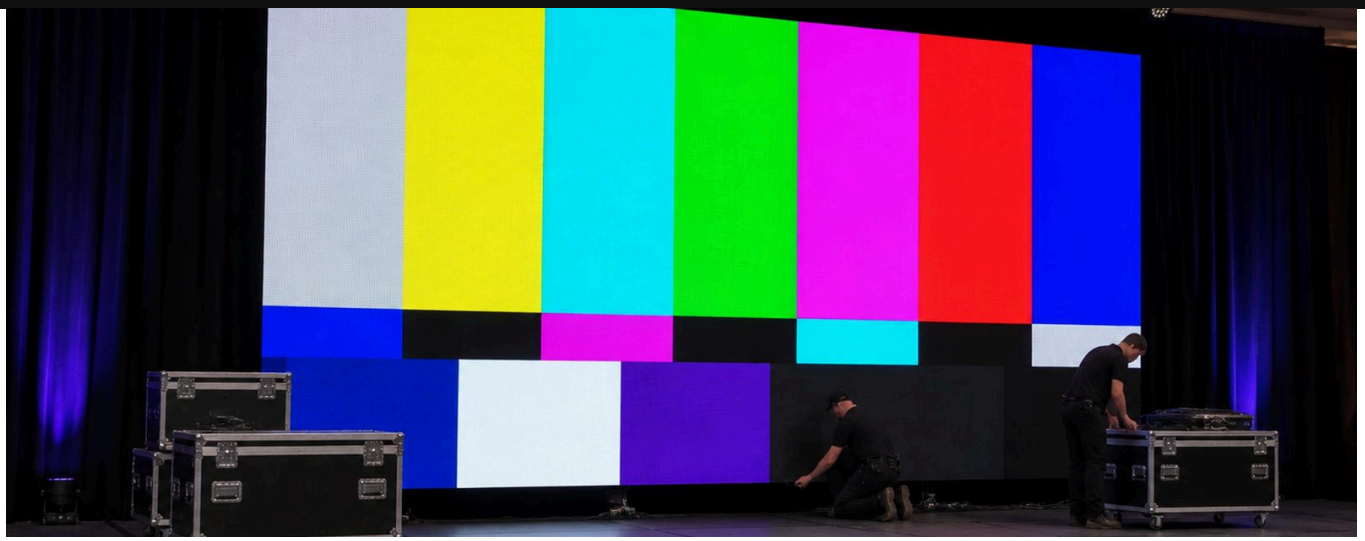
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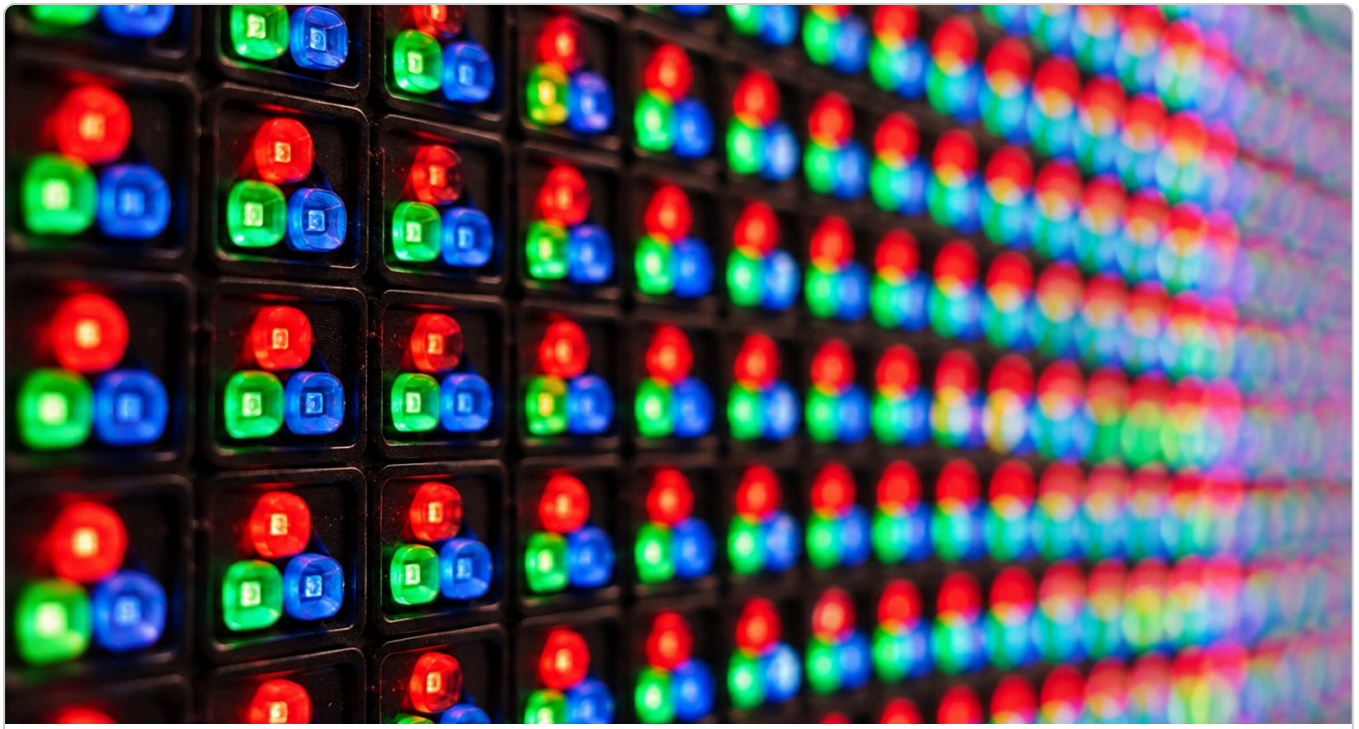
LED Screens

An LED wall is the biggest, most expensive and most fragile thing on many stages. It is also simple once you see it as three things: panels that make light, a processor that tells each panel what to show, and the power to run it. This module covers pixel pitch, building and cabling a wall, getting the picture right and finding a fault fast.

B&W Productions · Proper Planning, Prevents Poor Performance



01 Panels, pixels and pitch



Each pixel is a red, green and blue LED. Pitch is the distance from one pixel to the next.

PANEL (CABINET)

The building block. Most rental panels are 500 mm square, or 500 by 1000 mm. They lock together into a wall.

PIXEL PITCH

The gap between pixel centres in millimetres. P2.6 means 2.6 mm. Smaller pitch means more pixels and a sharper picture up close.

RESOLUTION

Width in mm divided by pitch. A 500 mm panel at P3.9 is 128 pixels wide. At P2.6 it is 192.

VIEWING DISTANCE

Rule of thumb: the closest viewer should be about one metre away for every millimetre of pitch. P3.9 wants about 4 m.

BRIGHTNESS

Measured in nits. Indoor walls run a fraction of what they can do. Outdoor walls are far brighter to beat the sun.

INDOOR OR OUTDOOR

Outdoor panels are sealed against rain and dust (IP rated). Indoor panels are not. One shower kills them.

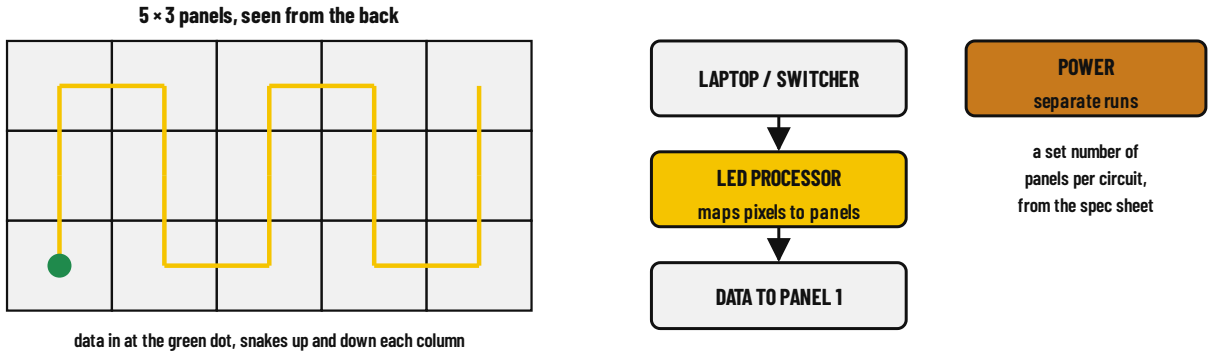
TRY IT: SIZE THE WALL

Panel wattage comes from the panel's spec sheet. Use the maximum figure for power planning.

FIELD RULE

Pitch in millimetres is roughly the closest seat in metres.

02 From laptop to light



The processor is the brain. It takes one picture and tells each panel which piece to show. Data runs panel to panel. Power runs separately.

1. **Source.** A laptop, media server or camera switcher sends a normal video signal (HDMI or SDI).
2. **LED processor.** Scales the picture to the wall's pixel size and sends it out on network-style data cables.
3. **Data runs.** Each processor output feeds a chain of panels. A port can only carry so many pixels (about 650,000 on a typical processor; check yours). Big walls need several ports.
4. **Mapping.** In the processor software, someone draws how the panels are cabled so each one shows the right piece. Wrong map, scrambled picture.
5. **Backup.** A second data cable into the far end of each chain lets the wall survive one bad cable. Worth it on a show that matters.



The processor and its mapping file. Save the file and keep a copy.

FIELD RULE

Cable the data exactly as the map says. The map and the cables are one thing.

03 Powering a wall

An LED wall draws most when it shows full white at full brightness, and far less on normal content. You plan for the maximum.

- **Panels link power to each other.** The spec sheet says how many panels may hang off one feed. Never more.
- **Count the circuits.** Total maximum watts, divided by 230, gives the amps (Module 8). Spread the feeds across phases.
- **Own supply.** Keep the wall on its own circuits, away from sound, so its power supplies do not put noise on the audio.
- **Power on in order:** wall power first, then the processor, then the source. Off in reverse.
- **Brightness down.** Indoors, a wall at full brightness blinds the front row, washes out the lighting and flares on camera. Start around a quarter to a third and adjust by eye.
- **Earth.** Every feed properly earthed through the distro. Crew plug in. Electricians wire in.

> **FIELD RULE**
> Plan power for full white. Run the wall far below it.

04 Building and handling panels



Carry by the handles. Lock every latch. Never touch the face.

A wall is a structure. Ground-stacked walls stand on a base with rear bracing and ballast, to the supplier's plan. Flown walls hang from header bars and are rigged by a competent rigger (Module 15).

1. **Level the first row.** The base bar is levelled with its feet before any panel goes on. A crooked first row gets worse with every row above.
2. **Two people per panel** on anything above the first row.
3. **Carry by the handles**, face away from your body and belt buckle. Never rest a panel on its face or its bottom edge pixels.
4. **Lock every latch**, side and top, as each panel goes in.
5. **Follow the arrows.** Panels have an up arrow and a data direction. All the same way.
6. **Brace and ballast** as the plan says before going higher. Outdoors the wind plan applies: a wall is a sail.
7. **Cable as you go:** power and data links on each row before the next row hides them.

> **TAKE CARE**
> The corner and edge LEDs break off with a light knock. Edge protectors stay on until the panel is in the wall, and go back on before it comes out.

FIELD RULE

Handles only. Face never touches anything.

05 Getting the picture right

A wall is rarely a standard screen shape. Eight panels by five at P3.9 is 1024 by 640 pixels. Content made for a TV will be stretched, cropped or soft unless someone plans for it.

- **Tell the content person the pixel size** and the shape as early as possible. That is the single most useful thing crew can do.
- **Fill or fit.** The processor can scale a 16:9 picture to fit with black bars, or fill and crop the edges. Decide with the client, not during the show.
- **Big and bold.** Thin fonts, fine lines and small logos shimmer on a wall. Large text, strong contrast.
- **Dark backgrounds** look better and are kinder to the lighting than full white slides.
- **Test patterns first.** Colour bars and a grid show a wrong map, a dead pixel or a colour mismatch before the client's video does.
- **Cameras.** A wall can show dark bands or ripples (moiré) on camera. Fixes: higher refresh panels, matching the camera shutter, moving the camera back or softening focus on the wall.
- **Black is off.** A wall showing black still glows slightly. For a true blackout, the processor has a blackout or freeze button. Know where it is.

> **FIELD RULE**
> Give the designer the wall's pixel size before they open the software.

06 Finding a fault fast

YOU SEE	MOST LIKELY	CHECK
One panel black	No power to it, or its data in is out	Power link into that panel, then the data cable into it
One panel and every panel after it black	Data cable out of the last good panel	Reseat or swap that one cable
A small square inside a panel wrong or dead	One module in the panel	Swap the module or the panel
Picture in the wrong place or scrambled	Mapping does not match the cabling	Compare the map with the real data path
Whole wall black	Processor, source or blackout button	Is the processor getting input? Is blackout on?
Whole wall flickers or drops out	Data cable or port over its pixel limit, or a bad first cable	Swap the first cable, split the run across two ports
Colours differ panel to panel	Panels from different batches or wrong calibration	Group same batches together, tell the supplier

Work from the last good panel. The fault sits between the last panel that works and the first one that does not.

> **FIELD RULE**
> Spare data cable, spare power link and a spare panel live next to the wall, not in the truck.

07 Strike and transport

1. ☐ **POWER OFF IN ORDER**
   Source, processor, then wall power. Wait for it to go dark.

2. ☐ **CLEAR BELOW AND IN FRONT**
   Nobody under a wall coming down.

3. ☐ **TOP ROW FIRST**
   Two people per panel. Unlock, lift by the handles.

4. ☐ **EDGE PROTECTORS ON**
   Before the panel goes into its case.

5. ☐ **CASES AS THE SUPPLIER PACKS THEM**
   Faces protected, never face to bare face, never flat under weight.

6. ☐ **CABLES COUNTED AND COILED**
   Data and power links back in their trunk (Module 12).

7. ☐ **FAULTS TAGGED**
   A panel with a dead module gets a red tag with its position in the wall.

8. ☐ **DRY BEFORE CLOSING**
   Outdoor walls are wiped and dried. A wet case is a dead panel next week.

When we hire in a wall, the supplier's technician leads the build and the strike. You work to their instructions on their kit.

> **FIELD RULE**
> A panel is safest in the wall or in its case. The floor in between is where they die.

08 Check what you learnt

Ten questions. Circle one answer for each. The answer key is on the last page. Pass mark: 8 out of 10.

1. What is pixel pitch?

- ○ **A** The brightness of the wall
- ○ **B** The distance between pixel centres in millimetres
- ○ **C** The weight of a panel
- ○ **D** The number of panels

2. A wall is P3.9. Roughly how close should the nearest viewer be?

- ○ **A** Half a metre
- ○ **B** About 4 metres
- ○ **C** 20 metres
- ○ **D** It does not matter

3. What does the LED processor do?

- ○ **A** Powers the panels
- ○ **B** Scales the picture and tells each panel which piece to show
- ○ **C** Cools the wall
- ○ **D** Records the show

4. **The picture is scrambled across the wall. What is the likely cause?**

- ○ **A** Low brightness
- ○ **B** The mapping does not match the data cabling
- ○ **C** A flat battery
- ○ **D** The wrong HDMI brand

5. **How do you plan power for a wall?**

- ○ **A** For average content
- ○ **B** For full white at full brightness, from the spec sheet
- ○ **C** By guessing
- ○ **D** One plug for everything

6. **How do you carry a panel?**

- ○ **A** By the face
- ○ **B** By the handles, face away from your body
- ○ **C** By the data cable
- ○ **D** Under one arm, face in

7. **One panel and every panel after it are black. Where do you look first?**

- ○ **A** The processor
- ○ **B** The data cable out of the last good panel
- ○ **C** The laptop
- ○ **D** The mains distro

8. **What is the most useful thing to tell the content designer?**

- ○ **A** The wall's brand
- ○ **B** The wall's pixel size and shape
- ○ **C** The truck size
- ○ **D** The crew call time

9. **Indoors, how bright should the wall run?**

- ○ **A** Full brightness
- ○ **B** Well below full, set by eye
- ○ **C** It cannot be changed
- ○ **D** Off

10. **Who rigs a flown LED wall?**

- ○ **A** Any two crew
- ○ **B** A competent rigger
- ○ **C** The content designer
- ○ **D** The client

Answer key

1. **B**. Pitch is the centre-to-centre distance between pixels, in mm.
2. **B**. About one metre per millimetre of pitch.
3. **B**. The processor scales and maps the picture onto the panels.
4. **B**. The map in the processor must match the real data path.
5. **B**. Plan for maximum draw and respect the panels-per-feed limit.
6. **B**. Handles only. The face and edges never touch anything.
7. **B**. The fault sits between the last working panel and the first dead one.
8. **B**. Content made to the wall's real pixel size looks right.
9. **B**. Indoor walls run at a fraction of maximum so they do not blind or wash out the room.
10. **B**. Flown walls are rigging. That is a competent rigger's job.

Photos: scene photographs are AI-generated illustrations and do not show B&W Productions equipment or events. This module is crew training, not a substitute for the manufacturer's manual, the venue's rules or the event safety officer's instructions.