. Press the numeral key and 'Enter' to input the new norm adjust temperature. It displays:

P8	0.00
----	------

The right data means the amend coefficient of the zero temperature effecton under the low level 5~10V with the unit 0.0001mV/V. $^{\circ}\text{C}$. Data bound $< \pm 32.00$. For example, the adjust zero is under 25°C , when the temperature change to 40°C , the zero changes to 0.0015mV/V. $^{\circ}\text{C}$. The zero temperature

effectation is:

$$0.0015 / (40-20) = 0.0001 \text{ (mV/V.}^\circ\text{C)}$$

Amend coefficient of the Zero temperature effectation is (if the original amend coefficient is not zero, it is the actually amend coefficient change effected by the zero temperature):

$$-(0.0001/0.0001)=-1.00 \text{ (0.0001 mV/V.}^\circ\text{C)}$$

Press the numeral key and 'Enter' to input the new amend coefficient. It displays:

P9	0.00
----	------

The right data means the amend coefficient of the zero temperature effectation under the low level 5~10V with the unit ppm/°C. Data bound $<\pm 32.00$ ppm/°C. For example, the full span adjusted output is 2.0000mV/ under 25°C, when the temperature change to 40°C, the full span output is 2.0002mV/V, the effectation of temperature output is:

$$(2.0002-2.0000)/2.0000/(40-25)=6.67 \times 10^{-6} \text{ (/ }^\circ\text{C)}$$

The effectation amend coefficient of the output temperature is -6.67(ppm/°C).

Press the numeral key to input the new effectation amend coefficient of the output temperature. Press 'Enter', it displays:

PA	0.00
----	------

The right data means the amend coefficient of the zero temperature effectation under the original high level 10~20V with the unit 0.0001mV ppm/°C. Data bound $<\pm 32.00$.

Press the numeral key and 'Enter' to input the new effectation amend coefficient of the new temperature.

It displays:

Pb	0.00
----	------

The right data means the amend coefficient of the temperature under the original high level 10~20V with the unit ppm/°C. Data bound $<\pm 32.00$ ppm/°C. Press the numeral key to input the new effectation amend coefficient of the new temperature. Press 'Enter', it displays:

PC	0.00
----	------

The right data means the amend coefficient of original low level 5~10V with the unit ppm/V. Data bound $<\pm 32.00$ ppm/V. For example, the full span output is 2.0000mV/V under the excitation voltage of 10V, when the stimulating voltage change to 5V the full span changed to 1.9999mV/V, the effect of voltage is:

$$(2.0000-1.9999)/2.0000/(10-5)=10\times 10 \text{ (-6) (V)}$$

That is the low voltage effect 10ppm/V, the amend coefficient of the voltage effect is -10(ppm/V). Press numeral key to input the new amend coefficient of the voltage effect. Then press 'Enter', it displays:

Pd	0.00
----	------

The right data means the amend coefficient of original high level 10~20V with the unit ppm/V. Data bound $<\pm 32.00$ ppm/V. Press numeral key to input the new amend coefficient of the voltage effect. Press 'Enter' to back to the step-walking output status.

The full span output of temperature effect usually less than 5ppm/ °C. It usually do not use the temperature adjust if it is do not require strictly of the full span output or the temperature do not change too much.

3.5.14 Adjust display of stimulating voltage

Press 'Adjust', it displays:

CL

Press '4', '4', '4', '4' and 'Enter' to enter into the adjust status of the excitation, it displays:

CU

Input the pre-arranged data of the current stimulating voltage, press ‘Enter’, wait to enter into the measurement of the excitation status. It finish the adjusting when displays the current excitation voltage. It displays:

U X.XX

Press ‘Enter’ to back to the step-walk output status.

3.5.15 Check the parameter

Press ‘Check’ to enter into the internal statement number check status. Press ‘Check’ repeatedly, it displays different parameters in turn (**refer to figure 1**). In order to recover quickly once the data lose for some reasons, save the parameters after adjusting.

Note: the parameter P0~P3 display in decimals in the check status while display by hexadecimal in the adjust status . The parameters can be changed by the adjust method.

It can use the following method to check the non-linearity amend data:

Press ‘Adjust’, ‘2’, ‘2’, ‘2’, ‘2’ and ‘Enter’ to enter into the non-linearity amend status. It displays:

0.0 0.0

The left data means the amend port with the unit mV/V. The right data means the original non-linearity amend data. Press ‘Enter’ repeatedly, it can display different amend data.

Figure 1 Parameter Index

Times of Press	Indicator	Meanings
1	P0	low level (5~10V) zero D/A code, unit: code
2.	P1	low level (5~10V) full span D/A code, unit: code
3	P2	high level (10~20V) zero D/A code, unit: code
4.	P3	high level (10~20V) full span D/A code, unit: code
5	P4	step-length, unit: mV/V
6	P5	original data, unit: mV/V
7	P6	full span, unit: mV/V
8	P7	norm temperature of adjust , unit: °C
9	P8	low level (5 ~ 10V) amend coefficient of the zero temperature,

		unit:0.0001mV/V°C
10	P9	low level (5~10V) amend coefficient of output temperature, unit: ppm/°C
11	PA	high level (10~20V) amend coefficient of the zero temperature, unit: 0.0001mV/V°C
12	Pb	high level (10~20V) amend coefficient of output temperature, unit:ppm/°C
13	PC	low level (5~10V) amend coefficient of voltage, unit: ppm/V
14	Pd	high level (10~20V) amend coefficient of voltage, unit: ppm/V
15	PE	Check the A/D change rate by the excitation
16	F0	back to Function 0

Chapter 4 User's programs write

4.1 Command system of the user's program

The simulator has a simple command system. Refer to details of the command index in **figure 2**. User can write program to control the output of the simulator. This can be used to simulate the signal change of the production, debug the indicator or system. The user's program can be written by the keyboard and computer. The command code is showed by number when write program by keyboard. When write the program by compute, the program can be written by sub-symbol. Then the special compiler of the simulator translates the program into machine language. At last the program can be loaded down to the simulator by RS-232C interface.

Figure 2 XY1 Command index

Com.	Format	Binary Code	Command function	Sub-symbol	Remark
00	00 n.nnnn	0xxxxxxx xxxxxxxx	output according to parameter	SET	parameter bound 0-2.0000, execution time about 2.5 ms
01	01 nnnnn	10001000 00000000 xxxxxxx xxxxxxxx	input the next data to D/A	OUT	parameter bound 0-65535 execution time about 3 ms
02	02 nnnnn	10010000 xxxxxxxx	time-lapse	DL	unit:10mS, bound 1-255
03	03 nnnnn	1001100 xxxxxxxx	time between every step is -1	TIME	unit:1mS, bound 1-255
04	04 ±0.nnnn	10100sxx xxxxxxxx	set step-length, the data is showed by real code, 's' for symbol bit, the following is the same	STEP	parameter bound:-0.1000-0.1000
05	05 ±nnnn	10101sxx xxxxxxxx	jump when the effect input (correspondingly move)	CJMP	parameter bound:-1024-1023
06	06 nnnn	10110000 xxxxxxxx	execute the steps, begin to cycle (command 3 and 4 needed)	N=	parameter bound:1-255
07	07 nnnnn	10111000 00000000 xxxxxxx xxxxxxxx	jump to the appointed command address	GOTO	parameter bound:0-32767
08	08 nnnn	11000000 xxxxxxxx	set the original data of the counter 1	I=	parameter bound:1-255
09	09 nnnn	11001000 xxxxxxxx	set the original data of the counter 2	J=	parameter bound:1-255
10	10 ±nnnn	11011sxx xxxxxxxx	the counter 1 reduce by 1, not equals to 0 jump	DJNZI	parameter bound:-1024-1023
11	11 ±nnnn	11011sxx xxxxxxxx	the counter 2 reduce by 1, not equals to 0 jump	DJNZJ	parameter bound:-1024-1023
12	12	11100000 00000000	nop	NOP	
13	13 nnnn	11101000 xxxxxxxx	send the content of the data which use the parameter as the address to the D/A	BOUT	data module format: later bit of the first letter is the length of the data

 d nnnnn	xxxxxxxx xxxxxxxx xxxxxxxx xxxxxxxx	transformer data data, until input finish	DATA DATA	module 1 letter every data (2 bits) 0.5mS every step
14	14	11110000 00000000	program pause until effect input then continue	HALT	
15	15	11111000 00000000	program stop	END	

4.2 Keyboard program write

Connect the simulator to the indicator which been measured or connect the excitation voltage interface with 5-10V DC power.

4.2.1 Input program

Presses 'Func', '3' to enter into the program write function. It displays:

0000 0

0000 means the command serial number of the current program. The hexadecimal 0 means the original command code saved in the memorizer.

Input the new command code by the decimal number. For example, the 0 of the hexadecimal 0 input the decimal 0; A of the hexadecimal input the decimal 10, the rest may be deduced by analogy. If the input high bit > 1 then it should be ignored. Press 'Enter' to save the parameter. If the commands include the parameters, it displays:

P. 0.1000

0.1000 means the original parameter. Input the new parameter by numeral key, then press 'Enter' to save the command and parameter into the memorizer. If the input parameters exceed the data bound, the saved parameters shield the overrun part according to the binary code format. For example, if the data bound is 0-255 and input the parameter 257, the actually saved parameter is 1. It displays the next command address after inputting the parameter:

0001 F
19

Continue the above steps until input the whole program. In course of program writing, press '1' and '5' or press 'Back' return to the Function 0.

Note: the command is input by the decimal number while it displays by hexadecimal. For example, the 'F' in the above figure means 'program stop' command which is '15'.

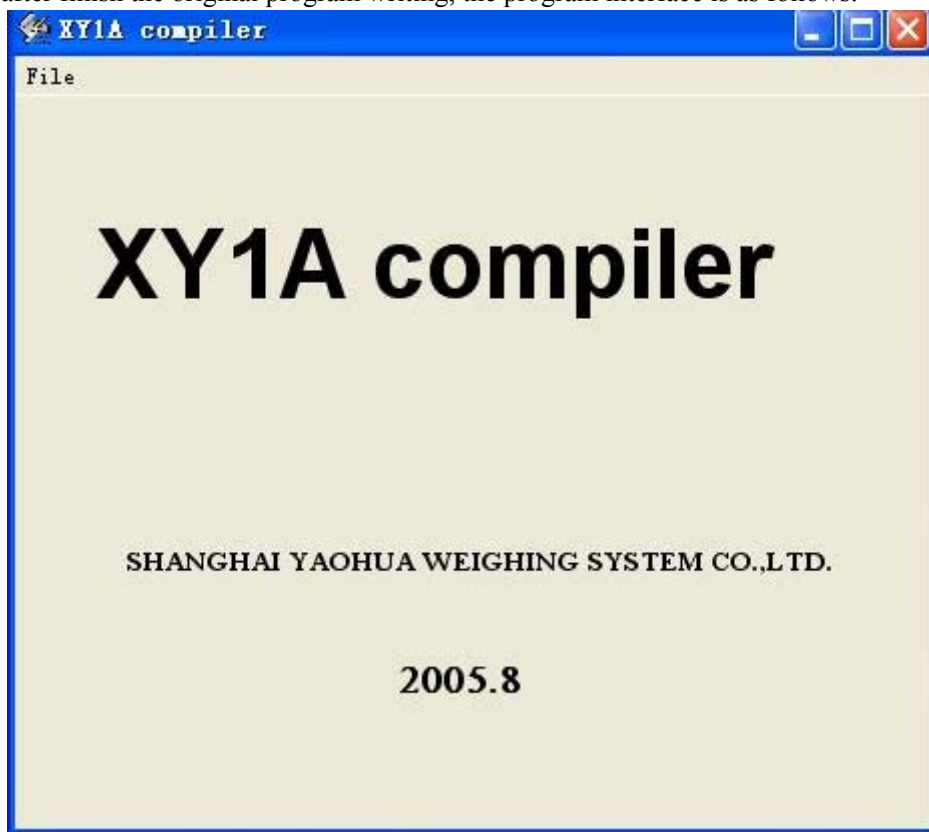
4.2.2 Program modify

In the programs write status, it displays the command and parameter in turn. Input the new command or parameter directly when it displays the command or parameter which need to modify, then press 'Enter'.

Press 'Back' to back to the Function 0.

4.3 Computer program write

The program can be written by text profile and write the user's program by sub-symbol. The extend name of the user's original program is '.YX1'. Refer to the grammar for program writing in section 4.4 and example for program write in section 4.5. Start the special translate program 'XY1A.EXE' to start translate after finish the original program writing, the program interface is as follows:



Translate program interface

Choose 'profile', then choose 'Open' of the profile menu, the program interface is as follows:

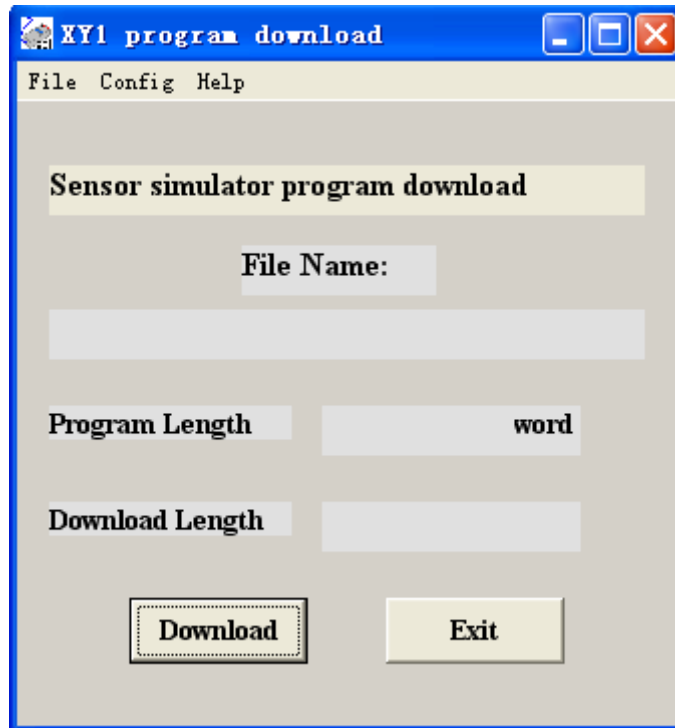


Choose the original program profile 'TEST2.XY1', then open. When finishes the program writes, it display 'Translate finished' and make out the machine code target profile with the extend name '.OBJ' and the list profile with the extend name '.LST'. It shows 'error found on XXX part', if it find errors in course of program writes. It can open the list profile to check the errors and modify the original program. After the program writes successfully, it can load down the translated machine code by the RS232 socket.

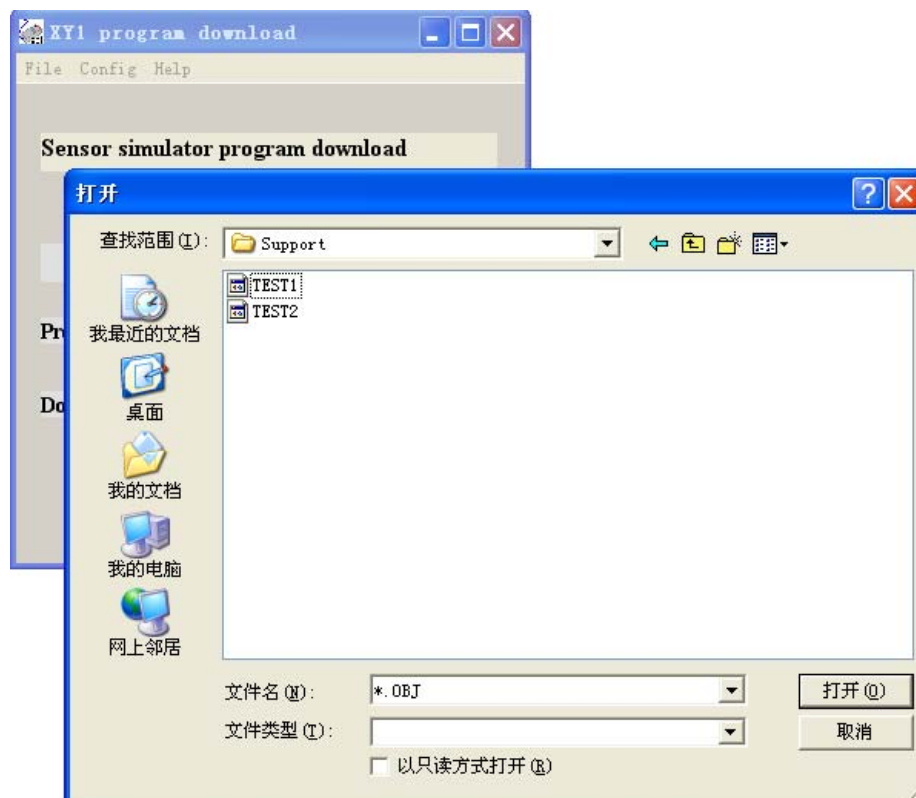
The communication format of the simulating and the computer is: asynchronous communications, 9600bps, no checkout, 8 bits data, and 1 stop bit. During the transmission, the computer send the begin symbol '02H' and 'XY1' in ASCII code first. After get the reply signal '06H', the transmission begin. Every transmission, it send 1 begin symbol '06H', 2 bytes of data (low byte send first) and 2 bytes check sum of the data. After getting the reply signal '06H', it begins to send the next 2 bytes of data. The computer resends the data if does not get reply in 0.5 second. The simulate stop receiving and back to the Function 0 when it get the signal '02H'and 'END'.

Note: The simulate must enter into the receiving status then the computer can begin transmission, otherwise the simulator can not work normally. If the above thing happens, it must cut down the power of the simulator then it can receive data again.

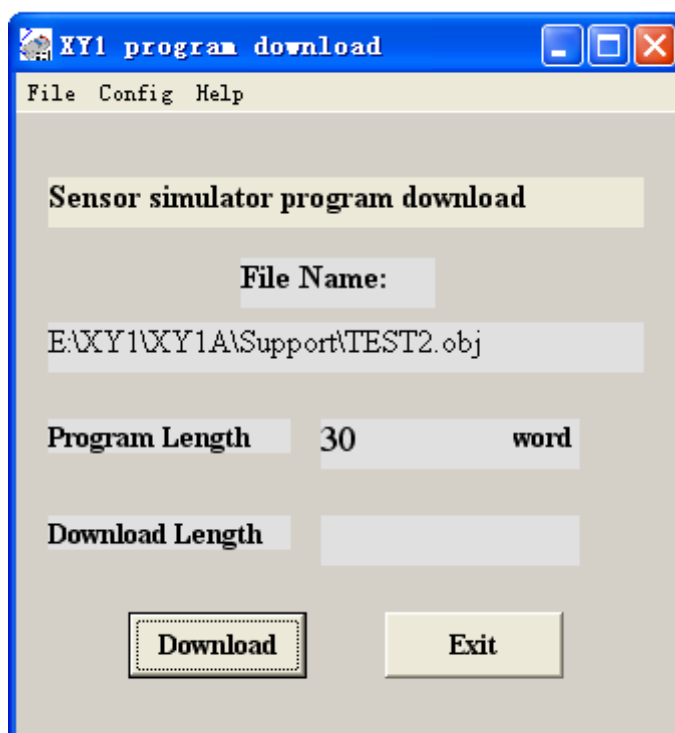
Start communication program XY1.EXE before loading the program. The program interface is as follows:



Choose 'profile', then choose 'Open' of the profile menu, the program interface is as follows:



Choose the target profile 'TEST2.obj' and open. Read in the program, the program interface is as follows:



Choose 'Set' menu to choose the serial interface connect to the simulator. The serial interface must be set by choice and can not input by the keyboard. Turn on the communication cable. The communication indication of the simulator lights on. Press 'Fun' and 'Continue Pro' to enter into the receiving status, it displays:



Press the 'Load down' button to start the data transmission. **Note: The simulate must enter into the receiving status then the computer can begin transmission, otherwise the simulator can not work normally. If the above thing happens, it must cut down the power of the simulator then it can receive data again.**

In course of receiving, the simulator displays the accumulative total received data by hexadecimal:



When finish the load down, the received data displayed is longer then the program length by 1 bit which is a begin-of-file. If transmission byte displayed on the computer is 0, it means the transmission failed. Press 'Back' to return and operate again according to the above steps.

Install the software, press the icon of the program 'XY1A.EXE' and 'XY1.EXE' then the program start. The program icon also can be sent to the desktop for shortcut method.

4.4 Grammar for computer writes

4.4.1 Extend name of the original program is '.XY1'.

4.4.2 Tab begins with character and end with colon. Tabs do not longer than 6 characters and can hold one line.

4.4.3 Sub-symbol and tab do not match upper/lower case.

4.4.4 Every command includes operation data hold one line.

4.4.5 Operation data 'data length' of the command 'BOUT' module output and the command are in the same line. Every data module holds one line.

4.4.6 Operation data is expressed by decimal. If be expressed by hexadecimal, it should add '&H' before operation data

4.4.7 Use black or TAB as list separator for the space of Command code, operation data and note.

4.4.8 Mark with semicolon ahead of the note.

4.4.9 The constant and the tab can be defined by pseudoinstruction 'EQU'.

4.4.10 Program end by command 'END' and the following command will be neglected.

4.5 Example of the program

The original example program TEST2.XY1 written by text editor is as follows:

```

;XY1A load cell simulator program example

A0      EQU      10      ;add value sentence
A1      EQU      200
        SET      0      ;set the output to 0mV/V
        DL      A1      ;time-lapse 2 seconds
        J=      20      ;output 20 degressive ladder waves
LOOP1:  ;cycle 1
        SET      1.0    ;set the output to 1.0mV/V
        NOP      ;blank
        DL      A0      ;time-lapse 100mS
        TIME     100    ;every ladder 100mS
        STEP     -0.1   ;ladder high -0.1mV/V
        N=      10      ;ladder waves begin transmission at 10
        DJNZJ   LOOP1  ;cycle 20 times
        I=      10      ;output 10 narrow triangle-wave pulse
        OUT     &H0000 ;DA code output =&H0000
    
```



```
LOOP2:                                ;cycle 2
    DL      A1                          ;time-lapse 2 seconds
    BOUT    10                          ;module output and 10 parameters
    &H2000                                ;compose a triangle-wave
    &H4000
    &H6000
    &H8000
    &HA000
    &H8000
    &H6000
    &H4000
    &H2000
    &H0000                                ;5 parameters
    DJNZI   LOOP2                       ;cycle
    HALT                                ;pause
    GOTO    0                            ;transfer to begin
    END                                    ;program stop
```

Compiled by the **XY1A.EXE**, it brings the following list profile and object code profile.

The list profile **TEST2.LST** is as follows:

Filemane:E:\XY1\vbprg\TEST2.lst

addr	code	line	Source Text
		1	;XY1A load cell simulator program example
		3	A0 EQU 10 ;add evaluate sentence
		4	A1 EQU 200
0	0	5	SET 0 ;set output to 0mV/V
1	90C8	6	DL A1 ;time-lapse 2 seconds
2	C814	7	J= 20 ; output 20 degressive ladder waves
		8	LOOP1: ;cycle 1
3	2710	9	SET 1.0 ; set output to 1.0mV/V
4	E000	10	NOP ; blank command and can be cancelled
5	900A	11	DL A0 ;time-lapse 100mS
6	9864	12	TIME 100 ;every ladder 100mS
7	A7E8	13	STEP -0.1 ;ladder high -0.1mV/V
8	B00A	14	N= 10 ; ladder waves begin transmission at 10
9	DC07	15	DJNZ LOOP1; cycle 20 times
10	C00A	16	I= 10 ; output 10 narrow triangle-wave pulse
11	9000 0	17	OUT &H0000 ; DA code output =&H0000
		18	LOOP2: ;cycle 2
13	90C8	19	DL A1 ;time-lapse 2 seconds
14	900A	20	BOUT 10 ; module output 10 parameters
15	2000	21	&H2000 ; compose a triangle-wave
16	4000	22	&H4000
17	6000	23	&H6000
18	8000	24	&H8000
19	A000	25	&HA000
20	8000	26	&H8000
21	6000	27	&H6000
22	4000	28	&H4000
23	2000	29	&H2000
24	0	30	&H0000 ; 5 parameters
25	D40D	31	DJNZ LOOP2; cycle
26	F000	32	HALT ; pause
27	9000 0	33	GOTO 0 ; transfer to begin
29	F800	34	END ; program stop

The object profile **TEST2.OBJ** is as follows:

```
&h0
&h90C8
&hC814
&h2710
&hE000
&h900A
&h9864
&hA7E8
&hB00A
&hDC07
&hC00A
&h9000 &h0
&h90C8
&h900A
&h2000
&h4000
&h6000
&h8000
&hA000
&h8000
&h6000
&h4000
&h2000
&h0
&hD40D
&hF000
&h9000 &h0
&hF800
```

Then Start XY1.EXE to load down the target profile to the XY1 simulator.

Chapter 5 Errors & Information

It displays errors information when the simulator can not work normally. The meanings are as follows:

Serial NO.	Information display	Description
1	1E XXXX	floating point numbers addition overflow ^{1,}
2	2E XXXX	floating point numbers multiplication overflow ^{1,}
3	3E XXXX	floating point numbers zero get rid/ overflow ^{1,}
4	4E XXXX	floating point numbers change to BCD code overflow ^{1,}
5	5E XXXX	BCD change to the floating point number overflow ^{1,}
6	6E XXXX	integer part of the floating point number change to binary overflow ^{1,}
7	F0—H—	stimulating voltage too high, change the switch to high level ^{2, 3,}
8	F0—L—	stimulating voltage too low, change the switch to low level ^{2, 3,}

Note:

1. '1E XXXX' means the floating point numbers addition overflow error at the address of XXXX. The error is usually brought by the wrong parameter set. So check the parameter and input the new parameter or adjust the simulator again.
2. The simulator can not work normally if the voltage is more than 20.5 V or low than 4.8 V. The simulator may break if the voltage is over 20V+10%.
3. The simulating voltage can only be measured when the simulator is in the Function 0, Function 1, Function 2 status (F0, F1, F2)

Chapter 6 Using Note

6.1 Choose the right switch for the simulating voltage. The simulating voltage can not over 20.5 v and can not join the bridge with resistance to increase the simulating voltage.

6.2 The input resistance can be reduced by parallel connection resistance at the output socket of the stimulating voltage. The output resistance of the simulating is about 360 Ω. When connect by 4 wires, the system stability will reduce if the resistance parallel connection at the output socket of the stimulating voltage.

6.3 It can improve the division of the simulator and reduce the output signal of full span by parallel connection precise resistance at the output socket of the simulator. For example, the output of the simulator measured by 360 Ω, if parallel connection a precise resistance of 120 Ω/5ppM, the full span output reduce to :

$$2.0000 \times (360 // 120) / 360 = 0.5000 \text{ (mV/V)}$$

The division increased to 0.000025 mV/V

360//120 means the parallel connection value of 360 Ω and 120Ω. The full span output after the parallel connect exceeds the calculation value appreciably by 0.5%. The relative linearity error keeps the same.

Note, output resistance is not the same at the 10V level and 20V level, the gap is about 0.24%. If keep the output resistance the same as the original and reduce the full span output, it can serial connection relative resistance at the output socket. The resistance can use the sheet metal resistance.

6.4 The resistance of the wires reduces the output signal of the simulator as the simulator is adjusted at the connection socket. When measure the stability of the 6 wires indicator by the simulator, the feedback signal of the indicator stimulating voltage should pick the stimulating connection port of the stimulating. When measure the stability of the 4 wires indicator by the simulator, the wires connect the simulator and indicator should as short as possible and the wires should have large cross section, also consider the effect to the output signal by the resistance change of the wires.

6.5 The input resistance and side current of indicator which loaded by the simulator will affect the veracity of the zero and full span output signal. The effect can be estimate from the output resistance of the simulator.

6.6 The thermoelectricity made from temperature imbalance has big influence to the measurement as the output signal of the simulator is very low. For example, if touch the connection pole by hand, it may lead the signal floating by several mV. So keep the temperature of the environment stable during measurement and avoid touching the sensitive part to the temperature.

Chapter 7 General fault eliminate

Cause of the fault	Processing method
output unstable 1、 the output down-lead do not connect firmly 2、 connection-peg not hard up 3、 strong electromagnetism disturbance	1、 screw down the down-lead 2、 adjust or change the connection-peg 3、 eliminate the disturbance
no display and output 1、 error connection, reverse connect the output and input 2、 reverse connect the stimulating voltage 3、 low stimulating voltage of the indicator	1、 correct the connection 2、 correct the connection 3、 check the output stimulating voltage of the indicator
the simulator display ‘ --H--’ or ‘-- L --’ while the stimulating voltage is in the normal bound 1、 wrong switch position of the stimulating voltage bound 2、 the indication of the stimulator voltage not adjust	1、 move the switch to the right position 2、 adjust the voltage indication
the simulator get display but no output the switch of the simulator stop in the middle position	move the switch to the right position
can not load down programs by computer 1、 error operation order 2、 error choice of serial interface 3、 transmission wire do not connect firmly	1、 refer to the 4.4.9 2、 choose the right number of serial interface again 3、 check the transmission wire