ECM97 Pick & place machine

This manual provides the operator and maintenance staff with information necessary to ensure efficient and trouble-free operation of the ECM97 pick & place machine.

WARNING. The machine contains moving mechanical parts, and therefore extreme care must be taken to ensure that fingers, clothing, jewellery, tools etc. do not get caught in the equipment. The machine will stop instantly when the red Emergency Stop switch is pressed.

The machine will come to a controlled stop if the red "Cycle Stop" switch is pressed, or if the **F10** or **F1** function key on the computer keyboard is pressed.

Beware, the machine may start automatically when a PCB is inserted on the conveyor.

Machine operators must not wear loose clothing or jewellery, and must fasten up long hair.

The electrical supply must be disconnected from the machine before commencing any maintenance work on it.

OPERATION MANUAL

ECM – 97 L

Thank you very much for purchasing ECM93 chip placer. This machine is low cost
entry machine but is capable to up-grade in various application area.
This manual is concise version and final one will be supplied when available.

INSTALLATION GUIDE (Also see SETUP file.)

1.Computer requirement
   To control ECM93,following IBM PC/AT compatible computer is required.
   (IBM and PC/AT are trade mark of International Business Machine corp.)

   CPU: 386 or 486 up to 486DX 66MHz. Set CPU constant of the system using
        diagnostic routine before running machine.

   Memory:2 M bytes minimum.

   Drives: One 1.44M and 720K 3.5 inch floppy drive.
           One hard drive with DOS later than V3.0. The hard drive should
           have at least 2 Mbyte free area.

   I/O Slot: At least 1 having 8 bit data bus. Auto conveyor system needs one
             more and vision system needs another one.

   Monitor: VGA color monitor.

   Printer: Option

   Serial inter face: Option

2. Open cartons and check goods.
   The main body is secured on shipping board so remove it by unscrewing 4
   foot knobs.Then set the knobs again in the main body and adjust height
   on the table. Disassemble one screw from the control plate which is located
   right side of the main body and positioned at shipping position.And raise
   the plate to operating position and secure it by 4 screws attached.
   If you purchased computer table,assemble two legs and back bars by attached
   screws and then assemble flat plate on it.

3. I/O card(s) installation and cable connection.
   Plug off computer mains cable and open computer cover. Insert I/O card(s)
   in empty slot firmly and secure it by screw.

        Standard ECM93 requires one HD411 board.
        With conveyor requires one more HD411 board.
        Vision system requires one vision board.

   Connect cable to I/O card(s) to control box and main body to control box as
   shown in attached diagram.
   Mains voltage is set by factory according to shipping destination but if
   change is required,open cover of control box and change transformer setting
   as required.
   Connect air piping to main body thru air regulator and adjust air pressure to
   5kg/cm² (70psi).

4. Installation of software
   The software is supplied in 720K 3.5 inch floppy disk.The disk has main
   directory TB and sub directories ECM,TXT and DATA.
   Using INSTALL.BAT file in the master disk all necessary directories are
   created in C drive and files are copied in the directories.
   a) Turn on computer and in the root directory and insert the master disk
   in drive A,type A:INSTALL<ENTER> and all necessary action will be done.

   Note:INSTALL.BAT file makes new AUTOEXC.BAT file for ECM93 and current
        AUTOEXEC.BAT file is erased.If you need current AUTOEXEC.BAT file,
        save it with different name such as AUTOEXEC.OLD before proceeding
        installation.

INSTALLATION NOTICE

ECM93 v.1 SOFTWARE REQUIRES RAM DRIVE IN THE COMPUTER.SO MODIFY CURRENT
CONFIG.SYS IF THE RAM DRIVE IS NOT CONFIGURED.
USING AN EDITOR,ADD ONE LINE IN CONFIG.SYS FILE AS FOLLOWS.

devicehigh=c:¥dos¥ramdrive.sys 256 /E

SO ACTUAL CONFIG.SYS LIKE BELOW.(IT MAY DIFFER SLIGHTLY BY SYSTEM.)

```
    DEVICE=C:¥DOS¥SETVER.EXE
    DEVICE=C:¥DOS¥HIMEM.SYS
    DOS=HIGH
    DEVICE=C:¥DOS¥ANSI.SYS
    devicehigh=c:¥dos¥ramdrive.sys 256 /E
    BUFFERS = 30
    FILES=20
```

IT MUST BE LOCATED AFTER HIMEM.SYS AND USUALLY THE RAM DRIVE # IS SET
TO D BUT IF IT IS DIFFERNT DRIVE # THEN CHANGE THE REMARK OF k2 IN
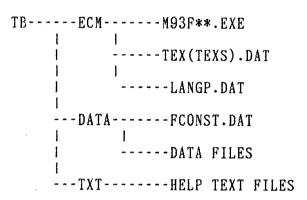SYSTEM CONSTANT.

AFTER CONFIG.SYS FILE IS CHANGED.INSET THE MASTER DISK IN DRIVE A AND
TYPE

    A:INSTALL <ENTER>

AND ALL FILES WILL BE COPIED IN THE COMPUTER.

Version 4.3 software

1.Software installation
Install M93F.EXE/TEX.DAT/LANGP.DAT or M93FV.EXE/TEX.DAT/LANG.DAT or M93FVS.EXE/
TEXS.DAT/LANGP.DAT to TB ECM directory according to machine configuration
from TB ECM directory of the master disk.And install FCONST.DAT and other data
files to TB DATA directory from TB DATA directory of the master disk and finally
install all text files to TB TXT directory from TB TXT directory of the master
disk.

```
TB------ECM-------M93F**.EXE
        |        |
        |         ------TEX(TEXS).DAT
        |        |
        |          ------LANGP.DAT
        |
        ---DATA-------FCONST.DAT
        |        |
        |         ------DATA FILES
        |
        ---TXT--------HELP TEXT FILES
```

2.Pass word
Version 4.3 software provides 3 level pass word function.
Level 0 is for operators who just load data and assemble PCB.
Level 1 is for group leaders who can edit and change data.
Level 2 is for maintenance technicians who can change system constants and
optimize the machine operation.
To set pass word,LANGP.DAT file should be edited by a text editor.
Contents of LANGP.DAT file:
When LANGP.DAT file is loaded in a text editor the contents are as follows.
    0,0,0,0,0,0

The first 0 is for the 1st language(English) and if it is changed to 1,the 2nd
language prepared in TEX(S).DAT file is selected.The 2nd 0 is for no pass word
and changing it to 1,pass word function is activated.
From the second line,pass word and level can be input up to 9.For example
    0,1
    TED,2
    JOE,1

This case TED is pass word as level 2 and JOE is level 1 pass word. And when
pass word input is prompted,press enter key will result level 0 pass word.

Reboot computer and turn on control box.
Now computer display will ask Machine run Yes/No. Press f1 key to see help
message.

1.Start operation
After all connection complete,turn on computer mains and then control box.
(TO TURN OFF MAINS,TURN OFF CONTROL BOX FIRST.)

```
┌───── Input condition ═════╗
║                           ║
║   Machine run Y/N          ║
║                           ║
╚════════ Help=F1 ══════════╝
```

Usually press Y key to start but if you want off-line data editing,press N
key then even the machine is not connected computer can execute program.
Pressing f1(function key #1 on key board top) help message pops up.
Printed help messages are attached in this mamual.See [HLPM.00]

Then following file directory is displayed.See [HLPM.010]
When the machine is shipped out from factory,BAK data file is prepared.
This file is a dummy data but also prepared some basic feeder and system
constant data.
Input file name then the main menu will pop up as next page.

DEMO	.SEQ	TEST	.SEQ	BAK	.SEQ	TT	.SEQ
Q	.SEQ	BAK1	.SEQ	SOP	.SEQ	KK	.SEQ
C10	.SEQ	2125	.SEQ	IC	.SEQ		

104841216 Bytes free

```
┌════════ Enter Q to return to Menu ═══════╗
║                                          ║
║  Data file name                          ║
║                                          ║
╚═ Help=F1 ════════════════════════════════╝
```

When Y is pressed at input condition window and if mains power of
control box is OFF then following warning message appears.

Check Mains or Move head to center.

Everything is OK,up/down and theta homing starts and "XY homing OK?"
is asked as follows.
     After homing completes,data file directory is displayed as previous
     page.

HOME U
HOME TH

```
┌─────────────────────────────────┐
│                                 │
│      Homing   Y/N               │
│                                 │
│  ───────── Help=F1 ─────────    │
└─────────────────────────────────┘
```

```
┌─────── ** ECM93  Main  Menu **───────────┐
│         1 Data List           .          │
│         2 Data Input          .          │
│         3 Data Load           .          │
│         4 Down Load (RS232C)             │
│         5 Assembly            .          │
│         6 Back to Menu        .          │
│         7 Diagnostic          .          │
│         8 Calibration         .          │
│         9 Quit                .          │
└─ Help=F1 ════════════════════════════════┘
```

2.Job selection
All jobs can be selected from this main menu thou if the machine is not
connected,some jobs such as assembly can not execute.
Move white bar using up/down arrow key to desired job and press enter or
simply press a number from 1 to 9 attached on each job,then menu window
is switched to nest step.
Moving white bar on a job and press f1 key,then necessay help message
will pop up.

Following help messages are prepared.
Data list   [HLPM.01]
Data input   [HLPM.02]
Data load   [HLPM.03],[HLPM.010]
Down load (RS232C)   [HLPM.04]
Assembly   [HLPM.05]
Back to Menu   [HLPM.06]
Diagnostic   [HLPM.07]
Calibration   [HLPM.08]
Quit   [HLPM.09]

3.Data list

Several data lists can be selected by menu bar and they are shown in next few pages.

```
╔═* Data list of *═══╗        ╔═══════ ECM 93 Data List by  mm ═══╗
║ 1 Tape    Feeder  .║        ║ # of parts per P.C.Board = 10     ║
║ 2 Tray    Feeder  .║        ║                                   ║
║ 3 Linear Feeder   .║        ║     # of Tape cassette  = 10      ║
║ 4 Nozzle Changer  .║        ║     # of  Grid    trays = 3       ║
║ 5 PCB Parts       .║        ║     # of  Chip  feeders = 12      ║
║ 6 Part type       .║        ║     # of  Bits    used  = 6       ║
║ 7 Dispens type    .║        ║     # of Positioners    = 1       ║
║ 8 Main menu       .║        ╚════════════ File:DEMO ════════════╝
╚═ Help=F1 ══════════╝
```

See following help messages.

Tape feeder   [HLPF.01]
Tray feeder   [HLPF.02]
Linear feeder   [HLPF.03]
Nozzle changer   [HLPF.04]
PCB parts   [HLPF.05]
Part type   [HLPF.06]
Dispens type   [HLPF.07]

```
                                  ╔═══════ ECM 93 Data List by   mm ═══╗
                                  ║ # of parts per P.C.Board = 10      ║
╔═ Type══ # ═════ X ══════ Y ═════ A ═══ Strk ══ Rem**************** ╗
║                                                                    ║
║   tape  1       23.00      10.00      .00  180    2125             ║
║   tape  2       36.00      10.00      .00  180                     ║
║   tape  3       49.00      10.00      .00  180                     ║
║   tape  4       62.00      10.00      .00  180                     ║
║   tape  5       75.00      10.00      .00  180                     ║
║   tape  6       88.00      10.00      .00  180                     ║
║   tape  7      101.00      10.00      .00  180                     ║
║   tape  8      114.00      10.00      .00  180                     ║
║   tape  9      127.00      10.00      .00  180                     ║
║   tape 10      140.00      10.60      .00  180    3216             ║
║                                                     ╔══════════╗   ║
║                                                     ║ 1 Return ║   ║
║                                                     ║ 2 Edit . ║   ║
║                                                     ║ 3 Next . ║   ║
╚═ Help=F1 ══════════════════ Tape feeder ═══════════╝══════════╝═══╝
```

See [HLP4.0] for small window,Return/Edit/Next etc.

```
 Type== # ===== X ====== Y ===== A === Strk == Rem****************

 grid  1       99.79      214.48        .00  160      100 PIN QFP
 qty   1       6          2
 pitch 1       27.30      25.00
```

```
                                                        1 Return
                                                        2 Edit  .
                                                        3 Next  .
 Help=F1 ================ Tray feeder ====================
```

```
 Type== # ===== X ====== Y ===== A === Strk == Rem****************

 Bit   1       316.21      67.70     45.00  200
 Bit   2       316.31      55.80     45.00  200
 Bit   3       316.21      43.70     45.00  200
 Bit   4       316.21      31.70     45.00  200
 Bit   5       316.21      19.70     45.00  200
 Bit   6       316.21       7.70     45.00  200

 Pos   1       240.60     192.00       .00

 dumping_P.    280.00    -235.00
```

```
                                                        1 Return
                                                        2 Edit  .
 Help=F1 == Nzl-exchanger._Positioner & Dumping_point === 3 Next  .
```

```
                                    ┌──── ECM 93 Data List by   mm ────┐
                                    │   # of parts per P.C.Board = 10  │
┌── # = Fdr == X ==== Y === A = Prt = Nzl Indx Strk DT HA ──┐
│  bias          40.00   40.00                                            │
│  1       10    91.90   27.90     .00 1    1   1    180  1   0.          │
│  2       10    83.90   27.90     .00 1    1   1    180  1   0           │
│  3       10    75.90   27.90     .00 1    1   1    180  1   0           │
│  4       10    67.90   27.90     .00 1    1   1    180  1   0           │
│  5       10    59.90   27.90     .00 1    1   1    180  1   0           │
│  6       10    51.90   27.90     .00 1    1   1    180  1   0           │
│  7       10    43.90   27.90     .00 1    1   1    180  1   0           │
│  8       10    87.90    9.50     .00 1    1   1    180  1   0           │
│  9       10    79.90    9.50     .00 1    1   1    180  1   0           │
│  10      10    63.90    9.50     .00 1    1   1    180  1   0           │
│                                              ┌──────────┐              │
│                                              │ 1 Return │              │
│                                              │ 2 Edit . │              │
│                                              │ 3 Next . │              │
└─ Help=F1 ════════ [ DEMO ] PCB data from bias point ═════┘
```

```
                              ┌── ECM 93 ┌──── Command ────┐
                              │  # of parts p │ 1 Back to list menu. │
                              │               │ 2 Change data      . │
┌── # = Fdr == X ==== Y === A = Prt = Nzl Ind │ 3 Delete data      . │
│  bias          40.00   40.00                │ 4 Quit and save    . │
│  1       10    91.90   27.90     .00 1    1  1 │ 5 Return to top    . │
│  2       10    83.90   27.90     .00 1    1  1 │ 6 Print out data   . │
│  3       10    75.90   27.90     .00 1    1  1 │ 7 Add      data    . │
│  4       10    67.90   27.90     .00 1    1  1 │ 8 Insert data      . │
│  5       10    59.90   27.90     .00 1    1  1 │ 9 Go to PCB step #  . │
│  6       10    51.90   27.90     .00 1    1  1 │ A Sorting    data  . │
│  7       10    43.90   27.90     .00 1    1  1 │ B Exchange Data    . │
│  8       10    87.90    9.50     .00 1    1  1 │ C Step  &  repeat  . │
│  9       10    79.90    9.50     .00 1    1  1 │ D Extend copy data . │
│  10      10    63.90    9.50     .00 1    1  1 │ E Skip placement   . │
│                                                │ F Active           . │
└─ Help=F1 ════════ [ DEMO ] PCB data from bias point ═════┘
```

See Command helps as follows

Back to list menu	[HLPC.01]	Change data	[HLPC.02]
Delete data	[HLPC.03]	Quit and save	[HLPC.04]
Return to top	[HLPC.05]	Print out data	[HLPC.06]
Add data	[HLPC.07]	Insert data	[HLPC.08]
Go to PCB step#	[HLPC.09]	Sorting data	[HLPC.010]
Exchange data	[HLPC.011]	Step & repeat	[HLPC.012]
Extend copy data	[HLPC.013]	Skip placement	[HLPC.014]
Active	[HLPC.015]		

=P#=	Nzl	L#=	=Btm	=Rgt	=Lft	=X====	=Y===	=Pt===	=W==	Thk===	lv==	Rem************
x 1	1	0	0	0	0	.2	.2	0	0	0	0	3216
x 2	1	0	0	0	0	.2	.2	0	0	0	0	2125
x 3	2	0	0	0	0	1	1	0	0	1	0	SOP
x 4	2	0	0	0	0	3	3	0	0	2	2	QFP
x 5	2	0	0	0	0	3	3	0	0	2	3	QFP

```
┌──────────┐
│ 1 Return │
│ 2 Edit . │
│ 3 Next . │
└──────────┘
```

Help=F1 ══════════════════Part type data══════════════════

Type	#	PC	PTA mm	PTB mm	PTDA mm	PTDB mm	VO	DW4	DW5	DW6	REM*******
disp	1	1	0	0	0	0	3	3	3	3	
disp	2	2	1.6	0	0	0	3	3	3	3	3216
disp	3	3	2	1.5	0	0	3	3	0	3	3 DOT
disp	4	4	3	3	0	0	3	3	3	3	4 DOT
disp	5	5	5	4	0	0	3	3	3	3	5 DOT
disp	6	6	7	6	0	0	3	3	3	3	2 LIN
disp	7	7	10	10	12	12	3	3	3	3	4 LIN
disp	8	8	10	10	12	64	3	3	3	3	64 DO

```
┌──────────┐
│ 1 Return │
│ 2 Edit . │
│ 3 Next . │
└──────────┘
```

════════════════════ Dispens type ════════════════════

4. Assembly is selected at the main menu, following message window appears.
   Input required assembly # and nozzle # attached.
   See help [HLPR.0]

```
┌─ Input info. ─────────────── Help=F1 ─┐
│                                       │
│    Number of assemblies required  10  │
│                                       │
│              Attached Nozzle #   1    │
│                                       │
│                                       │
│                                       │
└─ No Nozzle = 0   Redo = -1 ───────────┘
```

Then set PCB on the fixture firmly and press space bar to start assembly

```
┌═══════RUN STATUS═══════┐   ┌════════TOTAL════════┐
║                        ║   ║                     ║
║                        ║   ║   Planned Qty 10    ║
║                        ║   ║                     ║
╚════════════════════════╝   ╚═════════════════════╝
┌═ # = Fdr ══  X  ════   Y  ===   A  = Prt = Nzl Indx Strk  DT   HA ═┐
│ bias         40.00     40.00                                       │
│                                                                    │
│                                                                    │
│                                                                    │
│                                                                    │
│                  ┌─────────────────────────────────┐              │
│                  │                                  │              │
│                  │      Waiting for P.C.B set.      │              │
│                  │                                  │              │
│                  │    Press ANY key.T to terminate  │              │
│                  │                                  │              │
└══════════════════└─ Help=F1 ───────────────────────┘──────────────┘
```

   F1=HELP   F10=STOP   Space=Interrupt   R=Re-try   S=Interrupt & Re-try

```
     ┌──────RUN STATUS───────┐     ┌───────────TOTAL──────────┐
     │                       │     │                          │
     │                       │     │  Planned Qty 10          │
     └───────────────────────┘     └──────────────────────────┘

     ┌ # = Fdr ==  X  ====  Y  ===  A  = Prt = Nzl Indx Strk  DT  HA ─┐
     │ bias        40.00   40.00                                     │
     │ 1     10    91.90   27.90    .00 1     1   1   180   1    1    │
     │ 2     10    83.90   27.90    .00 1     1   1   180   1    1    │
     │ 3     10    75.90   27.90    .00 1     1   1   180   1    1    │
     │ 4     10    67.90   27.90    .00 1     1   1   180   1    1    │
     │ 5     10    59.90   27.90    .00 1    ·1   1   180   1    1    │
     │ 6     10    51.90   27.90    .00 1     1   1   180   1    1    │
     │ 7     10    43.90   27.90    .00 1     1   1   180   1    1    │
     │ 8     10    87.90    9.50    .00 1     1   1   180   1    1    │
     │ 9     10    79.90    9.50    .00 1     1   1   180   1    1    │
     │ 10    10    63.90    9.50    .00 1     1   1   180   1    1    │
     │                                                               │
     │                                                               │
     │                                                               │
     └══════════════════ [ DEMO ] PCB data from bias point ══════════┘

       F1=HELP   F10=STOP   Space=Interrupt   R=Re-try   S=Interrupt & Re-try


     ┌────────RUN STATUS──────┐     ┌───────────TOTAL────────┐
     │ Accum.   5 sec     c   │     │  Assembled 2           │
     │ Average 16.14 sec      │     │  Planned Qty 10        │
     └────────────────────────┘     └────────────────────────┘

     ┌ # = Fdr ==  X  ====  Y  ===  A  = Prt = Nzl Indx Strk  DT  HA ─┐
     │ bias        40.00   40.00                                     │
     │ 1     10    91.90   27.90    .00 1     1   1   180   1    1    │
     │ 2     10    83.90   27.90    .00 1     1   1   180   1    1    │
     │                                                               │
```

During assembly,assembly list is displayed and black bar advances accord-
ing to assembly progress and run status is displayed on upper portion of
screen.If dispenser is in action dispenser heater status also displayed
on upper right of screen.
If you want to change or check certain data without terminates assembly,
press space bar then the main menu is displayed and you can go to the data
list and change or check data then back to assembly.The assembly will start
from next step.

**** HELP MENU INDEX *** Move cursor on the item and press enter **

CODE	Description	CODE	Description
M0	Input condition	F1	Tape feeder
M1	Data list	F2	Tray Feeder
M2	Data Input	F3	Linear Feeder
M3	Data Load	F4	Nozzle Exchanger
M4	Down Load	F5	PCB Part Data
M5	Assembly	F6	Part Type Data
M6	Back to Top	F7	Dispenser Type
M7	Diagnostic	F8	Back to Menu
M8	Calibration	F9	Homing
M9	Quit	C1	Back to List menu
M10	F8 key:Teaching mode	C2	Change Data
M12	Constant Data (1)	C3	Delete Data
M13	Constant Data (2)	C4	Quit and Save
M14	T key:Terminate assembly	C5	Return to Top
M15	Homing OK ?	C6	Print out Data
M16	Check control box power or	C7	Add Data
	Move head to center		******** Press PageDown ********

**** HELP MENU INDEX *** Move cursor on the item and press enter **

CODE	Description	CODE	Description
C8	Insert Data	X0	Help menu system
C9	Go to PCB step	X1	Special characters using Alt key
C10	Data Sorting	X2	Option features
C11	Exchange Data	X3	Calibration of XSHIFT/CPX etc.
C12	Step and Repeat	X4	Dispenser offset adjustment
C13	Extend Copy data	X5	LV Value in Vision system
C14	Skip Placement	X8	F6 Partial assembly
C15	Un-skip	X9	File Maintenance
E	Major Error code	X10	Added Dispenser features
R	Assembly PromptX	X11	Additinal info for Constant data
D	Assembly Interrupt	X12	Laser Align system
END			

Input condition
 This software provides two modes, Machine-run mode and the Off-line mode.
The machine run mode is to control ECM93P main frame so the machine should
be connected to the computer thru I/O card(s) and mains on.
*** CAUTION **
* The mains switch of ECM93's control box must be TURN ON after computer *
* on and TURN OFF prior to computer off.   *
****
If Y (Yes) is input then machine starts for homing and if some error happens
an error message appears on screen. If machine is not connected, the system
will hang up.

The off-line mode is prepared to edit or create data without machine.
If N is input the off-line mode starts.

Check computer key board and confirm that CapsLock and NumLock LED's turn
on.
END

Data list
This function displays data list on screen. And you can change data using
various commands which are displayed on a winwow.On the data list,following
keys are used to edit data.   Make sure CapsLock and NumLock keys turn on.
 Num keys and upper case Alphabet keys are valid for input data.
Cursor keys: Select data to edit.
Tab key   :   Moves cursor to next data.(Shift +Tab Moves back cursor.)
Enter key   :   Storer changed data in memory.If Enter key is not pressed
                (and moves cursor up/down),the changed are not stored.
Home key   :   Moves cursor to the top of line.
End key   :   Moves cursor to the end of line.
PgUp/PgDn   :   Moves cursor to the top(end) of rows.
F8 key   :   When machine is connected,the pick-up head moves to X,Y
                coordinates on the data list and teaching can be performed.
¥   key   :   Increment data input.Pressing ¥ key,"Increment X**/Y**" is
                displayed on screen.Input XY increment values separating by
                / or Y.   Example 12.5(X only),2.5/-5,2.5Y-5.2,Y5.2 etc.

**** PgDwn key *** to see next page for extended feature of ¥ key.******
E,ESC key   :   To terminates editing,press ESC key or E key.
Extended feature of ¥ key
Now ¥ key is used to add or subtract a value to all data of X,Y,Theta or
stroke of Pcb and feeder list.
This feature is usefull to change all deta of Z stroke etc.
To perform this feature,press ¥ key then input + followed by seq # and X or
Y or A or S and a value.
For example if you want to add 200 for all stroke data then input as
            +S200
This case seq # is ommited and all data were changed.
If you want to subtract 25 form seq# 5 to 12 of stroke data,input as
            +5:12S-25
Two sequense numbers should be separated by : or space.
X,Y,A(theta) and Index can be changed the same manner.After this command is
executed screen is switched to start menu.

END

Data Input
This function creates a new data file.
Usually this function is not required since some data is already stored in
the data file and to create a new data from such existing data is much
easier .
When this function is selected, file directory is displayed and file name
input is prompted. Then "Step number ?" is displayed. Input "C" to cancel
operation.
If you want to input from begining, input 1 otherwise input targeted step
number. Then a data list is displayed and you can input new data.
Once Enter key is pressed previous data is copied to next sequence.
To terminate data input, move cursor to left end and press Esc .
END

Data Load

This function up load a new data from hard disk.
Stored data file names are displayed on the screen. So move cursor on the
desired file name and press Enter key.
To quit data loading, press ESC key or move cursor on a blank area and press
Enter key.
To load data file from other drive or directory, press D key and then key
input is prompted at the top of screen. So key in correct drive name and
directory name. The drive name should be followed by : such as A: .
Wrong drive or directory name or no SEQ file in the specified directory will
result erratic operation.
To back to default drive and directory, press D key and Enter key and
C:BATA directory is reset again.
END

Down Load
This function down load a data thru RS232 communication interface.
The data format of the sending data should be matched to our data format.
The function is not workable in this version.
END

Assembly
This function runs machine according to the data in the memory.
There are several modes of operation.
See more details in Part type Help menu.

During assembly, if you want to stop operation Press F10 key then,
```
--------------------------------
| Continue=1 Home=2 Menu=3 Quit=4 |    is displayed.
--------------------------------
```
You want to continue assembly, press 1. To move head to home position, press 2
To stop assembly press 3. To terminate system operation, press 4.

If you want to change data, press M key then the main menu is displayed.
Select 1:DATA LIST and make necessary changes on the data and back to the
main menu and select 5:ASSEMBLY and assembly continues.
CAUTION!! DO NOT DELETE DATA. IT MAY RESULT UNEXPECTED MOTION.
Red stop button can interrupt assembly the same as F10 key. Green start key
can start it again.
END

Back to Top
This function initialize machine and software.
Homing is prompted.
END

F8 key :Teaching mode
In this mode,the pick up head moves to specified data coordinates.
On the screen,current status is shown as X=*** Y=*** A=*** U=*** I=*
where X,Y are coordinates,A is angle,U is stroke and I is increment step
for teaching and right end sign shows which coordinate is displayed,
EYE/CAM(era),NoZzLe or dispenser NeeDle.
Following keys are used for teaching.
Arrow keys: To move X and Y.
A,a   key :   To rotate Z(Theta) axis."A" rotates shaft CCW looking from top
              and "a"(SHIFT+A if Caps Lock is activated.) rotates CW.
U,u   key :   Up and down head shaft.Even I>10,U/u increment stays at 10.
*,/,+,-   :   Change value of I(Teaching Increment).
7,9,5,6   :   Moves head to eye sensor,nozzle and dispenser/CAM respectively.
Space,R   :   Space bar moves back head at U=0 position and R repeats
              remembered stroke.It can toggle.
V,0   :   V turns on vacuum and 0 shut off vacuum.V can toggle.
ESC   :   Quit teaching.If the last stroke is not zero,system asks if
              you want to change stroke value.
N   :   Nozzle exchange.   ***** press PageDwn ****
I   key :   To test feeder advancing hammer.At lower right of screen
              Feeder,index are asked so input as 4,1.(#4 feeder and 1 index)
              To test stick feeder,use 10 as dummy index and adequate hammer
              operation is obtained.
S   :   Search center of EYE sensor mark.Position on the mark and press
              S,then eye sensor scans mark and position head to the center.
1,2,3,4,C :   To determin the center of 2/4 points,set eye to the first point
              and press 1 (beep) and then set to the second point (beep) and
              press C.The head moves to the center point.This feature is
              usefull to determine a center of lands.To determine QFP center
              4 point method is usefull.Set X direction by 1 and 2 and set Y
              direction by 3 and 4 and press center.
T   :   With auto tray feeder,exchange tray.
*********** CAUTION ******************
When to check nozzle exchanger position,note current angle value.Since it
may be changed during test and if you do not return it to original value,
the nozzle exchange operation may be malfunction.So unless otherwise you
want to modify it causing reassemble of head etc.,do not change angle value.
END

Constant Data (Version 3. 0 or later)
These data are used to control machine. To change data may destroy machine.
k1:HX/DV!   X axis belt tension constant. approx 200000. (Driver PG=2)
                 DV! is unit constant, Metric=100 and Imperial=2540
k2:HY/U   Y axis belt tension constant. approx 200000. (Driver PG=2)
                 U is unit identification, Metric=1 and Imperial=2
k3, 4:X(Y)limit/ The maximum traveling range of X, Y axis. ZK!, UK! are theta/
     ZK!, UK!   Z constants and normally 100, 40. Refer Motor setting
k5:V3/EM   Recovering # of pick-up miss. /EYE mark set 0=shiny 1=blk
k6:UM/UM1   Z axis up position to activate mechanical jaws. UM1 for SOP
k7:LO/UPCAMERA   Camera constant for vision system.
k8, 9:X(Y)SHIFT Offset between nozzle and eye sensor. Refer X3 for calib.
     TILT2, 3   Angle offset at 180 and 270 degrees.
k10:Focus/BM   Height of off line positioner. /Bad mark 0=blk 32=bright
k11:DTHC/DTHI   Corection limit for chips (DTHC) and QFP (DTHI) for vision.
k12:CPX/CPY   Offset between dispenser and eye sensor. Refer X3 for calib.
k13:TILT/TILT1   Positioner angle offset at 0 and 90 degrees.
k14:MSTOP/FSTOP Wait time after motor stops (& Eye sensor)/PU wait time
k15:POSW/TSTOP   Wait time for positioner /NZL UP wait time ** PgDwn **
k16:WS/WSLM   X motor max speed (1-255)/Max slope   Larger >> Faster
k17:WSS/XPIC   X motor low speed (1-255)/Auto tray PIC position
k18:WSL/WSLQ   X motor min/ build up rate(Slope)/QFP max speed. "" ""
k19:WS1/WSLM1   Y motor max speed/Max slope.
k20:WSS1/XSL1   Y motor low speed/Auto tray PCB 1st position
k21:WSL1/WSLQ1   Y motor min build up rate(Slope)/QFP max speed.
k22:WS2/MAT   Theta motor max speed/Matching factor for Vision
k23:WSS2/CPU   Theta motor low speed/CPU speed constant
k24:WSL2/YTRAY   Theta motor build up rate/Auto tray Height constant
k25:WS3/WSQ3   Z motor max speed   Larger >> Faster/for QFP
k26:WSS3/WSSQ3   Z motor low speed   ""   ""/for QFP
k27:WSL3/WSLQ3   Z motor build up rate   ""   ""/for QFP
k28:LOADER/CHOKE   0/10=no loader 1/11=loader installed/1 Nzl choke test
 ***LOADER=10/11 is for console type & changes XY direction of cursor key.
k29:ICWAIT/DMP   Wait time for larger IC/Dump position of QFP 0=TRAY 1=D. P.
k30:DISPENSER   0=no 1/2=dispenser Temp C/F 5/6 dispenser Only. 10=Camera
    /DISTEM   Dispenser temperature set value. 0=No temp. control
 CAUTION Do not set temperature too high. The max set temp should be less
          than 50 centigrade or 122 F. !!! See Constant Data (2) also !!
END

3500 / 2500   16
70 / 43400   17
1200 / 3 000   18
3500 / 3500   19
70 / 25000   20
1000 / 3000   21

If you want to restart again from bigining, press T key then main menu
will be displayed.
When dispenser is installed and the constant data shows that the dispenser
is active, the dispenser status is displayed on the top right of the screen.
At the begining of production watch the status and wait until temperature
raises and status shows "OFF". If temperature is set to 0, no control is done.
To warming up machine mechanism, W key is prepared to make machine running
in dummy mode. So pressing W key, head up and down starts for 10 times and
then X, Y, Theta run for 10 times and finally the centering jaw closes and
opens for 10 times. If you want to stop, press any key and warm up sequence
will complete and homing starts.
If B or b key is pressed, Bell will beep at the end of assembly completion.
Press any other key to start.
END

Homing ok ?
After up/down and theta homing completes, XY homing will be started.
If there is no foreign material exists on work area of XY arm, which may
interfere with moving pick-up head, press any key and homing will start.

END

Check control box power or Move head to center.

When mains power of control box is off or XY arm is positioned in home
sensor position, which is X<0 or Y<0 position, this warning message appears.
If XY arm is located in home sensor position, turn off mains of control box
once and move head to center and turn on mains again.

***** CAUTION *********
After this message appears and turns on mains of control box properly,
up/down and theta homing starts and

                    Homing ok ?

SHOULD BE DISPLAYED. IF THIS MESSAGE IS NOT DISPLAYED AND XY HOMING STARTS
without this message, TURN OFF MAINS OF CONTROL BOX AND THEN COMPUTER and
reboot again. Mains of the control box should be turned on after computer
turns on and turn off before computer mains off.
END

Tape feeder
Feeder #   : Feeder # starts from 1 to 24 at left side and 25 to 48 at
                right side. As option feeder # can extend up to 120.

```
        0     #1              #25

        X     .                .
              .                .
              .                .
        +     #24             #48
           0    > >  Y   > >  +
```

X, Y position: X, Y position to pick up component is very important for
                stable operation. Adjust position in edit mode(2) and press
                ESC key for teaching.
        **** Note: On Table Top model, X and Y coordinates are assigned **
        ****   as shown above. Back to Front=X & Left to Right=Y ****
Stroke   : Nozzle hight on component is also very important. If height
                is not correct, pick up miss happens frequently. Check height
                in edit mode the same as above.   **** PageDown ****
To use paper base 32mm tape feeder, input 32 in Indx.
END

Tray feeder
If PCB size is small, IC tray can be set on PCB fixture.
Input X, Y coordinates of left top posotion and then input # of repeat and
pitch.   IC TRAY

```
      -  ------------------
         | * |   |   |   |
      X  ------------------
         |   |   |   |   |
      +  ------------------
            -   Y    +
```

When the thickness of tray is thick and picked up component tends to hit
the tray, input 20-50 in the last column of Rem where +++ are shown such as
                    Rem*************+++
                              40

and component is raised roughly 2mm (1 makes 0.05mm). Do not input too much
value to avoid the component hits centering jaws.
Note: Back to front is X direction and Left to Right is Y direction for
Table top model.
END

Linear feeder
Feeder # starts from 121.SO if you install 6 lanes then feeder# will be
121, 122, 123, 124, 125, 126.
When auto vibration off unit is installed and a tape feeder # is specified
at the last of remark string (in the column shown as +++), the vibration
of linear vibration feeder is stopped when a part is picked up to stabilize
pick up operation.
When ultra miniature component in 2mm index tape is picked up by tape and
linear feeder assignment, recovering from pickup miss may not be performed
because tape is not advanced. This case pressing I and input tape#, tape can
be advanced or input CC and tape # in above Rem string and tape will be
advanced properly.
　　Example　　　　　Rem**************+++　　　Meaning
　　　　　　　　　　　　　　　　　　CC　4　<-- Use #4 tape with this lane.

END

Nozzle exchanger
6 nests are prepared for various pick up nozzles. The most left nest is #1.
Usually smaller size of nozzle is set to #1 and larger nozzle such as IC
nozzle is set to #6.
The X, Y coordinates of the nests are set at factory. To change the data
may cause malfuction of nozzle exchange so care should be taken.
To correct nozzle exchange position, select this command then select Edit(2)
and Change(2) and move cursor on required exchanger # and press ESC key
then the head moves on the nest. Before moving head, set a nozzle on the head
and REMOVE nozzle from the nest.
Press U(upper case) key and head goes down. Check position pressing space bar
and R key to up-down and if necessary move head to X or Y direction.
Positioner
Off-line positioner is prepared to align QFP or large SOP precisely. Teach
front right corner point and XY and W value in part type data will make
where the part should be placed in the positioner. Also set stroke as the
nozzle just touches on the positioner top guide. See next page.

********** Press PageDown *****************

```
 ----------------
|              ||     X, Y, W, Pt in the part type data are used to
|  --------    ||     determine the center of component.
| | QFP   ^ |  ||     X and Y are component size. W is allowance
| | < X > Y |W ||     to drop component. Usualy 2. 0-3. 0mm will be OK.
|  --------    ||     Pitch determines how much scrub will be done
|==============+|     before to pick up component. 0. 5-2mm will be OK.
               ^
```

        Positioner X, Y

Pick up height is set by k10 of constant data so adjust nozzle on the
positioner plate in teaching mode and note stroke value and input it
in k10.
Positioner 2 is for vision camera position and Positioner 3 is Extender
arm position on Pre-alignment station and X, Y coordinates are the front-
right of it.
END

PCB part data
Input necessary data for placement of components on a PCB.
Feeder # :#1 to 120 are assigned for tape feeder. 121 to 200 are assigned
           for bulk feeder. 201 to 220 are assigned for IC tray. 251, 252 are
           EYE sensor mark and 0 for bad mark sensing. Bad mark is used with
           step and repeat command. 271, 272 are prepared to align PCB posi-
           tion manually. 261, 262 are vision fiducial checking.
X, Y, A   :X, Y coordinates and angle data.
Part type :Input a part type # from part type data.
Nozzle#   :Nozzle # is set automatically when part type is selected.
Tape Index:Input # of tape indexing. Normally input 1 and 12mm tape needs 2
           and some tape requires 3 or 4.
Stroke(Z) :Thickness of component is automatically compensated refering
           part type data. so adjust this stroke so that the tip of nozzle
           just touches on PCB.
DT   :Dispenser type #. Specify this # when dispenser is used.
           For more details, see "7 Dispenser type" in this feeder menu.
HA   :Dispenser dot direction. DT, HA will not be displayed when
           dispenser is not used.   ***** Press PgDwn key. *******
HA:Dispenser dot direction 0=0deg 1=90deg 2=180deg 3=270deg
PTA=Dot distance in X direction at HA=0 & 2, and Y direction at HA=1 & 3
PTB=Dot distance in Y direction at HA=0 & 2, and X direction at HA=1 & 3

```
PC HA=0      HA=1        PC   HA=0          HA=1
 1   *        *           5   *   * P       *   * P
                                      T     *     T
 2 *   *       * P            * * * B       *   * A
   PTA          T             PTA           PTB
               * A
                             6   ----- P    |   | P
 3   * P     *   P               T          |   | T
     T         * T               ----- B    |   | A
   *  * B     *   A              PTA         PTB
   PTA        PTB                  PTDA         PTDB
                            7, 8 P - -----    P- ......
 4 *  * P    *   * P              T |    | PTB T |    | PTA
     T         T                  D |    |      D |    | NOTE:PTDB in
   *  * B     *  * A           -  B - -----    A- ...... PC=8, is total
   PTA        PTB                 PTA            PTB      dot # in lines
END
```

Part type data for Laser-Align system
The part type data is basically prepared for vision system but it is also
used for laser align system.(2nd description appears without vision)
Nozzle #   :Assign nozzle # for each part type.A nozzle # can be assigned
              to several part type.
Lead #(y1)   :Laser align does not use this.
X,Y   :For small chip,QFP and SOP these values are used to tell the
              size of component to Laser align system.
              To pick up from tape feeder #1 thru 48 (or 96 for ECM98P)
              usually input longer length of a component in X and narrower
              in Y.
              More details refer X12 Laser align system.
Thickness   :Component thickness.Using this data placement Z stroke is
              adjusted.This value is very important for accurate measuring
              by Laser align system.Refer X12 Laser align system.
\# Y↳/t   :Usually laser beam scans the portion of 1/2 of the thickness
              but some case requires offset of beam position so use W for
              offset of above thickness data.+W raises nozzle higher.
LV   :0=Self alignment at pick up position for small chips .
              1=Use of Laser Align centering system.
Remark   :Start with CHI,~~TR~~,SOP,~~QFP~~.If the first 3 characters are CHI
              then unproper pick up such as tomb stone is checked by Laser
              beam and error 300 is returned.   *Slower operation if Rem = SOP* .
              Value under TS specifies X/Y size tolerance.75=+/-25% OK
     ******   Part type data for vision or bottom LASER system ******
Lead #(y1)   :Total lead numbers.(POS1 Y offset)
Btm/Rgt/Lft :# of leads on the bottom/right/left of the screen.
(y2/scn/ang) :scan offset/acan pitch/angle offset
X/Y   :Contour dimension of the component.Horizontal=X & vertical=Y.
Pt(XL/YL   :Lead pitch of the component.(top lead to side lead)
Thickness   :Component thickness.Using this data placement Z stroke is
              adjusted.
LV   :Refer X5 LV values for vision system.
Rem   :Remark should start with 3 digit part abbreviation.
              CHI=small chip   TR =transister   SOP=SOP   QFP=QFP
              VAC at the tail:Option Vac sensor for miniature chip
END

Dispenser type
Up to 50 dispenser patterns can be stored in file.
When you select this function, Dispenser type list is displayed.

Disp: Dispenser type # 1 thru 50
PC :   Dot pattern type 1 thru 8. (#6 & 7=Line draw #8=Dots for SOP)
PTA :   Dot distance in X direction at HA=0 & 2, in Y direction at HA=1 & 3
PTB :   Dot distance in Y direction at HA=0 & 2, in X direction at HA=1 & 3
 When PC=7 or 8, line(dot) width(s) are determined by PTDA and PTDB.

PTDA: Line width in X direction at HA=0 & 2, in Y direction at HA=1 & 3
PTDB: Line width in Y direction at HA=0 & 2, in X direction at HA=1 & 3
           When PC=8, PTDB specified total number of dots instead of width
VO :   Dispensing volume per dot.
DW4 :   Wait time between Down signal ON and Shot starts.
DW5 :   Wait time after dispensing shot completed.
DW6 :   Wait time between Up signal ON and Head moves.

END

Delete data
To delete certain data from data list. Using this command, Del seq #-# is
prompted at the left low on the display.
So input desired sequence # on the data list.
If two seq. numbers are input joining by - as 3-6, then lines 3 thru 6 are
deleted.
END

Quit and save
To terminate editing and save changed data and back to the top menu.
When this command is executed, current file name is displayed on input frame.
If you want overwite, just press Enter key or input new file name without
extension ". SEQ". Drive and directory canbe changed by pressing ESC key and
inputting new drive (plus :) and directory. Example A:, A:ATA
If you change mind and do not want to save input Q to quit operation.
If input file name already exists, the system warns.

```
┌─────────────────┐
│ File name ***   │
│ already exists  │
│ Over write Y/N  │
└─────────────────┘
```

If you input Y the the file is overwote and if you input N then
        [Input another file name]   is displayed. So input new name then
    [Data Saving. Pls wait a while.]   is blinks short period on the screen.

Upper case and lower case characters are not recognized.
            *** PRESS PgDown for more info. ***
Note
 You can save current data as BAK(BAcKup) file any time simply pressing F2
 key while you are in edit mode. This case, however, the system does not ask
 over write or not but always over write on the BAK file.
About File name
 A file name consists of alphabetic or numeric characters up to 8, period
 and extension up to three characters such as BAK. SEQ= BAK + . + SEQ.
 You do not input the period and extention to save a file but system
 automatically attaches period and necessary extensions.
 The extensions are;
    . SEQ Placement data on PCB
    . TAP Tape feeder data
    . TRY Tray feeder data
    . FDR Bulk feeder data
    . DAT Data for nozzle exchanger, positioner, part type and system
           constants.
You can use alphabetic and numeric characters up to 8 for file name but
DO NOT insert SPACE, period between characters. TEST 1 is saved as TEST.
This case use underline _ instead of space as TEST_1.
END

Error Code List of Vision System

00	No Error	53	Left Side Lead Pitch Incorrect
01	Improper Parameter	60	No Leads in Bottom Window
02	Part Number Not Registered	61	No Leads in Right Window
03	Calibration is Not Set	62	No Leads in Upper Window
05	Basic Window is Not Displayed	63	No Leads in Left Window
11	Interrupt is Requested	70	Left Edge Not Found
12	Preview Command not Calibration Step 1	71	Right Edge Not Found
21	Improper Pattern (fiducial) # Assigned	72	Upper Edge Not Found
22	Window Size is Incorrect	73	Bottom Edge Not Found
23	No More Registration (overflow)		
24	Pattern is Incorrect		
25	There are Other Similar Patterns		
26	Improper Area Size		
27	No Pattern Exists		
28	After Search ,No Pattern Found		
30	Bottom Edge Not Found		
31	Right Edge Not Found		
32	Upper Edge Not Found		
33	Left Edge Not Found		
34	Bottom Size Error		
35	Right Size Error		
36	Upper Size Error		
37	Left Size Error		
40	Too Many Leads on Bottom Side		
41	Too Many Leads on Right Side		
42	Too Many Leads on Upper Side		
43	Too Many Leads on Left Side		
44	Less Leads on Bottom Side		
45	Less Leads on Right Side		
46	Less Leads on Upper Side		
47	Less Leads on Left Side		
50	Bottom Side Lead Pitch Incorrect		
51	Right Side Lead Pitch Incorrect		
52	Upper Side Lead Pitch Incorrect		

Add data
To assign data area at the end of data list and copies dummy data on it.
ADD # is prompted so input required number.
END

Insert data
To insert a data area above the input seq. # and copies dummy data.
END

Go to PCB step #
If the PCB data is very large, you can jump to desired seq. line by this command.
END

Data sorting
After PCB data completes, this function minimizes assembling time.
The minimization is performed by sorting data according to exchangeable
nozzle # and tape feeder # so that the time exchanging nozzles and sliding
tape indexing device can be minimized.
First of all, assembling sequence is sorted acssending to nozzle # and then
tape feeder numbers are sorted in every nozzle groupe.
The tape indexing device activates tapes feeders every 3 steps as a group
so if installed tape feeder numbers are not many, install them as # 1, 4, 7 or
3, 6, 9, 12 etc. and the sliding time is reduced.
To use 2mm pitch tape for miniature chips, tape feeder and linear feeder are
combined to pick up components. This case if feeder # assignment is wrong,
sorting will not work properly. To avoid it assign linear feeder # as
Tape feeder # + 120 or the rest of (Tape#/3) +123

Example	Tape #	The rest of Tape#/3	Linear feeder #
	1	1	1+120=121
	9	0	9+120=129
			or 0+123=123

END

Doesn't work yet.

Exchange data
To exchange two data, input seq # first from which the data is swapped to
"seq # to".
END

Step and repeat
If pcb is a populated one, you do not need to input all data but just input
"mother data" and use this command to create step and repeat data.
According to prompted instruction, input X, Y repeating number and pitch.
When EYE mark (251) is defined in master circuit and to check every EYE
mark in the populated circuits is desired, input angle data of 251 as 1.0
and every EYE marks are checked before assembling. (If not set angle to 0)
this case , use of 252 is not recommended since each circuit is relatively
small and accurate angle calculation by 252 is not expected.
END

Skip placement
Some case certain point of placement is ignored causing lack of component
etc. Input skip seq # from - to. Two numbers should be joined by -.
Then such data has prefix of "*" in the list.

V6. 0A or later
If certain point of placement is ignored but dispensing only required,
type SKIP at the top of the remark of certain part type data.
END

Activate skip placement
All prefix "*" for skip placement can be removed by this command.
END

Major error codes
5   Illegal function call
       There are many causes but mainly unexpected negative data.
11   Division by zero
       Unexpected zero data
52   File Open Error
       Can not open file causing No expected file in the directory.
53   File not found
       The file name specified could not be found on the indicated drive.
57   Device I/O error
       A serious hardware problem. Turn off mains and try again.
61   Disk full
       There isn't enough free space on the disk. Check disk's free area.
71   Disk not ready
       The door of floppy disk drive is open or no disk.
72   Disk media error
       The controller board of the disk drive indicates a hard media error.

   Other error codes or in case an error can not be recovered, call reps.
END

Command summary

Number of assemblies required:

> Input required total number you want to assemble.
>
> If you input 0, you can return to main menu.

Attached Nozzle #   :

> Input nozzle # which is attached on the head. If no nozzle is
> attached, input 0. Also at this stage if you want to redo, input
> -1 then you can return to the main menu.

Note: # of Pick-up miss check

> When a component can not be picked up properly, the system attempts
> to pick up component again. Usually 3 (3 times) is set in constant
> data. When pick up miss happens as specifed number, the machine stops
> and prompts how to do. Remove the cause and then press space bar to
> recover or press G (Go) key to skip placement.
>
> Major causes of Pick-up miss are incorrect XY coordinates for feeder
> position, improper nozzle stroke, improper nozzle size and nozzle
> choke etc. To change this value, back to main menu and press 1 and ESC
> key then constant data is displayed. And change k5:V3 value.

************* PgDn for Upgrade features ***************

> To correct cause of Pick-up miss, press M key when pick-up miss
> happens and Main Menu will be displayed. The assembly will continue
> when Assembly is selected again.
>
> Beeping sound is prepared to warn pick-up miss. The beep can be
> silenced by pressing S key.

END

Command summary
:
F1=HELP:
        This Help message.
F10=STOP:
        The machine stops and asks "Continue=1 Home=2 Menu=3 Quit(DOS)=4".
        So input 1 to continue or 2 to back to home or dumping point or 3 to
        return to main menu or 3 to quit operation.
        To restart assembly after back to Menu, "From top=1 Continue=2" is
        prompted. Select 1 if new assembly is required. Select 2 if previous
        assembly should be continued.
M=Menu (Interrupt):
        The machine stops at that step and returns to main menu. You can
        enter into data list and edit data whatever you want. And then select
        (5) assembly from main menu and assembling continues from next step.

END

About ECM93 Help system editor
HELPEDIT program is prepared to modify or enhance current Help menu
supplied by manufacturer.
Run HELPEDIT program in TBCM directory and you will see the help menu
on the monitor the same as machine runs. Press F1 key to display Help index
then select item by pressing cursor key (and Enter).
If you want to change content, press E key and a specified editor in
HELPEDIT.CFG is executed and you can modify the content. To terminate editor
follow by editor's rule.

**** Format of Help menu. ******
The format of the menu is one line 76 characters maximum and 19 lines makes
one page. And max pages is 2. The last line must start as END(Return).
**** To create new Help menu ****
When Help index is displayed, press E key and the editor is executed. So add
a new code on the same colomn at which current codes are displayed.
The new code must start from "X" and follow by one or two number(s).
for example X2 or X12 etc. And add an index description then create a new
file named as X.0n and n is number specified as above. **** PgDwn ****
The first number of the extension is always zero when the system language
is English and if files are prepared for second language, the extension
should be 1. During display, the language mode can be switched by pressing
ESC key but if the files of the second language are not available, the system
will hang up. So be carefull to press ESC key.
END

Option features(V4. 3C or later)
Following features are retro fit and enhance ECM93 performance.
1. Teaching camera
   Teaching camera is recommendable to define PCBand feeder X/Y coordinates.
The offset between nozzle and camera should be input in k12 CPX/CPY or k36
X/Y CAMERA(V4. 3C later).
2. Additional vacuum sensor:
   The nozzle to pick up sub-miniature components such as 0402 chip is very
fine and difficult to adjust vacuum sensor commonly used with other nozzle
Additional vacuum sensor as an option for such component makes adjustment
easy. To use optional sensor, indicate VAC at the end of the remark of Part-
type data.
3. Electro valve for puffing
   To prevent sticking of small component on the nozzle, puffing (to apply
positive pressure in the nozzle after placement) is effective. This option
can not be applied when dispenser or IC extender arm is installed.
Puff timing is programable by indicating value(1-20) at the end of remark
of PCB data.
                 ********** PageDown ***************
4. Air nozzle for stick feeder
   To stabilize vibratory feeder operation to feed stick tube component,
air nozzle to blow air from the end of the tube is available. Air supply
is fed from piping of tape hammer so that tape hammer # shold be specified
in the end of remark of liear feeder data.
5. Vision system
   To place fine pitch QFP or odd shape parts, mechanical jaw may not work
properly. Grey scale vision system is usefull for such application. Vision
unit is retro fit and snaps onto feeder base and occupies 5 feeder slots.
6. Theta motor speed control
   To increase speed for standard chip component and also to increase theta
accuracy for QFP, switching of theta resolution is possible adding one I/O
card and minor wiring change on the control board. Using this option, QFP
placement accuracy greatly increased without decreasing placement speed for
standard components.
7. From V6. 0B
*Dispenser and extender arm and camera can be installed and operate the same
 time thou it requires hardware change. This case k30 Dispenser value should
 be 20, 21 or 22.
END

Calibration of XSHIFT,YSHIFT,XCP and YCP (V5.0A or later)
These system constants are prepared to compensate the offset between nozzle
and EYE Sensor or Camera/Dispenser.
To calibrate it,set nozzle on a pcb position and place a white paper and a
carbon paper and mark the nozzle bit repeating up and down nozzle.
Then press 7 key to move EYE Sensor on the mark.If it is not just on the
mark press 0 key and hearing beep move light beam on the mark.When it is
aligned,press C key then CALIB Y/N appears on the screen.If you want to
change system constant,press Y and system constant XSHIFT/YSHIFT are rewrote
Camera/Dispenser offset CPX/CPY are calibrated by the same manner pressing
5 key instead of 7 key of above procedure.
If camera and dispenser are exchangeable,press 6 key to calibrate dispenser
after camera offset is calibrated.
These changed constants are only in memory so if you want to save it in disk
press F2 to save it.
From V5.0A, XSHIFT and CPX are independent so changing EYE offset will not
affect on Camera offset.

******************** Pg Dn *********************
Calibration on XOFFSET/YOFFET (V7.3 OR LATER)
The same as XSHIFT calibration,placement offsets can be calibrated as
follows.
Using F8 key,teach position and escape then press F6 for partial assembly.
And watch position by camera.If correction is required,press F8 key then
press "." (period) key and move cross line to the center of chip and press
C key and Y key to make change.
(To center,1 and 2 key is now usable for easy centering.)
Input angle 0,90,180 and 270 for individual offset.
(Negative angle or not 90 deg increment angle is not accepted)
END

Mouse control (V5. 0A or later)
When mouse driver is installed and 2 button Mouse is connected, Mouse can
be used instead of key board. In general left button is used as Enter key
or Y key and right button is used as N key or E key. When Y/N? is prompted,
klick left button for Y and right button for N. Movement of cursor is
performed by moving mouse. In edit mode left button is used as Enter key
and right button is used as E key. This case even cursor is not positioned
at the most left, edit mode can be escaped by pressing right button.
In edit mode, teaching mode is performed by pressing ESC key but also
pressing left button and klick right button will make the same action.
In teaching mode, a control window opens at upper right on the screen.
Moving mouse on a desired function and klick left button to activate
function. To move head, for example, align cursor on * of *Xx+ and head moves
X direction with INC 500 and 50 on X, 10 on x and 1 on +.
To exchange nozzle align cursor on nozzle# attached and click. Then beep
continues so align cursor on the desired nozzle # and klick left button
again. When beeping stops all exchange process completes.
To quit teaching, klick right button.
Key boad is also active so use key board for other functions.
END

LV Value in Vision system

LV   Description
7   Small rectangular part. Specify the size in X and Y.
8   Single end part.Specify window offset in X or Y and window size in
      pitch and W.   Pitch
                         _____   _____
                        ||||||| | ^
      + | | | W
                        ||||||| |
                         _____   _____

                  <----- X ------>

       Note:When window is located along with X axis specify angle 0.
9   Dual end part.The same as LV=8
10=Measures X,Y,A and lead numbers of the component.
11=Measures X,Y,A,lead numbers and lead pitch.
12=Measures X,Y and A only.Used to pre align component.
  **************** Page Down ******************
13   LV=7 plus one mechanical squaring operation.
14   LV=8 plus one mechanical squaring operation.
19   Reserved for small chip.
20   2 FOV(Field of View) method for large QFP.Chech from outer leads.
21   2 FOV   ""   ""   ""   .Check from inner leads.

25   Manual align lower camera:Use POS#1 as center point and align
     both lead positions using arrow and A(angle) keys and toggle by
     Space bar.When OK press Enter.Specify lead width in X/Y of part
     type data.
27   Fixed Lower Align senSER:Teach POS#1 for Mech aligner and POS#2
     for LASER center point.Specify outer width in X/Y of part type
     data and lead length in Pt and W.# of leads and bottom usually
     100 and 20 in left and right.
END

F6 Partial assembly
During Edit-Change mode and displaying PCB data, move cursor on desired
sequense and press F6 function key.
Then "Nozzle # attached" is asked. So input attached nozzle # and if it
differs from the specified nozzle #, the nozzle is automatically exchanged
and part is picked up from feeder and placed on the PCB.
This feature is usefull to place one component during production and
also usefull to test repeatability.
END

File maintenance
Following procedures are made by this mode.
1:   Disk Format (2HD only)
     Insert blank disk in drive A and Disk format is made in this routine.
     Note that the format is 2HD 1.44M only.
2:   Copy from HD to FD
     Insert a data disk in drive A and select file name and necessary files
     are saved in the floppy disk.
3:   Copy from FD to HD
     Insert a data disk in drive A and select file name and necessary files
     are saved in TB¥DATA directory in the hard drive.
4:   Delete file
     Select desired file and press enter key then Y/N is asked and input Y
     then the file is deleted.
END

Added Dispenser features
(Also refer F5 PCB Part data and F7 Dispenser Type)
PC=2 (2 point)
 If PTB is not zero then dispensing angle overrides 90 deg on HA and A.
PC=6 (2 lines)
 If PTB=0 then it draws one line.
PC=9 (circle/arc)
 PTA=Dia, PTDA=Starting angle, PTDB=End angle(0=360) and the last 3-digit
value in the remark of Dispenser type data is scan speed. Smaller is slower.
Angle=0 is X+ point and draws counter clock wise.
PC=10 (continuous line)
 This draws a continuous line from the current point.
PTDA=X length, PTDB=Y length and PTB is flag and if it is zero then the
needle raises after completion and shut boff dispens. If it is not zero,
needle stays down and waits next continuous draw (line or arc).
PC=11 (continuous arc)
PTA=Dia, PTB=Flag(see PC=10), PTDA=Starting angle and PTDB=End angle.
If the last value in the end of remark is minus then it draws in clock
wise.   ********* PageDown for 2/digital dispenser ********
Digital dispenser system as the 2nd head
General operation of the 2nd head is the same as standard 2 head pick &
place machine except;
1. Instead of pick & place, it dispens dot, line or circle according to the
   dispens type data.
2. Z stroke is stored in the first 4 letters of the remark of dispenser
   type data.
3. Automatic height control is prepared as option. This case add feeder#240
   as a dummy point to check PCB height and later dispensing uses this
   measured height as the stroke.
   system constant up position 3rd and 4th value determine needle gap
   between PCB and slow raise height to eliminate string.
*If DTDB is not zero such as 0.1, then needle will not return home position
 and continues dispense. This is a feature to increase dispense speed.**
Second dispenser system
When the 2nd dispenser is installed, dispenser type is always the next
dispens type. For example #1 dispenser type is specified in PCB data then
#2 dispenser type is used for the 2nd dispenser.
END

Constant Data (Laser align) Additional info.

k3	If the servo motor is used for theta as option, the first letter of remark must be S(ervo).
	If the model is ECM98P then the last letter of the remark must be P for 48 feeder model and p for 96 feeder model.
k5	If single color(red) warning lite is installed, set 1 to the last of remark.
k6	UM/UM1 Nozzle up position for LAHD.UM1 for large nozzle.
k7	If the first letter of the remark is not L(ow) then closed loop fiducial check is performed. The last 2 characters of the remark increases the wait time of fiducial check.
k11	If the first letter of the remark is CL(osed), then closed loop vision check for component is made.
k17	When auto tray feeder is installed, set A(uto) to the first letter of the remark. The last 2 digits of the remark specify the # of tray stack. Default(no value) is 10.
k16-k27	X, Y, THETA and Z motor speed control
	These constants controls motor speed setting and details

********* Page Down *****************************

	are explained in the comparison table in the operation manual.
k34	To install vision system, the first letter of thr remark must be V(ision).
k36	If the vision system is fixed(not removable) then the first 5 letters of the remark must be DIREC(t).
k44	Two nozzles can be assigned as simultaneous pick, pick & place and place.(2 head model only)
k45	Nozzle center point in the laser beam. The value is measured by h command in the teaching mode. 1=10 microns

Followinfg k46 thru k51 are used for Laser Align system. DO NOT CHANGE.

k46	#1 Hold off angle.
k47	#1 Algorithum
k48	#2 Hold off angle
k49	#2 Algorithum
k50	#1 Angle limit
k51	#2 Angle limit
END	

Laser Align system
The machine installs CYBER OPTIC's LAHD unit which is class 1 laser beam
measuring system. During placement travel, the nozzle spins and component
sucked is also rotated in the laser beam. The LAHD returns data when the
minimum width of the component is obtained and the component rotates
further and when it rotates 90 deg after the first minimum was obtained
the width and center data are returned again. So using both data offset
of component is corrected.
LAHD can returns accurate data if the first minimum is obtained from
narrower side of the component. The configuration of LAHD in ECM's is
designed as when component picks up fron basic tape feeder, the narrower
width can be checked first. If the narrower side can not set as the 1st
minimum then set feeder angle as 90 or -90 degrees. This case placement
angle is angle in PCB data + angle of feeder.
Usually the laser beam scans the middle portion of the component thickness
but leaded component may need to shift scan position depends on the shape
of leads. The ¶ value in the part type can offset the position of laser
beam.   YU/t
         -------------------- PgDn -----------------------
Setting of Laser Align system
1. Center position of the nozzle.
   Attache nozzle on the head and go in teach mode. Press shift+U to raise
   nozzle several times and press shift+H to measure nozzle position.
   If display width is approx nozzle dia then note the center value.
   The value is in millimeter so multiply 100 and input it in k45 first and
   second values. For example if it is 12.732 then k45 is 1273/1273.
2. Laser beam height
   The nozzle tip must be set above the laser beam. So go in teach mode and
   raise nozzle as item 1 above until the width becomes zero and note the
   U value and input in k6. The first value of k6 is for small chip nozzle
   and the 2nd value is for large nozzle.
3. Part type
   Set proper part type data for Lase Align. Refer F6 part type data.
4. Error code for laser align (displayed at low center of screen)
    64: No part 67:Can not find min width 300:Pick up error (tomb stone)
   200: Y dimension exceeds the TS limit.
   201: X dimension exceeds the TS limit.
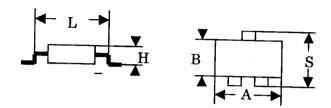END

Appendix

~~Bottom~~ LASER and Bottom teaching camera instruction manual

CAD down load program CADDOWN6 instruction manual

1. Preparation
   a) Transistor data registration
      Open part type data and select one line for a transistor. Check transistor(SOT) data from a data book or measure it by scale or using "l" command in teaching mode.
      You should get following data A,B,L,H and S (S is not used in part type data).
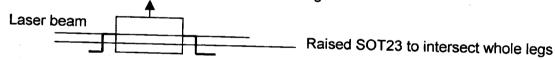

      For example SOT23 has following data
        A=2.9mm   B=1.3mm L=1.8mm   H=0.95mm and S=2.4mm

      Usually transistor is supplied in tape reel and in the pocket of tape and legs are located at tape edge so in the most of tape feeder configuration of ECM machines A is Y direction and B and L (and S) are X direction of machine X/Y coordinates.
      So part type data for SOT23 looks like;

P#Nzl	y1	y2	Scn	Ang	X	Y	XL	YL/t	Thk	lv	Rem*********TS***+++
(P# Nzl	L#	Btm	Rgt	Lft	X	Y	Pt	W	Thk	lv	Rem*********TS*+++)
* 2	0	0	0	0	1.8	2.9	.0	.0	1.0	1	CHIP TR 70

      Note: The second label in the bracket is for vision installed machine.

      YL/t (W) is height offset of Laser measurement and usually zero but some case the intersection of laser beam is just border of bent leg you may better to input 0.1 or 0.2 to raise transistor and laser beam intersects whole legs.

Laser beam   Raised SOT23 to intersect whole legs

   b) Nozzle up position check
      In teach mode raise nozzle until it reaches the value set in system constant k6 and press Shift+H and Center=0 must be displayed.If OK press / (increment=1) and press U to down nozzle 0.05mm step and press Shift+H to see when Center=**** is displayed and note absolute U value (other word disregard minus sign). System constant k6 first value (for small nozzles) must be set +1 to +5 of this U value.

2. Assembly
   Make sure part type is specified correctly in PCB data and run. If error code displayed other than zero, (0=OK)
   64: No part or nozzle height is too high
   67: Can not find minimum width. Part has no corner or nozzle height is too low and measures nozzle it self (round, no sharp corner. **See appendix**)
   200: Y dimension is out of limit and shows actual measured value. If display shows 200 25 it is the same as error 67 and means the system can not find the minimum width. (**See appendix**)
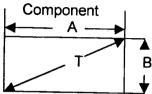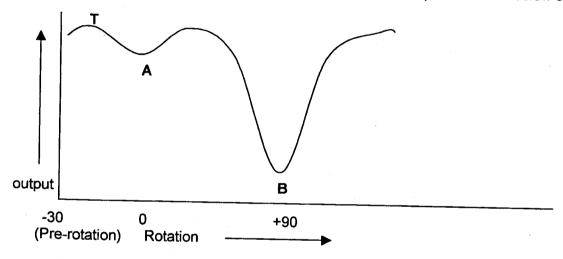   210: X dimension is out of limit and shows actual measured value.

Appendix

Error 67 or Error 200 25

In our system, component Y dimension in part type is measured first by Laser align system and after rotates 90 degrees X dimension is measured.

Y dimension measurement is done knowing the minimum width rotating component as shown below.

T is the maximum width of the component and A and B are rectangular width of the component. and when the component is rotated in the Laser beam, the out put looks like below chart.

The component is rotated −30 degrees as pre-rotation first and then rotated 120 degrees. Pre rotation is an offset of random angle when the component is picked up so that the **first minimum** width can be obtained within 90 degrees rotation.

The dip at A is much smaller than the dip at B because T/A ratio is much smaller than T/B. **Specially, component corners are rounded the T becomes smaller or B is narrower then the dip at A becomes smaller and some time the dip can not be detected by Laser system and results Error 67 or Error 200 25. This case, simple solution is to exchange A and B, adding 90degrees on feeder data** so that when the component is picked up, the orientation changes 90 degrees at 0 angle. Also swap X and Y data in part type so the above example becomes as follows.

P#	Nzl	y1	y2	Scn	Ang	X	Y	XL	YL/t	Thk	lv	Rem*********TS***+++		
*	2	0	0	0	0	2.9	1.8	.0	.0	1.0	1	CHIP	TR	70

And add 90 degree on tape feeder data as;

Type	#	X	Y	A	Strk	Rem***********
tape	23	285.25	2.58	90.00	300	SOT23

Adding 90 degrees on tape feeder data does not affect on placement angle of PCB data.

Not on ECM97WL

BOTTOM LASER AND BOTTOM TEACHING CAMERA

Bottom LASER and bottom teaching camera are prepared as low cost way to align fine pitch components on the ECM series machine thou the bottom teaching camera is not full automatic but operator's assistance is required. LASER stands for Lower Align SEnsoR but not LASER light
The bottom teaching camera uses LV=25 (125) and the bottom LASER uses LV=27 and POS=1 and POS=2 are used.
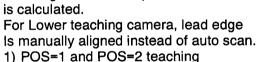The principle of the alignment :
A component is picked up from Tray (feeder) but part is not sucked at center but 2mm off center and component moves toward gauging block
as 1 then push the component to the gauging block so that the nozzle just come to the component center.
This is made by specifying component size and gauging block position properly.
Then the component lead edge is centered to camera/LASER as 3 and scans in X direction until the lead edge is found. Then the component is moved to other edge and scans to find other lead edge. Knowing both lead edges the center position in X is calculated.
For Lower teaching camera, lead edge Is manually aligned instead of auto scan.
1) POS=1 and POS=2 teaching
Install unit on the machine and .enter in teaching mode of POS #1.
Set camera cross line to the gage block surface.
Then teach Camera/LASER center as POS #2.
This case make sure CAM is selected but not 1 st.
2) Preparation of part type data
Component size X/Y ,length till lead XL/YL (pt/W) etc should be taught in part type data.
(If vision is not used, LASER head machine softwares provide above title in part type data automatically.)
y_1,y_2 (L#, Btm) are offset correction but input 0 first time. Scn(Rgt) is scan pitch for LASER and input 10 (0.1mm) .If you input larger value then scan pitch is increased but may missing to find the lead edge.
Ang(Lft) is angle offset not only bottom camera/LASER but also Laser   align head too but set to 0 first time.
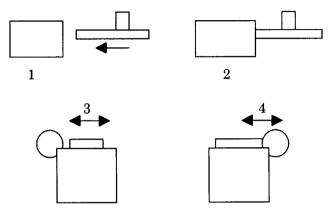3) Adjustment of LASER sensor gain
The sensor has three mode fine, turbo and super.
Super will be the best so to set to SUPER , push mode button and hold few second then it should blinks then push sea saw button and set green LED to super. Push mode button 2 times then display will show current value. Push sea saw button several times continuously and set ON value. For example if dark value is 30-40 set ON value 60-70.If it is too high then the sensor can not recognize lead reflection and if it is too low the accuracy decreases.
4) Adjustment of system constant k10
System constant k10 2nd value is for low vision camera focus point but it is utilized for bottom camera/LASER focus point. Also this value is used to hit gauging block and part thickness in part type data is subtracted and the bottom of component is always set to this height.

HINTS of good placement

Bottom teaching camera is very easy to set up since final alignment is made by operator.
So in assembly a component is picked up and come to gauging block and align skew and Y coordinate then the lead edge is displayed so align it by arrow key and press space bar then the other edge is displayed so align it again by arrow key and pressing space bar the position is toggled so if alignment is ok then press E key and the component is placed on the PCB. If slight skew is found loosen center screw and adjust angle of gauging block by eccentric cam screw. And tighten center screw.

Bottom LASER is automatic scan system so if taught values of component are correct then the lead edge is found quickly and measurement completes within 5-6 seconds. But if the values are not correct and adjustment of light beam is not proper then long scan is resulted.
Also pick up position tolerance is not large and within +/- 1mm will be necessary so X/Y coordinates of tray pick up position must be accurate.(2mm offset of pick up point as mentioned above is automatically done so just teach component center.)
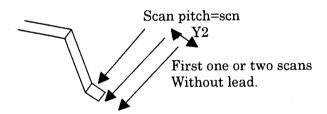
An example data for QFP208

Nzl	y1	y2	scn	ang	X	Y	XL	YL/t	thk	Lv	Rem ********TS***
6:	-50	20	10:	0	30.00	31.00	2.20	2.2:	2.0	27	QFP 208 85

This case QFP208 X/Y is approx 30mm and XL/YL is 2.2mm and y1 and y2 are offset of;
y1: Offset of POS #1 position so if Y placement is off then you can adjust it by Y itself or this value also you can change POS #1 position but y1 is easier.
y2: Offset of Y. This value is added to Y when position the lead on the light beam so that the first or second scan can not reach on the lead since the flatness of the lead tip of QFP208 is less than 1mm very narrow so if scan starts from on the lead (if data is correct it always happen) second scan may be out of flat part and the system can not think the lead edge is found.(System checks at least two times and when two readings are within the limit then FOUND is happened.)

Scan pitch=scn
Y2
First one or two scans
Without lead.

Example of BGA (27mm square)

Nzl	y1	y2	scn	ang	X	Y	XL	YL/t	thk	Lv	Rem ********TS***
6	0	-90	10	0	32.00	27.00	3.00	2.0	1.0	27	QFP BGA 85

This example shows how leadless component is measured. As you see X is 32mm instead of 27mm this value allows over scan in X direction so that the scan start from out side of the body. Y2 of –90 allows to start scan within body.

First scan   y2 from inside of body

CAD down program CADDOWN6 V1.4

This program is prepared to convert CAD ASCII data to our ECM format.

Prior to use this software, CAD data file must be created as ASCII format data.

If the data is created by a spread sheet software such LOTUS/EXCEL then select SAVE AS

and choose file type as space separated (.prn) and save it.

Now to make easy to understand CAD conversion,   the general format of CAD ASCII file

will be explained.

CAD data is basically the data to create PCB pattern so all information to make PCB

pattern are gathered and the Garber format file is made. However chip placer does not

need the most of information in a Garber file and only needs X/Y coordinates of

component center, placement angle, part description and part designation.

Any CAD system has the feature to export such data as ASCII file thou its output format

is not the same. Various CAD system data can be converted to our system format, editing

CAD MASTER file. Usually CAD data does not have feeder data so existing ECM data file is

loaded first and feeder data are used as reference.

Then CAD ASCII data is loaded and its part description is compared with feeder data part

description (Remarks) and if the matched data exists then its feeder # is chosen

automatically and if not a list of feeder is displayed so select a appropriate feeder #. Then the

part description is written in the remark of feeder data.

When the conversion completes, the placement data is saved as a ***.SEQ file for ECM

machines so the file can be read in the machine and only thing to do is to teach the bias

point using teach mode.

1. Preparation

    A)   Check computer's config.sys has following line to use RAMDRIVE.

        Device=c:¥dos¥ramdrive.sys 256/e   (¥ is backslash)

        If RAM drive is not available then edit CADP.DAT file and change the second value

        from D to C and data are stored in free space of hard disk drive.

    B)   Check CADDOWN6.EXE ,CADTEX.DAT and CADP.DAT are in TB¥ECM directory

    c)   Copy all   sample files having .CAD extension and CAD ASCII file(s) in TB¥DATA

        directory

2. Usage

    Execute CADDOWN6.EXE then to input CAD MASTER file is asked and display registered

    master files. This is the file to configure your CAD system format.

    First time if you have no proper master file, then read following section A).

    A)   Move cursor on any file name and press enter then the master file is loaded and

        Setup=1 DownLoad=2 End=3   is displayed so select 1 <enter>.

        Then   1=CADmaster change   2=Edit   is displayed again so select 2.

        The content of CAD master file is displayed as

1. CAD system   ****

2. Unit mm=1 Inch=2 mil=3   1

3. Separator comma=1 space=2   2/1

4. Terminator CR/LF=1   1

5. Start line   **

6. X data column   *

7. Y data column   *

8. Angle data column   *

9. Part description column   *

A. Part description length*

B. Part name column   *

C. Skip data   *

D. Extension   *

CAD master file configures how the necessary data are located in the file. To change data move cursor by arrow key on the item and press enter key then input is prompted at the lower corner on the screen so enter desired value.

1. CAD system: Name of CAD master file. Any name is acceptable but must be within 8 characters according to DOS limitation. In general CAD system name is recommended.

2. Unit mm=1 inch=2 mil(1/1000 inch)=3: Input CAD system unit.

   (If 0 is input then the system assumes the unit is 1/100 mm.)

3. Separator comma=1 space=2 : Character to separate data. Space is recommended.

   If CAD data has X,Y and A before its coordinates, input 2/1 to skip reading.

   Example data   C1 N0001 X50.25 Y100.00 A90.00 CPQUV8205

4. Terminator CR/LF=1 : Terminator of a data string must be CR/LF always.

5. Start line: Some CAD system data has a header data such as date and remarks. To skip such data, specify the placement data start line.

6. X data column: Specify column number of X data in data string. In above example data it is 3.

7. Y data column: Specify column number of Y data in data string. In above example data it is 4.

8. Angle data column: Specify column number of angle data in data string. In above example data it is 5.

9. Part description column: Specify column number of part description. Part description is a data which component is used. In above example data it is 6. This data is used to search feeder number.

A. Part description length: Part description string is compared with feeder remark and

select matched feeder but feeder remark length is 13 character maximum so if the length of part description is not 13 character then specify how long length should be compared with feeder remark. In above example data it is 9. Upper or lower case character is compared as different character.

B. Part name column: Specify column number of part name (designator) on PCB. Usually it appears on PCB and the data is stores in the remark of converted PCB data. In above example data it is 1.

C. Skip data: Some CAD data includes the data for test pin etc. These data can be deleted from placement data specifying part name (designator) here such as PIN.

D. Extension: Unique file name extension for used CAD system.(3 characters maximum) When down load file names are displayed, only file names having this specified Extension are displayed.

After all changes are made, press ESC key and configured data are saved in the file named as CAD system name specified in 1. CAD system.

B)   After a CAD master file is loaded, select 2=Down load then existing placement file names are displayed so choose one from it. Any file can be chosen but it is better to choose a data which has similar components as many as possible since doing so many part descriptions are already in the remark of feeder data and manual selection of a feeder is eliminated. PCB data are not down loaded except its bias data.

C)   Then CAD data file name is asked so move cursor on the desired name and press ENTER key.   Data are retrieved according to the CAD master file configuration and then system looks up feeder remarks and if matched remark with part description exists then its feeder # is inserted in the converted data. If the matched data is not exists then feeder list is displayed on the screen so select a feeder # then the part description is inserted in the selected feeder #.

All feeder numbers are selected, new file is saved automatically having CAD file name with extension .SEQ. If original file name length is less than 8 characters, remaining part is filled by under lines.

    Example   TEST.XYZ ->> TEST____.SEQ

The created data can be read by ECM 9* series chip placers so adjust bias point by teaching and check part type.

    Conversion Example

TEST DATA FOR CAD DOWNLOAD

C1 N0001 X50.25 Y100.00 A90.00 CPQUV8205

C2 N0001 X55.25 Y-5.00   A0 CPQUV8206

C3 N0002 X60.25 Y105.00 A0 CPQUV8205

C4 N0002 X65.25 Y110   A0 CPQUV8207

Above CAD ASCII data are stored in TEST.XYZ CAD file and each data is separated by space

and X,Y and angle data have X,Y and A as leader of the data. The first column data is part name (designator) of PCB and 6th column data is part description. 2nd column data is not necessary to convert. To make easy visibly above data have different number of spaces as separator and any numbers of spaces are acceptable.

The CAD master file to convert data is;

1. CAD system		CADEX (an appropriate name)
2. Unit mm=1 Inch=2 mil=3		1
3. Separator comma=1 space=2		2/1
4. Terminator CR/LF=1		1
5. Start line		2 (one comment line)
6. X data column	3	
7. Y data column	4	
8. Angle data column		5
9. Part description column		6
A. Part description length9		
B. Part name column		1
C. Skip data		* (If no skip then must input *.)
D. Extension		XYZ
		END

1. DATA FILE MEDIA:3.5 INCH 720K/1.44M DISK OR 5 INCH 1.2M DEPENDS ON CUSTOMER'S CHOICE.
2. FILE NAME   :   UP TO 8 CHARACTERS ACCORDING TO DOS SPEC.
   EXTENSION   :   WE HAVE SEVERAL EXTENSIONS AS FOLLOWS.
   FILE NAME.SEQ :   PCB PLACEMENT DATA YOU MAY NEED TO CREATE THIS FILE.
   FILE NAME.TAP :   TAPE FEEDER DATA FOR PARTICULAR USE OF "FILE NAME" ASSEMBLY.
   FILE NAME.FDR :   BULK FEEDER DATA "" "" "".
   FILE NAME.TRY :   IC TRAY FEEDER DATA "" "" "".
   FILE NAME.TIM :   TIMER DATA   "" "" "".

       PART.DAT :   PART TYPE DATA COMMMON TO ALL .   UP TO 50 DATA.
        POS.DAT :   POSITIONER DATA "" "".
        BIT.DAT :   PICK UP NOZZLE EXCHANGER DATA "" "" "".
3. DATA FORMAT
   I SUPPOSE YOU NEED TO CREATE ****.SEQ FILE AND MAY BE PART.DAT AT INITIAL STAGE AND LATER YOU CAN REFER IT FOR OTHER DATA.

***.SEQ FILE FORMAT SEPARATORS ARE :,X,Y,A AND R.TERMINATER CR LF
     Spaces in the string are ignored.
FIRST DATA
Total# on PCB:# of Step & Repeat:# of Tape Feeder:# of Tray Feeder F # of Bulk Feeder X # of nozzle Y # of positioner A 0 R
Example   10: 0: 15: 5F 0X 4Y 1A 0R
This is 10 parts on PCB,no step & repeat,15 Tapes,5 IC trays,no bulk,4 nozzle exchangers and 1 positioner.
2nd DATA
Part dumping point X:Y:FX PCB Bias X Y PCB Bias Y A 0 R
3rd to Total #+2
Nozzle#:Stroke:Tape Index:F Feeder# X position Y position A angle R
Example   1: 500: 1:F 1X 2500Y 3000A 0 R
 This is Nozzle=1,stroke=500 (pulses),Tape advance=1,feeder#=1,X coordinate= 25mm,Y coordinate=30mm and angle=0. Pls note that XY coordinates on a PCB are measured from bias point and 1 is 1/100 mm.

PART.DAT FILE FORMAT SEPARATORS : AND R.
FIRST DATA
Total # of data:R   Example 45:R   This means that 45 data exists.
2nd Data and follows,
Nozzle#:# of Leads:component length:component width:thickness:vision level:R rem strings up to 18 character
Example 4:100:2800:2400:250:25:RQFP 100PIN
This is Nozzle#=4,# of leads=100,component length=28mm,width=24mm,thickness=2.5 vision slice level=25 and component is QFP 100 PIN.

The ERROR statement can simulate run-time errors as a debugging technique for error-handling routines.

For more information about run-time error trapping, see the ON ERROR and ERROR statements and the ERR, ERL, and ERADR functions in Chapter 5, "Turbo Basic Reference Directory."

If run-time errors are not trapped by your program, then a Turbo Basic program aborts upon encountering an error condition and displays the error number and a brief message to describe the condition. If the program was executed from within Turbo Basic, the editor cursor is also positioned at the statement that caused the error. Run-time errors have error codes between 0 and 255; for example:

Error 5 illegal function call at pgm-ctr: 761

Error messages aren't included in .EXE programs; therefore, run-time errors that occur in programs launched from DOS do not include error text, only numbers. Debug's Find run-time error option is able to translate the program counter value returned by a run-time error into the exact statement within the source file that caused the error. For example:

nnnError-description<CR/LF>

where nnn is a three-digit error code. (For more information, see Chapter 3, "The Debug Command.")

Run-time Errors

2 Syntax error
A run-time syntax error has been created by a READ statement trying to load string data into a numeric variable. Other syntax errors are caught by the compiler.

3 RETURN without GOSUB
A RETURN was encountered without a matching GOSUB; that is, there is nothing to RETURN from.

4 Out of data
A READ statement ran out of DATA statement values.

5 Illegal function call
This is a catch-all error related to passing an inappropriate argument to some statement or function. A few of the 101 things that can cause it:

• Too large a color or screen mode argument
• Issuing a graphics statement without a graphics adapter or setting the proper mode with the SCREEN statement

• Trying to perform invalid mathematical operations, such as taking the square root of a negative number.
• Too large (or negative) a record number in a GET or PUT.
• Attempting to use the WIDTH statement on a sequential file.

6 Overflow
An overflow is the result of a calculation producing a value too large to be represented in the indicated numeric type. For example, $x\% = 32767 + 1$ causes overflow because 32,768 can't be represented by an integer. Integer overflow error is not caught unless a program is compiled with the Overflow switch turned on in the Options menus; floating-point overflow is always caught.

7 Out of memory
Many different situations can cause this message, including dimensioning too large an array.

9 Subscript out of range
You attempted to use a subscript larger than the maximum value established when the array was DIMensioned. This error is not reported unless the compiler Options' Bounds switch is turned on.

10 Duplicate definition
You attempted to dynamically dimension an array for the second time, without first erasing it.

11 Division by zero
You attempted to divide by zero or to raise zero to a negative power.

13 Type mismatch
You used a string value where a numeric value was expected or vice versa. This can occur in PRINT USING, DRAW, or PLAY statements.

14 Out of string space
String storage space is exhausted; string memory is limited to 64K.

15 String too long
The string produced by a string expression is longer than 32,767 bytes.

19 No RESUME
Program execution ran to the physical end of the program while in an error-trapping routine. There may be a missing RESUME statement in an error handler.

20 RESUME without error
You executed a RESUME statement without an error occurring; that is, there is no error-handling subroutine to RESUME from.

24 Device time-out
The specified time-out value for a communication status line has expired. Time-out values can be specified for the ClearToSend, CarrierDetect, and DataSetReady status lines. The program should either abort execution or retry the communications operation. (See the OPEN COM statement in Chapter 5 for further information.)

25 Device fault
A hardware error has occurred; for example, with the printer interface or a communications adapter.

27 Out of paper
The printer interface indicates that the printer is out of paper. It may simply be turned off or have some other problem.

50 Field overflow
Given the file's record length, you attempted to define too long a set of field variables in a FIELD statement.

51 Internal error
A malfunction occurred within the Turbo Basic run-time system. Call Borland's Technical Support Group with information about your program.

52 Bad file number
The file number you gave in a file statement doesn't match one given in an OPEN statement or the file number may be out of the range of valid file numbers.

53 File not found
The file name specified could not be found on the indicated drive.

54 Bad file mode
You attempted a PUT or a GET (or PUT$ or GET$) on a sequential file.

55 File already open
You attempted to open a file that was already open or you tried to delete an open file.

57 Device I/O error
A serious hardware problem occurred when trying to carry out some command.

58 File already exists
The new name argument specified by the NAME command already exists.

61 Disk full
There isn't enough free space on the indicated or default disk to carry out a file operation. Make sure there is enough free disk space and retry your program.

62 Input past end
You tried to read more data from a file than it had to read. Use the EOF (end of file) function to avoid this problem. This error can also be caused by trying to read from a sequential file opened for output or append.

63 Bad record number
A negative number or one larger than 16,777,215 was specified as the record argument to a random file PUT or GET statement.

64 Bad file name
The file name specified in a FILES, KILL, or NAME statement contains invalid characters.

67 Too many files
This error can be caused either by trying to create too many files in a drive's root directory or by an invalid file name that affects the performance of DOS's Create File system call.

68 Device unavailable
You tried to OPEN a device file on a machine without that device; for example, COM1: on a system without a serial adapter or modem.

69 Communications buffer overflow
You executed a statement to INPUT characters into an already full communications buffer. Your program should either check and empty the buffer more often or provide a larger buffer size.

70 Permission denied
You tried to write to a write-protected disk.

71 Disk not ready
The door of a floppy disk drive is open or there is no disk in the indicated drive.

72 Disk media error
The controller board of a floppy or hard disk indicates a hard media error in one or more sectors.

74 Rename across disks
You can't rename a file across disks or directories. A file isn't moved by a NAME statement, it's only given a new title.

75 Path/File access error
During a command capable of specifying a path name (OPEN, RENAME, MKDIR, for example), you used a path inappropriately; for example, trying to OPEN a subdirectory or to delete an in-use directory.

76 Path not found
The path you specified during a CHDIR, MKDIR, OPEN, and so forth, can't be found.

202 Out of string temp space
A string expression required the use of too many temporary string buffers. This can be caused by an expression like MID$(LEFT$(MID$(RIGHT$(...). Try simplifying your string expressions by storing intermediate results in temporary string variables.

203 Mismatched common variables
You attempted to CHAIN between two program segments that did not contain matching COMMON statements. Turbo Basic checks the type and number of variables in COMMON statements.

204 Mismatched program options
You attempted to CHAIN between two program segments that were compiled with different program options (different math library, math coprocessor required, and so forth).

205 Mismatched program revisions
You attempted to CHAIN between two program segments that were created with different versions of the Turbo Basic compiler.

206 Invalid program file
You attempted to CHAIN or RUN a program segment that was not compiled with Turbo Basic.

242 String/array memory corrupt
The string memory area has been improperly overwritten. This could be caused by the improper action of an assembler subroutine, string array access outside of the dimensioned limits, or by an error within the Turbo Basic run-time system.

243 CHAIN/RUN from .EXE file only
You attempted to CHAIN or RUN a program segment from within the Turbo Basic environment. You must compile your program to disk using the compiler Options menu selection and then execute programs that use CHAIN or RUN from DOS.

Compiler Errors

401 Expression too complex
The expression contained too many operators/operands; break it down into two or more simplified expressions.

402 Statement too complex
The statement complexity caused an overflow of the internal compiler buffers; break the statement down into two or more simplified statements.

403 $IF nesting overflow
Conditional compilation blocks ($IF/$ELSE/$ENDIF) can only be nested up to 16 levels deep.

404 $INCLUDE nesting overflow
Include files may be nested up to five levels deep, including the main program itself. That allows the program to have four nested include files.

405 Block nesting overflow
Your program has too many statement block structures nested within each other. Turbo Basic block structures may be nested 255 levels deep.

406 Compiler out of memory
Available compiler memory for symbol space, buffers, and so on, has been exhausted. If no more memory is available, separate your program into a small main program that uses the $INCLUDE metastatement to include the rest of your program. If you are compiling your program to memory and get this error, try compiling the program to disk with the compiler Options menu.

407 Program too large
Your program contains more than 65,530 statements.

408 Segment exceeds 64K
Your program contains a segment that exceeds the 64K limitation. Add a $SEGMENT metastatement to your source program to force program code into another segment.

409 Variables exceed 64K
Scalar variables are limited to 64K total space. In this space we include pointers to strings, integers, long integers, and single- and double-precision reals. Get rid of any unused variables or split up your program into separate Main and CHAIN programs.

410 "," expected
The statement's syntax requires a comma (,).

411 ";" expected
The statement's syntax requires a semicolon (;).

412 "(" expected
The statement's syntax requires a left parenthesis (().

413 ")" expected
The statement's syntax requires a right parenthesis ()).

414 "=" expected
The statement's syntax requires an equal sign (=).

415 "-" expected
The statement's syntax requires a hyphen (-).

8mmテープ　取付方法

テープリール

ビニール　トップカバーの巻取り

空テープ