SURFACE GRINDERS

- AD1&ADC (H4X) INSTRUCTION MANUAL -

Models for AD1: PSGS, PSGC, PSGO, and PSGP

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WARNING: Please read this manual before using the unit

Introduction of the functions and features of the ADC & AD1 controllers.

FEATURES

General

- 1~2 Controlled Axis – X, Y.
- Voltage-Driven Servo System with Max. Response Speed Of 500kpps (I.E.30 Meters/Min With 1µresolution)
- 32k Of Program Memory, Expandable To 220k (option).
- Battery Backup.
- MCM (Machine Constants)Parameters For Setting Machining Requirements.
- Backlash Error Compensation.
- Continuous Program Execution or Single Block At A Time.
- Option Skip.
- Position Stop and Feed-Hold Function.
- Interchangeable Absolute Or Incremental Coordinates In Programming.
- Self-Diagnostics and Error Function.
- Master/Slave Mode.
- Internal Programmable PLC To Suit Your Requirement (special option).
- Interface For MPG Hand-Wheel.
- Standard Di: 24, D0: 16, Expandable To I/O-48/32.

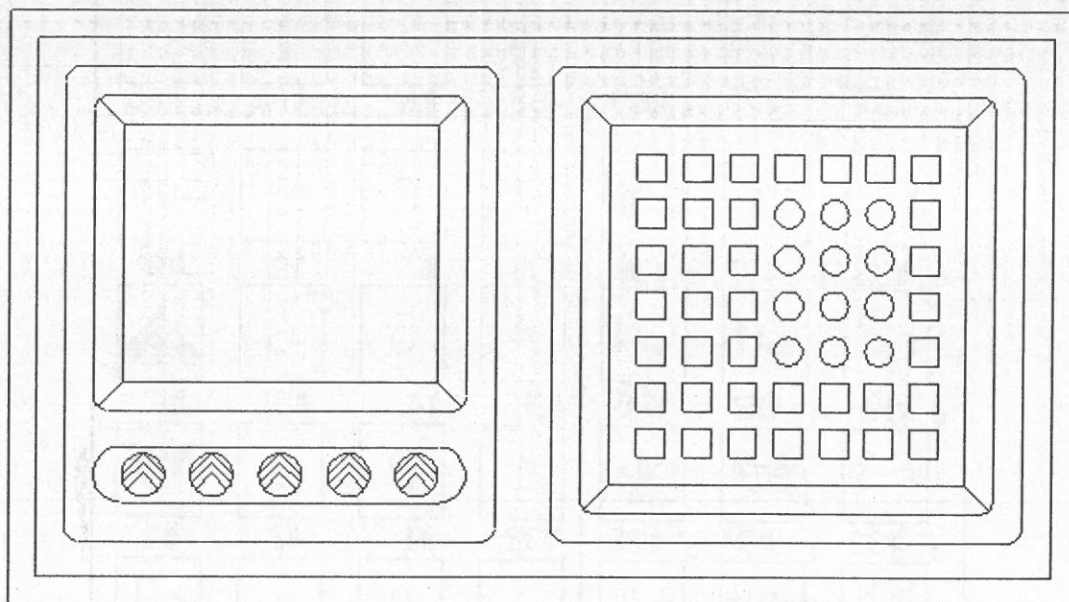## Main Features of AD1 Computerized Command Control System:

- Automatically rapid approach to the surface of working piece for the proper position.

- Least command increment 0.001mm (0.0001").

- Total stock removal resolution up to 99999μm.

- Total fine feed stock removal   resolution up to 99999μm.

- Setting of "spark -out" grinding: up to 999 passes.

- Selectable wheelhead retract clearance at job completion for convenient workpiece loading and unloading: up to 300mm (9.9inch).

- Pause grinding function during grinding cycles via "HOLD" button.

- Cycle end modes:

     a. Spindle motor off

     b. Hydraulic motor off

     c. Power off

after the grinding processes is completed.
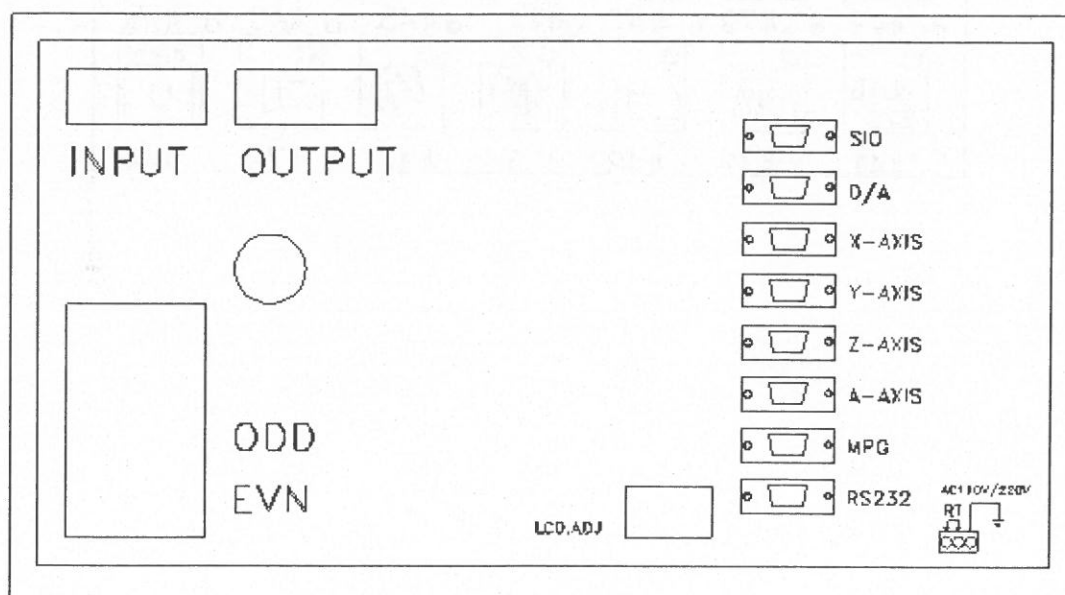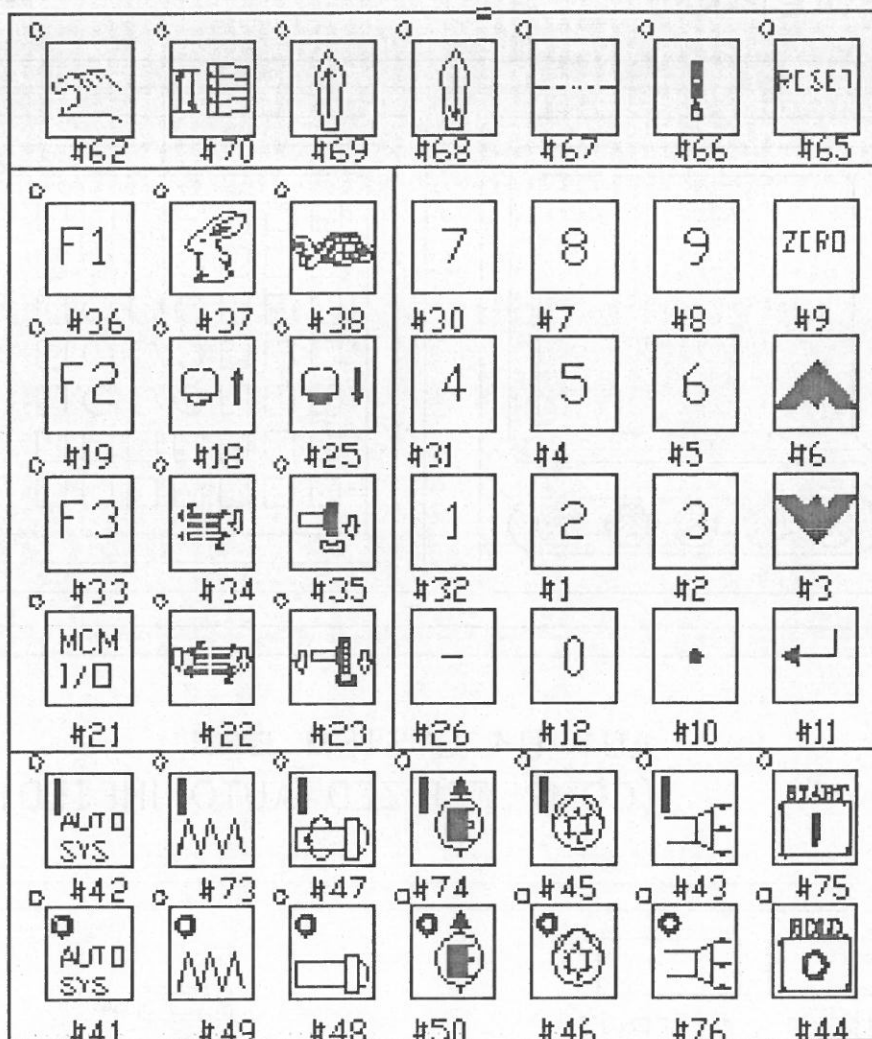
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A. CONSOLE PANEL

AD1 H4 SYSTEM 控制器
(COMPUTERIZED AUTO INFEED)

#62	#70	#69	#68	#67	#66	RESET #65
F1 #36	#37	#38	7 #30	8 #7	9 #8	ZERO #9
F2 #19	#18	#25	4 #31	5 #4	6 #5	#6
F3 #33	#34	#35	1 #32	2 #1	3 #2	#3
MCM I/O #21	#22	#23	– #26	0 #12	• #10	↵ #11
AUTO SYS #42	#73	#47	#74	#45	#43	START #75
AUTO SYS #41	#49	#48	#50	#46	#76	HOLD #44

FUNCTIONS OF PANEL

#11: Enter.

#9: Set-up switch for initial working position.

#37: Rapid upward/downward movement.

#38: Slow upward/downward movement.

#18: Wheel rapid upward movement function.

#25: Wheel rapid downward movement function (push#25 & SB40 (SA40) together).

#34: Single-direction surface grinding mode.

#22: Bi-direction surface grinding mode.

#35: Single-direction plunge grinding mode (complete stroke).

#23: Bi - direction plunge grinding mode (complete stroke).

#65: System reset.

#75: Start AD1 cycle and release auto grinding modes.
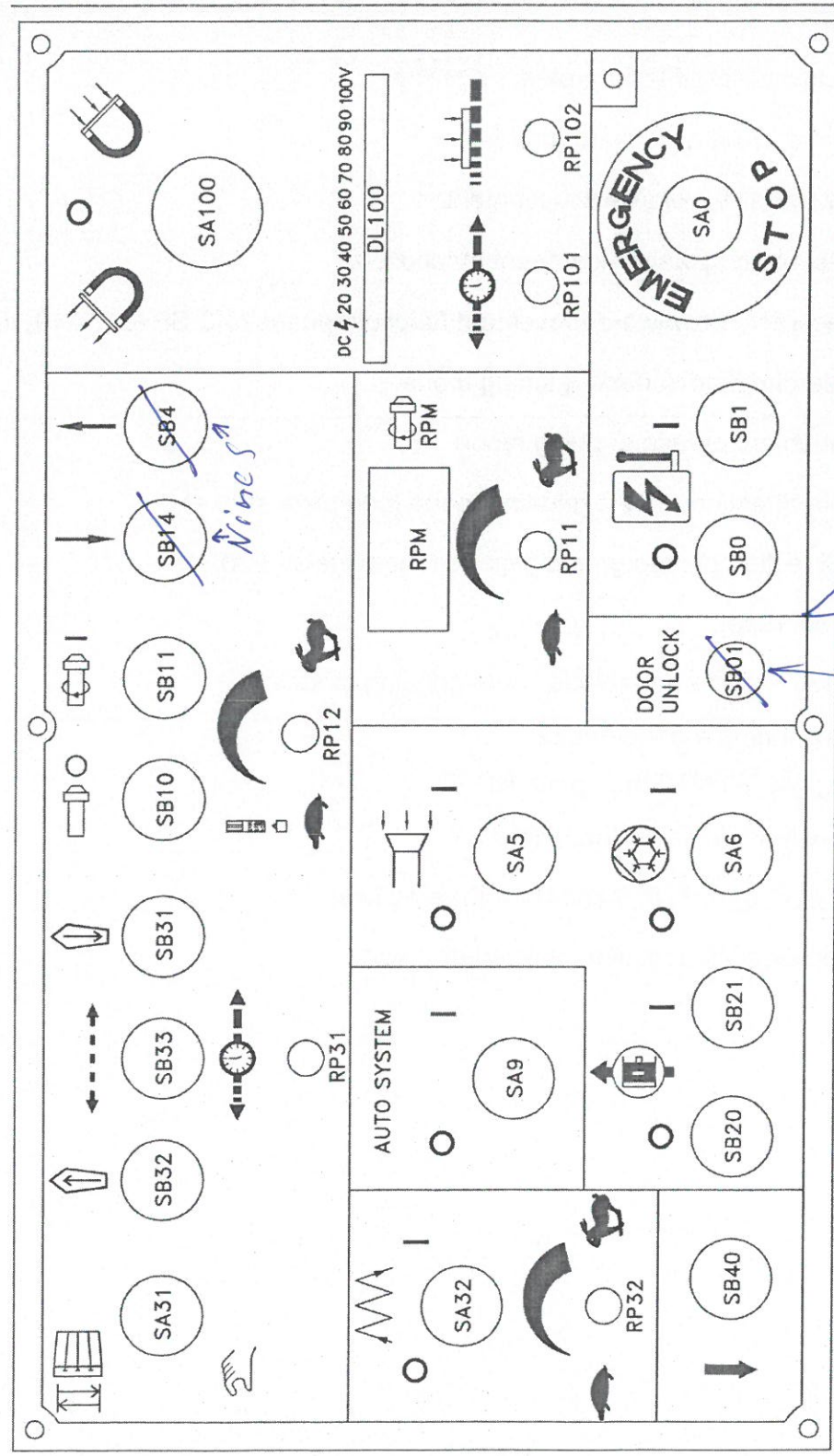
#44: Auto grinding modes freeze.
First push START, then push HOLD.

#66: Auto wheel dressing (options).

1, 2, 3, 4, 5, 6, 7, 8, 9 and 0: Numbered keys

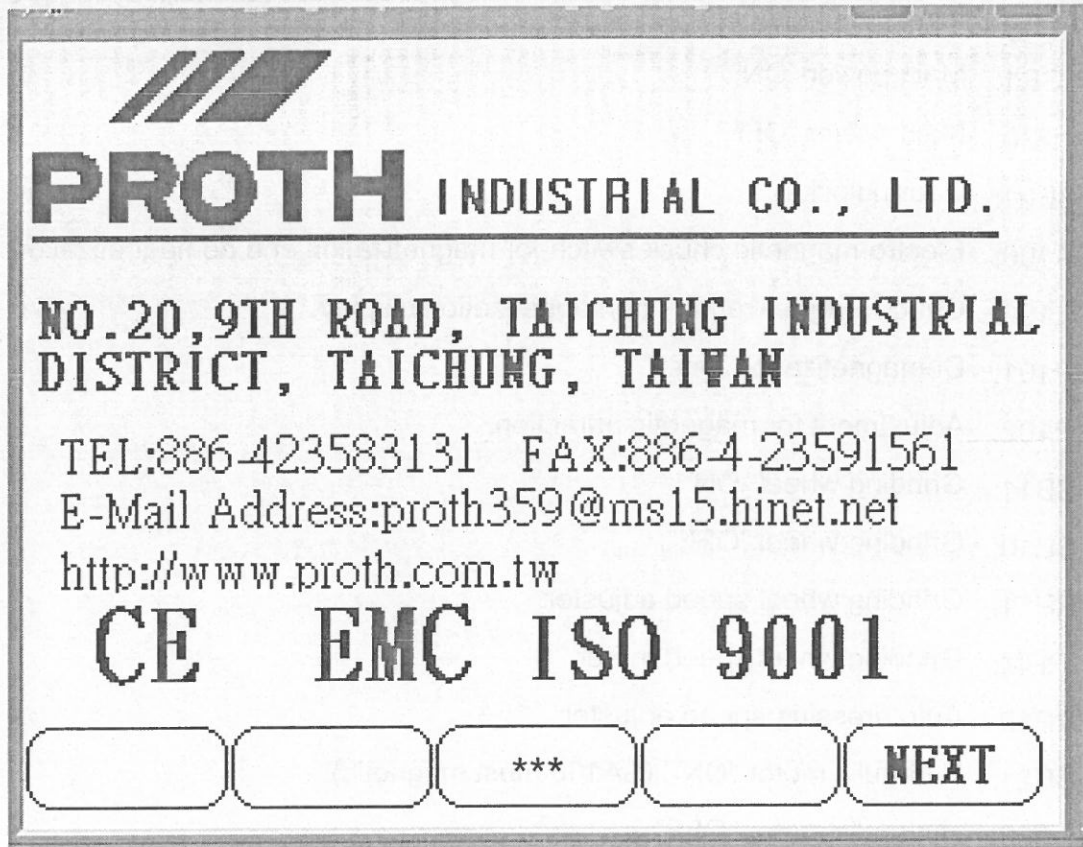Other keys: No function, only led display.

CONTROL PANEL

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FUNCTIONS OF PANEL

SA0: Emergency stop.

SB1: Main power "ON".

SB0: Main power "OFF".

SB01: Door unlock.

SA100: Electro-magnetic chuck switch for magnetization and demagnetization.

DL100: Chuck magnetization / demagnetization display.

RP101: Demagnetization time.

RP102: Adjustment for magnetic attraction.

SB11: Grinding wheel "ON".

SB10: Grinding wheel "OFF".

RP11: Grinding wheel speed adjuster.

RPM: Grinding wheel speed meter.

RP12: Auto dressing speed adjuster.

SB21: Hydraulic motor "ON". (SA100 must magnetic)

SB20: Hydraulic motor "OFF".

SA31: Auto / manual cross feed selections.

SB31: Cross feed forward button.

SB32: Cross feed backward button.

SB33: Cross feed stroke adjuster by electronic one touch system.

RP31: Cross feed rate adjuster.

SA32: Criss-Cross grinding switch.

RP32: Criss-Cross speed adjuster.

SB4: Button for grinding wheel upward movement.

SB14: Button for grinding wheel downward movement.(Press SB40 & SB14 together)

SB40: Button for grinding wheel downward movement.(Press SB40 & SB14 together)

SA5: Dust suction "ON" / "OFF".

SA6: Coolant system "ON" / "OFF".

SA9: Servo system "ON" / "OFF".

B. SCREEN PICTURES

B-1 Front Page

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CE EMC ISO 9001

***   NEXT

NEXT: Next Page (Main Page)

*** In the middle of push button, you can select the different languages.

B-2 Main Page

```
 ⊕           -0000.000                    mm

 TOTAL STOCK REMOVAL          00000    𝓊

 FINE FEED STOCK REMOVAL      00000    𝓊

 ROUGH FEED RATE                000    𝓊

 FINE FEED RATE                 000    𝓊

 SPARK OUT TIMES                000   TIMES

 WHEELHEAD RETRACT CLEARANCE    000    mm
 AT JOB COMPLETION

 ↕×10   BRIGHT   MPG   ▭▯ ⬆   NEXT
```
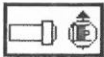
↕ X10:   Intermittent feed selections (x1,x5,x10,x100)
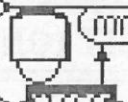
BRIGHT: Screen protection. Press any key to recover the screen.

MPG: MPG.

▭▯ ⬆ :   Selectable power off, spindle motor off, hydraulic motor off after the grinding processing is completed

NEXT: To cycle set-up page.

B-3 Cycle Set-Up Page

```
┌─────────────────────────────────────────────────────┐
│  ⇕×10   BRIGHT   MPG   ▭  🔼   ⋮≡⋮                     │
│  ⊕        -0000.000                            mm     │
│  TOTAL STOCK REMOVAL    00000                  u      │
│  ROUGH FEED    000    MUL    00000                    │
│  PROCESS                                              │
│  FINE FEED     000    MUL    00000                    │
│  PROCESS                                              │
│  SURPLUS       000    SURPLUS       000               │
│  ROUGH FEED           FINE FEED                       │
│  SPARK OUT     000    (mm)    00000                   │
│  PROTH   BRIGHT   HDC              NEXT               │
└─────────────────────────────────────────────────────┘
```

PROTH: To front page.

BRIGHT: Screen protection. Press any key to recover the screen.

HDC: To dressing times setting page. (options)

NEXT: Back to main page.

MUL: Multiply. (rough feed / fine feed grinding times)

【Example】 Cycle Set-Up Page

↕	BRIGHT	MPG	⬛◻ ⬆	↓▤↓

✛	0.000	mm

TOTAL STOCK REMOVAL	200	μ

ROUGH FEED PROCESS	5	MUL	15
FINE FEED PROCESS	3	MUL	8

SURPLUS ROUGH FEED	0	SURPLUS FINE FEED	1
SPARK OUT	0	⬛(mm)	0

PROTH	BRIGHT	HDC		NEXT

- Rough feed process 0.005mm, totally 15 times.
- Fine feed process 0.003mm, totally 8 times.
- Surplus fine feed 0.001mm for one time
- Press HDC to enter into wheel dressing setting page.

B-4 Wheel dressing Setting Page

```
┌─────────────────────────────────────────────┐
│                   HDC                         │
├─────────────────────────────────────────────┤
│  ROUGH DRESSING TIMES        00               │
├─────────────────────────────────────────────┤
│  FINE DRESSING TIMES         00               │
└─────────────────────────────────────────────┘




┌──────┐┌────────┐┌──────┐┌────────┐┌────────┐
│      ││ BRIGHT ││      ││  ADC   ││  NEXT  │
└──────┘└────────┘└──────┘└────────┘└────────┘
```

- ROUGH DRESSING TIMES:

  How many times of rough grinding to do one time of rough wheel dressing.

- FINE DRESSING TIMES:

  How many times of fine grinding to do one time of fine wheel dressing.

BRIGHT: Screen protection. Press any key to recover the screen.

ADC: To auto dressing page.

NEXT: Back to cycle set-up page.

【Example】 Wheel dressing Setting Page

```
┌─────────────────────────────────────────┐
│                  HDC                      │
├─────────────────────────────────────────┤
│  ROUGH DRESSING TIMES        10           │
├─────────────────────────────────────────┤
│  FINE DRESSING TIMES          3           │
└─────────────────────────────────────────┘
```

```
┌──────┐┌────────┐┌──────┐┌──────┐┌────────┐
│      ││ BRIGHT ││ ADC  ││      ││  NEXT  │
└──────┘└────────┘└──────┘└──────┘└────────┘
```

- Rough dressing time sets 10. That is every time when rough grinding process reaches 10 times then wheel dressing is actuated one time.
- For example, on page 13, rough feed process 0.005mm, totally 15 times. The rough dressing wheel is actuated only 1 time.

- Fine dressing time sets 3.   That is every time when fine grinding process reaches 3 times, then wheel dressing is actuated one time.
- For example, one page 13, fine feed process 0.003mm, totally 8 times. Therefore, the fine dressing times is actuated for 2 times.
- Should rough dressing time or fine dressing time set   "0", the wheel dressing won't be actuated neither rough grinding process nor fine grinding process.

- Press ADC to enter into auto dressing page.

B-5 Auto Dressing Page (Option)

```
                    A D C

    ⊕           -0000.000          mm

 TOTAL DRESSING REMOVAL      0.00

 ROUGH FEED RATE  0.00     MUL  000

 FINE FEED RATE   0.00     MUL  000

 SPARK OUT TIMES               000

 WHEEL COMPENSATION        0.00  mm

 [ ]POWER  BRIGHT   [ ]↑    ↓[ ]   NEXT
```

- ROUGH FEED RATE: Rough dressing rate per time.
- FINE FEED RATE: Fine dressing rate per time.

    [ ]POWER.   Diamond dressing on.

    BRIGHT: Screen protection. Press any key to recover the screen.

    [ ]↑ :   Diamond dresser up.

    ↓[ ] :   Diamond dresser down.

    MUL: Multiply. (diamond rough dressing / fine dressing times)

    NEXT: Back to cycle set-up page.
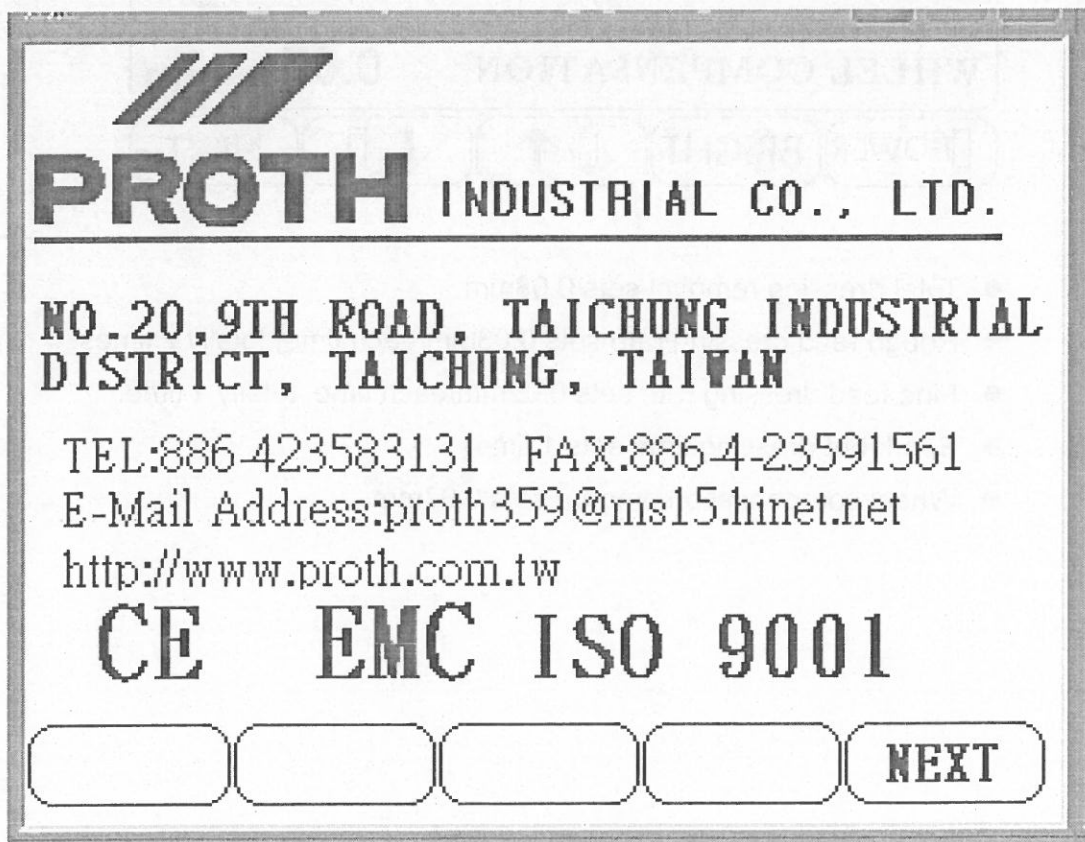
【Example】 Auto Dressing Page (Option)

ADC	
⊕	mm
TOTAL DRESSINGREMOVAL	0.08
ROUGH FEED RATE 0.03 MUL	2
FINE FEED RATE 0.02 MUL	1
SPARK OUT TIMES	1
WHEEL COMPENSATION 0.07	mm

(⬛POWER)(BRIGHT)(⬛ ↑)(↓ ⬛)(NEXT)

- Total dressing removal sets 0.08mm.
- Rough feed dressing rate sets 0.03mm/each time, totally 2 times.
- Fine feed dressing rate sets 0.02mm/each time, totally 1 time.
- Spark out dressing time sets 1 time.
- Wheel compensation amount sets 0.07mm.

C. GENERAL INSTRUCTIONS

**How to energize AD1 system

1. Release Emergency Stop SA0.

   · Follow arrows'direction on the button.

2. Turn SA9& SA31 clockwise to make AD1 Auto System ON.

   · Servo motor for up/down movement will be in Hold situation.

3. Turn SA100 clockwise to magnetize chuck.

   · HL100 is light.

4. Push SB1 to pop up "Front Page".

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
CE   EMC   ISO 9001

NEXT

5. Push the button below "NEXT" to "Main page"

6. Push the button below "NEXT" to "Cycle set up page" & start to set up grinding amount and cycles.

7. Push #37 / #38 for wheel rapid/slow movement.

8. Push #18 / (#25 & SA40) for wheel upward / downward movement.

9. Please follow the procedure on the next page.

C-1 Main Page

```
┌─────────────────────────────────────────────┐
│  ✦          -0000.000              mm         │
├─────────────────────────────────────────────┤
│  TOTAL STOCK REMOVAL      00000     μ         │
├─────────────────────────────────────────────┤
│  FINE FEED STOCK REMOVAL  00000     μ         │
├─────────────────────────────────────────────┤
│  ROUGH FEED RATE           000      μ         │
├─────────────────────────────────────────────┤
│  FINE FEED RATE            000      μ         │
├─────────────────────────────────────────────┤
│  SPARK OUT TIMES           000    TIMES       │
├─────────────────────────────────────────────┤
│  WHEELHEAD RETRACT CLEARANCE 000   mm         │
│  AT JOB COMPLETION                            │
├─────────────────────────────────────────────┤
│  ↕×10  BRIGHT   MPG   ▭ ◉      NEXT           │
└─────────────────────────────────────────────┘
```

Input each value for total stock removal, fine feed stock removal, rough feed rate, fine feed rate, spark out times and wheelhead retract clearance at job completion.

NEXT: Press to access to Cycle Set-Up page.

[↕] : Press to access to intermittent feed selections (X1, X5, X10, X100), with a picture [↕× 1], the rapid up/down of the servo motor will be cancelled. Press the wheel up/down bottom and the spindle will move 1μm per time. Continue to press this bottom and it appears in order [↕× 5] (5μm), [↕×10] (10μm), [↕] (continuous). Press **RESET** to resume [↕] .
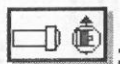
MPG: Press to start handwheel mode, with an inverse white MPG.

The step move mode start at the same time, [↕] changes

to [↕× 1]. Handwheel mode is selectable as [↕× 1],

[↕× 5], [↕×10]. Press MPG again or press RESET to

cancel. Press START to perform the program will cancel the

step move and handwheel modes as well. (The hardware of

this mode is optional, while the software is available)

Selectable power off, spindle motor off, hydraulic motor off

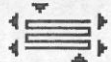after the grinding processing is completed.

About parameters:
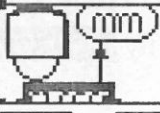
- Total stock removal resolution up to 99999μm.
- Total fine feed stock removal resolution up to 99999μm.
- Maximum rough feed grinding resolution up to 100μm per pass.
- Maximum fine feed grinding resolution up to 10μm per pass.
- Selectable spark-out passes up to 999 times.
- Maximum wheel head retract up to 999 mm.

If the selection switch is not at AUTO SYSTEM ON, the program can not start by
START.

If fine grinding reserve > 0, the minimum fine feed grinding resolution is 1μper
pass, which can not be 0μ.

Minimum fine feed grinding resolution is 1μ.

C-2 Cycle Set-Up Page

```
┌─────────────────────────────────────────────────────┐
│  [↕×10] [BRIGHT] [MPG] [⊏⊐ ⬆] [≡]                    │
│                                                       │
│  ⊕        -0000.000                        mm        │
│                                                       │
│  TOTAL STOCK REMOVAL      00000              μ        │
│                                                       │
│  ROUGH FEED    000    MUL    00000                   │
│  PROCESS                                              │
│                                                       │
│  FINE FEED     000    MUL    00000                   │
│  PROCESS                                              │
│                                                       │
│  SURPLUS       000    SURPLUS       000              │
│  ROUGH FEED           FINE FEED                       │
│                                                       │
│  SPARK OUT     000    (mm)  00000                    │
│                                                       │
│  [PROTH] [BRIGHT] [HDC] [   ] [NEXT]                 │
└─────────────────────────────────────────────────────┘
```

Finish input processing number value at main page, press START to enter auto feeding system and cycle set-up page, and it will be locked forcibly until the auto feeding finished or press RESET.

The grinding schedule is the contrast of the already feed and the total grinding quantity resolution.

HOLD: Press to access to the program pause page, the button is available only during the program performing period.

BRIGHT: Press and shows a inverse white BRIGHT, means the screen light is on. Normally, the light will be off in five minutes without touch any control button, while the program performing will not suspend. Press any button to light when it is off.
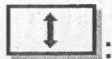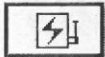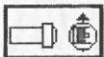
$\boxed{\updownarrow}$: During the auto feed program, if the feed set is insufficient or over, press this button to suspend, and the step-move mode starts at the same time, it is available to select $\boxed{\times 1}$, $\boxed{\times 5}$, $\boxed{\times 10}$ to compensation or withdraw. When it shows in order the program will continue to perform automatically. Or press $\boxed{\text{START}}$ to finish it, the button is available only in the program performing.

To select the items needed to stop when the program finishes.

Items are: $\boxed{}$ power, $\boxed{}$ spindle, $\boxed{}$ tank,

$\boxed{}$ spindle and oil tank.

$\boxed{\text{NTXT}}$: Before the program $\boxed{\text{START}}$ or after the program ends, press the button to back to the main page. During the program, this button is replaced by $\boxed{\text{IN PROGRAM}}$ and could not back to the main page.

D. OPERATION

### D-1 Manual operation mode

D-1-1 Continuous rapid / slow movement

D-1-1-1 Speed:

Rapid speed – press: 🐰

Slow speed – press: 🐢

D-1-1-2 Rapid / slow upward movement:

Step1- Select 🐰 / 🐢

Step2- Push [⊟↑] once; press [⊟↓] again for stop moving.

D-1-1-3 Rapid / Slow downward movement:

Step1- Select 🐰 / 🐢

Step2- Hold down ⇩ (SA40) and [⊟↓] push once.

Release SB40 for stop moving.

Note:

If no re-set action was interrupted, the last rapid / slow setting will still be kept.

Up / down speed will not available to change during rapid / slow or up / down moving function execution.

PROTH

D-1-2 Intermittent Movement: Intermittent function can be operated either auto or manual operation and moving amount can be picked from TFT.

*** Up / down intermittent movement processes as follows:

Step1- Energize intermittent movement function by pushing

$\boxed{\updownarrow\times 1}$ & $\boxed{\updownarrow\times 5}$ & $\boxed{\updownarrow\times 10}$.
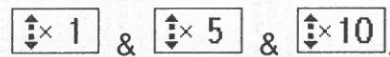
Step2- Select intermittent moving amount from TFT.

Step3- Press $\boxed{\ominus\uparrow}$ or $\boxed{\ominus\downarrow}$ to start the movement.

Note:

To hold down $\boxed{\ominus\uparrow}$ or $\boxed{\ominus\downarrow}$ to advance the movement is not available.

D-2 Automatic operation mode (automatic in feed)

There are two auto grinding modes: surface grinding mode and plunge grinding mode.

The processes of surface grinding and plunge grinding modes as follows:

D-2-1 Surface Grinding Mode:

Step1- Adjust slide clogs to the desirable setting position (see Appendix A-1)

Step2- Adjust the electronic cross feed stroke adjusters to the Desirable grinding position (see Appendix A-2)

Step3- Key in number following the processes of cycle set up page.

Step4- Move the wheel to proper grinding position. (It is also Available to use continuous / intermittent movement function with manual operation)

Step5- Push [Zero] to set up the initial working position.

Step6- Push [⬚] or [⬚] .

Step7- Push [Start] on.

Step8- Push SB32 or SB31 with forward or backward moving Setting.

Step9- Turn flow control lever clockwise and push RP31 to set Up the cross speed of working table.

* Adjust the grinding amount during grinding modes, you have to push the button below JOG and select up /down movement with [⬚↑] / [⬚↓] .

D-2-2 Plunge Grinding Mode:

Step1- Adjust slide clogs to the desirable setting position. (See Appendix A-1)

Step2- Key in numbers following the processes of total rough grinding amount and total fine grinding amount.

Step3- Push [Zero] to set up the initial working position.

Step4- Move wheel to desirable grinding position. (It is also available to use continuous/ intermittent movement function with manual operation to move grinding wheel)

Step5- Select complete stroke plunge grinding by pushing [⊐↓] or half stroke plunge grinding by pushing [⊢⊐↓] .

Step6- Push [Start I] and turn flow control lever clockwise to start the mode.

D-2-3 Warning:

1. The min. command increment unit is 0.001mm.
2. Numbered keys and grinding modes are not available to change during auto. grinding modes.

Things allowed:

1. Intermittent movement.

2. Push [Hold ○] to freeze automatic grinding cycles; you have to push [Start I] to release the cycle.

3. To automatic grinding modes, first push START on.

4. To adjust grinding amount, first push [↕× 1] & [↕× 5] & [↕×10].

Then, use [⊖↑] / [⊖↓] to adjust grinding amount.

D-3 Appendix

D-3-1 Appendix A-1

Set the distance of longitudinal travel.

Have the directional arm L2 at its neutral position, turn the flow control lever clockwise with slow motion to increase the speed of table movement. When the flow control lever reaches 90°, the table will get its maximum speed.

Adjust the positions of slide clogs T1 and T2 in order to get the proper length and position for grinding magnetic chuck surface.

TABLE DOGS
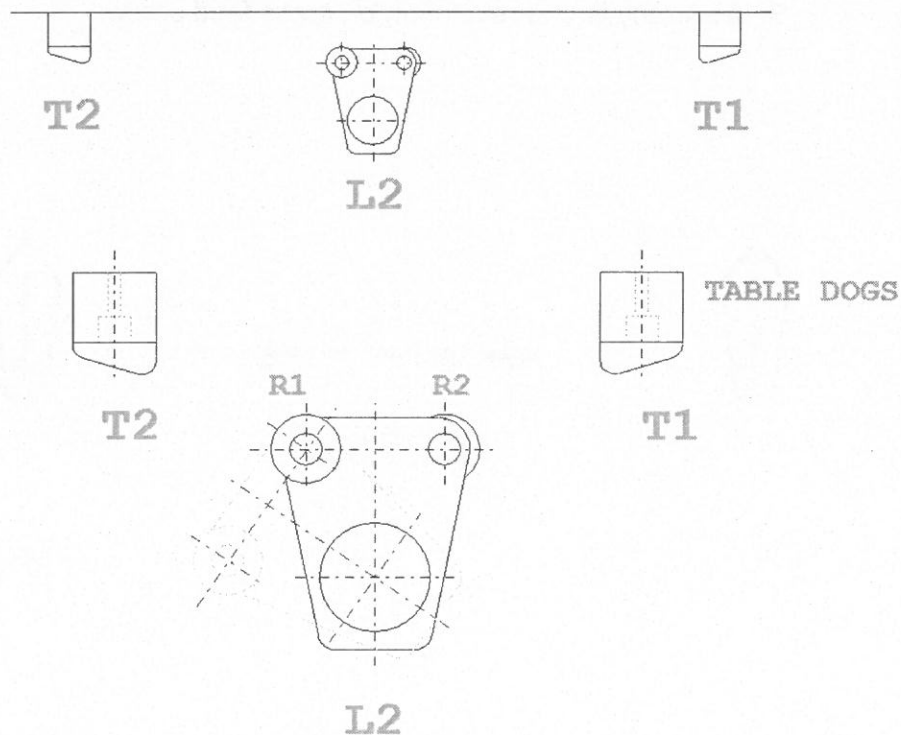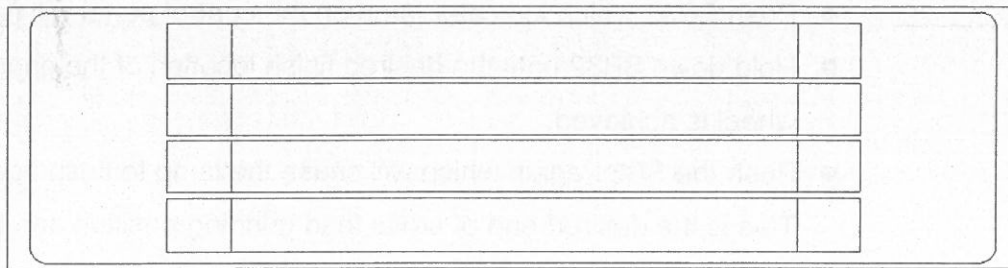
D-3-2 Appendix A-2

The function and operation of electric touch cross traverse setting system.

1. The advantage of the electronic 'one-touch' system is to quickly electronically pre-set the beginning and end surface width of cross grinding to be accomplished. This can significantly improve production time.

2. Setting the system in simple-

   - Hold down SB31 until the grinding wheel reaches the desired start position.
   - Push SB32 which indicator lamp on the control panel will flash.
   - Hold down SB32 until the desired finish location of the grinding wheel is achieved.
   - Push the SB31 again which will cause the lamp to flash again. This is the desired end of cross feed grinding position and the settings are complete.

3. Accuracy is one revolution on cross feed screw.

SB39

+

SB31   SB32

D-3-3 Appendix

AUTO PARALLEL DRESSING ATT.

**9130GA

一 般 公 差 詳 依	未註明圓角	X	R	表面處理	X	材質	X	數量	X
檢 驗 技 術 標 準	未註明倒角	X	C	件名	自動平行整輪總成			比例	X
單位：mm	日 期 簽 名			圖號	**9130GA			圖序	
	核定								
	設計			上一工業股份有限公司					
	製圖	88.12.9	郭清海	PROTH TEL:(04)359230 FAX:(04)3591561					
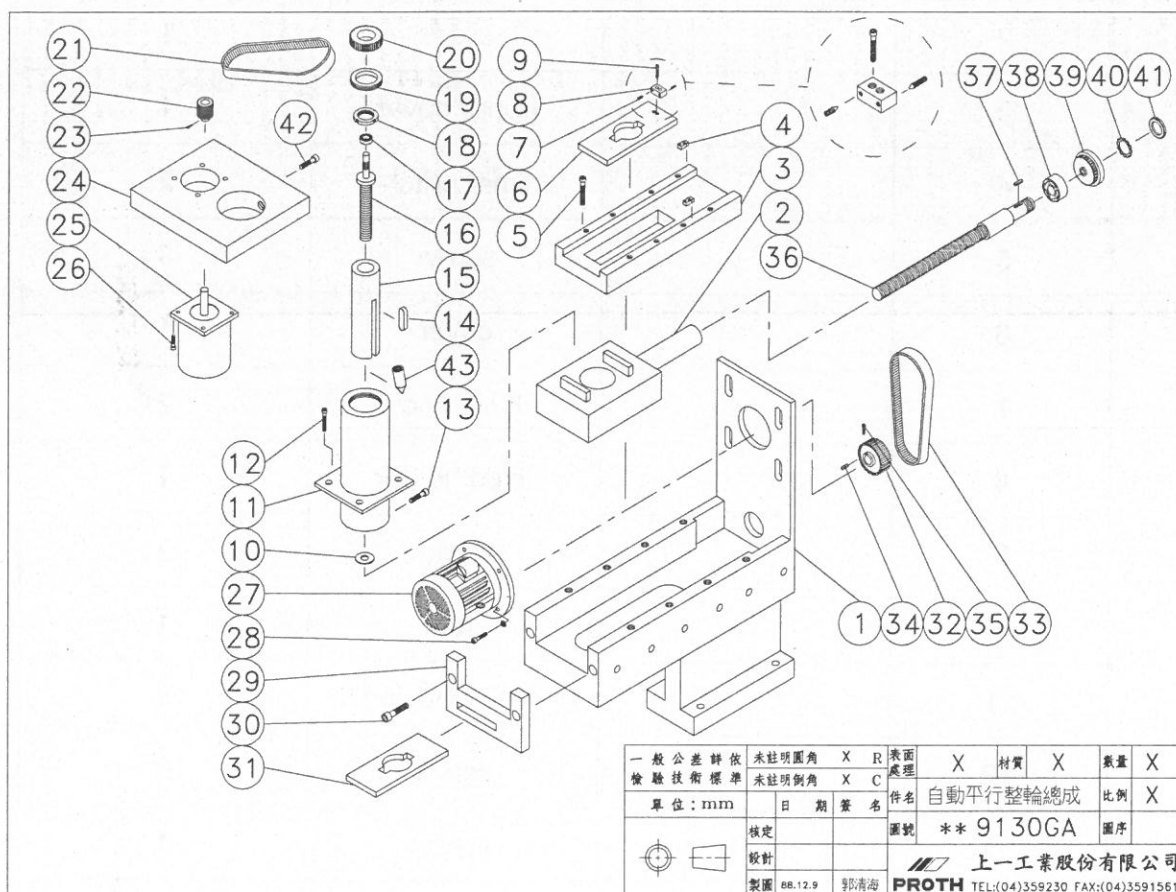
PART LISTS

INDEX NO	PART NO	PART NAME	QUANTITY
1		Main frame	1
2		slider	1
3		upper cover	1
4		limit switch	2
5		screw	8
6		cover	1
7		limit block	2
8		fixed holder	1
9		screw	2
10		seal	1
11		fixed housing	1
12		screw	4
13		screw	1
14		key	1
15		diamond holder	1
16		leadscrew	1
17		bearig (6002 zz)	1
18		nut	1
19		outer nut	1
20		timing pulley	1
21		belt	1

PROTH INDUSTRIAL CO., LTD.

PROTH

INDEX NO	PART NO	PART NAME	QUANTITY
22		timing pulley	1
23		screw	1
24		motor holder	1
25		step motor	1
26		screw	4
27		60W DC motor	1
28		screw	4
29		fixed holder	1
30		screw	2
31		cover	1
32		timing pulley	1
33		belt	1
34		key	1
35		screw	1
36		leadscrew	1
37		key	1
38		bearing (6001 zz)	1
39		timing pulley	1
40		washer	1
41		nut	1
42		screw	1
43		diamond dresser	1