"Unrivaled Customer Satisfaction"

ROSEN
AVIATION

# Personal Displays



# Technical Manual

*Technical Manual, Personal Displays*

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**Contents**

## 1. INTRODUCTION

Rosen's high-definition personal monitors are available in a range of sizes and mounting options that allow customers to configure a system that fits their aircraft's cabin interior.

This manual describes how to install arm-mounted personal displays onto your aircraft. It contains everything you need to know to install the base receptacles and connect the display to confirm that it is functioning correctly.

> ⮕ **NOTICE** | This manual covers only Rosen's high-definition personal displays. Standard-definition displays are covered in the *9" Composite Technical Manual* (P/N **105809**) on the Rosen Aviation website.

The model numbers listed are for reference purposes only. A wider range of specialty models is available. For more information about a specific model, please contact Rosen Sales or Technical Support.

**Note:** Only trained and qualified personnel should perform installation and service.

### 1.1. Personal Display Options

Rosen's 9000-*xxx*- and 1200-*xxx* series of personal displays are available in several arm plug-in configurations:

- Left-,right-, and center arm mounts
- Locking and non-locking arms

Bases are sold separately. See the display Outline & Installation drawings for an appropriate base.

The *Outline & Installation* drawings—specific to each display/arm combination—and the Technical Manual are available on the Rosen website at www.rosenaviation.com.

From the Rosen Aviation home page, select the **Products** tab and browse by product category. Please contact Technical Support if you cannot find the drawing you need.

#### 1.1.1. Unpacking

> ⚠️**WARNING** | The spring lift in the 9000-*22x* and 1200-*1xx* models is under pressure and could seriously injure hands/fingers if caught in mechanism during operation or during unpacking. USE CAUTION when stowing or deploying these displays.

## 2. VIDEO INPUTS

Rosen's personal displays enable viewers to watch single, high-definition video signals in a variety of formats as well as standard video signals. The following video inputs are available on various models:

- 3G HD-SDI input up to 1080p
- Composite (CVBS)

If the base receptacle is pinned out for SDI and Composite, then the corresponding display supports both video inputs. However, the display cannot support both video inputs simultaneously.

- If neither SDI nor COMPOSITE is connected, the display will default to SDI.
- If SDI is connected and no COMPOSITE is available, the display will default to SDI.

This unit can be controlled via a cabin management system using RS-232, if an RS-232 connection is present on the configuration. The display connects to 28VDC aircraft power and receives video through a video distribution amplifier or directly from video sources.

## 3. SYSTEM INTEGRATION

The typical installation of the personal display is multiple arm-mounted monitors connected to a video source. The following connection diagram illustrates how to configure the displays to create a complete cabin entertainment system or integrate a display into an existing system.
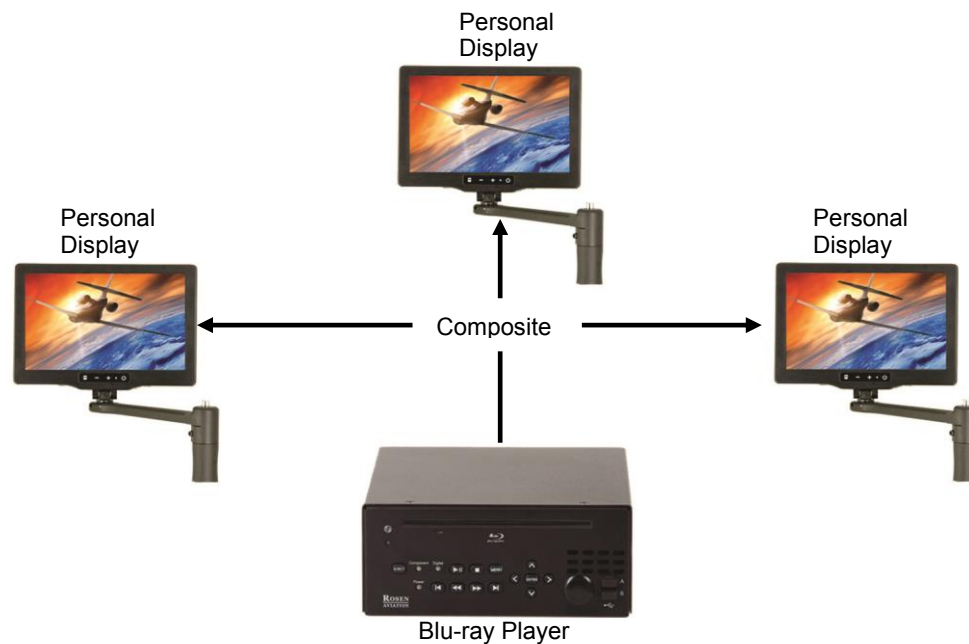


Figure 1  Connecting analog displays

High-definition displays are typically installed in a system where the video is distributed via SDI from a cabin management system and/or HD video distribution to each display.
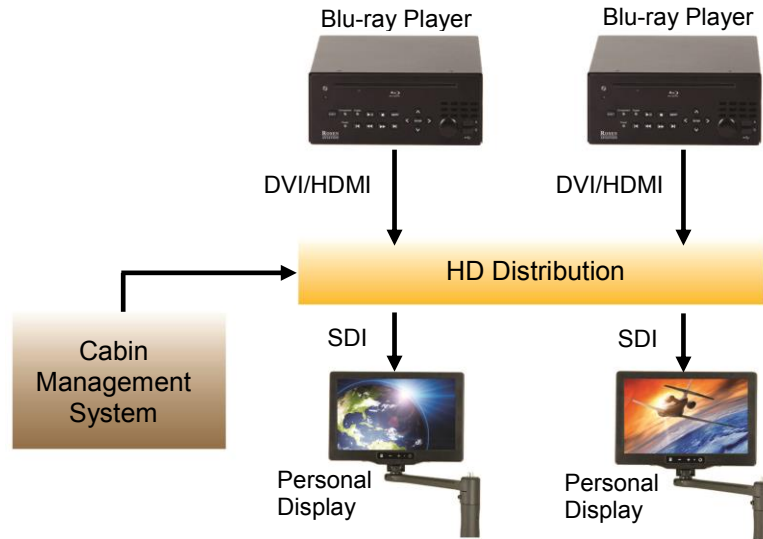


Figure 2 Connecting HD displays

## 4. INSTALLATION GUIDELINES

Most Rosen personal displays are designed on an arm that plugs into a base. Ensure the correct orientation that when plugging the arm into the base receptacle, as shown below, so that the connection is not forced. For round bases, the set screw in the base follows the arm's keyed slot. For rectangular bases, position the arm slot towards the base's dowel pin.



Round arm                                      Rectangular arm
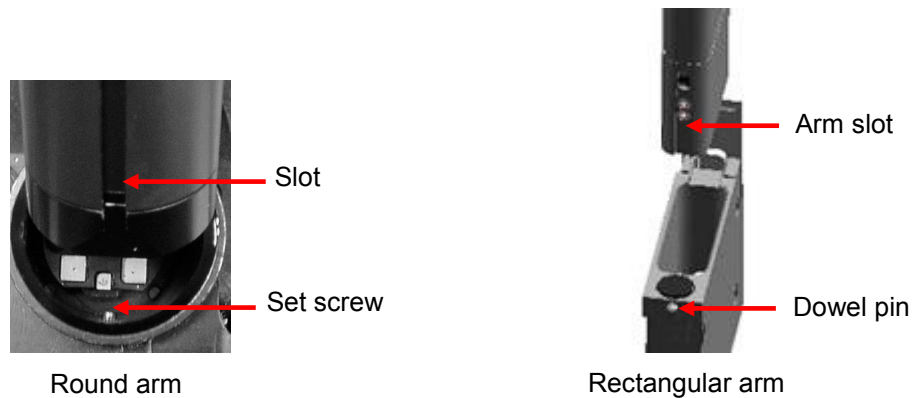
Figure 3  Arm-mount base receptacles

## 4.1. Installing/Removing SlimLine Arm Assemblies

To install a SlimLine arm assembly, press the arm button all the way in and push straight down on the arm into the plug body.



Figure 4  SlimLine locking arm feature

To remove a SlimLine arm assembly, press the arm button in all the way and lift up under the arm.

### 4.1.1. Locking a SlimLine Arm

To rotate a SlimLine locking arm so that the display rotates, press the arm button in only halfway.

Rotate the display/arm until it locks into the next position, and then release the arm button to lock in the position.

## 4.2. Installing/Removing Rectangular Arm Assemblies

To install a rectangular arm assembly, raise the base lid, and align the arm slot towards the base's dowel pin. To remove a rectangular arm assembly, press the latch button in and lift the assembly straight up from the base.
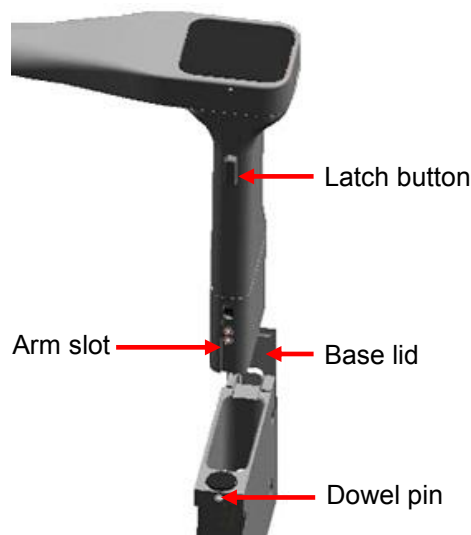


Figure 5  Removing a rectangular arm assembly

### 4.2.1. Locking a Rectangular Arm

To rotate a rectangular arm so that the display rotates, press on the arm cap cover to rotate the arm and lock into place at 0° and 180° locations, and then release the cap cover.



Arm cap cover

Figure 6  Locking mechanism on a rectangular arm

### 4.2.2. In-seat Displays

USE CAUTION when stowing or deploying the in-seat displays. The power turns on and off automatically when you raise and lower the display.

To deploy and stow the display, press straight down on the latch button and gently guide the display up or down into a locked position. The latch will click as it locks into place.



Latch button on the model 1200-*1xx* driver shaft

Be sure that the screen, gimbal, and arm align before stowing

Figure 7  Latch button for in-seat displays

## 4.3. Base Installations

The bases mount on either a vertical or a horizontal surface, typically with a minimum of four screws (two per flange); however, the rectangular bases require only two screws.

- A ground wire is present in all base harnesses
- For base pinout information, refer to the monitor drawings
- We suggest connecting bases using shielded harnesses to improve EMI performance.

Figure 8  Mounting dimensions for the 0100-342 base receptacle

Figure 9  mounting dimensions for the 0100-140 base receptacle (right)
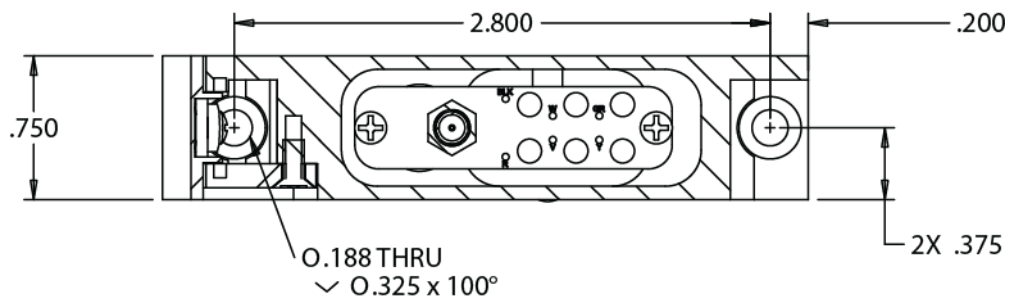
Figure 10  Mounting dimensions for the 0100-139 base receptacle (left)
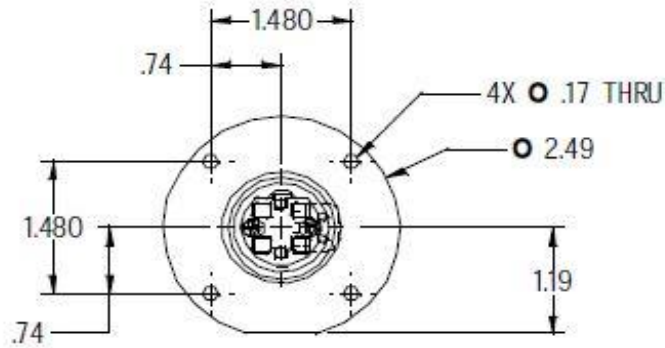
Figure 11  Mounting dimensions for the 0100-043 base receptacle
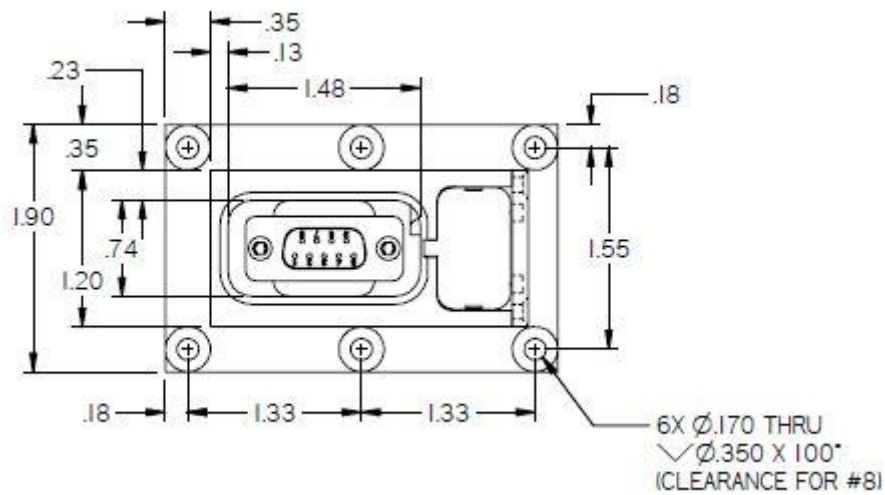


Figure 12  Mounting dimensions for the 0100-010 base receptacle
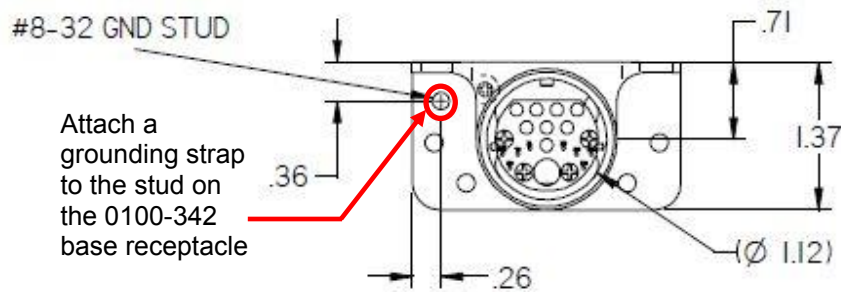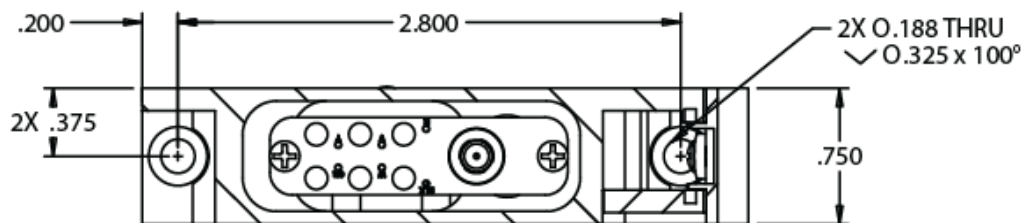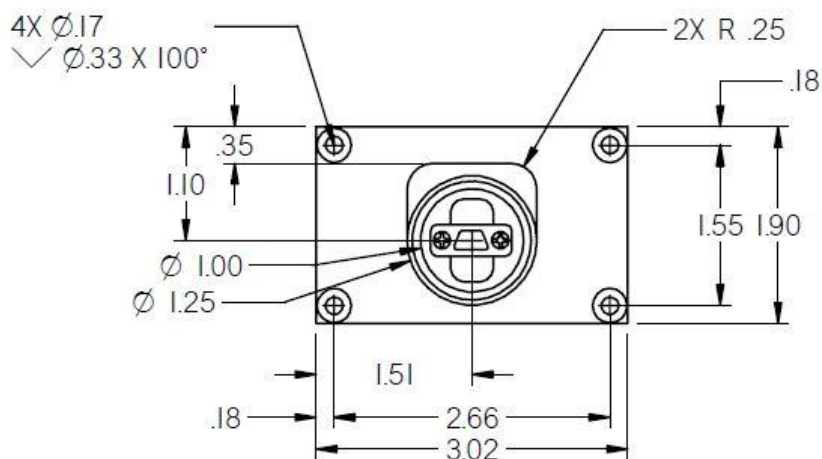


Figure 13  Mounting dimensions for the 0100-004 base receptacle

## 4.4. Pinout Connections

There are several ways to connect a personal display to an aircraft's entertainment system.

Use the pinout descriptions on the monitor's *Outline and Installation* drawing to assist in completing the wiring connections.

**Note:** This display is for entertainment purposes only; connect to a non-critical power bus.

## 5. INITIAL POWER UP

Make sure to turn off the power before connecting the harnesses.

1. Ensure low impedance ground connections on the base.
2. Ensure that **28 VDC** power supply is **OFF**
3. Connect the power supply and video source to the appropriate harnesses.
4. Supply power and wait for a video signal on the screen. The default setting for most personal displays is Auto On and the default source should display on the screen.

   For in-seat monitors, deploy the display by pressing down on the latch button, as shown below. Stow and deploy the display to observe the latch mechanism, harness movement, and the limit switch. The display should automatically turn on when deployed and turn off when stowed.



Latch button

Limit switch lever and set screw control the power on in-seat displays
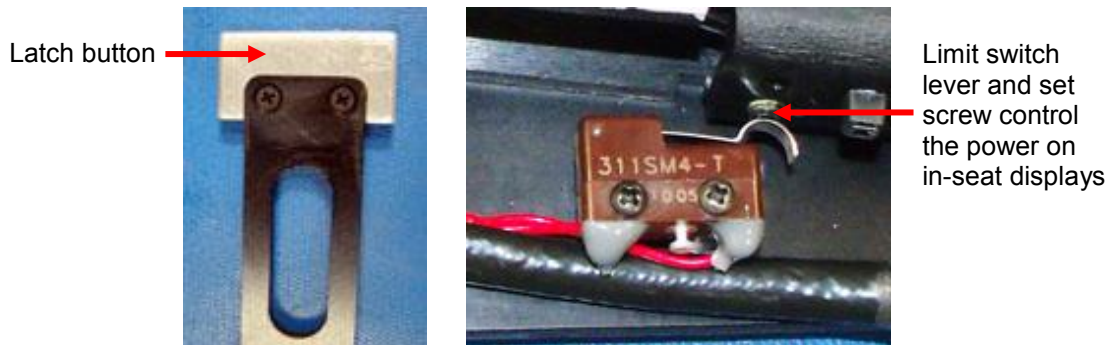
Figure 14  In-seat display power controls

| | |
|---|---|
| ➡ **NOTICE** | Do not plug or unplug the display connector while power is applied. |
| | When cycling power, leave unit off for 20 seconds before restoring power. |

## 5.1. In-seat Display Adjustments

If an in-seat display does not shut off when it is stowed, adjust the set screw directly above the limit switch lever so that the limit switch activates when monitor is stowed.

**⇒ NOTICE** | To prevent damage to the switch, be sure the limit switch lever does not bottom out on the switch body.

Adjust set screw to contact limit switch

Proper contact for the limit switch lever

Figure 15  Set screw and limit switch positions for power on/off control

If the power harness stretches or is kinking while stowing or deploying, loosen the cable clamp, remove cable ties, and reposition the harness. For optimum reliability, the power harness should have a minimum bend diameter of one-half inch, as shown below. Re-secure the cable ties and tighten the cable clamp.

Cable tie in base

Second cable tie on limit switch wires
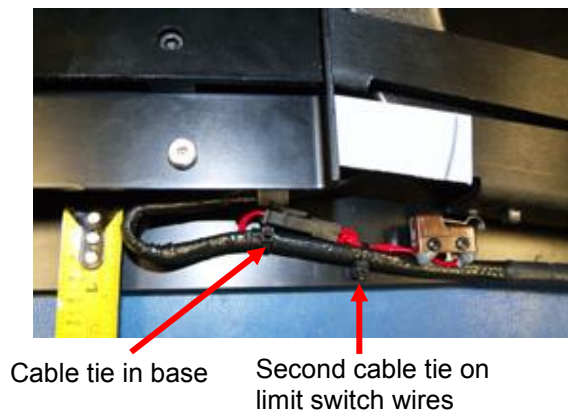
Figure 16  Harness position for optimal reliability

## 6. DISPLAY TOUCH CONTROLS

The personal displays have touch-sense buttons on the front panel to control all operating functions. **Note:** The pad layout is slightly different on some models; for example, the Power LED is not available on some models. Use the plus (**+**) and minus (**–**) buttons to navigate through the options.

Backward left/down   Forward right/up

Menu button opens the OSD and accepts option values

Power

Power LED

Touch pad without a power LED
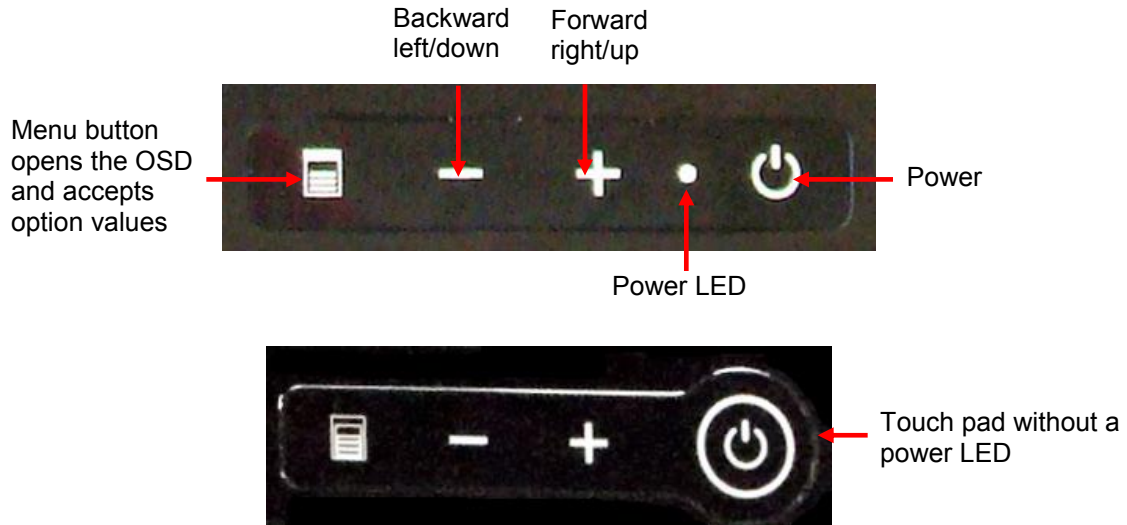
Figure 17  Touch controls

## 7. ON-SCREEN DISPLAY OPTIONS

The OSD contains screen settings, options in menus, and informational readouts that display over the image, as shown below. Press **Menu** on the front panel to open the Main Menu, as shown in Section 7.1.

Press **+** and **–** to navigate between the menu page, options, and values columns. Select the **Back** option to switch menu pages. The yellow highlighted area shows the currently selected option in the menu.

- Press **Menu** and **+** to move right across the menu page options and values.
- Press **Menu** and **–** to move left across the menu page options and values.

Press **–** to access menu pages. The selected menu page is highlighted

The center block contains menu page options and values

The right block contains the menu option values

Figure 18  OSD menu pages

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The available menu options will vary depending on which source signal is active.

- Press **Menu** to choose a setting or an option.
- Select the **Back** option in the OSD to switch menu pages.
- Press **Exit** to close the OSD and save settings.

**Note:** The on-screen display will timeout and close automatically after no screen activity for a preset amount of time, which is adjustable on the Technician Menu→OSD Timeout option. See Section 8.4, OSD Timeout, on page 25.

## 7.1. Exit

Use Exit to close the OSD. When you press **Menu** on the front panel, the OSD opens to this screen, as shown below. Press **Menu** again to close the OSD from this screen.

Press **+** and **–** to access the other menu pages in the OSD.

From other settings within the OSD, select **Back** and **Exit** to close the OSD.



Figure 19  Opening screen for the Main Menu

## 7.2. User Menu

The Main Menu opens to the screen, shown in Figure 19 (above). Press **–** to access the User menu options.

Press **+** and **–** to select a User option and press **Menu** to change its value.



Figure 20  User menu options

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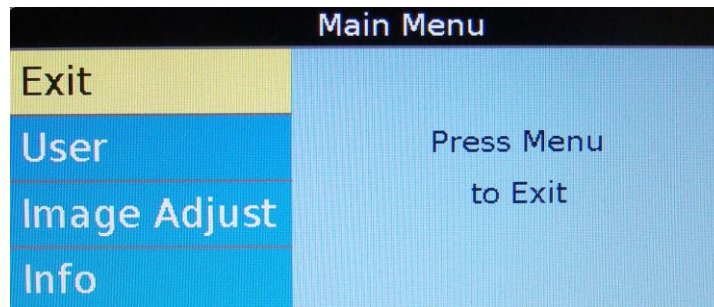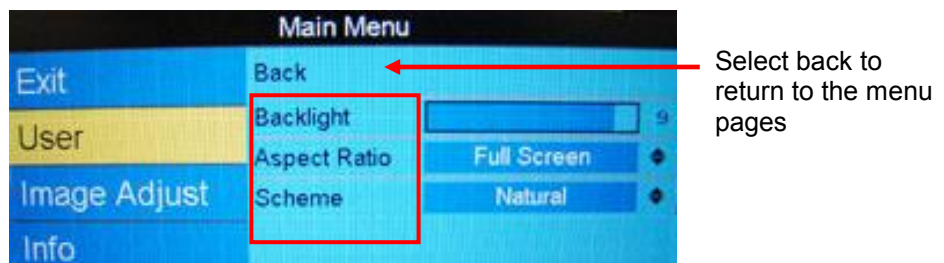
### 7.2.1. Backlight

Use this setting to adjust the intensity of the LCD backlight.

From the User page, press **+** and **–** to select **Backlight** and then press **Menu** to open the control bar shown below.

Press **–** or **+** to change the value on the control bar accordingly.

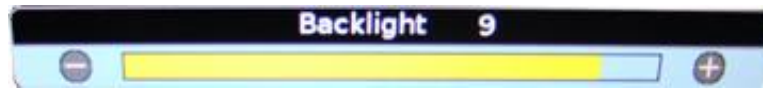Press **Menu** to set the backlight brightness and close the control bar.



Figure 21  Backlight option

### 7.2.2. Aspect Ratio

Use Aspect Ratio to adjust the picture expansion to match the encoding of the source image most closely. Select **User→Aspect Ratio** and then press **Menu**. To switch the display between aspect ratio modes (described below), press **+** and **–**. Watch for proportional changes in the background picture and choose the optimal mode for the source. Press **Menu** to set the mode and select **Back→Exit** to close the OSD.

**Full Screen:** Displays standard 4:3 source video in 16:9 aspect ratio by expanding the image horizontally. Circles will appear as ovals in the central and outer portions of the screen. If the source image is letterboxed, there will be black bars at the top and bottom of the image. A 16:9 widescreen source will fill the screen with minimal distortion.

**Pillar Box:** A standard 4:3 source image will appear with vertical black bars on the left and right side of the image. If the image source is letterboxed, then there will also be horizontal bars at the top and bottom of the image as well.

**Letterbox Expanded:** Expands the source video in the vertical and horizontal dimensions to fill the display screen. Letterbox-format DVDs will have small or no bars showing in this mode, while 4:3 aspect video sources will expand beyond the screen boundaries, appearing cropped.

**Note:** This mode is not available for RGB or a graphic, PC-based HDMI/DVI source.

### 7.2.3. Scheme

There are two default color settings or schemes: Natural and Vivid. If the screen colors are not what you expect, select Scheme and press + / **–** to toggle between the settings. The background picture's colors change as you toggle between the settings. Vivid uses a higher color saturation level above the Natural level.

Try both schemes to determine which one you like best before adjusting the other picture quality settings.

Select **User→Scheme** and then press **Menu** to access the settings.

Select the setting and press **Menu** to accept the changes, and then select **Back→Exit** to close the OSD.

### 7.3. Image Adjust

Use the Image Adjust menu pages, as shown below, to control the color and picture quality. Highlight Image Adjust and press **+** to highlight the options, and then press **Menu** to change the option values.



Figure 22  Image Adjust menu page

#### 7.3.1. Scheme

Scheme is also available from the Main Menu→User page. For information about how this option works, see Section 7.2.3 on page 16. Changing the Scheme affects changes that you make to the User menu settings and is source specific.

#### 7.3.2. Picture-Quality Controls

The Brightness, Contrast, Saturation, Hue, and Sharpness menu options use control bars to fine-tune different aspects of the picture quality. To adjust these options, press **Menu** and **–** to select **Image Adjust.** Choose a menu option, and then press **Menu** to open a control bar and adjust the value, similar to Figure 23, shown below.

Press **–** or **+** to change the brightness on the LCD accordingly.

Press **Menu** to set the brightness and close the control bar.

Select **Back→Exit** to close the OSD.



Figure 23  Sample picture-quality control bar

#### 7.3.3. Reset Scheme

Restores the values of the current scheme to their default settings. Use Reset Scheme to revert to the default screen colors if the other Image Adjust options did not correct the screen quality changes that you expected.

Select **Image Adjust→Reset Scheme** and then press **Menu**.

Select **Back→Exit** to close the OSD.

For information about the different scheme modes, see Section 7.2.3 on page 16.

## 7.3.4. Image Adjust Advanced (Submenu)

Use the Image Adjust→Advanced submenu options, as shown below, to fine-tune the primary screen colors and to restore the monitor's factory screen settings. Press **Menu** and **–** and **+** to select **Image Adjust→Advanced**, and then press **Menu**.

To close the menu, select the **Back** option, or select **Back→Exit** to close the OSD.



Figure 24  Advanced submenu options

### 7.3.4.1. Color Temperature

Use the Color Temperature options to change the warmth of the picture in all sources. When you select Color Temperature, the screen changes, and a toggle appears to switch between User and 6500K, as shown below.
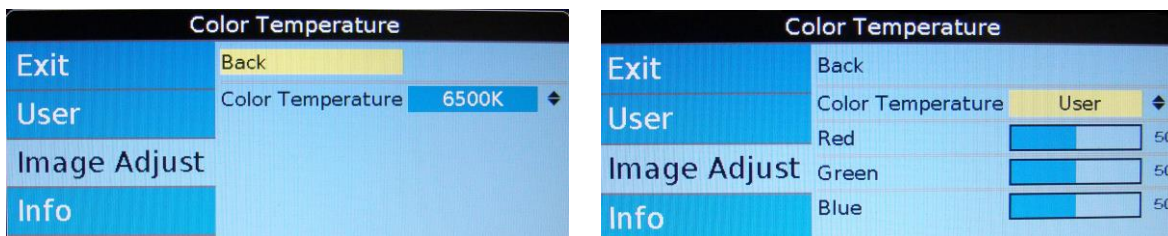


Figure 25  Color Temperature options

Press **–** and **Menu** to open the Color Temperature Page.

Press **–** to access the **User** setting and then press **Menu** and **–** to access the individual colors.

7.3.4.1.1. Color Levels: Red, Green, Blue

Setting the Color Temperature to User will make the Red, Blue, and Green options active. Each color adjusts the low-level registers of its respective color value in the picture.

Select the **Image Adjust→Advanced Menu**, press **–** and then **Menu** to access Color Temperature. Set Color Temperature to **User,** and then press **Menu**.

Press **–** to choose a color level, and then press **Menu** to open a control bar to adjust the value, similar to Figure 26 shown below.

♦ **Red**: Press – to show more cyan-colored tones, and press **+** to intensify the red tones.

♦ **Green**: Press – to show more magenta tones, and press **+** to intensify the green tones.

♦ **Blue**: Press – to show more yellow tones, and press **+** to intensify the blue tones.

Press **Menu** to set the color and close the control bar.

Select **Back→Exit** to close the OSD.
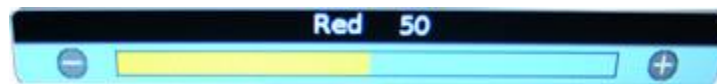


Figure 26  Sample color-level control bar

7.3.4.2. Restore Defaults

This option restores the default screen settings from the user menus for all video sources. It does not erase Technician Menu settings or change the internal time and date. A Defaults Restored message appears in the lower corner of the menu after the restore is complete.
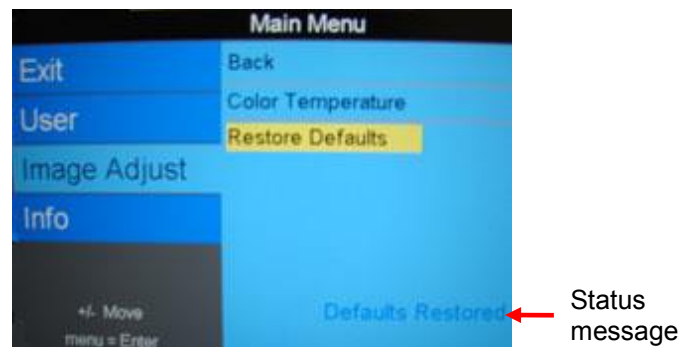


Figure 27  Restore Defaults option

### 7.4. Info

Use the Information page to review operating status, view details about the display, and access the Technician Menu.

To open the page, press **Menu** and then**–** from within the OSD menu.

**Notes:**

- Press Menu and + to highlight the Back option—required to access the Technician Menu
- The firmware (FW) fields vary by model and are subject to change.
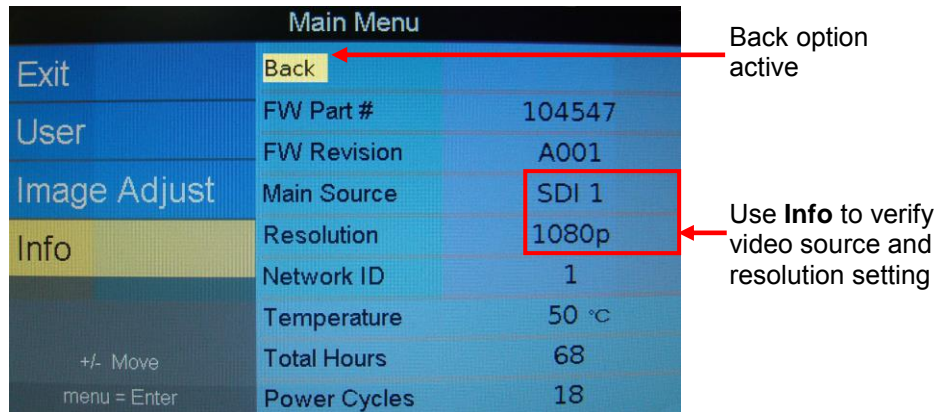


Figure 28  Info page

## 8. TECHNICIAN MENU

To protect the display from accidental or unintentional adjustments, the Technician Menu is accessible only with a special button combination. To avoid repeating this button sequence after each change, the menu remains active until you manually close it.

**➡ NOTICE** | Whenever there is a change to the Technician Menu, exit the menu, and cycle power for the changes to be fully accepted.

To open the Technician Menu, start with the display on, and press the following buttons in this order:

1. Press **Menu** and **–** to select the **Info** page.
2. With the **Back** option highlighted on the Info page, press **+ – + – + + +**, and then press **Menu**.
3. The Technician Menu opens. The options you see depend on the model number. All SDI 9000-3*xx* displays use a different Technician Main Menu structure.
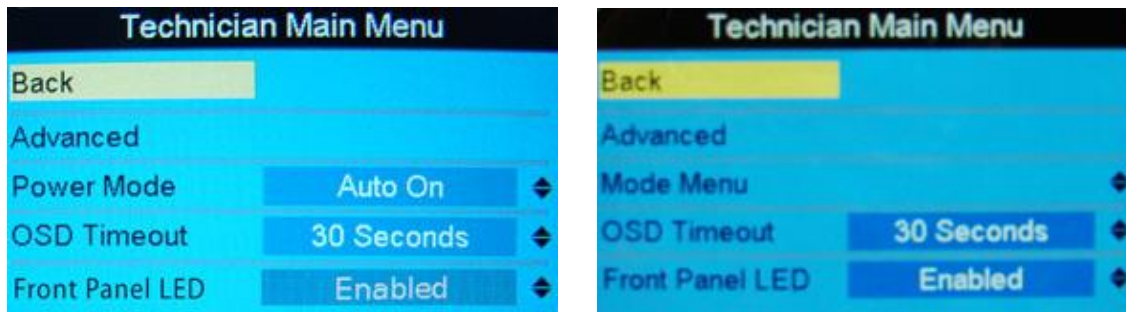


SDI -*3xx* displays only

Figure 29  Technician Main Menus

To navigate the menu options, press **+** or **–** on the touch pad.

To close the Technician menu and return to the Info Page, select the **Back** option and press **Menu**. To close the Technician menu and the OSD, select **Back➔Exit**.

**Note:** The Main Menu options are not selectable while the Technician Menu is open.

## 8.1. Advanced Technician Menu

This submenu provides installers and technicians more advanced controls of the image.



Only options for
SDI -*3xx* displays →
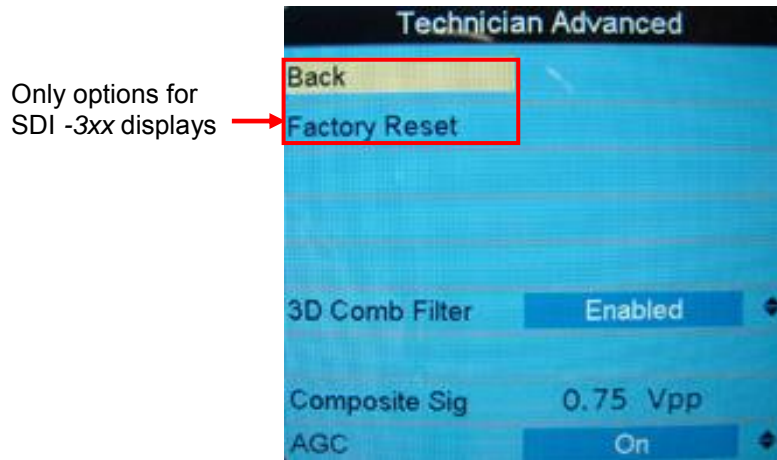
Figure 30  Technician Advanced Menu

### 8.1.1. Factory Reset

Choose this option to perform a complete factory restore. It is similar to Reset Scheme in the Main Menu→Advanced submenu; however, Factory Reset returns all items with pre-determined defaults in *both* the User and Technician menus to their factory settings.

Highlight **Advanced→Factory Reset** and press **Menu**.

A *Reset Complete* message appears after the display restores the default settings.

### 8.1.2. 3D Comb Filter

**(Composite only)** When set to Enabled, the display will eliminate dot crawl and some noise on stationary portions of the picture.

Highlight **Advanced→3D Comb Filter** and press **Menu**.

Use **+** and **–** to set the option **Enabled** or **Disabled**, and then press **Menu**.

Select **Back** and press **Menu** to return to the Technician Menu

Select **Back** and **Menu** to exit the OSD.

### 8.1.3. Composite SIG (Signal)

(**Composite only**) This is a read-only screen that shows the signal strength of the currently viewed composite source. Composite Signal Strength ranges from 0 to 1.25 Vpp in 0.25V increments. It will read NA (not available) if a Composite source is not active or the AGC (Automatic Gain Control) (below) is set to Off.

### 8.1.4. AGC (Automatic Gain Control)

(**Composite only**) This option is a signal compensation tool that will accommodate for strong and weak Composite signals.

Highlight **Advanced→AGC** and press **Menu**.

Use **+** and **–** to set the option and then press **Menu**.

Select **Back** to return to the Technician Menu.

Select **Back** and **Exit** to exit the OSD.

## 8.2. Power Mode

Use Power Mode to set the display's startup state. Power Mode works the same on all personal displays; however, on SDI -3*xx* models the option is in the Technician Menu→Mode Menu.

From the Technician Menu, press **–** to select **Power Mode** and then press **Menu**.

Use **+** and **–** to set the desired power mode, and then press **Menu**.

Options include the following:

- **Auto-On:** The display always starts up in the ON state when 28V is applied (default).
- **Auto-Off:** The display always starts up in the standby state when 28V is applied.
- **Restore Previous:** The display returns to the previous power settings after any power interruption.

Select **Back** to return to the Technician Menu.

Select **Back** and **Exit** to exit the OSD.

## 8.3. Mode Menu

(**For SDI -3*xx* models only**) Use the Mode Menu options to specify the power mode and access the SDI Overscan settings. From the Technician Main Menu, highlight **Mode Menu**, and then press **Menu**.
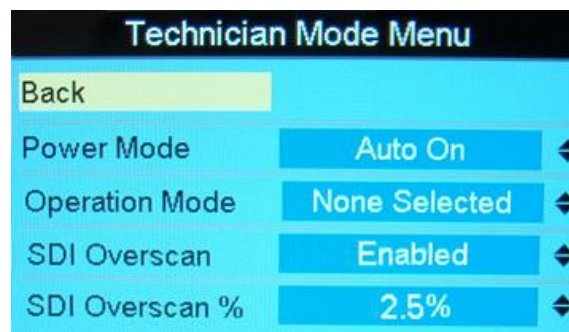


Figure 31  Technician Mode Menu for -3*xx* models

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### 8.3.1. Power Mode

Power Mode is in the Technician Mode→Mode Menu for SDI -3*xx* models and on the Technician Menu for all other personal displays. For information about how Power Mode works, see Section 8.2, Power Mode, on page 23.

### 8.3.2. Operation Mode

(**For SDI -3*xx* models only**) Operation Mode is a read-only option set to None Selected; no operation modes are applicable.

### 8.3.3. SDI Overscan

(**For SDI -3*xx* models only**) Use SDI Overscan to enable or disable video overscan for SDI at 480i and 576i resolutions. When enabled, the setting cuts off a small percentage (2.5% by default) around the edges of the image and resizes it to fit the full screen. When set to disabled, a zero percent overscan is applied to all SDI resolutions. You can also enable/disable this feature via the RS-232 protocol.

From the Technician Menu, press **–** to select **Mode Menu→SDI Overscan** and then press **Menu**.

Use **+** and **–** to set the option to **Enabled** or **Disabled**, and then press **Menu**.

Select **Back** to return to the Technician Menu.

Select **Back** and **Exit** to exit the OSD.

### 8.3.4. SDI Overscan %

(**For SDI -3*xx* models only**) Use SDI Overscan % to set the amount of overscan applied to the picture's edges of SDI signals at 480i and 576i resolutions—you will not see overscan with any other resolutions. The setting percentages are 0.0%, 2.5% (default), 3.0%, 5.0%, and 10.0%. The overscanned image will automatically update and the screen will briefly go black when you switch between percentage values. You do not have to cycle power for the change to take effect. You can also change the overscan value via the RS-232 protocol.

From the Technician Menu, press **–** to select **Mode Menu→SDI Overscan %** and then press **Menu**.

Use **+** and **–** to set the percentage option and then press **Menu**.

Select **Back** to return to the Technician Menu.

Select **Back** and **Exit** to exit the OSD.

## 8.4. OSD Timeout

Use OSD Timeout to set the amount of time the menu screens and control bars are visible, without making any changes, before they timeout and close automatically.

There are three increments: 6 Seconds, 15 Seconds, and 30 Seconds.

From the Technician Menu, press **–** to select **OSD Timeout** and then press **Menu**.

Use **+** and **–** to select a time increment and press **Menu**.

Select **Back** and **Exit** to exit the OSD.

## 8.5. Splash Screen

Use this option to turn a splash screen on or off. The splash screen appears for approximately eight seconds when 28V power is first applied to the display.

When enabled, the Rosen Aviation splash screen appears. When disabled, the screen remains black.

Highlight **Technician→Splash Screen** and press **Menu**.

Use **+** and **–** to set the option and then press **Menu**.

Select **Back** and **Exit** to exit the OSD.

## 8.6. Front Panel LED

**(Available on select models)** The Front Panel LED option turns the power LED on or off. When the option is Off, the power LED will be black.
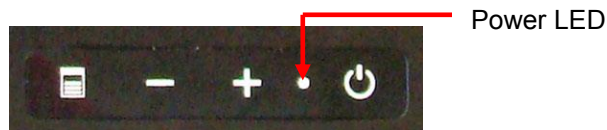
Power LED



Figure 32  Front touch pad with LED indicator

When it is On, the power LED will have the following states:

- **Green** indicates the display is receiving power.
- **Amber** indicates the display is in standby mode.
- **Red** indicates the display is registering an error.
- **Black** indicates the display is receiving no power.

Highlight **Technician→Front Panel LED** and press **Menu**.

Use **+** and **–** to set the option and then press **Menu**.

Press **Exit** to exit the OSD.

## 9. MAINTENANCE: TENSION ADJUSTMENTS

Arm mounting diagrams and the tools required to adjust the tension. Adjust the screen's tilt, if necessary, by torquing the 8-32 socket head cap screws. **Note**: You cannot adjust the tension on the rectangular arms.
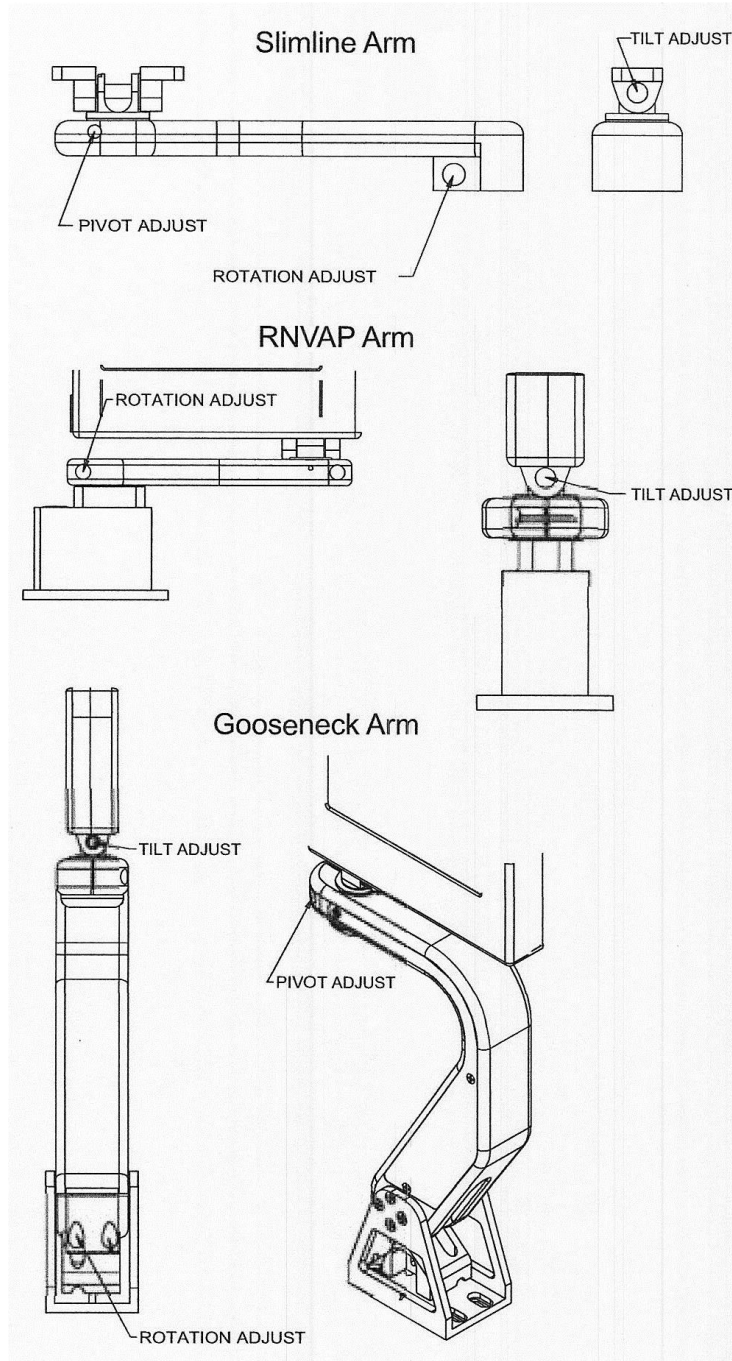
Figure 33  Tension adjustment points for arm mount displays

## 10. TECHNICAL REFERENCES AND SUPPORT

**➡ NOTICE**     Always check the Rosen Aviation website under the Products tab to ensure that you are working with the most current revision of technical documentation.

If you need assistance in configuring a personal display to work with an HD system, please contact Rosen Aviation Technical Support at 541.342.3802.

### 10.1. Troubleshooting

If the display does not function properly, refer to the following troubleshooting table for symptoms and possible solutions before contacting Rosen field support.

**Note:** Always use a multimeter to verify voltages. Check actual results against the requirements described in this manual.

Table 1  Troubleshooting tips and solutions

| Problem | Possible Solutions |
|---|---|
| No video (signal) | • Verify that the display is turned on and the video source is supplied.<br>• Verify that a signal is reaching the display using another display.<br>• Check Power Mode settings on page 23.<br>• Verify that the pinout is correct. |
| Screen is black | • Verify that the display is receiving power.<br>• Check Power Mode settings on page 23.<br>• Verify that the pinout is correct.<br>• Verify that the video source is supplied and a disc is installed (if required).<br>• Verify all connections between the source and the display. |
| Image flickers | • Verify that the signal cable is secure.<br>• Verify that the vertical frame frequency of the incoming video is 75 Hz or less. |
| Distorted Image | • Verify supported resolution.<br>• Check Power Mode settings on page 23.<br>• Verify that the pinout is correct.<br>• Verify that a signal is reaching the display using an oscilloscope or another display.<br>• Examine the display for pinched or damaged cables. |
| Wrong Colors | • If the screen colors are not what you expect, reset the current scheme. For more information, see Reset Scheme on page 17 and Restore Defaults on page 19. |

## 10.2. Cleaning the Display

To clean the LCD, very gently wipe the screen with a clean, commercially approved LCD cleaning cloth and alcohol-free LCD cleaning solution. Use one firm cleaning motion instead of circular or repeated side-to-side scrubbing.

## 10.3. RTCA DO-160F Qualifications for Displays

The table below shows the DO-160 compliance of the personal monitors. Omitted categories are not applicable to these products or the expected installations. For specific details about qualification compliance, please contact Rosen for an individual product's qualification test report.

Table 2  DO-160F test categories

| Description | Section | Category | Comments |
|---|---|---|---|
| **Temperature and Altitude** | **4** | | |
| Ground Survival/Short-Time Operating Low Temp | 4.5.1 | A1 | |
| Operating Low Temperature | 4.5.2 | A1 | |
| Ground Survival/Short-Time Operating High Temp | 4.5.3 | A1 | |
| Operating High Temperature | 4.5.4 | A1 | |
| In-flight Loss of Cooling | 4.5.5 | – | Not applicable |
| Altitude | 4.6.1 | A1 | |
| Decompression | 4.6.2 | A1 | 8,000 – 50,000 ft. |
| Overpressure | 4.6.3 | A1 | |
| **Temperature Variation** | **5** | | |
| Temperature Variation | 5.3.1 | C | |
| **Humidity** | **6** | | |
| Humidity | 6.3.1 | A | |
| **Operational Shocks & Crash Safety** | **7** | | |
| Operational Shocks | 7.2.1 | B | |
| Crash Safety (Impulse) | 7.3.2 | B | |
| Crash Safety (Sustained) | 7.3.3 | B | |
| **Vibration** | **8** | | |
| Random Vibration – Fixed Wing Aircraft | 8.5.2 | S (Curve B) | |
| **Magnetic Effect** | **15** | | |
| Magnetic Effect | 15.3 | A | |

| Description | Section | Category | Comments |
|---|---|---|---|
| **Power Input** | **16** | | |
| **Normal Operating Conditions (DC)** | **16.6.1** | | |
| Average Value Voltage (DC) | 16.6.1.1 | Z | |
| Ripple Voltage (DC) | 16.6.1.2 | Z | |
| Momentary Power Interruptions (DC) | 16.6.1.3 | Z (A) | Seamless operation through 200 msec, EUT must self-recover for interruptions longer than 200 msec. |
| Normal Surge Voltage (DC) | 16.6.1.4 | Z | |
| Engine Starting Under Voltage Operation (DC) | 16.6.1.5 | Z | |
| **Abnormal Operating Conditions** | **16.6.2** | | |
| Voltage Steady State (DC) | 16.6.2.1 | Z | |
| Momentary Under Voltage (DC) | 16.6.2.3 | Z | |
| Abnormal Surge Voltage (DC) | 16.6.2.4 | Z | |
| **Voltage Spike** | **17** | | |
| Voltage Spike | 17.4 | A | |
| **Audio Frequency Conducted Susceptibility** | **18** | | |
| AF Conducted Susceptibility- Power Inputs | 18.3.1 | Z | |
| **Induced Signal Susceptibility** | **19** | | |
| Magnetic Fields Induced Into Equipment | 19.3.1 | AC | |
| Magnetic Fields Induced Into Interconnecting Cables | 19.3.2 | AC | |
| Electric Fields Induced Into Interconnecting Cables | 19.3.3 | AC | |
| Spikes Induced Into Interconnecting Cables | 19.3.4 | AC | |
| **Radio Frequency Susceptibility** | **20** | | |
| Conducted Susceptibility (CS) – 10 kHz to 400 MHz | 20.4 | T | |
| Radiated Susceptibility (RS) – 100 MHz to 18 GHz | 20.5 | T | |

| Description | Section | Category | Comments |
|---|---|---|---|
| **Emission of Radio Frequency Energy** | **21** | | |
| Conducted RF Emission | 21.4 | M | |
| Radiated RF Emission | 21.5 | M | |
| **Electrostatic Discharge (ESD)** | **25** | | |
| Electrostatic Discharge (ESD) | 25.5 | A | |
| **Flammability** | **26** | N/A | Flammability testing in accordance with 14 CFR 25.853 Appendix F |

## 10.4. Specifications

See the appropriate Outline and Installation drawings on the Rosen Aviation website for display specifications.

### 10.4.1. Supported Composite/Composite Resolutions
NTSC (480i/29)
PAL (576i/25)
SECAM (576i/25)
RS-170 B&W (480i/29)

### 10.4.2. Supported SDI Resolutions
480i/29
576i/25
720p/50, 720p/59, 720p/60
1080i/25, 1080i/29, 1080i/30
1080p/23, 1080p/24, 1080p/25, 1080p/29, 1080p/30, 1080p/50, 1080p/59, 1080p/60

## 11. DEFINITIONS

**3G HD-SDI**    Newer, high-definition serial digital interface with a single 2.970 G/bit/s serial link

**AF**    Audio frequency

**AGC**    Automatic Gain Control

**CFR**    Code of Federal Regulations

**CS**    Conducted susceptibility

**CVBS**    Composite video blanking and sync

**DC**    Direct Current

**DVI**    Digital Visual Interface

**EUT**    Equipment under test

**HD**    High Definition

| | |
|---|---|
| **HDMI** | High Definition Multimedia Interface |
| **IR** | Infrared |
| **LCD** | Liquid Crystal Display |
| **LED** | Light Emitting Diode |
| **NTSC** | National Television Standards Committee. A video standard used in the United States, Canada, Japan, Mexico, the Philippines, South Korea, Taiwan, and some other countries. |
| **OSD** | On Screen Display – the actual user/technician menu, and any informational readouts displayed on the image. |
| **P/N** | Part Number |
| **PAL** | Phase Alternating Line. A video standard used in Europe, China, Malaysia, Australia, New Zealand, the Middle East, parts of Africa, and other parts of the world. |
| **PC** | Personal computer |
| **RF** | Radio frequency |
| **RGB** | Red, Green, Blue |
| **RS-232** | Standard for serial binary data interchange |
| **SDI** | Serial Digital Interface |
| **SECAM** | (*Séquentiel couleur à mémoire.*) French for "sequential color with memory," an analog color video system first used in France. |
| **V** | Volts |
| **VDC** | Volts direct current – voltage from an aircraft battery or generator |
| **Vpp** | Volts peak-to-peak |
| **W** | Watts |

## 12. REVISION HISTORY

**NOTICE** Revision E is limited to draft or prototype documents. Revisions I, O, Q, S, X and Z are not to be used.

| Revision | Date | Revision Description | EC |
|---|---|---|---|
| A | 08/23/11 | Initial release | 11534 |
| B | 11/29/11 | Harness and set screw adjustments at limit switch for in-seat monitors | 11727 |
| C | 01/15/13 | Add features for the G280 bases and displays; consolidate instructions for setting similar Image Adjust and Image Position menu options; update template, installation guidelines, and DO-160 table | 13-0025 |
| D | 04/16/13 | Add Mode Menu to the Technician Menu for models 9000-3xx; update troubleshooting tips | 13-0156 |
| F | 03/13/14 | Update cover photo and Section 10.2, cleaning the display | 14-0082 |