

UFOS-537 UPDATE REPORT

INTRODUCTION:

The descriptions of added/changed features and bug fixes are split up into the four types of software; vision, servo, boot and UFOS. With each type of software the descriptions are split up into the versions of software that have been tested from version UFOS-531 onwards.

ADDED/CHANGED FEATURES:

UFOS SOFTWARE

Version UFOS-532 :

- [1] Addition of template matching; it is now possible to take an image of an fiducial in memory and use it for fiducial recognition. This can be used as follows ;

Set OPTION 9 to 20 in the fiducial visionfile setup (DATA IN/ VISION/ SETUP) to select the template matching algorithm. This causes OPTIONS 10 and 11 to have following meaning ;

OPTION 10 : TEMPLATE NUMBER

In this option the template sequence number can be input, this may be 0 to 99. But the actual amount of templates is limited by the memory. In case of a shortage of memory the error message "323: TEMPLATE OVERFLOW" is displayed. Teaching a new template can only be done in this case by first deleting an other one.

OPTION 11 : SIMULARITY

This options reflects the allowed percentage of deviation between the template in memory and the picture currently taken by the camera. So the lower the percentage the more accurate.

The templates are stored on the floppy disk drive. When template matching is selected by means of OPTION 10 then the funciton keys at the bottom of the screen have following functions ;

F1 :

TEACH

With the help of this function key it is possible to store an image into memory. When the key F1 is pressed the folowing message appears at the bottom of the screen " TEACHING OK ? (YES: →.NO: EXIT)".

If the ENTER-key is pressed then the image data is registered into memory with the sequence number as stated in OPTION 10.

If the EXIT-key is pressed then the job is skipped and the previous screen reappears.

The maximum size of the template is ... of the display size, so teaching with a bigger WINDOW 1 results in an error.

However during running the WINDOW 1 should be made big enough so that the mark will be at all times within the window.

F2 :

DISP

This function will display the currently selected image (see OPTION 10) onto the vision screen.

F3 :

LOAD

When this function key is pressed following message appears onto the screen "LOAD OK ? (YES:→. NO:EXIT)". Pressing the ENTER key loads the selected image (see OPTION 10) into the memory from floppy disk. By pressing EXIT the previous screen will be displayed.

F4 :

SAVE

When this function key is pressed the following message appears onto the screen "SAVE OK ? (YES:→. NO:EXIT)". Pressing the ENTER key saves the currently selected image (see OPTION 10) on disk. By pressing EXIT the previous screen will be displayed.

F5 :

DELETE

When this function key is pressed the following message appears onto the screen "TEMPLATE DELETE (0-99)". Pressing the tempte number followed by the ENTER key deletes the selected image from memory. By pressing EXIT the previous screen will be displayed.

F6 :

No function.

Version UFOS-532 :

- [1] Addition of density- and radius-options in the fiducial vision file, they have following meaning:

Option 6: Density difference

This option is available if option 9 is set to 6..8. Normally this value is set to 30..40. But when the contrast is low, a small value must be input. When 0 is selected then the software uses 40 as a value.

Option 7: Radius

This option enables to input the radius of the fiducial mark, but is only effective when option 9 is set to 6 (circle mark detection).

VISION SOFTWARE

Version UFOS-532, VISION 111:

- [1] Template matching is added in the fiducial algorithm.

BOOT SOFTWARE

Version UFOS-532, BOOT 012:

- [1] Addition of "YM84D" in the dipswitch settings menu. This is not for PHILIPS machines. A choice can be made between a cover for high speed or low speed.

BUG FIXES:

UFOS SOFTWARE

Version UFOS-533:

- [1] Bug fix for a problem with multi-recognition in CON-mode. The recognition during CON-mode failed because the parameter of the read direction was not automatically changed.
- [2] Bug fix for a problem with the axis movement under following conditions; when the STOP-key was pressed during axis movement in auto running, the mode changed to MANUAL, the head moved to another position and auto running restarted, then the head did not return to the original target position.

Version UFOS-534:

- [1] Bug fix for a problem with the R-absolute angle correction, the way of calculating has been changed. This function is not completely tested and as such not official being used.
- [2] Bug fix for the MOUNT DATA UTILITY. When SKIP was selected for LINE DISPENSE data the x-coordinates sometimes changed.
- [3] Bug fix for a problem with automatically saving of the SYSTEM data. When the display was changed from SYSTEM/UTILITY/DISK/FORMAT to the MAIN MENU after changing of the SYSTEM data, the saving of this data failed sometimes.

Version UFOS-535:

- [1] Bug fix for a problem with the tray count. When a PICKUP ERROR or VISION ERROR occurred on a tray component (so a component with TRAY data for COMPONENT TYPE parameter) the TRAY COUNT parameter was not counted and a pickup retry was executed at the same position.

Version UFOS-536:

- [1] Bug fix for the SYSTEM ERROR 60 when a program which mounts QFP's from the trayfeeder starts running in AUTO mode.

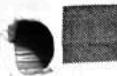
Version UFOS-536:

- [1] Bug fix for slow auto running speed. Deletion of the time out job on head up/down for shortage of memory caused the running speed to be slower. Instead the CANC function has been deleted.
- [2] Wrong behaviour of the trayfeeder 31 brake, the brake became active while the servo was active under following conditions; the auto running is stopped by means of the emergency button, the servo is turned ON, the menu changed to other mode than running, the menu is changed back to running, the brake becomes active.

Manual Number: 5322 871 63603
Revision Code: 96.00
Issue date: Nov-96

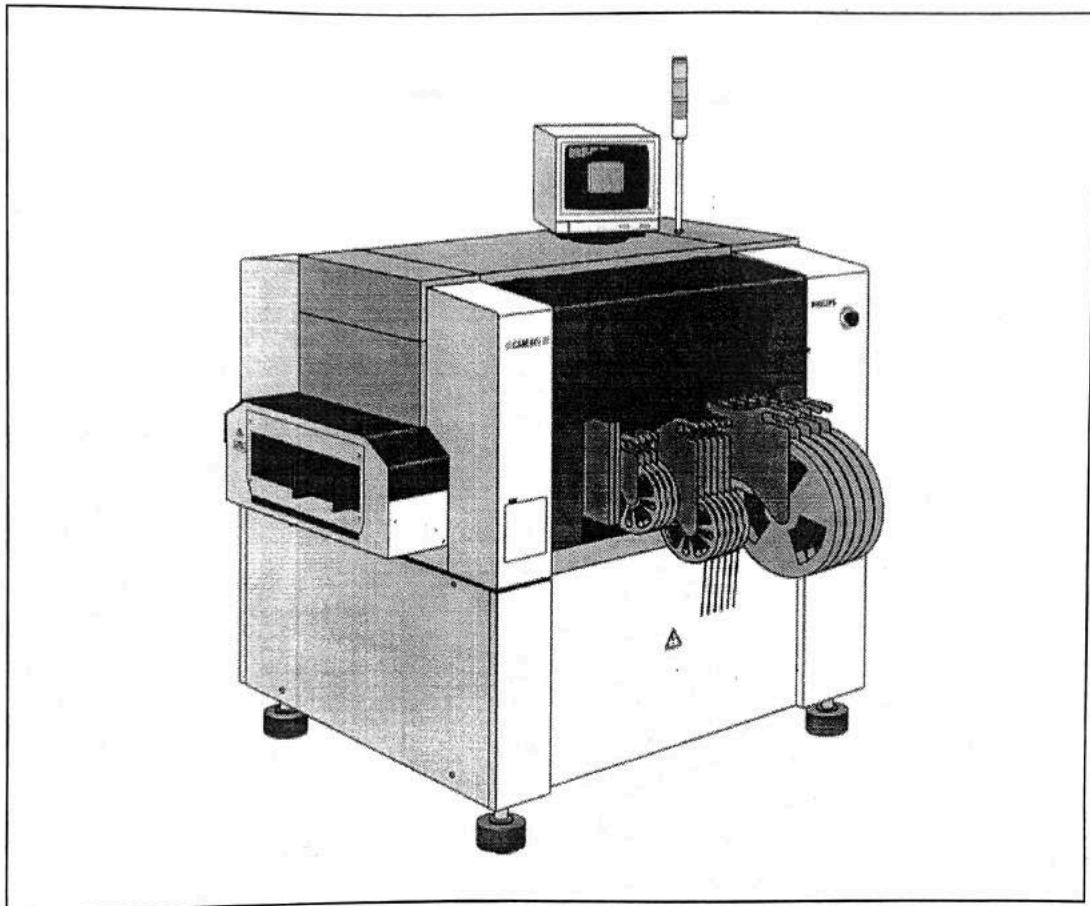
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PA1306/40

CSM 66/84/84V III



Service Manual

Philips
Electronic Manufacturing
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PHILIPS

- [3] Bug fix for trayfeeder hangup. If the DUMP POINT parameter of a tray component was set to STANDARD, the machine slept after a dump action. This happened only in case the vision error occurred on a component with the same component number as a component that is being brought from the trayfeeder.
- [4] Bug fix for trayfeeder hangup. When the emergency key was pressed during running mode and the READY key was pressed, the trayfeeder hangs up.

VISION SOFTWARE

Version UFOS-535, VISION 112:

- [1] Bug fix for a problem with the QUAD mode.
After recognition of a component in quad mode you cannot see the description image of the component on the vision monitor, only the real image is visible

Version UFOS-537, VISION 113:

- [1] Bug fix for a problem with BGA calibration, if this calibration was executed a vision error and lockup occurred.

KNOWN REMAINING BUGS:

- [1] The SHIFT-I function does not work at DATA IN /PCB/FIDUCIAL.
- [2] When a component is picked from a tray and the source is changed from trayfeeder to e.g. 32mm emboss tape, the machine keeps on picking from the trayfeeder after restart of production. Only when the machine configuration is set to "LCS" then it works normally.

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Service Manual

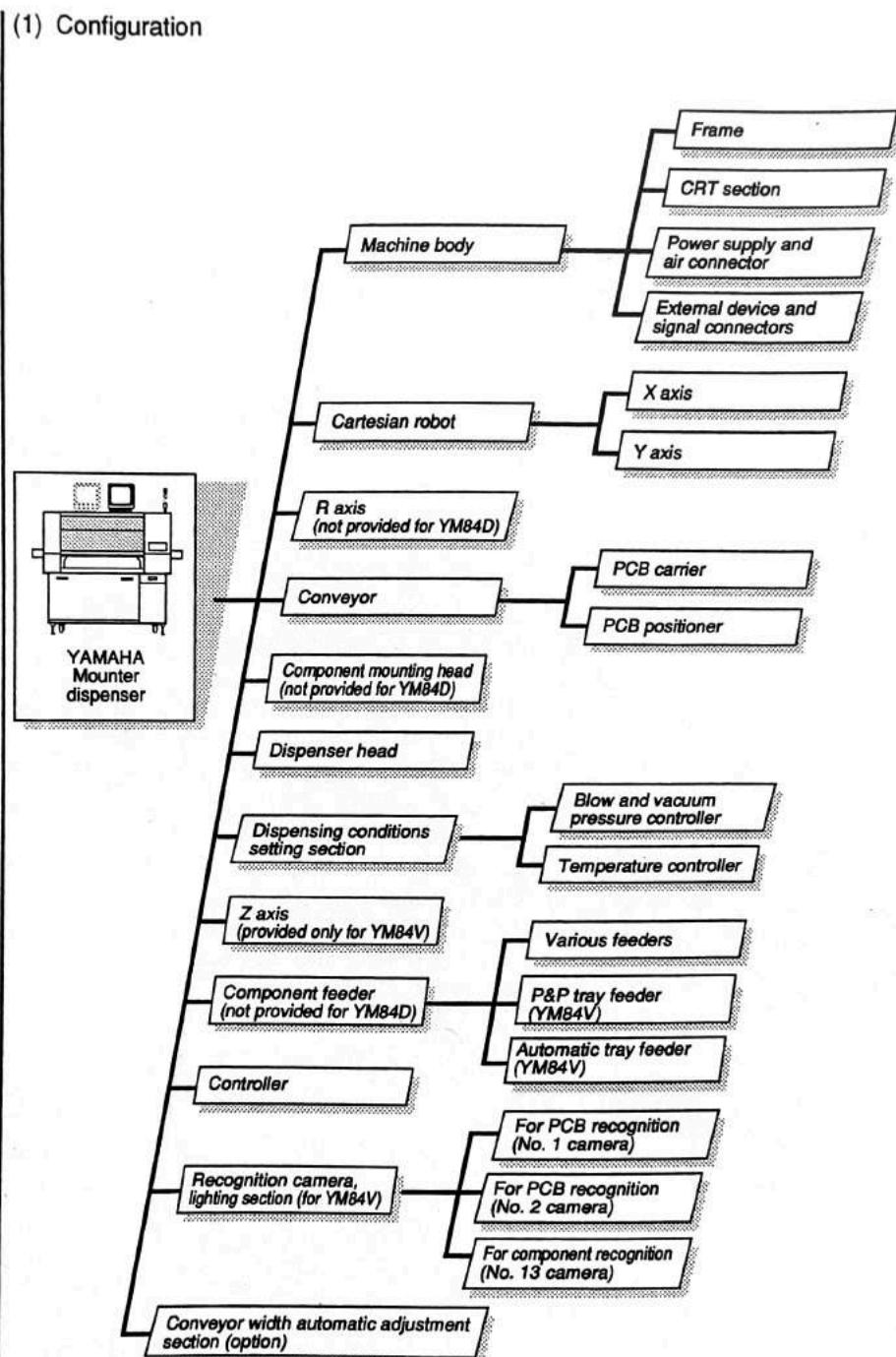
CSM 66/84/84V III

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1-1 Machine Specifications

1-1-1 Outline of Machine

Fig. 1-1
System configuration



21199001-00

CHAPTER 1

SPECIFICATIONS

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SAFETY

General:

For the correct and safe use of the CSM system, it is essential that both **OPERATING** and **SERVICE** personnel follow generally accepted safety procedures in addition to the safety precautions specified in these safety and quick reference cards. The operating, service and installation manuals have warning and cautionary statements throughout the whole manuals where applicable. Warnings and cautionary statements and/or symbols are present on the system where applicable.

Cautions and Warnings:

- A **Caution!** sign is used to indicate correct operating or maintenance procedures in order to prevent damage to, or destruction of, equipment or other property.
- A **Warning!** sign indicates a potential danger that requires correct procedures or practices in order to prevent personal injury.

Training level personnel:

Operation, adjustment, maintenance and repair of the CSM system may only be carried out by **qualified and trained** personnel who are aware of the hazards involved.

The following training levels are defined:

- Operator level: Official Philips training course or training received by a qualified maintenance engineer.
- User or Supervisor level: Official Philips training at one of the official Philips Training Centres.
- Maintenance or Service level: Official Philips training at one of the official Philips Training Centres.

Safety standards:

The safety standard of the CSM system is in accordance with CE directives:

- Machine directive 89/392/EEC and 91/368/EEC.
- Low Voltage directive 73/23/EEC.
- EMC directive 89/336/EEC.

Liability:

Philips shall not be liable for any costs, damages or personal injuries if the CSM system is not used according to the safety rules given in this paragraph.

Detailed information:

For more detailed information how to operate and to maintain the CSM machine please refer to the Operating and Service manuals of this system.

Location Safety and Quick Reference Cards:

The Safety and Quick Reference cards MUST BE LOCATED CLOSE to the CSM machine. This enables operators to have easy access to the relevant cards.

Warning!

It is never allowed to overrule or disconnect any safety or emergency switch or any other provision made in machine which is part of the safety circuit.

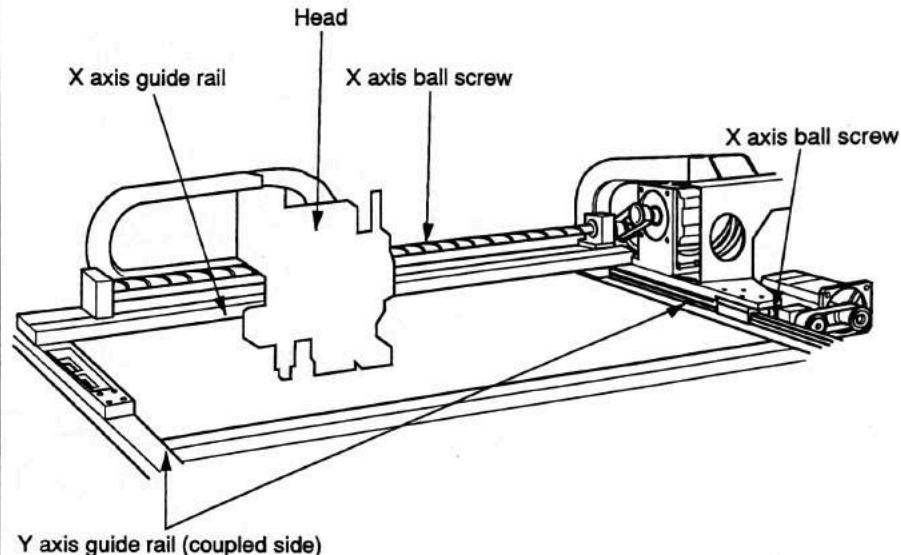
**1-1-2 Outline of X-Y axes
Y-Z-R axes**

(1) X-Y axes

The X-Y axes move and position the mounting head at a high speed and high accuracy. These axes are driven and controlled by an AC servomotors and a digital servo control system.

1) Outline view

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**Fig. 1-3
X-Y axes**

2) Specifications

Drive axis and stroke	X axis 620mm, Y axis 597mm (CSM84, CSM84V) X axis 488mm, Y axis 372mm (CSM66)
-----------------------	-------------------------------------------------------------------------------------

Drive method AC servomotor

Max. speed	X axis 1400mm/sec Y axis 1400mm/sec Composite $1400 \times \sqrt{2}$ mm/sec
------------	-----------------------------------------------------------------------------------

Repeatability ± 0.02 mm

Motor rating	X axis 400W, 200V Y axis 750W, 200V
--------------	----------------------------------------

(3) Machine specifications

- 1) PCB transfer method Belt conveyor
- 2) PCB transfer height 900mm±10mm
- 3) PCB flow direction Left to right.
- 4) Machine weight CSM66 : Machine body approx. 450kg
 CSM84 : Machine body approx. 580kg
 CSM84V : Machine body approx. 600kg
 CSM tray feeder 31 : approx. 20kg
- 5) Applicable air pressure The air source pressure must have an air flow of 40NL/min. or more while at 5.5 to 10.0kg/cm². Only purified air passed through an air dryer and air filter must be supplied. The machine's working air pressure can be adjusted between 5.0 and 5.5kg/cm² with the air regulator. A male coupler (Nitto Koki air coupler plug 20PM) is provided on the side of the mounter. Use a Nitto Koki 20SH or 30SH female socket for connection.

WARNING !!

Dirty air can cause trouble.

- 6) Power supply AC200/208/220/230/240V±10%, 50/60Hz
 Single-phase, 4.0KVA
 Single-phase cable and ground cable
- 7) Environment Temperature : 15 to 30°C
 Humidity : 30 to 90% (with no dew condensation)

WARNING !!

When using a humidifier, avoid using an ultrasonic or spray type. The calcium and magnesium in the water could disperse in the atmosphere and be sucked into the vacuum generator. This can cause a drop in the vacuum generator performance.

Atmosphere : Use the machine in a stable environment that is not subject to direct sunlight, wind or rain, etc.

WARNING !!

The machine performance can drop when used in an environment containing combustible gas, dust or dirt. Make an effort to keep the environment as clean as possible.

- 8) Interlock For worker safety, an interlock will be applied and all axes will stop temporarily if the front or rear cover is opened. If the supply air pressure drops below the value set for the pressure switch activation in the air gauge (set to 4kgf/cm² before shipment), an interlock will be applied and all axes will stop to protect the machine and secure normal operation.

(2) Outline of operation

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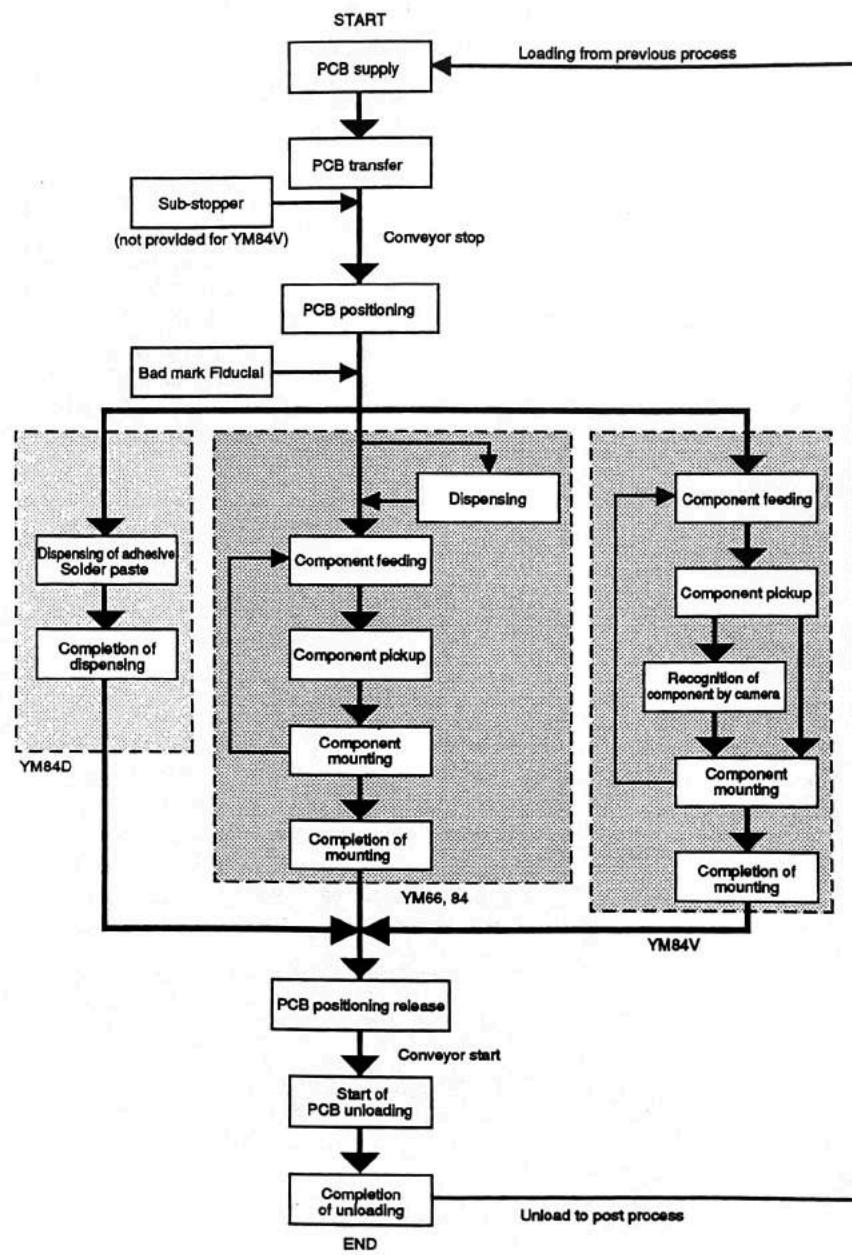


Fig. 1-2
Outline of operation

1-1-3 Outline of conveyor

Fig. 1-5
Pin reference method conveyor

(1) Pin reference method PCB positioning type

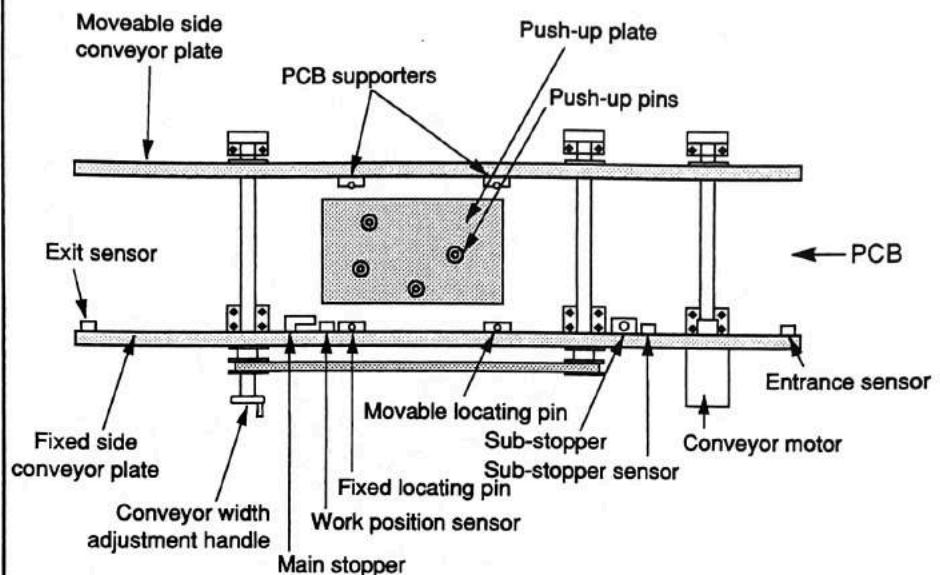
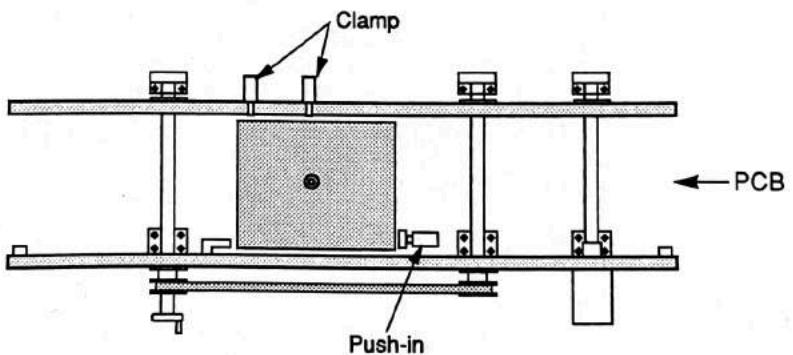


Fig. 1-6
Edge reference method conveyor

(2) Edge reference method PCB positioning type (option)



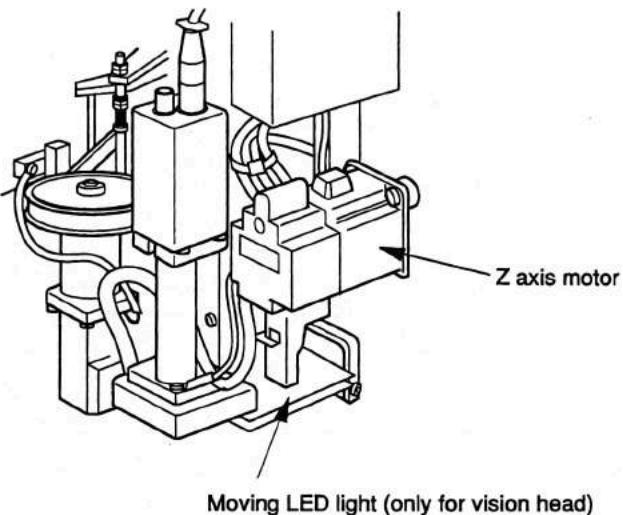
(3) Z axis (provided only for CSM84V)

The components can be mounted without stress using the Z axis. To realize this, the image processing components can be mounted with a high precision using soft landing (mounting while considering component height).

1) Outline view

11199012-00

Fig. 1-4-2
Z axis section



2) Specifications

Drive method	AC servomotor + Rack and pinion
Rating	60W, 200V

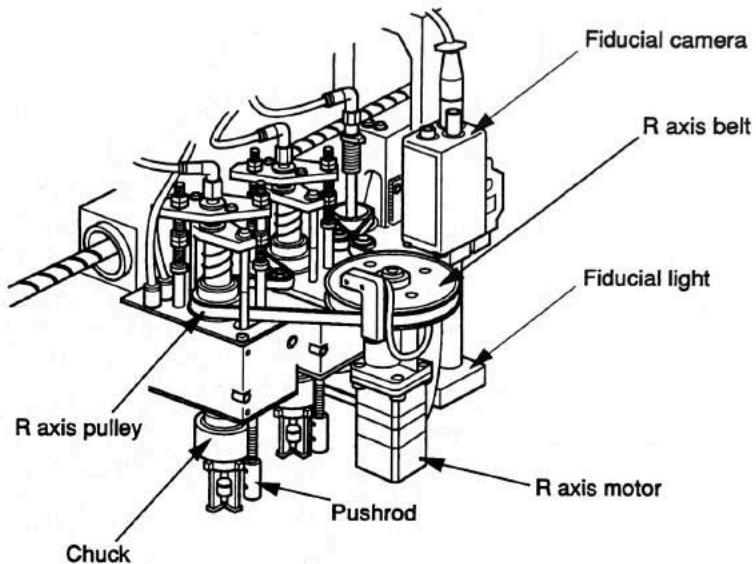
Fig. 1-4-1
R axis section

(2) R axis section

The R axis precisely rotates and positions the mounting head.

1) Outline view

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2) Specifications

Drive method	AC servomotor + Harmonic drive
Rating	8.6W, 200V

(2) Head specifications

- | | |
|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1) R axis synchronous head | ±0.15mm (CSM)
±0.3mm |
| 2) Vision head | ±0.04mm (excluding CSM 66, 84)
±0.08mm |
| 3) Dispenser head | ±0.15mm (only CSM 66, 84) |
| 4) Mounting angle | 0° to 360° (min. setting unit 0.01°) |
| 5) Dispensing angle | 0°, 90° (only dispenser head) |
| 6) Component pickup
error detection | 3-stage vacuum sensor (change pickup level
according to component shape) |
| 7) Dispensable material | Various adhesives (Locktite 3601, 360; Heraeus
PD860002SP; Matsushita MR-8153R; Somar
NF-1000-6R, etc.)
Solder paste for dispensing (Senju Metal SPT-70-
OF-63, etc.) |
| 8) Syringe | Musashi Engineering PSY10 (10cc), PSY30
(30cc). Must be completely defoamed by vacuum
in syringe. |
| 9) Dispensing pattern | Adhesive : 1-shot, 2-shot dispensing
Solder paste : 1-shot or line dispensing |
| 10) Dispensing time control | 1 to 255 steps (min. setting unit 1ms) |
| 11) Temperature control | Room temperature +20°C (Max. 40°C) |
| 12) Dispensing pressure
adjustment | Adjustment width 0 to 5kgf/cm ² |

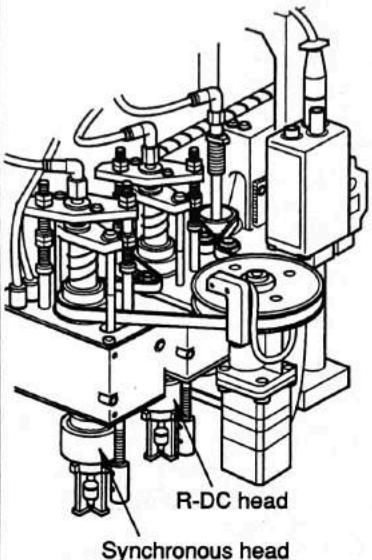
Items 3), 5), 7 to 12) above do not apply to CSM84V. Item 2) applies only to CSM84V.

CAUTION !

1-1-4 Outline of head

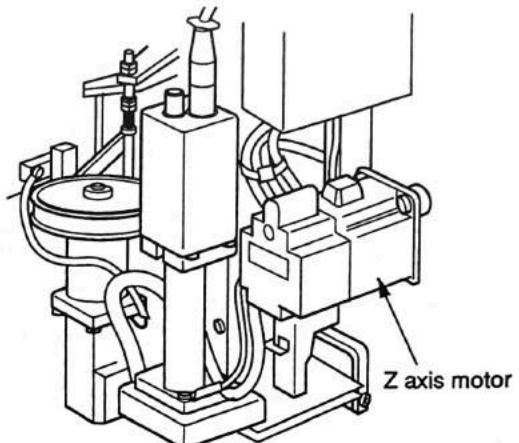
(1) Outline view of head

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R-axis synchronous head

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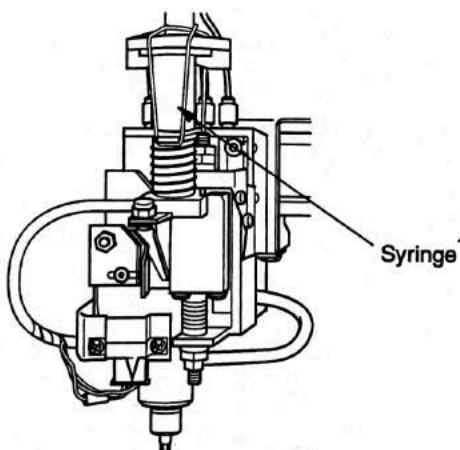


Vision head (for YM84V)

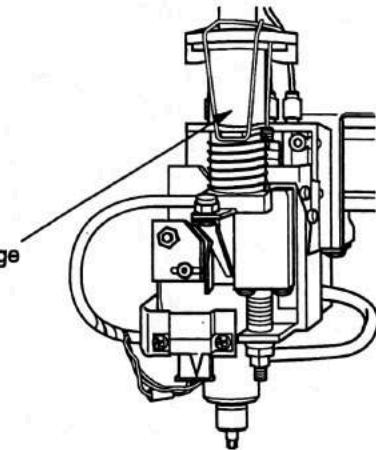
Fig. 1-7
Outline views of
various heads

11199015-00

11199016-00



Dispenser head (10cc)



Dispenser head (30cc)

CAUTION !

There are two types of syringes for the dispenser head, one with a capacity of 10cc and one with a capacity of 30cc.

CAUTION !

(3) Conveyor specifications

- | | |
|------------------------|------------------------------------------------------------------------------------------------------|
| 1) Conveyor reference | Manual reference (the rear side reference is optional) |
| 2) PCB exchanging time | Standard conveyor approx. 8.5 sec.(60Hz)
High-speed soft stop conveyor approx. 5.5 sec.
(60Hz) |

1. The PCB exchanging time is the time from when one PCB has been released from positioning until the next PCB is positioned. This is the total time including the transfer time, positioning time and positioning release time, etc.
2. The above values will differ according to the PCB side, machine type and adjustment state, etc. Thus, the user should measure using their own PCBs.

- | | |
|-------------------|------------------------------------------------------------------------------------------------------------------------|
| 3) Conveyor speed | Standard conveyor 14m/min. (50Hz), 17m/min.
(60Hz)
High-speed soft stop type
23m/min. (50Hz), 28m/min. (60Hz) |
|-------------------|------------------------------------------------------------------------------------------------------------------------|

CAUTION !

The CSM84V is provided with a high-speed soft stop conveyor as a standard.

- | | |
|-----------------------------------------------|------------------------------------------------------------------------|
| 4) PCB positioning repeatability | $\pm 0.05\text{mm}$ |
| 5) PCB width adjustment | Manual handle (Automatic conveyor width setting is optional) |
| 6) Applicable PCB side at sub-stopper section | PCB longitudinal direction L = 457mm (CSM84)
L = 330mm (CSM66) |

CAUTION !

The CSM84V is not provided with a sub-stopper.

Table 1-4-1
Mountable
components
with vision
head

Head specifications	Component recognition camera specifications	Nozzle type	Example of mountable components
Standard	Max. component dimensions 45mm square (0.5mm pitch)	Nozzle 1 (M)	OFP, SOP 0.5mm pitch or more, max. mounting weight 6g Component outline dimensions 14 to 32mm square
		Nozzle 2 (L)	OFP, SOP 0.5mm pitch or more, max. mounting weight 15g Component outline dimensions 20 to 45mm square
		Nozzle 3 (S)	OFP, SOP 0.5mm pitch or more, max. mounting weight 1.5g Module outline dimensions 5mm or more square Component outline dimensions 14 to 32mm square
Standard or without tape feed mechanism	Max. component dimensions 32mm square (0.3mm pitch)	Nozzle 1 (M)	OFP, SOP 0.3mm pitch or more, max. mounting weight 6g Component outline dimensions 14 to 32mm square
		Nozzle 2 (L)	OFP, SOP 0.3mm pitch or more, max. mounting weight 15g Component outline dimensions 20 to 32mm square
		Nozzle 3 (S)	OFP, SOP 0.3mm pitch or more, max. mounting weight 1.5g Module outline dimensions 5mm or more square Component outline dimensions less than 16mm
Without tape feed mechanism	Max. component dimensions 54mm square (0.5mm pitch)	Nozzle 1 (M)	OFP, SOP 0.5mm pitch or more, max. mounting weight 6g Component outline dimensions 14 to 32mm square
		Nozzle 2 (L)	OFP, SOP 0.5mm pitch or more, max. mounting weight 15g Component outline dimensions 20 to 54mm square
		Nozzle 3 (S)	OFP, SOP 0.5mm pitch or more, max. mounting weight 1.5g Module outline dimensions 5mm or more square Component outline dimensions less than 16mm

4) Vision head (Fixed centering unit)

Nozzle type	Example of mountable components	
	Centering unit 1 18 to 45mm square	Centering unit 2 3 to 20mm square
Nozzle 1(M)	Component outline dimensions 18 to 32mm square	Component outline dimensions 12 to 20mm square
Nozzle 2(L)	Component outline dimensions 20 to 45mm square	Component outline dimensions 20mm square
Nozzle 3(S)		Component outline dimensions 8 to 16mm square

CAUTION !

1. The maximum component height is 6.5mm or less.
2. When using both the vision recognition (standard camera for 54mm square) and the vision recognition (camera for 0.3mm pitch), the QFP that is 32mm or less square at a pitch of 0.3mm or more will be mounted with the vision recognition (camera for 0.3mm pitch). The 0.3mm pitch QFP cannot be recognized with the vision camera (standard camera for 54mm square).
3. The mountable component can be changed by changing the nozzle type.

Table 1-3
Mountable components

(5) Sizes of mountable components (irrelevant for YM84D)

1) R axis synchronous head

Chuck and nozzle type	Example of mountable component (unit: mm)	
TYPE1	Resistor	L1.00 × W0.50 × T0.50 to L2.00 × W1.25 × T0.50
TYPE2	Resistor, ceramic capacitor square chip	L1.60 × W0.80 × T0.50 to L4.50 × W2.00 × T0.50
	Resistor, capacitor melf	ø1.25 × 2.00 to ø1.35 × 3.45
	Tantalum capacitor	L2.90 × W1.60 × T1.60 to L4.70 × W2.60 × T2.10
	Chip inductor	L3.20 × W2.50 × T2.00
	Mini-mold transistor	L2.90 × W1.50 × T1.10 to L4.00 × W3.00 × T1.80
TYPE4	Power transistor	L4.60 × W2.60 × T1.60
	Resistor, capacitor melf	ø1.25 × 2.00 to ø2.20 × 5.90
TYPE5	Aluminum electrolytic capacitor	L4.30 × W4.30 × T5.70 to L6.60 × W6060 × T5.70
TYPE8	Ceramic capacitor	L4.50 × W3.20 × T1.90 to L5.60 × W5.00 × T1.90
	Tantalum capacitor	L6.00 × W3.20 × T2.50 to L7.30 × W4.30 × T2.80
	Film capacitor	L7030 × W5.30 × T3.25
	Chip inductor	L4.50 × W3.20 × T3.20
	Power transistor	L4.60 × W2.60 × T1.60
	SOP	6P, 8P L5.0 × W4.5 × T1.5 10P, 12P L7.6 × W4.5 × T1.5 14P, 16P L10.1 × W4.5 × T1.5 18P, 20P L12.6 × W5.7 × T1.5
		22P, 24P L15.3 × W7.5 × T2.0 8P L5.0 × W4.5 × T1.5 10P, 12P L7.6 × W4.5 × T1.5 14P, 16P L10.1 × W4.5 × T1.5 18P, 20P L12.6 × W5.7 × T1.5 22P, 24P L15.3 × W7.5 × T2.0 28P L17.8 × W7.5 × T2.0
TYPE9	SOP	
TYPE10	PLCC	Max. 44 P, maximum outline dimensions 18mm square
	PLCC	4P to 84P, maximum outline dimensions 17 to 30mm square

2) Precision head (Fixed centering unit)

Nozzle type	Example of mountable components	
	Centering unit 1 18 to 45mm square	Centering unit 2 3 to 20mm square
Nozzle 1	Component outline dimensions 18 to 45mm square	Component outline dimensions 16 to 20mm square
Nozzle 2		Component outline dimensions 3 to 16mm square
Nozzle 3	Component outline dimensions 18 to 32mm square	Component outline dimensions 8 to 16mm square

CAUTION !

1. The maximum component height is 6.5mm or less.
2. There are various types of jaws and nozzles, and the combination of these is called a "type".
3. The mountable component can be changed by changing the chuck and nozzle type.
4. The Type 1, 2, 4 and 5 chuck ass'ys, the type 8 and 9 chuck ass'ys and the type 10 chuck ass'y differ. Thus, the type cannot be changed just by changing the jaw (restricting claw).
5. Special shapes (high-density arrays, bare chips, LEDs, etc.) not listed above can also be handled. Consult YAMAHA for details.

Table 1-1
Head combina-
tions

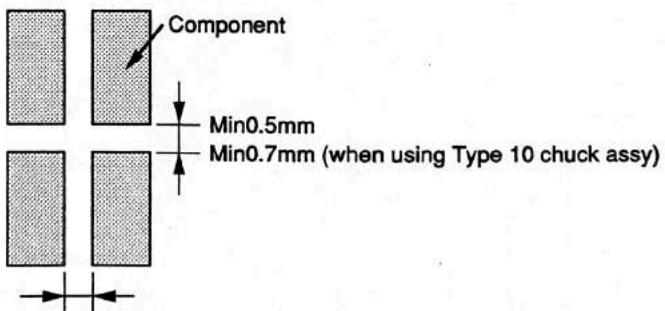
Configuration type	No. 1 head	No. 2 head	No. 3 head
1	B	A	B
2	D1	A	B

Table 1-2
Head combina-
tions

Configuration type	No. 1 head	No. 2 head	No. 3 head
1	B	A	V
2	D1	A	V

Fig. 1-8
Component
mounting interval

4) Component mounting interval



CAUTION !

Normal components cannot be mounted after a tall component (ø20) such as an aluminum electrolytic capacitor is mounted. Mount the normal component first, and then mount the aluminum electrolytic capacitor.

7) Types of vision head (YM84V) nozzles

1) No. 1 nozzle

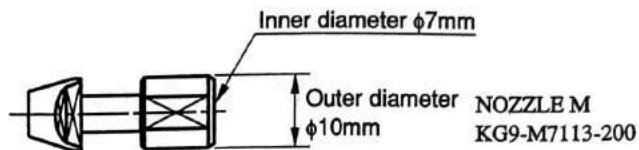
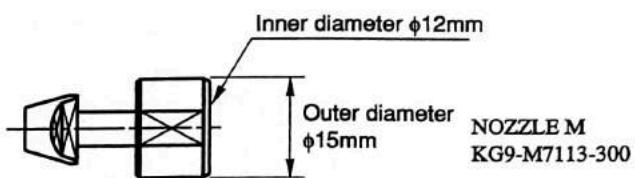
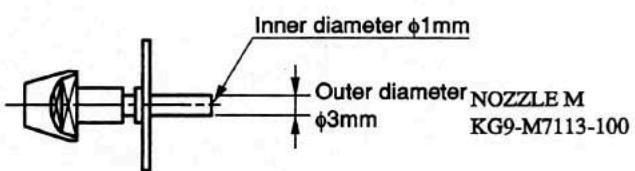


Fig. 1-10
Types of vision
head nozzles

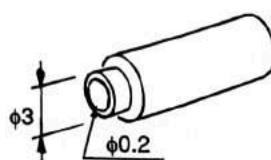
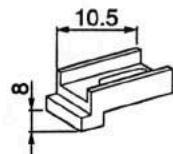
2) No. 2 nozzle



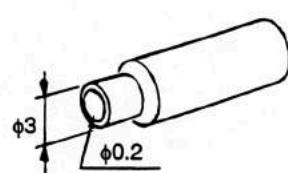
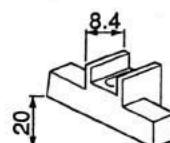
3) No. 3 nozzle



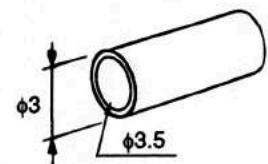
4) TYPE5

NOZZLE AEC
K38-M7113-F0XJAW AEC1
K38-M7167-80XJAW AEC2
K38-M7167-90X

5) TYPE8

NOZZLE C
K38-M7113-C0XJAW SO02
K38-M7167-60XJAW CO20
K38-M7167-70X

6) TYPE9

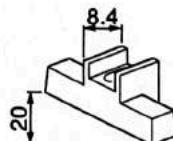
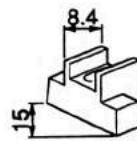
NOZZLE D
K38-M7113-D0X

Same as Type 8 jaw

Same as Type 8 jaw

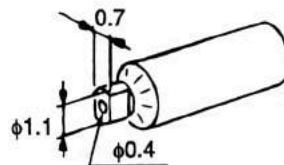
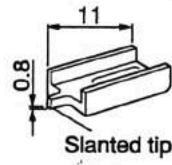
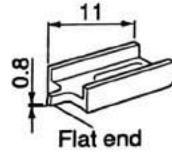
7) TYPE10

Same as Type 9 nozzle

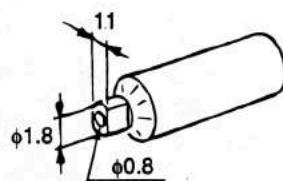
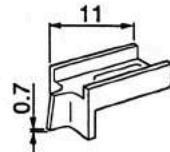
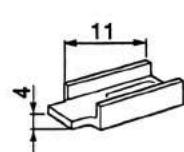
JAW SO02
K38-M7167-70XJAW CO15
K98-M7167-A0X

(6) Types of R-DC and synchronous head jaws and nozzles

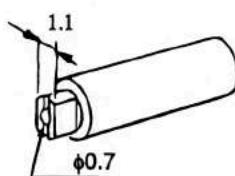
1) TYPE1

NOZZLE H
K38-M7113-H0XJAW1005-1
K38-M7167-D0XJAW1005-2
K38-M7167-E0XFig. 1-9
Types of R-DC
and synchronous
head jaws and
nozzles

2) TYPE2

NOZZLE B
K38-M7113-B0XJAW0711-Y
K38-M7167-B0XJAW4011-Y
K38-M7167-C0X

3) TYPE4

NOZZLE E
K38-M7113-E0X

Same as Type 2 jaw

Same as Type 2 jaw

2) YM84, 84V, 84D

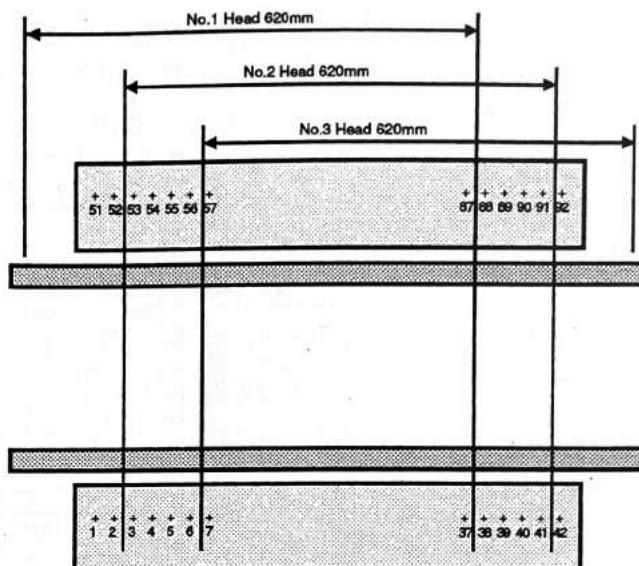


Fig. 1-14
Movable range of
YM84, 84V and
84D heads

CAUTION !

1. The max. PCB size of L457mm x W407mm is within the movable range of all heads.
2. The numbers 1 to 42 and 51 to 92 in Fig. 1-19 indicate the feeder numbers.
3. If the No. 1 head is the dispenser head for YM84V, numbers 1, 2, 41 and 52 cannot be used.
4. The following is not possible for the YM84V.
 - * When using the triple tray feeder specifications, numbers 59 to 92 cannot be used.
 - * When using the automatic tray feeder specifications, number 51 to 92 cannot be used.
 - * When using the P & P tray feeder specifications or the manual tray feeder specifications, numbers 84 to 92 cannot be used.
6. The PCB width will differ according to the tray size when using the manual tray feeder specifications.
7. The feeder plate is not provided for the 84D.

(10) Movable range of heads

1) YM66

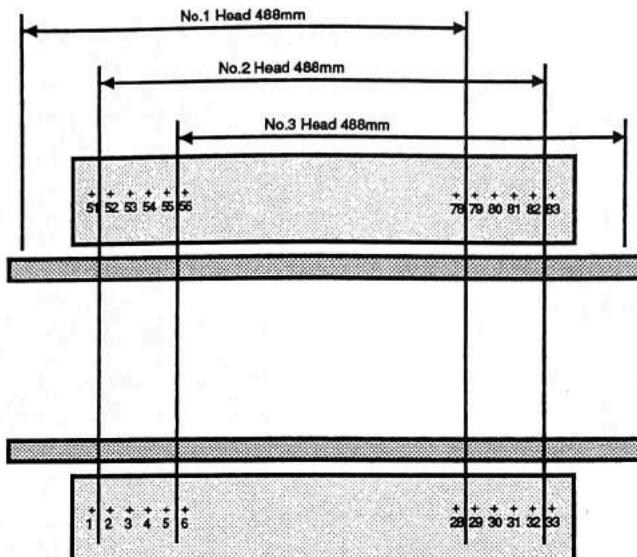
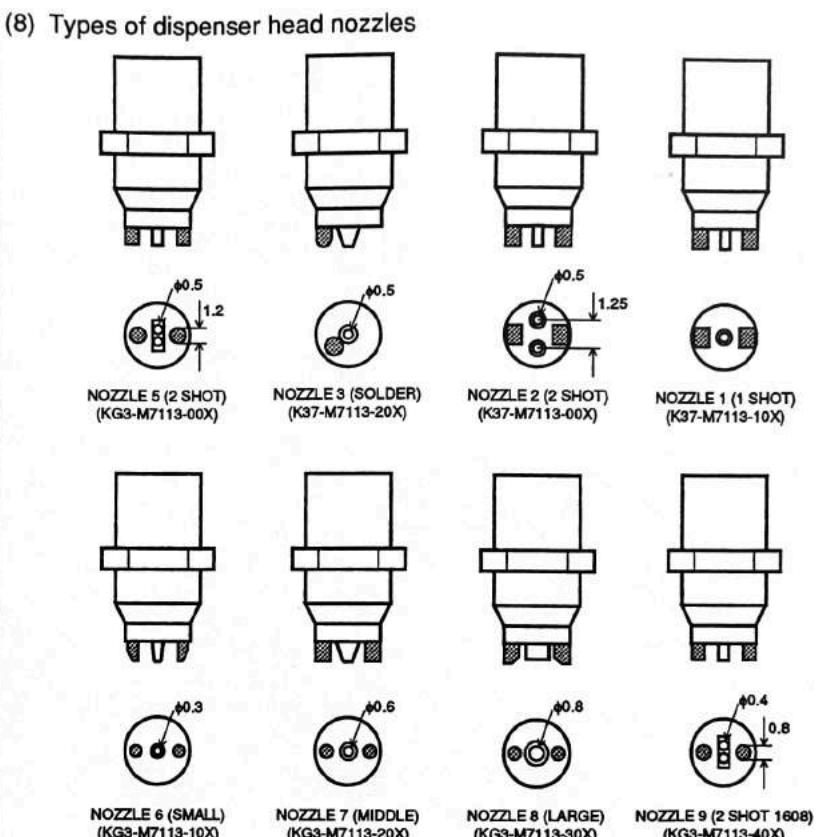


Fig. 1-13
Movable range of
YM66 heads

CAUTION !

1. The max. PCB size of L330mm x W250mm is within the movable range of all heads.
2. The numbers 1 to 33 and 51 to 83 in Fig.1-18 indicate the feeder numbers.
3. There are feeder numbers that cannot be installed depending on the optional specifications.
4. If the No. 1 head is a dispenser head, numbers 1 and 51 cannot be used.

Fig. 1-11
Types of dispenser head nozzles



CAUTION !

1. The guides prevent the discharge outlet from directly touching the PCB.
2. Fig.1-15 shows the nozzle direction looking from the front of the head when the dispenser head is not rotating (0° degrees).
3. The KG3 series and solder past nozzles have a shaved outlet, and the other K37 series have pipe specifications for the adhesive dispensing section.

(9) Examples of dispensing

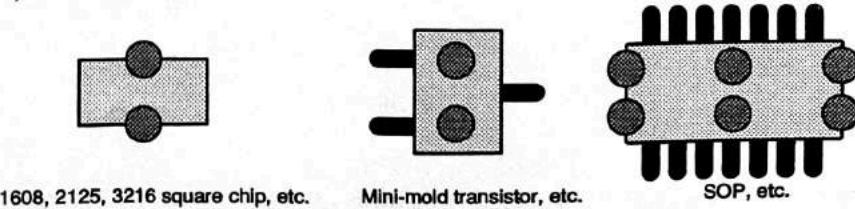
The one-shot nozzle can be used for dispensing various components. Compared to the two-shot nozzle, the amount of dispensing data created and the tact per PCB is approximately double. Furthermore, when dispensing adhesive that hardens under ultraviolet light, the adhesive tends to protrude from the shape of the component placed on top.

Fig. 1-12
Examples of adhesive dispensing

1) One-shot nozzle


1005, 1608, 2125 square chip, etc.

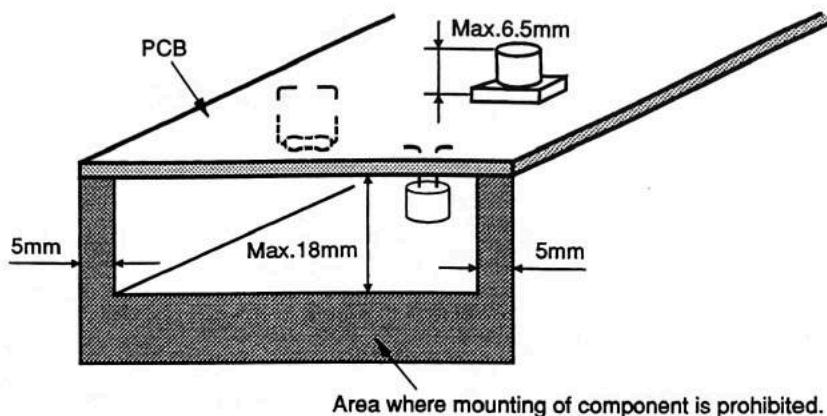
2) Two-shot nozzle



1-1-6 Outline of applicable PCBs

Fig. 1-16
State of PCB before component mounting

(1) State of PCB before component mounting



(2) PCB material

Paper phenol, glass-reinforced epoxy, aluminum, ceramics, etc.

(3) PCB thickness

Paper phenol, glass-reinforced epoxy, etc. : 0.8 to 2.0mm
Ceramics, etc : 0.6 to 1.0mm

(4) Tolerable PCB warping

Upward warping	: Max. 0.5mm(YM84V)
	: Max. 1.0mm(YM84D, 66, 84)
Downward warping	: Max. 1.0mm

CAUTION !

If a PCB warped greater than the values given above (especially in the upward direction) is mounted, the mounting precision can drop remarkably.

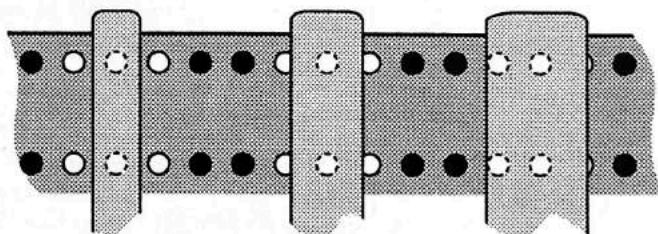
(5) PCB positioning method

Pin reference method (standard)
Edge reference method (option)

(2) Installation of various feeders

66 thin-type 8mm tape feeders can be installed on the YM66, and 84 can be installed on the YM84SII. (Note that this is when options such as the fixed centering options are not installed.) However, as the other types of feeders have a thick width, installation in the same manner as the 8mm feeder is not possible. The amount of 8mm feeder space required by the various feeders is shown below.

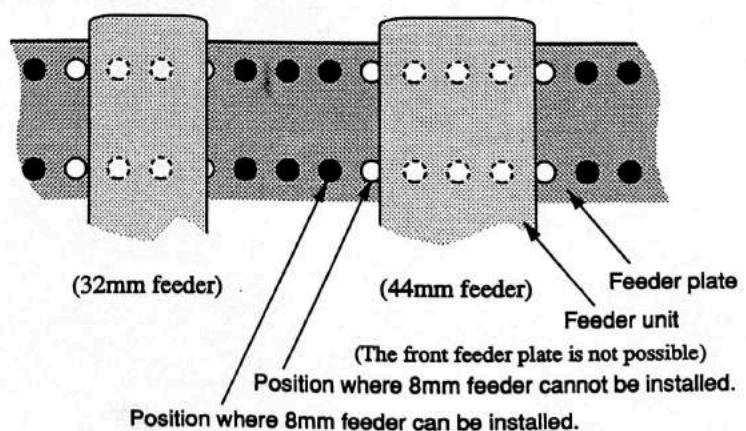
12mm feeder	: 3 feeders
16mm feeder	: 3 feeders
24mm feeder	: 3 feeders
32mm feeder	: 4 feeders
44mm feeder	: 5 feeders
Multi-stick feeder	: 8 feeders
Bulk feeder (8-series)	: 8 feeders
Stick feeder (8P to 20P)	: 2 feeders
Stick feeder (20P to 28P)	: 3 feeders
Stick feeder (PLCC44P)	: 3 feeders
Stick feeder (PLCC68P)	: 4 feeders
Stick feeder(PLCC84P)	: 4 feeders



(12mm feeder) (16mm feeder) (24mm feeder)

Fig. 1-15
Installation of various feeders

When setting two 12mm feeders or a 16mm and 12mm feeder consecutively, an interval is skipped as shown below.

**CAUTION !**

The 32 and 34 embossed tape feeders cannot be installed on the front feeder plate.

1-1-5 Outline of component supply devices (feeders)**(1) Outline**

Each feeder can be removed from the front and rear feeder plate with a single step. The feeder plate can also be easily attached and detached, allowing easy setup work as compared to the conventional methods.

The thin-model tape feeder eliminates the top tape winding mechanism, so bothersome disposal of the top tape is not required. Replacement of the tape without stopping the mechanism is possible with the tape connecting jig.

1) Tape feeders**A. 8 and 12mm thin-type tape feeders (7-inch and 15-inch)**

The tape is fed by a push rod that moves with the vertical movement of the mounter head. The feed pitch is 4mm per movement, so if the tape feed pitch is 8mm or 12mm, the push rod is moved two to three times. A tape feeder for 1006 square chips is available for the 8mm tape feeder, and a tape feeder for aluminum electrolytic capacitors is available for the 12mm tape feeder.

B. 12, 15, 24 and 32mm air-type tape feeders (15-inch)

The tape is fed by an air cylinder that moves with the vertical movement of the mounter head. The feed pitch can be changed according to the pitch of the tape reel components. A tape feeder for aluminum electrolytic capacitors is available for the 12mm and 16mm tape feeders, and an adhesive type tape feeder is available for the 32mm tape feeder.

2) Stick feeders and multi-stick feeders

The stick feeder is a component shooter made exclusively for shapes such as SOPs and PLCs. One stick feeder can feed only one type of component. The multi-stick feeder can feed components of various sizes. The plate used for fixing the sticks can be easily exchanged, so the types of components that can be fed with one multi-stick feeder increases greatly.

1-1-7 Outline of
beam sensor,
CCD camera
and vision
functions

(1) Beam sensor system (YM84D, 66, 84)

1) Teaching function

Teaching is done using a red LED beam having a diameter of approx. Ø1mm.

2) Bad mark detection function

Bad marks on the PCB are detected, and dispensing and mounting to that PCB is canceled. (Normally the bad marks are glossy seals, however, for the ceramic PCB, etc., the bad marks are non-reflective type seals.)

3) Fiducial function

Two fiducial marks on the PCB are read, and the error of the PCB reference hole or edge processing, errors caused by the PCB fixing mechanism, and local strain on the PCB, etc., is corrected.

A. Fiducial marks

- * Round marks with a diameter of Ø1 to Ø2mm (Shape recommended by YAMAHA), 1 to 2mm square marks, 1 to 2mm diamond-shape marks. (Sizes of up to 5mm can be recognized, but the precision will drop.)
- * The contrast between the marks and PCB surface must be clear.
- * There must be no scratches, etc. on the mark surface.
- * The surface material must be copper foil, solder plating or gold plating.
- * Glass-reinforced epoxy is the most suitable for the PCB material, and white ceramic is inadequate. Gloss material cannot be used.

B. Scan area

- * There must be no objects (patterns, etc.) that can be detected within 0.5mm of the mark periphery.

4) PIC function

The beam sensor is automatically moved according to the input mounting data, and the pattern position on the PCB and the mounting data are compared and corrected.

2) For edge reference method

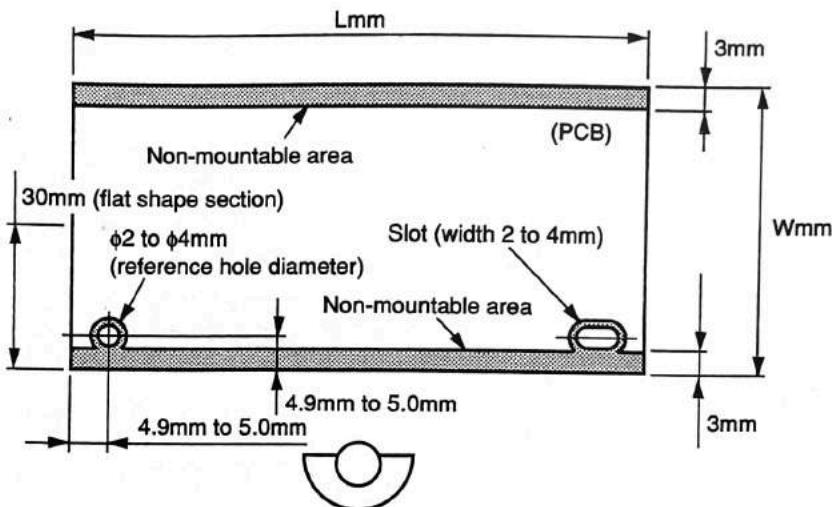
Model	Machine specifications	Applicable PCB dimensions	
YM84 YM84V	Standard(YM84SII)	L330 × W250mm(Max)	L50 × W30mm(Min)
	Manual tray specifications	L330 × W250mm(Max)	L50 × W30mm(Min)
	Triple tray specifications	L330 × W247mm(Max)	L50 × W30mm(Min)
	Automatic tray feeder specifications	L330 × W222mm(Max)	L50 × W30mm(Min)
	P&P tray feeder specifications	L330 × W250mm(Max)	L50 × W30mm(Min)
YM66	Standard	L280 × W220mm(Max)	L50 × W30mm(Min)
	Specifications with fixed centering	L280 × W214mm(Max)	L50 × W30mm(Min)

☞ CAUTION !

1. In the manual tray specifications, the dimensions of the PCB that can be used will differ according to the size (width) of the tray set.
2. If a 44mm feeder is set when using the batch exchange dolly specifications, the PCB dimensions will be limited. (YM84/Max.: 397mm)

Fig. 1-17
Applicable PCB dimensions

(6) Applicable PCB dimensions

**CAUTION !**

Mounting is not possible within 1mm around the reference hole and slot shown in Fig. 1-22.

1) For pin reference method (standard)

Model	Machine specifications	Applicable PCB dimensions
YM84 YM84V	Standard(YM84)	L457 × W407mm(Max) L50 × W30mm(Min)
	Manual tray specifications	L457 × W293mm(Max) L50 × W30mm(Min)
	Triple tray specifications	L457 × W275mm(Max) L50 × W30mm(Min)
	Automatic tray feeder specifications	L457 × W250mm(Max) L50 × W30mm(Min)
YM66	P&P tray feeder specifications	L457 × W407mm(Max) L50 × W30mm(Min)
	Standard	L330 × W250mm(Max) L50 × W30mm(Min)
	Specifications with fixed centering	L330 × W214mm(Max) L50 × W30mm(Min)

Note that for the edge reference (option) specifications, the following PCB dimensions will apply.

Model	Machine specifications	Applicable PCB dimensions
YM84 YM84V	Standard(YM84SII)	L457 × W395mm(Max) L50 × W30mm(Min)
	Manual tray specifications	L457 × W265mm(Max) L50 × W30mm(Min)
	Triple tray specifications	L457 × W247mm(Max) L50 × W30mm(Min)
	Automatic tray feeder specifications	L457 × W222mm(Max) L50 × W30mm(Min)
	P&P tray feeder specifications	L457 × W395mm(Max) L50 × W30mm(Min)
YM66	Standard	L330 × W220mm(Max) L50 × W30mm(Min)

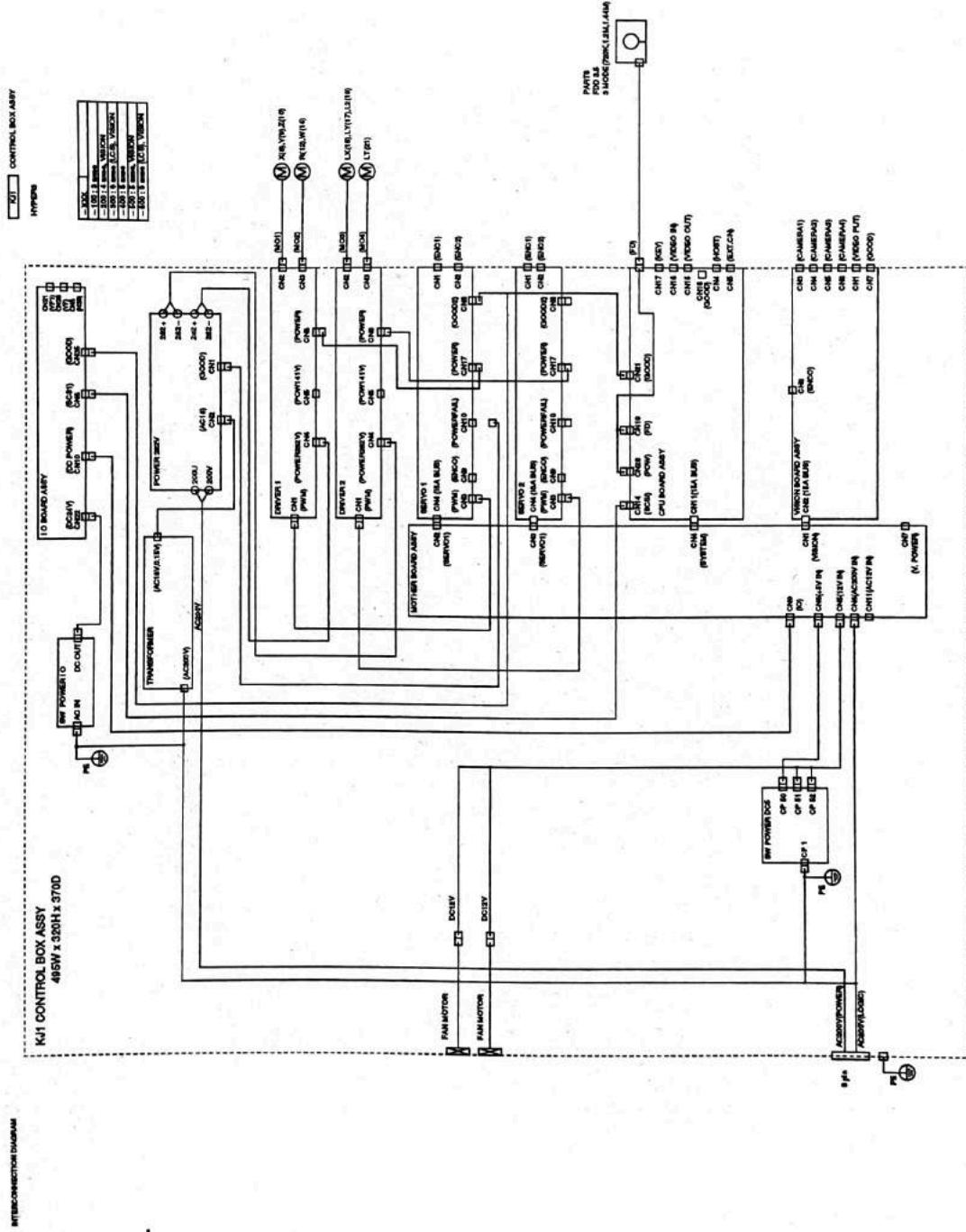
1-2-2 Equipment layout

Fig. 1-19
block diagram

(1) MCX2 controller block diagram

The key operation section, CRT screen display, mounter head I/O section, PCB transfer I/O section and other peripheral devices are connected with the MCX2 controller.

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1-2. Electrical specifications

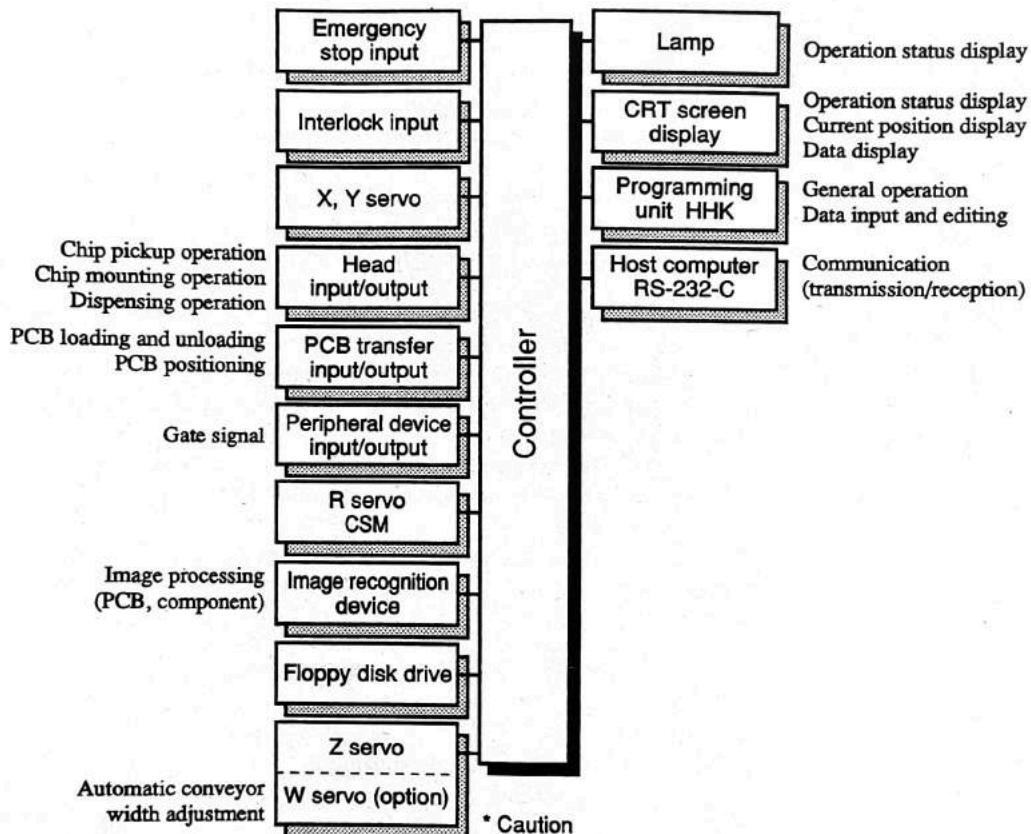
1-2-1 System outline

Fig. 1-18
System configura-
tion diagram

(1) System configuration diagram

The electric control system for this machine is an application system with adaptivity and optimization of surface mounting work. The targets for optimization include all mechanisms, electrical parts and software.

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CAUTION

The Z servo is provided only for the CSM84V.

The W servo can be used for automatic conveyor width adjustment.

(2) CCD camera and vision system (YM84V)

1) Teaching function

Teaching is done by moving the camera for PCB recognition.

2) Bad mark detection function

Bad marks on the PCB are detected, and dispensing and mounting to that PCB is canceled. (Normally the bad marks are glossy seals.)

3) Fiducial function

Two fiducial marks on the PCB are read, and the error of the PCB reference hole or edge processing, errors caused by the PCB fixing mechanism, and local strain on the PCB, etc., is corrected.

A. Fiducial marks

- * Round marks with a diameter of ø1 to ø2mm (Shape recommended by YAMAHA), 1 to 2mm square marks, 1 to 2mm diamond-shape marks. (Sizes of up to 5mm can be recognized, but the precision will drop.)
- * The contrast between the marks and PCB surface must be clear.
- * There must be no scratches, etc. on the mark surface.
- * The surface material must be copper foil, solder plating or gold plating. (Padded solder plating and flat, mirror-like solder finishes are not adequate.)
- * Glass-reinforced epoxy is the most suitable for the PCB material, and white ceramic is inadequate. Gloss material cannot be used.

B. Scan area

- * There must be no objects (patterns, etc.) that can be detected within a 4mm square from the mark center.

4) Lead bending detection function

Lead bending that is approx. 30% (min.) of the lead pitch can be detected.

5) CCD camera type

For PCB fiducial mark recognition : 1 unit

For component recognition:

Standard : 1 unit

Option (for large components) : 1 unit

Option (fine vision) : 1 unit

6) Vision file types

For component recognition : 28 types

For PCB recognition : 1 type

For bad mark recognition : 1 type

7) Recognition time

PCB recognition : approx. 2 sec.

For component recognition

Standard : approx. 0.9 sec.

Fine vision : approx. 0.2 sec.

1-2-3 Outline of
MCX2 con-
troller

(1) Outline of controller

The MCX2 controller has been newly designed exclusively to perform sufficiently as a surface mounter controller.

The mounter head movement speed can be set between 1 and 100% in increments of 1%. With Philips' original acceleration/deceleration curve, the chip components can be mounted smoothly at high speeds.

The protective functions include various alarms, a self-diagnosis function, and temporary stop and emergency stop safety functions. Over 100 types of alarms are output on the CRT screen to allow smooth recovery when trouble occurs.

For peripheral devices, a personal computer communication device is supported to provide an external memory. HOST (transmission/reception) can be used as the communication port (RS-232-C standard) for this.

This system also supports I/O signal control for three mounter heads, the PCB transfer conveyor, PCB fixing locating pins and stoppers, and various peripheral devices, etc.

The operation procedure has been modified to an interactive method. The parameters and data have been organized and placed in hierarchies, providing a user-friendly man-machine interface.

A 3.5-inch floppy disk is controlled, allowing data required for the machine to be backed up automatically. By controlling the user PCB data with floppy disks, data can be easily controlled offline.

(3) Power supply block diagram

Always contact Philips before changing the input voltage.

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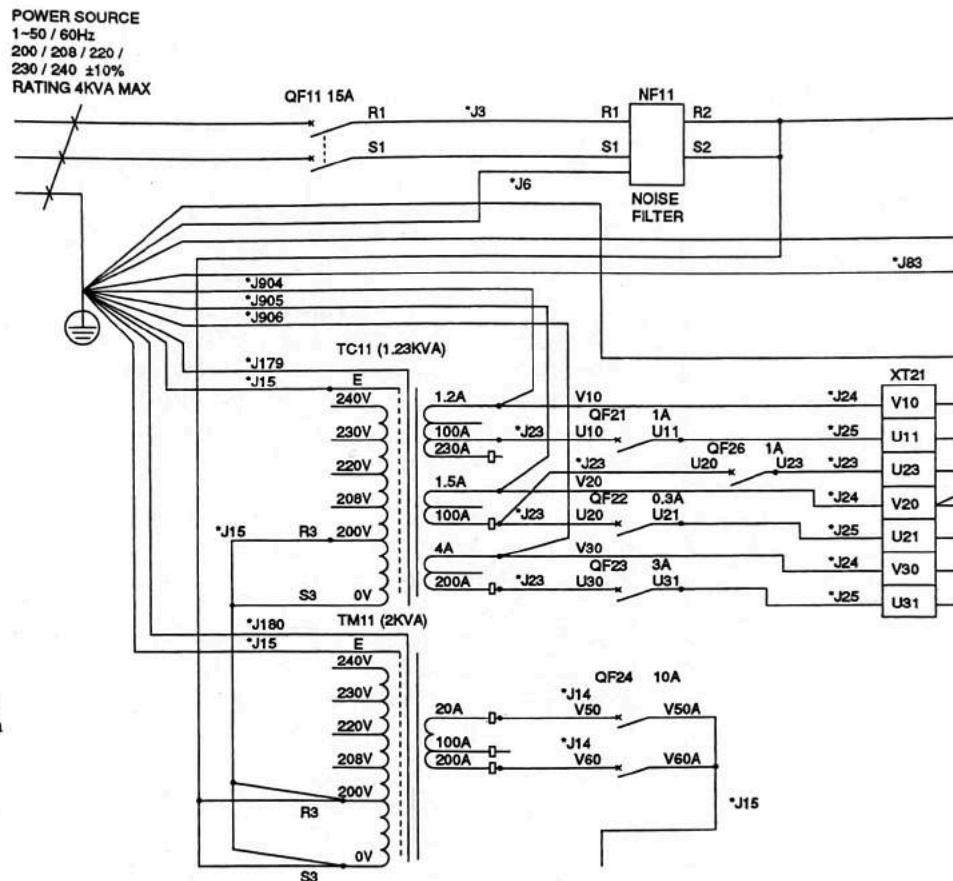


Fig. 1-21
Power supply
block diagram

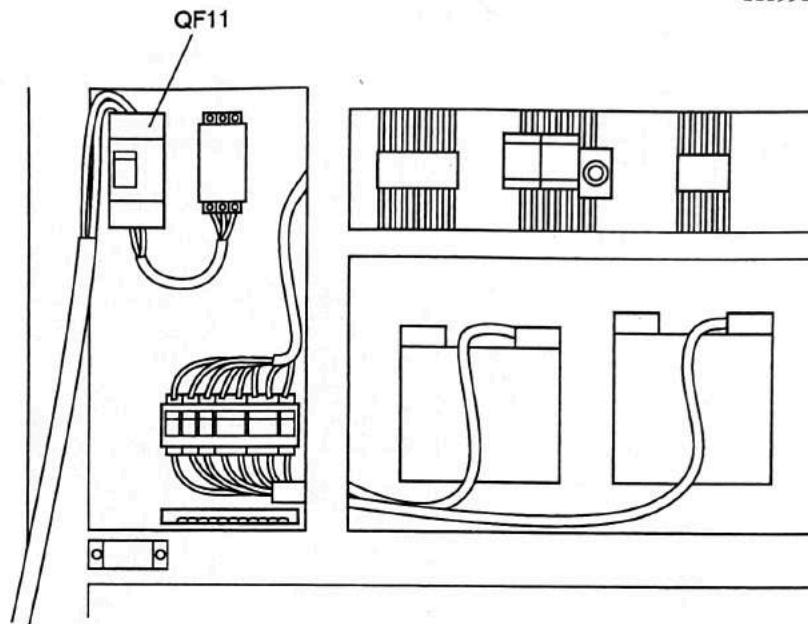
200V	208V	220V	230V	240V
SEE ABOVE	240V 230V 220V R4/R5 • 208V 200V 0V	240V 230V R4/R5 • 220V 208V 200V 0V	240V R4/R5 • 230V 220V 208V 200V 0V	R4/R5 • 240V 230V 220V 208V 200V 0V

(2) Power supply connection

Confirm the power supply specifications, and then open the power supply box on the rear left of the mounter, and connect the single-phase 200V, 208V, 220V, 230V, 240V to the breaker (QF11) using a 3.4mm² or thicker wire and crimp terminal (M5).

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Fig. 1-20
Power supply connection

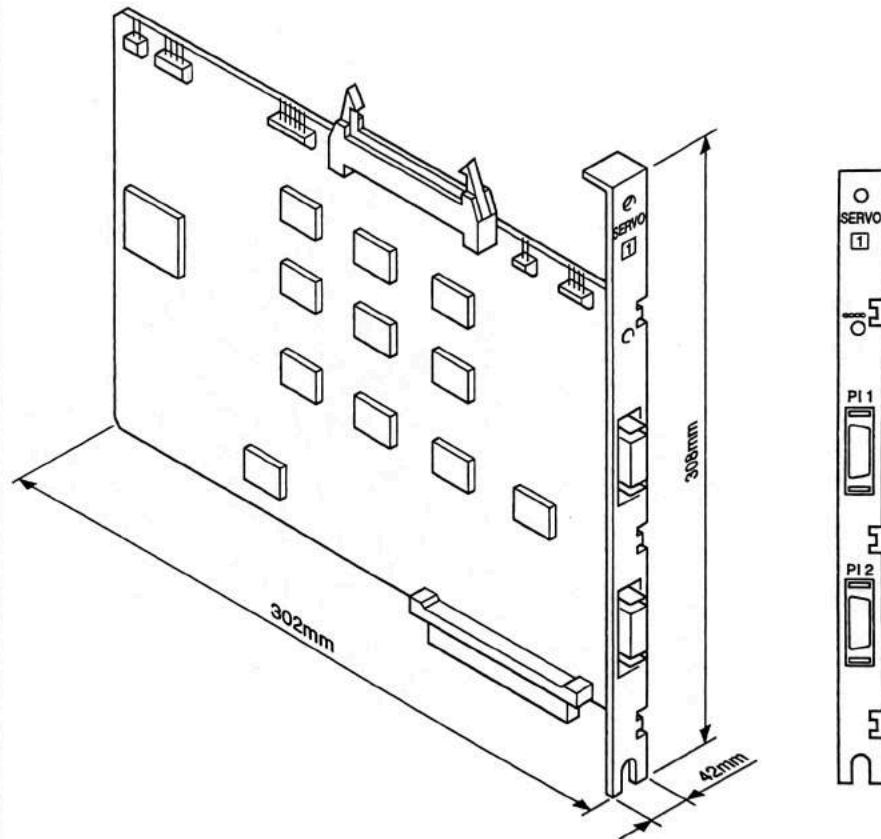


(3) Servo board ass'y (Servo 1)

This board controls the unit's AC servomotor.

If an error occurs in this unit, the display LED GOOD (green) will go out (turn OFF), and the machine will enter the emergency stop state (servo OFF).

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1-2-4 MCX2 Controller functions

The MCX2 controller is configured of a CPU PCB, IO PCB, mother PCB, servo PCB, driver PCB, driver power PCB power supply unit, etc. (SW power supply for control, SW power supply for IO).

The functions of each PCB are described below.

(1) CPU PCB

The CPU PCB is used to control the electricity of the surface mounter. The CPU functions include has FDD and video output (CRT display), serial x 2 (one is exclusive for HHK), SCSI (exclusive for IO PCB interface), and video input (can be used for video output with internal changeover).

The CPU also has an ISA bus for interfacing with other PCBs. LEDs that indicate the internal status are arranged on the front panel. When the basic functions are running normally, the GOOD LED1 (green) lights. At the same time, the connector output GOOD: CN21 (internal) is turned ON. This output directly shuts off the servomotor power supply when an error is detected.

(2) IO PCB

The IO PCB communicates the input/output signals for the CPU PCB and peripheral IO. The signals are divided into those required for the conveyor and head peripheral, and are led to each I/O connector.

The IO PCB also controls the sensor PCB, and leads in the head vacuum data.

This PCB controls the DC24V power supply for I/O, and has green LED lamps VPP, VP, VP2 and VP1 for displaying the power supply output. This power supply state is constantly monitored, and if a fault is found, the CPU PCB is notified. VP1 is for displaying the outputs such as stick feeder used only during servo ON.

VP2 displays the output for the VPU and VP1 feeding.

VP displays the other general purpose I/O outputs. This output has an output short circuit protection circuit built in before VP, VP2 and VP1 to prevent accidents caused by output short circuits and overcurrents. The current is controlled in the overload state when a short circuit occurs. A circuit protector (CB1) is connected in front of VPP which is the base power supply for these.

If the protection circuit functions, the LED lamp VPP for output display will go out. (VP, VP2 and VP1 all go out.)

The protection is released when the cause of the protection circuit functioning is removed and the reset switch on CB1 is pressed.

Set all S1 DIP switches to the OFF side.

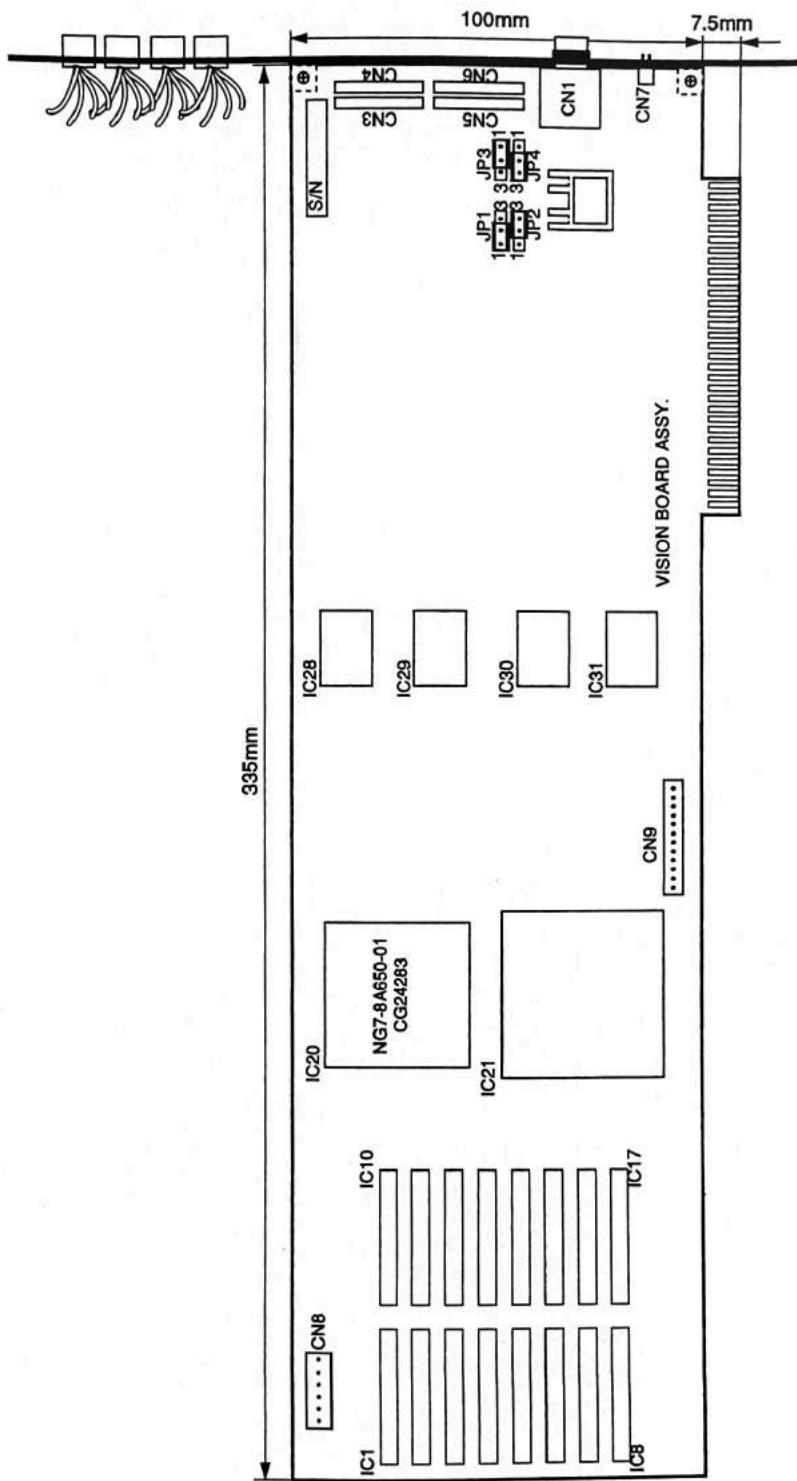
Table 1-5
Controller basic
specifications

(2) Controller basic specifications

Item	Specifications
Type	MCX2
Compatible models	CSM66, CSM84 and CSM84V system machines
No. of controllable axes	Max. 9 axis simultaneously
CPU	80386 + 80387
Memory capacity	RAM: standard 192KB (approx. 2560 points)
Memory method	RAM: lithium battery backup (only time and date data) Built-in 3.5-inch FDD: 2HD (1.44MB), 2HD (1.2MB) or 2DD (720KB)
Speed control	Setting in 1% increments between 1 and 100% in respect to maximum speed is possible.
Min. setting unit	0.01mm and 0.01 deg.
I/O	Input: 88 points, Output: 64 points
RS232C	One user host channel, one channel exclusive for external output
Self-diagnosis functions	Watch dog timer, overtravel, overload, CPU error, encoder error, servo driver error, battery voltage error, power voltage error, programmable controller power supply (24V) error, temperature error, etc.
Peripheral devices	Programming device, production control information, PC utility
Power supply	AC200V
Environmental conditions	Noise: 1500V/ μ sec or less, Temperature: 0 to 40°C, Humidity: 35 to 90% (with no dew condensation)
Outline dimensions	495(W) × 320(H) × 370(D)mm

Function	Explanation
Host communication	Online/offline mode (constant communication possible)
Data file	5 types (MCH, BRD, FDR, PRD, VIS)
Others	Error messages, safety functions, self-diagnosis functions

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(5) Vision board ass'y

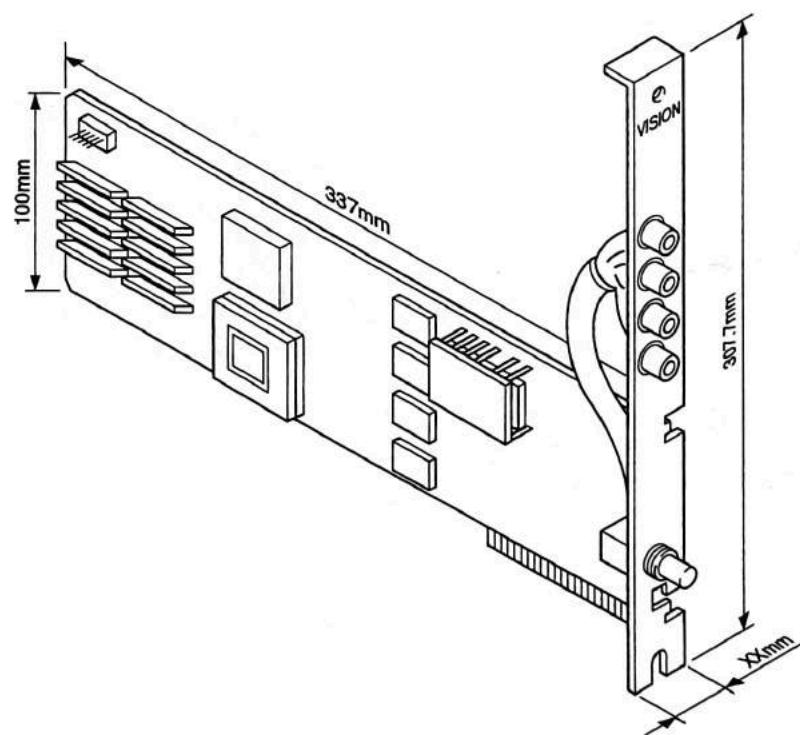
This board recognizes the picked up components and marks on the PCB as images, and calculates the position and direction.

The image signals retrieved from a maximum of four cameras can be processed.

If an error occurs in this board, the connector output (relay contact signal) GD3 (CN7) will be shut off (cut OFF).

There are four jumper pins (JP1, JP2, JP3, JP4) on the board. Normally, these do not need to be changed, but may require changes depending on the camera 3 and 4 type.

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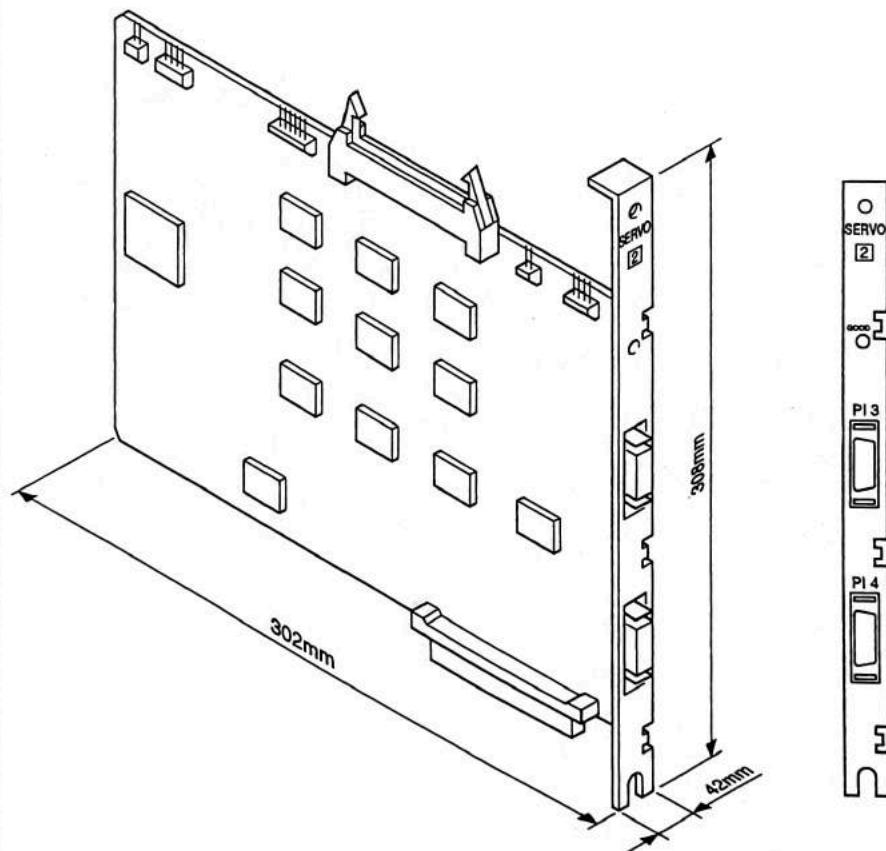
(4) Servo board ass'y (Servo 2)

This board controls the AC servomotor for the LX, LY, LZ and LT axes. If the trayfeeder specifications are selected, this board will be assembled into the controller.

If the specifications are not selected, a dummy panel will be installed instead. If an error occurs in this unit, the display LED GOOD (green) will go out (turn OFF).

This board is connected to the mother board arranged on the controller floor with a bus-line connector.

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**CAUTION !**

This board is assembled in when the trayfeeder specifications are selected.

(6) Driver board ass'y (Driver 1, 2)

This board drives AC motors for up to seven axes.

The motor drive DC power supply (DC282V) is supplied from POWER 282V via CN4.

The current control signal is received from the ASI board ass'y via CN1, and at the same time a current feedback signal is returned.

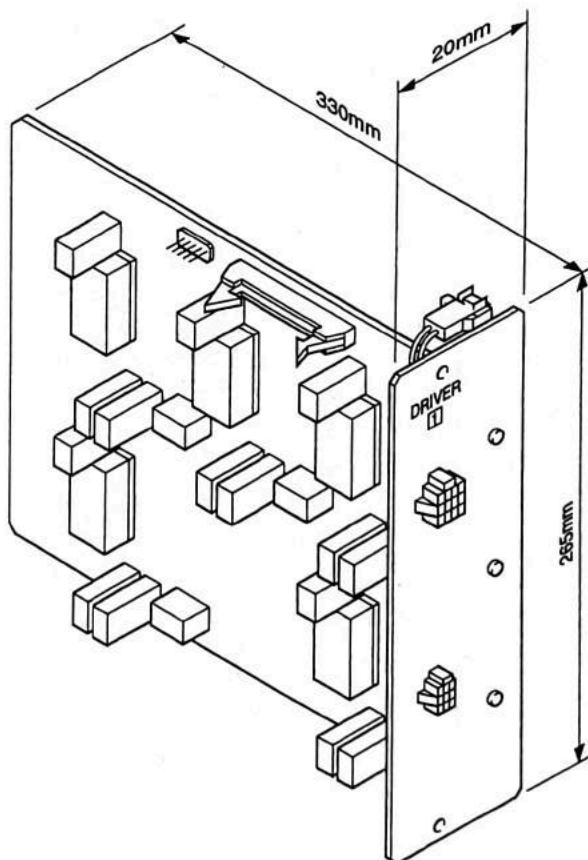
A GTR (Giant Transistor) module for controlling the current is arranged with the heat radiation plate panel on the rear side of the PCB.

A current for driving motors for a maximum of four axes is output via CN2, and a current for driving motors for a maximum of three axes is output via CN3.

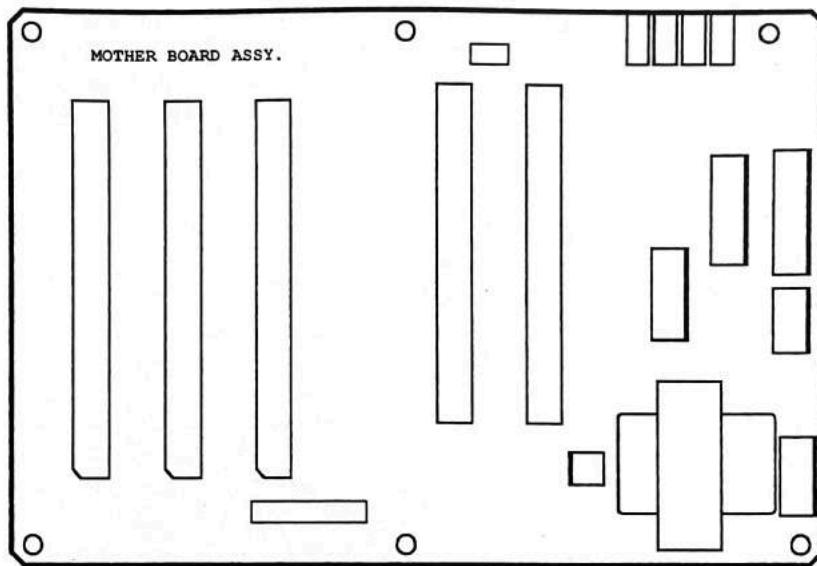
A 5V, ±12V power supply is received from the servo PCB via CN6. An IPM (Intelligent Power Module) for controlling the current is fixed with the heat sink on the rear side of the PCB.

A plate is screwed onto the PCB and heat sink. A 12-pin connector (CN2) and a 9-pin (CN3) connector are fixed on this plate.

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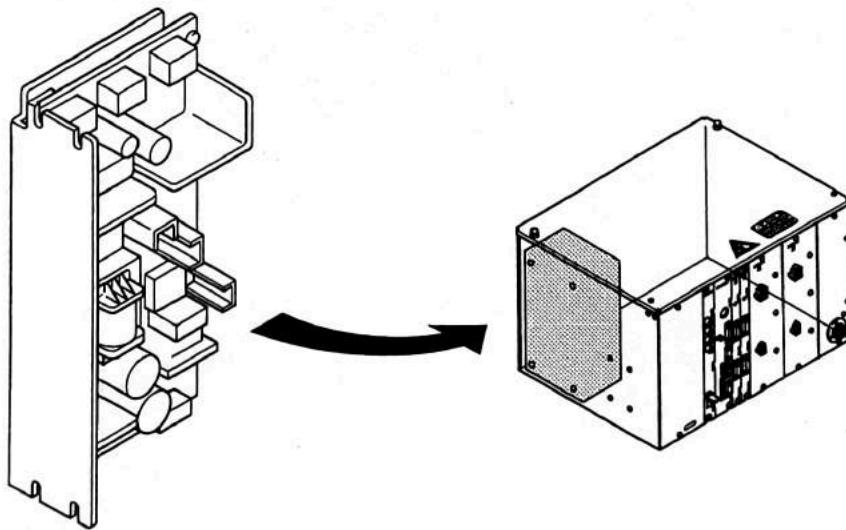
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**(9) SW power supply**

This is the DC power supply unit for the control system in the controller.
+5V, +12V and -12V are supplied from one unit.

The power supply unit is fixed with screws from the outer side of the controller.

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(8) Mother board ass'y

This board connects various boards such as the system, servo and vision boards with an ISA bus-line (power supply and signal).

This board also has an AC & DC power failure detection function. The AC input and DC5V (+12V, -12V) status is monitored, and power voltage drops, instantaneous power failures and errors in the DC power supply unit for control system are indicated with LEDs.

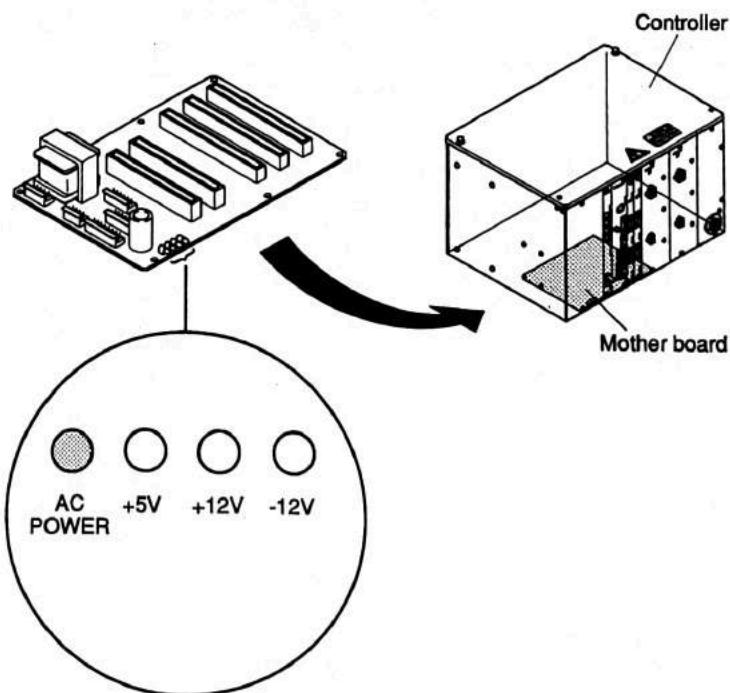
The operation status of the LEDs is shown below.

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● ○ : Lit, X : Not lit, — : Not defined

Display LED Specifications	AC POWER (lights during error)	+5v (Lights when normal)	+12v (Lights when normal)	-12v (Lights when normal)	Note
AC200v : VAC $V_{AC} \geq 180v$ VAC < 160v	X ● (Red)	— —	— —	— —	Normal AC voltage drop
DC+5v : $V_1 \geq 4.75v$ $V_1 < 4.75v$ $V_1 < 4.5v$	— — ● (Red)	○ (Green) X X	— — —	— — —	Normal DC5v error ↑
DC+12v : $V_2 \leq 10.8v \leq V_2 \leq 13.2v$ $V_2 < 10.8v, 13.2v < V_2$	— —	— —	○ (Green) X	— —	Normal DC+12v error
DC-12v : $V_3 = -10.8v$ $V_3 = -10.6v$ Where, $4v \leq V_1 \leq 6v$	— —	— —	— —	○ (Green) X	Normal DC-12v drop

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(7) Power 282V board ass'y

This board rectifies the AC200V, and supplies the DC power supply (DC282V) for motor drive to the drive board ass'y.

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