TECHNICAL SPECIFICATIONS

March 2020

Royal Albert Hall
Kensington Gore
London
SW7 2AP
020 7589 3203
www.royalalberthall.com

Figure 1 – The Royal Albert Hall Auditorium

About This Document

These Technical Specifications are a guide to the majority of the technical services offered and facilities available at the Royal Albert Hall, London.

This information is meant as a guide to incoming companies and productions, but is not exhaustive so should not be used in isolation. The information is subject to change without notice.

All events coming to the Hall will be assigned a dedicated Technical Point of Contact being either the Technical Operations manager, Rigging Manager, Logistics Manager or Technical Supervisor to oversee the production, please consult with them for all aspects of your technical requirements, for more information and for hire prices where applicable.

This document and more are available electronically via our website www.royalalberthall.com/about or contact the Production and Technical Department.

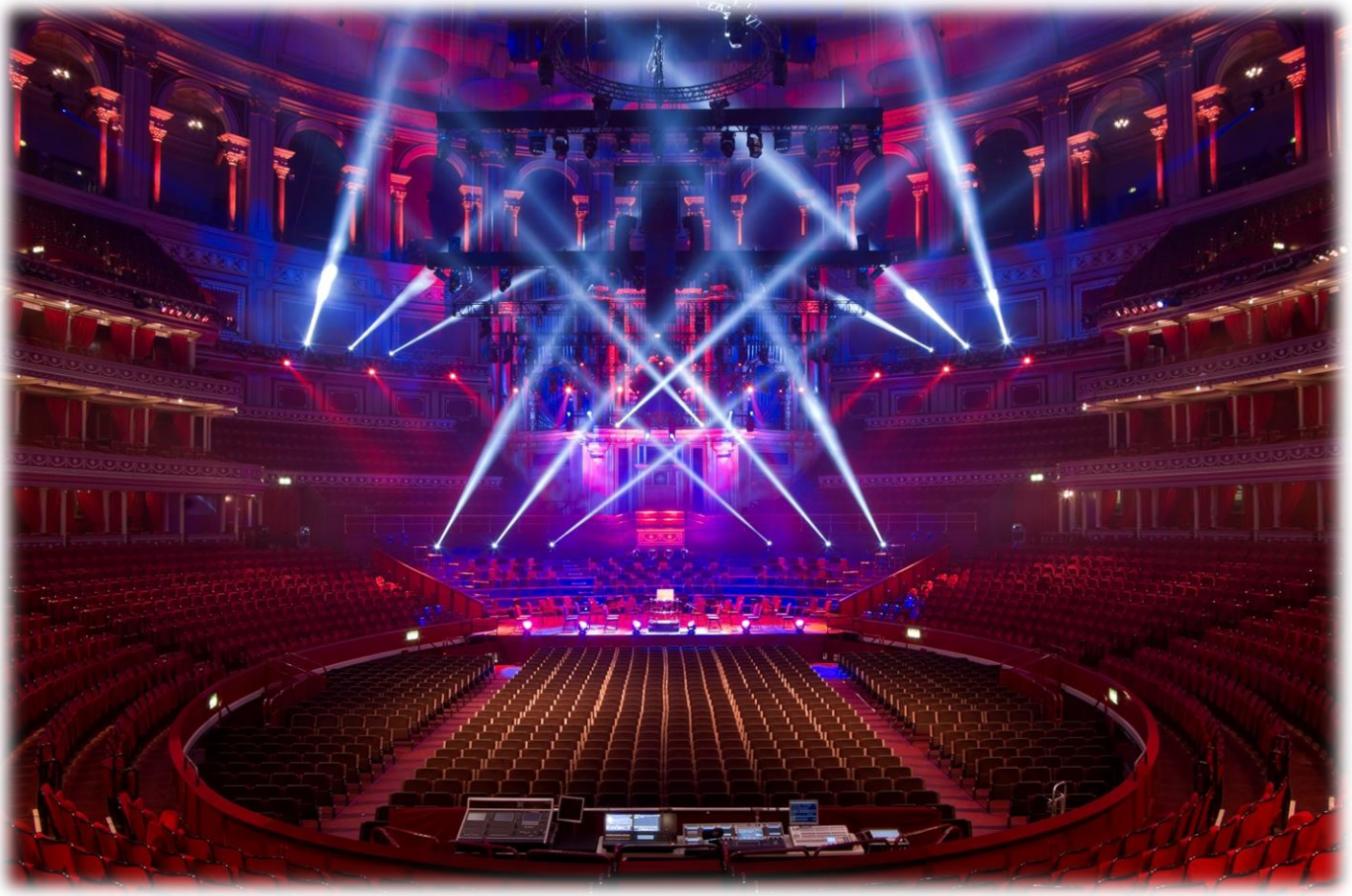


Figure 2 – The Royal Albert Hall Auditorium, with show lighting

Technical Contacts

RAH Audio ***audio@royalalberthall.com***	Royal Albert Hall	0207 589 3203
RAH Lighting ***lighting@royalalberthall.com***	Royal Albert Hall	0207 589 3203
General Technical Enquiries ***technicalenquiries@royalberthall.com***	Royal Albert Hall	0207 589 3203
AV Partners ***rah@sflgroup.co.uk***	SFL Group	0118 969 0900

RIGGING SPECIFICATION

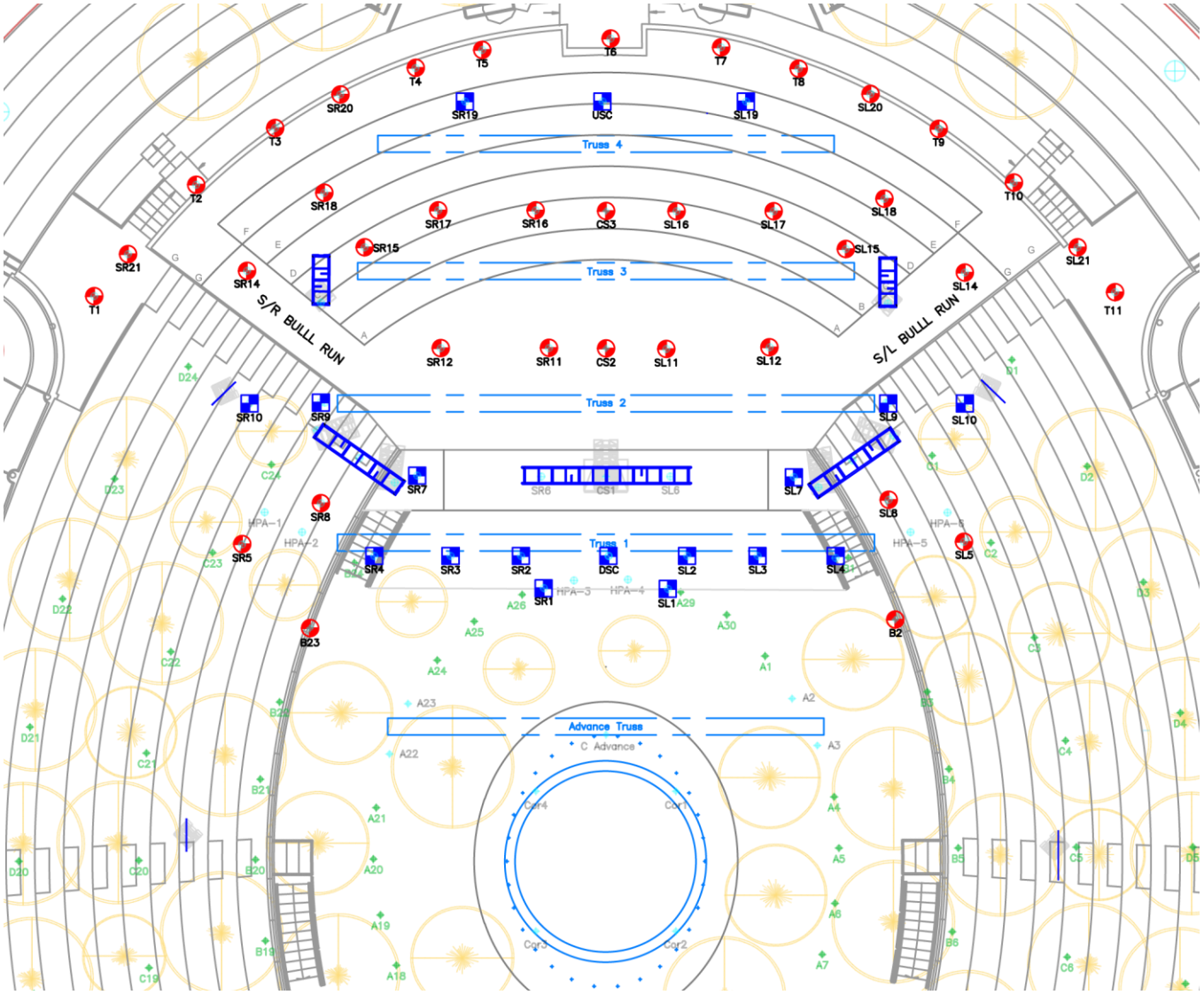
Overview

Owing to the closed nature and height of the roof, the Hall's basic motor rig is available to incoming productions at no extra cost. All rigging must be carried out in accordance with our Rigging Code of Practice and in conjunction with your Technical Supervisor.

The Hall's chain hoists are controlled using a custom Kinesys touchscreen system from stage level, which is operated by your Technical Supervisor during load ins and outs. Most standard points are also fitted with load cells and position encoders with all information fed back live to the operator.

Default Chain Hoist Rig Plan

Figure 3 – Chain Hoist Rig Plan



Chain Hoists

- 18 Permanently rigged 2t Liftket chain hoists situated as per the rigging plan
- 37 Permanently rigged 1t Liftket chain hoists situated as per the rigging plan
- 29 Permanently rigged 1t Liftket chain hoists supporting the lighting trusses (Trusses 1-4, the Advance truss and the circular corona truss)

The following chain hoists are also available if required, at a cost per point, to be rigged in specific points located on the rigging plan. Please consult with your Technical Manager for positions and availability.

- 6x 2t Liftket chain hoists
- 12x 1t Liftket chain hoists
- 12x 500kg Liftket chain hoists

Trussing

The 4 over stage trusses are “type A steel” general purpose 52cm truss painted black. The Advance truss is black GP52 type aluminium truss. All trusses are permanently rigged with the house lighting rig, and can be used for under slinging an additional U.D.L. of 2 tonnes.

Truss Lengths

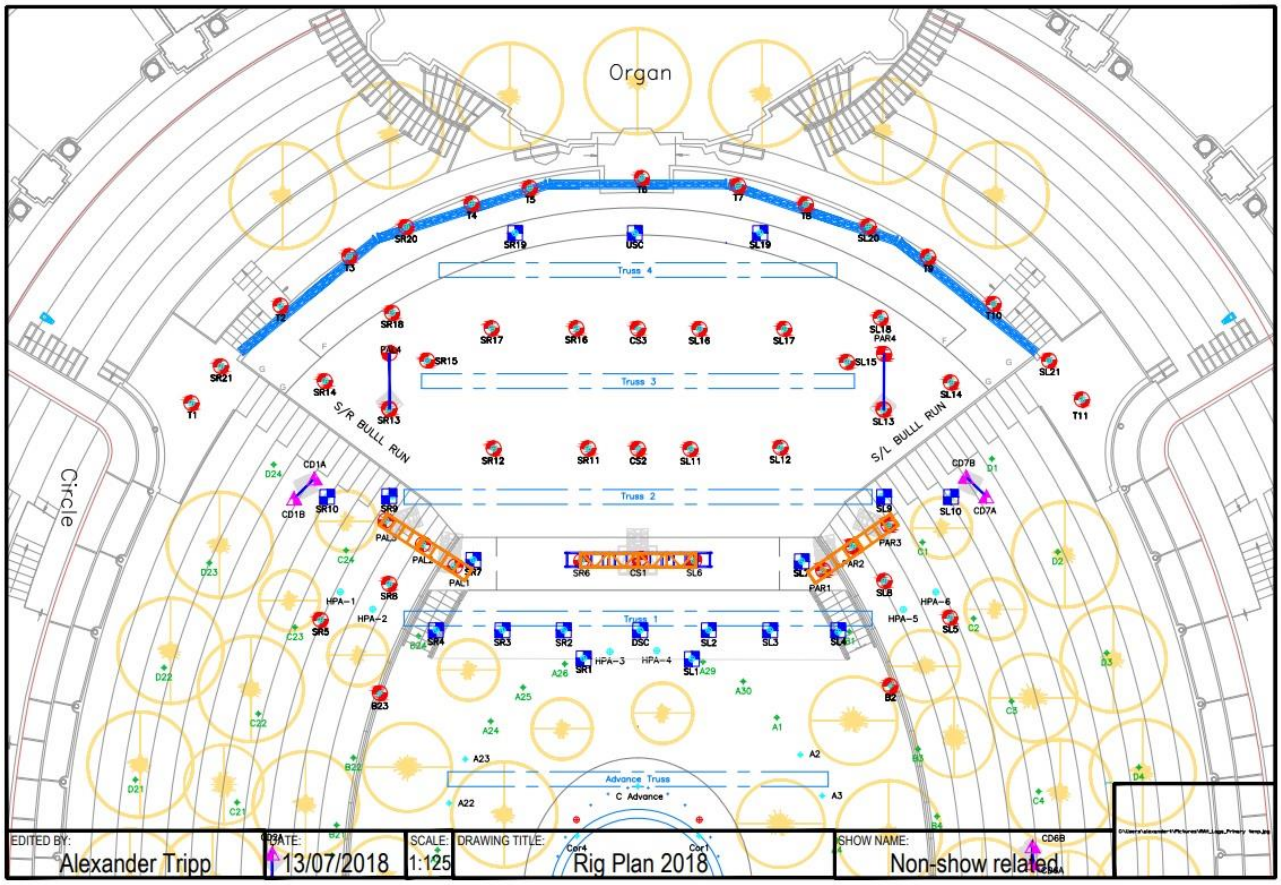
Advance Truss	13 meters
Truss 1	16 meters
Truss 2	16 meters
Truss 3	15 meters
Truss 4	13.5 meters

There is a permanently rigged Circular Corona truss. This is black Prolyte H30v (6m external diameter) rigged on four points beneath the corona.

Truss available for Hire

We also hold in stock a “Slot” truss; this can sit in front of the organ on the “T” chain hoists, following the back line of stage. This consists of 10 x 3m lengths of black Prolyte H30d triangular truss, with 4 custom 30d book corners. This truss is not permanent and will incur a charge if required, please consult with your Technical Supervisor for more information.

“Slot Truss” Rig Plan



We also have 4 x 3m sections of Slick GS Truss available for use, please speak to your technical supervisor for more information.

Rausing Circle and Gallery

The Circle bar is a curved steel bar that runs around the Rausing Circle, designed for rigging. This has a SWL of 75Kg/m (between brackets). There is also a bar located in each bay of the Gallery. These bars are rated at 180Kg UDL.

Lighting Specifications

Overview

The Royal Albert Hall Lighting Rig consists of a fixed rig of intelligent fixtures spread across 4 house trusses over-stage, and an advance truss and circular truss located in the auditorium. There is also a fixed rig of generic and intelligent fixtures spread around the circle rail, Organ Circle and Gallery level.

Further Information

Further specific information on the RAH rig both from a design and systems perspective, including gobos, colours, network protocols, circuit locations and patching can be obtained from the RAH Lighting Specification, which is available on the Royal Albert Hall website or through your Technical Supervisor, along with detailed PDF and WYSIWYG plans.

Lighting Infrastructure

Control & Networking

The Hall's lighting infrastructure primarily consists of CAT5 and fibre-optic runs throughout the auditorium supporting the ArtNet Protocol. There is also a second, independent network running MA Net2 at the main control positions.
These runs congregate in the Dimmer room, where they are distributed to the roof and to each truss, terminating in a DMX Node or via DMX via the roof node, and to various auditorium locations as DMX via an ELC Node8 and DMX splitters in the Dimmer room.
HTP merging is enabled to facilitate dual desk shared control of the rig.

Connections are located in appropriate places within the auditorium and can be connected either directly by Ethernet or Opticonn (via in-house switch), or via an in-house DMX Input Node. Locations include:

- Rear Arena (ArtNet, MA Net2)
- Loggia 18 (ArtNet, MA Net2)
- G Stalls platform (ArtNet)
- Upstage Left & Right - back wall (ArtNet)
- RAH Control Room (ArtNet & MA Net2)
- A and F vomitories (ArtNet)
- Gallery Bay 1 (ArtNet and MA Net2)
- Gallery Tech Area - behind the organ (ArtNet)
- Gallery Bay 12 (ArtNet & MA Net2)
- Dimmer Room (ArtNet & MA Net2)
- Roof (ArtNet)

Dimming & Hard Power

All lighting circuits within the Auditorium and on the house trusses terminate in the Dimmer room in the form of a 16A Ceeform or Socapex patch bay.

These circuits are located mostly around the Circle rail, in most gallery bays, and on stage, in either Socapex or 16A Ceeform outlets.

The RAH Dimmer room can supply 216 ways of dimming and 168 ways of hard power, of which there are 125 dimmers and 130 ways of hard power allocated to the fixed rig. The remainder are patchable as required.

House Trusses

The house trusses are rigged with permanently installed Socapex, fed via reels in the roof, which is fixed to both Socapex and individual 16A breakouts. Many of the circuits are used by the in house rig, with only a few remaining on each truss for production use. See the RAH Lighting Specification for more details.

Houselights

The auditorium houselights and working lights are controlled via Paradigm, with panels in various locations. In most circumstances the RAH will retain responsibility for their operation, including for show cues.

Lighting Equipment List

Qty.	Description	Notes
	Moving Lights	
16	Robe BMFL Spot*	
22	VL3000 Spot*	
12	Martin Viper Wash DX*	
36	Robe DL7PC Wash (PC Lens)*	
16	Robe Mega Pointe* (8 of these floating stock)	
16	Martin Encore Performance CLD*	
6	Clay Paky Alpha Wash 1200*	* - As part of the fixed lighting rig. N.B. These units cannot be de-rigged or moved.
6	Clay Paky Profile Plus SV 1200*	
6	VL2500 Spot	
	LEDs	
12	ETC Lustr 2 Fresnel*	
12	ETC Lustr 2 14 Degree + Diffuser*	
13	Pulsar Chroma Flood 200*	Installed in the Gallery for Mushroom lighting
60	Coemar Parlite RGB*	Installed in the Gallery to up-light the pillars
38	Robe Parfect 100*	14 Installed to light Organ, 24 installed to light roof dome
10	Thomas LED PixelPar 90	
	Generic Profiles	
12	15º-30º Source 4 zoom+	
10	19º Source 4 profile	
6	10º Source 4 profile+	
9	5º Source 4 profile	
12	50º Source 4 Profile+	
14	25º-50º Source 4 Junior zoom	
	Other Generics	
96	Source 4 Par+	+ - As part of a fixed auditorium lighting package
40	Par 64+	
12	2 Lamp Molefay*	
2	4 Lamp Molefay	
10	Par 64 Chrome floor cans	
16	Par 64 Chrome ACLs (4 bars of 4 pars)	
10	CCT Minuette fresnels	
18	Birdies	
	Flood/House lights	
23	Nocturn 1 KW Flood+	
6	Selecon Lui Cyc Flood+	
4	2kw Robert Juliat fresnels	
	Special effects	
2	MDG Atmosphere ATMe	
2	Unique II Hazers	
2	Cirro Strata Hazer	
1	Le Maitre Haze Master	
	Follow Spots	
4	2.5kw Robert Juliat Cyrano Follow Spots(Electronic)	Available at extra cost
	Lighting Consoles	
1	Grand MA 2 Lite (with NPU)	
1	Grand MA Command wing with Touchscreen PC	
1	Chroma-Q Vista EX with Touchscreen PC	
1	Jands Vista S3	
1	Avolites Pearl Expert + Wing (Titan)	
1	MA Dot 2 Core and wing (Elgar Room)	
	168 ways of hard power	
	216 ways of dimming	ETC Sensors (3 racks of 72 circuits)

Audio Technical Specification

About This Document

These Audio Technical Specifications are a detailed guide to the sound system and facilities available at the Royal Albert Hall, London.

This is a supplementary document to be used alongside the RAH Technical Specifications. This information is meant as a guide to incoming companies and productions, but is not exhaustive so should not be used in isolation. The information is subject to change without notice.

All events coming to The Hall will be assigned a dedicated Audio Project Manager and dedicated Technical Supervisor (TS) to oversee the production. Please consult with them for all aspects of your technical requirements, for more information and for hire prices where applicable.

Main Auditorium Speaker System

Overview

Our installed house system comprises of a d&b Audiotechnik V-Series system, which covers the entirety of the auditorium in the following configuration:

Main Flown System:

Main Left:	9 x d&b V8 & 3 x d&b V12
Main Centre:	9 x d&b V8 & 3 x d&b V12
Main Right:	9 x d&b V8 & 3 x d&b V12
Out Fills Left:	8 x d&b V8
Out Fills Right:	8 x d&b V8
Circle Delays:	7 hangs of 6 x d&b Y8
Gallery System:	23 x d&b Ti10P
Choir Stalls Left:	4 x d&b Y8
Choir Stalls Right:	4 x d&b Y8

d&b array processing is in place for all the main system elements.

Other configurations, to suit specific events, can be discussed further with your Audio Project Manager.

Subs:

Flown Subs:	4 x d&b SL-Sub
Floor Subs:	2 x d&b SL-Sub

Front & Floor Side-Fills:

Depending on the size of the event, the floor speakers can be scaled up or down, options include:

Front Fills:	d&b 16C Column loudspeaker (rigged horizontally) d&b Y10P
Floor Side Fills:	d&b 24C Column loudspeaker d&b Y10P
Choir Front Fills:	d&b 16C Column loudspeaker

Box Speakers

All 144 audience boxes have a delay fill to enhance detail and vocal intelligibility. The boxes are also equipped with rear surround speakers, for effects or envelopment purposes. These loudspeakers are all d&b 4S cabinets.

Amplifiers:

All speakers are driven by their appropriate d&b Amplifiers (10D / D20 / 30D / D80).

FOH Consoles, Stage Racks & System Control:

FOH Mixing Consoles:

DiGiCo SD7 (Quantum) c/w Optical connections & Waves DMI Card
DiGiCo SD10 c/w Optical connections & Waves upgrade kit

Stage Racks:

2 x DiGiCo SD Rack c/w: 32bit 8ch mic/line input cards
8ch line out cards
8ch AES output cards

2 x DiGiCo SD-Mini Rack c/w: 32bit 8ch mic/line input cards
8ch line out cards
8ch AES output cards

Audio Networking:

DiGiCo OptoCore Loop, run on an installed fibre network, with connection points both FOH & on stage.

Redundant Dante network, run on an installed Ethernet network, with connection points both FOH & on stage.

1 x DiGiCo Orange Box: OptoCore – Dante

System & Amplifier Control:

d&b DS100 Signal Engine combined with d&b DS10 Audio Network Bridges

Stage Monitors

Monitor Mixing Console:

DiGiCo SD10 c/w Optical connections & Waves upgrade kit

Monitor Speakers:

8 x d&b M4 Monitor Wedge
8 x d&b E6
8 x d&b E5

Wireless IEM:

8 x Dual/Stereo channels of Shure PSM1000 Personal Monitoring System
c/w P10T Dual Channel Transmitter and P10R Bodypack Receiver

Earphones available on request as a consumable item.

Microphone Packages:

Wireless:

8 x Shure Axient Digital ADX2 Handheld Transmitter
c/w Shure Beta 58 mic head

8 x Shure Axient Digital ADX1 Bodypack Transmitter
c/w DPA 4066 Headset Microphone

2 x Shure Axient Digital AD4Q 4 Channel Receiver

Rock/Pop:

2 x Shure Beta 52
2 x Shure Beta 91A
12 x Shure Beta 57A
6 x Shure Beta 98 c/w drum clip
6 x Neumann KM 184
6 x AKG C414 c/w with shock mount
2 x Sennheiser E609
6 x Sennheiser E904 c/w drum clip
4 x Beyerdynamic M201
2 x Audix D6
2 x Neumann TLM102 c/w shock mount
10 x Shure Beta58A
12 x Radial J48 Phantom Powered DI Box

Orchestral:

36 x DPA d:screet 4061 c/w pre-amp violin clips
14 x DPA d:vote 4099 c/w pre amp and various instrument clips
8 x DPA 4098 c/w long 122cm boom
40 x DPA 2011
35 x Neumann TLM102 c/w shock mount

Mic stands and clips:

Various short stands, tall stand and instrument clips to match the above microphone packages.

UHF Radio Frequencies:

The Royal Albert Hall annually licence a number of TV channels for wireless microphones and IEMs. Please contact your assigned Audio Project Manager to discuss availability.

Additional and Supplementary Equipment:

Should any equipment be required that is not on this equipment specification, sub-hire quotations can be produced. We have good relationships with many hire companies, and can secure preferable rates on various equipment.

Audio Personnel

Audio Project Manager:

Each event at The Royal Albert Hall is assigned an Audio Project Manager. They will be responsible for organising and facilitating all your audio needs. They will also be available on the day of your event to manage all audio requirements, and system tech responsibilities.

Audio Engineers:

From our large pool of freelance engineers, we can supply personnel who are experienced and familiar with the working practices of the Audio department and the Royal Albert Hall.

This includes: FOH Engineers
Monitor Engineers
RF Technicians
Stage Technicians
Load-in and load-out crew

Power Specifications

Overview

The Hall utilises a TN-S earthing arrangement.
Unless otherwise stated all sockets are Ceeform, 1Ø=Blue 3pole, 3Ø=Red 5pole.

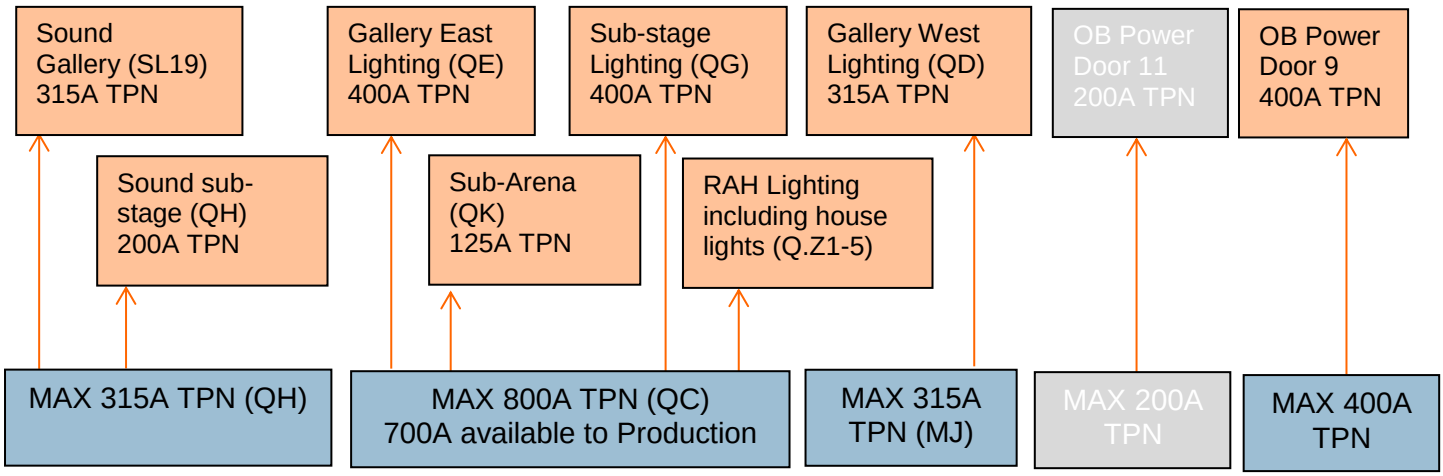


Figure 4 – Show Power Schematic

Show & Tech Power Panels

Under stage (QG – 400A TPN)
400A Powerlock
125A 3Ø,
2 x 63A 3Ø, 2 x 32A 3Ø
6 x 63A 1Ø (2 x L1, 2 x L2, 2 x L3)
6 x 32A 1Ø (2 x L1, 2 x L2, 2 x L3)
4 x 13A RCD Protected.

Arena (QK – 125A TPN)
125A 3Ø, 63A 3Ø, 32A 3Ø
125A 1Ø, 63A 1Ø, 32A 1Ø (ALL L2)
3 x 16A 1Ø (1 x L1, 1 x L2, 1 x L3)

Gallery East (QE – 400 TPN)
400A Powerlock
200A Powerlock
125A 3Ø**, 63A 3Ø,
32A 3Ø, 16A 3Ø
32A 1Ø (L2), 16A 1Ø (L1)
4 x 13A RCD Protected (L3)

Gallery West (QD – 315A TPN)
400A Powerlock (315A fuse on feed)
200A Powerlock
125A 3Ø, 63A 3Ø,
32A 3Ø, 16A 3Ø
32A 1Ø (L2) 16A 1Ø (L1)
4 x 13A RCD Protected (L3)

Under stage Sound (QH – 200A TPN)
200A Powerlock
125A 3Ø, 63A 3Ø,
32A 3Ø, 16A 3Ø,
125A 1Ø, *63A 1Ø****, 32A 1Ø (ALL L2)
3 x 16A 1Ø (1 x L1, 1 x L2, 1 x L3)

Gallery Sound (SL19 – 315A TPN)
125A 3Ø, *63A 3Ø*,
32A 3Ø, 16A 3Ø,
125A 1Ø, 63A 1Ø,
32A 1Ø, 16A 1Ø (ALL L2)

** Supplies RAH lighting rig when used

FOH power

Loggia 18 - 63A 3Ø and 32A 3Ø supplies, for projectors etc.Rigging power
32A 3Ø in Vom A & F (DSL & DSR) for temporary supplies during load in and out.

Outside Broadcast Power

Please note that from April 2020, the OB compound will be relocated from the West Car Park (Door 9 – North West Quadrant) back to it's original position at Door 11 – South West Quadrant. Please speak to your Technical Supervisor for more information.

Door 11 – South West Quadrant

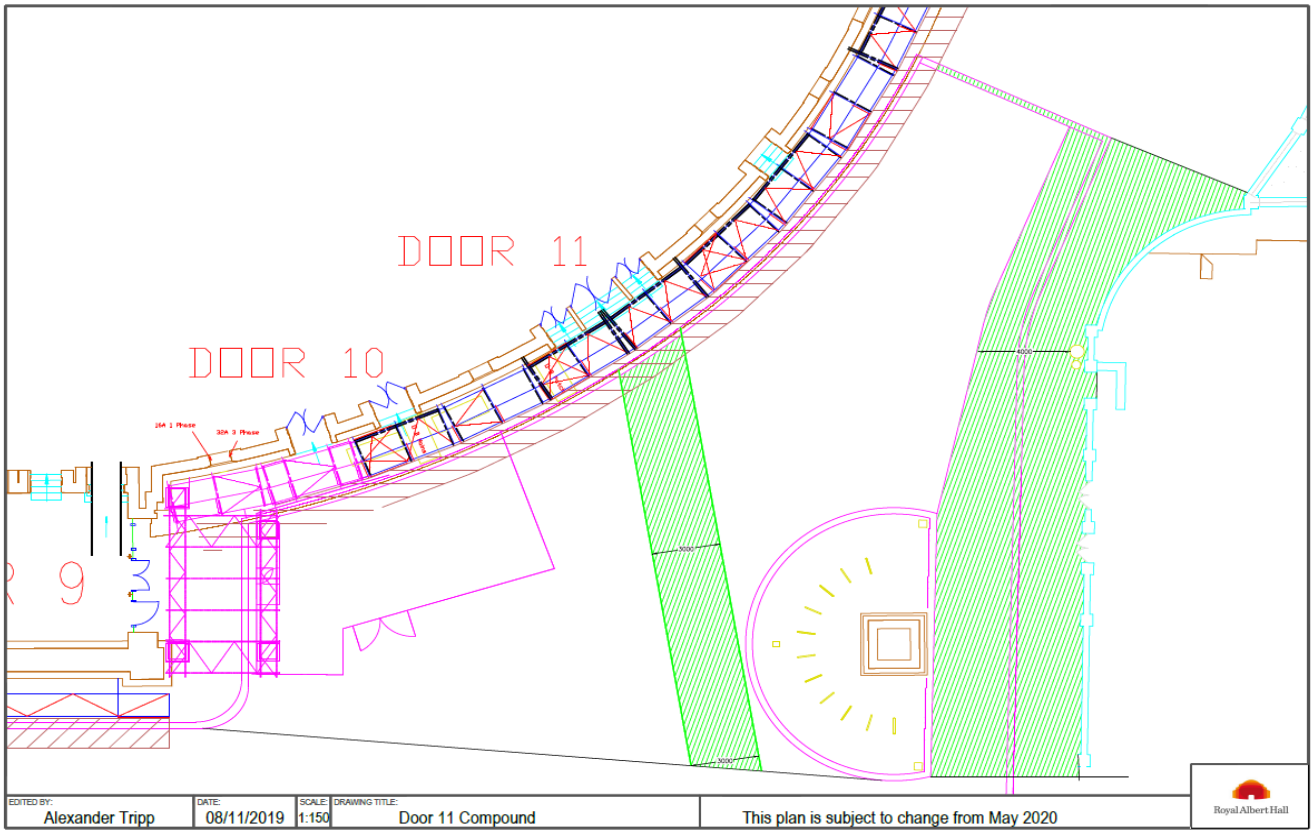
This OB Power Room is located on basement level under door 10. There is also the ability to connect a back-up generator into this supply in case of power failure, with automatic switching.

Main Incomer rated at 200A per θ

No.	Rating	Phase	RCD	RCD Bypass
1	63A	1θ – L1	300mA	✓
2	63A	1θ – L1	300mA	✓
3	63A	1θ – L1	300mA	✓
4	63A	1θ – L1	300mA	✓
5	63A	1θ – L2	300mA	✓
6	63A	1θ – L2	300mA	✓
7	63A	1θ – L2	300mA	✓
8	63A	1θ – L2	300mA	✓
9	63A	1θ – L3	300mA	✓
10	63A	1θ – L3	300mA	✓
11	63A	1θ – L3	300mA	✓
12	63A	1θ – L3	300mA	✓

No.	Rating	Phase	RCD	RCD Bypass
13	63A	3θ+E+N	300mA	✓
14	63A	3θ+E+N	300mA	✓
15	32A	3θ+E+N	30mA	×
16	32A(4x)	3θ+E+N	30mA	×
17	13A		30mA	×
18	125A	1θ – L1	300mA	✓
19	125A	1θ – L2	300mA	✓
20	16A	1θ – L1	30mA	×
21	32A	1θ – L2	30mA	×
22	32A	1θ – L3	30mA	×
23	125A	3θ+E+N	300mA	✓
24	63A	3θ+E+N	300mA	✓
25	16A	3θ+E+N	30mA	×
26	125A	1θ – L3	300mA	✓

Figure 5 - OB Power Room Circuits



Outside Broadcast Door 9 – North West Quadrant

This OB Power Room is located on basement level under door 9. There is a cable route via a trap in the pavement which leads to the compound area outside.

All RCDs can be bypassed excluding the 13A sockets
A company representative will need to sign a document stating that their equipment has circuit protection to meet BS7671

Main Incomer rated at 400A per phase.

ID	Rating	Phase	RCD
A3	32A	SPN – L2	30mA
A4	32A	SPN – L3	30mA
A5	32A	TPN	30mA
A6	32A	TPN	30mA
A7	16A	TPN	30mA
A8	16A	SPN – L1	30mA
A9	16A	SPN – L1	30mA
A10	63A	SPN – L1	300mA
A11	32A (4no 13A)	SPN – L2	30mA
A12	125A	TPN	300mA
A13	125A	SPN – L1	300mA
A14	63A	SPN – L2	300mA
A15	63A	SPN – L3	300mA
A16	63A	SPN – L1	300mA
A17	63A	SPN – L2	300mA
A18	32A (4no 13A)	SPN – L3	30mA
A19	125A	TPN	300mA
A20	125A	SPN – L3	300mA
A21	63A	SPN – L3	300mA
A22	63A	SPN – L1	300mA
A23	63A	SPN – L2	300mA
A24	63A	SPN – L3	300mA
A25	63A	TPN	300mA
A26	63A	TPN	300mA
A27	63A	TPN	300mA
A28	63A	SPN – L1	300mA
A29	63A	SPN – L2	300mA
A30	63A	SPN – L3	300mA

Signal patching

The new OB infrastructure has direct patchable links to the existing room in the sub-basement, in order to utilise the panels around the building. Triax, XLR, MM Fibres, SM Fibres and Cat 6 are available. For more information please speak to your Technical Supervisor.

Additional fibre patch panels will also be available at specific areas around the building.

Outdoor power

East and West Car park - 2 x 63A 3Ø, 1 x 16A 1Ø
Both located in 'pop-up' manhole covers, see Stage Door for access.

Bus Power: Door 9 North (West Car Park, see plan below) – 1 x 32A 3Ø, 1 x 16A 1Ø

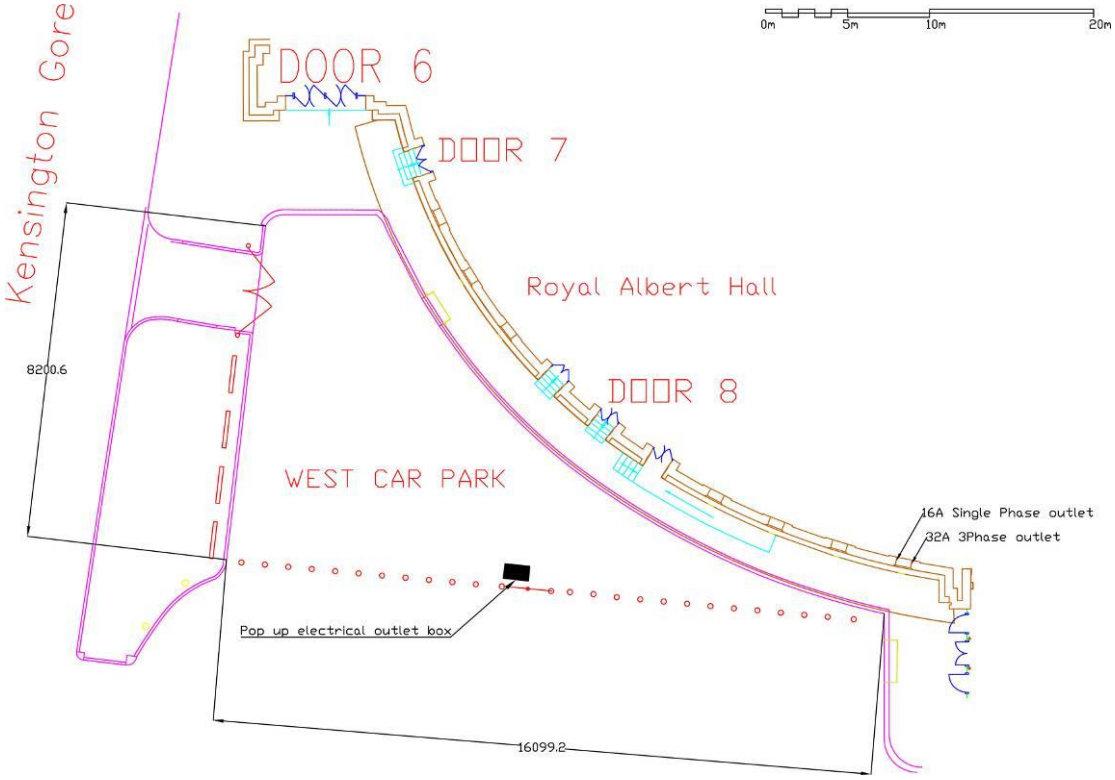


Figure 6 – West Car Park Power Plan

Stage Specification

Stage & Arena Dimensions

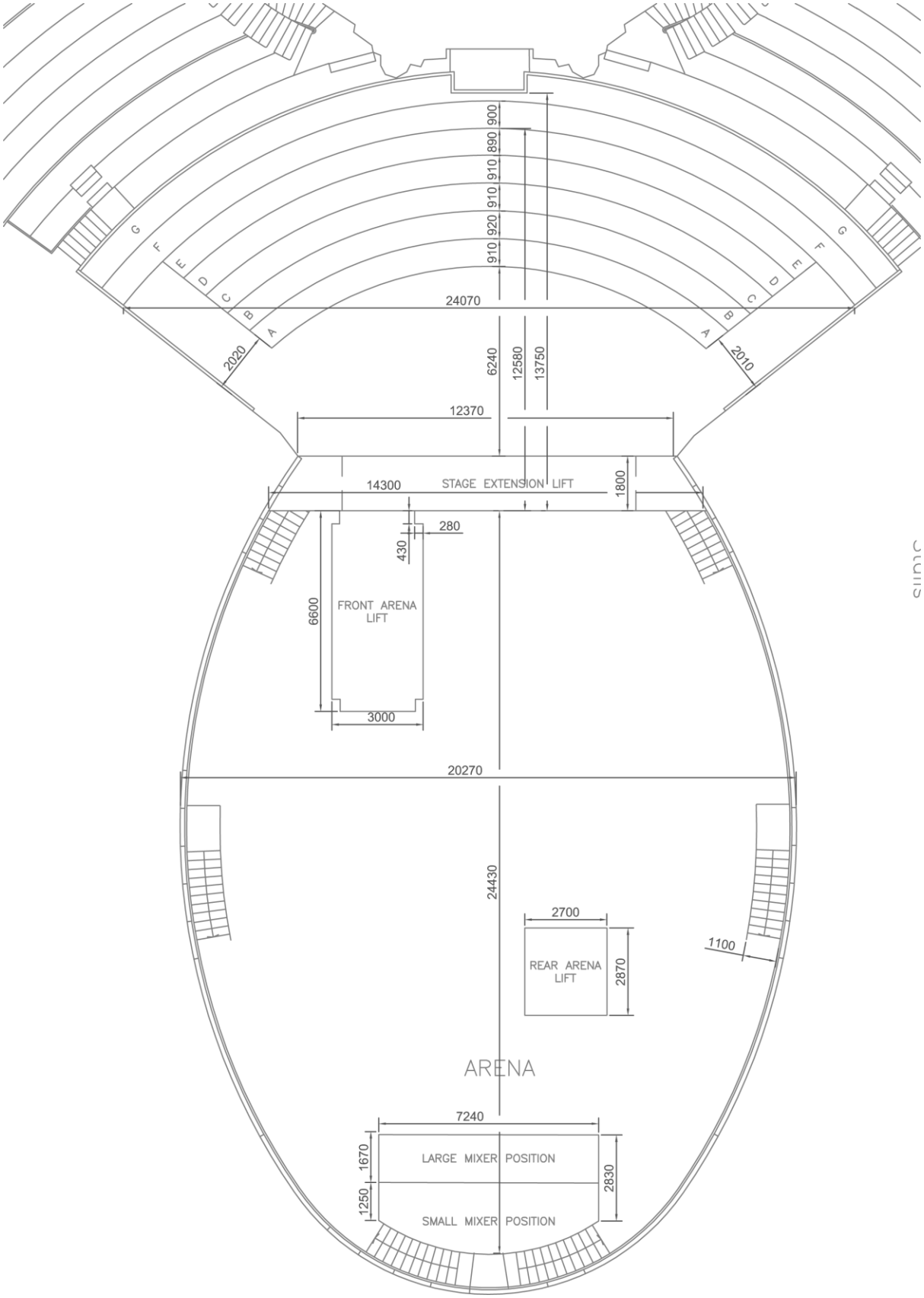
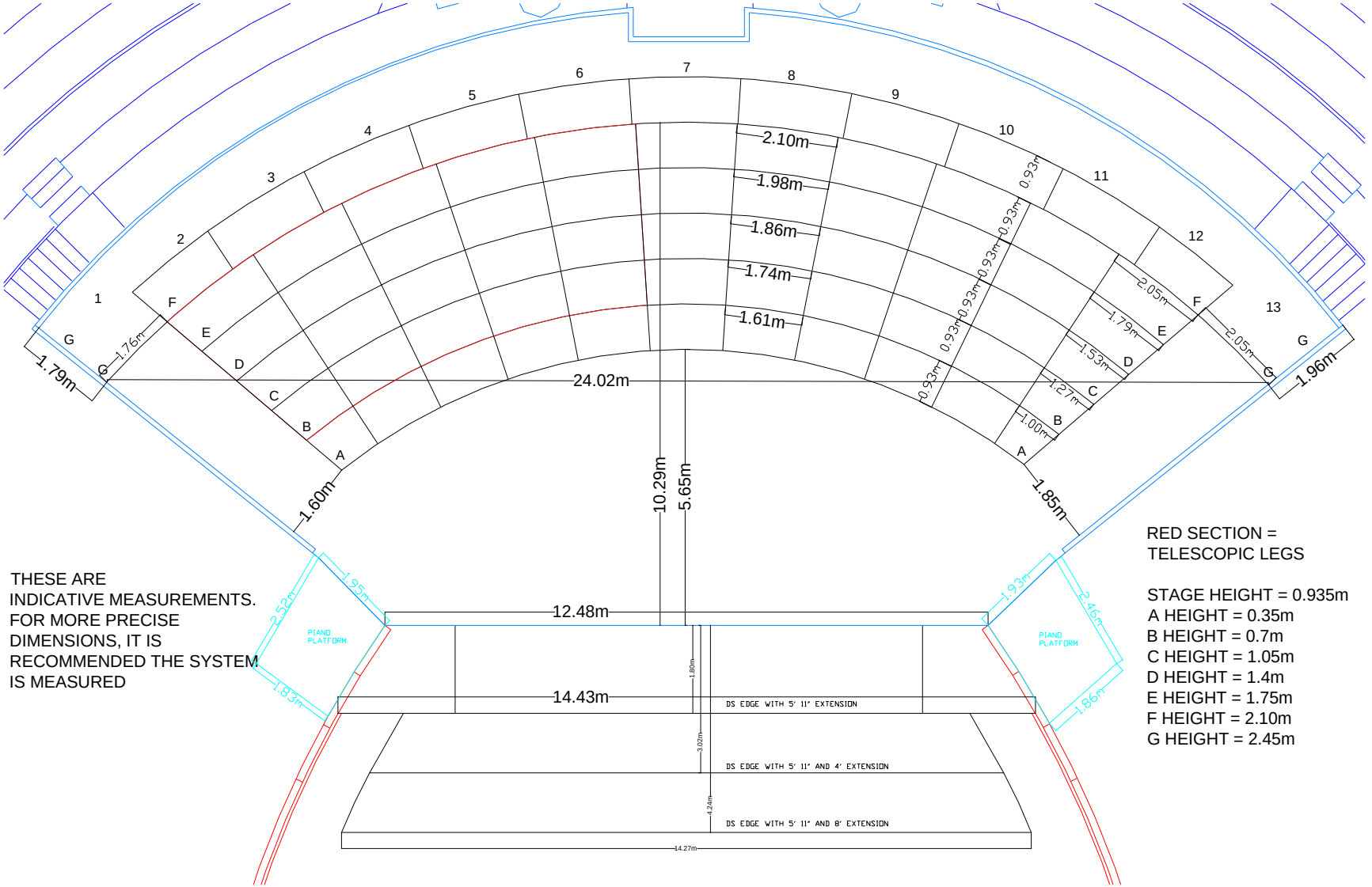


Figure 7 – Stage and Arena Dimensions

Stage Riser Dimensions



THESE ARE INDICATIVE MEASUREMENTS. FOR MORE PRECISE DIMENSIONS, IT IS RECOMMENDED THE SYSTEM IS MEASURED

RED SECTION = TELESCOPIC LEGS

STAGE HEIGHT = 0.935m
A HEIGHT = 0.35m
B HEIGHT = 0.7m
C HEIGHT = 1.05m
D HEIGHT = 1.4m
E HEIGHT = 1.75m
F HEIGHT = 2.10m
G HEIGHT = 2.45m

Figure 8 – Stage and Riser Dimensions

Stage information

The Royal Albert Hall stage consists of four layers. The first layer is 24mm ply and an additional 18mm layer on top. The next layer is made of 6mm ply and then the top layer is oil-tempered 6.4mm hardboard. The Hall recently undertook a large project to replace the top layer. Following this major project it is essential that the stage is well maintained and that everything is done to avoid any permanent damage to the stage surface.

The stage has a weight load capacity of 5kn per M^2
The Arena floor has a weight load capacity of 5kn per M^2

All visiting production teams and performers must comply with the following:

- Orchestras must provide spike blocks for cellos and double bases.
- No items can be fixed to the stage without prior permission. This includes glue, nails and screws.
- Any holes created must be filled in at the cost of the event responsible for making them – this includes any materials and additional painting.
- Good quality/ low tack tape should be used on the stage and extra care should be taken when taking this up. The RAH technical team use Le Mark Mag Tape.
- Please make use of the cable traps and trays. The RAH technical team can advise on their locations.
- All steel deck, risers, chairs and other staging/set pieces must have end caps.
- Unless agreed in advance the stage must not be painted.
- No food or drink can be brought onto the stage. Water is permitted, so long as the container has a lid.
- Any damage caused to the stage must be made good immediately post the event. Any additional repair costs will be charged back to the promoter.

Lift information

Lift A (Arena) also known as the Main Lift
SWL 5,000kg dynamic/10,000kg static UDL

Lift floor dimensions – 6.63m x 2.89m
Main loading door – 2.36m H x 2.48m W
Long sided door – 2.36m H x 5.6m W

This is the main lift for the production load in and load out.

Lift B (Broad) also known as the Front of Stage/Piano lift
SWL 3,500kg dynamic/7,400kg static UDL
This is generally used to extend the stage front, but often replaced with a steel-deck extension to enable the use of PA subs etc in the
space underneath.

Lift C (Contingency) also known as Small/Rear Arena
SWL 2,000kg dynamic/4,000kg static UDL
This can be used by the house for chair and table removal etc whilst Lift A is being used by production.

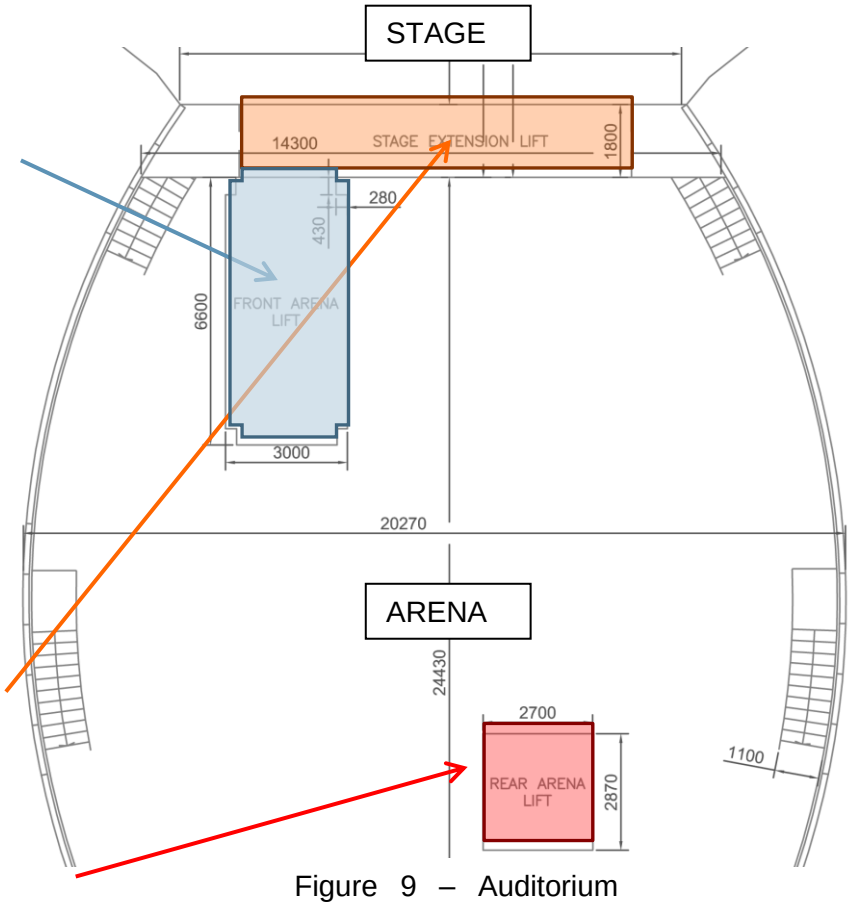


Figure 9 – Auditorium

Lift floor dimensions - 2.69m x 2.87m

Door 4 Lift (to gallery) also known as the Catering Lift

SWL 1800kg UDL
This can be accessed via the catering ramp in the loading bay, and through the catering corridor.
Internal dimensions - H 2.45m x **W** 1.85m x **L** 1.95m
Door dimensions – H 1.97m **x W** 1.27m

Door 11 lift

SWL 3,000kg UDL

This is the only goods lift available to productions outside of the auditorium. Door 11 lift serves all floors, from the sub-basement (loading bay) to Gallery. For larger items a site visit is recommended to view the routes to and from the lift on each level to ensure access is possible.
Internal dimensions – **H** 2.98m (2.09m door) x **W** 1.8m x **L** 2.4m.

Roof Service Hoist

SWL 250kg
For hauling equipment into the roof, there is a small hatch with variable speed 250kg chain hoist from ground floor level (O-stalls) to the lower walkway of the roof. Please discuss use of this with your Technical Manager.
Roof hatch opening: 0.63m x 0.63m

Comms System

Overview

The Hall is fitted with a full-duplex digital 4-channel Clear-Com Helixnet Partyline system with outlets located in appropriate positions around the auditorium. The Helixnet system outputs 59V so is not compatible with other Clear-Com products. The Royal Albert Hall will provide six Helixnet 2-channel belt-packs and headsets and cabling free of charge. Additional sets (up to 10 total) may be used at extra cost.

Alongside the "House" ring, there is a separate "Visitor" XLR3 ring. A separate master-station can be plugged in to this to enable touring companies to use their comms system instead.

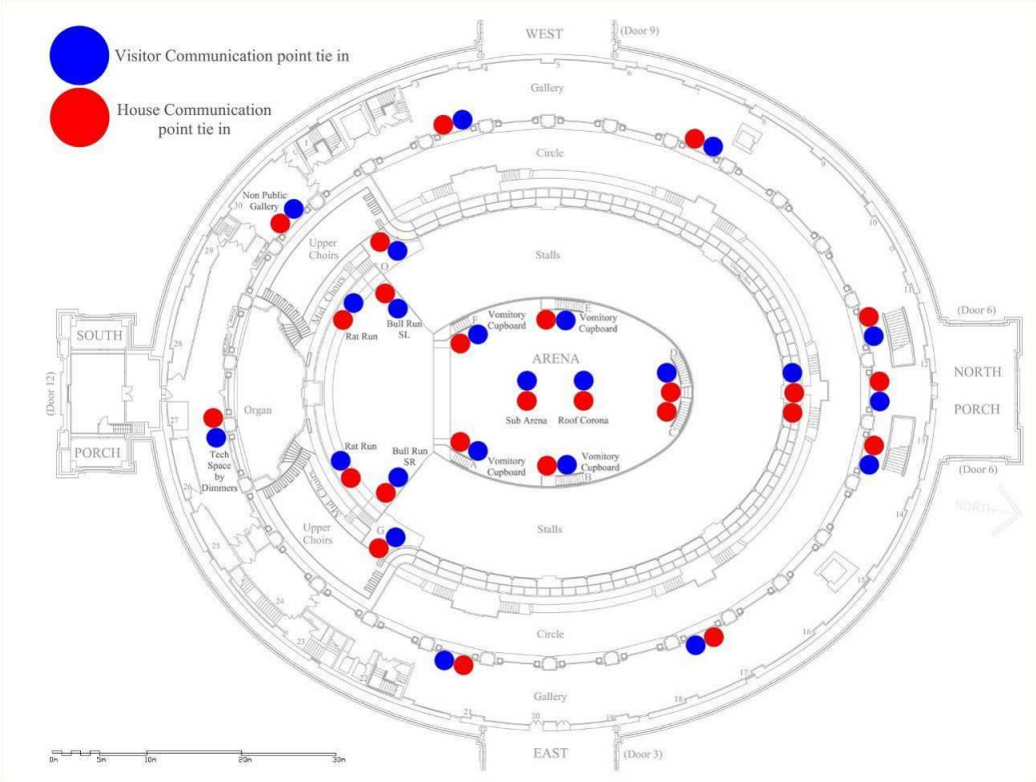
Figure 10 – Clear-Com Helixnet Belt-pack and Master Station

Compatibility & Interfaces

The master station and associated patching is located in the Blowing Chamber and is the responsibility of your TM.

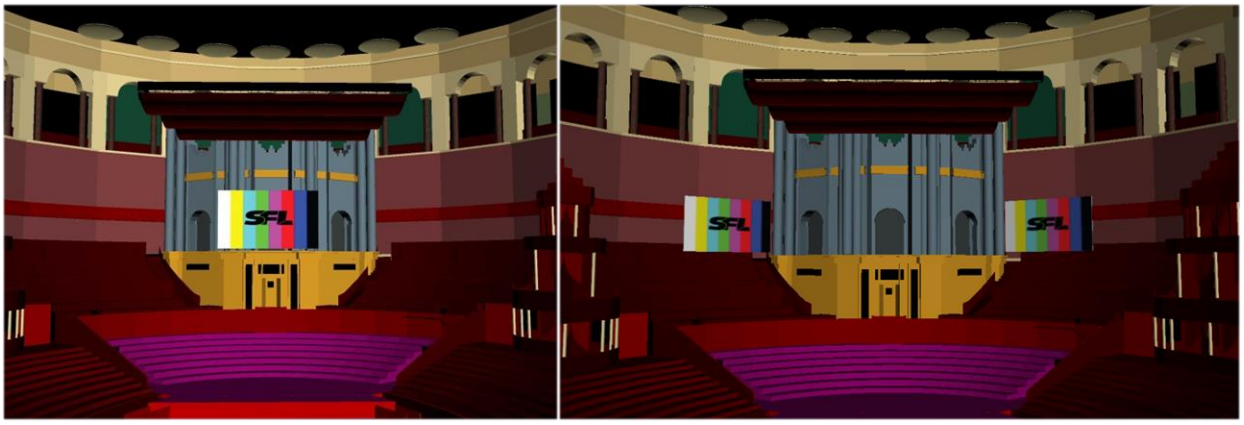
- The base station has 2 outputs, each can power up to ten 2-channel belt-packs and is patchable to meet requirements; the default setup is for one output to power gallery outlets and the second output powering the remaining tie lines.
- RTS or Clear-Com (analog 2-wire XLR3 or 4-wire RJ45) systems can interface with the Helixnet system via the interface module in the master station.
- Program feed can be fed into the master station.
- RAH Motorola Radios can interface with 1 channel of the Helixnet system.

Plan



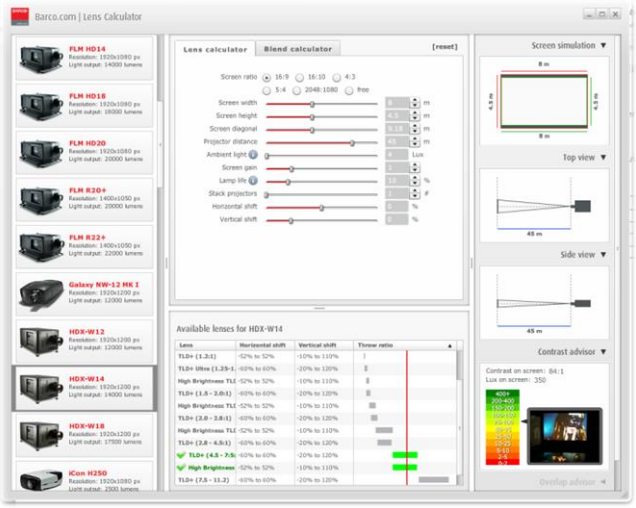
AV Solutions

SFL Group can provide a bespoke video solution for your event from a single central projection screen to a multi camera HD shoot. There is never a standard set up but to help you think through options available to you here are some example screen locations.



26’ x 15’ (16:9 ratio) Central Screen **21’ x 12’ (16:9 ratio) Side Screens**

Projection & Screen Technologies



SFL are stockists of Barco Projectors and by default this is what we would recommend. If for some reason you would like to use another manufacturer then we can also quote you an alternative solution.

In terms of screen size this all depends on the content you are showing and the audience size but we would recommend a minimum screen size of 16’ wide. For a 16’ screen we would recommend a 10,000 lumen projector. Below is a table giving you a few examples of screen and projection configurations. These screens are all in the 16:9 wide screen ratio but we do also supply screens in 4:3 ratio.

Screen Size	Minimum Recommended Projection	High Quality Projection
16’ x 9’ Front / Rear	1x Barco CLM R10+, 10,000 lumens DLP, SXGA+	1x Barco HDX-W14, 14,000 lumens, Full HD
21’ x 12’ Front / Rear	2x Barco CLM R10+, 10,000 lumens DLP, SXGA+	1x Barco HDX-W14, 14,000 lumens, Full HD
26’ x 12’ Front / Rear	1x Barco HDX-W14, 14,000 lumens, Full HD	1x Barco HDX-W20, 20,000 lumens, Full HD
18m x 7.6m (Cinema)	2x Barco HDX-W20, 20,000 lumens, Full HD	

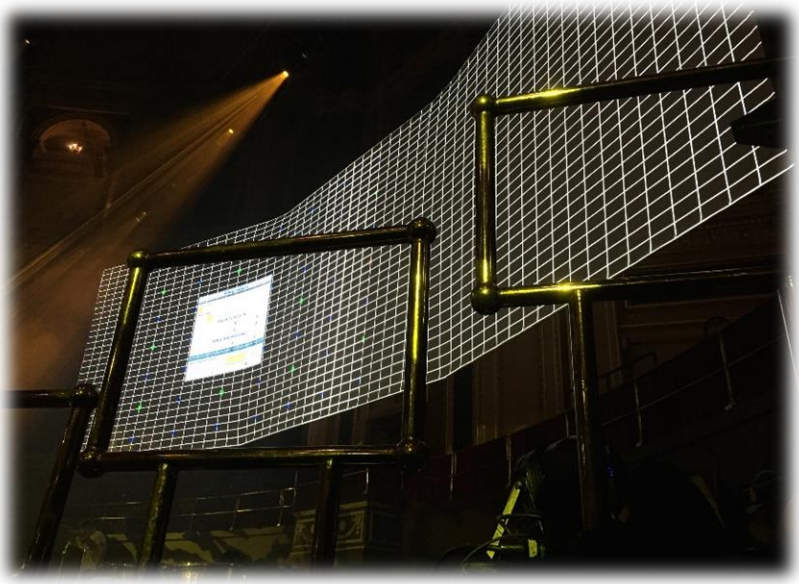
For events where front projection is required then we would suggest some box holds to put the projectors in. Ideally GT22 but we can also use 2nd Tier 45/46.
SFL can also provide a huge variety of screen configurations like this solution on the right. This is five 12' screens arranged in the round and projected from the gallery to provide a 360 degree screen solution for the Rausing Circle seats. Another screen option is plasmas; these could be used as stage comfort screens or relay screens for the choir stalls just to ensure that every member of the audience can see a screen.

Camera & Graphics Switching Solutions

SFL can also provide a complete camera solution for live to screen footage or for recording & post production edit. As a standard we use Sony broadcast spec cameras and Canon lens'. We also provide various specials which may consist of elements such as Jib, Steady Cam, Track & Dolly.

Our high definition solutions utilise Sony HXC-100 / HDC-1500 / HDC-2500 Cameras which are full HD interlaced.

We have various HD-SDI portable production unit solutions which can take from 4 to 12 x SD/HD-SDI inputs along with a number of computer inputs or playback sources.



SFL can provide various image processing solutions to run any number of projection or LED screens.
SFL can also provide high end image processing solutions for 4K video, screen blends, curved screens, projection mapping.

SFL's custom configured film playback solution can be used for film with live orchestra events along with non DCI film premieres. If DCI is needed then this is something that can also be provided.

We also have stock of high res indoor LED solutions, various pixel pitch options are available depending on your requirements.

For more information or for a quote please contact us on the details below.

SFL Group Main Number - 0118 969 0900
SFL Group Email Address – rah@sflgroup.co.uk

Health and Safety Specifications

All information in this section is taken from the Hall's Health and Safety policies which are available to all incoming companies from your Event Manager or Technical Supervisor. This is not meant as a comprehensive guide to health and safety, but as a reference to some of the more important factors.

Please also see:

- The Royal Albert Hall Event safety Guide
- The Royal Albert Hall Rigging Code of Practice
- The Royal Albert Hall Hard Hat Safe Working Practice
- The Royal Albert Hall Roof Access Code of Practice

Hard Hat Safe Working Practice – Overview

The Royal Albert Hall has identified the need for all personnel in specific areas to wear protective headwear (Hard Hats) during the Load In and Load Out of events. This is due to the risk of head injuries from working on and around Rigging/Lighting equipment. Movement of rigging or other automated equipment during a performance are subject to separate control measures and fall outside of this procedure.

- Whenever activity involving working on or around rigging, lighting or other technical equipment is taking place then **ALL** personnel in the following locations are required to wear a hard hat:
    - Stage
    - Choir Stalls
    - Arena
    - All of the Stalls (Including all entrances and exits)
    - In/On the Main Arena Lift including at sub-basement level.
- There are orange flashing beacons and illuminated signs in many locations around the auditorium and entrances.
- The beacons and signage will be activated or de-activated by the Hall's Duty Technical Manager only. Production staff should contact the TM to activate the beacon system and public address messaging.
- All RAH and Production management are to ensure this SWP is adhered to. Any persons, who are asked more than once to put a hard hat on, will be required to leave the building and not return that day.
- Suitable head protection is to be provided by Production or Contractor.
- A small quantity of Hard Hats will be provided to the Promoter and artists.
- Headwear is to comply with BS EN 397 or BS EN 12482.

Personal Protective Equipment

- Anyone working at the Hall is expected to wear any PPE that has been assessed as being required for their tasks.
- Failure to do so will result in the individual being asked to cease work until the PPE is worn. Persistent refusal may result in the individual being asked to leave the building.
- All production company employees and contractors undertaking manual handling tasks or other tasks where there is a risk of foot injury are required to wear suitable safety footwear. In general, all shoes should at least enclose the toes.
- Work at height will be monitored closely to ensure that contractors use appropriate PPE such as harnesses and fall arrest equipment.

Roof Access – Overview

The roof areas of the Royal Albert Hall have been identified as high risk environments that require effective control. All non-RAH personnel wishing access to the Dome are to complete a Temporary Roof Access Authorisation and receive a safety briefing and induction from a member of the Technical Team. Please discuss with your TM in advance if you believe roof access is required.

Emergency Beacon

It is the policy of the Hall that during amplified events, a beacon is placed within eye-shot of any mix positions. Should the beacon activate at any point, the sound engineer must cease all sound levels emanating from the desk immediately and await further instruction. Emergency beacons will be supplied by the Hall.

Risk assessments

Essentially there are five steps to risk assessment, which all those working in the Hall must consider:

1. Look for hazards.
2. Decide who might be affected and how.
3. Evaluate the risks arising from the hazards and decide whether existing precautions are adequate or more should be done.
4. Record your findings.
5. Review your assessment from time to time and revise it if necessary.

All routine activities relating to the staging of an event, from the load-in, the fit-up and the load out have been assessed by appropriately trained Hall staff and are monitored/recorded by the show staff. Where deemed necessary, safety precautions have been put in place and methods of operation improved to reduce hazard and risk.

There may be occasions when unusual staging arrangements require activities not currently assessed. On such occasions promoters and production companies will be asked to assist the Hall's show staff in carrying out a risk assessment and implementing appropriate steps to ensure safe working conditions.

Everyone engaged in activities related to the staging of an event should ensure that their own personal safety and that of others is not compromised. Operatives should only undertake those tasks that they are trained or skilled in, are physically capable of doing and that pose no risk or hazard to themselves or those around them.

If required, further information regarding risk assessment is available from your Event Manager or Technical Supervisor.

Sample Risk Assessment Form

Job or Operation	
Hazards	

Personnel at risk	
Severity	

Initial Risk Rating	LOW MED HIGH

Controls

Further Action Required / Notes

Residual Risk Rating	LOW MED HIGH

Assessed by	
Action By	

Figure 11 - Sample Risk Assessment Form

Appendix 1 – Useful Measurements

Item		Dimensions				
		Internal (m)			Doors (m)	
		H	W	D	H	W
Lift 1 - Main Arena Lift	Main door		2.89	6.63	2.36	2.48
	Long side door		2.89	6.63	2.36	5.6
Lift 3 – Rear Arena Lift (minimum due to guides rails)			2.7	2.87		
Lift 4 – Forestage Lift					9.67	1.8
Door 11 lift		2.98	1.81	2.41	2.09	
Door 4 Lift		2.45	1.85	1.95	1.97	1.27
Roof Service hoist opening			0.63	0.63	0.63	0.63
Loggia 18 doors					2.13	0.73
Loggia 19 doors					2.13	0.73
Grand Tier 22					2.11	0.89

Cable routes	Distance (m)
Sub-stage power to stage	20
Rear of stage to GT22	50
Stage to FOH rear arena	45

Stage	Distance (m)
Stage width to F riser	24
Stage width – widest point	26.9
Stage depth (centre line, no extension)	12.65
Stage height	0.935
Downstage edge (no extension)	12.37
Downstage edge (with 5’ 11” extension)	14.3
Back of G riser (drape line)	30.5
Back of stage to slot motor position (height)	35

Arena	Distance (m)
Widest point (B to E vomitory)	17.58
Depth of arena (Stage to C/D vomitory)	26.23
Depth of arena (5’ 11” extension to C/D vomitory)	24.43
Arena floor to Corona	45

Appendix 2 – Standard Trim Heights

House Standard trim heights for lighting (Stage floor to bottom chord of truss)	Distance (m)
Advance Truss	14.8
Truss 1	14
Truss 2	12.5
Truss 3	12.5
Truss 4	12.5
Circular Truss	14.8

Appendix 3 – Loading Reference

Item		UDL SWL (kg)
Gallery lighting bar		180
Circle lighting bar (per metre between brackets)		75
House truss sub-hang capacity (per truss)		2000
Lift 1 – Main Arena Lift	Dynamic	5000
	Static	10000
Lift 3 – Rear Arena Lift	Dynamic	2000
	Static	4000
Lift 4 – Forestage Lift	Dynamic	3500
	Static	7400
Door 11 Lift		3000
Door 4 Lift		1800
Roof service hoist		250
Stage		5kN/m²

Appendix 4 – Ancillary Patching

Video & Camera Patching

There is a comprehensive installation of audio and video patching which was installed in conjunction with the BBC to facilitate the Proms season, held at the Hall each year. This is available for use of incoming productions.

All circuits terminate in a patch room beneath Door 11 on sub-basement level, which is a short simple cable route to OB vehicles outside.

	Location	Quantity	Facilities
1	Gallery North	2 3 21 8 2 1	Camera triax (Lemo) Audio multiway (Mil 16-26) wired for 8 circuits Video circuits (BNC) SDV Circuits (BNC) 16A Mains outlets (BS4343) 13A Mains outlet (BS1363)
2	Gallery South	1 1 7 4 1	Camera triax (Lemo) Audio multiway (Mil 16-26) wired for 8 circuits Video circuits (BNC) SDV Circuits (BNC) 16A Mains outlets (BS4343)
3	Grand tier box 3 (&2)	2 3 21 8 2 1	Camera triax (Lemo) Audio multiway (Mil 16-26) wired for 8 circuits Video circuits (BNC) SDV Circuits (BNC) 16A Mains outlets (BS4343) 13A Mains outlet (BS1363)
4	Grand tier box 17	1 1 7 4 1	Camera triax (Lemo) Audio multiway (Mil 16-26) wired for 8 circuits Video circuits (BNC) SDV Circuits (BNC) 16A Mains outlets (BS4343)
5	Grand tier box 24	1 2 14 4 1 1	Camera triax (Lemo) Audio multiway (Mil 16-26) wired for 8 circuits Video circuits (BNC) SDV Circuits (BNC) 16A Mains outlets (BS4343) 13A Mains outlet (BS1363)
6	Grand tier box 40	1 2 14 4 1 1	Camera triax (Lemo) Audio multiway (Mil 16-26) wired for 8 circuits Video circuits (BNC) SDV Circuits (BNC) 16A Mains outlets (BS4343) 13A Mains outlet (BS1363)
7	Grand tier box 41 (&42)	1 1 7 4 1	Camera triax (Lemo) Audio multiway (Mil 16-26) wired for 8 circuits Video circuits (BNC) SDV Circuits (BNC) 16A Mains outlets (BS4343)
8	Loggia Box 6	1 1 7 4 1	Camera triax (Lemo) Audio multiway (Mil 16-26) wired for 8 circuits Video circuits (BNC) SDV Circuits (BNC) 16A Mains outlets (BS4343)
9	Loggia box 18	1 2 14 4 1 1	Camera triax (Lemo) Audio multiway (Mil 16-26) wired for 8 circuits Video circuits (BNC) SDV Circuits (BNC) 16A Mains outlets (BS4343) 13A Mains outlet (BS1363)
10	Loggia box 19	1 2 14	Camera triax (Lemo) Audio multiway (Mil 16-26) wired for 8 circuits Video circuits (BNC)

		4 1 1	SDV Circuits (BNC) 16A Mains outlets (BS4343) 13A Mains outlet (BS1363)
11	Loggia box 27	1 1 7 4 1	Camera triax (Lemo) Audio multiway (Mil 16-26) wired for 8 circuits Video circuits (BNC) SDV Circuits (BNC) 16A Mains outlets (BS4343)
12	Loggia box 32	1 1 7 4 1	Camera triax (Lemo) Audio multiway (Mil 16-26) wired for 8 circuits Video circuits (BNC) SDV Circuits (BNC) 16A Mains outlets (BS4343)
13	Stage West	2 2 14 8 2	Camera triax (Lemo) Audio multiway (Mil 16-26) wired for 8 circuits Video circuits (BNC) SDV Circuits (BNC) 16A Mains outlets (BS4343)
14	Stage East	2 2 14 8 2	Camera triax (Lemo) Audio multiway (Mil 16-26) wired for 8 circuits Video circuits (BNC) SDV Circuits (BNC) 16A Mains outlets (BS4343)
15	Organ (Stage centre)	1 1 7 4 1	Camera triax (Lemo) Audio multiway (Mil 16-26) wired for 8 circuits Video circuits (BNC) SDV Circuits (BNC) 16A Mains outlets (BS4343)
16	Bullrun West	1 2 14 4 1 1	Camera triax (Lemo) Audio multiway (Mil 16-26) wired for 8 circuits Video circuits (BNC) SDV Circuits (BNC) 16A Mains outlets (BS4343) 13A Mains outlet (BS1363)
17	Bullrun East	1 2 14 4 1 1	Camera triax (Lemo) Audio multiway (Mil 16-26) wired for 8 circuits Video circuits (BNC) SDV Circuits (BNC) 16A Mains outlets (BS4343) 13A Mains outlet (BS1363)
18	Arena South, east	1 1 7 4 1	Camera triax (Lemo) Audio multiway (Mil 16-26) wired for 8 circuits Video circuits (BNC) SDV Circuits (BNC) 16A Mains outlets (BS4343)
19	Arena South, west	1 1 7 4 1	Camera triax (Lemo) Audio multiway (Mil 16-26) wired for 8 circuits Video circuits (BNC) SDV Circuits (BNC) 16A Mains outlets (BS4343)
20	Arena South, south, west	1 1 7 4 1	Camera triax (Lemo) Audio multiway (Mil 16-26) wired for 8 circuits Video circuits (BNC) SDV Circuits (BNC) 16A Mains outlets (BS4343)
21	Arena North (east+west)	2 3 21 8 2 1	Camera triax (Lemo) Audio multiway (Mil 16-26) wired for 8 circuits Video circuits (BNC) SDV Circuits (BNC) 16A Mains outlets (BS4343) 13A Mains outlet (BS1363)
22	Under Arena	2 3 21 8 2 1	Camera triax (Lemo) Audio multiway (Mil 16-26) wired for 8 circuits Video circuits (BNC) SDV Circuits (BNC) 16A Mains outlets (BS4343) 13A Mains outlet (BS1363)

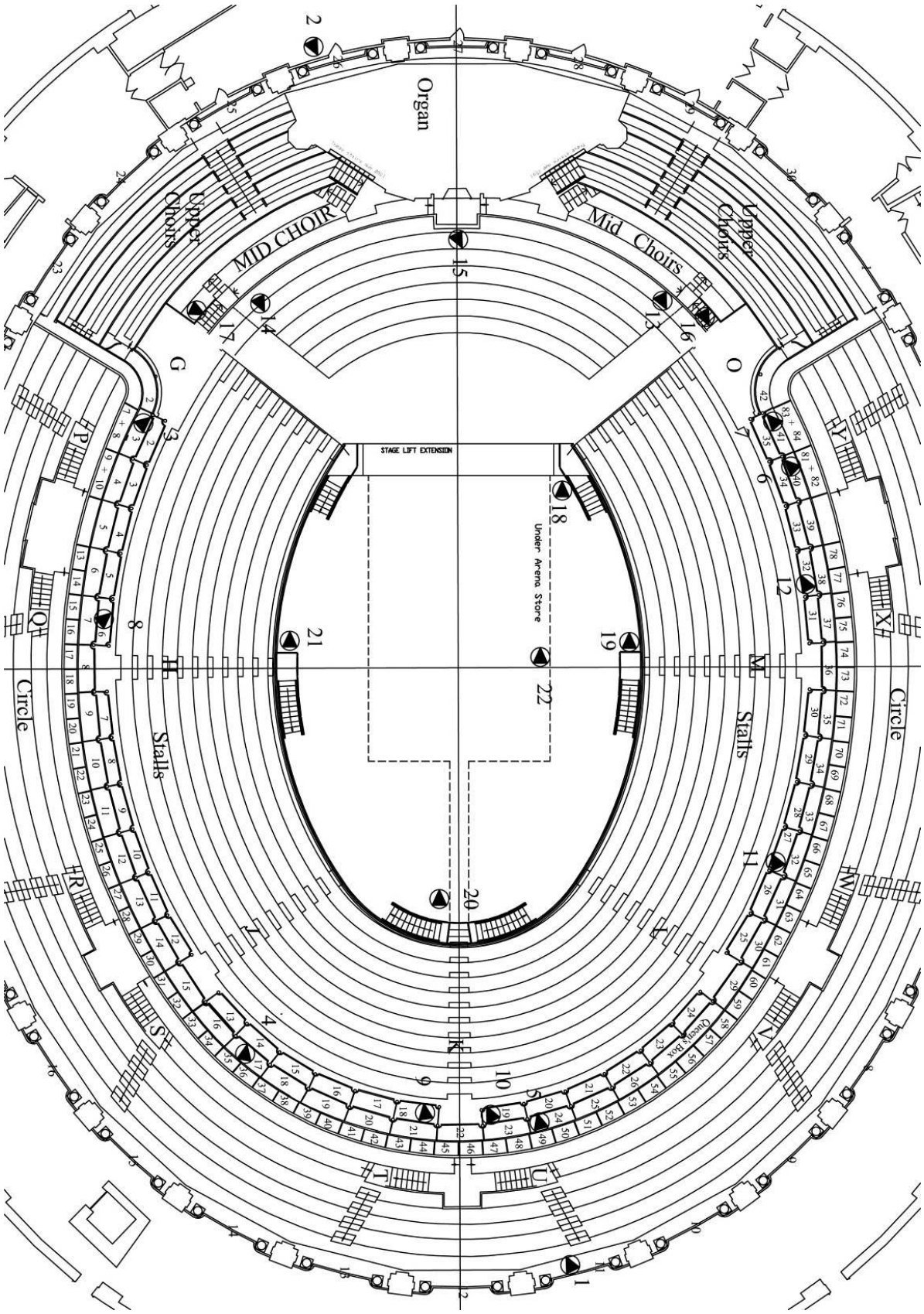


Figure 12 - Video & Camera Patch Positions