420-6601-ENG

REV1

INSTALLATION & USER MANUAL

STOP

IMPORTANT

- To use this machine safely and correctly, read this manual carefully.
- After reading this manual, be sure to keep it available nearby the product or somewhere convenient so that it can be referred to whenever necessary.
- When transporting or reselling this product, be sure to attach this manual to the product.

BEFORE USING THIS PRODUCT

Thank you for purchasing our arcade use simulator equipment “CYCRAFT” game machine.

Safety notes:

To ensure the safe usage of the product, be sure to read the following before using this product. The following instructions are intended for the users, operators and the personnel in charge of the operation of the product.

After carefully reading and sufficiently understanding the warning displays and cautions, handle the product appropriately. Be sure to keep this manual available nearby the product or somewhere convenient so that it can be referred to whenever necessary.

In this manual, explanations which require special attention are enclosed with dual lines. Depending on the degree of potential hazards, the terms of DANGER, WARNING, CAUTION, etc. are used.

Be sure to understand the contents of the displays before reading the text.

Indicates that mishandling the product by disregarding the instructions can cause severe injury.

Indicates that mishandling the product by disregarding the instructions can cause a potentially hazardous situation which can result in serious injury.

Indicates that mishandling the product by disregarding the instructions can cause a slightly hazardous situation that can result in light personal injury and or material damage.

For the safe usage of the product, the following pictographs are used:

Indicates “HANDLE WITH CARE”. In order to protect personnel and equipment, this display is attached to places where the Owner’s manual and or Service Manual should be referred to.

Indicates a “Protective Earth Terminal”. Before operating the equipment, be sure to connect it to the Earth line.

Perform work in accordance with the instruction herein stated.
Follow instructions carefully paying special attention from the standpoint of accident prevention. Failure to follow instructions can cause accidents. Instructions will point out those jobs requiring trained technicians or servicemen.

Before installing the product, check for the electrical specification sticker.
SIMULINE products have a sticker on which the electrical specifications are detailed. Ensure that the product is compatible with the power supply voltage and frequency requirements of the location in which the machine is to be installed.

Install and operate the product only in places where appropriate and sufficient lighting is available such that warning stickers can be clearly read.

Be sure to turn off power before working on the machine.
To prevent electric shock, be sure to turn off power before starting any work in which the worker is exposed to the interior of the product.

Exercise great care when handling the monitor.
Some of the monitor parts are subjected to high-tension voltage. Even after turning the power off, some components retain high-tension voltage. Only qualified service engineers should perform monitor repair and replacement.

Be sure to adjust the monitor properly.
Do not operate the product with on-screen flickering or blurring unadjusted. Using the product with the monitor not properly adjusted may cause dizziness or a headache to an operator, a player, or the customers.

Specification changes, removal of equipment, conversion and/or additions not designated by SIMULINE are not allowed.
Do not make any engineering changes by alterations, unauthorized parts replacements or other modifications under any circumstances. Should doors, lids and protective parts be damaged or lost, refrain from operating the product, and contact the office where the product was purchased from or the office of Simuline given in this manual.
SIMULINE shall not be held responsible for any accidents, compensation for damage to a third party, resulting from unauthorized changes and modifications to the product.

When transporting or reselling this product, be sure to attach this manual to the product.

*Description herein contained may be subjected to improvements and changes without notice
**The contents described herein are fully prepared with due care. However, should any question arise or errors be found, please contact SIMULINE.

INTRODUCTION OF THIS INSTALLATION & SERVICE MANUAL

This manual is intended to provide detailed descriptions together with all the necessary information covering the general operation of electronic assemblies, electromechanicals, servicing control, spare parts, etc. for the product, CYCRAFT.
This manual is intended for the owners, personnel and managers in charge of operation of the product. Operate the product after carefully reading and sufficiently understanding the instructions. If the product fails to function satisfactorily, non-technical personnel should under no circumstances touch the internal system. Please contact office where the product was purchased from.

Use of this product is unlikely to cause physical injuries or damages to property. However, where special attention is required “IMPORTANT” symbol and message is given in the manual as follows:

Indicates that mishandling the product by disregarding this message can cause performance degradation or malfunctions.

DEFINITION OF PERSONNEL IN THIS MANUAL:

Non-technical personnel who do not have technical knowledge and expertise should refrain from performing such work that this manual requires the arcade maintenance personnel or a serviceman to carry out, or work which is not explained in this manual. Failing to comply with this instruction can cause severe accidents such as electric shock.

Ensure that parts replacement, servicing & inspections, and troubleshooting are performed by the arcade maintenance personnel or a serviceman. It is instructed herein that particularly hazardous work should be performed by the serviceman who has technical expertise and professional knowledge in the field.

The following definitions for personnel are used in this manual:

- **Arcade maintenance personnel**
  Those who have experience in the maintenance of amusement equipment and vending machines, etc. and also participate in the servicing and control of the equipment through such routine work as equipment assembly and installation, inspections, and replacement of parts and consumables, etc. within the amusement facilities and or locations under the management of the owner and owner’s operators of the product.

- **Serviceman:**
  Those who carry out inspections and maintenance services of the equipment under authorization of the amusement equipment manufacturer. Serviceman shall have technical expertise equivalent to that of technical high school graduates in the fields of electricity, electronics and or mechanics.
- **Player**
  Persons who play games at facilities and shops where arcade amusement game machines are installed.
- **Gallery**
  Persons who are onlookers near the games at facilities and shops where arcade amusement game machines are installed.

REVISION RECORDS:

Language : English
Rev : 1.0
Modified Date: May. 24, 2003
O/S Version : 1.58
Game Version: BGD0

PLACE TO BE CONTACTED:

To present repairs and parts, contact the dealer from whom you purchased your machine.

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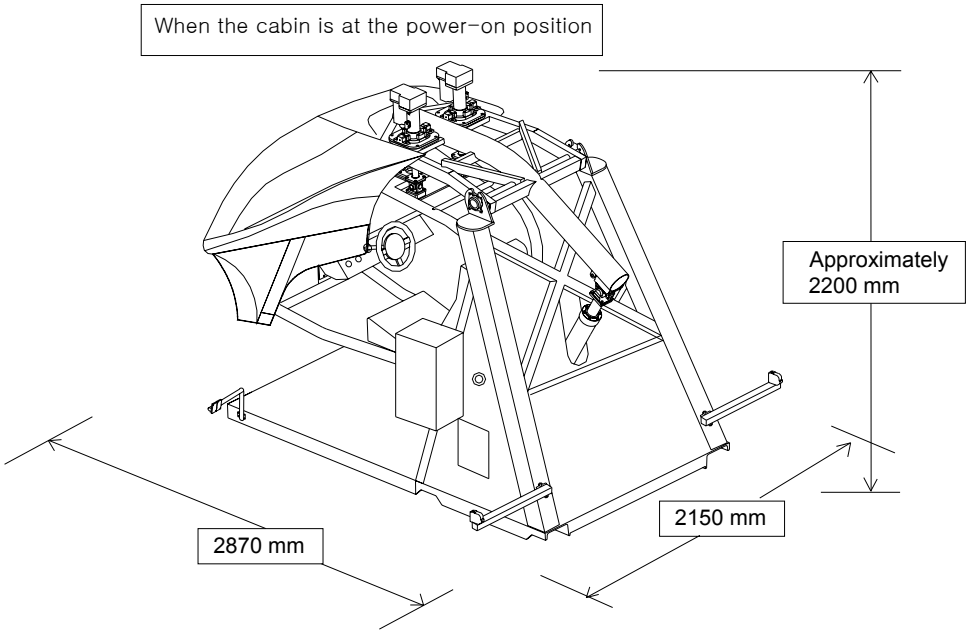
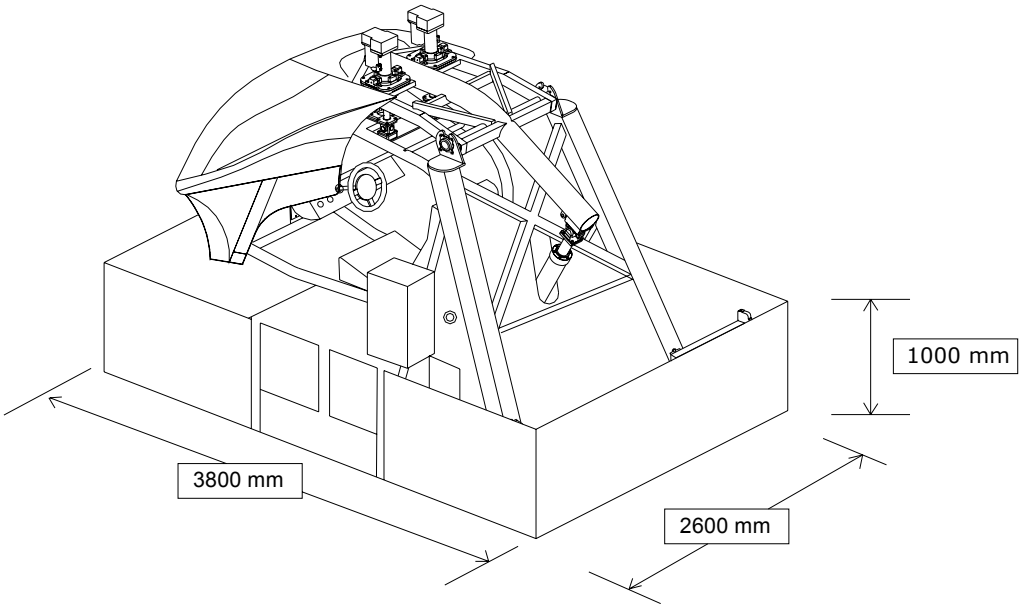
1. PRODUCT SPECIFICATIONS

1.1 GENERAL SPECIFICATIONS



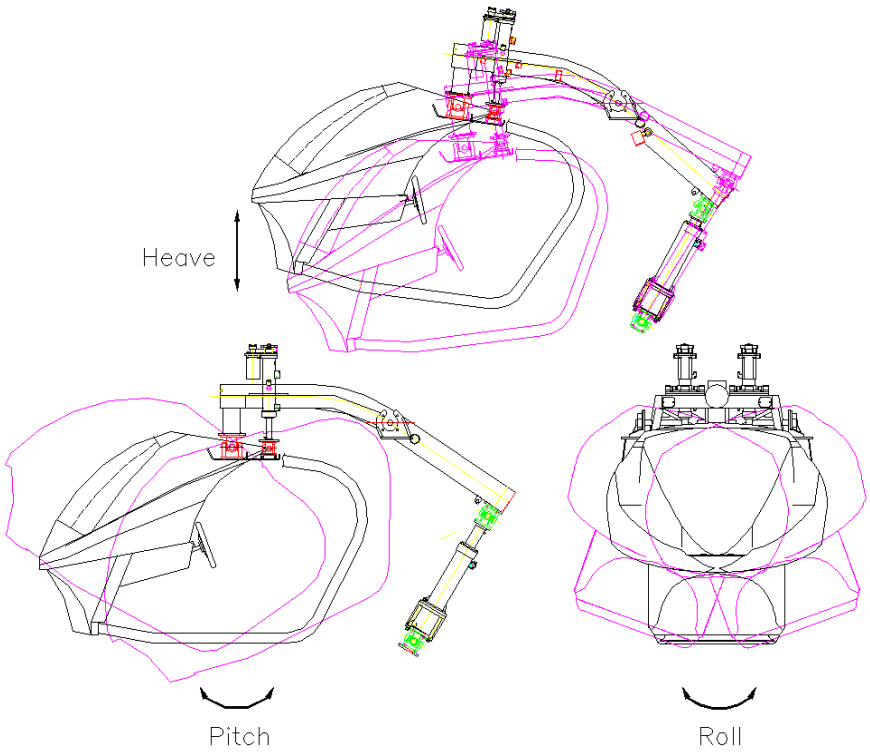


Category	Coin-op interactive motion simulator
Play type	Arcade game
Main Machine Dimensions (at the power-on position.)	**2870 mm (L) × 2150 mm (W) × ~ 2200 mm (H)**
Main Machine Dimensions (transport dimensions)	**2850 mm (L) × 1530 mm (W) × 1950 mm (H)**
Fence Dimensions	**3800 mm (L) × 2600 mm (W) × 1000 mm (H)**
Weight	Main Machine : (Approximately) **880 kg** Fence **:** (Approximately) **105 kg**
Electric Power	**Single phase AC 200/208/220/230/240 V, 50/60 Hz, (Max) 8A**
No.of Passenger	Single Player
Passenger Weight Limit	120 Kg
Compartment	Semi-enclosed with seat belt
Game	Go-Kart racing game

1.2 MOTION SYSTEM DESCRIPTION

The motion actuation system used in Cycraft is a very unique, high tech system that distinguishes Cycraft from other simulator products. The motion system has the following special features:

- **Fully electric motion system:** The actuators are fully electrical (no hydraulics), making it superior in terms of maintainability and transportability.
- **Patented "inverted" configuration (virtual 5 DOF system):** The motion actuators are configured such that pitch and roll rotational motions have their center of rotations above the passenger. This patented technology enables the simulator to produce the effects of a 5 DOF (degrees of freedom) motion system although it has only 3 DOF mechanically. Therefore, fast and accurate motion cueing is made possible without increasing costs.

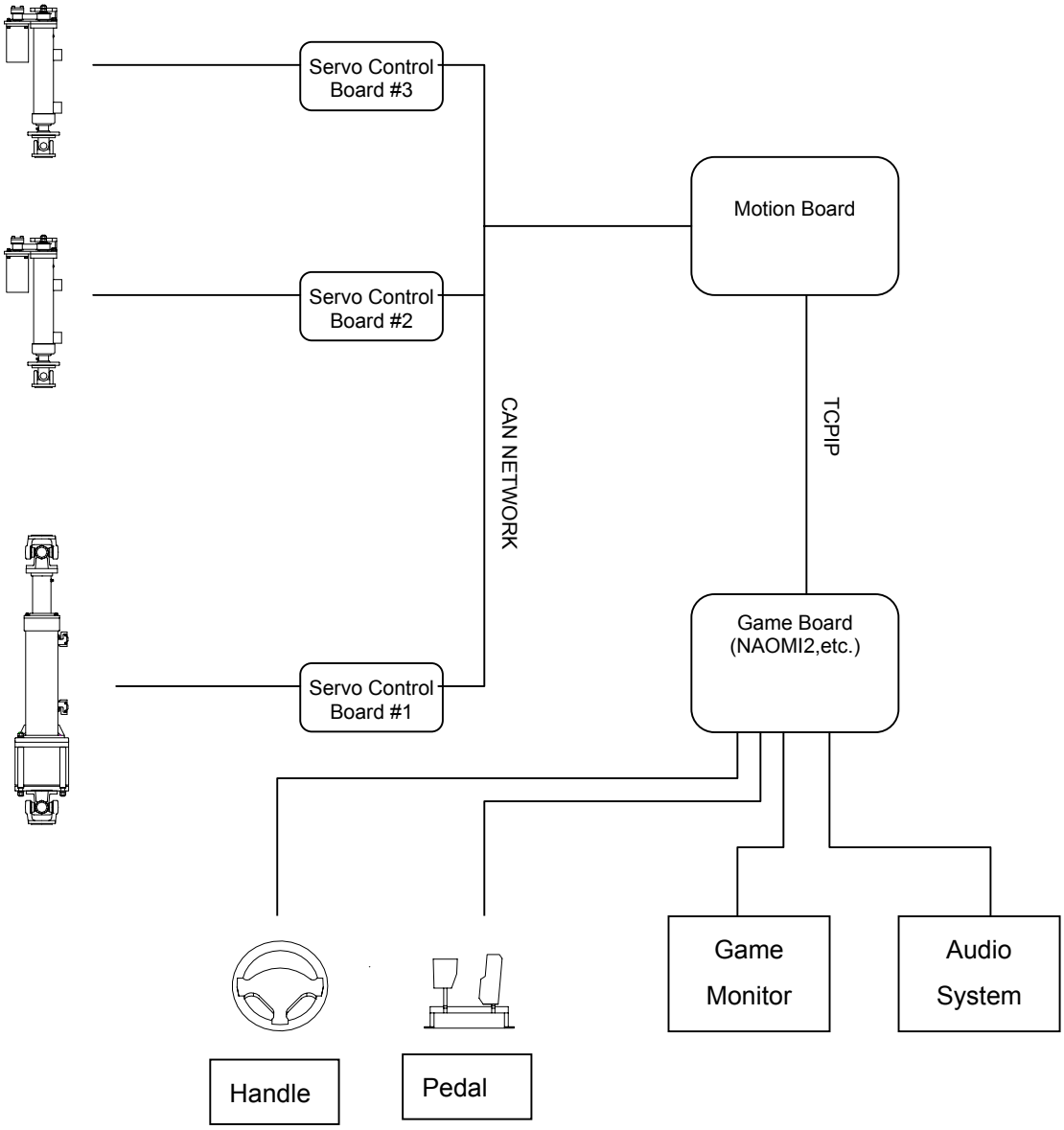


3DOF Motion system

The heave actuator produces up/down heave motion by rocking the rocker arm which holds the passenger cabin. The two suspended actuators on the rocker arm assembly produce the relative pitch and roll motions

Separate controllers inside the MSCU control each of the linear actuators. The controllers are in turn connected to the motion board which generates the commands for each actuator via high speed industrial CAN network cable.

During the game, the game computer regularly sends the attitude data and other dynamic properties data in real time to the motion control computer. The motion board then calculates in real time, the motion necessary to give the passenger the best feeling of reality and converts this motion to commands for the motion controllers and actuators.



SYSTEM DIAGRAM OF CYCRAFT

1.3 SAFETY SYSTEM FEATURES

Operators of Cycraft should familiarize themselves with the safety features of Cycraft to ensure that they are functioning properly for safe and proper operation. Cycraft incorporates a number of safety features to ensure that accidents and injury will not be caused to passengers and on-lookers due to the motion of the simulator. Following is a description of each safety feature.

- **Fence:** A sturdy metal fence with an entrance door is provided with Cycraft. It will ensure that on-lookers and waiting players will be kept a safe distance from the moving cabin. The fence will also prevent on-lookers from approaching too closely and unnecessarily tripping the photo sensors during play. Warning signs and regulation signs are attached to the fence and door to inform customers and on-lookers.
- **Side Photo Sensor:** Two photo sensors attached on each side of the outer frame of Cycraft cause the motion to stop if any obstacle obstructs the line between the sensor and the reflective plate during play. Therefore, even if people enter the fence and approach Cycraft when it is moving, safety is ensured since the photo sensor will be tripped and motion stopped. Motion resumes 3 seconds after the obstacle is removed.
- **Floor Sensor:** The floor plate beneath the cabin is a pressure sensor which activates when stepped on. It is guaranteed to detect pressures above 20 kg. Activation of the floor sensor will stop the Cycraft motion as with the photo sensors described above. Motion will re-activate 3 seconds after the pressure is removed. The floor sensor guarantees safety even in the case when people somehow approach Cycraft without tripping the photo sensor and also in the case when the passenger falls from the cabin during play for any reason.
- **Seat Belt Sensor:** The seat belt buckle in Cycraft is equipped with a sensor that detects when the seat belt is fastened or not. Cycraft will not start the game unless the seat belt is fastened properly. Also, if the seat belt is unfastened during the game, the motion will stop until it is re-fastened.
- **Game Stop Button:** This button, located inside the cabin allows the player to stop the game anytime during play. Pressing this button will terminate the game and lower the cabin to the initial position.
- **Motion Stop Switch:** The motion stop button located behind the coin chute case stops the motion when pressed. Motion restarts 3 seconds after the button is

released. This button can be pressed by outside on-lookers or by the operator in case the photo or floor sensors cannot be activated or the motion must be stopped for safety reasons.

- **Power Cutoff Switch:** This button located inside the operator panel but accessible through a sliding door on the operator panel cover shuts off the main power to the system. Pressing this switch will stop the ongoing motion of the system but will not stop and hold the position of the cabin as with the other buttons and safety features. Instead, the cabin will slowly pitch forward (nose down) and glide down to its lowest position due to its own weight. Therefore, **this switch should NOT be pressed when the motion needs to be stopped.** This switch should only be used in the rare emergency case when power must be cut off such as when a fire is ignited.

NEVER press the power cutoff switch when there is a person or obstacle UNDER the cabin. The cabin will glide down after the switch is pressed and can cause serious injury to anybody under the cabin.

- **Safety Link and Safety Oriented Mechanical Design:** The safety link located on the rear part of the rocker arm functions to prevent a free fall of the cabin in case the heave actuator is broken off from the rocker arm. The two rocker arm bearings and center shaft of the rocker arm is designed such that even if one of the bearings comes loose, the shaft will be held up by the frame to prevent a fall. The cabin is suspended by three universal joints (central joint and two joints connecting to the actuators). Therefore, even if one of the joints fail, the other two will support the cabin to prevent a complete free fall.
- **Other Safety Features:** Cycraft is equipped with an uninterruptible power supply (UPS) to supply critical parts in case of power outages so that the cabin does not fall abruptly. In case of power outages (and also when the power cutoff switch is pressed), the control circuits powered by the UPS will use the power generated by the free turning motors to actively brake and decelerate the fall. The system will come to rest softly when this feature operates properly.
- **Safe Inherent Design:** The basic configuration of the inverted motion system allows for the cabin to be suspended much lower from the ground than conventional motion simulators. Also, it is dynamically much more stable by making it very difficult to tip the cabin over to it's side. Thus, the Cycraft structural design is inherently much safer than conventional motion simulators.

2. INITIAL INSPECTION

2.1 PACKING LIST

CYCRAFT PACKING LIST (1/2)			
No.	Item	Description	Q'ty
1	CYCRAFT Main Body		1 set
2	Rear Caster (R)		1
3	Rear Caster (L)		1
4	Floor Sensor Plate (A)	A Type	1
5	Floor Sensor Plate (B)	B Type	1
6	Floor Sensor Plate (C)	C Type	1
7	Floor Sensor Plate (D)	D Type	1
8	Boarding Step		1
9	Coin Chute Tower		1
10	Fence Holding Plate (A)	A Type	1
11	Fence Holding Plate (B)	B Type	1
12	Fence Holding Plate (C)	C Type	1
13	Gate Door (Right)		1
14	Gate Door (Left)		1
15	Fence Pole (A)	A Type	4
16	Fence Pole (B)	B Type	2
17	Fence Pole (C)	C Type	3
18	Wire Mesh	A Type	6
		B Type	2
19	**Installation Kit Box**	Safety Link Bar	1
		Hexa Bolt M12 x 35L	6
		Hexa Bolt M12 x 35L	4
		Hexa Bolt M8 x 30L	8
		Fence U Bracket	32
		SUS Wrench Bolt M6 X 10L	32
		SUS Wrench Bolt	32
		SUS M6 Nut	32
		Hexa Bolt M8 x 20L	10
		Hexa Bolt M8 x 20L	3
		Hexa Nut M8	4
		Countersink Head Bolt	4
		Boarding Step Joint Bracket	2

CYCRAFT PACKING LIST (2/2)			
No.	Item	Description	Q'ty
19	**Installation Kit Box** (continued)	Clamping Filter	1
		Fence Sign Plate	4
		Sign Ring Clip	8
		Play Instruction Sticker (Including Local Language Sticker)	1 set
20	**Document & Spare Part Box**	Installation & Service Manual	1
		Floor Sensor	2
		Monitor Fuse	1
		Motor MIDI BD Fuse	1
		Volume for SPG2500	1
		Volume for SPG2200	1
		Pushbutton Lamp	2
		Grease Gun	1
		Grease	400g
		Paint (Red)	200ml
		Truss Bolt M4 x 12L	5
		Round Head Bolt M5 x 10L	4
		Fence U Bracket	2
		SUS Wrench Bolt M6 X 10L	2
		SUS Wrench Bolt M6 x 25L	2
		SUS M6 Nut	2
		Hexa Bolt M8 x 20L	2
		Hexa Nut M8	2
		Countersink Head Bolt M6x10L	2
		Hexa Bolt M12 x 35L	2
		Cable Tie	5
21	Naomi2 Carton		1
22	GD-ROM Carton		1

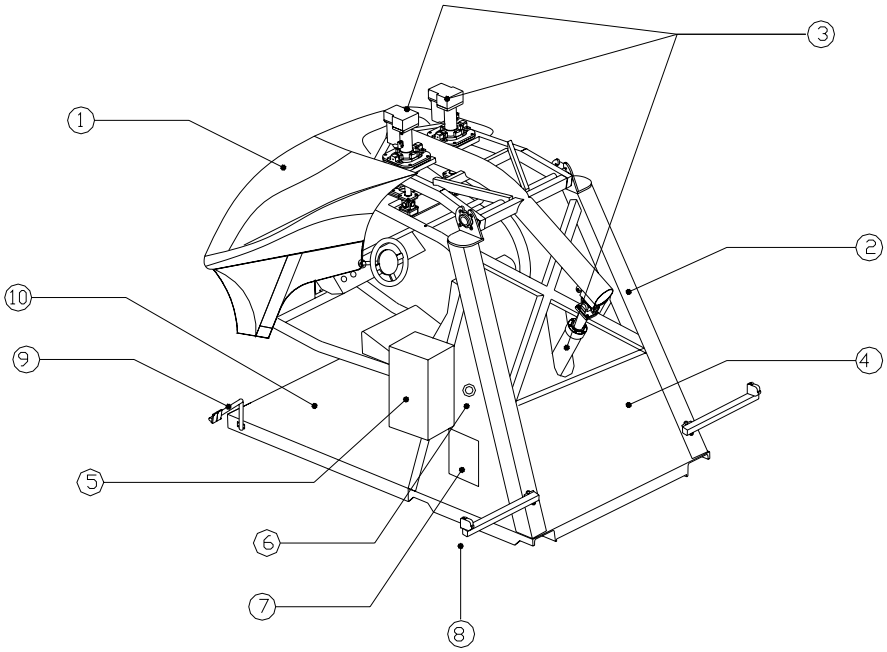
2.2 GENERAL RECEIVING INSPECTION

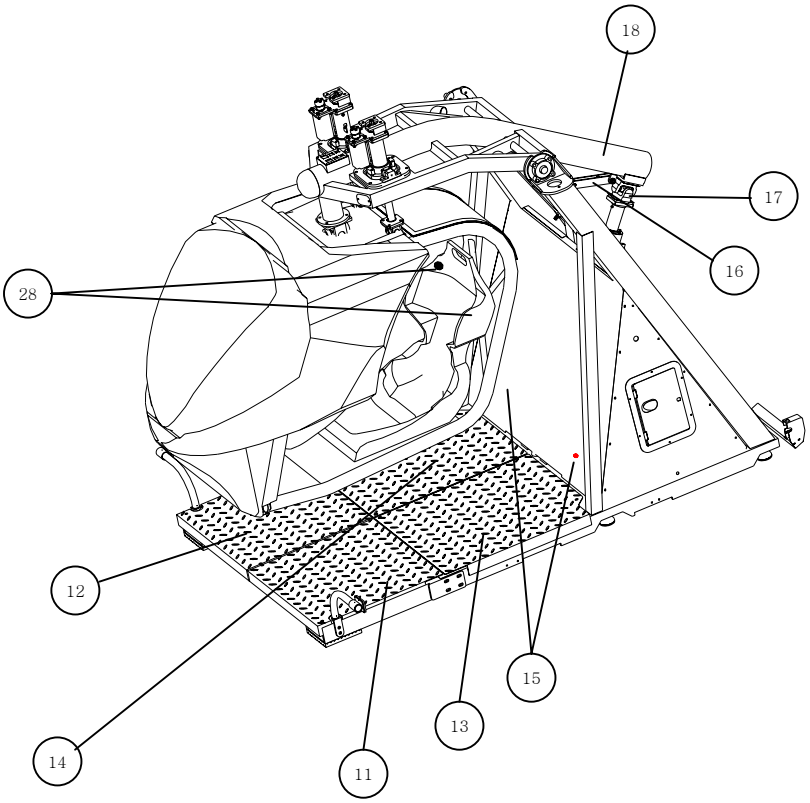
Only QUALIFIED SERVICE PERSONNEL should carry out inspection.

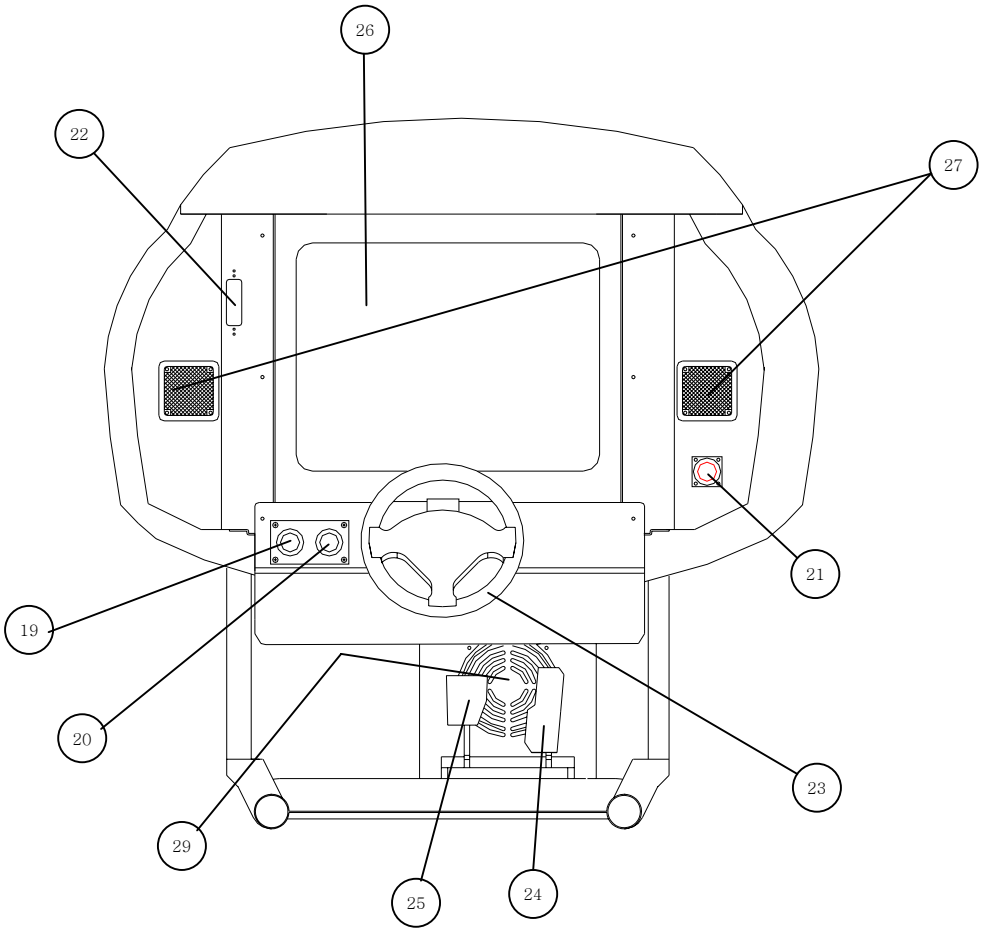
Normally all Simuline products are manufactured so that operation is possible immediately after proper installation. However, it can be possible that an irregular situation occurs during transport and delivery to prevent this. To verify that transport and delivery has be carried out without irregularity, a proper general receiving inspection should be made as follows:

- Are then any dented parts or defects (cuts, etc.) on the external surfaces of the product?
- Are castors and leg adjusters present and undamaged?
- Do the power supply voltage and frequency requirements match with the local supply?
- Are all wiring connectors correctly and securely connected? Unless connected in the correct direction, connector connections cannot be made successfully. Do not insert connectors forcibly.
- Are all IC's of each IC board firmly inserted?
- Does the power cord have any cuts or dents?
- Do fuses meet the specified rating?
- Are such units such as monitors, control equipment, IC boards, etc. firmly secured?
- Are all earth wires connected?
- Are all accessories available?
- Can all doors and lids be opened with the accessory keys and/or tools?

3. NAMES OF MAJOR PARTS





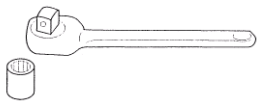
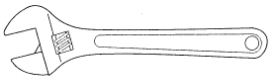
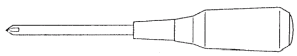


No.	Item	Description
1	**Cabin**	Carries the player and moves during operation.
2	**Main Frame**	Holds the cabin, actuator system and electronics.
3	**Actuators**	Three electric linear actuators that move the cabin in 3 DOF (degrees of freedom). The two actuators on top of the cabin creates pitch and roll motions. The actuator behind the cabin creates heave motion.
4	**Motion System Cabinet Unit (MSCU)**	Houses all the control electronics and electrical components.
5	**Coin Chute Tower**	Carries the coin chute mechanism.
6	**Motion Stop Switch**	Pressing this button will stop the simulator motion but game play will continue. Motion resumes 3 seconds after the switch is released. This button can be used in case of emergency when motion must be stopped.
7	**Operator Panel**	Houses indicators and switches to set and control Cycraft. Refer to Chapter 2 for details.

8,9	**Safety Photo Sensors**	There are 2 photo sensors on each side of the outer frame. If any of the sensor lines are obstructed, the simulator will stop in its current orientation until 3 seconds after the removal of the obstruction.
10	**Safety Floor Sensor**	The metal floor plate underneath the cabin is a pressure sensor that stops the simulators motion when stepped on. The simulator will begin to move again 3 seconds after the removal of the pressure.
11~ 14	**Safety Floor Sensor Plate**	11 = A type, 12 = B type, 13 = C type, 14 = D type
15	**Floor Sensor Indicator Lamp**	Lamp(Green) goes off when the floor sensor is activated.
16	**Safety Link**	Safety link connected to the rocker arm.
17	**Heave Actuator Joint**	
18	**Rocker Arm**	Tilts up and down to create heave motion.
19	**Start Button**	Begins the game after coin is inserted.
20	**View Button**	Changes the driver's view perspective during play.
21	**Game Stop Button**	Terminates the game and lowers the cabin to the initial position.
22	**Video Control Buttons**	Removing this cover exposes the control buttons to adjust video screen parameters. Refer to Chapter 2 for details.
23	**Steering Wheel**	Produces steering input for the game.
24	**Accelerator Pedal**	Produces accelerator input for the game.
25	**Brake Pedal**	Produces braking input for the game.
26	**Monitor**	Displays game graphics.
27	**Front Speakers**	Produces audio effects.
28	**Rear Speakers**	Produces audio effects.
29	**Subwoofer**	Produces audio effects with low frequency

4. TRANSPORTING AND MOVING

4.1 EQUIPMENT REQUIRED FOR UNLOADING AND TRANSPORT

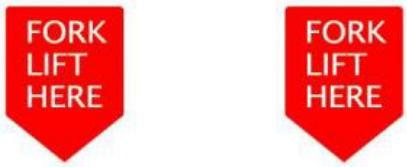
No	Equipment	Description	Q'ty	Purpose
1	Fork Lift	Capacity over 1500 kg Boom attached fork	1	Lift and transport out of packing crate.
2	Wood block	10 cm x 10 cm x 100 cm 	4	Set under the base frame so that fork can be inserted and removed easily.
3	Rear caster (supplied)		2	Used together with front casters (already installed) to roll the machine to destination location.
4	Socket wrench		1	Attaching the rear casters.
5	Wrench		1	Adjusting the level of casters.
6	Philips type screwdriver		1	Loosening and securing truss bolts
7	Bolt	Hexahead M12 x 35 L	6	Attaching the casters

4.2 UNLOADING AND OPENING THE CRATE

1) When unloading the crate from the container or truck, it is recommended to insert the forklift from the heavier rear side of the crate.
2) The crate should not be opened from the front. Open the rear and/or one of the sides when opening the crate.

4.3 UNPACKING AND INSTALLING REAR CASTER WHEELS

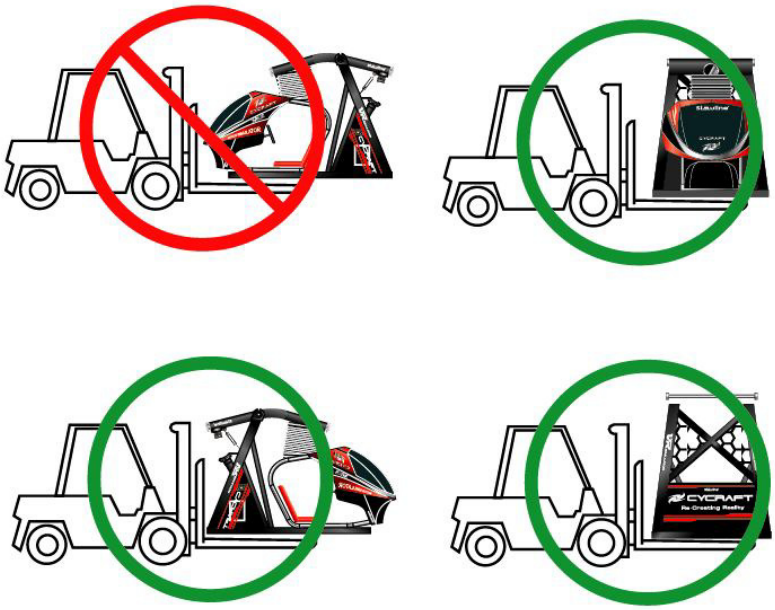
1) After the crate is opened, unpack the separate accessories and components so that the main simulator body is accessible.
2) Insert forklift from the *rear* of Cycraft or from the *side*. ***DO NOT INSERT FORKS FROM THE FRONT SIDE.*** When inserting forks from the side, make sure the forks are positioned to enter the cutoff sections in order to ensure Cycraft does not tip over. Insert forks fully until the tips are visible on the other side.



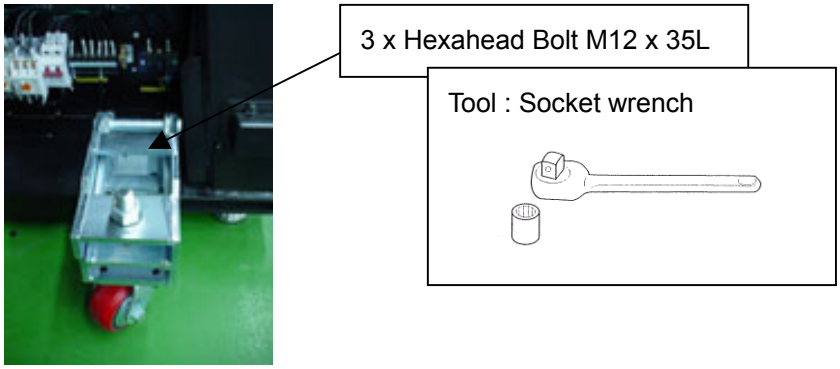
Fork Lift Insert Mark

STOP
IMPORTANT

DO NOT INSERT FORKS FROM THE FRONT SIDE



3) After CAREFULLY taking Cycraft out of the crate, install the rear two wheels by first removing the MSCU cover as shown in the figure below. Note that the front two wheels are already installed.



STOP
IMPORTANT

Be careful not to step on and damage the floor pressure sensor springs and switches installed on the frame beneath the cabin

4) Adjust the heights of the wheels by rotating the nut on top of each wheel using 19 mm wrench or socket until Cycraft is raised sufficiently for transport. Then, carefully roll Cycraft to its destination location. After Cycraft is positioned in it's installation location, lower Cycraft by turning the wheel height adjustment nuts counterclockwise and disassemble each of the wheel assembly.

4.4 MOVING THE MACHINE

Only QUALIFIED SERVICE PERSONNEL should carry out this operation.

Cycraft simulator is a complex delicate machine. Special care must always be taken when handling Cycraft.

When moving Cycraft within a facility, it is recommended to utilize the casters provided with the product. It is not necessary to disassemble the heave actuator and/or the safety link. Only the fence and boarding step with coin chute need to be disassembled.

When Cycraft must be moved long distances by truck, it is recommended that the heave actuator and safety link be disassembled such that the cabin is set securely on the base of the outer frame. Trucking Cycraft without the heave actuator disassembled can cause mechanical damage to the actuator due to shock and vibration during transport. Be sure to lay the wooden plate between the cabin and the base frame as when Cycraft was delivered. This plate protects the floor sensors and switches during transport.

- **When moving the machine, be sure to remove the power cord and plug from the power supply. Moving the machine with the power cord inserted can cause the power cord to be damaged, resulting in a fire or electric shock when installed in a new location.**
- **When moving the machine, with the heave actuator in the assembled state, make sure that the machine is not exposed to high vibrations and shock. Mechanical and structural damage can result.**

5. INSTALLATION INSTRUCTION

5.1 LOCATION REQUIREMENTS

5.1.1 ENVIRONMENT REQUIREMENTS

Cycraft is designed for **indoor use** and should never be installed outdoors. Environment and facility requirements are as follows:

Installation location	Indoor use only
Ambient temperature	5 to 40℃
Humidity	10 to 70 % (no condensing)
Min. Entrance dimensions	1530 mm (L) x 1950 mm (H)
Min. Ceiling Height	2380 mm (H)
Min. Footprint (incl. Fence)	3800 mm (L) x 2600 mm (W)
Min. Floor Loading	**310 kg/m^2**
Cleanliness	Free of dust and debris

- Never install the game machine outdoors

Also avoid the following locations even though they are indoors.

- Near a leaky roof, close to any kind of dripping water, or any place with high humidity that can condense
- Close to an indoor pool or showers
- Exposed to direct sunlight
- Exposed to direct heat, such as close to a heater vent, or in a highly heated room
- Close to flammable or volatile chemicals, or dangerous materials
- Avoid floors that slope(any slope more than 2 degrees)
- Avoid strong vibrations
- Avoid dusty locations
- Avoid any location that does not allow enough space around the machine

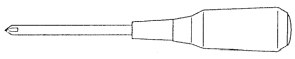
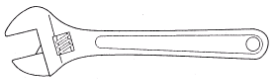
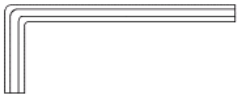
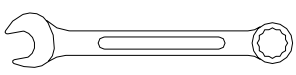
5.1.2 ELECTRICAL REQUIREMENTS

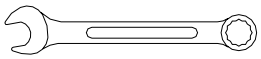
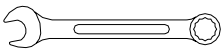
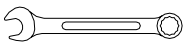
The facility should provide the following electrical power outputs for Cycraft:

Input Voltage	Single Phase AC 200V, 208V, 220V, 230V, 240V
Frequency	50 / 60 Hz
Rated Current (Max)	8 Amp
Peak Current	12 Amp
Building Circuit Breaker (Recommended)	15 Amp

Note: The average power requirement is measured power consumption during normal operation. Peak power requirement is theoretical short term peak power possible for short times during special driving conditions. Therefore, it is recommended that facility power be based on peak power requirements for best results.

5.2 EQUIPMENT REQUIRED FOR INSTALLATION

No	Tools	Description	Q'ty	Purpose
1	Philips type screwdriver		1	Loosening and securing truss bolts
2	Wrench (19 mm ~ 27 mm)		1	Adjusting the levers.
3	Hex Key (6mm)		1	Boarding step, Coin Chute Tower
4	Hex Key (5mm)		1	Fence
5	Hex Key (2.5 mm)		1	Photo sensor, mirror
6	Spanner (19 mm)		2	Heave actuator Turnbuckle

7	Spanner (17 mm)		1	
8	Spanner (13 mm)		1	Floor sensor plate
9	Spanner (10 mm)		1	Fence mesh

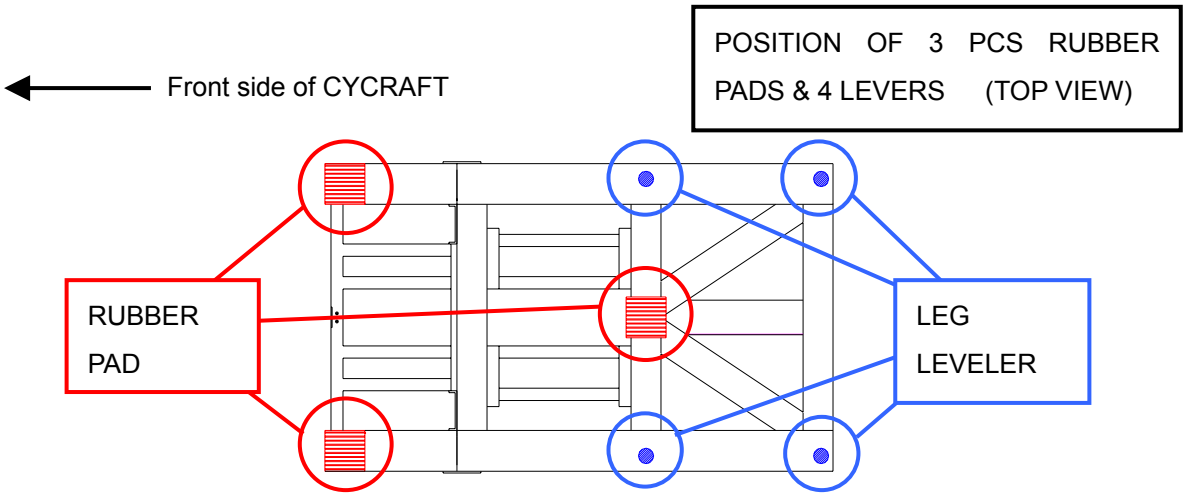
5.3 STEPS FOR INSTALLATION

Installation should be carried out according to the following steps.

STEP 1 SECURING IN PLACE (LEG ADJUSTER ADJUSTMENT)
STEP 2 CONNECTING THE HEAVE ACTUATOR
STEP 3 CONNECTING THE SAFETY LINK
STEP 4 ASSEMBLING THE FLOOR SENSOR PLATE
STEP 5 SETTING THE PHOTO SENSORS
STEP 6 COIN MECHANISM INSTALLATION
STEP 7 CONNECTING THE POWER CORD
STEP 8 TESTING AND ALIGNING THE PHOTO SENSORS
STEP 9 TESTING AND ADJUSTING THE FLOOR SENSOR
STEP 10 FENCE ASSEMBLY

5.4 SECURING IN PLACE (LEG ADJUSTER ADJUSTMENT)

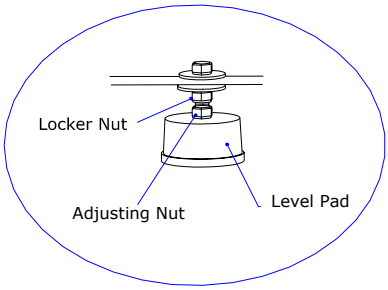
After Cycraft is placed in location, the level pads must be adjusted correctly to prevent Cycraft from moving about the floor due to its own motion. Cycraft has 3 stationary rubber pads and 4 adjustable level pads as shown.



The process to place and adjust the level pads correctly is as follows:

1) Make sure that all of the four adjustable pads are not touching the ground. If it is, raise it so that only the three rubber pads touch the ground. The center of mass of Cycraft is very near the central rear rubber pad. Therefore, it is advisable to have two people stand on top of the front two rubber pads to make sure the three pads are touching the ground securely.

2) Lower the 4 adjustable level pads so that they touch the ground and partially hold the weight of Cycraft. Do not extend them so much that the central rubber pad is raised from the floor.



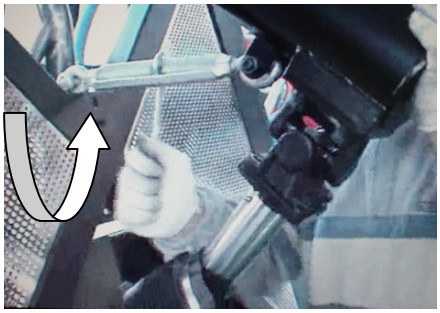
3) After you are satisfied that the pads are set correctly, you can proceed to assemble Cycraft. However, after assembly, the pads should be observed during the test runs and adjusted further if there seems to be excessive movement or uneven loading and lifting of the pads.

5.5 CONNECTING THE HEAVE ACTUATOR

At no time during the installation and assembly process should personnel place body parts or go beneath the cabin. Take note that there is always the danger of the cabin falling.

1) Install the turnbuckle firmly between the frame and rocker arm as shown.

2) Lower the rear end of the rocker arm by rotating the turnbuckle counterclockwise as seen from the rear. Use a crowbar or rod as shown in the photo and rotate the turnbuckle almost to its limit.



During this process the cabin will be lifted up. As it lifts up it will simultaneously tip towards the front and slide backwards

3) Disassemble the heave actuator holding bracket and free the heave actuator. Make sure the actuator is supported so that it does not fall over to one side when the holding bracket is disassembled.

4) Rotate the actuator piston counterclockwise as seen from the top to extend the actuator. Match the 4 bolt holes of the flange and rocker arm mating part close enough so that bolts can be inserted. It is not necessary to have the flange mated exactly to the rocker arm at this stage.

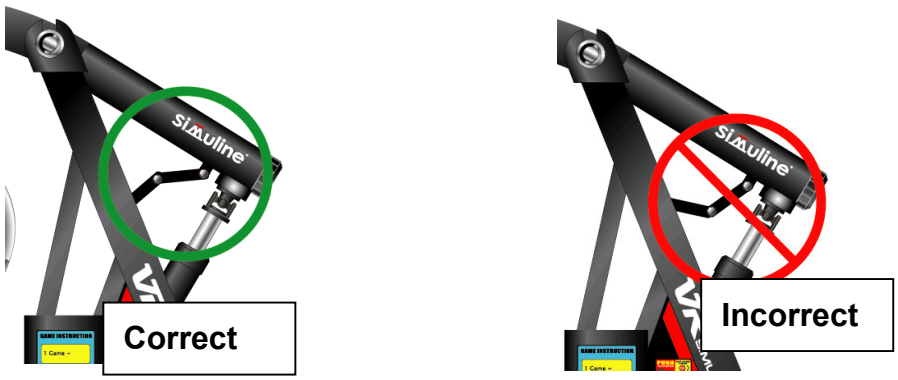
5) Tighten the four bolts evenly one at a time. The heave actuator piston will extend as the bolts are tightened. Tighten all four bolts to **1200** kgf•cm torque. Mark the bolt and relative side of the flange as in the figure so that it can later be inspected easily for looseness.

6) Rotate the turn-buckle counterclockwise to lower the cabin and extend the heave actuator fully. When the bolts connecting the turnbuckle to the rocker arm feels loose and the weight of the cabin is held fully by the actuator, disassemble the turnbuckle completely from each end and remove it.

5.6 CONNECTING THE SAFETY LINK

1) Position the safety link as in the figure below with the longer link section above the shorter link section. Tighten the bolt connecting the link to the rocker arm to **1200** kgf•cm torque and mark the bolt position so that it can later be inspected for looseness.

2) Make sure that the link is **bent such that the center connecting joint protrudes forward and the link is bent in the "<" shape** as in the figure.



STOP
IMPORTANT

If the link is installed incorrectly in the reverse "L" shape (see figure), the link will hit the actuator and actuator joint when heave motion occurs and the system will be damaged. Make sure it is installed correctly.

Figure of cycraft after assembling the heave actuator and safety link

5.7 ASSEMBLING THE FLOOR SENSOR PLATE

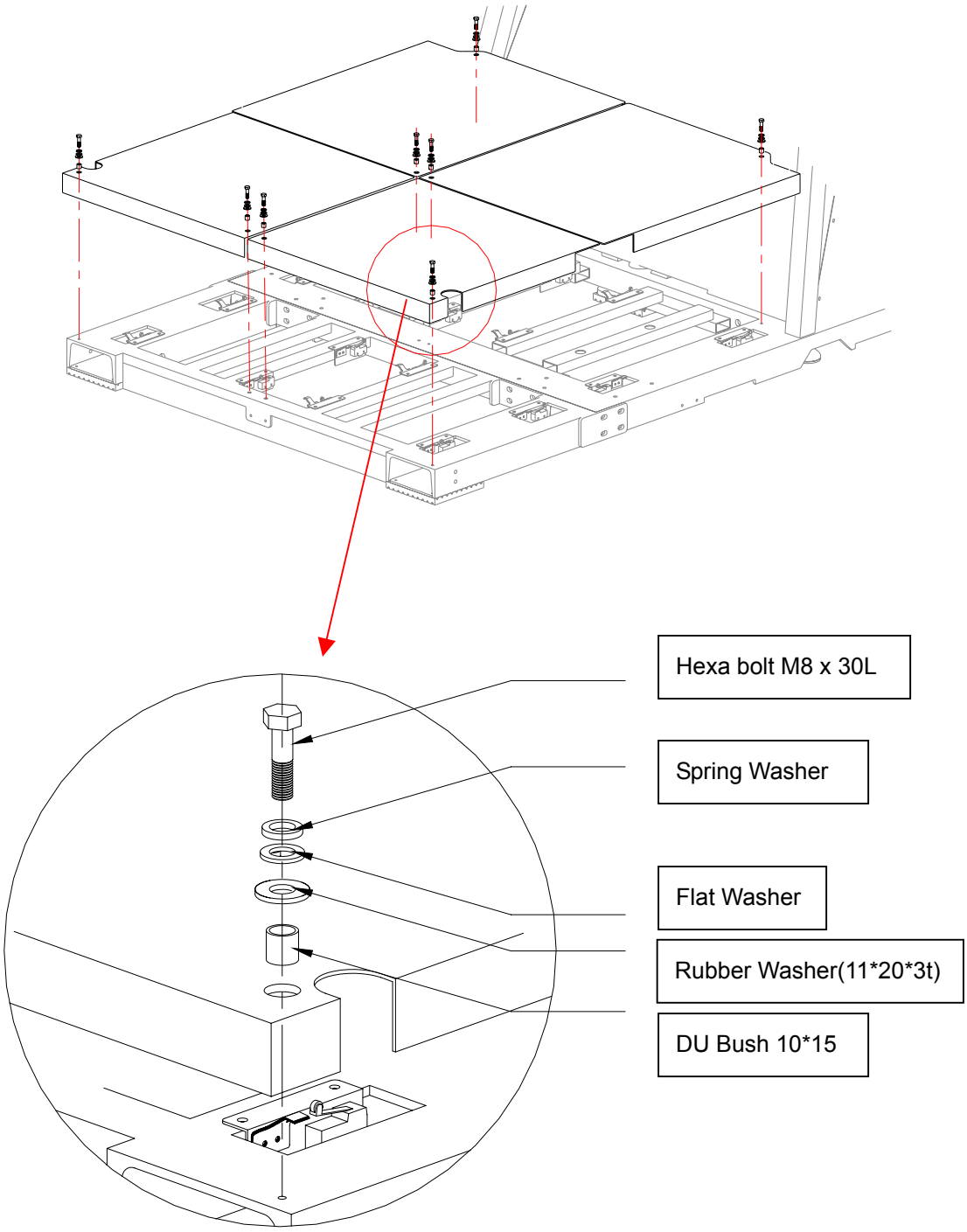
WARNING

NEVER go under the cabin to install or service the floor pressure sensor system when the main power is ON. Serious injury can result if the system malfunctions. Always place a structure to support the cabin in case it falls. Turn the main power off when it is necessary to go under the cabin.

CAUTION

Be careful not to damage the springs and micro switches on the bottom frame when assembling the floor sensor plates

1) Make sure there are no objects or debris on top of the lower frame structure where the floor plates must be installed.
2) **2** or more people should lift each of the 4 sections of the floor plate and place them in the specified position. Be careful not to damage the springs and micro switches.
3) There are two guide holes in each of the floor plate sections as in the figure. Insert the provided spacer, washer, and bolt assembly into each of the guide holes and tighten securely.

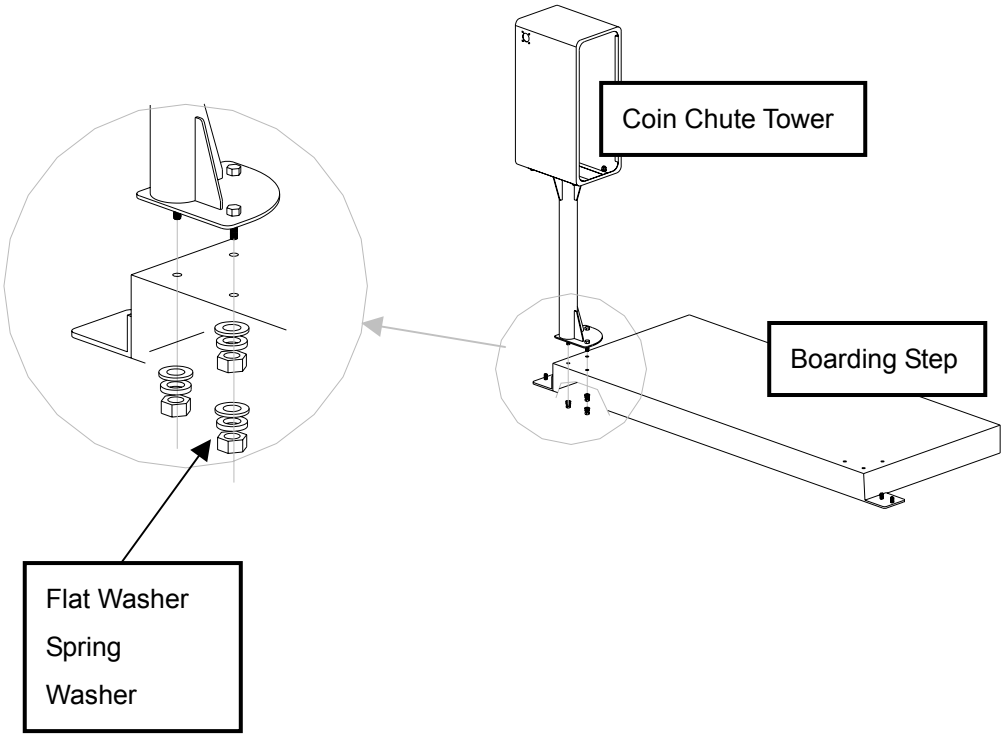


4) After assembly, make sure each floor plate section moves about 1/2 inches up and down freely.

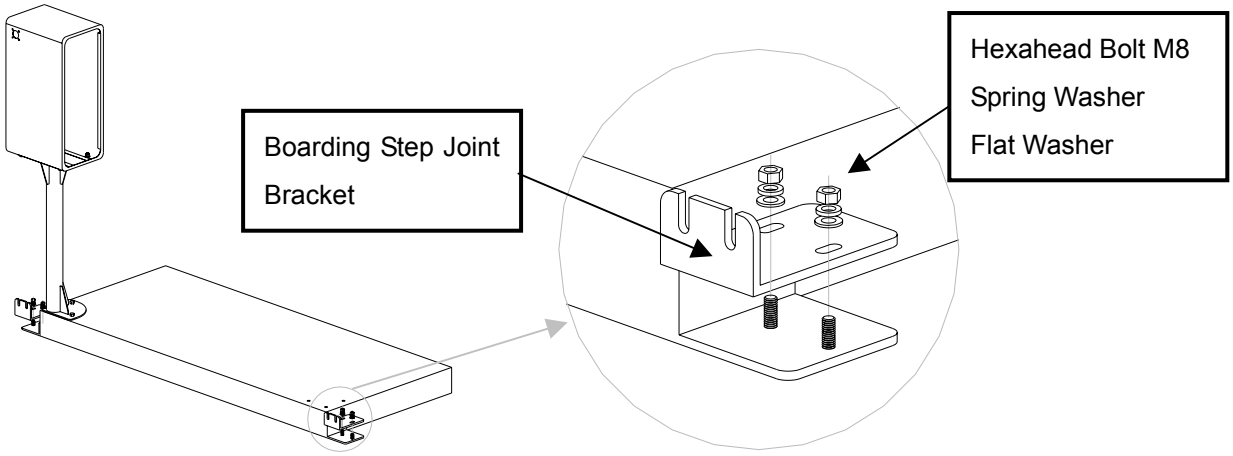
5.8 ASSEMBLING THE BOARDING STEP AND COIN CHUTE TOWER

The boarding tower and coin chute tower should be assembled at this stage so that electrical connections to the coin mechanism can be made and functional testing of Cycraft can be performed before final assembly of the fence. To assemble the boarding step and coin chute tower, follow the next procedure.

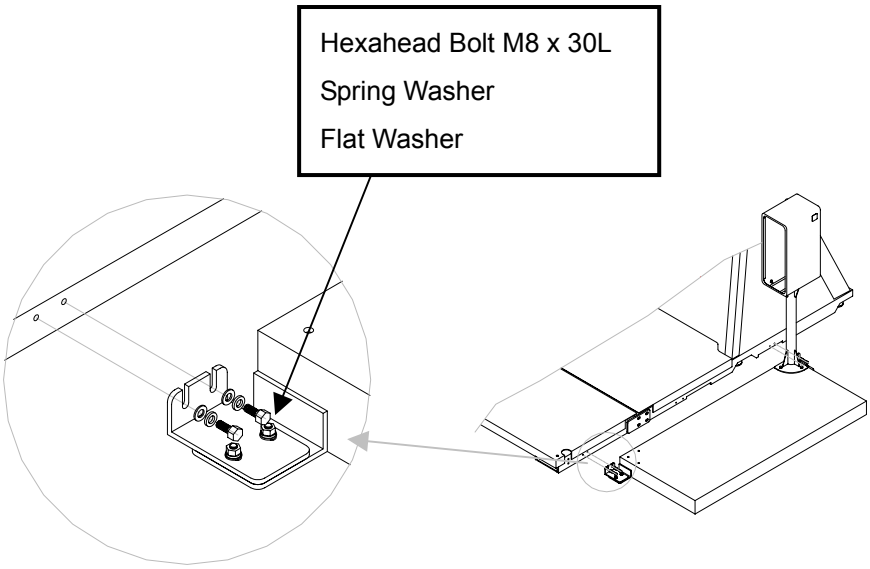
1) Attach the coin chute tower on the boarding step.



2) Then attach two boarding step joint bracket to the boarding step.



3) Position the assembled boarding step and secure it to the base of Cycraft as shown.



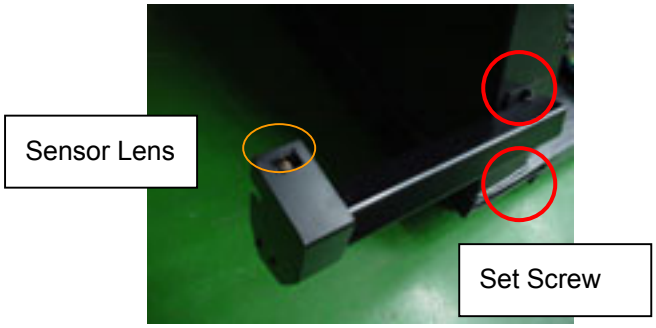
5.9 SETTING THE PHOTO SENSORS

There is a set of photo sensor and reflective plate on each side of Cycraft. Set the photo sensor system as follows:

1) Loosen the set screws of the reflective plate arms and rotate the arms so that the reflective plates point backwards at 90 degree angles from the sides of Cycraft and tighten the set screws.

Tool : HEX KEY 2.5 mm

2) Loosen the set screws of the photo sensor arms and unfold them so that the arms point outward and the photo sensor lens points toward the reflective plate.



3) Tighten the set screws to secure the arms. Remove the clear protective plastic on the photo sensor lens if it is still intact.
4) It may be necessary to adjust the photo sensor alignment later on. This process is described in the Chapter 5.12.

5.9 COIN MECHANISM INSTALLATION

Only Qualified Service Personnel should carry out this operation.

Cycraft uses the standard coin box face plate provided by Happs Controls and Sega Enterprise. The compatible model numbers are,

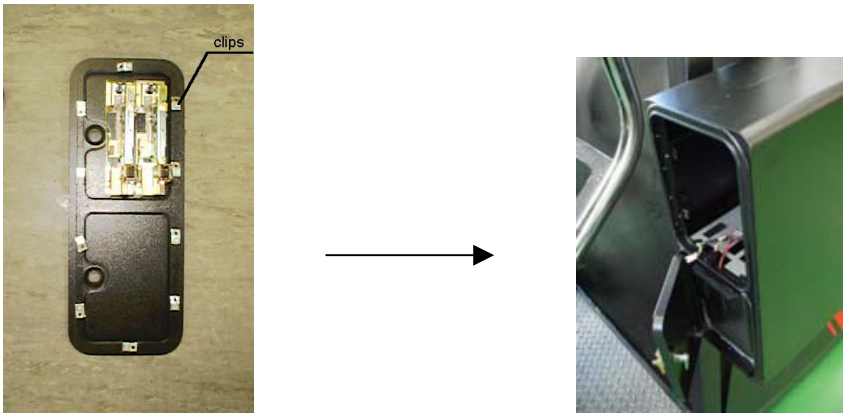
HAPPS: Frame 42-3272-00
Lower Door 42-3245-16
Upper Door 42-7201-00

SEGA: ASAHI Standard

The coin chute door and coin mechanism to be used must physically match the above coin chute frame. When fitting the coin mechanism to the door please refer to the specific manufacturers installation instructions for that coin mechanism.

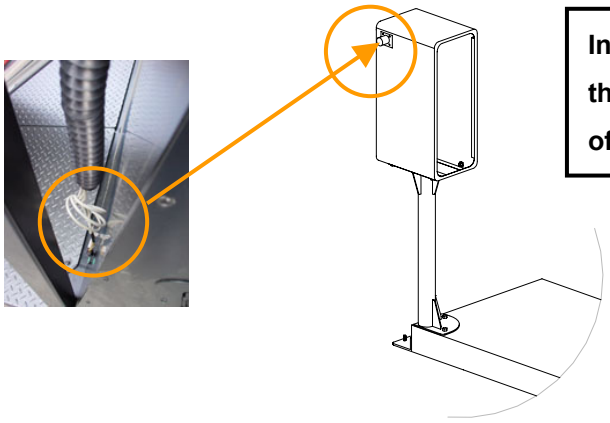
To mechanically assemble the coin chute frame and cash door,

1) Loosen all of the bolts on the frame that secure the clips.
2) Turn all clips in towards the door.
3) Position the door into the aperture in the coin chute tower.
4) Turn the clips around so that they will hold the door in the machine.
5) Tighten all of the bolts.



5.9.1 WIRING CONNECTION

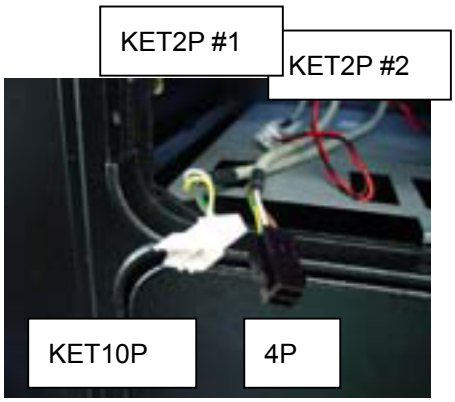
1) Route the bundle of cables into the coin chute tower. Be sure to use the supplied



Insert the cables through this hole and tighten the end of bellows with cable tie

rubber bellows and cable tie

2) There are 4 electric connectors, the KET 10P, two KET 2P and the 4P connectors. The pin assignments for each connector are:



KET 10P (for coin selector)

1 ---------- GND

2 ---------- +12V

7 ---------- COIN SW1 in NAOMI I/O BD

8 ---------- COIN SW2 in NAOMI I/O BD

4P (for bill acceptor power, 12V lamp)

1---------- 110V AC(R)

2---------- 110V AC(T)

3---------- +12V

4---------- GND

KET 2P #1 (for coin meter #1)

1---------- COIN METER 1 in NAOMI I/O BD

2---------- +5V

KET 2P #1 (for coin meter #2)

1---------- COIN METER 2 in NAOMI I/O BD

2---------- +5V

3) Attach the coin chute door and coin selector. Then, perform the wiring referring to the electric schematic #1 of the SCU provided in session 10.1 to determine the correct connection method.

5.10 CONNECTING THE POWER CORD

Before supplying power to the power cord, make sure that the system is properly configured inside the MSCU for your facility power supply voltage. Improper configuration can damage your system permanently.

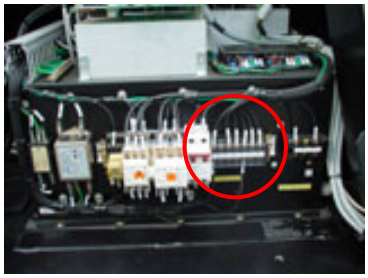
Cycraft is designed to accept the single phase 200V, 208V, 220V, 230V, and 240 VAC, 50/60 Hz power sources to support the different electric power systems in different parts of the world. However, the system must be configured correctly for each power supply voltage by connecting an electric line to one of three available terminals inside the MSCU.

To connect and/or verify the power cord voltage setting,

1) Open the MSCU cover in the rear of the simulator.

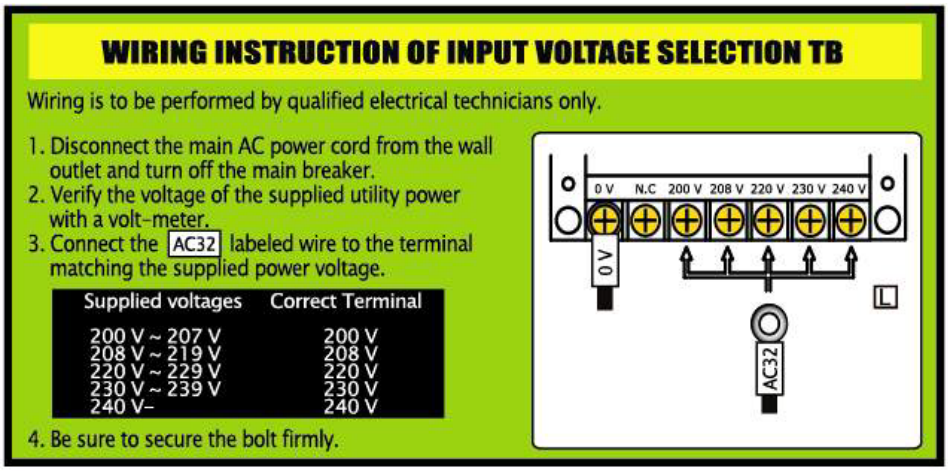
Before opening the MSCU cover, make sure the power line is NOT connected to the building power source and that there is no electrical power supplied to the system to prevent injury from electrical shock.

2) Locate the input voltage selection terminal block and the voltage selection wire

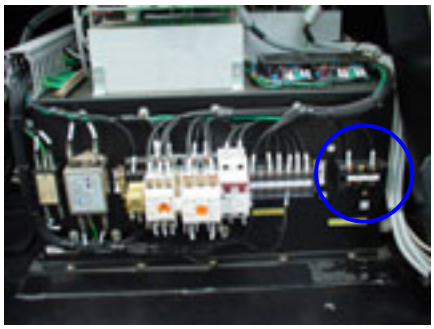


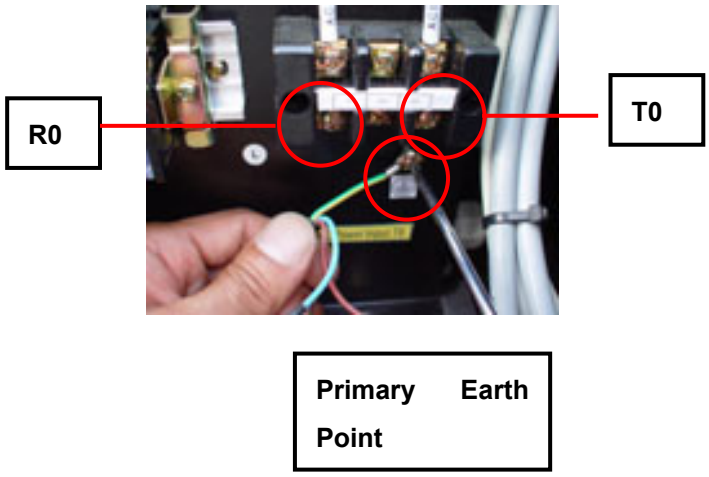
shown in the picture below.

3) Connect the voltage selection wire to the terminal that matches your facility supply voltage according to the input voltage selection terminal wiring instruction.



4) Locate the power cord connection terminal and connect the two power lines and the earth line of the power cord as shown below. **Make especially sure that the earth line is properly connected for safe and proper operation.**





Primary Earth Point

5) Verify that all connections are correct. Then, connect the power cord to the facility voltage source.

6) Go to the Operator Panel and verify that the red LED labeled “Main Power” is lighted. Before proceeding to start the power up sequence of Cycraft, operators should familiarize themselves with the switches and controls on the Operator Panel.

5.11 POST INSTALLATION TESTING AND INSPECTION

After the mechanical and electrical installation is complete, it is necessary to carry out a final checking procedure and make some adjustments if necessary. To carry out the final tests and adjustments, you must power UP Cycraft.

Carry out the Power-UP sequence according the procedure outlined in section 6.2. Before you power-up Cycraft, make sure of the following:

(a) The power cord is connected to the correct voltage outlet and the green main power LED is lighted.
(b) The emergency power off switch and motion stop switch (behind the coin chute box) are released.

Make sure there are no personnel or objects under or in the area of the cabin before switching the power on. The power up sequence will move the cabin and personnel can be injured.

Make sure there are no passengers in the cabin when power is turned on. The extra weight of the passenger can cause a fault in the power ON sequence.

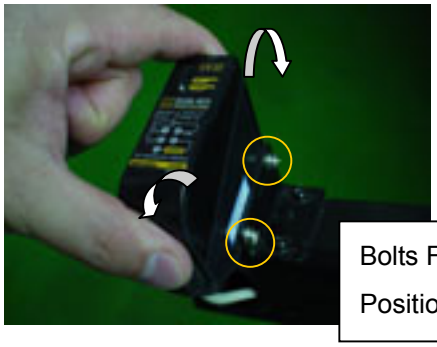
After successful power UP, it is possible that a beeping sound is heard and the red LED labeled “Safety Sensor” on the Operator Panel is lighted. This indicates that adjustments on the safety sensors (floor sensor and/or photo sensors) are needed. Even if the beeping sound is not made, read the following sections and verify that the sensors are in the best operating conditions.

5.11.1 TESTING AND ALIGNING THE PHOTO SENSORS

1) Make sure that the Yellow LED on top of the photo sensor is lighted when there is no obstacle between the photo sensor and the reflective mirror.
2) Tap and slightly shake the photo sensor bar and the reflective mirror bar. Make

sure that small vibrations and motion of the photo sensor and the reflective plate does not cause the Yellow LED to instantaneously turn off.

3) Make sure that the Yellow LED turns off when an obstacle is placed between the sensor and reflective plate.
4) If any of the above tests fail, carry out the following to align the sensor and mirror:
   A. Remove the steel cover of the photo sensor and expose the sensor holding bracket and screws as shown below.



Bolts For Photosensor Position Adjustment

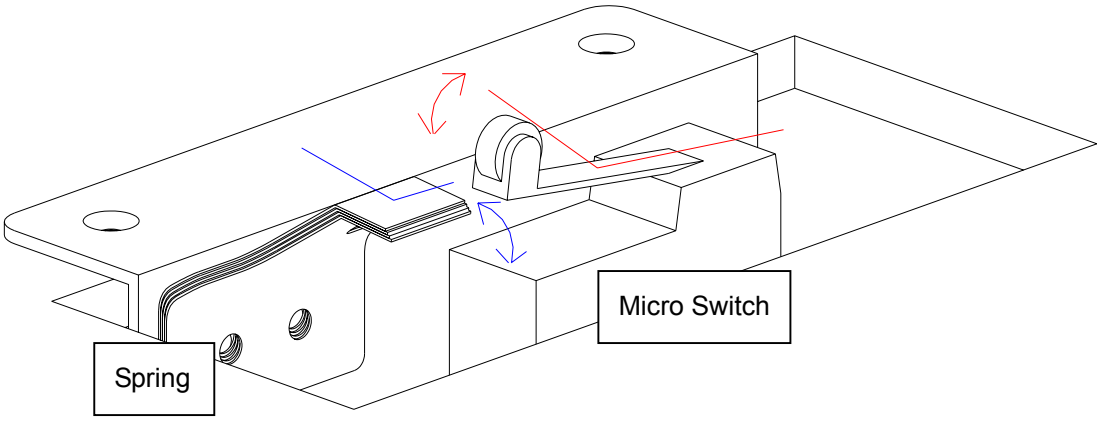
   B. Loosen the screws as necessary to align the photo sensor correctly. Adjust the reflective plate alignment by loosening the set screws shown below.

   C. Align the reflective mirror and the photo sensor correctly by observing the Yellow LED on top of the photo sensor. Tighten all set screws when complete.
   D. Carry out the tests described in steps 1), 2), and 3) above.

5.11.2 TESTING AND ADJUSTING THE FLOOR PRESSURE SENSOR

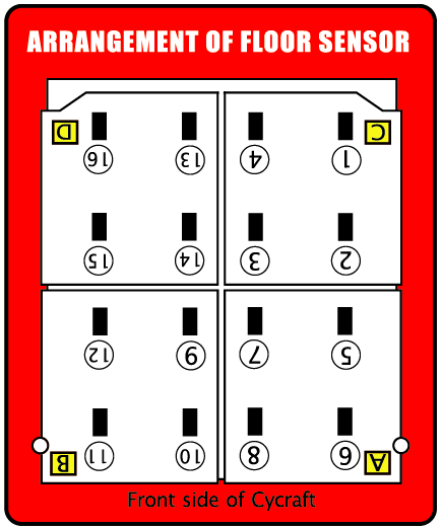
NEVER go under the cabin to install or service the floor pressure sensor system when the main power is ON. Serious injury can result if the system malfunctions. If it is necessary to work under the cabin, turn the power off and support the cabin by a strong structure if it is necessary to raise it.

1) Verify that the two green floor sensor LED's on each side of the MSCU front side cover (see figure) is turned on when nothing is on top of the floor plates. If the green LED is OFF, the floor sensor system must be adjusted.
2) Verify that stepping on different parts of the floor sensor lightly turns the Green LED off. If the LED does not turn off, the floor sensor system must be adjusted (note that a 20kg weight on any part of the floor sensor must activate the sensor).
3) If any of the above tests do not pass, it is possible that the springs or sensors have been damaged or slightly bent out of shape during transport and installation. To adjust the floor sensor carry out the following steps on the floor plate section(s) that do not operate properly:
   A. Each floor plate has 4 sets of springs and switches under it. Lift the plate off to expose them.
   B. With the plate lifted, the Green floor sensor LED must be ON. If not, this indicates a defective sensor switch or wiring. Refer to the service manual for instructions on how to replace the floor sensor switch.
   C. Press each sensor lightly and verify that it clicks when pressed within its stroke. Verify operation of the Green LED.
   D. The suspected switch's sensitivity can be increased or decreased by slightly bending the sensor contact lever up or down (see figure below). Do not bend more than 1 or 2 millimeters.



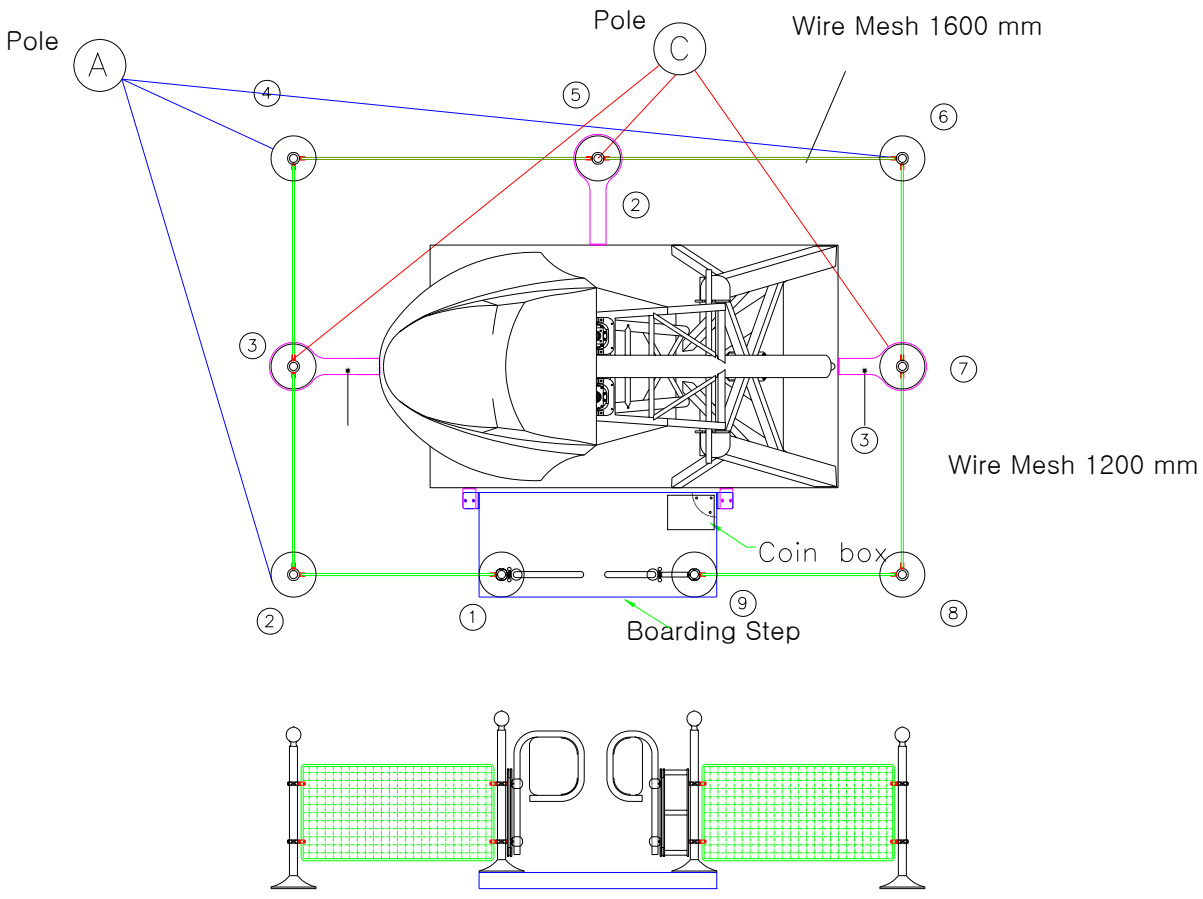
E. Note that making the sensor too sensitive (i.e. bending the lever up too much) will cause the sensor to activate due to the own weight of the floor plate or make it so sensitive that slight motions or vibrations during play will trip the sensor. Making the sensor too insensitive (i.e. bending the lever down too much) will cause the sensor to not activate even when the floor plate if fully pressed down.

F. You can find the micro switch's number on the wiring diagram using the sensor arrangement sticker beside the floor sensor LED as shown below.

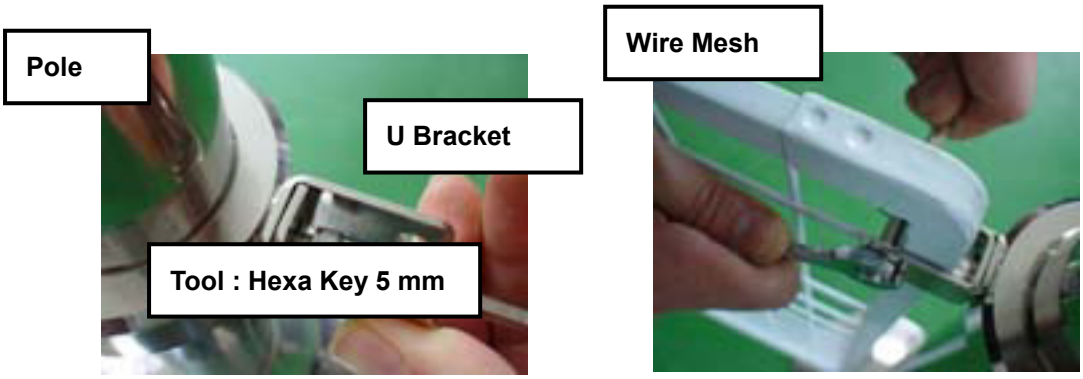


5.12 ASSEMBLING THE FENCE

1) Confirm that boarding step is fitting to the base frame of main machine with no gap to the ground and locate the 9 fence poles around Cycraft as shown.



2) Assemble the pole and mesh from the pole no.1 to the pole no.9 in the order of clockwise. It is needed to be aware that there are 3 kinds of pole. Type A are the corner poles (pole no. 2,4,6,8) with base plate. Type B are the gate door poles with lower the junction ring other than poles. Type C are the middle poles without base plate.
3) The fence U bracket assembling work is as shown below. Perform total 32 assembling of U bracket and 4 door gate bolt fixings.



5.14 FIGURE OF CYCRAFT AFTER FINISHING THE INSTALLATION WORK

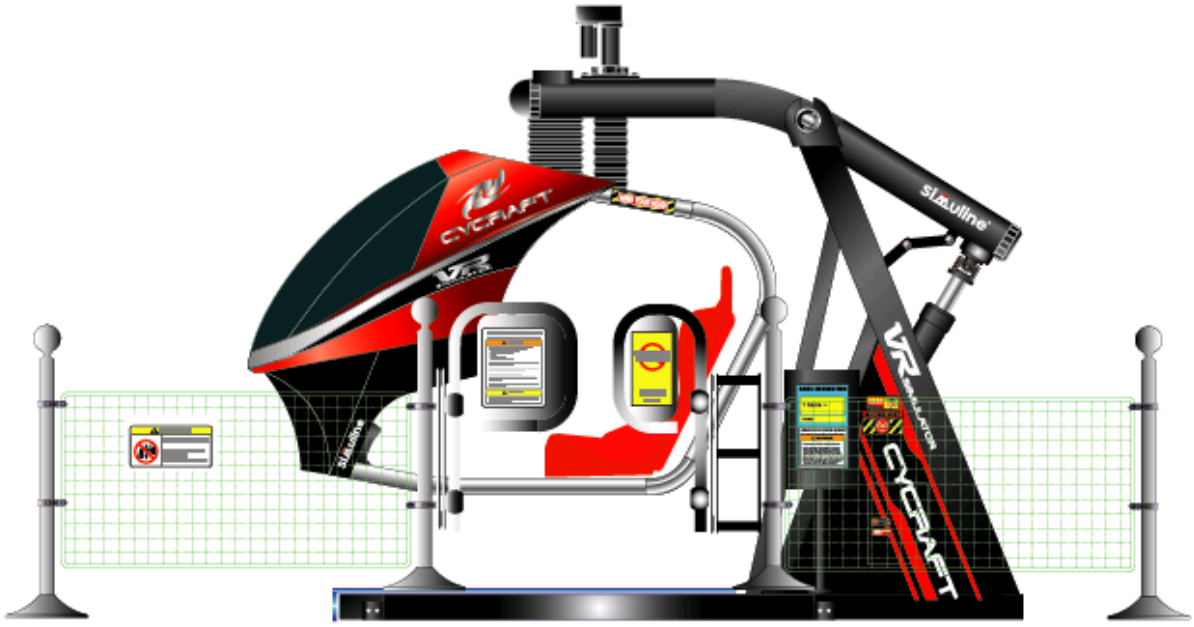
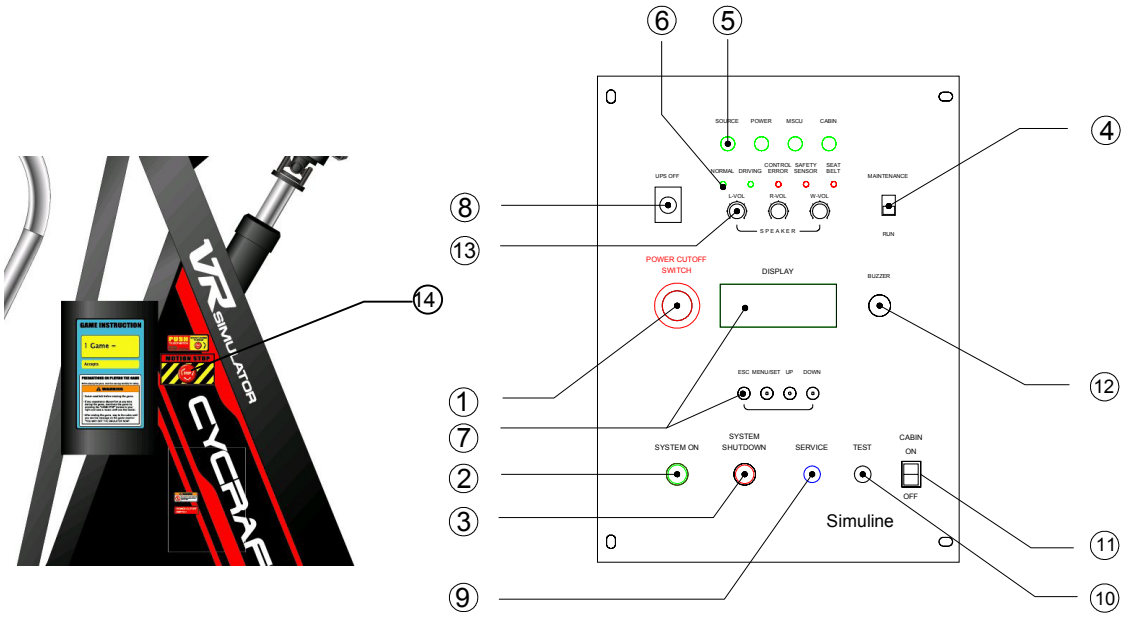


Figure of Power-ON position

6. OPERATING & ADJUSTMENT

6.1 DESCRIPTION OF INDICATORS AND SWITCHES ON THE OPERATION PANEL



No	Item	Description
1	**Power Cutoff Switch**	This push button switch cuts off the main power to the Cycraft. It should be used in such emergency situations as when a fire breaks out in the system. Note that pressing this switch will cause the cabin to glide down to the un-powered rest position. **Therefore, the space under the cabin must be free from objects and personnel to prevent damage and injury.**
2	**System ON Button**	These buttons are used to power up the simulator norm ally. Press the buttons for 3 seconds or longer to activ ate.
3	**System Shutdown Button**	These buttons are used to power down the simulator normally. Press the buttons for 3 seconds or longer to activate
4	**Maintenance Switch**	This switch is for use by trained maintenance personnel only. The switch allows the computer systems to boot up without starting the simulator operation for special maintenance and troubleshooting purposes. This switch should always be in the down position when the

		simulator is being operated normally.
5	**Supply Power LEDs**	These LEDs light respectively, when the main power, power to the actuator controllers, and the cabin power are supplied.
6	**Condition LEDs**	These LEDs light according to the status of the simulator as follows: ● NORMAL LED: Lights(Green) when in normal operating condition. ● DRIVING LED: Lights(Green) when simulator is in driving condition. ● CONTROL ERROR LED: Lights(Red) when an error condition in the motion system is detected. System will automatically power down. ● SAFETY SENSOR LED: Lights(Red) when either the photo sensor or floor pressure sensor is activated. ● SEAT BELT LED: Lights(Red) when the seat belt is released during the game.
7	**Menu, Set,Up, Down, LCD Panel**	These buttons and the LCD panel are used to configure the simulator settings and show the current status of the simulator. They are explained in a separate section below in this manual.
8	**UPS OFF Switch**	This switch forces the UPS to turn off manually.
9	**Service Button**	This button increments the credit. It has the same effe ct as inserting a coin in the coin selector. But there is no change of coin meter.
10	**Test Button**	This button is used to configure the game computer. Refer to the game computer manual for further information.
11	**Cabin Power Switch**	This switch turns on and off the power supply to the 29” monitor and speaker amp. and other components inside the Cabin. Power can be turned on only if the Main AC power is on.
12	**Buzzer**	Activates when a system error occurs or when the safety sensors are activated.
13	**Sound Volume Knobs**	Cabin interior speaker volume knobs for the front speakers, back speakers and the subwoofer.
14	**Motion Stop Switch**	Pressing the Motion Stop Switch will stop the cabin motion and hold it in its current position. Motion will resume normally 3 seconds after the switch is released. The game will continue without motion even when the switch is pressed.

6.2 TURNING THE POWER ON AND OFF

Before you power-up Cycraft, make sure of the following:

1) The power cord is connected to the correct voltage outlet and the green main power LED is lighted.
2) The power cutoff switch and motion stop switch (behind the coin chute tower) are released.

Make sure there are no personnel or objects near or under the cabin before switching the power on in order to prevent damage and injury.

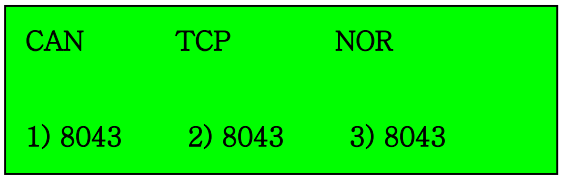
Make sure there are not passengers in the cabin when power is turned on. The extra weight of the passenger can cause a fault in the power ON sequence.

To power ON Cycraft, switch the cabin power switch ON and press the green "SYSTEM ON" button on the operator panel for about 3 seconds. The power up sequence will proceed automatically according to the following sequence:

1) The main power contacts will close with a few clicking sounds and the MCU power LED, cabin power LED, and the LCD panel will light up.
2) The monitor screen inside the cabin will show the start-up sequence of NAOMI2 game board.
3) The cabin will pitch down fully and slowly put itself to the horizontal initial position. Also, the steering wheel will rotate slowly to the right and left limits and then come to rest in the neutral position. Make sure the steering wheel is not obstructed during this process.
4) When the "SYSTEM ON" sequence is complete, the cabin monitor will show the game's graphics screen with the message "Insert Coin to Start".

Upon successful SYSTEM ON, the Operator Panel LED's and the LCD display will indicate as follows:

INDICATOR	Dwg. No.	CONDITION	REMARK
Power Pilot Lamps	5	All 4 lamps ON (Green)	
Normal LED	6-1	ON (Green)	Will turn off when driving starts
Driving LED	6-2	OFF	Will turn on when driving starts
Control Error LED	6-3	OFF	
Safety Sensor LED	6-4	OFF/ON	Will turn on if photo sensor or floor sensor is activated.
Seat Belt LED	6-5	OFF/ON	Will turn on if seat belt is not locked.
LCD Display	7	Refer to lower figure	



LCD Display After Proper Power ON

The SYSTEM OFF sequence can be initiated at any time by pressing the red "SYSTEM OFF" button for about 3 seconds. The cabin monitor will turn off and the cabin will glide down to the nose down rest position. Then, the main powers to the computers and other components will shut off automatically.

Before turning off the power, MAKE SURE THERE IS NO PERSON OR OBSTACLE NEAR OR UNDER THE CABIN. The cabin will glide down upon power off and can cause serious damage or injury.

UPS POWER OFF SWITCH: Sometimes, due to a malfunction or other reasons, the main power may not shut down properly and the UPS will make a continuous beeping sound. In this case it will be necessary to force a complete shutoff of the power manually. To do this, press the UPS Power OFF switch for about 3 seconds. The UPS will shutdown forcefully and the beeping sound will disappear.

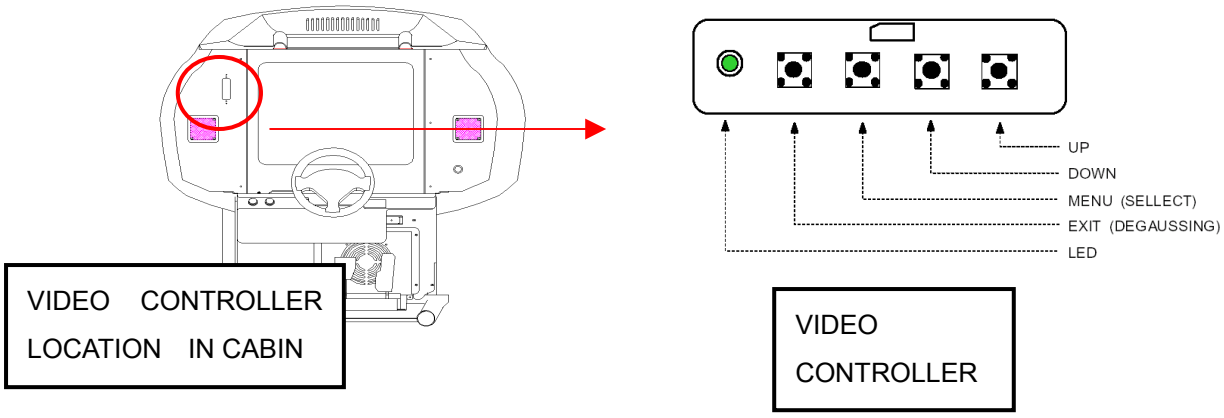
STOP
IMPORTANT

Turing off the UPS before allowing the cabin to come to the rest position will cause the cabin to drop abruptly. This will subject unnecessary shock and vibration to the system. Make sure the cabin is in the rest position before shutting the UPS power off manually.

6.3 ADJUSTMENT OF THE SPEAKER VOLUMES

Cycraft has 5 speakers installed in the cabin – 2 front stereo speakers on each side of the monitor, 2 rear stereo speakers in the chair shoulder area, and 1 woofer speaker located behind the brake and accelerator pedals. Three knobs are provided on the Operator Panel to set the front, rear, and woofer speaker volumes independently.

6.4 SETTING VIDEO MONITOR PARAMETERS



VIDEO CONTROLLER BUTTON FUNCTIONS

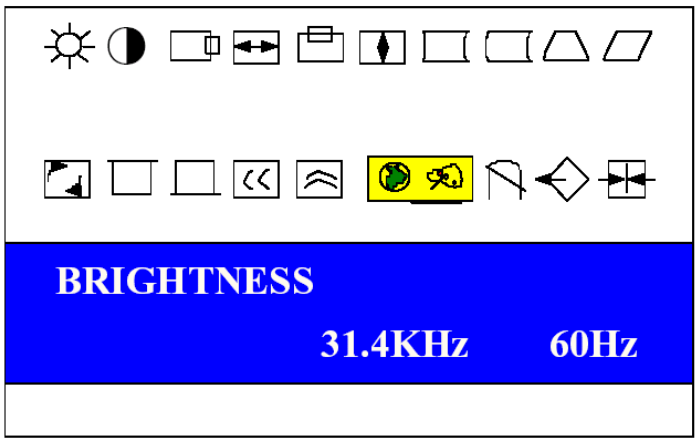
BUTTON	FUNCTION
MENU(SELECTION)	In the beginning, starts the VIDEO controls. In a sub menu, moves the control to the higher level.
EXIT(DEGAUSSING)	In the main menu, exits the VIDEO controls.
UP	In the beginning, proceeds to the contrast adjustment. In the main menu, moves the control menu to the right.

	In a sub menu, increase the adjustment.
DOWN	In the main menu, moves the control menu to the left. In a sub menu, decrease the adjustment

.

VIDEO Control Menu Set

1.BRIGHTNESS
2.CONTARST
3.H-POSITION
4.H-SIZE
5.V-POSITION
6.V-SIZE
7.SIDE-PINCUSHIN
8.PIN-BALANCE
9.TRAPEZOIDE
10.PARALOGRAM
11.ROTATION
12.TOP-CORNER
13.BOTTOM-CORNER
14.H-MOIRE
15.V-MOIRE
16.LANGUAIGE
17.COLOR-TEMP
18.DEGAUSSING
19.RECALL
20.ZOOM



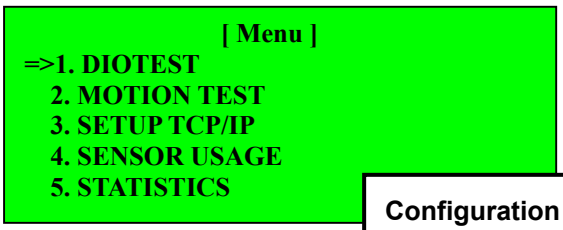
The brightness, contrast, color, alignment, sharpness, and degaussing settings for the cabin graphics monitor can be adjusted by using the monitor setting panel located in the upper left had side of the front monitor panel. To access the panel, first remove the two screws on the panel cover. Instructions for adjustment will display on the monitor during the adjustment process.

6.5 USING THE LCD PANEL TO SET CONFIGURATIONS

The LCD display and the 4 buttons below it inside the Operator Panel can be used to set different configurations. Operation method and functions of the LCD buttons are as described in the table below.

BUTTON	FUNCTION
ESC	Returns the menu to the upper level
MENU/SET	When pressed for 1 seconds the first time, it puts the display in the setting mode and brings up the configuration main menu. Once inside the setting mode, it will set the highlighted menu item.

UP	Highlights the upper menu item.
DOWN	Highlights the lower menu item.

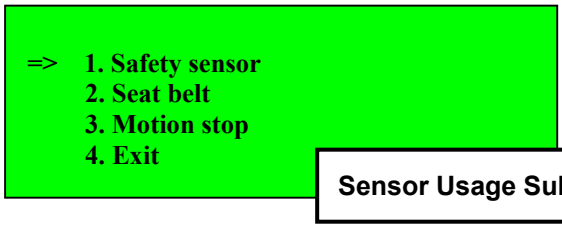


Configuration of LCD Main Menu

All settings through the LCD panel can be made only when the system is powered up in the "**maintenance mode**". This mode is entered by first putting the Maintenance Switch in the operation panel in the "Maintenance" position and powering up the system. After the maintenance mode is entered, configuration and settings can be made as described in the following sub-sections.

6.5.1 SETTING THE SAFETY SENSOR PARAMETERS

1) Bring up the configuration main menu by pressing the MENU/SET button for 2 seconds.
2) Highlight the "4. Sensor Usage" item by using the UP and DOWN buttons. The highlighted item is indicated by the "=>" sign.
3) Press MENU/SET button to bring up the Sensor Usage sub-menu.



Sensor Usage Sub-Menu

Each of the items in the above list can be enabled or disabled. For example, to disable the floor and photo sensors, highlight item 1, press the MENU/SET button, and use the UP and DOWN switches to toggle to the "OFF" setting.

4) After setting the sensor, press the ESC button to go to the previous upper level menu until the main menu is displayed.
5) Highlight "4. Exit" and press MENU/ESC for three seconds to fix the settings and

exit the menu.

The safety sensors, motion stop switch and seat belt sensor should always be enabled (in the "ON" setting) during all normal situations. The feature to disable the safety settings should be used only in special situations, for example when an attendant is present near the machine, solely under the discretion and responsibility of the operator. ***Simuline Inc. will not be liable for any accidents or damages resulting from operation of Cycraft with any of the safety features disabled.***

6.5.2 SETTING TCP/IP CONFIGURATION

This function allows the TCP/IP setting of the motion boardto be set. The motion computer and the game computer are connected via TCP/IP. All settings are preset in the factory but for future upgrades and maintenance, it may be necessary to adjust settings.

1) Bring up the configuration main menu by pressing the MENU/SET button for 2 seconds.
2) Highlight the "3. SETUP TCP/IP" item by using the UP and DOWN buttons. The highlighted item is indicated by the "=>" sign.
3) Press MENU/SET button to bring up the TCP/IP setting sub-menu.

4) Highlight and select the desired parameter and use the UP and DOWN buttons to change the values.

The following are the factory pre-set values for the ClubKart game.

IP ADDRESS : 192.168.1.1
SUBNET MASK : 255.255.255.0

GATEWAY ADDR: 192.168.1.1

6.5.3 VIEWING THE TOTAL COIN COUNT (STATISTICS)

The total number of coins accepted by Cycraft after production can be viewed by selecting the “5. Statistics” item from the configuration main menu.

6.5.4 TESTING THE DIGITAL INPUT/OUTPUT CHANNELS

The digital input/output (DIO) channels in Cycraft can be tested for functionality by using the LCD panel on the Operator Panel. To carry out DIO test,

1) Bring up the configuration main menu by pressing the MENU/SET button for 2 seconds.
2) Highlight the “1. DIO TEST” item by using the UP and DOWN buttons. The highlighted item is indicated by the “=>” sign.
3) Press MENU/SET button. This will display the first DIO channel. Pressing the UP and DOWN buttons will navigate through the different DIO items.
4) Press the MENU/SET button when the desired channel appears. If it is an input channel, the state of the channel (either ON or OFF) will appear on the screen. Proper operation can be checked by physically activating the channel and verifying that the state shown changes accordingly. If it is an output channel, the current output command will be indicated. Use the UP and DOWN arrows to change the command state and verify that the output is physically activated (i.e. lamp turns on and off).
5) When finished, press the ESC switch repeatedly until main screen appears.

6.5.5 MOTION TEST

This menu item runs the motion system of Cycraft through a series of pre-recorded slow speed motion. It can be used to verify that the actuators are operating properly.

6.6 SETTING THE COIN AND CREDIT CONFIGURATION

The coin and credit configuration (i.e. cost per game) must be set directly on the game

computer (NAOMI2) by using the “Service” and “Test” buttons on the Operator Panel. Refer to the NAOMI2 service manual for instruction on how to change the coin and credit configuration.

6.7 GAME PLAY OPERATION

The operator must make sure that all the safety features are functioning correctly before accepting passengers. ***Manufacturer shall not be held liable for damages and claims due to operation of Cycraft without all safety features operating properly.***

Make sure that all safety sensor functions are operating properly. To start the game, player must first insert the correct amount of coins, enter the cabin and put on the seat belt. The screen will then show the “Press Start Button” sign. Pressing the Start button will raise the cabin to the neutral position and the game will start, beginning from the car and course selection process.

During play, the GAME STOP button can be pressed to stop the game at any time. Players who feel nauseous from the motion or need to terminate the game for any other reason can use this button to discontinue the game and exit the simulator.

The View button is used to toggle the graphics viewpoint between the driver’s seat view and tail following view. It is recommended that players use the driver’s seat view for best virtual reality effects.

After the game is finished, the cabin will come down to the initial position and the player may exit.

7. MAINTENANCE AND REPLACEMENT

7.1 ROUTINE MAINTENANCE

Maintenance and repair shall be performed only by qualified mechanical and electrical maintenance personnel in accordance with instructions provided in the manuals.

Routine maintenance and inspection of Cycraft should be carried out to ensure safe operation and longevity of the machine. Contact your distributor or the manufacturer for any instructions beyond those given in the manuals and for any questions regarding maintenance and repair procedures.

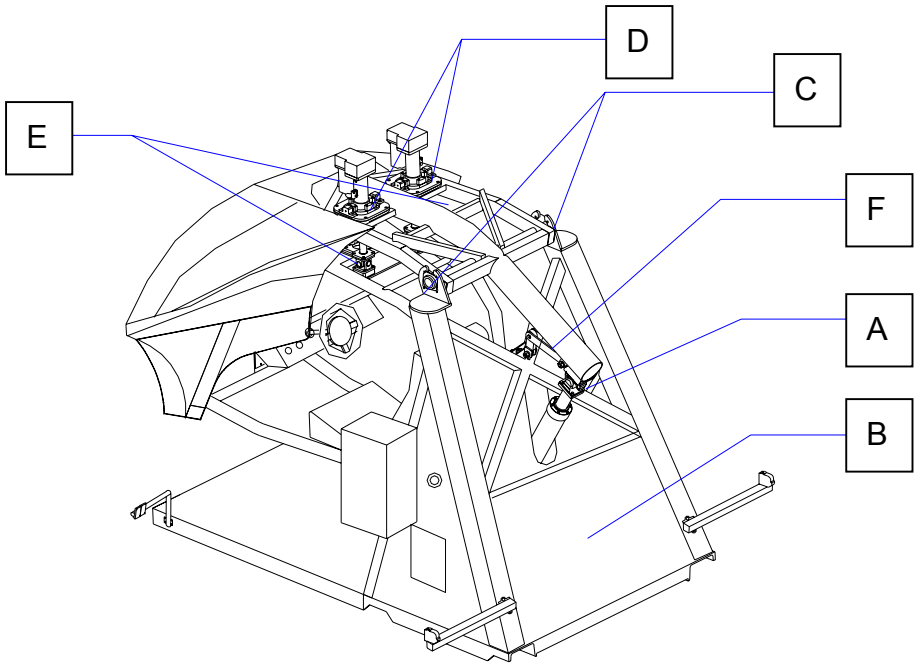
Routine Maintenance and Frequency:

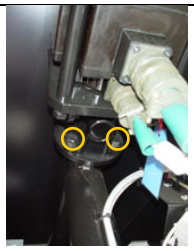
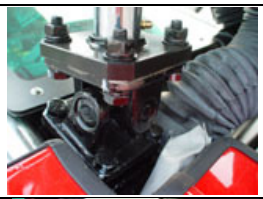
Frequency	Maintenance Activity
Daily	Verify that all the safety sensors (floor sensor, photo sensor, motion stop switch) are working properly. If any malfunction is found, repair it before accepting players.
Daily	Check the system for abnormal noise and vibrations. There should not be screeching, grinding, or rattling noises which can indicate loose bolts or abnormally rubbing of parts. If such suspected noises are heard, verify the source and repair or replace as necessary. Inspect bolts and connections and the integrity of the mechanical system as described below.
Weekly	Verify that all the bolts connecting the outer frame, actuators and cabin are not loose according to the procedure described in the next section. Tighten if necessary.
Weekly	Verify that the snap rings in each of the universal joints are lodged in their grooves correctly according to the procedure described in the next section. The snap ring must be set securely in place.
Monthly	Check all weld areas of the frame and actuator described in the next section for cracks or other damage. None is acceptable.
Monthly	Check the actuator drive belt for indication of tears, cracks, or other damage. Exchange immediately if any damage is found.
Monthly	Clean the MSCU air filters and fan.
Every 6 Months	Lubricate the actuators with grease provided by manufacturer or equivalent.
Every 18 Months	Lubricate the joints with grease provided by manufacturer or equivalent
Every 2 Years	Replace the batteries of the UPS.

All inspections described below must be performed with all electrical POWER OFF. Attempting to carry out the processes with the power ON can cause serious injury to personnel due to abrupt motion and electrical shock.

7.2 INSPECTION OF CRITICAL BOLTS AND CONNECTIONS

The above figures indicate the location of critical bolts on Cycraft. These bolts hold up the cabin and can cause the cabin to drop if they come loose. They are marked with a white line after assembly so that misaligned marking lines can identify loose bolts easily.



Inspection Point	Part Picture	How to check
A		Hexahead bolt M12 x 8 points
		Lower joint of heave actuator is inside of MSCU so in order to inspect the bolts, the MSCU cover must be removed. Hexahead bolt M12 x 8 points
		Hexahead bolt M12 x 4 points
		Hexahead bolt M10 x 8 points
		Hexahead bolt M10 x 4 points (Lower) Hexahead nut M10 x 4 points (Upper)
F		

7.3 VERIFICATION OF SNAP RINGS

The universal bearings have two snap rings each which prevent the actual bearing

from popping out of its cage. Verify that the snap rings are lodged securely in their respective grooves. If any appear to be loose, push them back in place using a screw driver or other sharp object and check daily to make sure the problem does not repeat. If the problem persists, contact your distributor or manufacturer for a replacement part.

7.4 CHECKING WELD CONDITION

Visually check all the weld areas of the outer frame for signs of cracks or failure. None is acceptable. If any problems are found, contact your distributor or the manufacturer.

7.5 CHECKING THE ACTUATOR DRIVE BELT

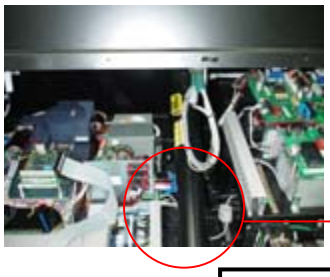
The actuator drive belt can be accessed by removing the belt cover as shown in the figure below.

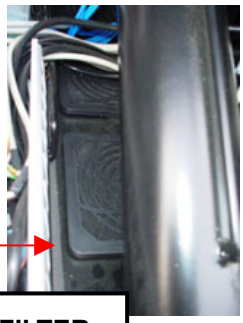
TOP ACTUATOR

Visually inspect both of the belts for wear or tear. If any damage to the belt is discovered, the belt must be replaced. Check the tension of the belt. If the belt is loose, it must be tightened. The procedure to replace and tighten the belt is described in the Installation and Service manual.

7.6 CLEANING THE MSCU AIR FILTERS AND FAN

The MSCU air filters and fans are located as shown in the above figure. They should be cleaned regularly to ensure proper ventilation and prevent excessive rise in electric component temperatures. Pull out the filter cover to access the filter. Take the filter out and clean with water. Ensure the filter is dry before replacing. Clean the ventilation fan with a damp cloth.





MSCU AIR FILTER

MSCU FAN

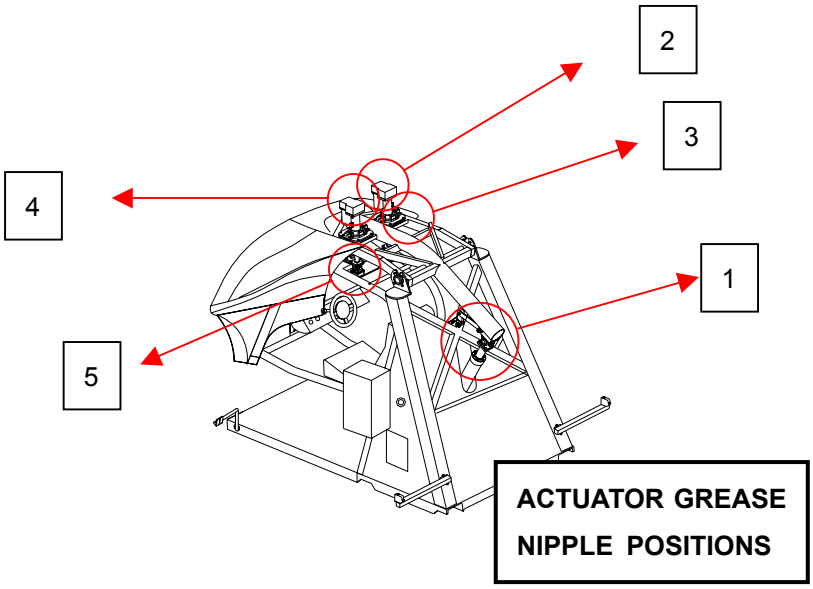
WARNING

Make sure water does not drip into the open circuitry in the MSCU during cleaning. Permanent electrical damage can occur.

7.7 LUBRICATING THE ACTUATORS

This maintenance work should be performed every 6 months.

1) Prepare grease gun with grease specified as below or equivalent:
   KLUBER HIMONAX WS433
2) Take off the actuator bellows and bearing covers and identify the grease nipples as shown in the figure below:



3) Inject grease in the amounts given in the table below for each of the components:

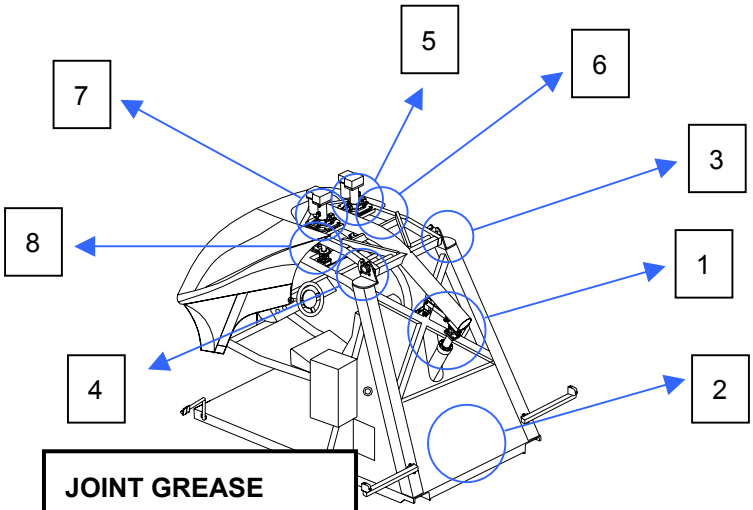
No.	Part	Picture	Amount of Grease
1	Heave Actuator Cylinder		60 grams
2,4	Top Actuators Cylinder		30 grams
3,5	Top Actuators Bearing		10 grams

4) Wipe away any excessive grease.
5) Play the game for at least three games and wipe away all excessive grease.
6) Replace all covers and bellows.

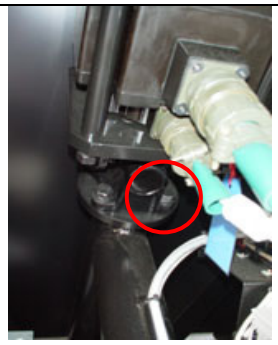
7.8 LUBRICATING THE JOINTS

This maintenance work should be performed every 18 months.

1) Prepare grease gun with grease specified as below or equivalent:
   KLUBER HIMONAX WS433
2) Identify the grease nipples as shown in the figure below.



3) Inject grease in the amounts given in the table below for each of the components :

No.	Part	Picture	Amount of Grease
	Heave Actuator Universal joint (Upper)		5 grams
	Heave Actuator Universal Joint (Lower)		5 grams
	Rocker Arm Joint		5 grams

5,6	Top Actuator Gimbal Joint		5 grams
	Top Actuator Universal Joint		5 grams
	Central Universal Joint		5 grams

4) Wipe away any excessive grease.
5) Play the game for at least three games and wipe away all excessive grease.
6) Replace all covers and bellows.

8. REPLACEMENT OF SERVICE PARTS.

STOP
IMPORTANT

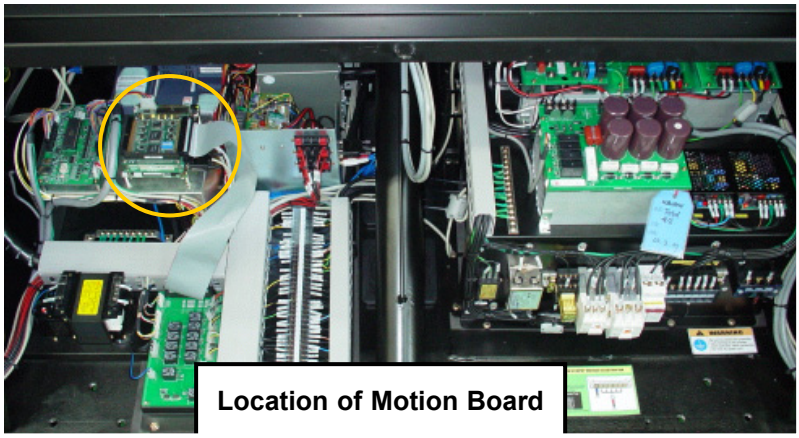
Only Qualified Service Personnel must carry out maintenance. Ensure that the main power is switched OFF and disconnected before attempting any work.

8.1 EXCHANGING THE COMPACT FLASH CARD

Cycraft's motion board inside the MSCU is programmed to log any occurrence of errors with relevant system status data onto a compact flash card. In case of unidentifiable problems, it can be recommended that the compact flash card be replaced by a duplicate (provided by the distributor) and the original one be returned to the manufacturer for analysis. Or, if the operator is capable, the error log file can be accessed from the compact flash card and sent to the manufacturer by the operator. Also, future program upgrades may require exchanging the compact flash card.

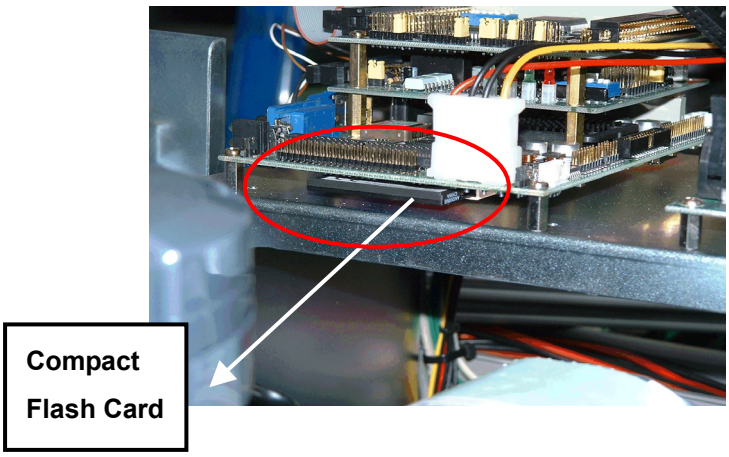
To remove the compact flash card,

1) Make sure all electrical power is OFF.
2) Locate the motion control computer in the MSCU and disassemble it from the floor plate by loosening the 4 screws in the corner of the computer board as shown in the figure.



Location of Motion Board in MSCU

3) Expose the underside of the computer board where the compact flash card is locat ed and pull the compact flash card out.



To re-install the compact flash card, follow the above process in reverse.

Once the compact flash card is removed, it can be sent to the manufacturer for analysis. Another way is to plug the compact flash card into a compact flash card reader connected to a PC and copy the file named **MCUErr.log**. This file can then be sent to the manufacturer for analysis.

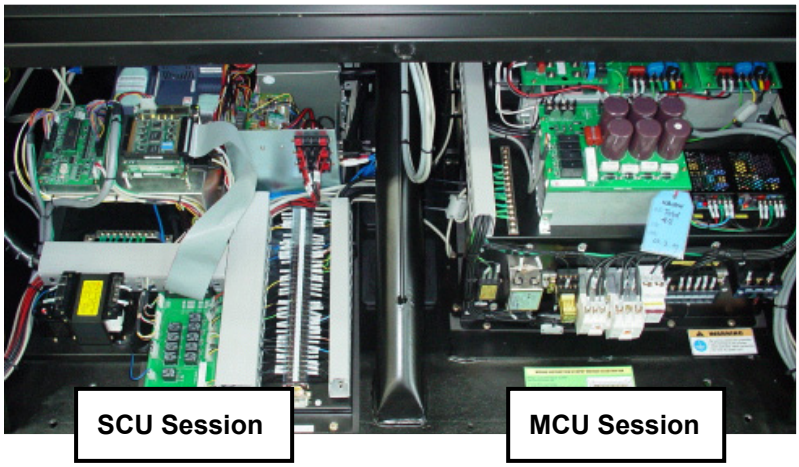
Do not attempt to take out or access the compact flash card unless instructed to do so by the distributor or manufacturer.

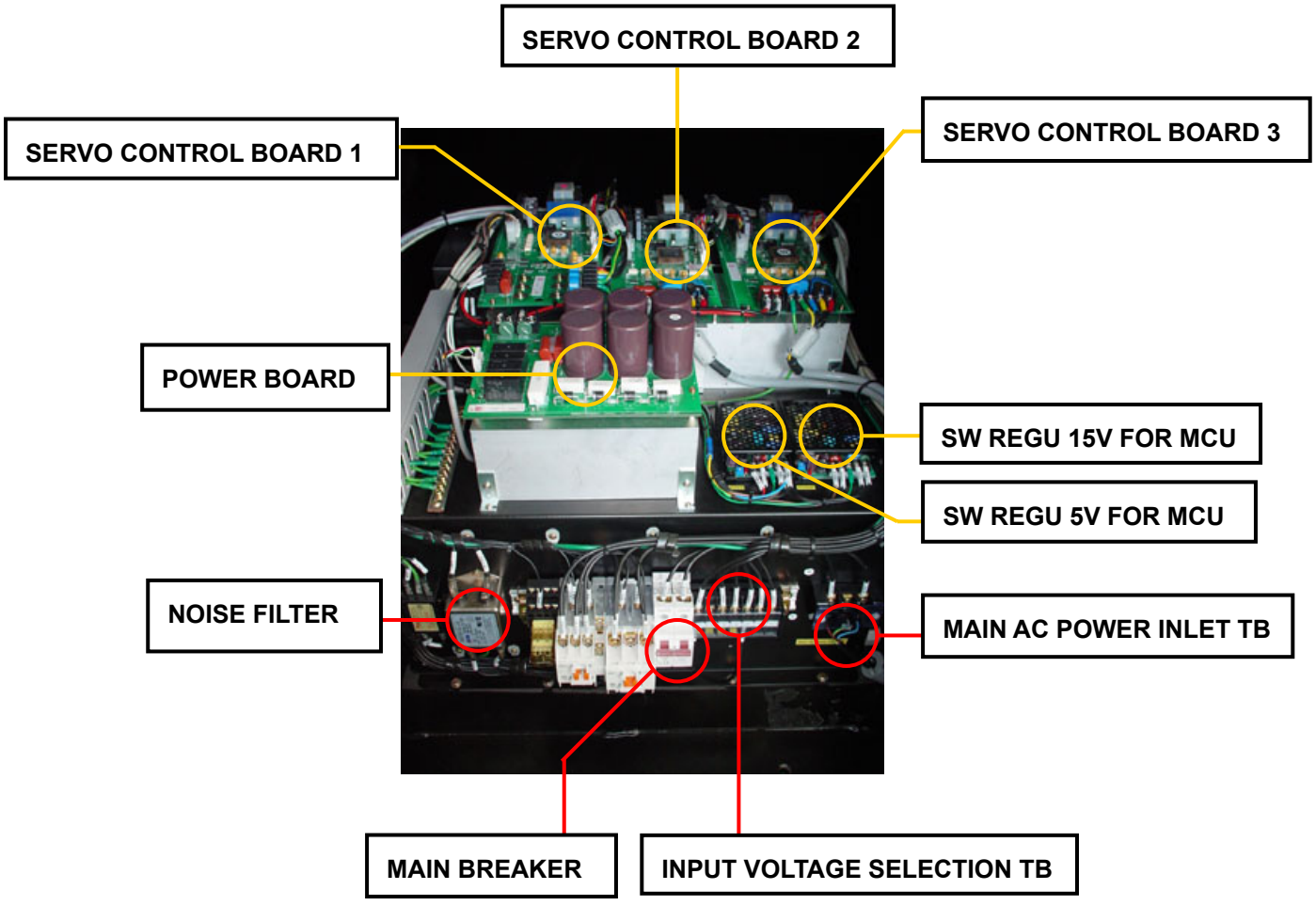
8.2 REPLACEMENT MSCU COMPONENTS AND BOARDS

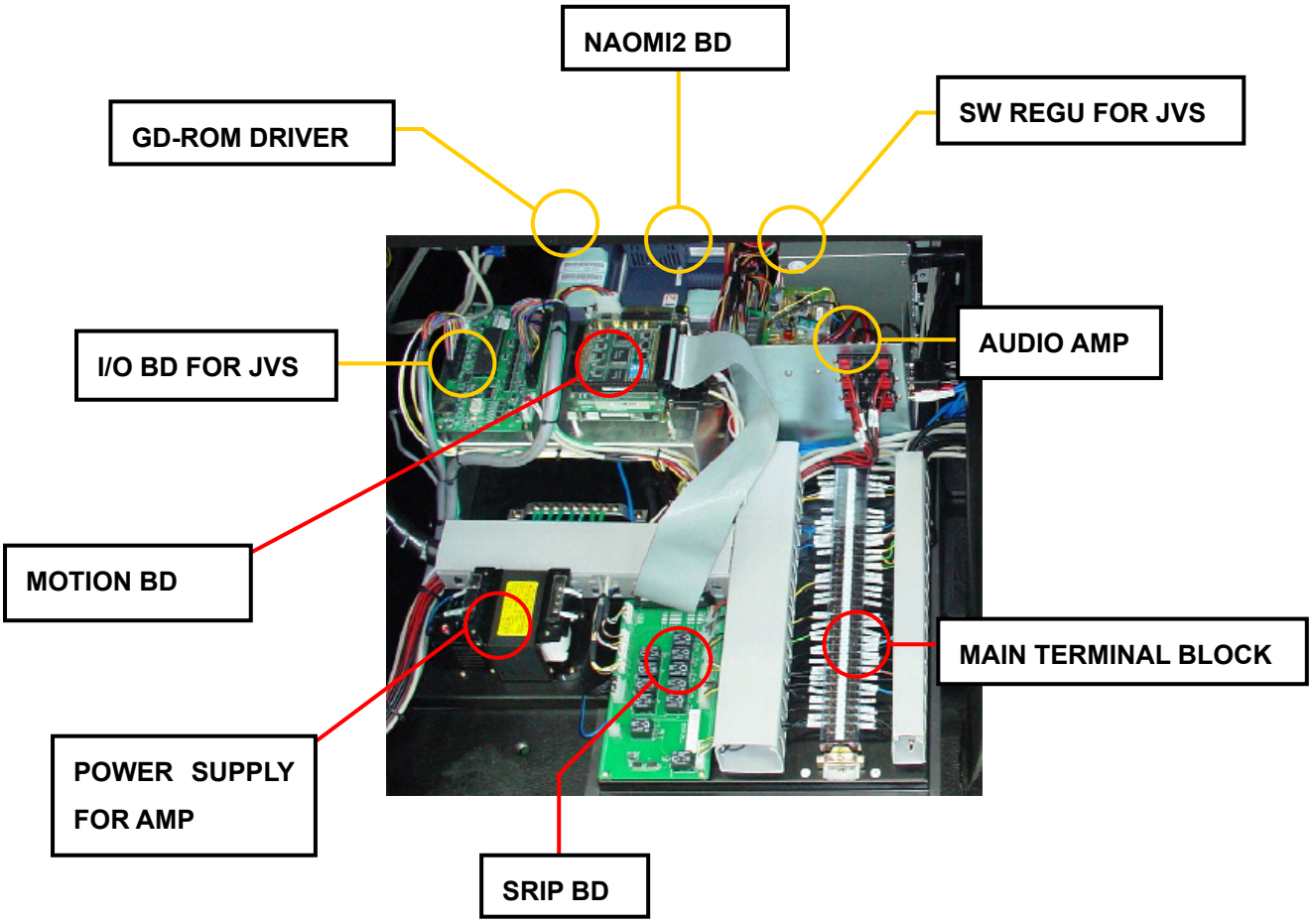
STOP
IMPORTANT

Turn off the power and disconnect the supply power before servicing.
This unit is to be serviced by trained personnel only.

1) The following pictures show the location of major modules, components and boards in the MSCU. Main power must be disconnected before any part is accessed or replaced. Only qualified maintenance personnel or serviceman should carry out replacement work. Replacement procedures of components and parts are mostly straight forward. However, if any questions arise or additional information is required, contact your distributor or Simuline Inc.

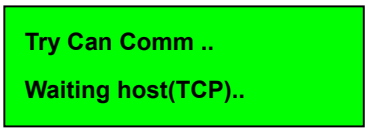
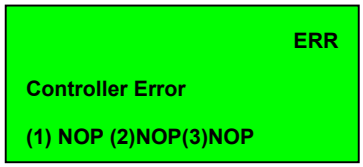

SCU Session
MCU Session


SERVO CONTROL BOARD 2
SERVO CONTROL BOARD 1
SERVO CONTROL BOARD 3
POWER BOARD
SW REGU 15V FOR MCU
SW REGU 5V FOR MCU
NOISE FILTER
MAIN AC POWER INLET TB
MAIN BREAKER
INPUT VOLTAGE SELECTION TB


NAOMI2 BD
GD-ROM DRIVER
SW REGU FOR JVS
I/O BD FOR JVS
AUDIO AMP
MOTION BD
MAIN TERMINAL BLOCK
POWER SUPPLY
FOR AMP
SRIP BD

9. TROUBLESHOOTING

9.1 TROUBLESHOOTING TABLE

No	Symptom	Probable Cause	Remedy
1	*The simulator does not move properly and the LCD screen on the MSCU front panel does not show "CAN" and it shows an*  *error message as*	The CAN communication line from the motion board to the MCU is not working properly.	Make sure that the CAN line is plugged in correctly on both the motion board and MCU sides
2	*The simulator does not initialize or move properly and the LCD screen shows an error message as following. Also, the "Power" LED on the SCU front panel does*  *not light up.*	Main power is not supplied because either the line is not live or because the emergency button is in the pressed position. Another probable cause may have controller error.	Check the lamp labeled "Power" on the MCU and the SCU. If the lamp on the MCU is off, check if the main power line live. If the MCU lamp is on and the SCU lamp is off, check E-Stop button is released by rotating it counterclockwise. Open the MCU box and check the circuit board was visibly damaged.
3	*During initialization, the simulator continuously jerks slightly and makes a ticking sound without initializing.*	The actuators are encountering a load too large for initialization. Either there is someone or something heavy inside the cabin or something is obstructing the motion.	Press the E-Stop button and remove whoever, or whatever is in the cabin. Power down the system and start again. If there is an obstruction, remove it.
4	*There is no sound.*	Speaker lines are disconnected or switched off or the volume is not set properly.	Check that there are no loose connections or switched off behind the speaker. Rotate the volume knob on

			the rear of the right speaker.
5	*The LCD screen on the SCU does not show any message after power up.* *Motion base does not initialize(when initializing, cabin moves slightly with jerks).*	Motion Board boot-up failure.	Open the door on the rear of the SCU. Hook up the extra monitor, Keyboard, mouse to the connectors labeled “Motion Board”. Check if the Motion Board boots up normally. If Motion Board has problem , contact technical support center for replacement.
6	*The simulator does not initialize.*	Controller module may have malfunction	Check the error message appeared on the LCD of the SCU. Refer to the controller error message list
7	*Some area on the cabin monitor has strange color* *The display is out of position or distorted.*	The monitor may be magnetized. The monitor may not be adjusted properly.	Press the degaussing switch on the **monitor adjustment control pad** inside the cabin front beside monitor. Adjust the monitor as the screen instructions with the control panel.
8	*Sound is too loud or low* *Vibration level on the seat is too high or low*	The sound level is not adjusted properly.	Change the volume setting on the back side of the operator panel.
9	*Steering wheel turns either to the left or to the right and then locks*	The Steering potentiometer may malfunction	Contact technical support center and ask for replacement.
10	*Coins is rejected*	Coins may be jammed	Reset the machine by powering down and up.

9.2 CONTROLLER ERROR MESSAGE TABLE

MCU Error Message (LCD display)	Meaning	Remedy
NOP	No motor power	• Verify that the 'Emergency Power Shutoff Switch' button on the SCU is released. • Verify that circuit breaker inside the MSCU is switched off caused by an error • Check the main power source in the building.
ECD	No Encoder Signal	Check the encoder line connections to the actuators and servo controllers
FLT	Fault	• Motor controller module may have a fatal damage if this happens repeatedly. • Replace the controller module, if necessary.
OVC	Over Current	• This error occurs when excessive current flows through the controller and motor. It can occur due to the following reasons: a. the actuators are overloaded because of excessive movement. b. The actuator has a mechanical problem causing excessive friction and/or abnormal vibration. c. too much grease is put in. • Replace the controller module or actuator as deemed necessary.
OVT	Over Temperature	• This error appears when the temperature of the power module on the controller is too high. • Replace the controller module, if necessary.
OVV	Over Voltage	• This error appears when output voltage from the Rectifier on the controller exceeds the standard voltage. • Check the input voltage value. • Replace the controller module, if necessary.
BLS	Bottom Sensor Error	• The actuator is extending or retracting beyond it's normal range of motion and is tripping the Limit Sensors on the upper and bottom stroke limits of each actuator. • Verify that the sensors are functioning properly.
TLS	Top Sensor Error	

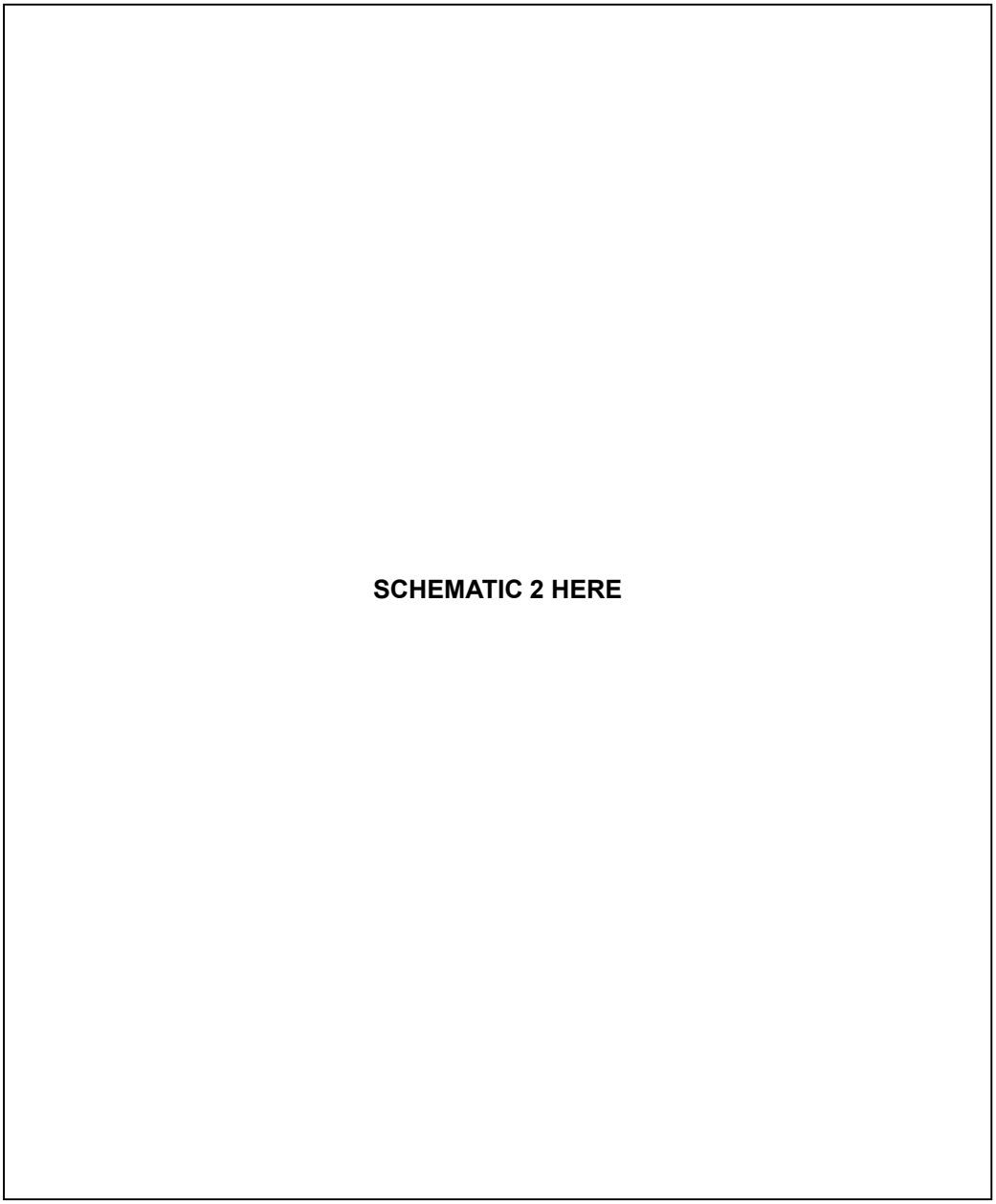
10. ELECTRIC SCHEMATICS

The following pages contain the electrical schematic for this machine.

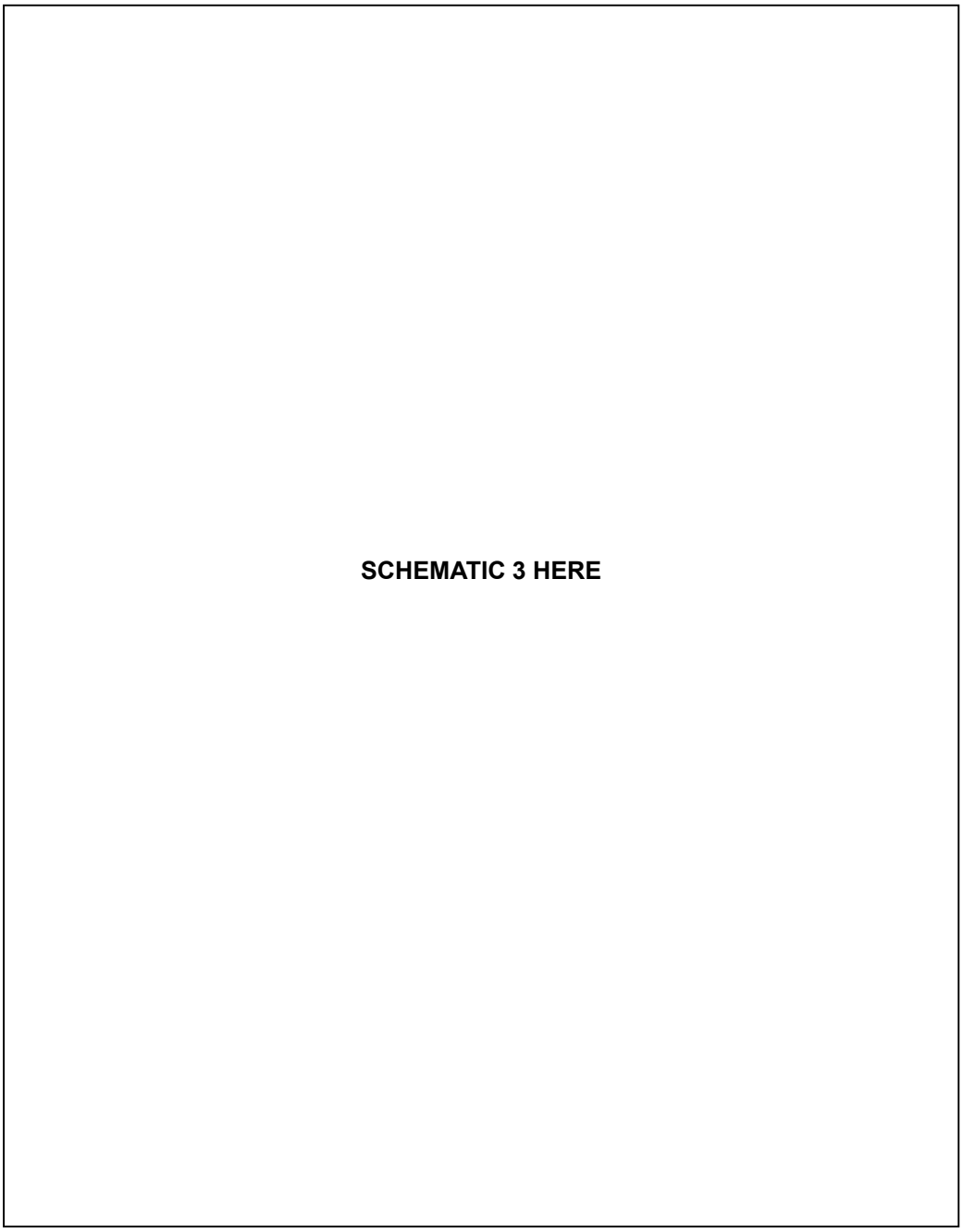
10.1 SCU SCHEMATIC

SCHEMATIC 1 HERE

10.2 Cabin Schematic



10.3 MCU Schematic



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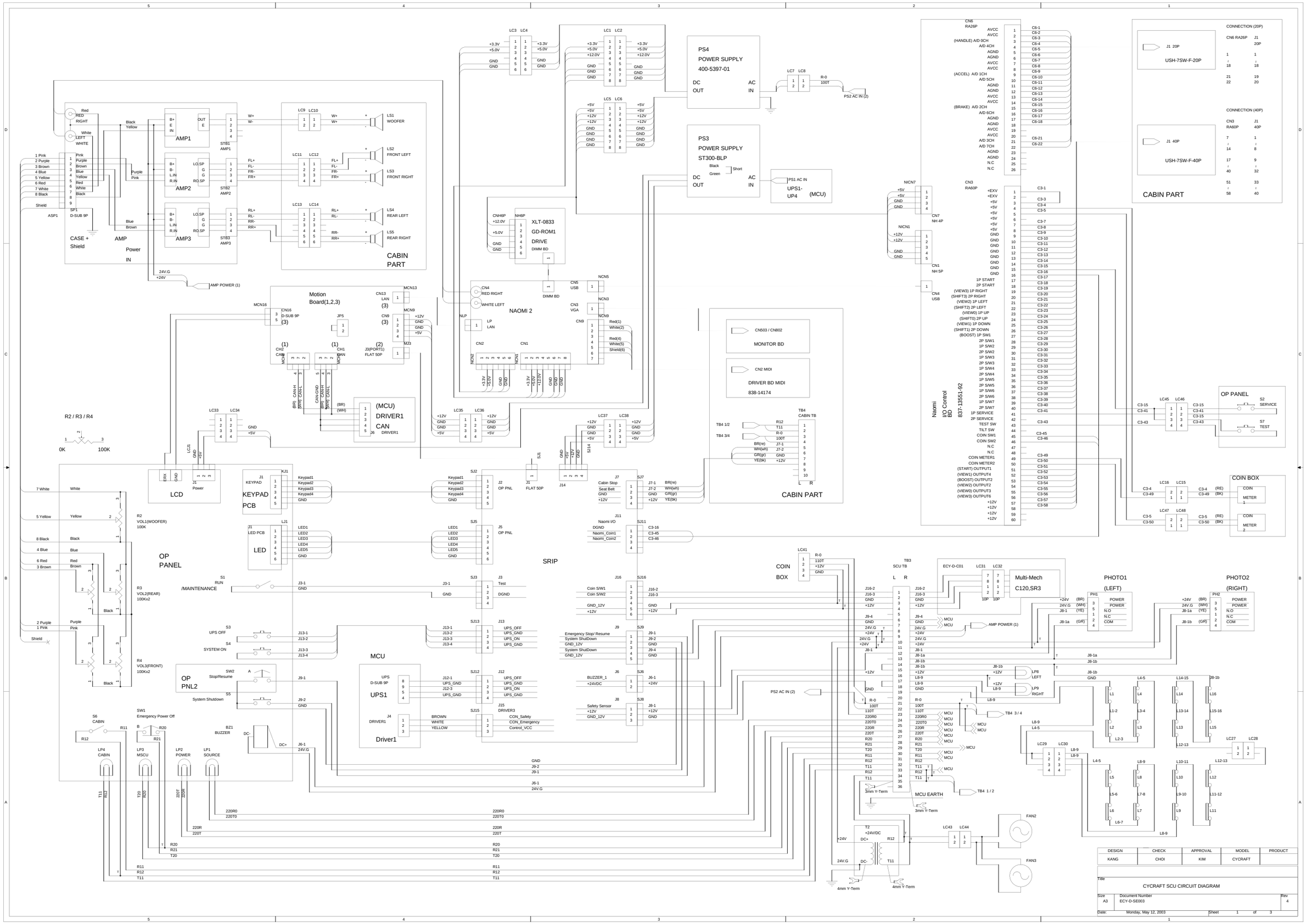
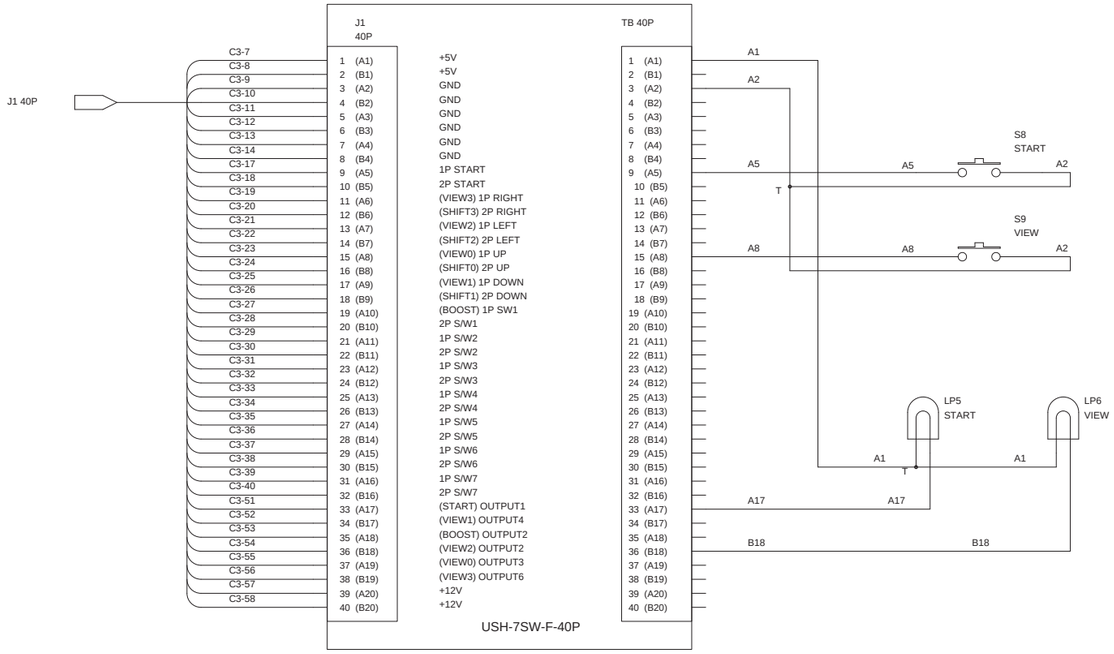
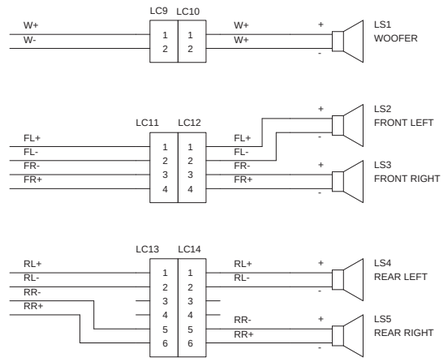
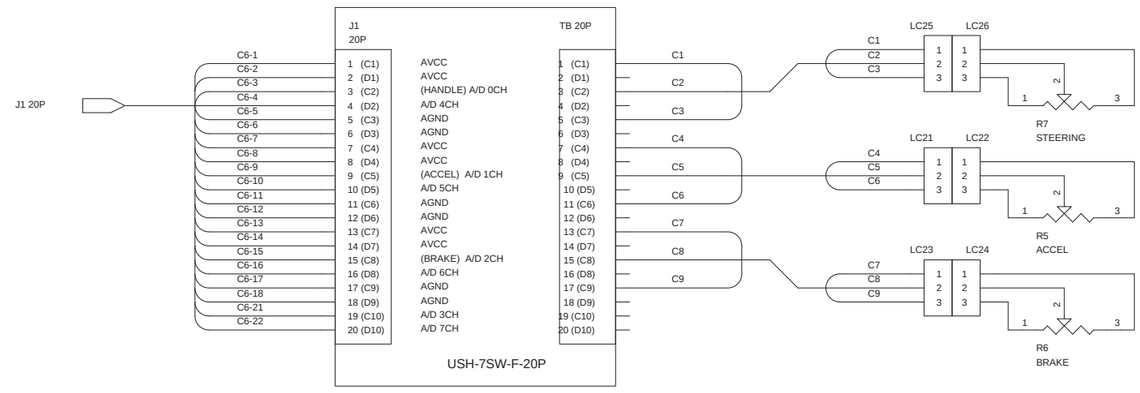
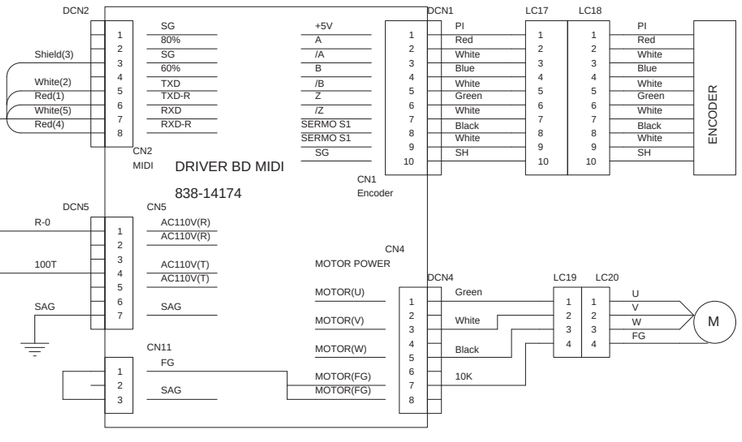
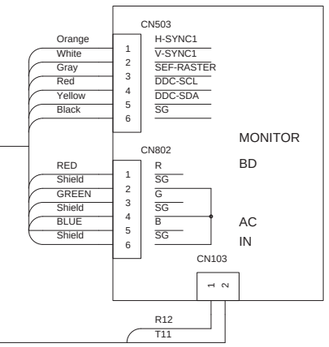

PS4
POWER SUPPLY
400-5397-01
DC OUT
AC IN
PS3
POWER SUPPLY
ST300-BLP
DC OUT
AC IN
PS1 AC IN
UPS1-UP4 (MCU)
PS2 AC IN (2)
XLT-0833
GD-ROM1 DRIVE
DIMM BD
NAOMI 2
Motion Board(1,2,3)
AMP1
AMP2
AMP3
AMP
CASE + Shield
Power IN
AMP POWER (1)
CABIN PART
CN6 RA26P
CN3 RA60P
CONNECTION (20P)
CONNECTION (40P)
USH-7SW-F-20P
USH-7SW-F-40P
Naomi I/O Control BD 837-13551-92
MONITOR BD
DRIVER BD MIDI
838-14174
CABIN TB
OP PANEL
LCD
KEYPAD PCB
LED
SRIP
MCU
UPS1
Driver1
OP PNL2
COIN BOX
SCU TB
Multi-Mech C120,SR3
PHOTO1 (LEFT)
PHOTO2 (RIGHT)
OP PANEL
SERVICE
TEST
COIN METER 1
COIN METER 2
FAN2
FAN3
MCU EARTH
R2 / R3 / R4
0K
100K
R2 VOL1(WOOFER) 100K
R3 VOL2(REAR) 100Kx2
R4 VOL3(FRONT) 100Kx2
DESIGN KANG
CHECK CHOI
APPROVAL KIM
MODEL CYCRAFT
PRODUCT
CYCRAFT SCU CIRCUIT DIAGRAM
Size A3
Document Number ECY-D-SE003
Rev 4
Date: Monday, May 12, 2003
Sheet 1 of 3

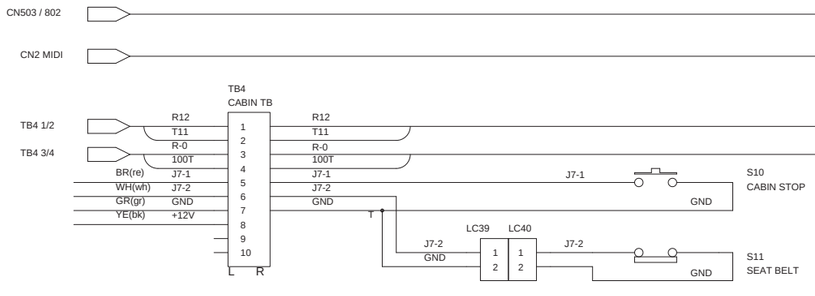


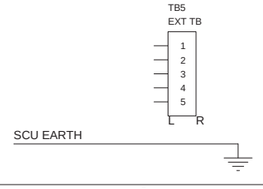












START, VIEW

Power +12V

DESIGN	CHECK	APPROVAL	MODEL	PRODUCT
KANG	CHOI	KIM	CYCRAFT	

Title: CYCRAFT CABIN CIRCUIT DIAGRAM

Size	Document Number	Rev
A3	ECY-D-SE004	4

Date: Saturday, April 26, 2003 Sheet 2 of 3

MAIN INPUT
POWER SOURCE
(WITH EARTH)

PRIMARY
EARTH

SCU TERMINAL
BLOCK

POWER
SUPPLY
ST300-BLS
(SCU)

SRIP
CON

SERVO
DRIVER
3

SERVO
DRIVER
2

SERVO
DRIVER
1

MOTION
BOARD

CAN

MOTOR
CONNECTOR PANEL

MOTOR
CONNECTOR PANEL

POWER
Board

WIRE COLOR

WHITE	WH
BROWN	BR
GREEN	GR
YELLOW	YE
GRAY	GY
PINK	PI
BLUE	BL
RED	RE
BLACK	BK
PURPLE	PU
ORANGE	OR

DESIGN	CHECK	APPROVAL	MODEL	PRODUCT
KANG	CHOI	KIM	CYCRAFT	

Title: CYCRAFT MCU CIRCUIT DIAGRAM

Size: A3 | Document Number: ECY-D-SE002 | Rev: 4

Date: Tuesday, May 13, 2003 | Sheet 3 of 3

KORTEK 2938DF

Game Monitor

Service Manual

Warning!

Only qualified service personnel should carry out maintenance on the product.

(KTA 0402 - 02 – 01)

CONTENTS

1. SCOPE

The monitor described in the followings is based on a 29" diagonal tri-color shadow mask CRT utilizing an in-line electron gun assembly.

This display device is composed of the CRT with deflection yoke,the small PCB containing the CRT socket and the large PCB containing the deflections,the micom circuits,the power supply and the video amplifier circuit.

This specification defines a high resolution 29" color monitor to be operated in analog drive mode input.

2. RELATED DOCUMENTS

2.1 Parts list.

2.2 Service manual

2.3 Product outgoing inspection specification.

2.4 Schematic & waveform of circuit.

3. EXTERNAL REFERENCE SPEC.

4. REGULATORY INFORMATION

4.1 SAFETY APPROVAL.

The system will be certified according to the following international safety standards.

* UL : UL1950
* CSA : CSA C22.2 NO1
* CE(LVD) : EN60950

4.2. ELECTROMAGNETIC INTERFERENCE.

The system will be certified according to the following international radiation standards.

* CE(EMC) : EN55022:97
* FCC : PART 15 CLASS A VERIFICATION

4.3 X-RADIATION.

The X-radiation emitted from this picture tube will not exceed 0.5mR/h for anode current combination.

X-radiation at a constant anode voltage varies linearly with anode current.

4.3.1 The system will comply with the following international standards.

* DHHS 21 CFR SUB CH J

5. GENERAL CHARACTERISTICS

5.1 OPERATION OF CONTROL PART.

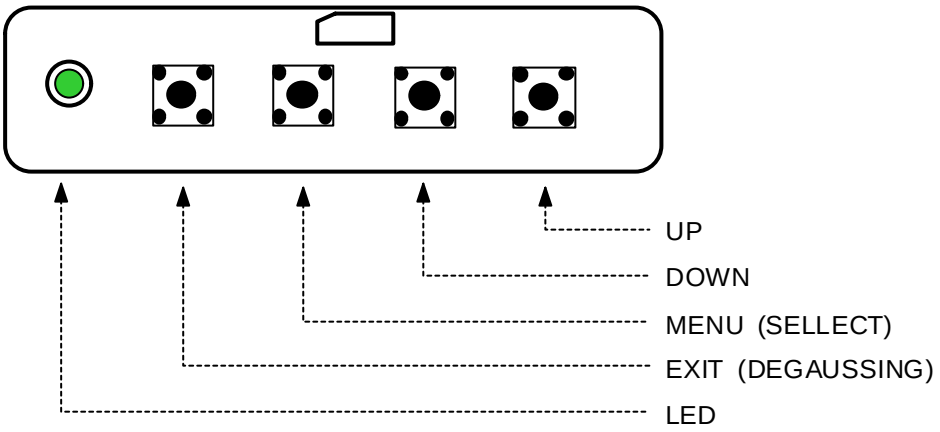
5.1.1 CONTROL BOARD

MENU(SELLECT) : In the beginning, starts the OSD controls.
In a sub menu, moves the control to the higher level.

EXIT(DEGAUSSING) : In the main menu, exits the OSD controls.

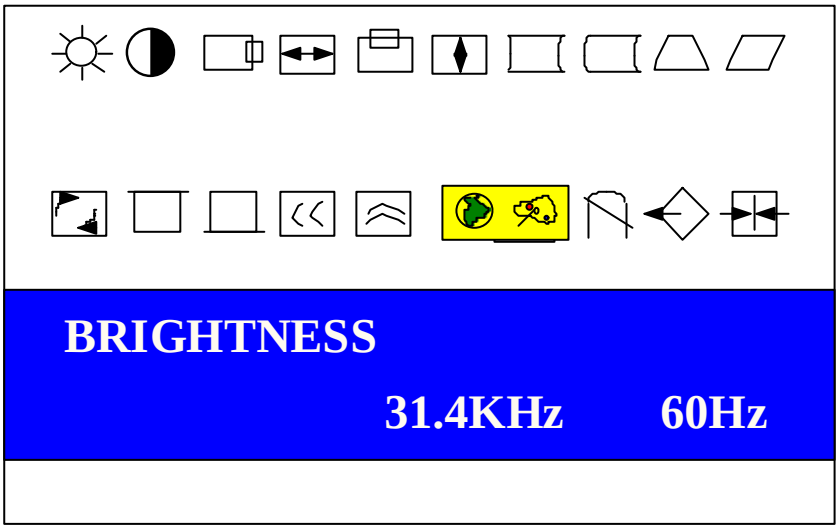
UP : In the beginning, proceeds to the contrast adjustment.
In the main menu, moves the control menu to the right.
In a sub menu, increase the adjustment.

DOWN : In the main menu, moves the control menu to the left.
In a sub menu, decrease the adjustment.

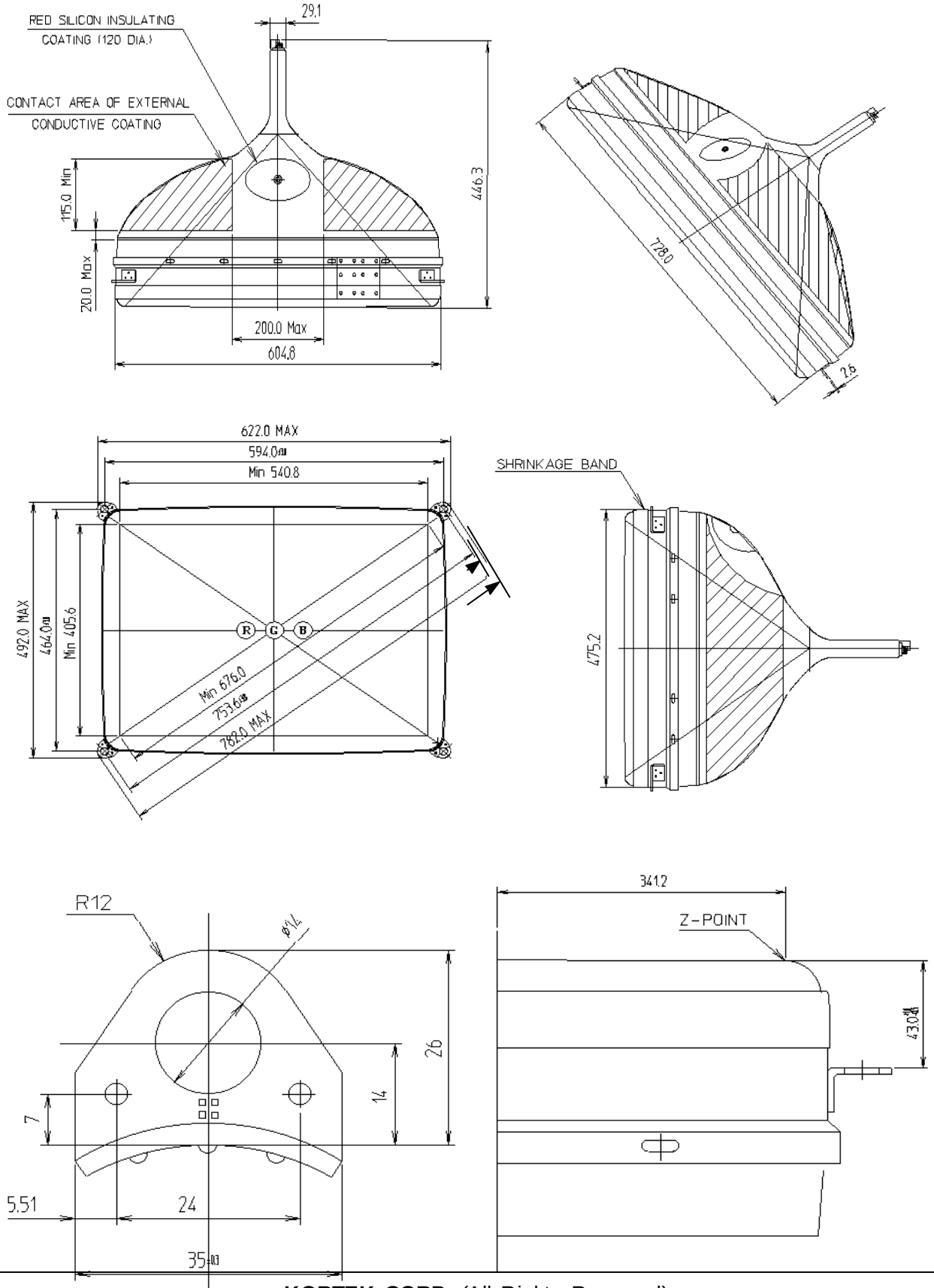


5.1.2 OSD MANUAL

1.BRIGHTNESS
2.CONTARST
3.H-POSITION
4.H-SIZE
5.V-POSITION
6.V-SIZE
7.SIDE-PINCUSHIN
8.PIN-BALANCE
9.TRAPEZOIDE
10.PARALOGRAM
11.ROTATION
12.TOP-CORNER
13.BOTTOM-CORN
ER
14.H-MOIRE
15.V-MOIRE
16.LANGUAIGE
17.COLOR-TEMP
18.DEGAUSSING
19.RECALL
20.ZOOM

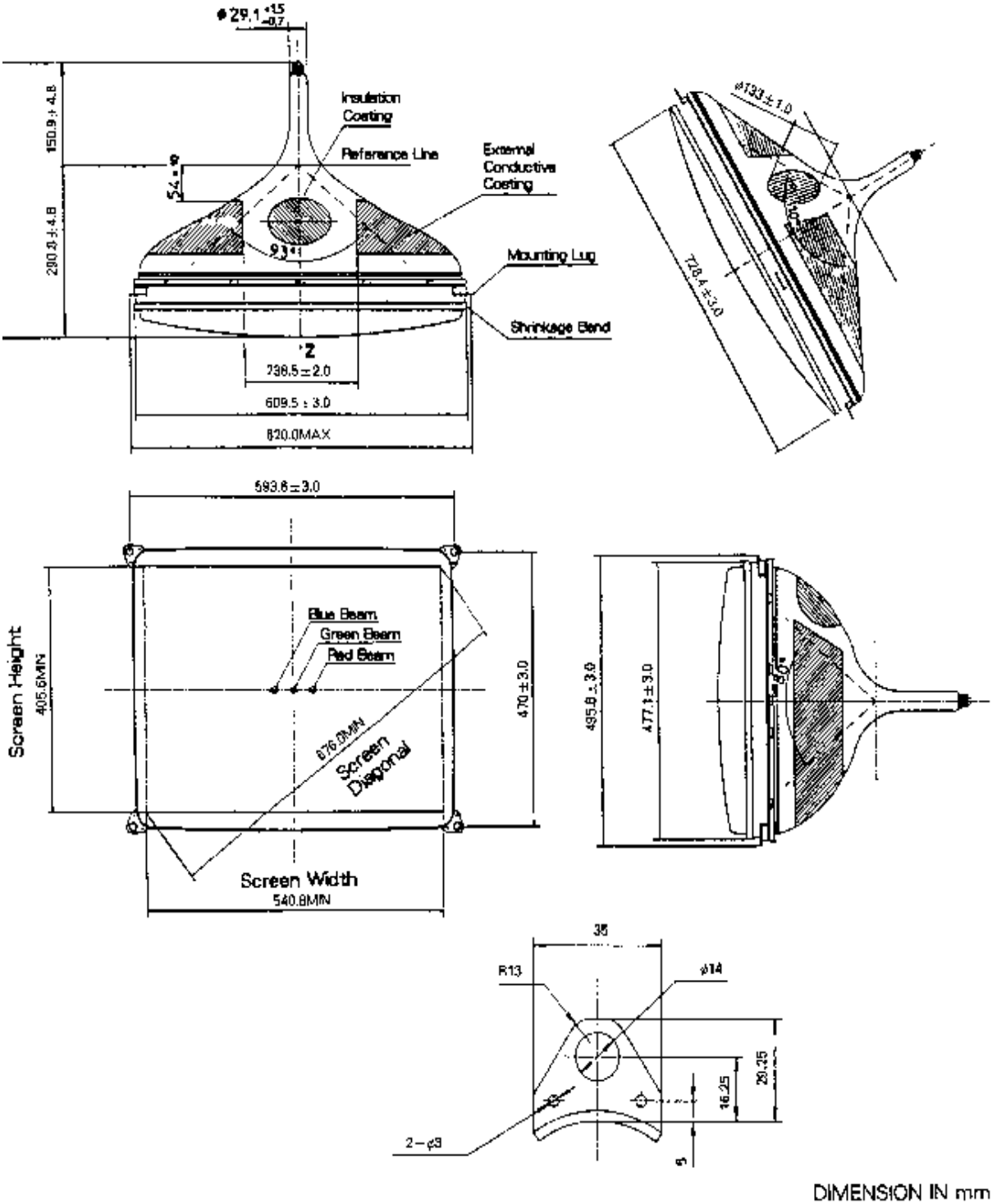


5.3.1. CRT DIMENSION.(SAMSUNG): KT-2938DF



5.3.2. CRT DIMENSION.(SAMSUNG) : KT-2938F

Attachment F.



Detail of mounting lug

5.4 SIGNAL CABLE & CONNECTION.

5.4.1 Signal cable

A shield signal interface cable must be intended as a part of the monitor.

The cable length shall be 1500 mm with a tolerance of ±50mm .

This cable shall be of a suitable type in order to comply with any

specification item , and shall be terminated in a 15 pin D-shell male

connector type FOXCONN D973292-8 or equivalent,with pin assignment as follows.

5.4.2 SIGNAL CABLE PIN CONNECTION (15 PIN D-SUB MINIATURE SIGNAL CONNECTOR WITH CABLE)

CONNECTION				REMARK
D-SUB 15PIN	IBM PC	WIRE COLOR	6P CONN 6P CONN	
1	RED	RED COAX-IN	6P CONN-1	
2	GREEN	GREEN COAX-IN	6P CONN-3	
3	BLUE	BLUE COAX-IN	6P CONN-5	
4	N.C	-	-	
5	GND	BLACK COAX-GND		
6	RED-GND	RED COAX-GND	6P CONN-2	
7	GREEN-GND	GREEN COAX-GND	6P CONN-4	
8	BLUE-GND	BLUE COAX-GND	6P CONN-6	
9	N.C	-	-	
10	ID	GRAY	6P CONN-3	
11	N.C	-	-	
12	SDA	YELLOW	6P CONN-5	
13	H-SYNC	ORANGE	6P CONN-1	
14	V-SYNC	WHITE	6P CONN-2	
15	SCL	RED	6P CONN-4	
SHELL	GND	BLACK	6P CONN-6	

5.4.3 BUYER CONNECTOR PIN CONNECTION (OPTION)

6. MECHANICAL CHARACTERISTICS.

6.1 PRODUCT DIMENSION.(unit : mm)

Description	With Frame	Packaging
Width	627	650
Height	540	575
Length	565	595

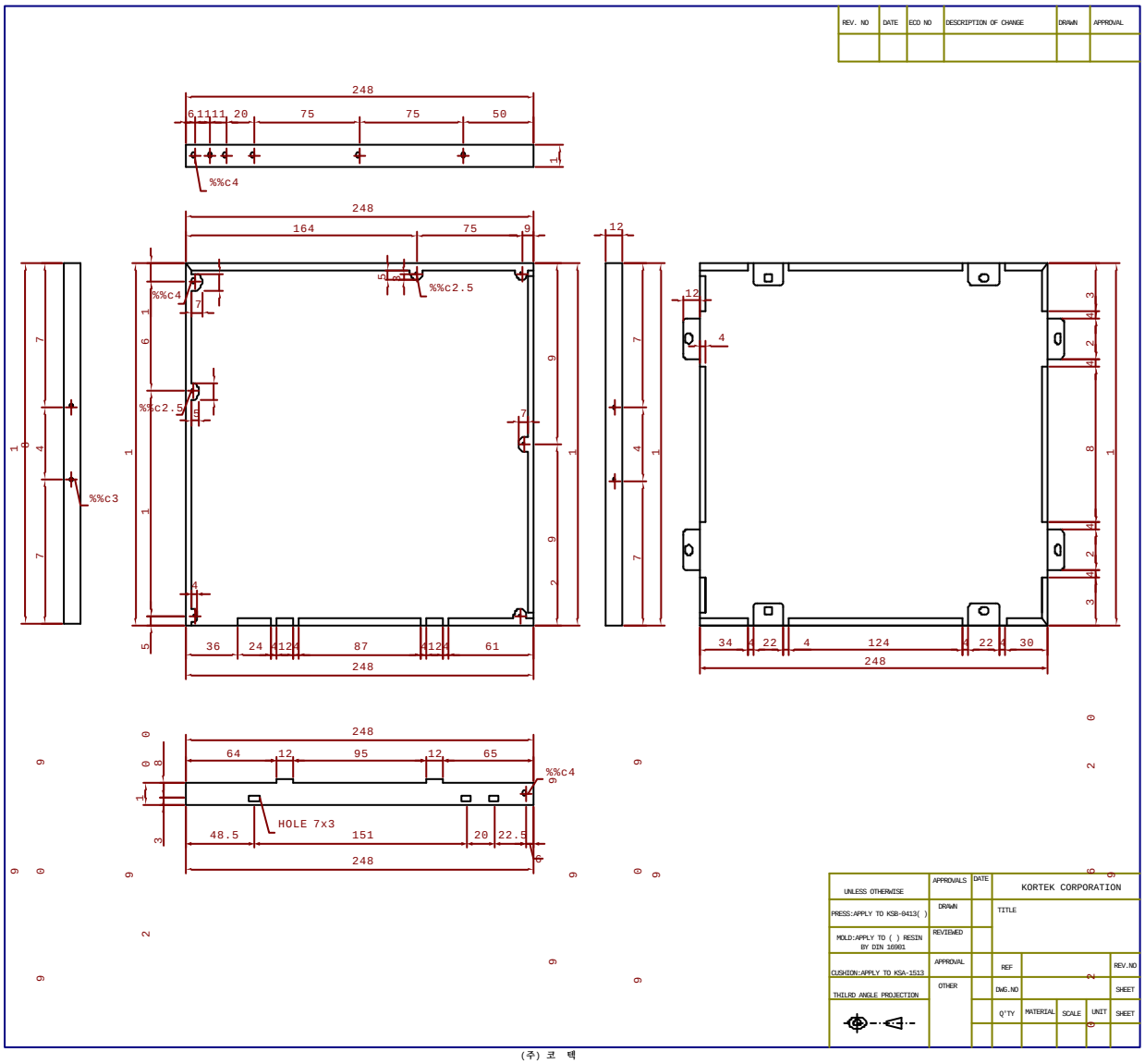
6.2 WEIGHT : NET 36 kg

GROSS 44 kg

6.3 MECHANICAL MATERIALS.

6.3.1 INTERNAL METAL PARTS.

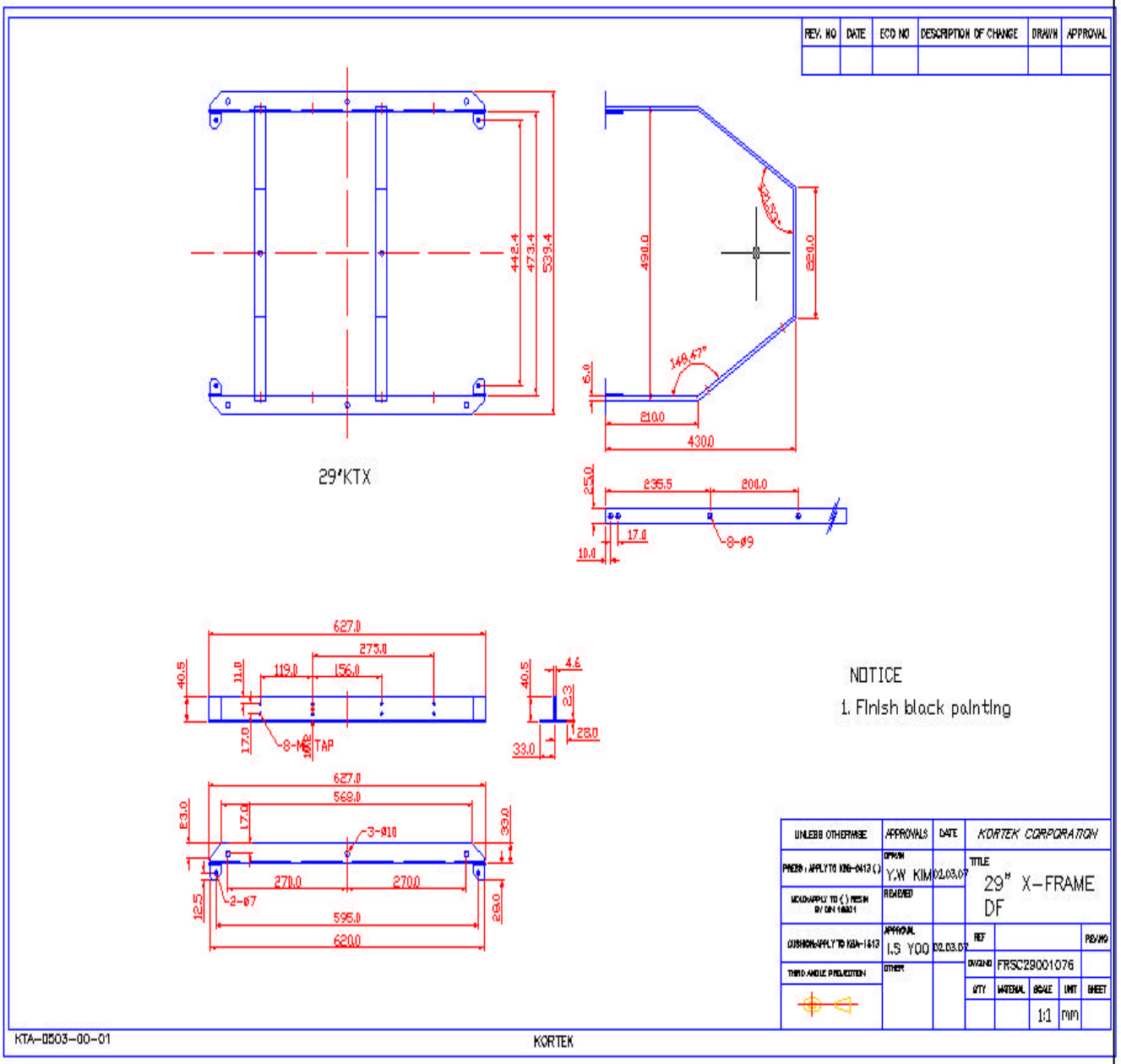
* PCB GUIDE CHASSIS DIMENSION



(주) 코 텍

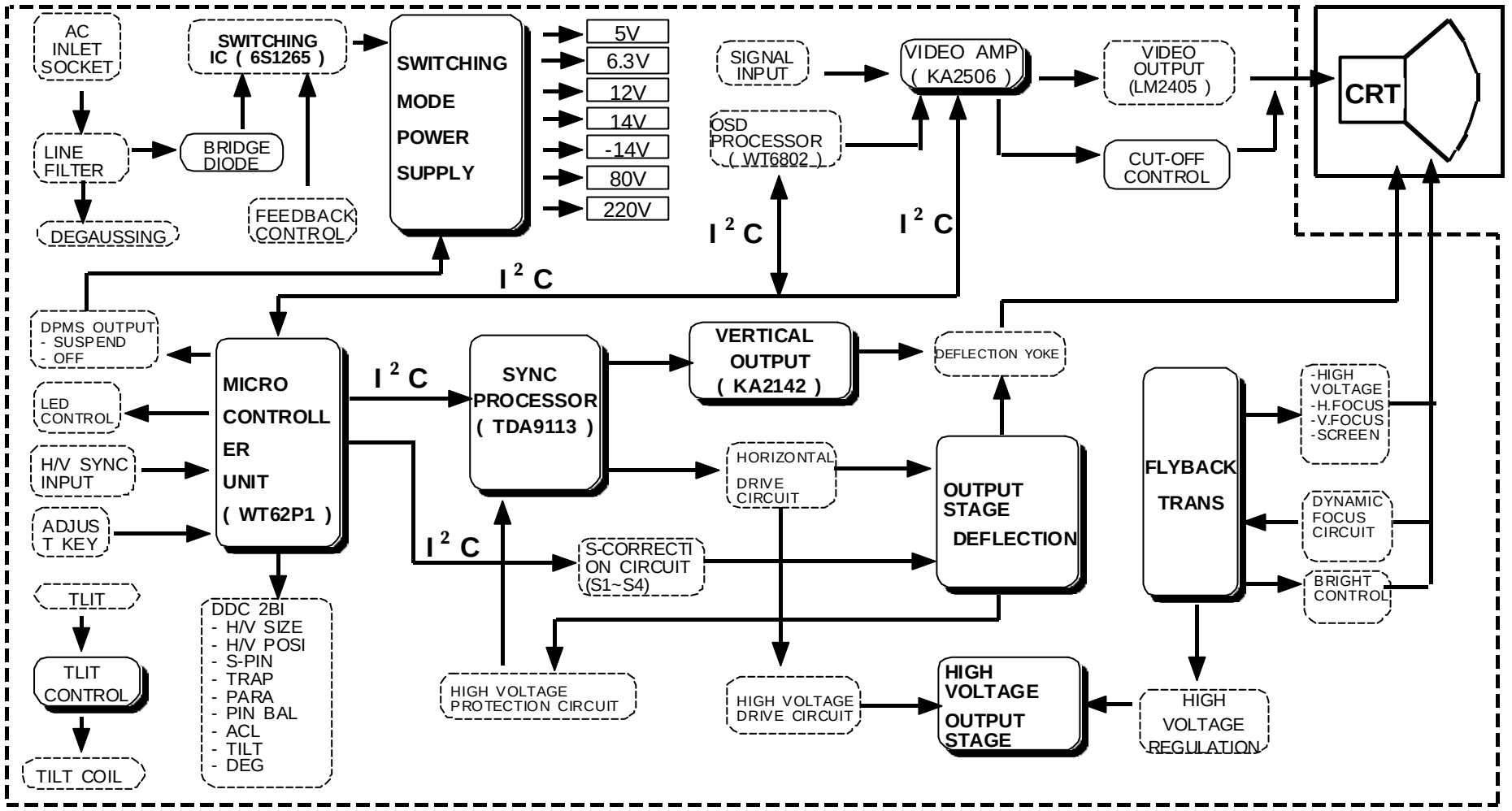
6.3.1 FRAME METAL PARTS.(BUYER OPTION) FRONT (STANDARD FRAME)

* MAIN FRAME CHASSIS (KORTEK STANDARD)



7.ELECTRICAL CHARACTERSISTICS.

7.1 BLOCK DIAGRAM



7.2 INPUT POWER.

The display device shall maintain the specified performances in the range described below.

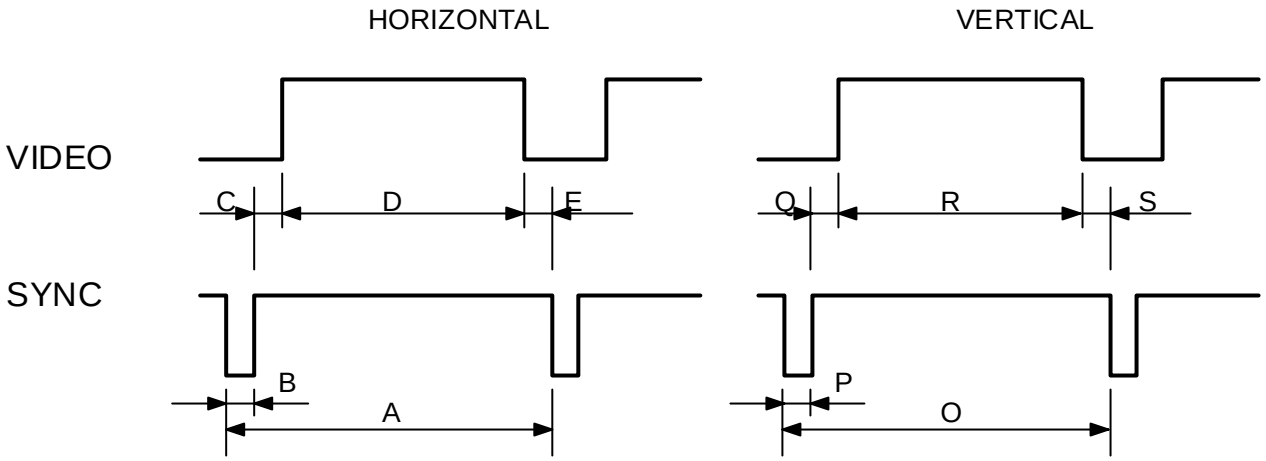
NO	DESCRIPTION	NOMINAL	REMARKS
1	Power Source	AC 100V ~ 240V	Universal Power
2	Frequency	50 ~ 60Hz	
3	Power Consumption	MAX. 140W	

7.3 SIGNAL & SYNS.TIMING

The input signals shall be applied to the display device through the signal cable which must be intended as part of the monitor.

SECTION	DESCRIPTION	NOMINAL	REMARKS
VIDEO SIGNAL RED GREEN BLUE	VIDEO INPUT	0.0 to 0.714Vp-p ANALOG	
	POLARITY	POSITIVE	
	PIXEL RATE	MAX. 40MHz	
	MAX. RESOLUTION	800 × 600 / 60Hz	
	INPUT IMPEDANCE	75 ohms	
SYNC SIGNAL	TYPE	SEPARATE H/V COMPOSITE H/V	
	POLARITY	POSITIVE OR NEGATIVE	
	FREQUENCY	HOR.: 30 40KHz VER.: 50 160 Hz	
	LEVEL	SEPARATE SYNC : HIGH ≥2.0V, LOW ≤0.8V	

7.4 TIMING CHART (FACTORY MODE)



DESCRPTION		I.B.M		VESA	
		720*400	640*480	640*480	800*600
H	f KHz	31.469	31.469	37.860	37.88
	A uS	31.778	31.778	26.413	26.40
	B uS	3.813	3.813	1.270	3.20
	C uS	1.907	1.907	4.603	2.20
	D uS	25.422	25.422	20.317	20.00
	E uS	0.636	0.636	0.762	1.00
	POL.	NEG	NEG	POS	POS
V	f Hz	70.087	59.940	72.809	60.317
	O mS	14.268	16.683	13.735	16.58
	P mS	0.064	0.064	0.079	0.11
	Q mS	1.080	1.048	0.740	0.61
	R mS	12.711	15.253	12.678	15.84
	S mS	0.413	0.318	0.238	0.03
	POL.	POS	NEG	POS	POS

8. ADJUSTMENTS

8.1 DEFLECTION CIRCUIT ADJUSTMENT

8.1.1 Screen position adjustment. (H-SHIFT,V-SHIFT)

* Receive a cross-hatch pattern signal of all factory preset mode.
* Adjust H-SHIFT,V-SHIFT for the screen position to center.

※ NOTE : All of the user control functions are adjustable when the OSD appears on the screen.

8.1.2 Horizontal size adjustment. (H-SIZE)

* Adjust contrast and brightness controls to maximum.
* Receive a cross-hatch pattern signal of all modes.
* Adjust H-SIZE for the horizontal size equal to 400±3.0 mm.

8.1.3 Vertical size adjustment. (V-SIZE)

* Adjust contrast and brightness controls to maximum .
* Receive a cross-hatch pattern signal of all modes.
* Adjust V-SIZE for the vertical size equal to 295±3.0 mm.

8.1.4 Pincushion adjustment. (Pincushion)

* Receive a cross-hatch pattern signal of all modes.
* Adjust Pincushion for compensation of the east/west distortion.

8.1.5 Trapezoidal adjustment

* Receive a cross-hatch pattern signal of all modes.
* Adjust TRAPEZOIDAL for compensation of the geometric distortion..

8.1.6 Parallelogram adjustment

* Receive a cross-hatch pattern signal of all modes.
* Adjust PARALLELOGRAM for compensation of the geometric distortion.

8.1.7 Pin Balance adjustment

*Receive a cross-hatch pattern signal of all modes.

*Adjust PIN BALANCE for compensation of the geometric distortion.

8.2 VIDEO CIRCUIT ADJUSTMENT.

8.2.1 Control function.

* Contrast control

  This function controls the contrast of the screen, and determines the gain of the video amplifier.

* R,G,B-GAIN controls.

  These controls are used for adjusting the gain of RED,GREEN,BLUE video signals.

* R,G,B-BIAS controls.

  These controls are used for adjusting the RED,GREEN,BLUE bias-voltage of Cathode.

* Focus control. (On the FBT)

  This controls determines the optimum focus of the screen.

8.3 THE ADJUSTMENT OF WHITE BALANCE.

* Adjust the screen V/R control slowly so that voltage of G2 is equal to 500 ~ 600 volt.
* Operate the monitor for 15 minutes in order to warm up the CRT and circuits.
* Degauss the CRT face fully with degaussing tool.
* Adjust brightness and contrast to the 80% value.
* Receive a raster pattern of 800*600 38KHz,60Hz mode.
* Adjust R,G,B-BIAS controls so that the raster becomes white and luminance is 0.5(F/L) and for the specified color coordinate.
* Receive a one ball white pattern of 800*600 38KHz,60Hz mode.
* Adjust R,G,B-GAIN controls for the specified white color with the color analyzer.
* Receive a full white screen of 800*600 38KHz,60Hz mode.
* Adjust ACL controls for the specified luminance with the color analyzer.

◆ SPECIFICATIONS.

※ Standard color coordinate.(BRT,CONT; 80%)

* 6500 °K ; X=0.313 ± 0.02 Y=0.329 ± 0.02

* 9300 ◦ K ; X=0.281 ± 0.02 Y=0.311 ± 0.02

※ Maximum brightness : BRT,CONT ;MAX

· With full white pattern ; 25 30 F/L (9300&6500◦ K) ☞ BUYER OPTION

· With one ball white pattern ; 45 50 F/L (9300&6500◦ K) ☞ BUYER OPTION

· Checking area : Center of display.

9. DISPLAY REQUIREMENTS

9.1 Engineering check and test equipment

9.1.1 Engineering check

This specification defines a high resolution 29" color monitor to be operated in analog drive mode.

This procedure defines test & inspection requirements, and acceptance criteria for visual and functional characteristics.

9.1.2 Test equipment.

1.Personal computer or signal generator, test program(software) for color monitor.

2.Color-Analyzer (CA-100).

3.Display template for screen adjustment.

9.2 Engineering check point.

9.2.1 Packaging.

Check the packaging to make sure the unit is in a shippable condition.

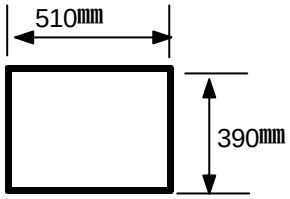
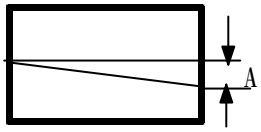
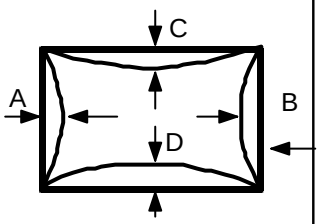
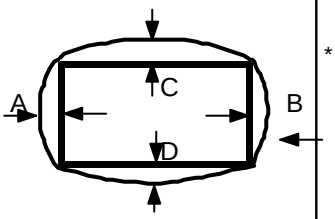
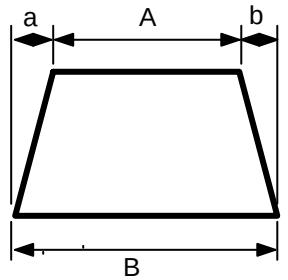
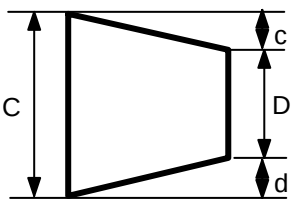
The following items shall be verified.

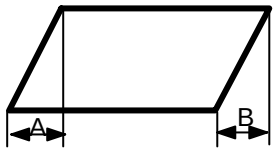
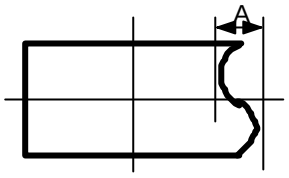
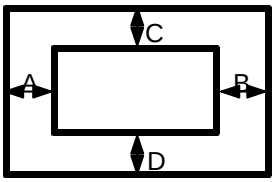
* BOX.

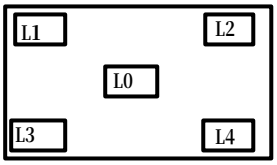
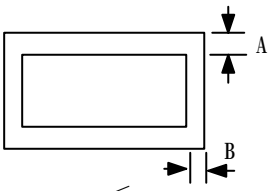
* LABEL

9.2.2 Enclosure

The monitor,intended as a finished product,shall comply with any ergonomic and safety specification contained in box.

NO	ITEM	SPECIFICATION	REQUIREMENT	Pattern
1	VISUAL		Standard direction : N/E (all items)	
1-1	DISPLAY SIZE (Standard)		A. Display the cross hatch pattern. B. The size must be adjustable to the followings by using user's control for all specified mode. * Horizontal size : 510±3㎜. * Vertical size : 390±3㎜ .	Cross-hatch (640/60Hz)
1-2	LINEARITY	Linearity $\frac{Lmax-Lmin}{Lmax+Lmin} \times 100\%$	A. The linearity of screen must be displayed on the CRT within the spec.(Horizontal and vertical) * Ver : ≤ 5% Hor : ≤ 5%	16×12 square pattern (640/60Hz)
1-3	TILT		A. The tilt must be within the limit of the spec. * A = ± 2㎜ MAX.	Cross-hatch pattern (640/60Hz)
1-4	DISTORTION 1)PINCUSHION		* Maximum allowable error; A,B : Lessthan 3.0 mm C,D : Lessthan 3.0 mm	"
	2)BARREL		* Maximum allowable error; A,B : Lessthan 2.0 mm C,D : Lessthan 2.0 mm	"
	3)TRAPEZOID	 	* | A-B | ≤2.0 mm * | C-D | ≤3.0 mm * a,b,c,d ≤ 3.0 mm	"

NO	ITEM	SPECIFICATION	REQUIREMENT	Pattern
1-4	4)PARALLELOGRAM		* A,B ≤ 3.0 mm	Cross-hatch (640/60Hz)
	5)"S" CURVE		* A ≤ 3.0 mm	"
1-5	DISPLAY-CENTER		* | A-B | ≤6 mm * | C-D | ≤4 mm * The maximum variation of the display center have to be within the spec.	"
1-6	FOCUS	* Visual test	* Cut off the back raster. (0.07F/L) * Adjust contrast maximum or 45F/L at one ball white pattern. * Change pattern to "windows-me pattern". * Check the focus of the dots,bars, and characters.	Windows-me pattern (640/60Hz)
1-7	JITTERING	* Visual test	* There shall be no jitter when the screen is viewed from 45 Cm	
1-8	MIS CONVER-GENCE	* A zone(Φ390mm circle):0.25mm MAX * B zone :0.35 mm max.	* Measure the distance between red, green and blue lines with a micro-scope after the proper adjustment of white balance.	Cross-hatch
1-9	ACOUSTIC NOISE	* Not any audible sound	* During the display operating, it has not to be any audible sound.	"
1-10	WHITE BALANCE	* 6500◦ K X=0.313 ± 0.02 Y=0.329 ± 0.02 * 9300◦ K X=0.281 ± 0.02 Y=0.311 ± 0.02	* The white color coordinates in the center of the surface of CRT after proper adjustment of white balance * Cont; 80% (DEFULT VALUE)	Full white pattern (0.7V Level)
1-11	WHITE COLOR TRACKING	* 6500◦ K X = 0.313±0.02 Y = 0.329±0.02 * 9300◦ K X = 0.281±0.02 Y = 0.311±0.02 * 10 F/L and MAX	* Set contrast control at 10 and MAX * Measure it in the center of CRT. * No one color shall achieve domina-nce,when the standard white color is displayed at all the allowed settings of the contrast control.	"
1-12	PURITY	* Visual test	* After degaussing,it has not to be any perceptible color shift in the scanning area while viewing a primary color field at 30 cm's distance.	R,G,B Primary color pattern
1-13	RASTER REGULATION	* Less than 2.0 mm at one side	* Measure it from minimum to maximum luminance at full white screen.	Full white pattern (640/60Hz)

NO	ITEM	SPECIFICATION	REQUIREMENT	Pattern
1-14	BRIGHTNESS UNIFORMITY	* More than 75%	* Measure it at center contrast to 25 F/L,BRT : cut-off	Full white pattern
1-15	WHITE UNIFORMITY		* BRT ; max CONT ; max. * COLOR MODE ; 9300◦ K * The X or Y coordinate between any position in the entire display area shall not vary more than 0.015 * X of L1,L2,L3,L4 ≤ X of L0±0.015 Y of L1,L2,L3,L4 ≤ Y of L0±0.015	"
1-16	MOIRE	* Visual test	* No any visible moire at 20F/L, "A"Zone (Ψ350mm circle) * Full white pattern (800×600/60Hz)	Full white pattern
1-17	MODE CHANGE	* Visual test	* Upon changing modes,the display image must be stable and meet all image performance specifications within 1.0 second. * Mute time must be longer than the input signal recognition time.	all modes
1-18	LUMINANCE	* FULL WHITE PATTERN : 25 27 F/L * ONE BALL WHITE ; 45 50 F/L * MINIMUM LUMINANCE : LESS THAN 3F/L	* CONTRAST : MAX * 9300◦ K,6500◦ K * MINIMUM LUMINANCE : CONTRAST : MIN. BRIGHTNESS : MIN.	Full white pattern (800X600 / 60Hz)
1-19	GRAY SCALE LINEARITY	* VISUAL TEST	*CONTRAST : MAX. ;The 16 step gray bars shall be distinguishable. *CONTRAST : MAX. ;More than 15 step gray bars are distinguishable.	16 gray pattern (800X600 / 60Hz)
1-20	RASTER LUMINANCE	* 0.5 F/L (BUYER OPTION)	* CONTRAST ; MAX. * 6500 ° K; X=0.313 ± 0.02 Y=0.329 ± 0.02 * 9300 ° K; X=0.281 ± 0.02 Y=0.311 ± 0.02	800X600 / 60Hz
1-21	DYNAMIC REGULATION	* LESS THAN 1.0mm ONE SIDE	*CONTRAST:MAX. *USE HORIZONTAL BAR PATTERN	800X600 / 60Hz
1-22	SIZE CONTROL RANGE	* HORIZONTAL : LESS THAN 450mm,MORE THAN OVER SCAN * VERTICAL : LESS THAN 350mm,MORE THAN OVER SCAN		CROSS-HATCH 800X600 / 60Hz
1-23	TOTAL DISTORTION	 A,B ≤3.0 mm	* In case of factory preset mode,the image performance meets specification without user adjustments. * In case of user mode,the image performance meets the specifications with user adjustments.	CROSS-HATCH (800X600 / 60Hz)
1-24	BENT ON TOP	LESS THAN 0.5mm		CROSS-HATCH (800X600 / 60Hz)
1-25	SPOT	VISUAL TEST	*No any visible spot at power-off *No any visible spot at mode change	"
1-26	RINGING	VISUAL TEST	*Ringing, vertical black bar shall not be visible to the eye when viewed at 50cm from CRT surface and video is positioned center.	FULL WHITE (800X600 / 60Hz)
1-27	OSD Color&Position	VISUAL TEST	*No discolor *In case of factory preset mode, OSD display is located at just center position.	All modes
1-28	OSD NOISE& distorion	VISUAL TEST	*No visible OSD distortion &Noise	All modes

9.2.4 CRT SPECIFICATIONS

1) Screen and faceplate blemishes

Set up the tube as described in section2 and adjust each gun to provide approx. 8 feet lamberts of 9300 ℃K+MPCD.or 6550 ℃K+MPCD. light at the center of the screen.The screen should be viewed with blanked raster at a distance of 2 feet. Defects not visible at this viewing distance are considered acceptable. Ambient light level at the tube face should be approx. 0.1 foot candle

① Quality zones:The screen quality area is divided into two quality zones.

Zone A ····· The central rectangle of the screen horizontal 270mm by vertical 213mm on the screen.

Zone B ····· Out side of zone A on the screen.

2) Degree of contrast

The degree of contrast of blemishes is determined by using a set of neutral

A	B	C	Clear
0.4	0.1	0.2	

Clear slide mount

density filter mounted as described below.

spot conrast comparater

A(0.4) filter:Kodak wratten gelatin filter N0.96 N,D.0.4

B(0.1) filter:Kodak wratten gelatin filter N0.96 N,D.0.1

C(0.2) filter:Kodak wratten gelatin filter N0.96 N,D.0.2

The filter is held at arm's length(2 feet min.)against the tube which is moved laterally so that the spot in question may be viewed in sucessively denser filters.

The degree of contrast is determined as indicated below:

*High contrast spot :Spots which are visible through an 0.1 filter are immediately visible upon entering an adjacent 0.4 filter.

*Medium contrast spot:Spots which are visible through an 0.1 filter but disappear momentarily upon entering an adjacent 0.4 filter.

*Low contrast spot :Spots which are visible through an 0.1 filter but disappear momentarily upon entering an adjacent 0.2 filter.

3) Blemish size

① Blemish size:

The size of a round blemish is equal to its diameter.

The size of an irregularly shaped blemish is equal to its equivalent diameter defined as the average of the major and minor axes.

A blemish shall be defined as a visible spot or flaw occuring on the screen or glass.

② Defect classification

Medium and high contrast screen and faceplate blemishes are measured and defined as being in one of the following size classes.

Size class	Equivalent diameter of blemish
1	over 0.96mm
2	0.76 through 0.95mm
3	0.46 through 0.75mm
4	0.26 through 0.45mm
5	0.25 or less

③ Limit acceptability

The following limits of acceptability are applied for unlighted green phosphor dots or trios and high contrast blemishes on the screen and in the glass when viewed with a white raster.

Blemish size (mm)			Minimum seperation
	Zone A	Zone B	
over 1.21	1	2	
0.81 - 1.20	2	4	
0.51 - 0.80	3	6	Ignore
0.28 - 0.50	6	8	
0.27 or less	Ignore	Ignore	

4) Elongated blisters

Within the limits elongated blisters shall be defined in the table and not subject to the equivalent diameter test of a.

5) Scratches

The following rejection criteria apply for scratches on the faceplate.

*Allowable maximum scratche size

Width(mm)	Length of single scratch(mm)
0.05 or less	Ignore
0.0. - 0.12	50
0.13 - 0.20	30
over 0.20	None allowed

10. OPERATION OF CIRCUIT

10.1 POWER CIRCUIT.

The switching mode power supply is adopted for universal power supply.

The chassis (secondary side) is isolated from the power source (primary side) by the transformer T101.

By the winding of the transformer T101 connected to the drain of IC106 and the other winding connected to the control circuit, the IC106 is submitted to feed back by sync trans T102.

When the voltage of power source or load current is varied, it is detected by T102 and the voltage is applied to PIN 3 of IC106.

When the voltage applied to PIN 3 is varied,the conducting time of IC106 is varied to compensate output voltage for the change, which makes output voltage of T101 stabilized.

10.2 DPMS CIRCUIT

10.2.1 SUSPEND MODE

If the H or V sync input is inactive, the output of IC501 pin14 becomes high, and the output voltage of IC103 will be down.

Therefore the deflection circuit and the video amp circuit can not operate.

At this suspend mode, the LED on the front of this unit indicates Blinking.

The power consumption at suspend mode is less than 15W.

10.3 Interface circuit

This is composed of IC501.

IC101 circuit detects frequency and polarity and controls the displayed image.

IC101 performs functions as follows.

- ※ DPMS function
- ※ VIDEO MODE selection
- ※ G/D correction control
- ※ OSD control
- ※ IMAGE SIZE,POSITION CONTROL
- ※ IMAGE DATA MEMORY.

10.4 VIDEO DRIVE CIRCUIT.

The R, G and B input signals with analog level are applied to the pre-amplifier KA2506.

This section amplifies the output signal of a generator enough to drive a video output circuit and video of OSD buffering.

Video gain is controlled by the DC voltage of PIN 12.

Clamping pulse is applied to PIN 18 of IC201.(BACK PORCH CLAMP)

10.5 VIDEO OUTPUT CIRCUIT.

The pre-amplified R, G and B video signals are applied to the amplifier IC803(LM2405)

And then, these video signals are drived to the cathodes of CRT.

The CRT bias for accurate white balance is obtained by R, G and B bias controls circuit.

That circuit composed IC803.

10.6 DEFLECTION CIRCUIT.

This circuit has two ICs. IC301(TDA9113) is a monolithic IC for horizontal and vertical sync. processing. And IC201 is a monolithic IC for vertical power amplifier.

10.6.1 Vertical Deflection Circuit.

The vertical sync signal is applied to PIN 13,23 of IC301.

The vertical frequency of the oscillator can be varied by the RC constant at PIN 6,8.

Vertical screen size can be controlled by the current at PIN 13 of IC301.

IC201 is the vertical power amplifier that drives vertical DY.

10.6.2 Horizontal Deflection Circuit.

The horizontal sync signal is applied to PIN 1 of IC301.

The IC301 has the autosync detection function of frequency-locked loop that can look the H-oscillator over a wide frequency range.

※ Trapezium (by DC voltage applied at pin11)

※ Side-pin (by DC voltage applied at pin11)

※ H-size (by DC voltage applied at pin11)

11. PCB INFORMATION

11.1 MAIN PCB : MJ29 DXXH50

11.2 SOCKET PCB : SM29 38DSH0

12. RELIABILITY TEST SPEC.

12.1 Environmental Test

The monitor unit must not be degradiated and damaged by operating over the specified range and will meet specifications when returned to the operating environment.

KORTEK will perform these tests on the monitor prior to its release.

The monitor is required to pass these tests before mass production.

These tests are detailed in KORTEK environment specification.

12.2 Temperature test

* Operating : 0°C To 45°C
* Storage : -20°C To +60 °C

12.3 Humidity test

* Operating : 15% To 80% (Non condensing)
* Storage : Maximum 90%

12.4 Drop test : Refer to KORTEK's ENVIRONMENTAL TESTS MANUAL.

12.5 Leakage current test : Refer to KORTEK's ENVIRONMENTAL TESTS MANUAL.

12.6 ESD test : Refer to KORTEK's ENVIRONMENTAL TESTS MANUAL.

12.7 Long life test.(MTBF)

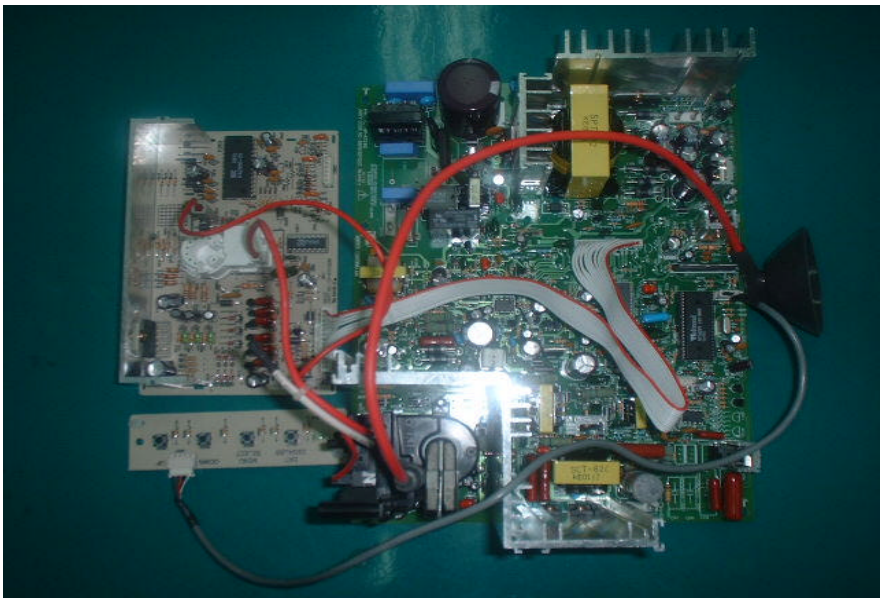
The monitor shall have 50,000hrs MTBF when operated under any combination of conditions as detailed specification.

12.8. Altitude.

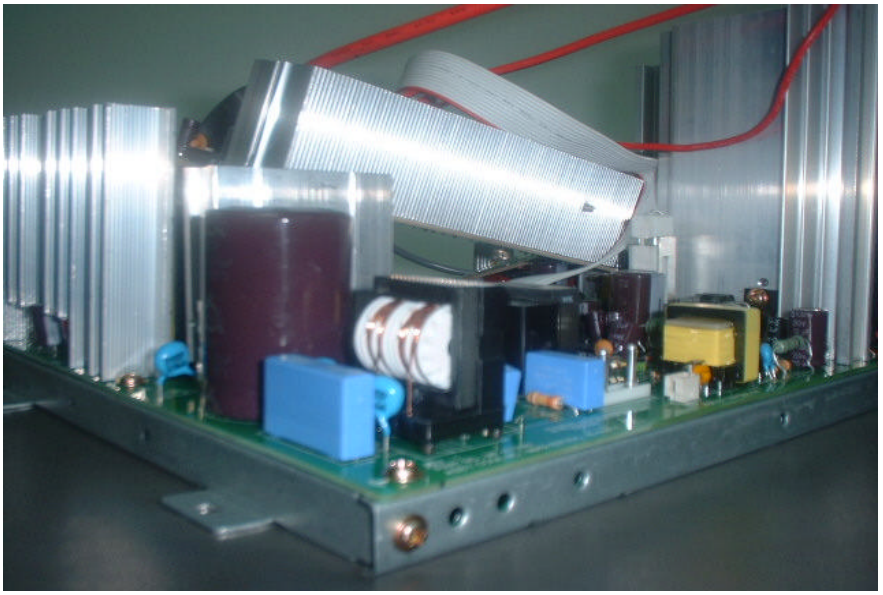
* Operating : 0 ~ 10,000 ft
* Non operating : 0 ~ 15,000 ft

13. PICTURES.

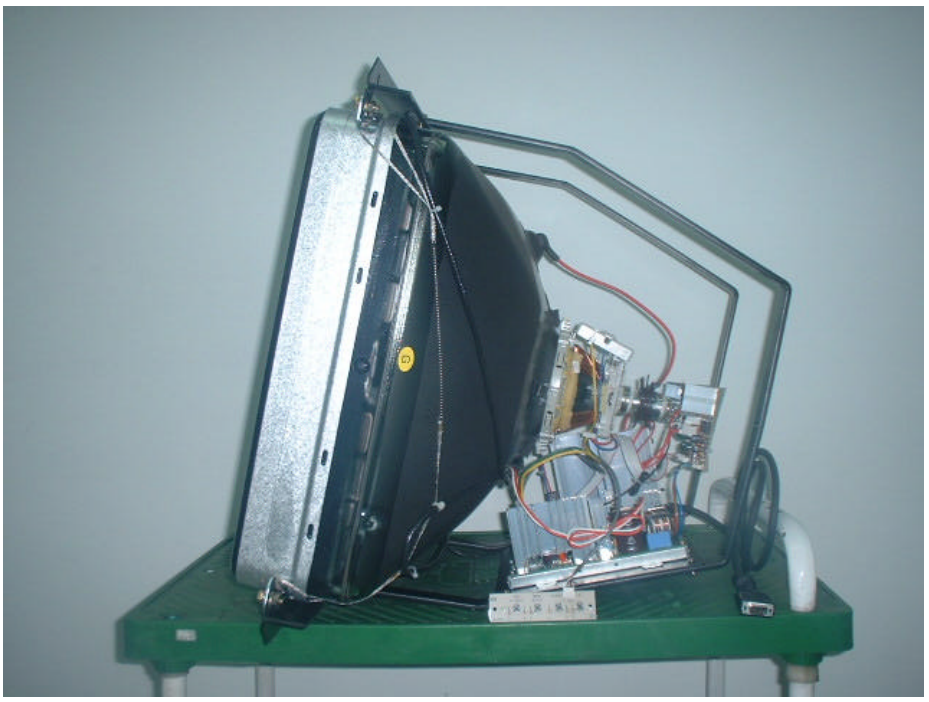
13-1. PCB ASS'Y



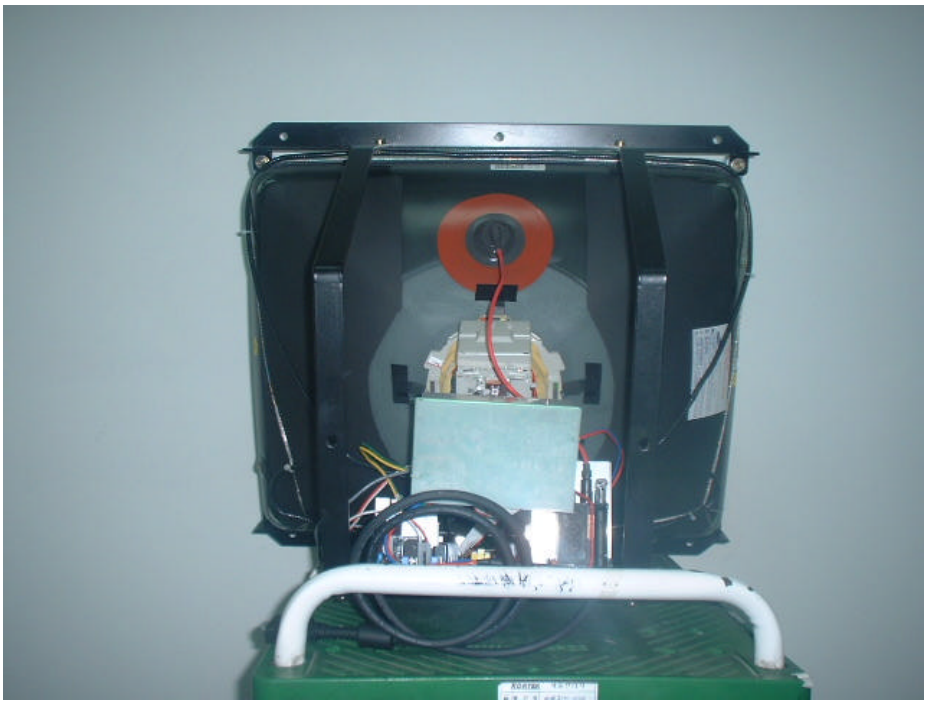
13-2. PCB & GUIDE CHASSIS ASS'Y

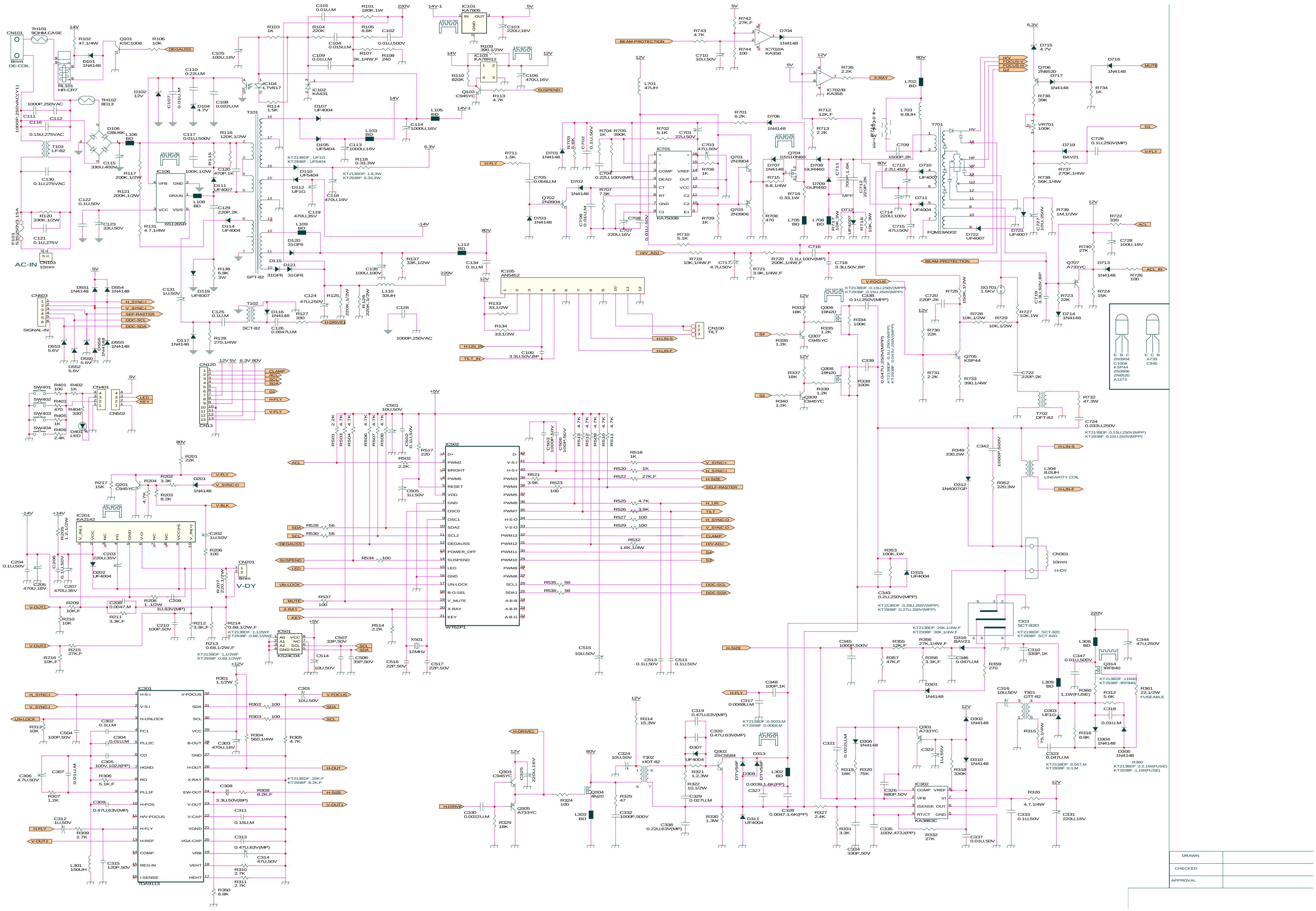


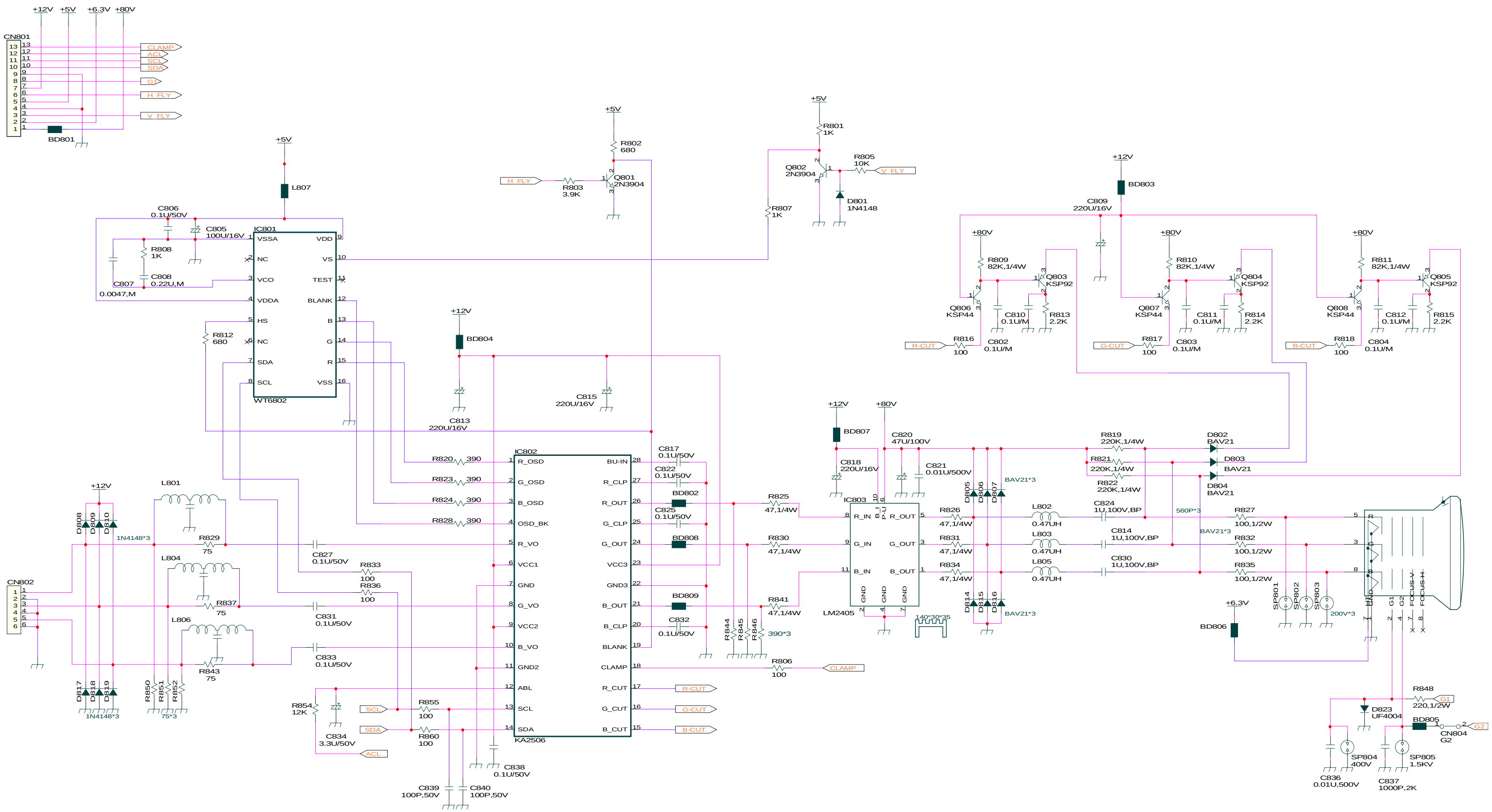
13-3. SIDE (STANDARD FRAME)



13-4. REAR (STANDARD FRAME)



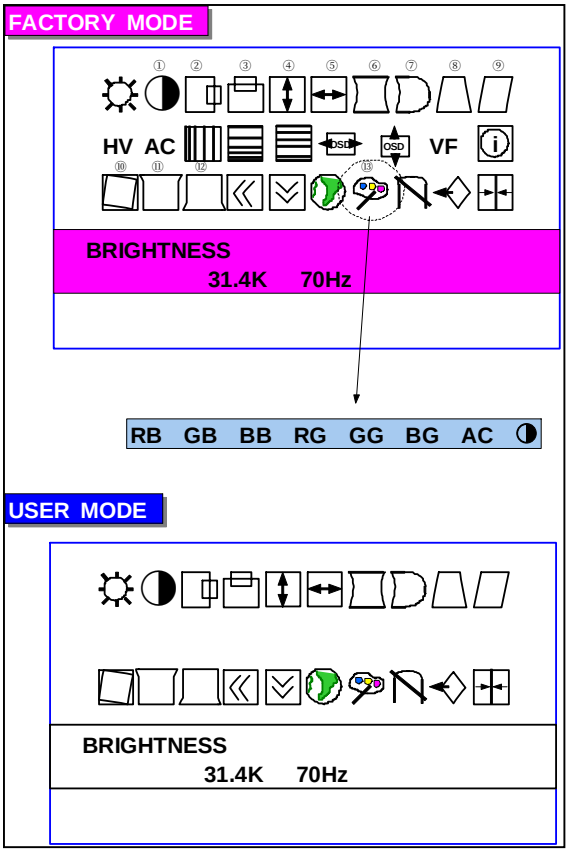

AC-IN
CN101
DE-COIL
TH101
9OHM,CASE
RL101
HR-CR7
TH102
8D13
T103
LF-82
F101
D106
GBU6K
IC106
6S1265R
T101
SPT-82
IC104
LTV817
IC102
KA431
IC101
KA7805
IC103
KA78R12
Q103
C945YC
T102
SCT-82
CN503
SIGNAL-IN
H_SYNC-I
V_SYNC-I
SELF-RASTER
DDC-SCL
DDC-SDA
CN120
CN401
CN502
LED
KEY
IC201
KA2142
V-DY
CN201
IC105
AN5452
CN100
TILT
IC502
WT62P1
IC501
KS24C04
X501
12MHz
IC301
TDA9113
IC701
KA7500B
IC702/A
KA358
IC702/B
KA358
T701
FQM19A002
T702
DFT-82
T301
GTT-82
T302
HDT-82
T303
SCT-82D
IC302
KA3883C
CN301
H-DY
L304
LINEARITY COIL
BEAM-PROTECTION
X-RAY
SUSPEND
DEGAUSS
MUTE
H-FLY
V-FLY
H/V-ADJ
ACL
ACL_IN
V-FOCUS
H-SIZE
H-DRIVE
H-OUT
V-OUT1
V-OUT2
UN-LOCK
H-LIN-S
H-LIN-F
TILT_IN
H-LIN_IN
CLAMP
DRAWN
CHECKED
APPROVAL

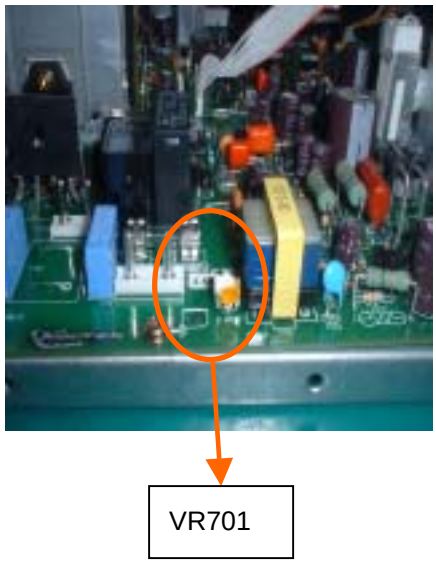


CN801
+12V
+5V
+6.3V
+80V
CLAMP
ACL
SCL
SDA
G1
H_FLY
V_FLY
BD801
+5V
L807
C806
0.1U/50V
C805
100U/16V
IC801
R808
1K
C808
0.22U,M
C807
0.0047,M
VSSA
NC
VCO
VDDA
HS
NC
SDA
SCL
VDD
VS
TEST
BLANK
B
G
R
VSS
WT6802
R812
680
+5V
R802
680
H_FLY
R803
3.9K
Q801
2N3904
+5V
R801
1K
Q802
2N3904
R805
10K
V_FLY
D801
1N4148
R807
1K
+12V
BD803
C809
220U/16V
+80V
R809
82K,1/4W
Q803
KSP92
Q806
KSP44
C810
0.1U/M
R813
2.2K
R-CUT
R816
100
C802
0.1U/M
+80V
R810
82K,1/4W
Q804
KSP92
Q807
KSP44
C811
0.1U/M
R814
2.2K
G-CUT
R817
100
C803
0.1U/M
+80V
R811
82K,1/4W
Q805
KSP92
Q808
KSP44
C812
0.1U/M
R815
2.2K
B-CUT
R818
100
C804
0.1U/M
+12V
BD804
C815
220U/16V
C813
220U/16V
IC802
R820 390
R823 390
R824 390
R828 390
R_OSD
G_OSD
B_OSD
OSD_BK
R_VO
VCC1
GND
G_VO
VCC2
B_VO
GND2
ABL
SCL
SDA
BU-IN
R_CLP
R_OUT
G_CLP
G_OUT
VCC3
GND3
B_OUT
B_CLP
BLANK
CLAMP
R_CUT
G_CUT
B_CUT
KA2506
C817
0.1U/50V
C822
0.1U/50V
BD802
C825
0.1U/50V
BD808
BD809
C832
0.1U/50V
R825
47,1/4W
R830
47,1/4W
R841
47,1/4W
R844
R845
R846
390*3
R806
100
CLAMP
R-CUT
G-CUT
B-CUT
+12V
L801
D808
D809
D810
1N4148*3
R829
75
C827
0.1U/50V
L804
CN802
R837
75
C831
0.1U/50V
L806
R843
75
C833
0.1U/50V
R833
100
R836
100
D817
D818
D819
1N4148*3
R850
R851
R852
75*3
R854
12K
C834
3.3U/50V
SCL
SDA
ACL
R855
100
R860
100
C838
0.1U/50V
C839
100P,50V
C840
100P,50V
+12V
+80V
BD807
C820
47U/100V
C818
220U/16V
C821
0.01U/500V
IC803
R_IN
G_IN
B_IN
R_OUT
G_OUT
B_OUT
GND
LM2405
140*30*35
D805
D806
D807
BAV21*3
D814
D815
D816
BAV21*3
R826
47,1/4W
R831
47,1/4W
R834
47,1/4W
L802
0.47UH
L803
0.47UH
L805
0.47UH
C824
1U,100V,BP
C814
1U,100V,BP
C830
1U,100V,BP
R819
220K,1/4W
R821
220K,1/4W
R822
220K,1/4W
D802
BAV21
D803
BAV21
D804
BAV21
560P*3
BAV21*3
R827
100,1/2W
R832
100,1/2W
R835
100,1/2W
SP801
SP802
SP803
200V*3
+6.3V
BD806
GND
G1
G2
FOCUS-V
FOCUS-H
R848
220,1/2W
G1
D823
UF4004
BD805
CN804
G2
G2
SP804
400V
SP805
1.5KV
C836
0.01U,500V
C837
1000P,2K

Re-adjustment of Back Raster

1. A power source should be supplied on the pressed "UP" key on control PCB before suppling power source.
2. After as the above action, OSD mode will be switched to Factory mode as below a picture. For your reference, there are difference color on OSD menu Factory mode and User mode.
3. As the below a picture, If you select "Color Temp" to use "UP","DOWN" key, you can see "USER","6500","6900" on OSD menu.
4. If you select "9300"(double click), Color Adjudtment menu will be appeared on the top of screen as the below a picture.
5. If you select contrast mode, Cotrast Icon will flicker. As the state, you adjust contrast value to Maximum.
6. And after you find and adjust VR701 on the main PCB until Back Raster will be disappeared just before





PCM-3680 PC/104
Dual Port CAN Interface Module

Jumper Setting

The PCM-3680 is a special purpose communication card that brings the Control Area Network to your PC. With the built-in CAN controller, the PCM-3680 provides bus arbitration and error detection with automatic transmission repeat function. This drastically avoids data loss and ensures system reliability. The on-board CAN controllers are located at different positions in the memory. You can run both CAN controllers at the same time, independently. The PCM-3680 operates at baud rates up to 1 Mbps and can be installed directly into the expansion slot of your PC.

Control Area Network

The CAN (Control Area Network) is a serial bus system especially suited for networking "intelligent" I/O devices as well as sensors and actuators within a machine or plant. Characterized by its multi-master protocol, real-time capability, error correction, high noise immunity, and the existence of many different silicon components, the CAN serial bus system, originally developed by Bosch for use in automobiles, is increasingly being used in industrial automation.

Direct Memory Mapping

The PCM-3680 is assigned with memory address, which allows direct access to the CAN controller. This is the simplest and fastest way of programming any board in a PC because the board is regarded as standard RAM.

Optical Isolation Protection

On-board optical isolators protect your PC and equipment against damage from ground loops, increasing system reliability in harsh environments.

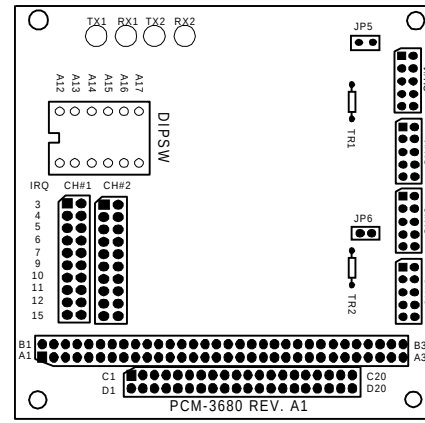
Specifications

- **Ports**: 2
- **CAN controller**: 82C200
- **CAN transceiver**: 82C250
- **Signal support**: CAN-L, CAN-H
- **Memory address**: From C800H to EF00H
- **IRQ**: 3, 4, 5, 6, 7, 9, 10, 11, 12, 15
- **Isolation voltage**: 1000 V_{DC}
- **Power consumption**: +5 V @ 400 mA typical, 950 mA max.
- **Connectors**: Dual DB-9 male connectors
- **Operating temperature**: 32 to 122˚F (0 to 50˚C)
- **PC/104 form factor**: 3.6" x 3.8" (90 mm x 96 mm)
- **Shipping weight**: 0.9 lb (0.4 kg)

Features

- Operates 2 separate CAN networks at the same time
- High speed transmission up to 1 Mbps
- 16 MHz CAN controller frequency
- Takes a 4 KB address space, 40 base address adjustable in steps from C800H up to EF00H
- Optical isolation protection of 1000 V_{DC} ensures system reliability
- Wide IRQ selection for each port includes: IRQ 3, 4, 5, 6,7, 9, 10, 11, 12, 15
- LED indicates Transmit/Receive status on each port
- Direct memory mapping enables speedy access to the CAN controllers
- C library and examples included

Jumper & Switch Locations



Part no. 2000368000 1st Edition Printed in Taiwan May 1996

Initial Inspection

In addition to this user's manual, your shipping box should contain the following items:

- PCM-3680 Dual-port CAN Interface Card
- C Driver and DataMonitor Utility Diskette

WARNING! *Discharge your body's static electric charge by touching the back of the grounded chassis of the system unit (metal) before handling the board. You should avoid contact with materials that hold a static charge such as plastic, vinyl, and styrofoam. The board should be handled only by its edges to avoid static damage to its integrated circuits. Avoid touching the exposed circuit connectors.*

Installation

Card Configuration

The PCM-3680 has two ports, each with one jumper. The jumpers set the IRQ for the ports, which can be configured separately. A DIP switch sets the memory base address for each port. The following chart shows the function of the jumper and the switch (see the previous page for jumper and switch locations).

Switch and jumper functions	
IRQ Setup	
JP1	Port 1
JP2	Port 2
Memory base address	
SW1	Port 1, Port 2

Default Settings

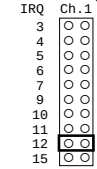
- Port 1 is set for COM1 (IRQ=12, Memory address = DA00:0000).
- Port 2 is set for COM2 (IRQ=15, Memory address = DA00:0200).

If you need to change these settings, see the following sections. Otherwise, you can simply install the card. Note that you will need to disable your CPU card's on-board COM ports, if any, or set them to alternate addresses/IRQs.

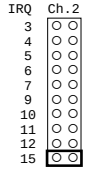
Jumpers and Switches

Jumpers JP1 and JP2 set the interrupts for Port 1 and Port 2, respectively. You can choose any IRQ from 3 to 15, except 8, 13 and 14. When you choose IRQs, make sure they are not used for other cards in the system. The following figures show the card's default settings.

JP1: Port 1 IRQ Default



JP2: Port 2 IRQ Default



Memory Base Address (SW1)

The memory base address for the PCM-3680, which requires 4 KB of address space, is made up of the memory segment and its associated offset. The address for the memory segment is set through SW1, a six-position DIP switch. You can choose any base address from C800 to EF00. The following table shows the DIP switch settings and the corresponding base addresses.

Memory address configuration (SW1)

Address/DIP switch	A12	A13	A14	A15	A16	A17
C800H	on	on	on	off	on	on
C900H	off	on	on	off	on	on
CA00H	on	off	on	off	on	on
CB00H	off	off	on	off	on	on
CC00H	on	on	off	off	on	on
CD00H	off	on	off	off	on	on
CE00H	on	off	off	off	on	on
CF00H	off	off	off	off	on	on
D000H	on	on	on	on	off	on
D100H	off	on	on	on	off	on
D200H	on	off	on	on	off	on
D300H	off	off	on	on	off	on
D400H	on	on	off	on	off	on
D500H	off	on	off	on	off	on
D600H	on	off	off	on	off	on
D700H	off	off	off	on	off	on
D800H	on	on	on	off	off	on
D900H	off	on	on	off	off	on
DA00H	on	off	on	off	off	on
DB00H	off	off	on	off	off	on
DC00H	on	on	off	off	off	on
DD00H	off	on	off	off	off	on
DE00H	on	off	off	off	off	on
DF00H	off	off	off	off	off	on
E000H	on	on	on	on	on	off
E100H	off	on	on	on	on	off
E200H	on	off	on	on	on	off
E300H	off	off	on	on	on	off
E400H	on	on	off	on	on	off
E500H	off	on	off	on	on	off
E600H	on	off	off	on	on	off
E700H	off	off	off	on	on	off
E800H	on	on	on	off	on	off
E900H	off	on	on	off	on	off
EA00H	on	off	on	off	on	off
EB00H	off	off	on	off	on	off
EC00H	on	on	off	off	on	off
ED00H	off	on	off	off	on	off
EE00H	on	off	off	off	on	off
EF00H	off	off	off	off	on	off

Memory Area

Once the memory segment for the base address is selected, the offset will be automatically assigned for Port 1, Port 2, and hardware reset. The following table shows the base addresses of the CAN controllers.

Base address (hex)	CAN controller
base:0000h - base:00FFh	Basic- Port 1
base:0100h - base:01FFh	HW reset Basic - Port 1
base:0200h - base:02FFh	Basic- Port 2
base:0300h - base:03FFh	HW reset Basic - Port 2
base:0400h - base:0FFFh	Not used

Software Programming

Quick Reference Table

The following table lists the available functions and their corresponding syntax and descriptions.

Library functions

Function	Syntax (in C)	Description
1	canInitHW()	Sets IRQs
2	canExitHW()	Releases settings
3	canReset()	Resets CAN port
4	canConfig()	Controls CAN port settings
5	canNormalRun()	Sets mode
6	canSendMsg()	Sends message
7	canReceiveMsg()	Reads data

Complete Function Description

Function 1

Sets an IRQ number for Port1 and Port 2.

- **Command** canInitHW (UI segment, BYTE IRQ1, BYTE IRQ2)
- **Argument** UI segment, BYTE IRQ1, BYTE IRQ2
  segment=c000-df00 step 0x100
  IRQ1=Port 1 IRQ number 0 (polling), 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 15
  IRQ2=Port 2 IRQ number 0 (polling), , 4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 15
  0: polling
- **Response** 1=successful
  0=fail
- **Example**

```
#include "can841.h"
main()
{
    UI gSegment=0xDA00;
    BYTE CAN1_IRQ, CAN2_IRQ;
    CAN1_IRQ=12;
    CAN2_IRQ=15;
    if (canInitHW (gSegment, CAN1_IRQ, CAN2_IRQ)==0)
        printf ("HARDWARE INITIALIZATION ERROR!\n");
}
```

Function 2

Releases all settings of the CAN card.

- **Command** canExitHW()
- **Argument** None
- **Response** 1=successful
  0=fail
- **Example**

```
#include "can841.h"
main()
{
    if (canExitHW()==0)
        printf ("CAN RELEASE FAIL!\n");
}
```

Function 3

Resets CAN port and flushes the TX/RX buffers.

- **Command** int canReset (BYTE port);
- **Argument** BYTE port; port= port number (0 or 1)
- **Response** 1=successful
  0=fail
- **Example**

```
#include "can841.h"
main()
{
    if (canReset (0)==0)
        printf ("RESET PORT 1 FAIL!\n");
}
```

Function 4

Controls the setting of the CAN port's acceptance code, acceptance mask, and bus timing register.

- **Command** canConfig (BYTE port, CAN_STRUCT can);
- **Argument** BYTE port, CAN_STRUCT can;
  port= port number (0 or 1)
  can= CAN struct pointer
- **Response** 1=successful
  0=fail
- **Example**

```
#include "can841.h"
main()
{
    CAN_STRUCT can1, can2;
    can1.acc_code=0;
    can1.acc_mask=0xff;
    can1.bt0=0;
    can1.bt1=0x1c;
    if (canConfig(0,can1)==0)
        printf ("CAN PORT 1 CONFIGURE ERROR!\n");
}
```

Function 5

Sets a CAN port to normal mode for normal operation.

- **Command** canNormalRun (BYTE port);
- **Argument** BYTE port;port= port number (0 or 1)
- **Response** 1=successful
  0=fail

Example

```
#include "can841.h"
main()
{
    if (canNormalRun(0)==0)
        printf ("CAN Port 1 can't change to Normal Mode!\n");
}
```

Function 6

Tells the CAN port to send a message.

- **Command** canSendMsg (BYTE port, MSG_STRUCT send_msg);
- **Argument** BYTE port, MSG_STRUCT send_msg; port= port number (0 or 1) send_msg= send buffer pointer
- **Response** 1=successful
  0=fail

Example

```
#include "can841.h"
main()
{
    MSG_STRUCT smsg1;
    UI i;
    smsg1.id=0x015;
    smsg1.rtr=0;
    smsg1.dlen=8;
    for(i=0; i<smsg1.dlen; i++)
        smsg1.data[i]=i;
    if (canSendMsg(0,smsg1)==1)
        printf ("TRANSMISSION SUCCESSFUL!\n");
}
```

Function 7

Read data from CAN port input buffer.

- **Command** int canReceiveMsg (BYTE port, MSG_STRUCT *msg_ptr);
- **Argument** BYTE port, MSG_STRUCT *msg_ptr; port= port number (0 or 1) *msg_ptr= input buffer pointer
- **Response** 1=message received
  0=no message received

Example

```
#include "can841.h"
main()
{
    MSG_STRUCT rmsg2;
    if (canReceiveMSG, *rmsg2)==1)
    {
        printf ("Port2 receive: ID=%3X RTR=%ld
            Length=%ld", rmsg2.id, rmsg2.rtr, rmsg2.dlen);
        for (i=0; i<rmsg2.dlen; i++)
            cprintf (" %2X", rmsg2.data[i]);
    }
}
```

Example Program

The following example program, can841.lib, implements the sending and receiving of messages over the CAN controller. The program is written in C.

```
#include “can841.h” /*Library function declaration*/
/*--------------------------------------*/

/* CAN controller interrupt connection */
#define CAN1_IRQ 12 /* 0 means polling */
#define CAN2_IRQ 15 /* 0 means polling */
#define PORT1       0
#define PORT2       1
#define FAIL        0
#define SUCCESS 1

void main(void)
{
   /* Declare the CAN card segment address. */
   UI gSegment=0xDA00;
   CAN_STRUCT can1, can2;
   MSG_STRUCT smsg1, smsg2;
   MSG_STRUCT rmsg1, rmsg2;
   UI  i;


if(canInitHW(gSegment,CAN1_IRQ,CAN2_IRQ)==FAIL)
       {
           clrscr();
           cprintf("\n\n Hardware Initializa
           tion Error");
           return;
       }

       /* Reset CAN controller */
       canReset(PORT1);
       canReset(PORT2);

       can1.acc_code=0;        /*     */
       can1.acc_mask=0xff;     /*          */
       can1.bt0=03;        /*baud rate 1Mbps*/
       can1.bt1=0x1c;
       if(canConfig(PORT1,can1)==FAIL)
       {
           clrscr();
           cprintf("\n\n CAN Port %d Configuration
           Error",1);
           return;
       }
   memcpy(&can2, &can1, sizeof(CAN_STRUCT));
   if(canConfig(PORT2,can2)==FAIL)
   {
       clrscr();
       cprintf("\n\n CAN Port %d Configuration
       Error", 2);
       return;
   }
   canNormalRun(PORT1); /*Put CAN1 into normal mode.*/
   canNormalRun(PORT2); /*Put CAN2 into normal mode.*/

   clrscr();

   smsg1.id = 0x015;   /* Set ID =8    */
   smsg1.rtr=1;        /* Data lengths =8  */
   smsg1.dlen=8;
   for(i=0; i<smsg1.dlen; i++)
   smsg1.data[i] =i;
   while(1)
   {
       canSendMsg(PORT1, smsg1); /*Send to CAN1*/
       if(canReceiveMsg(PORT2, &rmsg2)==1)
       {
           cprintf("PORT2 receive:ID=%3X
           RTR=%1d Length=%1d",
               rmsg2.id,rmsg2.rtr, rmsg2.dlen);
```

```
            for(i=0; i< rmsg2.dlen; i++)
                cprintf(" %2X",rmsg2.data[i]);
            printf("\n");
        }
        if (kbhit())
        {
            getch();
            break;
        }
    }

    /* Reset CAN controller. */
    canReset(PORT1);
    canReset(PORT2);
    canExitHW();
    clrscr();
}
```

DataMonitor Utility

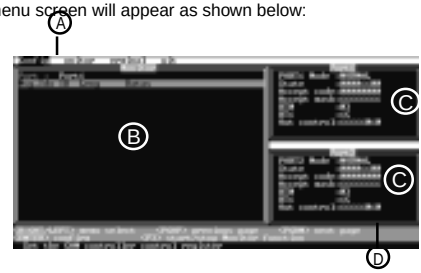
Software Overview

The PCM-3680 comes with a utility disk with the following software capabilities:

- CAN controller configuration
- CAN transmission monitoring
- Terminal emulation

Main Menu

Run DataMonitor at the DOS prompt. DataMonitor's main menu screen will appear as shown below:



The main screen consists of:

A. Menu bar: Lists the available functions. From the main menu you can select Configuration, Monitoring, and Terminal.

B. Monitor screen: Shows monitored data, including message index, CAN device ID, data length, and data.

C. Status fields: Display the status of the two ports and the status register of the CAN controllers.

D. On-line help/message bar: Shows various key commands and states the function of the currently highlighted item.

Configuration

Before you transmit a CAN object, you must configure the CAN controller by selecting the <Config> menu with the cursor keys and pressing <Enter>. The Configuration function determines the ports to be used and their communication parameters.

The port configuration window is shown below.

The parameters below need to be configured for each CAN controller:

Address segment: The base address (address segment) of the PCM-3680 is normally adjusted during the installation process. The selection of the address segment needs to be the same as that of the hardware configuration.

Port: Select the port you want to configure.

Baud rate: The baud rate must be coordinated with the CAN network. Choose the appropriate one from the list of baud rates.

Acceptance code: Specifies the value of the 8 most significant bits of the identifier (ID10 ... ID 3)

Acceptance mask: Specifies the bit positions which are "relevant" for acceptance filtering.

Note: The acceptance code and acceptance mask are configured through eight digits (1 digit per bit) using 0 or 1.

Value	Definition
0	This bit position will accept only a "relevant" message.
1	This bit position will not screen messages.

Example: Acc Code = 11111111
Acc Mask =11111111

The shown acceptance filter will accept every received message.

Interrupt: Sets the interrupt for each port. Be sure that this setting matches the IRQ already selected for the PCM-3860, which accepts values between IRQ3 to IRQ15, except 8 and 13.

Running mode: During the normal configuration and communication process, select Normal Mode. When the system fails, you can hit <Enter> to reset the CAN controller. Hit <Enter> again to return to Normal Mode to further execute your configuration.

Monitor

Select the port to be monitored from the <Monitor> pull-down menu. Press F3 to start and stop the monitoring process.

Monitor Screen

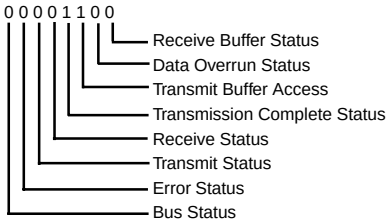
The monitored data for a selected port appears in the monitor screen (see area **B** in the diagram under Main Menu section.)

If the CAN controller is configured correctly and the transmission has been successfully completed, every CAN object will be shown in order of appearance.

Status Fields

Status fields at the right of the screen display the status of the two ports:

The status fields show information including the Mode (Normal or Reset), Acceptance Code, Acceptance Mask, BTR0, BTR1, Output Control Register, and Status Register. The normal value of the Status Register is:



The registers can only be read if the CAN controller is in Normal mode. If the CAN controller operates correctly and the transmission has been completed successfully, the status register will show as the normal value: 00001100. If the Error Status and/or the Bus Status is 1, you have selected the wrong baud rate or the CAN cable is damaged. Also check the correct bus terminator.

Terminal

This function provides a direct way to:

1. Send data over the CAN network.
2. Test CAN transmission.

Select <Terminal> from the menu bar for the following screen:

Transmitting Data

To transmit data, the PCM-3680 must be connected to a CAN network with at least one node and the configuration for the card must be complete.

First, select <Terminal> to edit the data. Enter the port, the object ID and the data bytes as hexadecimal value. Press <Enter> to begin data transmission. If the CAN controller is configured correctly and the transmission has been successfully completed, every CAN object will be shown in order of appearance at the left side of the screen.

Testing Data Transmission

To test CAN transmission without actually sending, connect Port 1 to Port 2 on the PCM-3680. Select <Terminal> and enter port 1 as transmitting port. Port 2 will therefore be designated as receiving port.

Note: To send Data Frame (Transmit), enter "0" for RTR. If you want to send Remote Frame (Request), enter "1" for RTR.

Wiring

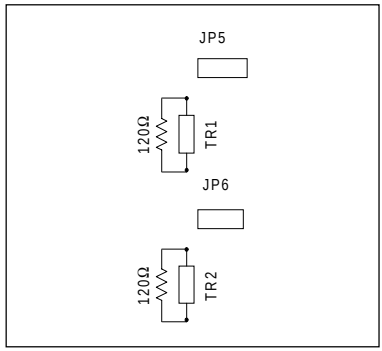
Pin Assignments

The following figure shows the pin assignments for the card's DB-9 connectors.

Termination Resistor Setup

Termination restistors are factory-installed to allow for impedance matching. These resistors can be enabled by using jumpers number 5 and 6 (shown below). Jumper 5 enables the terminal resistor for port 1, while jumper 6 enables the terminal resistor for port 2. The value of the resistor equals the characteristic impedence of the signal wires (approximately 120 Ω)

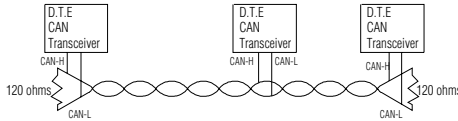
The following figure shows resistor placements. Port TR1 enables jumper JP5, and TR2 enables jumper JP6



CAN termination resistor installation

CAN signal wiring

The CAN standard supports half-duplex communication. This means that just two wires are used to transmit and receive data.



Wiring topograhpy

Wiring connections are as follows:

PCM-3860	DTE (male DB-9)	Terminal DTE
Pin	**Signal**	**Signal**
7	CAN-H	CAN-H
3	GND	GND
2	CAN-L	CAN-L

Register Structure

This appendix gives a brief description of the CAN controller registers. For more detailed information, please refer to the *Stand-alone CAN-controller Data Book* from Philips Semiconductors Microcontroller Products. (You may also find the information on the enclosed disk under the "Manual" directory, in the Word 6.0 file: REGISTER.DOC.)

CAN Controller Address Allocation

Philips PCX82C200 CAN Controller

ADDRESS

Register address map

0	CONTROL	control segment
1	COMMAND	
2	STATUS	
3	INTERRUPT	
4	ACCEPTANCE CODE	
5	ACCEPTANCE MASK	
6	BUS TIMING 0	
7	BUS TIMING 1	
8	OUTPUT CONTROL	
9	TEST	
10	IDENTIFIER	descriptor (transmit buffer)
11	RTR BIT, DATA LENGTH CODE	
12	BYTE 1	data field (transmit buffer)
13	BYTE 2	
14	BYTE 3	
15	BYTE 4	
16	BYTE 5	
17	BYTE 6	
18	BYTE 7	
19	BYTE 8	
20	IDENTIFIER	descriptor (receive buffers)
21	RTR BIT, DATA LENGTH CODE	
22	BYTE 1	data field (receive buffers)
23	BYTE 2	
24	BYTE 3	
25	BYTE 4	
26	BYTE 5	
27	BYTE 6	
28	BYTE 7	
29	BYTE 8	

#	TITLE	ADDRESS	7	6	5	4	3	2	1	0
Control Segment										
1	Control Register	0	Test Mode	Sync	Reserved	Overrun Interrupt Enable	Error Interrupt Enable	Transmit Interrupt Enable	Receive Interrupt Enable	Reset Request
2	Command Register	1	Reserved	Reserved	Reserved	Go to Sleep	Clear Overrun Status	Release Receive Buffer	Abort Transmission	Transmission Request
3	Status Register	2	Bus Status	Error Status	Transmit Status	Receive Status	Transmission Complete Status	Transmit Buffer Access	Data Overrun	Receive Buffer Status
4	Interrupt Register	3	Reserved	Reserved	Reserved	Wake-Up Interrupt	Overrun Interrupt	Error Interrupt	Transmit Interrupt	Receive Interrupt
5	Acceptance Code Register	4	AC.7	AC.6	AC.5	AC.4	AC.3	AC.2	AC.1	AC.0
6	Acceptance Mask Register	5	AM.7	AM.6	AM.5	AM.4	AM.3	AM.2	AM.1	AM.0
7	Bus Timing Register 0	6	SJW.1	SJW.0	BRP.5	BRP.4	BRP.3	BRP.2	BRP.1	BRP.0
8	Bus Timing Register 1	7	SAM	TSEG2.2	TSEG2.1	TSEG2.0	TSEG1.3	TSEG1.2	TSEG1.1	TSEG1.0
9	Output Control Register	8	OCTP1	OCTN1	OCPOL1	OCTP0	OCTN0	OCPOL0	OCMODE1	OCMODE0
10	Test Register (note 1)	9	Reserved	Reserved	Map Internal Register	Connect RX Buffer 0 CPU	Connect TX Buffer CPU	Access Internal Bus	Normal RAM Conncet	Float Output Driver
Transmit Buffer										
11	Identifier	10	ID.10	ID.9	ID.8	ID.7	ID.6	ID.5	ID.4	ID.3
	RTR, Data Length Code	11	ID.2	ID.1	ID.0	RTR	DLC.3	DLC.2	DLC.1	DLC.0
	Bytes 1-8	12-19	Data	Data	Data	Data	Data	Data	Data	Data
Receive Buffer 0/1										
12	Identifier	20	ID.10	ID.9	ID.8	ID.7	ID.6	ID.5	ID.4	ID.3
	RTR, Data Length Code	21	ID.2	ID.1	ID.0	RTR	DLC.3	DLC.2	DLC.1	DLC.0
	Bytes 1-8	22-29	Data	Data	Data	Data	Data	Data	Data	Data

Control Register (CR)

The Control Register is used to change the behavior of the PCX82C200. Control bits may be set or reset by the attatched microcontroller, which uses the Control Register as a read/write memory.

Command Register (CMR)

A command bit initiates an action within the transfer layer of the PCX82C200. If a read access is performed to this address, the byte 11111111 (binary) is returned.

Status Register (SR)

The Status Register reflects the status of the PCX82C200 bus controller. The Status Register appears to the microcontroller as a read-only memory.

Interrupt Register (IR)

The Interrupt Register allows identification of an interrupt source. When one or more of this register's bits are set, the INT pin is activated. All bits are reset by the PCX82C200 after this register is read by the microcontroller. This register appears to the microcontoller as a read-only memory.

Acceptance Code Register (ACR)

The Acceptance Code Register is part of the acceptance filter of the PCX82C200. This register can be accessed (read/write) if the Reset Request bit is set HIGH (present). When a message which passes the acceptance test is received and if there is an empty Receive Buffer, then the respective Descriptor and Data Field are sequentially stored in this empty buffer. In the case that there is no empty Receive Buffer, the Data Overrun bit is set HIGH (overrun).

Acceptance Mask Register (AMR)

The Acceptance Mask Register is part of the acceptance filter of the PCX82C200. This register can be accessed (read/write) if the Reset Request bit is set HIGH (present). The Acceptance Mask Register classifies the corresponding bits of the acceptance code as "relevant" or "don't care" for acceptance filtering.

Bus Timing Register 0 (BTR0)

The Bus Timing Register 0 defines the values of the Baud Rate Prescaler (BRP) and the Synchronization Jump Width (SJW). This register can be accessed (read/write) if the Reset Request bit is set HIGH (present).

Bus Timing Register 1 (BTR1)

The Bus Timing Register 1 defines the length of the bit period, the location of the sample point, and the number of samples to be taken at each sample point. This register can be accessed (read/write) if the Reset Request bit is set HIGH (present).

Output Control Register (OCR)

The Output Control Register allows, under software control, the setup of different driver configurations. This register may be accessed (read/write) if the Reset Request bit is set HIGH (present).

Test Register (TR)

The Test Register is used only for production testing.

Transmit Buffer

The Transmit Buffer stores a message from the microcontroller to be transmitted by the PCX82C200. It is subdivided into the Descriptor and Data Field. The Transmit Buffer can be written to and read from by the microcontroller.

Receive Buffer

The layout of the Receive Buffer and the individual bytes correspond to the definitions given for the Transmit Buffer layout, except that the addresses start at 20 instead of 10.

PCM-3724
PC/104 48-bit Digital I/O Module

Introduction

The PCM-3724 is a PC/104-standard DIO module which attaches to the piggyback connector on your CPU card or PC/104 CPU module. The PCM-3724's two Intel 8255 PPI compatible chips provide 48 bits of parallel digital input/output. Buffered inputs and outputs offer high driving capacity.

The module's 48 bits are divided into six 8-bit I/O ports: A0, B0, C0, A1, B1 and C1. You can configure each port as either an input or output in software. The module also offers two hardware interrupt lines to the PC.

The module offers two 50-pin OPTO-22 compatible connectors which can connect to a PCLD-7216 SSR I/O module carrier board, PCLD-885 power relay output board, PCLD-785B 24/16-channel relay output board or a PCLD-782B 24/16 channel opto-isolated D/I board.

Features

- 48 TTL digital I/O lines.
- Simulates mode 0 of 8255 PPI (port C0 and C1 are not separable)
- Buffer circuit for high driving capacity, TTL level
- Interrupt handling
- OPTO-22 compatible 50-pin connectors
- Output status readback

Applications

- Industrial AC/DC I/O module monitoring and control
- Relay and switch monitoring and control
- Parallel data transfer
- Sensing the signals of TTL, DTL, CMOS logic
- Driving indicator LEDs

Specifications

I/O address assignments

Address	Function
BASE+0	PORT A0
BASE+1	PORT B0
BASE+2	PORT C0
BASE+3	CFG REG
BASE+4	PORT A1
BASE+5	PORT B1
BASE+6	PORT C1
BASE+7	CFG REG
BASE+8	Direction
BASE+9	Gate control

Input signal

- **Logic high voltage**: 2.0 to 5.25 V
- **Logic low voltage**: 0.0 to 0.80 V
- **High level input current**: 1 μA
- **Low level input current**: -1 μA

Output signal

- **Logic high voltage**: 2.4 V min.
- **Logic low voltage**: 0.4 V max.
- **High level output current**: -35 mA max.
- **Low level output current**: 35 mA max.
- **Driving capacity**: 15 LS TTL

Transfer rate

- **Typical**: 300 K bytes/sec
- **Maximum**: 500 K bytes/sec

Power consumption

- **Typical**: 90 mA @5 V_{DC} (±5%)
- **Connector**: Two OPTO-22 compatible 50-pin connectors (J3 and J4)

Part no. 2003724100 1st Edition Printed in Taiwan May 1994

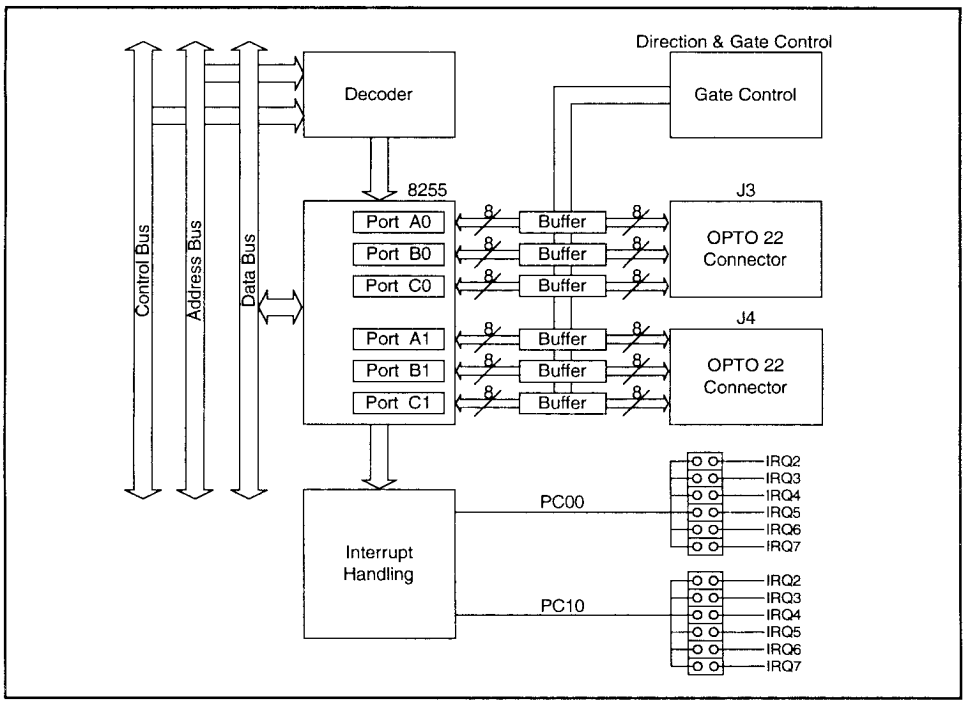
Connector pin assignments

J3/port 1

PC 07	1	2	GND
PC 06	3	4	GND
PC 05	5	6	GND
PC 04	7	8	GND
PC 03	9	10	GND
PC 02	11	12	GND
PC 01	13	14	GND
PC 00	15	16	GND
PB 07	17	18	GND
PB 06	19	20	GND
PB 05	21	22	GND
PB 04	23	24	GND
PB 03	25	26	GND
PB 02	27	28	GND
PB 01	29	30	GND
PB 00	31	32	GND
PA 07	33	34	GND
PA 06	35	36	GND
PA 05	37	38	GND
PA 04	39	40	GND
PA 03	41	42	GND
PA 02	43	44	GND
PA 01	45	46	GND
PA 00	47	48	GND
+5 V	49	50	GND

J4/port 2

PC 17	1	2	GND
PC 16	3	4	GND
PC 15	5	6	GND
PC 14	7	8	GND
PC 13	9	10	GND
PC 12	11	12	GND
PC 11	13	14	GND
PC 10	15	16	GND
PB 17	17	18	GND
PB 16	19	20	GND
PB 15	21	22	GND
PB 14	23	24	GND
PB 13	25	26	GND
PB 12	27	28	GND
PB 11	29	30	GND
PB 10	31	32	GND
PA 17	33	34	GND
PA 16	35	36	GND
PA 15	37	38	GND
PA 14	39	40	GND
PA 13	41	42	GND
PA 12	43	44	GND
PA 11	45	46	GND
PA 10	47	48	GND
+5 V	49	50	GND



PCM-3724 Block Diagram

Installation

Initial inspection

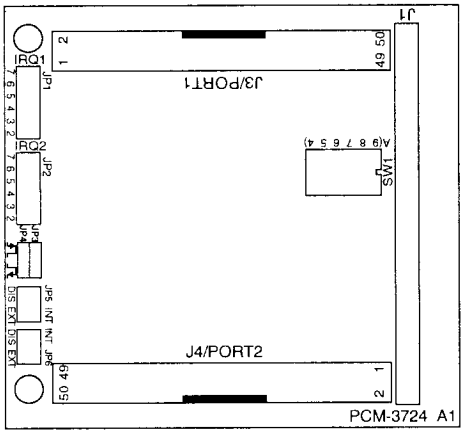
Before you install the PCM-3724, first check to make sure it was not damaged during shipping. If you find any damage or the module fails to meet specifications, please contact your local dealer or sales representative. Also contact the shipper and save the shipping materials for the shipper's inspection.

Switch and jumper settings

We designed the PCM-3724 with ease-of-use in mind. It has one function switch and six jumper settings. The following sections tell how to configure the module. You may want to refer to the figure below for help identifying module components.

CAUTION! *Do not install or remove the PCM-3724 I/O board while the power is ON, as this may damage the plug-in board or CPU card.*

The following diagram shows the location of the module's switches and jumpers:



Jumper and switch locations

Base address selection (SW1)

You control the PCM-3724's operation by reading or writing data to the PC's I/O (input/output) port addresses. The module requires 16 consecutive address locations. Switch SW1 sets the module's base (beginning) address. Valid base addresses range from Hex 000 to Hex 3F0. Other devices in your system may, however, be using some of these addresses.

We set the PCM-3724 for a base address of Hex 300 at the factory. If you need to adjust it to some other address range, set switch SW1 as shown below:

Module I/O addresses (SW1)

Range (hex)	Switch position					
	1	2	3	4	5	6
000 - 00F	●	●	●	●	●	●
010 - 01F	●	●	●	●	●	○
⋮						
200 - 20F	○	●	●	●	●	●
210 - 21F	○	●	●	●	●	○
⋮						
* 300 - 30F	○	○	●	●	●	●
⋮						
3F0 - 3FF	○	○	○	○	○	○

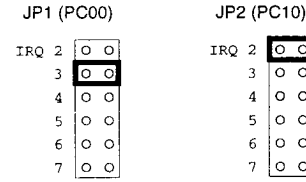
○ = Off ● = On * = default

Switches 1-6 control the PC bus address lines as follows:

Switch	1	2	3	4	5	6
Line	A9	A8	A7	A6	A5	A4

Interrupt settings (JP1, JP2)

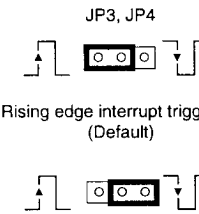
Jumpers JP1 and JP2 control the IRQ levels, as shown below:



Note: *You must set each I/O line to a different interrupt level.*

Interrupt level (JP3, JP4)

Jumpers JP3 and JP4 select the trigger edge (rising or falling) for I/O lines PC00 and PC10, respectively. Jumpers settings appear below:



If you set the PCL-3724 to trap on a rising edge, the module will generate an interrupt if the I/O line (PC00 or PC10) changes from TTL LOW to TTL HIGH. Conversely, if you set the module to trap on a falling edge change, then it will generate an interrupt when the I/O line changes from TTL HIGH to TTL LOW.

Interrupt mode (JP5, JP6)

The PCM-3724 provides two I/O lines (PC00 and PC10) which you can use to generate hardware interrupts to the PC. Jumper JP5 controls interrupt line PC00, and jumper JP6 controls interrupt line PC10. The DIS setting for each jumper (shown in the figure below) disables the corresponding line's interrupt capability. The INT setting enables the line's interrupt capability.

JP5 and JP6

(Default)

The EXT setting allows you to enable and disable control by external interrupt. I/O line PC04 controls the interrupt on line PC00, and line PC14 controls the interrupt on line PC10. Bring line PC04 to TTL LOW to enable the interrupt capability on PC00. Send line PC04 to TTL HIGH to disable the interrupt capability on PC00. I/O line PC14 controls PC10 in the same way.

Operation

The PCM-3724 module simulates MODE 0 of an Intel 8255 programmable peripheral interface (PPI) chip, with Port C undividable. The module is pin compatible with most industrial solid state I/O racks and modules, such as those manufactured by OPTO-22, Potter Brumfield, Gordos, etc.

The PCM-3724's two 50-pin male IDC connectors interface with directly to OPTO-22 racks.

The PCM-3724 offers two I/O lines (PC00 and PC10) to generate hardware interrupts, as described on page 3.

Configuration

Mode 0 of the 8255 provides simple input/output functions. No handshaking is required since you read or write data directly to or from a specified port.

8255 MODE 0 function definitions

- Six 8-bit ports (Port A0, B0, C0, A1, B1 and C1)
- Any port can be used for input or output
- Outputs are latched, whereas inputs are not latched

The PCM-3724 requires ten I/O ports, identified below:

I/O port assignments

Location	Write	Read
BASE+0	8255 Port A0	8255 Port A0
BASE+1	8255 Port B0	8255 Port B0
BASE+2	8255 Port C0	8255 Port C0
BASE+3	8255 Mode Register for Ports A0, B0 and C0	N/A
BASE+4	8255 Port A1	8255 Port A1
BASE+5	8255 Port B1	8255 Port B1
BASE+6	8255 Port C1	8255 Port C1
BASE+7	8255 mode Register for Ports A1, B1 and C1	N/A
BASE+8	DIO direction	N/A
BASE+9	Gate control	N/A

8255 data registers

The PCM-3724's I/O ports (BASE+0 to 2 and BASE+4 to 6) directly map to the 8255 ports. Bit assignments for each I/O port appear below:

BASE+0 8255 Port A0 (read/write)

Bit	7	6	5	4	3	2	1	0
Value	PA07	PA06	PA05	PA04	PA03	PA02	PA01	PA00

BASE+1 8255 Port B0 (read/write)

Bit	7	6	5	4	3	2	1	0
Value	PB07	PB06	PB05	PB04	PB03	PB02	PB01	PB00

BASE+2 8255 Port C0 (read/write)

Bit	7	6	5	4	3	2	1	0
Value	PC07	PC06	PC05	PC04	PC03	PC02	PC01	PC00

BASE+4 8255 Port A1 (read/write)								
Bit	7	6	5	4	3	2	1	0
Value	PA17	PA16	PA15	PA14	PA13	PA12	PA11	PA10

BASE+5 8255 Port B1 (read/write)								
Bit	7	6	5	4	3	2	1	0
Value	PB17	PB16	PB15	PB14	PB13	PB12	PB11	PB10

BASE+6 8255 Port C1 (read/write)								
Bit	7	6	5	4	3	2	1	0
Value	PC17	PC16	PC15	PC14	PC13	PC12	PC11	PC10

8255 mode registers

BASE+3 8255 Mode Register, A0, B0, C0 (write)								
Bit	7	6	5	4	3	2	1	0
Value	1	0	0	PA0	PC0	0	PB0	PC0

Where:

PB0: 0 = Port B0 as output
1 = Port B0 as input

PC0: 0 = Port C0 as output
1 = Port C0 as input

PA0: 0 = Port A0 as output
1 = Port A0 as input

BASE+7 8255 Mode Register, A1, B1, C1 (write)								
Bit	7	6	5	4	3	2	1	0
Value	1	0	0	PA1	PC1	0	PB1	PC1

Where:

PB1: 0 = Port B1 as output
1 = Port B1 as input

PC1: 0 = Port C1 as output
1 = Port C1 as input

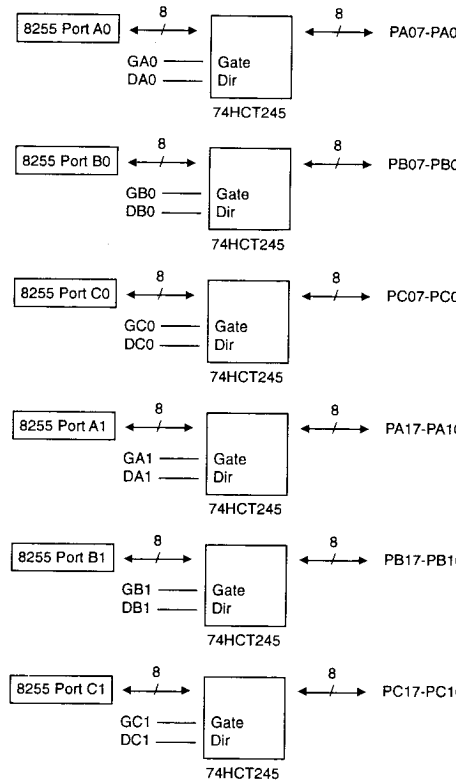
PA1: 0 = Port A1 as output
1 = Port A1 as input

NOTE: *After power-on or reset, all ports (Port A0, B0, C0, A1, B1 and C1) are set to input mode.*

Gate control

Six 74HCT245 chips (one for each port) buffer the PCM-3724's I/O lines to increase driving capacity. Because the 74HCT245 is a bidirectional, tri-state line buffer, you need to set two additional I/O ports (BASE+8 and 9) to control the direction of data flow.

The following diagrams show the gate and direction signals for each port:



Gate and direction assignments for each port

Address assignments for the buffer direction register (BASE+8) and gate control register (BASE+9) appear below:

BASE+8 Buffer direction (write)								
Bit	7	6	5	4	3	2	1	0
Value	N/A	N/A	DA1	DB1	DC1	DA0	DB0	DC0

Where:

DA0 1 = Port A0 is an output port
0 = Port A0 is an input port

DB0 1 = Port B0 is an output port
0 = Port B0 is an input port

DC0 1 = Port C0 is an output port
0 = Port C0 is an input port

DA1 1 = Port A1 is an output port
0 = Port A1 is an input port

DB1 1 = Port B1 is an output port
0 = Port B1 is an input port

DC1 1 = Port C1 is an output port
0 = Port C1 is an input port

BASE+9 Gate active/tri-state (write)

Bit	7	6	5	4	3	2	1	0
Value	N/A	N/A	GA1	GB1	GC1	GA0	GB0	GC0

Where:

GA0 0 = Port A0 remains tri-state
1 = Port A0 becomes active

GB0 0 = Port B0 remains tri-state
1 = Port B0 becomes active

GC0 0 = Port C0 remains tri-state
1 = Port C0 becomes active

GA1 0 = Port A1 remains tri-state
1 = Port A1 becomes active

GB1 0 = Port B1 remains tri-state
1 = Port B1 becomes active

GC1 0 = Port C1 remains tri-state
1 = Port C1 becomes active

NOTE: *System power-on or reset will clear registers BASE+8 and 9, setting all ports to gated-off (tri-state) and input data direction.*

Interrupt handling

The PCM-3724 offers two I/O lines, PC00 and PC10, which you can use to generate a hardware interrupt to the CPU. Interrupts are edge-triggered. Please refer to page 3 for jumper settings and description.

NOTE: *Since the PCM-3724's digital input data are not latched, the module provides no "first event" trapping to determine which input was active first.*

Although interrupts are normally triggered by external signals, the PCM-3724 can send output data to emulate an interrupt singal. See the example programs in the following section.

Programming

The following programming examples show how to use the module's readback function to monitor the output status, how to use the interrupt function (rising and falling edge) and how to set the initial value for the output port. The example programs run under Turbo C version 2.0 or later.

Programming notes

You can program the PCM-3724's ports in software for input, output or tri-state. When you power-on or reboot your system, however, all of the ports will be reset to tri-state. When you configure one of the ports for output for the first time and sent data to it, it will not output until you have set the output buffer direction and activated the gate. This prevents external devices from being damaged before they are initialized. When a port is set for output, a read action on the port will return the data to be output.

```
/*******************************************************
*  This demo program shows how to use the PCL-3724's     *
*  readback function to monitor the output status.       *
*                                                        *
*  Hardware setting:                                     *
*      1. Base address set at 0x300                      *
*******************************************************/
#include <stdio.h>
#include <conio.h>
#include <process.h>
#include <dos.h>

main()
{
int base = 0x300;  /* set base address to 300 (hex)    */
int portA;         /* save readback value of port_A1   */
int portB;         /* save readback value of port_B1   */
int portC;         /* save readback value of port_C1   */
int i,j;

/* handle screen */
clrscr();
gotoxy(30,3);
textattr(0x70);
cputs("PCL-3724 DEMO PROGRAM");
gotoxy(11,6);
printf("PortA0 output value -> ");
gotoxy(11,8);
printf("PortB0 output value -> ");
gotoxy(11,10);
printf("PortC0 output value -> ");
gotoxy(43,6);
printf("PortA1 Readback -> ");
gotoxy(43,8);
printf("portB1 Readback -> ");
gotoxy(43,10);
printf("portC1 Readback -> ");

/* initialization */
outportb (base+9,0x0); /* disable all gates */
outportb (base+3,0x80);/* set 8255 port0 all as output */
outportb (base+8,0xff); /* set direction of all ports to
                           /*  output */
outportb (base+9,0xff); /* enable all gates */

/********************** main program ***/
for ( j=0;j<0x100;j++ )
{
     outportb (base,j); /* out j to port A0 */
     gotoxy (34,6);
     printf("%2x",j);
     portA = inportb (base);
     gotoxy(63,6);
     printf("%2x",portA);
     if ( portA != j )
     {
          printf ("\7");  /* beep */
          gotoxy (30,13);
          textattr(0x09);
          cprintf("PortA1 readback error!");
          getch();
          exit(1);  /* quit to dos */
     }
     outportb (base+1,j); /* out j to port B0 */
     gotoxy (34,8);
     printf("%2x",j);
     portB = inportb (base+1);
```

```
        gotoxy(63,8);
        printf("%2x",portB);
        if ( portB != j )
        {
             printf ("\7");  /* beep */
             gotoxy (30,13);
             textattr(0x09);
             cprintf("PortB1 readback error!");
             getch();
             exit(1);  /* quit to dos */
        }
        outportb (base+2,j); /* out j to port C0 */
        gotoxy (24,10);
        printf("%2x",j);
        portC = inportb (base+2);
        gotoxy(63,10);
        printf("%2x",portC);
        if ( portC != j )
        {
             printf ("\7");  /* beep */
             gotoxy (30,13);
             textattr(0x09);
             cprintf("PortC1 readback error!");
             getch();
             exit(1);  /* quit to dos */
        }
   } /* end of for */
   } /* end of main() */

/*********************************************************
*  This demo program shows how to use the interrupt      *
*  function (rising edge) of the PCM-3724.               *
*  Hardware settings:                                    *
*     1. Base address set at 0X300                       *
*     2. JP1 set at IRQ 2                                *
*     3. JP5 set at INT or EXT                           *
*     4. JP3 set at RISING trigger                       *
*********************************************************/
#include <dos.h>
#include <stdio.h>
#include <conio.h>

/* new INT 0AH ISR */
void interrupt alarm (void)
{
     char Port61_Old_Status;
     char Port61_New_Status;
     int DelayTime = 0x300;
     int Count = 0;
     int i;

     /**  get original port 61H status and save it  **/
     Port61_New_Status=Port61_Old_Status=inportb(0x61);

     /**  set port 61h bit1 to 0  **/
     Port61_New_Status &= 0xfd; /* 1111 1101 in binary */

     for (Count=0;Count<0x300;Count++,DelayTime--)
     {
          Port61_New_Status ^= 0x02;  /* ON/OFF bit1 */
          outportb (0x61, Port61_New_Status);
          for (i=0 ; i<DelayTime ; i++);
     }
     outportb (0x61, Port61_Old_Status);
     outportb (0x20, 0x20);  /* send EOI to 8259 */
} /* end of ISR */

void main()
{
int IMR,base=0x300;
void interrupt (*Int_A_Old_Vector)();
Int_A_Old_Vector = getvect(0x0a); /*get old int 0ah ISR*/
setvect (0x0a,alarm);  /* set new int 0ah ISR */
IMR = inportb(0x21); /*get 8259 interrupt mask register*/

/* initialization */
outportb (base+9,0x0);  /* disable all gates */
outportb (base+3,0x80); /* set Port A0, B0 and C0 to */
                        /*  output mode */
outportb (base+8,0xff); /* set all ports to output  */
                        /*  direction */
outportb (base+9,0xff); /* enable all gates */
clrscr();
printf("Press any key to generate a rising edge"
     "interrupt");
getch();
outportb(0x21,0xfb & IMR); /* set IRQ2 nonmasked */
/* PC04=0->interrupt enable, set PC00=0 and then set
PC00 = 1 to generate a rising edge signal */
outportb (base+2,0x0);
printf("\n\nPort C0 = %x",inportb(0x2c2));

/* generate a rising edge signal PC00 */
outportb (base+2,0x01); /* set PC04 = 0 -> interrupt
enable, set PC00 = 1 */
printf("\n\nPort C0 = %x",inportb(0x2c2));
printf("\n\nPress any key to quit...");
getch();

/* restore old INT 0AH ISR */
setvect (0x0a,Int_A_Old_Vector);
outportb (0x21,IMR);  /* restore 8259 interrupt mask */

/* set ports as INPUT to release IRQ2 line */
outportb (base+3,0x9b);
outportb (base+9,0x0);   /* disable all gates */
outportb (base+8,0x0);   /* set all ports to input */
                         /* direction */
outportb (base+9,0xff);  /* enable all gates */
} /* end of main() */

/*********************************************************
*  This demo program shows how to use the interrupt      *
*  function (falling edge) of the PCM-3724.              *
*  Hardware settings:                                    *
*     1. Base address set at 0X300                       *
*     2. JP1 set at IRQ 2                                *
*     3. JP5 set at INT or EXT                           *
*     4. JP3 set at FALLING trigger                      *
*********************************************************/
#include <dos.h>
#include <stdio.h>
#include <conio.h>

/* new INT 0AH ISR */
void interrupt alarm (void)
{
     char Port61_Old_Status;
     char Port61_New_Status;
     int DelayTime = 0x300;
     int Count = 0;
     int i;

     /**  get original port 61H status and save it  **/
     Port61_New_Status=Port61_Old_Status=inportb(0x61);

     /**  set port 61h bit1 to 0  **/
     Port61_New_Status &= 0xfd; /* 1111 1101 in binary */
     for ( Count=0; Count < 0x300; Count++, DelayTime--)
     {
     Port61_New_Status ^= 0x02;  /* ON/OFF bit1  */
          outportb (0x61,Port61_New_Status);
          for (i=0;i<DelayTime;i++);
     }
     outportb (0x61,Port61_Old_Status);
     outportb (0x20,0x20);  /* send EOI to 8259 */
} /* end of ISR */

void main()
{
     int IMR,base=0x300;
     void interrupt (*Int_A_Old_Vector)();
     /* get old int0Ah ISR*/
     Int_A_Old_Vector = getvect(0x0a);
     setvect (0x0a,alarm); /* set new int 0ah ISR */
     /*get 8259 interrupt mask register*/
     IMR = inportb(0x21);

     /* initialization */
     outportb (base+9,0x0);  /* disable all gates */
     outportb (base+3,0x80); /* set Port A0, B0 and C0 */
                             /* to output mode */
     /* set all ports to output direction */
     outportb (base+8,0xff);
     outportb (base+9,0xff); /* enable all gates */
     clrscr();
     printf("Press any key to generate a falling edge"
          "interrupt");
     getch();
     outportb(0x21,0xfb & IMR); /* set IRQ2 nonmasked */
     /* PC04=0 -> interrupt enable, set PC00=1, then set
     PC00=0 to generate a falling edge signal */
     outportb (base+2,0x01);
     printf("\n\nPort C0 = %x",inportb(0x2c2));

     /* generate a falling edge signal PC00 */
     /* PC04=0 -> interrupt enable, set PC00=0 */
     outportb (base+2 , 0x00);
     printf("\n\nPort C0 = %x",inportb(0x2c2));
     printf("\n\nPress any key to quit...");
     getch();

     /* restore old INT 0AH ISR */
     setvect (0x0a,Int_A_Old_Vector);
     /* restore 8259 interrupt mask */
     outportb(0x21,IMR);
```

```
    /* set as INPUT to release IRQ2 line */
    outportb(base+3,0x9b);
    outportb(base+9,0x0);   /* disable all gates */
    /* set all ports to input direction */
    outportb (base+8,0x0);
    outportb (base+9,0xff); /* enable all gates */
} /* end of main() */

/*********************************************************
*   This demo program demonstrates how to set the       *
*   PCM-3724's output port to an initial value.         *
*                                                       *
*   Hardware setting:                                   *
*   1. Base address set at 0x300                        *
*********************************************************/

#include <stdio.h>
#include <conio.h>
#include <process.h>
#include <dos.h>

main()
{
  int base = 0x300; /* set base address to 300(hex) */

  /* handle screen */
  clrscr();
  gotoxy(30,3);
  textattr(0x70);
  cputs("PCM-3724 DEMO PROGRAM");
  gotoxy(27,6);
  printf("portA0 output value -> ffH");
  gotoxy(27,8);
  printf("portB0 output value -> 0H");
  gotoxy(27,10);
  printf("protC0 output value -> ffH");

/******************** main program ******************/
  /* Initialization */
  outportb (base+9,0x0);   /*disable all gates*/
  outportb (base+3,0x80);  /* set 8255 port 0 all as */
                           /*  output */
  outportb (base,0xff);    /* out ffH to port A0 */
  outportb (base+1,0x0);   /* out 0H to port B0 */
  outportb (base+2,0xff);  /* out ffH to prot C0 */
  outportb (base+8,0xff);  /* set direction to output  */
                           /* for all ports */
  outportb (base+9,0xff);  /* enable all gates */
} /* end of main() */
```

PCM-5820 Series

(PCM-5820/5820L/5820E/5822)

NS GXM Single Board Computer with CPU SVGA/LCD, Ethernet, Audio and TV-out Interface

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This manual is for the PCM-5820/5820L Rev. A104 or higher. PCM-5820E Rev. A101 or higher, PCM-5822 Rev. A101

Part No. 2006582006

4th Edition Printed in Taiwan March 2000

Packing list

Before you begin installing your card, please make sure that the following materials have been shipped:

- 1 PCM-5820 Series all-in-one single board computer
- 1 startup manual
- 1 utility disk/CD, driver, and manual (in PDF format)
- 1 2.5" IDE flat cable, 44-pin to 44-pin (part no. 1701440351)
- 1 keyboard / PS2 mouse cable (part no. 1700060201)
- 1 secondary serial port cable (part no. 1701140201)
- 1 parallel cable (part no. 1700260650)
- 1 floppy cable, for 3.5" FDD only (part no. 1701340602)
- 1 audio cable (part no. 1700160160)
- 1 USB cable (part no. 1703100260)

If any of these items are missing or damaged, contact your distributor or sales representative immediately.

The PCM-5820 Series' Model Comparison Table

	GXM-233	GXM-200	Ethernet	LVDS	TV-Out	LCD
PCM-5820	x		x	x		x
PCM-5820L	x			x		x
PCM-5820E		x	x	x		x
PCM-5822		x	x		x	x

Contents

Tables

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CHAPTER 1

General Information

This chapter gives background information on the PCM-5820 Series.

Sections include:

- Board specifications
- Board layout and dimensions

1.1 Introduction

The PCM-5820 Series is the ultimate cost-effective solution for limited space applications. It offers all the functions of an AT-compatible industrial computer on a single board and only occupies the space of a 3½" hard drive. The PCM-5820/5820L comes with an embedded high-performance GXM-233 processor on-board. The PCM-5820E and PCM-5822 come with a low power GXM-200 processor on-board. For maximum performance, the PCM-5820 Series also support an SDRAM SODIMM socket that can accept up to 128 MB memory.

On-board features include an Ethernet interface, audio interface, socket for Compact Flash Card, Enhanced IDE interface with up to Ultra DMA transfer protocol, one parallel port, two serial ports (RS-232 and RS-232/422/485) with DB-9 connector as COM1, and a mini-DIN PS/2 keyboard/mouse interface. An SVGA/LCD display controller (LCD, and CRT displays) allows LCD screen resolutions up to 1024 x 768 and CRT resolutions up to 1280 x 1024 @ 16 colors. Supports LVDS interface (PCM-5820L and PCM-5820E only) for long distance LCD panel signal transmission and EMI protection add-ons. Also provided is a TV-out function (PCM-5822 only) for NTSC and PAL TV format that supports composite, S-video and SCART (optional) outputs.

The PCM-5820 Series complies with the "Green Function" standard and supports three types of power saving features: Normal, Doze, and Sleep modes.

The display type configuration is done through software. A single Flash chip holds the system BIOS and the VGA BIOS. This minimizes the number of chips and eases configuration. You can change the display BIOS simply by programming the Flash chip.

If you need any additional functions, the PCM-5820 Series has a PC/104 connector for future upgrades.

1.2 Features

- Ultra-compact size single board computer as small as a 3 1/2" hard disk drive (145 mm x 102 mm)
- On-board NS GXM-233/200 CPU
- Up to 128 MB system memory by SODIMM (SDRAM)
- On-board VGA/LCD controller
- On-board LVDS interface (PCM-5820L and PCM-5820E only)
- On-board 100Base-T Ethernet interface (PCM-5820/5820E/ PCM-5822 only)
- On-board TV-out function, NTSC and PAL format (PCM-5822)
- Supports CompactFlash card
- Built-in Enhanced IDE (AT bus) hard disk drive interface
- On-board mini-DIN PS/2 keyboard/mouse connector
- Two serial ports: one RS-232, one RS-232/422/485 or infared selectable (uses 16C550 UARTs with 16 byte FIFO)
- Upgradeable through PC/104 module
- Green engine with sleep mode and low power consumption
- Single +5 V power supply

1.3 Specifications

1.3.1 Standard SBC functions

- **CPU**:
  - Embedded NS GXM-233 / 2.9 V (for PCM-5820/L)
  - Embedded NS GXM-200 / 2.2 V (for PCM-5820E/ PCM-5822)
- **BIOS**: AWARD 256 KB Flash memory
- **Chipset**: NS CX5530
- **System memory**: One 144-pin SODIMM socket accepts up to 128 MB SDRAM
- **Enhanced IDE interface**: Supports up to two EIDE devices. BIOS auto-detect, PIO Mode 3 or Mode 4 transfer, Ultra DMA33 mode (ATA-4) up to 33 MB/sec.
- **FDD interface**: Supports up to two FDDs
- **Serial ports**: One serial RS-232 port, one serial RS-232/422/485 port
- **Parallel port**: One parallel port, supports SPP/EPP/ECP mode
- **Infrared port**: Shared with COM2. Transfer rate up to 115 kbps.
- **Keyboard/mouse connector**: Mini-DIN connector supports standard PC/AT keyboard and a PS/2 mouse
- **USB interface**: two USB ports, USB 1.0 compliant
- **Power management**: Supports power saving modes including Normal/Doze/Sleep modes. APM 1.1 compliant
- **Watchdog timer**: 1.6 sec. intervals

1.3.2 Local-bus flat panel/VGA interface

- **Chipset**: NS CX5530
- **Display memory**: 1 ~ 4 MB share memory, set in BIOS
- **Display type**: Supports CRT and TFT LCD displays. Can display CRT and flat panel simultaneously
- **Flat panel display mode:** Panel resolution supports up to 1024 x 768 @ 18 bpp. Supports 18-bit TFT LCD panel
- **CRT display mode**: Non-interlaced CRT monitors resolutions up to 1280 x 1024 @ 256 colors or 1024 x 768 @ 16 bpp

1.3.3 LVDS (Low Voltage Differential Signal) interface (PCM-5820, PCM-5820L, PCM-5820E)

- **Chipset**: TI SN75LVDS84 or compatible chipset
- **Performance**: 18 low-voltage TTL data channels plus clock-in and 3 low-voltage differential data channels plus clock-out.

  3.3 Volt and 250 mW (typ.). Meets ANSI/EIA/TIA-644

1.3.4 Audio function

- **Chipset**: NS CX5530
- **Audio controller**: AC97 version 2.0 compliant interface
- **Audio interface**: Microphone in, Line in, CD audio in, Line out, Speaker L, Speaker R.
- **Power**: Accepts +12 V source for improved audio quality

1.3.5 Ethernet interface (PCM-5820/5820E/5822 only)

- **Chipset**: RTL 8139
- **Ethernet interface**: PCI 10/100 Mbps Ethernet. IEEE 802.3 u protocol compatible
- **Connection**: On-board RJ-45 connector
- I/O address switchless setting
- Built-in boot ROM

1.3.6 Mechanical and environmental

- **Dimensions (L x W)**: 145 mm x 102 mm (5.9" x 4.2")
- **Power supply voltage**: +5 V (4.75 ~ 5.25 V)
- **Power consumption** (typical) :
  - +5 V @ 3.0 A with GXM-233, 64 MB SODIMM and 40 MB CFC (PCM-5820)
  - +5 V @ 1.9 A with GXM-233, 64 MB SODIMM and 40 MB CFC (PCM-5820 Rev. A104 or higher
  - +5 V @ 1.5 A with GXM-200, 64 MB SODIMM and 40 MB CFC (PCM-5820E, PCM-5822)
- **Operating temperature**: 0 ~ 60° C (32 ~ 140° F)
- **Weight**: 0.77 kg (weight of total package)

1.3.7 Solid state disk

- Supports one 50-pin socket for CompactFlash™ card

1.3.8 TV-out function (PCM-5822 only)

- Chipset: CHRONTEL CH7003C
- Supports NTSC, NTSC-EIA (Japan) and PAL TV formats
- Provides Composite, S-video, and SCART (optional) outputs via RCA (composite) connector and S-video connector
- Supports 640 x 480 and 800 x 600 input resolutions
- Supports Windows 95/98 and Windows NT driver
- Over-scan, under-scan, and position adjustable (Windows 95/98 only)
- Auto-detection of TV presence

1.4 Board layout and dimensions

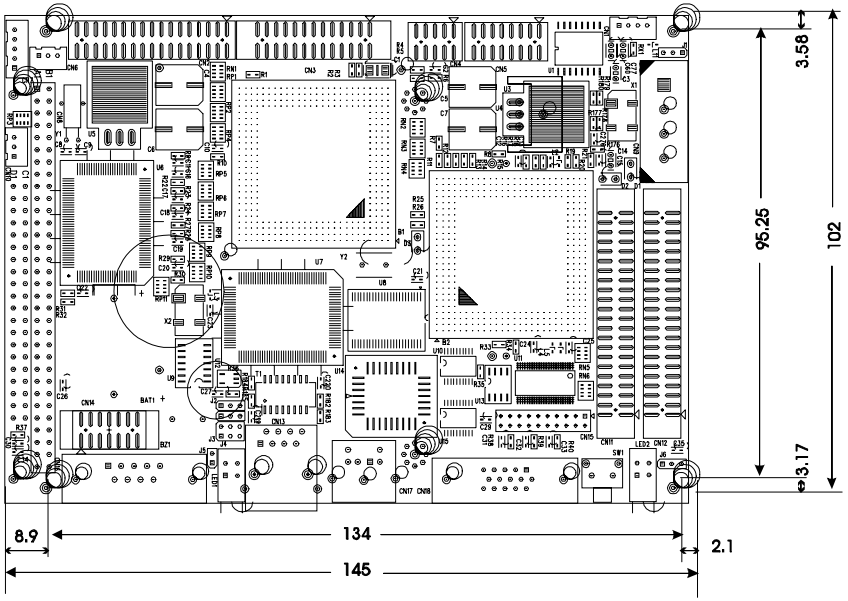


Figure 1-1: PCM-5820 Series dimensions

CHAPTER 2

Installation

This chapter tells how to set up the PCM-5820 Series hardware, including instructions on setting jumpers and connecting peripherals, switches and indicators. Be sure to read all the safety precautions before you begin the installation procedure.

2.1 Jumpers and connectors

Connectors on the board link it to external devices such as hard disk drives, a keyboard or expansion bus connectors. In addition, the board has a number of jumpers that allow you to configure your system to suit your application.

The table below lists the function of each of the board jumpers and connectors:

Table 2-1: Jumpers

Label	Function
J1	Audio power source setting
J2	Clear CMOS
J3	Watchdog timer action
J4	COM2 selector
J5	Buzzer setting
J6	LCD power selector
J7	Ethernet power select (PCM-5822)

Table 2-2: Connectors

Label	Function
CN1	CD audio input connector
CN2	Floppy disk connector
CN3	Parallel port connector
CN4	USB connector
CN5	Audio connector
CN6	CPU fan power connnector (+5 V)
CN7	IR connector (infrared)
CN8	PC/104 connector
CN9	Main power connector (+5 V, +12 V)
CN10	Auxilary power connector (-5 V, -12 V)
CN11	IDE Hard disk connector
CN12	LCD connector
CN13	Ethernet connector
CN14	COM2 connector
CN15	LVDS connector
CN16	COM1 connector
CN17	PS/2 keyboard + PS/2 mouse
CN18	CRT display connector
CN19	CompactFlash™ socket
CN20	SODIMM socket
CN21	S-Video connector (PCM-5822 only)
CN22	RCA (composite) connector (PCM-5822 only)
CN23	ATX feature connector (PCM-5822)
CN24	ATX power button & power LED connector
LED1	Ethernet LED (PCM-5820/5820E/5822)
LED2	Power & HDD LED (PCM-5820/5820L/5820E)
SW1	Reset button (PCM-5820/5820L/5820E)

2.2 Locating jumpers

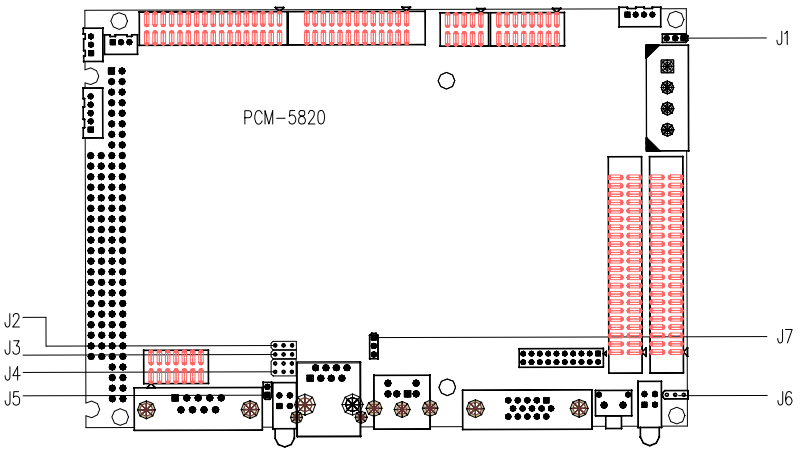


Figure 2-1: Jumpers

2.3 Locating connectors

2.3.1 Component side

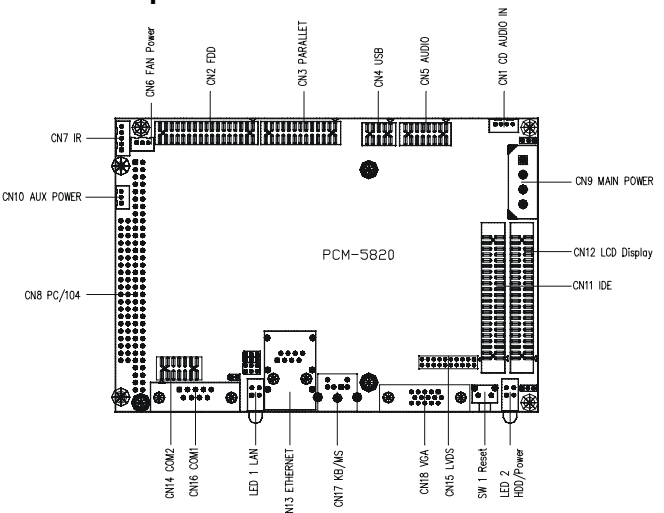


Figure 2-2a: Connectors - component side (PCM-5820/L/E)

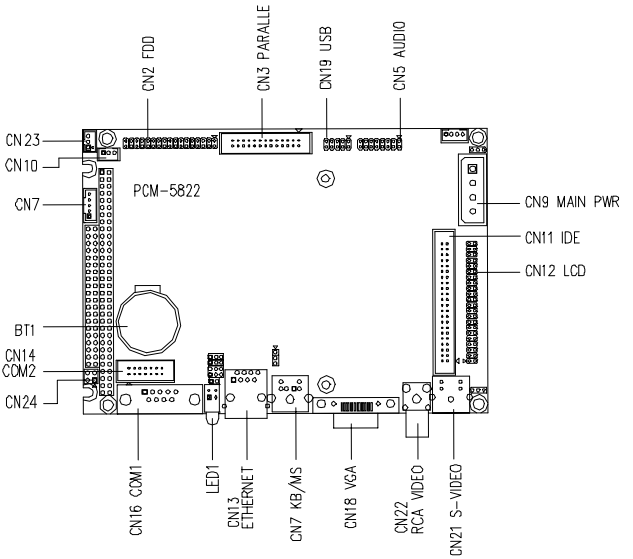


Figure 2-2b: Connectors - component side (PCM-5822)

2.3.2 Solder side

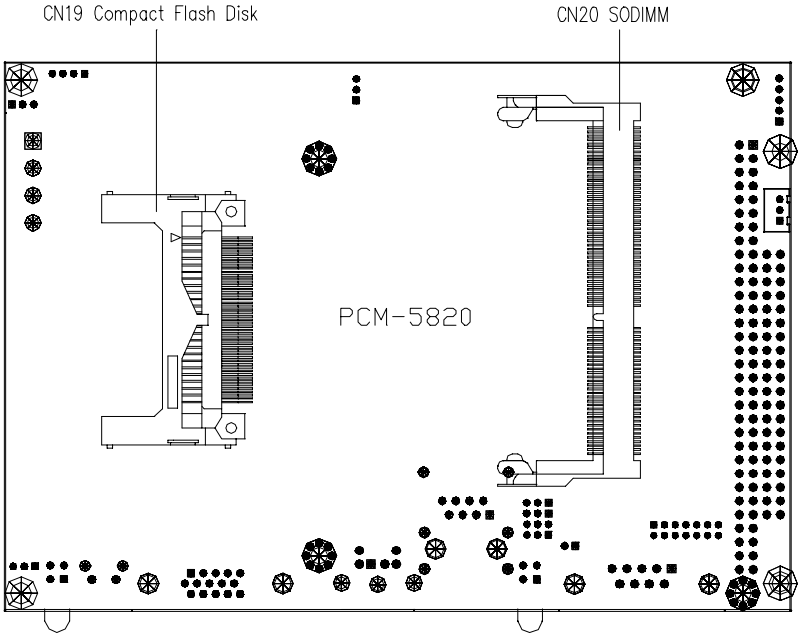
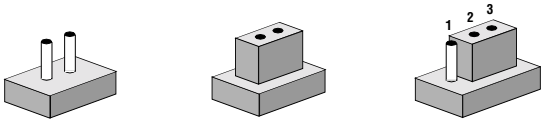


Figure 2-3: Connectors - solder side (PCM-5820 Series)

2.4 Setting jumpers

2.4.1 Introduction

You may configure your card to match the needs of your application by setting jumpers. A jumper is the simplest kind of electrical switch. It consists of two metal pins and a small metal clip (often protected by a plastic cover) that slides over the pins to connect them. To "close" a jumper, you connect the pins with the clip. To "open" a jumper you remove the clip. Sometimes a jumper will have three pins, labeled 1, 2, and 3. In this case you would connect either pins 1 and 2 or 2 and 3.



Open **Closed** **Closed 2-3**

The jumper settings are schematically depicted in this manual as follows:

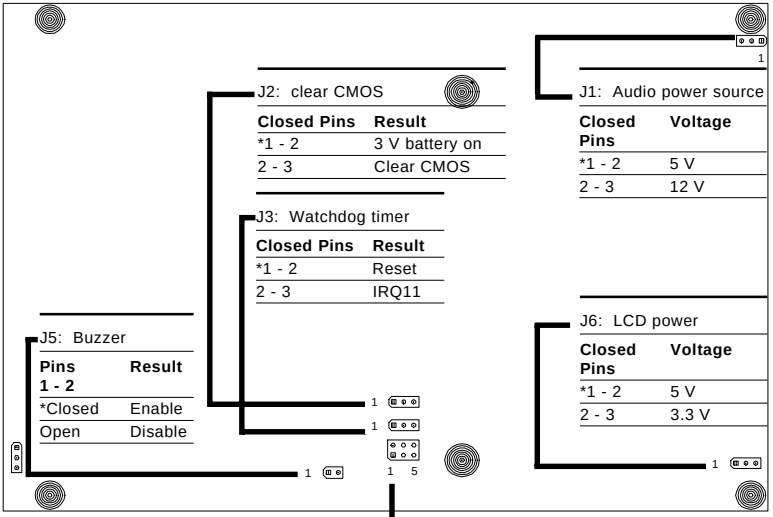
Open **Closed** **Closed 2-3**

A pair of needle-nose pliers may be helpful when working with jumpers.

If you have any doubts about the best hardware configuration for your application, contact your local distributor or sales representative before you make any changes.

Generally, you simply need a standard cable to make most connections.

2.4.2 Settings details



* default setting

2.5 Safety precautions

Warning! *Always completely disconnect the power cord from your board whenever you are working on it. Do not make connections while the power is on because sensitive electronic components can be damaged by the sudden rush of power.*

Caution! *Always ground yourself to remove any static charge before touching the board. Modern electronic devices are very sensitive to static electric charges. Use a grounding wrist strap at all times. Place all electronic components on a static-dissipative surface or in a static-shielded bag when they are not in the chassis.*

2.6 Installing DRAM (SODIMMs)

2.6.1 Introduction

You can install anywhere from 16 MB to 128 MB of on-board DRAM memory using 16, 32, 64 or 128 MB 144-pin SODIMMs (Small Outline Dual In-line Memory Modules).

2.6.2 Installing SODIMMs

Note: The modules can only fit into a socket one way and their gold pins must point down into the SODIMM socket.

The procedure for installing SODIMMs appears below. Please follow these steps carefully.

1. Ensure that all power supplies to the system are switched Off.
2. Install the SODIMM card. Install the SODIMM so that its gold pins point down into the SODIMM socket.
3. Slip the SODIMM into the socket at a 45 degree angle and carefully fit the bottom of the card against the connectors.
4. Gently push the SODIMM into a perpendicular position until the clips on the ends of the SODIMM sockets snap into place.
5. Check to ensure that the SODIMM is correctly seated and all connector contacts touch. The SODIMM should not move around in its socket.

2.7 IDE hard drive connector (CN11)

The built-in Enhanced IDE (Integrated Device Electronics) controller supports up to two IDE devices, including CD-ROM drives, tape backup drives, a large hard disk drive and other IDE devices. It also supports faster data transfer, PIO mode 3, mode 4, and Ultra DMA 33 mode.

2.7.1 Connecting the hard drive

Connecting drives is done in a daisy-chain fashion and requires one or two cables, depending on the drive size. All required cables are included in your PCM-5820 Series package. 1.8" and 2.5" drives need a 1 x 44-pin to 2 x 44-pin flat-cable connector. 3.5" drives use a 1 x 44-pin to 2 x 40-pin connector. However, the required connectors are not included in the PCM-5820 Series package.

Wire number 1 on the cable is red or blue, and the other wires are gray.

1. Connect one end of the cable to CN11. Make sure that the red (or blue) wire corresponds to pin 1 on the connector, which is labeled on the board (on the right side).
2. Plug the other end of the cable to the Enhanced IDE hard drive, with pin 1 on the cable corresponding to pin 1 on the hard drive. (See your hard drive's documentation for the location of the connector.)

Connect a second drive as described above.

Unlike floppy drives, IDE hard drives can connect to either end of the cable. If you install two drives, you will need to set one as the master and one as the slave by using jumpers on the drives. If you install just one drive, set it as the master.

2.8 CompactFlash™ disk (CN19)

The PCM-5820 Series is equipped with a CompactFlash disk socket on the solder side and it supports the IDE interface CompactFlash disk card. The socket itself is especially designed to prevent any incorrect installation of the CompactFlash disk card. When installing or removing the CompactFlash disk card, please make sure that the system power is off.

The CompactFlash disk card is defaulted as the E: disk drive in your PC system.

2.9 Floppy drive connector (CN2)

You can attach up to two floppy drives to the the PCM-5820 Series' on-board controller. Any combination of 5¼" (360 KB and 1.2 MB) and/or 3½" (720 KB, 1.44 MB, and 2.88 MB) drives is possible.

A 34-pin daisy-chain drive connector cable is required for a dual-drive system. A 34-pin flat-cable connector is fitted on one end of the cable while the other end sports two sets of floppy disk drive connectors. Each set consists of a 34-pin flat-cable connector (for the 3½" drives) and a printed-circuit board connector (for the 5¼" drives).

2.9.1 Connecting the floppy drive

1. Plug in the 34-pin flat-cable connector into CN2. Make sure that the red wire corresponds to pin 1 on the connector.
2. Attach the appropriate conector at the other end of the cable to the floppy drive(s). You can use only one connector in the set. The set at the other end (after the twist in the cable) connects to the A: drive. The set in the middle connects to the B: drive.
3. If you are connecting a 5¼" floppy drive, line up the slot in the printed circuit board with the blocked-off part of the cable connector.

When connecting a 3½” floppy drive, you may have some difficulties in determining which pin is pin number one. Look for a number on the circuit board indicating pin number one. In addition, you should check if the connector on the floppy drive has an extra slot. If the slot is up, pin number one should be on the right. Please refer to any documentation that came with the drive for more information.

If needed, connect the B: drive to the connectors in the middle of the cable as described as above.

If your cable needs to be custom made, you can find the pin assignments for the board's connector in Appendix A.

2.10 Parallel port connector (CN3)

Normally, the parallel port is used to connect the card to a printer. The PCM-5820 Series includes a multi-mode (ECP/EPP/SPP) parallel port, accessed through CN3 - a 26-pin flat-cable connector.

You will need an adapter cable if you use a traditional DB-25 connector. The adpater cable should have a 26-pin connector on one end and a 25-DB connector on the other.

The parallel port is designated as LPT1 and can be disabled or changed to LPT2 or LPT3 in the system BIOS setup.

The parallel port interrupt channel is designated as IRQ7.

The proper ECP/EPP DMA channel can be selected via the BIOS setup.

2.11 Keyboard and PS/2 mouse connector (CN17)

The PCM-5820 Series board provides a mini-DIN keyboard connector, which supports both a keyboard and a PS/2 style mouse. In most cases, especially in embedded applications, a keyboard is not used. If the keyboard is not present, the standard PC/AT BIOS will report an error or failure during the power-on self test (POST) after resetting the PC. The PCM-5820 Series board's BIOS standard setup menu allows you to select "All, But Keyboard" under the "Halt On" selection. This allows non-keyboard operation in embedded system applications without the system halting during the POST.

2.12 Power connectors

2.12.1 Main power connector +5 V, +12 V (CN9)

Supplies main power to the PCM-5820 Series (+5 V) and devices that require +12 V.

2.12.2 Auxilary power connector (CN10)

Supplies secondary power to peripherals that require -5 V and -12 V.

2.12.3 CPU fan power connector (CN6)

This connector is reserved for an optional fan, which facilitates a better working environment for the CPU.

2.13 IR connector (CN7)

The PCM-5820 Series provides an IrDA port for transfer rates of 115 kbps. This connector supports the optional wireless infrared transmitting and receiving module, which is mounted on the system case. Configuration of the module is done through BIOS setup.

2.14 Audio interfaces (CN5, CN1)

The PCM-5820 Series is equipped with a high quality audio interface, which provides 16-bit CD quality recording and playback as well as OPL3 compatible FM music. It is supported by all major operating systems and is completely compatible with Sound Blaster Pro.

2.14.1 Audio connector (CN5)

The PCM-5820 Series provides all major signals on a 16-pin flat-cable connector (CN5). These audio signals include Microphone in (mono), Line in (stereo) and Speaker out (stereo). An adapter cable is needed if traditional telephone jack connectors are used for these audio signals.

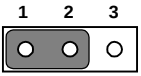
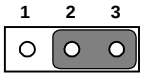
2.14.2 CD audio input connector (CN1)

All CD-ROM drives can provide analog audio signal output when used as a music CD player. The CN1 is a connector to input CD audio signals into the audio controller. The audio cable of your CD-ROM drive is suitable for connection to CN1.

2.14.3 Audio power source setting (J1)

The PCM-5820 Series is designed to work with a single +5 V power supply as audio interfaces usually function under +5 V. However, most audio controllers require an independant +12 V power source since this avoids noise interference from other digital circuits. By using J1, the PCM-5820 Series' audio interface can also accept +12 V power sources for improved audio quality.

Table 2-3: Audio power source setting

	* +5 V	+12 V
J1		

* default setting

Configuration of the audio interface is done completely via software utilities.You don't have to set any jumpers. For furhter information, please refer to Chapter 6 for audio setup details.

2.15 Serial ports (CN16, CN14)

The PCM-5820 Series offers two serial ports: one RS-232 and one RS-232/422/485. These ports allow you to connect to any serial device (a mouse, printers, etc.) or communication network.

2.15.1 COM1 RS-232 port (CN16)

The serial port connectors are mounted on the bottom edge of the card. The 9-pin D-SUB connector to the left of the card is the RS-232 port.

2.15.2 COM2 RS-232/422/485 selection (CN14)

The secondary port located above COM1, consists of a 14-pin, dual-in-line, male header and can be configured to operate in RS-232, RS-422, or RS-485 mode. This is done via J4.

Table 2-4: COM2 selection (J4)

	*RS-232	RS-422	RS-485
J4			

* default setting

The IRQ and address range for both ports are fixed. However, if you wish to disable the port or change these parameters later, you can do this in the system BIOS setup. The table below shows the settings for the PCM-5820 Series board's ports.

Table 2-5: Serial port default settings

Port	Address	Interrupt	Default
COM1	3E8, 3F8	IRQ4	3F8
COM2	2E8, 2F8	IRQ3	2F8

2.16 VGA interface connections

The PCM-5820 Series board's SVGA interface can facilitates conventional CRT displays as well as active LCD displays. The card has two connectors to support these displays, one for standard CRT VGA monitors and one for flat panel displays.

2.16.1 CRT display connector (CN18)

CN18 is a 15-pin, D-SUB connector commonly used for conventional CRT displays.

Detailed information on pin assignments for CRT display connector CN18 is given in Appendix A.

2.16.2 Flat panel display connector (CN12)

CN12 consists of a 44-pin, dual-in-line header.

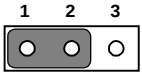
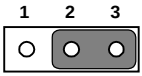
The power supply (+12 V) for CN12 is dependant on the supply connected to the board. Therefore make sure that CN9 is connected to a +12 V power supply.

The PCM-5820 Series provides a bias control signal on CN12 which can be used to control the LCD bias voltage. It is recommended that the LCD bias voltage not be applied to the panel until the logic supply voltage (+5 V or +3.3 V) and panel video signals are stable. Under normal operation the control signal (ENAVEE) is active high. When the PCM-5820 Series board's power is applied, the control signal is low until just after the relevant flat panel signals are present.

2.16.3 LCD power setting (J6)

The PCM-5820 Series' PCI SVGA interface supports 5 V and 3.3 V LCD displays. By changing the setting of J6, you can select the panel video signal level to be 5 V or 3.3 V.

Table 2-6: LCD power setting

	*5 V	3.3 V
J6		

* default setting

Configuration of the LCD type is done completely via the software utility. You do not have to set any jumpers. Refer to Chapter 3 for software setup details.

Refer to Chapter 3 for details on connecting the two standard LCDs: Toshiba LTM10C042 and LTM 12C275A.

2.17 LVDS interface (CN15)

The user can use this interface for long distance connections to an LCD panel. Data can be tranfserred over distances up to 5 meters. The PCM-5820 Series supports an 18-bit LVDS TFT LCD panel via an LVDS interface (CN15). It consists of a 20-pin dual in-line header.

2.18 Ethernet interface connections

The PCM-5820 Series is equipped with a high performance 32-bit PCI Ethernet interface which is fully compliant with IEEE 802.3u 10/100 Mbps CSMA/CD standards.

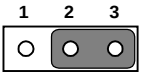
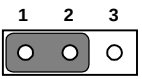
2.18.1 100Base-T RJ-45 connector (CN13)

100Base-T connections are made via the on-board RJ-45 connector.

2.18.2 Ethernet power select (J7)

PCM-5820 Series supports (WOL) wake up on LAN function, to activate this function, select "standby 5V" mode on J7.

Table 2-7: Ethernet power select

	*+5 V	Standby 5 V
J3		

* default setting

2.19 Ethernet LED and HDD/power LEDs

2.19.1 LED1 (Ethernet LED)

Table 2-8: Ethernet LED setup

LED	Setting
Green lamp	Tx
Yellow lamp	Link

The LED should be set so that when the cable is connected, the yellow lamp is activated; and when data is transmitted, the green lamp is activated.

2.19.2 LED2 (Power and HDD LED)

Table 2-9: HDD/power LED setup

LED	Setting
Green lamp	Power
Yellow lamp	HDD

The LED should be set so when the HDD is accessed the yellow lamp is activated, and when the power is on the green lamp is activated.

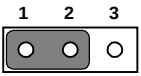
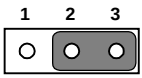
2.20 Watchdog timer configuration

An on-board watchdog timer reduces the chance of disruptions which EMP (electro-magnetic pulse) interference can cause. This is an invaluable protective device for standalone or unmanned applications. Setup involves one jumper and running the control software (refer to Appendix C).

2.20.1 Watchdog timer action (J3)

When the watchdog timer activates (CPU processing has come to a halt), it can reset the system or generate an interrupt on IRQ11. This can be set via J3 as shown below:

Table 2-10: Watchdog timer action

	*System reset	IRQ11
J3		

* default setting

2.21 USB connectors (CN4)

The PCM-5820 Series board provides two USB (Universal Serial Bus) interfaces which gives complete Plug and Play, and hot swaps for up to 127 external devices. The USB interfaces comply with USB specification Rev. 1.0 and are fuse protected.

The USB interfaces are accessed through two 10-pin flat-cable connectors, CN4. You will need an adapter cable if you use a standard USB connector.

The USB interfaces can be disabled in the system BIOS setup.

2.22 TV-out connector (CN21,CN22)

The PCM-5822 board provides on- board TV-out function through its RCA (composite) connector and S-Video connector, which support the composite and S-Video outputs. PCM-5822 also provides an optional SCART output.

The PCM-5822 TV-out function uses a CHRONTEL CH7003 C TV Encoder chip.

2.23 ATX power control conn. (CN23, CN24)

The PCM-5820 Series offers two serial ports: one RS-232 and one RS-232/422/485. These ports allow you to connect to any serial device (a mouse, printers, etc.) or communication network.

2.23.1 ATX feature connector (CN23) and power button (CN 24))

The PCM-5822 can support an advanced power button if an ATX power supply is used. To enable the power button:

1. Take the specially designed ATX-to-PS/2 power cable

2. Connect the 3-pin plug of the cable to the CN23 (ATX feature connector).

3. Connect the power on/off button to pin 2,4 of CN 24. (A momentary contact type of button should be used.)

Important: Be sure that the ATX power supply can take at least a 10 mA load on the 5 V standby lead (5VSB). If not, you may have difficulty powering up your system.

CHAPTER 3

Software Configuration

This chapter details the software configuration information. It shows you how to configure the card to match your application requirements. Award system BIOS is covered in Chapter 4.

Sections include:

- LCD display configuration
- Connections for two standard LCDs

3.1 Introduction

The PCM-5820 Series system BIOS and custom drivers are located in a 256 KB, 32-pin Flash ROM device, designated U14. A single Flash chip holds the system BIOS and VGA BIOS. The display type can be configured via software. This method minimizes the number of chips and eases configuration. You can change the display BIOS simply by reprogramming the Flash chip.

3.2 Utility CD disk

The PCM-5820 Series is supplied with a software utility on CD-ROM. This disk contains the necessary file for setting up the VGA display. Directories and files on the disk are as follows:

Figure 3-1: Contents of the PCM-5820 Series utility disk

AWDFLASH.EXE
This program allows you to update the BIOS Flash ROM.

5820V110.BIN
This binary file contains the system BIOS.

CBROM.EXE
This program allows you to combine your own VGA BIOS with system BIOS (5820V110.BIN).

RSET8139.EXE

This program enables you to view the current Ethernet configuration, reconfigure the Ethernet interface (medium type, etc.), and execute useful diagnostic functions.

3.3 VGA display software configuration

The PCM-5820 Series on-board VGA/LCD interface supports an 18-bit TFT LCD, flat panel displays and traditional analog CRT monitors. The interface can drive CRT displays with resolutions up to 1024 x 768 in 16 bpp. It is also capable of driving color panel displays with resolutions of 1024 x 768 in 18 bpp. The LCD type is configured completely via the software utility, so you do not have to set any jumpers. Configure the LCD type as follows:

1. Apply power to the PCM-5820 Series with a color TFT display attached. This is the default setting for the PCM-5820 Series. Make sure that the AWDFLASH.EXE and *.BIN files are located in the working drive.

Note: Make sure that you do not run AWDFLASH.EXE while your system is operating in EMM386 mode.

2. At the prompt, type AWDFLASH.EXE and press <Enter>. The VGA configuration program will then display the following:

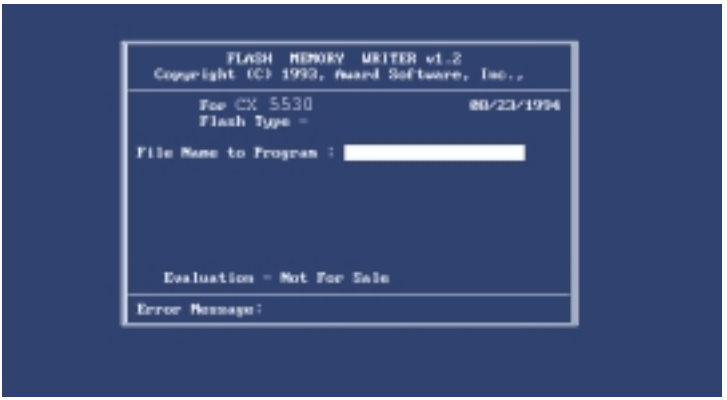


Figure 3-2: BIOS VGA setup screen

3. At the prompt, type in the BIN file which supports your display. When you are sure that you have entered the file name correctly press <Enter>. The screen will ask “Do you want to save?” If you wish to continue press Y. If you change your mind or have made a mistake press N.

4. If you decide to continue, the screen will issue a prompt which will then ask “Are you sure to program (Y/N)?” If you wish to continue, press Y. Press N to exit the program.

The new VGA configuration will then write to the ROM BIOS chip. This configuration will remain the same until you run the AWDFLASH.EXE program and change the settings.

3.4 Connections for two standard LCDs

3.4.1 Connections for Toshiba LTM10C042 (640 x 480 TFT color LCD)

Table 3-1: Connections for Toshiba LTM10C042

LTM10C042		PCM-5820 Series CN12	
Pin	**Name**	**Pin**	**Name**
1	GND	3	GND
2	CLK	35	SHFCLK
3	GND	4	GND
4	R0	27	PD12
5	R1	28	PD13
6	R2	29	PD14
7	GND	8	GND
8	R3	30	PD15
9	R4	31	PD16
10	R5	32	PD17
11	GND	33	GND
12	G0	19	PD6
13	G1	20	PD7
14	G2	21	PD8
15	GND	33	GND
16	G3	22	PD9
17	G4	23	PD10
18	G5	24	PD11
19	GND	34	GND
20	ENAB	37	M
21	GND	34	GND
22	B0	11	PD0
23	B1	12	PD1
24	B2	13	PD2
25	GND	39	GND
26	B3	14	PD3
27	B4	15	PD4
28	B5	16	PD5
29	GND	39	GND
30	VDD	5	+5 V
31	VDD	6	+5 V

3.4.2 Connections for Toshiba LTM12C275A (800 x 600 TFT color LCD)

Table 3-2: Connections for Toshiba LTM12C275A

LTM12C275A		PCM-5820 Series **CN12**	
Pin	**Name**	**Pin**	**Name**
1	GND	3	GND
2	NCLK	35	SHFCLK
3	NC	-	NC
4	NC	-	NC
5	GND	4	GND
6	R0	27	PD12
7	R1	28	PD13
8	R2	29	PD14
9	R3	30	PD15
10	R4	31	PD16
11	R5	32	PD17
12	GND	8	GND
13	G0	19	PD6
14	G1	20	PD7
15	G2	21	PD8
16	G3	22	PD9
17	G4	23	PD10
18	G5	24	PD11
19	GND	33	GND
20	B0	11	PD0
21	B1	12	PD1
22	B2	13	PD2
23	B3	14	PD3
24	B4	15	PD4
25	B5	16	PD5
26	ENAB	37	M/DE
27	GND	34	GND
28	VCC	5	+5 V
29	VCC	6	+5 V
30	GND	39	GND

3.5 Ethernet interface configuration

The PCM-5820 Series' on-board Ethernet interface supports all major network operating systems. To configure the medium type, to view the current configuration, or to run diagnostics, do the following:

1. Power the PCM-5820 Series on. Make sure that the RSET8139.EXE file is located in the working drive.
2. At the prompt, type RSET8139.EXE and press <Enter>. The Ethernet configuration program will then be displayed.
3. This simple screen shows all the available options for the Ethernet interface. Just highlight the option you wish to change by using the Up and Down keys. To change a selected item, press <Enter>, and a screen will appear with the available options. Highlight your option and press <Enter>. Each highlighted option has a helpful message guide displayed at the bottom of the screen for additional information.
4. After you have made your selections and are sure this is the configuration you want, press ESC. A prompt will appear asking if you want to save the configuration. Press Y if you want to save.

The Ethernet Setup Menu also offers three very useful diagnostic functions. These are:

1. Run EEPROM test
2. Run Diagnostics on Board
3. Run Diagnostics on Network

Each option has its own display screen that shows the format and result of any diagnostic tests undertaken.

CHAPTER 4

Award BIOS Setup

This chapter describes how to set BIOS configuration data.

4.1 System test and initialization

These routines test and initialize board hardware. If the routines encounter an error during the tests, you will either hear a few short beeps or see an error message on the screen. There are two kinds of errors: fatal and non-fatal. The system can usually continue the boot up sequence with non-fatal errors. Non-fatal error messages usually appear on the screen along with the following instructions:

```
press <F1> to RESUME
```

Write down the message and press the F1 key to continue the bootup sequence.

4.1.1 System configuration verification

These routines check the current system configuration against the values stored in the board's CMOS memory. If they do not match, the program outputs an error message. You will then need to run the BIOS setup program to set the configuration information in memory.

There are three situations in which you will need to change the CMOS settings:

1. You are starting your system for the first time
2. You have changed the hardware attached to your system
3. The CMOS memory has lost power and the configuration information has been erased.

The PCM-5820 Series' CMOS memory has an integral lithium battery backup. The battery backup should last ten years in normal service, but when it finally runs down, you will need to replace the complete unit.

4.2 Award BIOS setup

Award's BIOS ROM has a built-in Setup program that allows users to modify the basic system configuration. This type of information is stored in battery-backed CMOS RAM so that it retains the Setup information when the power is turned off.

4.2.1 Entering setup

Power on the computer and press <Del> immediately. This will allow you to enter Setup.

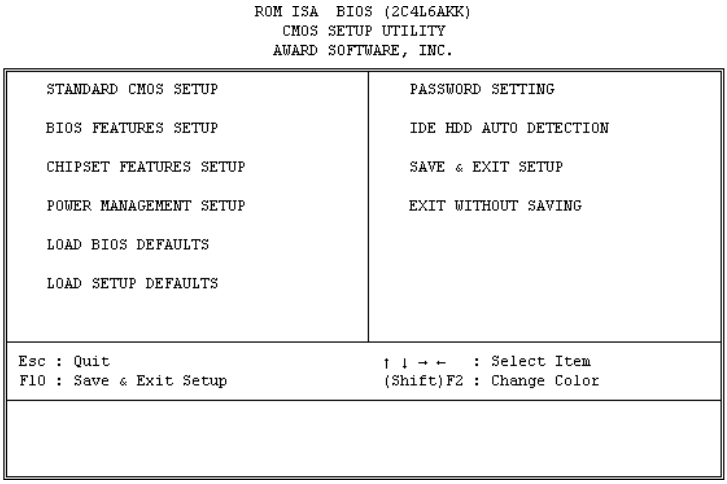


Figure 4-1: BIOS setup program initial screen

4.2.2 Standard CMOS setup

When you choose the STANDARD CMOS SETUP option from the INITIAL SETUP SCREEN menu**,** the screen shown below is displayed. This standard Setup Menu allows users to configure system components such as date, time, hard disk drive, floppy drive and display. Once a field is highlighted, on-line help information is displayed in the left bottom of the Menu screen.

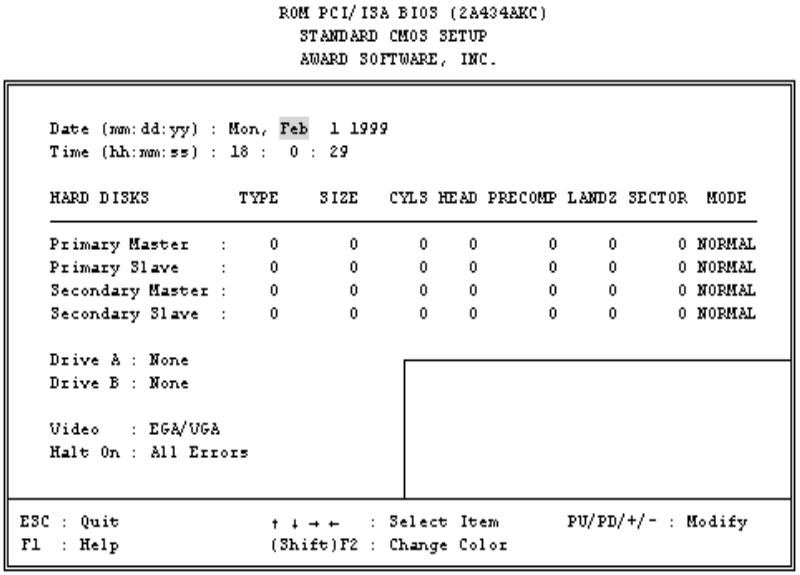


Figure 4-2: CMOS setup screen

4.2.3 BIOS features setup

By choosing the BIOS FEATURES SETUP option from the INITIAL SETUP SCREEN menu, the screen below is displayed. This sample screen contains the manufacturer's default values for the PCM-5820 Series.

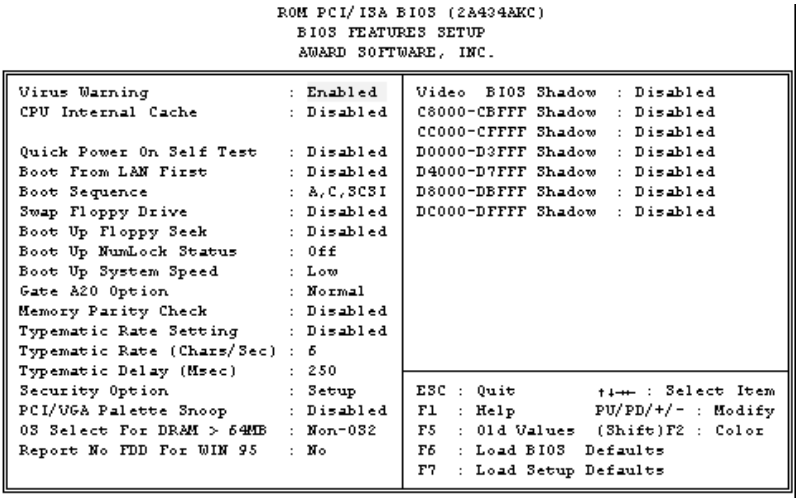


Figure 4-3: BIOS features setup

4.2.4 Chipset features setup

By choosing the CHIPSET FEATURES SETUP option from the INITIAL SETUP SCREEN menu, the screen below is displayed. This sample screen contains the manufacturer's default values for the PCM-5820 Series.

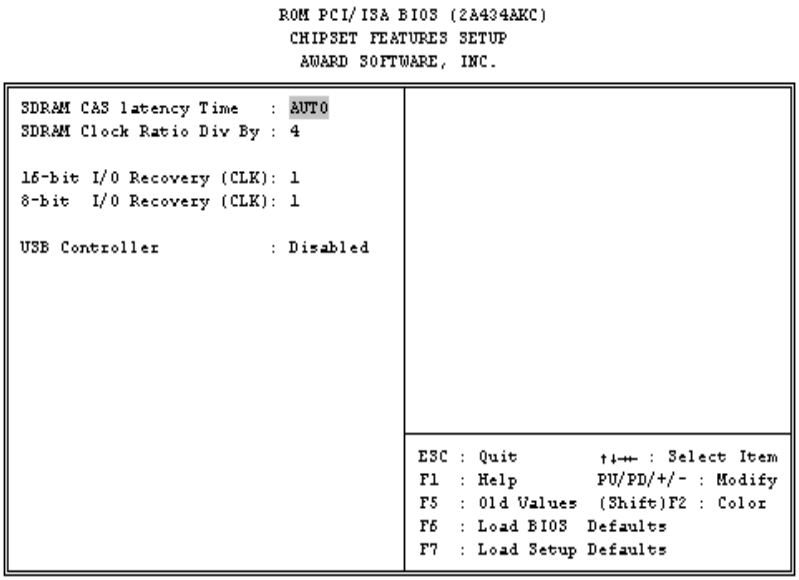


Figure 4-4: Chipset features setup

4.2.5 Power management setup

By choosing the POWER MANAGEMENT SETUP option from the INITIAL SETUP SCREEN menu, the screen below is displayed. This sample screen contains the manufacturer's default values for the PCM-5820 Series.

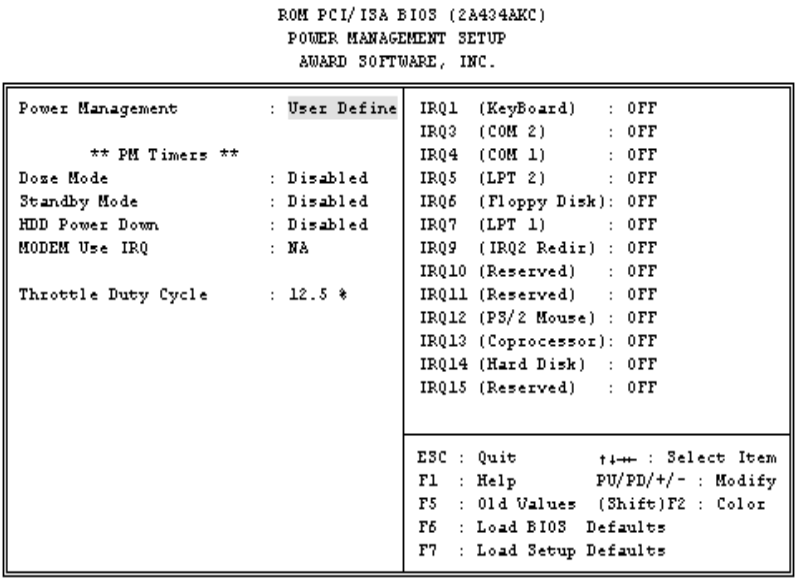


Figure 4-5: Power management setup

4.2.6 PnP/PCI configuration

By choosing the PnP/PCI CONFIGURATION option from the Initial Setup Screen menu, the screen below is displayed. This sample screen contains the manufacturer's default values for the PCM-5820 Series.

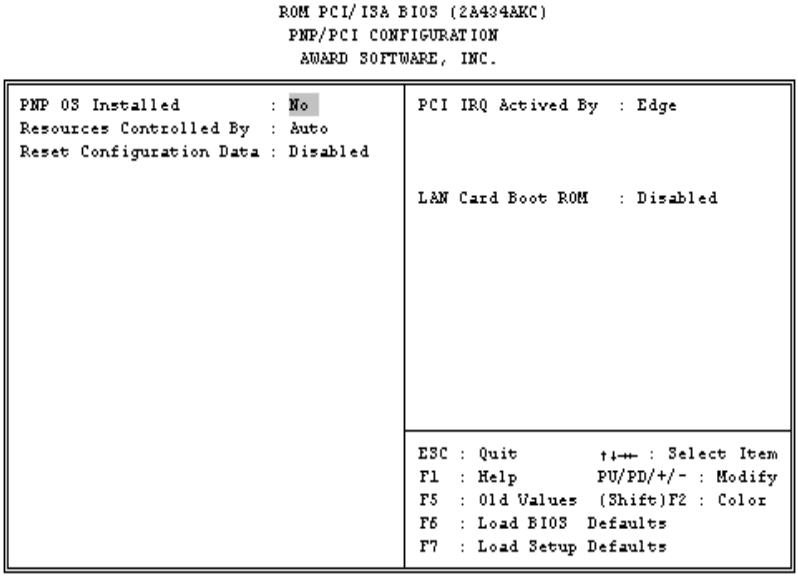


Figure 4-6: PnP/PCI configuration

4.2.7 Integrated peripherals

By choosing the INTEGRATED PERIPHERALS option from the INITIAL SETUP SCREEN menu, the screen below is displayed. This sample screen contains the manufacturer's default values for the PCM-5820 Series. The PANEL TYPE by default supports a 18-bit 640 x 480 TFT LCD panel display.

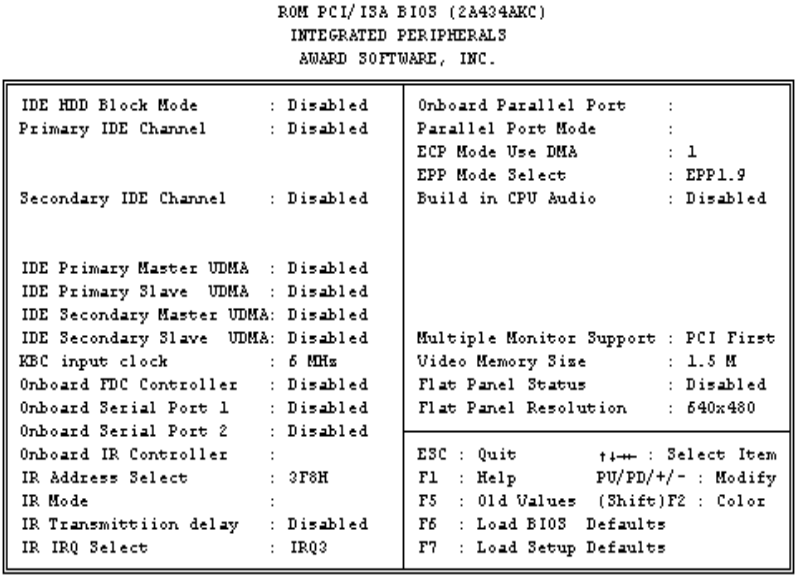


Figure 4-7: Integrated peripherals

4.2.8 Load BIOS defaults

LOAD BIOS DEFAULTS loads the default system values directly from ROM. If the stored record created by the Setup program becomes corrupted (and therefore unusable), these defaults will load automatically when you turn the PCM-5820 Series on.

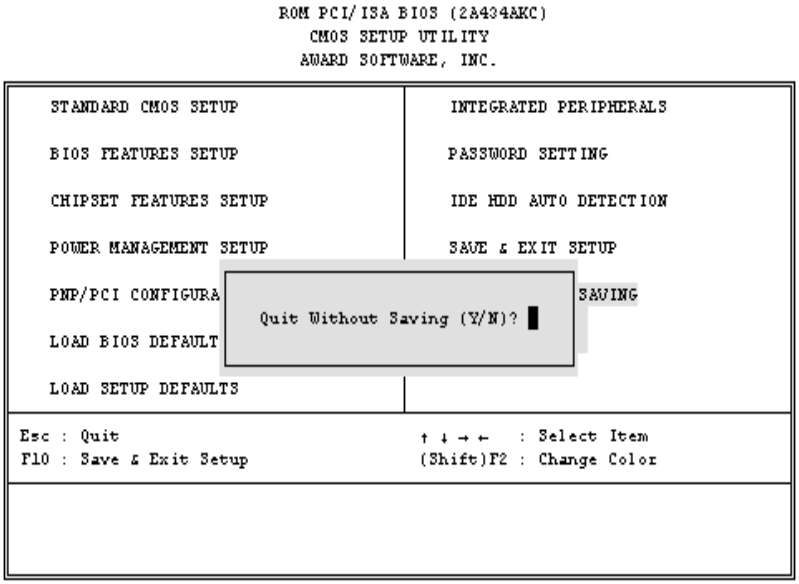


Figure 4-8: Load BIOS defaults screen

4.2.9 Change password

To change the password, choose the PASSWORD SETTING option form the Setup main menu and press <Enter>.

1. If the CMOS is bad or this option has never been used, a default password is stored in the ROM. The screen will display the following messages:

   Enter Password:

   Press <Enter>.

2. If the CMOS is good or this option has been used to change the default password, the user is asked for the password stored in the CMOS. The screen will display the following message:

   Confirm Password:

   Enter the current password and press <Enter>.

3. After pressing <Enter> (ROM password) or the current password (user-defined), you can change the password stored in the CMOS. The password can be at most eight (8) characters long.

Remember - to enable this feature, you must first select either Setup or System in the BIOS FEATURES SETUP.

4.2.10 Auto detect hard disk

The IDE HDD AUTO DETECTION utility can automatically detect the IDE hard disk installed in your system. You can use it to self-detect and/or correct the hard disk type configuration.

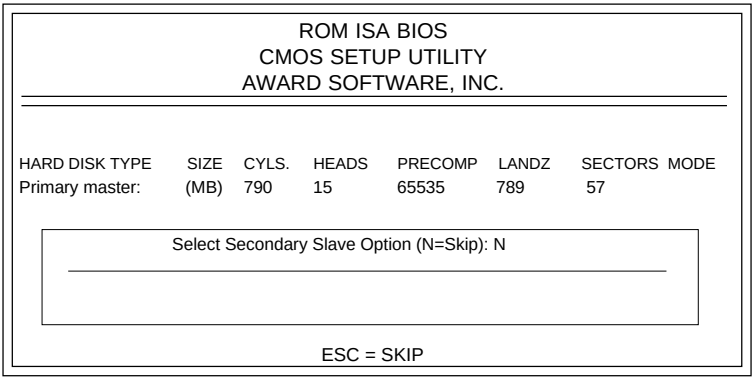


Figure 4-9: IDE HDD auto detection screen

4.2.11 Save & exit setup

If you select this option and press <Enter>, the values entered in the setup utilities will be recorded in the chipset's CMOS memory. The microprocessor will check this every time you turn your system on and compare this to what it finds as it checks the system. This record is required for the system to operate.

4.2.12 Exit without saving

Selecting this option and pressing <Enter> lets you exit the Setup program without recording any new values or changing old ones.

CHAPTER 5

SVGA Setup

- Introduction
- Installation of SVGA driver for Windows 95/98/NT

5.1 Introduction

The PCM-5820 Series has an on-board LCD/VGA interface. The specifications and features are described as follows:

5.1.1 Chipset

The PCM-5820 Series uses a Cyrix CX5530 chipset for its SVGA controller. It supports many popular 18-bit LCD displays and conventional analog CRT monitors. The VGA BIOS supports LCD. In addition, it also supports interlaced and non-interlaced analog monitors (color and monochrome VGA) in high-resolution modes while maintaining complete IBM VGA compatibility. Digital monitors (i.e. MDA, CGA, and EGA) are NOT supported. Multiple frequency (multisync) monitors are handled as if they were analog monitors.

5.1.2 Display memory

With 2 ~ 5 MB share memory, the VGA controller can drive CRT displays or color panel displays with resolutions up to 1024 x 768 at 64 K colors. The display memory can be expanded to 4 MB in BIOS for true-color resolution of 1024 x 768.

5.2 Installation of SVGA driver

Complete the following steps to install the SVGA driver. Follow the procedures in the flow chart that apply to the operating system that you are using within your PCM-5820 Series.

Important: The following windows illustrations are examples only. You must follow the flow chart instructions and pay attention to the instructions which then appear on your screen.

Note 1: The CD-ROM drive is designated as "D:" throughout this chapter.

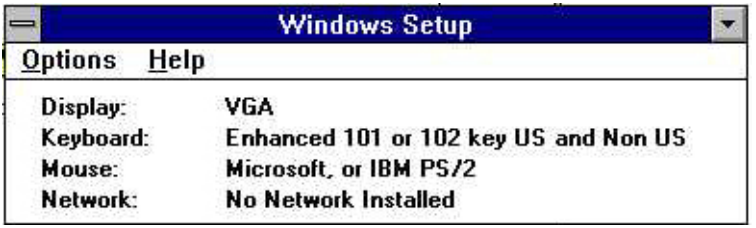
Note 2: <Enter> means pressing the “Enter” key on the keyboard.

Note 3: When you are using a CRT display, please make sure that your flat panel resolution settings (in the BIOS setup) are the same as your VGA resolution settings (in Windows). Otherwise your display may behave strangely.

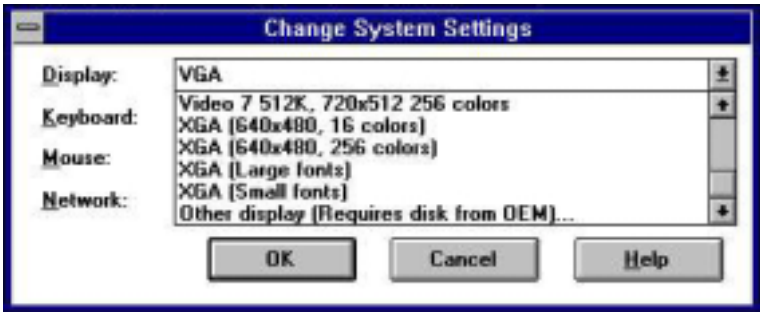
5.2.1 Installation for Windows 3.1

1. In the Windows 3.1 Main screen, click on the "Windows Setup" icon.

2. In the "Windows Setup" window, choose "Options", then select "Change System Settings".



3. In the "Change System Settings" window, select the "Display" item. In the dropdown selection, select "Other display (Requires disk from OEM)".



4. Type in the correct path like the window below, where drive "D" is the CD ROM drive. For example,
D:\ Biscuit\ 5820 \ VGA.100 \ Win31

5. Select the display type and preferred resolution, then click "OK".

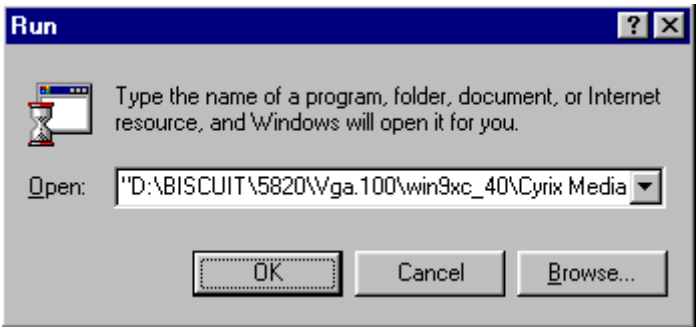
6. Choose "Restart Windows"

5.2.2 Installation for Cyrix MediaGX Certified drivers for Windows 95/980. Insert the disk into the CD-ROM drive.

1. Select "Start" then "Run".

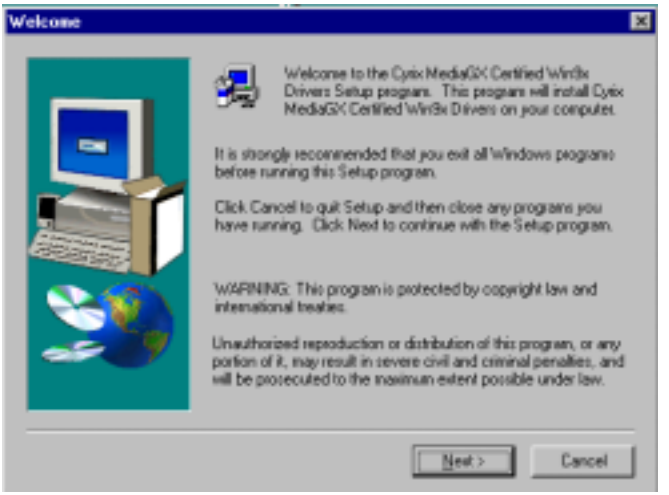
Type the correct path for the driver (like the example below)
"D:\BISCUIT\5820\VGA\Win9xc_40"

Click "OK"

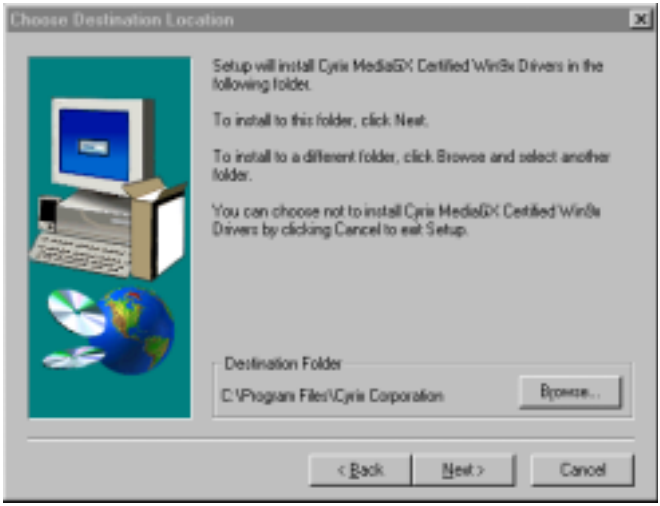


2. Click "Finish" to continue.

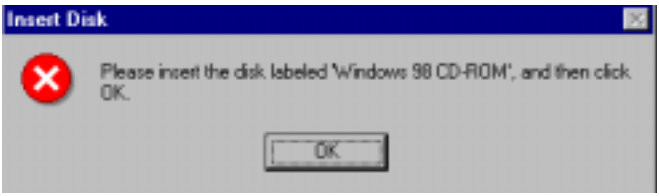
3. Click "Next" to proceed to the next step. Click "Yes" after you read the license agreement.



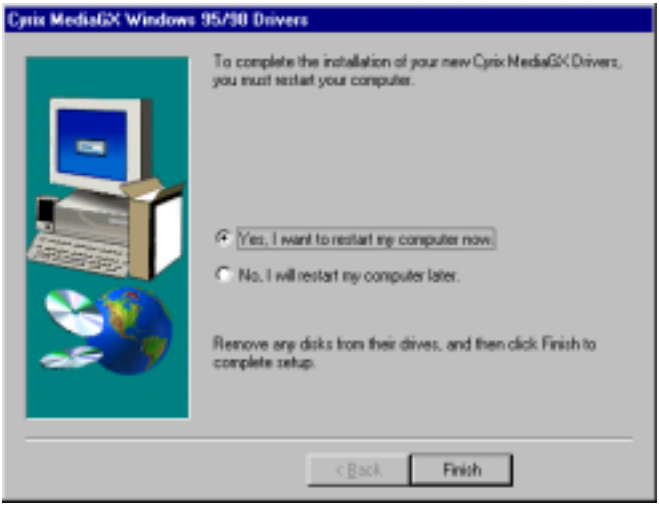
4. Follow the instructions which appear on the screen.



5. Insert the Win95/ 98 CD-ROM into the CD-ROM drive. Type the correct path for the Win9 x source file.



6. Choose "Yes", then click "Finish" to restart the computer.

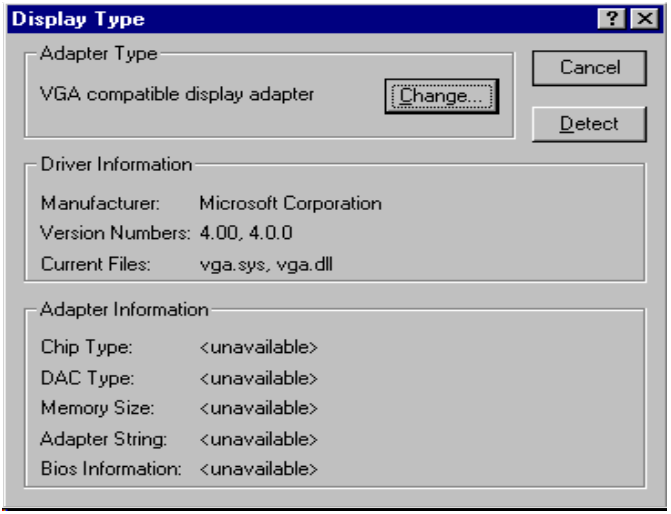


5.2.3 Installation for Windows NT

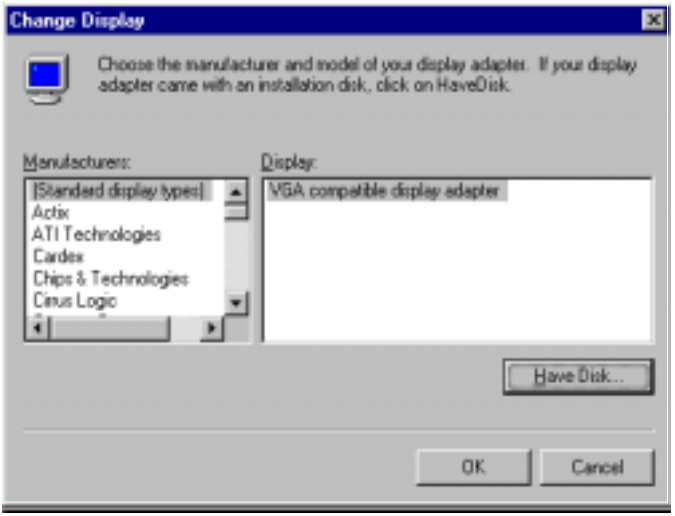
1. a. Select "Start", "Settings" then "Control Panel" to get to the screen below.
   b. Double click on the "Display" icon.

2. a. Choose the "Settings" selection.
   b. Click the "Display Type" button.

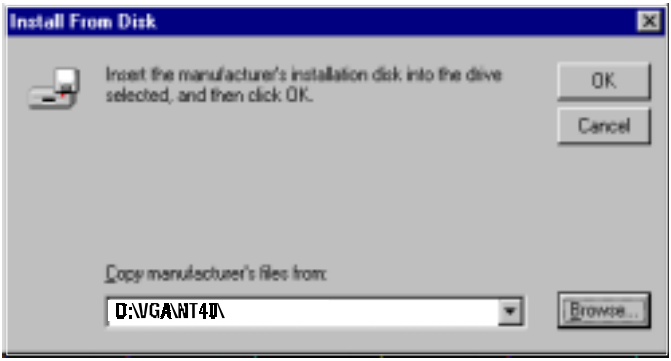
3. Press the "Change..." button.



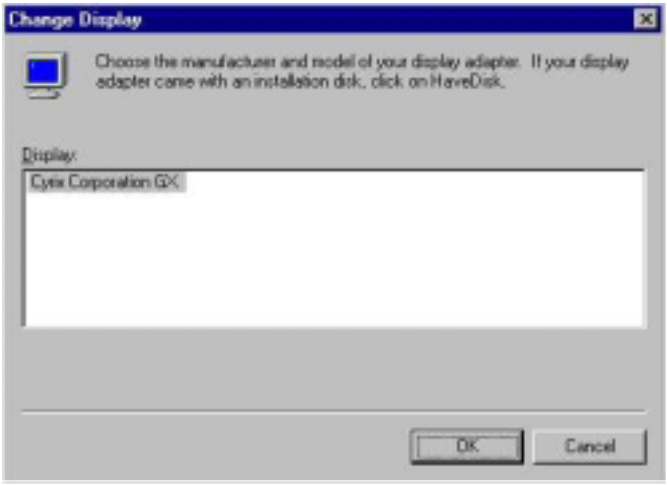
4. Click on the "Have Disk..." button



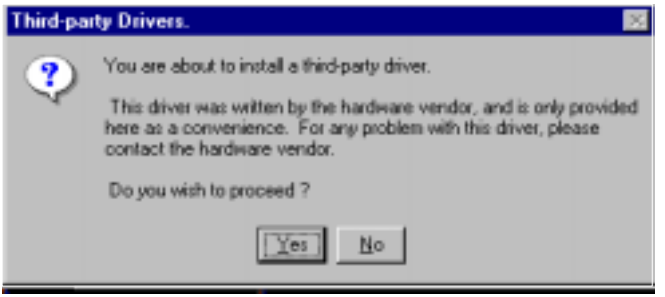
5. a. Insert the disk into the CD-ROM drive.
   b. Type "D:\Biscuit\5820\VGA\WINNT\VGA.110\"
   c. Press "OK".



6. a. Select the highlighted item.
   b. Press "OK".

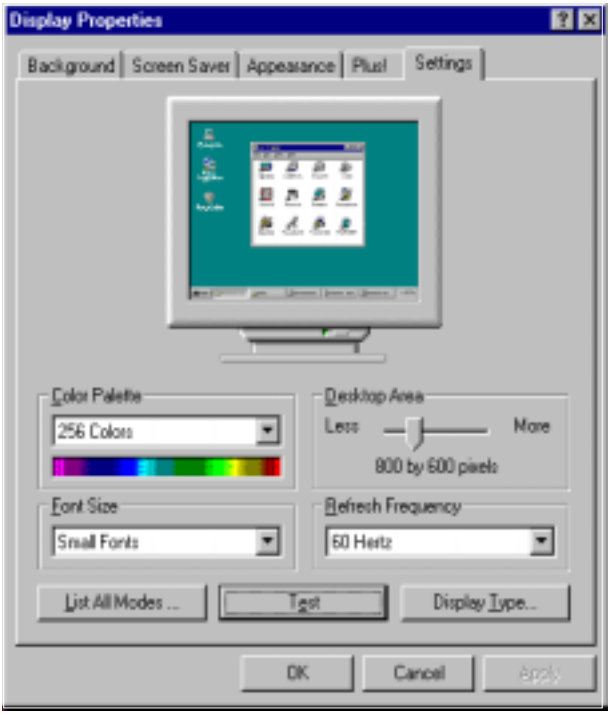


7. Press "Yes" to proceed.



8. Press "OK" to reboot.

9. a. Repeat Step 1 in this manual, select the "Settings" label.
   b. Adjust the resolution and color.
   c. Click "Test" to see the results.
   d. Click "OK" to save the settings.



5.3 Further information

For further information about the PCI/SVGA installation in your PCM-5820, including driver updates, troubleshooting guides and FAQ lists, visit the following web resources:

Cyrix web site: **www.national.com**

Advantech web sites: **www.advantech.com**
www.advantech.com.tw

CHAPTER 6

Audio

- Introduction
- Installation of audio driver for Windows 95/98/NT

6.1 Introduction

The PCM-5820 Series' on-board audio interface provides high-quality stereo sound and FM music synthesis (ESFM) by using the CX5530 audio controller from Cyrix Corporation. The audio interface can record, compress, and play back voice, sound, and music with a built-in mixer control. The PCM-5820 Series' on-board audio interface also supports the Plug and Play (PnP) standard and provides PnP configuration for audio, FM, and MPU-104 logical devices. It is compatible with AC97 version 2.0, voice, and music functions. The ESFM synthesizer is register compatible with the OPL3 and has extended capabilities.

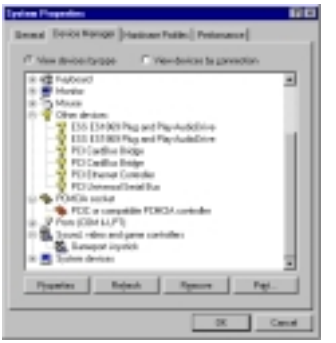
6.2 Installation of audio driver

Before installing the audio driver, please take note of the procedures detailed below. You must know which operating system you are using in your PCM-5820 Series, and then refer to the corresponding installation flow chart. Just follow the steps in the flow chart. You can quickly and successfully complete the installation, even though you are not familiar with instructions for Windows.

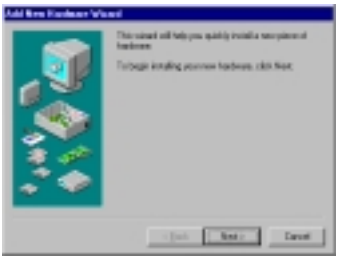
Note: The CD-ROM drive is designated as "D" throughout this chapter.

6.2.1 Installation for Windows 95/98

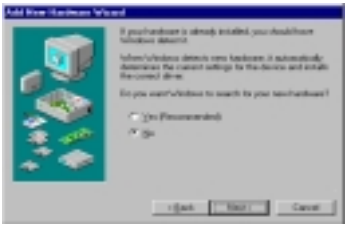
1. a. Select "Start", "Settings", "Control Panel", "System", "Device Manager".
   b. Click the "Other Devices" item.
   c. Remove items related to CX 5530.



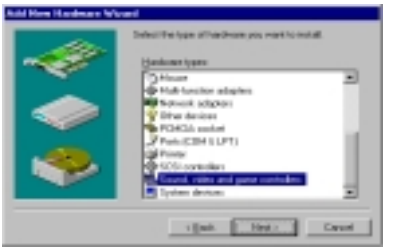
2. a. Select "Add new hardware".
   b. Click "Next".



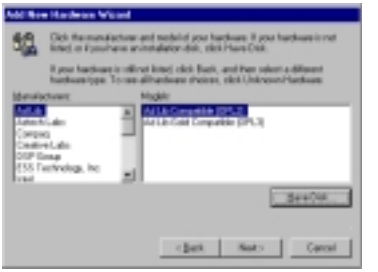
3. a. Choose "No", click "Next".



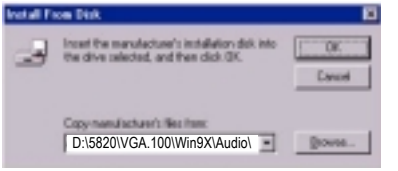
4. a. Select "Sound, video...".
   b. Click "Next".



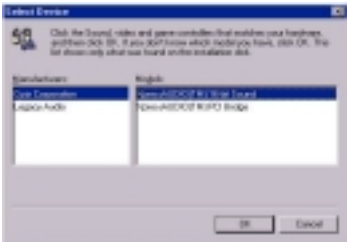
5. a. Click "Have Disk".



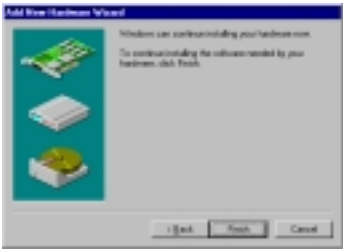
6. a. Insert the disc into the CD-ROM drive.
   b. Type the correct path "D:\5820\VGA\Win9X\Audio" and click the click the "OK" button.



7. a. Select "ES1869 Control interface".

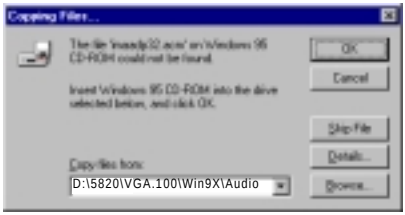


8. a. Click "Finish" to complete.

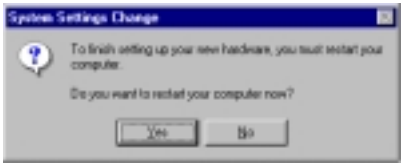


9. a. Click "OK".

10. a. Insert Windows 95 CD.
b. Type the path of your Windows 95 disc and click "OK".



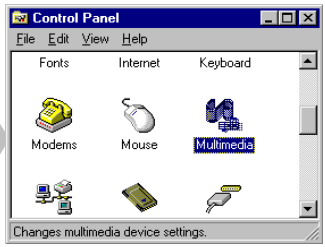
11. a. Click "Yes" to restart.



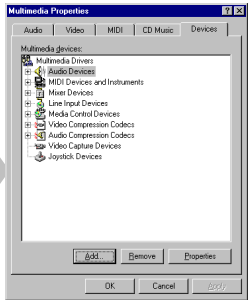
END

6.2.2 Installation for Windows NT

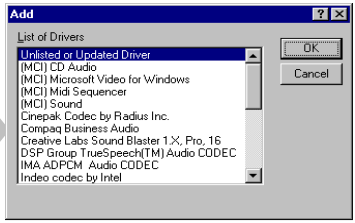
1. a. Select "Start", "Settings", "Control Panel".
   b. Double click "Multimedia".



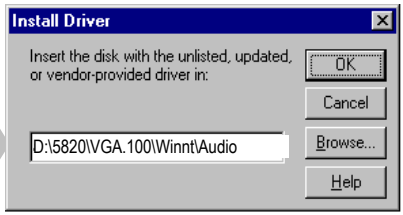
2. a. Select the "Devices" item.
   b. Click "Add".



3. a. Select the "Unlisted..." item.
   b. Click "OK".

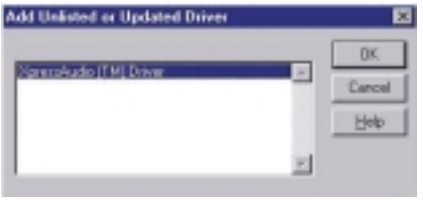


4. a. Insert the disc into the CD-ROM drive.
   b. Type "D:Biscuit\5820\VGA\Winn\Audio" and click "OK"



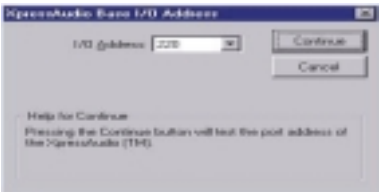
5.

a. Choose the highlighted item.
b. Click the "OK" button.



6.

a. Set the I/O address.
b. Click "Continue".



7.

a. Set Xpress Audio configuration.
b. Click "OK" to restart.

END

CHAPTER 7

PCI Bus Ethernet Interface

This chapter provides information on Ethernet configuration.

- Introduction
- Installation of Ethernet driver for Windows 95/98/NT
- Further information

7.1 Introduction

The PCM-5820 Series is equipped with a high performance 32-bit Ethernet chipset which is fully compliant with IEEE 802.3 100 Mbps CSMA/CD standards. It is supported by major network operating systems. It is also both 100Base-T and 10Base-T compatible. The medium type can be configured via the RSET8139.exe program included on the utility disk.

The Ethernet port provides a standard RJ-45 jack on board. The network boot feature can be utilized by incorporating the boot ROM image files for the appropriate network operating system. The boot ROM BIOS files are combined with system BIOS, which can be enabled/disabled in the BIOS setup.

7.2 Installation of Ethernet driver

Before installing the Ethernet driver, note the procedures below. You must know which operating system you are using in your PCM-5820 Series, and then refer to the corresponding installation flow chart. Then just follow the steps described in the flow chart. You will quickly and successfully complete the installation, even if you are not familiar with instructions for MS-DOS or Windows.

Note: The windows illustrations in this chapter are examples only. You must follow the flow chart instructions and pay attention to the instructions which then appear on your screen.

7.2.1 Installation for MS-DOS and Windows 3.1

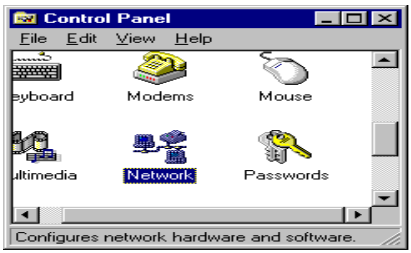
If you want to set up your Ethernet connection under the MS-DOS or Windows 3.1 environment, you should first check your server system model. For example, MS-NT, IBM-LAN server, and so on.

Then choose the correct driver to install in your panel PC.

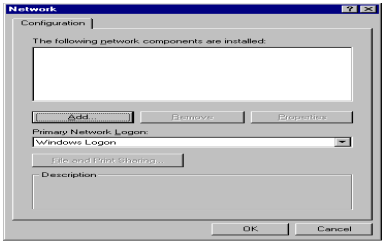
The installation procedures for various servers can be found on CD-ROM; the correct path being "D:\5820\Ethernet.100\wfw311".

7.2.2 Installation for Windows 95/98

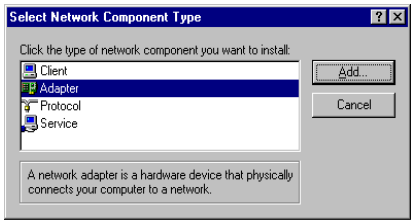
1. a. Select "Start", "Settings", "Control Panel".
   b. Double click "Network".



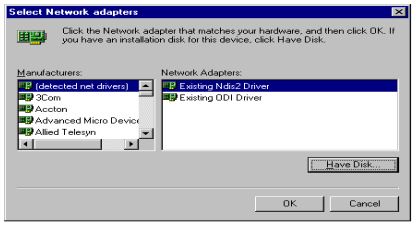
2. a. Click "Add" and prepare to install network functions.

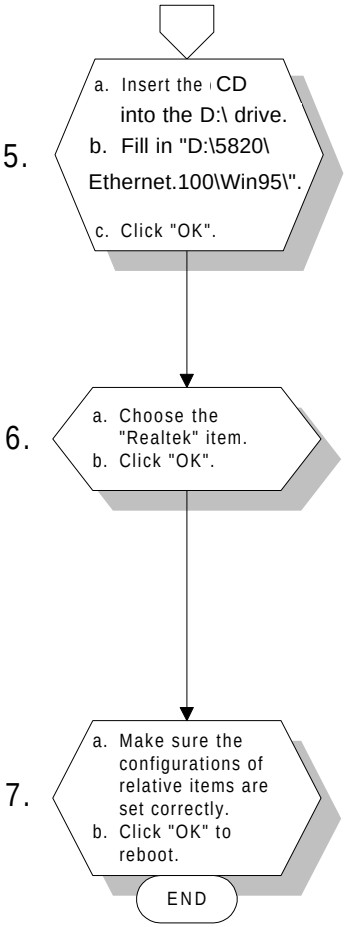


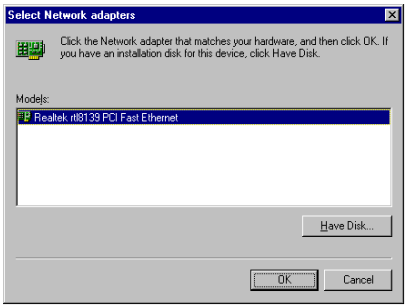
3. a. Select the "Adapter" item to add the Ethernet card.

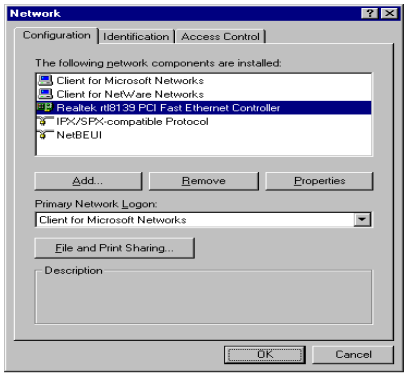


4. a. Click "Have Disk" to install the driver.





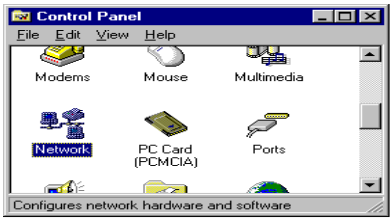




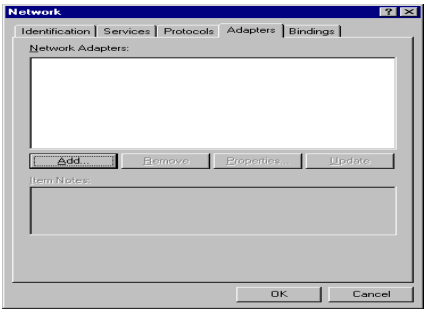
Note: *The correct path for Windows 98 is: "D:\5820\Ethernet.100\Win98"*

7.2.3 Installation for Windows NT

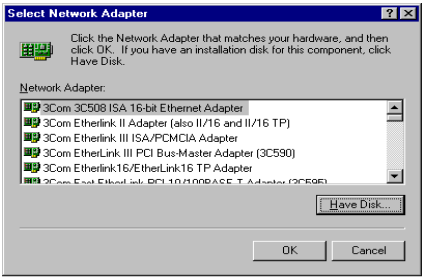
1. a. Select "Start", "Settings", "Control Panel".
   b. Double click "Network".



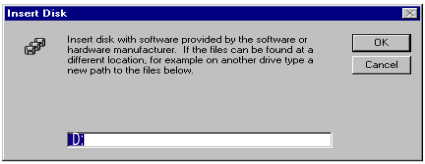
2. a. Choose the "Adapters" label.
   b. Click the "Add" button.



3. a. Press "Have Disk".



4. a. Type "D:".
   b. Press "OK".

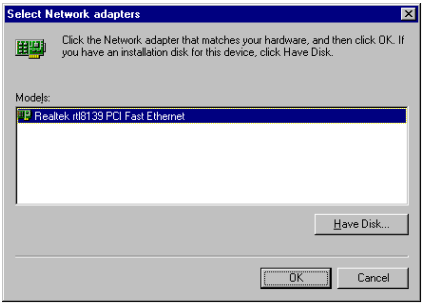


5.

a. Insert the CD into the D:\ drive.
b. Fill in "D:\5820\Ethernet.100\Winnt\".
c. Click "OK".

6.

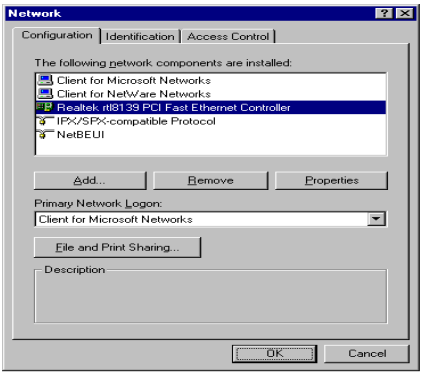
a. Choose the "Realtek" item.
b. Click "OK".



7.

a. Make sure the configurations of relative items are set correctly.
b. Click "OK" to reboot.

END



7.3 Further information

Realtek website: **www.realtek.com**

Advantech websites: **www.advantech.com**
www.advantech.com.tw

APPENDIX A

Pin Assignments

This appendix contains information of a detailed or specialized nature. It includes:

- CRT display connector
- Flat panel display connector
- COM2 RS-232/422/485 serial port connector
- Keyboard and mouse connector
- Main power connector
- IDE hard drive connector
- COM1 RS-232 serial port
- Ethernet 10Base-T connector
- Auxilary power connector
- Floppy drive connector
- Parallel port connector
- IR connector
- USB connector
- Audio connector
- CD audio connector
- LVDS connector
- CPU fan power connector
- RCA (composite) connector
- S-Video connector
- ATX power feature connector
- ATX power button & power LED connector

CRT display connector (CN18)

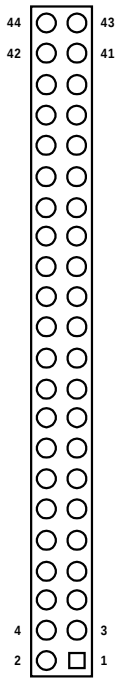
Table A-1: CRT display connector

Pin	Signal	Pin	Signal
1	RED	9	VDDC
2	GREEN	10	GND
3	BLUE	11	N/C
4	N/C	12	DDCSDA
5	GND	13	H-SYNC
6	GND	14	V-SYNC
7	GND	15	DDCSCL
8	GND		

Flat panel display connector (CN12)

Table A-2: Flat panel display connector

Pin	Function	Pin	Function
1	+12 V	2	+12 V
3	GND	4	GND
5	Vcc_LCD	6	Vcc_LCD
7	N/C	8	GND
9	N/C	10	N/C
11	PD0	12	PD1
13	PD2	14	PD3
15	PD4	16	PD5
17	N/C	18	N/C
19	PD6	20	PD7
21	PD8	22	PD9
23	PD10	24	PD11
25	N/C	26	N/C
27	PD12	28	PD13
29	PD14	30	PD15
31	PD16	32	PD17
33	GND	34	GND
35	SHFCLK	36	FLM
37	DE (M)	38	LP
39	GND	40	ENABKL
41	N/C	42	N/C
43	VSAFE (ENAVDD)	44	Vcc_LCD



COM2 RS-232/422/485 serial port (CN14)

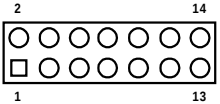


Table A-3: COM2 RS-232/422/485 series port

Pin	RS-232 port	RS-422 port	RS-485 port
1	DCD	N/C	N/C
2	DSR	N/C	N/C
3	RxD	N/C	N/C
4	RTS	N/C	N/C
5	TxD	N/C	N/C
6	CTS	N/C	N/C
7	DTR	N/C	N/C
8	RI	N/C	N/C
9	GND	N/C	N/C
10	N/C	N/C	N/C
11	N/C	TxD+	DATA+
12	N/C	TxD-	DATA-
13	N/C	RxD+	N/C
14	N/C	RxD-	N/C

Keyboard and mouse connnector (CN17)

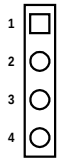
Table A-4: Keyboard and mouse connector

Pin	Signal
1	KB DATA
2	MS DATA
3	GND
4	V_{CC}
5	KB CLOCK
6	MS CLOCK

Main power connector (CN9)

Table A-5: Main power connector

Pin	Signal
1	+12 V
2	GND
3	GND
4	+5 V

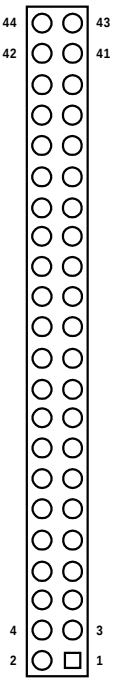


IDE hard drive connector (CN11)

Table A-6: IDE hard drive connector

Pin	Signal	Pin	Signal
1	IDE RESET*	2	GND
3	DATA 7	4	DATA 8
5	DATA 6	6	DATA 9
7	DATA 5	8	DATA 10
9	DATA 4	10	DATA 11
11	DATA 3	12	DATA 12
13	DATA 2	14	DATA 13
15	DATA 1	16	DATA 14
17	DATA 0	18	DATA 15
19	SIGNAL GND	20	N/C
21	DRQ*	22	GND
23	IO WRITE*	24	GND
25	IO READ*	26	GND
27	IO CHANNEL READY	28	N/C
29	ACK	30	GND
31	IRQ14 (IDE IRQ)	32	IOCS16*
33	ADDR 1	34	N/C
35	ADDR 0	36	ADDR 2
37	HARD DISK SELECT 0	38	HARD DISK SELECT 1
39	IDE ACTIVE*	40	GND
41	VCC	42	VCC
43	GND	44	N/C

* low active



COM1 RS-232 serial port (CN16)

Table A-7: COM1 RS-232 serial port

Pin	Signal
1	DCD
2	RxD
3	TxD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	RI

Ethernet 100Base-T connector (CN13)

Table A-8: Ethernet 100Base-T connector

Pin	Signal
1	XMT+
2	XMT-
3	RCV+
4	N/C
5	N/C
6	RCV-
7	N/C
8	N/C

Auxilary power connector (CN10)

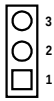


Table A-9: Peripheral power connector

Pin	Signal
3	-12 V
2	GND
1	-5 V

Floppy drive connector (CN2)

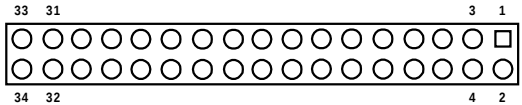


Table A-10: Floppy drive connector

Pin	Signal	Pin	Signal
1	GND	2	DENSITY SELECT*
3	GND	4	N/C
5	GND	6	N/C
7	GND	8	INDEX*
9	GND	10	MOTOR 0*
11	GND	12	DRIVE SELECT 1*
13	GND	14	DRIVE SELECT 0*
15	GND	16	MOTOR 1*
17	GND	18	DIRECTION*
19	GND	20	STEP*
21	GND	22	WRITE DATA*
23	GND	24	WRITE GATE*
25	GND	26	TRACK 0*
27	GND	28	WRITE PROTECT*
29	GND	30	READ DATA*
31	GND	32	HEAD SELECT*
33	GND	34	DISK CHANGE*

* low active

Parallel port connector (CN3)

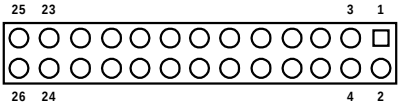


Table A-11: Parallel port connector

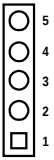
Pin	Signal
1	STROBE*
2	AUTOFD*
3	D0
4	ERROR*
5	D1
6	INIT*
7	D2
8	SLCTINI*
9	D3
10	GND
11	D4
12	GND
13	D5
14	GND
15	D6
16	GND
17	D7
18	GND
19	ACK*
20	GND
21	BUSY
22	GND
23	PE
24	GND
25	SLCT
26	GND

* low active

IR connector (CN7)

Table A-12: IR connector

Pin	Signal
1	+5 V (VCC)
2	N/C
3	IR_RX
4	GND
5	IR_TX



USB connector (CN4)

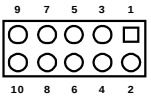


Table A-13: USB connector

Pin	Signal	Pin	Signal
1	USBVCC (5 V)	2	USB VCC (5 V)
3	DATA 0-	4	DATA 1-
5	DATA 0+	6	DATA 1+
7	GND	8	GND
9	GND	10	N/C

Audio connector (CN5)

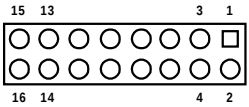


Table A-14: Audio connector

Pin	Signal	Pin	Signal
1	SPEAKER OUT R+	2	SPEAKER OUT R-
3	SPEAKER OUT L+	4	SPEAKER OUT L-
5	LINE OUT R	6	LINE OUT L
7	GND	8	GND
9	LINE IN R	10	LINE IN L
11	GND	12	GND
13	NC	14	NC
15	MIC IN	16	GND

CD audio connector (CN1)

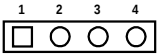


Table A-15: CD audio connector

Pin	Signal
4	GND
3	CD audio control R
2	GND
1	CD audio control L

LVDS connector (CN15)

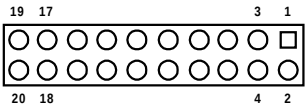


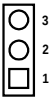
Table A-16: LVDS connector

Pin	Signal	Pin	Signal
1	VDD	2	VDD
3	VDD	4	VDD
5	GND	6	GND
7	GND	8	GND
9	TX0-	10	TX0+
11	GND	12	TX1-
13	TX1+	14	GND
15	TX2-	16	TX2+
17	GND	18	TXCK-
19	TXCK+	20	GND

CPU fan power connector (CN6)

Table A-17: CPU fan power connector

Pin	Signal
1	+5 V
2	GND
3	+12 V



S-Video connector (CN21)

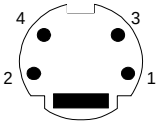


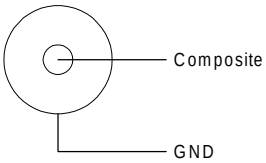
Table A-18: S-Video connector

Pin	Signal
1	GND
2	GND
3	Luminance output (brightness)
4	Chrominance output (color)

Table A-19: SCART Mode (optional)

Pin	Signal
1	Blue
2	CSYNC
3	Red
4	Green

RCA (composite) connector (CN22)



ATX power feature connector (CN23)

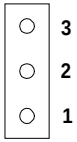


Table A-20: ATX power feature connector (CN23)

Pin	Signal
1	5VSB (Stand-by voltage)
2	NC
3	VPSON

ATX power button & power LED connector (CN24)

Table A-21: ATX power button & power LED connector (CN24)

Pin	Signal
1	LED+
2	Button+
3	LED- (GND)
4	Button- (GND)

APPENDIX B

System Assignments

- System I/O ports
- DMA channel assignments
- Interrupt assignments
- 1st MB memory map

B.1 System I/O ports

Table B-1: System I/O ports

Addr. range (Hex)	Device
000-01F	DMA controller
020-021	Interrupt controller 1, master
022-023	Chipset address
040-05F	8254 timer
060-06F	8042 (keyboard controller)
070-07F	Real-time clock, non-maskable interrupt (NMI) mask
080-09F	DMA page register,
0A0-0BF	Interrupt controller 2
0C0-0DF	DMA controller
0F0	Clear math co-processor
0F1	Reset math co-processor
0F8-0FF	Math co-processor
170- 178	2nd fixed disk for CompactFlash
1F0-1F8	1st fixed disk
200-207	Game I/O
278-27F	Reserved
2F8-2FF	Serial port 2
300-31F	Ethernet**
360-36F	Reserved
378-37F	Parallel printer port 1 (LPT2)
380-38F	SDLC, bisynchronous 2
3A0-3AF	Bisynchronous 1
3B0-3BF	Monochrome display and printer adapter (LPT1)
3C0-3CF	Reserved
3D0-3DF	Color/graphics monitor adapter
3F0-3F7	Diskette controller
3F8-3FF	Serial port 1
443	Watchdog timer

* PNP audio I/O map range from 220 ~ 250H (16 bytes)
  MPU-401 select from 300 ~ 330H (2 bytes)

** default setting

B.2 DMA channel assignments

Table B-2: DMA channel assignments

Channel	Function
0	Available
1	Audio*
2	Floppy disk (8-bit transfer)
3	Parallel**
4	Cascade for DMA controller 1
5	Audio*
6	Available
7	Available

* Audio DMA default setting: DMA 1.5

Audio High DMA select: DMA 1.3

Audio Low DMA select: DMA 5.6.7

** Parallel port DMA default setting: DMA 3

Parallel port DMA select: DMA 1.3

B.3 Interrupt assignments

Table B-3: Interrupt assignments

Interrupt#	Interrupt source
NMI	Parity error detected
IRQ 0	Interval timer
IRQ 1	Keyboard
IRQ 2	Interrupt from controller 2 (cascade)
IRQ 8	Real-time clock
IRQ 9	Reserve
IRQ 10	Available
IRQ 11	Reserved for watchdog timer
IRQ 12	PS/2 mouse
IRQ 13	INT from co-processor
IRQ 14	Preliminary IDE
IRQ 15	Secondary IDE for CompactFlash
IRQ 3	Serial communication port 2
IRQ 4	Serial communication port 1
IRQ 5	Audio*
IRQ 6	Diskette controller (FDC)
IRQ 7	Parallel port 1 (print port)

* Audio default setting: IRQ5
  USB and Ethernet IRQ is automatically set by the system

B.4 1st MB memory map

Table B-4: 1st MB memory map

Addr. range (Hex)	Device
F000h - FFFFh	System ROM
D800h - EFFFh	Unused
D000 - D400H	Available
C800h - D7FFh	Ethernet ROM*
C000h - C7FFh	VGA BIOS
B800h - BFFFh	CGA/EGA/VGA text
B000h - B7FFh	Reserved for graphic mode usage
A000h - AFFFh	EGA/VGA graphics
0000h - 9FFFh	Base memory

* default setting

APPENDIX C

LCD Services

This appendix contains information of a detailed or specialized nature. It includes information about 18-bit TFT LCD interfaces.

C.1 LCD services

LCD screens are very popular on Advantech's CPU cards, biscuit PCs and POS series products, such as the PCA-6135/6145/6153, and PCA-6751/PCA-6751V. "Lighting" LCDs is virtually impossible without technical expertise. Advantech provides LCD lighting and integration services to assist our customers in setting up their systems. Advantech's LCD lighting guide explains how to make connections between LCD interfaces and LCD panels, as well as how to control contrast, brightness, V_{EE} source, LCD inverter and all other factors that affect the successful installation of LCD panels.

The following information details our LCD lighting services:

a) This policy is only valid for Advantech products that include LCD support

b) The customer should **send** the following LCD components for service:
   - DC-AC inverter and cable (i.e. connector with/without wires) and data sheet
   - LCD flat panel and cable (connector with/without wires) and complete data sheet

c) Advantech will normally charge the customer a deposit. The deposit will be refunded when servicing exceeds a minimum volume

d) The customer must sign the agreement and fax it to us prior to sending the LCD package. Advantech reserves the right to refuse service if the customer cannot provide the required documents and auxiliary parts

e) Advantech will supply a BIOS file and connection cable to the customer upon completing the service

f) A minimum of seven working days is required for completion of service, starting from receipt of the LCD package by Advantech

For the 18-bit TFT display support list, please contact our customer service department for more detailed information and service files. See our web site at: **http://support.advantech.com/**

APPENDIX D

Installing PC/104 Modules

This appendix gives instructions for installing PC/104 modules.

D.1 Installing PC/104 modules

The PCM-5820 Series' PC/104 connectors give you the flexibility to attach PC/104 modules.

Installing these modules on the PCM-5820 Series is quick and simple. The following steps show how to mount the PC/104 modules:

1. Remove the PCM-5820 Series from your system, paying particular attention to the safety instructions already mentioned above.
2. Make any jumper or link changes required to the CPU card now. Once the PC/104 module is mounted you may have difficulty in accessing these.
3. Normal PC/104 modules have male connectors and mount directly onto the main card. (Refer to the diagram on the following page.)
4. Mount the PC/104 module onto the CPU card by pressing the module firmly but carefully onto the mounting connectors.
5. Secure the PC/104 module onto the CPU card using the four mounting spacers and screws.

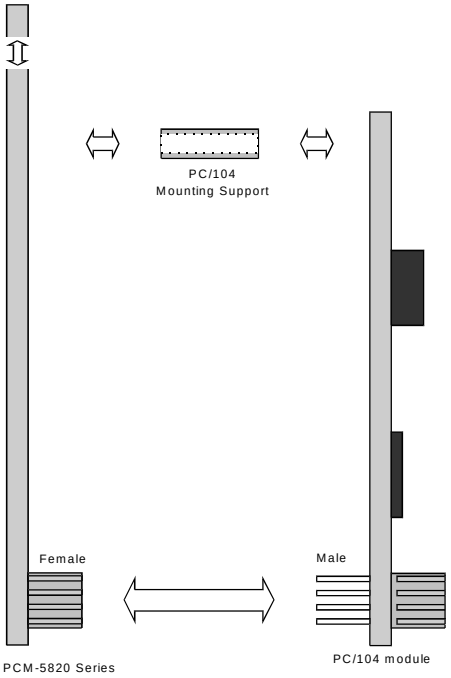


Figure D-1: PC/104 module mounting diagram

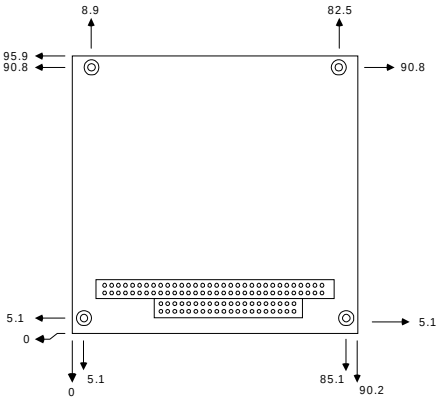


Figure D-2: PC/104 module dimensions (mm) (±0.1)

Table D-1: PC/104 connectors (CN8)

Pin Number	Signal Row A	Row B	Signal Row C	Row D
0	—	—	0 V	0 V
1	IOCHCHK*	0 V	SBHE*	MEMCS16*
2	SD7	RESETDRV	LA23	IOCS16*
3	SD6	+5 V	LA22	IRQ10
4	SD5	IRQ9	LA21	IRQ11
5	SD4	-5 V	LA20	IRQ12
6	SD3	DRQ2	LA19	IRQ15
7	SD2	-12 V	LA18	IRQ14
8	SD1	ENDXFR*	LA17	DACK0*
9	SD0	+12 V	MEMR*	DRQ0
10	IOCHRDY	N/C	MEMW*	DACK5*
11	AEN	SMEMW*	SD8	DRQ5
12	SA19	SMEMR*	SD9	DACK6*
13	SA18	IOW*	SD10	DRQ6
14	SA17	IOR*	SD11	DACK7*
15	SA16	DACK3*	SD12	DRQ7
16	SA15	DRQ3	SD13	+5 V
17	SA14	DACK1*	SD14	MASTER*
18	SA13	DRQ1	SD15	0 V
19	SA12	REFRESH*	KEY	0 V
20	SA11	SYSCLK	—	—
21	SA10	IRQ7	—	—
22	SA9	IRQ6	—	—
23	SA8	IRQ5	—	—
24	SA7	IRQ4	—	—
25	SA6	IRQ3	—	—
26	SA5	DACK2*	—	—
27	SA4	TC	—	—
28	SA3	BALE	—	—
29	SA2	+5 V	—	—
30	SA1	OSC	—	—
31	SA0	0 V	—	—
32	0 V	0 V	—	—

* active low

APPENDIX E

Programming the Watchdog Timer

The PCM-5820 Series is equipped with a watchdog timer that resets the CPU or generates an interrupt if processing comes to a standstill for whatever reason. This feature ensures system reliability in industrial standalone or unmanned environments.

E.1 Programming the watchdog timer

Jumper J3 controls the watchdog settings. The default configuration of the timer is enabled via a system reset.

To enable the watchdog timer, you must write a program which writes 1 to I/O port address 443 (hex) at regular intervals. The first time your program reads the port, it enables the watchdog timer. After that, your program must write 1 to the port at time interval of less than 1.6 seconds, otherwise the watchdog timer will activate and reset the CPU or generate an interrupt on IRQ11. When you want to disable the watchdog timer, your program should write 0 to I/O port 443.

If CPU processing comes to a standstill because of EMI or a software bug, your program's signals to I/O port 443 to the timer will be interrupted. The timer will then automatically reset the CPU or invoke an IRQ, and data processing will continue normally.

You must write your program so that it writes 1 to I/O port 443 at an interval shorter than the timer's preset interval. The timer's intervals have a tolerance of ± 30%, so you should program an instruction that will refresh the timer about every second.

The following program shows how you might program the watchdog timer in BASIC:

```
10      REM  Watchdog timer example program
20      X=Out &H443, 1 REM  Enable and refresh the
        watchdog
30      GOSUB 1000 REM  Task #1, takes 1 second to
        complete
40      X=Out &H443, 1 REM  Refresh the watchdog
50      GOSUB 2000 REM  Task #2, takes 1 second to
        complete
60      X=Out &H443, 0 REM  Disable the watchdog
70      END
1000    REM  Subroutine #1, takes 1 second to
        complete
  .
  .
  .
1070    RETURN
2000    REM  Subroutine #2, takes 1 second to
        complete
  .
  .
  .
2090    RETURN
```

APPENDIX F

Mechanical Drawings

F.1 Component side

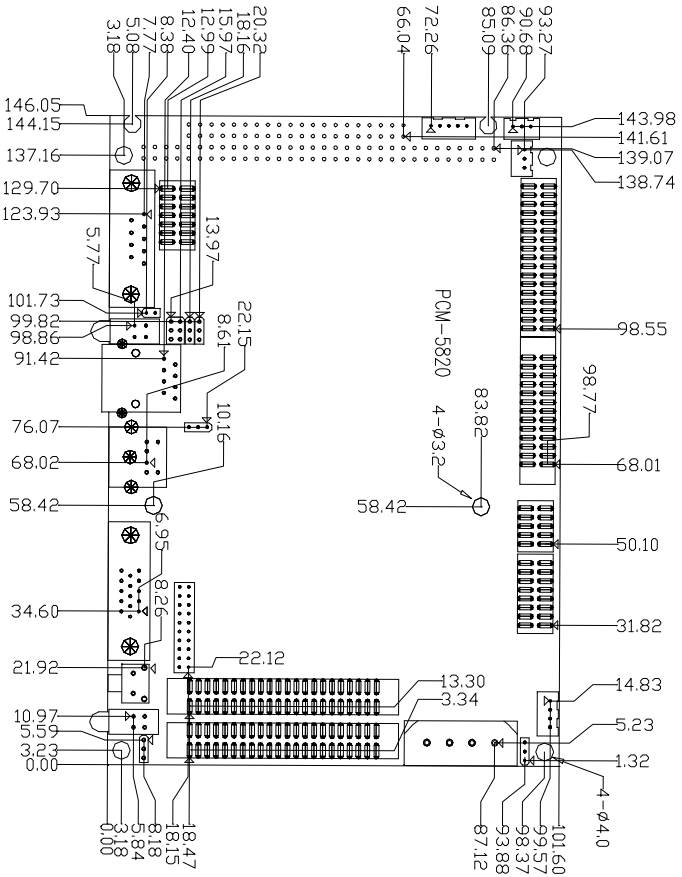


Figure F-1: Board Dimensions component side (PCM-5820, PCM-5820L, PCM-5820E only)

F.2 Component side (PCM-5822)

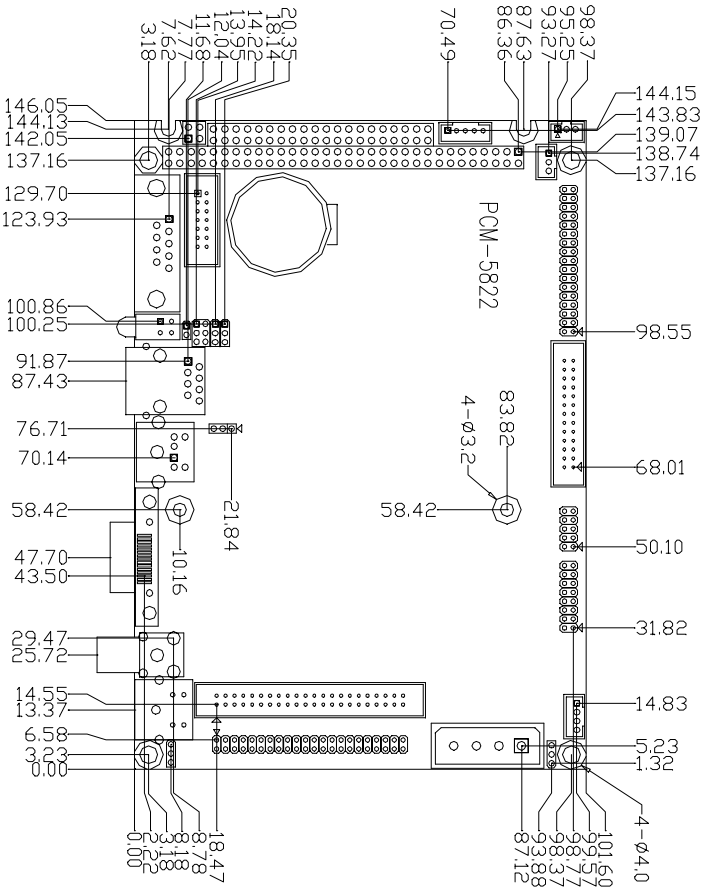


Figure F-2: Board Dimensions component side (PCM-5822 only)

F.3 Solder side

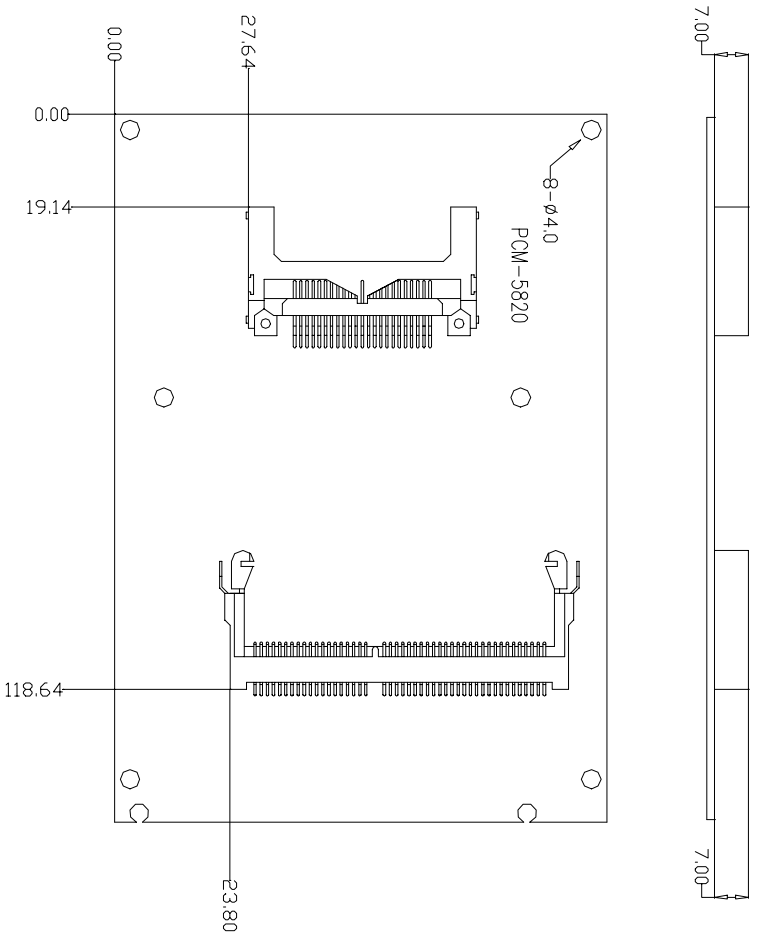


Figure F-3: Board Dimensions solder side (PCM-5820 Series)

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Thank you very much for selecting Autonics products.
For your safety, please read the following before using.

▣ Caution for your safety

※Please keep these instructions and review them before using this unit.

※Please observe the cautions that follow;

⚠ **Warning** Serious injury may result if instructions are not followed.

⚠ **Caution** Product may be damaged, or injury may result if instructions are not followed.

※The following is an explanation of the symbols used in the operation manual.
⚠:Injury or danger may occur under special conditions.

⚠ Warning

1. **In case of using this unit with machineries(Nuclear power control, medical equipment, vehicle, train, airplane, combustion apparatus, entertainment or safety device etc), it requires installing fail-safe device, or contact us for information on type required.**
   It may result in serious damage, fire or human injury.
2. **Do not disassemble and modify this unit, when it requires. If needs, please contact us.**
   It may give an electric shock and cause a fire.
3. **Do not connect a terminal when power on.**
   It may give an electric shock.

⚠ Caution

1. **This unit shall not be used outdoors.**
   It might shorten the life cycle of the product or give an electric shock.
2. **This unit must be used when the protection cover is installed.**
   It may shorten the life cycle of this unit. It may give electric shock.
3. **Please observe specification rating.**
   It might shorten the life cycle of the product and cause a fire.
4. **When wire connection, screw bolt on terminal block with 0.8 N · m strength.**
   It may cause a fire.
5. **Do not use this unit in place where there are big vibration.**
   It may cause a fire.
6. **In cleaning the unit, do not use water or an oil-based detergent.**
   It may give an electric shock and cause a fire.

▣ Ordering information

BX 15M – T D T □ – TP

Control output	P	PNP open collector output
	T	Built in timer function
		NPN open collector output
Appearances	1	Emitter
	2	Receiver
		Single body type(Emiter and Receiver)
Output	R	Relay output
	T	Solid state output(TR)
Power supply	F	Free power
	D	DC power
Detecting type	T	Through beam
	M	Retroreflective
	P	Retroreflective with polarizing filter
	D	Diffuse reflective
Detecting distance	M	Unit:m
		Unit:mm
Photoelectric sensor	BX	Series name

※The above specifications are changeable without notice anytime.

▣ Specification(DC power)

Type		DC power, Solid state output							
		NPN output type				PNP output type			
		Through-beam	Retroreflective(*1)		Diffuse reflective	Through beam	Retroreflective(*1)		Diffuse reflective
Model	Standard type	**BX15M-TDT**	**BX5M-MDT**	**BX3M-PDT**(With polarizing filter)	**BX700-DDT**	**BX15M-TDT-P**	**BX5M-MDT-P**	**BX3M-PDT-P**(With polarizing filter)	**BX700-DDT-P**
	Built-in Timer	**BX15M-TDT-T**	**BX5M-MDT-T**	**BX3M-PDT-T**(With polarizing filter)	**BX700-DDT-T**	**BX15M-TDT-TP**	**BX5M-MDT-TP**	**BX3M-PDT-TP**(With polarizing filter)	**BX700-DDT-TP**
Detecting distance		15m	0.1 to 5m (MS-2 mirror)	0.1 to 2m (MS-2 mirror) 0.1 to 3m (MS-3 mirror)	700mm(200×200mm non-glossy white paper)	15m	0.1 to 5m (MS-2 mirror)	0.1 to 2m(MS-2 mirror) 0.1 to 3m(MS-3 mirror)	700mm(200×200mm non-glossy white paper)
Detecting target		Opaque materials of Min. ø15mm	Opaque materials of Min. ø60mm		Transparent, Translucent, Opaque material	Opaque materials of Min. ø15mm	Opaque materials of Min. ø60mm		Transparent, Translucent, Opaque material
Hysteresis		————	————		Max. 20% at rated setting distance	————	————		Max. 20% at rated setting distance
Response time		Max. 1ms							
Power supply		12-24VDC ±10%(Ripple P-P:Max. 10%)							
Current consumption		Max. 40mA	Max. 30mA			Max. 40mA	Max. 30mA		
Light source		Infrared LED(Modulated)	Red LED(Modulated:660nm)		Infrared LED(Modulated)		Red LED(Modulated:660nm)		Infrared LED(Modulated)
Sensitivity		Adjustable by VR							
Operation mode		Selectable Light ON or Dark ON by slide switch							
Control output		• NPN open collector output ☞ Load voltage : Max. 30VDC, Load current : Max. 200mA Residual voltage : Max. 1V at 200mA, Max. 0.4V at 16mA				• PNP output ☞ Output voltage : Min. power supply-2.5V Load current : Max. 200mA			
Self-diagnosis output		• NPN open collector output ☞ Load voltage : Max. 30VDC, Load current : Max. 50mA, Residual voltage : Max. 1V at 50mA, Max. 0.4V at 16mA							
		Green LED turns on at unstable operation and output (transistor output) turns on							
Protection circuit		Reverse polarity protection, short-circuit protection							
Timer function		Selectable ON Delay, OFF Delay, One Shot Delay by slide switch, Delay Time:0.1 to 5sec(VR adjustable)							
Indication		Operation indicator : Yellow LED, Self-diagnosis indicator : Green LED							
Connection		Terminal connection							
Insulation resistance		Min. 20MΩ(500VDC)							
Noise strength		±240V the square wave noise(pulse width:1㎲) by the noise simulator							
Dielectric strength		1,000VAC 50/60Hz for 1minute							
Vibration		1.5mm amplitude at frequency of 10 to 55Hz in each of X, Y, Z directions for 2 hours							
Shock		500m/s² (50G) in X, Y, Z directions for 3 times							
Ambient illumination		Sunlight : Max. 11,000ℓx, Incandescent lamp : Max. 3,000ℓx							
Ambient temperature		Operating : -20 to +65℃(non-freezing condition), Storage : -25 to +70℃							
Ambient humidity		35 to 85%RH, Storage : 35 to 85%RH							
Ambient protection		IP66(IEC specification)							
Material		Case : ABS, Lens cover : PC, Lens : Acryl							
Accessory	Individual	————	Mirror(MS-2)	Mirror(MS-3)	————	————	Mirror(MS-2)	Mirror(MS-3)	————
	Common	Driver, Mounting bracket, Bolts/nuts							
Weight		TDT : Approx. 183g, TDT-T : Approx. 188g	MDT : Approx. 110g, MDT-T : Approx. 115g	PDT : Approx. 114g, PDT-T : Approx. 119g	DDT : Approx. 95g, DDT-T : Approx. 100g	TDT-P : Approx. 183g, TDT-TP : Approx. 188g	MDT-P : Approx. 110g, MDT-TP : Approx. 115g	PDT-P : Approx. 114g, PDT-TP : Approx. 119g	DDT-P : Approx. 95g, DDT-TP : Approx. 100g
Approval		CE							

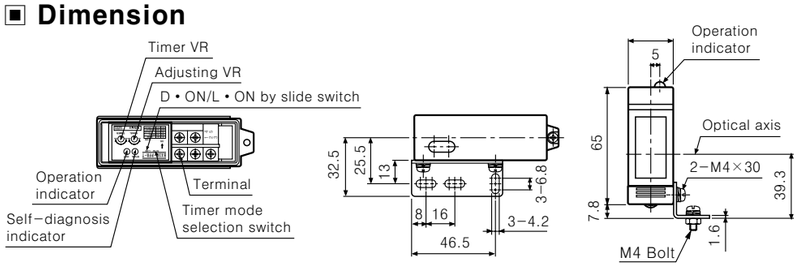
※(*1)The sensing range and the sensing object of the retroreflective sensor are specified with using the MS-2(MS-3) reflector. The sensing ranges of the retroreflective sensor in the above table are indentified as the possible setting ranges of the MS-2(MS-3) reflector. The sensor can detect on object under 0.1m apart.

▣ Specification(Free power)

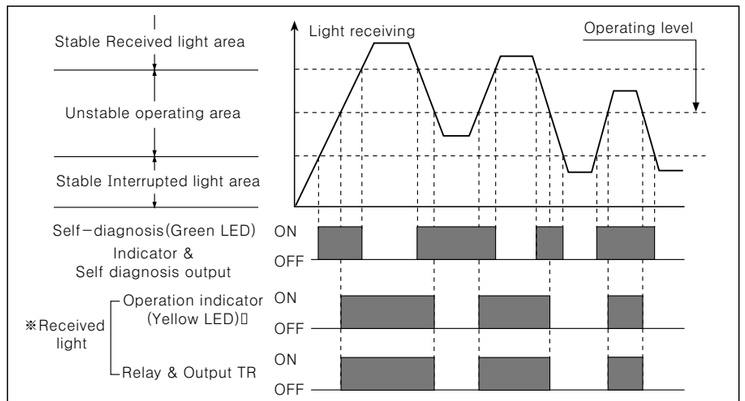
Type		Free power, Relay contact output			
		Through-beam	Retroreflective		Diffuse reflective
Model	Standard type	**BX15M-TFR**	**BX5M-MFR**	**BX3M-PFR**(With polarizing filter)	**BX700-DFR**
	Built-in Timer	**BX15M-TFR-T**	**BX5M-MFR-T**	**BX3M-PFR-T**(With polarizing filter)	**BX700-DFR-T**
Detecting distance		15m	0.1 to 5m(MS-2)	0.1 to 2m(MS-2), 0.1 to 3m(MS-3)	700mm(200×200mm non-glossy white paper)
Detecting target		Opaque materials of Min. ø15mm	Opaque materials of Min. ø60mm		Transparent, Translucent, Opaque material
Hysteresis		————	————		Max. 20% at rated setting distance
Response time		Max. 20ms			
Power supply		24-240VAC ±10% 50/60Hz, 24-240VDC ±10%(Ripple P-P:Max. 10%)			
Power consumption		Max. 3VA			
Light source		Infrared LED(Modulated)		Red LED(Modulated:660nm)	Infrared LED(Modulated)
Sensitivity		Adjustable by VR			
Operation mode		Selectable Light ON or Dark ON by slide switch			
Control output		• Relay contact output ☞ Relay contact capacity : 30VDC 3A at resistive load, 250VAC 3A at resistive load Relay contact composition: 1c(SPDT)			
Self-diagnosis output		Green LED indicator			
		Green LED turns on at unstable operation			
Timer function		• Selectable ON Delay, OFF Delay, One Shot Delay by slide switch • Delay Time : 0.1 to 5sec(VR adjustable)			
Indication		Operation indicator : Yellow LED, Self-diagnosis indicator : Green LED			
Connection		Terminal connection			
Insulation resistance		Min. 20MΩ(500VDC)			
Insulation type(*2)		⧈			
Noise strength		±1,000V the square wave noise(pulse width:1㎲) by the noise simulator			
Dielectric strength		1,500VAC 50/60Hz for 1minute			
Impulse voltage withstand		1kV(Generator:1.2/50㎲, Source impedence:500Ω, Source energy:0.5J)			
Vibration	Mechanical	1.5mm amplitude at frequency of 10 to 55Hz in each of X, Y, Z directions for 2 hours			
	Malfuntion	1.5mm amplitude at frequency of 10 to 55Hz in each of X, Y, Z directions for 10 minutes			
Shock	Mechanical	500m/s² (50G) in X, Y, Z directions for 3 times			
	Malfuntion	100m/s² (10G) in X, Y, Z directions for 3 times			
Ambient illumination		Sunlight : Max. 11,000ℓx, Incandescent lamp : Max. 3,000ℓx			
Ambient temperature		Operating : -20 to +65℃(non-freezing condition), Storage : -25 to +70℃			
Ambient humidity		35 to 85%RH, Storage : 35 to 85%RH			
Protection		IP66(IEC specification)			
Material		Case : ABS, Lens cover : PC, Lens : Acryl			
Accessory	Individual	————	Mirror(MS-2)	Mirror(MS-3)	————
	Common	Driver, Mounting bracket, Bolts/nuts			
Weight		TFR : Approx. 198g, TFR-T : Approx. 203g	MFR : Approx. 126g, MFR-T : Approx. 131g	PFR : Approx. 130g, PFR-T : Approx. 134g	DFR : Approx. 110g, DFR-T : Approx. 115g
Approval		CE			

※(*1)The sensing range and the sensing object of the retroreflective sensor are specified with using the MS-2(MS-3) reflector. The sensing ranges of the retroreflective sensor in the above table are indentified as the possible setting ranges of the MS-2(MS-3) reflector. The sensor can detect on object under 0.1m apart.
※(*2)"⧈" Mark indicated that equipment protected throughout by double insulation or reinforced insulation.

▣ Dimension

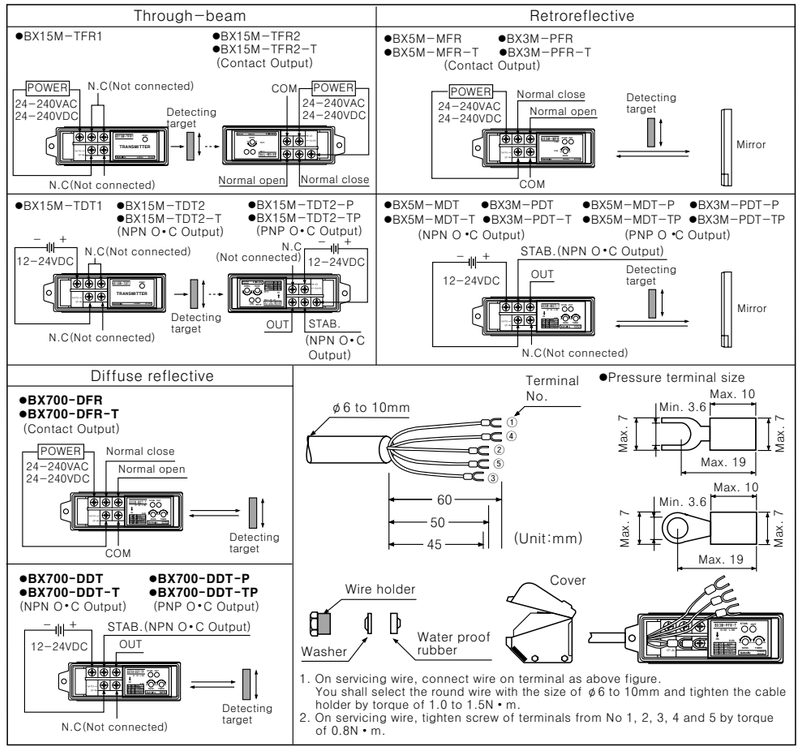


▣ Operation mode



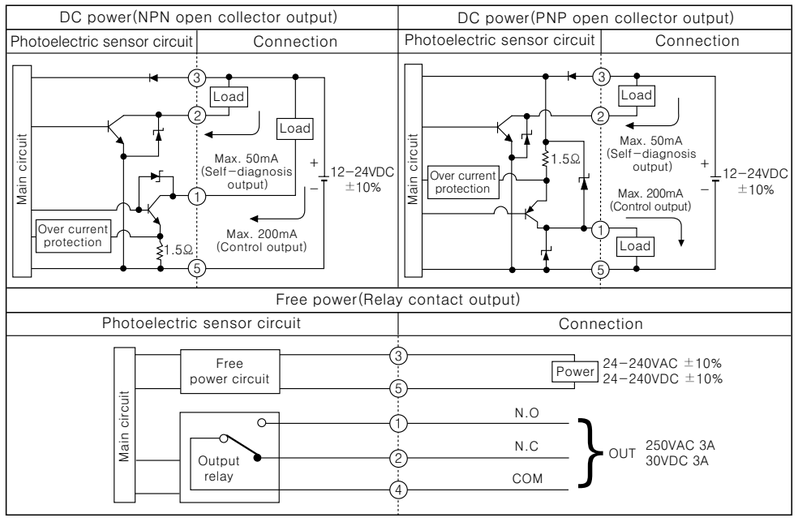
※Operation for Dark ON mode is opposed to above chart indication for Light ON mode.
※To prevent from the misoperation, output of units keeps the state of OFF for 0.5sec. after power ON.
※If the control output terminal is short-circuit or over current than the rated current flows in the unit, the sensor does not operate normally by protection circuit.

▣ Connection



1. On servicing wire, connect wire on terminal as above figure. You shall select the round wire with the size of ø6 to 10mm and tighten the cable holder by torque of 1.0 to 1.5N • m.
2. On servicing wire, tighten screw of terminals from No 1, 2, 3, 4 and 5 by torque of 0.8N • m.

▣ Control output circuit diagram



▣ Timer mode

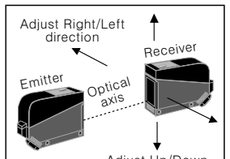
Timer mode	SW position SW1	SW position SW2	Status of detection / Operation mode	Received light / Interrupted light
Normal Mode	ON	ON	Light ON	ON / OFF
			Dark ON	ON / OFF
One Shot Delay Mode	ON	OFF	Light ON	ON / OFF
			Dark ON	ON / OFF
ON Delay Mode	OFF	ON	Light ON	ON / OFF
			Dark ON	ON / OFF
OFF Delay Mode	OFF	OFF	Light ON	ON / OFF
			Dark ON	ON / OFF

※T : Time set by timer VR.

▣ Mounting & Adjustment

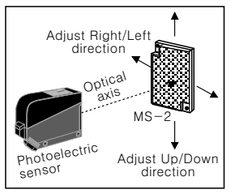
◎Through-Beam type

1. Supply the power to the photoelectric sensor, after setting the emitter and the receiver in face to face.
2. Set the receiver in center of position where indicator turns on, as adjusting the receiver or the emitter right and left, up and down.
3. Fix both units up tightly after checking that the units detects the target.
   ※If the detecting target is translucent body or smaller than ø16mm, it might not detect the target cause light passed.
   ※Sensitivity adjustment : Please see the diffuse reflective type.



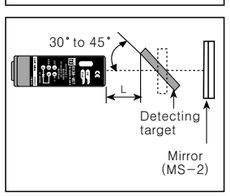
◎Retroreflective type

1. Supply the power to the photoelectric sensor, after setting the photoelectric sensor and the Mirror(MS-2) in face to face.
2. Set the photoelectric sensor in the position which indicator turns on, as adjusting the mirror or the sensor right and left, up and down.
3. Fix both units tightly after checking that the units detect the target.
   ※If use more than 2 photo sensors in parallel, the space between them should be more than 30cm.
   ※If reflectance of target is higher than non-glossy white paper, it might cause malfunction by reflection from the target when the target is near to photo sensor. Therefore put enough space between the target and photoelectric sensor or the surface of target should be installed at an angle of 30° to 45° against optical axis. (When detect target with high reflectance near by, photoelectric sensor with the polarizing filter should be used.)
   ※Sensitivity adjustment : Please see the diffuse reflective type.



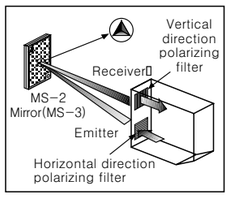
◎Retroreflective type(With polarizing filter)

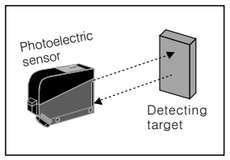
When the beam passes through polarizing filter from emitter, it will be converted as horizontal transverse beam and reaches to mirror MS-2(MS-3), afterwards it is converted by mirror function as vertical beam and reaches to receiver through polarizing filter. Even it can detect normal mirror.

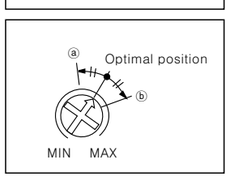


◎Diffuse reflective type

1. Even though the diffuse reflective type is set at Max. sensitive position, the sensitivity of the sensor must be adjusted according the existence of the reflective material in background.
2. Set the target at detecting position and turn sensitivity volume from minimum sensitivity position slowly, confirm ⓐ position where indicator(Yellow LED) is ON and self-diagnosis indicator (Green LED) is OFF.
3. If turn volume higher slowly in state of removed target, the operation indicator(Yellow LED) will be OFF and self-diagnosis indicator(Green LEd) will be ON. Confirm this position as ⓑ. [When self-diagnosis indicator(Green LED) and operation indicator (Yellow LED) are OFF, the Max. sensitivity position will be ⓑ.]
4. Set the adjuster at the center of two switching point ⓐ, ⓑ.
   ※Above sensitivity adjustment is when it is the state of Light ON mode. If it is the state of Dark ON mode, operation indicator (Yellow LED) will be opposite.
   ※The detecting distance indicated on specification chart is against 200×200mm of non-glossy white paper, may be changed by the size of the target, reflectance of the target.

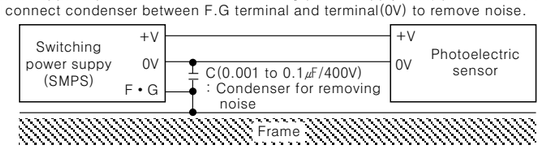






▣ Caution for using

1. Intercept a strong source of light as like sunlight, spotlight within inclination angle range of photoelectric sensor.
2. When it is used more than 2 sets of Through-beam type, it can be occurred mutual interference by emitter beam. In this case, please change position of the emitter and the receiver of the other in order to escape mutual interference.
3. When more than 2 sets of diffuse reflection types are installed adjacently, it may cause malfunction by light beam from the other target. So it must be installed at an enough interval.
4. When the photoelectric sensor is installed on a flat part that has high reflectance, it can be occurred malfunction by light beam from a flat part. The sensor must be installed as proper interval between the photoelectric sensor and a flat part.
5. When wire the photoelectric sensor with high voltage line, power line in the same conduit, it may cause malfunction or mechanical trouble. Therefore please wire seperately or use different conduit.
6. Avoid installing the unit as following place.
   Corrosive gas, oil or dust, strong flux, noise, sunny, strong alkali, acid.
7. In case of connecting inductive load as DC relay at load, use shielded cable, diode and varistor in order to remove noise.
8. The photoelectric sensor cable shall be used as short as possible, because it may cause malfunction by noise through the cable.
9. When it is stained by dirt at lens, please clean the lens with dry cloth, but don't use an organic materials such as alkali, acid, chromic acid.
10. When wire connection, the wire should be over than AWG No. 20 and length should be under than 100m.
11. Be sure to screw bolt with 0.3N • m to 0.5N • m torque.
12. When the unit is supplied power source from switching power supply unit, please earth Frame ground(F.G) terminal, and connect condenser between F.G terminal and terminal(0V) to remove noise.



※It may cause malfunction if above instructions are not followed.

▣ Main products

- COUNTER
- TIMER
- TEMPERATURE CONTROLLER
- PANEL METER
- TACHOMETER
- LINE SPEED METER
- DISPLAY UNIT
- PROXIMITY SWITCH
- PHOTOELECTRIC SENSOR
- FIBER OPTIC SENSOR
- PRESSURE SENSOR
- ROTARY ENCODER
- SENSOR CONTROLLER
- POWER CONTROLLER
- STEPPING MOTOR & DRIVER & CONTROLLER

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