



## Installation and Operation Manual

# FD201CV-LP VER HD

20.1” High-Definition Low-Profile Widescreen LCD





FD201CV-LP VER HD

20.1" High-Definition Low-Profile Widescreen LCD

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## Table of Contents

General Information .....	4
Front View .....	4
Additional Information .....	4
Specifications .....	5
Installation Instructions .....	5
Power .....	6
Wiring Instructions .....	6
S-Video/Composite & Audio Wiring .....	6
VGA Wiring .....	7
RS485 Wiring .....	8
HDMI .....	8
Power & Ground Wiring .....	9
Power/Video .....	9
RS485 Control .....	10
Command Sets .....	11
RS485 Network .....	12
Operations Instructions .....	13
Button Control .....	14
Technical Drawing .....	15-16
Troubleshooting .....	17
Technical Support .....	18
Instructions for Continued Airworthiness .....	18
Warranty .....	19
Log of Revisions .....	20



## General Information

The FD201CV-LP VER HD is a 20.1" High-Definition Low-Profile Widescreen LCD which has features that allow installation in the smallest of mounting areas with the minimum of interface equipment. Built with retrofit aircraft integration in mind, this display can switch between five video input sources using an infrared remote.

### Front View



### Additional Information

The FD201CV-LP VER HD utilizes a state of the art digital video decoding chipset for the analog video input. There are FIVE video source inputs available. They are in order of picture quality: (2)HDMI (Hi-Def video, such as Blu-Ray DVD or Playstation 3), (1)VGA (computer graphics like Moving Maps), (1) S-Video and (1) Composite Video (DVD, camera or VCR). Both NTSC and PAL formats are auto-detected.

The FD201CV-LP VER HD can also be connected to existing video switchers and use only a composite video input from a selector interface box. In this case, the IR remote will only be used to set up the screen after installation. e.g. adjust brightness, contrast, etc.

The LCD is protected with a .060" Lexan lens. The purpose of this lens is to prevent scratching of the LCD and reduce glare. The FD201CV-LP VER HD is made of all metal components. DO-160 testing has been completed and is available upon request

## Specifications

Display Type	20.1" TFT Color LCD
Display Color	16.7 Million Colors
Screen Resolution	1600x1200 UGA
Brightness	450 cd/m <sup>2</sup>
Dimensions	18.00" (W) x 15.13" (H) x 1.65" (D)
Display Size	16.1" (W) x 12.1" (H)
Weight	12lbs. 9 oz.
Power	28V DC @ 3.0A
Operating Temperature	0-50° C (32-122° F)
PC&Video Input	VGA (high-Density DB-15 Connector), S-Video, Composite, HDMI (2)
Video Type Supported	NTSC/PAL
Screen Control	On-Screen Display Menu
Viewing Angle	176° on Both Axis
Materials	Aluminum
DO-160 Testing	Section 21, Category B
Remote Control	IR, included
Pixel Pitch	255x255

## Installation Instructions

All cabin entertainment equipment, such as the FD201CV-LP VER HD, should be installed on a non-essential bus and have a dedicated circuit breaker. It is a requirement that a switch be installed in the cockpit so that the pilot can de-energize the entertainment system should it become necessary.

In order to install the unit, (4) 4-40 black oxide screws must be removed (2 on each side). Lift off the front cover to access 6-thru hole standoffs which require 6-#10 pan head machine screws for mounting. An alternate method for mounting: The unit can use the 8-32 fasteners (2 on each side) to attach 90° mounting angles (not included) to the sides of the monitor, then attach to the bulkhead.

When installed, at least ¼" gap should be maintained along the top and along the bottom of the unit to allow for convection cooling. **NOTE: Care should be taken to ensure the unit is not installed in an area with poor ventilation, or in an area with excessive heat.**

## Power

This is a **28VDC** monitor that requires 3.0 Amps of power to operate. The unit turns on automatically upon power application.

## Wiring Suggestions

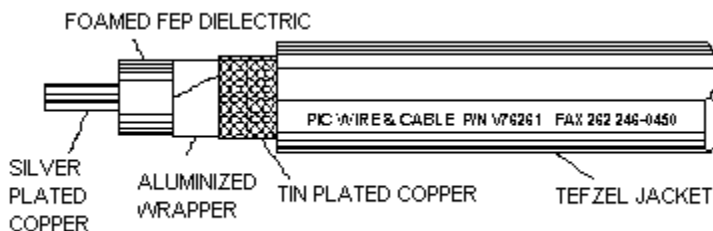
All shields should be grounded to the connector at the source, and floating at the display.

Avoid routing video wiring parallel to:

- AC wiring
- Strobe wiring
- DC motor supply cables
- Inverter cabling
- Or any other potential noise source.

## S-Video/Composite and Audio Wiring

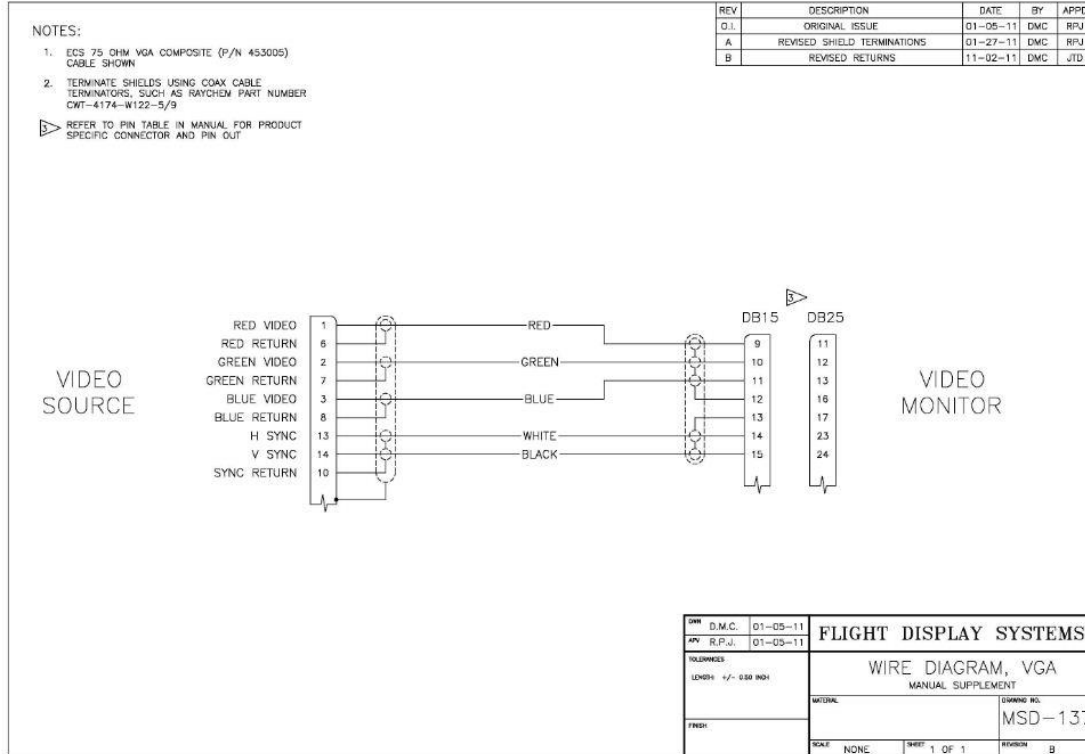
Recommended cable for s-video/composite and audio purposes is PIC 75 Ohm Coax, P/N V76261. This is a lightweight, flexible, and low signal loss cable which meets FAA flammability requirements of FAR 23.1359(d), FAR 25.853(a) and FAR 25.869(a)(4).



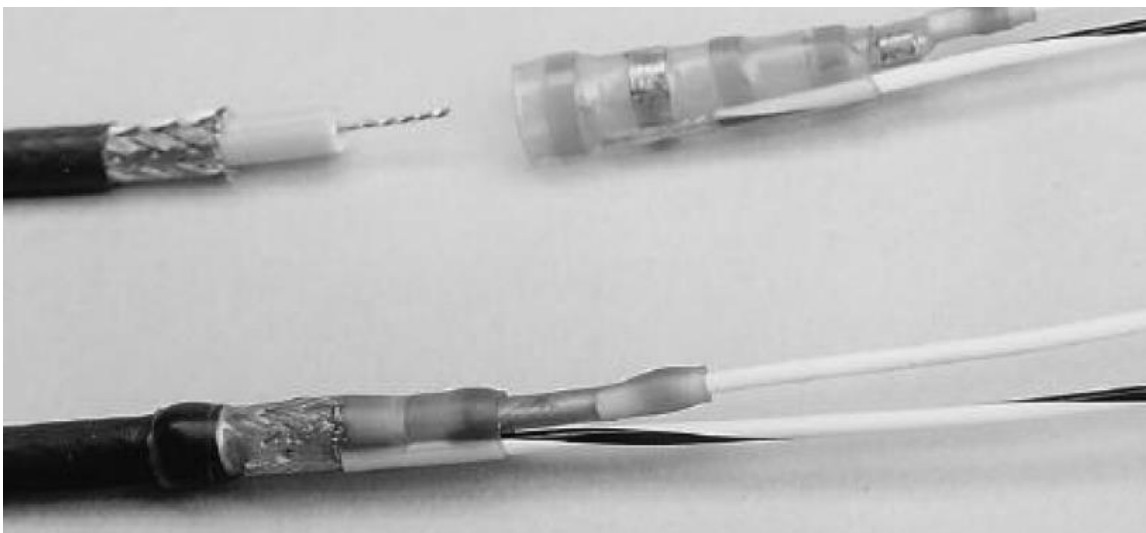
Similar aviation coaxial cable can be used from other vendors, as well. Some aircraft are prone to AC noise - we recommend adding to the composite source a 75Ohm video isolation transformer such as Deerfield Laboratory, Inc. Part No. 162-1 ([www.deerfieldlab.com](http://www.deerfieldlab.com), (650) 632-4090). In most cases this should be added to the video output of the source.

## VGA Wiring

Recommended cable for VGA purpose is ECS P/N 453005. This is a single shielded cable containing 5 separate coaxial cables, color-coded to match the functions of the wires.



Coax cables should be terminated using solder sleeve coaxial cable terminators, Raychem P/N: CWT-4174-W122-5/9



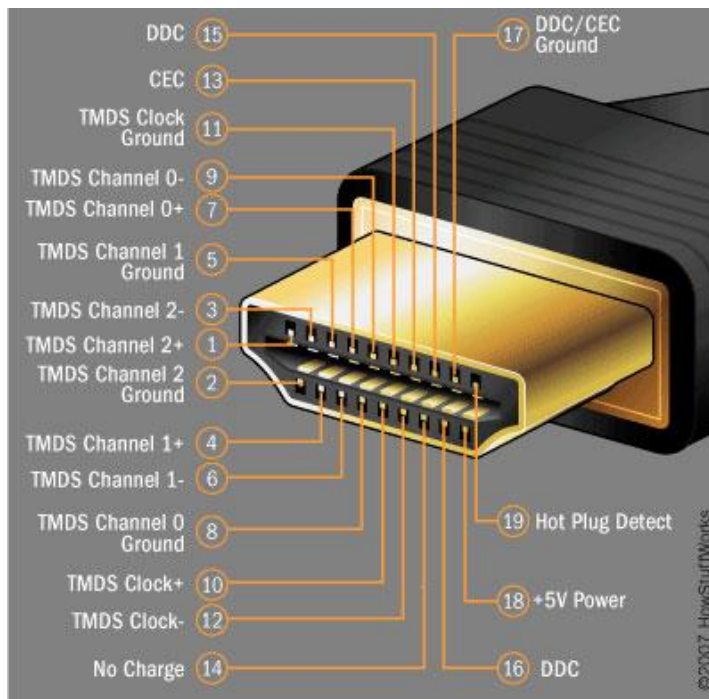


## RS-485 Wiring

Shielded twisted-pair 22 AWG wire is recommended for RS-485 wiring.

## HDMI

HDMI (High-Definition Multimedia Interface) defines the protocol and electrical specifications for the signaling, pin-out, electrical, and mechanical requirements of cable and connectors used for transmitting High-Definition content. The Type A HDMI connector (shown below) has 19 pins with bandwidth to support all SDTV, EDTV, and HDTV modes. The plug's outside dimensions are 13.9 mm wide by 4.45 mm high.



ECS manufactures an HDMI cable that is terminated at the factory. It is ordered as part number 600-19786-XXX, where XXX is the length in inches for the desired cable.

## Power and Ground Wiring

22 AWG wire is recommended for Power and Ground applications.

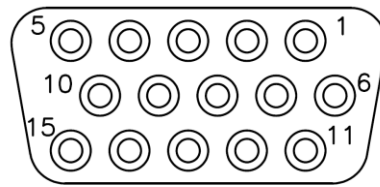


## Power/Video

### Pin out for P1 (High Density DB-15 Receptacle)

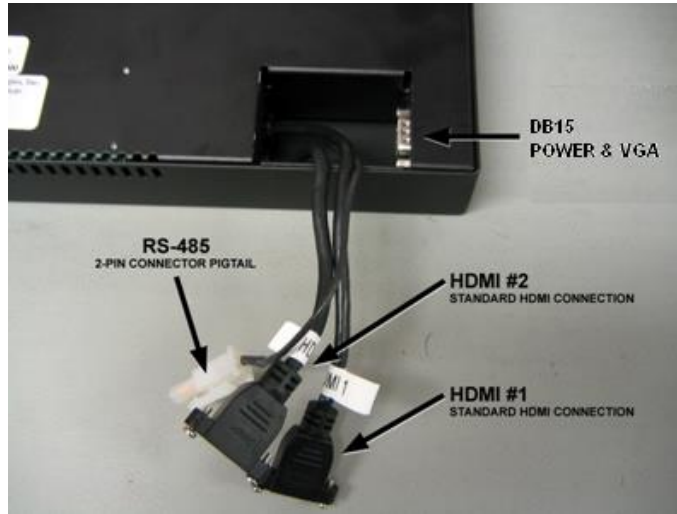
Connector  
 Crimp Contacts

P/N: M24308/2-286 or Equivalent  
 P/N: M39029/57-354 or Equivalent



MATING FACE

Pin Number	Description
1	28VDC Power
2	28VDC Ground
3	Composite Video - Signal
4	Composite Video - Shield
5	S-Video Y - Signal
6	S-Video Y - Shield
7	S-Video C - Signal
8	S-Video C - Shield
9	Red Video (Pin 1 on Standard VGA)
10	Green Video (Pin 2 on Standard VGA)
11	Blue Video (Pin 3 on Standard VGA)
12	Red Ground (Pin 6 on Standard VGA)
13	Green Ground (Pin 7 on Standard VGA)
14	Horizontal Sync (Pin 13 on Standard VGA)
15	Vertical Sync (Pin 14 on Standard VGA)

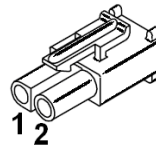


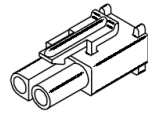
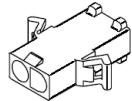
### RS-485 Control

RS485 is a two-wire communication interface that allows an external device such as a computer or switching unit to control the monitor’s functions remotely. Up to 99 monitors can be separately controlled by one unit.

#### Pinout for RS485 (2-Pin Connector, pigtail on back of Monitor)

Pin Number	Description
1	RS485B
2	RS485A



Part Description	Molex PN	
Connector Receptacle	19-09-1029	
Female Crimps	02-09-5147	
Connector Plug	19-09-2029	
Male Crimps	02-09-6145	

**Command sets for controlling the monitors with serial numbers starting w/ 12XXXXXXXX (10 digits) and above:**

Commands								
	Length	CMD	Index		Set ID	Data		Check Sum
<b>Power On</b>	0x08	0x12	0x9C	0x00	0x00	0x01	0x01	0x48
<b>Power Off</b>	0x08	0x12	0x9C	0x00	0x00	0x00	0x01	0x49
<b>HDMI 1</b>	0x08	0x12	0x8E	0x00	0x00	0x00	0x01	0x57
<b>HDMI 2</b>	0x08	0x12	0x8E	0x00	0x00	0x01	0x01	0x56
<b>DVI</b>	0x08	0x12	0x8E	0x00	0x00	0x02	0x01	0x55
<b>VGA</b>	0x08	0x12	0x8E	0x00	0x00	0x03	0x01	0x54
<b>S-Video</b>	0x08	0x12	0x8E	0x00	0x00	0x04	0x01	0x53
<b>Composite</b>	0x08	0x12	0x8E	0x00	0x00	0x05	0x01	0x52
<b>Auto</b>	0x08	0x12	0x7E	0x00	0x00	0x00	0x01	0x67
<b>Full Screen</b>	0x08	0x12	0x7E	0x00	0x00	0x01	0x01	0x66
<b>16:9</b>	0x08	0x12	0x7E	0x00	0x00	0x02	0x01	0x65
<b>4:3</b>	0x08	0x12	0x7E	0x00	0x00	0x03	0x01	0x64
<b>1:1</b>	0x08	0x12	0x7E	0x00	0x00	0x04	0x01	0x63

Below are the command sets to control the power, source selection, and backlight brightness. The 13 characters below are shown in hexadecimal. The communication system must be set up for 19200 Baud, no parity, 8 bits of data, and 1 stop bit.

Notes:

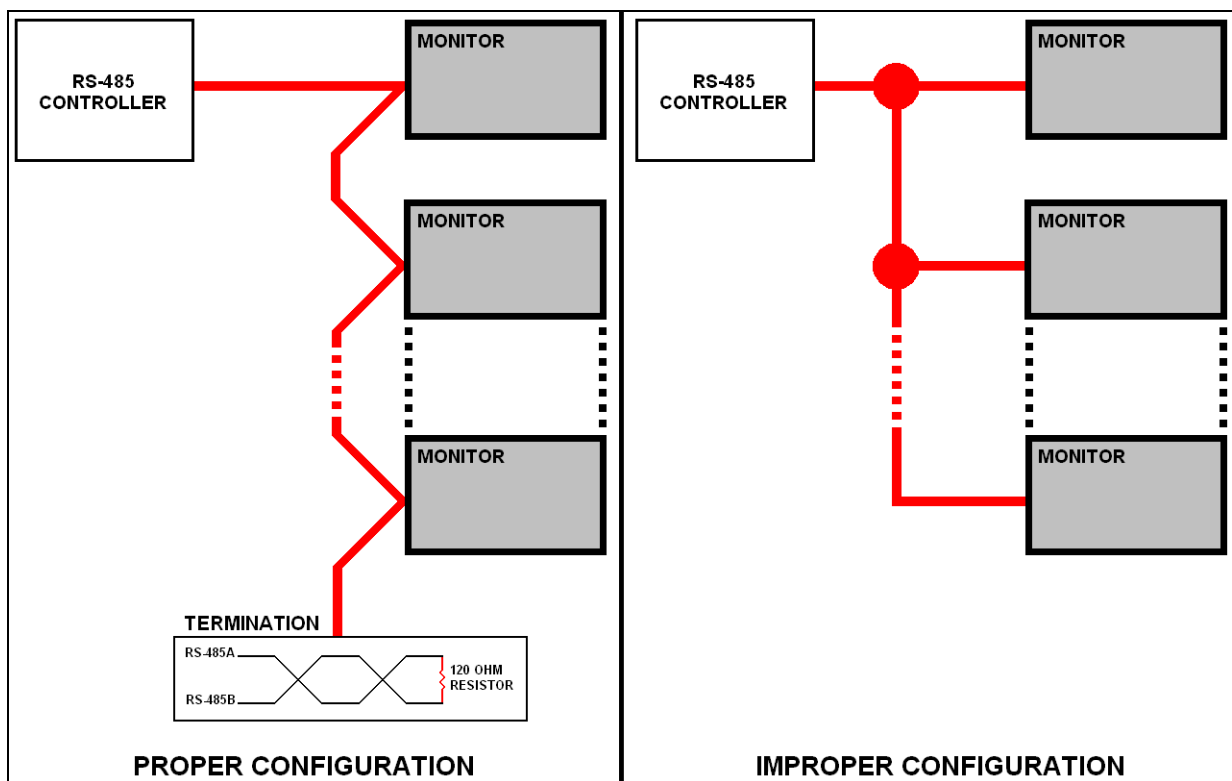
1. The first nine characters will remain the same for any command.
2. For connecting multiple monitors to one controller; the number can be set to 0x00 to control all monitors at once, 0x01 to control monitor number 1, 0x02 monitor number 2, and so on until 0x63 for monitor number 99.
3. The number will change depending on command.
4. Identifier for the group of commands.
5. All commands need to end with a Carriage Return

The RS-485 connector carries information between the Infrared received and the LCD controller board. Any connections to the RS-485 bus must be tolerant to the existing control signals. Devices connected to the RS-485 Bus should not send traffic that interferes with the existing RS-485 messages.

## RS-485 Network:

If there is more than one monitor connected to the aircraft's RS-485 controller system, then it is strongly recommended to connect the system in series, or daisy-chain, and terminate the twisted pairs with a 120 OHM resistor. This configuration improves the reliability of the system.

It is highly recommended to use 22 AWG twisted pairs for runs longer than 20 feet. Connect all RS-485 A pins together, all RS-485 B pins together.



## Operation Instructions

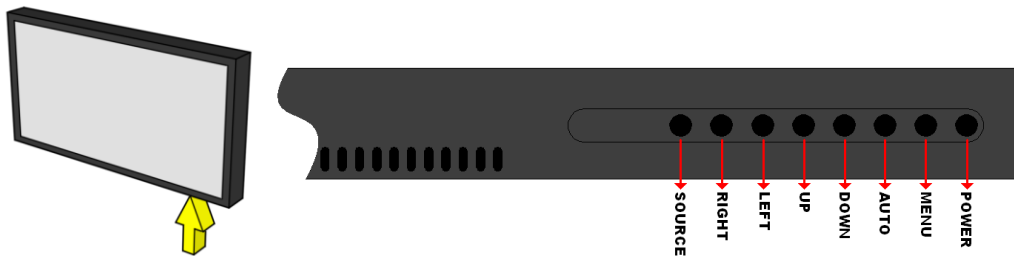
The FD201CV-LP VER HD is continuously on but can be de-energized by removing power from the entertainment system. No pilot or aircrew action is necessary during flight or ground operation.

The passengers will be able to change the video output from the FD201CV-LP VER HD using the video source select button on the display, or remotely with the included IR remote. Point the IR remote at the top of the LCD to make changes.

When applying 28VDC power, the display will turn on and look for a valid input on the last known source. If no input is found, the display will go to standby mode. Pressing the Select button will select new video input.

### Button Controls

Located at the bottom (right) of the FD201CV-LP VER HD are 8 buttons. Their functions are shown below:



BUTTON	DESCRIPTION
POWER	Toggles the power ON or OFF. Also, wakes the display up from SLEEP mode.
MENU	Opens the MENU.
AUTO	Auto-adjusts the display's size and position.
DOWN	Moves to the next selection in the menu.
UP	Moves to the previous selection in the menu.
LEFT	Decrease the selection's value in the menu.
RIGHT	Increases the selection's value in the menu.
SOURCE	Switches between sources coming into the display.

## Remote Control Buttons

Refer to Button Controls on previous page.

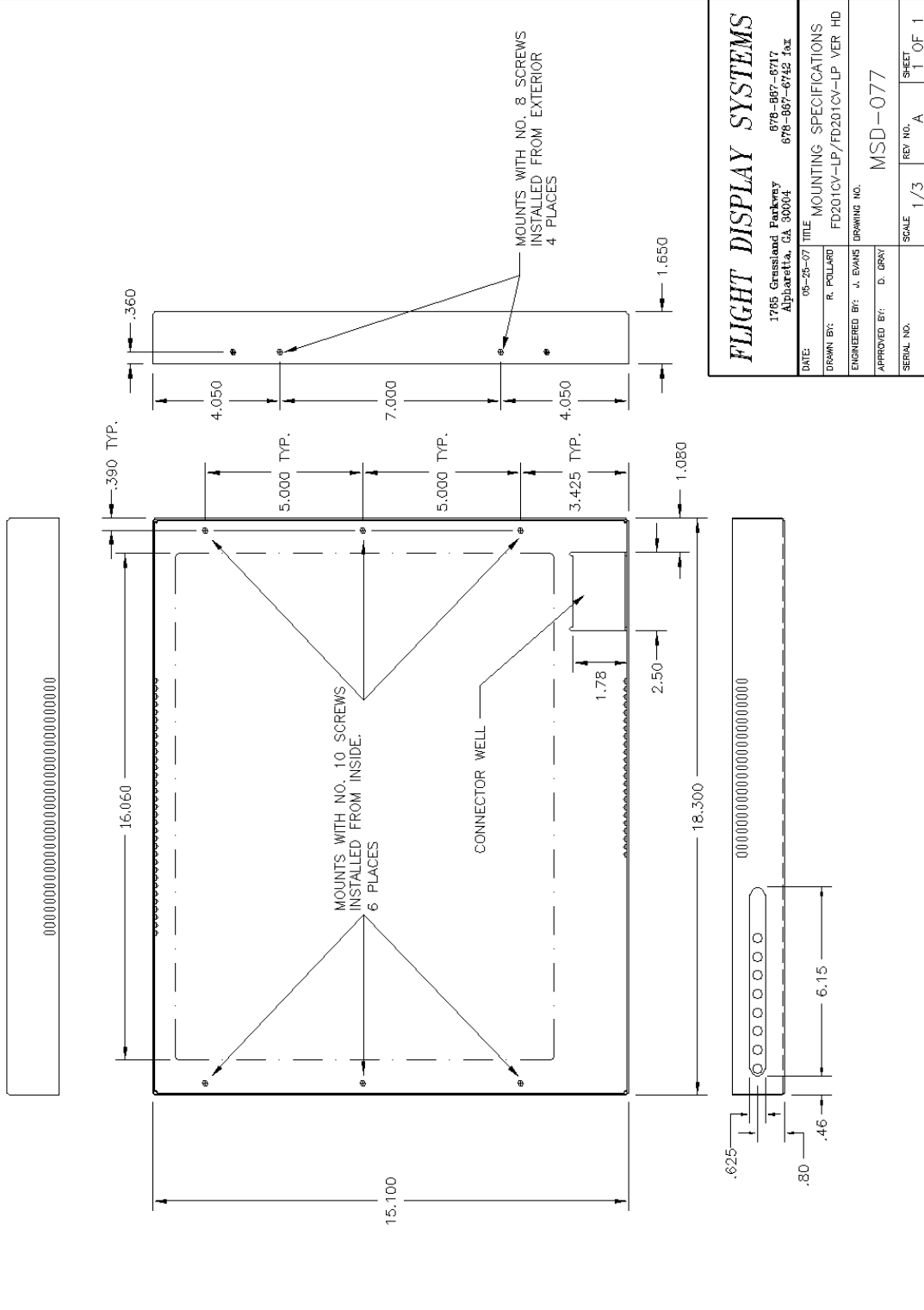








REV	DESCRIPTION	DATE	APV
A	ADDED 1.080 DIM	11-05-09	RPJ



<b>FLIGHT DISPLAY SYSTEMS</b>	
1785 Grassland Parkway Alpharetta, GA 30004 678-887-8717 678-887-6742 fax	
DATE: 05-25-07	TITLE: MOUNTING SPECIFICATIONS
DRAWN BY: R. POLLARD	FD201CV-LP/FD201CV-LP VER HD
ENGINEERED BY: J. EVANS	DRAWING NO.
APPROVED BY: D. GRAY	MSD-077
SERIAL NO.	SCALE: 1/3
REV. NO. A	SHEET 1 OF 1



## Troubleshooting

### VGA Shadowing

Most of shadowing problems are due to shielding on the wire. Locate the point where all of the shields are connected. Cut away the shields, one at a time, while viewing the display on the screen to observe which shield is causing the noise. Cutting away one shield at a time will allow you to focus and isolate the video noise issue.

- Twisted pair wiring is prone to video noise. ECS VGA Wire (Detailed under “Video Wiring Suggestions”) is recommended.

### Snow or Sweeping Lines

Lines that slowly sweep up and down are a result of AC noise. This AC noise can be generated by a power cart on the aircraft. Take the power cart off of the aircraft. Be careful of inverter wiring, which can also cause noise. Stand off the wires, if necessary.

If snow or sweeping lines persist, it is possible that the ground is at an incorrect point in the aircraft. Try moving the ground to another location.

### No power to Monitor, or No video Input

- Verify correct wiring. Check the base receptacle connectors for possibly damaged pins.
- Check that the video source is:
  1. Powered on,
  2. In Play mode, and
  3. Displaying video.

### Color Distortion

- Adjust brightness and contrast settings using the buttons on the monitor.



## Technical Support

Should you have any questions concerning this product or other Flight Display Systems products, please contact our Product Support representatives at (470) 239-7421.

### **Flight Display Systems**

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Alpharetta, GA 30005

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Email: [sales@FlightDisplay.com](mailto:sales@FlightDisplay.com)

For further product information, technical data and sample wiring diagrams, please click on the **Dealers** section of our web site at [www.FlightDisplay.com](http://www.FlightDisplay.com)

## Instructions for Continued Airworthiness

The FD201CV-LP VER HD is designed not to require regular general maintenance.





## Limited Warranty

All Flight Display Systems (FDS) products are warranted to be free from material or manufacturing defects for a period of 24 months from the date of shipment for General Aviation customers or 12 months from the date of shipment for Government/Special Mission customers. Any material or repair workmanship for in warranty repair service will be specifically warranted for 90 days or the remainder of the original warranty period, whichever is longer. If the original warranty period has expired, the 90 day repair warranty is limited to the material and workmanship specific to the repair activity completed.

The following conditions are exclusions to warranty coverage:

1. Labor costs associated with installation, removal or reinstallation of any product.
2. Damage to or malfunction caused by any unauthorized alteration made to the product.
3. Resolving signal quality issues caused by externally generated noise introduced by aircraft electrical systems or other components connected to any FDS product.
4. Any malfunction caused by improper installation or connection to aircraft wiring, industry standard cabin management/ inflight entertainment systems, or third party commercial equipment not specifically identified as compatible with FDS products.
5. Any malfunction caused by installation that does not conform to precautions associated with operating environments listed in the operating manual or consistent with industry best practices such as; high temperature, adequate ventilation, high humidity, high dust, or power surges.
6. Cosmetic damage or damage to internal components caused by installation or removal, failure to follow installation or operating instructions, or any neglect or misuse of the product.
7. Any product that is returned for service with a broken tamper evident seal, indicating tampering or improper handling of the product by an unauthorized person. Violation of product tamper evident seals or modification of factory installed serial and PMA labels voids any warranty, either expressed or implied.

The FDS technical support team is available to provide distance troubleshooting support during business hours (8:00am to 5:00pm EST) Monday through Friday at (470) 239-7421.

Many repair requests can be resolved through distance support and may not require return of merchandise to the factory. If a product must be returned to the factory for repair, an RMA number will be issued as directed by the technical support team and communicated by the repair coordinator.

Upon request by the customer, FDS may send a service technician onsite to repair any non-PMA products. The travel expenses incurred to include transportation, lodging and meals along with the technician's hourly rate shall be payable by the customer in accordance with FDS' applicable rates and procedures.

Flight Display Systems will, upon receipt of returned merchandise, remanufacture or replace the unit at our discretion and return the product by Ground Return Shipping. Express return shipment will be the responsibility of the sender.

This warranty is not transferable.

Any implied warranties expire at the express limited warranty expiration date. FDS shall not be held liable for any indirect, special, punitive, incidental or consequential damages.

Some states do not allow limitation on the length of an implied warranty. In such states, the exclusions or limitations of this limited warranty may not apply.





## Log of Revisions

Rev	Date	Page	Description
A	06/17/2008	---	---
B	07/14/2008	8-10	Added additional information about RS485 Serial Port
C	07/23/2008	12	Added remote control button image
D	08/22/2008	3	Updated the weight
E	10/03/2008	12	Updated Remote Control Buttons
F	01/29/2009	3,15	Updated specifications, warranty info
G	07/29/2009	4,5,12,16	Updated S-Video, Coax Terminator, Pinout, Remote and Installation Drawing
H	11/09/2009	17	Revised Assembly Drawing MSD-077
I	03/29/2010	4, 8	Added clearance space info, Included photo of backshell with connectors
J	06/20/2011	5	Added Operating Temperature, New Format
K	05/23/2014		Changed address, warranty information, Changed the RS-485 Command Set

