



Laboratory Equipment Manufacturer
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Instruction Manual

VERTICAL PROFILE PROJECTOR

VT12-1550-DP300



PLEASE READ THIS MANUAL CAREFULLY BEFORE OPERATION

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MRC. 8.22

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Instrument Usage

Digital Measuring Profile Projector is a precise and excellent effective measuring instrument integrates of Optic, Mechanic and Electronic, and widely used in the field of mechanic, electronic, rubber industry.

This instrument can inspect all kinds of surface and outline of complicated work-pieces such as Template, Pressing work-pieces, Cam, Screw thread, Gear, and so on.

It is used in the fields of academy, laboratory and factories departments of quality check and control.

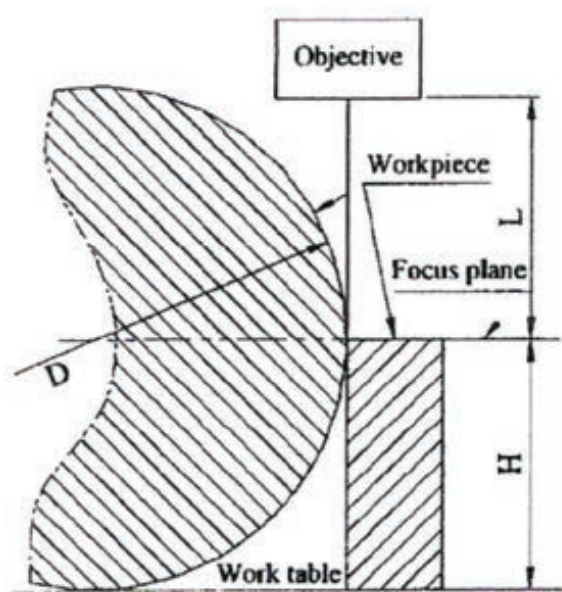


Fig. 1 Largest work piece instruction

Instrument Working Principle

The working principle of projector is shown in Fig. 2. Put a work-piece on the table. The objective O forms and magnifies the image Y' of the work-piece Y on the projection screen P.

User not only can measure Y' directly with a common glass scale, but also can compare with standard picture on the projection screen.

Moving the table, the measuring result can be shown on the digital readout. In fig. 2, S1 is transmission illumination source, S2 is reflection illumination source; K1 is transmission condenser, K2 is reflection condenser. These two groups of sources can be used respectively, and also can be used together.

Usually, the semi-transmitted mirror L can be only used while using reflective illumination.

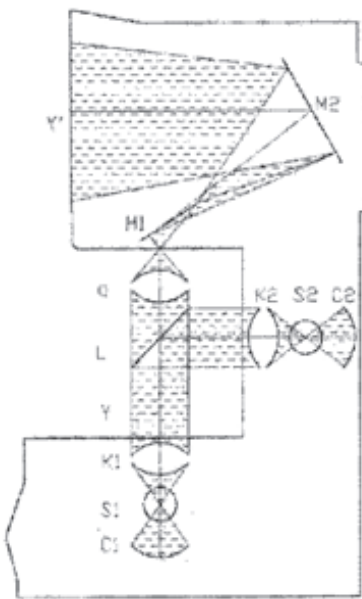


Fig. 2 WORKING PRINCEPLE

Construction and Function

1. main construction of instrument.

See figure 3. It is composed mostly of the projection box (See 1), main body (see 18) and work-table (see 18).

Projection box: including the objective (see 23), reflective mirror M1 and M2 (figure 2) projective screen (see 2) that is imaging-system and LCD multifunctional data processing system (see 5).

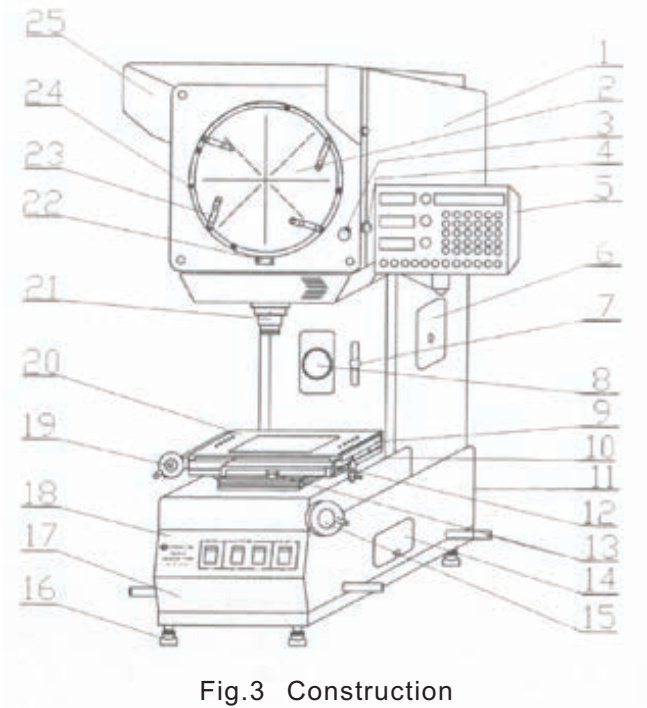
The rotating system of the projective screen is installed with the angle encoder.

Main body: except to support the projection box and the worktable, it is also installed the illumination system of the instrument, electronic control system and refrigate fan.

Worktable: Including the horizontal travel (X axis), vertical travel (Y axis) that is for coordinate measurement and erect (Z axis) which is for focal adjusting. The X-axis and the Y-axis are installed with the linear scales (see 9) which with the resolution of 0.001mm.

2. Function of Electronic Boards

- 1. Projection box
- 2. Projection screen
- 3. Micro-hand wheel
- 4. Screen-locking handle wheel
- 5. Digital Readout
- 6. Side doors
- 7. Adjusting hand wheel for reflective illumination
- 8. Reflective condenser
- 9. Y-axis linear scale
- 10.Y-axis fast wheel
- 11.Power board
- 12.X-axis fast wheel
- 13.X-axis fast hand wheel



- | | | | |
|---------------------|----------------------|------------------------------|----------------|
| 14.Side doors | 15.Lift hand wheel | 16.Horizontal adjusting bolt | 17.Main body |
| 18.Operating panel | 19.Y-axis hand wheel | 20.Worktable | 21.Objective |
| 22.Screen zero mark | 23.Spring fixture | 24.Screen twirling handle | 25.Light cloak |

- 1. Power Signal
- 2. Power Main Switch
- 3. Transmission Light Switch
- 4. High/low Transmission Light Switch
- 5. Reflective Light Switch

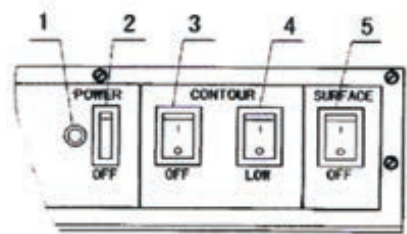


Fig4. Operation panel

- 1. Main Power Plug
- 2. Fuse of Power
- 3. Edge-defector Power
- 4. Voltage Switch of 220V/110V

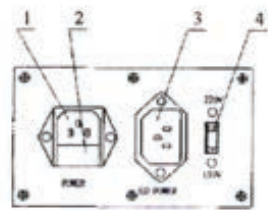


Fig5. Power Supply

- 1. X coordinate linear scale connector
- 2. Y coordinate linear scale connector
- 3. Angle encoder connector

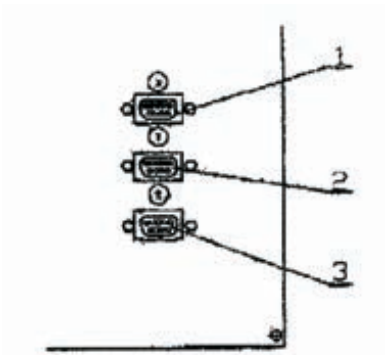


Fig 6. Signal connector panel

- 1. Light Group Fixing Bolt
- 2. Light Set Adjusting Bolt
- 3. Light Set Adjusting Shelf
- 4. Light Set
- 5. Light Set Fixing Bolt
- 6. Pottery Light Set
- 7. Light Set Adjusting Bolt
- 8. Bulb
- 9. Concave Reflective Mirror

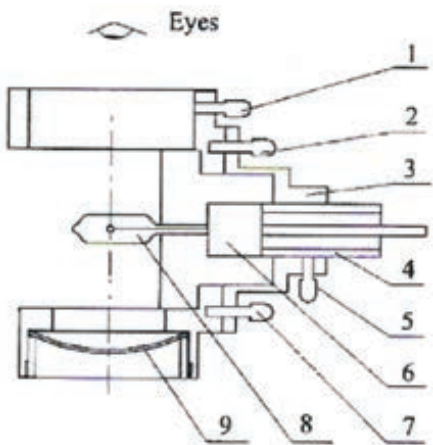


Fig7. Illumination group

Uncover and Fixing

Unclose all of packages, take out the instruction of the instrument and read this chapter before operating.

Unscrew the four fixing bolts of the baseboard. Move the instrument to the pre-set work stage.

The stage must be very sturdy for the instrument is as weight as 150kg or so.

Put on screw and adjust the four screws. Make sure that the instrument must be horizontal. All these can be tested level that is put on the worktable.

The orientation of the instrument has to avoid windows or strong light source for fear decreasing the contrast of the screen.

Take out the connector board on the worktable which is fixing between the X-axis and Y- axis, then the worktable can be moved by both the hand wheel and handgrip.

The power supply can be adjusted as 220V/110V depends on the local voltage. Adjust the voltage and close the switch before connecting the power supply. Otherwise the electricity system will be destroyed or the instrument can't work normally. As you obeying the above mentioned, the instrument can be used subsequently.

Instrument Operation

Instruction must be read before read before you operate the instrument. Especially the chapter of “The construction and function of the instrument”, for that can help you to further understand the instrument.

1. Replace and Adjust the Illumination Bulb

This can only work when replacing or adjusting the bulb and checking the instrument regularly. The bulbs need to re-adjust because the original adjust of the bulbs sometimes will change when delivering or moving. This is called re-adjust.

Caution:

This can only be done after make sure that the illuminator is cold down. Otherwise is would be dangerous of hurting for the illuminator is of high temperature.

• Re-adjusting

- Take out the lens and turn on the transmission light. If the glower's image is illegibility or dose not concentrate on the screen center. Please do as:
- Open the side-door on the right of the instrument (14), unscrew the (1) as Fig. 7, move the whole set of the illumination set up and down. On the screen, the glower's image will change from illegibility to clear.
- When the filament is almost clear (it needn't be too clear) and is on the center of the screen, please fix the screw (1) and put on the lens. All the re-adjust is completed.

• Method of replacing the bulb (see fig. 7)

- Open the side-door on the right of the instrument.
- Unscrew the screw (1) and take out the whole illumination set.
- Take out the halogen bulb (8)
- Put on the new bulb (please use the soft cloth or paper to touch the bulb).
- Test by eyes from the top to see whether the glower's image by the concave reflective mirror (9) and itself is overlap, if not please do as:
- Draw the lamp holder (4) side to side. Make the glower and its image overlap at the right-and-left way. Then screw the screw (5).
- Unscrew the screw (2) and (7). Make the adjusting shelf (3) to be the vertical way of the paper, and then move it parallel or obliquely. Until the glower filament and its image overlap at the vertical way on the paper. Then screw the screws (2) and (7).
- Re-fix the whole illumination set back to the instrument. The adjustment following is the same as 6.1.1 Actually, the bulbs replacing need not to follow the steps as this. Only 6.1.2.1 and 6.1.2.3 and 6.1.2.4 step are available. For all the lights are pre-adjusted by the producer. The

glower will not be departure from the optical-axis obviously if the specification of the bulb is correct.

• The adjustment of the reflective illumination (See Fig. 8)

- The method of replacing the bulb is the same as 6.1.2
- Take the semi-reflective mirror-holder (4) install on the lens (6). Let the mirror faces the reflected condenser (2). Then turn on the reflective illumination.
- Counter-clockwise, please unscrew the handle (1). Make the reflective condenser (2) move up and down. Then screw the handle (1) at the clockwise way when (2) is as high as semi-reflective mirror (3).
- Put the work piece onto the worktable. Make sure it is within the reflective illumination range. The image of the work piece appears on the screen after focus.
- You can rotate the draw tube of the reflective condenser (2) according to the size of the work piece to change the area of the light range. The image of the work piece becomes lighter as the light range becomes smaller

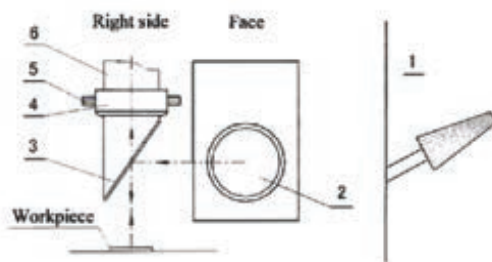


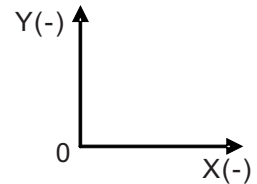
Fig. 8 Instruction of reflection illumination

2. Replacement of the Lens and Condenser

- There is only one lens connector of the instrument. Different lens should be replaced separately.
- The choice of lens' magnification must be based on the precision of the size of the work piece. Usually speaking, the outline measurement will be more precise with the higher magnification of the lens. So dose the aim precision of the coordinate measurement.
- Please turn down the worktable before you replace the lens. For that would be enough space for replacing the lens.
- The transmission illumination should be re-adjust correspondingly when use 10x-20x, Or 50x-100x lens. There is a correspond mark on the pole (20) of Fig. 3. Therefore, when the pole of the 10x-20x is pushed out meanwhile the pole 50x-100x is pushed in.
- Please don't put the semi-reflective mirror (see 4 of Fig. 8) on the lens when you use the transmission light to measure. Otherwise the outline measurement precision and the brightness of the screen would be therefore unfavorably affected. This should be especially caution for that would affect the result if you just care for the temporary convenient.
- After all the above-mentioned are completed, the instrument can work well only need to adjust the focus to the work piece.

3. Worktable Operation

- After turn on the main power on the multifunctional Digital Readout (see the 5 of Fig.3), appears the value of coordinate of X-axis and Y-axis. The value changes when moving of the worktable.
- The positive and the negative value of the X/Y coordinate can be set through Digital Readout which the users can previously set it up. If you want to measure one work piece in the first quadrant, please do as following:
- The movement of X and Y coordinates: except hand wheel moving, X and Y coordinate can also be moved speedy by the hand haulm (See 13 of Fig. 3). While the hand wheel is used for focusing and lifting the worktable. (See 15 of Fig. 3)
- Please move the handle wheel when using the X and Y coordinate to measure.
- When you use the X and Y coordinates to measure. Usually you should move the worktable side to side for several times after you have the focusing. That would be more convenient to measure because the worktable is running into measuring format form the stillness format.
- Please return the X and Y worktable to the symmetrical position after measuring.



4. Projector Screen Operation

- After turn on the main power. The circling angle value of the screen will appear on the Digital Readout as well (see the 5 of the Fig.3). You can pre-set the transition to angle value thorough it previously. For instance: $3^{\circ} 36' \longleftrightarrow 3.60^{\circ}$.
- When the locking screw is unscrew (see 4 of Fig. 3). The screen can be move circle-wise quickly by the small handle (see 24 of Fig. 3). Or be moved slowly by the micro-hand wheel (see 3 of Fig. 3). And slowly movement should be used when measure angles.
- The four spring fixtures on the projective screen (see 23 of Fig. 3) can be used to nip the magnified standard picture or the glass ruler, which is for the outline comparison measurement.
- When the white line on the stand of the screen aims at zero mark (see 22 of Fig. 3). The level line on the screen is parallel with X coordinate. Please adjust the work piece edge to parallel with the level line so that you can take the X coordinate measurement now.
- The are $30^{\circ}, 60^{\circ}, 90^{\circ}$ or $45^{\circ}, 90^{\circ}$ on the screen for standard graduation line. For that can be used to measure these special angles comparably. Therefore you can take the angle measuring system to measure the angles just by counting the deviation between them.

5. Rs2 Connector Operation

RS232 connector showed as (5) of Fig. 3. Communicating between the instrument and computer, it can process the data automatically and draw out the outline of parts through the special software. The report of measurement result and drawings can be printed out through the printer.

Measurement Method

There are two measurement methods of the projector:

Outline measurement and coordinate measurement

1. Outline Measurement

Measure by comparing with the “magnified standard picture”. This method is suitable for the large amount of complicated situation. Please take the following steps:

- a) Choose the lens basing on the size of the work piece. Design a magnified picture as the same magnified-times as the lens. Please use the transparent plastic material with little contractibility. On the picture you can draw out the limit of tolerance. For instance, if the size of work piece is $\varnothing 25$, you can choose the 10X lens and draw a picture with the proportion of 10:1. The following standard magnified pictures are available: circle-arcs, angles, gears, screws and grids.
- b) Nip the standard magnified picture on the screen by the four spring fixtures.
- c) Put the work piece onto the worktable. Then focus it. Move the X-Y axes table to make sure that the work piece overlaps the standard magnified picture.
- d) It is qualified if the deviation between the image the image and the picture is within the limit of tolerance. Otherwise it is unqualified. The deviation can be measured by the X-Y coordinate. Use the glass ruler (optional) with the resolution of 0.5mm to measure the image of the work piece on the screen directly, the data which is smaller then 0.5mm can also be measured by the X-Y coordinated. Then divided by the magnified times of the lens. The last result is the size of the work piece.

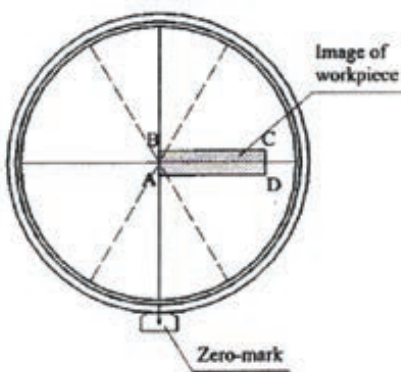


Fig.9 One-dimensional measuring

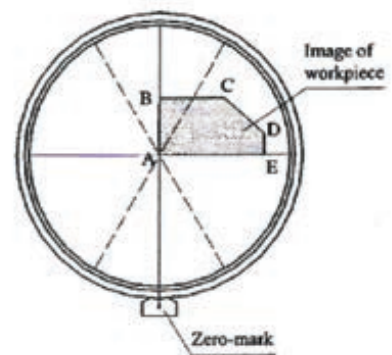


Fig.10 Two-dimensional measuring

2. Coordinate Measurement

One-dimensional measuring

- Put the work piece onto the worktable and focus it after chose the suitable lens.
- Turn the projective screen to the zero mark, the white line of the screen holder aim at the zero mark.

- Adjust the work piece parallel with the measuring axis. (See Fig.9) BC is parallel with X-axis.
- Move the worktable, make the measuring edge AB aim at the vertical graduation line of the screen. The value of the X coordinate is set zero.
- Move the X-axis. Make the other edge of the work piece CD aim at the vertical graduation line of screen. What X-axis shows is the size of AD edge.

Two-dimensional measuring

- Aim at the zero line of the projective screen at the zero mark.
- Put the work piece onto the worktable. Please choose a bigger magnification of lens and adjust the focus.
- Adjust the measuring edge to be parallel respectively with X-axis and Y-axis. See AE//X ,AB//Y of the Fig.10.
- Move the X-Y worktable. Aim the image point A of work piece on the cross graduation point of the screen. The value of X-axis and Y-axis is set zero.
- Move the worktable again. Aim the image point C or D on the cross graduation points. Now the value appears on the Y-axis is the measurement value of BC or AE. While the value appears on the X-axis is the value of AB or DE.
- Use the SKEW function of multifunctional digital readout. The position of the work piece can be put arbitrarily with any precise adjustment. Only need to move the worktable to aim the A, B, C, or D on the cross graduation point respectively. You can measure out the length concerned. This operation is a time-saved and efficient way. The details can be seen in SDS5-3PJ manual.
- Connecting the RS232 port with computer. It can process the data automatically by the double coordinate measurement and draw out the outline of parts through the special software K2.5 (optional). The result of measurement report and drawings can be printed out through the printer. And the work piece can be put on the table arbitrarily without any precise adjustment. These can enhance the quality and upgrade the effect of the measurement.

Angle measurement

- Put the work piece onto the worktable. Choose the lens base on the size of the work piece then focus it.
- Adjust the tip of the angle into the graduated center of the screen (See Fig. 11).
- Turn the screen again. Aim the line at the other edge of the measuring angle. Now the value displayed is the value the measured angle θ
- With the lines on the screen which show $30^\circ, 60^\circ, 90^\circ, \dots$ or $45^\circ, 90^\circ, \dots$ (the precision is $1'$).
- You can take the measurement comparing with these special angel values.

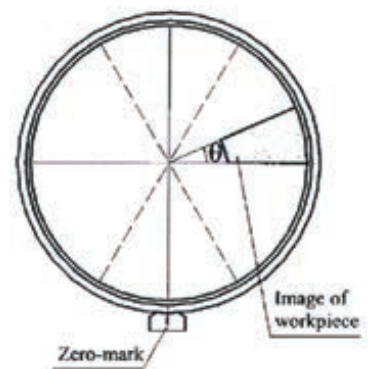


Fig.11 Angle Measurement

Instrument Maintenance

Digital measuring profile projector is a precise instrument integrating optic, mechanic, electricity and computing technical. It should be maintained properly and frequently. Well-maintained instrument can prolong the longevity by preserving the precision.

1. The instrument should be placed in the desiccative and clean room with the temperature of $20^{\circ}\text{C}\pm 5^{\circ}\text{C}$ and humidity of 60%. For fear the precision of instrument and the optic system being unfavorably affected, users should avoid the surface of the optic parts being moldy and obviate the metal parts being rusted. Nor the rail can be dusty.
2. The surface of optic parts should be kept clean and mustn't be touched by finger. Surface dust can be cleaned by soft brush. If there is too much dirtiness that affect the normal operation, please wipe it softly by the defatted cotton, or the lens-cleaning paper dip with some toluene or dip with the mixture of ethanol and ether.
3. Please don't touch the projective screen while operating because it is granulate panel. It would be unclear because the surface will be covered by dust and oil after long-time used. Users can wipe the whole screen by the clean wet gauze dip with some neutral detergent. Subsequently, you should wipe the screen with clean wet gauze for several times to get rid off the detergent. Be cautious please don't dip with too much water for fear that would drop down to the worktable which would cause rusted of the metal. Or you can cover a plastic pellicle on the worktable previously, the supplier should be called to manage the above work if it is much difficult for users to do.
4. Regarding the exposed metal of the instrument, it should be cloaked with the rustproof grease and wiped by the aviation gasoline regularly or after used to avoid being rusted.
5. The lens, the worktable and the other accessories of the instrument are of high fixing precision. Users can't uncloset all the adjusting screw and tightening screw without supplier's permission. You can ask for inspection by the supplier if the instrument is out of order. The magnification or the lose-precision of the instrument would not be considered as warranty as warranty if that is resulted from the users unclosing it without any permission.
6. Whether the cold fans work properly count for much to both the properly functioned and the longevity of bulbs. Users should pay closed attention to such a problem and contact the distributors at once when the instrument is out of order.
7. Regarding the worktable precision, it has already been made the error compensation by Digital Readout within the producing process. Users can't change the error compensation and other preset value without any permission. Otherwise that would cause the malfunction and incorrect precision of the instrument.
8. Please turn off the light power of the instrument after use. Except the reflection and transmission light, please don't on all the lights powers simultaneously if isn't necessary. Usually, users only need to turn on the lower grade while using the transmission light. Except saving the resource, all the mentioned above can also prolong the longevity of the light and maintain the well state of the instrument.

Instrument Electrical System

The power supply, illumination, refrigeration and digitizer electro-circuit are as Fig. 12.

For instance:

- K1- main power switch
- K2-110V/220V switch
- K3- reflective light switch
- K4-transmission Low/High grade switch
- RD-fuse
- B1-cold fan of transmission light
- B2- cold fan of main body
- B3- cold fan of reflective light
- L1- reflective light
- L2- transmission light
- RS232- computer connector port

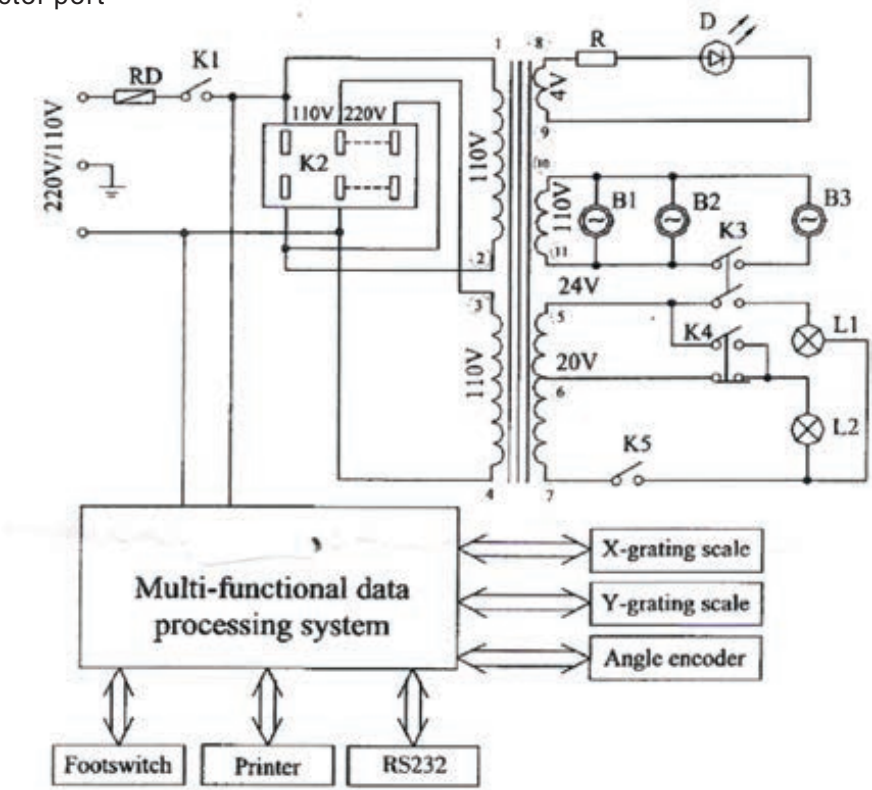


Fig.12 Electricity Method

Instrument Consistency

1. Standard accessories as following:

No.	Items	Unit	Quantity	Remark
1	Main body with work-stage	PIECE	1	
2	Shade Plank	PIECE	1	
3	10X objective	PIECE	1	
4	10X Semi-transmitted Mirror	PIECE	1	
5	4A/Φ5 X 20 Fuse	PIECES	5	Standby
6	24V/150W bulb	PIECES	2	
7	Spring fixture of screen	PIECE	4	
8	Digital readout	SET	1	Arm-type
9	Power Line	PIECE	1	
10	Operation Manual for Instrument	COPY	1	
11	Operation Manual for Digital Readout	COPY	1	
12	Packing List	COPY	1	

2. Optional accessories as following:

1	Objective 20X, 50X, 100X	5	Measure Software
2	300mm, 50mm Glass Scale	6	Edge Detector
3	Angle and circularity Chart	7	Mini-Printer
4	Rotary Table		

DP-300 Digital Readout Operation Instruction



To insure the safety and obtain satisfactory performance, please study this operation instruction thoroughly before your operation.

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User's Guide Promise

Safe Mark

We applied different safe marks (Warning Sign, Safety Warning Marks) in its user's guide, in order to make sure users correctly operate the instrument, prevent any danger and avoid accident.

General Warning Signal:



Indicate the potential danger, if neglect, may result in physical harm or endanger the safety of life and property.



Indicate the potential danger, if neglect, may result light or moderate endanger the safety of life and property.

Special Warning Signal:



Prohibit Particular Operation, the left Signal means "Prohibit Demolition"

Type of Annotations

This guide has the following type of annotations: to help operators correctly operate the instrument, to obtain reliable measuring data.

Important

- An important annotations, it is necessary to complete a task, if want to smoothly finish a task, the annotations can not be ignored.
- An annotation to indicate you'd better careful. Or else will lose the important data, reduction of precision, to cause malfunction or can't work properly.

Attention

- These annotations are to stress or replenish some important literal information, also offer special information (such as Restrictions on equipment configuration memory or special version of software explanation).

Cue

- Cue is to help users, it according to user's requirement to help users apply the technique and procedures described in this text.
- It also offers some bibliography information about subject.

For loss or damage that resulted by nonobservance the User's Guide, We will uncommitted any responsibility. This guide's contents are subject to change without notice.

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Environmental Conditions

- Avoid exposure to the sun or under high temperature, the temperature must be used in the 0–40℃ range.
- Keep away from the equipment with high-voltage, high current, strong magnetic field.
- Keep the Optical scale signal cable line away from the power cord.
- Avoid use it in the environment of scrap iron, oil, water, bug dust and vibration.
- Keep away from strong acid, alkali and chemicals.

Direction for Use



- If a malfunction occurs, such as on the circumstances the power is turned on, no LCD image display, should stop using the DP-300 digital readout. At the same time to inform authorized distributor, it will send maintenance engineer to repair immediately. In such circumstances, if continue to use the DP-300, it may lead to electric shock or fire.
- Do not let foreign bodies, such as water, metal or other liquids enter into the DP-300 digital readout from the back interface, otherwise they may lead to electric shock or fire.
- Do not damage or modify the AC power adapter power cable. If squeezing or pulling, distorting or heat deformation by heavy objects, it may leads to AC power adapter damage and cause to electric shock or fire.
- When lightning near, press the combination of AC power adapter plugs. Otherwise, they will probably lead to failure, electric shock or fire.
- Do not contact combination plugs and AC power adapter plug by wet hands, it could lead to electric shock or fire.
- When the plug inserts into an electrical outlet, don't contact with the combination of AC power adapter plugs, or may lead to electric shocks.
- Don't directly contact with the back plate interface pins by hand, or will leads to the failure of internal circuit by static electricity, using the supplied protective cover, cover the interface that does use temporarily.
- If the power cord or a combination of AC power adapter plugs damaged, or loose of power plug, please do not use DP-300 digital readout. At the same time to inform authorized distributor, it will send maintenance engineer to repair immediately. In such circumstances, if continue to use the DP-300 digital readout, it may lead to shock or fire.
- Do not connect AC power adapter to the high-current power supply, such as connecting machine tools or large CNC measuring machine power, but also avoid the use of complex circuit wiring. If the metal part or outlet of AC power adapter combination plugs contaminated with dust, water vapor or oil pollution, needed a dry cloth rub-up. Otherwise it might lead to fire.
- Do not arbitrarily remove or modify DP-300 digital readout. Otherwise, it will lead to DP-300 digital readout can not be used. If the DP-300 digital readout needs to overhaul, please contact with authorized distributor.



- Do not impact LCD panels, not to use sharp tools top pressure LCD, otherwise it will cause breakdown of LCD panels. If the liquid flow from the breakdown of inside LCD panels, it will tarnished your skin, at this time you need wash your skin in the water for 15 minutes. If the liquid crystal sullied your eyes, please rinse with water at least 15 minutes, and then quickly seek medical treatment because LCD liquid crystal contains a strong stimulus material.
- Please keystroke with your fingers, do not use pencils, ball pens or sharp tools to strike keyboard, otherwise it will cause damage to the keyboard.

- Must use a specific AC power adapter, or it may cause internal circuit failure, fire or injury of life.
- Be sure hold plug when pull out the AC power adapter combination plug, do not pulling the power cord, or else it would pull off the line caused the inside wire nudity, which could lead to electric shock or fire.
- Must insert the AC power adapter combination plugs into the electrical outlet, or it may result in fires or cause failure.

Caution

Prohibit unauthorized removal or any unauthorized modification



- Do not remove or modify DP-300 digital readout unilateral, otherwise accuracy and function will be adversely affected, or will be failures. For testing or maintenance DP-300 digital readout, please contact with authorized distributor.

Attention to install battery



Caution

Memory of backup saved applies lithium battery, so please note the following:

- Lithium batteries installed in digital readout of printed circuit boards.
- Do not discarded or burning the scrapped digital readout, or throw in the fire, the battery will leak from chemical substances, cause explosions or intense burning. Disposal methods should accordance with government regulations.

The general note for use DP-300 digital readout

Measures should be taken when problems

- When the temperature of DP-300 digital readout is too high, smoking or Off-flavor, it should be immediately shut down power from the power outlet and unplug the AC power adapter plugs. And inform authorized distributor immediately, they will send maintenance engineer to repair. In such circumstances, if continue to use, it may lead to electric shock or fire.
- If the foreign body, such as water or metal debris falling into the digital readout, should be immediately shut down power from the power outlet and unplug the AC power adapter plugs. And to inform authorized distributor immediately, they will send maintenance engineer to repair. In such circumstances, if continue to use the DP-300 digital readout, it may lead to electric shock or fire.
- If the crust or some other components of DP-300 digital readout damaged by severe shock, it should be immediately shut down power from the power outlet and unplug the AC power adapter plugs. And to inform authorized distributor immediately, they will send maintenance engineer to repair. In such circumstances, if continue to use the DP-300 digital readout, it may lead to electric shock or fire.

Warranty

From the date of purchase in one year, if confirmed the manufacturing processes and materials are flawed of DP-300 digital readout manufactured by us, according to the user's choice, be repaired or replaced free of charge, but must be prepaid the retreat postage of DP-300 digital readout.

If the following reasons lead DP-300 digital readout can not be used or damaged, even in the warranty period, will still collect maintenance fees:

1. Because of improper operation or unauthorized modification caused by any failure or damage.
2. After the purchase of equipment, due to improper transport, crashed or re-installation caused by the failure or damage.
3. Because of fire, salt and harmful gases, abnormal voltage or natural disasters cause the failure or damage.

This warranty effective only in the following occasions:

1. Equipment installation normal.
2. Operation agrees with the User's guide requirements

Brief Introduction

This chapter describes DP-300 digital readout, as well as an overview of each part of the name and function

1.1 Summary

DP-300 Digital Readout is a multifunction Processing System, use with Profile Projector, it can finish the complex work piece measurement. Work piece measurement includes adjustment, build origin of coordinates. By gather point to measure work pieces.

Principle of work as follows chart1.1.1:

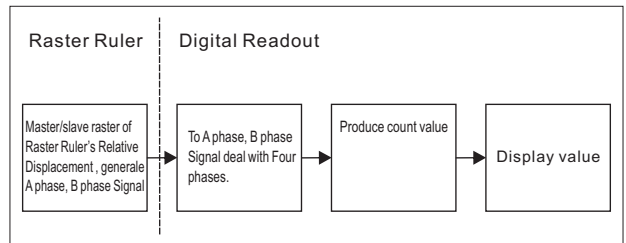


Chart 1.1.1

1.2 Each Part of the Name and Function

This section introduces each part of the name and function of DP-300 digital readout.

1.2.1 Introduction of Front Panel

1.LCD Screen

Display the measuring value

2.Keyboard

Through Keyboard can create kinds of setting and input data.



Chart 1.2.1 Front Pane

1.2.2 Introduction of Back Panel

1.Mains Switch

ON power switch placed in position, the power is turned on; placed OFF, the power-down. When the power is switched off, the internal settings will remain the same, but without stored data will be lost.

2.Socket

The socket for connect the AC adapter.

3.X Axis Raster Ruler Interface

For connect the X Axis of measuring instrument.

4.Y Axis Raster Ruler Interface

For connect the Y Axis of measuring instrument.

5.Z Axis Raster Ruler Interface

For connect the Z Axis of measuring instrument.

6.Foot Switch

For connect spare foot switch.

7.RS 232 Interface

For connect counter or interface device.

8.Printer Interface

For connect printer.

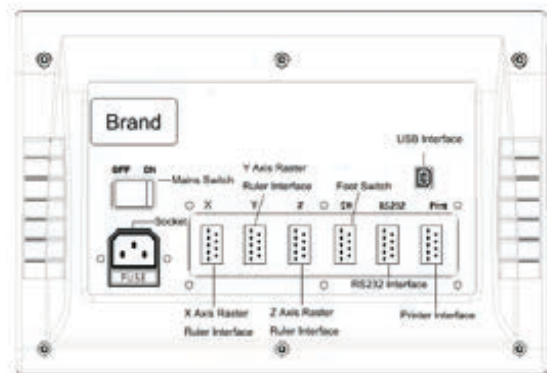


Chart 1.2.2 Back Panel

1.2.3 Side View

1.2.4 Top View

1.3 Keyboard Panel

This section introduces the keyboard panel button configuration and each button functions.

1.3.1 Keyboard panel button deploy



Chart1.2.3 Side View



Chart1.2.4 Top View

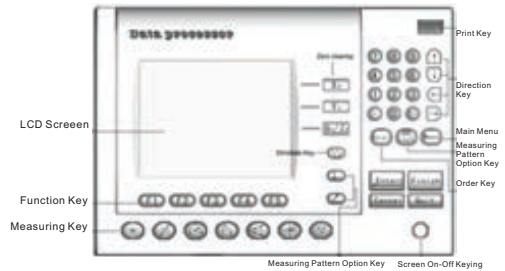


Chart1.3-1 keyboard panel button configuration

1.3.2 Function of Keyboard

1) 、 Measuring Key

Key	Function
	Measure a point
	Measure a line.
	Measure a circle
	Measure distance, include distance for point to point, point to line, point to circle, circle to circle and line to circle.
	Measure a point of intersection and angle formed by two lines.
	Correction Key for coordinate compensation.
	More function key, this instrument without definition for this key

2) 、 Function Key

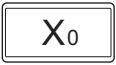
For different operation, these keys have different functions (function will be displayed on the soft key screen)

Key	Function
	Soft key area in the bottom of the screen from left to right the first soft key display functions.
	Soft key area in the bottom of the screen from left to right the second soft key display functions.
	Soft key area in the bottom of the screen from left to right the third soft key display functions.
	Soft key area in the bottom of the screen from left to right the forth soft key display functions.
	Soft key area in the bottom of the screen from left to right the fifth soft key display functions.

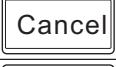
3) 、 Numeral Key

Key	Function
	In numerical input mode, press this key input "0"
	In numerical input mode, press this key input "1" When choice of icons, used to select the No.1 choice of projects.
	In numerical input mode, press this key input "2" When choice of icons, used to select the No.2 choice of projects.
	In numerical input mode, press this key input "3" When choice of icons, used to select the No.3 choice of projects.
	In numerical input mode, press this key input "3" When choice of icons, used to select the No.4 choice of projects.
	In numerical input mode, press this key input "5" When choice of icons, used to select the No.5 choice of projects.
	In numerical input mode, press this key input "6" When choice of icons, used to select the No.6 choice of projects.
	In numerical input mode, press this key input "7" When choice of icons, used to select the No.7 choice of projects.
	In numerical input mode, press this key input "8" When choice of icons, used to select the No.8 choice of projects.
	In numerical input mode, press this key input "9" When choice of icons, used to select the No.9 choice of projects.
	In numerical input mode, press this key input decimal point.
	In numerical input mode, press this key input positive sign and minus, defaults is positive sign.

4) 、 Zero Clearing Key

Key	Function
	For X Axis zero clearing.
	For Y Axis zero clearing.
	For Q or Z Axis zero clearing.

5) 、 Order Key

Key	Function
	Used to confirm the incident response and confirm coordinates. Confirm selection or input operation, shift to next step.
	Renounce selection or input operation, back to original status. Renounce the last time measured point data.
	For finished the measuring function or finish input.
	Renounce option or input operation, back to original status
	Enter the repeat pattern.

6) 、 Direction Key

	Cursor move up one place
	Cursor move down one place
	Cursor move left one location
	Cursor move right one location

7) 、 Measuring Pattern Option Key

	Shift between rectangular coordinate system and polar angle coordinate system
	shift among coordinate system, this key is non-effective in single coordinate system.
	Shift between millimeter (mm) and inch.

8) 、 Others Keys

	Menu key. Used for important setting, include system setting, program and some important functions.
	Dimidiate Key, in numerical input mode, presses this key can dimidiate the cursor value.
	Screen On/Off.
	Printer Key, print the data.

1.4 The definition of the term commonly used

This section introduces the definition of the term commonly used of DP-300 digital readout to help users understand the contents of the manual.

1.4.1 Graphic elements

DP-300 generated by the basic graphic elements, including point, line, circle. The angle and distance is the result of a combination of the above graphic, but in the DP-300 is still viewed as graphic elements. Graphic elements are referred to graphics, graphic element or element.

1.4.2 Graphic Table

When generated new graphic, it will be put in the graphic table. DP-300 can store 100 graphs (001-100).

1.4.3 Targeting Point

In Measuring, a special point of data is inputted the coordinates of DP-300 system, the DP-300 calculate the correct measurement graphics process. These graphic elements used to generate the special point is that the sampling points. In addition to measuring distance and angle measurement, other graphics can be measured up to collect 50 points.

1.4.4 Method of Generated Graphics

1、 Graph Measuring

Collect sample points on the work piece and generate graph by these points.

2、Pre-place Graph

Through the keyboard input the necessary information generated new graphics.

3、Construct Graph

Put the previous generated graph portfolio into a new graph.

1.4.5 Recall Graphic Elements

Rapid positioning an already exist element in the list.

1.4.6 Coordinate System

1. Relative / Absolute Coordinate System

Absolute Coordinate means the basic coordinate

Relative Coordinate System means relative to Absolute Coordinate.

2. Polar angle /Rectangular coordinate

Rectangular coordinate to state a point as (x, y)

Polar angle coordinate state a point as (p, θ)

Eg : LCD displays "The current location coordinates"

X window displays 1.000

Y window displays 2.125

It means the current coordinate is(1.000,2.125), but if convert polar angle coordinate is(2.349,64.799)

1. 4. 7 Measurement Pattern

There are two modes of measurement. One is before measuring, pre-set the measurement points, up to 50 samples; in addition, before measure, the measurement does not set-points, decide the measurement during the measuring.

1.4.8 Function of Rotation of Coordinates (Adjust the Coordinate)

In order to improve the measuring precision, convenient for operator, DP-300 digital readout offers the coordinate adjustment. The main function of the rotation of coordinate is to adjust the work piece for operator.

When the work piece edge irregular or form an angle with X-axis, coordinate rotation allows the operator spin the X-axis to work piece edge position to improve accuracy and convenient measurement.

1.4.9 Input Numbers

After input numbers, press  key to confirm input numbers. Press  key to cancel input number. In the input process, press  key to cancel the last time of number input.

Also can press  at first, indicate input the default number.

Basic System Setting

This chapter describes the basic system settings, including system setting, senior management, compensation options, the language setting, communications settings, and printing options six options.

2.1 System Settings

This function includes the following 4 aspects:

Point Hits

Line Hits

Circle Hits

Angle Type

Chart 2.1.1, System Setting Interface, first page of system setting

Systemic	mm	1	CART
Systemic	Point Hits	00	
Advanced	Line Hits	02	
Equalize	Circle Hits	03	
Language	Angle Type	Centigrade	
Ports	Key click	be on	
Supervisor	Backlight		
Printer			

Chart 2.1.1

2.1.1 Point Hits

This function setting the max sampling points, factory setting is 01, the max setting points are 50.

2.1.2 Line Hits

This function setting the max sampling point when measure line, factory setting is 02, the max setting points are 50.

2.1.3 Circle Hits

This function setting the max sampling point when measure circle, factory setting is 03, the max setting points are 50.

2.1.4 Angle Type

This function setting the display form of angle, it has two choices: degree centigrade and degree/minute/second. Factory setting is degree centigrade.

2.1.5 System Setting Operation Illustration

In system setting, use left key right key, up key, down key, number keys, Quit key and Enter key.

The following are introduce each key:

- 1) 、 :Enter System Setting.
- 2) 、 :and  :Quit System Setting.
- 2) 、/ :Use for select each option. As point measuring sampling, point's line measuring sampling, points circle measuring sampling, point's angle display format.
- 3) 、 number key: Use for input the sampling points.
- 4) 、 :Two choices: Shift option, Use for angle display form, between degree centigrade and degree/minute/second.

For the above options, press ENTER first, then press up/down key to select, then press ENTER to confirm selection.

2.2 Advanced

This function includes the following 8 aspects setting:

Load Defaults

Z-Axis Type

X Rescaling

Y Rescaling

Z Rescaling

Reverse X

Reverse Y

Reverse Z

Chart2.2.1Advanced Management Interface

Advanced		mm	in	CART
^		Load Defaults: ENTER		
Systemic		Z-Axis Type:	Linearity	
<u>Advanced</u>		X-Rescaling:	0.001:	
Equalize		Y-Rescaling:	0.001:	
Language		Z-Rescaling:	0.001:	
Ports		Reverse X:	NO	
Supervisor		Reverse Y:	NO	
Printer		Reverse Z:	NO	
v				

Chart2.2.1Advanced Management

2.2.1Load Defaults

This function use for load defaults, load defaults has the following contents:

1. ABS Zero clearing
2. INC Zero clearing
3. The resolution of X, Y axis Z/Q is 0.001. Linearity standard and observed is 1.000, angle express format is degree centigrade.
4. Transmission speed of RS232 is 9600bps , data bit is 8, stop bit is 1, no parity bit.
5. X and Y axis apply linearity compensation
6. All the graphic elements, user's program are deleted.

2.2.2 Z-Axis Type

This function use for setting Z axis pattern, there are two choices for Z axis setting: linearity and whirl coding ruler. Load defaults are linearity raster ruler.

2.2.3 X Rescaling

This function use for setting X axis resolution, that is to say is the precision, it have six options: 0.001、0.002、0.005、0.0001、0.0002、0.0005, factory setting is 0.001

Cue:

Different raster ruler has different resolution, this function should not be modified, generally, it has setting OK.

2.2.4 Y Rescaling

This function use for setting Y axis resolution, that is to say is the precision, it have six options: 0.001、0.002、0.005、0.0001、0.0002、0.0005, factory setting is 0.001

2.2.5 Z Rescaling

This function use for setting Z axis resolution, that is to say is the precision, it have six options: 0.001、0.002、0.005、0.0001、0.0002、0.0005, factory setting is 0.001

2.2.6 Reverse X

This function can set if turn on the Reverse X in two dimensions graph, X axis from left to right is steadily increase. But some time the measuring direction is from right to left. Under this circumstances, you can set the Reverse X is YES, at this time, X axis from right to left is steadily increase. Sure in the three dimension graph, factory setting is NO.

2.2.7 Reverse Y

This function can set if turn on the Reverse Y in two dimensions graph, Y axis from low to top is steadily increase. But some time the measuring direction is from top to low. Under this circumstances, you can set the Reverse Y is YES, at this time, Y axis from top to low is steadily increase. Sure in the three dimension graph, factory setting is NO.

2.2.8 Reverse Z

This function can set if turn on the Reverse Z, in three dimensions graph, Z axis from low to top is steadily increase. But some time the measuring direction is from top to low. Under this circumstances, you can set the Reverse Z is YES, at this time, Z axis from top to low is steadily increase. Factory setting is NO.

2.2.9 Advanced Management Operation Illustration

In advanced management, use left key right key, up key, down key, number keys, Quit key and Enter key. The following are introduce each key:

- 1)、 :Enter advanced management setting.
- 2)、 and  :Quit advanced management setting.
- 3)、/ :Use for select each option. As point measuring sampling, point's line measuring sampling, points circle measuring sampling, points angle display format.
- 4)、 :When select the factory reset, press ENTER can quit the factory reset.

Only two options, shift the option.

For the above options, press ENTER first, then press up/down key to select, then press ENTER to confirm selection.

2.3 Equalize

This function has three options:

Correction Type

Linear Error Correction

Section Error Correction

Chart 2.3.1 to 2.3.4 is the relative interface for equalize

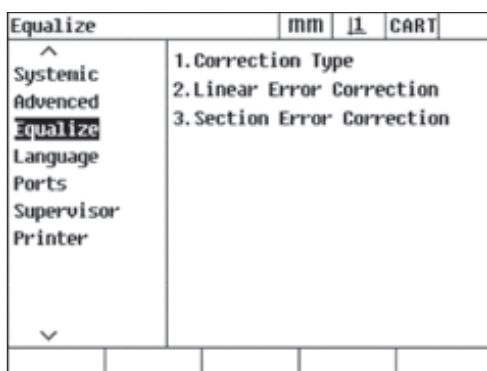


Chart2.3.1 Equalize

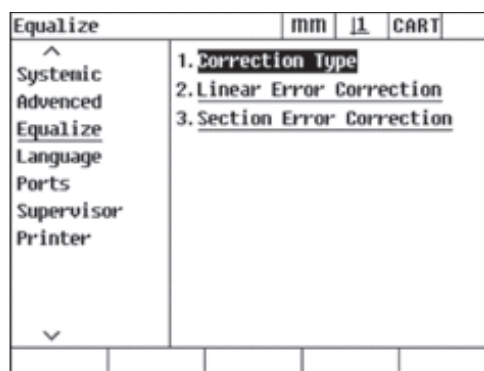


Chart2.3.2 Equalize

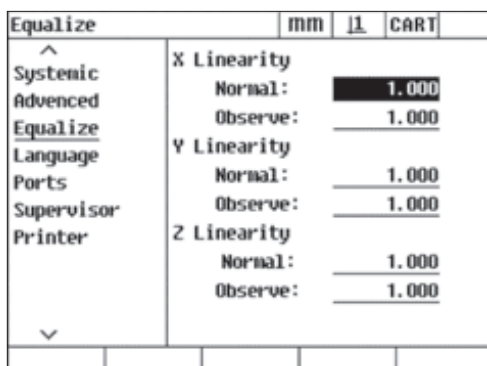


Chart2.3.3 Equalize

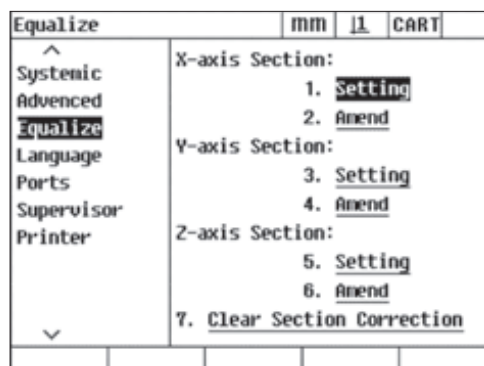


Chart2.3.4 Section Error Correction

2.3.1 Correction Type

This option for setting the type of correction, it has two types: Linearity and section. Linearity is based on linear relationship in the whole area (such as the X-axis). The section is in a section of correction (such as X-axis of 0-20 mm) within the linear correction

2.3.2 Linearity Error Correction

This option use for linearity setting, include X axis, Y axis and Z axis linearity error correction

2.3.3 Section Error Correction

This option use for section setting, include X axis, Y axis and Z axis section error correction and modification, also can clear the section compensation.

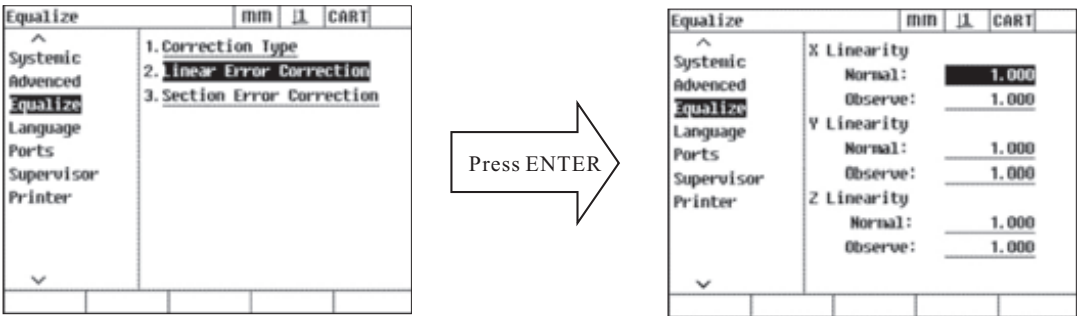
2.3.4 Operation for Correction Type

In correction type, use left key right key, up key, down key, number keys, Quit key and Enter key. The following are introduce each key:

- 1) 、 :Enter equalize
- 2) 、 :and  :Quit equalize.
- 3) 、 /  :Use for select each option. As compensation option, linearity, section
- 4) 、 Number key: In linearity setting, input standard value and observed value.
- 5) 、  :When there are only two options, shift the option.

For more than two options, press ENTER first, then press up/down key to select, then press ENTER to confirm selection. After enter compensation option, press ENTER can enter the relevant option setting.

【Example】



2.4 Language

This function use for setting the display language, we can select from Simplified Chinese, Traditional Chinese and English. It will be in effective after selected. Chart 2.4-1、 Chart 2.4-2 Language Setting Interface

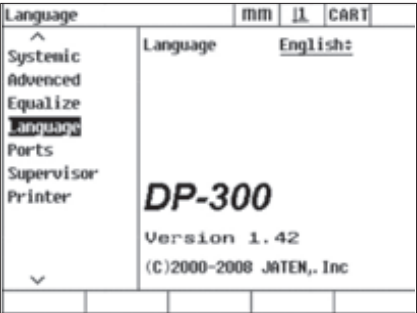


Chart 2.4.1 Language 1



Chart 2.4.2 Language S2

2.4.1 Language Setting Operation Introduction

In language setting, use left key right key, up key, down key, number keys, Quit key and Enter key. The following are introduce each key:

- 1)、 :Enter Language Setting
- 2)、 :and  :Quit Language Setting
- 3)、/ :Use for select each option, such as: Simplified Chinese, Traditional Chinese and English.
- 4)、 :Press ENTER first, then press Top and Low key to select, then press ENTER to confirm.

2.5 Ports

This function setting for connect PC RS232 interface, include: Baud, Word Len, Stop bits, Parity
Chart2.5.1Ports setting interface:

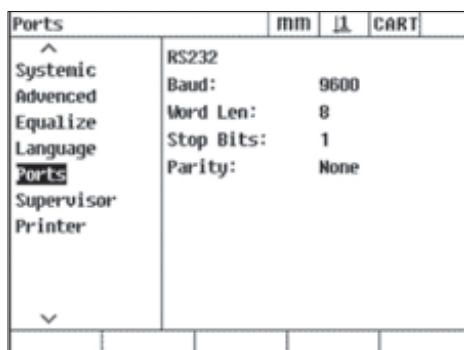


Chart 2.5.1 Communications setting

2.5.1 Baud

There are five options for this function: 4800、9600、14400、19200 and 28800. Commonly use 9600, load defaults is 9600.

2.5.2 Word Len

There are two options for this function: 7 Bit and 8 Bit, commonly use 8 Bit, load defaults is 8

2.5.3 Stop Bits

This function has two options: 1 Bit and 2 Bit, load defaults is 1.

2.5.4 Parity

This function has three options: odd number check, even number check, and no check, load defaults is none.

2.5.5 Ports Setting Operation Introduction

In Ports setting, use left key right key, up key, down key, number keys, Quit key and Enter key. The following are introduce each key:

- 1)、 :Enter Ports Setting
- 2)、 :and  :Quit Ports Setting
- 3)、/ :Use for select each option, such as: Baud, word Len, Stop bits, Parity.
- 4)、 :When there are two choices, shift the option. Press ENTER first, then press Top and Low key to select, laze press ENTER to confirm.

2.6 Supervisor

This option setting the identity of supervisor, include two identities: Supervisor and User. Users just have permission for system setting. The two Supervisors have separate password. Input password will automatically switch to relevant identity, if input the wrong password, "Password Non-effective" will be displayed in the screen. Then you can re-input password.

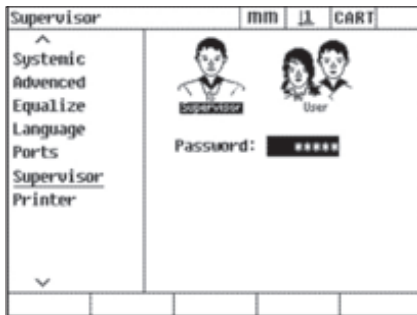


Chart 2.6.1 Supervisor

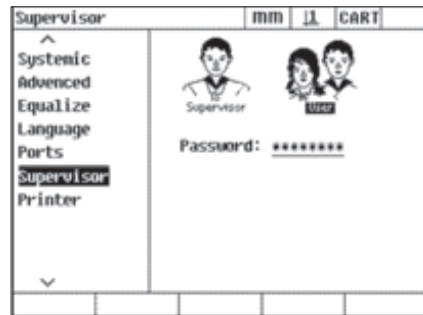


Chart 2.6.2 User

2.6.1 Supervisor

Supervisor has all the permission for all operation.

2.6.2 User

User just has basic operation permission, the operation option have system setting, language setting, print option, but can't set advanced, equalize, ports setting.

2.6.3 Supervisor operation Introduction

In Supervisor, use left key right key, up key, down key, number keys, Quit key and Enter key. The following are introduce each key:

- 1)、 :Enter supervisor setting
- 2)、 :and :Quit supervisor setting.
- 3)、Number Key: Input password.
- 4)、 :After input password, Press ENTER key to confirm.

2.7 Printer

This function used for setting connect the printer information, include print titles, print blank line, print unit, the specific print option, please refer the appendix----Print output format list.

Chart 2.7-1 Printer Interface

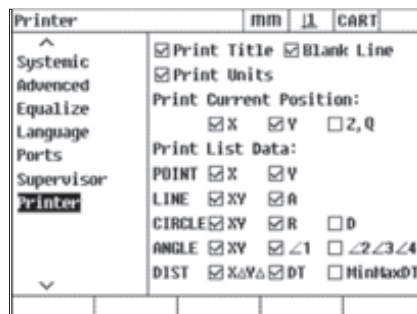


Chart 2.7.1 Print Option

2.7.1 Operation for Printer Option

In printer option, use left key right key, up key, down key, number keys, Quit key and Enter key. The following are introduce each key:

- 1)、 :Enter the printer option setting
- 2)、 :and :Quit the printer option setting
- 3)、 :Select for each option, such as print titles, print unit, and print blank line.
- 4)、 :Shift option

Clearance Function Operation

In DP-300, clearance function include delete the graph element that stored in the graph list and delete adjustment.

3.1 Operation for Clearance Function

The following are the clearance function operation steps:

1. Press , display as follows

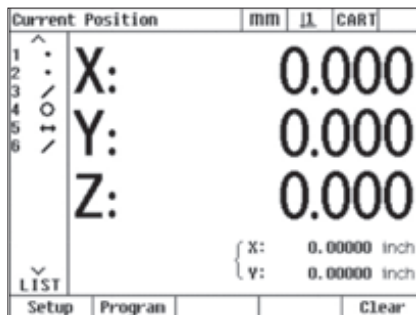


Chart 3.1.1

2. Press "Clear" corresponding function key, enter the clearance operation interface.

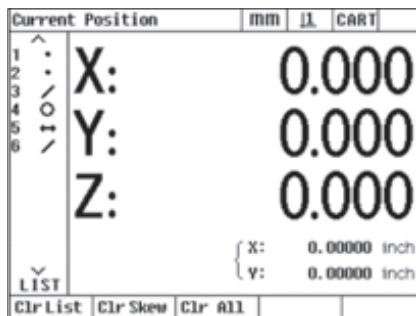


Chart 3.1.2

3. There are three delete:

- a. Clear List

Delete all graph element which stored in the list, include the measuring elements, Create elements and all of the Construct elements.

- b. Clear Skew

Delete all coordinate angle compensation

- c. Clear All

Delete a and b

Note:

- Use this function must be cautious

Cue:

- If need to delete a graph element, may use delete key

Introductions for Basic Operation

This chapter introduces the basic operation, basic element measuring function, Create graphic element, Recall function, Construct graphic element, coordinate adjustment and communications.

4.1 Basic Operation for Measurement

This section introduces the basic operation of measurement, include how to turn on and off this instrument, how to select the list project, how to do the system setting, how to enter the measuring interface, how to switch the unit and zero clearing for axis.

4.1.1 Power On/Off

- **【Start system operation Step】**

1. Turn on the measuring instrument power
2. Turn on the measuring instrument screen.

At this time, DP-300 enter the self-check, press any key or after self-check, if the three axes are linearity compensation, then enter the normal display status, as chart 4.1.1. If certain coordinate was set as section compensation, there are two kinds of cases display in the interface.

- 1) 、 Find R1 then enter the normal display interface
- 2) 、 If you are sure that you didn't move the raster ruler, press  will enter the normal display status.

- Check carefully the cable before turn on.
- Under the power on normal, enter the self-check, LCD display the company name, copyright and some other information on by on.



Warning

- After Power on, pay attention the digital readout, if there is something wrong, cut down the power immediately.
- Please don't insert the signal under the power on circumstance

- **【Turn off the system operation step】**

- 1) Turn off the measuring instrument screen.
- 2) Turn on the measuring instrument power

4.1.2 How to Select Graphic List

- **【Function key】**



- **【Operation Step】**

- 1) Adjust the current interface into the "current coordinate" interface (chart 4.1.1) or measuring interface..
- 2) Press   Key enter the selection list.

4.1.3 System Setting

- **【Function key】**



- **【Operation Step】**

- 1) 、 Adjust the current interface into the "current position" interface (chart 4.1.1)

2) Press , enter function selection interface chart 4.1.2

3) Then press “Setup” corresponding key () , enter system setting interface (Chart4.1.3.)

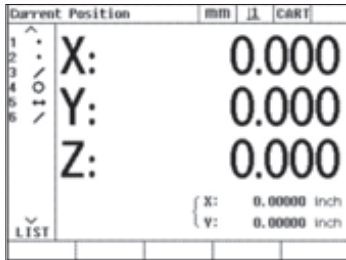


Chart 4.1.1 Current position

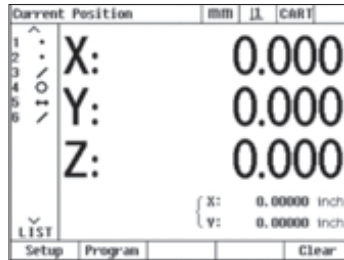


Chart 4.1.2 Function Selection

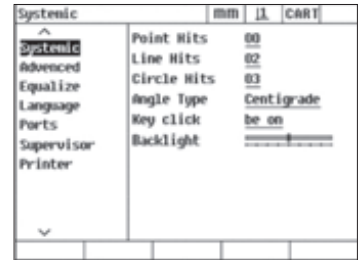


Chart 4.1.3 System Setting

4.1.4 How to Enter the Measuring Interface

- 【Function key】



- 【Operation Step】

1) Adjust the current interface into the “current position” interface (chart 4.1.1)

2) Press measuring key enter corresponding measuring interface, chart 4.14 to 4.18.

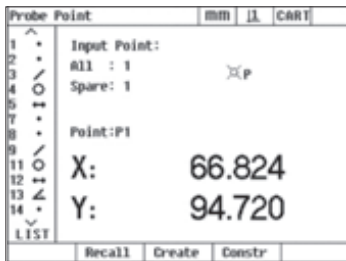
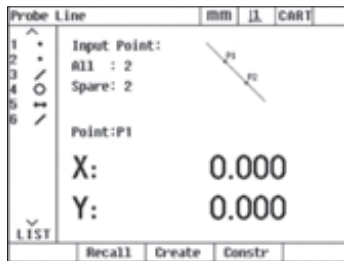


Chart 4.1.4 Probe Point



Point 4.1.5 Probe Line

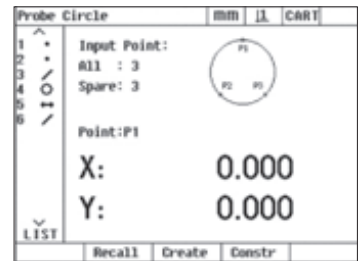


Chart 4.1.6 Probe Circle

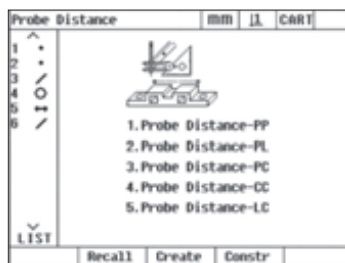


Chart 4.1.7 Probe Distance

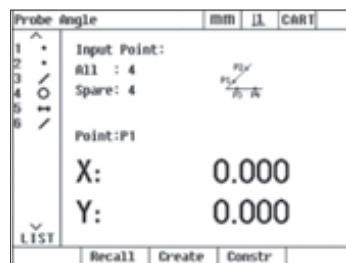


Chart 4.1.8 Probe Angle

4.1.5 How to Switch Unit

- 【Function Key】



- 【Operation Step】

Press the unit switch key  , can switch between millimeter and inch.

【Example】

1) The display before press the unit switch key, chart 4.19.

2) The display after press the unit switch key, chart 4.1.10

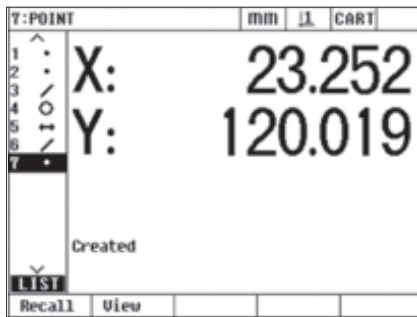


Chart 4.1.9

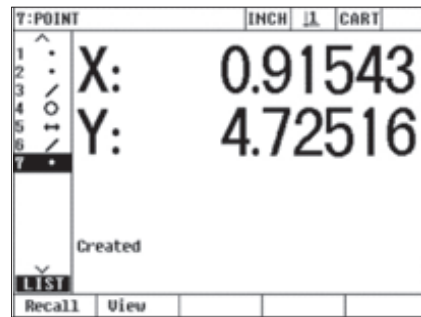
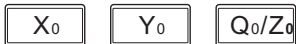


Chart 4.1.10

4.1.6 How to use Axis Zero Clearing

- **【Function】**



- **【Operation Step】**

1. When need to zero clearing the sampling data, press **X₀** **Y₀** **Q₀/Z₀** key, made the X Y, Z axis zero clearing.

【Example】

1、 Before press the zero clearing key, the current position display as follows, Chart 4.1.11

2、 After Press **X₀** , the current position displays as follows, Chart 4.1.12

3、 Then press **Y₀** and **Q₀/Z₀** the current position display as follows, Chart 4.1.13

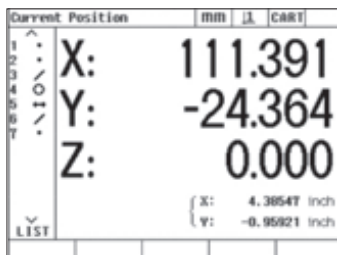


Chart 4.1.11

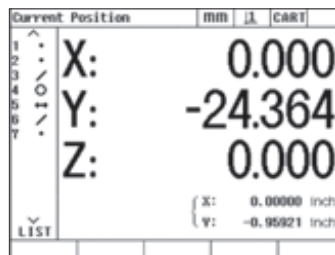


Chart 4.1.12

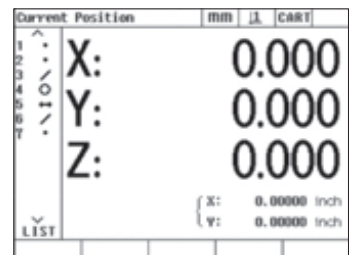
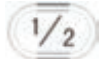


Chart 4.1.13

4.1.7 How to use Dimidiate Key

Press **1/2** key, will divide 2 for the current value, Use this function, display the midpoint of current value.

- **【Function key】**



- **【Operation Step】**

1. When need to half the current value, press **1/2** key.

2. There will appear three circumstances.

- When need X axis half, press **X₀** key.
- When need Y axis half, press **Y₀** key.
- When need Z axis half, press **Q₀/Z₀** key.

4.2 Basic Factors Measuring Function

This section introduces DP-300 common usage functions: measuring point, line, circle, distance and angle, and as measuring point example introduce the display interface.

4.2.1 Introduction of Interface

The following as measuring point interface an example (chart 4.2.1), briefly introduce the display interface.

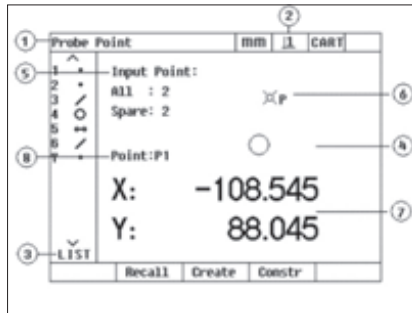


Chart 4.2.1 measuring point

- ① on the title bar, displays the current operation objective: Probe Point
- ② on the right of the title bar, displays the length unit (MM/INCH), coordinate switch mark, coordinate mode (CART/POS). Users can press the key to change the length unit, and press to change the coordinate mode.

Note:

DP-300 just supports the sole coordinate system, so can't switch coordinate system.

- ③ on the left of the interface is graphic element list, User measure, Create or Construct of all elements information will display in the list.
- ④ on the right of the interface is the display zone of measuring information.
- ⑤ On top left corner of measuring information zone is the points display zone, remind user the total sampling points and the reminder points, point measuring support multi point measuring, Under the point measuring, User can press the to add sampling points. For example, if the current sampling point is 1. Press once, the sampling points become 2. Press again , the sampling points become 3, by parity of reasoning. The max sampling points is 50.

Cue:

Users can set default under the “menu/setting/system setting”, afterwards system will auto use the setting sampling points. Line measuring and circle measuring also support the multi points measuring function. They also can apply the same method to modify the sampling points.

- ⑥ on the top right corner of measuring information zone displays the current measuring function pictures, remind the users the current measuring function.
- ⑦ on the bottom of measuring information zone displays the current coordinates. If the measuring machines belonging to projector, then the coordinates is the projector screen crosshairs, if measurement machine is video measuring, then the coordinates of the coordinates is the focus of the lens, if measuring machines belonging to probe, then the coordinates is the probe Coordinate.
- ⑧ On the top of the coordinates information zone, which is the middle measurement information display zone shows the current sampling points, for example, displays P2, that indicate collect P2, users can through picture to determine the needs of the points in what position

Cue:

In order to obtain the correct measuring result, users must strictly according to cue points collect points, otherwise, it will produce the measuring result doesn't agree with the user's desired value.

4.2.2 Probe Point

The function of point measuring is to record the number of detected objects on the point elements. Users can use these elements to construct some point, straight line, distance, angle or circle.

- **【Key Operation】**

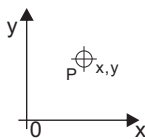


- **【Function】**

On the current position interface (the default layout after power on) or browse the graphic elements list, press $\odot$ key, then enter the point graphic element operation interface, system default press $\odot$ key enter measuring function. On the status bar of LCD screen displays the current function information, if use point Create function or point Construct function, can select function key. These include Recall (F2), Create (F3), and Construct (F4). If the measuring parameter conformance to requirements, the measuring result will automatically add to the left of the main interface list, and displays the relative information of measuring result. Generally, the new graphic element will be put the last.

Cue :

- If user wants to cancel the sampling points, press key.
- Whenever the acquisition of a sampling point the cue area of sampling points automatically minus 1, when the sample collection points equal to the maximum point prompted points at the end of measurement automatically finish.



- Measuring point 1-50 will obtain the coordinate value of point.
- Execute the multi points, obtain the coordinate mean arithmetical value.
- Measuring result input: X, Y.

【Example】

1. Press point measuring key $\odot$, enter probe point function, displays point measuring dialog box. Chart4.2.2
2. User moves the current position to he is interested measuring value, collect the point. Chart 4.2.3.
3. Press Enter key to collect the coordinate value, display the general information of probe point. Chart4.2.4
4. Press the corresponding function key F2 of View, check the detail information of probe point Chart 4.2.5

Cue: “View” corresponding function key can switch the graphic element general information to detail information.

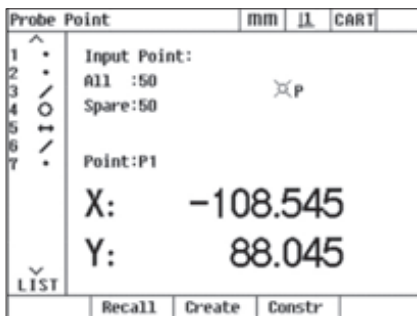


Chart 4.2.2 Probe Point

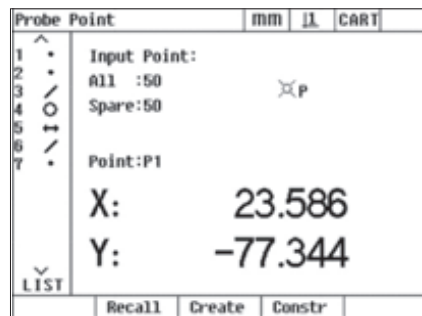


Chart 4.2.3 Probe Point

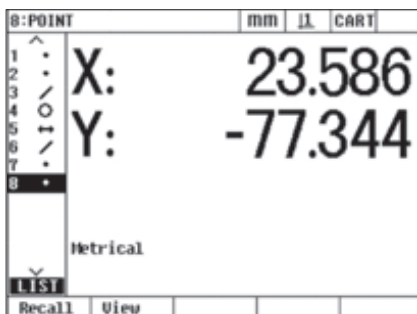


Chart 4.2.4

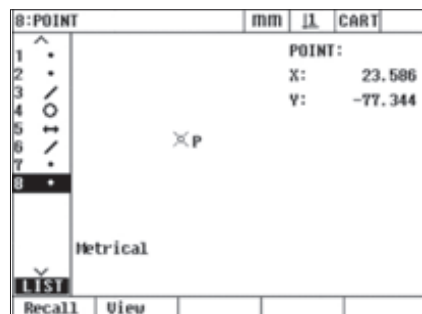


Chart 4.2.5

4.2.3 Probe Line

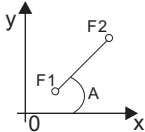
The function of probe line is to measure the line element. Users can construct some points, lines, distance and angle.

- **【Key Operation】**



- **【Function】**

On the current position interface (the default layout after power on) or browse the graphic elements list, press  key, then enter the line graphic element operation interface, system default press  key enter measuring function. On the status bar of LCD screen displays the current function information, if use line create function or line Construct function, can select function key. These include Recall (F2), Create (F3), and Construct (F4). If the measuring parameter conformance to requirements, the measuring result will automatically add to the left of the main interface list, and displays the relative information of measuring result. Generally, the new graphic element will be put the last.



- Measure 2-50 points to obtain the elevation angle of line.
- Execute multi points measuring, by average method to obtain mean value;
- Measuring result out put X, Y, A, F1.

Cue:

Line measuring direction from first point P1 to last point P2, pay attention to vector direction, it will effect the calculate result elevation angle.

【Example】

1. Press line measuring key , enter line measuring function, display line measuring dialog box. (Chart 4.2.7.)
2. User moves the current position to he is interested measuring value, collect the point. Press  key to collect the coordinate P1, then collect P2. Chart 4.2.8
3. Use the same method to collect P2., then press , display then measuring information. Chart 4.2.9

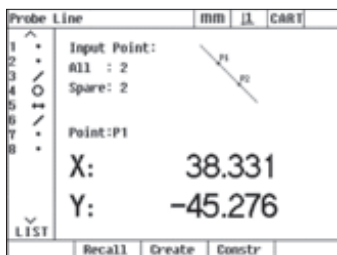


Chart 4.2.7 Probe Line

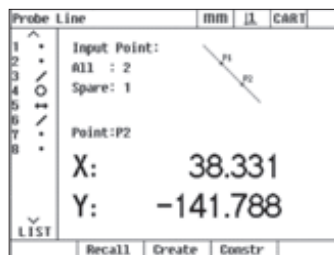


Chart 4.2.8 Probe Line

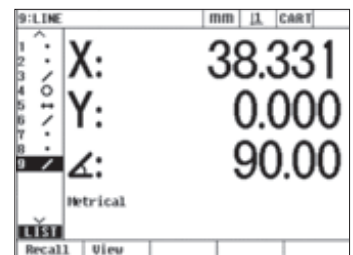


Chart 4.2.9

4.2.4 Probe Circle

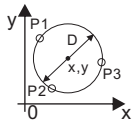
Circle measuring function is to record some circle element of object. Three or more points form a circle, users can construct some points, lines, distance and angle.

- **【Key operation】**



- **【Function】**

On the current coordinate interface (the default layout after power on) or browse the graphic elements list, press  key, then enter the circle graphic element operation interface, system default press  key enter circle measuring function. On the status bar of LCD screen displays the current function information, if use circle Create function or circle Construct function, can select function key. These include Recall (F2), Create (F3), and Construct (F4). If the measuring parameter conformance to requirements, the measuring result will automatically add to the left of the main interface list, and displays the relative information of measuring result. Generally, the new graphic element will be put the last.



- Measure 3-100 points to obtain the diameter of circle.
- Execute multi points measuring, by average method to obtain mean value;
- Measuring result output : X、Y、D、r、F2

【Example】

1. Press the circle measuring key , enter circle measuring function, display circle measuring dialog box, chart 4.2.7
2. User moves the current coordinate to he is interested measuring value, collect the point. Press  key to collect the coordinate P1, then collect P2. Chart 4.2.11
3. Use the same method to collect P2、P3, then press , display the measuring information. chart4.2.12

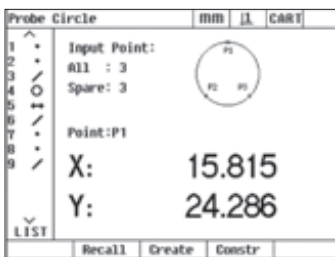


Chart 4.2.10 probe circle

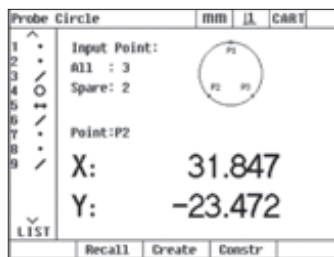


Chart 4.2.11 probe circle

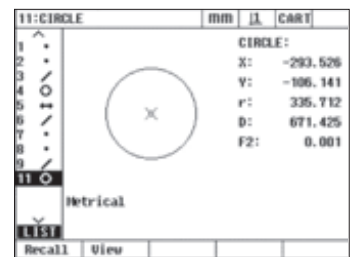


Chart4.2.12

4.2.5 Probe Distance

Probe Distance includes: point to point, point to line, point to circle, circle to circle, line to circle. Point to point is the basic probe distance

【Key Operation】



【Function】

On the current position interface (the default layout after power on) or browse the graphic elements list, press  key, then enter the probe distance operation interface (Chart 4.2.13), On the status bar of LCD screen displays the current function information, if use distance Create function or distance Construct function, can select function key. These include Recall (F2), Create (F3), and Construct (F4). We also can press number key to enter probe distance function.

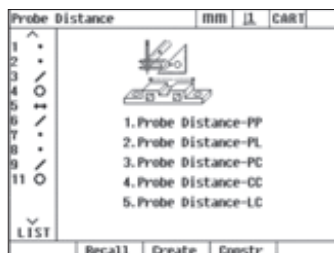


Chart 4.2.13

Point to point distance(Number key ①)

- Measure two points, obtain distance from point(P1)to point(P2)
- Output the measuring result: $X\Delta$ 、 $Y\Delta$ 、DT

【Cue】

- Distance measuring from the first measuring point P1 to the second measuring point P2
- According to the following formula obtain the coordinate difference value($X\Delta$ 、 $Y\Delta$) :
(coordinate difference value)=(the second measuring point value)-(the first measuring point value)
Sign symbol of coordinate difference value made by the measuring sequence

Distance measuring point to line(Number key ②)

- Measure three points , obtain the distance between)to line(formed by P2 and P3)
- Measuring result output: $X\Delta$ 、 $Y\Delta$ 、DT

Distance measuring point to circle(Number Key ③)

- Measure four points, obtain the distance from point(P1) to circle(formed by P2 、 P3 and P4)
- Measuring result output: $X\Delta$ 、 $Y\Delta$ 、DT、MaxDT、MinDT

Distance measuring circle to circle(Number Key ④)

- Measure six points, obtain the distance from circle(formed by P1、 P2 and P3) to circle formed by P4、 P5 and P6)
- Measuring result output: $X\Delta$ 、 $Y\Delta$ 、DT、MaxDT、MinDT

Distance measuring line to circle(Number Key ⑤)

- Measure five points, obtain the distance from line(formed by P1 and P2) to circle(formed by P3、 P4 and P5)
- Measuring result output: $X\Delta$ 、 $Y\Delta$ 、DT、MaxDT、MinDT

Generally speaking, probe distance has the following steps:

1. Press measuring key [N] ,according to measuring mode select a number.
2. Collect each point coordinate
3. Press [Finish] key finish measure

【Example】

(Take point to point distance for example)

1. Press distance measuring key [N] ,then press key ① ,enter probe distance function, display the measuring dialog box. Chart 4.2.14
2. User moves the current coordinate to he is interested measuring value, Press [Enter] key to collect the coordinate P1, then collect P2. Chart 4.2.15
3. Collect P2, then press [Enter] key, display the distance from P1 to P2. Chart 4.2.16

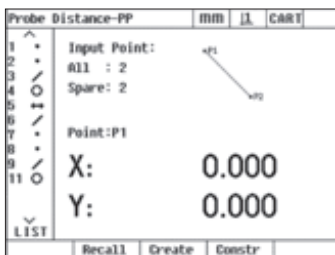


Chart 4.2.14 Distance-PP

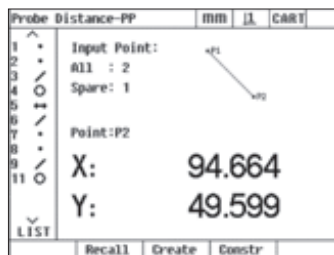


Chart 4.2.15

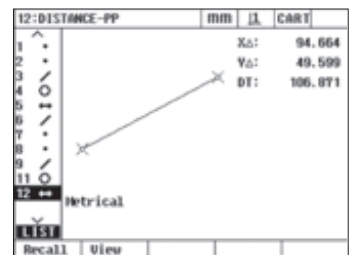


Chart 4.2.16

4.2.6 Probe Angle

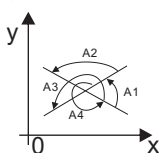
Record some angle elements of measuring object. Three or more than three points define a circle. Users can construct some points, lines, circles, distance or angles.

- 【Key Operation】



- 【Function】

Probe Angle method is by measuring the angle of two sides, and thus get the purpose of measuring angle elements. In the DP-300, each of the two sides can be collected 2-50 points. When using random sampling data mode, each side of the number samples collected by the user to decide. Generally, it is necessary to adopt a multi points measuring line to accurately measure the angle. Using Create sampling points mode, each line of sampling points will be displayed on the LCD screen.



- Measure 2-50 points on the line (P1、P2), then measure the other line 2-50 points(P3、P4), obtain the point of intersection and included angle
- Execute multi points measuring, by least squares calculate the mean line and point of intersection and included angle.
- Measuring result output : X、Y、A1、A2、A3、A4

【Cue】

- Each line of direction of vector from the first measuring point (P1/P3) to the last measuring point(P2/P4)
- Crossing angle A1 (0~180 Degree), it is an interior angle formed by two lines of vector.
- Crossing angle A2 (0~180 Degree), it is value is $180-A1$ 。
- Crossing angle A3 (180~360 Degree) , it is value is $180+A1$ 。
- Crossing angle A2 (180~360 Degree) , it is value is $360-A1$ 。

【Example】

1. Press circle measuring key  , enter probe angle function, display the following dialog box. Chart 4.2.17
2. User moves the current position to he is interested coordinate value, Press  key to collect the coordinate P1, then collect P2. Chart 4.2.18
3. Repeat step 2, collect P2, P3, P4 value, then press  , and display the probe angle information.
4. Press “view” corresponding function key, display the detail information of angle. Chart 4.2.21

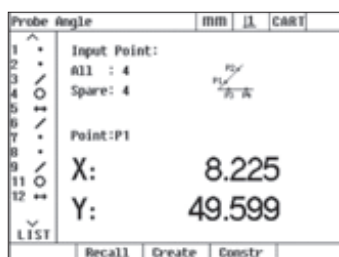


Chart 4.2.17

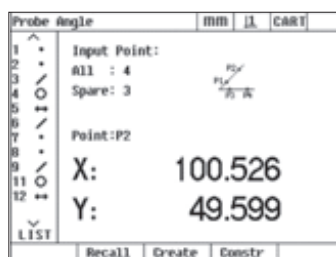


Chart 4.2.18

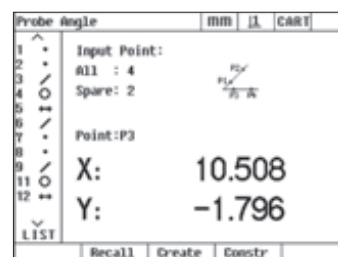


Chart 4.2.19

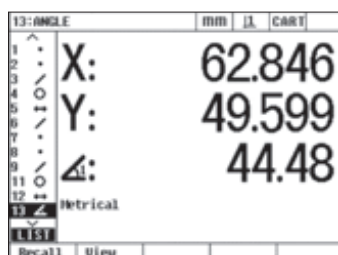


Chart 4.2.20

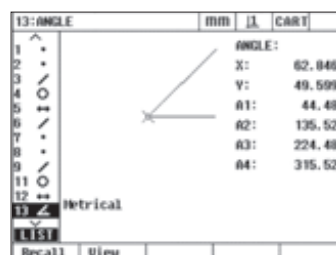


Chart 4.2.21

4.3 Create Function of Graphic Element

DP-300 offers input numbers from keyboard to generate new graphic, it called create graphic element. Use this method to create the elements and the use of samples collected by measuring the elements of the same elements, the difference only lies in Creates elements through the keyboard, it is an ideal element, so it did not error. Can be Create elements are: points, lines, round, distance, angle and adjustment.

General Step for create graphic element:

1. Press measuring key select type of graphic element.
2. Press "Created" corresponding function key, generally the key is **(F3)**
3. Press number key to input coordinate value
4. Press **Finish** key finish

The following introduce the replace point, line, circle, distance, angle and adjustment.

4.3.1 Create Point

- Input a point P (X、Y)
- Obtain a create point
- output : X、Y

4.3.2 Create Line

- input a point P (X、Y) and angle A
Obtain a replace line, form a crossing angle A with X axis, and pass point P.
- Output : X、Y、A、F1

4.3.3 Create Circle

- Input a point P (X、Y) and radius
Obtain a created circle, its points P for the center and r for the radius
- Output : X、Y、D、r、F2

4.3.4 Create Distance

Point to point :

- Input two points P1 (X、Y) and P2 (X、Y)
- Obtain a replace distance
- Output : XΔ、YΔ、DT

4.3.5 Create Angle

- Input a point P (X、Y) and an angle A
- Obtain a replace angle
- Output : X、Y、A1、A2、A3、A4

4.3.6 Create Skew

- Input two points P1 (X、Y) 、 P2 (X、Y) and A coordinate
- Obtain a replace line
- Output : X、Y、A

4.3.7 Example for Create

Take create point as example, specifically introduce the operation steps of create function.

【Operation steps】

1. Press measuring key **(⊗)**, then press "Create" corresponding key **(F3)**, enter create point interface, chart 4.3.1. Waiting for input data.
2. Input data through number key. Eg: input 1.023. the input order is **(1) (.) (0) (2) (3)** , displays as chart 4.3.2
3. Press **Enter** confirm the input data, displays as 4.3.3
4. Press direction key, wait for Y axis data, and chart 4.3.4
5. Repeat step 2: input data by number key, eg input -2.321. input order is **(2) (.) (3) (2) (1)** **(+/-)** , input order also can **(+/-) (2) (.) (3) (2) (1)** . Displays as 4.3.5

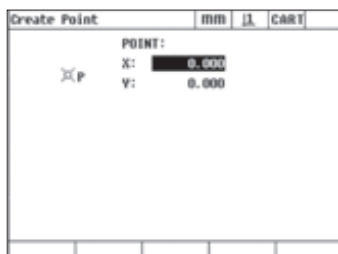


Chart 4.3.1

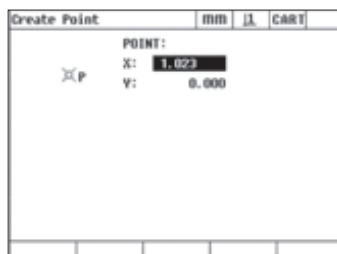


Chart 4.3.2

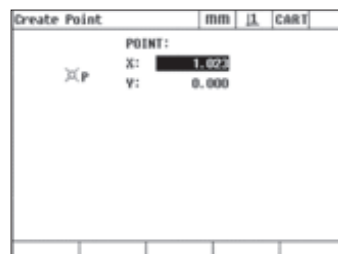


Chart 4.3.3

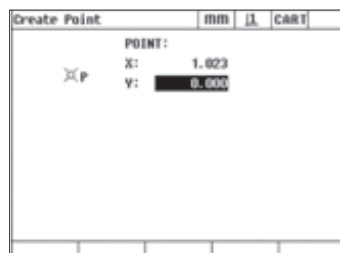


Chart 4.3.4

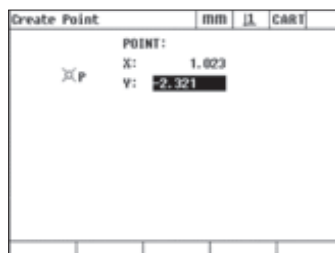


Chart 4.3.5

6. Press accept input data of Y axis, display as 4.3.6.

7. Press to finish point replace, displays as 4.3.7.

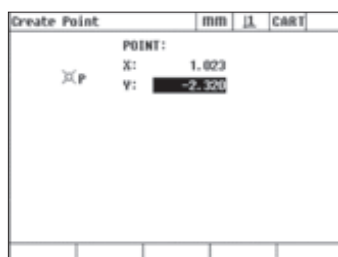


Chart 4.3.6

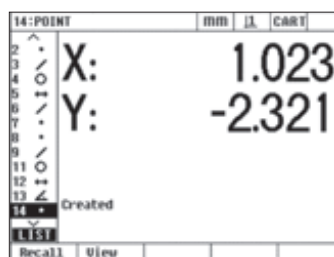


Chart 4.3.7

Note:

- When the input data was misuse and didn't press , then press can be cancel the entered data, then input the correct data.
- When input a misuse data, but not press , use and select the misuse data, then press to cancel the entered data.
- After enter data, no need to press , but directly press or , confirm input and move to prior or next one to input.
- Elements in DP-300, such as point, line, circle, distance, angle and correctly can use the method described above will replace them out, but all kinds of graphics data is not the same, so there is a bit different on the screen

4.4 Recall Function

This section introduces the Recall function of DP-300

4.4.1 Meaning of Recall

Recall function means to call out the stored graphic element from graph list. Apply these given elements represent the currently measuring object, create new measuring object.

4.4.2 Example of Recall

【Operation Steps】

1. Press "Recall" corresponding function key or , Skip "Please enter feature ID " dialog box, display as 4.4.1.

2. Enter your ID, press confirm ID, if the ID is 1, then display as 4.4.2.

Cue: ID can't above the number of graphic list

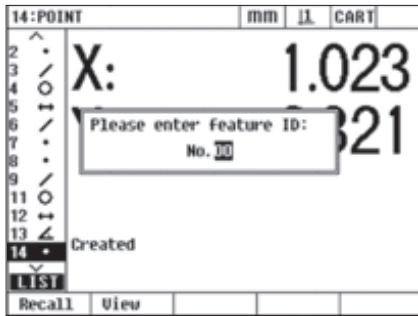


Chart 4.4.1 Recall Interface

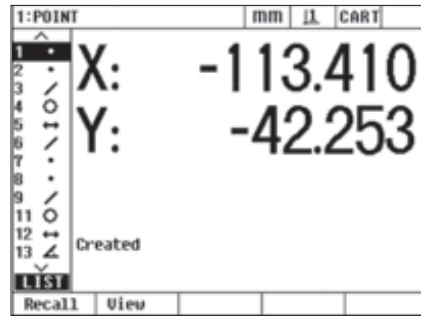


Chart 4.4.2

Cue:

- When Recall function use in execute measuring, if need to cancel certain selected element, first select this element by direction key, then press , cancel selected element.

Note:

- When certain element selected, it will appear a mark “√” beside.
- When Recalled function use in execute measuring,, after selected all the required element, the second point on behalf of the necessary elements of the operation will start automatically selected
- When the Recalled element required the replace value, press created element will automatically display.

4.5 Construct Graphic Element Function

This section introduces the meaning and step of Construct graphic element, Construct point, line, circle, distance and angle. At last take example for how to use Construct graphic element.

4.5.1 Construct Graphic Element

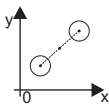
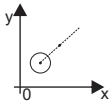
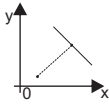
Choose from the graphic elements list construct a new graphic element called the graphic elements of the Construct graphics. Use this method to create the graphic elements and use measurement methods and preferences of the graphic elements of the same operation can be used for all kinds. Generally speaking, Construct Graphic Element has the following steps:

- According to graphic type to select a certain measuring key.
- Select two or more graph from graphic element list
- Press finish

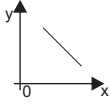
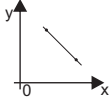
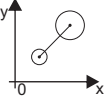
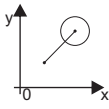
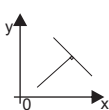
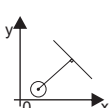
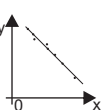
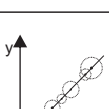
The following are the graphic Construct table to help understanding the Construct graphic element.

4.5.2 Point Construct

Params	Construct result	Graph	Operation Step	Remarks
1	Point		1. Press x confirm the Construct result type 2. Select a point element 3. Press Finish	
2	Two lines point of intersection		1. Press x confirm the Construct result type. 2. Select two line element 3. Press Finish	Nodal without parallel line
2	Middle point		1. Press x confirm the Construct result type 2. select two point element 3. press Finish	

Params	Construct result	Graph	Operation Step	Remarks
2	Two circles of the mid-point of the center		1.press  confirm the Construct result type 2. select two circles elements 3. Press 	
2	Middle point of the pant and circle center		1.Press  confirm the Construct result type 2. Select a point element and a circle element 3. Press 	
2	Foot of point to line		1.press  confirm the Construct result type 2. Select a point element and a line element 3. Press 	Point is not on the line

4.5.3 Construct Line

Params	Construct result	Graph	Operation Step	Remarks
1	Line		1.Press  confirm the Construct result type 2.Select a line element 3.press 	
2	Two points constitute a line		1.Press  confirm the Construct result type 2.Select two point elements 3.Press 	Two points can not be the same
2	Two circles central constitute a straight line		1.Press  confirm the Construct result type 2.select a circle element 3.press 	The two circle center can not be the same
2	A point and a circle center constitute a line		1.Press  confirm the Construct result type 2.Select a point element and a circle element 3.press 	
2	Point to the vertical line		1.Press  confirm the Construct result type 2.Select a line element and a point element 3.Press 	
2	Vertical line of circle center to line		1.Press  confirm the Construct result type 2.Select a line element and a circle element 3.Press 	
Three and more	Multi points connect line		1.Press  confirm the Construct result type 2.Select three and more points elements 3.press 	Multi points connect line
Three and more	Multi circle center connect line		1.Press  confirm the Construct result type 2.Select three and more points elements 3.Press 	Multi circle center connect line

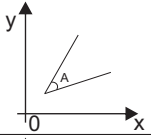
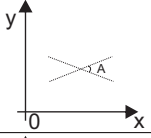
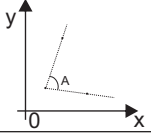
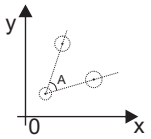
4.5.4 Construct Circle

Params	Construct result	Graph	Operation Step	Remarks
1	circle		1. Press confirm Construct result type 2. Select a circle element. 3. Press	
3	Three points constitute a circle		1. Press confirm Construct result type 2. Select three point elements 3. Press	Three points can not be the same each two.
3	Three circle center constitute a circle		1. Press confirm Construct result type 2. Select three circle elements. 3. Press	Three circle centers can not be the same each two.
Three or more	Multi points constitute a circle		1. Press confirm Construct result type 2. Select more than three circle elements 3. Press	Multi points in the same circle
More than three circles	Multi circle centers constitute a circle		1. Press confirm Construct result type 2. Select three circle elements 3. press	Multi circle centers in the same circle

4.5.5 Construct Distance

Params	Construct result	Graph	Operation Step	Remarks
2	Distance of two points		1. Press confirm Construct result type 2. Select two point element 3. Press	
2	Point to line's vertical length		1. Press confirm Construct result type 2. Select a point element and a line element 3. press	
2	Point to circle center distance		1. Press confirm Construct result type 2. Select a point element and a circle element 3. Press	
2	circle center to circle center distance		1. Press confirm Construct result type 2. Select two circle elements 3. Press	
2	Vertical length of circle center to line		1. Press confirm Construct result type 2. Select a line element and a circle element 3. Press	

4.5.6 Construct Angle

Params	Construct result	Graph	Operation Step	Remarks
1	Angle		1.Press  confirm Construct result type 2.Select an angle element 3.Press 	
2	Included angle formed by two lines		1.Press  confirm Construct result type 2.Select two line elements 3.Press 	
3	The first point as angle vertex		1.Press  confirm Construct result type 2.select three point elements 3.Press 	
3	The first circle center as angle vertex		1.Press  confirm Construct result type 2.Select a line element and a circle element 3.Press 	

4.5.7 Construct Example

Below we have some typical examples of detailed instructions on how to measure and construct some special elements of the general steps

Example 1:olve the distance between two circle centers (take distance between circle 5 and circle 10 as an example)

1. Reference from the structural elements table and find the distance between the two circle center, press  , display as chart 4.5.1
2. press number key  , then press “Construct” corresponding function key  , display as chart 4.5.2

Note:

Can not press  , directly press “Construct” corresponding function key

- 1.Press  or  ,displays as follows, press  key, select the circle, displays as 4.5.3

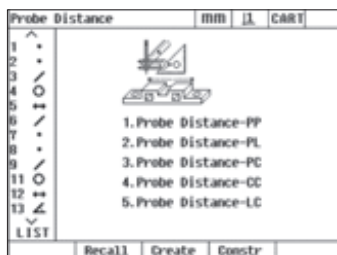


Chart 4.5.1

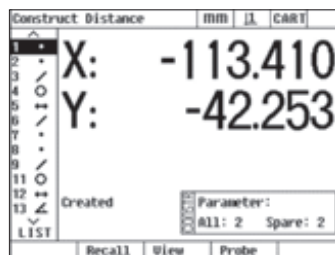


Chart 4.5.2

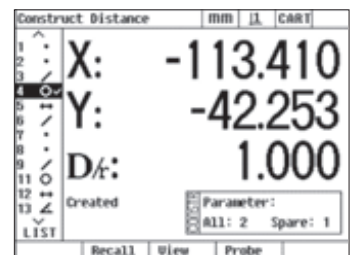


Chart 4.5.3

- 2.Continue step 3, Select the other circle, then press  , new graphic elements add to graph list, chart 4.5.4

Example2: Three points constitute an angle

(take point 16 (4.000, 3.000), 4(0.000, 0.000), and 7 (1.023, -2.321) as an example)

1. Press  , then display as charts 4.5.5
2. Press “Contracture” corresponding function key  , displays as chart 4.5.6

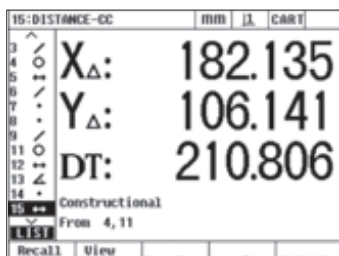


Chart 4.5.4

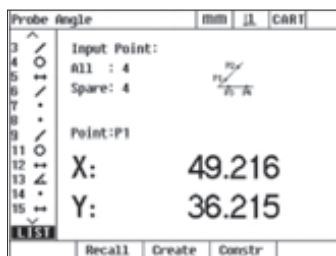


Chart 4.5.5

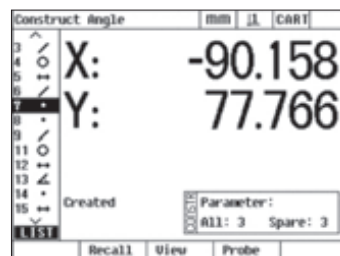


Chart 4.5.6

3. Press or , then press , display as chart 4.5.7
4. Continue step 3, select point 4, as chart 4.5.8
5. Continue step 3, select point 7, then press key, new graph element add to graph list, as Chart 4.5.9

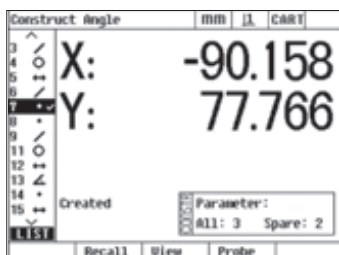


Chart 4.5.7

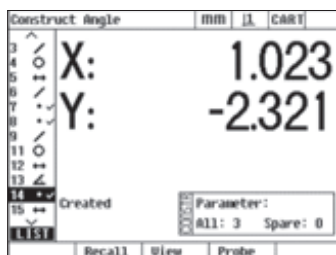


Chart 4.5.8

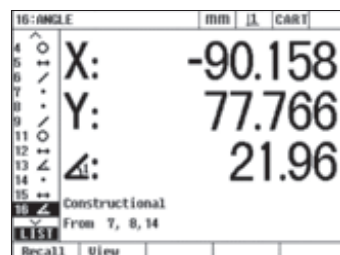


Chart 4.5.9

4.6 Coordinate Skew Function

This section introduces the coordinate skew function, including the meaning and function of coordinate skew three modes of adjustment, at last take example to introduce how to operate coordinate skew.

4.6.1 Probe Skew

Rotate the current coordinate system a center angle and parallel move made the coordinate axis with a side of work piece superposition, this operation called Coordinate Skew.

After execute skew, stored in the graph list of graphic element will automatically transform into skew coordinate value. After clear skew, stored in the graph list of graphic element will automatically transform into the original coordinate value.

4.6.2 Function of Coordinate Skew

Function of coordinate skew is to help operator adjust work piece, convenient measurement, improve the measuring speed. When the edge of work piece is irregular or form an angle with coordinate axis, coordinate skew allow operator rotate the coordinate system an angle, made the coordinate axis with work piece edge superposition, make the mechanical coordinate transform into the work piece coordinate. When measure a new work piece, use the skew function first, it will be convenient for the following measuring operation.

Adjust a work piece, the method is select a side of work piece, taken this side as final, rotate coordinate an angle, made the original coordinate axis with the line superposition or parallel, then choose a suitable point as objective original point, use of coordinates translation function, move the original data point to selected data point, measuring a line at least need two points, up to 50. Sampling points more than two will produce more precise skew results.

4.6.3 Coordinate Skew Mode

DP-300 digital readout offers three coordinate skew modes:

Mode 1 : input two points P1、 P2, new coordinate take P1 as original point. Tie line of P1 and P2 is X axis, direction is P1→P2. Chart 4.6.1

Mode 2: need to input three points P1、P2、P3, new coordinate X axis as the tie line between P1 and P2, direction is P1→P2, then pass P3 draw vertical as the Y axis, foot is the original point. Chart 4.6.2

Pattern 3: Input 4 points P1、P2、P3、P4, new coordinate X axis is P1 and P2 tie line, direction is P1→P2, original point is P3 and P4 tie line cross with P1P2 tie line. Chart 4.6.3

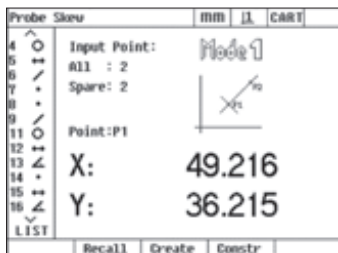


Chart 4.6.1

Coordinate Skew mode 1

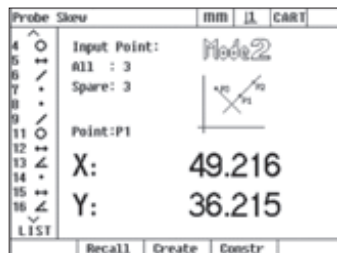


Chart 4.6.2

Coordinate Skew mode 2

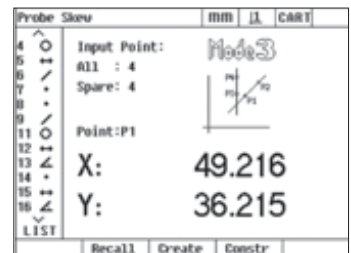


Chart 4.6.3

Coordinate Skew mode 3

Generally, there are the following steps for probe skew:

1. Press measuring key $\oplus$, enter probe skew interface.
2. Select adjustment pattern
3. Collect point coordinate value
4. Press key for finish

4.6.4 Example for Skew

Take mode 2 as an example, introduce adjustment.

1. Press $\oplus$ key, enter probe skew interface. Chart 4.6.4.

2. Next, continuously press $\oplus$, to select skew pattern, here we press once $\oplus$ select patter 2, displays as Chart 4.6.5

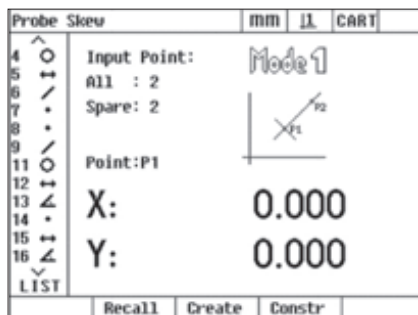


Chart 4.6.4

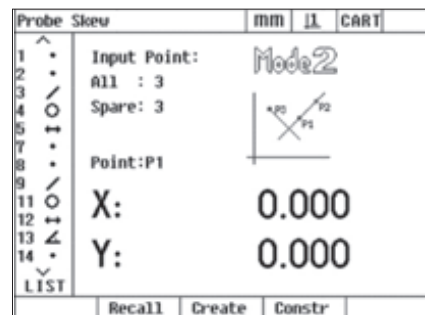


Chart 4.6.5

3. Collect the first point P1, press $\boxed{\text{Enter}}$, wait for input P2 value, chart 4.6.6

4. Repeat step 3, after collected P2、P3, Press $\boxed{\text{Enter}}$. Displays as 4.6.7

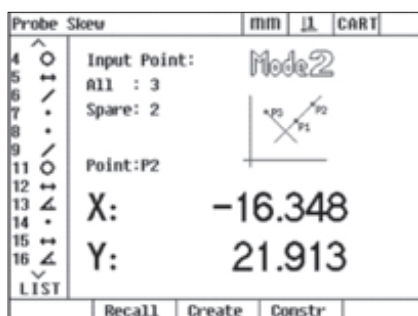


Chart 4.6.6

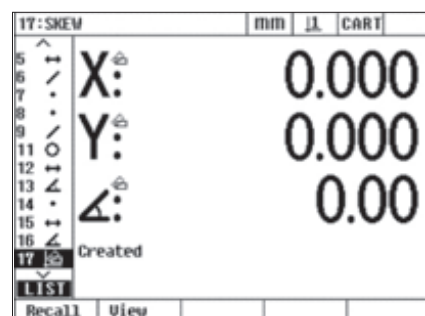


Chart 4.6.7

Cue :

- Input three points, they can't be the same each two. Otherwise after collected the third point, press, it will appear a cue "Measuring Failure"
- We can select step 3 Create corresponding function key or Construct corresponding function key, then Create or Construct skew
(Create relative operation please refer to <DP-300 User's Guide>, <4.3 Create graphic element>);
(Construct relative operation please refer to <DP-300 User's Guide>, <4.5 Construct graphic element>)

4.7 Ports

This section introduces the DP-300 digital readout connect with printer, there are many models of printer, but not all of them are suitable.

Note: Users should check the applicability, link, and transmission setting.

4.7.1 RS 232 Interface

This instrument uses RS 232 interface, its default value is:

Baud 9600

Word Len 8

Stop Bits 1

Parity None

Table 4.7.1 RS232 Interface explanation:

Table 4.7.1 RS232 Interface explanation

Interface No.	Explanation	Direction
2	Data input	Input
3	Data output	Output
5	Data exchange output	Output
6	Data exchange output	Output
7	Earthling signal	Public port
8	Power supply	Output
20	Data exchange input	Input

4.7.2 Ports Cable Connection

Table 4.7.2 Ports Cable Connection

IBM 9 needle	RS 232	Printer
1	DCD	2、6、8、26
2	RX	19
3	TX	21
4	DTR	
5	GND	10-24
6	DSR	
7	TRS	
8	CTS	
9	RI	
0(crust)	GND	10-24

4.7.3 Ports and printer setting

Print width: 32, 40, 80 three choices (Set by standard of printer)

Linage: Setting each page print number of rows

Form feed Option: Set print whether automatically form feed

4.7.4 Printer Output Form

Character “v” means one of the following characters

X, Y, Z, R, D, <, T, A

“d” indicate a number “-” indicate minus “s” indicate blank

Linear figure print format

Factory setting is the metric system, unit: mm

a) Metric System

Position: 1 2 3 4 5 6 7 8 9 10 11 12 13 14

Content: v s s s s - d d d d . d d d

Example 1: X 1 5 9 . 0 0 0

Example 2: R - 1 . 4 6 7

b) English System

Position: 1 2 3 4 5 6 7 8 9 10 11 12 13 14

Content: v s s s s - d d . d d d d d

Example 1: X 0 . 6 2 5 9 8

Example 2: R - 0 . 0 5 7 7 6

Angle Format

Default Value is DD format

a) DD Format

Position: 1 2 3 4 5 6 7 8 9 10 11 12 13 14

Content: v v s s s - d d d d . d d d

Example 1: < 6 0 . 5 0 1

Example 2: A 1 4 7 . 3 5 0

b) DMS Format

Position: 1 2 3 4 5 6 7 8 9 10 11 12 13 14

Content: v v s s - d d d . d d . d d

Example: < 6 0 . 3 0 . 0 3

Example2: A 1 4 7 . 2 1 . 0 0

Introduction of Subject

5.1 How to add probe points in measuring

【Summary】

In DP-300 system, can add probe points in measuring.

【Operation Steps】

1. When in the measuring, to add probe points, can be directly press the corresponding measuring key.

【Example】

Take circle measuring as an example, introduces how to add probe points when in measuring

1. First, enter the circle measuring interface, displays as All: 3, Spare: 3. Chart 5.1.1

2. After input the first point P1, press key, and displays input point: 3, spare: 2. Then input the second point: P2. Displays as 5.1.2

3. If need to add probe points, we can press measuring key  to add probe points. Press  once, displays the input points, All: 4, spare: 3. Displays as 5.1.3

Cue:

- In adding probe points, press  once, number of input points and spare points will automatically add 1, can repeatedly press key.

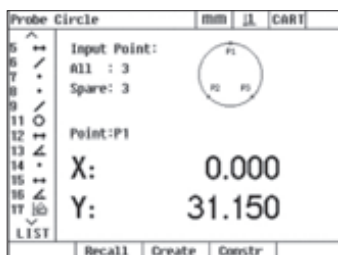


Chart 5.1.1

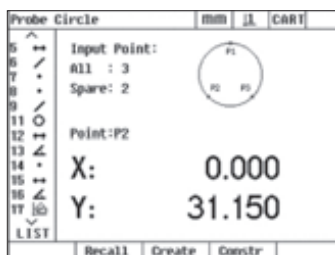


Chart 5.1.2

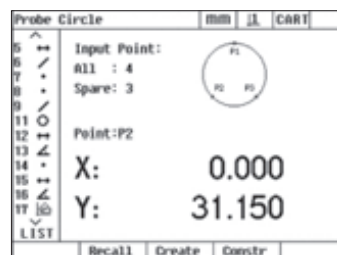


Chart 5.1.3

5.2 When obtain measuring result, how to finish measuring

【Summary】

In DP-300 system, can finish measuring, once obtain the result

【Operation Step】

1. When obtain the measuring result, if need finish measuring, press , immediately finish, result will be displayed.

Cue:

- When measuring multi elements, if press , finish with the first element, then start the second element measuring.

5.3 How to cancel the incorrect probe point data

【Summary】

Use can cancel the prior measuring data, and measure the original position again

【Operation Step】

1. Press , prior measuring data will be canceled.

If repeat press , the point measuring data will be continuously canceled.

5.4 How to cancel a measuring result from list

【Summary】

In D-300 system, can press to cancel a measuring result from list.

【Operation Step】

1. Use direction key  or , select the element which will be deleted, if delete the angle element 6, displays as 5.4.1
2. Press , then appear "Are you sure?" dialog box, then press "Sure" corresponding function key , confirm delete the graphic element 6, displays as 5.4.2, press cancel corresponding key , cancel the delete operation

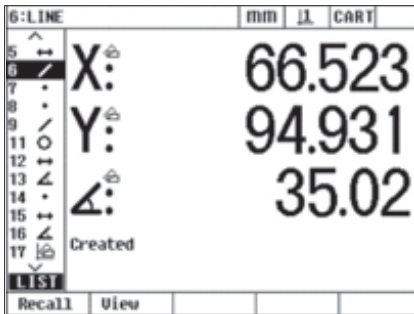


Chart 5.4.1

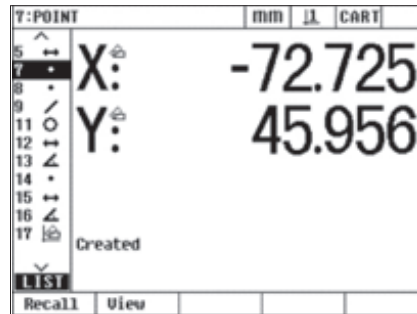


Chart 5.4.2

5.5 How to set axis section Correction value

Take X Axis Section Error Correction as an Example, detailed introduce the operation step of Section Error Correction

1. Enter system setting interface.
2. Press  or  browse menu to select Equalize, displays as 5.5.1
3. Press  then press , Set Section as Correction Type, displays as 5.5.2
4. Press  or , back to Equalize Interface, press  or , select "Section Error Correction" displays as chart 5.5.3

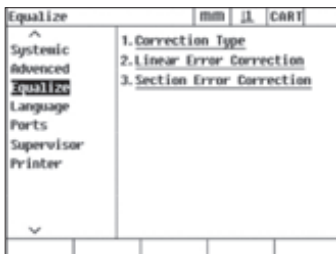


Chart 5.5.1

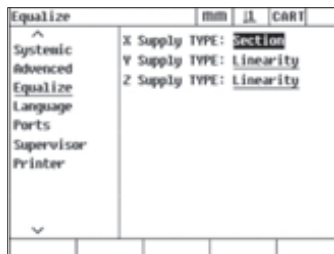


Chart 5.5.2

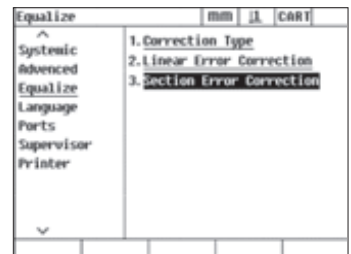


Chart 5.5.3

5. Press , enter Section setting interface, Chart 5.5.4
6. Press , display "seek X axis RI.....", chart 5.5.5
7. Move Linearity, display as chart 5.5.6

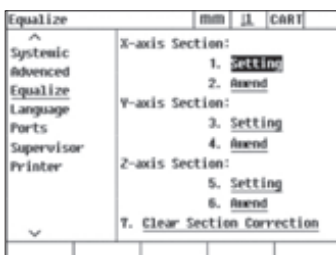


Chart 5.5.4

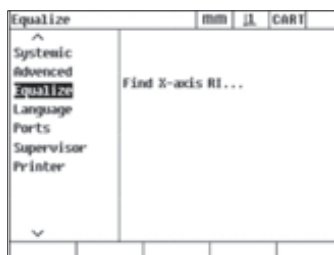


Chart 5.5.5

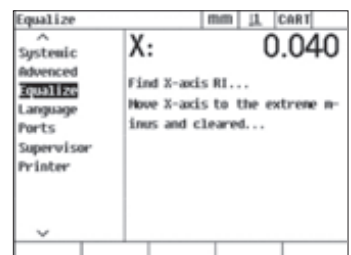


Chart 5.5.6

8. According to cue, move X axis to minus, then press , zero clearing X axis, then enter an interface waiting for input the first Correction point value, Chart 5.5.7

9. Move raster, after set the first point, click  , enter the second point, chart: 5.5.8

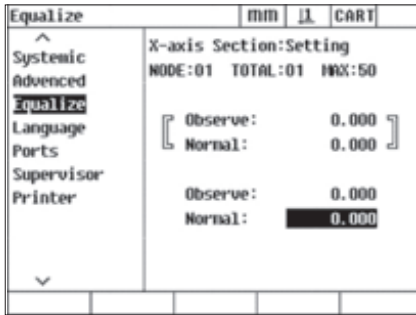


Chart 5.5.7

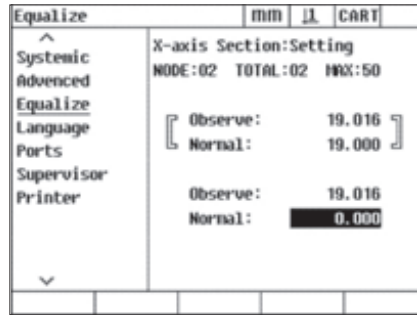


Chart 5.5.8

10. repeat step 8, set other points standard value, max Correction points is 50.

11. After input all the correction points, press  , back to section interface, as Chart 5.5.4

Note:

- This setting can adjust raster measuring result and normal error
- Normal and digital ruler, direction must be the same
- This is the Section of X axis operation step
- If need to set Y axis Equalize value, should press  or  in step 5, until select “set Y axis equalize value”
- When input equalize value, must input from one end to the other end, the direction should better the same with count direction
- For no equalize section, the other display count is: if this point in the front of equalizes section, then apply the first equalize area to equalize, if this point in the back of equalizes section, then apply the last equalize area to equalize. For linearity better, no need to equalize section input standard value.

As chart 5.5.9, the first section no need to equalize, in the practice input the equalize is 0.000. but the second equalize is 20. remember no to input 20 in the first equalize section, from the first equalize point is wrong.

- After select Section, each time of power on requires seek RI (refer to DP-300 operation guide) (4.1.1 How to Power On /Off), now finish the operation step.
- If setting section before, we should press  and  in step 5. select “Amend”, to amend the axis section interface. As chart 5.5.10

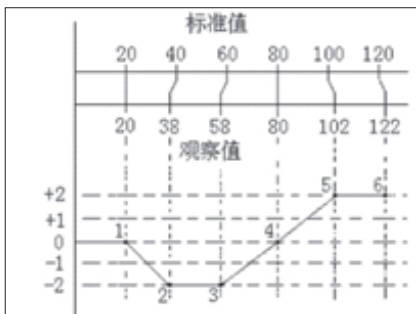


Chart 5.5.9

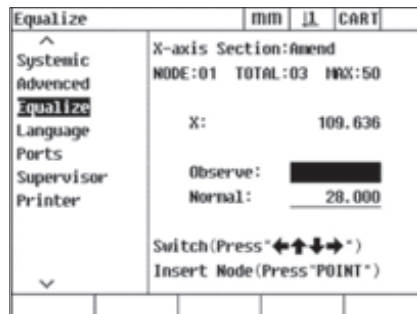


Chart 5.5.10

program function explanation

In DP-300 DRO system, the user is permitted to record the repetitive steps to the procedures, and it is permitted to running the program to finish the repeatable work.

And meanwhile the user can edit, copy and delete the program.

DP-300 DRO system can record total ten procedure documents, and each procedure document can maximum containing 200 piece sentences.

The user can set a procedure document to two running models which is be run once or be run repeatable.

The specific settings method you can reference the content of chapter 6.2

Following is the details introduction of procedure function.

6.1 User's Program Compilation

During record the procedure, it can record the related operate of user. Such as: cleared, delete, measure, preset, construct, coordinate skew, half, print Etc.

The general step of user's procedure record as following:

- 1) Press  the key on the screen, and enter into the interface of the program editor, as show in chart 6.1 .



chart 6.1



chart 6.2



chart 6.3

- 2) In accordance with option, select the related number key, and press number  key, selecting "Record", like the picture 6.2 shows. If the other program has exist in the DRO DP-300 system, please press the down  key and select the blank program to record. Otherwise, it will cover the exist program. Like the picture 6.3 shows.

Enter the number into the bar box, such as the number "one", and press  key, it's going to the record state. (The first number which is entered into the bar box can not be zero, and the maximum is not more than eight numbers.)

- 3) After go into the record, it can go to related operate such as measure, preset, construct circle feature, coordinate skew and so forth, and every operator step is all be recorded one by one.

6.2 User's Program Editing

In the interface of program, if the program of selected in the list is effective, the content of this program will appear in right window, and meanwhile it can use the "editor" key go into the editing status, and find the content of the program.

- 1) Press  key, like the picture 6.4 shows, and then press number  key, the small LCD screen will show the steps of the recording. Press up key  and  down key, the operator can see the specific step of the recording. Like picture 6.5 shows.



chart 6.4



chart 6.5

3) The current row is the first row, the user press the “Enter” key, it can amend the run model of the current program, if the model of the running is running once, it shows as 6.5 picture. If the model of the running is running recycling, it shows as 6.6 pictures.

With regards to the meaning of the symbol and number of the directive statement, the operator can review the specification in charter 6.4



chart 6.6

6.3 User’s Program Execution

The directive statement of the program has been run automatically. For the directive which is the calculated result direct, the flash screen will be seen when the program is running. If the directive asking the user go to operate, the directive will stop running at once, and waiting for input of user. The most directive can calculate the results immediately, For instance, preset, construction, cleared, print, half and so on. Only the measure directive is necessary for the user go to operate.

6.4 Example of User’s Program

For instance 1, the user program 2: measure the distance of the two circles.

1) Return to the normal status, press **Program** key, like the picture 6.4 shows. Press down **↓** key, and set up to the second program document, and then press number **①** key, and put into the name of user, for example: “2” as show in chart 6.7



chart 6.7

2) Press **Enter** key and enter into recording, as show in chart 6.8 . Select and press **⌂** key, the interface of measure distance will appear. Press down **↓** key and select the fourth option, then step into the interface of measure circle to circle distance. The “REC” mark will appear in the upper right corner, like the picture 6.9 show.

3) Sampling the six points coordinates respectively, get two circles, and measure the distance of theirs. The measure results as show in chart 6.10

4) Press **Quit** key, return to the current interface of coordinates, and then press **Quit** key quit recording, like the picture 6.11 shows.



chart 6.8

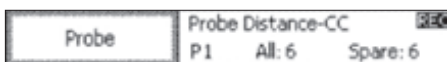
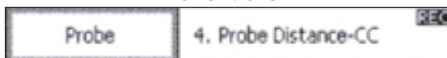


chart 6.9

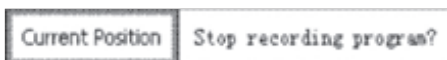


chart 6.11



chart 6.10

For example 2 the program of user: it including many functions such as preset, measure, construction, print, reset, half, delete, coordinate skew, clear and so forth. In additional, this program can be operated repeatable after finished the foresaid operate, and the specific operate step as following:

- 1) Return to the normal status, press  key and the interface will appear like picture 6.4 show. Press down  key and position the third program document, and then press number  key, put into the program name of user, for instance “3” (The specific operate step please see the procedure record of user)
- 2) The recording step including: Preset point 28, measure point 29, measure point 30, construct distance 31, print current circle feature 31, print current coordinates, cleared X-axis(Current Coordinates), cleared Y-axis(Current Coordinates), half X-axis, delete circle feature 25, measure and probe skew 32, clear all. The finished interface of record as show in picture 6.12

Edit Program	001 Start 1.Record 2.Run	Edit Program	016 Clear X axis Current Position 1.Record 2.Run
Edit Program	002 Create Point 28 1.Record 2.Run	Edit Program	017 Clear Y axis Current Position 1.Record 2.Run
Edit Program	007 Probe Point 29 (Pts=01) 1.Record 2.Run	Edit Program	018 Half X axis 1.Record 2.Run
Edit Program	009 Probe Point 30 (Pts=01) 1.Record 2.Run	Edit Program	019 Delete feature 25 1.Record 2.Run
Edit Program	011 Constr-Distance 31 02 1.Record 2.Run	Edit Program	020 Probe Skew 32 (Pts=02) 1.Record 2.Run
Edit Program	Σ: 28 30 1.Record 2.Run	Edit Program	022 Clear All 1.Record 2.Run
Edit Program	014 Print feature 31 1.Record 2.Run	Edit Program	023 End 1.Record 2.Run
Edit Program	015 Print Current Position 1.Record 2.Run		

chart 6.12

In chart 6.12, the first column figures show that the function of instruction in the location of procedure. For instance: “011” construct distance 31 02 Σ:28 30 The number 011 indicator that the location of this program instruction is eleven; The second column description words show that the achieve function of instruction; The third column number show that the circle feature in location of list or distinction current coordinates and non-current coordinates; The fourth column expression and number show that required number of parameters to achieve the function, if the construct number of parameters is more than ten, it only show ten numbers of parameters, and the spare parameters will be ignored. The fifth, sixth column number show that the selected the circle feature 28 and circle feature 30 during constructing.

- 3) After finished the record, if the operator need to run the program of aforesaid recycling, in the interface of editor program, when the cursor enter into the line of “Start” press key, the letter “Recycling operation” will appear like picture 6.6 show. If selected this function, after the program

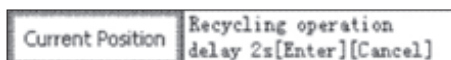


chart 6.13

has been run once, the dialog box 6.13 will be shown.

If this dialog box is appear, it means the program has been run once. The user canpress “ENTER” key and run the program from scratch again, and can press “CANCEL” key and cancel run program. If the user does not take any operate, after two seconds, the program will be run from scratch automatically.

Appendix

7.1 Output Symbol List

Output symbol data processor obtain the relative data, as chart 7.1.1

Table 7.1 .1

Output Symbol	Meaning	Display	Graph explanation
X	X-Axis coordinate	X:	
Y	Y-Axis coordinate	Y:	
R	polar coordinates radial distance	R:	
A	polar coordinates angle	A:	
D	Circle diameter	D:	
r	Circle radius	r:	
A1	Two elements form an angel (internal angle)	A1:	
A2	Two elements form an angel(180° -A1)	A2 :	
A3	Two elements form an angel(180° +A1)	A3:	
A4	Two elements form an angel(360° -A1)	A4:	
F1	True value	F1:	
F2	Really roundness	F2:	
XΔ	X axis coordinate adjustment	XΔ:	
YΔ	Y axis coordinate adjustment	YΔ:	
DT	Two elements center to center distance	DT:	
MaxDT	Max distance between two element	MaxDT:	
MinDT	Min. distance between two elements	MinDT:	

7.2 Compression BCD Format

PC send out a character "R", this digital box received a "R", immediately send back 17 byte to PC, the following are the 17 byte:

Byte 1st: Head = 0x0fe (hex value)

Byte 2nd: sign bit Bit 7—Bit 5=0 (reserved)

Bit 4: 0 (metric system mm), 1 (English system inch)

Bit 3:(reserved).

Bit 2: Z Axis sign bit, 0 means "+", 1 means "-"

Bit 1: X Axis sign bit, 0 means "+", 1 means "-"

Bit 0: Y Axis sign bit, 0 means "+", 1 means "-"

Byte 3rd: status bit (indication error)

Bit 7—Bit 4 = 0 (reserved)

Bit3: In measuring press  or trample foot switch is 1

Bit2: Z axis status, 0 means OK, 1 means ERROR

Bit1: Y axis status, 0 means OK, 1 means ERROR

Bit0: X axis status, 0 means OK, 1 means ERROR

Byte 4th-7th: X axis value, apply compression BCD format:

X-value = $B4 + B5 * 10^2 + B6 * 10^4 + B7 * 10^6$

Eg: Assume X axis value is -1.234

Byte 8th-11th: Y axis value, apply compression BCD format

Y-value = $B8 + B9 * 10^2 + B10 * 10^4 + B11 * 10^6$

Byte 12th-15th: Z axis value, apply compression BCD format

Z-value = $B12 + B13 * 10^2 + B14 * 10^4 + B15 * 10^6$

Byte 16th-17th: check sum, compression BCD format

$B17, B16 = B2 + B3 + B4 + B5 + B6 + B7 + B8 + B9 + B10 + B11 + B12 + B13 + B14 + B15$

B16.Bit0: is the check sum's least significant bit

B17.Bit7: is the check sum's most significant position

Note:

Don't care the inexistent axis value, eg:

If Byte 8th-11th Value is Y-value, then 4th -7th and 12th -15th no use

B4: is the forth byte, the others similar

From B4 TO B17 is the compression BCD format

7.3 ASCII Character Format

By PC send out a character 'S', this digital received a 'S', immediately back to PC 70 characters

1. The first 10 characters as follows:

Byte: 0 1 2 3 4 5 6 7 8 9

Symbol: S : s s s s s \r \l



The first character 'S' means head, the later 's' means blank, '\r' means enter, '\l' means line break.

2. the later 60 characters, X、Y、Z separately hold 20 byte, eg :

Byte	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
Character	X	:	s	s	s	S	x	x	x	x	x	x	x	s	m	m		s	\r	\l
Eg:	X	:				-	3	0	.	0	5	3			m	m			\r	\l

Byte	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49
Character	Y	:	s	s	x	X	x	x	x	x	x	x	x	s	m	m	s	s	\r	\l
Eg:	Y	:					3	2	7	.	5	9	2		m	m			\r	\l

Byte	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69
Character	Q	:	s	s	x	X	x	x	x	x	x	x	x	s	s	s	s	s	\r	\l
Eg:	Q	:						1	2	8	.	8	3						\r	\l

Explanation :

X axis from 10 to 29 byte, Y axis from 30 to 49 byte, Z axis from 50 to 69 byte.

No.24 and 25, the unit always mm (metric system) or in (English system), Y axis is No.44 and 45, Q axis without unit.

Capital letter X means X axis, lowercase letter and symbol, decimal point bite is total 9 byte, Lowercase S means blank, "\r" means Enter, "\l" means new line, these two characters always locate in No.28 and 29, Y axis is No.48 and 49, Q axis is No. 68 and 69

Example X axis is -30.053mm, Y axis 327.592mm, Q axis:128.83.

PC send a character 'S', After received 'S' then send 70 to PC

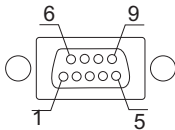
7.4 Data output format

The output format of data is print output.

7.5 Kinds of Signal Connect Interface

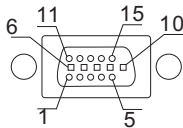
7.5.1 Raster Connect Signal

1) 9PD socket



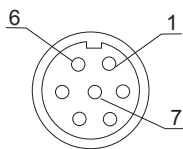
No.	Signal	Wire color
1	+5V	red
2	0V	black
3	A+	grown
4	B+	yellow
5	ABS+	orange
6	NC	
7	NC	
8	NC	
9	FG	mesh grid

2) 15PD socket(Optional)



No.	Signal	Wire color
1	+5V	red
2	0V	black
3	A+	grown
4	B+	yellow
5	NC	
6	FG	mesh grid
7-14	NC	
15	ABS+	orange

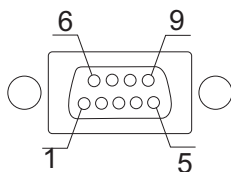
3) 7PD socket(optional)



No.	Signal	Wire color
1	0V	black
2	NC	
3	A+	grown
4	B+	yellow
5	+5V	red
6	ABS+	orange
7	FG	mesh grid

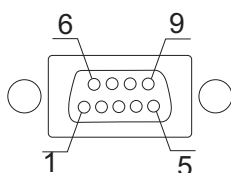
9PD socket is the standard outfit, 15PD socket and 7PD socket is option

7.5.2 RS232 Signal Interface



No.	Signal	Wire color
1	NC	
2	TXD	yellow
3	RXD	orange
4	NC	
5	GND	brown
6	NC	black
7	NC	red
8-9	NC	

7.5.3 Foot Switch

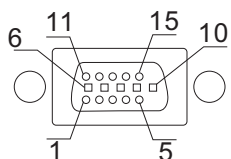


No.	Signal	Wire color
1	FT1_1	red
2	FT1_2	red
3	FT2_1	brown
4	FT2_2	brown
5	EXTO_PLUS	yellow
6	EXTO_RIN	orange
7	EDGE_PS	blue
8	EDGE_GND	black
9	NC	

7.5.4 Printer Connect Interface

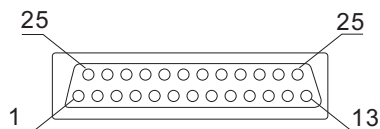
15PD Socket is standard outfit, 25PD option

1) 15PD socket



No.	Signal	Wire color
1	STROBE	red
2	D0	brown
3	D1	yellow
4	D2	orange
5	D3	blue
6	D4	purple
7	D5	grey
8	D6	white
9	D7	green
10	ACK	pink
11	BUSy	azure
12-15	GND	black

1) 25PD socket (Optional)



No.	Signal	Wire color
1	STROBE	red
2	D0	brown
3	D1	yellow
4	D2	orange
5	D3	blue
6	D4	purple
7	D5	grey
8	D6	white
9	D7	green
10	ACK	pink
11	BUSy	azure
12	GND	black
13-17	NC	
18-25	GND	black

7.6 Specification

Model	DP300
Order#	561-301
Weight	About 1.5 Kg
Dimensions	196mm x 287mm x 56mm
Input voltage range	100V - 240V
Max power	15W
Working Temperature	0 °C - 40 °C
Storage Temperature	-20 °C - 40 °C
relative humidity	< 90%
coordinate	3 Axis
Operation Keyboard	Seal film touch keyboard
Raster interface	9PD/15PD
Raster signal	Orthogonal TTL Square wave, the drive capability is more than 10mA.
Raster resolution	Adjustable (0.1 μm、0.2 μm、0.5 μm、1 μm、2 μm、5 μm)
RS232	9P D-Model bond, <-5V('1'), >+5V('0')
Printer Port	Centronix Interface
Foot Switch Interface	Contact mode short circuit
Printer	Option

