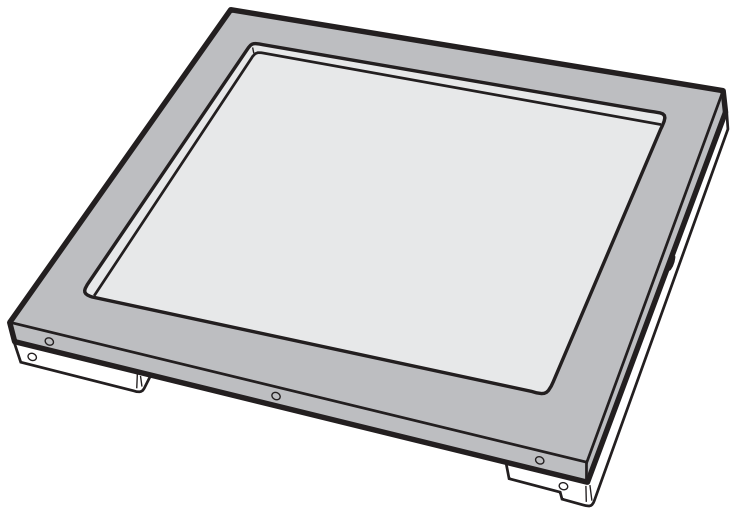
SERVICE MANUAL

INDUSTRIAL MONITOR

LMU-TK15A4 (Without Touch Panel)
LMU-TK15A4T (With Touch Panel)
(GENERAL)

PRODUCT CODE NO.	
LMU-TK15A4	1 938 102 24
LMU-TK15A4T	1 938 102 28



REFERENCE NO. SM 920009 PRODUCT CODE NO.193810224
REFERENCE NO. SM 920010 PRODUCT CODE NO.193810228

INDEX

Refer to the separate user's guide for instruction.

PRECAUTIONS

Placement precautions

- Avoid placing the unit in humid or dusty places, or where it will be exposed to excessive heat (direct sunlight, heaters, etc.)
- Do not step on or set anything on the AC cord. **DAMAGE TO THE AC CORD IS A SAFETY RISK AND CAN CAUSE A FIRE.**
- Do not connect the unit to the same AC outlet with appliances that generate large amounts of interference (such as heaters with thermostats, appliances with motors, etc.). It is best to use a completely separate electrical outlet.
- Keep the unit away from water. If water accidentally enters the unit, unplug the AC power cord immediately. DO NOT PLUG IN THE UNIT AGAIN.

Handling precautions

- Avoid bending, kinking or damaging the AC power cord.
- Never insert or remove the power cord with wet hands. Also, be sure to hold cord by the plug when removing it from the outlet.
- Do not remove any parts that are held in place with screws. (The unit does not contain any user serviceable items.)
- Maintain standard room temperature (5ºC to 40 ºC, or 41ºF to 104 ºF) during use. Do not subject the unit to shock or vibration. Do not move the unit while it is in use.
- A rapid increase in room temperature in cool weather can cause condensation to from inside the unit. If this occurs, wait at least 15 minutes after turning the unit on before attempting to operate it.

1. MAIN SPECIFICATION

Model Name		LMU-TK15A4	LMU-TK15A4T
Display			
Panel Type		TFT	
Screen Size		15.0"	
Pixel Pitch		0.297×0.297 mm	
Pixel Format		1,024×768	
Brightness		250cd/m^2 typ.	
Response Time		40ms	
Contrast		350 : 1 typ.	
Viewing Angle (minimum)		Left & Right :±70° Up : 55° Down : 65°	
Back Light		CCFL × 2	
Colors		16.77million	
Video Control			
Input Signal	System	Analog RGB	
	Video	0.7Vp-p 75 ohm	
	Sync.Type/Level	Separate TTL	
Synchronization Frequencies	Horizontal	24.8k - 60.2kHz	
	Vertical	56 - 75Hz	
Touch panel			
Type		-	Capacitive
Electrical Resolution		-	10bit (1,024x1,024)
Communication		-	Bi-directional asynchronous RS232C serial communication
Physical			
Input	Video Signal	15pin mini D-Sub	
	Serial	-	9pin mini D-Sub
	Power Supply	DC Jack	
Environment	Operating Temperature	operating : 5° to 40°	
		Storage : -20° to 60°	
	Humidity	30% - 85% RH (No Condensation)	
Power Supply (AC Adapter)	Model Name	GI40-US1225	
	Input	AC115-240V 1.0A-0.55A, 50-60Hz	
	Output	DC 12V 2.5A	
Power Supply Consumption		28W max.	30W max.
		5W in Energy Saving mode	
Dimensions		385(W) x 308(D) x 46(H) mm	385(W) x 309(D) x 54(H) mm
Weight		3.7 kg	4.2 kg
Accessories		AC Adapter, Power Cord, RGB cable, OSD control box, User's Guide	AC Adapter, Power Cord, RGB cable, Serial cable, OSD control box, Touch Ware CD-ROM, User's Guide

2. TROUBLESHOOTING

Check the following for troubles of LCD monitor.

No.	Symptom		Check Points	Treatments	Class
1	No Picture with Back light OFF	1	Is the Power "ON" to a LCD Monitor ?	Check AC outlet, AC cord, DC Jack and Power switch for a LCD monitor	A
		2	Is the Power "ON" to a Computer ?	Check the Power for a Computer	A
		3	Is a signal cable connected securely ?	Check the connection of a signal cable	A
		4	Is a computer standing by ?	Be out of standing by condition, by operating to a computer	A
		5	Disconnected a signal cable ? or Bent a terminal pin ?	Ensure the connection of a signal cable	B
		6	Is an AC Adapter defective?	Replace an AC Adapter with the new one	C
		7	Is the wire harness between Inverter PCB and a LCD module secured firmly ?	Check the connection of wire harness	C
		8	Is the wire harness between main PCB and Inverter PCB secured firmly ?	Check the connection of wire harness	C
		9	Is the wire harness between main PCB and DC IN PCB secured firmly ?	Check the connection of wire harness	C
		10	Is the LCD module defective ?	Replace a LCD module with the new one	C
		11	Is the Inverter unit defective ?	Replace an Inverter unit with the new one	C
		12	Is the display circuit on main PCB defective ?	Replace the main PCB with the new one	C
		13	Is the Power Supply circuit on main PCB defective ?	Replace the main PCB with the new one	C
2	No Picture with Back light ON	1	Is a computer standing by ?	Be out of standing by condition, by operating to a computer	A
		2	Is a screen saver programming running ?	Press any key or touch the mouse, to end the screen saver program	A
		3	Is the computer's signal timing not agreeable to the LCD's specification ?	Adjust the computer's signal timing, if possible	B
		4	Is the Image Processing circuit on main PCB defective ?	Replace the main PCB with the new one	C
3	White/Grey on whole screen(Nothing on screen)	1	Is the wire harness between main PCB and LCD module secured firmly ?	Ensure the connection of wire harness	C
		2	Is the LCD module defective ?	Replace a LCD module with the new one	C
		3	Is the Image Processing unit circuit on main PCB defective ?	Replace the main PCB with the new one	C

A It is possible to treated by end-user
B It might be possible to treat by end-user in some case.
C It must be treated by Professional Technical Staff

No.	Symptom		Check Points	Treatments	Class
4	Screen's display range is incorrect	1	Is the adjustment for screen performed correctly ?	Adjust the screen correctly	A
		2	Is the output level on image from a computer not agreeable to LCD's specification ?	Check the specification of a computer	B
		3	Is the size of screen set correctly ?	Set the size of screen again(refer to User's Manual for computer)	A
5	Screen is distorted	1	Is the adjustment for screen performed correctly ?	Adjust the screen correctly	A
		2	Is a signal cable connected securely ?	Check the connection of a signal cable	A
		3	Is a sigil cable extended ?	Don't extend a signal cable	A
		4	Is the output level on image from a computer not agreeable to LCD's specification ?	Check the specification of a computer	B
		5	Is the Image Processing circuit on main PCB defective ?	Replace the main PCB with the new one	C
6	Part of colors (R/G/B) is not displayed. Black line appears in vertically	1	Is a signal cable connected securely ?	Check the connection of a signal cable	A
		2	Is the connection between main PCB and a LCD module securely ?	Ensure the connector of wire harness	C
		3	Is the Image Processing circuit on main PCB defective ?	Replace the main PCB with the new one	C

A It is possible to treated by end-user
B It might be possible to treat by end-user in some case.
C It must be treated by Professional Technical Staff

3. MAINTENANCE

3-1 LMU-TK-15A4

Disassembling the major components

(1) Cabinet

1. Unscrew to secure the cabinet(8-position)
2. Pull the cabinet upward to remove it

(2) LCD module

1. Unscrew to secure the LCD module(4-position)
2. Pull the LCD module up, and pull two connectors out from inverter unit
3. Disconnect two cables from the main PCB

(3) Inverter Unit

1. Unscrew to secure the Inverter Unit(4-position)
2. Disconnect the cable from the main PCB

(4) Main PCB

1. Pull a RGB signal cable out
2. Unscrew to secure the main PCB(5-position)
3. Disconnect the cables on the main PCB(6-position)
   (one cable has already been disconnected)
   / two connectors from LCD module
   / one connector from the Switch PCB
   / one connector from the VR PCB
   / one connector from the DC-IN PCB
   / one connector from the Inverter PCB
4. Unscrew to secure the bracket for RGB connector(2-position)

(5) Connector PCB

1. Unscrew to secure the connector PCB(2-position)
2. Disconnect the cable from the main PCB

(6) VR PCB

1. Unscrew to secure the VR PCB(2-position)
2. Disconnect the cable from the main PCB

(7) DC-IN PCB

1. Unscrew to secure the DC-IN PCB(2-position)
2. Disconnect two cables, one is from power switch and another one is
   From the main PCB

(8) Power Switch

1. Remove the power switch, while pressing the hock of the power switch

3-2 LMU-TK-15A4T

Disassembling the major components

(1) Cabinet

1. Unscrew to secure the cabinet(8-position)
2. Pull the cabinet upward to remove it

(2) LCD Panel

1. Unscrew to secure the LCD panel(4-position)
2. Pull the LCD panel and touch panel up, and pull two connectors out from inverter unit
3. Disconnect two cables from the main PCB
4. Unscrew to secure the earth terminal(1-position)
5. Disconnect the cable on the main PCB
6. Disconnect the cable on the touch controller PCB

(3) Inverter Unit

1. Unscrew to secure the inverter unit(4-position)
2. Disconnect the cable from the main PCB

(4) Main PCB

1. Pull a RGB signal cable out
2. Unscrew to secure the main PCB(5-position)
3. Disconnect the cables on the main PCB(7-position)
   (two cables has already been disconnected)
   / two connectors from LCD panel
   / one connector from the Switch PCB
   / one connector from the VR PCB
   / one connector from the DC-IN PCB
   / one connector from the Inverter PCB
   / one connector from the Touch Controller PCB
4. Unscrew to secure the bracket for RGB connector(2-position)

(5) Touch Controller

1. Unscrew to secure the touch controller PCB(2-position)
2. Disconnect a serial cable

(6) Serial Cable (Connector and Cable with bracket)

1. Unscrew to secure the bracket for serial cable(2-position)

(7) Connector PCB

1. Unscrew to secure the connector PCB(2-position)
2. Disconnect the cable from the main PCB

(8) VR PCB

1. Unscrew to secure the VR PCB(2-position)
2. Disconnect the cable from the main PCB

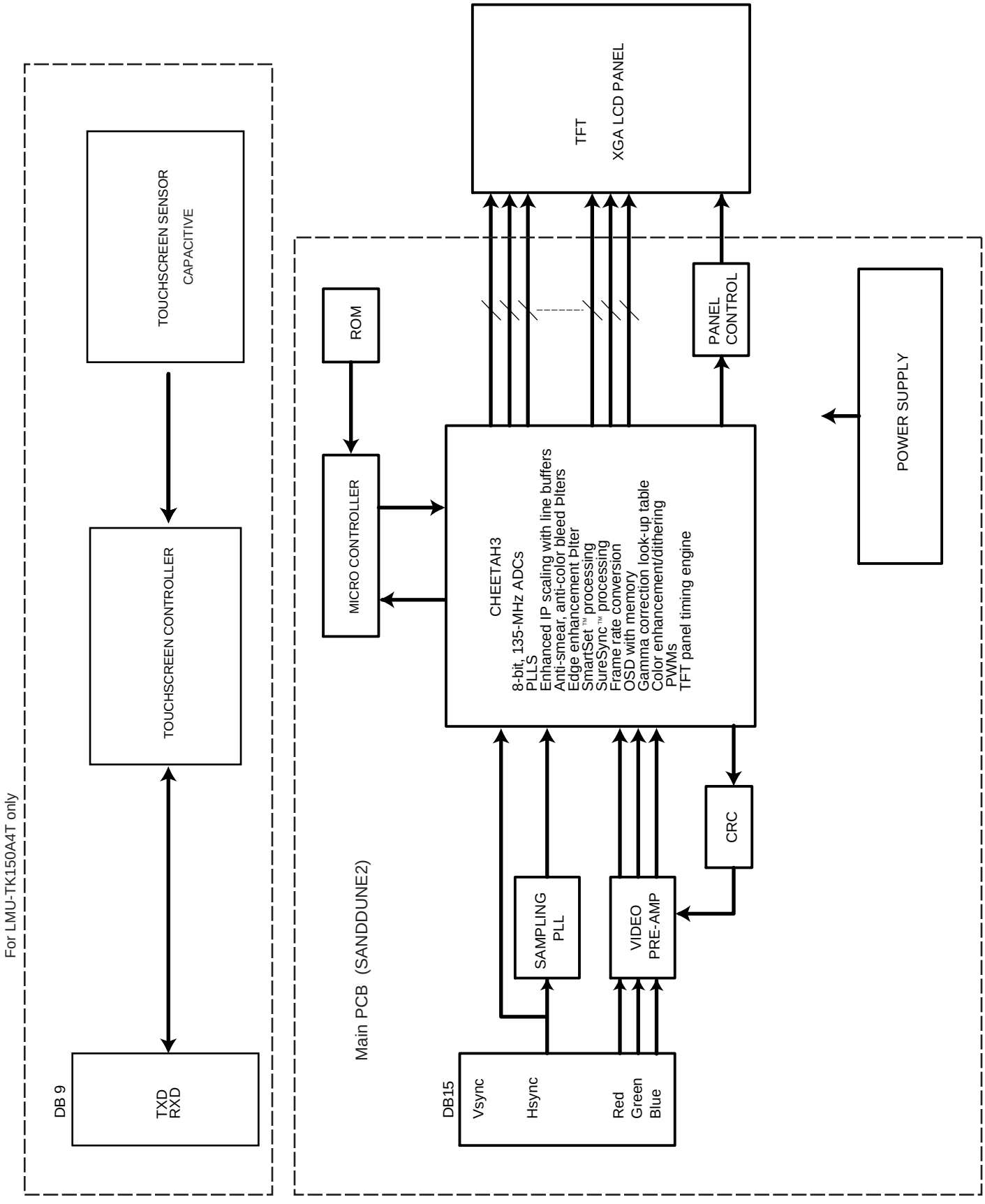
(9) DC-IN PCB

1. Unscrew to secure the DC-IN PCB(2-position)
2. Disconnect two cables, one is from power switch and another one is from the main PCB

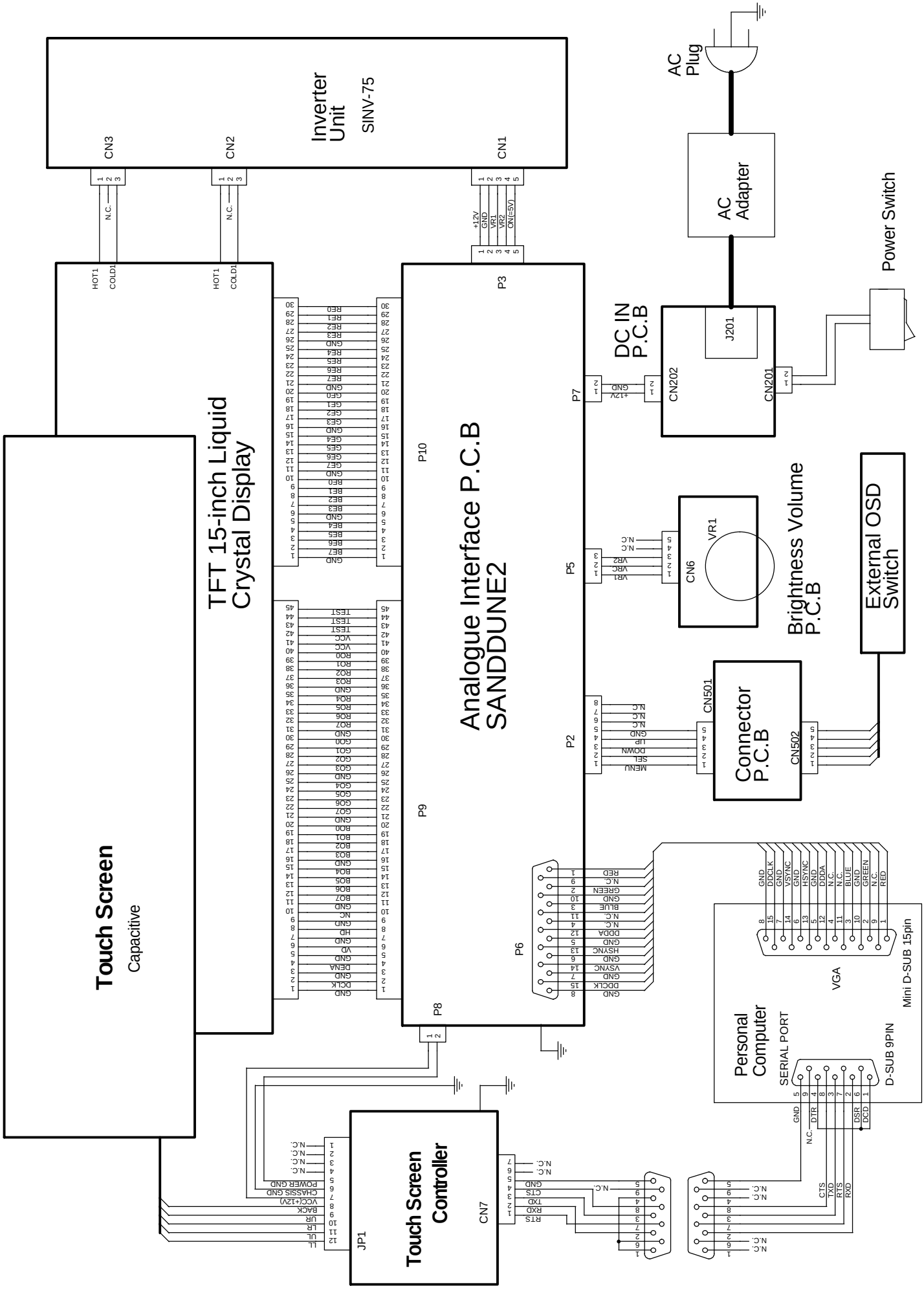
(10) Power Switch

1. Remove the power switch, while pressing the hook of the power switch

4. BLOCK DIAGRAM



5. Connection Diagram



6. TABLE OF SIGNAL NAME

Symbol	Signal Name	Location	Notes
RED	RED/Analog Video Signal	P6-1	
GREEN	GREEN/Analog Video Signal	P6-2	
BLUE	BLUE/Analog Video Signal	P6-3	
DDDA(ID1)	DDC Data	P6-12	
HSYNC	Horizontal Synchronizing Signal	P6-13	
VSYNC	Vertical Synchronizing Signal	P6-14	
DDCK(ID3)	DDC Data Clock	P6-15	
BE7	BLUE Data[MSB]-Even	P10-2	POLARITY +
BE6	BLUE Data	P10-3	POLARITY +
BE5	BLUE Data	P10-4	POLARITY +
BE4	BLUE Data	P10-5	POLARITY +
BE3	BLUE Data	P10-7	POLARITY +
BE2	BLUE Data	P10-8	POLARITY +
BE1	BLUE Data	P10-9	POLARITY +
BE0(EVEN)	BLUE Data[LSB]-Even	P10-10	POLARITY +
GE7	GREEN Data[MSB]-Even	P10-12	POLARITY +
GE6	GREEN Data	P10-13	POLARITY +
GE5	GREEN Data	P10-14	POLARITY +
GE4	GREEN Data	P10-15	POLARITY +
GE3	GREEN Data	P10-17	POLARITY +
GE2	GREEN Data	P10-18	POLARITY +
GE1	GREEN Data	P10-19	POLARITY +
GE0(EVEN)	GREEN Data[LSB]-Even	P10-20	POLARITY +
RE7	RED Data[MSB]-Even	P10-22	POLARITY +
RE6	RED Data	P10-23	POLARITY +
RE5	RED Data	P10-24	POLARITY +
RE4	RED Data	P10-25	POLARITY +
RE3	RED Data	P10-27	POLARITY +
RE2	RED Data	P10-28	POLARITY +
RE1	RED Data	P10-29	POLARITY +
RE0(EVEN)	RED Data[LSB]-Even	P10-30	POLARITY +
DCLK	Data Clock	P9-2	
DENA	Data Enable	P9-4	POLARITY -
VD	Vertical Synchronizing Signal	P9-6	POLARITY +
HD	Horizontal Synchronizing Signal	P9-8	POLARITY +
BO7	BLUE Data[MSB]-Odd	P9-12	POLARITY +
BO6	BLUE Data	P9-13	POLARITY +
BO5	BLUE Data	P9-14	POLARITY +
BO4	BLUE Data	P9-15	POLARITY +
BO3	BLUE Data	P9-17	POLARITY +
BO2	BLUE Data	P9-18	POLARITY +
BO1	BLUE Data	P9-19	POLARITY +
BO0	BLUE Data[LSB]-Odd	P9-20	POLARITY +
GO7	GREEN Data[MSB]-Odd	P9-22	POLARITY +
GO6	GREEN Data	P9-23	POLARITY +
GO5	GREEN Data	P9-24	POLARITY +
GO4	GREEN Data	P9-25	POLARITY +
GO3	GREEN Data	P9-27	POLARITY +
GO2	GREEN Data	P9-28	POLARITY +
GO1	GREEN Data	P9-29	POLARITY +

Symbol	Signal Name	Location	Notes
GO0	GREEN Data[LSB]-Odd	P9-30	POLARITY +
RO7	RED Data[MSB]-Odd	P9-32	POLARITY +
RO6	RED Data	P9-33	POLARITY +
RO5	RED Data	P9-34	POLARITY +
RO4	RED Data	P9-35	POLARITY +
RO3	RED Data	P9-37	POLARITY +
RO2	RED Data	P9-38	POLARITY +
RO1	RED Data	P9-39	POLARITY +
RO0	RED Data[LSB]-Odd	P9-40	POLARITY +
TEST	Test Signal Out(*)	P9-43	
TEST	Test Signal Out(*)	P9-44	
TEST	Test Signal Out(*)	P9-45	
+12V	for Output Voltage (+)	P3-1	
VR1,2	for Contrast Volume	P3-3,4	
ON=5V	for Back-Light Control	P3-5	H: Light ON
VR1,2	Brightness Control	P5-1,3	
VRC	Brightness Control	P5-2	
MENU	Menu Key Input	P2-1	
SEL	Select Key Input	P2-2	
DOWN	Down Key Input	P2-3	
UP	Up Key Input	P2-4	
LED R	LED/RED, Control Signal	P2-6	
LED G	LED/GREEN, Control Signal	P2-8	

* : This terminal must be opened at System-side.

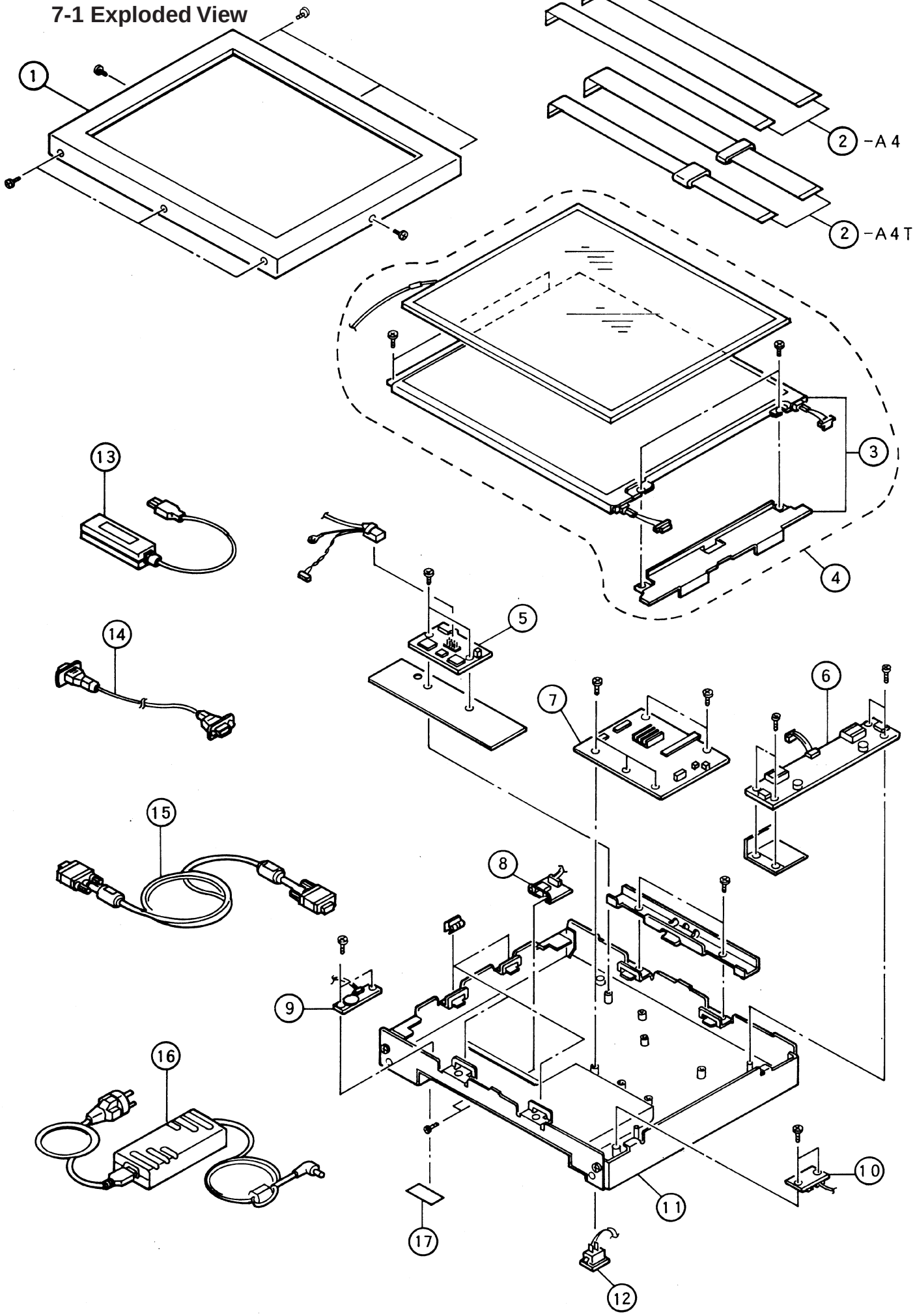
TouchScreen Controller

(for LMU-TK15A4T only)

RTS	Repuest To Send	JP1-1	
RXD	Receive Data	JP1-2	
TXD	Transmit Data	JP1-3	
CTS	Clear To Send	JP1-4	
DCD	Data Carrier Detect	NC	
DTR	Data Terminal Ready	NC	
GND	Signal ground	NC	
DSR	Data Set Ready	NC	
GND	Chassis (earth) ground	NC	
UR	Upper right (UR) corner	JP2-9	
LR	Lower right (LR) corner	JP2-10	
UL	Upper left (UL) corner	JP2-11	
LL	Lower left (LL) corner	JP2-12	

7. EXPLODED VIEW AND PARTS LIST

7-1 Exploded View



⚠ CAUTION

Parts marked as ⚠ Are very important to secure safety.
In case of replacement, it is required to use designted parts for safety.

7-2. Parts List

7-2-1 LMU-TK15A4

REF NO.	⚠	PART No.	DESCRIPTION	Q'ty	NOTES
	OUTER				
		632 890 7397	OUTER CARTON	1	
	INDIVIDUAL				
		632 861 5414	PAD, TOP	1	
		632 889 7827	ACCESSORY CASE	1	
		632 889 7834	PAD	1	
		661 000 9587	PAD, CORNER	8	
		632 862 2696	POLYETHYLENE BAG, 400X550	1	FOR MONITOR
		632 603 0998	POLYETHYLENE BAG, 130X500	1	FOR AC ADAPTER
		632 298 2376	POLYETHYLENE BAG, 120X320	1	FOR CONTROLL BOX
		632 607 4824	POLYETHYLENE BAG, L 180X270	1	FOR USER'S GUIDE
		632 567 2588	POLYETHYLENE BAG, 200X300	1	FOR RGB CABLE
	ACCESSORY				
		632 890 8363	INSTRUCTION MANUAL, ENGLISH	1	
		632 890 8370	INSTRUCTION MANUAL, GERMAN	1	
	CABINET1				
1		661 001 5564	TOP LID ASS'Y	1	
17	⚠	632 892 1010	RATING PLATE	1	
	CHASSIS				
11		661 001 5526	BOTTOM LID ASS'Y, 15A4	1	
	CHASSIS ELC.				
3		661 001 5540	LIQUID CRYSTAL DIS. ASS'Y, 15.0"	1	
6	⚠	661 001 5588	DC-AC INVERTER ASS'Y	1	
12		661 001 5595	POWER SWITCH ASS'Y	1	
16	⚠	661 001 5557	AC ADAPTER ASS'Y	1	
15		632 872 9494	VGA CABLE, 1.5M	1	
2		661 001 5601	FFC ASS'Y	1	
13		632 890 5010	REMOTE CONTROLLER ASS'Y	1	
	PC BOARD 1				
7		661 001 5632	PW BOARD ASS'Y, MAIN	1	
	PC BOARD 3				
9		661 001 5649	PW BOARD ASS'Y, VR	1	
	PC BOARD 4				
10		661 001 5663	PW BOARD ASS'Y, DC-IN	1	
	PC BOARD 6				
8		661 001 5670	PW BOARD ASS'Y, CN	1	

⚠ CAUTION

Parts marked as ⚠ Are very important to secure safety.
In case of replacement, it is required to use designted parts for safety.

7-2-2 LMU-TK15A4T

REF NO.	⚠	PART No.	DESCRIPTION	Q'ty	NOTES
	OUTER				
		632 890 7397	OUTER CARTON	1	Stamp T
	INDIVIDUAL				
		632 861 5414	PAD, TOP	1	
		632 889 7827	ACCESSORY CASE	1	
		632 889 7834	PAD	1	
		661 000 9587	PAD, CORNER	8	
		632 862 2696	POLYETHYLENE BAG, 400X550	1	FOR MONITOR
		632 603 0998	POLYETHYLENE BAG, 130X500	1	FOR AC ADAPTER
		632 298 2376	POLYETHYLENE BAG, 120X320	1	FOR CONTROLL BOX
		632 607 4824	POLYETHYLENE BAG, L 180X270	1	FOR USER'S GUIDE
		632 567 2588	POLYETHYLENE BAG, 200X300	1	FOR RGB CABLE
		632 607 4824	POLYETHYLENE BAG, L 180X270	1	FOR SERIAL CABLE
	ACCESSORY				
		632 890 8363	INSTRUCTION MANUAL, ENGLISH	1	
		632 890 8370	INSTRUCTION MANUAL, GERMAN	1	
		632 867 2325	CD-ROM DISK, TOUCHWARE	1	
	CABINET1				
1		661 001 5571	TOP LID ASS'Y	1	
17	⚠	632 892 1003	RATING PLATE	1	
	CHASSIS				
11		661 001 5519	BOTTOM LID ASS'Y, 15A4T	1	
	CHASSIS ELC.				
4		661 001 5533	LIQUID CRYSTAL DIS. ASS'Y, TOUCH	1	
6	⚠	661 001 5588	DC-AC INVERTER ASS'Y	1	
12		661 001 5595	POWER SWITCH ASS'Y	1	
16	⚠	661 001 5557	AC ADAPTER ASS'Y	1	
5		661 001 5625	SERIAL CONTROLLER ASS'Y	1	
15		632 835 1060	CABLE, VGA	1	
14		632 866 8397	SERIAL CABLE, 1.8M	1	
2		661 001 5618	FFC ASS'Y	1	
13		632 890 5010	REMOTE CONTROLLER ASS'Y	1	
	PC BOARD 1				
7		661 001 5632	PW BOARD ASS'Y, MAIN	1	
	PC BOARD 3				
9		661 001 5649	PW BOARD ASS'Y, VR	1	
	PC BOARD 4				
10		661 001 5663	PW BOARD ASS'Y, DC-IN	1	
	PC BOARD 6				
8		661 001 5670	PW BOARD ASS'Y, CN		

APPENDIX

Version of Firmware

The Version of Firmware is displayed on screen.

Turn the Power Switch to ‘OFF’. While pressing of the [SELECT] ([ENTER]) button, turn the Power Switch to ‘ON’.