B&W PRODUCTIONS · CREW TRAINING · MODULE 7

Setting Up a Processor

The loudspeaker processor is the brain between the mixer and the amps. This module is the setup process, step by step: name the outputs, route them, set the crossover points, align the subs, set the limiters, test one box at a time, save the preset. Every tool on the page is live. Work through it once here and the real unit on site will make sense.

B&W Productions · Proper Planning, Prevents Poor Performance



01 What a processor does

A loudspeaker processor (also called a DSP, a speaker management system or a crossover) sits between the mixer and the amplifiers. The mixer sends it a finished stereo mix. It splits that mix into the bands each speaker is built for, aligns them in time, protects the drivers, and sends each band to its own amplifier channel.

It does four jobs, and you will set them up in this order:

1 · CROSSOVER

Splits the mix by frequency. Bass to the bins, everything above to the tops. A 3-way rig adds a mid band.

2 · EQ

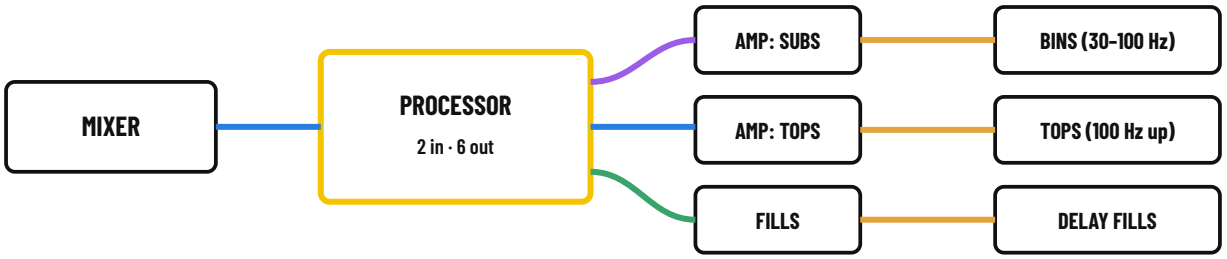
Tames the room and the boxes. For crew: leave it flat unless the engineer has saved a preset.

3 · DELAY

Lines speakers up in time so the subs and tops hit together, and so fills down the room do not echo the mains.

4 · LIMITER

A ceiling on each output. Stops a big amp cooking a speaker when someone pushes the mixer too hard.



Blue is line level on XLR. Yellow is speaker level on Speakon. The processor only ever sees and sends line level: it never touches a Speakon lead.

When you need one, and when you don't

- **Passive rig** (bins and tops on rack amps): always. Without it the amps send full-range to every box and the tops get bass they cannot handle.
- **Powered boxes** (Evox, powered subs): the DSP is inside the box. You usually do not need a processor, but one is still useful to delay fills and align subs.
- **Mixed rig** (passive mains, powered fills): one processor runs it all. Fills get a full-range output with a high-pass and a delay.

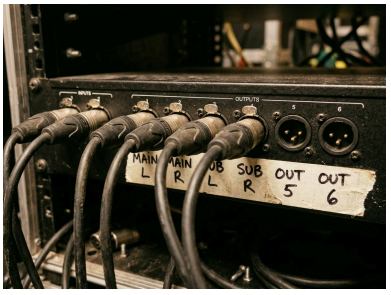
> **CREW RULE**
> You do not design the preset. The engineer does that once, in daylight, with a measurement mic. Your job is to load the right preset, route the outputs correctly, prove every box, and never unmute a limiter-less output into a passive speaker.

In the B&W kit: the FBT DLM 260, a 2-in / 6-out processor. It drives the passive side of the kit: the DAS Action-S218 double-18 bass bins and the Lynx tops on the Crown XTi and Powerworks amps.

02 Ins and outs



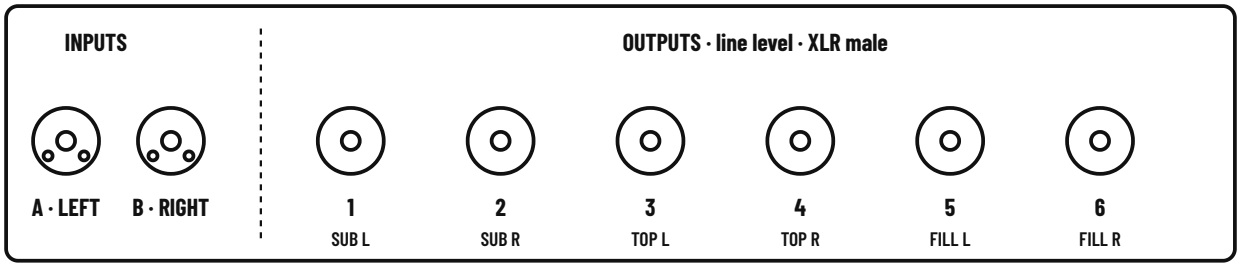
FBT DLM 260 front: screen, encoder, 6 output mutes



Rear: 2 XLR in, 6 XLR out, tape labels

A 2-in / 6-out processor. Front: input meters, the screen, and one mute button per output. Rear: inputs A and B from the mixer, outputs 1 to 6 to the amps, labelled on tape before the first cable goes in. Product photo: FBT.

Most processors you will meet are **2-in / 6-out** or **4-in / 8-out**. The inputs take the mixer's main left and right on XLR. The outputs are also XLR, line level, one per amp channel or powered box. Everything is balanced, so cable runs can be long.



A typical 2-in / 6-out rear panel. Inputs are XLR female, outputs XLR male, so you cannot plug a lead in the wrong direction. The labels under the outputs are tape, written by you, before the first cable goes in.

The front panel

- **Input meters**: show signal arriving from the mixer. No meter, no signal: the fault is before the processor.
- **Output mute buttons**: one per output. On site you unmute these one at a time, never all at once.
- **Output meters and limit lights**: a limit light flashing means that output has hit its ceiling. Occasional flicker is fine. Solid is too loud.
- **Preset recall**: the saved setups. Load the one named for tonight's rig. Most units can lock the panel so a knee does not change it mid-show.

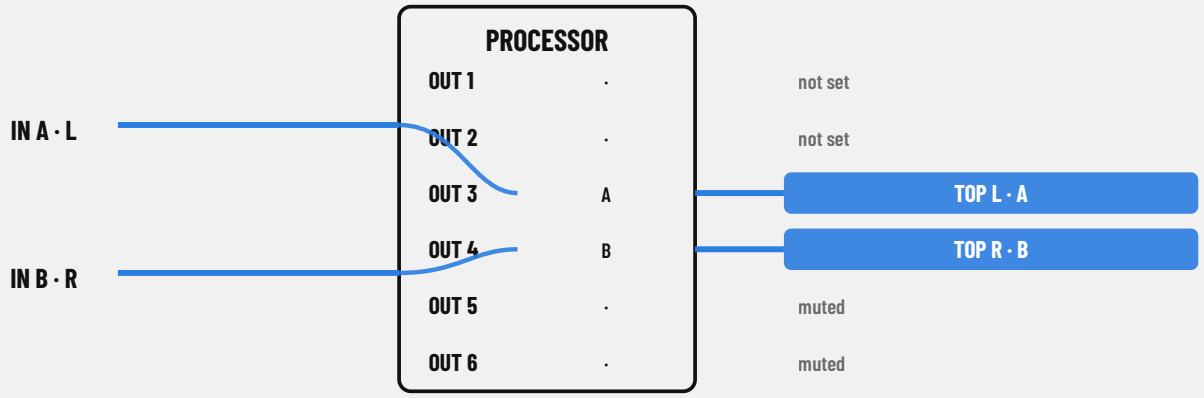
LABEL FIRST, CABLE SECOND

Put a strip of tape under the six outputs and write what each one feeds. Then write the same on the amp inputs. A rig wired against its labels is a rig that will be fault-found in the dark.

03 Routing: which output feeds what

Routing is the map from inputs to outputs. Left-side speakers take input A. Right-side speakers take input B. Subs usually take **A+B summed**, because bass is not directional and one mono sub feed keeps every bin working together. Choose a rig and set the outputs. The tool checks your map.

ROUTING MATRIX



Standard map for mono subs + stereo tops: 1 Sub (A+B) · 2 Sub (A+B) · 3 Top L (A) · 4 Top R (B) · 5 Fill L (A, delayed) · 6 Fill R (B, delayed).

Three maps you will use

RIG	OUT 1	OUT 2	OUT 3	OUT 4	OUT 5	OUT 6
2-way, mono subs	Sub A+B	Sub A+B	Top L (A)	Top R (B)	spare	spare
2-way + delay fills	Sub A+B	Sub A+B	Top L (A)	Top R (B)	Fill L (A) +delay	Fill R
3-way stereo	Sub A+B	Sub A+B	Mid L (A)	Mid R (B)	High L (A)	High R

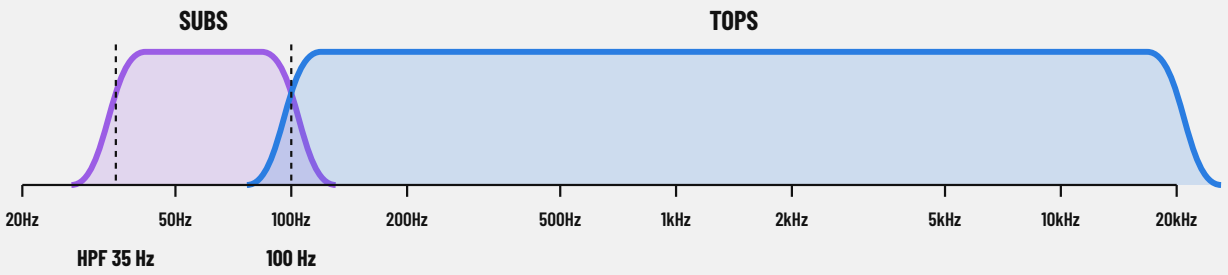
THE CLASSIC MISTAKE

Output 3 is labelled "Top L" but inside the processor it is still set to full range, or still routed from the preset before. The box plays, so nobody checks, and the tops get bass all night. The label is not the routing. The screen is the routing. Check both.

04 Crossover points and slopes

Each output has a **high-pass filter** (cuts below) and a **low-pass filter** (cuts above). A sub output is high-passed around 30 to 35 Hz to protect the driver and low-passed around 100 Hz. A top output is high-passed at the same 100 Hz. Where the two meet is the crossover point. The **slope** says how steep the cut is: 24 dB per octave Linkwitz-Riley (LR24) is the safe default, because the two sides add back to flat.

CROSSOVER TOOL



Defaults: sub HPF 35 Hz · sub/top crossover 100 Hz · mid/high 1.6 kHz · all filters LR24.

Starting points

OUTPUT	HIGH-PASS	LOW-PASS	SLOPE	WHY
Double-18 bins	`35 Hz`	`100 Hz`	`LR24`	Below 35 Hz the cone just flaps. Above 100 Hz you start to hear voices from the bins.
12" or 15" tops	`100 Hz`	`off (20 kHz)`	`LR24`	Matches the bins. Lower only if the tops are big 15s and there are no bins.
Mids (3-way)	`100 Hz`	`1.6 kHz`	`LR24`	The horn takes over around 1.2 to 2 kHz; the box's spec sheet gives the exact number.
Highs (3-way)	`1.6 kHz`	`off`	`LR24`	Never below the spec-sheet minimum. A horn fed too low dies quietly, then suddenly.
Delay fills (powered)	`80 Hz`	`off`	`BW12`	The box's own DSP does the rest. High-pass only keeps the bass with the bins.

WHERE THE NUMBERS COME FROM

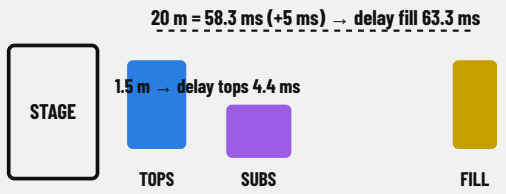
The speaker's spec sheet. Every passive box lists a recommended crossover and a minimum high-pass. The processor does not know what is plugged into it. If you set a horn output to 500 Hz because it "sounded fuller", you have bought a diaphragm.

B&W starting points: S218 bins 35 Hz to 100 Hz; Lynx tops high-pass at 100 Hz; Evox 12 on a delay output as a full-range fill, high-passed at 80 Hz, its own DSP left flat.

05 Delay and polarity

Sound travels about **343 metres per second**: roughly 2.9 milliseconds for every metre. If the subs sit two metres in front of the tops, their sound arrives early. If a fill speaker stands 20 m down the room, it arrives 58 ms before the mains do, and the audience near it hears an echo. Delay fixes both: you hold the nearer speaker back until the sound lines up.

DELAY CALCULATOR



Fill delay = distance ÷ 0.343 + 5 ms. Example: 20 m fill = 58 + 5 = 63 ms. Subs 1.5 m ahead of tops: delay the tops by 4.4 ms.

The fill rule

Delay the fill by its distance from the mains, plus about 5 ms. The extra few milliseconds make the mains arrive a touch first, so the ear locates the sound at the stage and the fill just adds level. Put the delay on the fill's output, not on the mains.

Polarity: the two-second check

Subs and tops can be out of polarity: one pushing while the other pulls, at the crossover frequency. The bass goes thin exactly where the two overlap. The test: play a track with a steady kick drum, stand in front of the stack, and flip the polarity button on the sub output. One setting has clearly more punch. Keep that one. If you cannot hear a difference, the delay is wrong, fix that first.

> **FIELD RULE**
> Delay the fill, not the mains. Delay the tops to the subs, not the subs to the tops. Then flip polarity on the subs and keep whichever is louder.

At B&W the Evox 12s go out as delay fills at the back of a long room. One processor output each, delayed to the mains.

06 Limiters and gain structure



Unmute one output at a time with the limiter already on. The laptop is the engineer's measurement rig; crew only need the mute buttons and the meters.

A limiter is a ceiling. Signal below the threshold passes untouched; signal above it gets squashed so the amp never delivers more than the speaker can take. Every passive-speaker output needs one, set **before** the output is unmuted. It is the only thing between a 2 000 W amp and a 600 W driver when the DJ pushes the master into the red at 1 a.m.

LIMITER HEADROOM

Headroom = 10 × log10(amp W ÷ speaker RMS W). Set the limiter at least that many dB below the amp's clip point, then 2 dB more for safety.

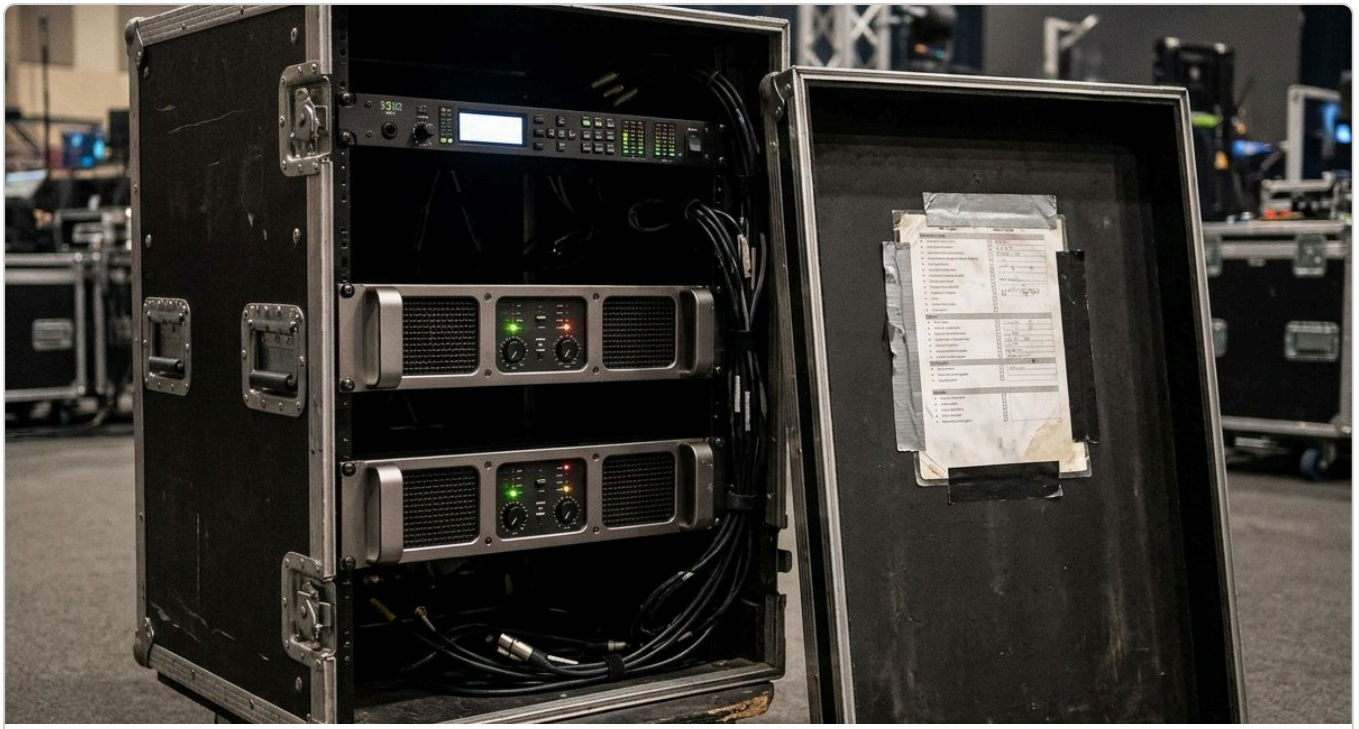
Gain structure: everything at zero

1. **Mixer**: main fader at 0, meters peaking around 0 dB on a loud track.
2. **Processor**: input gain 0 dB, output gains 0 dB. Volume is not set here.
3. **Amps**: attenuators fully up, or at the engineer's marked position. Not "a bit down to be safe": that only moves the clip point and breaks the limiter maths.
4. **Limiters**: set from the amp-to-speaker ratio above, then 2 dB more conservative. Red limit lights should flicker on peaks, never stay lit.

NEVER

Never unmute a passive-speaker output with the limiter switched off "just to test it". Test with the limiter on. If the limiter is wrong, the test will tell you. If it is off, the speaker will.

07 The setup process



The checklist lives inside the rack lid. Tick it every show. Nobody remembers step 7 at 1 a.m.

This is the order. Print it, tape it inside the amp rack lid, and tick it every time. It takes ten minutes on a rig you know and saves the first half hour of every show you don't.

1 ☐ **EVERYTHING OFF, EVERYTHING MUTED**

Amps off. All six processor outputs muted. Mixer master down. Cables labelled at both ends.

2 ☐ **CABLE IT TO THE LABELS**

Mixer L and R into inputs A and B. Each output to the amp channel or powered box written on its tape. Speakon from amp to box.

3 ☐ **POWER UP FROM THE SOURCE**

Mixer, then processor, then amps. Check the processor shows input signal on the meters with the mixer playing a track at 0 dB.

4 ☐ **LOAD THE PRESET**

Recall the preset named for this rig. No preset? Start flat, then set routing, crossovers and limiters from Lessons 3, 4 and 6.

5 ☐ **CHECK ROUTING ON THE SCREEN**

For each output: which input (A, B, A+B), which band, mute state. The label is not the routing.

6 ☐ **CHECK CROSSOVERS AND HIGH-PASSES**

Subs 35 to 100 Hz. Tops from 100 Hz. Fills from 80 Hz. All LR24. Match the spec sheet.

7 ☐ **CHECK LIMITERS**

Every passive output has one and it is on. Threshold from the amp-to-speaker headroom, minus 2 dB.

8 ☐ **UNMUTE ONE OUTPUT AT A TIME**

Track playing. Unmute output 1. Walk to the box it should feed. Right box? Right band (bins only thump, tops have no bass)? Mute it, next output.

9 ☐ **DELAY AND POLARITY**

Delay the tops to the subs, fills to the mains. Flip sub polarity and keep the louder one.

10 ☐ **SAVE AND LOCK**

Save as a new preset: venue, date, rig. Lock the front panel. Note the preset name on the rack tape.

If it is wrong

YOU HEAR	MOST LIKELY	CHECK
Voices coming out of the bins	Sub output set full range or low-pass too high	Sub output low-pass: should be about 100 Hz
Tops sound thin, no weight	Tops high-passed too high, or subs muted	Top HPF about 100 Hz; sub output unmuted; cable to the sub amp
Bass gets weaker when tops come on	Polarity or delay between subs and tops	Flip sub polarity; set top delay to the sub distance
Echo near the back of the room	Fill not delayed	Fill delay = distance ÷ 0.343 + 5 ms
One side silent, input meters fine	Output muted, or wrong routing on that output	Mute button; output screen; XLR to the amp
Limit light solid red on one output	Threshold too low, or that output's gain too high	Output gain back to 0; recheck limiter maths
Nothing on the input meters	Fault before the processor	Mixer master, mixer meters, the two XLRs into A and B

THE WHOLE MODULE IN ONE LINE

Label, route, cross over, limit, prove each box, align, save. In that order, every time.

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. Where does the processor sit in the chain?

- ○ **A** Between the CD player and the mixer
- ○ **B** Between the mixer and the amplifiers
- ○ **C** Between the amplifier and the speakers
- ○ **D** After the speakers, on the Speakon line

2. A 2-in / 6-out processor. The mixer's main L and R go to...

- ○ **A** Outputs 1 and 2
- ○ **B** Inputs A and B
- ○ **C** Any two outputs
- ○ **D** Input A only, B is for the DJ

3. Subs on a normal 2-way rig are best fed from...

- ○ **A** Input A only
- ○ **B** Input B only
- ○ **C** A+B summed (mono)
- ○ **D** Whichever input has more bass

4. Typical sub output filters for double-18 bins?

- ○ **A** High-pass 35 Hz, low-pass 100 Hz
- ○ **B** High-pass 100 Hz, low-pass off
- ○ **C** High-pass 20 Hz, low-pass 500 Hz
- ○ **D** No filters: the amp sorts it out

5. **Which slope is the safe default for crossovers?**

- ○ **A** 6 dB/octave Butterworth
- ○ **B** 24 dB/octave Linkwitz-Riley (LR24)
- ○ **C** 48 dB/octave Bessel
- ○ **D** Whatever the preset before used

---

6. **A fill speaker stands 20 m from the mains. Delay for the fill output?**

- ○ **A** About 20 ms
- ○ **B** About 63 ms (58 + 5)
- ○ **C** About 200 ms
- ○ **D** None; delay the mains instead

---

7. **The subs sit 1.5 m in front of the tops. What do you delay?**

- ○ **A** The subs by 4.4 ms
- ○ **B** The tops by 4.4 ms
- ○ **C** Both by 4.4 ms
- ○ **D** Nothing: 1.5 m doesn't matter

---

8. **How do you check sub-to-top polarity on site?**

- ○ **A** Look at the XLR pins
- ○ **B** Flip polarity on the sub output and keep the louder setting
- ○ **C** Turn the subs down until it sounds right
- ○ **D** Measure the cable length

---

9. **A 1 200 W amp drives a 600 W RMS speaker. The limiter should sit...**

- ○ **A** Off: the amp is only double
- ○ **B** At least 3 dB below the amp's clip point, then 2 dB more for safety
- ○ **C** At the amp's clip point
- ○ **D** At +3 dB above clip

---

10. **Correct order when proving the rig?**

- ○ **A** Unmute all six outputs and listen
- ○ **B** Unmute one output at a time, walk to the box, confirm the band, mute, next
- ○ **C** Unmute the subs first, then everything else together
- ○ **D** Leave it to the DJ

Answer key

1. **B**. Mixer → processor → amps (or powered boxes) → speakers. It only ever handles line level on XLR.
2. **B**. Inputs A (left) and B (right). Outputs are what feed the amps.
3. **C**. Bass isn't directional. A mono sum keeps every bin playing the same thing instead of fighting on a wide stereo mix.
4. **A**. 35 Hz protects the driver from air it can't move; 100 Hz keeps voices out of the bins.
5. **B**. LR24: the two sides sum back to flat at the crossover point. Most spec sheets assume it.
6. **B**. 2.9 ms per metre: 20 m = 58 ms, plus about 5 ms so the mains arrive a touch first. Delay the fill, never the mains.
7. **B**. Hold the nearer speaker back. The subs are nearer the audience, so the tops get the delay: 1.5 ÷ 0.343 = 4.4 ms.
8. **B**. Steady kick drum, stand in front, flip the button. One setting has clearly more punch. Keep it. If no difference, fix the delay first.
9. **B**. 10 × log10(1200 ÷ 600) = 3 dB. Set the limiter at least that far below clip, plus a couple of dB. Never run a passive output without it.
10. **B**. One output at a time. You confirm each box gets the right band before anything is loud. Then delay, polarity, save, lock.

Photos: product images courtesy of the manufacturers (RCF, Neutrik) and their distributors; scene photographs are AI-generated illustrations and do not show B&W Productions equipment or events.