JVC

VICTOR COMPANY OF JAPAN, LIMITED
AV & MULTIMEDIA SECTOR

Printed inJapan
XXX-0000

JVC
PROFESSIONAL

D-ILA™ PROJECTORS

Sales Manual

D-ILA™
The look of superior technology

Contents

D-ILA method

The “D-ILA method” is a method of picture projection that uses JVC’s original “D-ILA device”. Based on JVC‘s ILA® projector which has more than a 40% share of the professional large-screen projector market, the “D-ILA device” offers the same basic performance in a more compact, lighter, and less expensive design.

The projector incorporating this “D-ILA device” is the “D-ILA multimedia projector”.

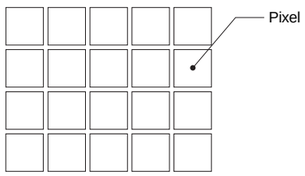
“D-ILA” stands for Direct drive Image Light Amplifier.

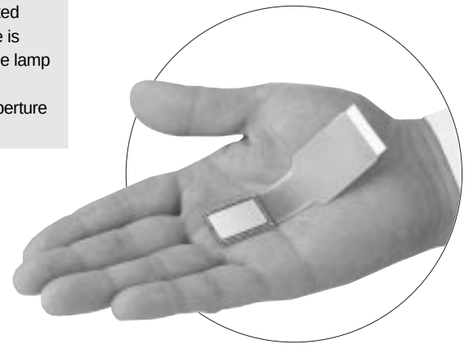
Just as an audio amplifier amplifies sound, the D-ILA device amplifies light to produce a picture.

This technology is applicable not only to front projection, but also such applications as an engine section for the rear-projection system.

• *The “D-ILA device” was originally developed and is manufactured by JVC.*

The D-ILA device is a high-density element with 1365 x 1024 pixels packed onto a small 0.9" (diagonal, 4:3) chip. Because it is so dense, this device is able to achieve a high aperture ratio (93%) that ensures that light from the lamp is utilized at top efficiency.
Gaps between pixels are extraordinarily small, making possible a high aperture ratio.



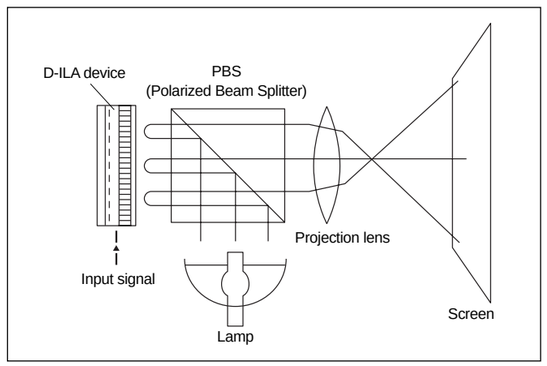


D-ILA™ multimedia projector lineup

DLA-G20

DLA-S15

The D-ILA method reflects the light from the lamp and uses it to produce a picture. Because the light use efficiency is so high, the device can be called a “light amplifier”.



What is the D-ILA multimedia projector?

D-ILA eliminates the trade-off between the high brightness and high resolution.

The D-ILA multimedia projector is able to project a clear, bright, high-resolution image onto a large screen. Vivid images can be achieved even in a bright room.

Bright large screen

● **High-brightness projection**
The D-ILA device is coupled with a newly developed 520 W xenon lamp to enable powerful light output of 2000 ANSI lumens.

● **High-quality large-screen projection**
Powerful light output of 2000 ANSI lumens ensures superb large-screen projection images on the recommended 300" (diagonal, 4:3) and max 521" (diagonal, 4:3) screens.

High picture quality

● **High-precision projection**
The D-ILA device provides high resolution of 1365 x 1024 pixels, enabling S-XGA images to be projected without compression or loss of quality. Horizontal resolution of 1000 TV lines (4:3) is achieved and pictures are clear and sharp, making it ideal for high-definition TV and personal computer images. With the ADPC (Adaptive Digital Pixel Conversion) circuit, resized pictures from various sources can be reproduced naturally with high picture quality.

● **Natural color reproduction**
A xenon lamp is used because the color balance of the light it emits is close to natural light. A high-performance color decomposition/composition mechanism is also used to ensure natural color reproduction.

● **Excellent gradation reproduction performance**
Superior reproduction of dark areas as well as light areas is essential for top projector performance. The D-ILA multimedia projector’s high contrast of 350:1 allows it to accurately reproduce all gradations from light to dark.

Convenience

● **Compatible with various video signal formats**
Computer signals of up to 1280 x 1024 dots and horizontal sync frequency of 82 kHz can be projected. Built-in multi-scanning enables one projector to project not only TV and video signals but also HDTV, personal computer and workstation signals. The 5:4/4:3/16:9 aspect ratio is automatically switched according to the projection source. (Manual mode can also be selected with some models.)

● **Flexible installation**
Using the powered zoom lens, the screen size and throw distance can be adjusted to suit the distance and position of the screen. This versatile lightweight projector can also be suspended from a ceiling with the dedicated hanging metal fittings. The left-right and up-down inversion function allows rear projection (a rear-projection model with 1:1 wide lens is available).

● **Various convenient functions**
Wired computerized remote control is possible via the control connector (RS-232C). 19 picture characteristic presets are provided, allowing picture characteristics to be adjusted independently to suit the video source. (When more than one video source with the same or similar sync frequency is used, independent adjustment may not be possible.)
Lamps can be replaced by the user, so maintenance is easy.

• *The specifications of the DLA-G20 are shown.*

High resolution

■ **High-density reflective device (D-ILA device)**
1365 x 1024 dots, aspect ratio of 4:3
1280 x 1024 dots, aspect ratio of 5:4, S-XGA full resolution

High brightness

■ **High aperture ratio (93%)**
■ **High reflective ratio device (D-ILA device)**
■ **Newly-developed 520 W xenon lamp**
1000 ANSI lumens

High contrast

■ **Continuous use of vertically-aligned liquid crystals established with the ILA device**
More than 250:1
350:1 achieved with the DLA-G20

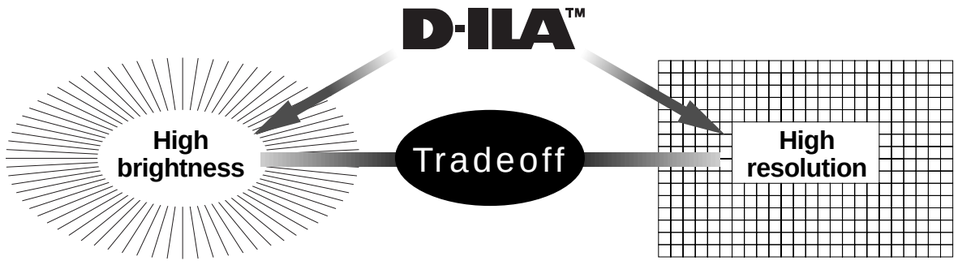
High picture quality

■ **10-bit digital gamma correction※**
Faithful reproduction of dark and bright parts
Excellent gradation reproduction
■ **Newly-developed xenon lamp**
Faithful color reproduction

Excellent operability

■ **Ready for various sources:**
ADPC (Adaptive Digital Pixel Conversion) circuit for multi source, optimum pixel density conversion for data, natural picture and moving picture, and high-speed digital processing
■ **Maintenance free:**
Maintenance needs only lamp replacement which the user can perform.
■ **Portability:**
Thanks to the compact, high-density D-ILA device, this high-performance projector is remarkably small (smallest in the S-XGA full resolution class) and lightweight (14 kg), making it extremely portable.

The D-ILA device has been designed to overcome the **trade off between "brightness" and "resolution"** that plagues conventional CRT and LCD projection methods. With D-ILA, instead of boosting one at the expense of the other, high resolution can be maintained while the light output of the main unit itself can be strengthened. As a result, large-screen projection capability can be provided. JVC likes to refer to the D-ILA method as "the third method".



※ **Digital gamma correction**
The brightness characteristics of the strong and weak parts of the drive voltage (video signal) are called "gamma characteristics". The straighter this curve, the better the gradation expression, ensuring more accurate gray scale reproduction.

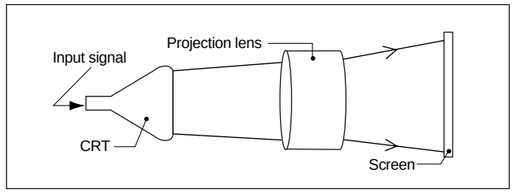
If "gamma characteristics" are poor, gradations cannot be expressed accurately, resulting in "flat black" or "white blurring" on the screen. To improve this, "gamma correction" is carried out. However, this is difficult if the device itself has an extreme "gamma characteristic". Because gamma correction works best when performed at as low a level as possible so the device's "gamma characteristic" should be relatively mild.

The D-ILA device has a mild "gamma characteristic" because the gradation degree is controlled with the polarized light degree. In the past, gamma correction was done with analog processing. With the D-ILA, the signal is digitized and corrected using precise 10 bit processing to ensure accurate gradation reproduction close to that of CRT.
(With the LCD method, the gamma curve is not linear so reproduction of gradations in near-white or near-black areas tends to be difficult.)

How does the D-ILA method avoid the trade off between "high brightness" and "high resolution"?

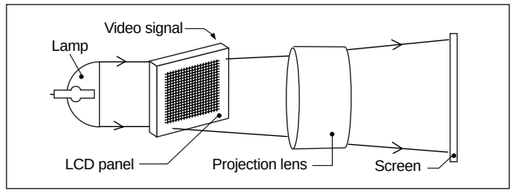
Most video projectors use either the CRT method or the LCD method. However, both methods suffer from having to make a tradeoff between high brightness and high resolution.

■ CRT method



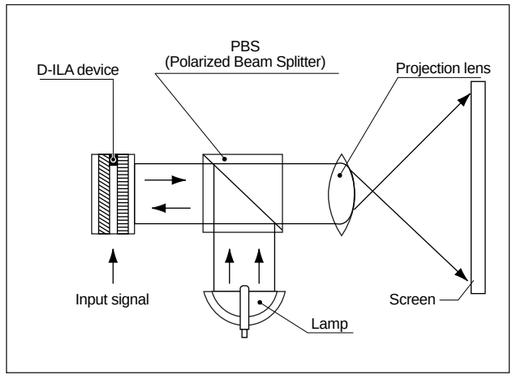
As shown in the figure on the left, the CRT method enlarges and projects optically the picture projected onto the CRT with the lens. To increase the brightness, the brightness of the CRT projection tube itself has to be increased. However, to increase the brightness of the image, a large amount of current is required. As a result, beams are expanded, degrading the resolution.
► **"High brightness" and "high resolution" conflict.**

■ LCD method



As shown in the figure on the left, the LCD method irradiates the LCD panel with the lamp and its transmitted light is optically enlarged and projected. The LCD panel is divided by pixels. Therefore, to increase the resolution, the number of pixels has to be increased. However, the result is that the aperture ratio (transmittivity of the light) is decreased, degrading the brightness. As there are lines to pass through video signals in the lattice section, some degree of thickness is required. Also, a pixel driving transistor is provided at the corner of each pixel. Consequently, it is structurally impossible to increase the aperture ratio. To compensate for this, a high output light source lamp must be used. However, the light transmission loss on the LCD panel is converted to heat energy, generating heat and damaging the LCD panel. As a result, bright lamps must be used with great care.
► **"High brightness" and "high resolution" conflict.**

■ The third method D-ILA



The D-ILA method overcomes the tradeoff between "high brightness" and "high resolution" by using the construction as shown in the figure on the left. As you can see, the D-ILA method optically amplifies the video signal with the D-ILA device. The resolution is determined by the pixel division of the panel. The D-ILA device integrates 1365 x 1024 dots on an 0.9" (diagonal, 4:3) panel to achieve exceptionally high resolution. In addition, the pixels are controlled from the C-MOS located at the rear, so it is not necessary to pass a line through the gap between pixels. This means there is no restriction on how close the pixels can be, making it possible to achieve a high aperture ratio of 93% and produce a clear picture without noticeable cross stripes.
The light emitted from the lamp enters the D-ILA device via the PBS (Polarized Beam Splitter). As most light is reflected when a picture is optically amplified, the light is not converted to the heat on the D-ILA device. So, the D-ILA device is not damaged by the heat in principle.As a result, a high output lamp can be used as a light source, achieving the high brightness.
► **"High brightness" and "high resolution" are not in conflict.**

D-ILA method present condition and subject

D-ILA multimedia projector technical description

D-ILA multimedia projector offers both high brightness and high resolution.

In world that is becoming increasingly digital, day by day, a device capable of projection of high-resolution computer graphics and digital video is becoming indispensable. D-ILA is capable of producing a high-resolution, high-contrast, big-screen image far brighter than conventional projection systems and viewable from a wider angle than ever.

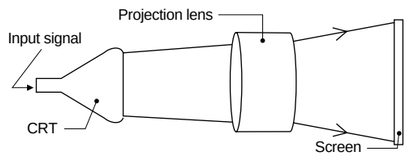
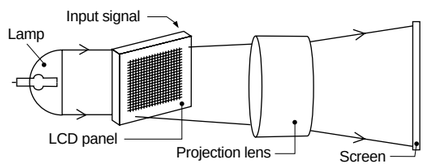
The conventional direct-view-type display is also changing to meet the demand for large-screen displays. However, the size of these displays is limited. As a result, demand for projectors which enlarge images optically and reproduce them on a large screen is growing.

The performance characteristics required of a high picture quality projector are listed below.

1. Large screen for an event hall
2. Higher brightness than in a movie theater
3. High resolution ready for high-definition TV
4. Input signal for multimedia

To satisfy these requirements, we developed the D-ILA multimedia projector.

Table 1 Outline of projector methods

Methods	Basic construction	Features
CRT		• Both the maturity degree and compatibility with conventional systems are high. • With no pixel construction, this method is easily fit to various signal forms. • To enhance the brightness, the amount of beam is increased, resulting in the lowered resolution and heat generation.
LCD		• With a single panel, this method is easily fit to the mass production. • As this is constructed with the pixel unit, the input signal form is limited. • The light use efficiency is low. • To increase the resolution, the aperture ratio is lowered, resulting in the lowered brightness and heat generation.

Outline of each projector method

Conventional projection methods: CRT projection tube method and LCD (liquid crystal) method. The construction and features of each method are outlined in **Table 1**.

The CRT method has been in use for a long time and the characteristics of its input signals are excellent. However, the higher the brightness, the larger the beam diameter, resulting in degraded resolution. At the same time, heat is produced when beams run into the phosphor screen. As a result, brightness and resolution are limited, resulting in an unsatisfactory tradeoff.

The LCD method offers compactness, light weight and mass-production. However, when the resolution is increased, the aperture ratio (area rate of effective pixel section) is lowered, resulting in decreased brightness and heat generation due to the light and heat conversion in non-aperture section (ineffective pixel section).

As a result, brightness and resolution are limited, resulting in an unsatisfactory tradeoff.

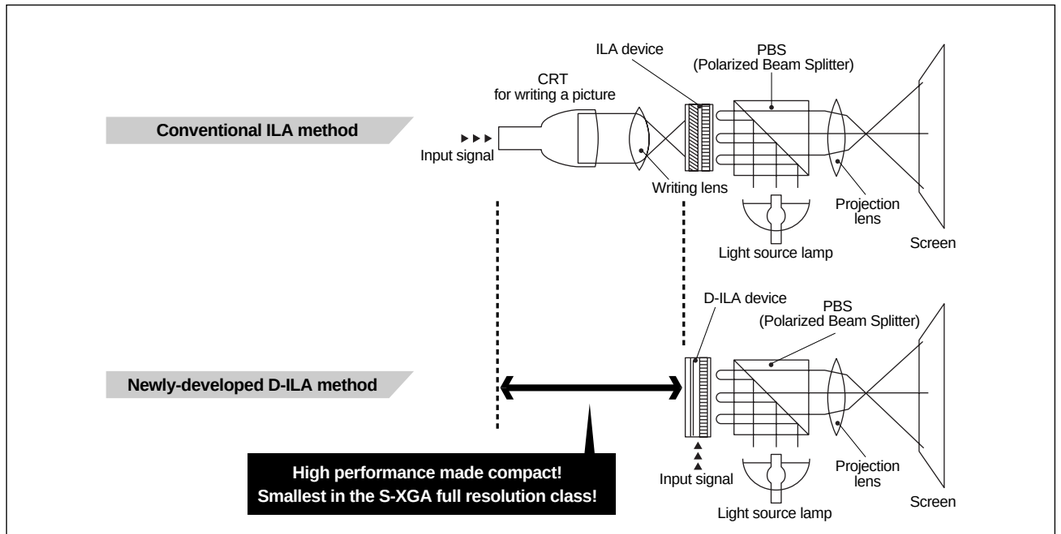
Even though both methods have been improved, they are still subject to a tradeoff between brightness and resolution. To maximize performance, projectors are often stacked in multiple configurations.

The ILA projector solves the tradeoff between brightness and resolution with a new method using a spatial light amplification device (ILA device).

In order to maintain high performance, while achieving a more compact design JVC developed the D-ILA method. As shown in **Fig. 1**, while the conventional ILA method uses the CRT to write a picture, the D-ILA method writes video signals directly and electrically to the device.

As a CRT and writing lens are not required, the body of the projector can be greatly reduced, while still achieving brightness of 2000 lumens — the highest in the S-XGA full resolution class.

Fig.1: Comparison between the ILA method and D-ILA method



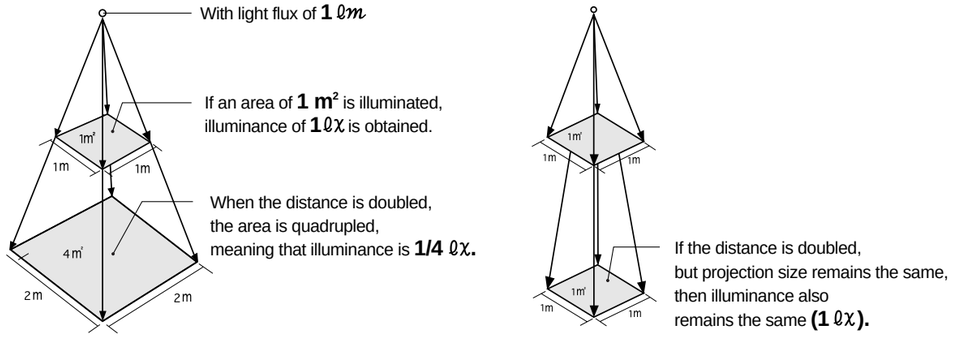
"Brightness" basics

Brightness levels can be expressed in various ways (units).

Unit	Symbol	Reading	Description
Light flux	lm	Lumen	The light output of a projector itself. A projector's basic brightness performance is easy to measure. However, the actual brightness can vary depending on the settings used and other factors. When comparing brightness performance, these settings should be checked. (eg.: 10% peak, all-white, etc., refer to (2) on the next page.)
Illuminance	lx	lux	To measure illuminance, the projected screen size (area), as well as the lm reading, is taken into consideration. When an area of 1 m^2 is projected with light output of 1 lm, illuminance is 1 lx. Therefore, the smaller the projection area, the larger the value of lx, even when the lm value remains the same. Similarly, the larger the projection area, the smaller the value of lx. It is important to know the projection screen size when assessing the lx value. If the value seems very high, it may be based on a very small projection screen size.
Intensity	cd/m^2	Candela per square meter	Intensity is a measure of the amount of light reflected from the screen. This is what people normally experience as brightness. Intensity is based on the reflectance (gain) of the screen and the illuminance (lx). Although intensity is a fair reference for brightness, it is important to compare the projector's brightness performance carefully. Because screen area and reflectance are added to the calculation, the intensity value can vary widely according to different conditions.
	nit	Nit	
	ft-L	Foot-lambert	

Brightness levels can be expressed in various ways (units).
Screen brightness is not related to throw distance. It is determined by projection size and screen reflectance (gain) unless the projection space is smoky or hazy. Even with a long throw distance, the brightness remains the same if the projection size is set to the same value by changing the lens magnification. The relationship is shown below.

Relationship among the projector light output, screen area and illuminance



Formula

Illuminance (lx) = Light flux (lm) / Screen area (m^2)

Intensity (cd/m^2) = Illuminance (lx) × screen reflectance (gain) / (radian) ≒ 3.14

ft-L = dc/m^2 × 0.292
cd/m^2 = nit = ft-L × 3.43
(Nowadays, cd/m^2 is more commonly used than nit.)

• *Catalog data should be compared with the same unit.*

The area of a typical screen

Model (inches) (diagonal)	4 : 3	(16:9) reference
80	1.99 m^2	1.77 m^2
100	3.09 m^2	2.76 m^2
120	4.47 m^2	3.96 m^2
150	6.98 m^2	6.21 m^2
200	12.38 m^2	11.03 m^2
300	27.88 m^2	24.83 m^2

Reference material (1)

Intensity at-a-glance table (with fine bead screen)

Aspect ratio = 4:3
Screen gain = 2.4

Screen size (model, inches)	Model	DLA-G20
	Light output (lm)	1000
	Length	Width	cd / m^2
42	0.85	0.64	1399.18
45	0.91	0.69	1218.84
50	1.02	0.76	987.26
60	1.22	0.91	685.60
70	1.42	1.07	503.71
80	1.63	1.22	385.65
90	1.83	1.37	304.71
100	2.03	1.52	246.82
110	2.24	1.68	203.98
120	2.44	1.83	171.40
130	2.64	1.98	146.04
140	2.84	2.13	125.93
150	3.05	2.29	109.70
160	3.25	2.44	96.41
170	3.45	2.59	85.40
180	3.66	2.74	76.18
190	3.86	2.90	68.37
200	4.06	3.05	61.70
220	4.47	3.35	50.99
240	4.88	3.66	42.85
250	5.08	3.81	39.49
260	5.28	3.96	36.51
280	5.69	4.27	31.48
300	6.10	4.57	27.42

Intensity table (with SF-L060FJ)

Aspect ratio = 4:3
Screen gain = 3.7

Screen size (model, inches)	Model	DLA-G20
	Light output (lm)	1000
	Length	Width	cd / m^2
60	1.22	0.91	1056.97

Intensity table (with SF-L060SJ)

Aspect ratio = 4:3
Screen gain = 3.8

Screen size (model, inches)	Model	DLA-G20
	Light output (lm)	1000
	Length	Width	cd / m^2
60	1.22	0.91	1085.53

Intensity table (with SF-L080S)

Aspect ratio = 4:3
Screen gain = 2.8

Screen size (model, inches)	Model	DLA-G20
	Light output (lm)	1000
	Length	Width	cd / m^2
77.5	1.57	1.18	479.42

Intensity table (with SF-L100FJ)

Aspect ratio = 4:3
Screen gain = 3.0

Screen size (model, inches)	Model	DLA-G20
	Light output (lm)	1000
	Length	Width	cd / m^2
100	2.03	1.52	308.52

DB-70S10 intensity table

Aspect ratio = 4:3
Screen gain = 1.9

Screen size (model, inches)	Model	DLA-S15
	Light output (lm)	1000
	Length	Width	cd / m^2
70	1.42	1.07	400.87

Intensity at-a-glance table (with SF-H1102 Fresnel lenticular)

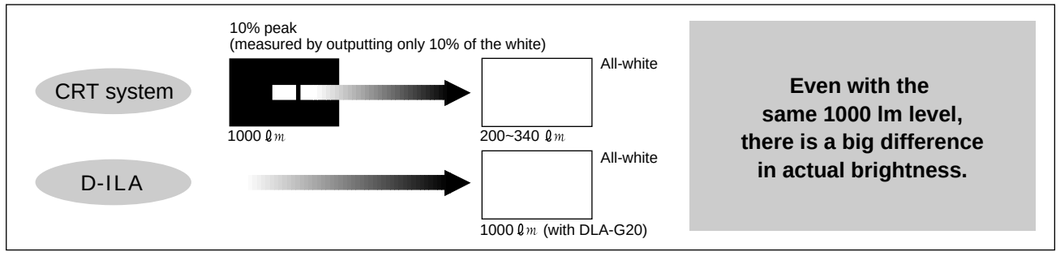
Aspect ratio = 4:3
Screen gain = 3.3

Screen size (model, inches)	Model	DLA-G20
	Light output (lm)	1000
	Length	Width	cd / m^2
100	2.03	1.52	339.37
110	2.24	1.68	280.47
120	2.44	1.83	235.67

- If a mirror for folding a light axis is available, add the reflectance of the mirror to the calculation according to the number of mirrors used.
- The intensity of the Japanese standard theater screen is around 30 to 65 cd/m^2.

Reference material (2)

The value of the light flux (lm) showing the projector's light output varies depending on incidental conditions. The "10% peak" value used for many CRT projectors increases to 3 to 5 times the all-white value. For example, if a CRT projector has a brightness level of 1000 lm at 10% peak, the value at all-white will be from 200 lm to 340 lm. With the DLA-G20, on the other hand, the value at all-white is 1000 lm, making the DLA-G20 3 to 5 times brighter than a CRT projector of the same level. This shows the importance of taking incidental conditions into account when comparing light flux (lm) performance.



Reference material (3)

Projected images can be difficult to see under bright light because the ambient light lowers the contrast ratio by illuminating the screen surface. As a result, the screen (and the image) appears whiter. The contrast ratio is normally classified as shown below. In each case, the reflection limit of the external light on the screen surface is shown as reference. For actual installation, the reflection amount on the screen should not exceed the values shown below.

Reference table for the reflection limit of the external light on the screen (aspect ratio = 4:3)

Required contrast ratio			30 : 1		50 : 1		100 : 1	
Screen size (Inches/model)	Model		DLA-G20	Reference/DLA-S15	DLA-G20	Reference/DLA-S15	DLA-G20	Reference/DLA-S15
	Contrast		250	250	250	250	250	250
	Light output (lm)		1000	1000	1000	1000	1000	1000
	Length (m)	Width (m)	Lux (lx)	Lux (lx)	Lux (lx)	Lux (lx)	Lux (lx)	Lux (lx)
42	0.85	0.64	53.70		29.29		10.98	
45	0.91	0.69	46.78		25.51		9.57	
50	1.02	0.76	37.89		20.67		7.75	
60	1.22	0.91	26.31		14.35		5.38	
70	1.42	1.07	19.33		10.54		3.95	
80	1.63	1.22	14.80		8.07		3.03	
90	1.83	1.37	11.69		6.38		2.39	
100	2.03	1.52	9.47		5.17		1.94	
110	2.24	1.68	7.83		4.27		1.60	
120	2.44	1.83	6.58		3.59		1.35	
130	2.64	1.98	5.60		3.06		1.15	
140	2.84	2.13	4.83		2.64		0.99	
150	3.05	2.29	4.21		2.30		0.86	
160	3.25	2.44	3.70		2.02		0.76	
170	3.45	2.59	3.28		1.79		0.67	
180	3.66	2.74	2.92		1.59		0.60	
190	3.86	2.90	2.62		1.43		0.54	
200	4.06	3.05	2.37		1.29		0.48	
220	4.47	3.35	1.96		1.07		0.40	
240	4.88	3.66	1.64		0.90		0.34	
250	5.08	3.81	1.52		0.83		0.31	
260	5.28	3.96	1.40		0.76		0.29	
280	5.69	4.27	1.21		0.66		0.25	
300	6.10	4.57	1.05		0.57		0.22	

30:1 = The minimum contrast ratio required for a general presentation
50:1 = The minimum contrast ratio required to watch a picture
100: 1 = Contrast ratio acceptable to most people
• *Select the contrast ratio according to the usage conditions.*

Formula

Calculate with $XL = L\left(\frac{1}{C_T} - \frac{1}{C}\right)$

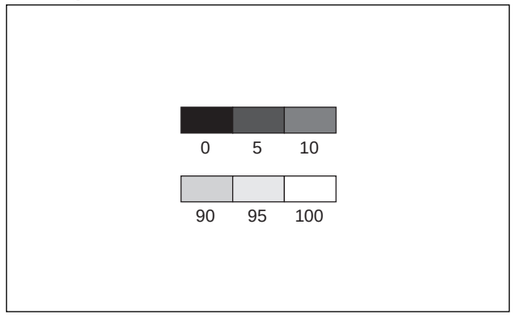
X_L = Reflection illuminance (lx)
L = White illuminance = $\frac{\text{Light output (lm)}}{\text{Screen area (m²)}}$ (lx)
C_T = Required contrast ratio
C = Contrast ratio of the projector

Reference material (4)

ANSI
The light output (lumen) of a projector cannot be clearly understood when different measurement methods are used. When data has been obtained with various measurement methods under different conditions, it is difficult to compare actual performance. To ensure a relatively meaningful basis for comparison, many manufacturers adhere to measurement standards set forth by "ANSI" (American National Standard Institute). The D-ILA is measured according to the ANSI IT 7.228.

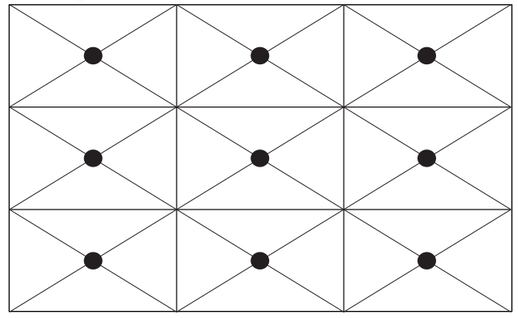
ANSI measurement method
Connect a signal generator and project signals at 100% level (all-white) on the screen.
(1) Project a signal pattern as shown in **Fig.1** and adjust the contrast and brightness so that the difference in lightness of each block can be recognized clearly. In this case, the aspect ratio should be the same for the screen and pattern.
(2) Project the all-white with this contrast and brightness.

Fig. 1



Measure the center point in each zone which is obtained by equally dividing the screen into 9 as shown in **Fig.2**. The ANSI value is obtained by averaging the 9 measured point values. Normally, an illuminance meter is used for measurement. As the measurement unit is lx(lux), obtain the value of lm(lumen) by calculating with the projected screen area.
• *ANSI is shown autonomously by each manufacturer and is not required. At present, the measurement method for light output is not prescribed.*
• *Even though ANSI indication is shown, a unique measurement method may have been used or conditions (1) may not be satisfied. Be careful!*
• *If the fact that the data is obtained according to "American National Standard IT 7.228" is shown on the document, the data is correct.classified as shown below. In each case, the reflection limit of the external light on the screen surface is shown as reference. For actual installation, the reflection amount on the screen should not exceed the values shown below.*

Fig. 2



Reference material (5)

Which is brighter, 1000 lm or 2000 lx (40" type, 4:3)? 2000 lx would seem to be brighter. However, the measurement unit is different. "lm" (lumen) shows the light output while " lx "(lux) shows the illuminance. These vary depending on the screen size.

$$\text{Illuminance (lx)} = \frac{\text{Light output (lm)}}{\text{Screen area (m²)}}$$

Therefore,
the light output (lm) = illuminance (lx) × screen area (m²).
A 40" screen with 4:3 aspect ratio is
0.5 m², lm = 2000 x 0.5 = 1000.
Therefore, 1000 lm and 2000 lx have the same brightness.

What is the difference between the D-ILA projector's "true S-XGA" capability and "S-XGA equivalent" capability offered by other projectors?

S-XGA is a high-resolution display mode used by personal computers with resolution of 1280 x 1024 pixels. Because the D-ILA device features built-in resolution of 1365 x 1024 pixels, it can project an image with full S-XGA resolution without compression or data loss. This is what we mean by "true S-XGA". **(Fig. 1)**

The term "S-XGA equivalent", on the other hand, does not describe a "true" S-XGA picture. Instead, it refers to projected image that is processed so that it resembles an S-XGA picture. Since LCDs in most LCD projectors can reproduce either 800 x 600 (S-VGA) pixels **(Fig. 2)** or 1024 x 768 (XGA) pixels **(Fig. 3)**, they are unable to handle all 1280 x 1024 pixels in an S-XGA display. Therefore, in order to project S-XGA signals, LCD projectors must compress or "thin out" the image data. This means that though the image may appear similar to an S-XGA image, it is not a true "S-XGA" image, since the projector is incapable of displaying the full S-XGA resolution.

Unfortunately, because many people are unaware of the difference between "true S-XGA" and "S-XGA equivalent", they can easily be misled about the true performance characteristics of a projector.

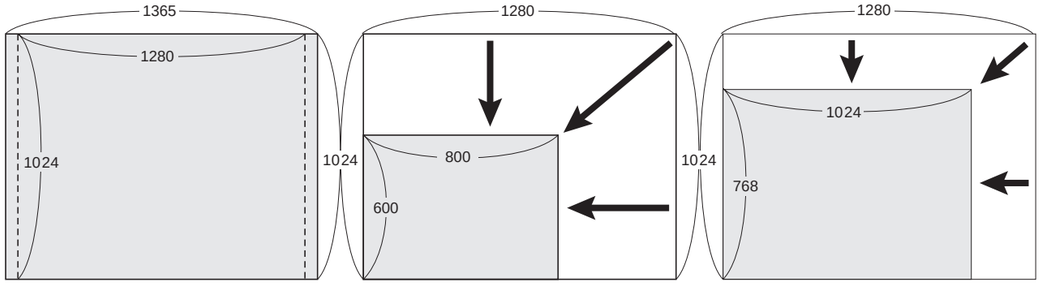
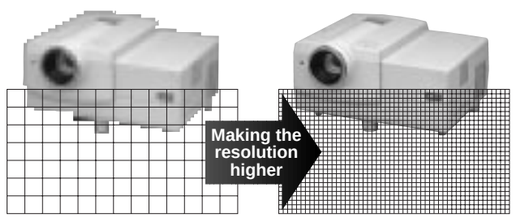


Fig. 1

Fig. 2

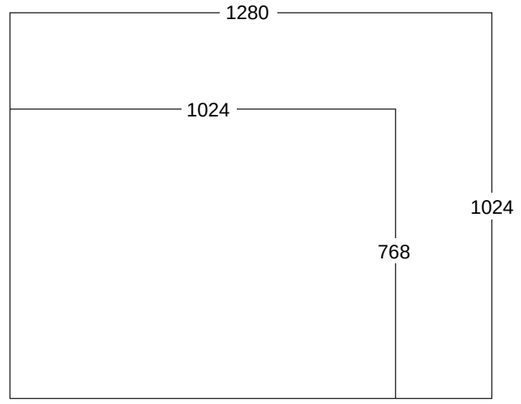
Fig. 3

Is high resolution really necessary?



Resolution is a scale for measuring the precision of the display. With a personal computer display, resolution is expressed by the number of dots or pixels used in the horizontal and vertical directions of the screen. For example, S-XGA is expressed as 1280 x 1024. The higher the numeric value, the higher the resolution. And the higher the resolution, the more precise the picture projected. If someone says that they do not need such high resolution, it is usually because their computer does not have high resolution display capability. However, rapid advances in personal computer technology will soon result in S-XGA becoming commonplace. By choosing a projector with the highest possible resolution, you can ensure that it won't be rendered obsolete the next time you upgrade your computer.

D-ILA multimedia projector (Quick Facts) Outstanding S-XGA full resolution



- **S-XGA resolution = 1280 x 1024 dots**
  XGA resolution = 1024 x 768 dots

  There doesn't seem to be any noticeable difference. Actually,

- **S-XGA (D-ILA)**
  1280 x 1024 = 1,310,720
  1,310,720 x 3 plates = **3,932,160 dots**

- **XGA**
  1024 x 768 = 786,432
  786,432 x 3 plates = **2,359,296 dots**

3,932,160 ÷ 2,359,296 x 100 = 166.7%

In terms of the total number of dots (or pixels), S-XGA resolution is 1.7 times that of XGA. The difference in image precision, smoothness and brilliance can be clearly seen.

There is a big difference between "full S-XGA resolution" (D-ILA) and "S-XGA equivalent".

- The term "S-XGA equivalent" indicates compression and data loss. Actual resolution is determined by the capabilities of the LCD panel. The maximum possible resolution with an LCD-based system is XGA (1024 x 768 dots).
  A 1024 x 768-dot LCD panel projects an "S-XGA equivalent" image, by compressing and attenuating S-XGA 1280 x 1024 signals.
- Compression affects the thickness of the lines that make up the picture, making the lines less clear. Attenuation eliminates some lines altogether.
- Because the D-ILA device has an inherent resolution of 1365 x 1024 dots, the D-ILA projector is able to reproduce S-XGA resolution in full without compression or data loss. This fact should be emphasized as a key sales point.

Offset axis

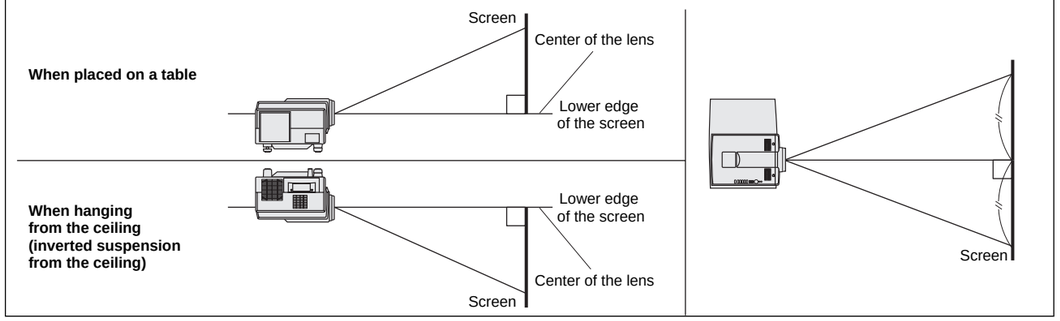
DLA-G20

The offset axis is applied to the projection optical axis (50% fixed). Thus, when the projector is placed horizontally, projection is upward, meaning that the projector does not interfere with the visibility of the picture even when viewed from behind the projector.

Installation conditions diagram

Upward off-axis is provided vertically, not horizontally.

- The off-axis is fixed (50%). Compensation for screen keystone distortion is not provided.
- The center axis of the lens is at the lower edge of the projection screen. This position remains unchanged even when zoomed.
- With inverted suspension from the ceiling, the center axis of the lens is at the upper edge of the projection screen.



With a ceiling suspension installation, the projector can be installed horizontally. Stability is assured by the upside-down reverse function. (The optional EF-G10CJ ceiling suspension stopper is recommended.)

Warning

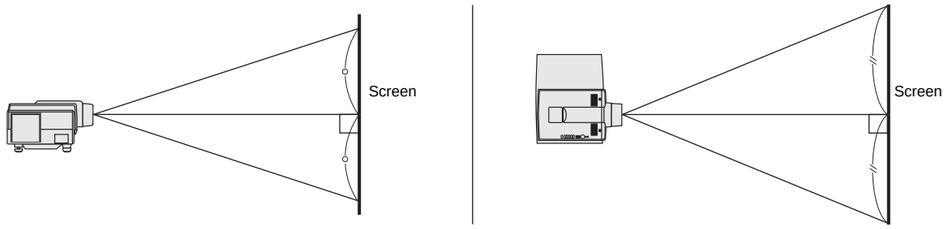
- *Special equipment is required to install the projector on the ceiling. For safety, this type of installation should be performed by a qualified technician, not by the customer.*
- *For installation, consult your dealer. JVC is not responsible for any damages or injuries that may result from improper or faulty installation.*

DLA-S15

Offset axis is not added to the projection optical axis. The center axis of the lens is at the center of the screen horizontally and vertically.

Installation conditions diagram

- The off-axis amount is fixed (0%). Compensation for screen keystone distortion is not provided.



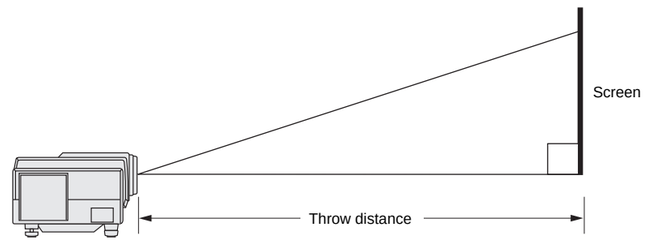
Note: The lens position shifts horizontally by 72 mm from the center of the unit. Keep this in mind during installation (DLA-G20/DLA-S15).

Throw distance

The throw distance for a media projector is shown below.

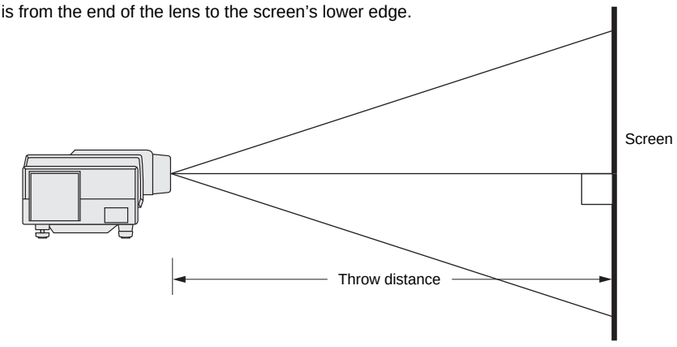
DLA-G20

- The throw distance is from the end of the lens to the screen's lower edge.



DLA-S15

- The throw distance is from the end of the lens to the screen's lower edge.



Notes:

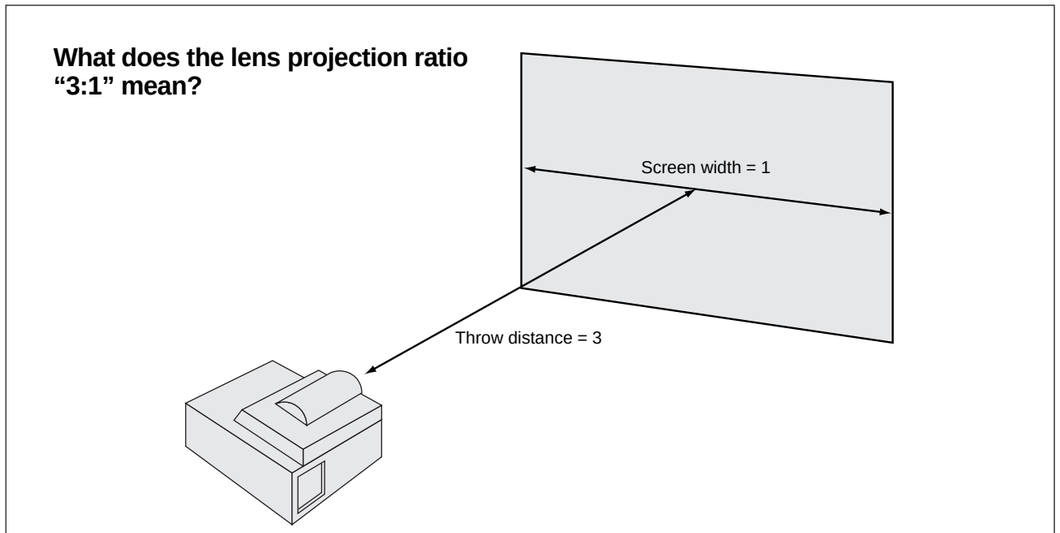
- Be careful when demonstrating because the DLA-S15's lens section extrudes 41 mm further than the DLA-G20's.
- The lens has a small degree of error and, unlike the ILA series, it is not provided with an electronic screen size adjustment function. For optimum results with the DLA-G20, do not use the maximum telescopic or wide angle values. If this is unavoidable, install the projector on a movable mechanism so that you can move it slightly to compensate for error. Similarly, because the DLA-S15 has a fixed focus lens, a similar mechanism will be required to allow adjustments to the throw distance.

Obtaining a rough throw distance

If you do not have a handy copy of the table, “Relationship between screen size and throw distance”, you can get a rough estimate using the following method.

Projection ratio of the projection lens

Since the DLA-G20 incorporates a zoom lens, throw distance and projection screen size can be adjusted. Indications marked on the projection lens (such as 3:1) represent the “projection ratio”, that is, “throw distance: screen width”. When the screen width is “1”, the throw distance is ”3”.



Obtaining the screen width

When the projector screen size is shown in inches (diagonally) and the screen width is unknown, use the following formula.

4:3	Screen width (m) = $\frac{\text{Inch value (diagonal)}}{\mathbf{49.21}}$
16:9	Screen width (m) = $\frac{\text{Inches (diagonal)}}{\mathbf{45.18}}$

Using this formula, the inch value (diagonally) can be calculated.

Obtaining the rough throw distance

Once you have calculated the screen width (as shown on the previous page), you can obtain a rough estimate of the throw distance.

Rough throw distance = screen width × lens value

Calculation example

■ Precondition
Screen size: 100" (4:3)
DLA-G20: Zoom lens projection ratio 2:1 to 3:1

■ Calculation
Screen width = 2.03 x 2 = 4.96 (m), 2.30 x 3 = 6.09 (m)

This calculation shows that a throw distance of between 4.06 and 6.09 m is required to project an image on a 100" (4:3) screen with the DLA-G20.
Keep in mind that the value obtained with this formula is approximate.

• Do not use the value without making allowance for error.
• Use this value as a guide when first discussing what screen size should be selected.
• If you need the correct value, refer to the table, “Relationship between screen size and throw distance” on pages 18 to 21.

Selecting the screen size

To determine the appropriate screen size, refer to the table below. The approximate relationship between screen size and number of seats is based on data from existing installations.

Screen size (model)	Number of seats
60	~ 10
80	10 ~ 20
100	20 ~ 30
120	30 ~ 80
150	80 ~ 120
200	120 ~ 200
250	200 ~ 450

• Since the DLA-G20 is provided with a zoom lens, there is more flexibility with regards to installation position. However, the throw distance must also be taken into consideration when choosing the installation position; otherwise, the required picture size may not projected.

Table: Relationship between screen size and throw distance

DLA-G20 4:3

Use the table below as a guide.

To obtain the throw distance from the projection size (projection ratio: 2:1 to 3:1)

Projection size			Throw distance (m)	
Model (inches) (diagonal)	Width (m)	Length (m)	Wide (2:1)	Tele (3:1)
42	0.85	0.64	—	2.5
50	1.02	0.76	—	2.9
60	1.22	0.91	—	3.5
70	1.42	1.07	2.8	4.1
80	1.63	1.22	3.2	4.7
90	1.83	1.37	3.6	5.2
100	2.03	1.52	3.9	5.8
110	2.24	1.68	4.3	6.4
120	2.44	1.83	4.7	7.0
130	2.64	1.98	5.1	7.5
140	2.84	2.13	5.5	8.1
150	3.05	2.29	5.9	8.7
160	3.25	2.44	6.2	9.3
170	3.45	2.59	6.6	9.8
180	3.66	2.74	7.0	10.4
190	3.86	2.90	7.4	11.0
200	4.06	3.05	7.8	11.6
210	4.27	3.20	8.2	12.2
220	4.47	3.35	8.5	12.7
230	4.67	3.51	8.9	13.3
240	4.88	3.66	9.3	13.9
250	5.08	3.81	9.7	14.5
260	5.28	3.96	10.1	15.0
270	5.49	4.11	10.4	15.6
280	5.69	4.27	10.8	16.2

Projection size			Throw distance (m)	
Model (inches) (diagonal)	Width (m)	Length (m)	Wide (2:1)	Tele (3:1)
290	5.89	4.42	11.2	16.8
300	6.10	4.57	11.6	17.4
310	6.30	4.72	12.0	17.9
320	6.50	4.88	12.4	18.5
330	6.71	5.03	12.7	19.1
340	6.91	5.18	13.1	19.7
350	7.11	5.33	13.5	—
360	7.32	5.49	13.9	—
370	7.52	5.64	14.3	—
380	7.72	5.79	14.6	—
390	7.92	5.94	15.0	—
400	8.13	6.10	15.4	—
410	8.33	6.25	15.8	—
420	8.53	6.40	16.2	—
430	8.74	6.55	16.5	—
440	8.94	6.71	16.9	—
450	9.14	6.86	17.3	—
460	9.35	7.01	17.7	—
470	9.55	7.16	18.1	—
480	9.75	7.32	18.5	—
490	9.96	7.47	18.8	—
500	10.16	7.62	19.2	—
510	10.36	7.77	19.6	—
520	10.57	7.92	19.93	—
521	10.59	7.94	20.0	—

• Because the lens generates a slight error, do not use the maximum settings.

DLA-G20 4:3

Use the table below as a guide.

To obtain the projection size from the throw distance (projection ratio: 2:1 to 3:1)

Throw distance (m)	Projection size					
	Wide (2:1)			Tele (3:1)		
	Model (inches) (diagonal)	Width (m)	Length (m)	Model (inches) (diagonal)	Width (m)	Length (m)
2.5	63	1.28	0.96	42	0.85	0.64
3.0	76	1.54	1.16	51	1.04	0.78
4.0	102	2.07	1.55	68	1.38	1.04
5.0	128	2.60	1.95	86	1.75	1.31
6.0	154	3.13	2.35	103	2.09	1.57
7.0	180	3.66	2.74	120	2.44	1.83
8.0	207	4.21	3.15	138	2.80	2.10
9.0	233	4.73	3.55	155	3.15	2.36
10.0	259	5.26	3.95	172	3.50	2.62
11.0	285	5.79	4.34	190	3.86	2.90
12.0	310	6.30	4.72	207	4.21	3.15
13.0	338	6.87	5.15	224	4.55	3.41
14.0	364	7.40	5.55	242	4.92	3.69
15.0	390	7.92	5.94	260	5.28	3.96
16.0	416	8.45	6.34	276	5.61	4.21
17.0	443	9.00	6.75	294	5.97	4.48
18.0	469	9.53	7.15	311	6.32	4.74
19.0	495	10.06	7.54	328	6.66	5.00
20.0	521	10.59	7.94	345	7.01	5.26

• Because the lens generates a slight error, do not use the maximum settings.

DLA-S15 **4:3**

Use the table below as a guide.

To obtain the throw distance from the projection size (projection ratio: 1:1)

Projection size			Throw distance (m) (1:1)
Model (inches) (diagonal)	Width (m)	Length (m)	
40	0.81	0.61	0.76
50	1.02	0.76	0.96
60	1.22	0.91	1.16
70	1.42	1.07	1.36
80	1.63	1.22	1.56
90	1.83	1.37	1.76
100	2.03	1.52	1.97
110	2.24	1.68	2.17
120	2.44	1.83	2.37
130	2.64	1.98	2.57
140	2.84	2.13	2.77
150	3.05	2.29	2.97
160	3.25	2.44	3.18
170	3.45	2.59	3.38
180	3.66	2.74	3.58
190	3.86	2.90	3.78
200	4.06	3.05	3.98

To obtain the projection size from the throw distance (projection ratio: 1:1)

Throw distance (m) (1:1)	Projection size		
	Model (inches) (diagonal)	Width (m)	Length (m)
0.76	40.0	0.81	0.61
1.00	52.0	1.06	0.79
1.25	64.5	1.31	0.98
1.50	77.0	1.56	1.17
1.75	89.5	1.82	1.36
2.00	101.4	2.06	1.55
2.25	114.0	2.32	1.74
2.50	126.5	2.57	1.93
2.75	139.0	2.82	2.12
3.00	151.4	3.08	2.31
3.25	163.5	3.32	2.49
3.50	176.0	3.58	2.68
3.75	188.5	3.83	2.87
4.00	201.0	4.08	3.06

• For the maximum projection size, use a 200-type (4:3) depending on the lens performance.

• As the throw distance and projection size are only accurate to within ±5%, a throw distance adjustment mechanism is required on the installation platform.

Stacking systems

1. DLA-M4000 stacking system

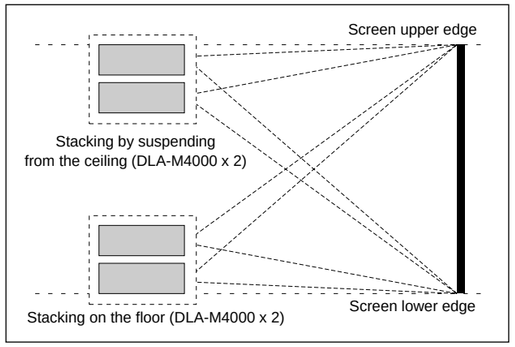
When high-intensity projection capabilities are required, two DLA-M4000s can be stacked in a vertical or horizontal configuration.

In a vertical stacking configuration, the DLA-M4000s are stacked one above the other. Using the power-driven lens shift function, the two projection images can be superimposed to obtain an image with double the standard brightness.

In a horizontal stacking configuration, the DLA-M4000s are placed side by side. The two projection images are superimposed using the mechanical lens shift function.

Note:

• As the two projection images are superimposed, registration differences appear in the center and peripheral areas of the screen due to the lens distortion. Use the center portion of the optical lens to minimize the registration difference. This difference cannot be eliminated because it is caused by lens distortion. The smaller the lens magnification, the less the distortion.



Vertical stacking limit range:
The DLA-M4000s can be stacked within the area from the screen upper edge to the lower edge.

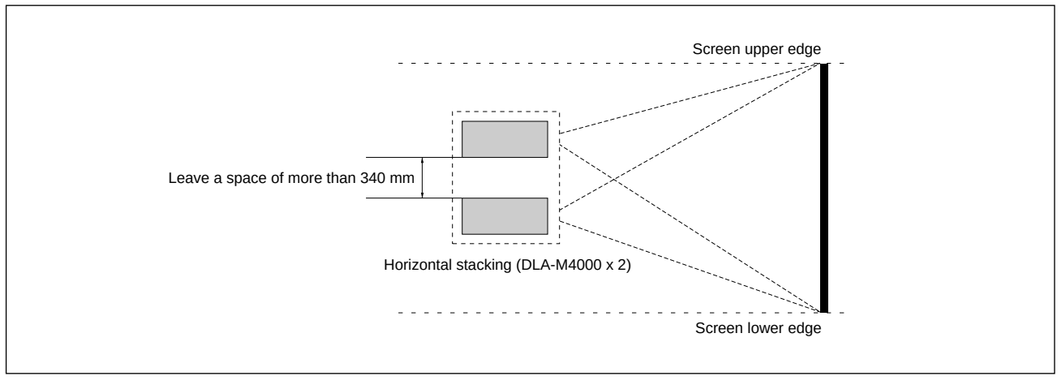
D-ILA-M4000 stack shift table

Screen size (4:3)	Width	Height	Throw distance	(368/H)*100	X								
					Y=50	Y45=	Y=40	Y=35	Y=30	Y=25	Y=20	Y=15	Y=10
65	1321	991	1970	37.13	12.87	7.87	2.78						
70	1423	1067	2130	34.49	15.51	10.51	5.51	0.51					
80	1626	1219	2440	30.19	19.81	14.81	9.81	4.81					
90	1829	1372	2760	26.82	23.18	18.18	13.18	8.18	3.18				
100	2032	1524	3080	25.15	24.85	19.85	14.85	9.85	4.85				
110	2235	1676	3390	21.96	28.04	23.04	18.04	13.04	8.04	3.04			
120	2438	1829	3710	20.12	29.88	24.88	19.88	14.88	9.88	4.88			
130	2642	1981	4030	18.58	31.42	26.42	21.42	16.42	11.42	6.42	1.42		
140	2845	2134	4340	17.24	32.76	27.76	22.76	17.76	12.76	7.76	2.76		
150	3048	2286	4660	16.1	33.9	28.9	23.9	18.9	13.9	8.9	3.9		
160	3751	2438	4980	15.1	34.9	29.9	24.9	19.9	14.9	9.9	4.9		
170	3454	2591	5290	14.2	35.8	30.8	25.8	20.8	15.8	10.8	5.8	0.8	
180	3657	2743	5610	13.42	36.58	31.58	26.58	21.58	16.58	11.58	6.58	1.58	
190	3861	2896	5930	12.71	37.29	32.29	27.29	22.29	17.29	12.29	7.29	2.29	
200	4064	3048	6240	12.07	37.93	32.93	27.93	22.93	17.93	12.93	7.93	2.93	
210	4270	3200	6560	11.5	38.5	33.5	28.5	23.5	18.5	13.5	8.5	3.5	
220	4470	3350	6880	10.98	39.02	34.02	29.02	24.09	19.09	14.09	9.09	4.09	
230	4670	3510	7200	10.48	39.52	34.52	29.52	24.52	19.52	14.52	9.52	4.52	
240	4880	3660	7510	10.05	39.95	34.95	29.95	24.95	19.95	14.95	9.95	4.95	
250	5080	3810	7830	9.66	40.34	35.34	30.34	25.34	20.34	15.34	10.34	5.34	0.34

Note:

• The data in this table is based on the assumption that two DLA-M4000s are stacked vertically.
When the offset axis of unit A is X% and that of unit B is Y%, X is obtained with Y = 50 to 10 in the formula
Y − X = 368/H x 100 (provided that the vertical offset axis of the DLA-M4000 is 0 to 50%).

The basic setup for a horizontal stack configuration is shown below.



■ D-ILA-M4000 1:1 lens throw distance table

Screen size (4:3)	Width	Height	Lens top point
80	1626	1219	1540.1
90	1829	1372	1747.47
100	2032	1524	1954.85
110	2235	1676	2162.23
120	2438	1829	2369.6
130	2642	1981	2576.97
140	2845	2134	2784.34
150	3048	2286	2991.71
160	3751	2438	3199.08
170	3454	2591	3406.44
180	3657	2743	3613.81
190	3861	2896	3821.17
200	4064	3048	4028.54

Important:

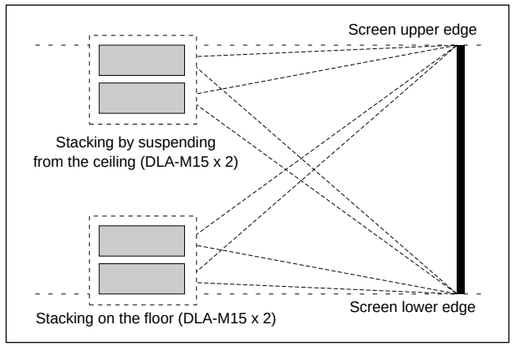
• Depending on the screen characteristics, different viewing angles can produce variations in illumination and color tone. Be sure to take this into consideration when selecting the screen. Consult your JVC dealer for more information regarding screen selection. The type of screen you use is especially important if you are using rear projection.

■ 2. DLA-M15 stacking system

If you need a compact, high-intensity projection system, you can stack two DLA-M15s in a vertical configuration.

When two DLA-M15s are stacked on a dedicated stacking platform and the two projection images are superimposed with the manual lens shift function, doubled brightness can be obtained. Available dedicated stacking platforms include a ceiling type and floor type.

Note:
As the two projection images are superimposed, registration differences appear in the center and peripheral areas of the screen due to the lens distortion. Use the center portion of the optical lens to minimize the registration difference. This difference cannot be eliminated because it is caused by lens distortion. The smaller the lens magnification, the less the distortion.



Vertical stacking limit range:
The DLA-M4000s can be stacked within the area from the screen upper edge to the lower edge.

■ D-ILA-M15 stack shift table

Screen size (4:3)	Width	Height	Throw distance	(306.6/H)*100	X					
					Y=50	Y=51	Y=52	Y=53	Y=54	Y=55
80	1626	1219	2368	25.15	24.85	25.85	26.85	27.85	28.85	29.85
85	1727	1295	2520	23.67	26.33	27.33	28.33	29.33	30.33	31.33
90	1829	1372	2672	22.34	27.66	28.66	29.66	30.66	31.66	32.66
95	1931	1449	2825	21.16	28.84	29.84	30.84	31.84	32.84	33.84
100	2032	1524	2976	20.12	29.88	30.88	31.88	32.88	33.88	34.88
105	2134	1600	3129	19.16	30.84	31.84	32.84	33.84	34.84	35.84
110	2235	1676	3281	18.29	31.71	32.71	33.71	34.71	35.71	36.71
115	2337	1753	3433	17.49	32.51	33.51	34.51	35.51	36.51	37.51
120	2438	1829	3585	16.76	33.24	34.24	35.24	36.24	37.24	38.24
125	2540	1905	3738	16.09	33.91	34.91	35.91	36.91	37.91	38.91
230	2642	1981	3890	15.48	34.52	35.52	36.52	37.52	38.52	39.52
135	2743	2057	4042	14.90	35.01	36.10	37.10	38.10	39.10	40.10
140	2845	2134	4194	14.37	35.63	36.63	37.63	38.63	39.63	40.63
145	2946	2210	4347	13.87	36.13	37.13	38.13	39.13	40.13	41.13
150	3048	2286	4499	13.41	36.59	37.59	38.59	39.59	40.59	41.59
155	3150	2362		13.00	37	38.00	39.00	40.00	41.00	42.00
160	3751	2438		12.57	37.43	38.43	39.43	40.43	41.43	42.43
165	3353	2515		12.20	37.8	38.8	39.80	40.80	41.80	42.8
170	3454	2591		11.83	38.17	39.17	40.17	41.17	42.17	43.17
175	3556	2667		11.50	38.5	39.50	40.50	41.50	42.50	43.5
180	3657	2743		11.18	38.82	39.82	40.82	41.82	42.82	43.82
185	3759	2819		10.88	39.12	40.12	41.12	42.12	43.12	44.12
190	3861	2896		10.59	39.41	40.41	41.41	42.41	43.41	44.41
195	3962	2972		10.32	39.68	40.68	41.68	42.68	43.68	44.68
20	4064	3048		10.06	39.94	40.94	41.94	42.94	43.94	44.94
250	5080	3810		8.05	41.95	42.95	43.95	44.95	45.95	46.95
300	6096	4572		6.71	43.29	44.29	45.29	46.29	47.29	48.26
350	7112	5334		5.75	44.25	45.25	46.25	47.25	48.25	49.25
400	8128	6096		5.03	44.97	45.97	46.97	47.97	48.97	49.97
450	9144	6858		4.47	46.53	47.53	48.53	49.53	50.53	51.53

Note:

• This table is based on the assumption that two DLA-M15s are stacked on a stacking table.
When the offset axis of unit A is X% and that of unit B is Y%, X is obtained with Y = 50 to 55 in the formula Y − X = 306.6/H x 100 (provided that the offset axis of the DLA-M15 is 30 to 55%).

3. DLA-M4000 multi-system (side by side)

Horizontal side-by-side placement of two DLA-M4000s is a basic requirement for a DLA-M4000 multi-system. Two DLA-M4000s are arranged horizontally and project images directly on the white screen. What is most essential for the multi system is the brightness on the screen and difference in color tone. According to our research so far, two horizontally placed DLA-M4000s can obtain the actual use level as a multi system. In rear projection configurations, screen characteristics are especially important.

As shown in the photo, both the brightness and tone reach the usage level. As a shading adjustment function for dark sections (not provided with the DLA-G10/G15/G20) has been added to the DLA-M4000, brightness can be adjusted to less than 10 with Eab at each point.

Reference: The performance of up to 3 horizontally arranged units is ensured.

4. DLA-G15 multi system (2 units put side by side)

As with the DLA-M4000 multi-system, two horizontally placed DLA-G15s are required. With this system, the screen characteristics are also very important. In particular, different viewing angles can produce variations in illumination and color tone depending on the screen characteristics. The DLA-G15 is affected by manufacturing characteristics (optical characteristics, especially D-ILA shading characteristics) because it is a general projector. Check the characteristics before shipping when selecting a projector for a multi-system.

<Reference for selection>
Compare R, G, and B shading adjustment data using the PSA controller.
• Check that the dynamic shading adjustment data is within 22% of unadjusted data.
• Make sure that each color has the same level.

Projection type (front projection)

Front projection

Front projection systems project light directly onto a screen. The reflected light appears as an image on the screen. Typically, the projector is installed on a table or suspended from the ceiling.

When external light is reflected on the screen, the image contrast is lowered. As a result, it is common practice to lower the lighting level during projection. Thanks to the D-ILA multimedia projector's powerful light output, however, projection is possible even in a relatively bright environment. (Nevertheless, even with the D-ILA projector, the less the external light reflection, the better the image quality.) (Refer to the table on page 10.)

Screen type

When it comes to determining the final picture quality of a large-screen projection system, the quality of the screen itself is often ignored. This is a mistake. Like the speakers in an audio system, screen quality is essential in determining the final result. Just as poor speakers will result in poor sound, no matter how good the rest of the audio system, so too will poor screen quality affect the quality of the projected image. Although the D-ILA multimedia projector's superior performance characteristics enable it to achieve a high-quality picture with any screen, choosing a high-quality screen with characteristics suitable for the viewing environment will assure optimum results. The information below will help you select the most appropriate screen.

There are five basic types of front projection screen. General characteristics are shown below.

Type	Recurrence	Standard gain (Gs)	Picture quality	Visual field	Characteristics
White	Reflectivity	1	○	Ultra wide	The screen surface is white and there is almost no gain. As the angle of visibility is close to the full diffusion of 180˚, this type is ideal for auditoriums and rooms with a theater-style layout since the audience expands sideways as the distance from the screen increases. The benefit of a white screen is more natural color reproduction if the room is dark or if the light output of the projector is sufficient.
Pearl	Reflectivity	1.3 ~ 2.0	◎	Wide	The screen surface is glossy pearl and the angle of visibility is around 30˚ for the left and right (60˚ total). The picture quality is dynamic and beautiful. The gradation of black and color reproduction are excellent and extremely high picture quality is obtained. Until recently, pearl screens were the screen of choice when picture quality was a priority. Recently, however, a new type of screen — beads screen — has been developed that offers comparable picture quality.
Silver	Reflectivity	3 ~ 4	△	Narrow	The screen surface is silver and the gain is extremely high, allowing pictures to be viewed in relatively bright rooms. The field of view is limited, restricting the audience position. This type is not suitable for large audiences. Hot spots are common and a curved screen is required. Picture quality is relatively low. This type is suitable for special business applications (3D projection using a polarized light).
Polarized light	Reflectivity	2 ~ 3	○	Middle	Using the characteristics of polarizing film, this reduces the effect of reflected external light. The high contrast ratio can easily be maintained even in bright surroundings, making this type suitable for projection in situations where it is desirable to leave the lights on. Care should be taken when using a polarized light screen because it is necessary to match the polarized light projected from the projector with the characteristics of the screen.
Beads	Recurrence	2 ~ 3	◎	Middle	Recurrence is the same as the lens effect of beads. The gain is high but the angle of visibility is relatively narrow. Ghosts appear due to a stray light phenomenon. Focus is not sharp and gradation is not smooth, resulting in soft picture quality. Recently, an excellent screen that eliminates these weak points has become available.

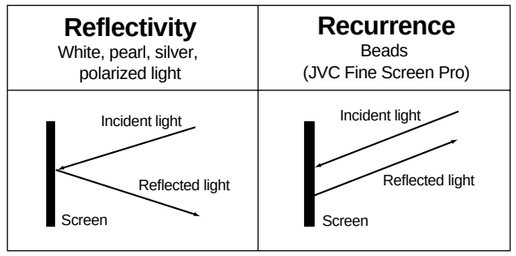
• The optimum screen differs depending on the situation. When selecting a screen, be sure to consider the advantages and disadvantages of each screen type.

Screen reflectivity and recurrence

Reflectivity means that the light reflects in the direction opposite to the angle of incidence.

Recurrence means that the light reflects in the same direction as the angle of incidence.

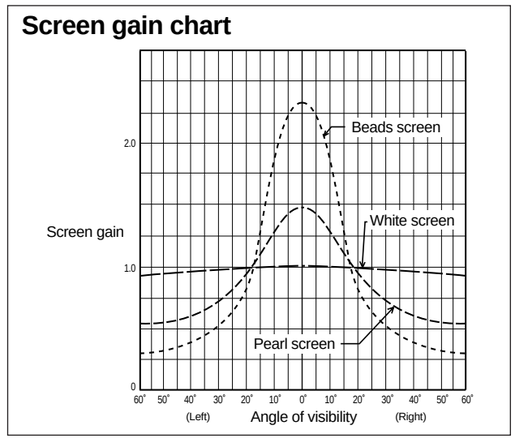
The projector installation position must be changed depending on the screen type. Position the projector so that the reflected light is level with the audience's eyes. Care should be taken to ensure that seats are not darkened (within the angle of visibility).

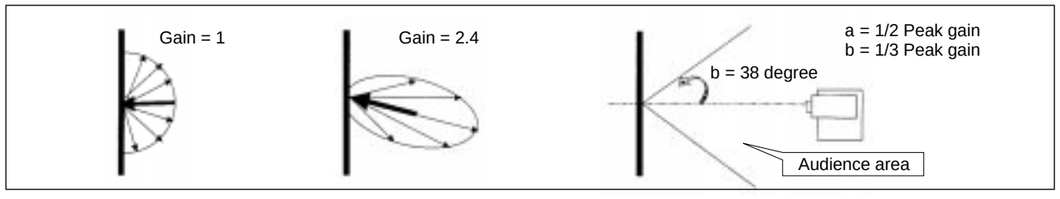


Screen gain

The screen shows an image by reflecting the projected light. This reflection degree is expressed with the gain (= Gs). The standard screen gain reference is based on the white screen which is set to "gain = 1".
(Strictly speaking, full diffusion (object obtained by burning magnesium on a aluminum plate) is "gain = 1". In actual use, "Kodacolor standard white" is "gain = 1". Normally, "gain" means the peak gain. The peak gain is the value at the point where the gain is the highest.)

The higher the gain, the brighter the screen. On the other hand, the angle of visibility becomes narrower. Refer to the typical example showing the relationship between the gain and angle of visibility shown on the right. In general, the angle of visibility is shown with the half gain angle (= angle a: point where the peak gain is halved) and 1/3 gain angle (= angle b).





Note on using a sound screen

A sound screen is designed so that sound from the speakers behind the screen passes through the screen through numerous small holes at the regular pitch on the screen surface.

With the D-ILA device, pixels are regularly arranged. Therefore, a moiré phenomenon may be produced by interference from these screen holes. The extent of this phenomenon depends on the hole diameter, hole disposition, hole disposition pitch and projection size. As there is no way to calculate this effect beforehand, be sure to verify the effect with a test projection.

FINE SCREEN PRO
Fine beads screen (Quick Facts)

Q.

Is the fine beads screen the same as the beads type? If so, since the beads type has a sharp gain, does the screen seem darker to viewers at the edge of the visibility angle?

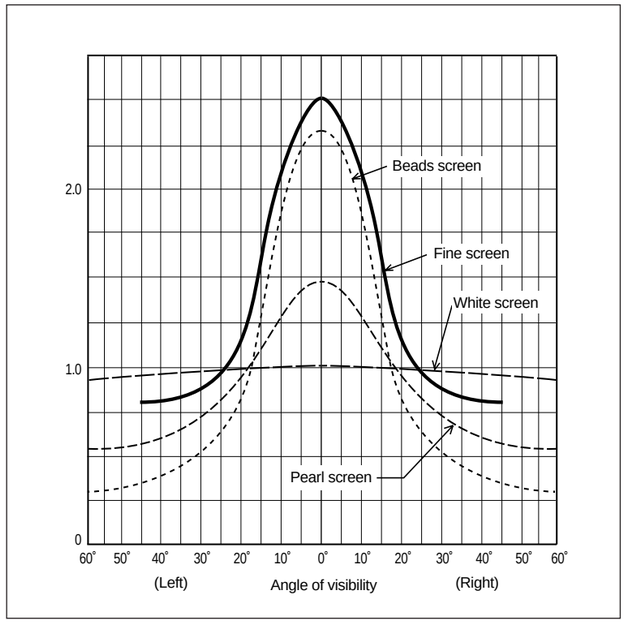
A.

As you can see the gain chart shown below, the absolute value indicates that the fine beads screen is brighter at most angles and the gain is higher even at the edges than any other screen type except for the white screen. All viewers will see a very bright picture, but since peak is sharp, the screen will be darker for people on the edges than for those in the middle.

To show the angle of visibility, there is a scale called the half gain angle (angle a). Depending on the case, the half gain angle of the fine beads screen may be narrower. However, the absolute value for the gain at all angles is higher in many cases. Therefore, it is risky to select a screen on the basis of its angle of visibility alone. We recommend comparing screens with the gain chart.

With the fine beads screen, beads with a diameter almost half that of conventional beads (70 µm) are embedded in a high density layout. This eliminates stray light and ringing phenomena, achieving an excellent picture with clear color reproduction and high contrast. When brightness or picture quality is important, it is better to choose the fine beads screen.

Screen gain chart



Fine beads screen	
Angle of visibility	Screen gain
0°	2.40
5°	2.21
0°	1.91
15°	1.50
18.5°(Angle a)	1.20
20°	1.11
25°	0.94
30°	0.86
35°	0.82
38.0°(Angle b)	0.80
40°	0.79
45°	0.77

• The screen gain charts except for the Fine Screen Pro are shown as a guide.

Polarized light screen (Quick Facts)

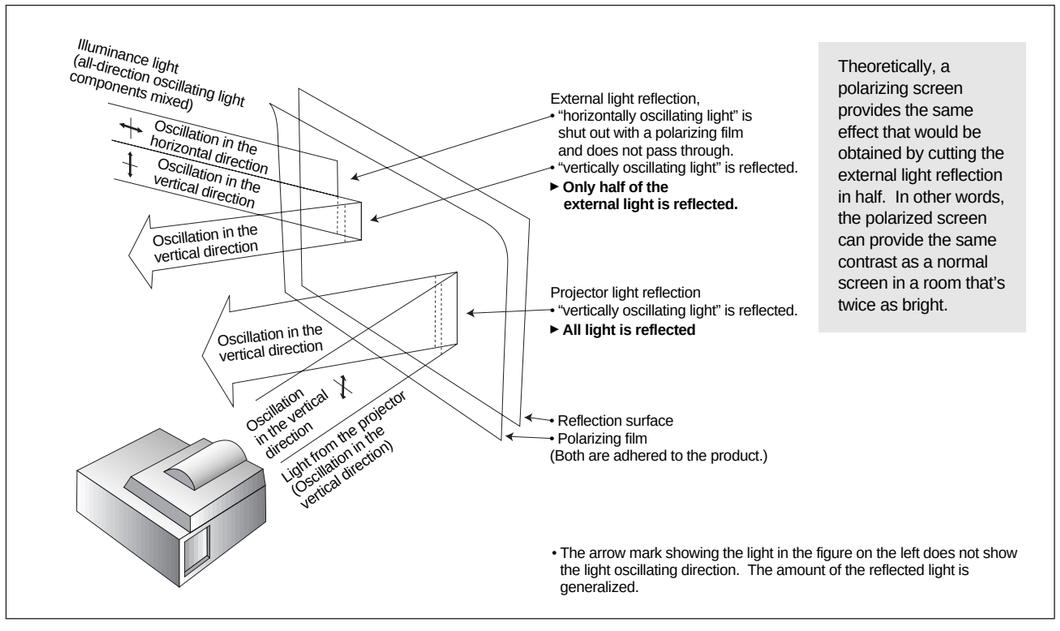
■ Principle of the polarized light screen

Lights used for normal illumination include a component which oscillates in all directions (360°) to distribute the light. The light emitted from the DLA-G20 D-ILA multimedia projector, on the other hand, mainly consists of vertically oscillating light. A screen with polarized light characteristics reflects only "vertically oscillating light" and absorbs "horizontally oscillating light". JVC polarized light screens include the SF-L100FJ, SF-L060SJ, and SF-L080S.

When the DLA-G20 projects light onto this type of screen, most of the light is reflected because the light from the DLA-G20 consists mainly of vertical components. Since external light, on the other hand, consists of both horizontal and vertical components, the screen will absorb up to 50 percent of the external light, reflecting only the vertical components. As a result, high contrast can be maintained even in a bright environment.

■ Notes on the use of the polarized light screen

1. To obtain the proper effect with the polarized light screen, the polarized direction of the projector must be the same as that of the screen. If a projector with a different polarized direction is used, (for example, a projector that outputs "horizontally oscillating light"), most of the projected light will be absorbed on the screen surface and the picture will not be visible.
For the DLA-G20/15, only the following screens should be used: SF-L100FJ / SF-L060FJ / SF-L060FSJ / SF-L080S. If any of these screens are used with another brand of projector or the DLA-G20/15 is used with another brand of screen, be sure to check the polarized light screen effect.
2. With a CRT projector or DLP system projector which does not output a polarized light, a polarized light screen effect cannot be obtained.
3. Some high-intensity LCD projectors may not be used with a polarized light screen.



Theoretically, a polarizing screen provides the same effect that would be obtained by cutting the external light reflection in half. In other words, the polarized screen can provide the same contrast as a normal screen in a room that's twice as bright.

• The arrow mark showing the light in the figure on the left does not show the light oscillating direction. The amount of the reflected light is generalized.

Projection type (rear projection)

Rear projection

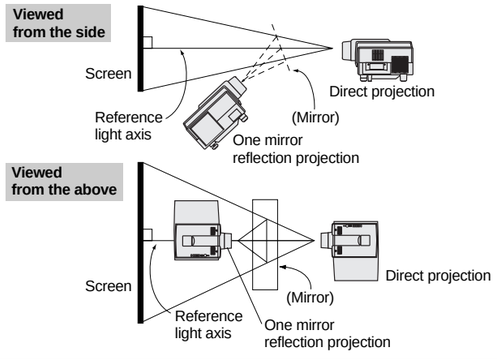
With rear projection systems, the transmitted light, rather than the reflected light, appears on the screen as an image. This means that the projector must be installed behind the screen. In principle, rear projection is not affected by the level of illumination in a room. If the D-ILA is used as a rear projector, its powerful light output ensures a clear, easy-to-view picture even in a very brightly lit room.
(Nevertheless, even with the D-ILA projector, the less the external light reflection, the better the image quality.)
(Refer to the table on page 10.)

The throw distance is the same as with front projection. In general, the light axis is folded back with a mirror and the depth of the back is reduced. To determine the relationship of the positions of the projector, mirror and screen, a CAD-based simulation is required.

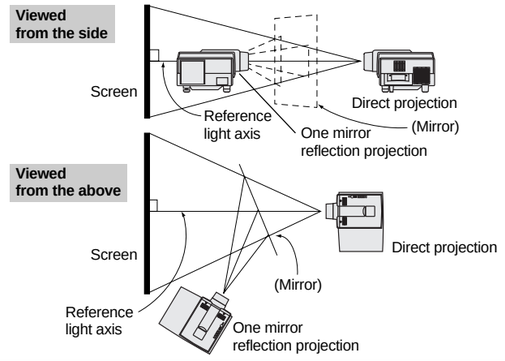
Installation standard

For rear projection, basically use the DLA-S15 D-ILA multimedia projector.
During rear projection with the DLA-S15, the reference light axis should intersect with the screen (incident angle 0°) regardless of the type of the screen.

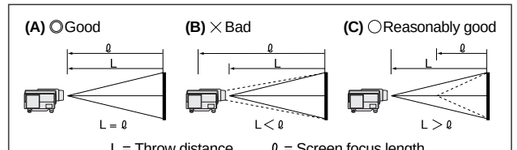
■ Installation example (reflection in the vertical direction)



■ Installation example (reflection in the horizontal direction)



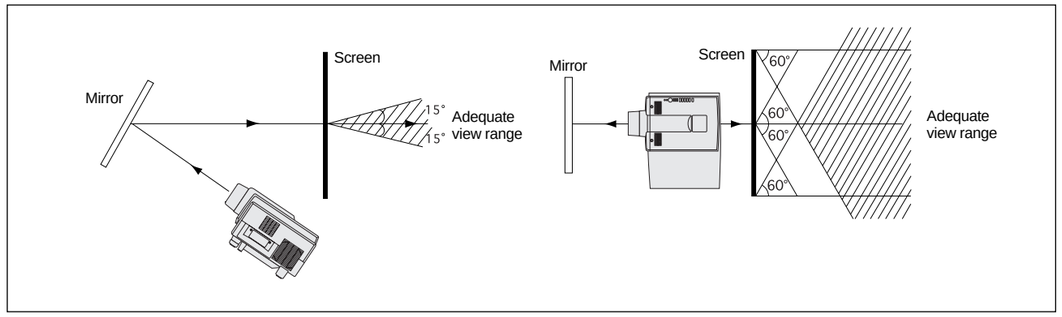
Hard screens with a cut lens (see below) have a fixed focus length. It is OK for the lens edge to be at the focus length position. If the distance is not appropriate, select a screen which allows the projector to be installed at a distance that exceeds the screen focus length. If the screen focus length and throw distance do not match each other, there will be problems with the picture. These are especially apparent if the projector is within the screen focus length; hot spots and color shifts are very noticeable, resulting in a significant loss of picture quality.



(A) L = ℓ Good
(B) L < ℓ Bad
Hot spots, color shifts, uneven brightness and blurred focus are very evident. This setting should be avoided.
(C) L > ℓ Reasonably good
This setting is not the best, but better than L< ℓ .

Range of adequate view

The range of adequate view generally depends on the “viewing angle”. The rear screen for the JVC DB-70S10 data box is shown as an example. The viewing angle varies depending on the screen. However, as the D-ILA light output is large, a fairly large viewing angle can be obtained.



Notes on screens for a transmission type rear projection

When a projector with divided pixels is combined with a screen which uses a Fresnel lens, lenticular lens and black stripe, cross stripes from the divided pixel panel interfere with the screen’s lens pitch and black striping, resulting in moiré pattern. The extent to which this pattern is noticeable depends on the size of the projected image, the screen’s lens pitch and the panel’s pixel division pitch.

Although the DLA-S15 has divided pixels, it has a high aperture ratio with very little cross striping, moiré patterns are not normally apparent. However, care should be taken when this unit is combined with a Fresnel lenticuler screen or black stripe screen. If moiré does appear, there is no way to get rid of it so be sure to check it beforehand.

Assuming that no moiré patterns appear, the Fresnel lenticular screen is a good choice since it can reproduce much better pictures in terms of the peripheral light quantity ratio, brightness and viewing angle than a screen that only uses a dispersal agent.

The D-ILA’s powerful light output results in heat generation. As the area available behind the screen is typically small, temperature can rise excessively. Cool the area behind the screen by providing good ventilation or by installing an air conditioner.
(When an external fan is added, take air flow resistance into consideration and use a fan with relatively large capacity.)

Heating value

Model	DLA-G20 / DLA-S15
Heating value	2260 kJ/h 540 kcal/h

Projector cooling fan capacity

Model	DLA-G20 / DLA-S15
Fan air capacity	Total 303.6 m^3/h (5.06 m^3/h)

Basic facts about reflecting mirrors

Mirror

- Ideally, when projecting images using rear projection, a mirror should not be used. However, if limited depth is available in the installation location, making it necessary to fold the light axis, you can use one mirror for reflection. If you use more than one mirror, consult the Projection Sales Department beforehand. The more mirrors used, the worse the picture quality and the lower the brightness.
- Be sure to use only a JVC-specified glass surface mirror. If an underside mirror or refex mirror is used, picture quality may be adversely affected.

There are three basic types of reflection mirror.

A. Surface mirror (surface aluminum evaporation glass mirror)
This mirror has a reflection surface on the glass surface. As there is no unnecessary reflected light, this mirror provides optimal reflection image. However, because the reflection surface is on the surface, it can easily be damaged. Be sure not to touch this surface with bare hands. Also, in comparison to other types of mirrors, surface mirrors are expensive and the maximum available size is relatively small. Nevertheless, if picture quality is the priority, choose this mirror.

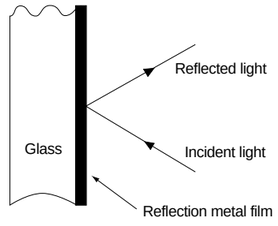
B. Underside mirror (general mirror)
The reflection surface is behind the glass. This is the kind of mirror normally employed in lavatories since the reflection surface is protected and difficult to damage. Cleaning is also easier and it is less expensive than a surface mirror. The disadvantage of this type is that light is reflected not only on the reflection surface but also partially on the glass surface. As a result, the image is doubled, producing a ghosting effect which makes it unsuitable for reflection of a projector image.

C. Refex mirror (Aluminum evaporation polyester film mirror)
Although refex mirrors are inexpensive, it is difficult to maintain surface smoothness, resulting in moiré and fuzzy images. This type of mirror has not been generally suitable for actual use. However, it has been recently improved.

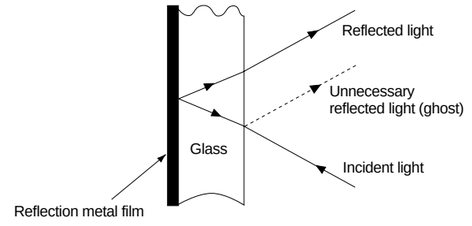
- As a result, a surface mirror is recommended for use as a reflection mirror for rear projection with the D-ILA.

Difference between surface mirror and underside mirrora

Surface mirror (mirror for the DB-70S10)



Underside mirror (general mirror)



	A: Surface mirror	B: Underside mirror	C: Refex mirror
Cost	×	△	△
Performance	◎	△	△
Maximum size	2400 mm × 1800 mm	3600 mm × 1500 mm	600 mm × 1400 mm
Remark	Use this type.	Not recommended.	Not recommended.

Total market (includes mirrors which the Projection Sales Department does not handle)

Basic facts about rear screens

■ Terminology

Single/double: Shows the number of screens to be used to produce one screen
Single: one, double: two

Fresnel: Fresnel lens which is cut in the form of a concentric circuit.

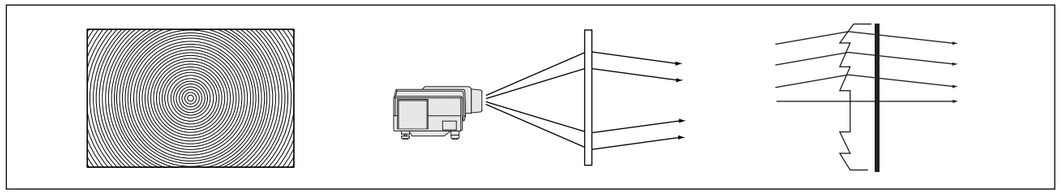
Lenticular: Lens cut straight vertically and horizontally.

Cross lenticular: Lenticular lens cut vertically and horizontally so that cut lines are crossed. Processing is not possible on the same surface. So, for a single lens, the front and rear sides are cut. For double lens, one side of each lens is processed.

Dispersal agent: This disperses the light and looks like frosted glass. This is mixed into material or sandwiched between the screen surfaces.

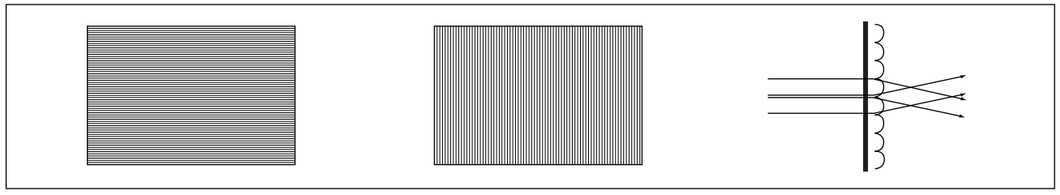
■ Role of the lens

Fresnel lens



With the Fresnel lens cut in the form of circles as shown on the upper left, the light axis is directed inward (shown in the middle and right figures) to prevent loss of brightness at the corners of the screen. This minimizes shadows and ensures that uniform brightness is obtained throughout the screen area.

Lenticular lens



With a lenticular lens which is cut straight vertically and horizontally as shown in the upper left and middle figures, the viewing angle is determined (upper right figure) and gain is held on the screen. The vertical lenticular determines the viewing angle in the horizontal direction and the horizontal lenticular determines the viewing angle in the vertical direction.

<Cost>

A single screen can cost several million yen and a double screen will cost several times more (for the size, refer to the next page).
A mold is used to manufacture a single screen. A double screen is manufactured by cutting each screen individually. (Large single screens are also manufactured by cutting, so they are also expensive.)

<Screen delivery>

As a hard screen cannot be rolled like a soft screen, it is delivered to the installation location in finished form. Therefore, it is necessary to ensure a delivery path. If the delivery path cannot be maintained after a building is completed, the screen must be delivered during construction.

Types of rear screen

As discussed in the section on front screens, the screen is an important factor in determining the final quality of the system. It is necessary to understand the features of the various types of screens.

Rear screens are roughly divided into “hard” and “soft” types. ”Hard” is further classified into several types. The representative types are shown below.

	Type	Maximum size	Characteristics
Hard	Single Fresnel lenticular	150 model (4:3)	The cost is relatively low and a bright, high-quality picture can be obtained. Some shadows may occur. Large size screens are difficult to transport and deliver.
	Double Fresnel lenticular	150 model (4:3)	Color shift is minimized. Brightness levels are good. There are joints in the screen. As the light passes through two screens, resolution tends to be degraded. Large size screens are difficult to transport and deliver.
	Double cross lenticular	200 model (4:3) 250 model (16:9)	Expensive but well suited for large screens. (Can be broken down for transportation. Joints may be visible.) As the light passes through two screens, resolution tends to be degraded. If the throw distance is short, the following phenomena result. (As the light axis compensation is insufficient, shadows appear.) At the cross section of the lenticular, scintillation may occur. Large size screens are difficult to transport and deliver.
	Dispersal agent hard type	180 model (16:9)	This is relatively inexpensive. Shadows and color shifts may be noticeable. Contrast is excellent. Picture is not very bright. Large size screens are difficult to transport and deliver.
Soft	Dispersal agent soft type	1000 model (4:3)	This is relatively inexpensive. Shadows and color shifts may be noticeable. Transportation, delivery and construction are easy. The screen moves with the air flow. Picture is not very bright.

	Single Fresnel lenticular	Double Fresnel lenticular	Single cross lenticular	Double cross lenticular	With dispersing agent contained	
					Hard	Soft
Brightness (gain)	○	○	△~○	△~○	△	△
Viewing angle	○	○	○	○	△	△
Contrast	○	△~○	○	○	△	△
Luminance uniformity (shading)	△~○	○	△~○	△	×	×
Color uniformity	○	△~○	○	△	×	×
Color reproduction	○	○	○	○	△	△
Resolution	○	○	△~○	○	○	○
Scintillation	○	○	△	×	○	○
Hot spot (fire ball)	○	○	○	×	×	×
Flare (blot)	△~○	△~○	△~○	△~○	△~○	△~○
Throw distance	○	○	○	△	△	△
Shock strength	○	○	○	○	○	×
Flatness	○	△	△	○	○	△
Installation difficulty	○	○	△	○	○	○
Change in resolution due to “floating”	○	△	○	△	○	○
Durability against environment	○	△	△	○	○	×
Maintenance	○	○	×	○	○	○
Maximum size (model)	150 (4 : 3)	150 (4 : 3)	250 (16 : 9)	250 (16 : 9)	180 (16 : 9)	1000 (4 : 3)

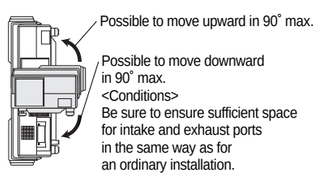
As of February, 1999 O: Good : Normal ×: Care required

Total market (includes mirrors which the Projection Sales Department does not handle)

Notes on the installation (DLA-G20/DLA-S15)

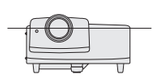
■ Inclination of the projector

Do not install the projector inclined to the left and right. Otherwise, color unevenness may occur or the lamp life may be shortened.

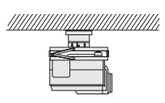


Possible to move upward in 90˚ max.

Possible to move downward in 90˚ max.
<Conditions>
Be sure to ensure sufficient space for intake and exhaust ports in the same way as for an ordinary installation.



Do not use the projector by inclining it to the left and right
(this concerns the installation angle, not the incident angle).

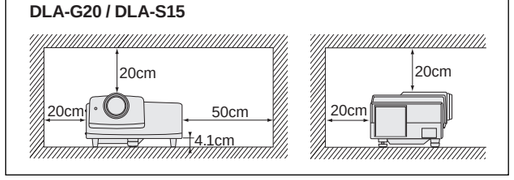


The projector can be set upside down and hung from the ceiling.
(It is recommended to use the dedicated hanging metal fittings "EF-G10CJ".) If the projector is set upside down, the intake port faces upward so be careful of dust.

■ Space required for heat radiation and maintenance

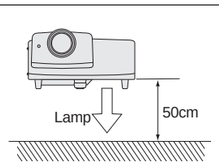
To maintain stable performance of the DLA-G20/DLA-S15 for a long period, it is necessary to provide sufficient space for heat radiation and maintenance before installation. Otherwise, overheating may result in deteriorating performance or damage to the projector.
The minimum space required is shown above.

DLA-G20 / DLA-S15



■ Fixing the projector to the metal fittings

Lamps should be replaced regularly based on usage time. If the projector is fixed to metal fittings, leave enough space (as shown on the left) for lamp replacement. The ceiling hanging metal fittings "EF-G10CJ" and data box "DB-70S10" allow the projector to be moved with the hinge for lamp replacement.

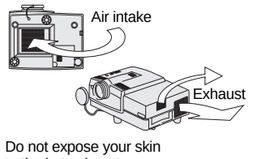


■ Notes on ambient temperature

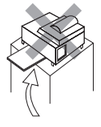
• The DLA-G20/DLA-S15 uses a high output lamp to obtain high intensity light. Therefore, it generates a lot of heat (540 kcal/h). Be sure to install the projector in a well ventilated location or provide some form of air conditioning.
• To enhance the cooling effect and ensure reliable performance, ensure that there is sufficient peripheral space and install an air-conditioner. Ideally a fixed temperature should be maintained.
• Sudden changes in temperature can cause condensation. If the projector is moved from a cold place to a warm place or the room temperature rises suddenly, wait at least one hour before turning the power on. Also, ensure that humidity levels are kept low.
• Do not block the ventilation slots or wrap the operating projector with a cloth, etc. Do not install the projector close to other equipment as this can interfere with air flow and result in rising internal temperature.

■ Air intake and exhaust of the DLA-G20/DLA-S15

The DLA-G20/DLA-S15 uses air to cool itself (as shown in the figure below). Therefore, do not block the intake and exhaust ports or place an object near the ports. Since air intake is performed at the base and only minimum clearance is kept when the projector is installed, be careful not to reduce the clearance by inserting paper or other objects beneath the unit.



Do not expose your skin to the hot exhaust.
Excessive exposure can cause burns.



Do not put paper or documents under the projector.
This reduces the clearance between the projector and the table, blocking the intake port and reducing the cooling effect.

Reference materials: Temperature and humidity conditions faor the DLA-G20/DLA-S15
Allowable operating temperature/humidity: +5˚ to +35˚/20 to 80%, no condensation
Allowable storage temperature/humidity: -10˚ to +60˚/10 to 90%, no condensation

■ Ceiling suspension

The DLA-G20 can be set upside down and suspended from a ceiling. Make sure there is enough space for the intake and exhaust ports to dissipate heat and to allow easy maintenance access (attach an elevator to move the projector up and down easily for maintenance and leave enough space for lamp replacement).

For installation of special metal fittings, it is necessary to use the feet of the projector or make an opening for intake port or lamp replacement. Use the dedicated "EF-G10CJ" ceiling hanging metal fittings.

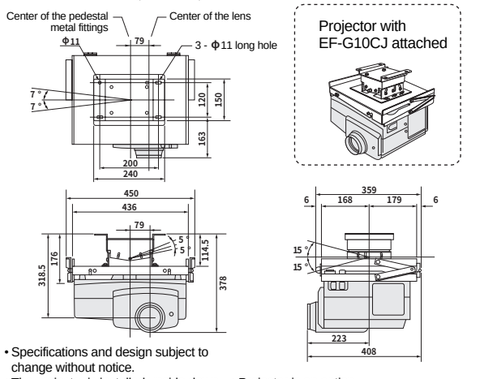
■ "EF-G10CJ" ceiling hanging metal fittings

Features:

• Enables the D-ILA multimedia projector "DLA-G20" to be suspended from a ceiling
• Enhances the installation flexibility of the DLA-G20
• Makes pan and tilt angle adjustment easy
• Enables easy assembly and installation

** Please note that the DLA-G20 cannot compensate for trapezoid distortion.*

Dimensions (Unit: mm)



• Specifications and design subject to change without notice.
• The projector is installed upside down. • Projector is an option.

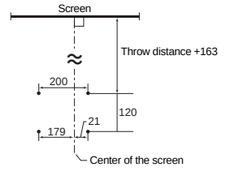
Specifications

Finish	Ivory coating
Vertical tilt variable range	±15˚
Horizontal tilt variable range	±5˚
Horizontal pan variable range	±7˚
Dimensions	(H) 176 x (W) 450 x (D) 359 mm (6-15/16" x 17-3/4" x 14-3/16")
Weight	6.5 kg (14.3 lbs.) (H) 378 x (W) 450 x (D) 408 mm
Dimensions (when the DLA-G20 is incorporated)	(14-15/16" x 17-3/4" x 16-1/8")
Weight (when the DLA-G20 is incorporated)	20.5 kg (45.2 lbs.)

• The lens of the DLA-G20 is not located at the center. When attaching the metal fittings, the lens center is shifted from the center of the pedestal metal fittings by 79 mm. Take this into consideration when determining the installation position.

■ Ceiling hole position when installing the ceiling hanging metal fittings

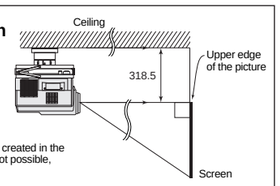
Ceiling hole position when installing the ceiling hanging metal fittings
Plane surface
(when the ceiling is viewed from the floor)



■ Screen installation position with ceiling-mounted projector

Screen installation position with ceiling-mounted projector
● Elevation view

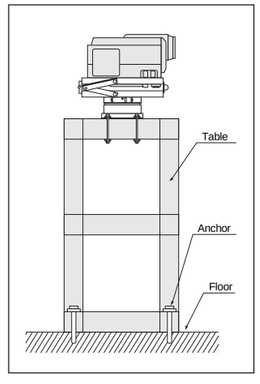
• To lower the screen further, put a cushion for adjustment between the metal fittings and the ceiling and lower the projector as well.
• To raise the screen further, a cavity must be created in the ceiling for the projector installation. If this is not possible, trapezoid distortion may occur.



■ Permanent installation on a table or shelf

To prevent the projector from falling, tipping over, etc., you may want to fix it securely to the platform, table or shelf where it is installed. You can do this with the "EF-G10CJ" ceiling hanging metal fittings. The table should also be firmly anchored to the floor.

• In all installations, the supporting platform (ceiling, table, etc.) must be able to support a total weight of at least 20.5 kg (14 kg projector and 6.5 kg "EF-G10CJ" ceiling hanging metal fittings). The weight of these items could result in a serious or fatal injury if an accident were to occur. Special precautions should be taken to prevent the projector from falling or being knocked over even under severe conditions such as an earthquake.
**For details, refer to the "EF-G10CJ" instruction manual.*
• Ensure that stress is not applied any part of the projector other than its feet.
• Installation and construction requires expertise and should only be performed by a skilled professional. To ensure safety, the customer should not do the construction work on their own.
• JVC will assume no responsibility for any accidents related to installation such as falls.



■ Replacing the light source lamp (DLA-G20/DLA-S15)

The light source lamp must be replaced periodically. As a rough guideline, the lamp should be replaced after about 1000 hours of operation.

When the lamp's operation time surpasses 900 hours, the LAMP indicator on the projector lights. When projection starts, the [lamp replacement] message is shown on the screen for about 2 minutes. Use a new light source lamp or prepare a light source lamp for replacement. When 1000 hours have passed, the LAMP indictor blinks and the light source lamp will not light even if the [OPERATE] button (or [POWER] button on the remote control unit) is pressed.

Although lamp replacement timing is normally about 1000 hours, it can vary depending on the operating conditions. If projection images are dark and the colors are abnormal, replace the light source lamp earlier. To purchase a light source lamp (DLA-20-LAMP), consult your JVC dealer.

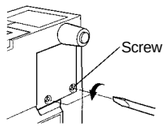
Notes:

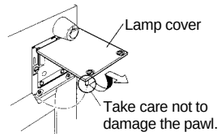
- If the projector is installed in a tight space where it is difficult to work on, move it to a place where there is more space to work to avoid injury.
- Use a genuine light source lamp. Problems may occur if you do not use an approved lamp. Do not use a used light source lamp. This will result in a reduction of performance and, if the lamp is damaged, could cause the projector to malfunction.
- Do not replace the light source lamp immediately after using the projector as the lamp will be too hot to touch. Wait at least one hour for the lamp to cool.
- When replacing the light source lamp, be sure to turn the main power off and unplug the power cord from the AC outlet. Otherwise, an injury or electric shock may result.
- Do not dispose of used lamps as is because doing so is very dangerous. The lamp contains gas that is sealed in under very high pressure. Before disposing of the lamp, be sure to remove the gas.

For more information on disposing of a used lamp, refer to the instructions provided with the lamp. If you have any questions, consult your JVC dealer.

1 Loosen the screw and remove the lamp cover.

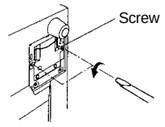
Loosen the two screws.

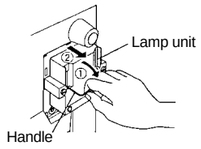




2 Loosen the screw on the lamp unit and pull the handle to remove the lamp unit.

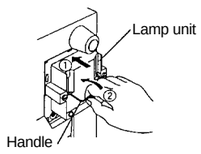
Loosen the two screws.

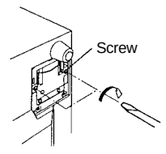




3 Insert a new lamp unit to the inner part and secure the screw.

Loosen the two screws.

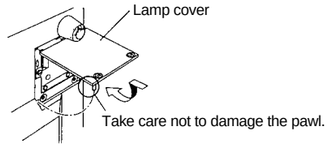




Note: Do not touch the glass surface of the light source lamp with bare hands or allow it to get dirty. This can shorten the lamp life and result in poor performance (pictures may appear darker). Hold the plastic section of a new light source lamp. Do not touch the metal section or front glass section.

4 Install the lamp cover and secure the screw.

Loosen the two screws.



Notes:

- Place the lamp unit in position and close the lamp cover correctly. If the lamp is not properly installed or the cover is not closed correctly, the safety switch comes on, preventing operation.
- If the pawl on the lamp cover is damaged, the projector may not work. In this case, replace the lamp cover with a new one.
- When the lamp is replaced, be sure to reset the lamp usage time. For resetting, refer to the instruction manual.

Operating precautions

The D-ILA projector is a precision instrument. Be sure to operate it carefully, according to the points listed below.

1 The D-ILA multimedia projector takes 40 to 50 seconds to display images after the power is turned on.

The D-ILA multimedia projector takes 40 to 50 seconds to display images after the power is turned on. This is not a malfunction. Images will become clear soon after they start to appear. Warming up is not necessary.

2 Do not disconnect power immediately after turning off the D-ILA multimedia projector.

The [OPERATE] indicator goes out when the projector is turned off, but the cooling fan keeps running for about 40 seconds (depending on environmental conditions). Therefore, do not turn the main power off, pull out the plug, or turn off the circuit breaker soon after finishing operation. Doing so could damage the lamp in the projector.

Do not shut off the power during operation, as this could also damage the lamp. JVC assumes no responsibility for any damage caused by this action.

3 The D-ILA multimedia projector takes a few seconds to change image signals.

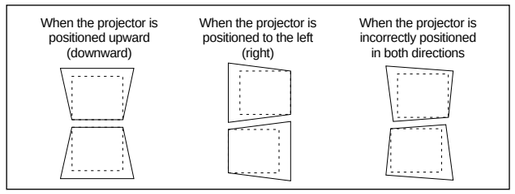
The D-ILA multimedia projector adapts to different kinds of multimedia. When it switches to a different type of image signal, the projector will take a few seconds to adapt to the new signal. When the signal changes, the display will be disturbed a bit, but this is not a malfunction.

4 Maintain the proper relationship between the projector and the screen.

The relationship between the throw distance and the screen size and the elevation angle are different for each type of D-ILA multimedia projector. Check the proper position for your machine before using.

5 There is no function to correct keystone distortion.

If the position is not correct as described in <4>, keystone distortion will occur. The D-ILA multimedia projector does not have an automatic function to correct this distortion. Adjust the projector's position relative to the screen to correct the image.



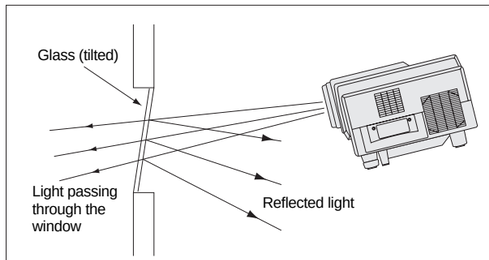
6 Perform maintenance in the proper amount of space.

The projector needs a certain amount of space for proper adjustment and maintenance (at minimum, the amount shown on page 34). Without enough space, maintenance cannot be properly carried out, which may eventually result in a malfunction.

7 Check the window panes in front of the projector before projecting images.

Light becomes weaker as it passes though a window pane. It is recommended to have no more than one pane in front of the projector in a projection room. (No pane is preferable.)

Moreover, part of the light coming from the projector will be reflected off the surface of the panes. Be sure to position the projector to prevent light from reflecting back into the lens.



Place the projector in a position where light is not reflected back into the lens. (e.g. Tilt the window pane in the projection room.)

8 In dark areas

The screen may become slightly brighter than the surrounding dark area, even though the projector is not projecting images (when muting or not receiving signals).

The border of the screen may become slightly brighter than the surrounding dark area. (When projecting a window, etc.).

The brighter areas will not stand out while the projector is projecting images.

9 The projector's surroundings

The D-ILA multimedia projector generates heat, so adjust the temperature in the room with ventilation or air-conditioning, referring to the table below for the energy generated by each type of projector. For optimum cooling efficiency and maintenance, refer to "Installation" on pages 34 to 35.

When the projector is transferred from a cold to warm place, or the room temperature drastically increases, it may cause condensation to form that will negatively affect the projector. To avoid or remove condensation, wait for more than an hour, then turn the projector on. In addition, avoid humid environments, as it will also cause condensation to form. (Keep the humidity as low as possible.)

DLA-G20 / DLA-S15	
Heating value	2260 kJ/h 540 kcal/h

10 Do not block the ventilation openings.

Do not cover the projector with a cloth during operation in order to avoid increasing the temperature in the projector, and do not place the projector near other equipment. It may disturb the flow of air and cause an increase in temperature. Small spaces may also hinder maintenance. Before you place the projector, refer to "Installation" on page 34 to 35.

11 The light source lamp must be replaced periodically.

It is recommended to replace the lamp periodically to maintain a clear picture. The lamp is mounted in a detachable housing for easy replacement. For more information, consult your JVC dealer.

- **Life of the light source lamp: about 1,000 hours**
- **Model No.: DLA-G10-LAMP**
- *Please note that lamp life is a guideline only, and is not a guarantee.*

12 When should the lamp be replaced?

The light source lamp in the D-ILA multimedia projector will gradually become exhausted as it is used, with the brightness lessening over time. The lamp should be replaced when its brightness becomes about half that of a new lamp.

Do not turn the projector on and off frequently. It will exhaust the lamp faster and shorten its life.

13 Lamp expiration warning

An orange "LAMP" indicator lights when the lamp is within 100 hours of expiring, so you know when it is time to replace it. An indication is also displayed on the screen for a few seconds after the projector is turned on. The orange indicator starts blinking when the expiration date gets closer. The projector has a timer with which you can confirm the number of hours the lamp has been used.

14 No forced shutdown when the lamp reaches its expiration date during projection.

It can be considered a selling point for our product, as many of the other companies' projectors automatically shut down when the lamp's expiration date is reached. Once the projector is turned off, however, it cannot be turned on again, so do not turn the projector off during an important meeting. To avoid any problems, keep a spare lamp handy as soon as the orange indicator lights. (You can cope with sudden lamp requirements by keeping spare lamps on a shelf.)

If the lamp does not light, replace the lamp after the projector is turned off and the plug is pulled out. Before replacing the lamp, wait for a while until it has cooled down, in order to avoid any injuries caused by touching the hot lamp just after turning it off. For more details about lamp replacement, refer to the instruction manuals of the projector and spare lamp.

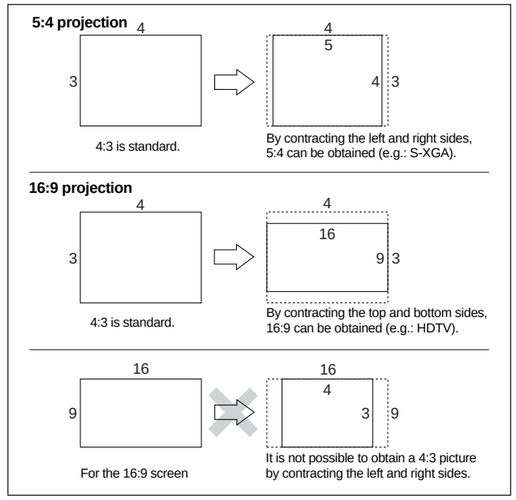
15 The lamp automatically turns off after a certain period of time passes without any sync signals.

If the projector does not detect any incoming sync signals for a specified period of time, the sleep function automatically turns it off. This function avoids unnecessary lamp exhaustion and also saves electricity, even in situations where you may have forgotten to turn the projector off.

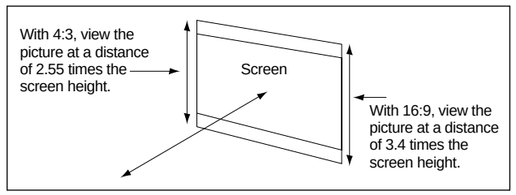
You can easily set the amount of time from the remote controller.

16 Changing the aspect ratio

The D-ILA multimedia projector can handle aspect ratios of 5:4, 4:3, and 16:9. Each projection method is shown below. Aspect ratio is switched automatically according to the type of input source. For NTSC and HDTV, 4:3 and 16:9 can be switched manually to assure compatibility with the DVD squeeze mode and 4:3 HDTV presenter camera.



17 Picture estimation on a large screen



To estimate a picture projected on the screen, the picture is usually viewed near the screen.If the picture is viewed at a distance of 40 to 50 cm from a 180-inch screen, the picture quality is the same as when viewing an 18-inch CRT monitor at a distance of 4 to 5 cm. That is, the picture on the 18-inch monitor is viewed with a 10x loupe. This is not a correct estimation method.

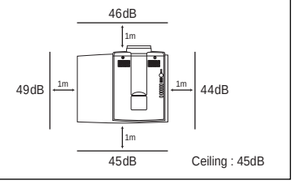
Suppose that a person with standard eyesight of 1.0 is estimating 1000 vertical dots with resolution of 1000 TV lines. As the vertical length of the 180-inch (4:3) screen is 2.74 m (2,740 mm), the length of one dot is 2.74 mm. The maximum distance with which this person can dissolve 2.74 mm is about 9.42 m. Actually, unless the distance is 70% of maximum distance (about 7 m), this person cannot judge one dot with ease. Thus, the proper viewing distance is about 7 meters. Estimate the picture at this distance. This distance is about 2.55 times the vertical length of the screen. Therefore, if the screen size is different, use the value as a guide obtained by multiplying the screen vertical length by 2.55. For 16:9 aspect ratio, multiply the screen vertical length by 3.4.

• The dots that you see near the screen are the D-ILA device's pixels and not abnormalities.

18 Fan noise

The D-ILA multimedia projector uses a high-output xenon lamp and generates heat. Because a fan is used to keep the projector cool, fan noise is produced. To attenuate this noise, various measures are taken as shown below. However, when muting or absorbing the noise, take care not to prevent heat dissipation.

- Model: DLA-G20 /DLA-S15
- Level (Distance of 1 m, A weighting, average): 46dB



19 Fan performance

Several fans are installed to cool the D-ILA multimedia projector. These fans have a total capacity of 303.6 m3/h (5.06 m3/min.) (DLA-G20/DLA-S15).

20 Burning

As with TVs and other display, burning occurs when a high contrast still picture is projected continuously.

- The D-ILA device incorporated in the D-ILA multimedia projector may cause burning.
- Once burning occurs, replace the part.
- When a 16:9 picture with the top and bottom sections cut is projected on a 4:3 screen for a long time and the picture source is switched to 4:3, the boundary line of the 16:9 screen (burning) may appear.

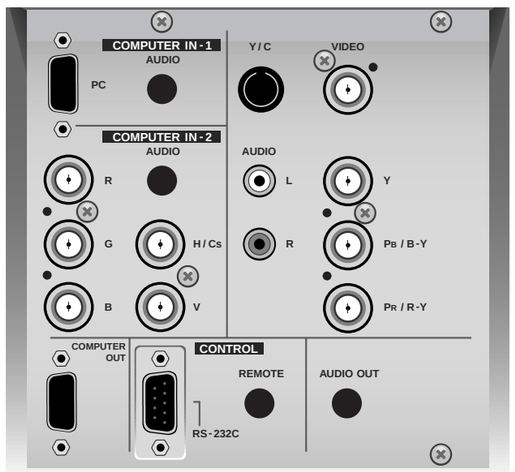
21 Control from the switcher

The D-ILA multimedia projector can be controlled from a switcher, controller or personal computer via the RS-232C interface. For "RS-232C control specifications", consult your JVC dealer.

System design

■ Note on setting up a D-ILA-based system

The input and output connectors of the DLA series (excluding the DLA-M4000) are shown below.



• The photo shows the DLA-G20 and DLA-S15.

Personal computer system	Analog RGB:	Mini D-sub 15 pins x 1
		R, G, B, H, V (BNC 5-axis) x 1
Video system	Y/C separation: Mini DIN 4 pins (S connector) x 1	
	Composite: BNC connector x 1	
	Color difference: Y, PB/B-Y, PR/R-Y (BNC 3-axis) x 1	
External control	Serial: RS-232C mini D-sub 9 pins x 1	

• The following 19 areas are preset for the DLA-G20 and DLA-S15.
• When video signals are input, the area corresponding to them is selected and locked.
• When input signals do not match in terms of the frequency, etc., the closest area is selected and locked.
In this case, since screen shift occurs, it is necessary to fine adjust the phase, tracking and horizontal and vertical positions. These can be adjusted automatically by pressing the [Quick Alignment] button to activate the auto setup function.
* If auto adjustment is not satisfactory, use the manual adjustment function.
* Even though signals can be input because they are in the allowable frequency range, images may not be projected normally with some types of signals.

Area No.	Source	Number of pixels (dots)	Scanning lines	Horizontal scanning frequency (kHz)	Vertical scanning frequency (Hz)	I/NI
0	NTSC	764×241	525	15.73	59.94	I
1	PAL/SECAM	922×287	625	15.63	50.00	NI
2	EDTV Ⅱ	764×482	525	31.47	59.94	I
3	HDTV	1920×517	1125	33.75	60.00	NI
4	PC-98	640×400	440	24.83	56.43	NI
5	VGA1	640×350	449	31.47	70.09	NI
6	VGA3	640×480	525	31.47	59.94	NI
7	Mac13"	640×480	525	35.00	66.67	NI
8	VGA VESA	640×480	500	37.50	75.00	NI
9	S-VGA1	800×600	628	37.88	60.32	NI
10	S-VGA2	800×600	666	48.08	72.19	NI
11	Mac16"	832×624	667	49.73	74.55	NI
12	XGA1	1024×768	806	48.36	60.00	NI
13	XGA2	1024×768	808	56.50	70.10	NI
14	Mac19"	1024×768	804	60.24	74.93	NI
15	Mac21"	1152×870	915	68.65	75.03	NI
16	S-XGA1	1280×1024	1066	63.98	60.02	NI
17	S-XGA2	1280×1024	1066	70.80	67.00	NI
18	S-XGA3 MacBoard	1360×1024		80.00	75.10	NI

• The areaa that each input connector covers is shown below. Check with this table if the required video source can be accepted to the selected connector.
* For example, even if HDTV signals are input to the Computer 1 mini D-sub 15-pin connector, normal images cannot be obtained as shown in the table .

■ Input connector table

Connector names	Connector form	Corresponding area No.
Computer 1	Mini D-sub 15 pins	4 ~ 18
Computer 2	R.G.B.H.V. BNC	0 ~ 18
Y,PB,PR	BNC	0 ~ 3
S video/composite	Mini DIN 4-pin/RCA pin	0 ~ 1

• Each time the input is switched, the D-ILA multimedia projector accesses the corresponding area. Therefore, switching takes time and the image is distorted. This is not a malfunction.
• To project a normal image, it may be necessary to adjust video output on the personal computer.
• A separate dedicated cable may be required for connection to a personal computer. Depending on the model, a conversion cable and conversion adapter may be required.