Black Opal Flat Panel Displays
Model Range

INTRODUCTION

This document describes models from four groups of Laserdyne's Black Opal displays:

the Black Opal **Xtreme (Air** and **Land**) range;
the standard Black Opal **RMU** range; and
the Black Opal **HD** range.

All models feature LED backlit LCDs.

A full listing of currently available models is shown in this document.

Options are available for each range, and models may be customised depending upon contract quantity.

All Black Opal displays are designed for surveillance, reconnaissance, observation, and sighting, including remote/indirect viewing of video images generated by day, night or thermal cameras, weapons systems, and also display computer based imagery and special formats such as those generated for radar consoles (e.g. RS343). They may also be integrated with computer-based equipment via a serial communications port.

All Black Opal displays have several features designed to increase the effectiveness and value of surveillance, sighting and security systems, including:

Image Enhancement;
Digital Zoom;
Freeze Frame;
Colourisation;
Motion ("edge tearing") compensation; and
Overlay (chroma keying) capability.

Each model features *MultiVision*, allowing for several video and 1 "PC" type inputs, and providing simultaneous display of up to two video inputs and one PC input at full frame rates.

Many display applications require the presentation of 2 or more inputs, either as split screen (horizontal or vertical), picture(s)-in-picture, single input layout readily changeable to view each input, and so on. Black Opal displays employ a series of screen Layouts (on-screen configurations) to maximise the display utility, and thus the effectiveness of the operator.

These Layouts are factory set, but may also be configured by the integrator and/or the operator. Configuration consists not only of how one or more inputs are presented, but also of the video channel to be output, and of a variety of on-screen settings such as saturation and contrast, thus ensuring that the operator has optimum viewing settings tailored for each individual screen Layout.

Layout settings are retained by the unit individually for each Layout, but may be reconfigured at any time.

BLACK OPAL XTREME RANGE

The Xtreme range are a reduced weight/reduced cost subset of the Black Opal display type:

Xtreme Air, airborne special, designed for airborne use; and

Xtreme Land, ground mobile special, designed for land vehicle use.

As well as Standard Definition connectivity, Xtreme displays feature digital HD capability, accepting HD video inputs and portraying them as user configurable best-fit to the LCD.

They retain the advanced video features and generally high level of ruggedisation for which Black Opal displays are renowned.

Xtreme Air

Some of the stringent sealing and other measures required for land and seaborne operations have been relaxed. They are engineered specifically for rotary wing aircraft, especially for military and paramilitary applications, with sizes ranging from a compact 6.5 to 19 inch diagonal, including one widescreen model.

Xtreme Land

Some of the stringent measures required for air and seaborne operations have been relaxed. They are engineered specifically for land vehicles, either wheeled or tracked, especially for military and paramilitary applications, with sizes ranging from a compact 6.5 to 19 inch diagonal, including one widescreen model.

Options (order quantity dependant) available for the Xtreme Air range of displays (8" and above) include:

multifunction buttons (extended mounting flange);

touchscreen;

single board computer (SBC); and

internal recording facility (Standard Definition).

Model	Description
Xtreme series	

Xtreme series

mini 6"

8"

9" wide

10"

12"

15"

19"

Suitability

- dedicated to use in helicopters (Xtreme Air) or land vehicles (Xtreme Land);
- reduced weight and cost;
- versatile mounting options;
- designed to withstand vibration, shock, and extended temperature operation, EM shielded.

Readability

- readable in full direct sunlight (10^5 lux);
- readable with night vision devices (adjustable low intensity backlight, green or red selectable 8" and above);
- backlit buttons (adjustable, green or red selectable 8" and above);
- anti-reflection coated window.

I/O (MultiVision system)

- Inputs   - multiple analogue and SDI video inputs (for SD, HD and other analogue video formats, and PC RGB inputs), and providing simultaneous display of up to 6 inputs;
- display   - up to 6 simultaneously;
- outputs   - analogue and SDI.

Mounting

- panel mount - through-holes in flange;
- side mount   - tapped holes on each side;
- rear mount   - VESA 75 type, on smaller models.

Model	Description	
Xtreme Air/Land mini6	Black Opal airborne special - helicopter dedicated design, or or ground mobile special – land vehicle dedicated design, 6.5", compact high brightness, XGA resolution.	**Display** 6.5" 4:3 LCD, 1,024 pixels x RGB x 768 lines, (XGA) resolution, 24 bit (16M) colour scale, 8 bit (256) grey scale. **Backlight** adjustable to over 800 nit.
Xtreme Air/Land 8	Black Opal airborne special - helicopter dedicated design, or or ground mobile special – land vehicle dedicated design, 8.4", high brightness, SVGA resolution.	**Display** 8.4" 4:3 LCD, 800 pixels x RGB x 600 lines, (SVGA) resolution, 24 bit (16M) colour scale, 8 bit (256) grey scale. **Backlight** adjustable to over 1,000 nit.
Xtreme Air/Land 9W	Black Opal airborne special - helicopter dedicated design, or or ground mobile special – land vehicle dedicated design, 9", widescreen high brightness, ¼ HD resolution.	**Display** 9" 16:9 LCD, 960 pixels x RGB x 540 lines, (¼ HD) resolution, 24 bit (16M) colour scale, 8 bit (256) grey scale. **Backlight** adjustable to over 1,000 nit.

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Model	Description
Xtreme Air/Land 10	Black Opal airborne special - helicopter dedicated design, or or ground mobile special – land vehicle dedicated design, 10.4", high brightness, XGA resolution.	**Display** 10.4" 4:3 LCD, 1,024 pixels x RGB x 768 lines, (XGA) resolution, 24 bit (16M) colour scale, 8 bit (256) grey scale. **Backlight** adjustable to over 1,200 nit.
Xtreme Air/Land 12	Black Opal airborne special - helicopter dedicated design, or or ground mobile special – land vehicle dedicated design, 12.1", high brightness, XGA resolution.	**Display** 12.1" 4:3 LCD, 1,024 pixels x RGB x 768 lines, (XGA) resolution, 18 bit (262k) colour scale, 8 bit (256) grey scale. **Backlight** adjustable to over 1,000 nit.
Xtreme Air/Land 15	Black Opal airborne special - helicopter dedicated design, or or ground mobile special – land vehicle dedicated design, 15", high brightness, XGA resolution.	**Display** 15" 4:3 LCD, 1,024 pixels x RGB x 768 lines, (XGA) resolution, 24 bit (16M) colour scale, 8 bit (256) grey scale. **Backlight** adjustable to over 1,000 nit.

Model	Description
Xtreme Air/Land 19	Black Opal airborne special - helicopter dedicated design, or or ground mobile special – land vehicle dedicated design, high brightness, SXGA resolution. **Display** 19" 5:4 LCD, 1,280 pixels x RGB x 1,024 lines, (SXGA) resolution, 24 bit (16M) colour scale, 8 bit (256) grey scale. **Backlight** adjustable to over 1,000 nit.

STANDARD BLACK OPAL RANGE

The standard (designated RMU) range is a subset of the Black Opal display type, specially designed for challenging environments, and has the longest history of any of the Black Opal ranges.

They are engineered for use in a variety of vehicles including rotary wing aircraft, especially for military and paramilitary applications. Black Opal RMU displays are deployed throughout the world, and have been in service for over 10 years.

While many of the models in this range have been superseded by the Xtreme and HD ranges, a few remain in production due to popularity, programme continuity, and to support previous programmes.

Options (order quantity dependant) available for the standard Black Opal range of displays include:
single board computer (SBC); and
internal recording facility (Standard Definition).

Model	Description
Standard RMU series **8" (HS)** **8" (HM)** **12"**	**Suitability** • land, sea or airborne applications; • designed to withstand vibration, shock, and extended temperature operation, EM shielded. **Readability** • readable in full direct sunlight (10^5 lux); • readable with night vision devices (adjustable low intensity backlight, green or red selectable); • backlit buttons (adjustable, green or red selectable); • anti-reflection coated window. **I/O (MultiVision system)** • Inputs - up to 4 analogue video + 1 PC; • display - up to 2 video and 1 PC simultaneously; • outputs - 1 analogue video. **Mounting (model dependent)** • PFSC35 Dzus fasteners RMU8HS, RMU12HX); or • threaded mounting holes top & bottom (RMU8HM).

Model	Description	
RMU8HS 	Remote Monitor Unit 8.4″ High brightness SVGA.	**Display** 8.4" 4:3 LCD, 800 pixels x RGB x 600 lines, (SVGA) resolution, 24 bit (16M) colour scale, 8 bit (256) grey scale. **Backlight** adjustable to over 1,000 nit.
RMU8HM 	Remote Monitor Unit 8.4″ High brightness Multi-function.	**Display** 8.4" 4:3 LCD, 1,024 pixels x RGB x 768 lines, (XGA) resolution, 24 bit (16M) colour scale, 8 bit (256) grey scale. **Backlight** adjustable to over 1,000 nit.
RMU12HX 	Remote Monitor Unit 12.1″ High brightness XGA.	**Display** 12.1" 4:3 LCD, 1,024 pixels x RGB x 768 lines, (XGA) resolution, 18 bit (262k) colour scale, 8 bit (256) grey scale. **Backlight** adjustable to over 1,000 nit.

BLACK OPAL HD RANGE

The HD range is Laserdyne's latest technology, with full High Definition video capability, engineered for use in a variety of vehicles including rotary wing aircraft, especially for military and paramilitary applications.

They feature the high level of ruggedisation for which Black Opal displays are renowned, and offer all of the Black Opal advanced video features, now applied to High Definition video.

So far they are available in 9 and 15 inch diagonal widescreen display sizes, with more sizes to follow.

The 15 inch model incorporates a widescreen UXGA (1920 x 1200) resolution LCD.

The 9 inch model makes use of a ¼ HD resolution LCD to provide the best, least processed image to a small display. Currently available LCDs with full HD resolutions are usually at least 15" diagonal size – impractical in many cases. The 9 inch ¼ HD model is **an excellent solution for HD applications requiring smaller displays**. The inputs are processed to screen as follows:

For 1080i input, no detrimental interpolation artifacts (due to downscaling) occur as each field of the input image (1920x540) is converted to 960x540 by simply averaging each adjacent pixel pair. No vertical interpolation is required. Latency of the image is kept to below ¼ of a field.

For 720p input, the image is downscaled in x and y to provide a fit to the display, resulting in a slight loss of vertical resolution, but still with less than ¼ of a frame latency.

Standard definition inputs (480i, 576i) are also supported, being able to be displayed in 4:3 aspect or letterbox.

Black Opal HD models feature multifunction button arrangements as standard.

Options (order quantity dependant) available for the Black Opal HD range of displays include:
touchscreen.

Model	Description
HD series **9"** **15"**	**Suitability** • land, sea or airborne applications; • High Definition inputs and display; • multi-function capability with assignable buttons for control of external devices via comms port; • designed to withstand vibration, shock, and extended temperature operation, EM shielded. **Readability** • readable in full direct sunlight (10^5 lux); • readable with night vision devices (adjustable low intensity backlight, green or red selectable); • backlit buttons (adjustable, green or red selectable); • anti-reflection coated window. **I/O (MultiVision system)** • Inputs - 4 x 3G-SDI [2 simultaneous channels on-screen], 4 x analogue inputs (supporting 1 x component/RGB and 1 x CVBS, or 4 x CVBS) [1 channel only on-screen]; • display - up to 2 video simultaneously; • outputs - SDI. **Mounting** • 9": panel mount - PFSC25 Dzus fasteners, side mount - tapped holes on each side, rear mount - VESA 75 type; • 15": threaded holes top and bottom, through-holes in corners.

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Model	Description	
D9QUW	Display 9" Quarter WUXGA Widescreen	**Display** 9" 16:9 LCD, 960 pixels x RGB x 540 lines, (¼ HD) resolution, 24 bit (16M) colour scale, 8 bit (256) grey scale. **Backlight** adjustable to over 900 nit.
D15UW	Display 15 .4" WUXGA Widescreen	**Display** 15.4" 16:10 LCD, 1,920 pixels x RGB x 1,200 lines, (WUXGA) resolution, 21 bit (7M) colour scale with dithering, 8 bit (256) grey scale with dithering. **Backlight** adjustable to over 1,000 nit.

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