624-299

Final Function Specifications of LIMA

624-299

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Author: Kenji Kimura
VM Id: JL05215 at YMTVM4
Phone: 0462-73-3061
Address: Solution Development No.2
Finance Solutions
AP Solution M&D

Owner: Fumikazu Sato
VM Id: JL17351 at YMTVM4
Phone: 0462-73-3185
Address: Finance Solutions H/W Project

2.0 Product Description

2.1 Product Positioning

Space at financial institution teller counters is at premium. Reduction in the space taken by the display monitor is a major requirement. A smart, professional, uncluttered appearance is also needed at the consultants and service desk.

On the other hand, people are going to pay more attentions to the earth environment and human health year by year.

According to these situation, LIMA LCD flat panel display is developed.

2.2 Highlight

The product highlight of LIMA is the following.

- Super thin type and compact size
  - 311 mm (W) x 112 mm (D) x 219 mm - 269 mm (H)
- User friendly and healthy design
  - No X-ray radiation
  - No flicker
- Low power Consumption
  - 1/5 - 1/15 of CRT monitor
- Plug compatible to standard VGA interface (CRT interface : 15pin D-Sub)
  - Auto adjustment function to suit attached system
- High quality flat panel (10.4 inch TFT Color LCD Panel)
  - 16 million color support
  - Higher brightness/contrast/response than STN/DST LCD panel
- Integrated universal power supply units (No external AC adapter)
- KBD/Mouse Cable attached connector
- On screen display for easy set-up
  - Brightness/Contrast/Phase adjust etc.

2.3 Function Summary

Function summary of LIMA is the following.

Item	Description
M/T Model	M/T 9052-V01
Display Type	TFT Color LCD
Display Screen	10.4 inch Diagonal (210.2 mm (H) x 158.4 mm (V)) 640 x 480 dots resolution 0.3285 x 0.33 mm dot pitch
Color	16 million (integrated FRC/Dither)
Brightness	110 cd/m²
Contrast	100 : 1 Typical
Interface	CRT compatible interface (15-Dsub) Analog R/G/B, H/V sync VGA mode supported KBD/Mouse cable attached
Backlight	CCFL
Power Management	Energy Saving DPMS / NUTEK
Power Consumption	16W : Normal, 4W: Stand-by mode
Power Supply	Integrated universal power supply AC 90 - 264 V
Dimension	311 mm (W) x 112 mm (D) x 219 - 269 mm (H)
Weight	3 Kg
Stand	Tilt/Lift, Incorporating AC Adapter
EMC	VCCI-1/FCC-A/CISPR-A
Test House Approval	UL/CSA/SEMKO/DEMKO

Figure 1. Function Summery

2.4 System Configuration

The following figure illustrates the system configurations

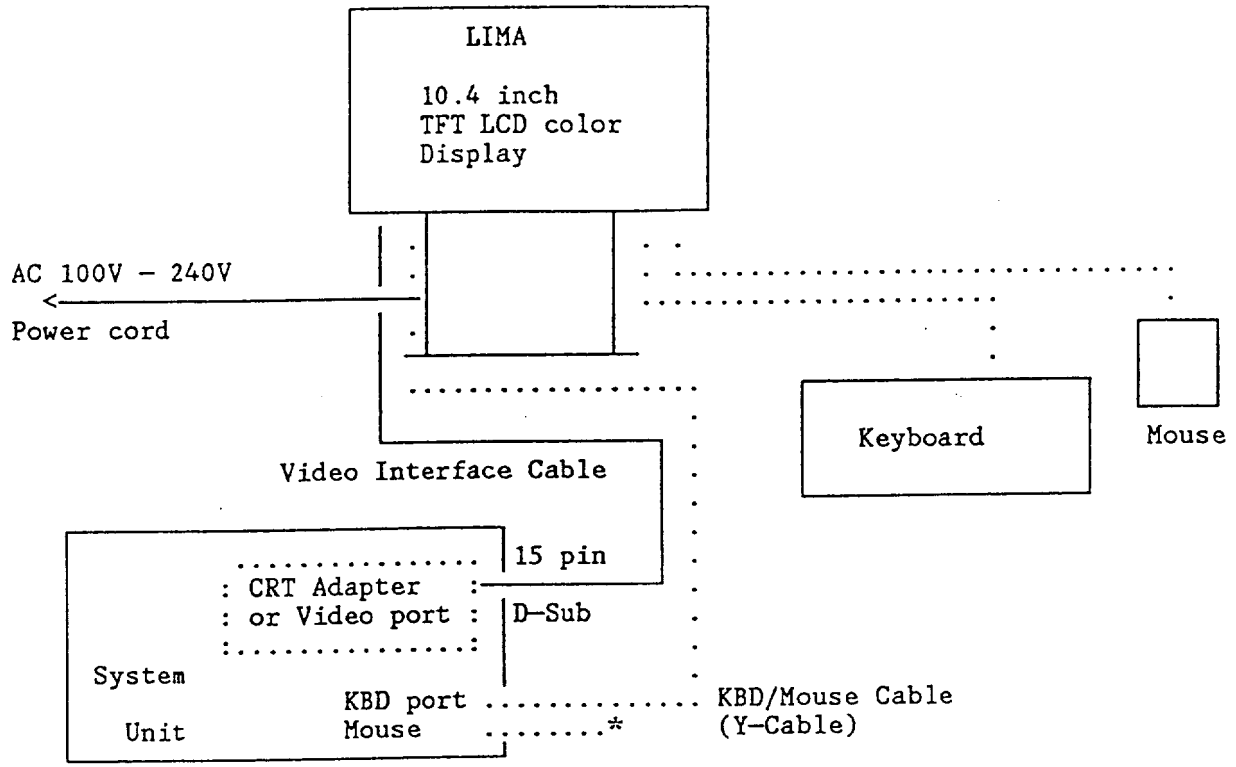


Figure 2. System Configuration of LIMA

LIMA LCD display is controlled by CRT display adapter card or Video port in System unit(PC) and has KBD/Mouse connect port.

3.0 Function Description

3.1 Display Characteristics

3.1.1 Support Display Modes

The display is intended for displaying color characters and graphics in 640 horizontal, 480 vertical dot matrix at a refresh rate of 60/70 Hz by a none-interlaced scanning.

This display can support display modes shown in the following table.

The details on the display modes are described in the ARES-V3 Engineering Specifications. Please refer it.

Type	Dots/ Lines	Video Clock	Horizontal Frequency	Vertical Frequency	Inter -lace	Sysc. H	Sysc. V
VGA	640/350	25.18 MHz	31.47 KHz	70.09 Hz	No	+	-
	640/400	25.18 MHz	31.47 KHz	70.09 Hz	No	-	+
	640/480	25.18 MHz	31.47 KHz	59.94 Hz	No	-	-
	720/350	28.32 MHz	31.47 KHz	70.09 Hz	No	+	-
	720/400	28.32 MHz	31.47 KHz	70.09 Hz	No	-	+

Figure 3. Signal Summary

LIMA has the function of horizontal reduction(720 x 400 --> 640 x 400) to display image on LCD.

3.1.2 Video Signal

Video signal accepts 0.0 to 0.7 volts (TYP) analog signal for each primary color.

The synchronous signal should be separated from analog video signals of video adapter and should be all TTL compatible level.

The spec of video signals is the following. The detail spec. of input video signal is described in ARES-V3 Engineering Specifications.

- Input impedance 75 ohm
- Voltage range 0.7 Vp-p (Typ.)
- Transition time 5 ns (10% to 90%) : RGB Video
- Transition time 100 ns (10% to 90%) : H-sync/V-sync
- PLL capability-1 25.2MHz +/- 0.2MHz for VGA 640 dots
- PLL capability-2 28.3MHz +/- 0.2MHz for VGA 720 dots

3.1.3 Color Support

F8515(ALBA-PRIME) Color LCD panel supports 256K color(6 bits per color). LIMA extends color resolution up to 16 Million color by method of FRC (Frame Rate Control) and Dithering(about 8bits per color).

3.1.4 Monitor ID Signals

During System Unit BAT, System Unit checks the Monitor ID to select the timing of the monitor control signals.

This display have the following monitor ID.

```
Monitor ID  =  1 1 1 0
```

The CRT adapter should recognized LIMA LCD and should output slow refresh rate video timing(60/70 Hz(max) whitch is the same refresh rate with 8512/13/18 display timing.

3.2 On Screen Display (OSD) and User Interface

To support various user control/adjustments and to display some information for users, OSD is supported in LIMA.

OSD is used for Brightness/Contrast indications, Auto-setup start, NUTEK time set, Manual adjustments and other information display. And the number of user control switches is minimized to 5 switches by OSD menu as below.

Normal SW function		Function when OSD menu On
Contrast Up	===>	Value Up
Contrast Down	===>	Value Down
Brightness Up	===>	Item Select Up
Brightness Down	===>	Item Select Down
OSD Menu On (Auto Set SW)	===>	OSD Menu Off

Figure 4. Switch function

Using OSD, LIMA has some adjustments as below.

- Automatic Set Up (Auto-Setup)
- Automatic Adjustment (Auto-Adjustments)
- Manual Adjustment

the detail specifications are described in the following chapter ("Control/Adjustments").

3.3 Power management

LIMA support NUTEK and DPMS requirements for power management.

- NUTEK Support

  LIMA support NUTEK requirement by observing Keyboard / Mouse clock a nd user switches. When some Stand-by time passes from last user access of Keyboard or Mouse, LIMA goes into Stand-by mode, and goes into Power-Off mode after next 10 minutes. By user access to Keyboard, Mouse or user switches, LIMA gets up from both modes. Stand-by time can be selected in OSD menu. (5,10,..,60 minutes and NUTEK-off)

- DPMS Support

  LIMA support DPMS requirement by observing H/V sync signal and has three mode (Normal/Stand-by/Power-off) power managements same as NUTEK.

The detail specifications are described in the following chapter ("Power Management").

3.4 Information messages

Some information screens are displayed for users. Information message disappears when the reason of the message goes out.

- Not supported video timing (Free-run mode, "NOT SUPPORTED VIDEO")
- System is not active or not attached (Back raster mode, "NO VIDEO")

3.4.1 Free-run mode and Back-raster mode

- Free-run mode

  LIMA runs into Free-run mode when Frequency of Hsync or Vsync is not fit to LCD panel or PLL can not be LOCKed, in order to protect the panel. Some Free-run pattern (Horizontal blue lines) and OSD message ("NOT SUPPORTED VIDEO") are displayed in the panel.

- Back-raster mode

  When any VSync does not exist in System interface and DPMS is disabled, LIMA runs into Back-raster mode displaying Blue-Back pattern and OSD message ("NO VIDEO").

  And when video connector is not system (Self-test pin ia opened.) LIMA runs into Back-raster mode, too.

3.5 CE Replaceable Lamp Unit

LIMA has a CE(Customer Engineer) replaceable Lamp unit.

THe Lamp unit in LIMA is designed to be replaced by IBM personal when the display goes dim. (e.g. < 40 cd/m^2)

4.0 Hardware Descriptions

This display is consisted of the following parts;

- TFT Color LCD Module
- Logic Card(ARES-V3 card, Control card, I/O card)
- AC Adapter
- Power Cable
- Video Interface Cable

Block diagram of LIMA display is the following.

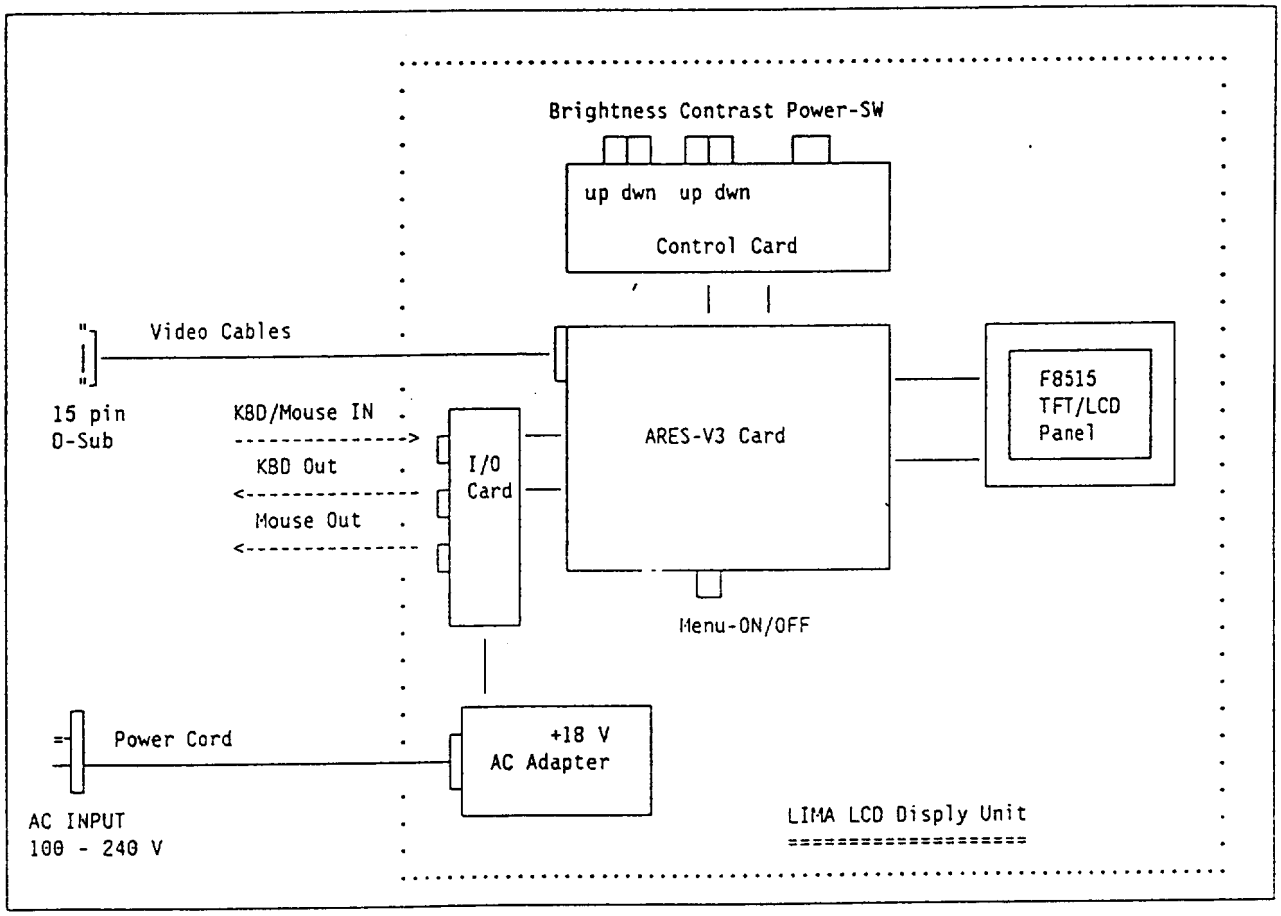


Figure 5. LIMA Block Diagram

4.1 TFT Color LCD module

The LIMA LCD display use the F8515 LCD module(P/N 85G0500).

The LCD module consist of the following components;

- TFT/LCD cell
- Lamp units (Backlight + Inverter)
- Associated electronics (drivers, control circuit, DC-DC converter, cables)

4.1.1 LCD Characteristics

The main characteristics of LCD module is the following;

The detail of them are described in Functional Specification of 10.4 inches TFT/LCD module(P/N 85G0501).

LCD Type	TFT Color LCD
Screen Diagonal (inch)	10.4
Active Area (mm)	210.24(H)x 158.40(V)
Pixels	640(3) x 480
Pixel Resolution (mm)	0.3285(per one triad) x 0.33
Pixel Arrangement	R.G.B. V-stripe
Display Mode	Normally White
White Luminancer (cd/m²)	110 (AC adapter mode)
Contrast Ratio	100:1 TYP, 60:1 MIN
Trise/Tfall (ms)	30 TYP, 50 MIN
Input Voltage	VDD: +5V, VBL:+20V
Power Consumption (W)	5.6 (AC adapter mode)
Weight (gr)	578 +/- 30g
Electrical Interface	Digital video (6 bits for erch R/G/B) (Sync. signal x4, Controls x2)
Temperature Range (C)	+ 5 to + 50 (Operating) - 20 to + 60 (Storage)
Failure Rate	1.0 % per 1000 hrs (initial 1K hrs) 0.7 % per 1000 hrs (after 1K hrs up to 10K hrs)
Backlight Life (hr)	8000

Figure 6. LCD Characteristics

4.2 Logic Cards

This display have three logic cards as below.

- Interface Card (ARES-V3 Card)
- Control Card
- I/O Card

4.2.1 Interface Card (ARES-V3)

This card(ARES-V3 card) is a key function of LIMA display.

This ARES-V3 card have a function for a conversion from analog video signal to th digital video signal and the timing signals required by the TFT color LCD panel.

The ARES-V3 card has the following key functions.

- A/D Converters (3 channels for RGB)
- PLL
- Timing Generator and Adjustments for TFT Color LCD Panel
- DC/DC Convertor (supply of +5V for logic and +18V for backlight)
- One chip micro-computer for Auto-Adjustments, Power management and User interface.

The details are described in the ARES-V3 card Functional Specifications (P/N39H7270). ARES-V3 card Block Diagram is the following.

5.0 Controls/Adjustments

5.1 Operator Control and Indicator

Operator control SW and indicator is provided on front cover as following figure.

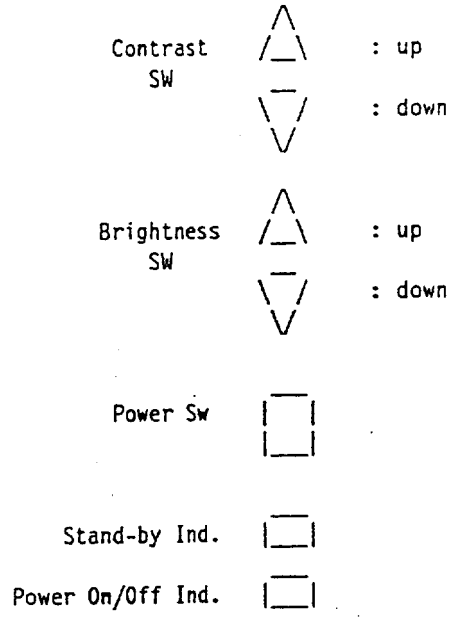


Figure 10. Operator control and Indicator

5.1.1 Contrast/Brightness(Direct Control)

Contrast/Brightness Up-Down switch is provided on the front cover.

Each level is displayed on screen from first touch and disappeared after 5 sec since last touch automaticaliy.

Using Up-Down switch, each level can be adjustable up to 32 level ("0" to "31").

5.1.2 Power On/Off Switch

A power On/Off switch is provided on the front cover. This power on/off switch is a DC(seconday circuit) on/off switch.

AC adapter unit(AC/DC circuit) is alive all day during AC cord connected.

5.1.3 Set-up Switch

Set-up switch is provided on rear cover. This set-up switch is OSD Menu On/Off switch. Using this switch, several control/adjustment is available in OSD Menu.

5.1.4 Power On/Off Indicator / Stand-by Indicator

The both indicator is provided on the front cover and these color are green. (Lower LED : Power on/off / Upper LED : Stand-by)

The power on/off indicator is lit when DC voltage is applied to the (secondary circuit).

The meaning of the stand-by indicator is the following by the combination of the power on/off indicator.

Power	Stand-by	Status
OFF	OFF	All secondary circuit off
OFF	ON	ARES-V3 Card BAT fail
ON	OFF	Normal operation
ON	ON	Panel off / Panel off and ARES-V3 off
ON	Blink	From Panel off to Normal

Figure 11. Power/Stand-by Indicator Status

5.2 Adjustments(OSD Menu)

Some adjustments is provided in LIMA using OSD(On Screen Display) function.

OSD menu is used for all adjustment/setting of LIMA. OSD menu appears on screen by MENU-ON switch. During OSD menu is displayed, Brightness/Contrast switches are changed to Item select and Value change, and Menu-on switch is changed to Menu-off switch.

OSD menu has two menus : Main-menu and Sub-menu. Main-menu is for user's normal access menu and Sub-menu is for adjustments if Auto-Setup is not best.

5.2.1 Main-menu

Auto-Setup

To start Auto-Setup or show the status of Auto-Setup by following messages.

Menu	Status
OFF	Normal status
READY	Waiting for Auto-Setup pattern
START	Auto-Setup is running
COMP	Normal end of Auto-Setup
ABORT	Abnormal end of Auto-Setup. Need to re-start Auto-Setup

Figure 12. Auto-Setup Status

Note: This Setup function is valid for both DOS and OS/2 (Windows) patterns. (TBD)

Power Save Mode

DPMS On/Off

NUTEK Stand by time select (NUTEK-off, 5, 10, 15, .., 55, 60 minutes)

Contrast
Brightness
These are completely as same as direct controls.

Note: Above settings do not require "SAVE".

5.2.2 Sub-menu

Phase
Video phase adjustment to set best sampling point of video.

Divider
Divider value to be set to PLL counter as the Horizontal total dots. By this change, Dot clock frequency is changed. The divider value of only 640x480 mode can be saved.

Vref Red
Vref Green
Vref Blue
Top Reference Voltages for each color (Red/Green/Blue)

H-POS
Horizontal position adjustment

V-POS
Vertical position adjustment

SAVE
To store all adjusted values to EEPROM and LIMA uses them hereafter. If exits from OSD menu without "SAVE", all adjusted values in Sub-menu return to the previous values before entering OSD menu.

RESET
Reset all values adjusted by user except for items in Main-menu and return to MFG setting values (before Auto-Setup is performed) or Auto-Setup values (after they are performed). "RESET" resets Stored values in EEPROM and Values adjusted during OSD menu-on.

Note: Manual adjustments take precedence over Auto-adjustments. This means that some item adjusted by user is fixed and does not work as the Auto-adjustment as long as re-Auto-Setup or "RESET" is performed.

5.3 Auto-Setup/Adjustment

5.3.1 Auto-Setup

LIMA needs to be customized to fit with user system to get good FOS quality.
Auto-Setup(Installation) is performed for this.

User can start Auot-Setup from OSD Menu when system is displaying "Auto-Setup Pattern". ("Auto-Setup Pattern" is provided by Auto-Setup Program.) LIMA checks the pattern and if it is an expected pattern. LIMA starts Auto-Setup cycle. If not, LIMA waits until the expected pattern is displayed. user exits from OSD Menu or user makes Auto-Setup disable.

This Auto-Setup is performed in DOS application and the setup pattern should be displayed by 4 representative VGA modes (Mode-12, 13, 3+, 0+).

And if need. Auto-Setup is performed in OS/2(Windows), too.

Customized items and performed items are below.

- Vref Tops and Vref bottoms (6 channels) (common to all modes)
- Detection of best sampling point (target) for video signal
- Detection of initial SHIFT (initial best point) for video signal
- Detection of initial Horizontal position
- Detection of Hsync period
- Clear all manual setting related DOS modes.
- Store all values from Auto-Setup

MFG setting in EEPROM are replaced with the customized values which become the base parameters hereafter.

During Auto-Setup, all switches are disabled and some information under proceeding Auto-Setup is displayed (READY/START/COMP/ABORT).

5.3.2 Auto-Adjustment

To minimize user adjustments, LIMA has automatic adjustments(Auto-Adjustments). This Auto-Adjustments works to go FOS quality on LCD panel anytime based on Auto-Setup parameters until usersets some items by manual in OSD Menu.

LIMA supports the following Auto-Adjustments

Video Frequency and Mode adjustment
LIMA can distinguish 5 VGA modes and OS/2 mode and set proper Dot Clock, Divider value to fit System Horizontal total dots and other timing, etc. automatically without any user intervention.

Phase adjustment
LIMA adjusts video phase to the best sampling point (acquired from Auto-Setup) automatically in order to reduce temperature characteristics or to correspond to various modes. Initial value is acquired from Auto-Setup.

Horizontal centering adjustment
Normally initial horizontal position (from Auto-Setup) is used. If some dots are hidden from horizontal display area, Horizontal position is changed in order to display them.

Phase and Horizontal position adjustments are taken precedence by Manual adjustment. (Manual adjustments disable these functions.)

6.0 Power Management

Display Power Management Signaling (DPMS) and NUTEK (National Board for Industrial and Technical Development) requirements are new requirements for energy saving program in order to reduce power consumption as much as possible. ARES-V3 supports both of the requirements. DPMS and NUTEK are the alternative functions and one of them is enabled at once. (Selected by OSD menu.)

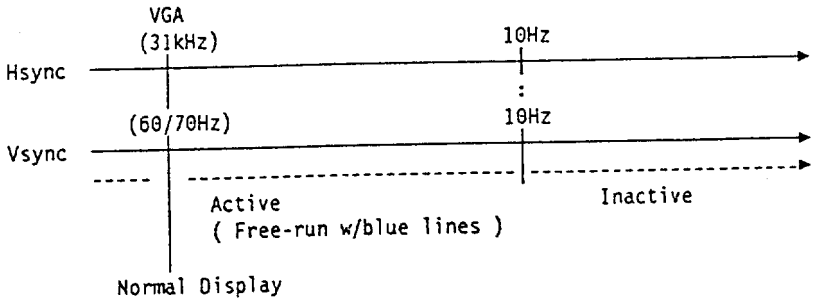
6.1.1 LIMA Definition for DPMS

The criteria to enter/exit H/Vsync inactive condition on LIMA is defined as shown in the following figure. LIMA observe the conditions of H/Vsync signals any time during Micro-processor(H8) of LIMA powered-on.**H8 does not observe the duty of sync signals but the period of them.** DPMS function can be disabled by OSD menu.

	Criteria to enter inactive condition	Criteria to exit from inactive condition
Hsync	Less than 10Hz	Greater than 10kHz
Vsync	Less than 10Hz	Greater than 20Hz

Note: Frequency Transition

- To enter inactive condition



- To exit from inactive condition

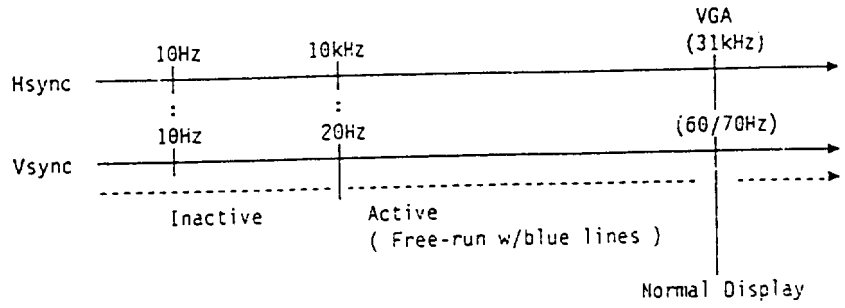


Figure 13. H/V sync inactive criteria on LIMA

The next figure shows the relation between DPMS states and and LIMA conditions. LIMA has only three power save modes and they are mapped as the table.

DPMS State	LIMA internal status		LIMA Condition
	LCD Power	ARES Power	
On	On	On	Normal
STAND-BY	Off	On	Panel Power off
Suspend PWR-Off	Off	Off (except H8)	Panel Power off & ARES off

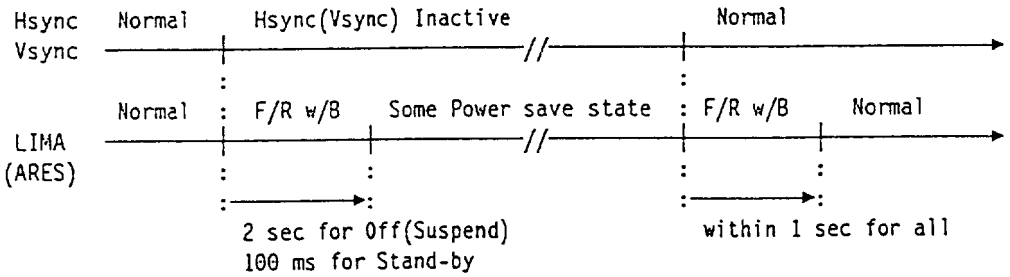
Note: These states and the power control signals are the same with NUTEK definitions.

Figure 14. LIMEA Definition for DPMS

Note: 1. Time Transition

During the period to enter Power-save states (Stand-by = 100ms, Suspend/PWR-Off = 2 sec), LIMA goes into free-run mode with screen black.

When exit from some Power-save states, LIMA will be in the free-run mode with screen black, at first. And then if the display timing is supported by LIMA, LIMA exits from the free-run mode and displays the image from the System. If not, LIMA goes into Free-run mode with the free-run pattern (horizontal blue lines) and OSD message ("NOT SUPPORTED VIDEO"). The period to check Hsync and Vsync is within 1 sec (TBD).



** F/R w/B = Free-run with Black screen

Note: 2. LIMA supports Back-raster mode, too. To support this, SELF_TEST signal in VGA video connector is used. The combinations with Hsync/Vsync are below.

SELF_TEST	Hsync/Vsync	LIMA condition
OPEN	Don't care	Back-raster mode (System is not attached)
Pull-down	Inactive	DPMS is active.
Pull-down	Active	Normal Display or Free-run w/ Blue lines

Note: When DPMS is activated and Off-System is attached, user can not access OSD menu to make DPMS inactive, because LIMA is in ON state only during 2 sec.
To avoid this, OSD menu is displayed by powering on with pushing OSD switch.
(EEPROM initialized function will be re-assigned to other.)

6.2 LIMA definition for NUTEK

NUTEK implementation on LIMA is defined as described below.

Customer can select NUTEK function enable/disable on OSD menu.

LIMA supports "Alternative A" of NUTEK definition. The criteria to enter NUTEK power saving mode on LIMA is defined as below. Customer can select the time period (T ns) on OSD Menu sceen.

State	A R E S D e f i n i t i o n
Automatic STAND-BY	By menu screen, customer can select the time period from last use of the keyboard, mouse or LIMA switches. Time period (Tns) : 5 minutes to 60 minutes by 5 minutes Readable screen not more than 2 seconds from the moment when the keyboard, mouse or LIMA switch is touched again.
Automatic POWER-OFF	ARES is powered-off except H8 when the keyboard, mouse or ARES switches are not touched for the time period since entering "Automatic STAND-BY" mode. The time period is fixed. Time period : 10 minutes Readable screen again when the keyboard, mouse or LIMA switches is touched again. Not more than 5 seconds.

Note: When NUTEK is disabled, LIMA never enter to power save modes of the above.

Note: During LIMA is waking up from Power save mode, all touched data of Keyboard, mouse or LIMA switches are valid.

Figure 15. NUTEK Criteria of LIMA

6.2.1 LIMA Definition for NUTEK

The following table shows the relation between NUTEK states and LIMA condition for NUTEK function.

NUTEK State	LIMA internal status		LIMA Condition
	LCD Power	ARES Power	
On	On	On	Normal
STAND-BY	Off	On	Panel Power off
PWR-OFF	Off	Off (except H8)	Panel Power off & ARES off

Note: "ARES off" means that all components on ARES card are powered off except for H8(Micro-Processor), some components related H8 and DC-DC related H8.

Figure 16. LIMA Definition for NUTEK

6.3 System Power Input Requirement

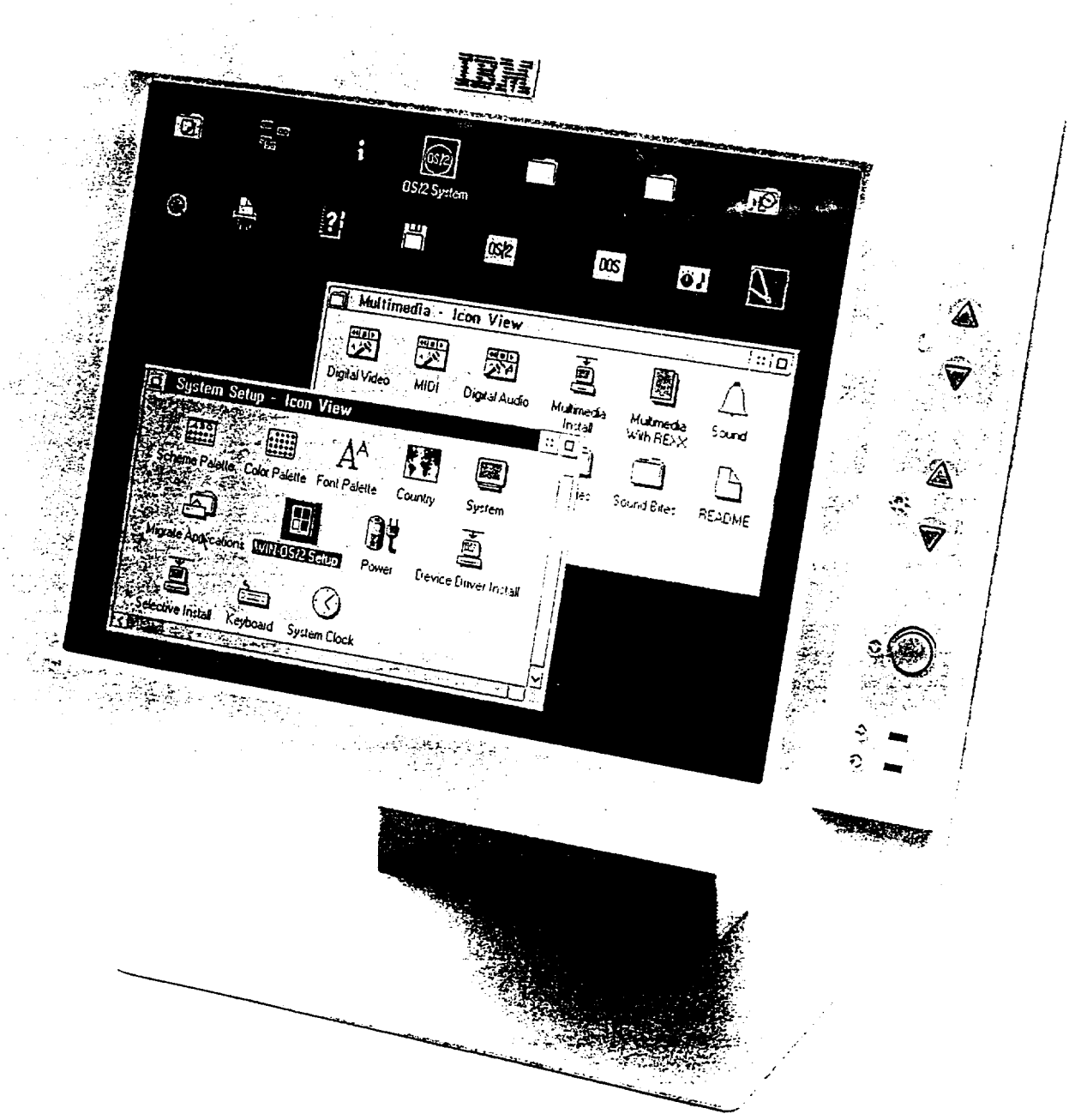
LIMA Power Dissipation is the following.

- Normal use : 16 W
- Stand by mode : 8 W
- Power off mode : 4 W

Premium TFT Color LCD with High Quality, Compact Size and Low Power Consumption

IBM

9052-V01 Color LCD Display



- 10.4 inch TFT color LCD
- Compact size with small footprint
- Low power consumption