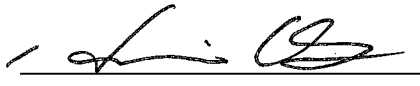
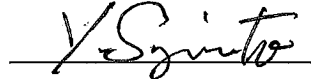


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**SPECIFICATION CONTROL DRAWING
65" LCD VIDEO MONITOR
PART NUMBER: ALD-6502A**

Prepared by  Date 4/4/12
Approved by  Date 4/4/12

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REVISION HISTORICAL RECORDS

Revision Symbol	Description (Rev SH. No., Contents)	Rev. Date	Prepared Section	
			Approval	Prepared

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1.0 INTRODUCTION

1.1 GENERAL

This drawing is the specification that shall establish the minimum design and performance requirements for Aircraft Cabin Systems, LLC (ACS) P/N: ALD-6502A.

1.2 SCD REVISION

This SCD is intended to reflect the true state of the LCD Monitor design requirements. Design changes whether requested by the customer or instituted by ACS, shall be documented by a revision to this SCD.

1.3 DEVIATIONS

ACS changes to the requirements may be acceptable to the customer, but the revision of the SCD may be considered inappropriate. In such case, a deviation shall be documented in a separate section of this SCD, and shall be either unlimited or be limited to a specific duration or number of units.

1.4 WAIVERS

If the equipment fails to meet some elements of the requirements, but is considered suitable for acceptance by the customer, a waiver shall be granted. The waivers shall be documented by a letter from the customer and shall be limited to a specific definition of how and when the waiver shall be removed.

1.5 PRODUCT RESPONSIBILITY

The equipment shall meet the requirements of this drawing and the specified portions of the referenced documents listed below in Section 2.0.

Testing shall be conducted to demonstrate that the equipment performs within the specified limits, meets the design requirements of this drawing, is free from manufacturing defects, and operates in the specified environments.

The customer shall approve all the design criteria and design changes which affect form, fit, function and interchangeability. ACS shall have overall design responsibility including all documentation and test reports required for FAA, CAA and MOT certification of the equipment.

ACS shall be responsible for requesting from the customer any additional information which is required in order to design the equipment to meet the requirements of this SCD.

2.0 APPLICABLE DOCUMENTS

The following documents, including all revisions and amendments, form a part of this document to the extent specified herein. In the event that portions of this document conflict with the reference documents, the requirements of this document shall take precedence.

Document Name	Document No.	Revision	Date	Comments
Environmental Conditions and Test Procedures for Airborne Equipment	DO-160	F	12/06/07	RTCA Document
ACS Quality Control Manual	QCM-01	D	1/19/07	ACS Document
Video Projection System	ARINC 722	New	11/5/80	ARINC Document

Table 1 – Supporting Documentation

3.0 TECHNICAL SPECIFICATIONS

3.1 FUNCTIONAL BLOCK DIAGRAM

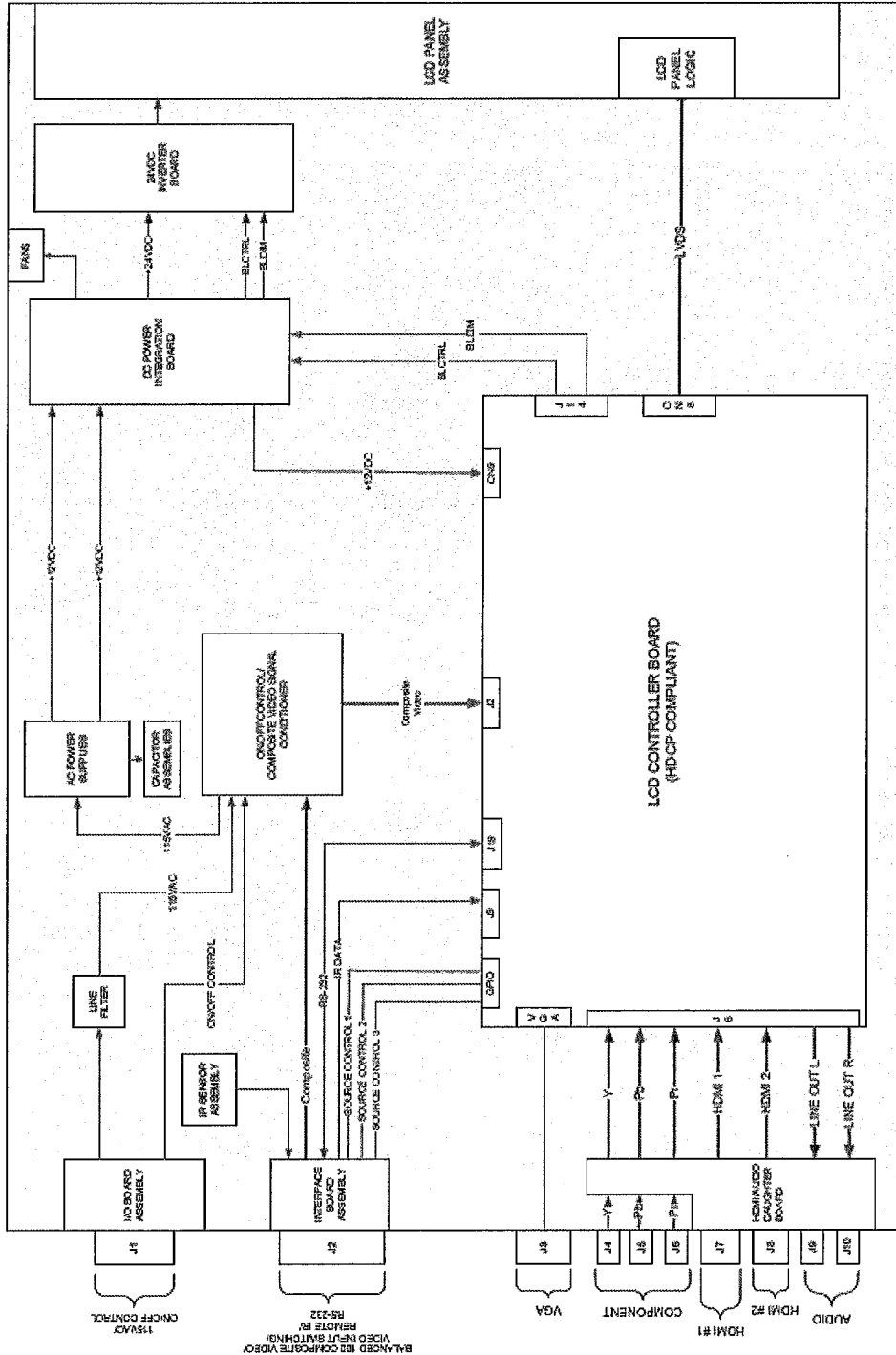


Figure 1 – ALD-6502A Functional Block Diagram

3.2 DESCRIPTION

- Designed for the aircraft environment
- Video Inputs:
 - XGA – 1 input
 - Composite Video – 1 input (Balanced 100Ω)
 - Component Video – 1 input
 - HDMI – 2 input (HDCP Compliant)
- Support of NTSC/PAL/SECAM video formats
- RS-232 Interface
- External IR Interface – 1 input
- ARINC 722 Control Interface

3.3 POWER/ WEIGHT SPECIFICATION

The equipment shall be designed to meet the specifications outlined in Table 2.

PARAMETER	RATING		Unit
	MIN	MAX	
DC Supply Voltage	20	32	VDC
AC Supply Voltage	100	122	VAC
AC Supply Frequency	60	440	Hz
DC Power Consumption	--	100	mW
AC Power Consumption	--	552	W
AC In-Rush Current	--	24	A
Temperature – Operational	-15	50	°C
Temperature – Non-operational	-55	85	°C
Weight	--	101	lbs
Power Interrupt	100	--	ms
Power Factor	98	--	%
Power Input Current Distortion	--	5	%

Table 2 – Power/ Weight Specification

3.4 VIDEO PERFORMANCE SPECIFICATIONS

The equipment shall be designed to meet the video performance specifications outlined in Table 3.

PARAMETER	RATING
Screen Size	65" (1639 mm) Diagonal
Native Resolution	1920 x 1080
Viewing Area	56.24" (1428.5 mm) x 31.64" (803.52 mm)
Aspect Ratio	16:9
Viewing Angle	178° Horizontal 178° Vertical
Contrast Ratio	2500:1
Brightness	500 cd/m ²
Glass Surface	ACS CrystalTint™ - Non-reflective Film
XGA Input	PC VGA or XGA Standard
Composite Input	100 ohms Balanced
Component Input	Y – 1V p-p into 75 ohms Pb – 0.7V p-p into 75 ohms Pr – 0.7V p-p into 75 ohms
Composite Input Format	NTSC, PAL, SECAM (Auto Switching)
Component Input Format	480i, 480p, 720p, 1080i
HDMI	480i, 480p, 720p, 1080i, 1080p (HDCP compliant)

Table 3 – Video Performance Specifications

3.5 MECHANICAL SPECIFICATIONS

The equipment shall be designed to meet the mechanical specifications outlined in Tables 4 through 10.

3.5.1 GENERAL

PARAMETER	RATING
Finish	Front and Sides – Anodized Aluminum with Black Matte Paint Rear – Anodized Aluminum
Dimensions	60.54" (W) x 36.11" (H) x 3.3" (D)
Air Volume	0.15" Clearance – Top, Bottom and Back

Table 4 – General Mechanical Specifications

3.5.2 CONNECTOR INTERFACES

Pin	Signal Name	Description
1	115VAC 400Hz	AC POWER
2	28VDC	28VDC POWER
3	28VDC RETURN	28VDC RETURN
4	115VAC 400Hz RETURN	AC POWER RETURN
5	CHASSIS_GND	CHASSIS GROUND
6	PWR_CNTRL_ON	POWER CONTROL ON
7	PWR_CNTRL_OFF	POWER CONTROL OFF
8	PWR_ON_INDICATOR	POWER ON INDICATOR
9	NC	NO CONNECTION

Table 5 – J1 Connector Pin Configuration

Pin	Signal Name	Description
1	COMPOSITE_IN_HI	BALANCED 100Ω
2	COMPOSITE_IN_LO	BALANCED 100Ω
3	GND	SHIELD OF INPUT CABLE
4	SOURCE CONTROL 1	SOURCE CONTROL 1 SWITCH (ACTIVE LOW)
5	SOURCE CONTROL 1 RETURN (GND)	GROUND
6	SOURCE CONTROL 2	SOURCE CONTROL 2 SWITCH (ACTIVE LOW)
7	SOURCE CONTROL 2 RETURN (GND)	GROUND
8	RS-232 TX	RS-232 TRANSMIT – VIDEO CONTROLLER
9	RS-232 RX	RS-232 RECEIVE – VIDEO CONTROLLER
10	RS-232 RETURN	RS-232 RETURN
11	EXT. IR SIGNAL 1	EXTERNAL IR SIGNAL #1
12	EXT. IR POWER	EXTERNAL IR POWER
13	EXT. IR POWER RETURN	EXTERNAL IR POWER RETURN
14	SOURCE CONTROL 3	SOURCE CONTROL 3 SWITCH (ACTIVE LOW)
15	SOURCE CONTROL 3 RETURN (GND)	GROUND

Table 6 – J2 Connector Pin Configuration

Pin	Signal Name	Description
1	XGA_RED_IN	RED
2	XGA_GREEN_IN	GREEN
3	XGA_BLUE_IN	BLUE
4	NC	NOT CONNECTED
5	XGA_IN_GROUND	GROUND
6	XGA_RED_IN_GROUND	RED RETURN
7	XGA_GREEN_IN_GROUND	GREEN RETURN
8	XGA_BLUE_IN_GROUND	BLUE RETURN
9	NC	NOT CONNECTED
10	XGA_IN_GROUND	GROUND
11	NC	NOT CONNECTED
12	DDC2_SERIAL_DATA_IN	DDC2 SERIAL DATA
13	XGA_H_SYN_IN	HORIZONTAL SYNC
14	XGA_V_SYN_IN	VERTICAL SYNC
15	DDC2_SERIAL_CLOCK_IN	DDC2 SERIAL CLOCK

Table 7 – J3 Connector Pin Configuration

Pin	Signal Name	Description
J4-C	Y_COMPONENT_SIGNAL	Y COMPONENT VIDEO SIGNAL
J4-S	Y_COMPONENT_SIGNAL_RETURN	Y COMPONENT VIDEO SIGNAL RETURN
J5-C	Pb_COMPONENT_SIGNAL	Pb COMPONENT VIDEO SIGNAL
J5-S	Pb_COMPONENT_SIGNAL_RETURN	Pb COMPONENT VIDEO SIGNAL RETURN
J6-C	Pr_COMPONENT_SIGNAL	Pr COMPONENT VIDEO SIGNAL
J6-S	Pr_COMPONENT_SIGNAL_RETURN	Pr COMPONENT VIDEO SIGNAL RETURN

Table 8 – J4, J5 and J6 Connector Pin Configuration

Pin	Signal Name	Description
1	TMDS DATA 2 (+)	TMDS CHANNEL 2 HIGH
2	TMDS DATA 2 SHIELD	TMDS CHANNEL 2 SHIELD
3	TMDS DATA 2 (-)	TMDS CHANNEL 2 LOW
4	TMDS DATA 1 (+)	TMDS CHANNEL 1 HIGH
5	TMDS DATA 1 SHIELD	TMDS CHANNEL 1 SHIELD
6	TMDS DATA 1 (-)	TMDS CHANNEL 1 LOW
7	TMDS DATA 0 (+)	TMDS CHANNEL 0 HIGH
8	TMDS DATA 0 SHIELD	TMDS CHANNEL 0 SHIELD
9	TMDS DATA 0 (-)	TMDS CHANNEL 0 LOW
10	TMDS CLOCK (+)	TMDS CLOCK HIGH
11	TMDS CLOCK SHIELD	TMDS CLOCK SHIELD
12	TMDS CLOCK (-)	TMDS CLOCK LOW
13	CEC	NOT APPLICABLE
14	RESERVED	RESERVED
15	DDC CLOCK	DISPLAY DATA CHANNEL SERIAL CLOCK
16	DDC DATA	DISPLAY DATA CHANNEL SERIAL DATA
17	DDC/CEC GROUND	DISPLAY DATA CHANNEL GROUND
18	+5V DC	+5VDC
19	HOT PLUG DETECT	HOT PLUG DETECT

Table 9 – J7, J8 Connector Pin Configuration

Pin	Signal Name	Description
J9-C	LINE OUT LEFT	AUDIO OUT LEFT
J9-S	LINE OUT LEFT RETURN	GROUND
J10-C	LINE OUT RIGHT	AUDIO OUT RIGHT
J10-S	LINE OUT RIGHT RETURN	GROUND

Table 10 – J9 and J10 Connector Pin Configuration

3.5.3 MATING CONNECTORS

Connector	Mating Connector Type	Mating Connector Part Number
J1	9-pin D-Sub Female	M24308/2-1F
J2	15-pin D-Sub Male	M24308/4-2 or equivalent
J3	15-pin High Density D-Sub Male	M24308/4-11F
J7	HDMI type A Male	HDMI type A Male

Table 111 – J1, J2, J3, and J7 Mating Connector Part Numbers

3.5.4 MECHANICAL OUTLINE

The equipment shall be designed to meet the mechanical outline specifications shown in Appendix A.

3.6 QUALIFICATION SPECIFICATIONS

The equipment shall be designed to meet the qualification specifications outlined in Table 12 through 14.

Qualification Test	DO-160E	Equipment Category	Limitations
Temperature and Temperature Variation (Combined)	Section 4	A1	
	Section 5	C	2°C per minute
Ground Survival Low Temperature	Section 4.5.1	A1	-55°C
Low Operating Temperature	Section 4.5.2	A1	-15°C
Ground Survival High Temperature	Section 4.5.3	A1	+85°C
High Operating Temperature	Section 4.5.4	A1	+50°C
Altitude	Section 4.6.1	A1	15,000 ft
Decompression	Section 4.6.2	A1	46,000 ft
Operational Shock and Crash Safety	Section 7.0	B	
Vibration	Section 8.0	S(B)	
Power Input	Section 16	Cat A (CF)	
Single Phase AC Power	Section 16.5	Cat A (CF)	
Current Harmonics	Section 16.7	Cat A (CF)	
RF Emissions	Section 21	Cat M	

Table 122 – Qualification Specifications

Issue Paper Tests	Description
Ball Impact	UL1418
300 lb Static Abuse Load	See Test Procedures

Table 133 – FAA Issue Paper Tests

Issue Paper Tests	Description
Bunsen Burner	Per Flammability Plan
Heat Release	Per Flammability Plan
Smoke Test	Per Flammability Plan

Table 144 – Flammability Test Requirements

3.7 WORKMANSHIP

Workmanship shall be in accordance with ACS document QCM-01.

4.0 OPERATING INSTRUCTIONS

4.1 EXTERNAL IR INTERFACE

4.1.1 IR Format

One external IR remote control interface operates via the NEC format.

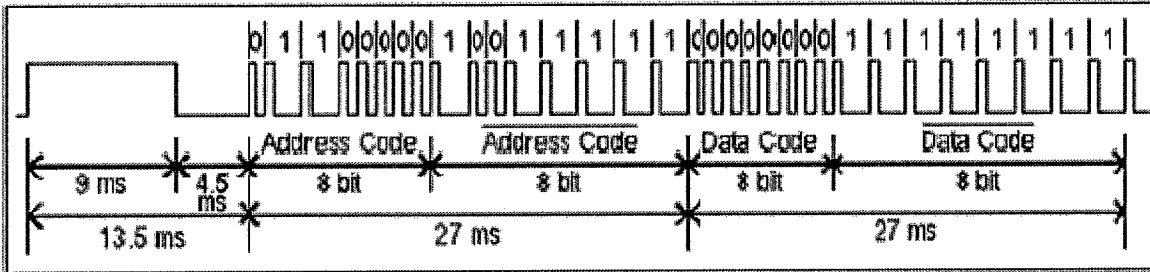


Figure 2 – NEC IR Format

4.1.2 IR HEX Codes

The IR HEX codes for each remote control function are identified in Figure 3 below.

Function	Description	HEX
Power	Button not used	11
Auto	Auto Adjust	12
Swap	Not Available	5A
Menu	Display OSD Menu	58
Plus	Button not used	1A
Minus	Button not used	19
PIP	Not Available	14
Flip	Not Available	56
Exit	Return to previous Menu	54
Reset	Factory Reset Settings	57
Scaling	Change scaling to 1:1, Fill or Aspect	55
Auto-color	Auto-Color Balance	17
Up	Menu navigation control	4D
Down	Menu navigation control	48
Left	Menu navigation control	0C
Right	Menu navigation control	0E
Enter	Execute	4C

Figure 3 – IR HEX Codes

4.2 EXTERNAL RS232 INTERFACE

The HEX codes for the RS232 interface functions are identified in Figure 4 below.

Item	Action	RS-232 Command Code	Comments
01	DOWN	0x04, 0x12, 0x02, 0xE8	
02	UP	0x04, 0x12, 0x03, 0xE7	
03	LEFT	0x04, 0x12, 0x05, 0xE5	
04	RIGHT	0x04, 0x12, 0x06, 0xE4	
05	ENTER	0x04, 0x12, 0x07, 0xE3	
06	EXIT	0x04, 0x12, 0x08, 0xE2	
08	POWER	0x04, 0x12, 0x0F, 0xDB	
09	AUTO ADJUST	0x04, 0x12, 0x11, 0xD9	
10	ASPECT	0x04, 0x12, 0x14, 0xD6	
11	MENU	0x04, 0x12, 0x15, 0xD5	
13	RESET	0x04, 0x12, 0x23, 0xC7	
14	AUTO COLOR	0x04, 0x12, 0x29, 0xC1	
15	FLIP	0x04, 0x12, 0x2C, 0xBE	
16	ACK	0x03, 0x0C, 0xF1	

Command Code Format: [Parameter 1, Parameter 2, Parameter 3, Parameter 4]

Parameter 1 = Length

Parameter 2 = Inquiry Code

Parameter 3 = Command Code

Parameter 4 = Checksum

For example: DOWN = 0x04, 0x012, 0x02, 0xE8

0x04 = Length

0x12 = Inquiry Code

0x02 = Command Code

0xE8 = Checksum

Figure 4 – RS232 HEX Codes

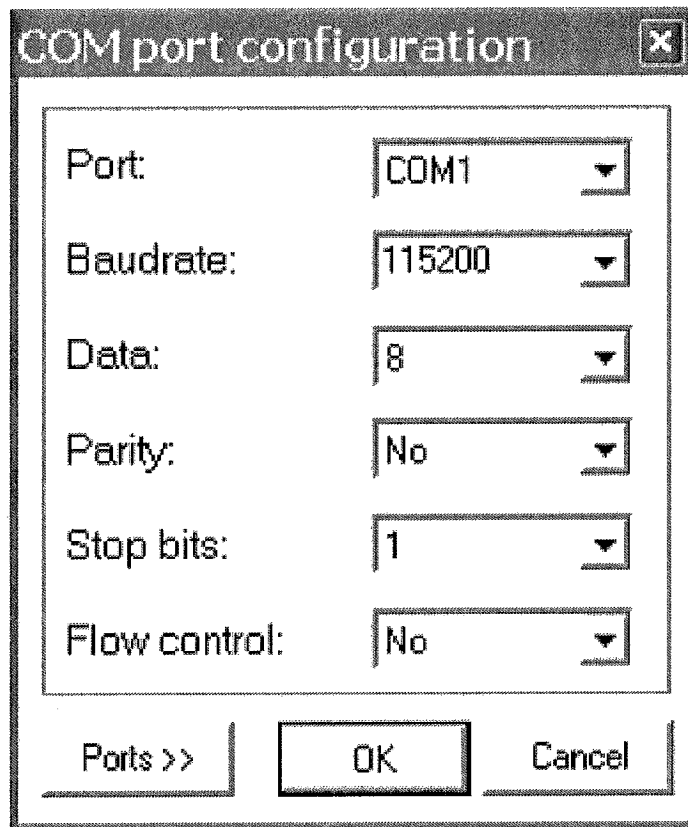


Figure 5 – RS232 COM Port Settings

4.3 ON/OFF CONTROL OPTIONS

The equipment shall be designed to operate via any of the ON/OFF control methods shown in Figure 6.

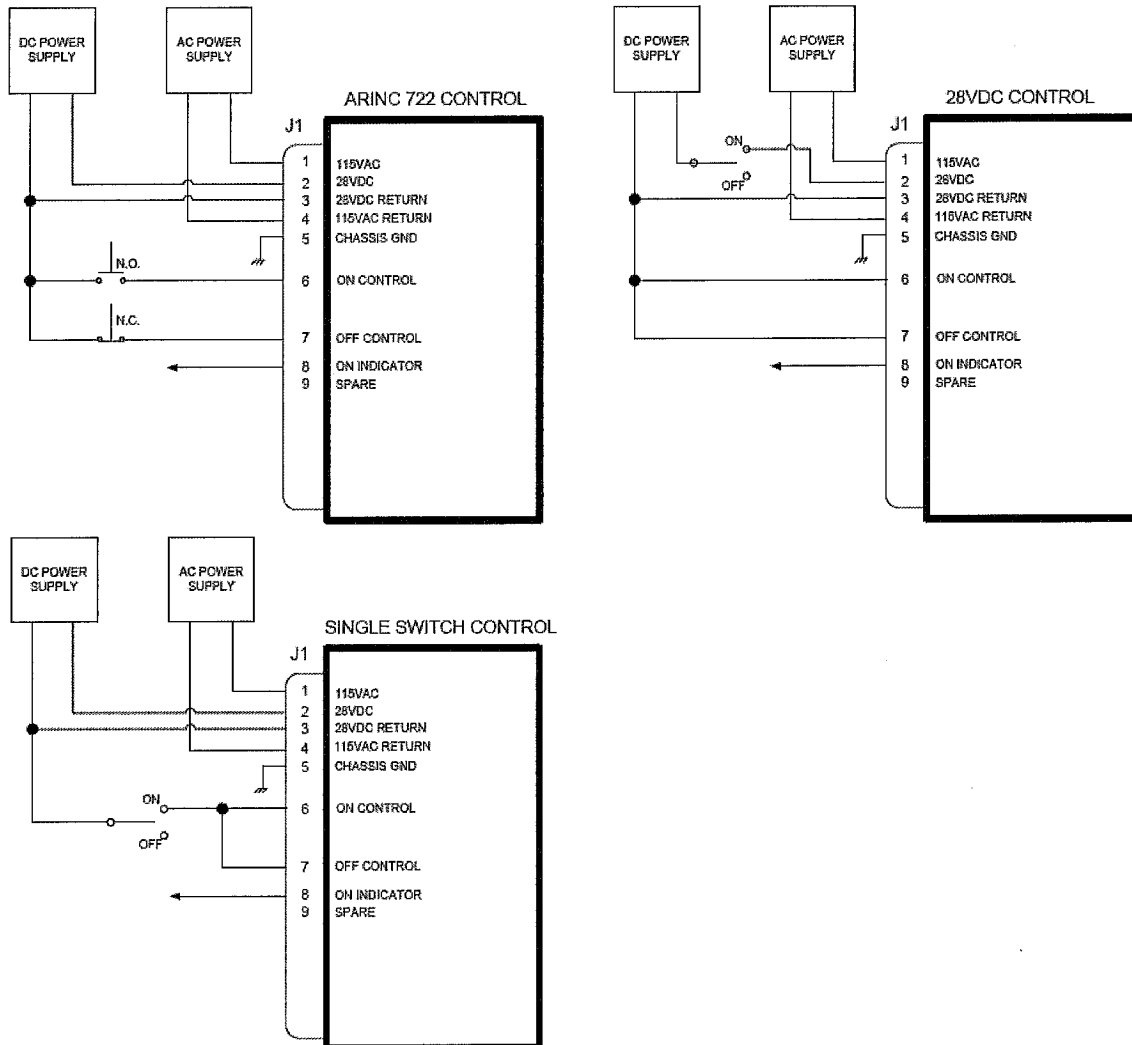


Figure 6 – ON/OFF Control Options

4.4 VIDEO SOURCE CONTROL LOGIC

The active video source to be displayed shall be determined by the state of the two external discrete inputs, SOURCE CONTROL 1, SOURCE CONTROL 2 and SOURCE CONTROL 3. See Figure 7 below for the logic that controls the active video source.

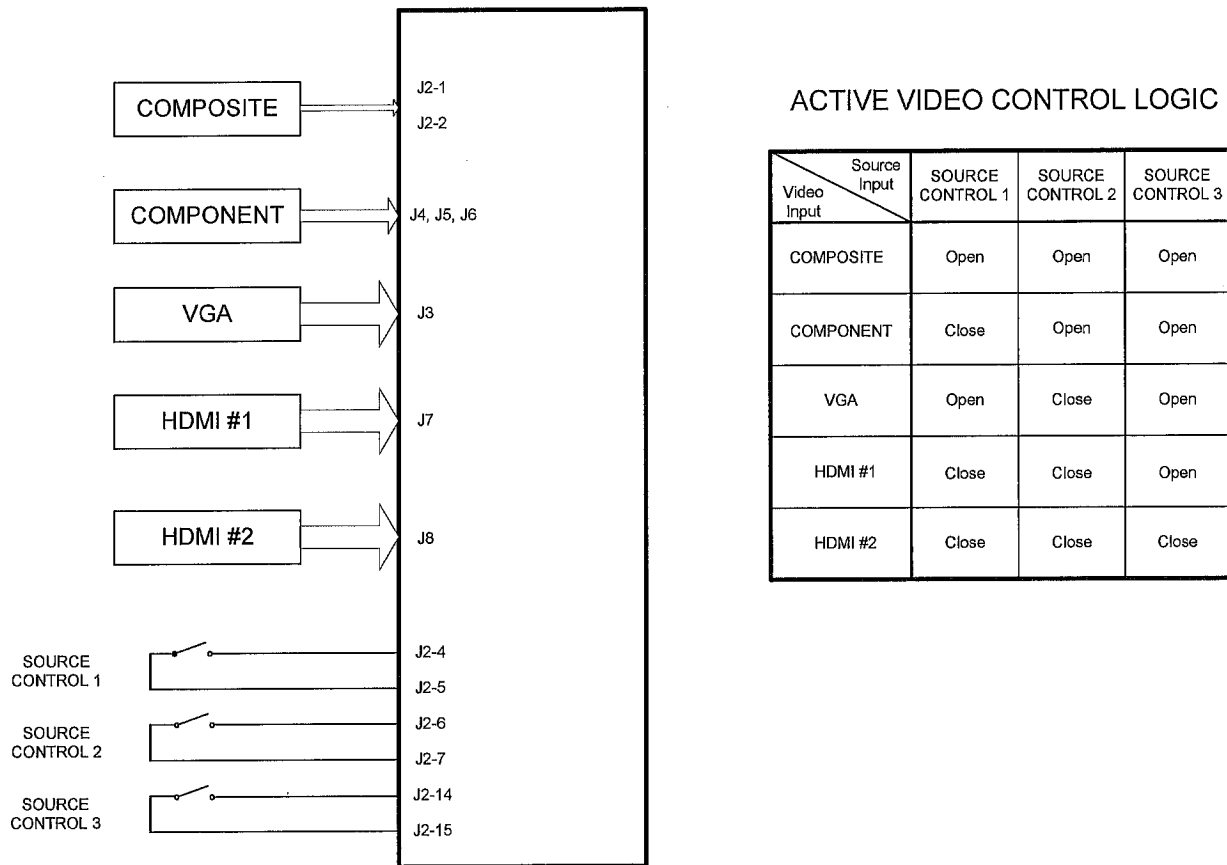


Figure 7 – Active Video Control Logic

4.5 INSTALLATION AND APPLICATION INFORMATION

4.5.1 MOUNTING

The LCD Monitor is designed to be mounted using eight mounting screws (8 X 8-32 X 1" Maximum), four on each side.

4.5.2 ORIENTATION

It is recommended that the Monitor be installed vertically with the connector "shelf" facing up due to thermal convection cooling design. The connectors are fitted from the side (Appendix A).

4.5.3 VENTILATION

It is recommended the ambient air operating temperature around the unit be maintained between -15° and +50°C. Avoid mounting near heat generating sources when possible. Methods to increase the amount of airflow around the unit, such as the installation of venting holes in the installation area of the LCD monitor are recommended when possible.

There should be a minimum of 0.15 inch clearance between the vented portions of the top, bottom and back of the unit. The design uses convection cooling from the bottom of the unit up through the top with some exhaust through the back.

4.5.4 MOISTURE AND LIQUIDS

Avoid installing the Monitor in areas subject to high humidity or exposure to possible spilled liquids.

4.5.5 LCD SCREEN PROTECTION

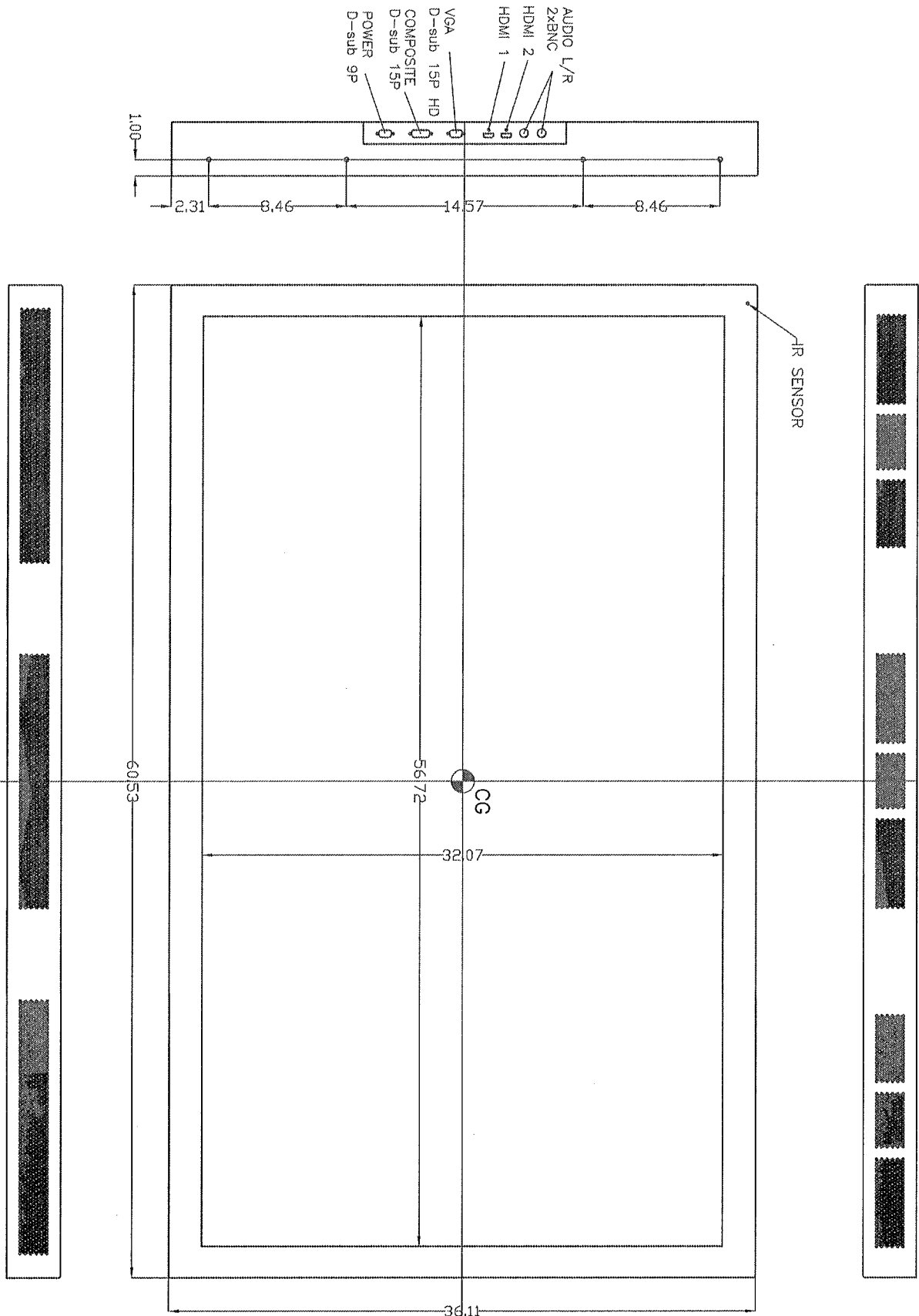
The LCD screen is susceptible to damage if care is not taken to protect it before and after installation on the aircraft. During the installation process, it is recommended to not remove the protective material that is applied to the screen during removal from its shipping container.

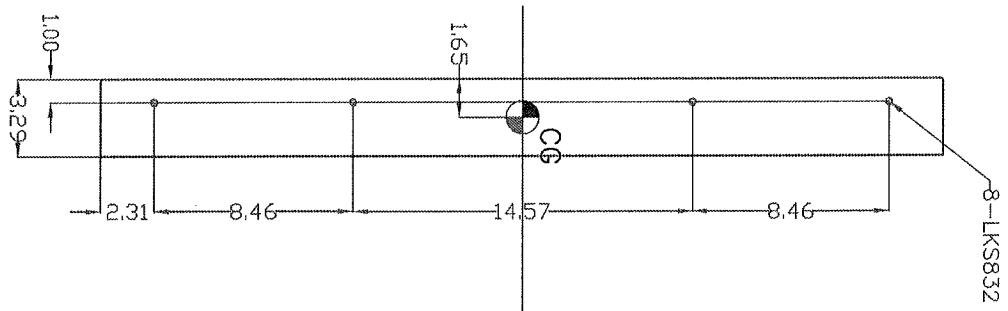
It should only be removed once it is installed and ready for operational testing. If the display is going to be unused for any length of time during the installation process, the LCD panel screen should always be protected from damage using some form of protective covering, such as taping a piece of cardboard over the screen.

4.5.6 INPUT POWER AND RETURN

1. Chassis ground (J1 pin 5) shall be connected to the airframe
2. +28 VDC (J1 pin 2) shall be connected to +28 VDC power
3. +28 VDC RTN (J1 pin 3) shall be connected to +28 VDC power return
4. 115VAC 400 Hz (J1 pin 1) shall be connected to 115 VAC 400 Hz power
5. 115 VAC RTN (J1 pin 4) shall be connected to 115 VAC power return

APPENDIX A





REAR VIEW

