

Command Reference of extension CA9

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PCB size command: @W

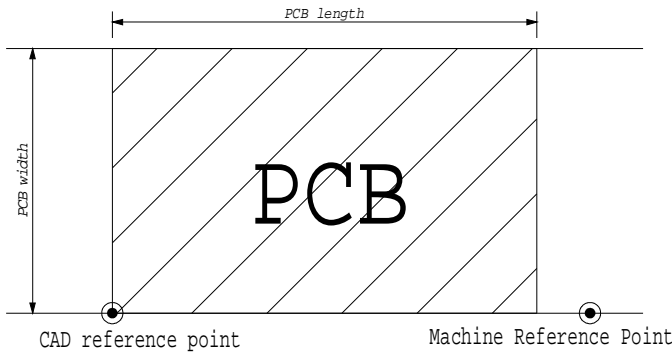
Form: @W 200000 150000

- @W : Discrimination command for PCB size
- 200000 : PCB length
- 150000 : PCB width (= conveyor width)

(NOTE)

- 1) The unit is a micrometer (1 μm).
- 2) In case of APT-9400, the PCB width is used to calculate the CAD reference point from its Machine Reference Point. Thus, the formula is led to as following:

X coordinate of CAD reference point = - PCB length



- 3) The Board Reference Point of the tester is a relative coordinate from the CAD reference point. The formula is led to the following:

X coordinate of Board Reference Point
 = X coordinate of Cad reference point + X coordinate of @O reference point

- 4) If there is some syntax error in this command, it will stop converting the test program and it appears error dialog.

Conveyor margin command: @Y

Form: @Y 000400

@Y : Discrimination command for conveyor margin

000400 : Conveyor margin

(NOTE)

- 1) The unit is a micrometer (1 μm).
- 2) In case of APT-8400, this command will be omitted.
- 3) If there is some syntax error in this command, it will stop converting the test program and it appears error dialog.

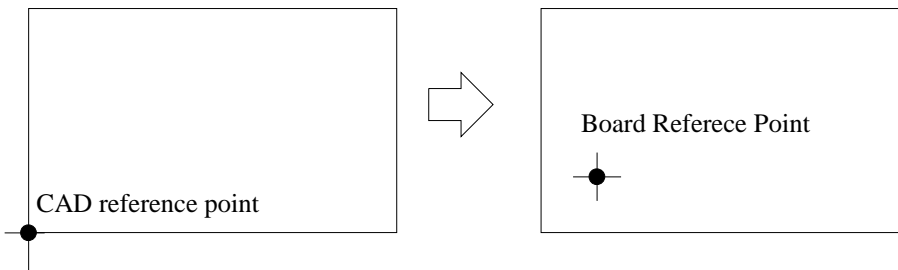
Board Reference Point command: @O

Form: @O 0242305 00001200

- @O : Discrimination command for Board Reference Point
- 00242305 : X coordinate of Board Reference Point (BRP)
- 00001200 : Y coordinate of Board Reference Point (BRP)

(NOTE)

- 1) The unit is a micrometer (1 μm).
- 2) This command is used only when the Board Reference Point is different from the CAD reference point.
Board Reference Point is the distance from the CAD reference point.



- 3) The “@O” command data can be put in any place of your extension CA8 data. (But, it makes void if this command was put among the auto. data creation steps. And when using the “@X” command, the “@O” command before “@X” is set to the BRP of side-A, after “@X” is set to the BRP of side-B.)
- 4) After translated the data, this XY coordinates value is deducted from the original data as per the examples in below.
- 5) If there is some syntax error in this command, it will stop converting the test program and it appears error dialog.

1) DATA translation: (when @O command be not used)

TAKAYA01.CA9 DATA

@H +02000 +03000 +04000 +05000
 R10 1KO 1A R +04000 +05000 +06000 +07000
 R55 2KO 2B R -02000 -02000 -01000 -00500

TAKAYA01.SD8

X:+00100 Y:+00150 X:+00200 Y:+00250
 X:+00200 Y:+00250 X:+00300 Y:+00350
 X:-00100 Y:-00100 X:-00050 Y:-00025

2) DATA translation: (when @O command be used)

TAKAYA02.CA9 DATA

@O +01000 +02000
 @H +02000 +03000 +04000 +05000
 R10 1KO 1A R +04000 +05000 +06000 +07000
 R55 2KO 2B R -02000 -02000 -01000 -00500

TAKAYA02.SD8

X:+00050 Y:+00050 X:+00150 Y:+00150
 X:+00150 Y:+00150 X:+00250 Y:+00250
 X:-00150 Y:-00200 X:-00100 Y:-00125

Auxiliary Board Reference Point command: @H

Form: @H 0012000 0350000 0300000 0050000

@H : Discrimination command for Auxiliary Board Reference Point
 0012000 : X coordinate of first Auxiliary Board Reference Point
 0350000 : Y coordinate of first Auxiliary Board Reference Point
 0300000 : X coordinate of first Auxiliary Board Reference Point
 0050000 : Y coordinate of first Auxiliary Board Reference Point

(NOTE)

- 1) The unit is a micrometer (1 μm).
- 2) When there were plural numbers of “@O” and “@H” command in the CA8 file, the XY coordinates of the first command found is effective.
- 3) If there is some syntax error in this command, it will stop converting the test program and it appears error dialog.

Reversible command: @X

Form: @X

@X : Discrimination command for reversible

(NOTE)

- 1) Test data up to the @X command line is assigned for side-A, the test data which starts after @X command is assigned for side-B. Also, XY coordinates translation is made symmetrically against the Y-axis.
- 2) If this command was placed at the top step, it judges all succeeding steps as Side-A and reverse all XY coordinate data (XY coordinates in each step and BRP) toward Y direction automatically.
- 3) If there is some syntax error in this command, it will stop converting the test program and it appears error dialog.

Ex.)

```
@O +012700 +000000          ® BRP on side-A
@H +012000 +000000 +182880 +208280    ® Aux. BRP on side-A
L1 1mH * 1A L +021590 +073060 +021590 +076800 @PS 3 @PC2
L2 1mH * 1A L +016510 +076800 +016510 +073060 @PL M 0 0 0 0
@X          ® After this step, Side-B start
@O +022700 -005000          ® BRP on side-B
```


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@H -022000 +020000 +072880 +018280

® **Aux. BRP on side-B**

C1 1uF * * C +031590 +083060 +061590 +066800 @T 25 25 @PC 1

C2 1uF * * C +046510 +096800 +026510 +033060 @PL L 2 2 2 2 @T 30 30

C3 1uF * * C +016510 +026800 +056510 +073060

Index command: @M

Form: @M TAKAYA

@X : Discrimination command for reversible
TAKAYA : Index

(NOTE)

- 1) Appointment of letter number is max. 32. After 32, all they are cut down.
- 2) The “@M” command data can be put in any place of your Extension CA8/CA9 data.
But, it makes void if this command was put among the auto. data creation steps, which is from the test data automatic generation command to “@CE”.
- 3) If there is some syntax error in this command, it will stop converting the test program and it appears error dialog.

Ex.)	Input	Index
	@MTAKAYA	"TAKAYA "
	@M TAKAYA	"TAKAYA "
	@M TAKAYA APT-9400	"TAKAYA APT-9400 "

Revise area set command: @B

Form: @B12 1000 1200 3000 4000 3000 5000

@B : Discrimination command for revise area set
1 : Revise area (1 – 3)
2 : Revise mode (1 – 3)
1000 1200 : XY coordinates of First reference point
3000 4000 : XY coordinates of Second reference point
3000 5000 : XY coordinates of Third reference point

[Revise area]

1. It revises after this step
2. It revises in only this group
3. It revises step data using this parts name

[Revise mode]

1. Revise position and inclination of PCB.
2. Revise position, scale and inclination of PCB.
3. Revise position of PCB.

(NOTE)

- 1) If there is some syntax error in this command, it will stop converting the test program and it appears error dialog.
- 2) In case of point system, you can use "N" command to specify the reference point with pin number.

Ex.) @B32 N102 N231 N459

Ex.)

```
@B12 +01000 +01500 +02000 +02500 +03000 +03500
```

```
// 1=It revises after this step / 2=Revise position, scale and inclination of PCB
```

```
R1 10KO * +01000 +01000
```

```
C2 103 * +01500 +01700
```

```
R5 22KO * +02000 +02000
```

```
@B31 +05000 +06000 +06500 +07000
```

```
// 3=It revises step data using this parts name / 1=Revise position and inclination of PCB
```

```
Q1 B-E * +05000 +05500
```

```
Q1 B-C * +05000 +06000
```

```
Q1 C-E * +06000 +05500
```

Pin coordinate command: @N

Form: @N
 00001 +010000 +010000 Vcc
 00002 +012000 +010000 AGND @CI:UDL:1234:1
 00003 +012000 +050000 /_RES_BUS(2)
 00004 +013000 +050000 NC, @CI:UDL:34:1
 00102 +059000 +050000 /N\$2758(12)
 00103 +060000 +050000 /N\$2758(13)
 @CE

@N : Discrimination command for pin coordinate
 00001 +010000 +010000 : XY coordinates of pin number 1
 Vcc : Net name of pin number 1 (max. 20 letters)
 00002 +012000 +010000 : XY coordinates of pin number 2
 @CI : Discrimination command for coordinate information
 See the following section.
 @CE : End cord of pin coordinate

(NOTE)

- 1) The unit is a micrometer (1 μm).
- 2) Maximum pin number is 32,000 pins.
- 3) Each parameter in the step data must be separated with space, comma and/or colon.

Ex.) @N

```
00195: -015113, -103860 /N$2758(0)
00196 -015113 -103352 /N$2758(1)
00197, -015113, -102362 /N$2758(2)
00198: -015113, -101854 /N$2758(3)
@CE
```

- 4) The pin number does not mind even if it is not continuing.
- 5) If there is some syntax error in this command, it will stop converting the test program and it appears error dialog.

Coordinate information command: @CI

Form: @CI:UDRL:1234:0

@CI : Discrimination command for coordinate information
 : : Separator
 UDRL : Movable directories for coordinates retry function (Up/Down/Right/Left)
 : : Separator
 1234 : Utilizable probe access (i.e. 12 / 23 / 234 / 24)
 This must be specified more than 2 probes.
 : : Separator
 0 : Probe lowest position (0 – F)

(NOTE)

- 1) If there is some syntax error in this command, it will stop converting the test program and it appears error dialog.
- 2) The separator must be used a colon.

Basic format

Form: [Part] [Value] [Comment] [Location] [Element]
 R1 10KO Resistance 1A R

[High pin X/Y] [Low pin X/Y] [Option Command]
 +01000 +01000 +01000 +01200 @PL H 0 0 0 0

Part : Part name (max. 8 letters)
 Value : Value (max. 6 letters)
 Comment : Comment (max. 20 letters)
 Location : Location (max. 4 letters)
 Element : Element (R/C/L/D)
 * : Auto. (It is determined by Capital letter of Part name.)
 R : Resistance (Ohm)
 C : Capacitance (Farad)
 L : Inductance (Henry)
 D : Voltage (Volt)

High pin coordinate : XY coordinates from the board reference point or CAD reference point.

Low pin coordinate : XY coordinates from the board reference point or CAD reference point.

Option command : Exclusive option command

(NOTE)

- 1) The unit is a micrometer (1 μm) for X/Y coordinates.
- 2) Each parameter in the step data must be separated with space.
- 3) High pin and Low pin can be used the following formats:
 Teaching system: Ex.) +01000 +01000
 Point system: Ex.) N103
 Bottom probe: B1 – B4 (Bottom probe: APT-8400 with TEM-10)
 B1 – B2 (Bottom probe: APT-9400)
 E1 – E64 (64 pin relay: APT-9400)
- 4) If there is some syntax error in this command, it will stop converting the test program and it appears error dialog.

The typical sample data is introduced as follows:

```
[Teaching system]
@O +01000 +02000
@H +02000 +03000 +04000 +05000
R10 1KO * 1A R +04000 +05000 +06000 +07000 @PS 1 @PC 1
```

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```

R55  2KO  *    2B  R  -02000  -02000  -01000  -00500  @PL M 1 1 1 1
C101 104  *    2A  C  +02000  +03000  +01500  +03000  @G +00200 +00500
D1    *    LED  1C  D  +00050  +00100  -00050  +00100  @T 20 20
JW    *    *    2C  *  +01000  +02000  +03000  +04000  @K SH

```

[Point system]

```

@O    +01000 +02000
@H    +02000 +03000 +04000 +05000
R10   1KO   *    1A  R  N101   N093   @PS 1 @PC 1
R55   2KO   *    2B  R  N933   N874   @PL M 1 1 1 1
C101  104   *    2A  C  N123   N236   G958
D1    *    LED  1C  D  N541   N874   @T 20 20
JW    *    *    2C  *  N777   N006   @K SH

@N
00001 +1000 +0250 Vcc
00002 +1000 +0250 GND
00777 +1000 +0250 NC

@CE

```

Guard command: @G (Option command)

Form: @G +0125300 +0035600

@G : Discrimination command for guard pin
 +0125300 : X coordinate of guard pin
 +0035600 : Y coordinate of guard pin

(NOTE)

- 1) The unit is a micrometer (1 μm).
- 2) Each parameter in the step data must be separated with space.
- 3) The maximum number of guard point is two (except APT-8300 series.)
 Ex.) @G +01000 +01200 @G +01500 +02500
- 4) Guard pin can be used the following formats:
 - Teaching system: Ex.) +01000 +01000
 - Point system: Ex.) N103 or G105
 - Bottom probe: B1 – B4 (Bottom probe: APT-8400 with TEM-10)
 B1 – B2 (Bottom probe: APT-9400)
 E1 – E64 (64 pin relay: APT-9400)
- 5) @G or G command must be in the start of any option command.
- 6) If there is some syntax error in this command, it will stop converting the test program and it appears error dialog.

Ex.)

[Teaching system]

```
R10 1KO * 1A R +04000 +05000 +06000 +07000 @G +04000 +07000
R55 2KO * 2B R -02000 -02000 -01000 -00500 @PL M 1 1 1 1
```

[Point system]

```
R10 1KO * 1A R N1253 N0563 @G N0128
R55 2KO * 2B R N1253 N5415 @G N0215 @G N856 @PL M 1 1 1 1
```

Or

```
R10 1KO * 1A R N1253 N0563 G0128
R55 2KO * 2B R N1253 N5415 G0215 G856 @PL M 1 1 1 1
```


Probe speed command: @PS (Option command)

Form: @PS 3

@PS : Discrimination command for probe speed
 3 : Probe speed (0 – 15)

(NOTE)

- 1) Each parameter in the step data must be separated with space, comma and/or colon.
- 2) Probe Speed command “@PS” could be set for each Pin number (Point system) as well. In case below, all test steps that use Pin #2 changes their probe speed to PS1 at a time.

```
00001:+000000,+040640      GND
00002:+057454,+087630      BP_ST_N15      @PS_1
00003:+057454,+090170      BP_ST_N14
00004:+057454,+092710      BP_ST_N13
00005:+057454,+095250      BP_ST_N12
00006:+057454, +097790      BP_ST_N11
```

- 3) If there is some syntax error in this command, it will stop converting the test program and it appears error dialog.

Probe's top and lowest position command: @PL (Option command)

Form: @PL H 0 1 1 0

@PL : Discrimination command for probe's top and lowest position
 H : Probe's top position
 0 1 1 0 : Probe's lowest position (0 – 9, A – F)
 1-axis, 2-axis, 3-axis and 4-axis from the left side.

(NOTE)

- 1) Each parameter in the step data must be separated with space.
- 2) If there is some syntax error in this command, it will stop converting the test program and it appears error dialog.

Probe access command: @PC (Option command)

Form: @PC 0

@PC : Discrimination command for probe access

0 : Probe access

8300	0=(*,N, *)	8400	0=(*,N,N, *)
	1=(N, *, *)		1=(*,N, *,N)
	2=(*, *,N)		2=(N,N, *, *)
			3=(*, *,N,N)
			4=(N, *, *,N)
			5=(N, *,N, *)
			6=(N, *, *, *)
			7=(*,N, *, *)
			8=(*, *,N, *)
			9=(*, *, *,N)

("N" means the useless probe)

(NOTE)

- 1) Each parameter in the step data must be separated with space.
- 2) If there is some syntax error in this command, it will stop converting the test program and it appears error dialog.

Judgement tolerance command: @T (Option command)

Form: @T 10 20

@T : Discrimination command for judgement tolerance
 10 : +% tolerance (0 – 255%)
 20 : -% tolerance (0 – 100%)

(NOTE)

- 1) Each parameter in the step data must be separated with space.
- 2) If there is some syntax error in this command, it will stop converting the test program and it appears error dialog.

Measurement function command: @K (Option command)

Form: @K JP

@K : Discrimination command for measurement function
 JP : Measurement function

JP : Jump (No test at the step)
 HO : Hold (Stop at the step before testing)
 SH : Short judgment (Pass if it was less than the set value)
 OP : Open judgment (Pass if it was more than the set value)
 AJ : Adjustment (Stop at the step while displaying measured value)
 D : Tolerance NG (Fail if measured value was in the tolerance)
 E : NG>Ref.value (Fail if measured value was larger than ref. value)
 F : NG<Ref.value (Fail if measured value was smaller than ref. value)
 GJ : Group jump (if the step fail, it moves to the next group)
 WA : Visual test function

(NOTE)

- 1) Each parameter in the step data must be separated with space.
- 2) If there is some syntax error in this command, it will stop converting the test program and it appears error dialog.

Measuring time command: @MT (Option command)

Form: @MT 10

@T : Discrimination command for measuring time

10 : Measuring time (0.1 – 999msec)

(NOTE)

- 1) It can appoint the measuring time between 0.1 and 9999(ms).
In case of less 300ms, they can be appointed at minimum resolution of 0.1ms.
As for over 300ms, the minimum resolution is 1ms.
If some decimal point was substituted and the measuring time was appointed to be over 300ms, the decimal point of the measuring time is automatically truncated.
- 2) Each parameter in the step data must be separated with space.
- 3) If there is some syntax error in this command, it will stop converting the test program and it appears error dialog.

Measuring mode command: @MM (Option command)

Form: @MM DCCV

@MM	: Discrimination command for measuring mode	
DCCV	: Measuring mode (DC constant voltage)	
AUTO	: Automatic measuring mode	
DCCC	: DC-CC measuring mode	
DCCV	: DC-CV measuring mode	
AC1C6K	: AC-CV measuring mode (f=1.6KHz)	
AC16K	: AC-CV measuring mode (f=16KHz)	
AC160K	: AC-CV measuring mode (f=160KHz)	
DCZD	: Zener voltage measuring mode	
DCVV	: DC voltage measuring mode	
DGNPN	: Built-in resistor transistor measuring mode (NPN) type	
DGPNP	: Built-in resistor transistor measuring mode (PNP) type	
LDCN	: IC Open measuring mode	
FETEN	: FET (Enhancement N channel type FET)	
FETEP	: FET (Enhancement P channel type FET)	
FETDN	: FET (Depletion N channel type FET)	
FETDP	: FET (Depletion P channel type FET)	
DCPC	: Photo coupler measuring mode	
AC160	: AC-CV (160Hz) measuring mode	(APT-9400 only)
ACVM	: AC voltage measuring mode	(APT-9400 only)
IAC160	: Impedance (160Hz) measuring mode	(APT-9400 only)
IAC1C6K	: Impedance (1.6KHz) measuring mode	(APT-9400 only)
IAC16K	: Impedance (16KHz) measuring mode	(APT-9400 only)
IAC160K	: Impedance (160KHz) measuring mode	(APT-9400 only)
NAC16K	: AC-CV (16KHz) measuring mode	(APT-9400 only)
NAC160K	: AC-CV (160KHz) measuring mode	(APT-9400 only)

(NOTE)

- 1) If the element is not specified, this mode setting is ignored.
- 2) When @MM command was not used, the measuring mode is automatically appointed based on "Value" and "Element". (If neither "Value" nor "Element" was described, nothing is appointed in the test data translated.)
- 3) If the command only for APT-9400 is used in APT-8400, it automatically translates to AUTO mode.

- 4) Each parameter in the step data must be separated with space.
- 5) If there is some syntax error in this command, it will stop converting the test program and it appears error dialog.

Measuring range command: @MI (Option command)

Form: @MI 2

@MI : Discrimination command for measuring range

2 : Measuring range (Range-2)

(NOTE)

- 1) If the element and the measuring mode are not specified, this range setting is ignored.
- 2) If the measuring range is not suitable for its measuring mode, this range setting is also ignored.
- 3) If the measuring range and the reference value by using @MR command are specified, the measuring range is set to "Fixed range".
- 4) If the measuring range and the reference value by using @MR command are specified and the range is not correct for its reference value, this range setting is also ignored.
- 5) Each parameter in the step data must be separated with space.
- 6) If there is some syntax error in this command, it will stop converting the test program and it appears error dialog.

Reference value command: @MR (Option command)

Form: @MR 200KO

@MR : Discrimination command for reference value

200KO : Reference value

(NOTE)

- 1) If this command is used, the value column is not used for creating the reference value.
- 2) If the element is not specified, this reference value is ignored.
- 3) Each parameter in the step data must be separated with space.
- 4) If there is some syntax error in this command, it will stop converting the test program and it appears error dialog.

Coordinate information command: @CI (Option command)

Form: @CI:UDRL:1234:0

@CI : Discrimination command for coordinate information
 : : Separator
 UDRL : Movable directories for coordinates retry function (Up/Down/Right/Left)
 : : Separator
 1234 : Utilizable probe access (i.e. 12 / 23 / 234 / 24)
 This must be specified more than 2 probes.
 : : Separator
 0 : Probe lowest position (0 – F)

(NOTE)

1) This command must be located after each X/Y coordinates.

Ex.)

```
R10 1KO * 1A R +4000 +5000 @CI:UL:12:1 +2000 +3000 @CI:RD:34:0
R55 2KO * 2B R -2000 -2000 -1000 -0500 @CI:UL:12:F
```

- 2) This command is only for teaching system. In case of point system, it must be set into pin coordinates. (see @N command)
- 3) If @PL command and @CI command are specified together, @PL command has priority.
- 4) If there is some syntax error in this command, it will stop converting the test program and it appears error dialog.
- 5) The separator of @CI command must be used a colon.

Parts position information command: @CP (Option command)

Form: @CP +001000 +002000

@CP : Discrimination command for component center position information
 +001000 : X coordinate of the center position of the component
 +002000 : Y coordinate of the center position of the component

(NOTE)

1) This command is used for the optical step.

If you want to convert from normal step to optical step in the Step list or the step review menu ([I] key), this X/Y coordinates will be used.

2) The unit is a micrometer (1 μm).

3) Each parameter in the step data must be separated with space.

4) This command must be located after X/Y coordinates.

Ex.)

```
R10 1KO * 1A R N102 N512 @CP +3000 +4000
R55 2KO * 2B R N564 N365 @CP N367
```

5) The X/Y coordinates can be used the following formats:

Teaching system: Ex.) +01000 +01000

Point system: Ex.) N103

6) If there is some syntax error in this command, it will stop converting the test program and it appears error dialog.

7) If the step used @B (Revise area set) command, @CP command is omitted.

[Initial set value (default value) of Option command]

@PS	0
@PL	H 0 0 0 0 (In case of 8300 series H 0 0 0)
@PC	0
@T	0 0
@K	Not measurement function is used. Blank (**).
@G	Not specified
@MM	Not specified
@MI	Not specified
@MT	Not specified
@MR	Not specified
@CI	:UDRL:1234:0
@CP	Not specified

IO/I command (I/O Input command)

Form: P1+2T3 SJ200 Comment IO/I *

[Part name] [Value] [Comment] [Loc.] [El.]

P1+2T3 : Port setting command (max. 8 letters)
 SJ200 : Function setting command (max. 6 letters)
 Comment : Comment (max. 20 letters)
 IO/I : Discrimination command for IO/I step
 * : Element

(NOTE)

- 1) Refer to the I/O function manual about each command.
- 2) Each parameter in the step data must be separated with space.
- 3) If there is some syntax error in this command, it will stop converting the test program and it appears error dialog.

IO/O command (I/O Output command)

Form: P1-4-A ON/W10 Comment IO/O *

[Part name] [Value] [Comment] [Loc.] [El.]

P1-4-A : Port setting command (max. 8 letters)
 ON/W10 : Function setting command (max. 6 letters)
 Comment : Comment (max. 20 letters)
 IO/O : Discrimination command for IO/O step
 * : Element

(NOTE)

- 1) Refer to the I/O function manual about each command.
- 2) Each parameter in the step data must be separated with space.
- 3) If there is some syntax error in this command, it will stop converting the test program and it appears error dialog.

IO/T command (I/O Terminal command)

Form: IC01 7pin I/OTerm IO/T * N10 N20 @T1:N23 @T3:N39 @W 20 @K SH
 [Part] [Value] [Comment] [Loc.] [El.] [H] [L] [T1] [T2] [Option]

IC01 : Part name (max. 8 letters)
 7pin : Value (max. 6 letters)
 Comment : Comment (max. 20 letters)
 IO/T : Discrimination command for IO/T step
 * : Element
 N10 : High pin number (Point system)
 N20 : Low pin number (Point system)
 @T1:N23 : Pin number for Terminal 1 (Point system)
 @T3:N39 : Pin number for Terminal 3 (Point system)
 @W 20 : Option command for IO step (Wait time = 20 x 100ms)
 @K SH : Option command (Function = SH)

(NOTE)

- 1) Refer to the I/O function manual about each command.
- 2) Terminal command can be used the following formats:
 - Teaching system: Ex.) @T1:+01000 +01000
 - Point system: Ex.) @T2:N103
 - Terminal @T1 – @T4 (APT-8400)
 - @T1 – @T5 (APT-9400)
 - @W1 – @W6 (power relay: APT-9400)
- 3) Bottom probe can be used also:
 - Ex.) @T1:B2 @W1:E32
 - B1 – B4 (Bottom probe: APT-8400 with TEM-10)
 - B1 – B2 (Bottom probe: APT-9400)
 - E1 – E64 (64 pin relay: APT-9400)
- 4) 2 terminals must be specified in this command.
- 5) The option command can be used the followings:
 - @PL, @PS, @T, @K (except WA), @W (= wait setting)
- 6) Each parameter in the step data must be separated with space.
- 7) If there is some syntax error in this command, it will stop converting the test program and it appears error dialog.

IO/M command (I/O Measuring command)

Form: IC01 7pin Comment IO/M * @T3:N10 @T4:N20 @T1:N23 @T2:N39 @W 20
[Part] [Value] [Comment] [Loc.] [El.] [T1] [T2] [T3] [T4] [Option]

IC01 : Part name (max. 8 letters)
 7pin : Value (max. 6 letters)
 Comment : Comment (max. 20 letters)
 IO/M : Discrimination command for IO/M step
 * : Element
 @T3:N10 : Pin number for Terminal 3 (Point system)
 @T4:N20 : Pin number for Terminal 4 (Point system)
 @T1:N23 : Pin number for Terminal 1 (Point system)
 @T2:N39 : Pin number for Terminal 2 (Point system)
 @W 20 : Option command for IO step (Wait time = 20 x 100ms)

(NOTE)

- 1) Refer to the I/O function manual about each command.
- 2) Terminal command can be used the following formats:
 - Teaching system: Ex.) @T1:+01000 +01000
 - Point system: Ex.) @T2:N103
 - Terminal
 - @T1 – @T4 (APT-8400)
 - @T1 – @T5 (APT-9400)
 - @W1 – @W6 (power relay: APT-9400)
 - (* @W1 – @W6 is able to use it to maximum 2 terminals simultaneously.)
- 3) Bottom probe can be used also:
 - Ex.) @T1:B2 @W1:E32
 - B1 – B4 (Bottom probe: APT-8400 with TEM-10)
 - B1 – B2 (Bottom probe: APT-9400)
 - E1 – E64 (64 pin relay: APT-9400)
- 4) 2 or more (max. 4) terminals must be specified in this command.
- 5) The option command can be used the followings:
 - @PC, @PL, @PS, @W (= wait setting)
- 6) Each parameter in the step data must be separated with space.
- 7) If there is some syntax error in this command, it will stop converting the test program and it appears error dialog.

IO/V command (I/O Voltage command)

Form: IC01 5V Comment IO/V * N110 N120 @P+:N123 @P-:N139 @IV 5 @W 20

[Part] [Value] [Comment] [Loc.] [El.] [H] [L] [P1] [P2] [Option]

IC01 : Part name (max. 11 letters)
 5V : Value (max. 11 letters)
 Comment : Comment (max. 20 letters)
 IO/V : Discrimination command for IO/V step
 * : Element
 N110 : High pin number (Point system)
 N120 : Low pin number (Point system)
 @P+:N123 : Pin number for + voltage (Point system)
 @P-:N139 : Pin number for – voltage (Point system)
 @IV 5 : Option command for IO/V step (Voltage = 5V)
 @W 20 : Option command for IO step (Wait time = 20 x 100ms)

(NOTE)

- 1) Refer to the I/O function manual about each command.
- 2) Terminal command can be used the following formats:
 - Teaching system: Ex.) @P+:+01000 +01000
 - Point system: Ex.) @P-:N139
 - @T1, @T2 (APT-8400 with TEM-10)
 - @P+, @P- (APT-94xx series with Programmable DC power supply)
 - @M1, @M2 (APT-94xx series with Multi power interface module port 1, 2)
 - @M3, @M4 (APT-94xx series with Multi power interface module port 3, 4)
- 3) Bottom probe can be used also:
 - @T1:B1, @T2:B2 (Bottom probe for apply voltage: APT-8400 with TEM-10)
 - B3, B4 (Bottom probe for measuring: APT-8400 with TEM-10)
 - B1, B2 (Bottom probe: APT-94xx series)
 - E1 – E64 (64 pin relay: APT-94xx series)
- 4) The option command can be used the followings:
 - @PL, @PS, @T, @K (except WA), @VA/VB, @IV(= voltage setting), @II(= Limit current setting), @W (= wait setting)
- 5) Each parameter in the step data must be separated with space.
- 6) If there is some syntax error in this command, it will stop converting the test program and it appears error dialog.

IO/P command (I/O Power command)

Form: IC01 5V Comment IO/P * @P+:B1 @P-:B2 @IV 5 @W 20
[Part] [Value] [Comment] [Loc.] [El.] [P1] [P2] [Option]

IC01 : Part name (max. 11 letters)
 5V : Value (max. 11 letters)
 Comment : Comment (max. 20 letters)
 IO/P : Discrimination command for IO/P step
 * : Element
 @P+:B1 : Bottom probe for + voltage (Point system)
 @P-:B2 : Bottom probe for – voltage (Point system)
 @IV 5 : Option command for IO/P step (Voltage = 5V)
 @W 20 : Option command for IO step (Wait time = 20 x 100ms)

(NOTE)

- 1) Refer to the I/O function manual about each command.
- 2) Terminal command can be used the following formats:
 - Teaching system: Ex.) @P+:+01000 +01000
 - Point system: Ex.) @P-:N139
 - @T1, @T2 (APT-8400 with TEM-10)
 - @P+, @P- (APT-94xx series with Programmable DC power supply)
 - @M1, @M2 (APT-94xx series with Multi power interface module port 1, 2)
 - @M3, @M4 (APT-94xx series with Multi power interface module port 3, 4)
- 3) Bottom probe can be used also:
 - @T1:B1, @T2:B2 (Bottom probe for apply voltage: APT-8400 with TEM-10)
 - B3, B4 (Bottom probe for measuring: APT-8400 with TEM-10)
 - B1, B2 (Bottom probe: APT-94xx series)
 - P1 – P6 (Power relay: APT-94xx series)
- 4) The option command can be used the followings:
 - @T, @K (except WA), @IV, @II(= Limit current setting), @W (= wait setting)
- 5) Each parameter in the step data must be separated with space.
- 6) If there is some syntax error in this command, it will stop converting the test program and it appears error dialog.

IO/C command (I/O Current command)

Form: IC01 5V Comment IO/C * @P+:N123 @P-:N139 @IV 5 @W 20 @II 3

[Part] [Value] [Comment] [Loc.] [El.] [P1] [P2] [Option]

IC01 : Part name (max. 11 letters)
 5V : Value (max. 11 letters)
 Comment : Comment (max. 20 letters)
 IO/C : Discrimination command for IO/C step
 * : Element
 @P+:N123 : Pin number for + voltage (Point system)
 @P-:N139 : Pin number for – voltage (Point system)
 @IV 5 : Option command for IO/C step (Voltage = 5V)
 @W 20 : Option command for IO step (Wait time = 20 x 100ms)
 @II 3 : Option command for IO/C step (Limit current = 50mA)
 (Limit current)
 0 = 5mA
 1 = 10mA
 2 = 25mA
 3 = 50mA
 4 = 100mA
 5 = 200mA
 6 = 500mA
 7 = 1000mA

(NOTE)

7) Refer to the I/O function manual about each command.

8) Terminal command can be used the following formats:

Teaching system: Ex.) @P+:+01000 +01000

Point system: Ex.) @P-:N139

@T1, @T2 (APT-8400 with TEM-10)

@P+, @P- (APT-94xx series with Programmable DC power supply)

@M1, @M2 (APT-94xx series with Multi power interface module port 1, 2)

@M3, @M4 (APT-94xx series with Multi power interface module port 3, 4)

9) Bottom probe can be used also:

@T1:B1, @T2:B2 (Bottom probe for apply voltage: APT-8400 with TEM-10)

B3, B4 (Bottom probe for measuring: APT-8400 with TEM-10)

B1, B2 (Bottom probe: APT-94xx series)

E1 – E64 (64 pin relay: APT-94xx series)

10) The option command can be used the followings:

@PL, @PS, @T, @K (except WA), @VA/VB, @IV(= voltage setting), @II(= Limit current setting),
@W (= wait setting)

11) Each parameter in the step data must be separated with space.

12) If there is some syntax error in this command, it will stop converting the test program and it appears error dialog.

Connector automatic generation command: @P

Form: @P1 CN200 RGB 5D @PL M 0 0 0 0

[Command] [Part] [Comment] [Loc.] [Option command]

@N 1 7 8 15

+00200 +00200

|

+00300 +00250

+00500 +00250

@CE

@P1 : Discrimination command for connector automatic generation

CN200 : Part name (max. 8 letters)

RGB : Comment (max. 20 letters)

5D : Location (max. 4 letters)

@PL M 1 1 1 1 : Option command (@PC or @K cannot be used)

@N 1 7 8 15 : Designating the turning point of the connectors

+00200 +00200 : XY coordinates of each connector leads

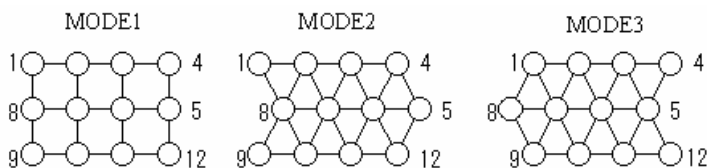
@CE : End cord of Pin coordinates

(NOTE)

1) It designates the type of automatic generation function depending on the letter attached to "@P".

@P?

@P1 = Mode 1 @P2 = Mode 2 @P3 = Mode3



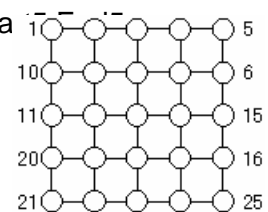
2) Command for designating turning points of Connectors.

The turning point is designated up to 5 max.

Form: @N Start1 End1 Start2 End2 Start3 End3 Start4 End4 Sta

@N : Command for designating the turning points

Start1 End1... : Connector number at the turning point



Ex.) @P1 CN55

@N 1 5 6 10 11 15 16 20 21 25

- 3) If there were no @N command which is to designate the turning point in the Connector automatic generation steps, it automatically translate the data to “Pin to pin” data.
- 4) Pin coordinates are limited to Max. 500. Translation for 501 or more is not possible.
- 5) The unit is a micrometer (1 μm) for X/Y coordinates.
- 6) It can be used the following formats for XY coordinates:
 - Teaching system: Ex.) +01000 +01000
 - Point system: Ex.) N103
 - Bottom probe: B1 – B4 (Bottom probe: APT-8400 with TEM-10)
B1 – B2 (Bottom probe: APT-9400)
E1 – E64 (64 pin relay: APT-9400)
- 7) The option command can be used the followings:
 - @PL, @PS, @T
- 8) Each parameter in the step data must be separated with space.
- 9) If there is some syntax error in this command, it will stop converting the test program and it appears error dialog.

IC automatic generation command: @I

Form: @I1 IC102 LS125 1A @PS 3
 [Command] [Part] [Comment] [Loc.] [Option command]
 @G 2
 +00200 +00200
 |
 +00300 +00250
 +00500 +00250
 @CE

@I1 : Discrimination command for IC automatic generation
 IC102 : Part name (max. 8 letters)
 LS125 : Comment (max. 20 letters)
 1A : Location (max. 4 letters)
 @PS 3 : Option command (@PC or @K cannot be used)
 @G 2 : Command for designating GND pin number of IC lead
 +00200 +00200 : XY coordinates of each IC leads
 @CE : End cord of Pin coordinates

(NOTE)

- 1) It designates the type of automatic generation function depending on the letter attached to “@I”.
 @I?
 @I1 : Pin to pin and pin to ground
 @I2 : Only pin to pin
 @I3 : Only pin to ground
 @I4 : Special automatic generation (Combination)
- 2) In case of “Pin to pin” data generation, GND number can be omitted.
- 3) “Comment”, “Location”, “Option command” can be omitted. In this case, they are substituted by their default.
- 4) Any XY coordinate value for each IC lead cannot be omitted. Once they were omitted, Max. pin number change.
- 5) A unit of XY coordinates value is “1 μm ”.
- 6) It can be used the following formats for XY coordinates:
 Teaching system: Ex.) +01000 +01000
 Point system: Ex.) N103
- 7) The GND pin number can be specified with the bottom probe.
 Ex.) @G 8 B2

B1 – B4 (Bottom probe: APT-8400 with TEM-10)

B1 – B2 (Bottom probe: APT-9400)

E1 – E64 (64 pin relay: APT-9400)

8) The option command can be used the followings:

@PL, @PS, @T, @JR (for J-leaded IC)

9) @CI (Coordinates Information) command can not use in XY coordinates.

10) Each parameter in the step data must be separated with space.

11) If there is some syntax error in this command, it will stop converting the test program and it appears error dialog.

Transistor automatic generation command: @Q

Form: @Q1 TR102 2SA100 3C @T 15 15
 [Command] [Part] [Comment] [Loc.] [Option command]
 +00200 +00200 [BASE]
 +00300 +00250 [COLLECTOR]
 +00500 +00250 [EMITTER]
 @CE

@Q1 : Discrimination command for Transistor automatic generation
 TR102 : Part name (max. 8 letters)
 2SA100 : Comment (max. 20 letters)
 3C : Location (max. 4 letters)
 @T 15 15 : Option command (@PC or @K cannot be used)
 +00200 +00200 : XY coordinates of B (Base)
 +00300 +00250 : XY coordinates of C (Collector)
 +00500 +00250 : XY coordinates of E (Emitter)
 @CE : End cord of Pin coordinates

(NOTE)

- 1) It designates the type of automatic generation function depending on the letter attached to “@Q”.
 @Q?
 @Q1 : Regular generation (3 steps)
 @Q2 : Only Digital transistor step (1 step)
 @Q3 : Normal generation & Digital transistor step (4 steps)
- 2) “Comment”, “Location”, “Option command” can be omitted. In this case, they are substituted by their default.
- 3) A unit of XY coordinates value is “1 μ m”.
- 4) It can be used the following formats for XY coordinates:
 Teaching system: Ex.) +01000 +01000
 Point system: Ex.) N103
 Bottom probe can not be used.
- 5) The option command can be used the followings:
 @PL, @PS, @T
- 6) @CI (Coordinates Information) command can not use in XY coordinates.
- 7) Each parameter in the step data must be separated with space.
- 8) If there is some syntax error in this command, it will stop converting the test program and it appears error dialog.

FET automatic generation command: @F

Form: @F FET10 2SA150 1A @T 15 15
 [Command] [Part] [Comment] [Loc.] [Option command]
 +00200 +00200 [GATE]
 +00300 +00250 [DRAIN]
 +00500 +00250 [SOURCE]
 @CE

@F : Discrimination command for FET automatic generation
 FET10 : Part name (max. 8 letters)
 2SA150 : Comment (max. 20 letters)
 1A : Location (max. 4 letters)
 @T 15 15 : Option command (@PC or @K cannot be used)
 +00200 +00200 : XY coordinates of G (gate)
 +00300 +00250 : XY coordinates of D (drain)
 +00500 +00250 : XY coordinates of S (source)
 @CE : End cord of Pin coordinates

(NOTE)

- 1) "Comment", "Location", "Option command" can be omitted. In this case, they are substituted by their default.
- 2) A unit of XY coordinates value is "1 μm ".
- 3) It can be used the following formats for XY coordinates:
 Teaching system: Ex.) +01000 +01000
 Point system: Ex.) N103
 Bottom probe can not be used.
- 4) If you use dual gate FET, you can specify as following:
 Ex.) @F Q123 2SC1020 3C @T 20 20
 N10 G1 (gate)
 N11 G2 (gate)
 N12 D (drain)
 N14 S (source)
 @CE
- 5) The option command can be used the followings:
 @PL, @PS, @T
- 6) @CI (Coordinates Information) command can not use in XY coordinates.
- 7) Each parameter in the step data must be separated with space.

- 8) **If there is some syntax error in this command, it will stop converting the test program and it appears error dialog.**

Pattern Check automatic generation command: @S

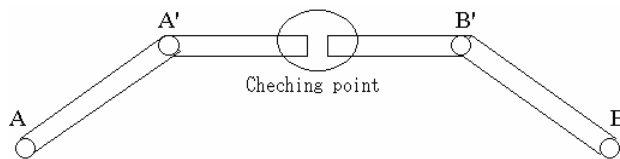
```
Form:  @S    TP10  TEST  1B    @PLH0000
       [Command] [Part]  [Comment] [Loc.] [Option command]

       +00200 +00200
       +00200 +00250
       +00500 +00250
       +00500 +00300
       @CE
```

@S : Discrimination command for Pattern check automatic generation
 TP10 : Part name (max. 8 letters)
 TEST : Comment (max. 20 letters)
 1B : Location (max. 4 letters)
 @PLH0000 : Option command (@PC or @K cannot be used)
 +00200 +00200 : XY coordinates of A point
 +00200 +00250 : XY coordinates of A' point
 +00500 +00250 : XY coordinates of B point
 +00500 +00300 : XY coordinates of B' point
 @CE : End cord of Pin coordinates

Ex.)

```
@S TP10 TEST 2A @PS3 @PL M 1 1 1 1
+01000 +02500
+01300 +03000
+02500 +02500
+02000 +03000
@CE
```



(NOTE)

- 1) "Comment", "Location", "Option command" can be omitted. In this case, they are substituted by their default.
- 2) A unit of XY coordinates value is "1 μm".
- 3) It can be used the following formats for XY coordinates:
 Teaching system: Ex.) +01000 +01000
 Point system: Ex.) N103
 Bottom probe can not be used.
- 4) The option command can be used the followings:

@PL, @PS, @T

- 5) @CI (Coordinates Information) command can not use in XY coordinates.
- 6) Each parameter in the step data must be separated with space.
- 7) If there is some syntax error in this command, it will stop converting the test program and it appears error dialog.

Vision test command: @V

Form: @V1 C101 104 E-cap. 3A +01200 +01500
 [Command] [Part] [Value] [Comment] [Loc.] [XY coordinates]

@V1 : Discrimination command for Vision test step
 C101 : Part name (max. 8 letters)
 104 : Value (max. 6 letters)
 E-cap. : Comment (max. 20 letters)
 3A : Location (max. 4 letters)
 +01200 +01500 : XY coordinates of Vision test

(NOTE)

- 1) It designates the type of automatic generation function depending on the letter attached to “@V”.
 @V?

[APT-8400]

@V1 : Polarity check of electric capacitor
 @V2 : Polarity check of tantalum capacitor
 @V3 : Polarity check of connector
 @V4 : Letter recognition
 @V5 : Presence check of component

[APT-9400]

@V1 : Polarity check
 @V2 : Polarity check
 @V3 : Presence check
 @V4 : Presence check
 @V5 : Presence check

- 2) “Comment”, “Location”, “Option command” can be omitted. In this case, they are substituted by their default.
- 3) A unit of XY coordinates value is “1 μm ”.
- 4) It can be used the following formats for XY coordinates:
 Teaching system: Ex.) +01000 +01000
 Point system: Ex.) N103
- Bottom probe can not be used.
- 5) All option command can not be used.
- 6) Each parameter in the step data must be separated with space.
- 7) If there is some syntax error in this command, it will stop converting the test program and it appears error dialog.

Photo coupler command: @PC

Form: @PC PC11 AKEC 2B N101 N102 N103 N104 @PS 2
 [Command] [Part] [Comment] [Loc.] [A] [K] [E] [C] [Option command]

@PC : Discrimination command for Photo coupler step
 PC11 : Part name (max. 8 letters)
 AKEC : Comment (max. 20 letters)
 2B : Location (max. 4 letters)
 N101 : Pin number of anode
 N102 : Pin number of cathode
 N103 : Pin number of emitter
 N104 : Pin number of collector
 @PC 2 : Option command (@PC or @K cannot be used)

(NOTE)

- 1) "Comment", "Location", "Option command" can be omitted. In this case, they are substituted by their default.
- 2) A unit of XY coordinates value is "1 μm ".
- 3) It can be used the following formats for XY coordinates:
 - Teaching system: Ex.) +01000 +01000
 - Point system: Ex.) N103
 - Bottom probe: B1 – B4 (Bottom probe: APT-8400 with TEM-10)
 - B1 – B2 (Bottom probe: APT-9400)
 - E1 – E64 (64 pin relay: APT-9400)
- 4) The option command can be used the followings:
 - @PL, @PS, @T
- 5) Each parameter in the step data must be separated with space.
- 6) If there is some syntax error in this command, it will stop converting the test program and it appears error dialog.

Kelvin measurement command: @KL

Form: @KL R102 1.00 Comment 2A N201 N202 N203 N204 @T 5 5
 [Command] [Part] [Value] [Comment] [Loc.] [+Sig] [+Sens] [-Sig] [-Sens] [Option]

- @KL : Discrimination command for Kelvin measurement step
- R102 : Part name (max. 8 letters)
- 1.00 : Value (max. 6 letters)
- Comment : Comment (max. 20 letters)
- 2A : Location (max. 4 letters)
- N201 : Pin number of +Signal
- N202 : Pin number of +Sensing
- N203 : Pin number of –Signal
- N204 : Pin number of –Sensing
- @T 5 5 : Option command (@PC or @K cannot be used)

(NOTE)

- 1) This command can be used in APT-9400CE/CJ system.
- 2) “Comment”, “Location”, “Option command” can be omitted. In this case, they are substituted by their default.
- 3) A unit of XY coordinates value is “1 μm”.
- 4) It can be used the following formats for XY coordinates:
 - Teaching system: Ex.) +01000 +01000
 - Point system: Ex.) N103
 - Bottom probe: B1 – B4 (Bottom probe: APT-8400 with TEM-10)
 - B1 – B2 (Bottom probe: APT-9400)
 - E1 – E64 (64 pin relay: APT-9400)
- 5) The option command can be used the followings:
 - @PL, @PS, @T, @MT, @MI, @MR
- 6) Each parameter in the step data must be separated with space.
- 7) If there is some syntax error in this command, it will stop converting the test program and it appears error dialog.

IC Open test automatic generation command: @A

```

Form:  @A      G1:+01000 +02000      G2:+07000 +06000
        IC17   1Pin   ICOP    1A    +01100 +02000  +01100 +01500  @PL H 0 0 1 0
        [Part] [Value] [Comment] [Loc.] [High Pin]      [Sensor]      [Option]
        IC17   2Pin   ICOP    1A    +01150 +02000  +01150 +01500  @PL H 0 0 1 0
        IC17   3Pin   ICOP    1A    +01200 +02000  +01200 +01500  @PL H 0 0 1 0
        IC17   4Pin   ICOP    1A    +01250 +02000  +01250 +01500  @PL H 0 0 1 0
        IC17   5Pin   ICOP    1A    +01300 +02000  +01300 +01500  @PL H 0 0 1 0
        @CE
    
```

@A : Discrimination command for IC Open step

G1:+01000 +02000 : XY coordinates of GND point 1 for IC Open test
(Omission is possible at the later step using @A)

G2:+07000 +06000 : XY coordinates of GND point 1 for IC Open test
(Omission is possible at the later step using @A)

IC17 : Part name (max. 8 letters)

1Pin : Value (max. 6 letters)

ICOP : Comment (max. 20 letters)

1A : Location (max. 4 letters)

+01100 +02000 : XY coordinates of high pin for IC Open test

+01100 +01500 : XY coordinates of sensor probe for IC Open test

@PL H 0 0 1 0 : Option command (@PC, @K, @MM, @MR or @MI cannot be used)

@CE : End cord of Pin coordinates

(NOTE)

- 1) This command needs optional IC Open test system.
- 2) “Comment”, “Location”, “Option command” can be omitted. In this case, they are substituted by their default.
- 3) A unit of XY coordinates value is “1 μm”.
- 4) It can be used the following formats for GND point:
 - Teaching system: Ex.) +01000 +01000
 - Point system: Ex.) N103
 - Bottom probe: B1 – B4 (Bottom probe: APT-8400 with TEM-10)
 - B1 – B2 (Bottom probe: APT-9400)
 - E1 – E64 (64 pin relay: APT-9400)
- 5) It can be used the following formats for high pin:
 - Teaching system: Ex.) +01000 +01000

Point system: Ex.) N103
Bottom probe: B1 – B4 (Bottom probe: APT-8400 with TEM-10)
 B1 – B2 (Bottom probe: APT-9400)
 E1 – E64 (64 pin relay: APT-9400)

6) It can be used the following formats for sensor probe:

Teaching system: Ex.) +01000 +01000
Point system: Ex.) N103
Bottom sensor: A1 – A6 (Bottom sensor probe: APT-9400)

7) The option command can be used the followings:

@PL, @PS, @T

8) It is possible to specify the two GND points every IC open test command in your program optionally. In case that the GND points were omitted at a test step with IC open test command, their GND points are assigned from the previous IC open test commands.

9) Each parameter in the step data must be separated with space.

10) If there is some syntax error in this command, it will stop converting the test program and it appears error dialog.

Comment line

Form: //

Or

/* */

Ex.)

```
// Test program remark line
@O +2000 +4000
@H +10000 +20000 +20000 +40000 // Auxiliary reference point
R1 10KO Resistor 1A R N102 N394 @PS 0 // @PL H 1 1 1 1
/*
R2 12KO Resistor 1B R N105 N394 @PS 0
*/
R3 20KO Resistor 2A R N106 N394
```


Conditional statement: @IF, @ELSE, @ENDIF

Form: @IF9000
 @KL R10 1.0O Comment 3A N102 N905 N103 N906 @T 5 5
 @ELSE
 R10 1.0O Comment 3A N102 N103
 @ENDIF

@IF9000	: Discrimination command for conditional statement (for APT-9400)
@KL ...	: Step for APT-9400 test program
@ELSE	: Discrimination command for conditional statement (for APT-8400)
R10 ...	: Step for APT-8400 test program
@ENDIF	: End code of conditional statement

(NOTE)

1) It designates the type of IF statement depending on the letter attached to “@IF”.

@IF?

[APT-8400]

@IF8000

[APT-9400]

@IF9000

2) This conditional statement cannot be nesting.

Scene Recycle command: @SR (Option command)

Form: @SR “Parts name of reference optical step”

(NOTE)

In the cases below, a warning message appears at the CA9 file conversion and the optical steps changes to normal steps.

- (1) When the appointed reference optical step is not available
- (2) When the appointed reference optical step is other than optical step
- (3) When the Vision test command (@V) is different from the appointed reference optical step’s
- (4) When Scene Recycle step was appointed to reference optical step

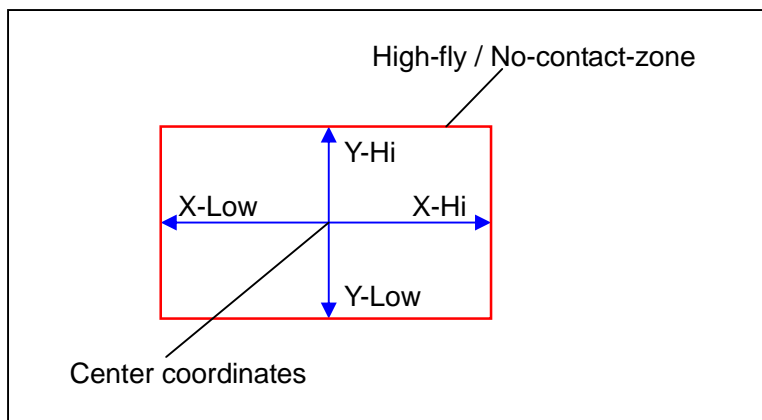
Ex.)

@V5 C56 15UF 16228306 * +021082 +008382	
@V5 C63 33UF 16123785 * +032893 +013589	
@V5 C64 22UF 16239964 * +050419 +029591	
@V5 C76 10UF 16247252 * +096647 +005461	
@V5 C153 10UF 16247252 * +048260 +120650	
@V5 C32 15UF 16228306 * +020193 +012954 @SR C56	
@V5 C38 15UF 16228306 * +004826 +000254 @SR C56	
<u>@V1 C41 15UF 16228306 * +008636 +000254 @SR C56</u>	B Case (3) above
<u>@V5 C49 33UF 16123785 * +029591 +008509 @SR C77</u>	B Case (1) above
@V5 C58 33UF 16123785 * +042545 +013589 @SR C56	
@V5 C61 15UF 16228306 * +038100 +009144 @SR C56	
<u>@V5 C62 15UF 16228306 * +038100 +009144 @SR C32</u>	B Case (4) above

High-fly / No-Contact-Zone command: @HN

Form: @HN? Parts 105230 103250 10000 -10000 5000 -5000 2500

@HN? : High-fly / No-contact-zone command
 Parts : Parts name
 105230 : Center coordinates in X-axis
 103250 : Center coordinates in Y-axis
 10000 : X-Hi (X-distance from center coordinates of the part)
 -1000 : X-Low (X-distance from center coordinates of the part)
 5000 : Y-Hi (Y-distance from center coordinates of the part)
 -5000 : Y-Low (Y-distance from center coordinates of the part)
 2500 : Height



(NOTE)

1) This command is available in the APT-94xx series only.

2) This command undertakes 5 different conversions below:

@HN1 : High-Fly-Zone only

@HN2 : High-Fly-Zone and No-Contact-Zone

@HN3 : High-Fly-Zone and No-Contact-Zone

(“Except Sensor Probe” - Only the sensor probe is permitted to access to No-Contact-Zone)

@HN4 : No-Contact-Zone only

@HN5 : No-Contact-Zone only

(“Except Sensor Probe” - Only the sensor probe is permitted to access to No-Contact-Zone)

3) All coordinates value should be written in micron (um).

4) This command should be written prior to @N (Pin coordinate command) command.

(Ex.)

JD1 P15-16 ISA_D * R N2200 N2946 @K OP

JD1 P16-17 ISA_D * R N2946 N2202 @K OP

JD1 P17-18 ISA_D * R N2202 N2205 @K OP

@HN1 J100 105230 103250 10000 -10000 5000 -5000 2500

@HN2 J101 100030 3250 12000 -12000 5000 -5000 10000

@N

00001: +001854, -088849 \$\$\$25334

00002: +001854, -083769 \$\$\$24725

00003: +001854, -078689 \$\$\$25332

- 4) After the CA9 conversion, the High-Fly-Zone and No-Contact-Zone steps will be added to the end of the test program, and displays followings on the list menu:

AUX. field → ZONE

Value field → "*"

Comment field → High-fly-zone, No-contact-zone or Zone (depends on @HN command)

F. field → "JP"

- 5) In case of No-contact-zone set only, the parameter for Height information is omissible.
- 6) Depending on this command, Probe permission will be automatically set as well. (This feature will be added in the future software update.)

Center Coordinates command: @BT (Option command)

Form: @BT 105230 103250

@BT : Center coordinates command
 105230 : Center coordinates in X-axis
 103250 : Center coordinates in Y-axis

(NOTE)

- 1) This command is available in both the APT-94xx series and APT- 8400 series.
- 2) All coordinates value should be written in micron (um).
- 3) This command is an option command for Step data.

(Ex.1)

R1 1KO Comment 1A R 1000 2000 3000 4000 @BT 10000 10000

(Ex.2)

In case of the parts that generates multiple steps under the identical parts name, it will be enough for you to specify this command at the forehand step only, because that results in substituting the center coordinates also in the other steps automatically. Nevertheless you will be able to specify this command to all the steps without problem.

IC 1-7P * 1A R 1000 2000 3000 4000 @BT 10000 10000

IC 2-7P * 1A R 1000 2000 3000 4000 (The same center coordinates as the forehand step are substituted automatically)

IC 3-7P * 1A R 1000 2000 3000 4000 (The same center coordinates as the forehand step are substituted automatically)

IC 4-7P * 1A R 1000 2000 3000 4000 (The same center coordinates as the forehand step are substituted automatically)

Contact point information command: @LA, @LF, @LS (Option command)

You were able to add “Contact point information” for each contact point in CA9 file. With this feature, you get to know the other contact points connecting on the same net easily in Step data review while arranging them in preferential order. We hereunder explain the basic specifications.

```
L1606 30.00 602138 * L N506 N1606 @T 10 10#
L1607 30.00 602138 * L N507 N1607 @T 10 10#
L1608 30.00 602138 * L N508 N1608 @T 10 10#
@N#
00001: -020542, -143192 GND
00002: -020542, -140652 SIGN1519
00003: -020542, -138112 SIGN1521
00004: -020542, -135572 SIGN1518
00005: -020542, -133032 SIGN1520
00006: -109124, -123274 SMUX
00007: -107854, -123274 SMUX
00008: -106584, -123274 SMUX
00009: -102775, -116755 SIGN1870
00010: -097695, -114384 SIGN1882
00011: -096425, -107865 SIGN1872
00012: -090250, -113432 GND
00013: -089842, -115570 GND
```

@LA	*	@LF	TH	@LS	T#
@LA	*	@LF	TP	@LS	T#
@LA	*	@LF	TP	@LS	T#
@LA	*	@LF	TP	@LS	T#
@LA	*	@LF	TP	@LS	T#
@LA	*	@LF	TP	@LS	T#
@LA	NC	@LF	TH	@LS	T#
@LA	NC	@LF	SMD	@LS	T#
@LA	*	@LF	TP	@LS	T#
@LA	*	@LF	TP	@LS	T#
@LA	*	@LF	TP	@LS	T#
@LA	*	@LF	SMD	@LS	T#
@LA	*	@LF	CN	@LS	T#

@LA command (Land Access command)

Form: @LA NC

- @LA : Land Access command
- NC : Describe “NC” following this command if the probe contact is not possible.

(Ex.)

00007: -107854, -123274 SMUX @LA NC

(Note)

- 1) This command is available in the APT-94xx series only.
- 2) In case of @LA * or no assignment of @LA command, LA on Pin coordinate edit menu will be substituted by ” * ”.
- 3) After CA9 file conversion, Contact point information is displayed on the pin coordinates list.

Pin No.	Net Name	PL	P1	P2	P3	P4	LA	Xcoord	Ycoord	BFRL	LF	LS
00012	GND	0	1	1	1	1	*	[-090.2500,-113.4325]			SMD	Top
00013	GND	0	1	1	1	1	*	[-089.8425,-115.5700]			CONNECTOR	Top
00014	GND	0	1	1	1	1	*	[-089.8425,-116.8400]			DIP	Top/Bottom
00015	SRS232_TXD	0	1	1	1	1	*	[-089.8425,-118.1100]			TEST_POINT	Top
00016	SRS232_RXD	0	1	1	1	1	*	[-089.8425,-119.3800]			TEST_POINT	Top
00017	SIGN880	0	1	1	1	1	*	[-083.3225,-124.4600]			TEST_POINT	Top
00018	SIGN876	0	1	1	1	1	*	[-083.3225,-123.1900]			TEST_POINT	Top
00019	SIGN881	0	1	1	1	1	*	[-083.3225,-121.9200]			TEST_POINT	Top
00020	SIGN882	0	1	1	1	1	*	[-083.3225,-120.6500]			TEST_POINT	Top
00021	SIGN883	0	1	1	1	1	*	[-083.3225,-119.3800]			TEST_POINT	Top
00022	VC50VR	0	1	1	1	1	*	[-083.3225,-118.1100]			SMD	Top
00023	GND	0	1	1	1	1	NC	[-083.3225,-116.8400]			PAD	Bottom
00024	GND	0	1	1	1	1	NC	[-083.3225,-115.5700]			THROUGH_HOLE	Top
00025	GND	0	1	1	1	1	*	[-025.6225,-123.1600]			CONNECTOR	Bottom
00026	GND	0	1	1	1	1	*	[-024.3525,-123.1600]			DIP	Top/Bottom
00027	GND	0	1	1	1	1	*	[-020.5425,-123.1600]			TEST_POINT	Top
00028	GND	0	1	1	1	1	*	[-019.2725,-123.1600]			SMD	Top

It indicates whether probe contact is possible or not.

* : Possible

NC : Not possible
 They are allowed to change on Pin coordinates list.

@LF command (Land Figure command)

Form: @LF TP

- @LF : Land Figure command
- TP : Contact point information
- [Default set]
- TEST_POINT (“TP” also acceptable)
- DIP
- PAD
- SMD
- THROUGH_HOLE (“TH” also acceptable)
- CONNECTOR (“CN” also acceptable)
- [User definition]
- Maximum 10 types
- Maximum 20 strings/type

(Ex.)

00010: -097695, -114384 SIGN1882 @LF TP

(Note)

- 1) This command is available in the APT-94xx series only.
- 2) Maximum 16 types of @LF command is usable. Data mode in APT system already defines 6 types of contact points in light blue, but other types up to 10 can be configurable by the customer as they like. (They are also managed in Data mode)
- 3) After CA9 file conversion, Contact point information is displayed on the pin coordinates list.

Pin No.	Net Name	PL	P1	P2	P3	P4	LA	Xcoord	Ycoord	BFR	LF	LS
00012	GND	0	1	1	1	1	*	[-090.2500,-113.4325]			SMD	Top
00013	GND	0	1	1	1	1	*	[-089.8425,-115.5700]			CONNECTOR	Top
00014	GND	0	1	1	1	1	*	[-089.8425,-116.8400]			DIP	Top/Bottom
00015	SRS232_TXD	0	1	1	1	1	*	[-089.8425,-118.1100]			TEST_POINT	Top
00016	SRS232_RXD	0	1	1	1	1	*	[-089.8425,-119.3800]			TEST_POINT	Top
00017	SIGN880	0	1	1	1	1	*	[-083.3225,-124.4600]			TEST_POINT	Top
00018	SIGN876	0	1	1	1	1	*	[-083.3225,-123.1900]			TEST_POINT	Top
00019	SIGN881	0	1	1	1	1	*	[-083.3225,-121.9200]			TEST_POINT	Top
00020	SIGN882	0	1	1	1	1	*	[-083.3225,-120.6500]			TEST_POINT	Top
00021	SIGN883	0	1	1	1	1	*	[-083.3225,-119.3800]			TEST_POINT	Top
00022	VC50VR	0	1	1	1	1	*	[-083.3225,-118.1100]			SMD	Top
00023	GND	0	1	1	1	1	NC	[-083.3225,-116.8400]			PAD	Bottom
00024	GND	0	1	1	1	1	NC	[-083.3225,-115.5700]			THROUGH_HOLE	Top
00025	GND	0	1	1	1	1	*	[-025.6225,-123.1600]			CONNECTOR	Bottom
00026	GND	0	1	1	1	1	*	[-024.3525,-123.1600]			DIP	Top/Bottom
00027	GND	0	1	1	1	1	*	[-020.5425,-123.1600]			TEST_POINT	Top
00028	GND	0	1	1	1	1	*	[-019.2725,-123.1600]			SMD	Top

It indicates types of contact points.

- TEST_POINT
- DIP

- PAD
- SMD
- THROUGH_HOLE
- CONNECTOR
- Others (User-definition)

They are not allowed to change on Pin coordinates list.

@LS command (Land Side command)

Form: @LS B

- @LS : Land Side command
- B : Describe "T", "B" or "TB" following this command.
(T : Top side B : Bottom side TB : Top and Bottom side)

(Ex.)

00003: -165868, +011035 NET1 @LS B

(Note)

- 1) This command is available in the APT-94xx series only.
- 2) After CA9 file conversion, Contact point information is displayed on the pin coordinates list.

Pin No.	Net Name	PL	P1	P2	P3	P4	LA	Xcoord	Ycoord	BFRL	LF	LS
00012	GND	0	1	1	1	1	*	[-090.2500,-113.4325]			SMD	Top
00013	GND	0	1	1	1	1	*	[-089.8425,-115.5700]			CONNECTOR	Top
00014	GND	0	1	1	1	1	*	[-089.8425,-116.8400]			DIP	Top/Bottom
00015	SRS232_TXD	0	1	1	1	1	*	[-089.8425,-118.1100]			TEST_POINT	Top
00016	SRS232_RXD	0	1	1	1	1	*	[-089.8425,-119.3800]			TEST_POINT	Top
00017	SIGN880	0	1	1	1	1	*	[-083.3225,-124.4600]			TEST_POINT	Top
00018	SIGN876	0	1	1	1	1	*	[-083.3225,-123.1900]			TEST_POINT	Top
00019	SIGN881	0	1	1	1	1	*	[-083.3225,-121.9200]			TEST_POINT	Top
00020	SIGN882	0	1	1	1	1	*	[-083.3225,-120.6500]			TEST_POINT	Top
00021	SIGN883	0	1	1	1	1	*	[-083.3225,-119.3800]			TEST_POINT	Top
00022	VC5OVR	0	1	1	1	1	*	[-083.3225,-118.1100]			SMD	Top
00023	GND	0	1	1	1	1	NC	[-083.3225,-116.8400]			PAD	Bottom
00024	GND	0	1	1	1	1	NC	[-083.3225,-115.5700]			THROUGH_HOLE	Top
00025	GND	0	1	1	1	1	*	[-025.6225,-123.1600]			CONNECTOR	Bottom
00026	GND	0	1	1	1	1	*	[-024.3525,-123.1600]			DIP	Top/Bottom
00027	GND	0	1	1	1	1	*	[-020.5425,-123.1600]			TEST_POINT	Top
00028	GND	0	1	1	1	1	*	[-019.2725,-123.1600]			SMD	Top

It indicates on which side contact point exists.

- Top : Top side
- Bottom : Bottom side
- Top/Bottom : both Top and Bottom side

They are not allowed to change on Pin coordinates list.

Variant management command: @VA, @VB, @VM, @VC (Option command)**Test flag command for Variant management (@VA, @VB)**

Test flag for Variant management is specified by Option command @VA and @VB.

Form: @VA A C

@VA : Test flag command for Variant management (*Set appointed flag*)

A C : Test flag number for Variant management (A~X and ALL)

ALL -> Test is performed in all Models

A~X -> Test is performed in only the Model with specified Test flag

Form: @VB A

@VB : Test flag command for Variant management (*Set flag by exclusion*)

A : Test flag number for Variant management (A~X)

A~X -> Test is performed in only the Model without specified Test flag

(Ex.) 4 kinds of Variant management

R1 1KO Comment 1A R 1000 2000 3000 4000 @VA B

R1 2KO Comment 1A R 1000 2000 3000 4000 @VA A C

R2 1KO Comment 1A R 1000 2000 3000 4000 @VB A

R2 3KO Comment 1A R 1000 2000 3000 4000 @VA A

R3 5KO Comment 1A R 1000 2000 3000 4000

If case of example above, the APT system runs test as follows;

Model A: R1(2KO), R2(3KO) and R3(5KO) are tested.

Model B: R1(1KO), R2(1KO) and R3(5KO) are tested.

Model C: R1(2KO), R2(1KO) and R3(5KO) are tested.

Model D: R2(1KO) and R3(5KO) are tested. (R1 isn't tested)

(Note)

- 1) This command is available in the APT-94xx series only.
- 2) @VA and @VB are Option command.
- 3) When these commands (@VA, @VB) are omitted, Test flag for "ALL" (A~X) is substituted.
- 4) It is possible to use the other Option commands at the same time.

Maximum Test flag number setting command (@VM)

This command specifies maximum number of Test flag for Variant management. The maximum number specified by this command is registered in Data mode. The APT system indicates the menu where Test flag could be chosen, added and/or changed within the limits of the maximum number.

Meanwhile, it is also possible to change maximum number in Data mode after the CA9 file conversion.

Form: @VM 10

@VM : Maximum Test flag number setting command
10 : Maximum number (2~24)

(Ex.)

@VM 10

If case of example above, Test flag can be specified within the limits of maximum 10.

(Note)

- 1) This command is available in the APT-94xx series only.
- 2) The @VM command can be described anywhere in the CA9 data.
- 3) The @VM command is not Option command.
- 4) When the @VM command is omitted, the maximum number is set for 24.

Test flag index setting command (@VC)

This command specifies Index of Test flag for Variant management. The index is specified per Test flag A~X.

Meanwhile, it is also possible to specify and/or change Index in Data mode after the CA9 file conversion.

Form: @VC
A:TAKAYA_9000-2A1
@CE

@VC : Test flag index setting command
A:9000-2A1 : Index (Max 20 letters)
@CE : Test flag index setting complete command

(Ex.)

@VC
A:9000-2A1
B:9000-2C3

C:9000-2B
D:9000-4A
E:9000-5B1
@CE

(Note)

- 1) **This command is available in the APT-94xx series only.**
- 2) **Letters of Index is maximum 20.**
- 3) **The @VC command is not Option command.**
- 4) **The @VC command can be described anywhere in the CA9 data.**

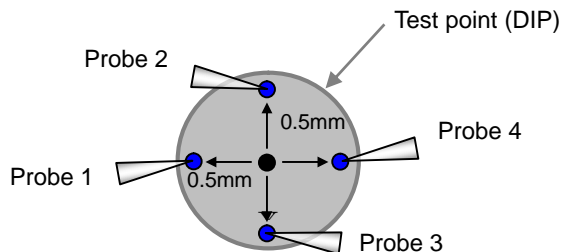
Variable offset contact command: @VO

@VO command is able to add the variable offset to the center of the coordinates during the CA9 file conversion. The @VO command works to assist in the existing @LF command (Land figure command) that indicates type of contact point.

Form: @VO DIP 50

@VO : @VO command (Variable offset contact command)
 DIP : @LF command (Land figure command)
 50 : Offset value (0 ~ 255); the distance unit for offset is 10 μ m

If case of example above, all of pin coordinates which Land figure is specified to "DIP" will have an offset of 0.5mm.



(Note)

- 1) The @VO command must always be placed prior to the @N command.
- 2) The @VO command should be specified within 16 letters (max).
- 3) The offset value specified by the @VO command is applicable in common to the A/B-side program.
- 4) It shows the error "Contact point information isn't available!" when the @VO command is used as single.

DDE command: @SA, @SN, @TN, @DD, @TO

To relieve the users of spending so much time to generate DDE steps manually, the CA9 format is able to support the DDE command.

Setup command for DDE in Data mode (@SA, @SN, @TN)

Form: @SA1 C:\TAKAYA\DDESVR.exe @SN DDESVR @TN DDE_Topic

- @SA : External application (Server application) command
- @SN : DDE Service name command
- @TN : DDE Topic name command

Ex)

@SA1 C:\TAKAYA\DDESVR.exe @SN DDESVR @TN DDE Topic

(1) (2) (3) (4) (5) (6)

(1) External application command (@SA)

- "@SA" should be followed by application number (1~3).

(2) External application name

- Character string next to "@SA" command is imported as the external application name.

- Be sure to specify External application name by full path.

(3) DDE Service name command (@SN)

(4) DDE Service name

- Character string next to "@SN" command is imported as the DDE Service name.

(5) DDE Topic name command (@TN)

(6) DDE Topic name

- Character string next to "@TN" command is imported as the DDE Topic name.

Setup command for DDE step (@DD, @SA, @TO)

Form: @DD IC01 7pin Comment Loc @T1:1000 2000 @T2:3000 4000 @SA 1 @TO1

- @DD : Recognition command for DDE step
- @SA : Server Application number (Option command)
- @TO : Time-out period (Option command)

@DD IC01 7pin Comment Loc. @T1:1000 2000 @T2:3000 4000 [Option command...]

(1) (2) (3) (4) (5) (6) (7) (8)

(1) Recognition command for DDE step

(2) PTS_item

(3) VAL_item

(4) Commend

(5) LOC_item

(6) Terminal 1

(7) Terminal 2

(Terminal number)

- The user is allowed to skip Terminal specification.
- Terminal number can be specified up to 4. (T1~T5)
- Using the same Terminal number twice is not permitted.

(Coordinate format)


- Specification of coordinates (Teaching system) Ex. +10000 +20000
- Specification of pin numbers (Point system) Ex. N152
- Specification of bottom pins Ex. B1, B2

(8) Option command

@SA, @TO, @PC, @PL, @PS, @K, @VA/@VB only

- @K command is not allowed to use for any other specification than JP(jump).
- @SA command is Application number:
 - Ex. @SA 1
 - Server Application number can be specified by 1~3. (default "1")
- @TO command is Time-out period:
 - Ex. @TO 1
 - Time-out period can be specified by 0~255. (default "0")

Command Reference of Extension CA9 (Vol.4)

Issued by :  TAKAYA CORP.
Head office : 661-1, Ibara-cho, Ibara-shi, Okayama 715-8503 Japan
Phone : +81-866-62-1870
Fax : +81-866-62-1886