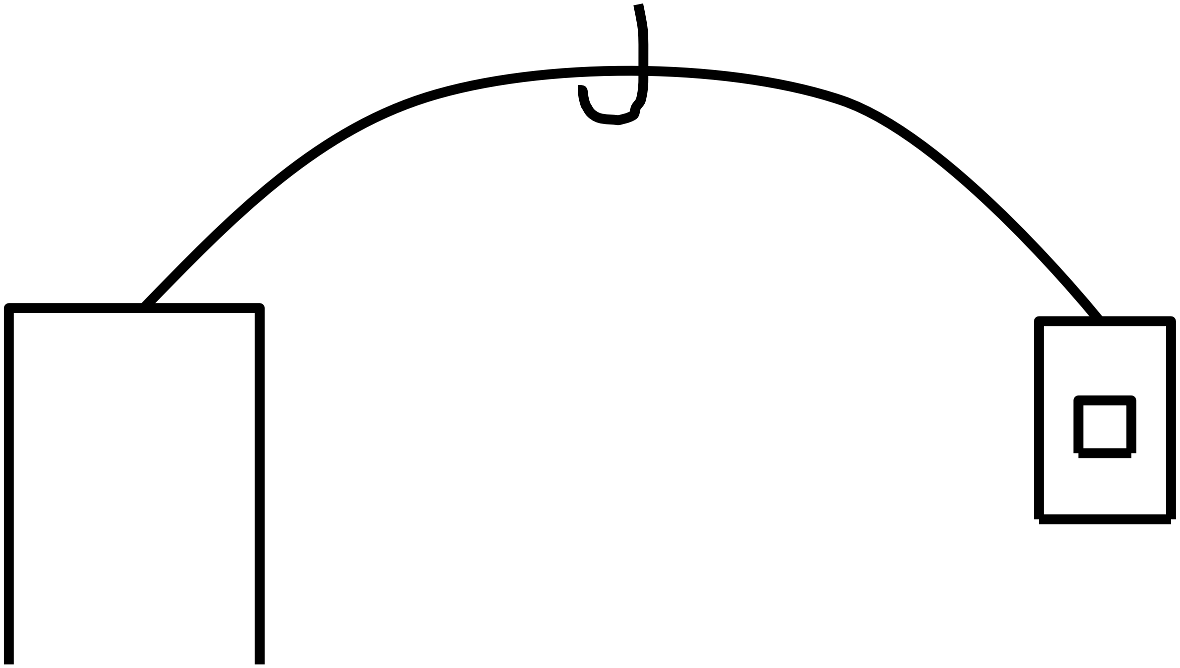
1 = Blue 2 = Red
3 = Green 4 = Orange

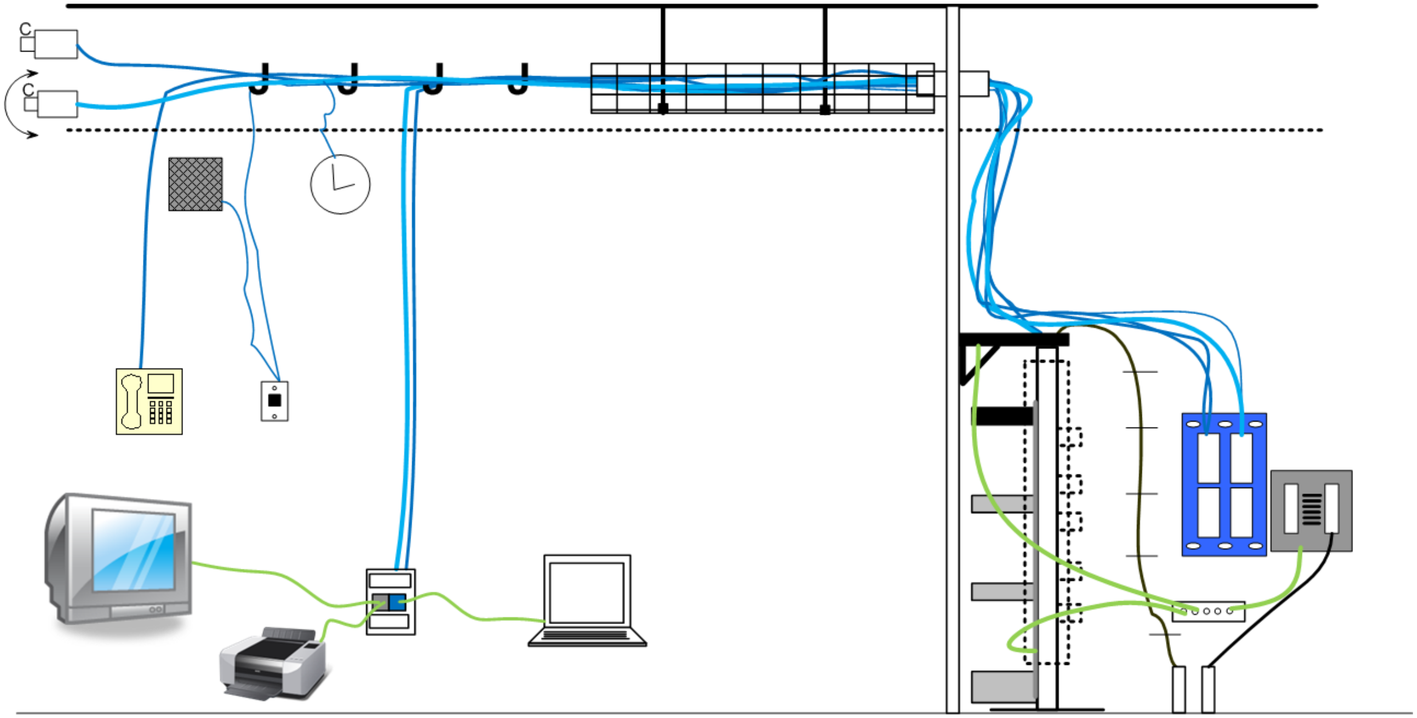
AV
Like
Paint by
Numbers

Presented By: Eric J. Marshall

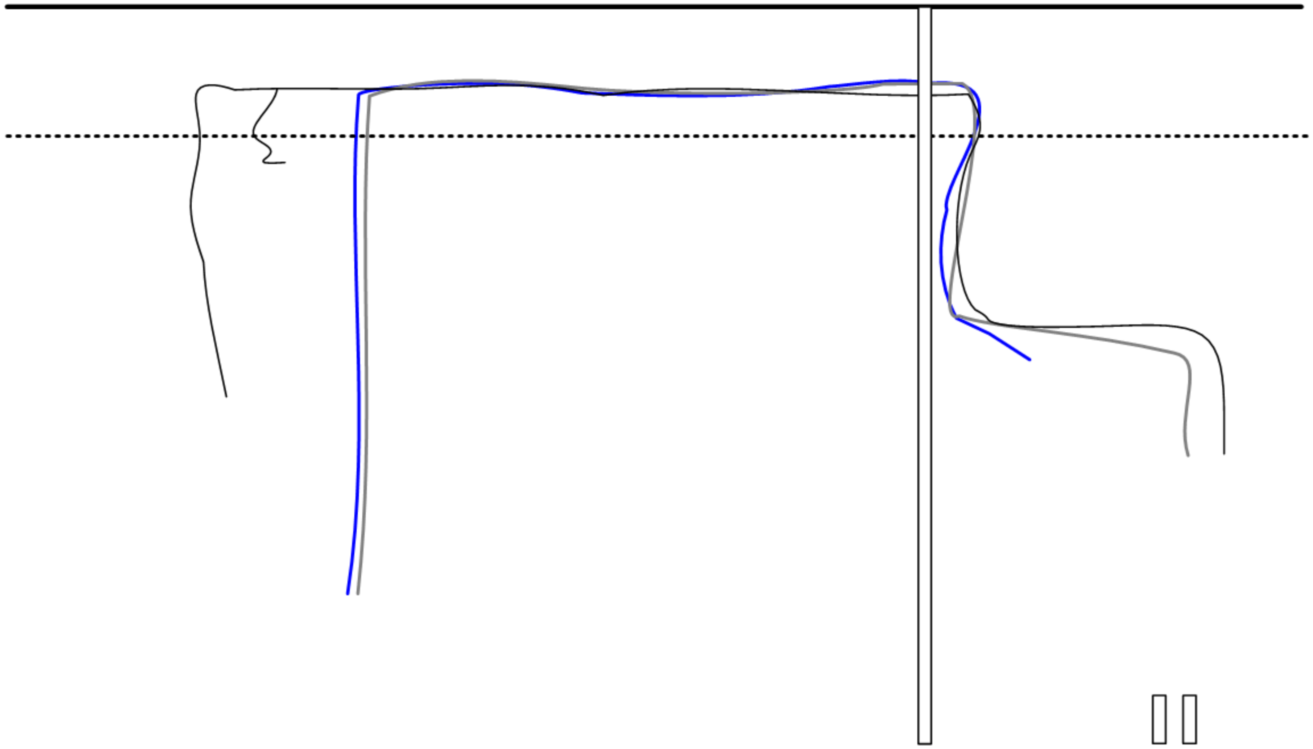
When I started in the industry, my boss drew me a picture of what WE DID.



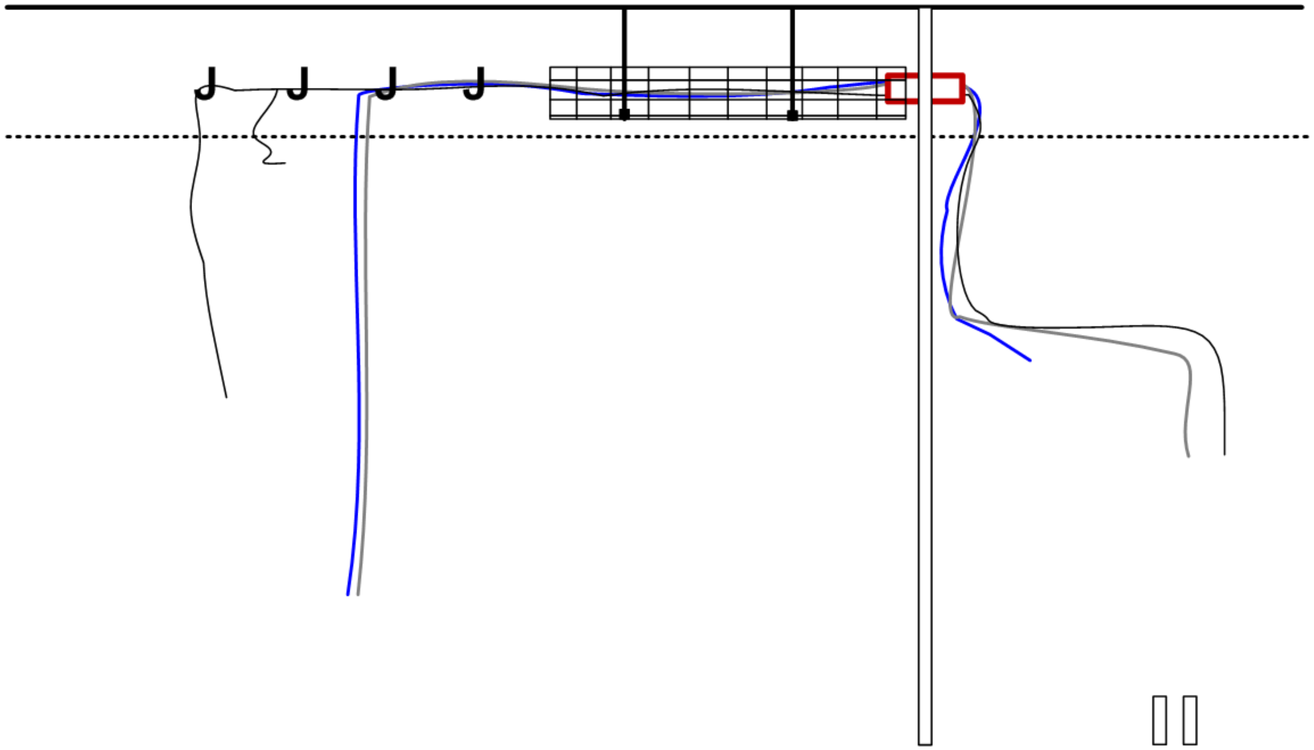
I Upgraded the Drawing



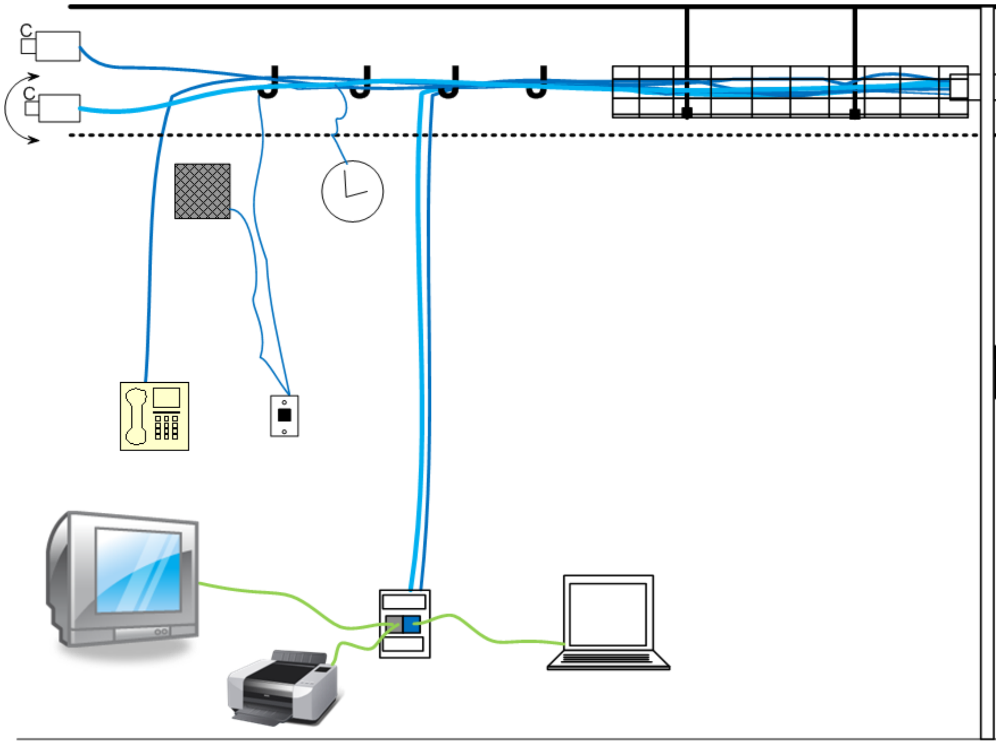
1. Address Cable



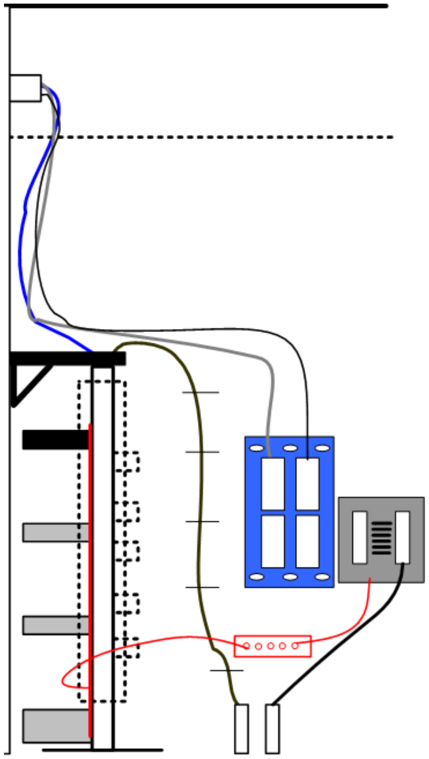
2. Address Pathway



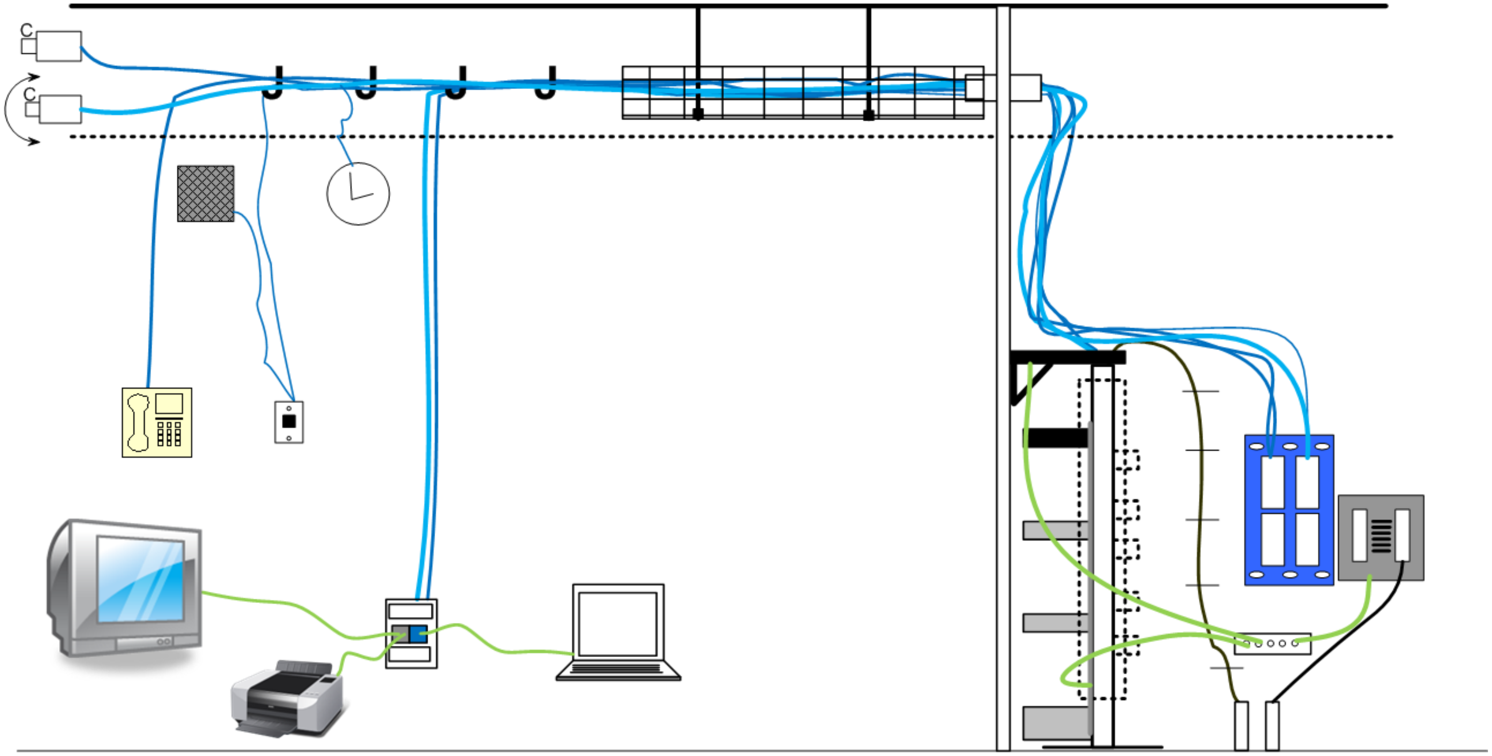
3. Address the Stations



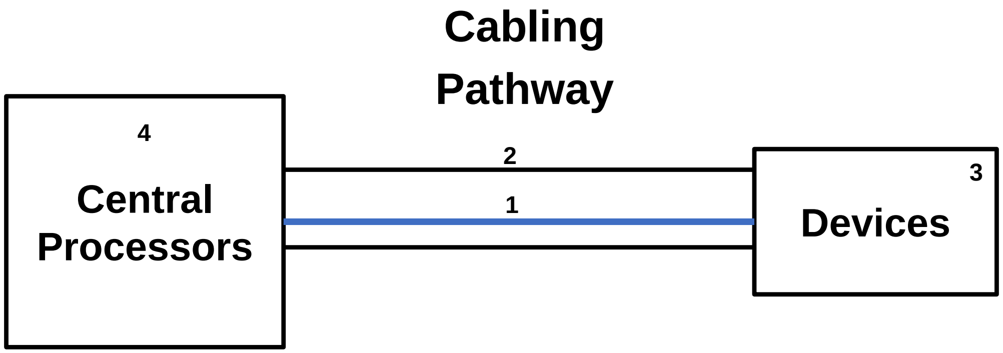
4. Address the Head End



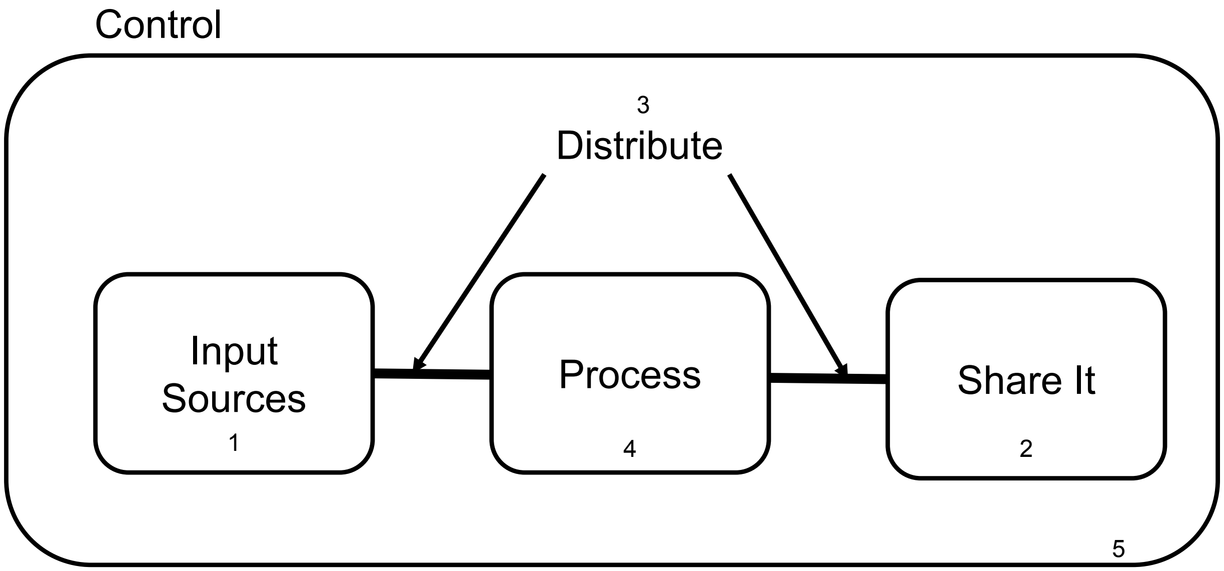
Completed Picture



What Do We Do TODAY?


Cabling
Pathway
4
Central
Processors
2
1
3
Devices

Audio Video



Control

3

Distribute

Input Sources

1

Process

4

Share It

2

5

Who are you?

A. Engineer/Designer
B. Sales Agent
C. Installer
D. Project Manager
E. Commission Agent / Inspector
F. Programmer
G. ALL THE ABOVE!

Can we do AV?

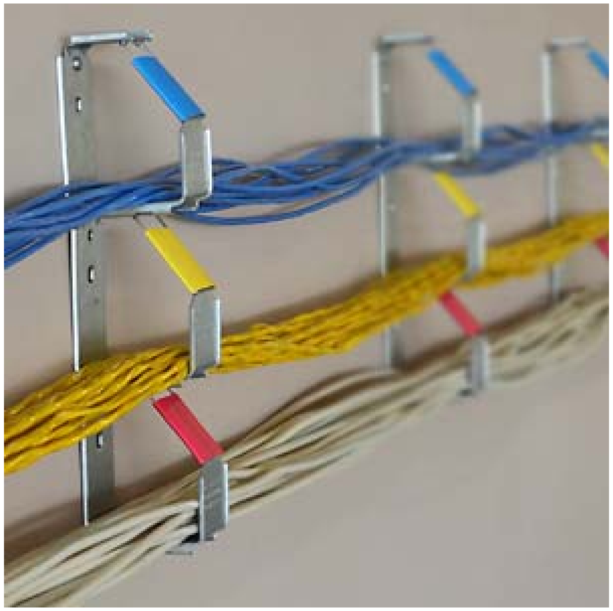
I was hired to start doing AV
at a structured cabling company`

Do you know how to
install cable?

Do you know how to
mount things on walls
and ceilings?

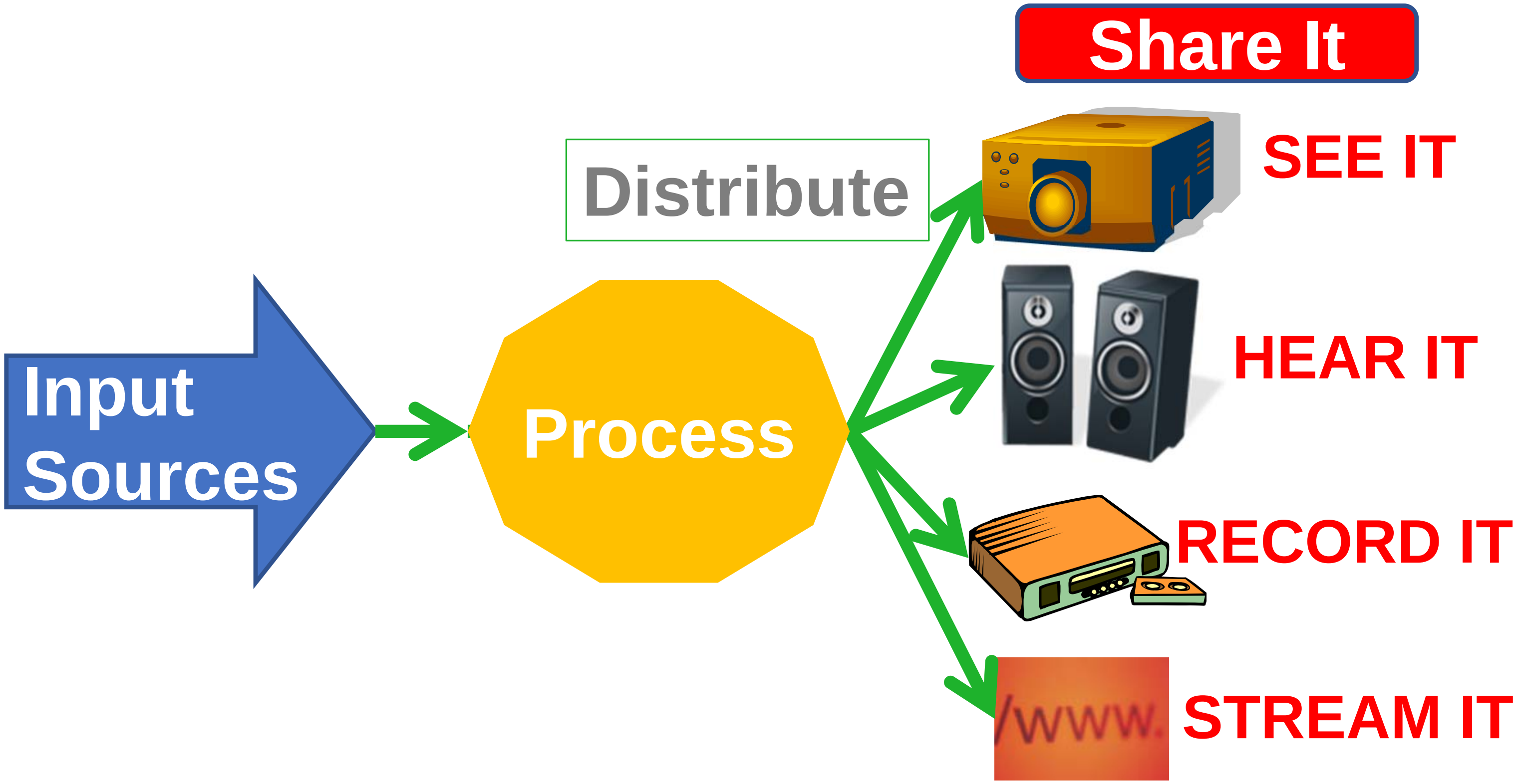
Let me pull your cable!
We are both going to the same place!

TDMM:
Save 30-40%



Sold 2.4 million
In 2 months!

4 Steps of AV



Input Sources

Process

Distribute

Share It

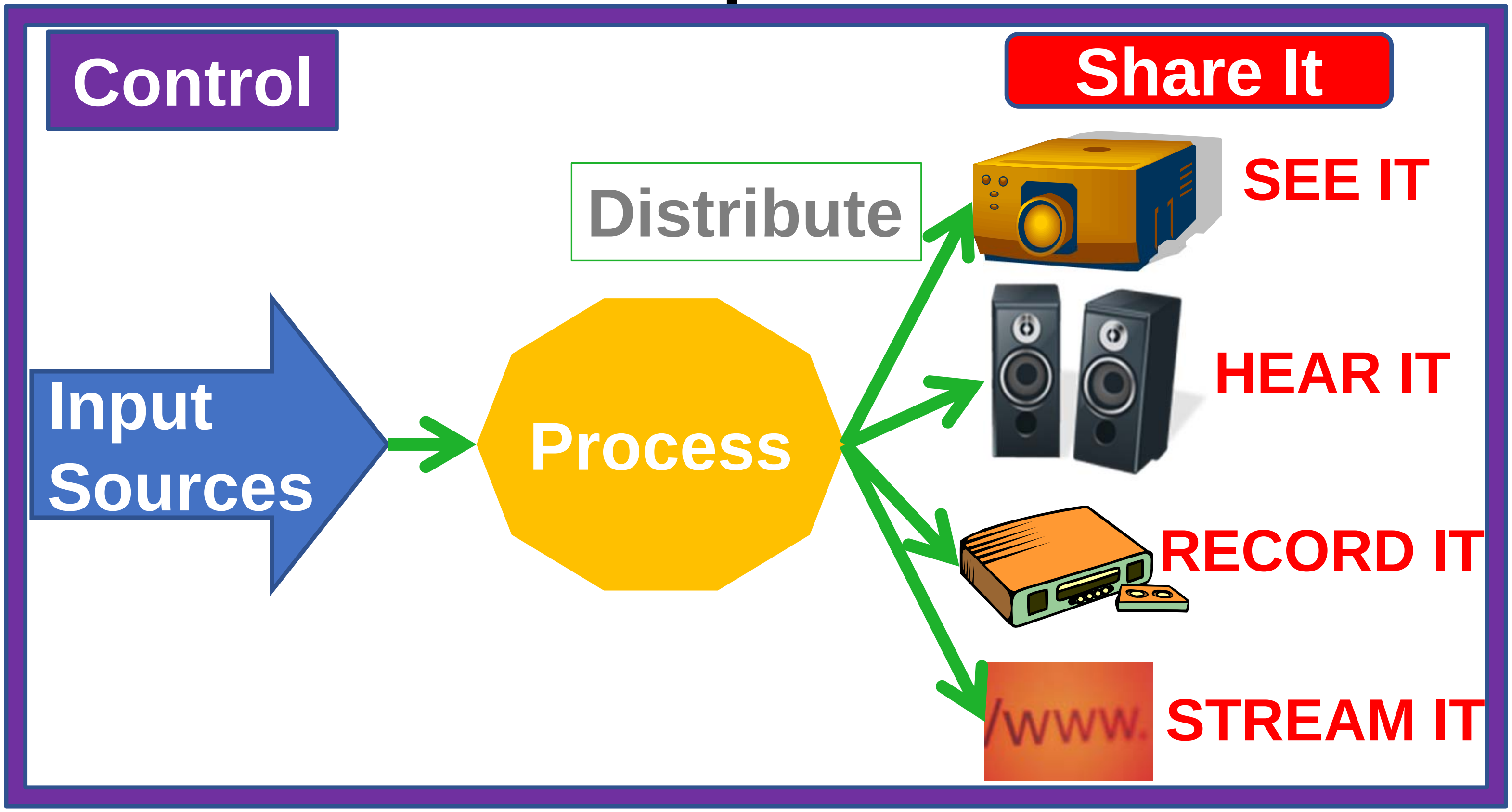
SEE IT

HEAR IT

RECORD IT

STREAM IT

5th Step of AV



Control

Share It

Distribute

Input Sources

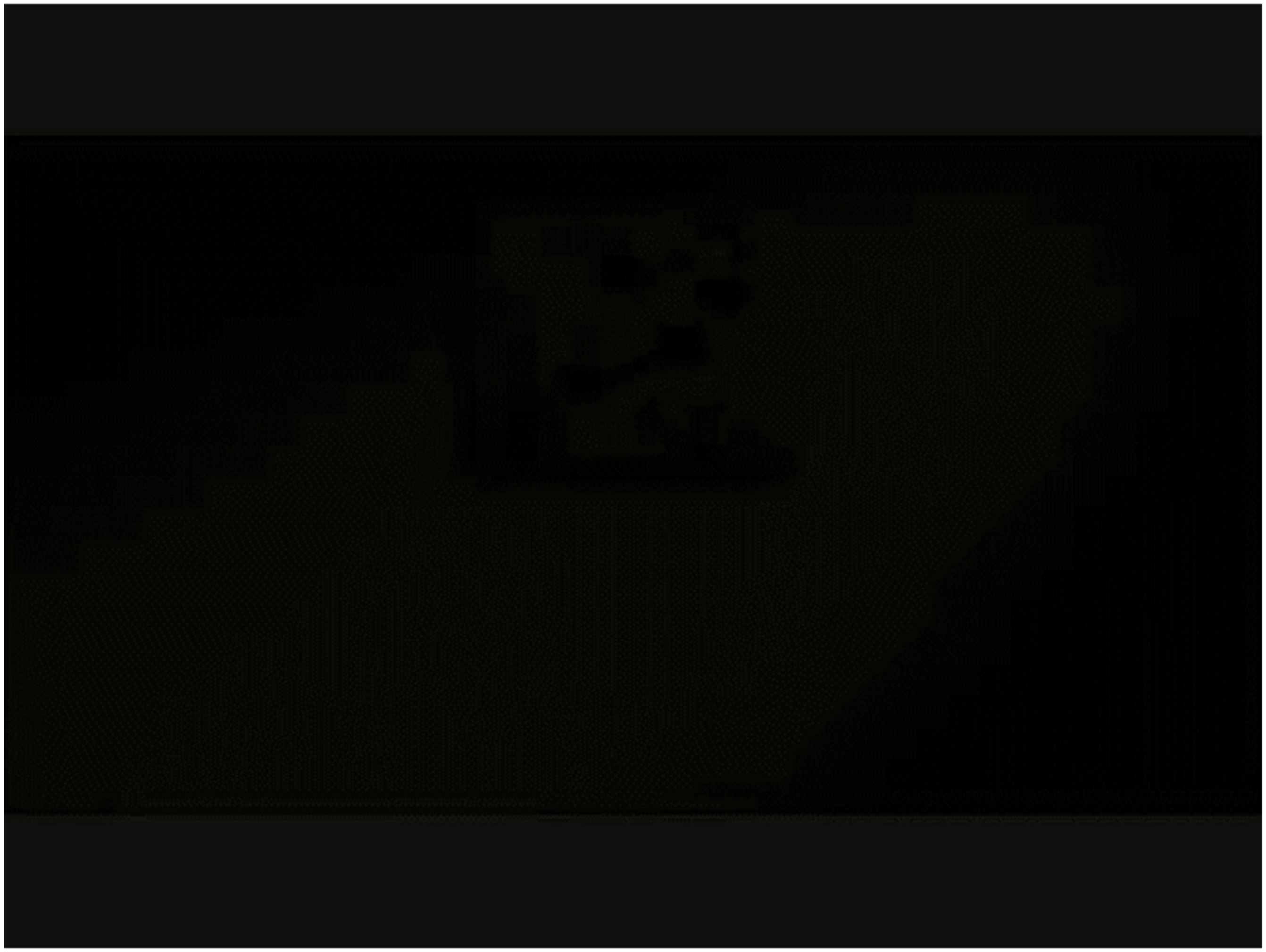
Process

SEE IT

HEAR IT

RECORD IT

STREAM IT



1. Input Sources
2. Share It
3. Distribute
4. Process
5. Control

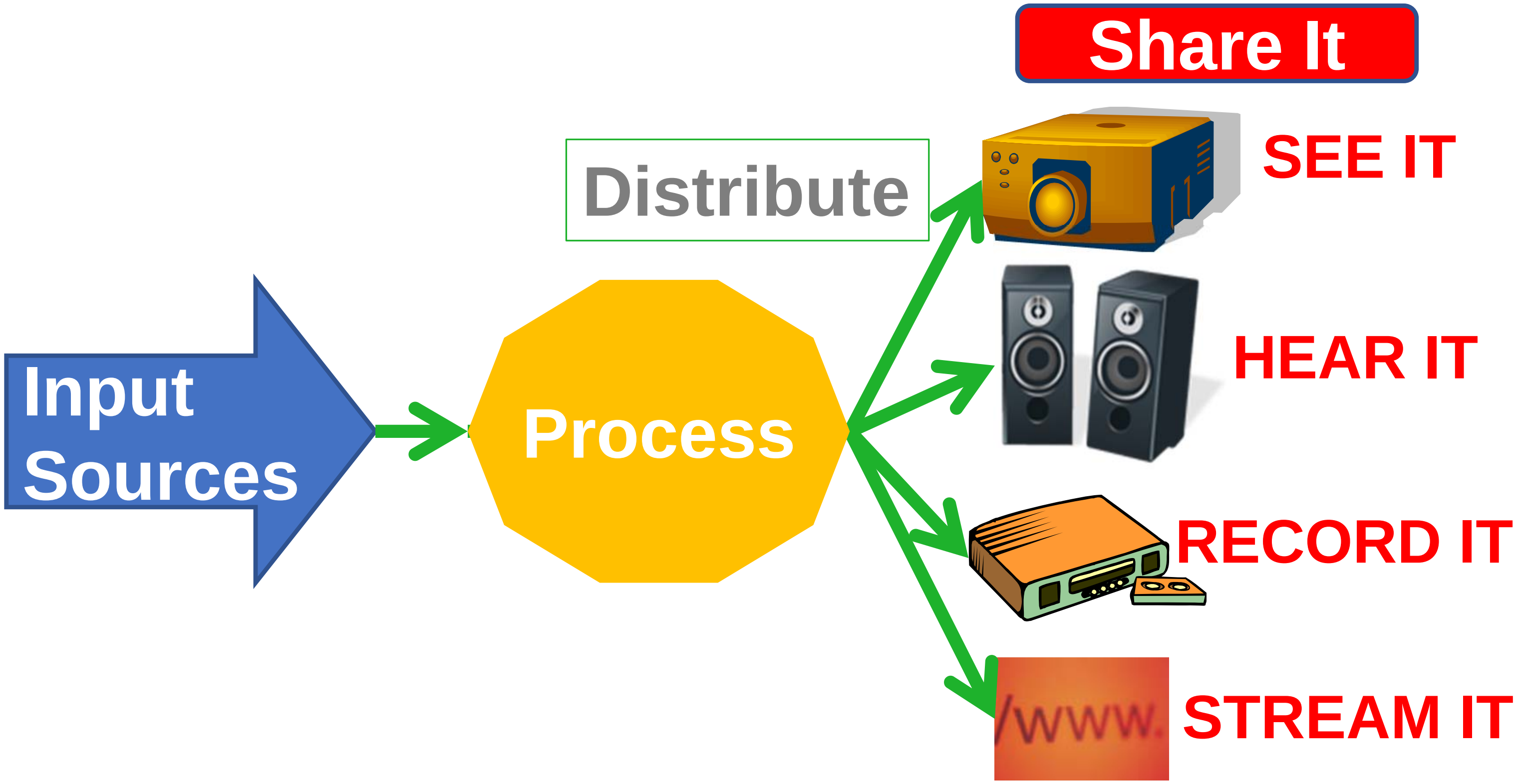
Which are the 5 Steps of AV?

A.
Select Sources – Share It – Cable It – Process – Control

B.
Input Sources – Share It – Distribute – Process – Control

C.
Pick Sources – Pick Outputs – Cable It – Share It – Control It

4 Steps of AV



Input Sources

Process

Distribute

Share It

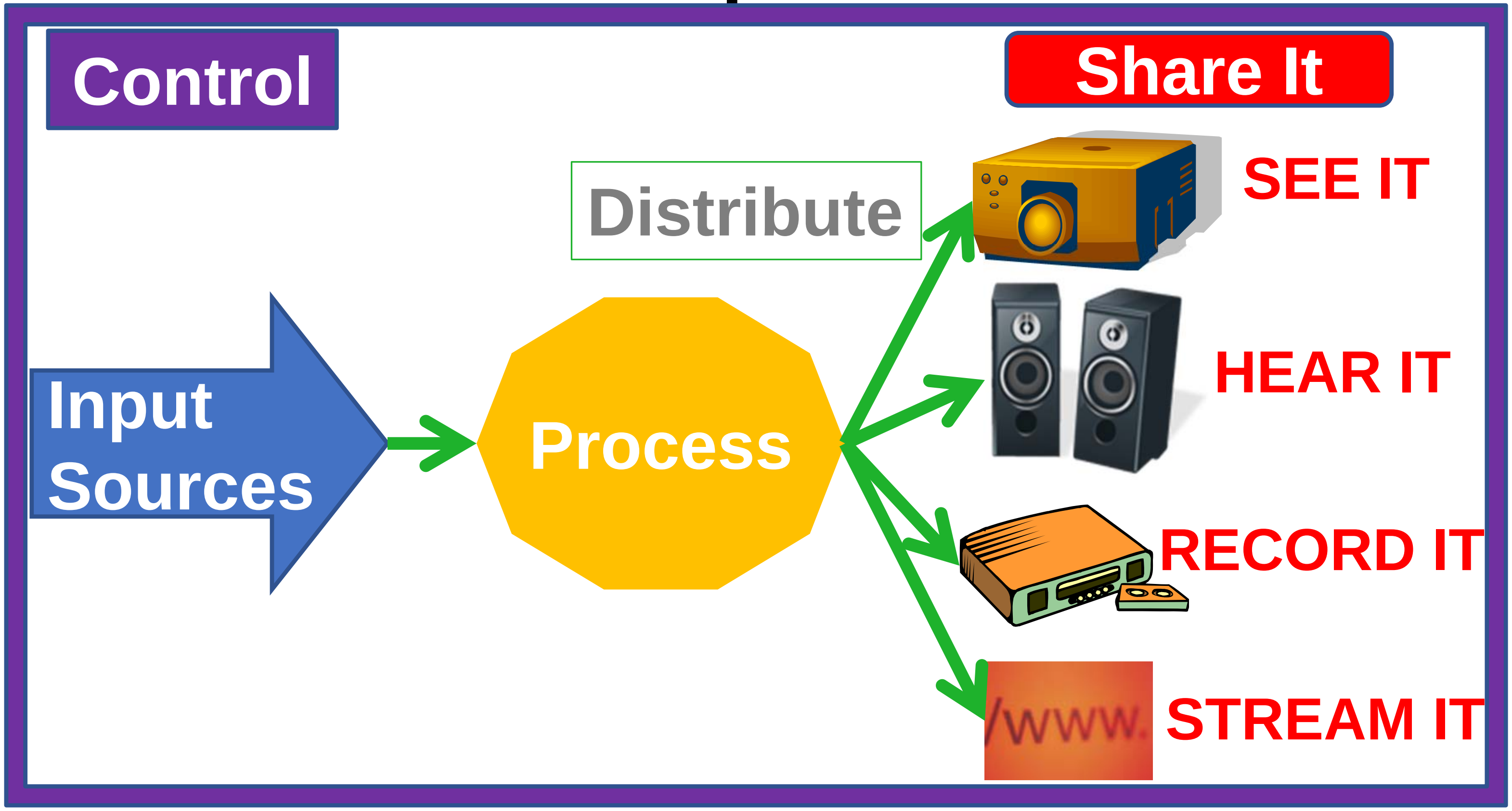
SEE IT

HEAR IT

RECORD IT

STREAM IT

5th Step of AV



Control

Share It

Distribute

Input Sources

Process

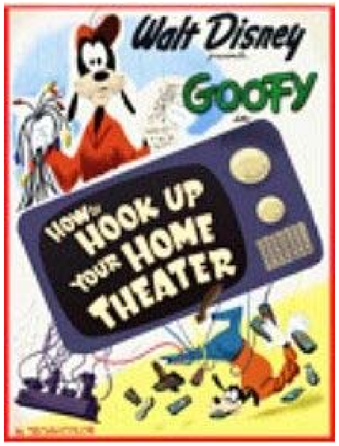
SEE IT

HEAR IT

RECORD IT

STREAM IT

Step 1 – Input Sources


Walt Disney
GOOFY
How to Hook Up Your Home Theater

Shiny Stuff
SAVE
$
MUST GO!!
OBEY BUY OBEY BUY
SPEAKERS
!!!

What are input sources?

Anything that generates Audio or Video

Audio Source Examples

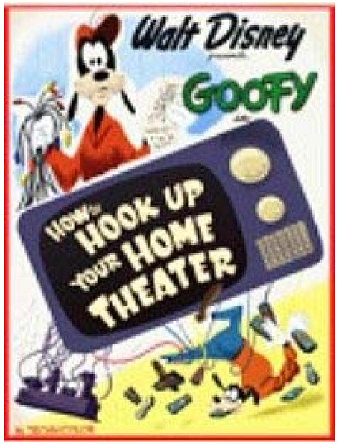
- CD Player / Recorder
- DJ Mixer / Karaoke
- MP3 Player or iPod
- Streaming – Spotify, Pandora…
- Audio Server
- AM/FM Tuner
- Satellite Radio
- Cassette Tape Player / Recorder
- Phonograph / Record Player / Turntable
- Microphone
- Instrument
- Public address / Noise Masking
- Bluetooth from Phone

Video Source Examples

- BluRay Player / Recorder
- TV Box or TV antenna
- Digital Signage
- VCR
- DVR / Video Server
- I-Pod Video / Phone
- Camera
- Computer

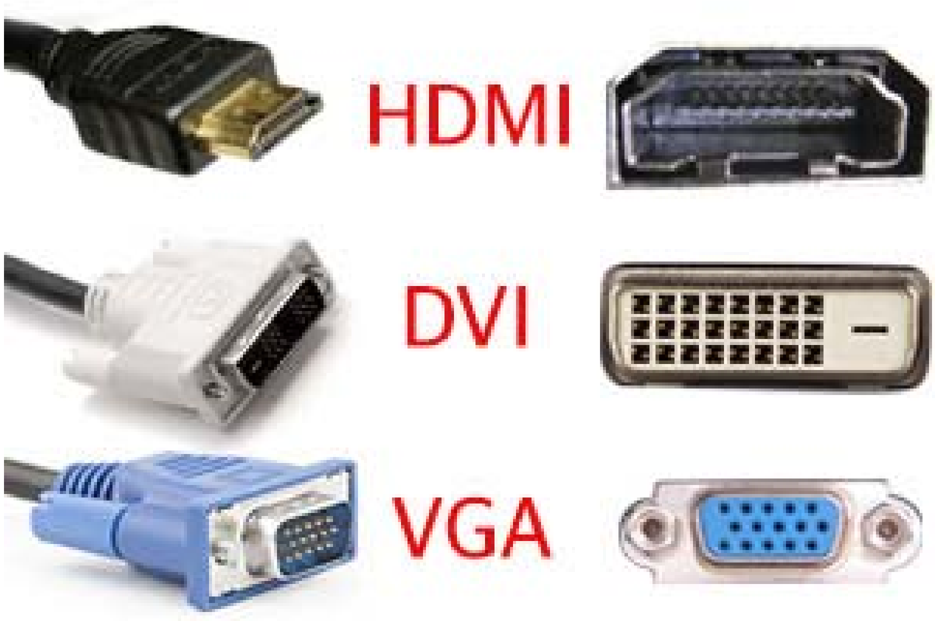
- Video CDs
- Document Camera
- Game Console
- Web Conference
- Streaming Service
- BYOD Wireless Collab Device
- Microscope / Telescope

You don’t have to worry about all the sources


Walt Disney
Goofy
How to Hook Up Your Home Theater

INPUT
Sources

Devices have connectors

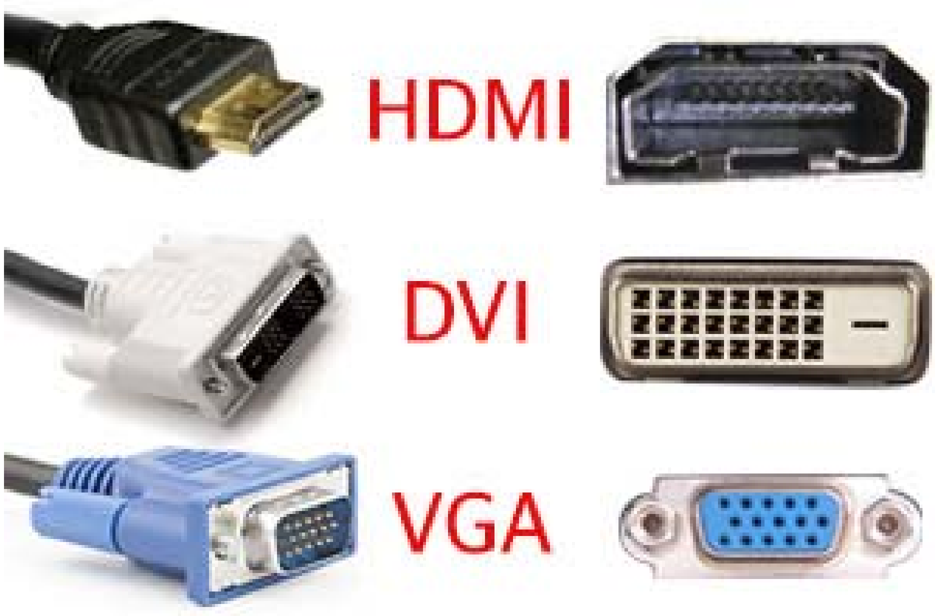


CONNECTORS
CONNECT

BUT

THE REAL
CONNECTION
IS THE
SIGNAL

Devices have connectors

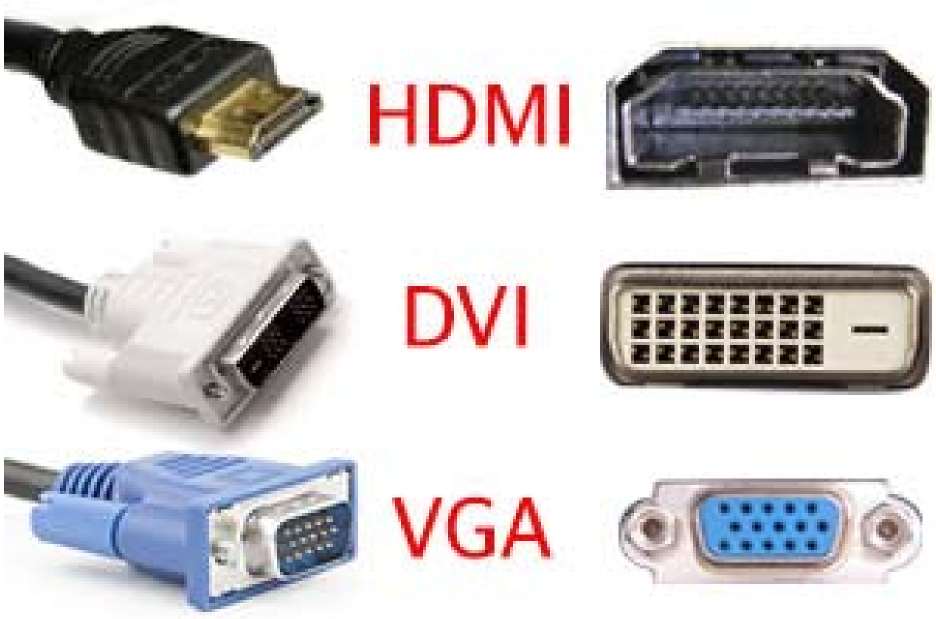


CONNECTORS
CONNECT

BUT

THE REAL
CONNECTION
IS THE
SIGNAL

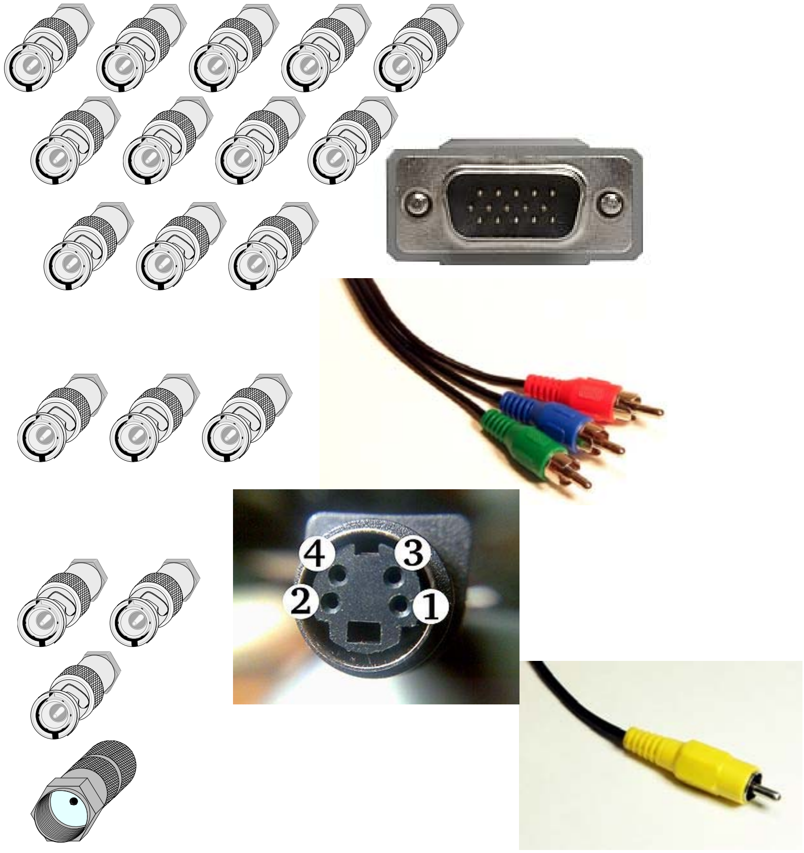
Devices have connectors



CONNECTORS CONNECT

BUT

THE REAL CONNECTION IS THE **SIGNAL**



High Resolution

- RGBHV = 5 Wire
- RGBS = 4 Wire
- RGsB/RsGsBs = 3 Wire

Can be either

- Component = 3 Wire

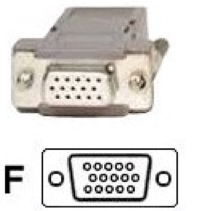
Low Resolution

- S-video (Y/C) = 2 Wire
- Composite = 1 Wire
- Radio Frequency (RF)

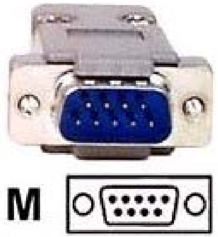
BNC Connector

- Used with coaxial cable.
- It is a round metal connector that is pressed and twisted to lock into place.
- BNC stands for “Bayonet Neill Concelman” (the names of the two developers – Paul Neill and Carl Concelman).
- Used for professional AV applications.

DB / HD Connectors



HD15 VGA Plug

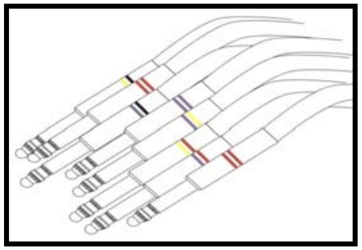


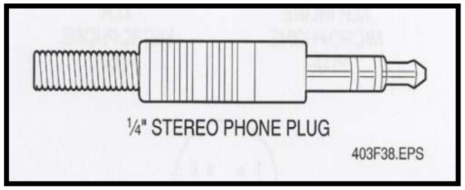
DB9 Serial Plug

- Common connector for computers.
- If it has 2 rows of pins it is called a “D-sub” or “DB” connector.
- If it has 3 rows of pins it is called an “HD” connector.
- The connector type is usually followed by a number telling the number of pins it can hold.
- (ex. DB9, DB25)
- HD15 is what is used by most computers!

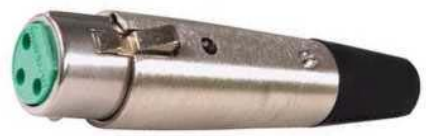
Audio plug

- Plugs are used for many audio applications
- Typical sizes are 3.5mm, 2.5mm, ¼”, and 3/16”
- 3.5mm is what is used on most computers and portable audio devices!



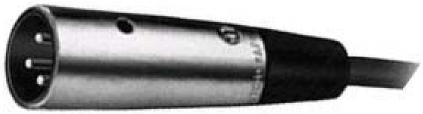

¼" STEREO PHONE PLUG
403F38.EPS

Audio Connectors

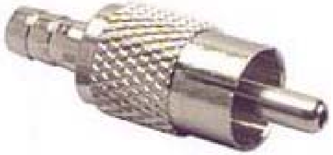


Female XLR Connector

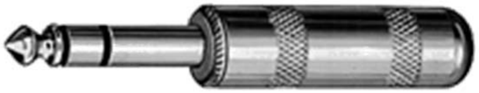
Pin	Signal
1	Shield
2	Signal +
3	Signal -



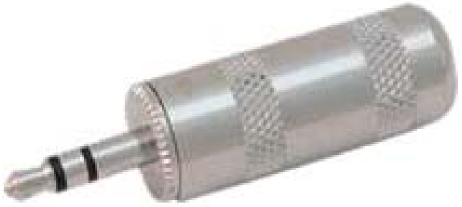
Male XLR Connector



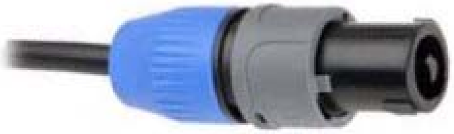
RCA Plug



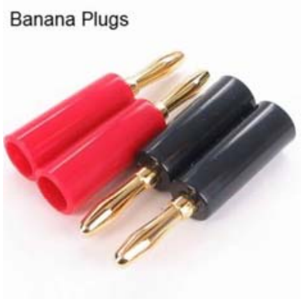
¼” Plug TRS (Tip Ring Sleeve)

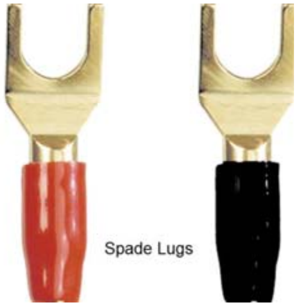


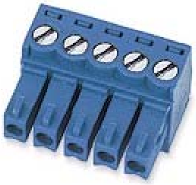
1/8” 3.5mm mini-plug TRS



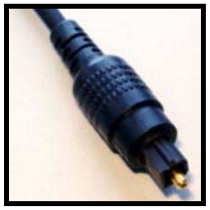
Speakon for Speakers





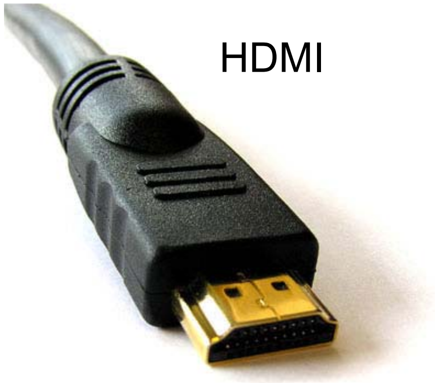


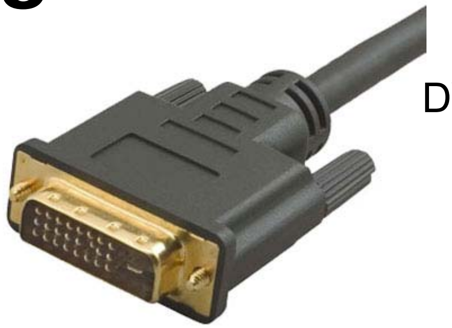
Euroblock, Captive Screw or Phoenix Connector

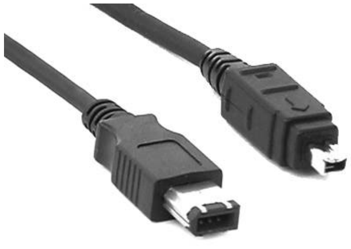


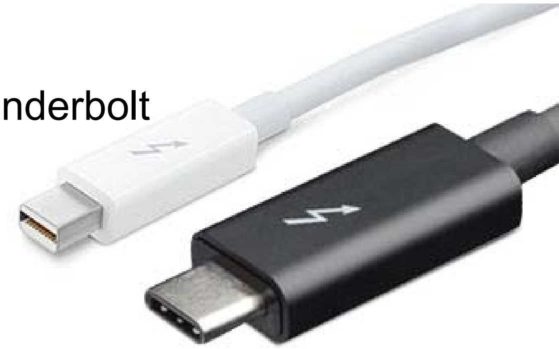
Toslink

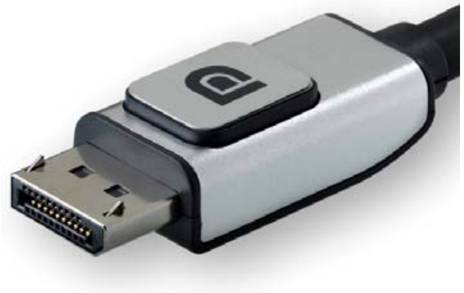
Digital Connectors

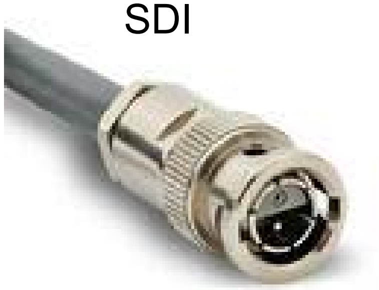

HDMI

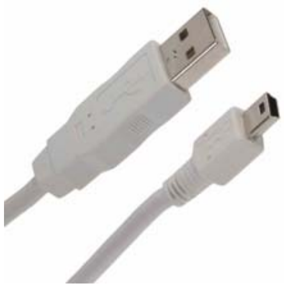

DVI


FireWire

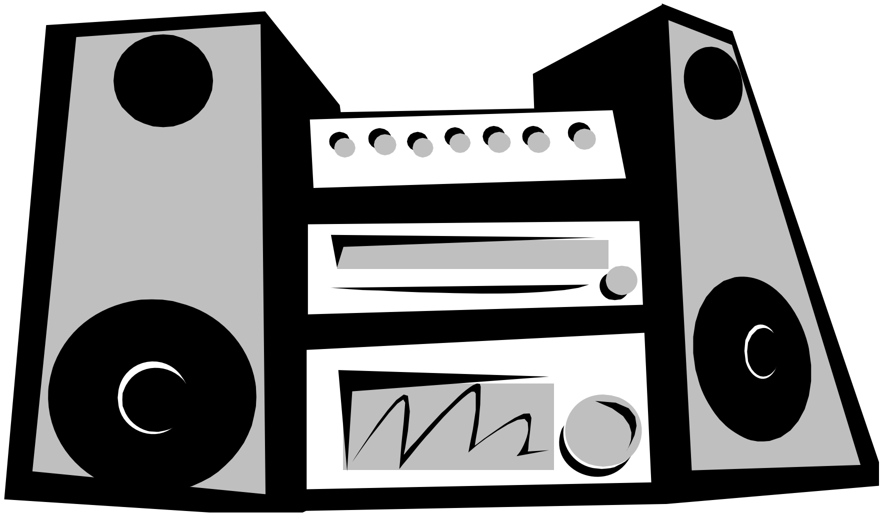

Thunderbolt


Display Port


SDI


USB

What Does Digital Add to Signal?



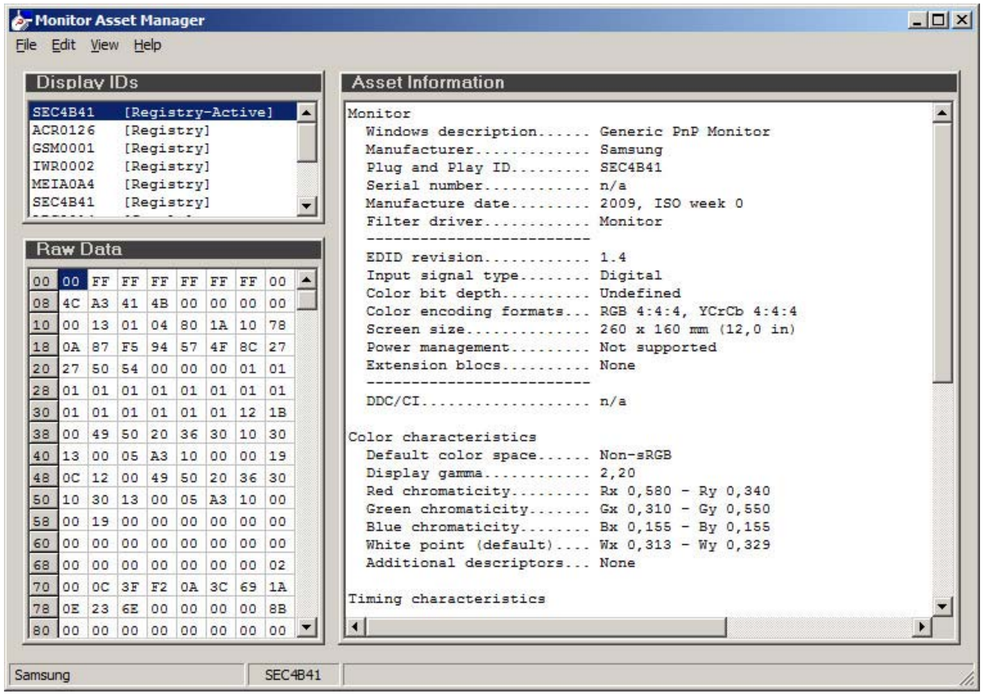
AUDIO

What Does Digital Add to Signal?

EDID

(Extended Display Identification Data)

- Hot Sync
- AV properties
- HDCP



```
SEC4B41    [Registry-Active]
ACR0126    [Registry]
GSM0001    [Registry]
IWR0002    [Registry]
MEIA0A4    [Registry]
SEC4B41    [Registry]
```

```
00 | 00 FF FF FF FF FF FF 00
08 | 4C A3 41 4B 00 00 00 00
10 | 00 13 01 04 80 1A 10 78
18 | 0A 87 F5 94 57 4F 8C 27
20 | 27 50 54 00 00 00 01 01
28 | 01 01 01 01 01 01 01 01
30 | 01 01 01 01 01 01 12 1B
38 | 00 49 50 20 36 30 10 30
40 | 13 00 05 A3 10 00 00 19
48 | 0C 12 00 49 50 20 36 30
50 | 10 30 13 00 05 A3 10 00
58 | 00 19 00 00 00 00 00 00
60 | 00 00 00 00 00 00 00 00
68 | 00 00 00 00 00 00 00 02
70 | 00 0C 3F F2 0A 3C 69 1A
78 | 0E 23 6E 00 00 00 00 8B
80 | 00 00 00 00 00 00 00 00
```

```
Monitor
  Windows description...... Generic PnP Monitor
  Manufacturer............. Samsung
  Plug and Play ID......... SEC4B41
  Serial number............ n/a
  Manufacture date......... 2009, ISO week 0
  Filter driver............ Monitor
  -------------------------
  EDID revision............ 1.4
  Input signal type........ Digital
  Color bit depth.......... Undefined
  Color encoding formats... RGB 4:4:4, YCrCb 4:4:4
  Screen size.............. 260 x 160 mm (12,0 in)
  Power management......... Not supported
  Extension blocs.......... None
  -------------------------
  DDC/CI................... n/a

Color characteristics
  Default color space...... Non-sRGB
  Display gamma............ 2,20
  Red chromaticity......... Rx 0,580 - Ry 0,340
  Green chromaticity....... Gx 0,310 - Gy 0,550
  Blue chromaticity........ Bx 0,155 - By 0,155
  White point (default).... Wx 0,313 - Wy 0,329
  Additional descriptors... None

Timing characteristics
```

What Does Digital Add to Signal?

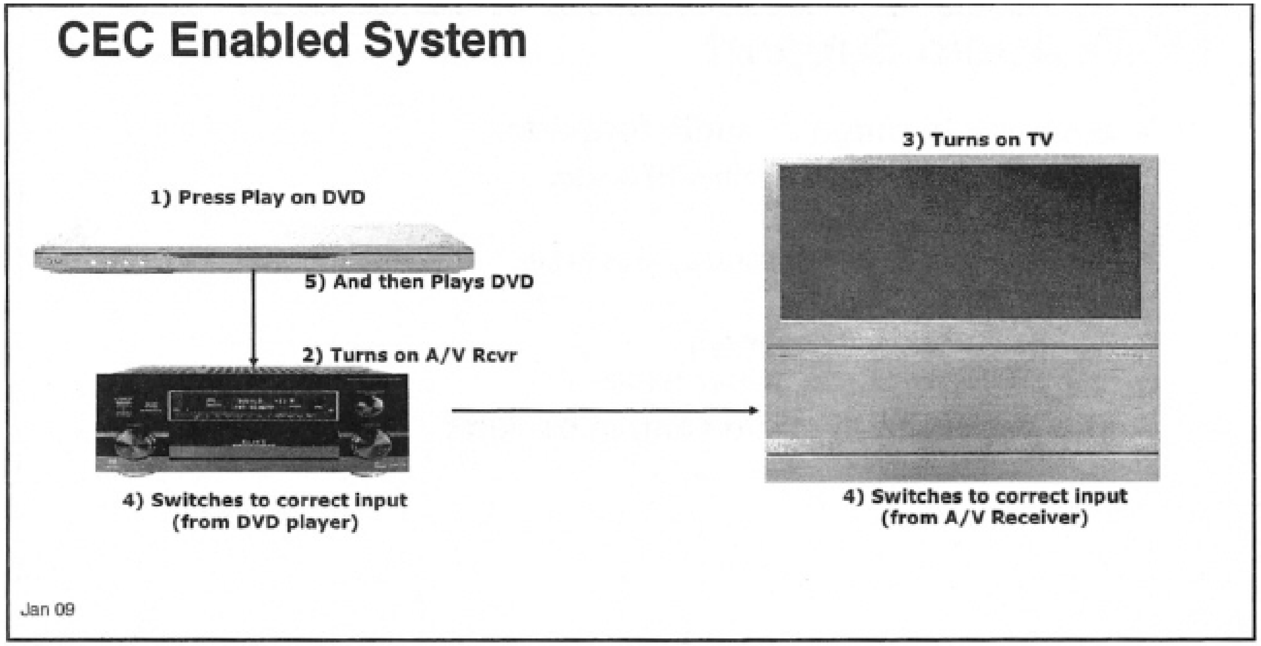
HDCP™

HIGH-BANDWIDTH DIGITAL CONTENT PROTECTION

Prevent Non-licensed devices from receiving content

Block eavesdropping – “Man in the Middle” attacks

What Does Digital Add to Signal?



CEC Enabled System

1) Press Play on DVD

5) And then Plays DVD

2) Turns on A/V Rcvr

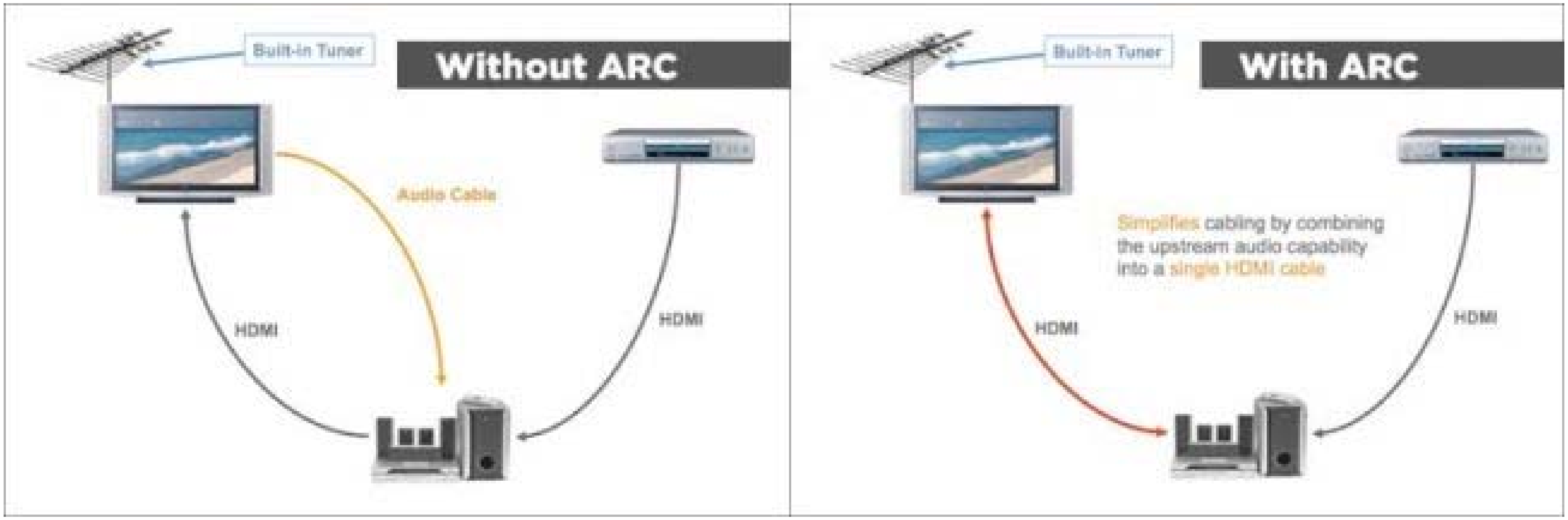
4) Switches to correct input
(from DVD player)

3) Turns on TV

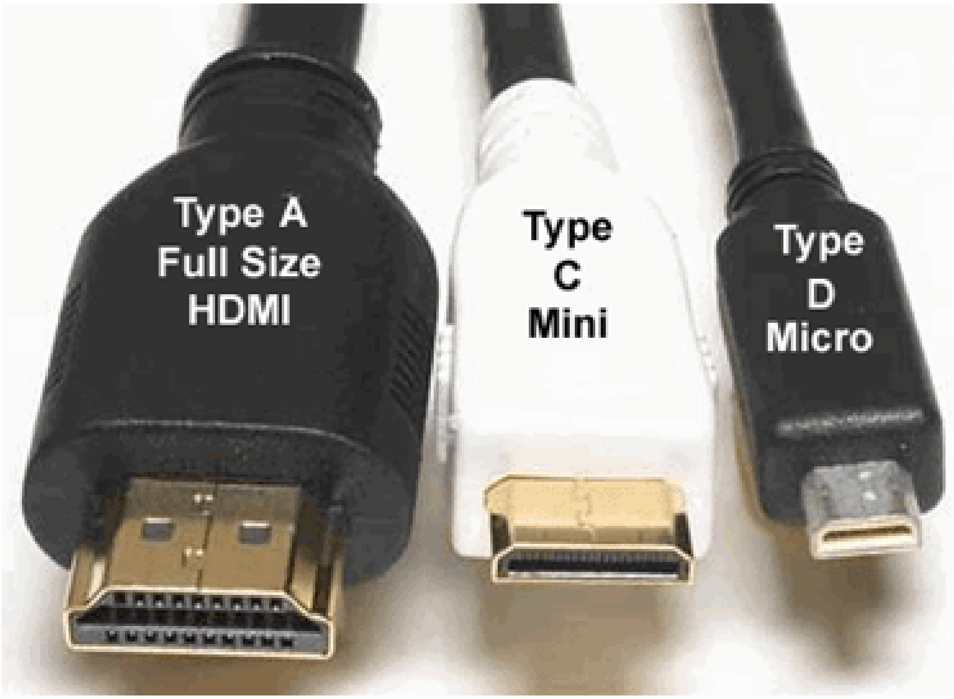
4) Switches to correct input
(from A/V Receiver)

Jan 09

What Does Digital Add to Signal?


Built-in Tuner
Without ARC
Audio Cable
HDMI
HDMI
Built-in Tuner
With ARC
Simplifies cabling by combining the upstream audio capability into a single HDMI cable
HDMI
HDMI

Different HDMI Examples

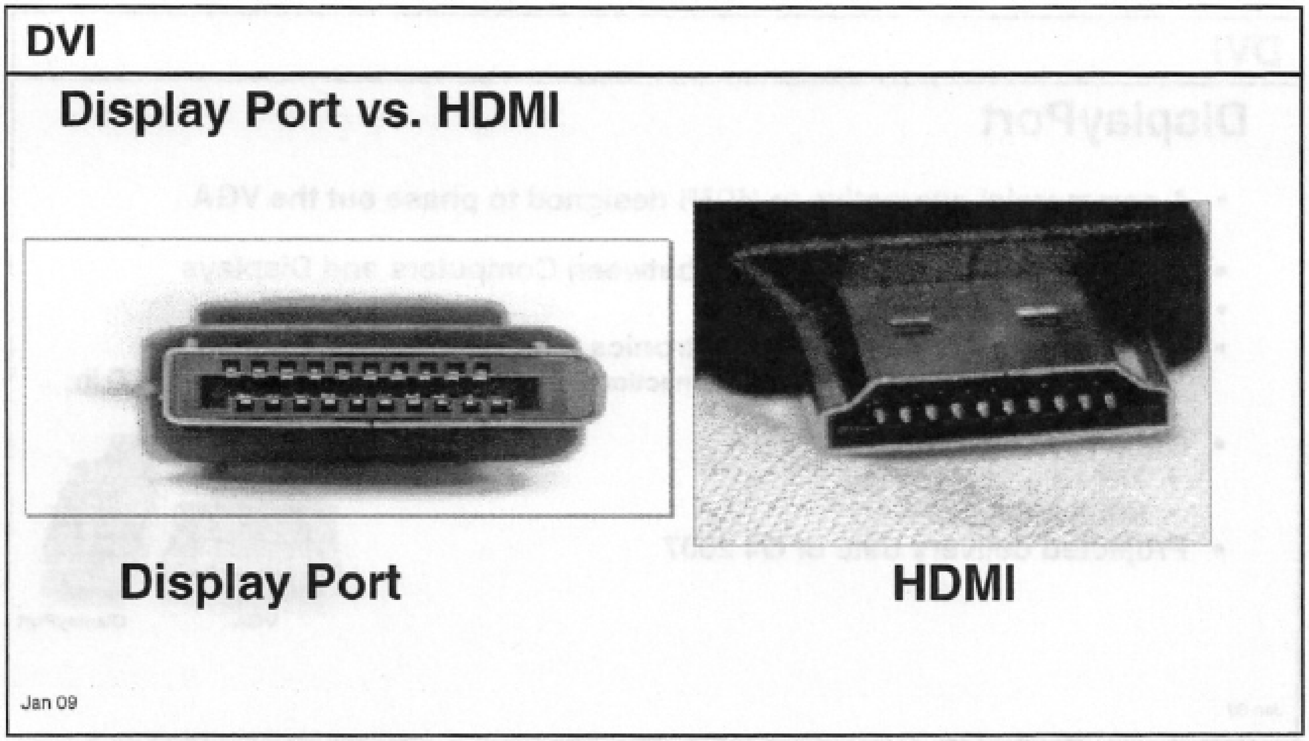

Type A
Full Size
HDMI
Type
C
Mini
Type
D
Micro

Different Display Port Examples

Display Port

Display Port Mini

Display Port / HDMI Comparison



DVI

Display Port vs. HDMI

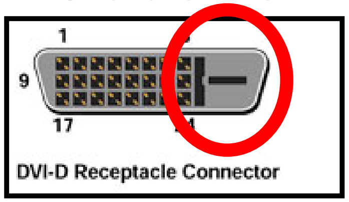
Display Port

HDMI

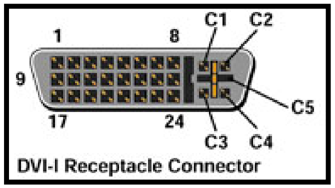
Jan 09

DVI Connector

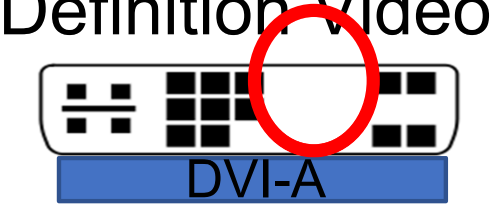
- LFH (low force helix) connector
- DVI-D = 24 pins and a single larger, offset ground bar; carry a digital signal ONLY.
- DVI-I = have 4 extra pins that surround the offset ground bar; carry both digital and analog signals.
- Used for Digital and High Definition Video



DVI-D Receptacle Connector

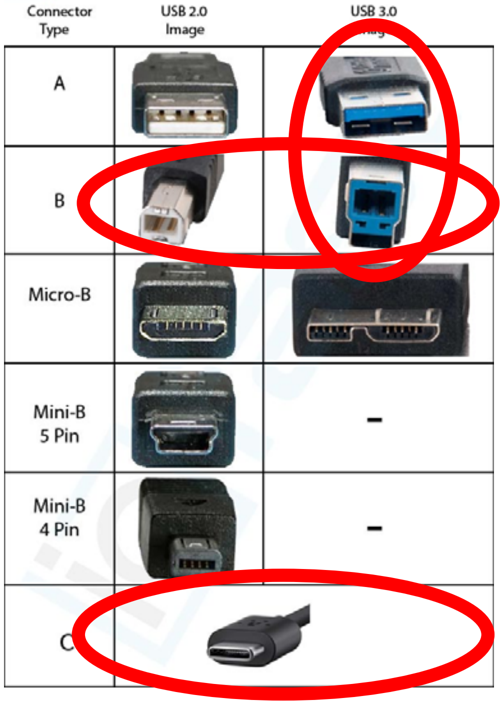


DVI-I Receptacle Connector



DVI-A

Different USB Examples



Connector Type	USB 2.0 Image	USB 3.0 Image
A		
B		
Micro-B		
Mini-B 5 Pin		-
Mini-B 4 Pin		-
C		

Don’t get confused by the connectors!

COMPUTERS

- D-sub (DB)
- HD
- DIN
- BNC
- DVI
- HDMI

VIDEO

- F-type
- HD
- RCA
- BNC
- DIN
- DVI
- HDMI

AUDIO

- RCA
- Plugs
- DIN
- Captive Screw
- Binding Post
- XLR
- HDMI
- F-Type
- Toslink

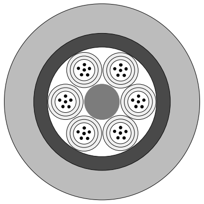
CONNECTORS CONNECT

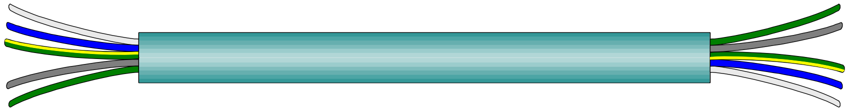
BUT

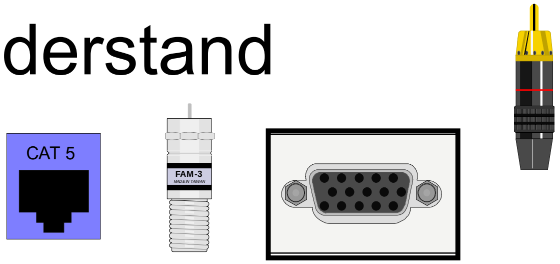
THE REAL CONNECTION IS THE **SIGNAL**

The Physical Connection

- Consists of two major components:
  - Conductors= pieces of wire that carry signals between devices. **$$$$$$**
  - Connectors= mechanical junctions between the conductors and pieces of equipment.
- To properly understand how to connect devices to the AV system you need to understand *CONNECTORS* ***and*** *SIGNALS.*

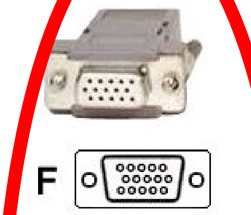




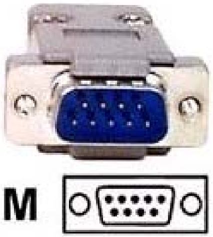


What’s the difference on the connector?

- The Pin Out – the way the conductors are placed in the connectors on each end. The pin out is the “Road Map” for the signal!



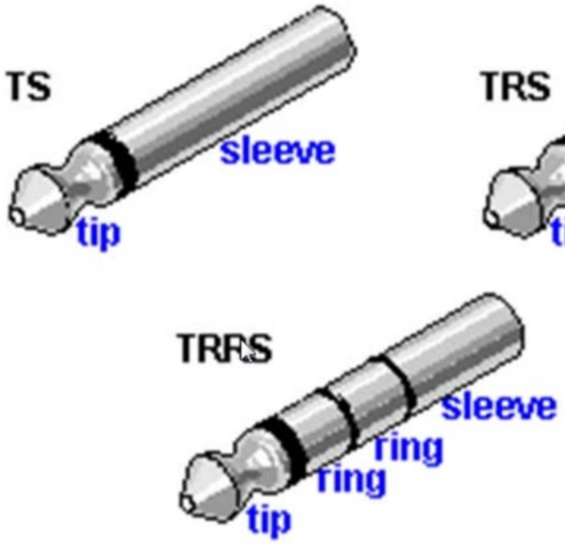
HD15 VGA Plug

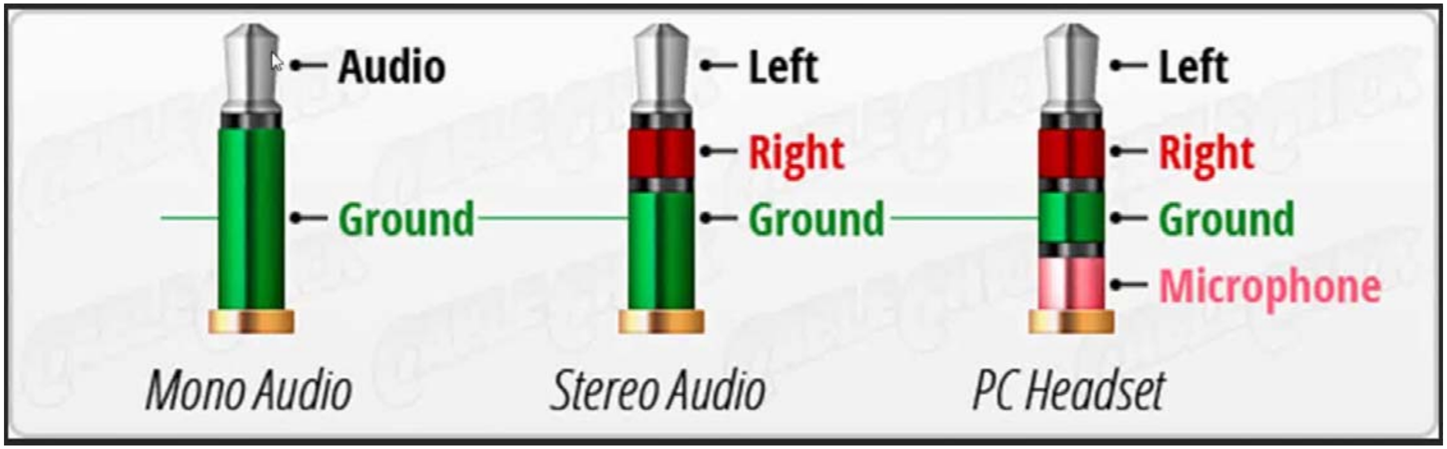


DB9 Serial Plug

- DB9 used for RS232
  - Pin 2 & Pin 3 = TX and RX
  - (go two more) Pin 5 = Ground

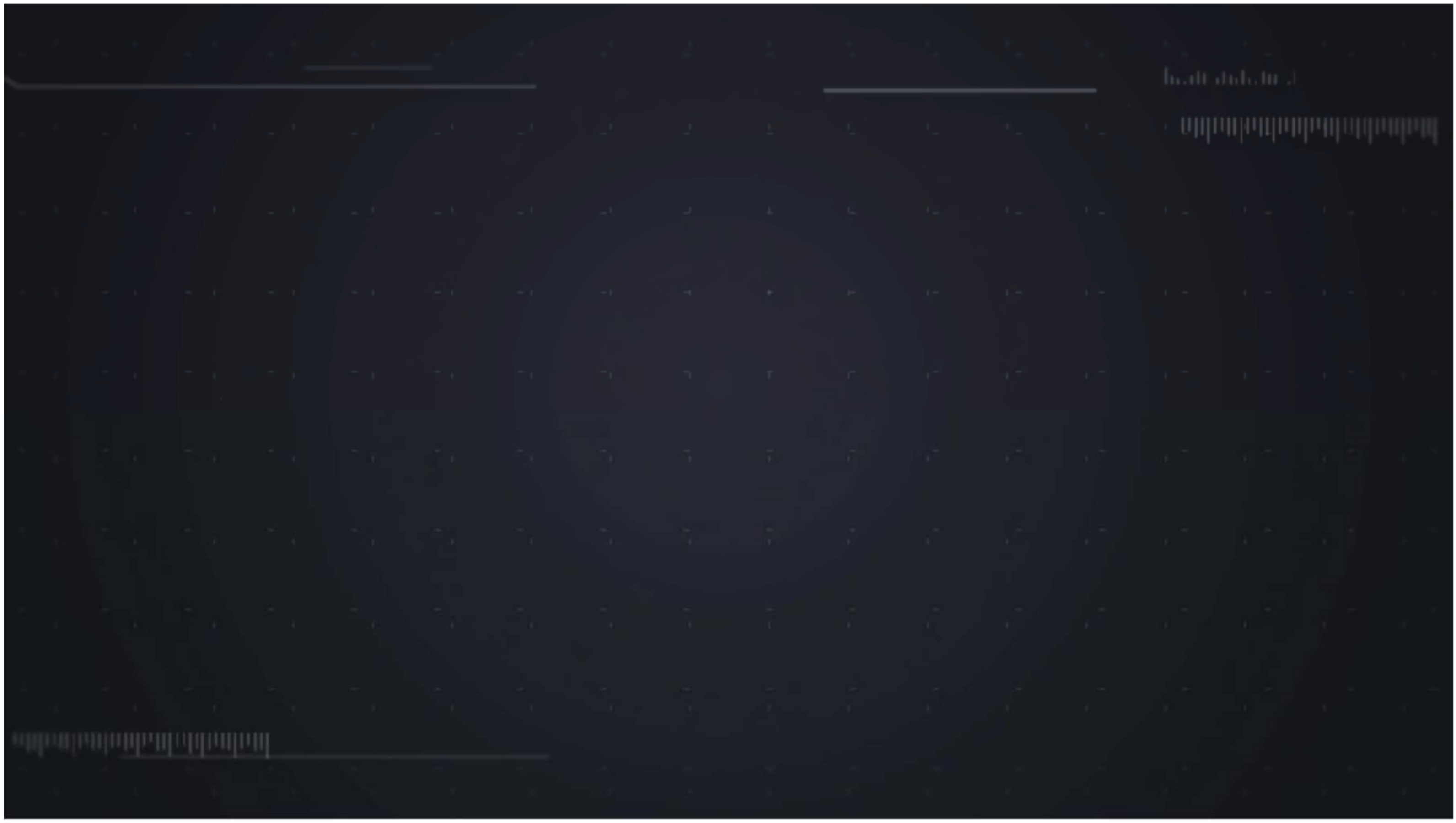
What’s the difference on the connector?


TS
sleeve
tip
TRS
sleeve
ring
tip
TRRS
sleeve
ring
ring
tip


Audio
Ground
Mono Audio
Left
Right
Ground
Stereo Audio
Left
Right
Ground
Microphone
PC Headset

What are the Pin-outs?

- Computer = HD 15
- S-video = 4 pin din
- Consumer Audio plug = 3.5mm
- Instrument/Professional Audio plug = ¼”
- RCA Color codes
  - Yellow, Green & Blue & Red = video
  - White, Red, Black, Orange= audio
- What version digital cable?

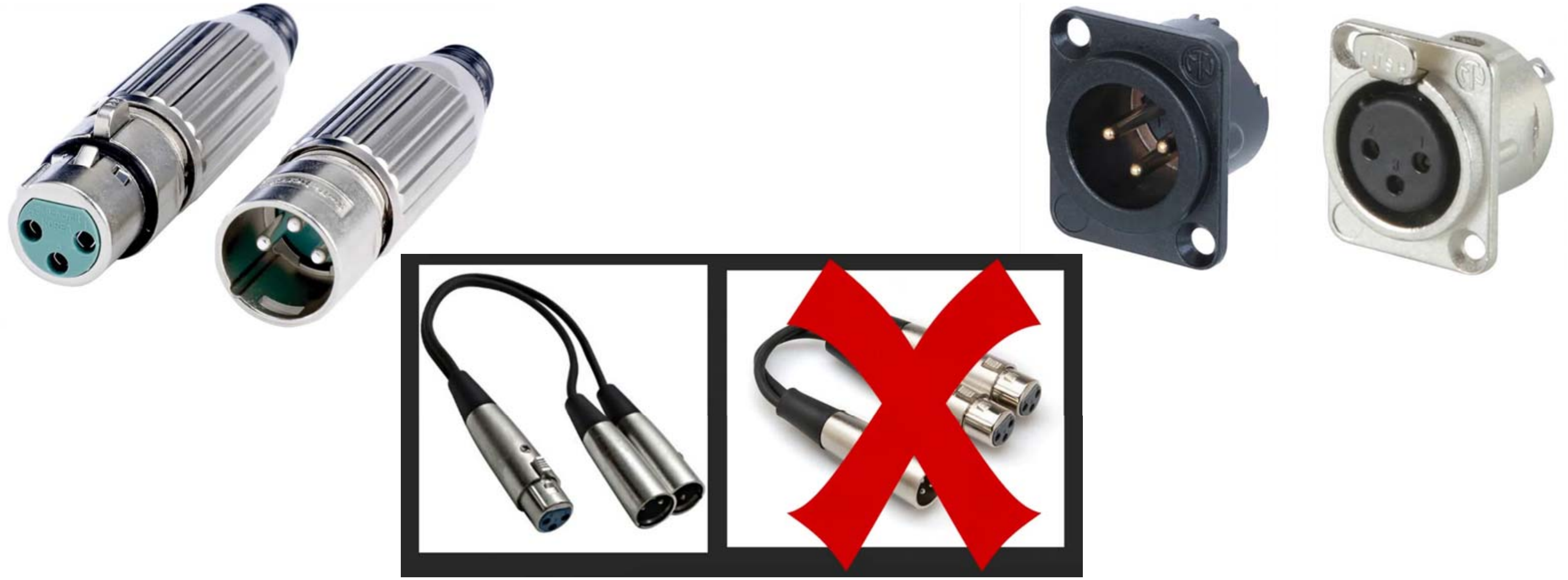


CONNECTORS
CONNECT

BUT

THE REAL
CONNECTION
IS THE
SIGNAL

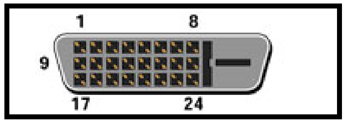
Male vs Female Connectors



Male connectors typically send and female receive.

What else makes the difference?

- Cables are a channel for the signal – WHAT GOES IN COMES OUT!!!!!
- **Cables/Adapters can not change the signal – electronics or special circuitry within a cable can.**
- Examples:
  - DVI signal from a computer is different from DVI signal from a TV.
  - VGA (computer) and component video are different signals.

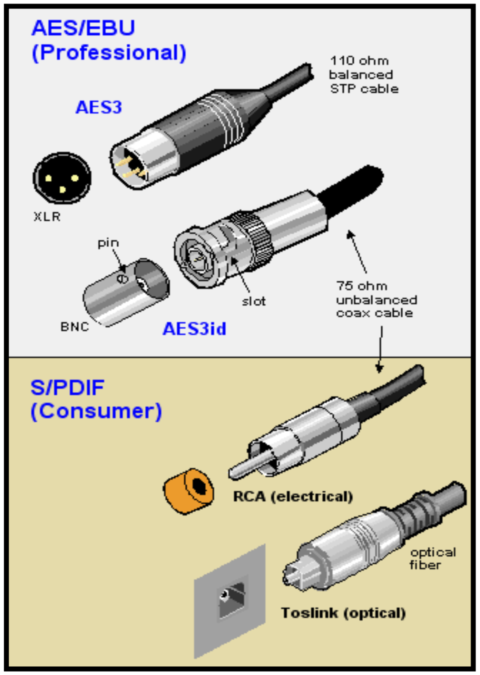


Gender Changers & Adapters

Change pathway at other end?
Useful for coupling

Make sure signal is same!
Make sure pin out is same!

AES/EBU vs. S/PDIF


AES/EBU
(Professional)
AES3
110 ohm
balanced
STP cable
XLR
pin
BNC
slot
AES3id
75 ohm
unbalanced
coax cable
S/PDIF
(Consumer)
RCA (electrical)
optical
fiber
Toslink (optical)

CONNECTORS
CONNECT

BUT

THE REAL
CONNECTION
IS THE
SIGNAL

Which is Correct?

A.

Connectors connect, but the real connection is the signal

B.

You can only connect devices with the same connectors

C.

You can use an adapter anytime to connect devices

D.

You can use any type of HDMI cable

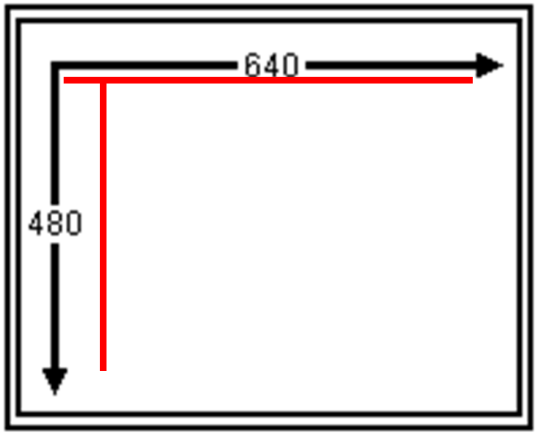
What is in the signal?
VIDEO

- Resolution
- Signal Type – RGB, Component…
- Digital Add Ons

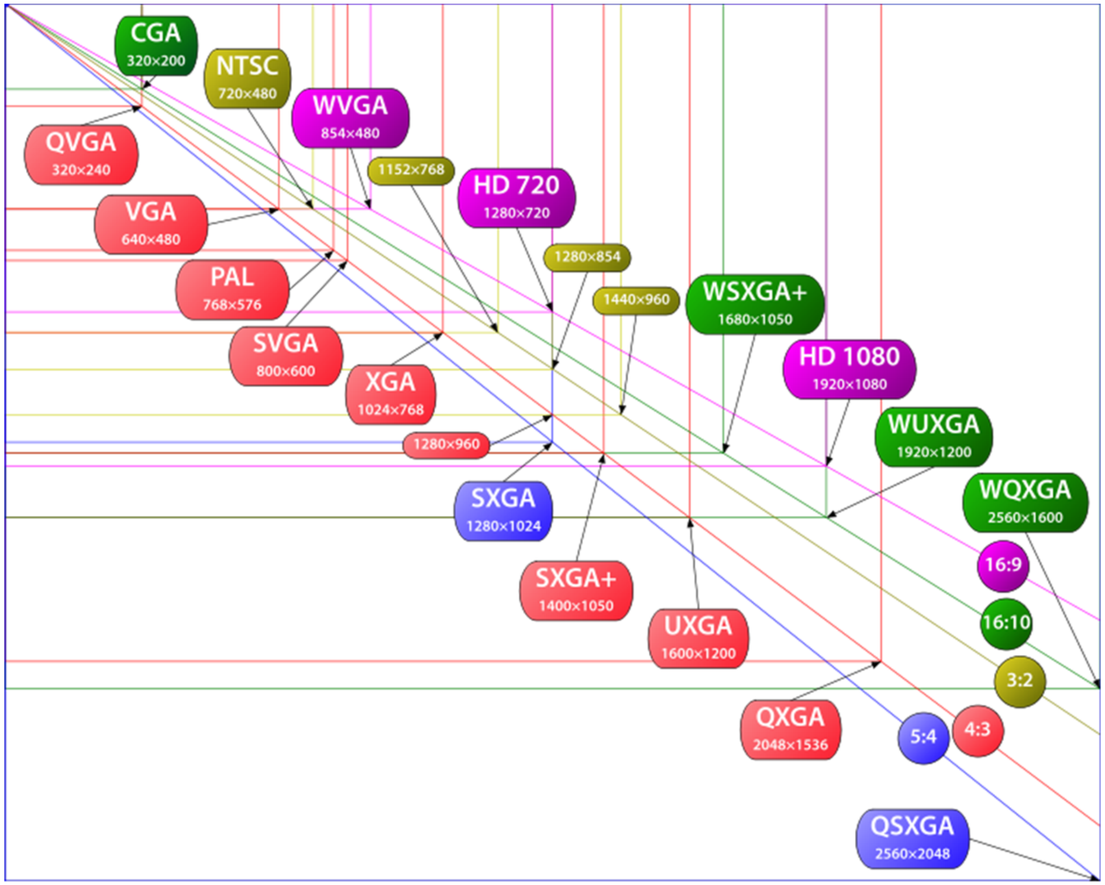
INPUTS
1
CONFIGURABLE
2
3
HDMI
4
5
HDMI
6

What is Resolution?

- Resolution = a measure of a video device's capability to make small dots and lines on a screen.
- Horizontal resolution = number of dots that can fill one line
- Vertical resolution = Number of lines.
- NTSC standard = 480 lines
- HDTV = 720 and 1080 lines
- UHD = 2K, 4K, 8K

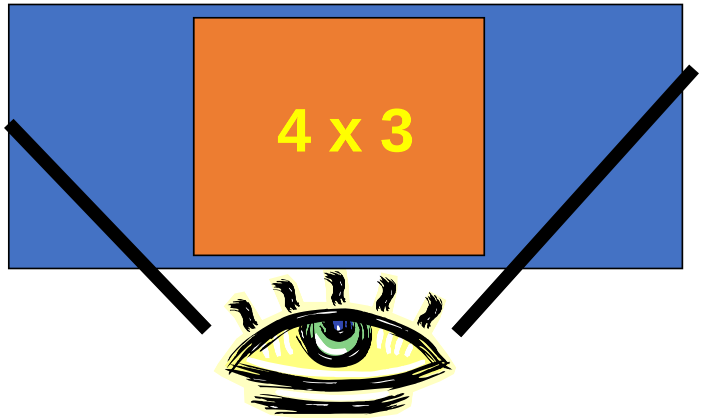


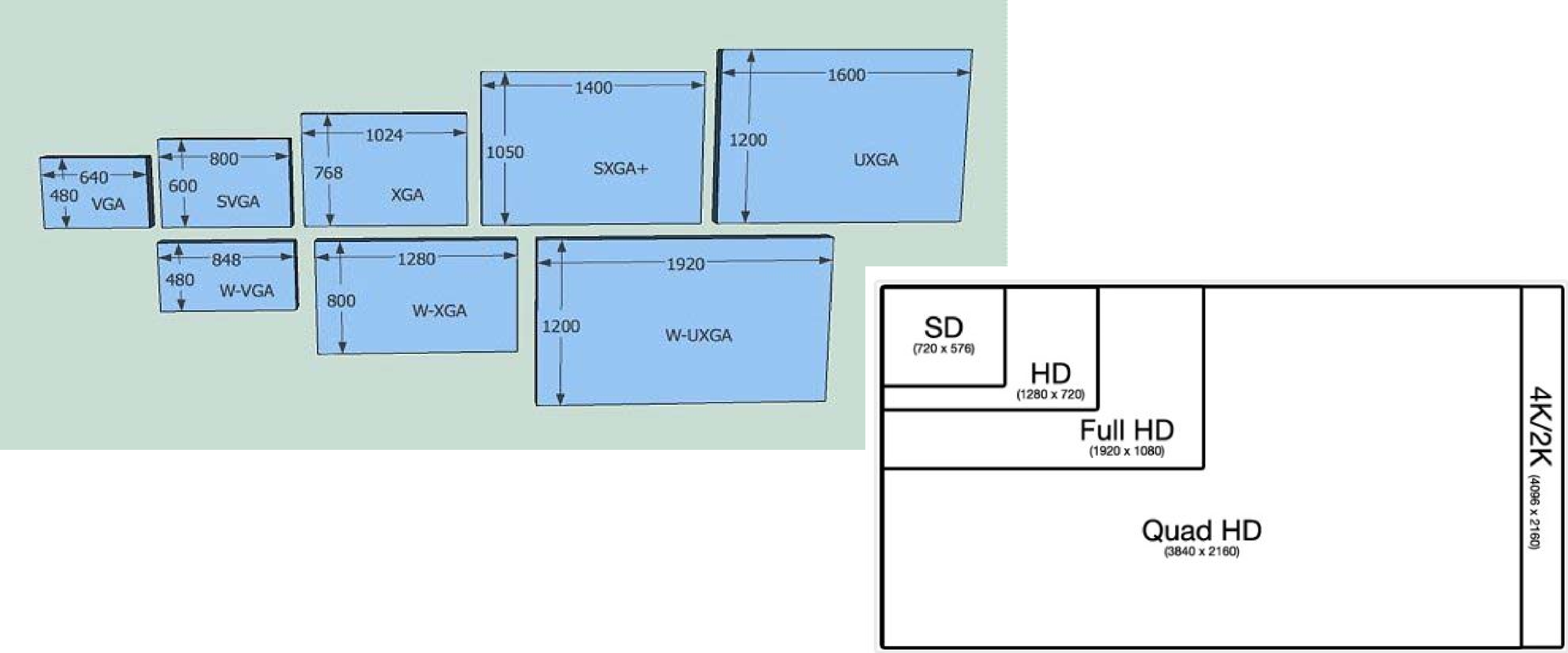
Example Resolutions
640 x 480 VGA
800 x 600 SVGA
1024 x 768 XGA
1600x 1200 UXGA
1920x1080 Full HD

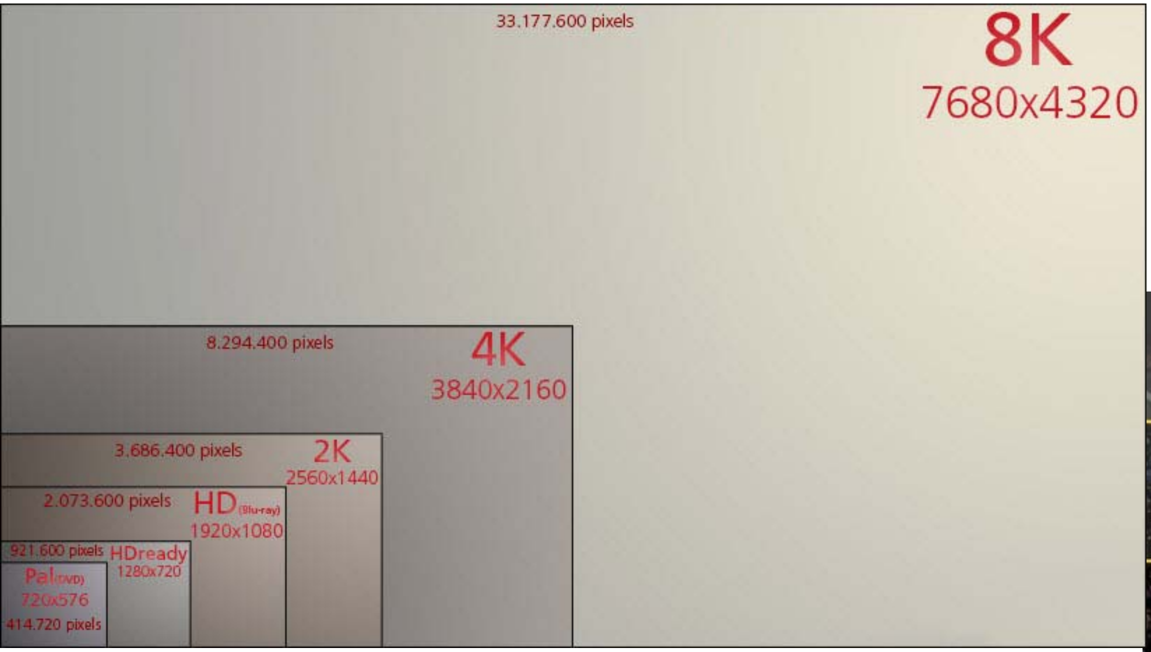

CGA
320×200
NTSC
720×480
WVGA
854×480
QVGA
320×240
1152×768
HD 720
1280×720
VGA
640×480
1280×854
PAL
768×576
1440×960
WSXGA+
1680×1050
SVGA
800×600
XGA
1024×768
HD 1080
1920×1080
WUXGA
1920×1200
1280×960
SXGA
1280×1024
WQXGA
2560×1600
SXGA+
1400×1050
16:9
UXGA
1600×1200
16:10
3:2
QXGA
2048×1536
5:4
4:3
QSXGA
2560×2048

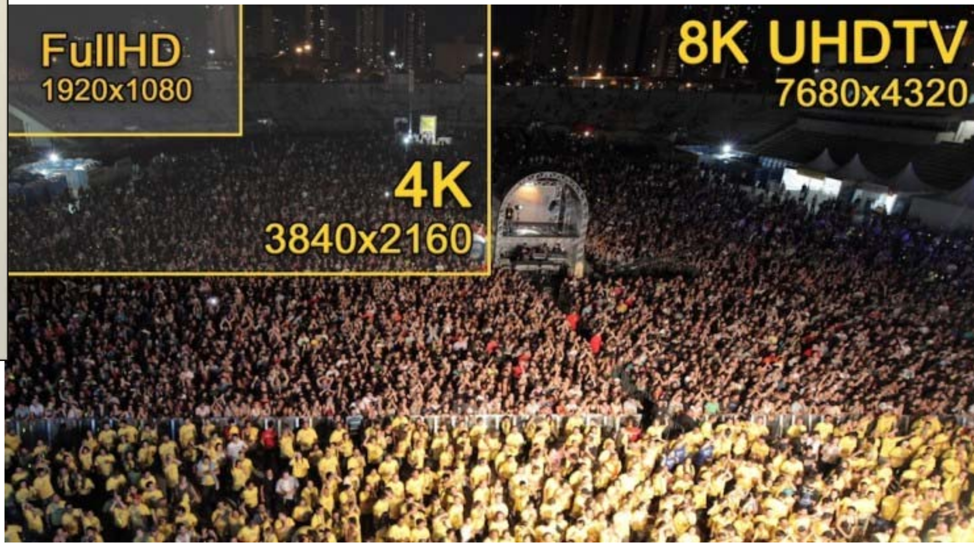
What is High Definition?

- High Definition is wider and fills more of the eyes viewing area.
- High Definition has more pixels.
- High Definition can be both digital and analog.



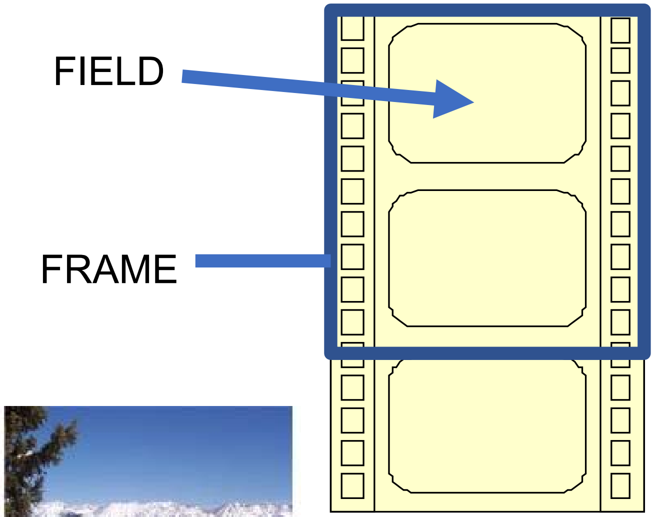

640
480
VGA
800
600
SVGA
1024
768
XGA
1400
1050
SXGA+
1600
1200
UXGA
848
480
W-VGA
1280
800
W-XGA
1920
1200
W-UXGA
SD
(720 x 576)
HD
(1280 x 720)
Full HD
(1920 x 1080)
Quad HD
(3840 x 2160)
4K/2K
(4096 x 2160)

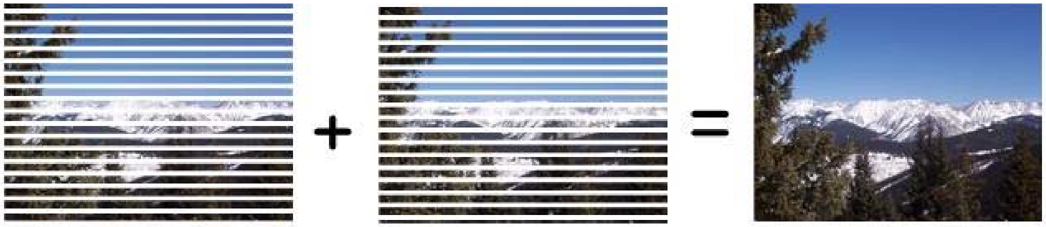

33.177.600 pixels
8K
7680x4320
8.294.400 pixels
4K
3840x2160
3.686.400 pixels
2K
2560x1440
2.073.600 pixels
HD (Blu-ray)
1920x1080
921.600 pixels
HDready
1280x720
Pal (DVD)
720x576
414.720 pixels


FullHD
1920x1080
4K
3840x2160
8K UHDTV
7680x4320

This video was captured in 8K

What is with the “i” and “p”?

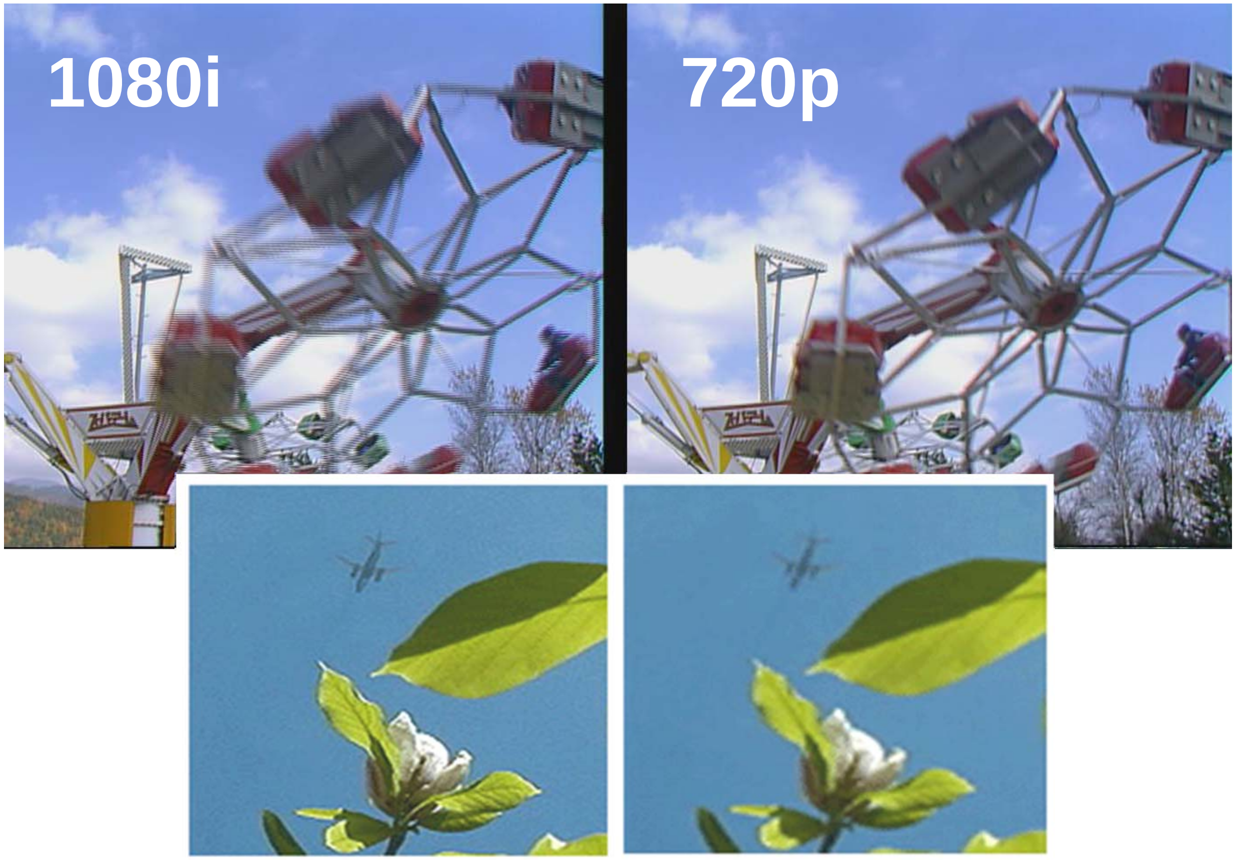




1/60th of a second field

1/60th of a second field

1/30th of a second frame

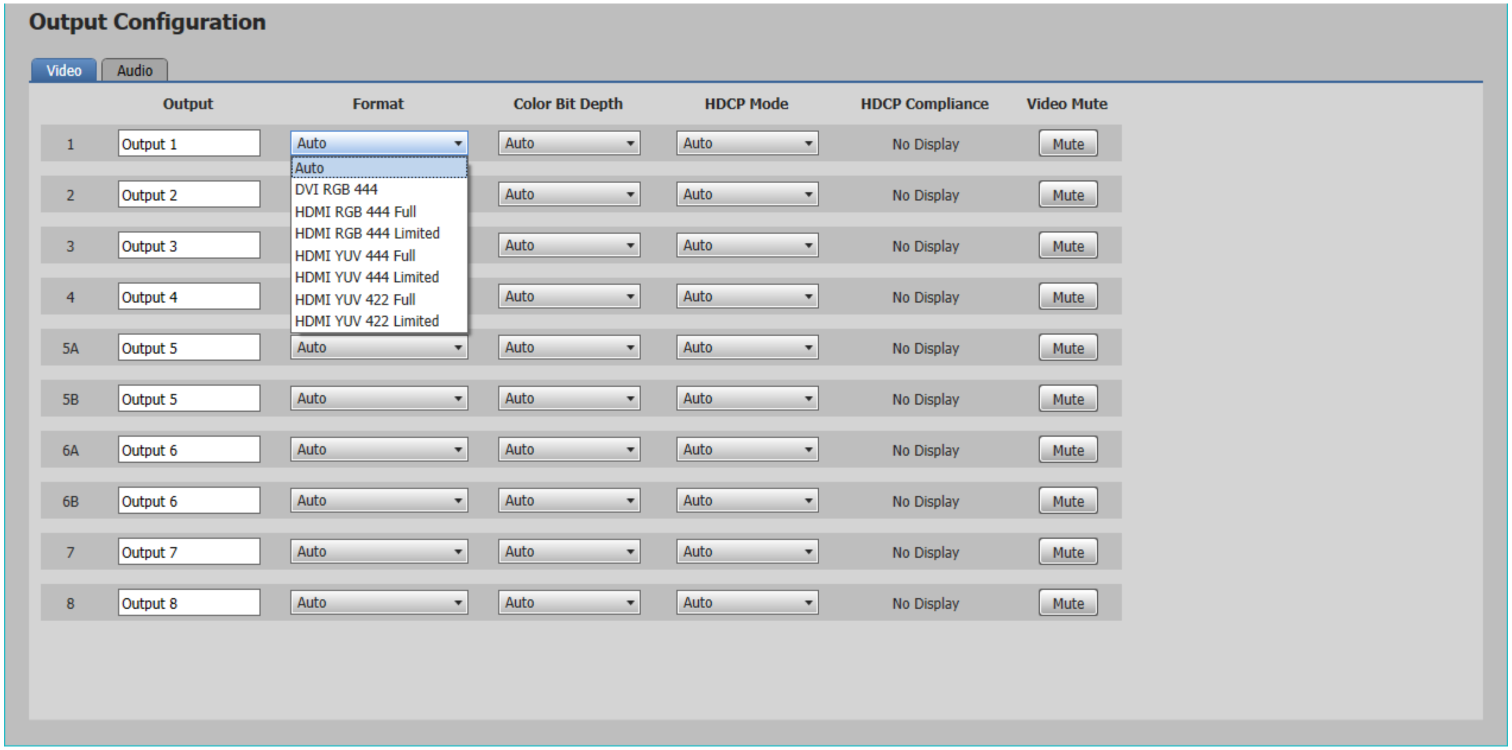


Progressive Scan

Interlaced Video

30Hz vs 60Hz

What is Signal Type?



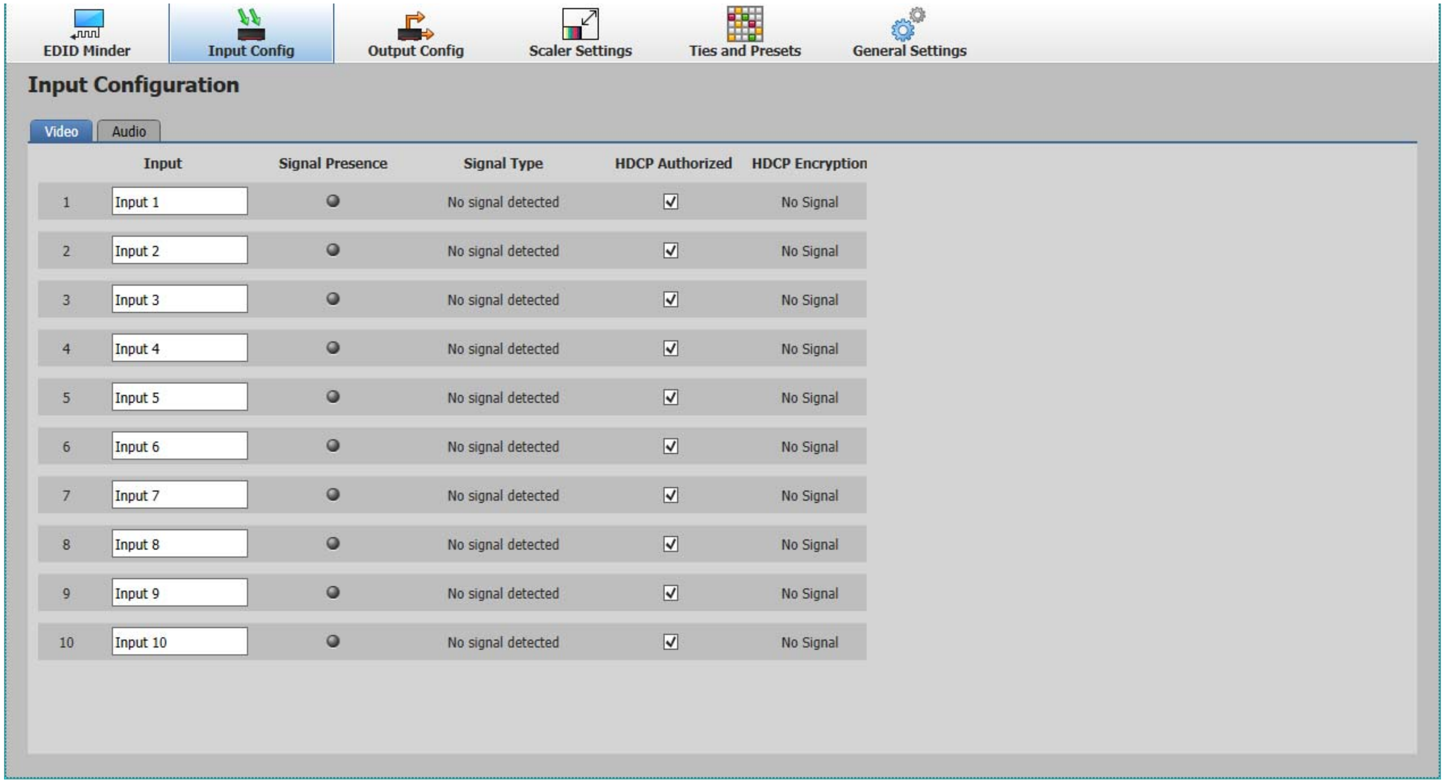
Output Configuration

Video
Audio

	Output	Format	Color Bit Depth	HDCP Mode	HDCP Compliance	Video Mute
1	Output 1	Auto	Auto	Auto	No Display	Mute
2	Output 2		Auto	Auto	No Display	Mute
3	Output 3		Auto	Auto	No Display	Mute
4	Output 4		Auto	Auto	No Display	Mute
5A	Output 5	Auto	Auto	Auto	No Display	Mute
5B	Output 5	Auto	Auto	Auto	No Display	Mute
6A	Output 6	Auto	Auto	Auto	No Display	Mute
6B	Output 6	Auto	Auto	Auto	No Display	Mute
7	Output 7	Auto	Auto	Auto	No Display	Mute
8	Output 8	Auto	Auto	Auto	No Display	Mute

Auto
DVI RGB 444
HDMI RGB 444 Full
HDMI RGB 444 Limited
HDMI YUV 444 Full
HDMI YUV 444 Limited
HDMI YUV 422 Full
HDMI YUV 422 Limited

Digital Add Ons?


EDID Minder
Input Config
Output Config
Scaler Settings
Ties and Presets
General Settings
Video
Audio

Input Configuration

	Input	Signal Presence	Signal Type	HDCP Authorized	HDCP Encryption
1	Input 1	●	No signal detected	☑	No Signal
2	Input 2	●	No signal detected	☑	No Signal
3	Input 3	●	No signal detected	☑	No Signal
4	Input 4	●	No signal detected	☑	No Signal
5	Input 5	●	No signal detected	☑	No Signal
6	Input 6	●	No signal detected	☑	No Signal
7	Input 7	●	No signal detected	☑	No Signal
8	Input 8	●	No signal detected	☑	No Signal
9	Input 9	●	No signal detected	☑	No Signal
10	Input 10	●	No signal detected	☑	No Signal

Which is NOT a component of a Video Signal?

A.
HDCP encryption

B.
Audio and control

C.
Resolution, frames/refresh rate, and color

D.
The cable connector

What About Audio?

Pro Audio cables and connectors - an overview: https://youtu.be/AnU27N3Clsw
Measuring 100V line audio systems: https://youtu.be/2RG2i4FtA2M
How to Choose the Best Speaker Cables: Gauge, Resistance and More: https://youtu.be/r7DdcZCbABo
How To Wire Subwoofers - Parallel vs Series - Single Voice Coil and Dual Voice Coil: https://youtu.be/jryFmICR4qA
How To Test Your Speaker System: https://youtu.be/TCdUL5ZvMHc
THE BEST Multimeter tutorial (HD): https://youtu.be/bF3OyQ3HwfU
Audio Impedance Meter- Testing 70/ 100 volt Speakers: https://youtu.be/NKCN_aK9wgQ
Amplifier to Speaker Matching Tutorial | UniqueSquared.com: https://youtu.be/pUou_noD1Gc
Understanding Sound Reinforcement - Power Amplifiers (Part 1): https://youtu.be/xFRH_1WQw4Y
Understanding Sound Reinforcement - Power Amplifiers (Part 2): https://youtu.be/QS2JXG6QWmQ
Troubleshoot and Eliminate AC Hum on Sound System: https://youtu.be/l4famaQmWnA
Biamp Audio 101 - Wiring & Interconnects: Balanced vs. Unbalanced: https://youtu.be/2uHaQ5OY9ew
Biamp Audio 101 - Gain Structure: Steps for Proper Gain Structure: https://youtu.be/rNbbz9swKto
Biamp Audio 101 - Measurements & the dB: Audio Meters: https://youtu.be/S6cUqud7JiY
SynAudCon: Gain Structure: https://youtu.be/lel8FZ4wLf8
What does bridge on an amplifier mean: https://youtu.be/cwXGd4bI-f0
Wiring Speakers and determine ohms: https://www.kicker.com/app/misc/support/tech/tech_papers/docs/SeriesAndParallelSpeakerWiring.pdf

What About Audio?

Pre-Process

–Mic = -60 dBV (0.001 volt) to -40 dBV (0.010 volt)

–Instrument = -20dBu

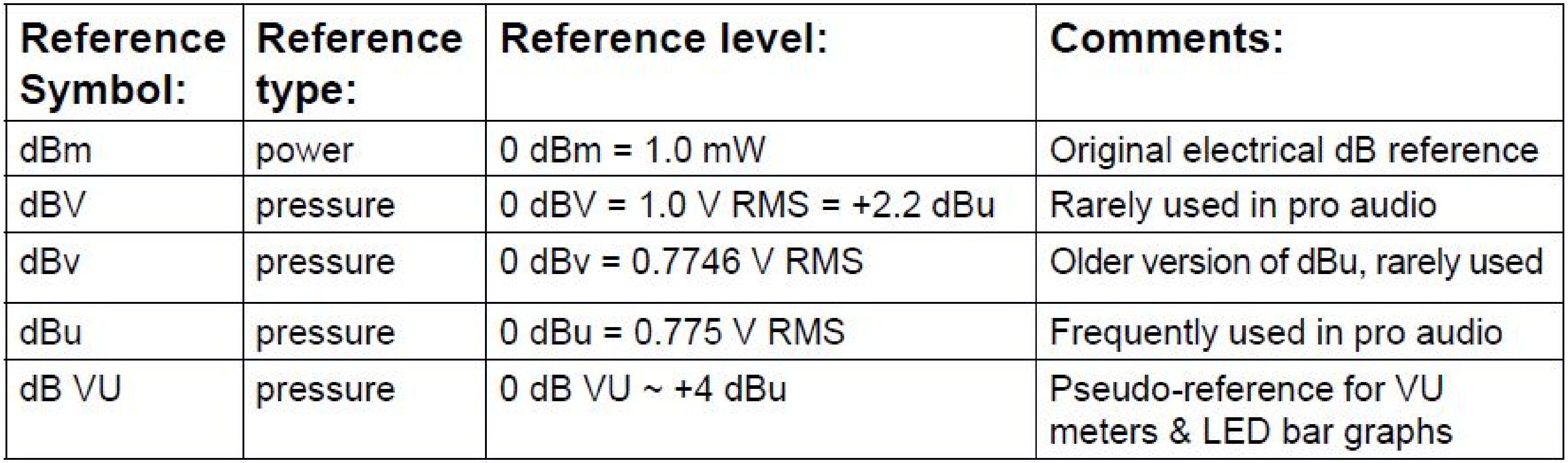
–Pro Line = +4dBu (1.25V)

–Consumer Line “Aux” = -10 dBV (0.300 volt)

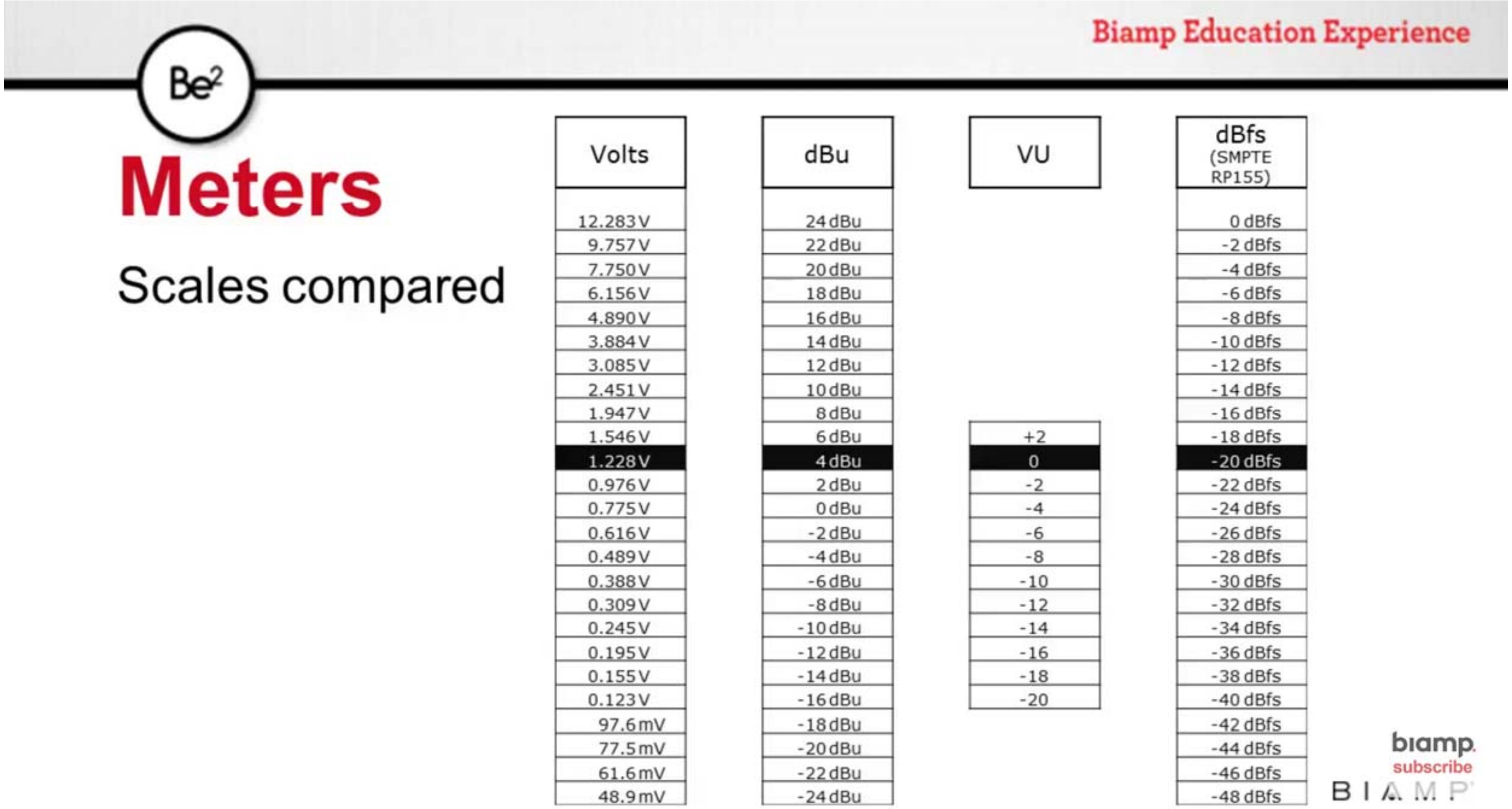
After Process

–Speaker = 25v or 70v or 4/8ohm

Electrical dB reference chart:



Reference Symbol:	Reference type:	Reference level:	Comments:
dBm	power	0 dBm = 1.0 mW	Original electrical dB reference
dBV	pressure	0 dBV = 1.0 V RMS = +2.2 dBu	Rarely used in pro audio
dBv	pressure	0 dBv = 0.7746 V RMS	Older version of dBu, rarely used
dBu	pressure	0 dBu = 0.775 V RMS	Frequently used in pro audio
dB VU	pressure	0 dB VU ~ +4 dBu	Pseudo-reference for VU meters & LED bar graphs



Biamp Education Experience

Be²

Meters

Scales compared

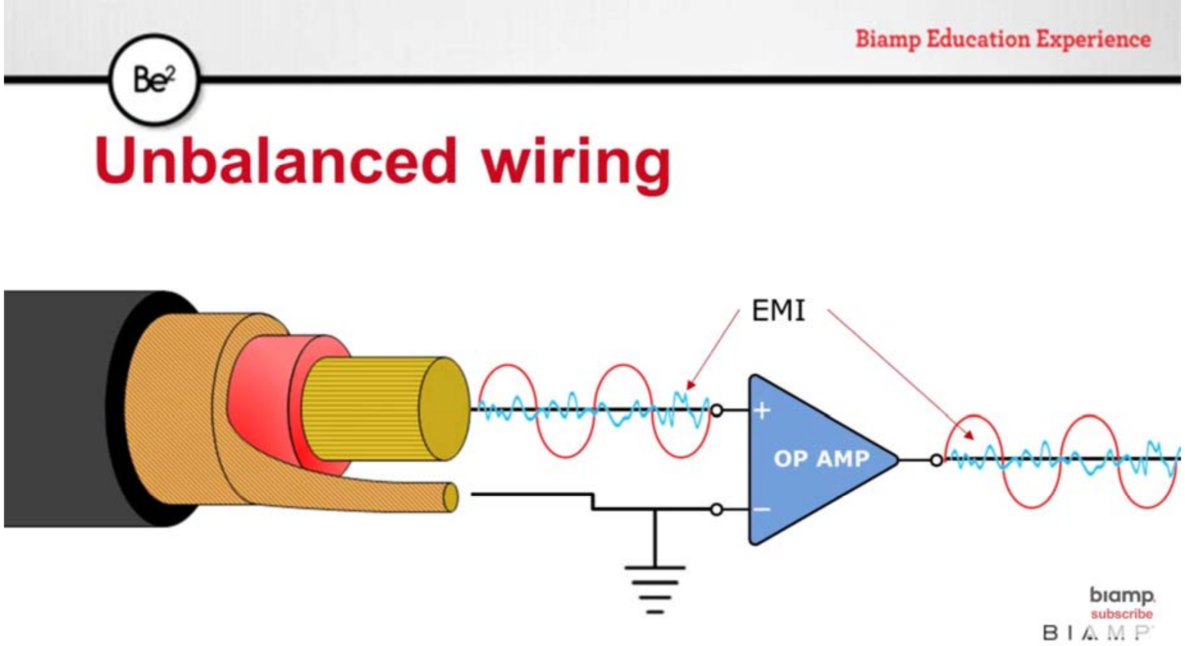
Volts	dBu	VU	dBfs (SMPTE RP155)
12.283 V	24 dBu		0 dBfs
9.757 V	22 dBu		-2 dBfs
7.750 V	20 dBu		-4 dBfs
6.156 V	18 dBu		-6 dBfs
4.890 V	16 dBu		-8 dBfs
3.884 V	14 dBu		-10 dBfs
3.085 V	12 dBu		-12 dBfs
2.451 V	10 dBu		-14 dBfs
1.947 V	8 dBu		-16 dBfs
1.546 V	6 dBu	+2	-18 dBfs
1.228 V	**4 dBu**	**0**	**-20 dBfs**
0.976 V	2 dBu	-2	-22 dBfs
0.775 V	0 dBu	-4	-24 dBfs
0.616 V	-2 dBu	-6	-26 dBfs
0.489 V	-4 dBu	-8	-28 dBfs
0.388 V	-6 dBu	-10	-30 dBfs
0.309 V	-8 dBu	-12	-32 dBfs
0.245 V	-10 dBu	-14	-34 dBfs
0.195 V	-12 dBu	-16	-36 dBfs
0.155 V	-14 dBu	-18	-38 dBfs
0.123 V	-16 dBu	-20	-40 dBfs
97.6 mV	-18 dBu		-42 dBfs
77.5 mV	-20 dBu		-44 dBfs
61.6 mV	-22 dBu		-46 dBfs
48.9 mV	-24 dBu		-48 dBfs

biamp.
subscribe
BIAMP

“Unity Gain”

What About Audio?

Balanced vs Unbalanced



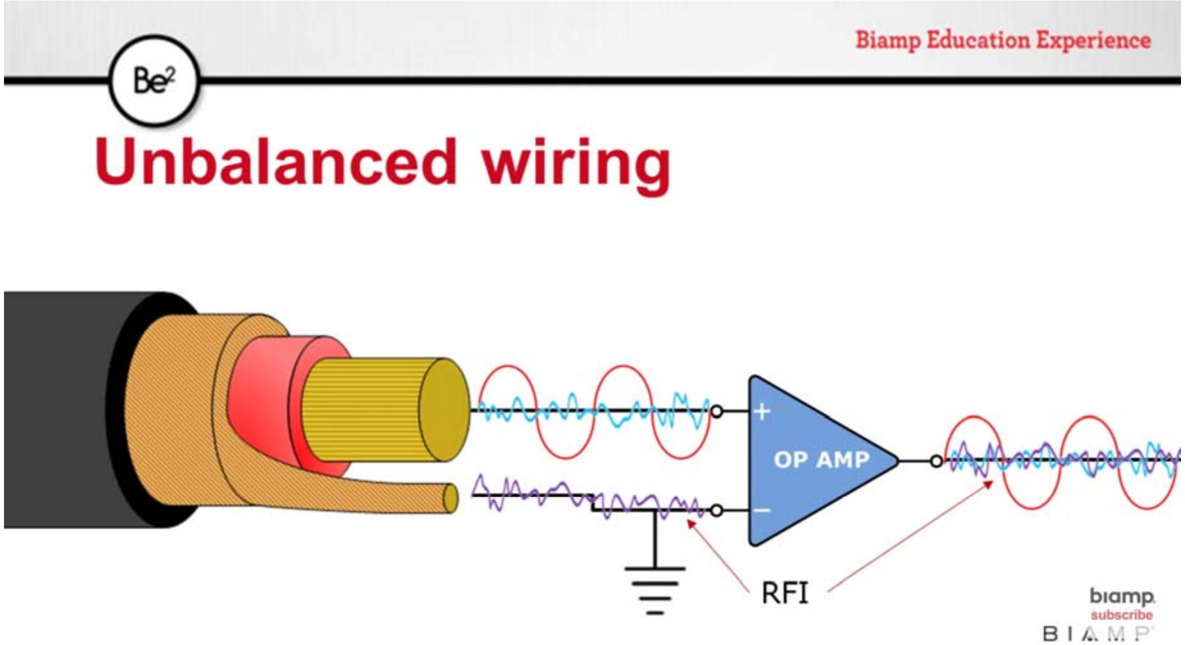
Biamp Education Experience

Unbalanced wiring

Be²
EMI
+
OP AMP
−
biamp.
subscribe
BIAMP

What About Audio?

Balanced vs Unbalanced



Biamp Education Experience

Unbalanced wiring

Be²
+
OP AMP
−
RFI
biamp.
subscribe
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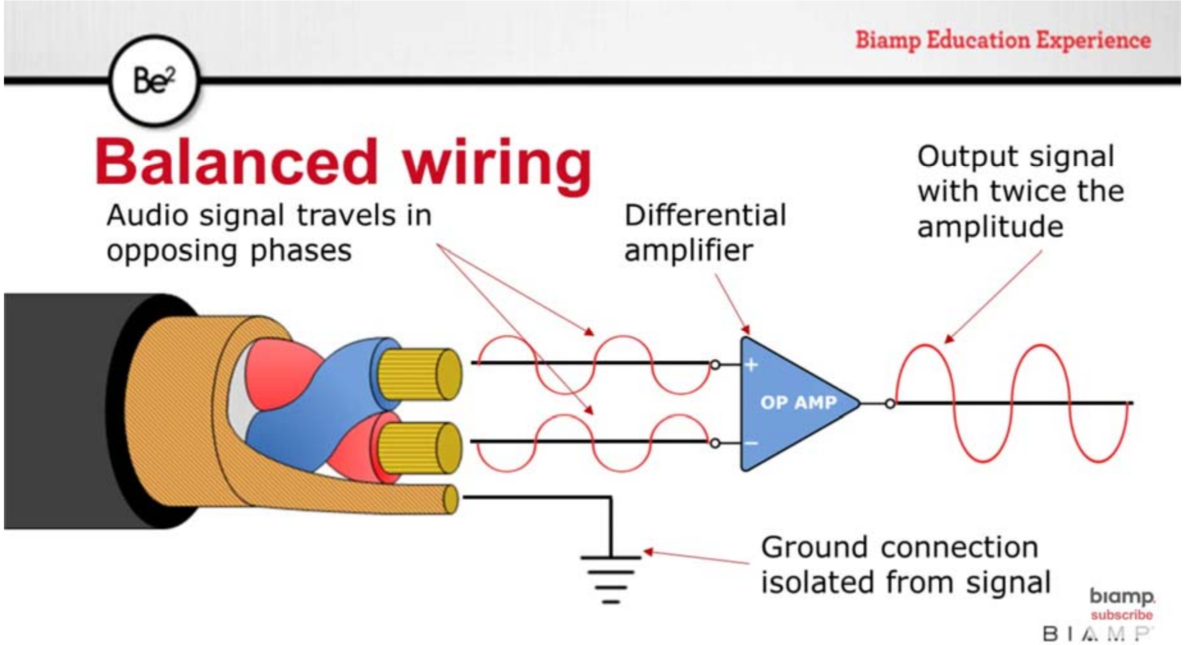
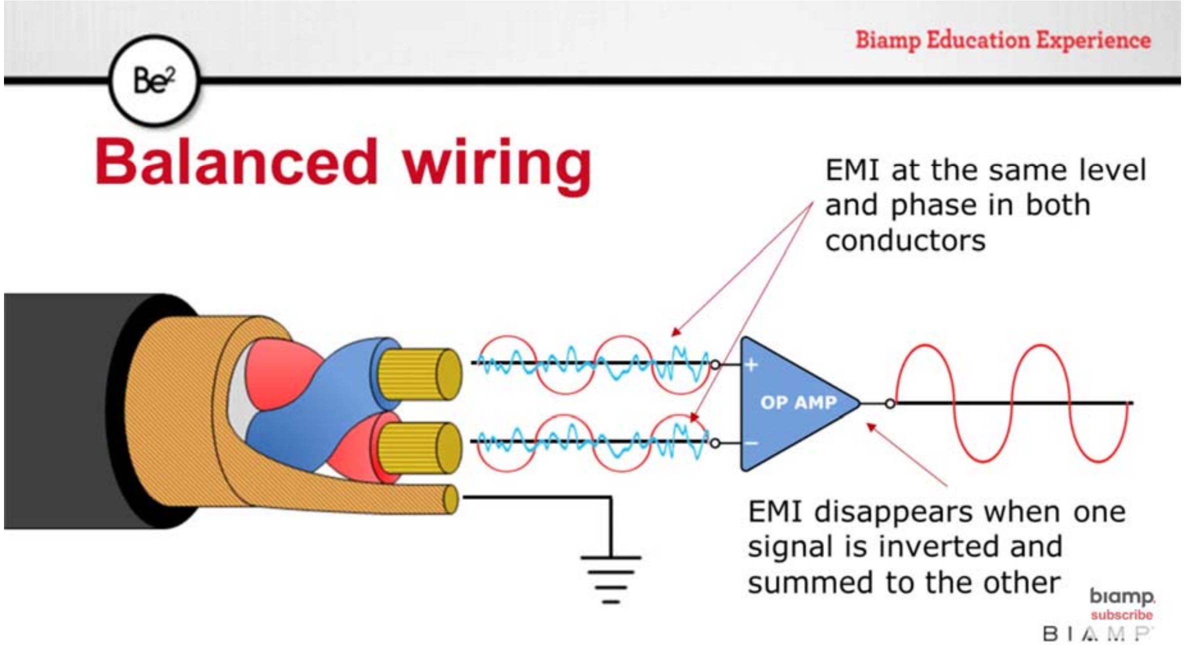
What About Audio?

Balanced vs Unbalanced


Biamp Education Experience
Be²
Balanced wiring
Audio signal travels in opposing phases
Differential amplifier
Output signal with twice the amplitude
+
OP AMP
–
Ground connection isolated from signal
biamp.
subscribe
BIAMP

What About Audio?

Balanced vs Unbalanced


Biamp Education Experience

Balanced wiring

EMI at the same level and phase in both conductors

EMI disappears when one signal is inverted and summed to the other

Be²
+
OP AMP
−
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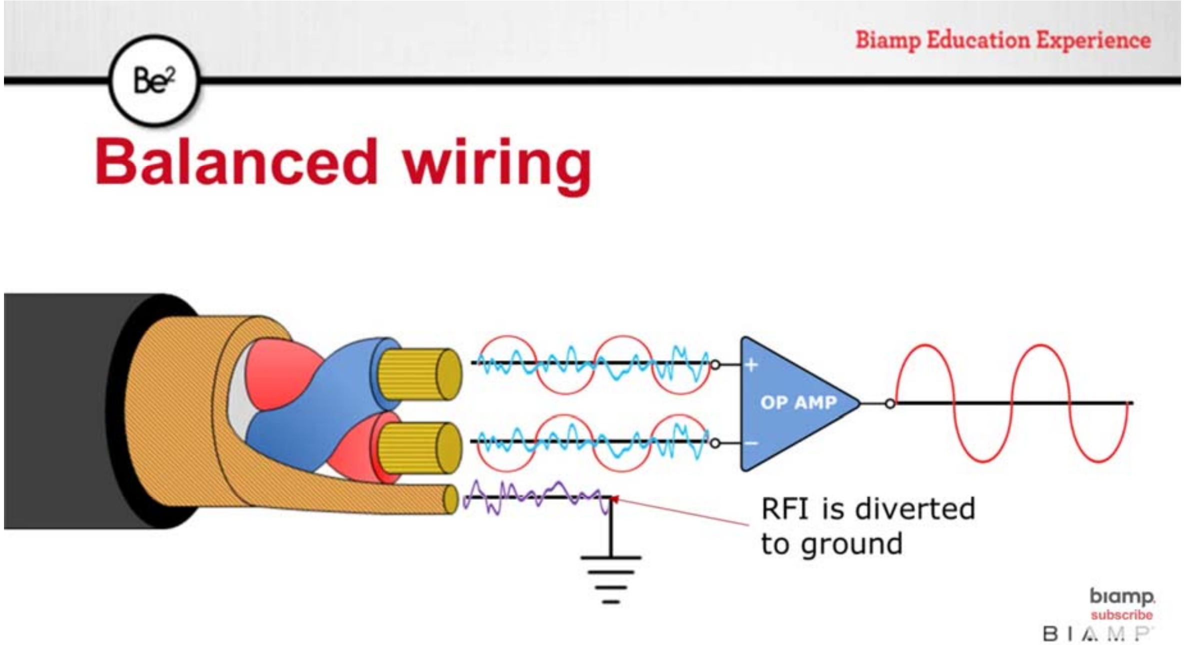
BIAMP

What About Audio?

Balanced vs Unbalanced



Biamp Education Experience
Be2

Balanced wiring

+
OP AMP
–

RFI is diverted to ground

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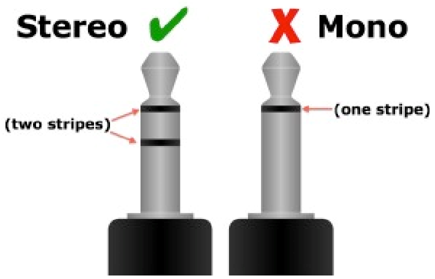
BIAMP

What About Audio?

Mono vs Stereo


Stereo ✓
X Mono
(two stripes)
(one stripe)

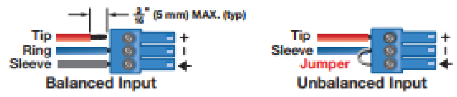

3/16" (5 mm) MAX. (typ)
Tip
Ring
Sleeve
Balanced Input
Tip
Sleeve
Jumper
Unbalanced Input

Figure 4. 3-pole Audio Input Wiring

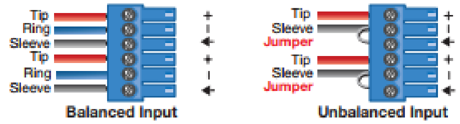

Tip
Ring
Sleeve
Tip
Ring
Sleeve
Balanced Input
Tip
Sleeve
Jumper
Tip
Sleeve
Jumper
Unbalanced Input

Figure 5. 6-pole Audio Input Wiring

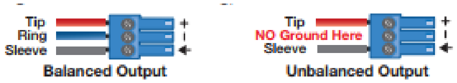

Tip
Ring
Sleeve
Balanced Output
Tip
NO Ground Here
Sleeve
Unbalanced Output

Figure 6. 3-pole Audio Output Wiring

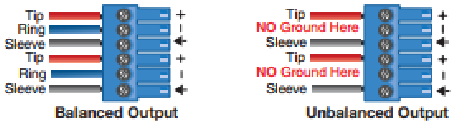
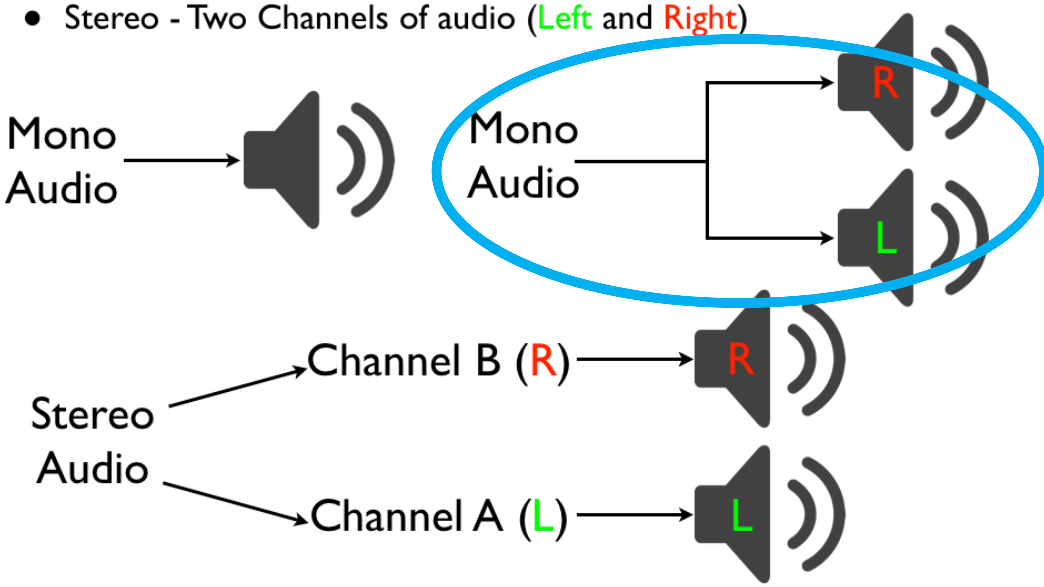

Tip
Ring
Sleeve
Tip
Ring
Sleeve
Balanced Output
Tip
NO Ground Here
Sleeve
Tip
NO Ground Here
Sleeve
Unbalanced Output

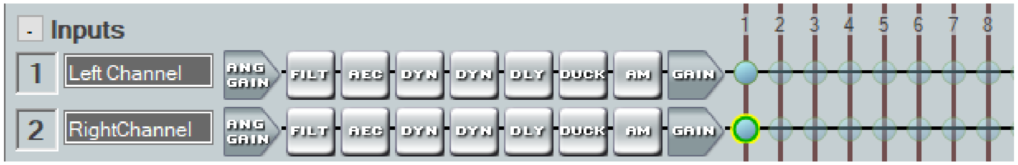
Figure 7. 6-pole Audio Output Wiring

- Mono - One single Chanel of Audio
- Stereo - Two Channels of audio (Left and Right)


Mono Audio
Mono Audio
R
L
Stereo Audio
Channel B (R)
Channel A (L)
R
L

What About Audio?

Mono vs Stereo


- Inputs
1 2 3 4 5 6 7 8
ANG GAIN
FILT
AEC
DYN
DYN
DLY
DUCK
AM
GAIN

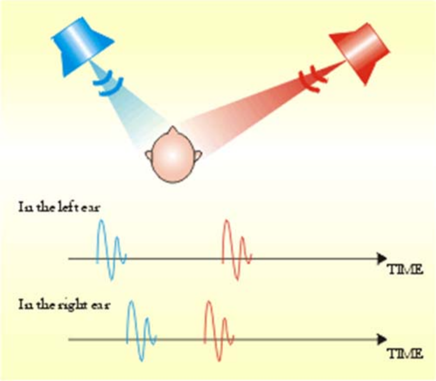
1 Left Channel

2 RightChannel

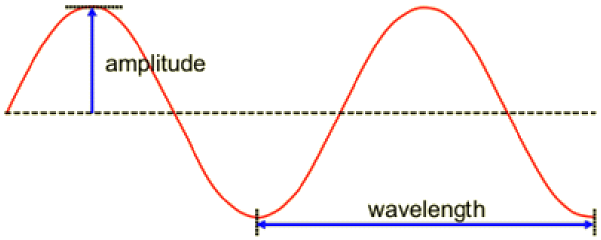
When mixing stereo to mono, attenuate both channels by -6dB to the output bus and the sum will be at the same 0 dB as both input channels

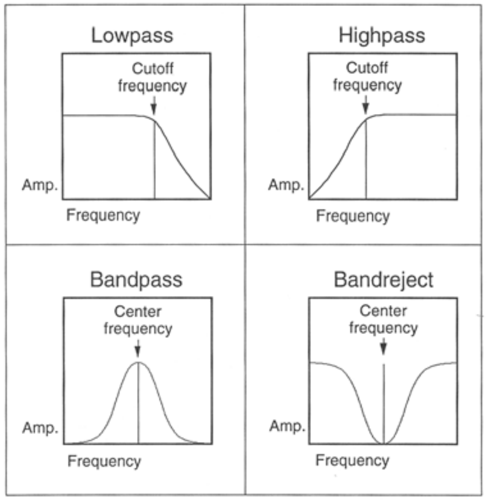
What About Audio?

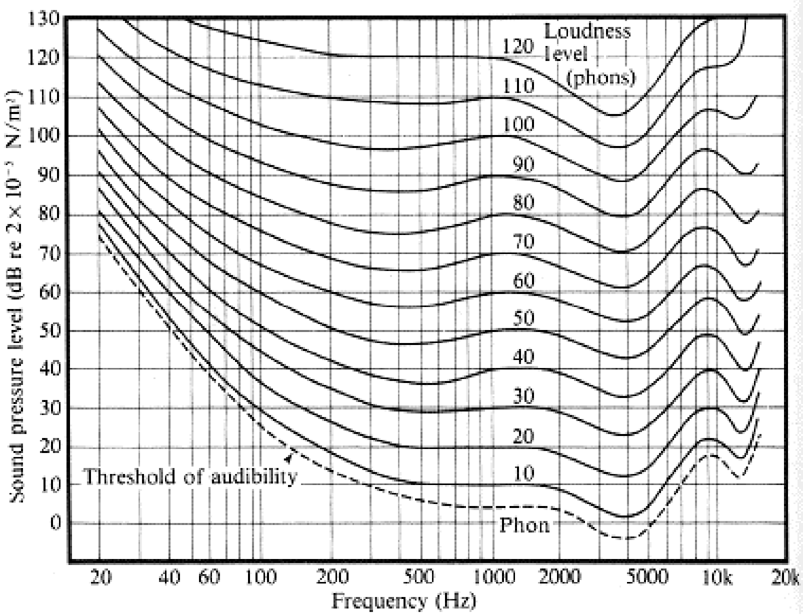
Frequency, Loudness, and Timing


In the left ear
TIME
In the right ear
TIME

1-35 ms


amplitude
wavelength


Lowpass
Cutoff frequency
Amp.
Frequency
Highpass
Cutoff frequency
Amp.
Frequency
Bandpass
Center frequency
Amp.
Frequency
Bandreject
Center frequency
Amp.
Frequency



Which is NOT a component of an Audio Signal?

A.
Voltage / Level

B.
Balanced vs Unbalanced

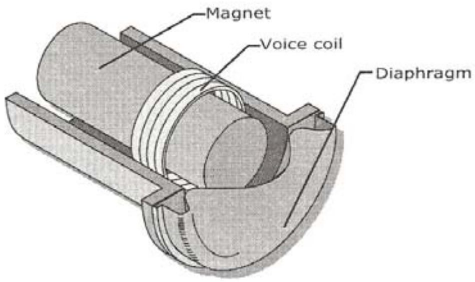
C.
The cable connector

D.
Frequency and timing

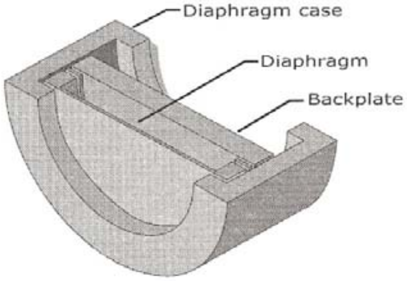
Microphones for Applications

- Handheld
- Shotgun - Theatre
- Parabolic – Sporting events
- Lavalier – Attach to clothing
- Contact pickup – Musical instruments
- Pressure response – Lay on flat surface
- Boundary – Set on Table for meeting
- Ceiling – Theater or Conference Room

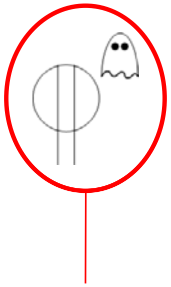
- Two common types of microphones are…
  - Dynamic Microphones


Magnet
Voice coil
Diaphragm

  - Condenser Microphones

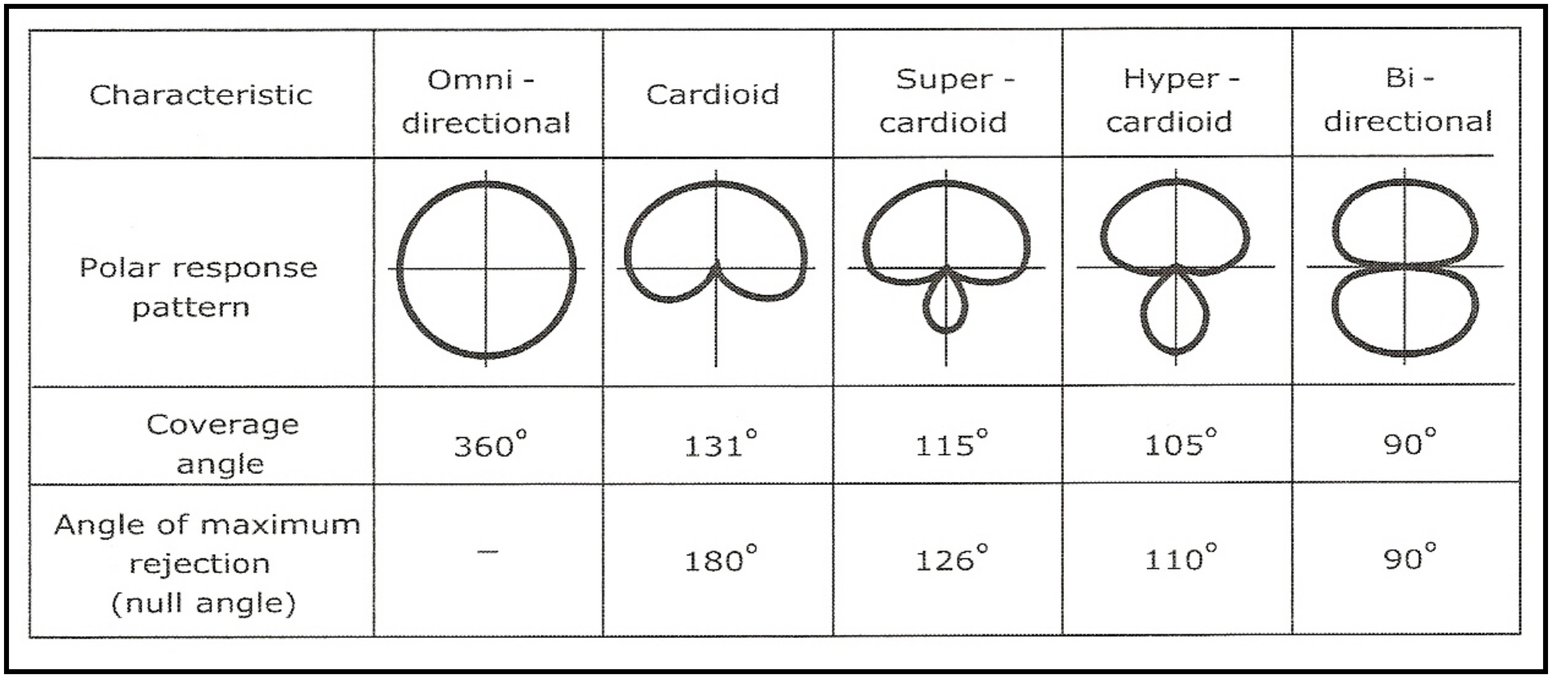

Diaphragm case
Diaphragm
Backplate

(Requires phantom power)



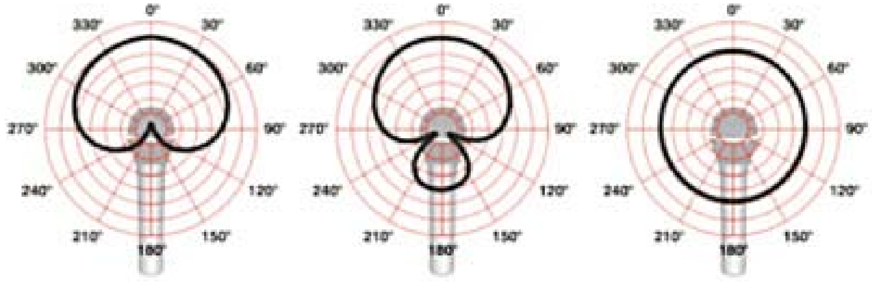
Phantom
Power

Microphone Pick Up Patterns



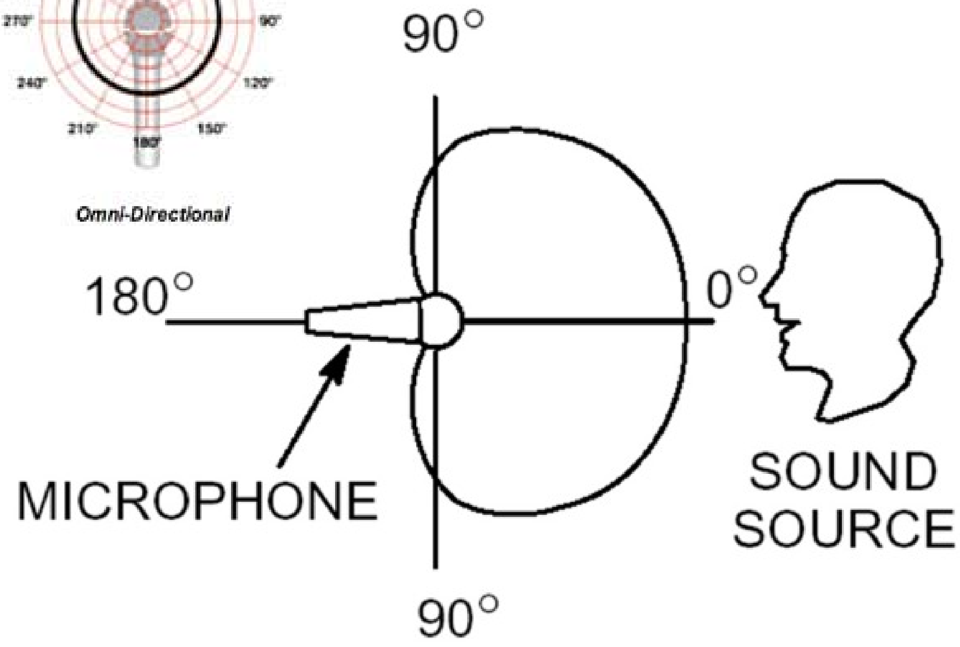
Characteristic	Omni - directional	Cardioid	Super - cardioid	Hyper - cardioid	Bi - directional
Polar response pattern					
Coverage angle	360°	131°	115°	105°	90°
Angle of maximum rejection (null angle)	–	180°	126°	110°	90°

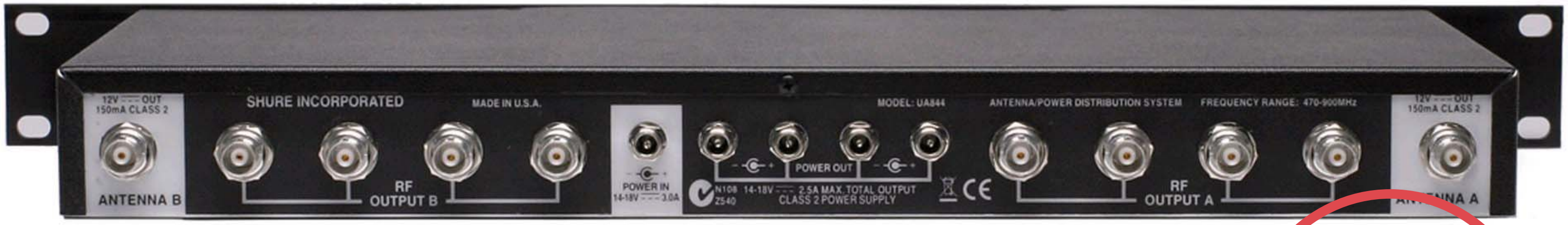
Microphone Pick Up Patterns


0°
30°
60°
90°
120°
150°
180°
210°
240°
270°
300°
330°

Cardioid   *Hyper-Cardioid*   *Omni-Directional*

SHURE.co.uk


90°
180°
0°
MICROPHONE
SOUND SOURCE
90°


12V OUT 150mA CLASS 2
ANTENNA B
SHURE INCORPORATED
MADE IN U.S.A.
RF OUTPUT B
POWER IN 14-18V 3.0A
POWER OUT
N108 14-18V 2.5A MAX. TOTAL OUTPUT CLASS 2 POWER SUPPLY
MODEL: UA844
ANTENNA/POWER DISTRIBUTION SYSTEM
FREQUENCY RANGE: 470-900MHz
RF OUTPUT A
12V OUT 150mA CLASS 2
ANTENNA A

Antenna Distribution

How many channels?

Depends on Frequency!
More money is typically better (features)

- VHF
- UHF
- UWB

Ultra Wide Band

- Ethernet

MXWAPT
SHURE Microflex® Wireless
SHURE MXWANI8
SHURE

Note: Pay attention to “Frequency” with THE MIC also!

Which is NOT a concern with microphones?

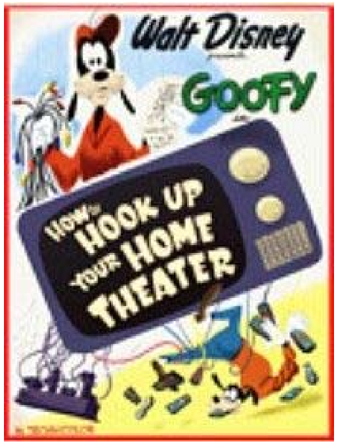
A.
The cable connector

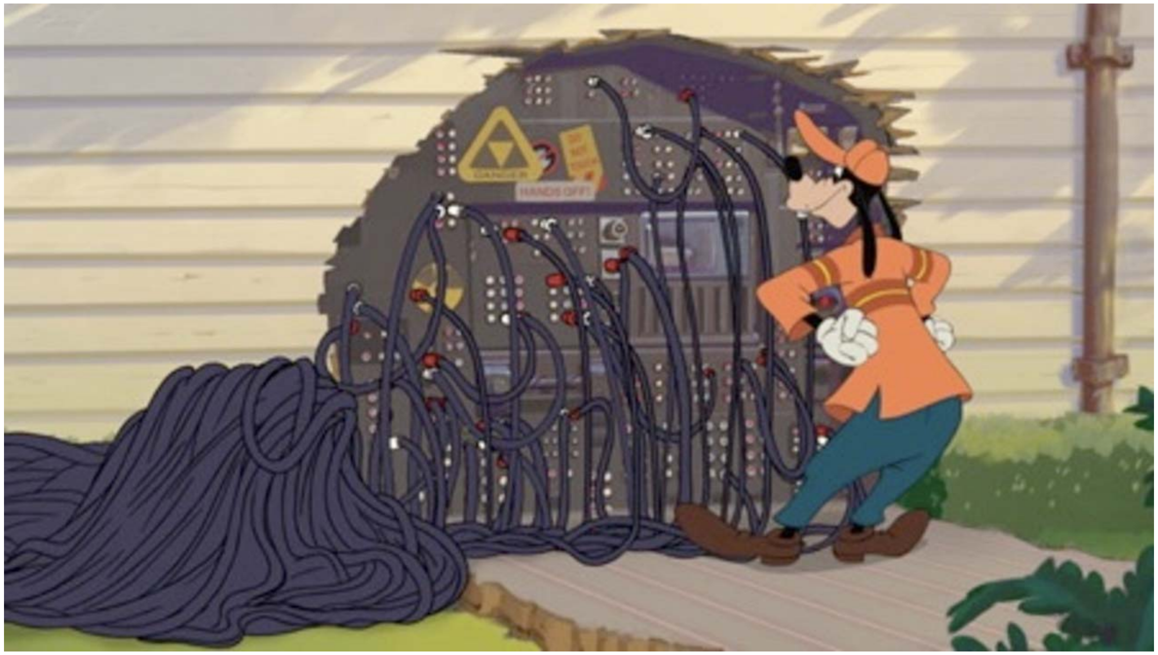
B.
Pick Pattern

C.
Application and power requirements

D.
Frequency, channels, and antennas

Give the User an Input


Walt Disney
GOOFY
HOW TO HOOK UP YOUR HOME THEATER



- Traditional
  - Skill Required
- Plug and Play
  - Not Hard Lid
  - Limited Futureability
- Twisted Pair
  - Solid conductor plugs
  - 2 cables? = 1 UTP/1 STP
  - Pay attention to A vs. B
  - Cat5E better for analog (Skew Free/Low Skew)
  - IF sending video – USE SHIELDED Cat6 or better
  - IP video follows same rules as our data cabling

CAT5A
CAT5B
CAT5A
CAT5B

R
H
G
V
B
INPUT
SPEAKERS
MIC 1
MIC 2

Extron
Extron
RGB 580xi SI AAP

Cable Cubbie

Pre-made and Custom Plates

VGA
AUDIO
- DIGITAL -
VIDEO
R
G
B
Pr
Y
Pb
S-VIDEO
HDMI
COMPUTER
LEFT
VIDEO
RIGHT
AUDIO
LEFT
S-VIDEO
RIGHT

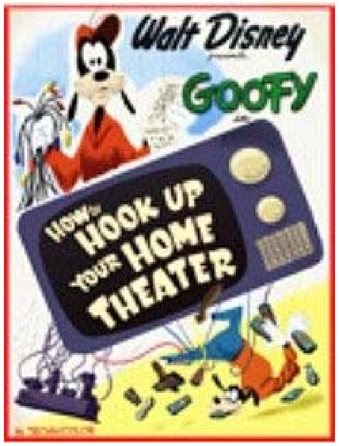
Decora Inputs

Floor Box Inputs

Extron
Extron

AAP Plates

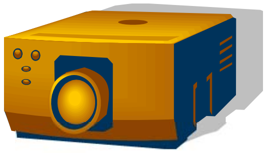
Step 2 – Share


Walt Disney
GOOFY
HOW TO HOOK UP YOUR HOME THEATER

4 Steps of AV

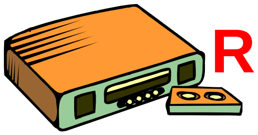
Input Sources

Share It



SEE IT

HEAR IT

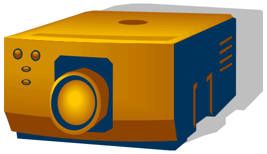


RECORD IT

STREAM IT

4 Steps of AV

Share It



SEE IT

Input Sources

Projector Types

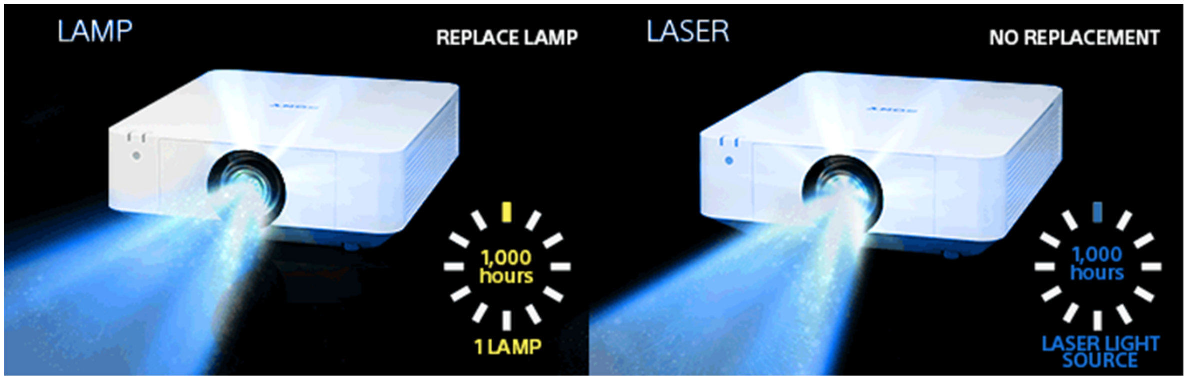
- ✓Pico
- ✓Portable
- ✓Multi-purpose
- ✓Professional \ Large Venue
- ✓Interactive

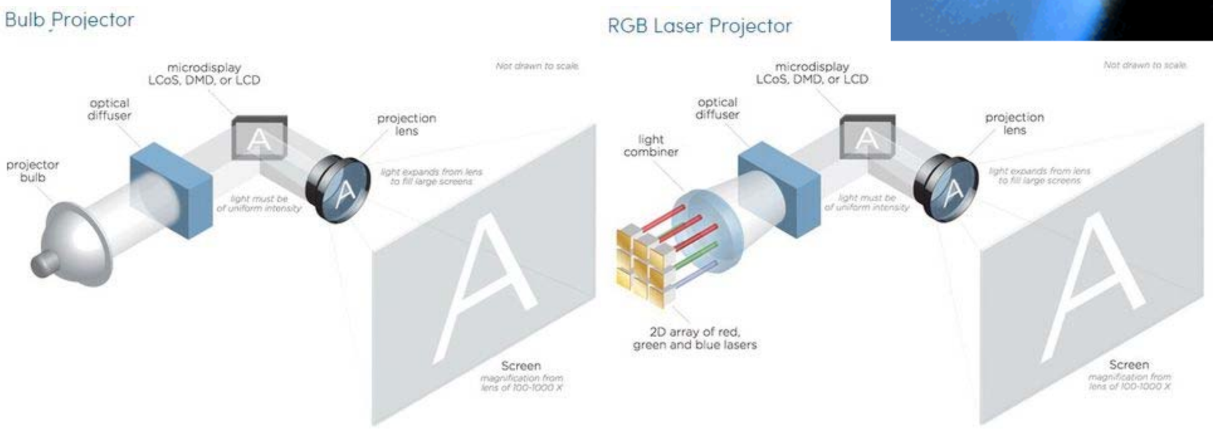
Projectors are the lowest cost method to show video content to a large group

Projector Types

- ✓Standard Throw
- ✓Short Throw
- ✓Ultra Short Throw
- ✓Ultra WIDE Throw

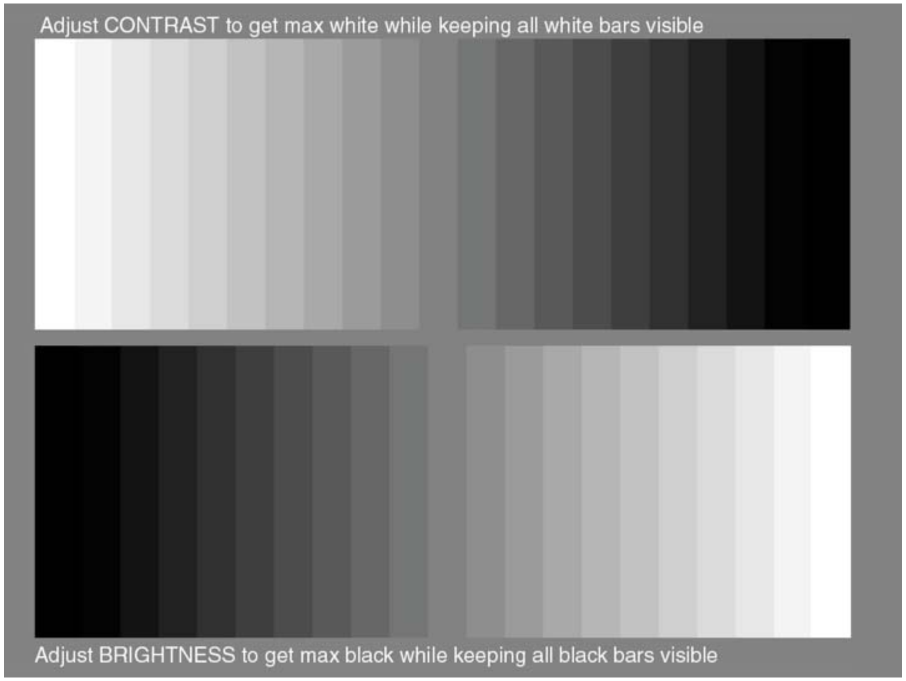
Laser vs Bulb


LAMP
REPLACE LAMP
1,000 hours
1 LAMP
LASER
NO REPLACEMENT
1,000 hours
LASER LIGHT SOURCE


Bulb Projector
Not drawn to scale
microdisplay LCoS, DMD, or LCD
optical diffuser
projector bulb
projection lens
light expands from lens to fill large screens
light must be of uniform intensity
Screen magnification from lens of 100-1000 X
RGB Laser Projector
Not drawn to scale
microdisplay LCoS, DMD, or LCD
optical diffuser
light combiner
projection lens
light expands from lens to fill large screens
light must be of uniform intensity
2D array of red, green and blue lasers
Screen magnification from lens of 100-1000 X

Projector Specs

- **Lumens**
  - Minimum 3000
  - Double is noticeable
    - fade over time
  - Keystone can half
  - Color Brightness
- **Contrast Ratio**
  - Light cancels

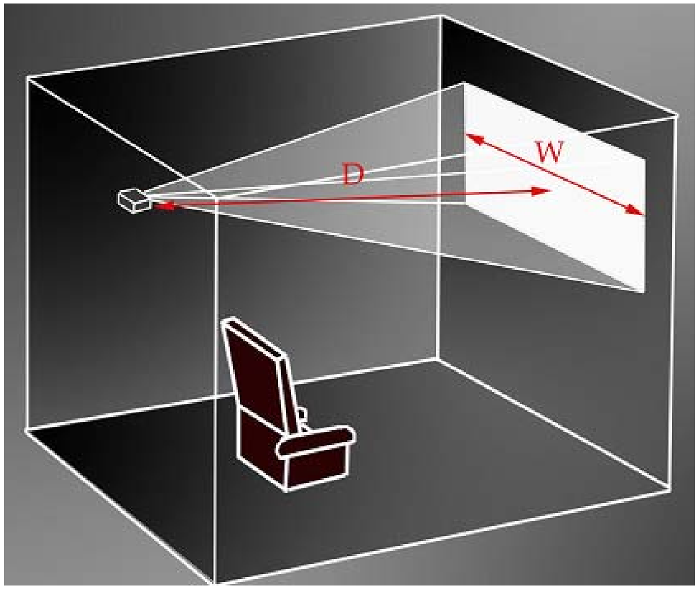

Adjust CONTRAST to get max white while keeping all white bars visible

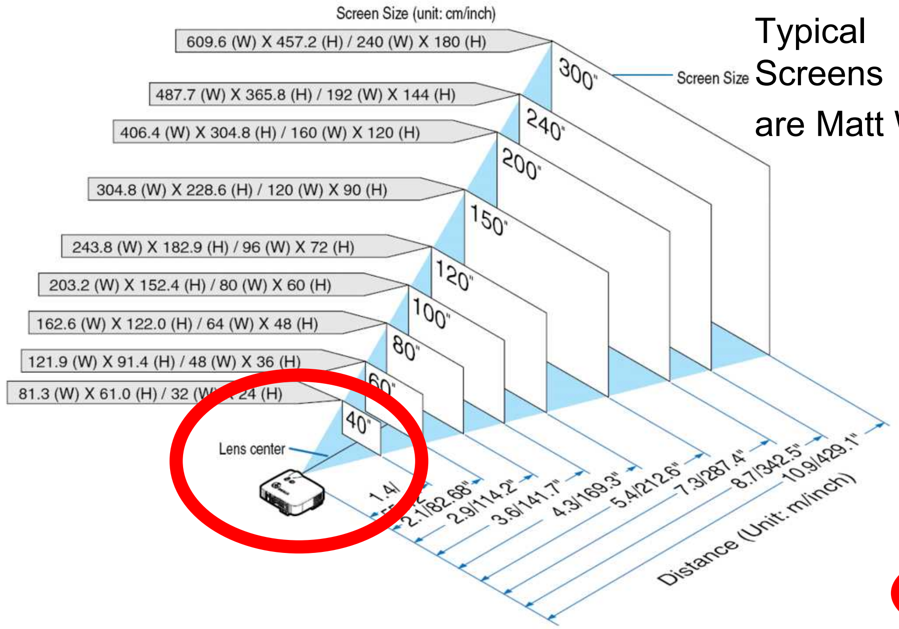
Adjust BRIGHTNESS to get max black while keeping all black bars visible

CAUTION: Use specs MOSTLY to compare models by same manufacturer

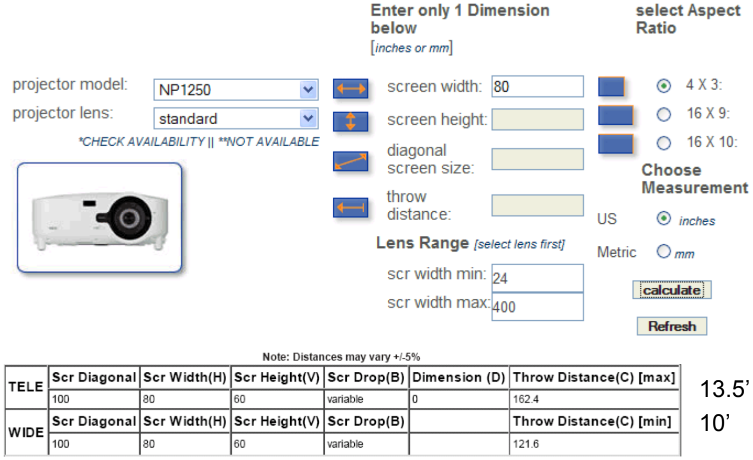
Projector Specs

- Throw Ratio
  - Multiply by width
- Native Resolution
  - Rescales to within
- Warranty
- Inputs




Screen Size (unit: cm/inch)
609.6 (W) X 457.2 (H) / 240 (W) X 180 (H)
487.7 (W) X 365.8 (H) / 192 (W) X 144 (H)
406.4 (W) X 304.8 (H) / 160 (W) X 120 (H)
304.8 (W) X 228.6 (H) / 120 (W) X 90 (H)
243.8 (W) X 182.9 (H) / 96 (W) X 72 (H)
203.2 (W) X 152.4 (H) / 80 (W) X 60 (H)
162.6 (W) X 122.0 (H) / 64 (W) X 48 (H)
121.9 (W) X 91.4 (H) / 48 (W) X 36 (H)
81.3 (W) X 61.0 (H) / 32 (W) X 24 (H)
300"
240"
200"
150"
120"
100"
80"
60"
40"
Screen Size
Lens center
1.4/
2.1/82.68"
2.9/114.2"
3.6/141.7"
4.3/169.3"
5.4/212.6"
7.3/287.4"
8.7/342.5"
10.9/429.1"
Distance (Unit: m/inch)

Typical Screens are Matt White



Enter only 1 Dimension below
[inches or mm]

select Aspect Ratio

projector model: NP1250

projector lens: standard

**CHECK AVAILABILITY || **NOT AVAILABLE*

screen width: 80

screen height:

diagonal screen size:

throw distance:

● 4 X 3:
○ 16 X 9:
○ 16 X 10:

Choose Measurement

US ● *inches*

Metric ○ *mm*

Lens Range *[select lens first]*

scr width min: 24

scr width max: 400

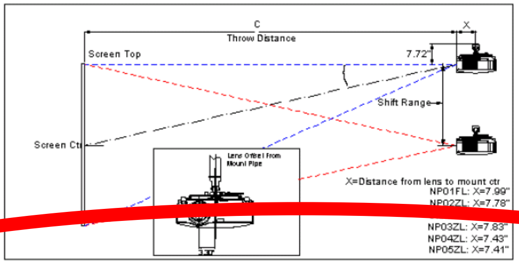
calculate
Refresh

Note: Distances may vary +/-5%

TELE	**Scr Diagonal**	**Scr Width(H)**	**Scr Height(V)**	**Scr Drop(B)**	**Dimension (D)**	**Throw Distance(C) [max]**
	100	80	60	variable	0	162.4
WIDE	**Scr Diagonal**	**Scr Width(H)**	**Scr Height(V)**	**Scr Drop(B)**		**Throw Distance(C) [min]**
	100	80	60	variable		121.6

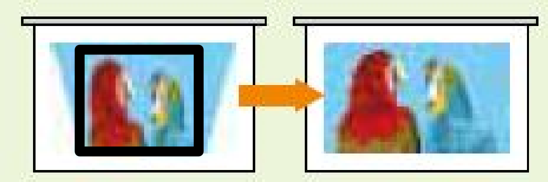
13.5’

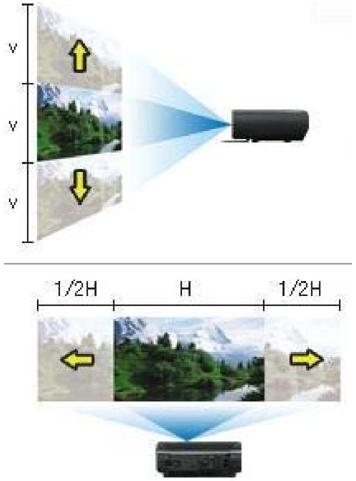
10’


C
Throw Distance
X
Screen Top
7.72"
Shift Range
Screen Ctr
Lens Offset From Mount Pipe
X=Distance from lens to mount ctr
NP01FL: X=7.99"
NP02ZL: X=7.78"
NP03ZL: X=7.83"
NP04ZL: X=7.43"
NP05ZL: X=7.41"

Distance from bottom of screen to floor should be 3-4 feet.

- PC-free presentations
- Wireless
- AUTO keystone
- Wireless mouse control
- Lense Shift
- Corner Adjustments
- Network Capable
    - Control and Monitor
    - Content





- Use furthest distance to determine HEIGHT
- IF showing…
    - Video ÷ 8
    - Data ÷ 6
    - Graphics ÷ 4
- WIDTH is determined by ratio…
    - 4:3 = 1.33
    - 16:9 = 1.78
    - 16:10 (8:5) = 1.6

4:3 NTSC Video

H = D x .6
W= D x .8
D= H x 1.667
D = W x 1.25

16:9 HDTV

H = D x .49
W = D x .87146
D = H x 2.04
D = W x 1.1475

16:10

H = D x .5299
W = D x .848
D = H x 1.8868
D = W x 1.1793

5:4 Data Graphics

H = D x .625
W = D x .781
D = H x 1.601
D = W x 1.281

1.85:1 WideScreen(Letterbox)

H = D x .4762
W = D x .881
D = H x 2.1
D = W x 1.135

2.35:1 CinemaScope

H = D x .3915
W = D x .92
D = H x 2.554
D = W x 1.0868

15:9

H = D x .5146
W = D x .8576
D = H x 1.9433
D = W x 1.166

QLED TV

QLED (Samsung Q7F)

OLED TV

OLED (LG B6)

LED TV

LED (Samsung KS8000)

QLED PROS AND CONS

Pros:

Brilliant whites
Ultra-bright (1,500nits)
Variety of screen sizes between 49-88-inch

Cons:

Not as slim (25.4mm)
Overly bright
Less convincing blacks
Slower refresh rate

OLED PROS AND CONS

Pros:

Lighter and thinner (2.57mm)
Self-lighting pixels
More convincing blacks
Faster refresh rate (0.001ms)
Judder and blur-free

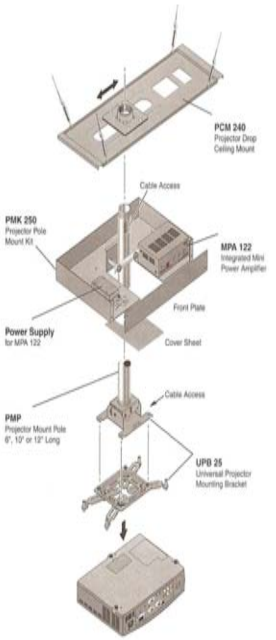
Cons:

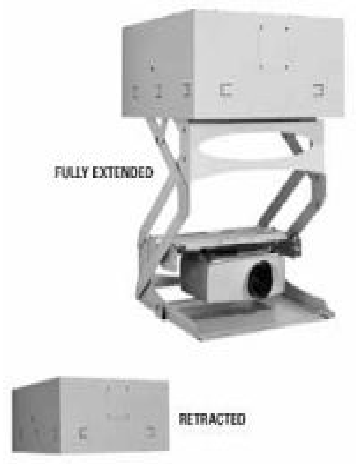
Only found in three screen sizes: 55, 65 & 77-inch
Muted brightness (1,000nits)
Expensive

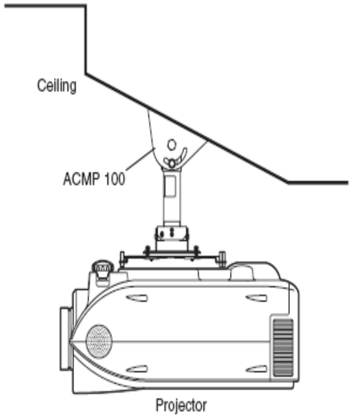
	QLED	OLED	LED
Black Level	Good	Perfect	Good
Motion Blur	Great	Perfect	Good
Viewing Angle	Poor	Great	Poor
Color volume	Great	Good	Good
Gray Uniformity	Average	Good	Average
Luminosity	Good	Good	Great
Image Retention	Great	Poor	Great
Price and Availability	Poor	Average	Great

https://www.rtings.com/tv/reviews/by-type/qled-vs-oled-vs-led

Projector Mounting Examples

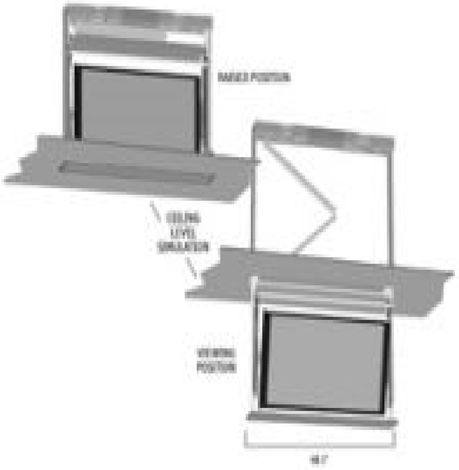

PCM 240
Projector Drop
Ceiling Mount
Cable Access
PMK 250
Projector Pole
Mount Kit
MPA 122
Integrated Mini
Power Amplifier
Front Plate
Power Supply
for MPA 122
Cover Sheet
Cable Access
PMP
Projector Mount Pole
6", 10" or 12" Long
UPB 25
Universal Projector
Mounting Bracket


FULLY EXTENDED
RETRACTED

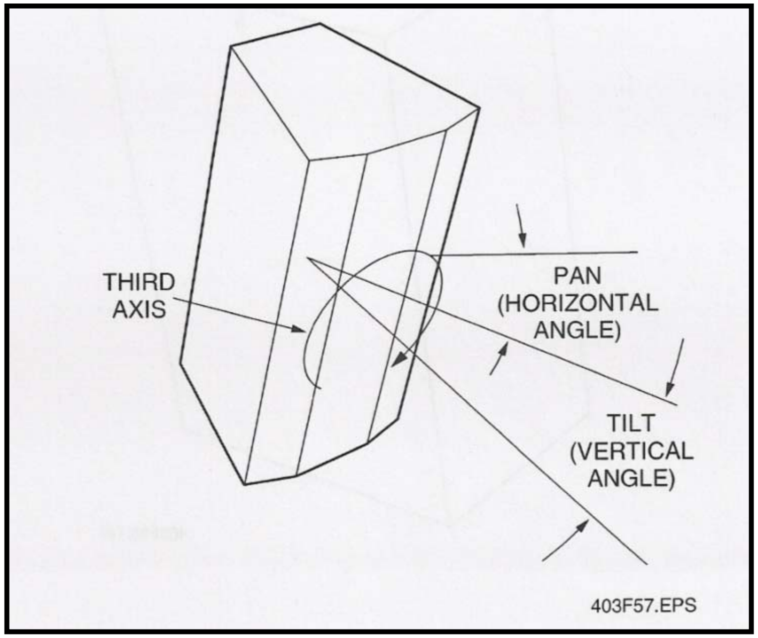

Ceiling
ACMP 100
Projector

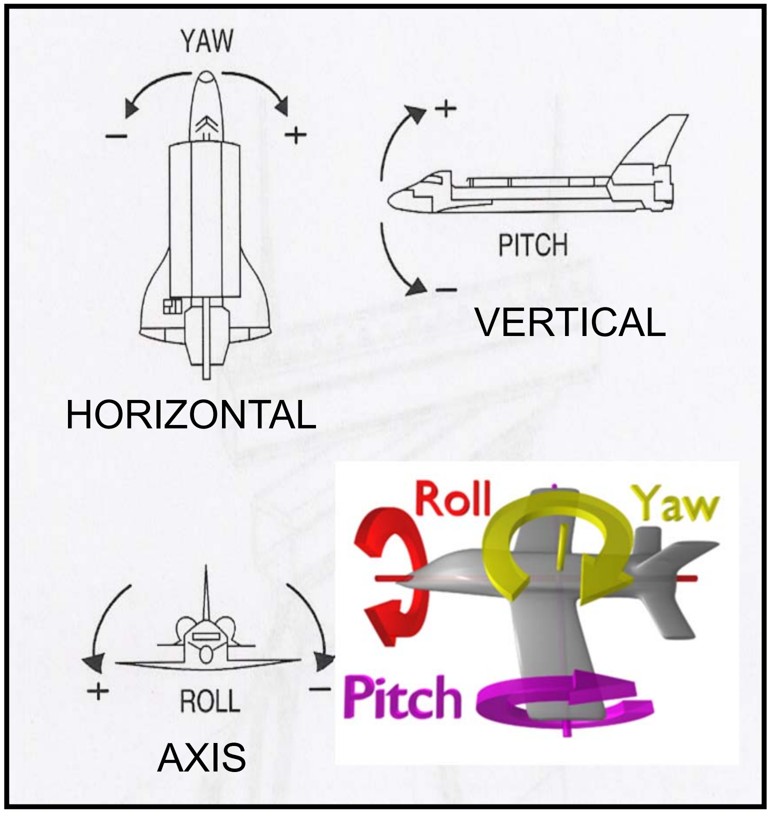
Measure twice…
Pay attention to alignment and height
Beware of building vibration

Monitor Display Mounting Examples


RAISED POSITION
CEILING LEVEL SIMULATOR
VIEWING POSITION

Pitch, Roll, & Yaw


THIRD AXIS
PAN (HORIZONTAL ANGLE)
TILT (VERTICAL ANGLE)
403F57.EPS


YAW
−
+
HORIZONTAL
+
PITCH
−
VERTICAL
+
ROLL
−
AXIS
Roll
Yaw
Pitch

A Word About Digital Signage

Commercial Display
Television

- Commercial TVs – made to run brighter longer (16/7 & 24/7)
- Built in Software or External Box

A Word About Video Walls

10:25
Thursday, January 21

- Thin bezel vs video wall
- Built in video wall capability drawbacks

-Can mount vertically or horizontally or architecturally (Remember aspects!)

Which is NOT a concern with projectors or displays?

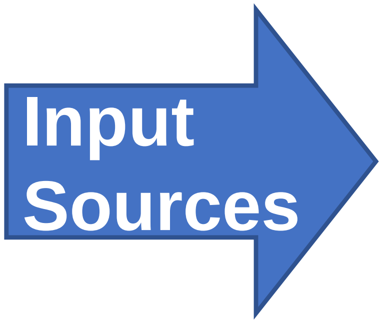
A.
Light source and native resolution

B.
Size for height and distance and type of mount

C.
Warranty and connections/features

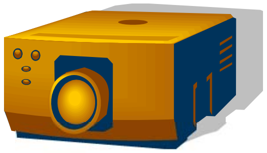
D.
Different manufacturer specs to compare brightness

4 Steps of AV



Input Sources

Share It



SEE IT

HEAR IT

Ceiling (Flush Mount) Speakers

Wall (Surface Mount) Speakers

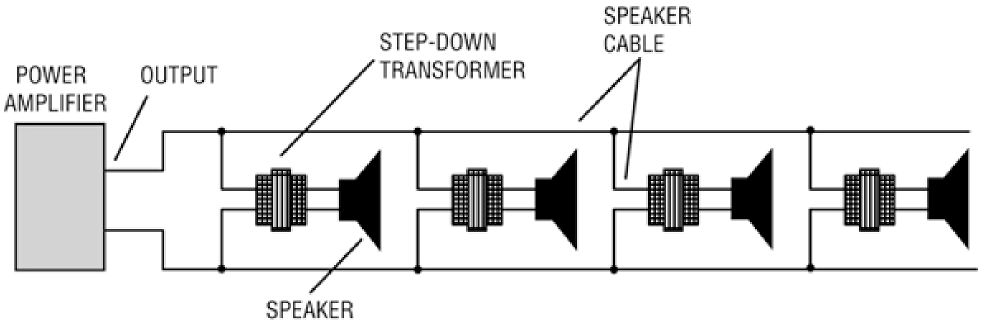
Wall (Flush Mount) In-Wall Speakers

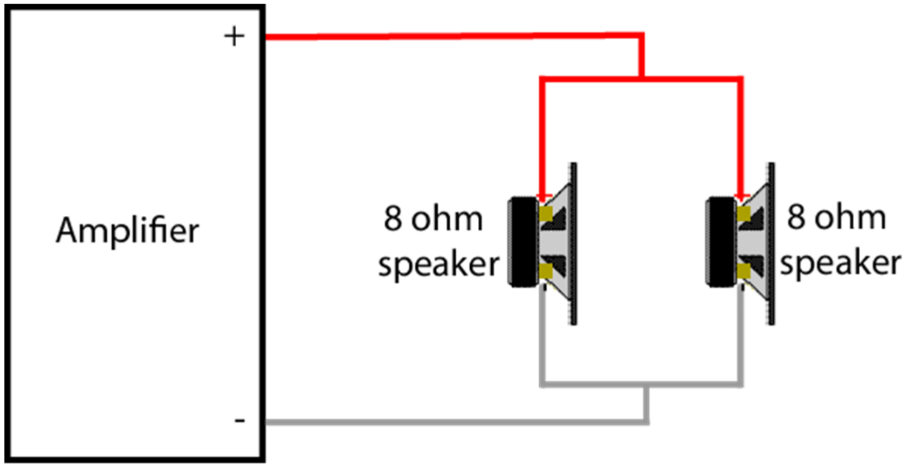
Pendant Speakers

Hidden Speakers

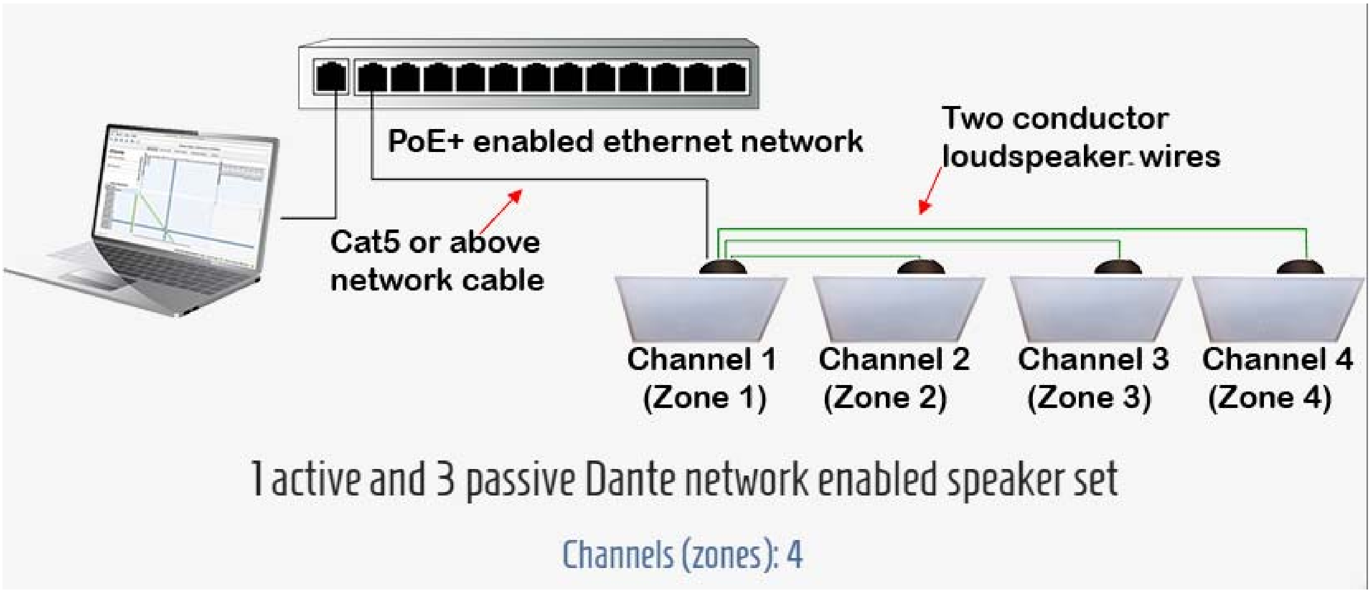
Architectural Options for Aesthetics

Constant Voltage vs 4/8 ohm direct


POWER AMPLIFIER
OUTPUT
STEP-DOWN TRANSFORMER
SPEAKER CABLE
SPEAKER


Amplifier
+
-
8 ohm speaker
8 ohm speaker

CV can go longer and do more speakers. Direct can go louder and can sound better. CV speaker is actually an 4/8ohm speaker!

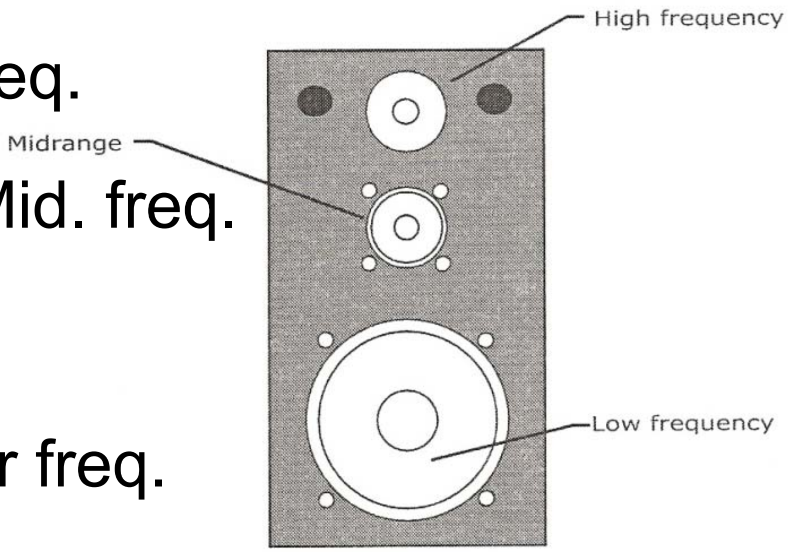

PoE+ enabled ethernet network
Two conductor loudspeaker wires
Cat5 or above network cable
Channel 1 (Zone 1)
Channel 2 (Zone 2)
Channel 3 (Zone 3)
Channel 4 (Zone 4)
1 active and 3 passive Dante network enabled speaker set
Channels (zones): 4

Dante Speakers

EUROLIVE
B208D
BEHRINGER

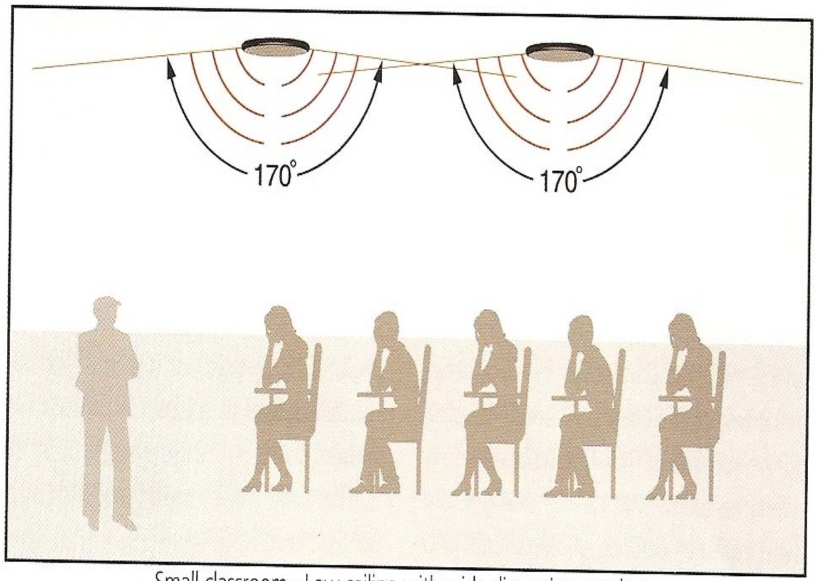
Powered Speakers

- Speakers frequency ranges…
  - **Tweeters**-High freq.
    (2,000-20,000 Hz)
  - **Horns**-Mid.-High freq.
    (300-8,000 Hz)
  - **Midrange cones**-Mid. freq.
    (200-8,000 Hz)
  - **Woofers**-Low freq.
    (40-600 Hz)
  - **Subwoofers**-Lower freq.
    (20-200 Hz)

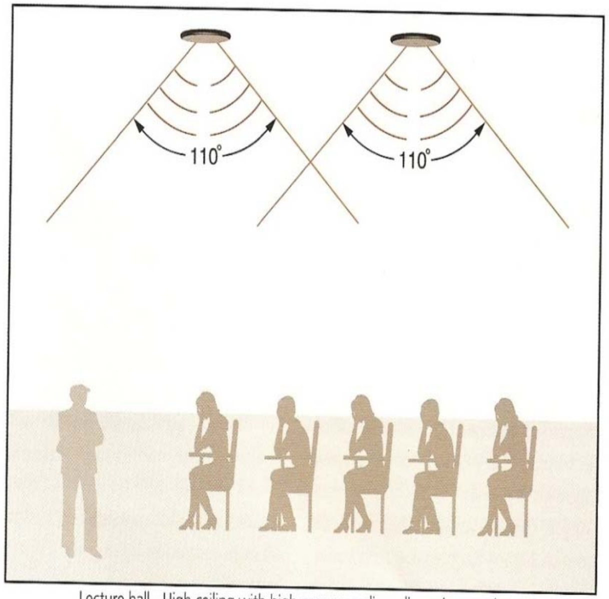


If crossover is not built in will have more than one termination block and need processing to filter frequencies.

Speaker dispersion



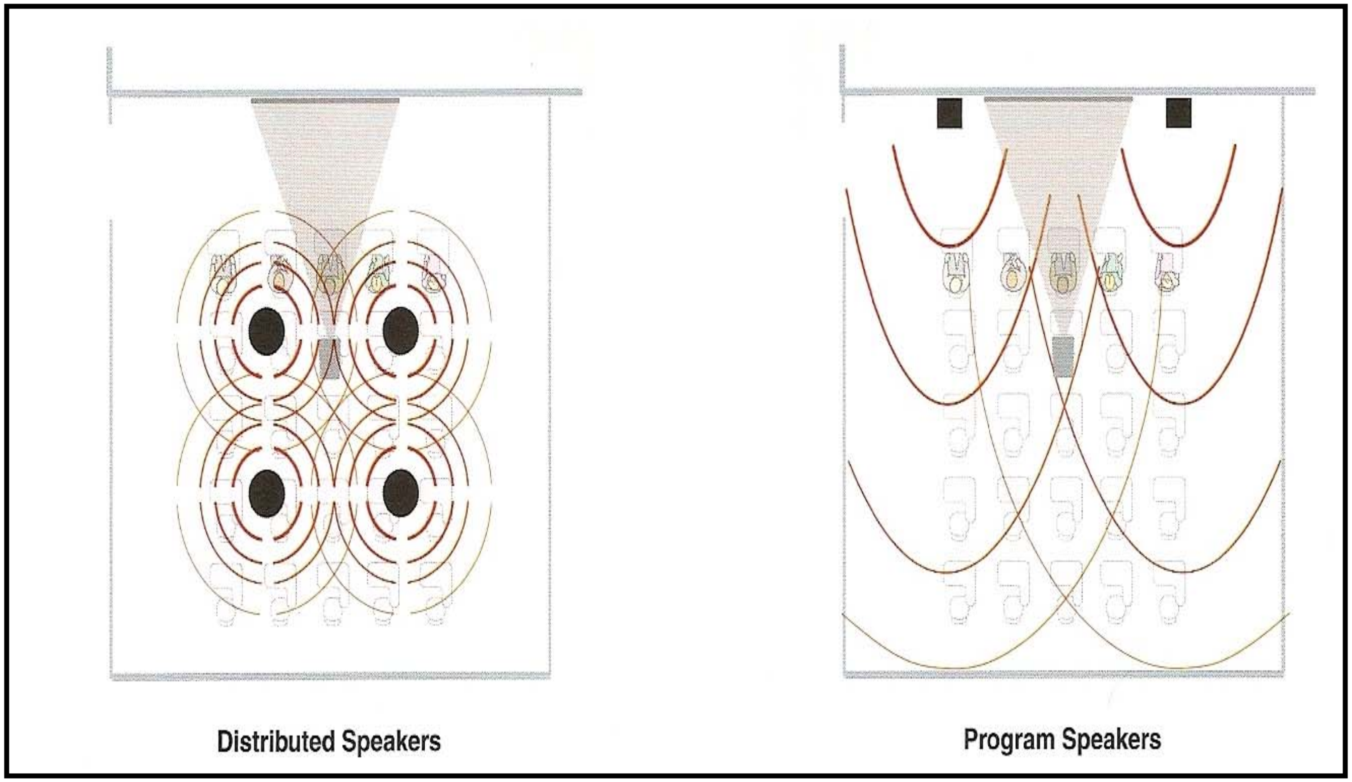
Small classroom - Low ceiling with wide dispersion speakers



Lecture hall - High ceiling with high power medium dispersion speakers

Work with architect to determine ceiling height for speakers and adequate screen height!

Speaker dispersion


Distributed Speakers
Program Speakers

Speaker Placement

- ***Turning volume up does not increase coverage area only loudness***
- Ceiling Speakers
  - Determine # of speakers using ceiling height X2 rule
- Wall Baffles
  - Determine # based on height from floor to speaker
    - 8’ high = space 20’ apart
    - 16’ high = space 30’ apart
    - Stagger on opposing walls

This facility is equipped with a hearing assistance system. Please ask for a receiver.
Listen

Know the requirements for ADA and your region

California:

11B-219.2 Required systems = An assistive listening system shall be provided in assembly areas**, including conference and meeting rooms.**

The minimum number of receivers to be provided shall be equal to 4 percent of the total number of seats, but in no case less than two…25% hearing aid compatible…building seats determine actual #...

Which is NOT a concern with audio outputs in our system?

A.
Architectural Aesthetics and Application

B.
Speaker dispersion patterns and placement

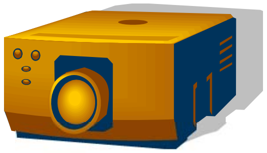
C.
People with hearing loss and frequencies

D.
What the audio source is

4 Steps of AV

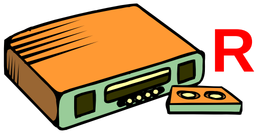
Input Sources

Share It



SEE IT

HEAR IT

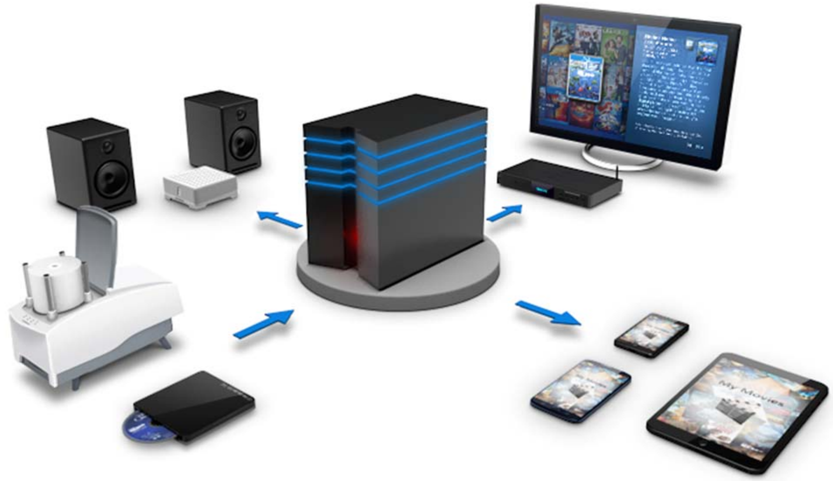


RECORD IT

STREAM IT

Recording

TASCAM
SS-CDR200

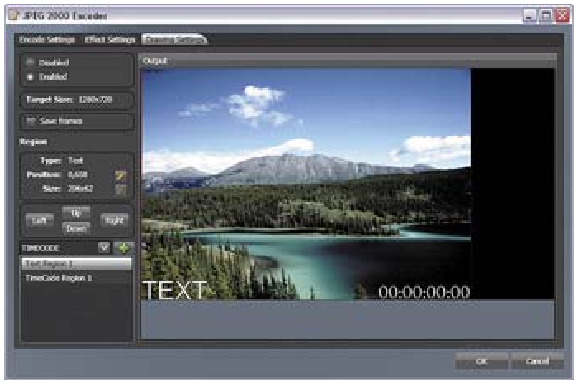


Streaming

INput

Works with these hosting services
USTREAM
WOWZA STREAMING CLOUD
YouTube
LIVE

OUTput


JPEG 2000 Encoder
Encode Settings
Effect Settings
Output
Left
Up
Down
Right
OK
Cancel

○ Disabled
● Enabled

Target Size: 1280x720

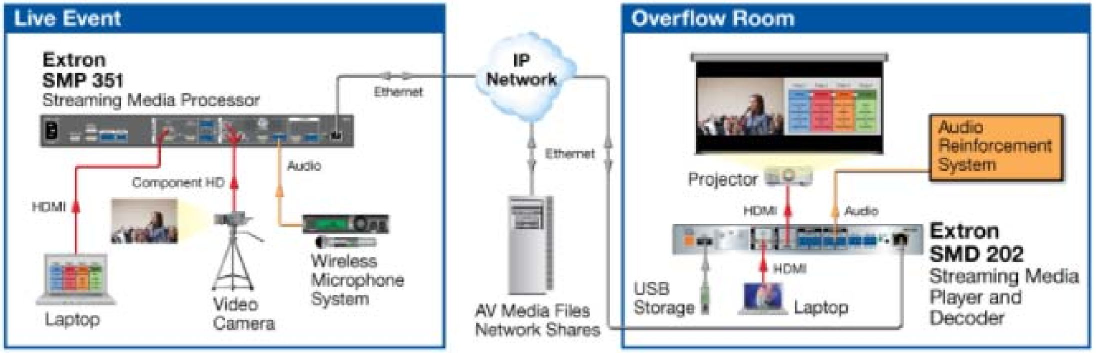
☐ Save frames

Region

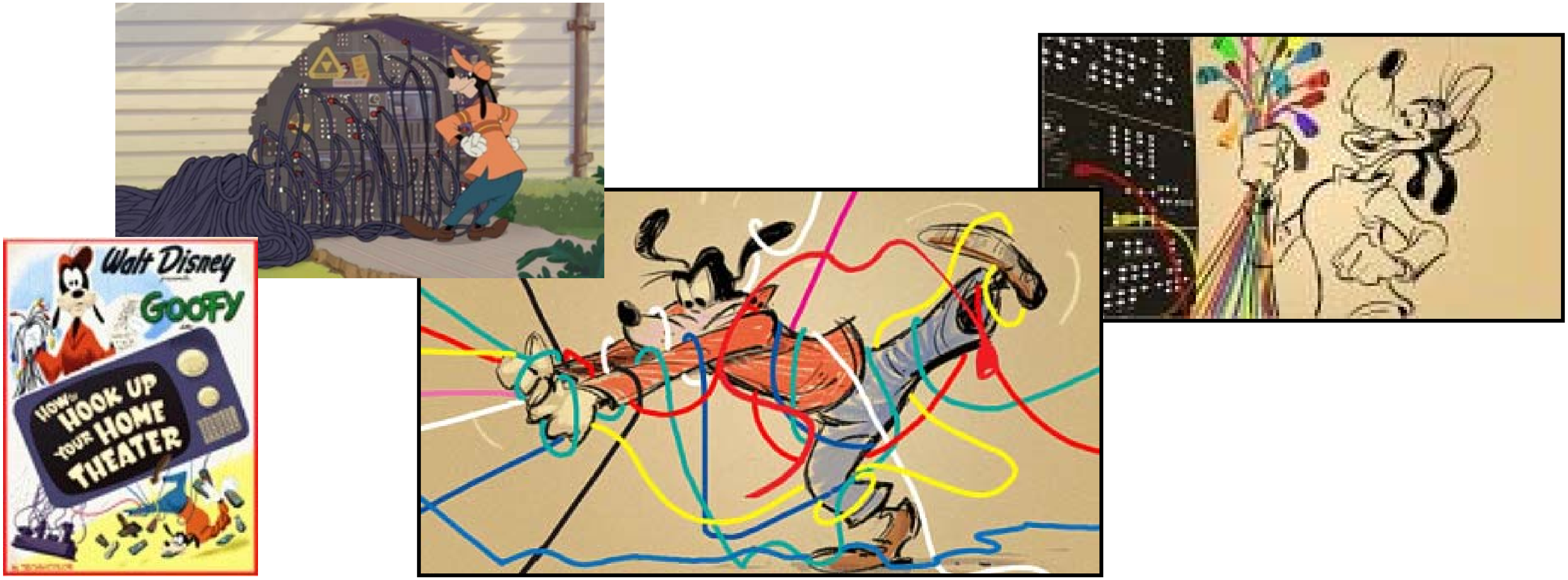
Type: Text
Position: 0,638
Size: 296x62

TIMECODE
Text Region 1
TimeCode Region 1

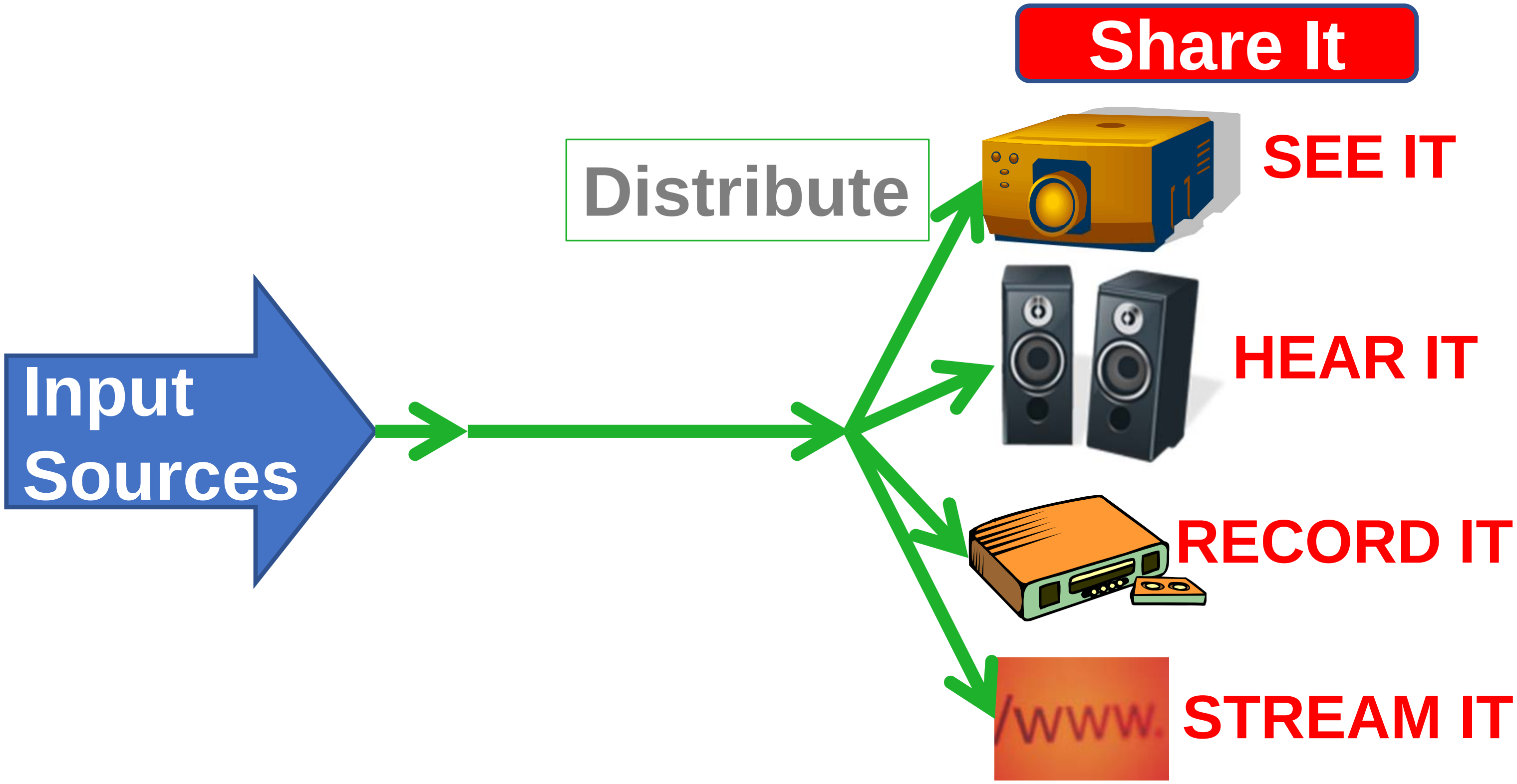
TEXT 00:00:00:00


Live Event
Extron
SMP 351
Streaming Media Processor
Ethernet
Component HD
Audio
HDMI
Laptop
Video Camera
Wireless Microphone System
IP Network
Ethernet
AV Media Files Network Shares
Overflow Room
Projector
Audio Reinforcement System
HDMI
Audio
HDMI
Extron
SMD 202
Streaming Media Player and Decoder
USB Storage
Laptop

Step 3 – Distribute


Walt Disney
Goofy
How to Hook Up Your Home Theater

4 Steps of AV



Share It

Input Sources

Distribute

SEE IT

HEAR IT

RECORD IT

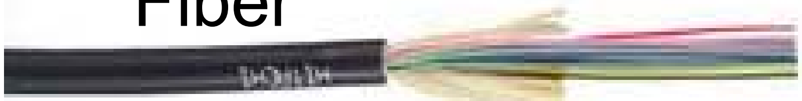
STREAM IT

High Res
Coax

Shielded & Control

Twisted Pair

Fiber

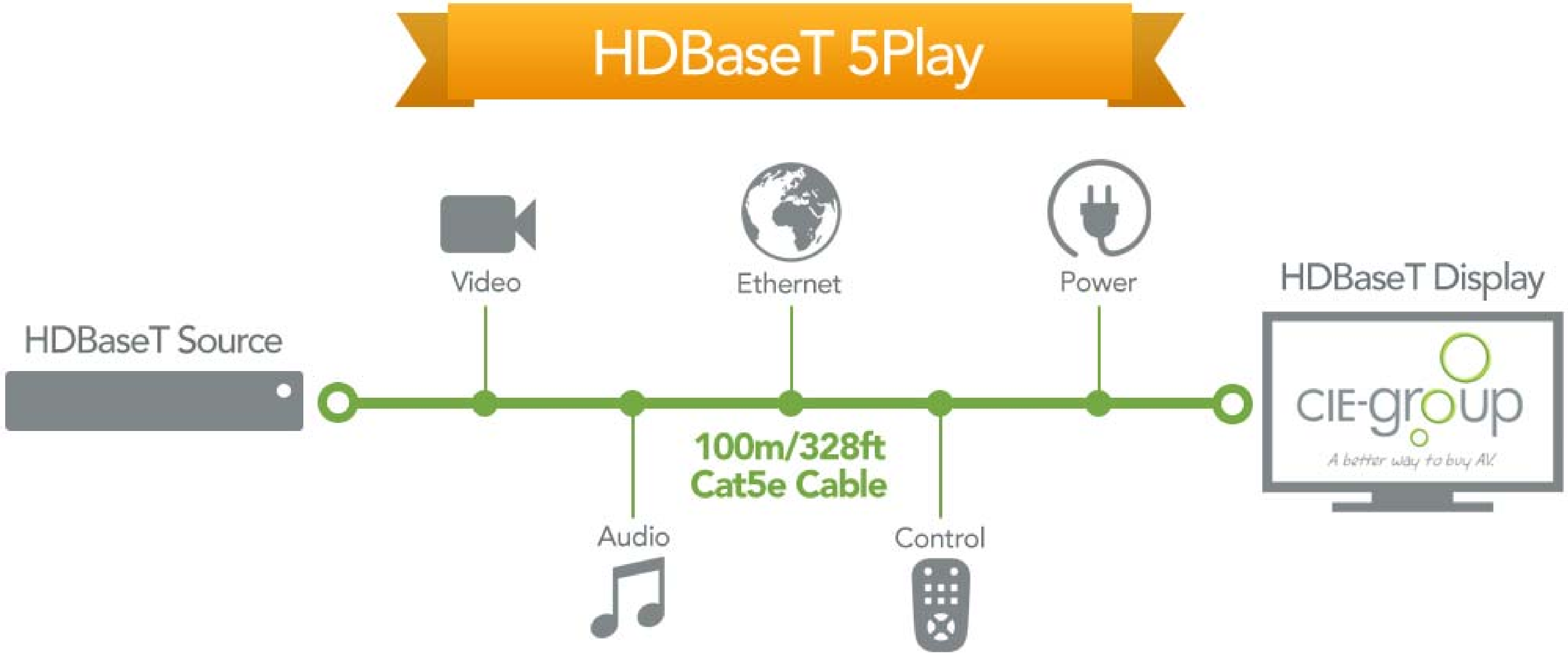


Plug & Play

Skew Free / Low Skew UTP

- Not to be used for Digital
- Mark with colored tag for easier identification
- Terminate with different colored jack than data

HD Base T


HDBaseT 5Play
Video
Ethernet
Power
HDBaseT Display
HDBaseT Source
CIE-group
A better way to buy AV.
100m/328ft
Cat5e Cable
Audio
Control

Audio over Ethernet

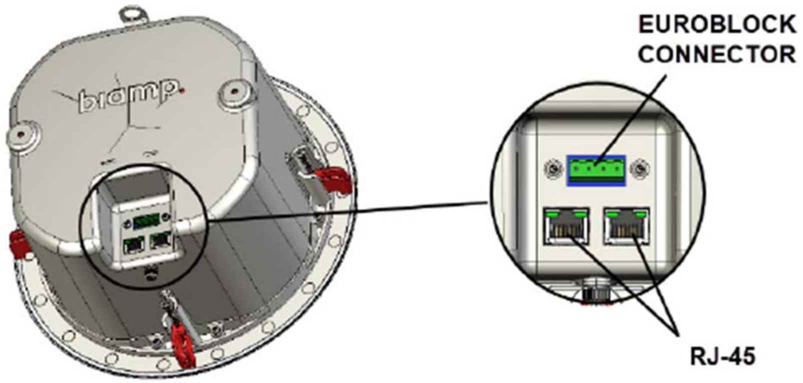
REPLACE THIS
WITH THIS
AND ROUTE IT ANYWHERE.

Dante™

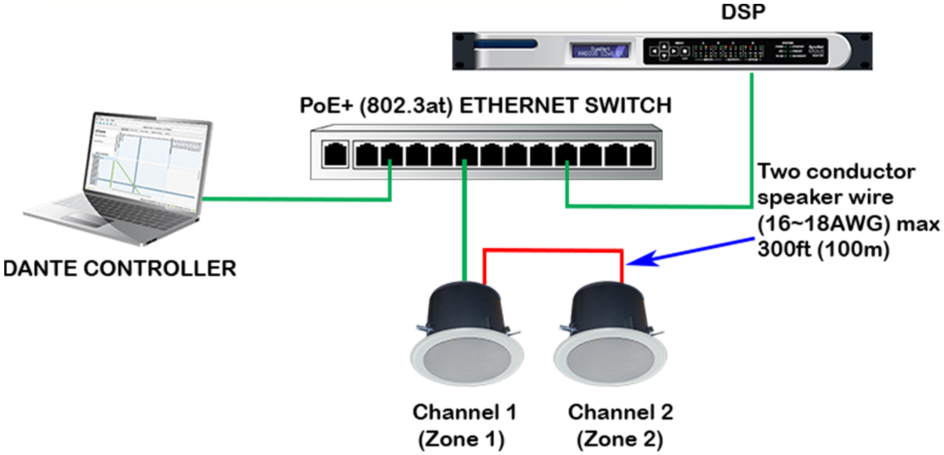
CobraNet®

IEEE 802.1 AVB

Audio over Twisted Pair


EUROBLOCK CONNECTOR
RJ-45
biamp.

AVB / Control
Model
Tesira AMP-450BP
Power
Locate
Amp
1
2 – Outputs – 3
4
PoE+ Class 4
Patent www.biamp.com/patents
TESIRA



DSP

PoE+ (802.3at) ETHERNET SWITCH

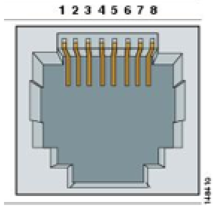
DANTE CONTROLLER

Two conductor speaker wire (16~18AWG) max 300ft (100m)

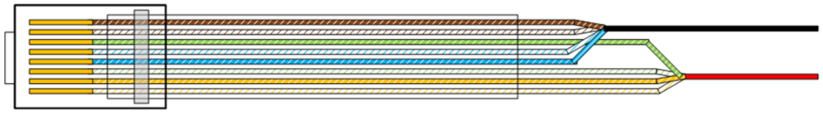
Channel 1 (Zone 1)

Channel 2 (Zone 2)

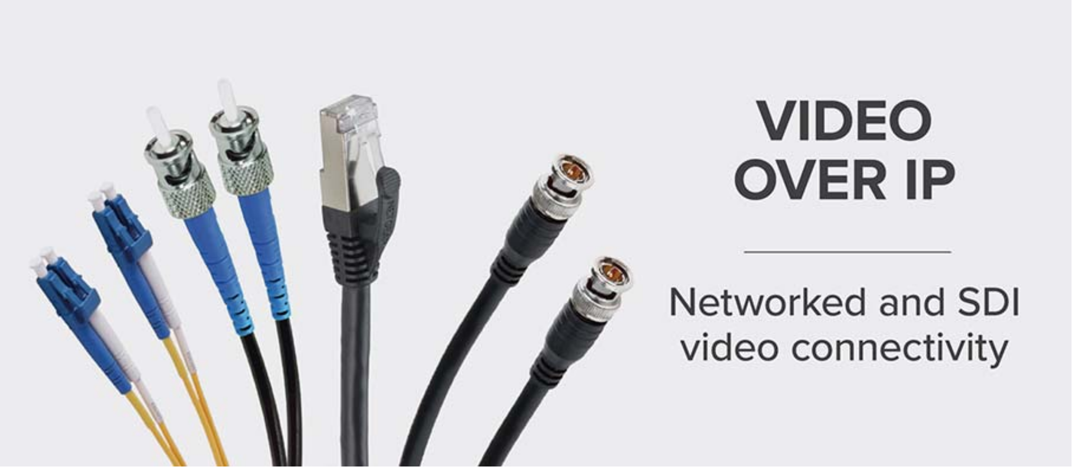
Pin Number	Function
1	Speaker +
2	Speaker +
3	Speaker +
4	Speaker -
5	Speaker -
6	Speaker +
7	Speaker -
8	Speaker -

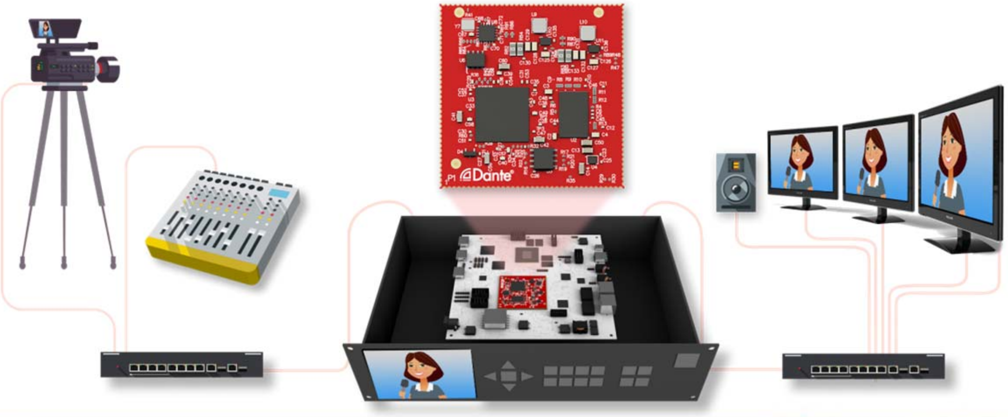


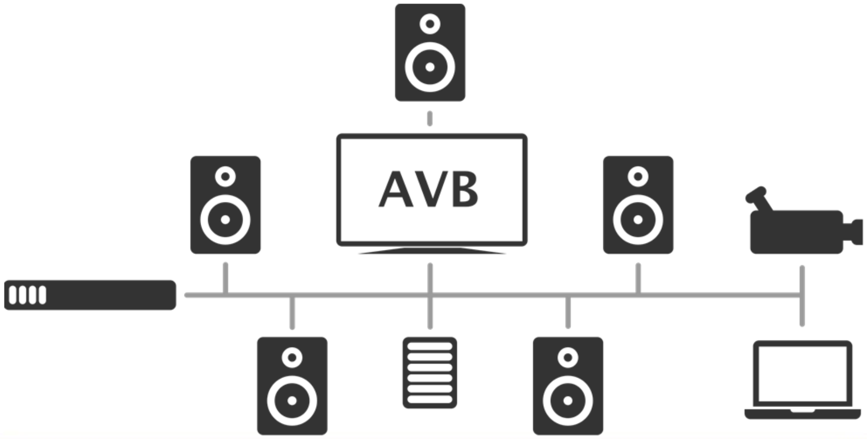
Mating Face View



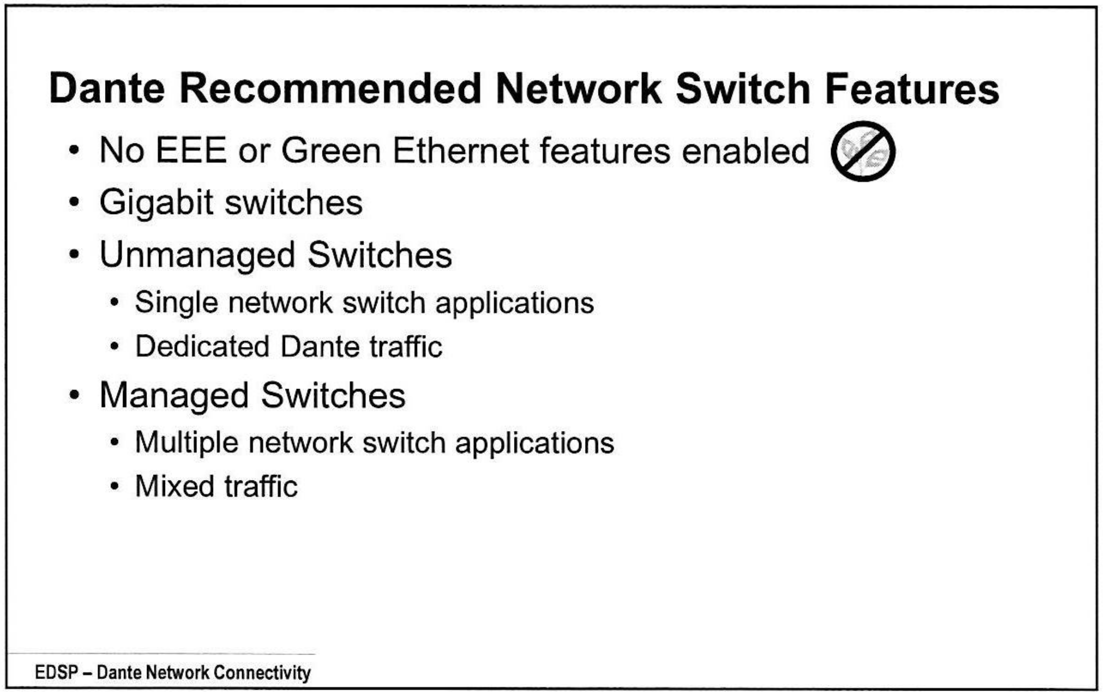
Video over Ethernet


VIDEO
OVER IP
Networked and SDI video connectivity





Over Ethernet – Switch Recommendations



Dante Recommended Network Switch Features

- No EEE or Green Ethernet features enabled ⊘
- Gigabit switches
- Unmanaged Switches
  - Single network switch applications
  - Dedicated Dante traffic
- Managed Switches
  - Multiple network switch applications
  - Mixed traffic

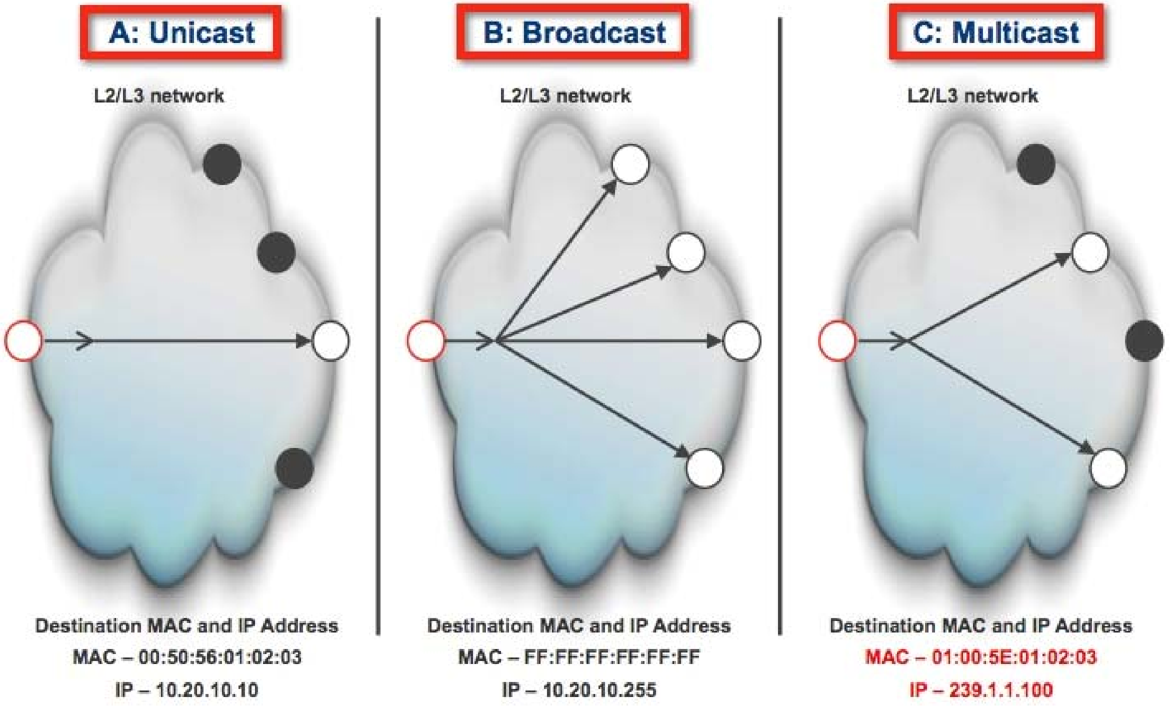
EDSP – Dante Network Connectivity

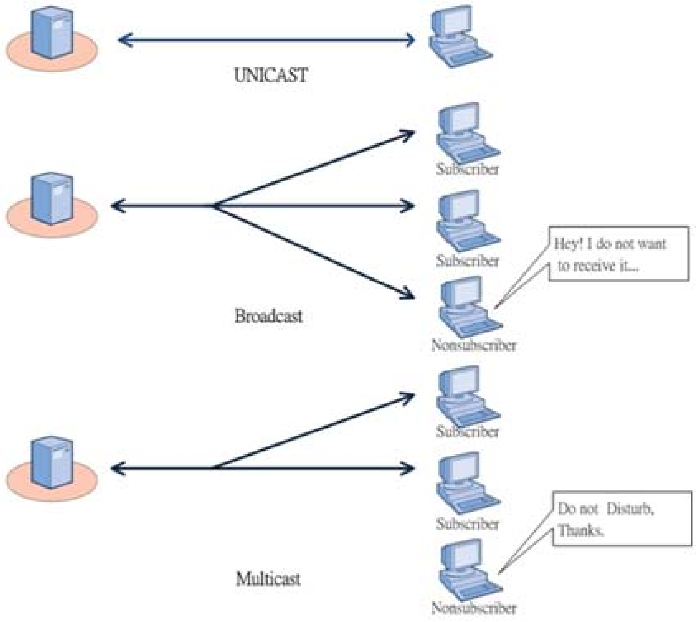
Over Ethernet – Switch Recommendations

MOTU
AVB SWITCH
1 2 3 4 5 E
1 Gb
ACTIVITY

PreSonus
SW5E AVB SWITCH WITH PoE
Link PoE
1 2 3 4 5
Link
PoE
Blue= PoE On
White= PoE Off
PoE
(Hold to toggle)

Over Ethernet – Switch Recommendations


A: Unicast
L2/L3 network
Destination MAC and IP Address
MAC – 00:50:56:01:02:03
IP – 10.20.10.10
B: Broadcast
L2/L3 network
Destination MAC and IP Address
MAC – FF:FF:FF:FF:FF:FF
IP – 10.20.10.255
C: Multicast
L2/L3 network
Destination MAC and IP Address
MAC – 01:00:5E:01:02:03
IP – 239.1.1.100


UNICAST
Subscriber
Subscriber
Nonsubscriber
Hey! I do not want to receive it...
Broadcast
Subscriber
Subscriber
Nonsubscriber
Do not Disturb, Thanks.
Multicast

You want a managed switch!

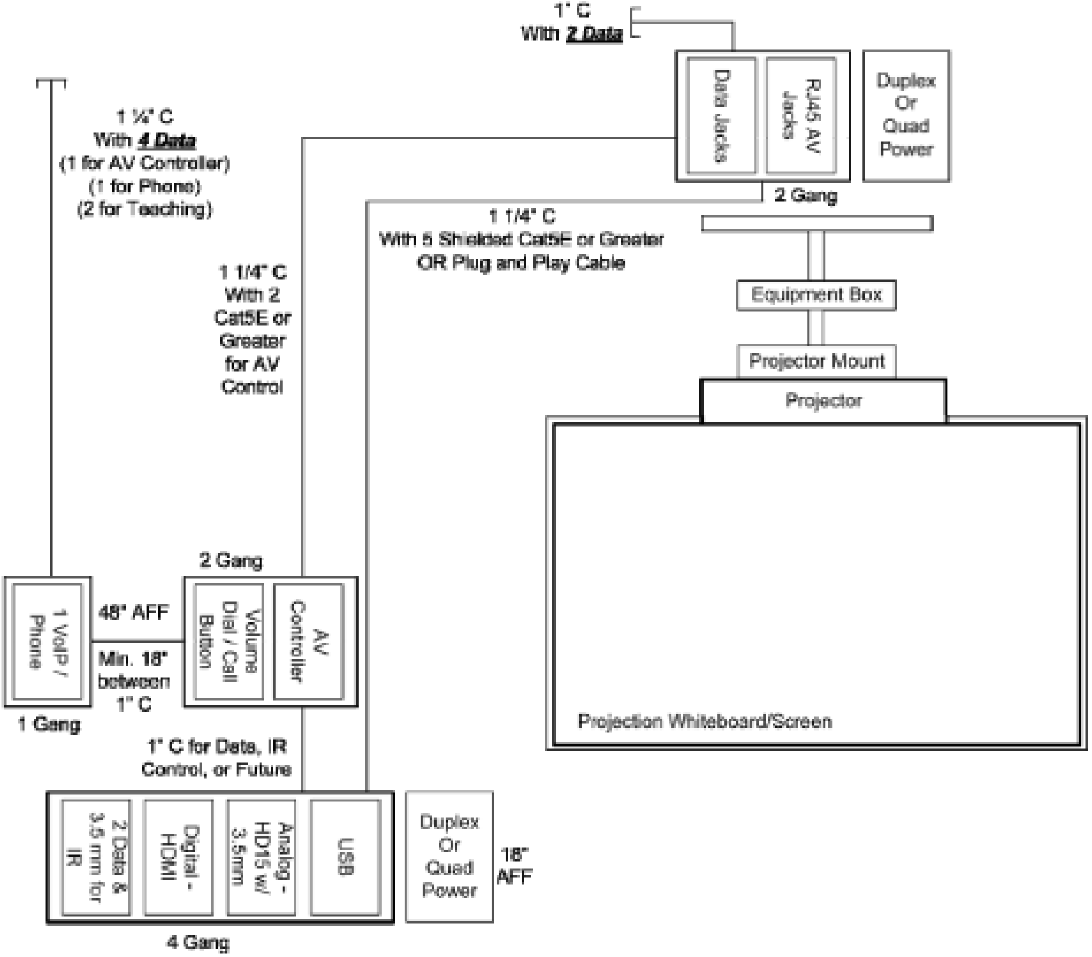

1" C
With **2 Data**
Data Jacks
RJ45 AV Jacks
Duplex Or Quad Power
2 Gang
1 ¼" C
With **4 Data**
(1 for AV Controller)
(1 for Phone)
(2 for Teaching)
1 1/4" C
With 2 Cat5E or Greater for AV Control
1 1/4" C
With 5 Shielded Cat5E or Greater
OR Plug and Play Cable
Equipment Box
Projector Mount
Projector
Projection Whiteboard/Screen
1 VoIP / Phone
1 Gang
48" AFF
Min. 18" between 1" C
2 Gang
Volume Dial / Call Button
AV Controller
1" C for Data, IR Control, or Future
2 Data & 3.5 mm for IR
Digital - HDMI
Analog - HD15 w/ 3.5mm
USB
4 Gang
Duplex Or Quad Power
18" AFF

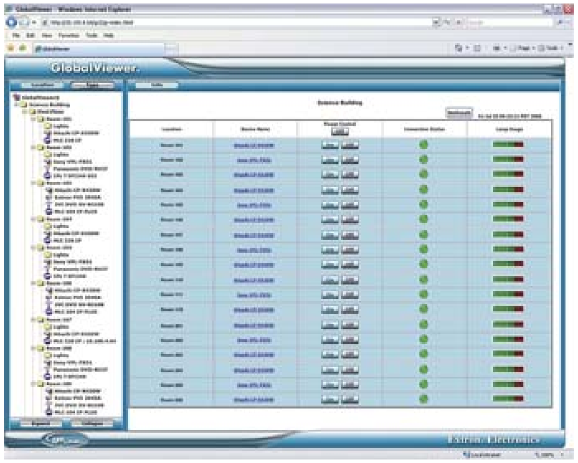
Figure 7-3
Minimum Recommended AV Infrastructure

Make sure to have data connections:

- At input locations
- At displays
- At processing and control equipment

INSIGNIA · Roku TV
Home
NETFLIX
YouTube
hulu
WATCH ESPN
HBO NOW

intel WiDi
Wireless Display


GlobalViewer
Extron Electronics

Which is NOT a concern when it comes to distribution in our system?

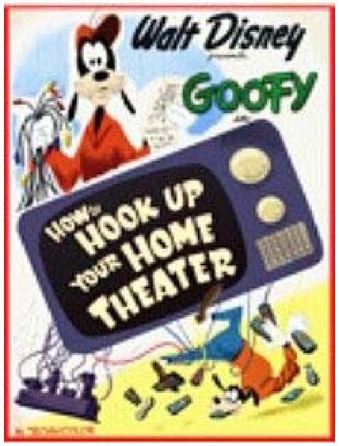
A.
Type of cable

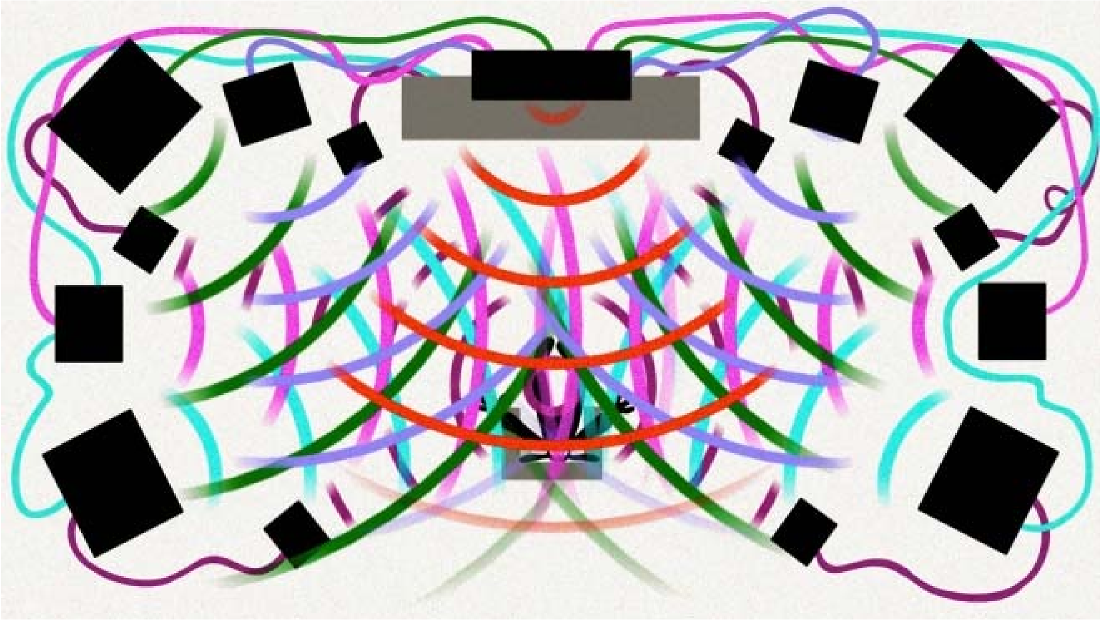
B.
What is the latest technology craze

C.
Where inputs & outputs are located & data and power near

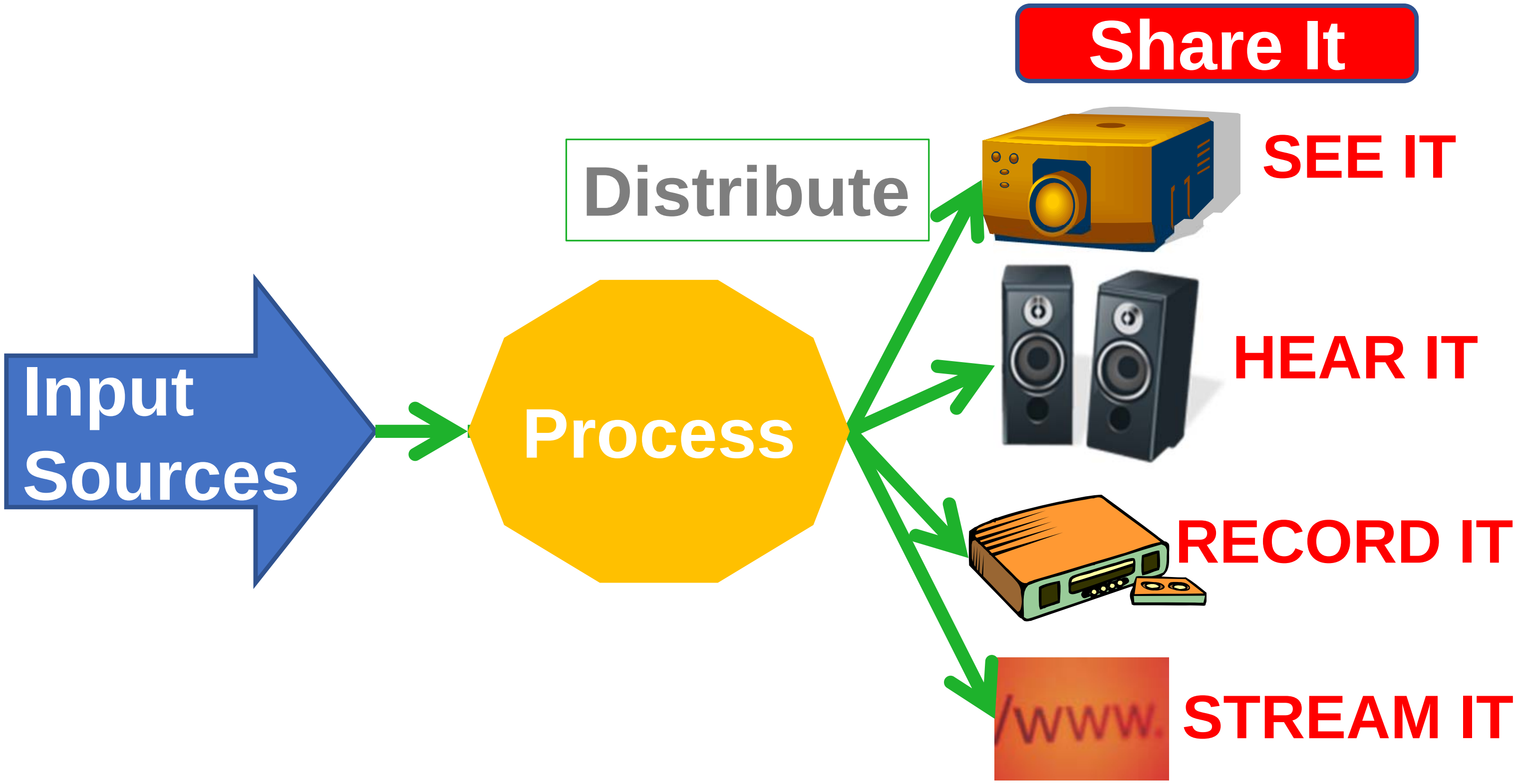
D.
Size of conduits and outlet boxes and paths between

Step 4 – Process


Walt Disney
GOOFY
HOW to HOOK UP YOUR HOME THEATER



4 Steps of AV



Share It

Input Sources

Process

Distribute

SEE IT

HEAR IT

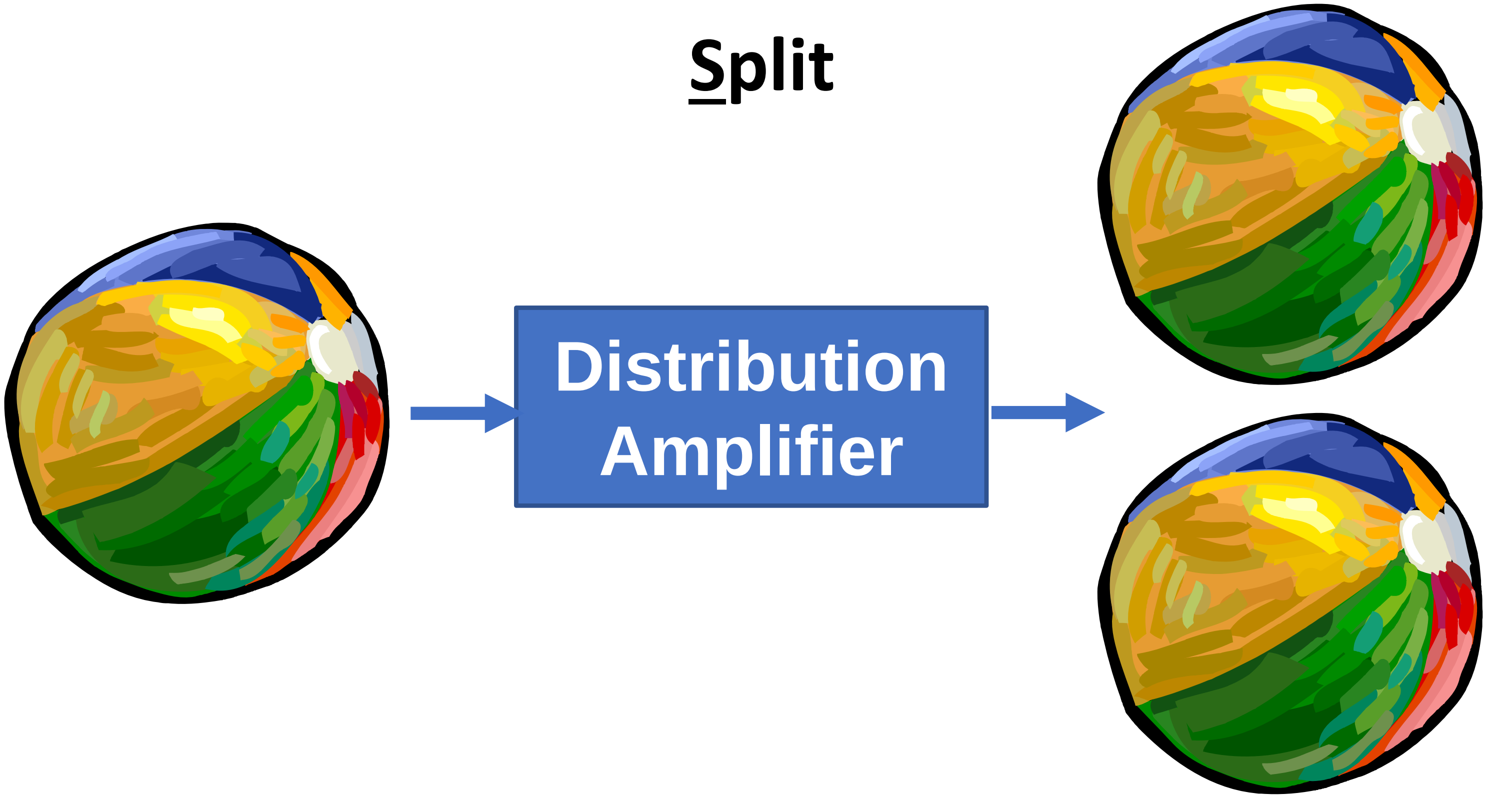
RECORD IT

STREAM IT

STEP 4 - Process

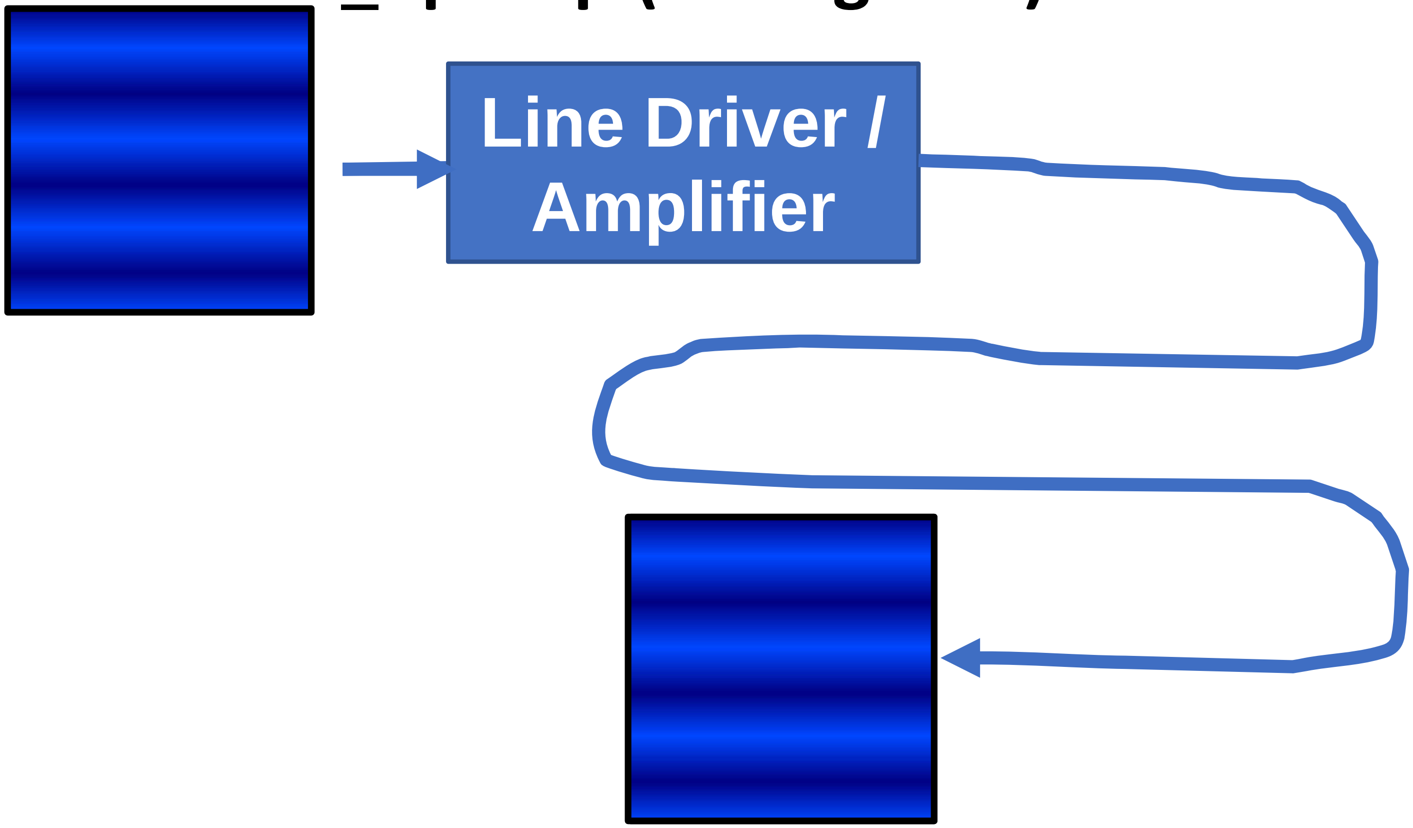
- Can be separate pieces of equipment or built into equipment used in step 2
  - Best to use separate
- Can be separate pieces of equipment for each option or one box can do several processing options
  - Save money and space with a box that does many features

Split

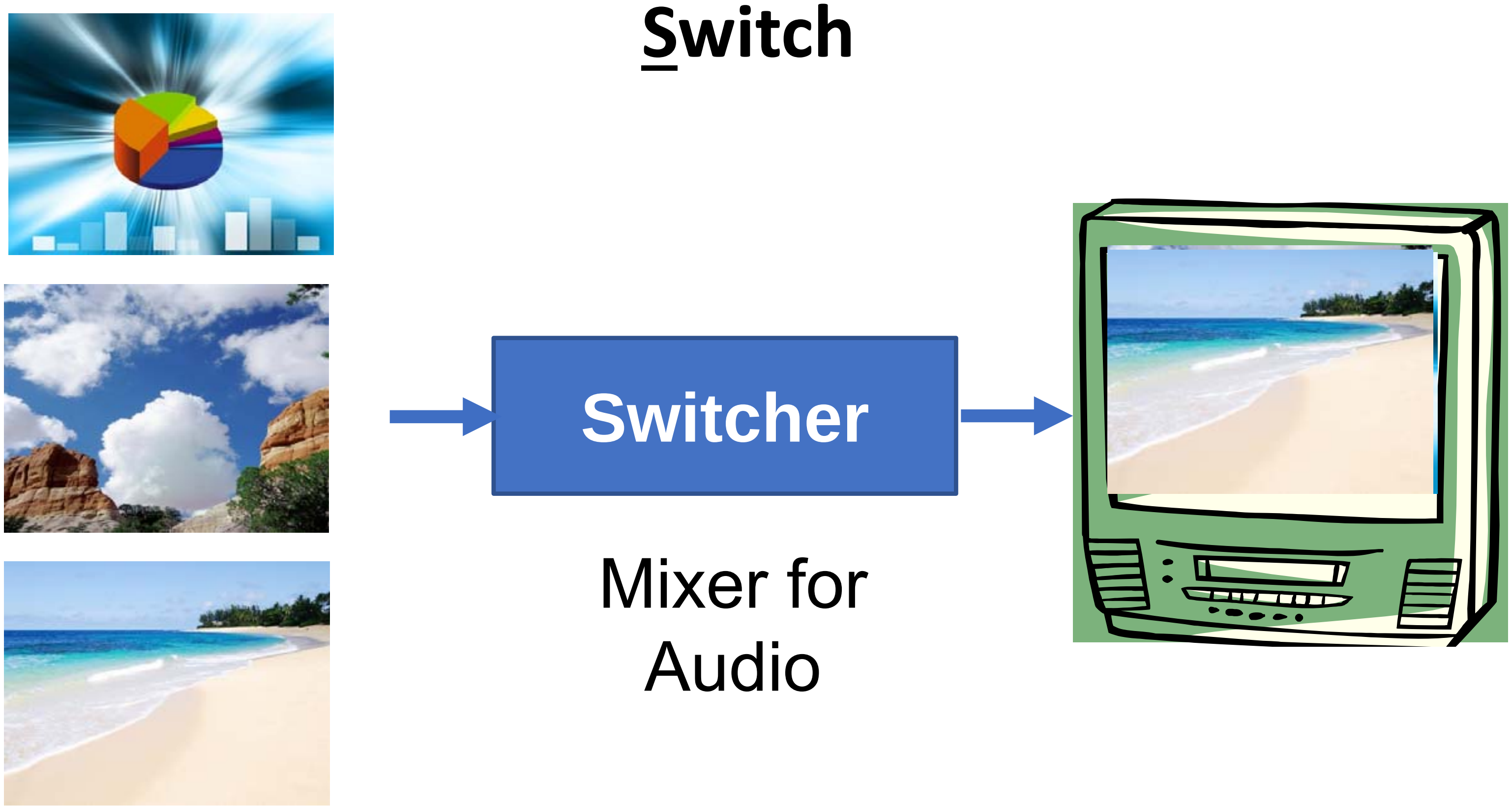


Distribution Amplifier

Supe Up (Strengthen)


Line Driver / Amplifier

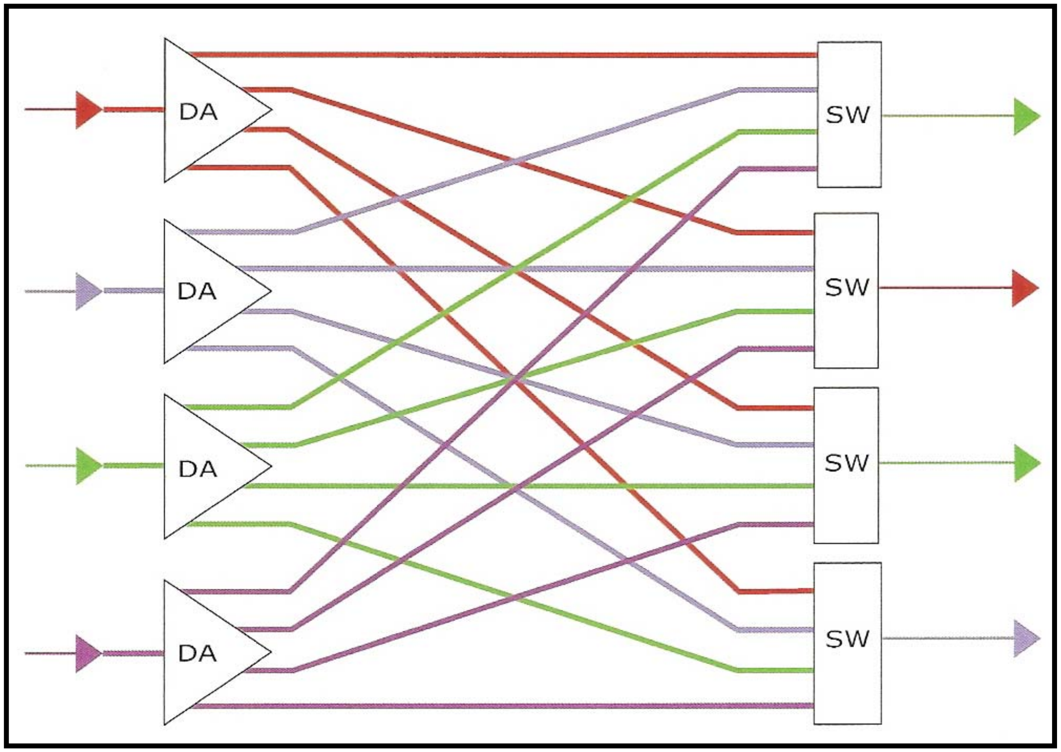
Switch



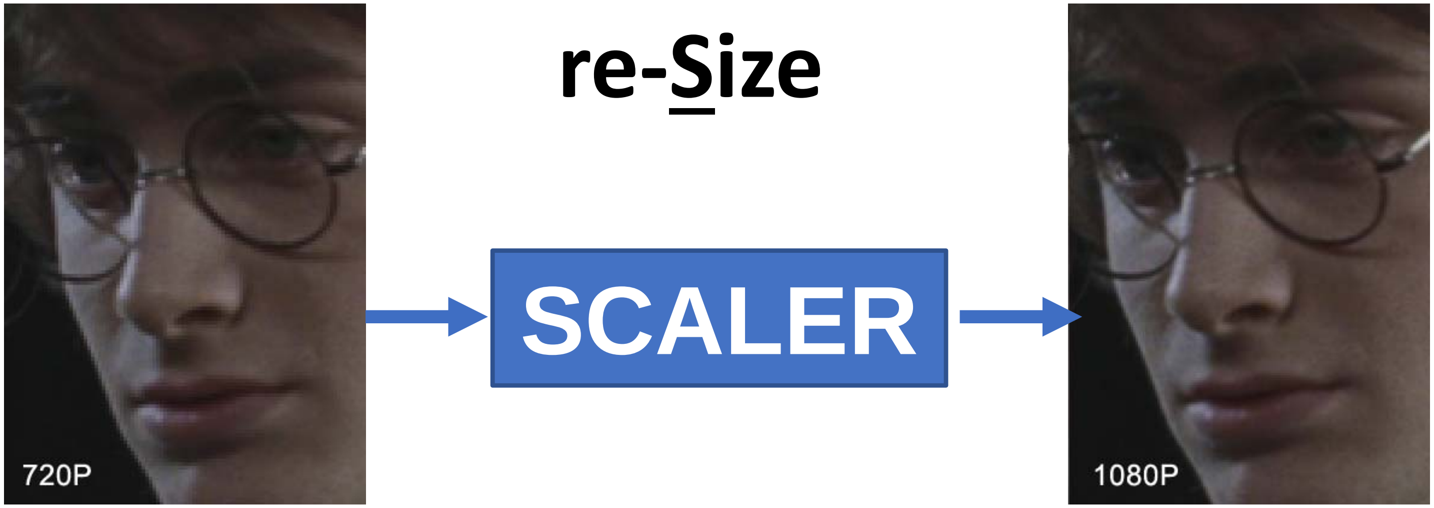
Switcher

Mixer for Audio

Matrix Switcher

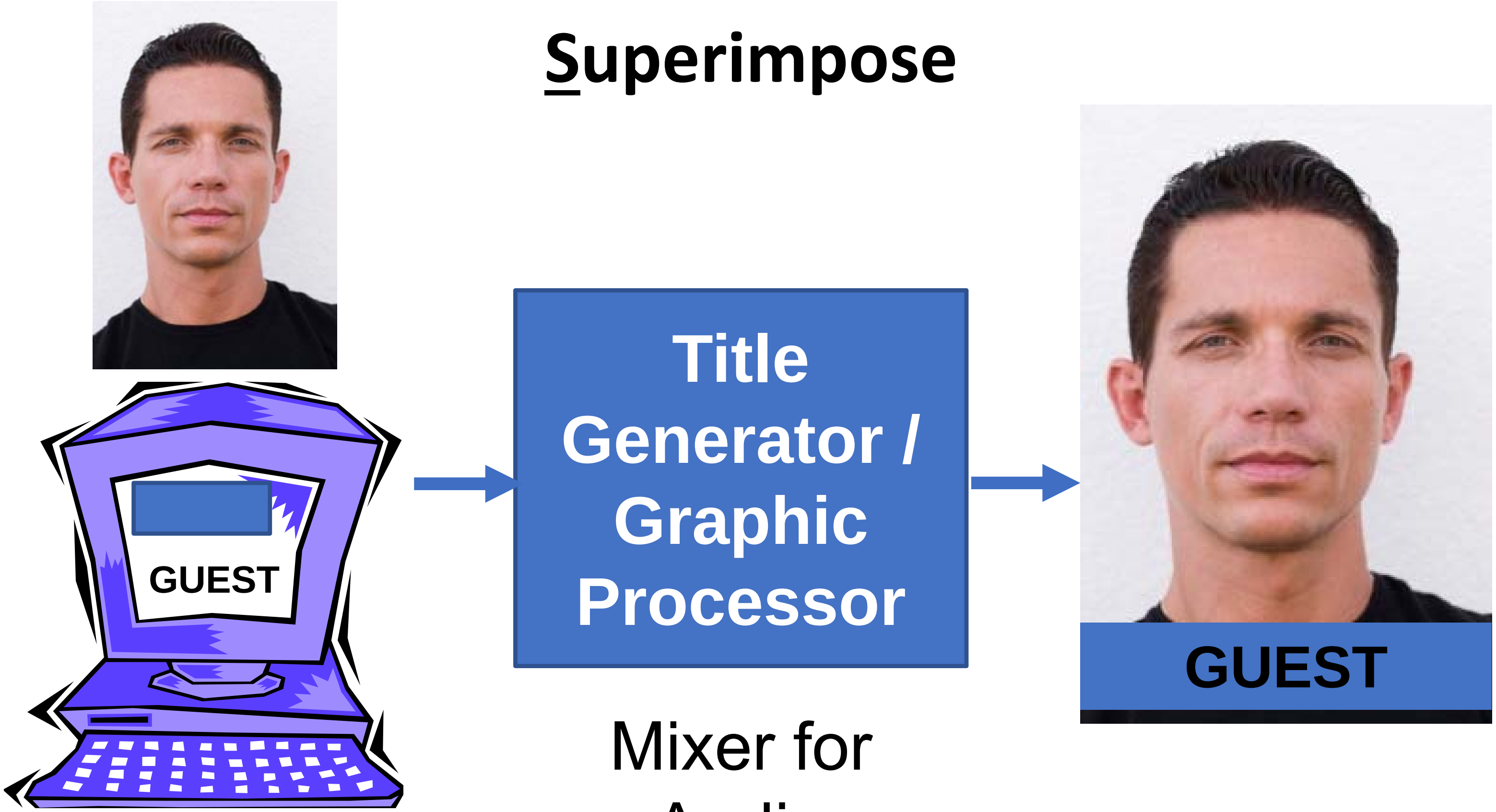

DA
DA
DA
DA
SW
SW
SW
SW

re-Size


720P
SCALER
1080P

1080p
720p
480p

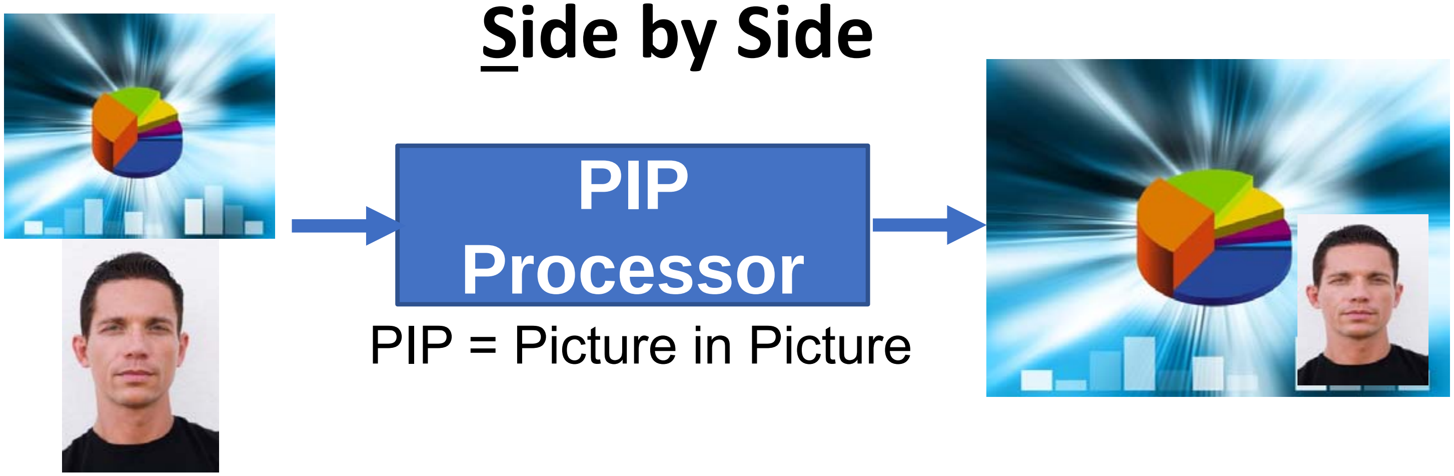
Superimpose



Title Generator / Graphic Processor

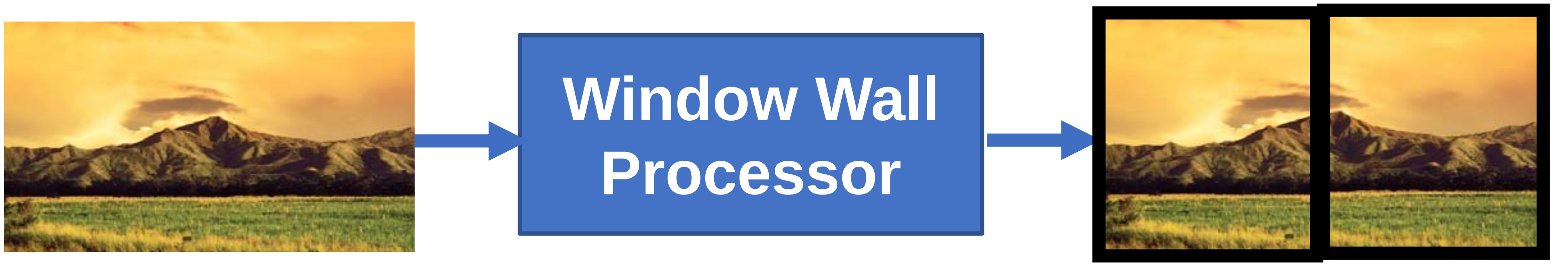
Mixer for Audio

Side by Side



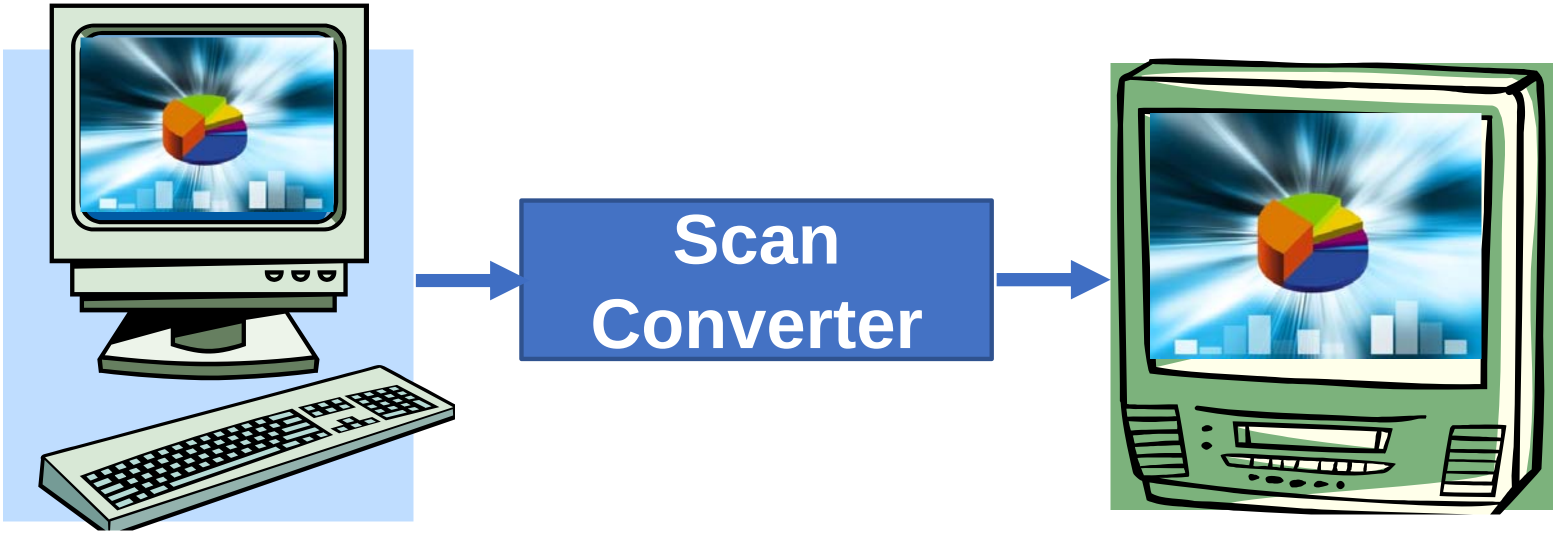
PIP Processor

PIP = Picture in Picture



Window Wall Processor

Swap



Scan Converter

Which is a correct statement?

A.
You do not need to spend money on processing
You can split signals using cables and adapters

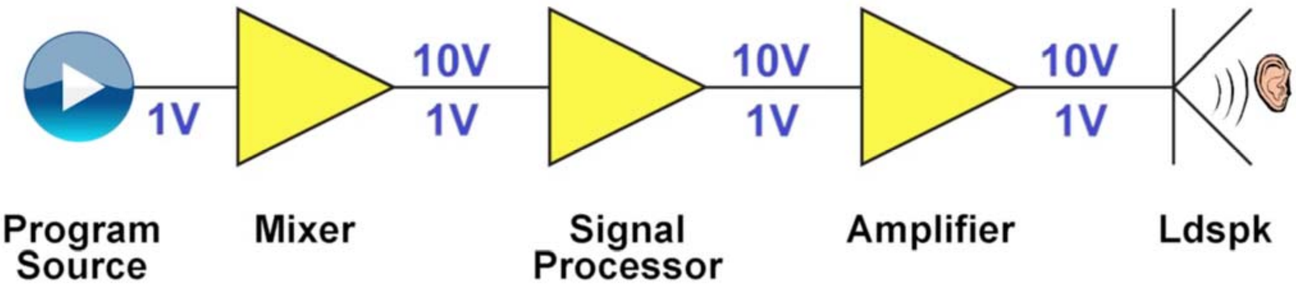
B.
Displays and sources will perfectly auto adjust their images to match after getting EDID settings

C.
External processors are better than ones in displays

D.
You will need a separate box for each processing option

Audio Processing

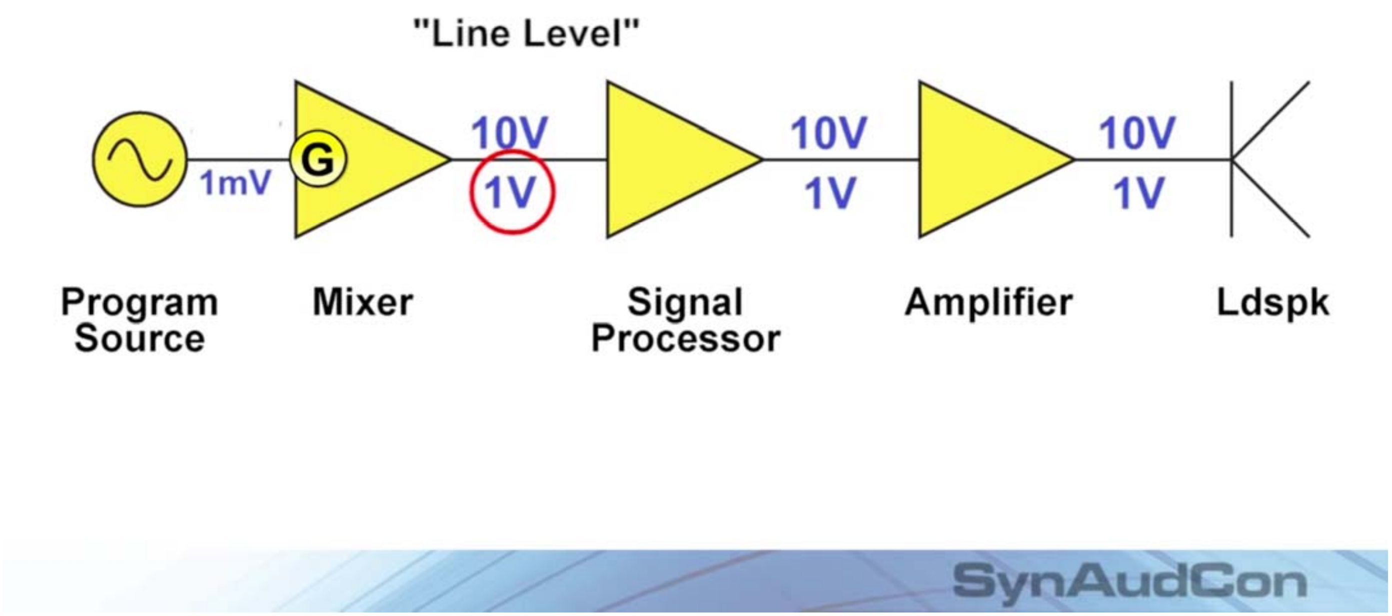
A Simple, Ideal Case


1V
10V
1V
10V
1V
10V
1V
Program Source
Mixer
Signal Processor
Amplifier
Ldspk

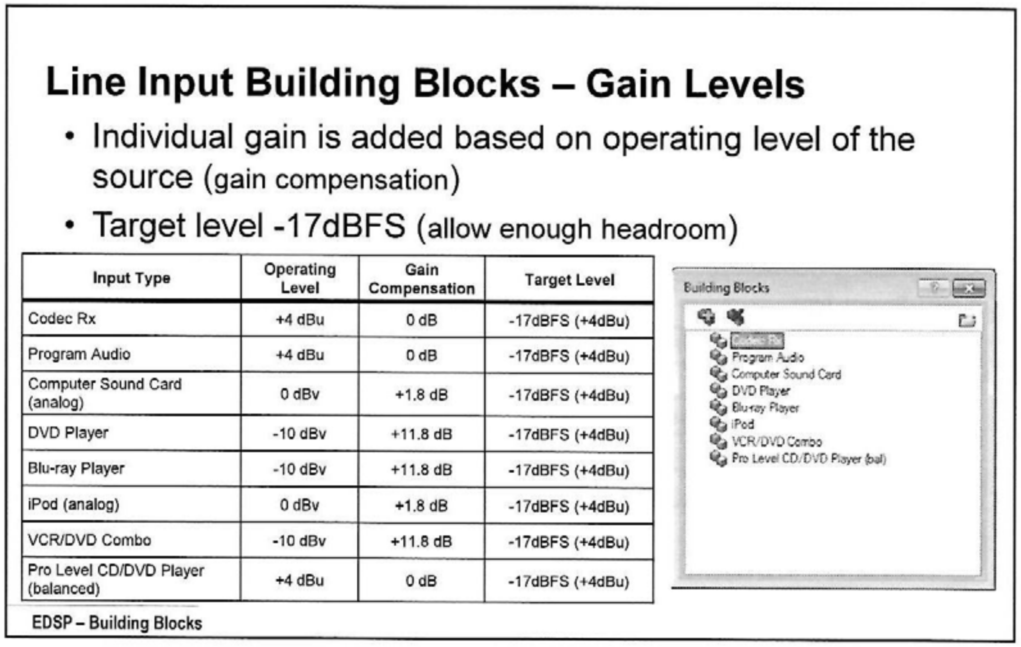
SynAudCon

Audio Processing

A Real-World System


"Line Level"
1mV
G
10V
1V
10V
1V
10V
1V
Program Source
Mixer
Signal Processor
Amplifier
Ldspk
SynAudCon

Audio Processing



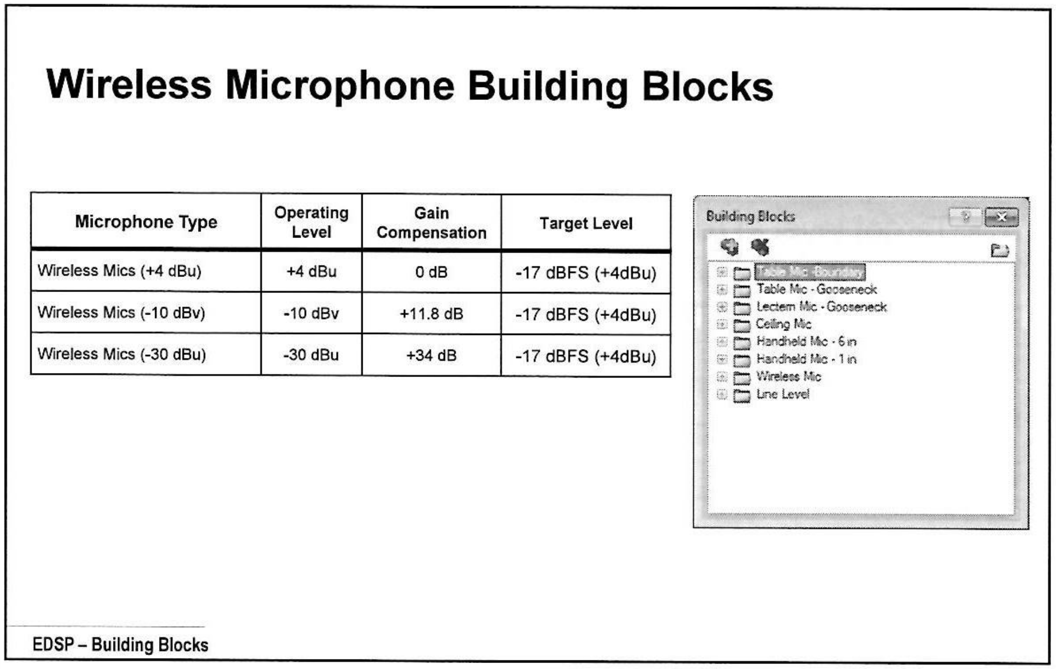
Line Input Building Blocks – Gain Levels

- Individual gain is added based on operating level of the source (gain compensation)
- Target level -17dBFS (allow enough headroom)

Input Type	Operating Level	Gain Compensation	Target Level
Codec Rx	+4 dBu	0 dB	-17dBFS (+4dBu)
Program Audio	+4 dBu	0 dB	-17dBFS (+4dBu)
Computer Sound Card (analog)	0 dBv	+1.8 dB	-17dBFS (+4dBu)
DVD Player	-10 dBv	+11.8 dB	-17dBFS (+4dBu)
Blu-ray Player	-10 dBv	+11.8 dB	-17dBFS (+4dBu)
iPod (analog)	0 dBv	+1.8 dB	-17dBFS (+4dBu)
VCR/DVD Combo	-10 dBv	+11.8 dB	-17dBFS (+4dBu)
Pro Level CD/DVD Player (balanced)	+4 dBu	0 dB	-17dBFS (+4dBu)

Building Blocks
Codec Rx
Program Audio
Computer Sound Card
DVD Player
Blu-ray Player
iPod
VCR/DVD Combo
Pro Level CD/DVD Player (bal)

EDSP – Building Blocks



Wireless Microphone Building Blocks

Microphone Type	Operating Level	Gain Compensation	Target Level
Wireless Mics (+4 dBu)	+4 dBu	0 dB	-17 dBFS (+4dBu)
Wireless Mics (-10 dBv)	-10 dBv	+11.8 dB	-17 dBFS (+4dBu)
Wireless Mics (-30 dBu)	-30 dBu	+34 dB	-17 dBFS (+4dBu)

Building Blocks
Table Mic - Boundary
Table Mic - Gooseneck
Lectern Mic - Gooseneck
Ceiling Mic
Handheld Mic - 6 in
Handheld Mic - 1 in
Wireless Mic
Line Level

EDSP – Building Blocks

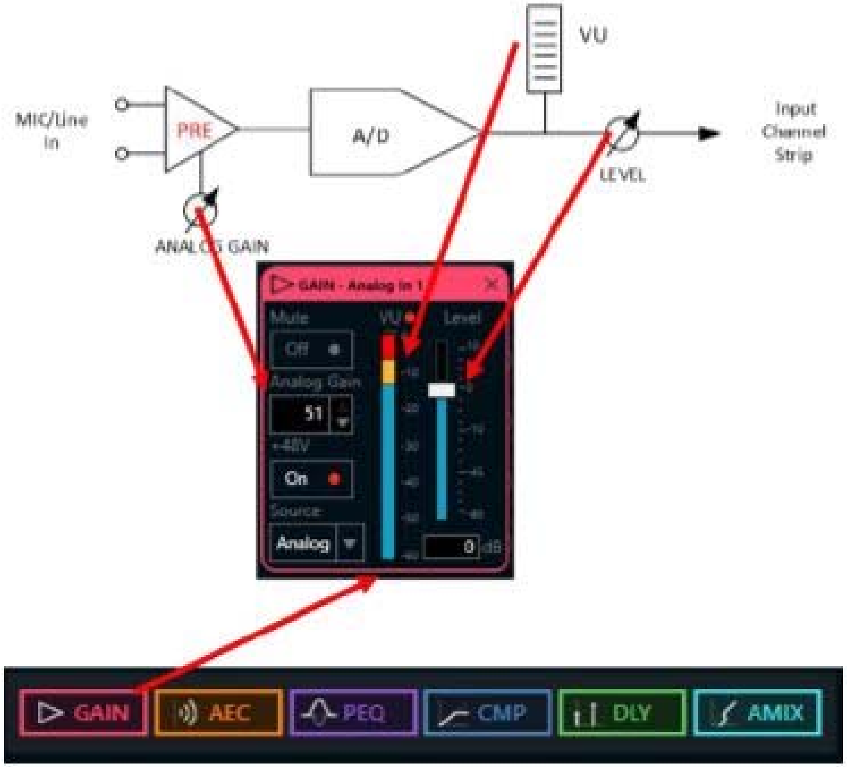
Audio Processing

+48V
3
gain
30
0 mic 60
line +40
80Hz
+48V
4
gain
0
30
0 mic 60
-20 line +40
80Hz
+48V
5
0
30
0 mic 60
-20 line +40

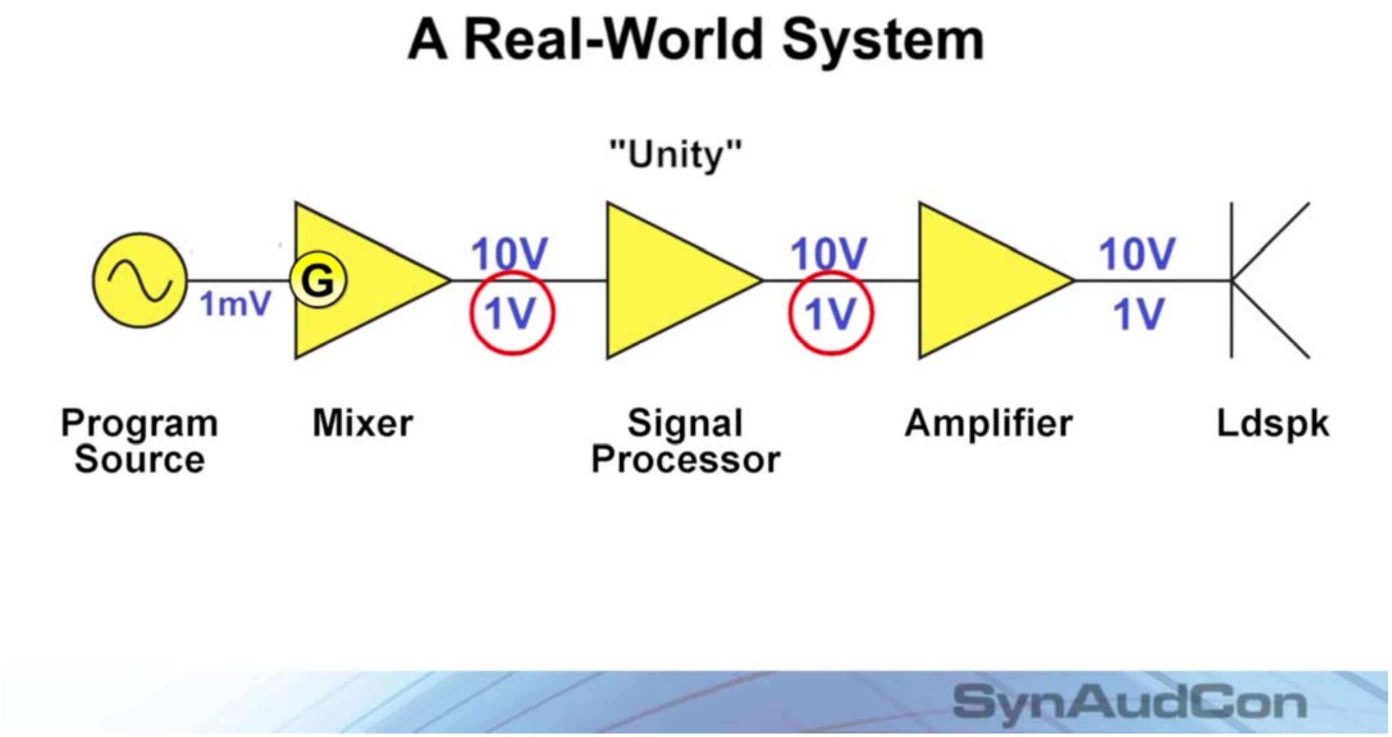
Audio Processing

UNBAL BALANCED
INPUT
BALANCED UNBAL
OUTPUT
PWR
DC IN
12 VDC
ROLLS
MADE IN USA
Mini-Mic
Preamp
MP13
GAIN
6 dB 50
clip
PHANTOM
POWER
pwr

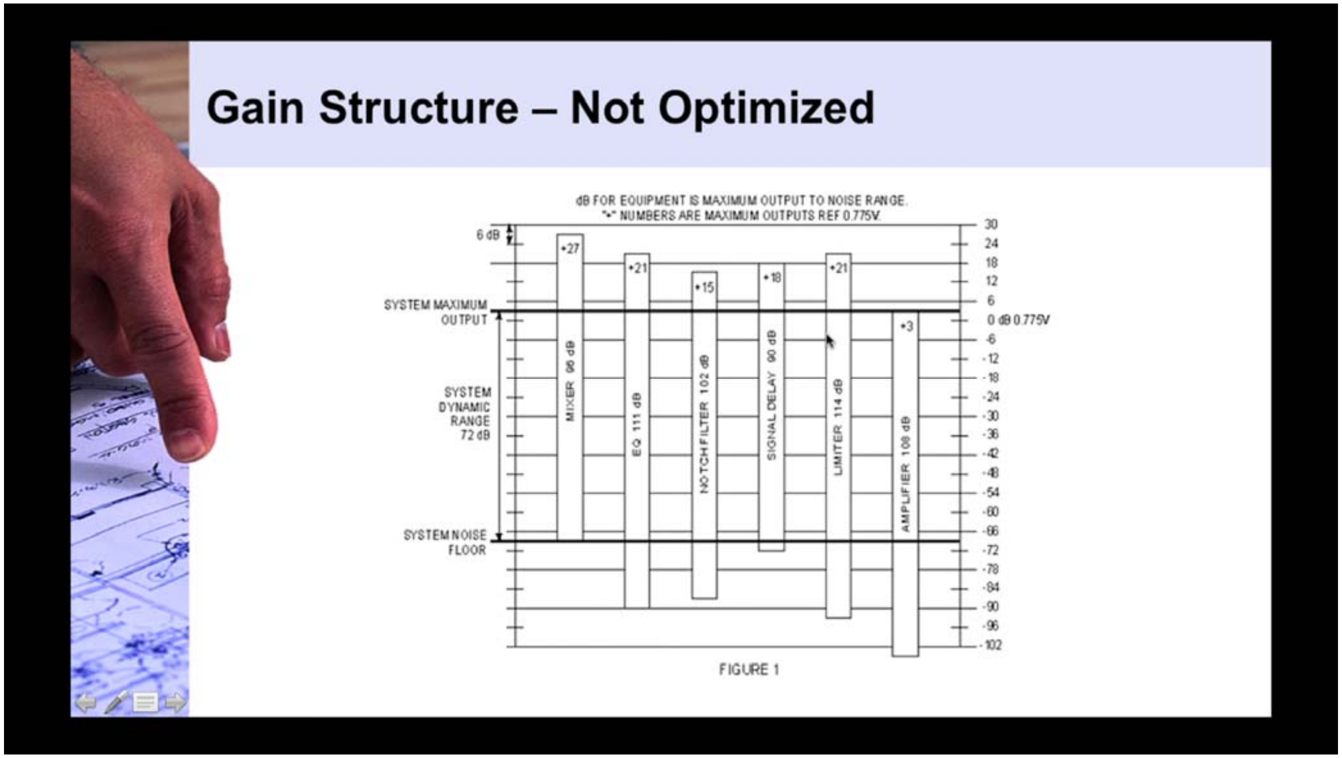
Audio Processing - INPUT


MIC/Line In
PRE
ANALOG GAIN
A/D
VU
LEVEL
Input Channel Strip
GAIN - Analog In 1
Mute
Off
Analog Gain
51
+48V
On
Source
Analog
VU
Level
0 dB
GAIN
AEC
PEQ
CMP
DLY
AMIX

Audio Processing


A Real-World System
"Unity"
1mV
G
10V
1V
10V
1V
10V
1V
Program Source
Mixer
Signal Processor
Amplifier
Ldspk
SynAudCon

Audio Processing

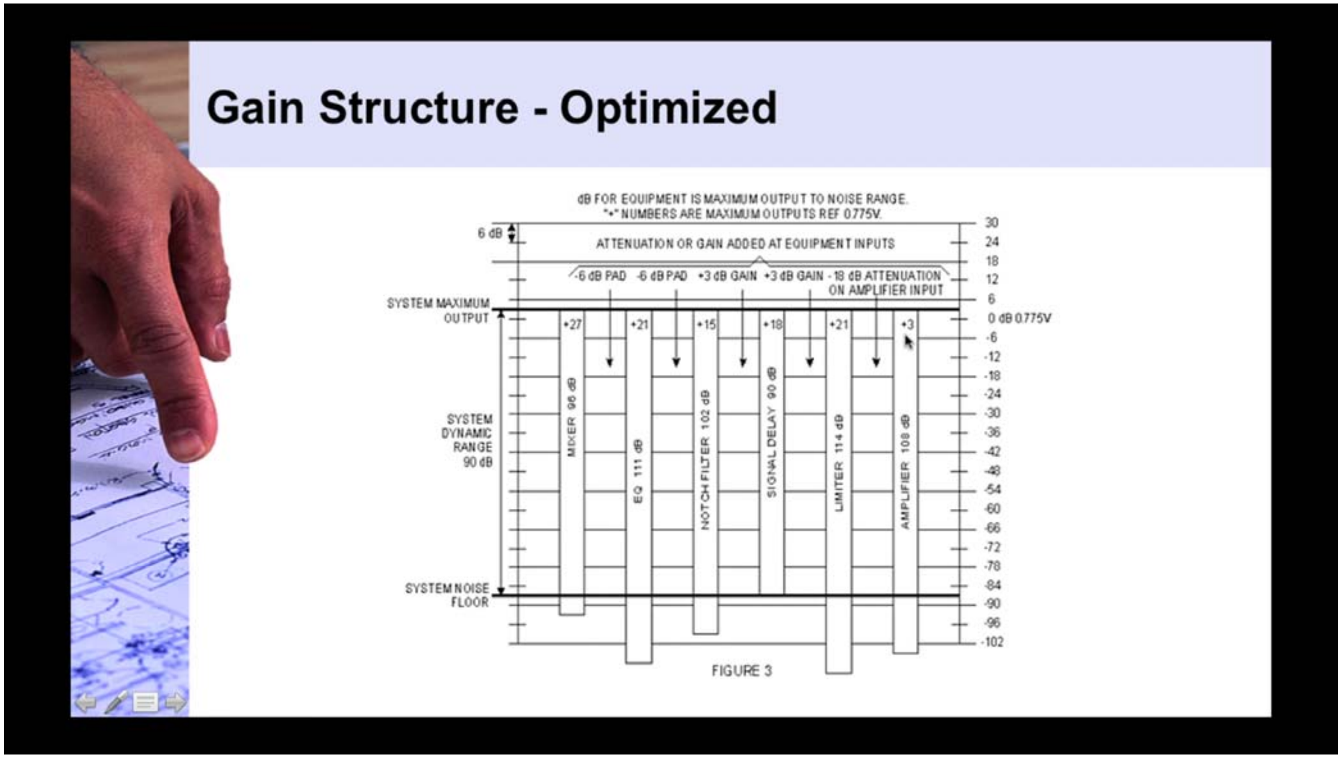


Gain Structure – Not Optimized

dB FOR EQUIPMENT IS MAXIMUM OUTPUT TO NOISE RANGE.
"+" NUMBERS ARE MAXIMUM OUTPUTS REF 0.775V.
6 dB
SYSTEM MAXIMUM OUTPUT
SYSTEM DYNAMIC RANGE 72 dB
SYSTEM NOISE FLOOR
+27
MIXER 96 dB
+21
EQ 111 dB
+15
NOTCH FILTER 102 dB
+18
SIGNAL DELAY 90 dB
+21
LIMITER 114 dB
+3
AMPLIFIER 108 dB
30
24
18
12
6
0 dB 0.775V
-6
-12
-18
-24
-30
-36
-42
-48
-54
-60
-66
-72
-78
-84
-90
-96
-102

FIGURE 1

Audio Processing

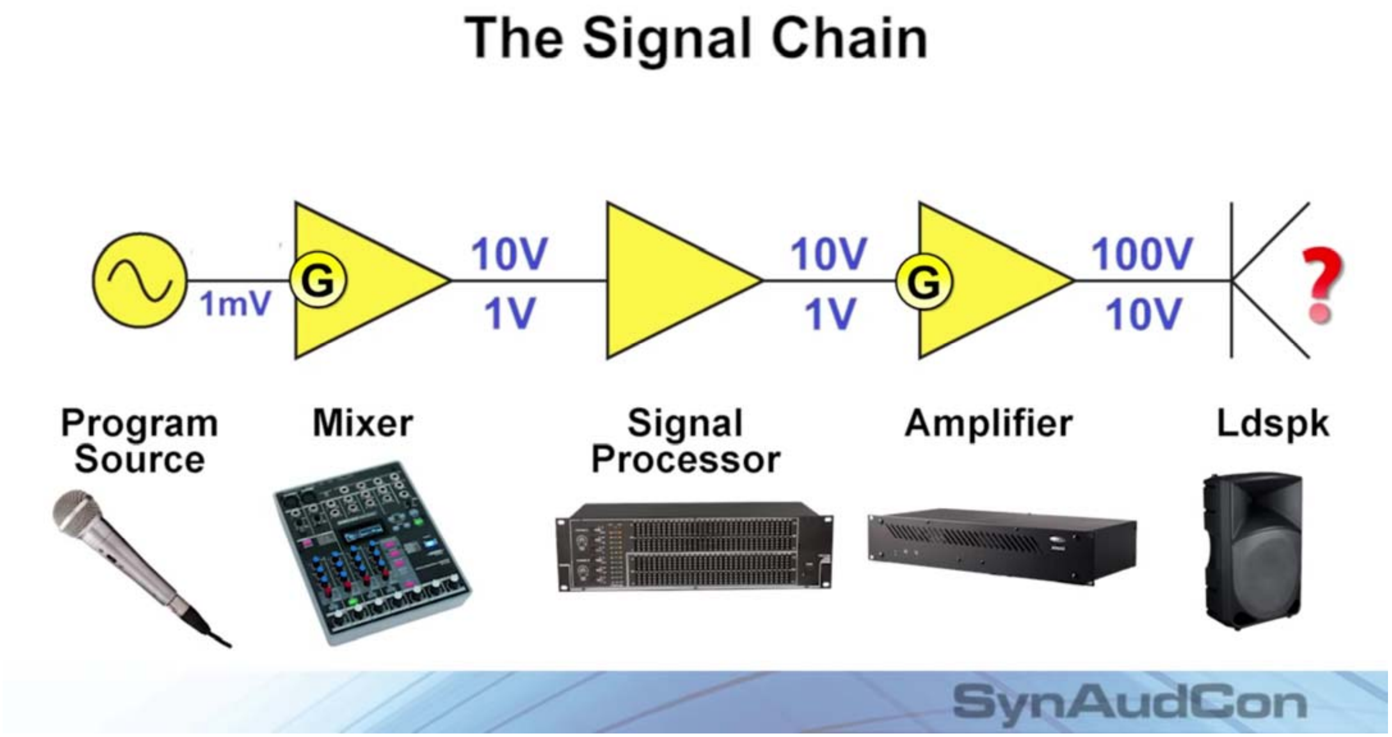


Gain Structure - Optimized

dB FOR EQUIPMENT IS MAXIMUM OUTPUT TO NOISE RANGE.
"+" NUMBERS ARE MAXIMUM OUTPUTS REF 0.775V.
6 dB
ATTENUATION OR GAIN ADDED AT EQUIPMENT INPUTS
-6 dB PAD
-6 dB PAD
+3 dB GAIN
+3 dB GAIN
-18 dB ATTENUATION ON AMPLIFIER INPUT
SYSTEM MAXIMUM OUTPUT
SYSTEM DYNAMIC RANGE 90 dB
SYSTEM NOISE FLOOR
+27
+21
+15
+18
+21
+3
MIXER 96 dB
EQ 111 dB
NOTCH FILTER 102 dB
SIGNAL DELAY 90 dB
LIMITER 114 dB
AMPLIFIER 108 dB
30
24
18
12
6
0 dB 0.775V
-6
-12
-18
-24
-30
-36
-42
-48
-54
-60
-66
-72
-78
-84
-90
-96
-102

FIGURE 3

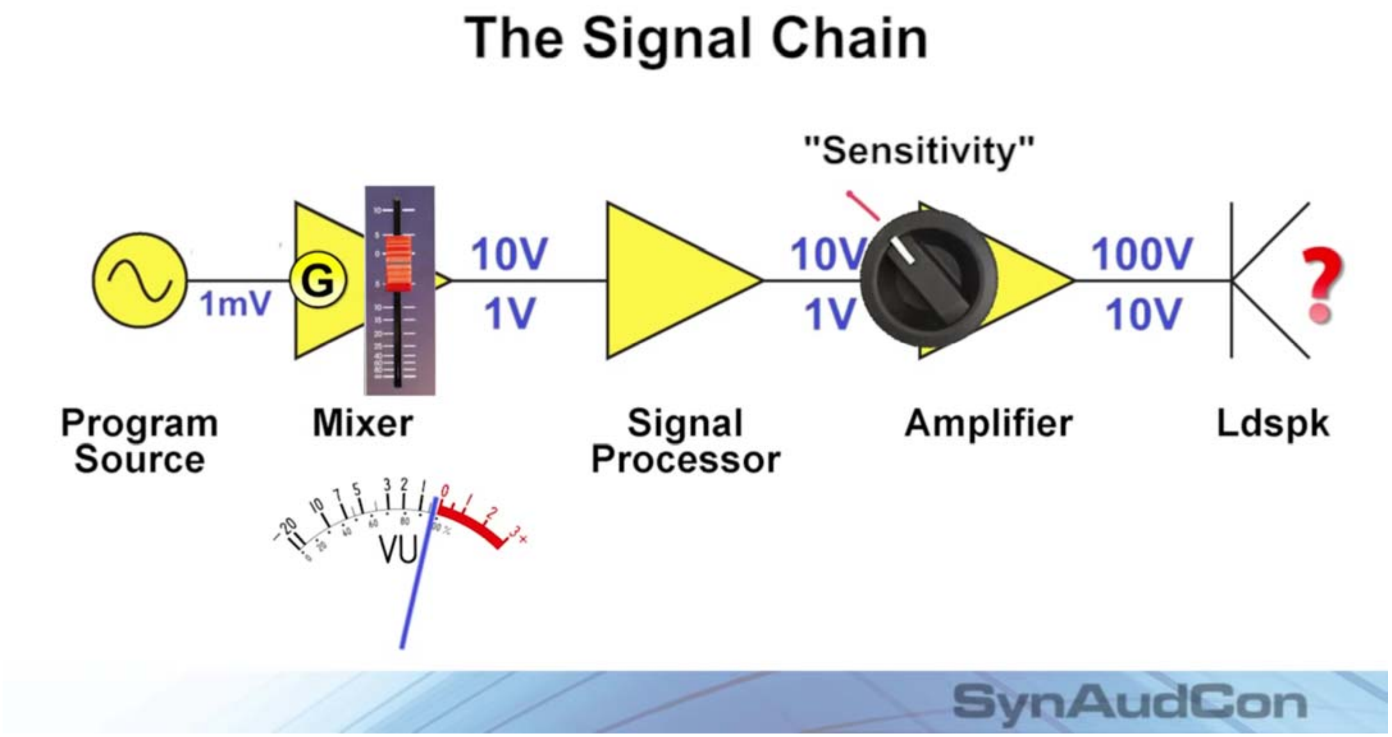
Audio Processing



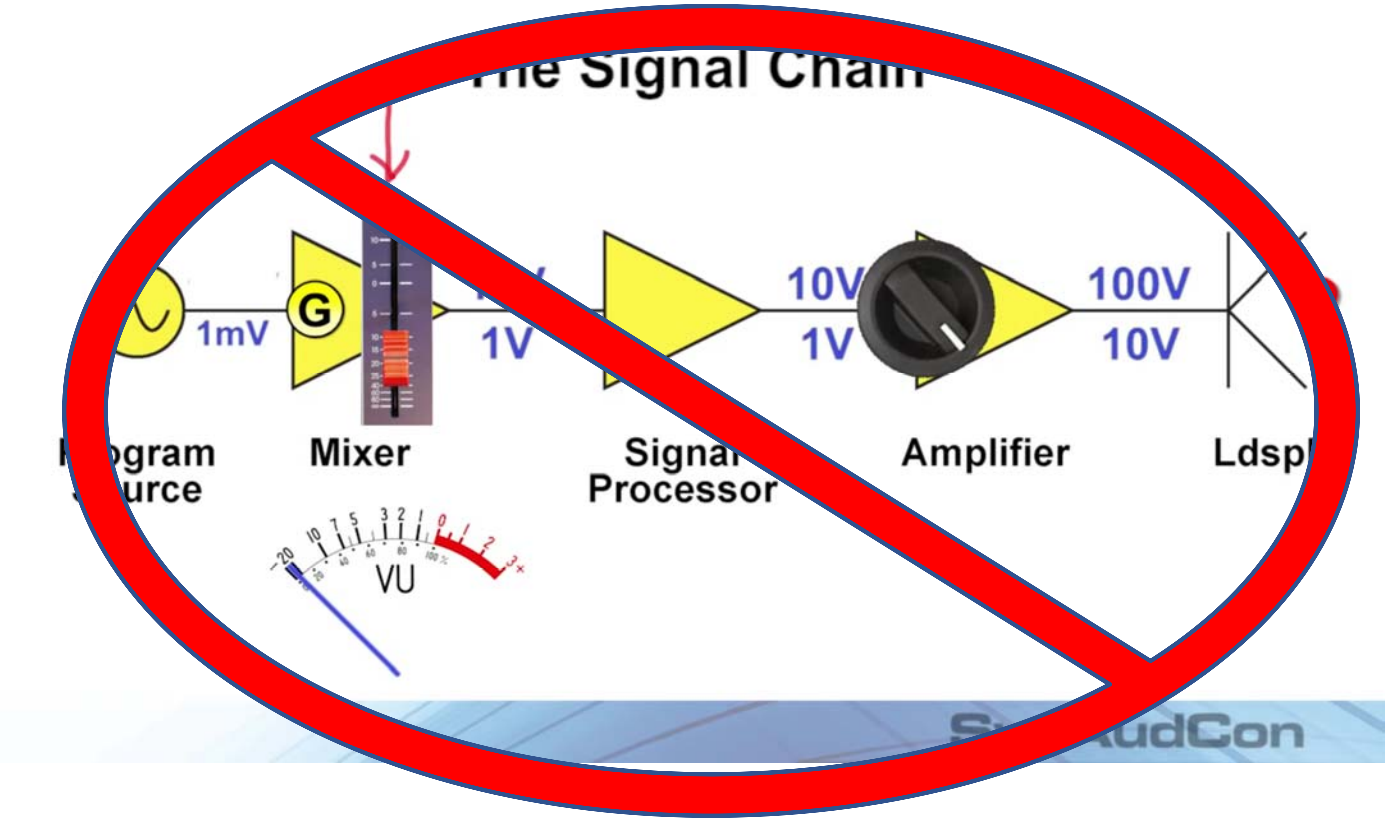
The Signal Chain

1mV
G
10V
1V
10V
1V
G
100V
10V
?
Program Source
Mixer
Signal Processor
Amplifier
Ldspk
SynAudCon

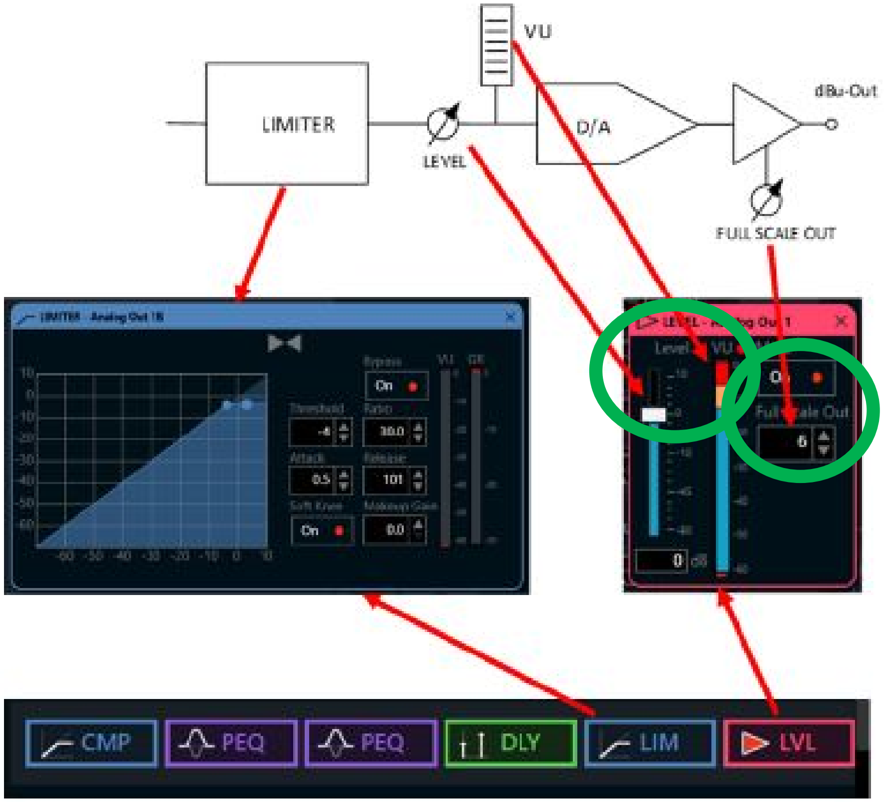
Audio Processing


The Signal Chain
"Sensitivity"
1mV
G
10V
1V
10V
1V
100V
10V
?
Program Source
Mixer
Signal Processor
Amplifier
Ldspk
VU
SynAudCon

Audio Processing


The Signal Chain
1mV
G
1V
10V
1V
100V
10V
Program Source
Mixer
Signal Processor
Amplifier
Ldspk
VU
SynAudCon

Audio Processing - OUTPUT



VU
LIMITER
LEVEL
D/A
dBu-Out
FULL SCALE OUT
CMP
PEQ
PEQ
DLY
LIM
LVL

LIMITER - Analog Out 1B

Bypass: On

Threshold: -4

Ratio: 30.0

Attack: 0.5

Release: 101

Soft Knee: On

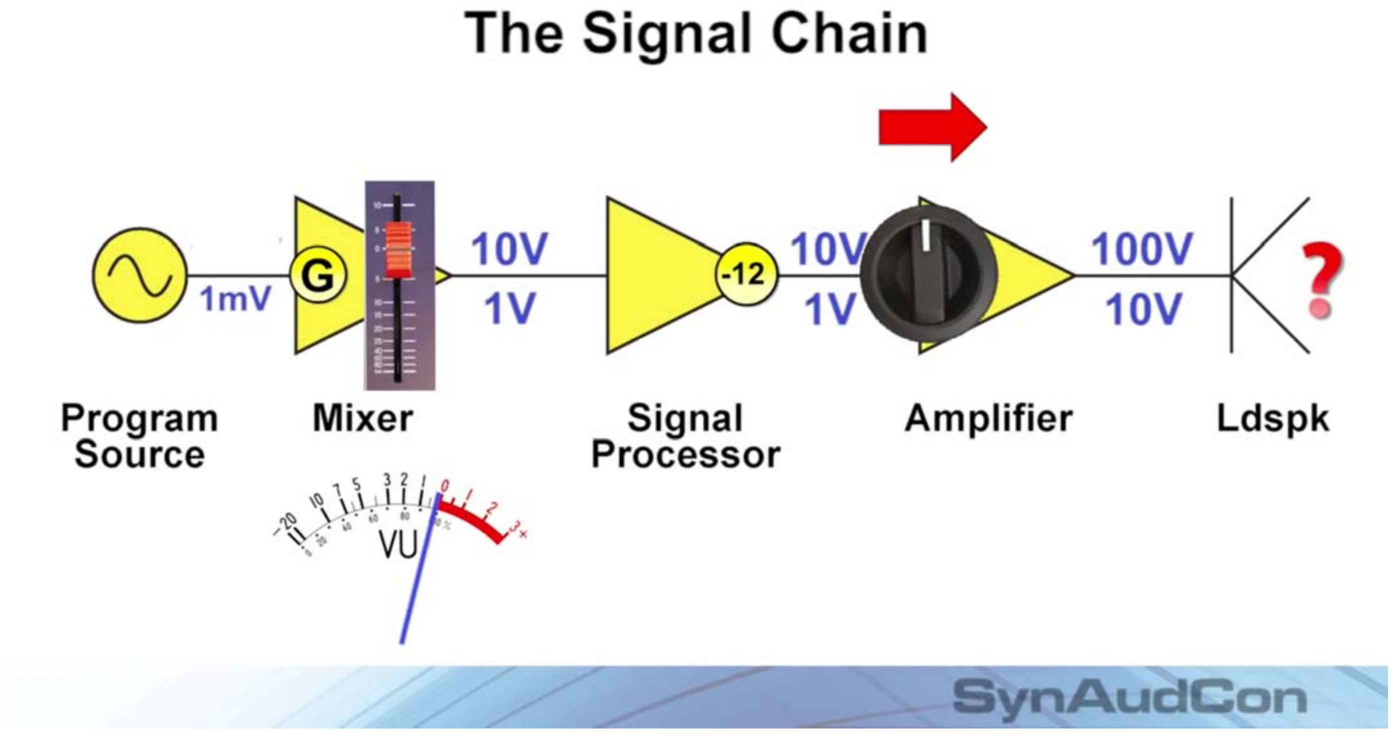
Makeup Gain: 0.0

LEVEL - Analog Out 1

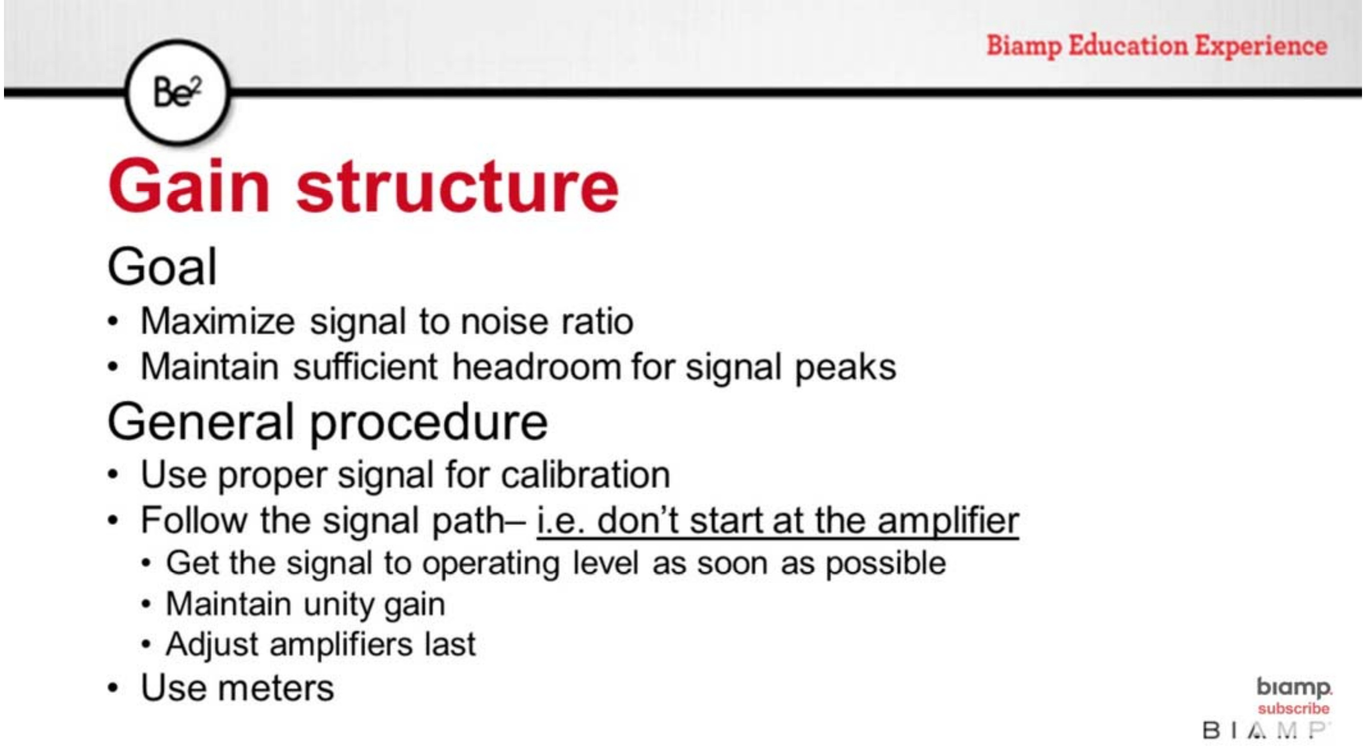
Level: 0 dB

Full Scale Out: 6

Audio Processing


The Signal Chain
G
1mV
10V
1V
-12
10V
1V
100V
10V
?
Program Source
Mixer
Signal Processor
Amplifier
Ldspk
VU
-20
10
7
5
3
2
1
0
1
2
3+
SynAudCon

Audio Processing



Biamp Education Experience

Be²

Gain structure

Goal

- Maximize signal to noise ratio
- Maintain sufficient headroom for signal peaks

General procedure

- Use proper signal for calibration
- Follow the signal path– i.e. don’t start at the amplifier
  - Get the signal to operating level as soon as possible
  - Maintain unity gain
  - Adjust amplifiers last
- Use meters

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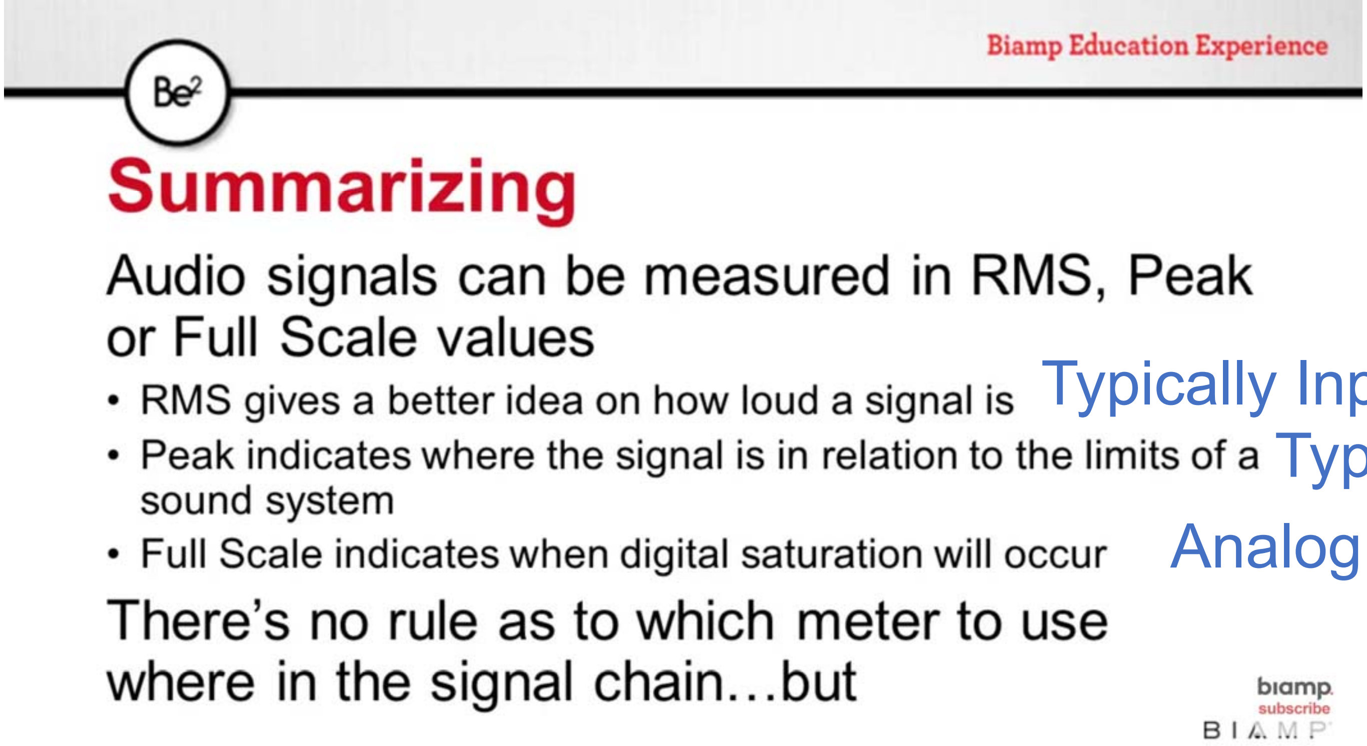
subscribe
BIAMP

Audio Processing



Biamp Education Experience

Be²

Summarizing

Audio signals can be measured in RMS, Peak or Full Scale values

- RMS gives a better idea on how loud a signal is
- Peak indicates where the signal is in relation to the limits of a sound system
- Full Scale indicates when digital saturation will occur

There's no rule as to which meter to use where in the signal chain…but

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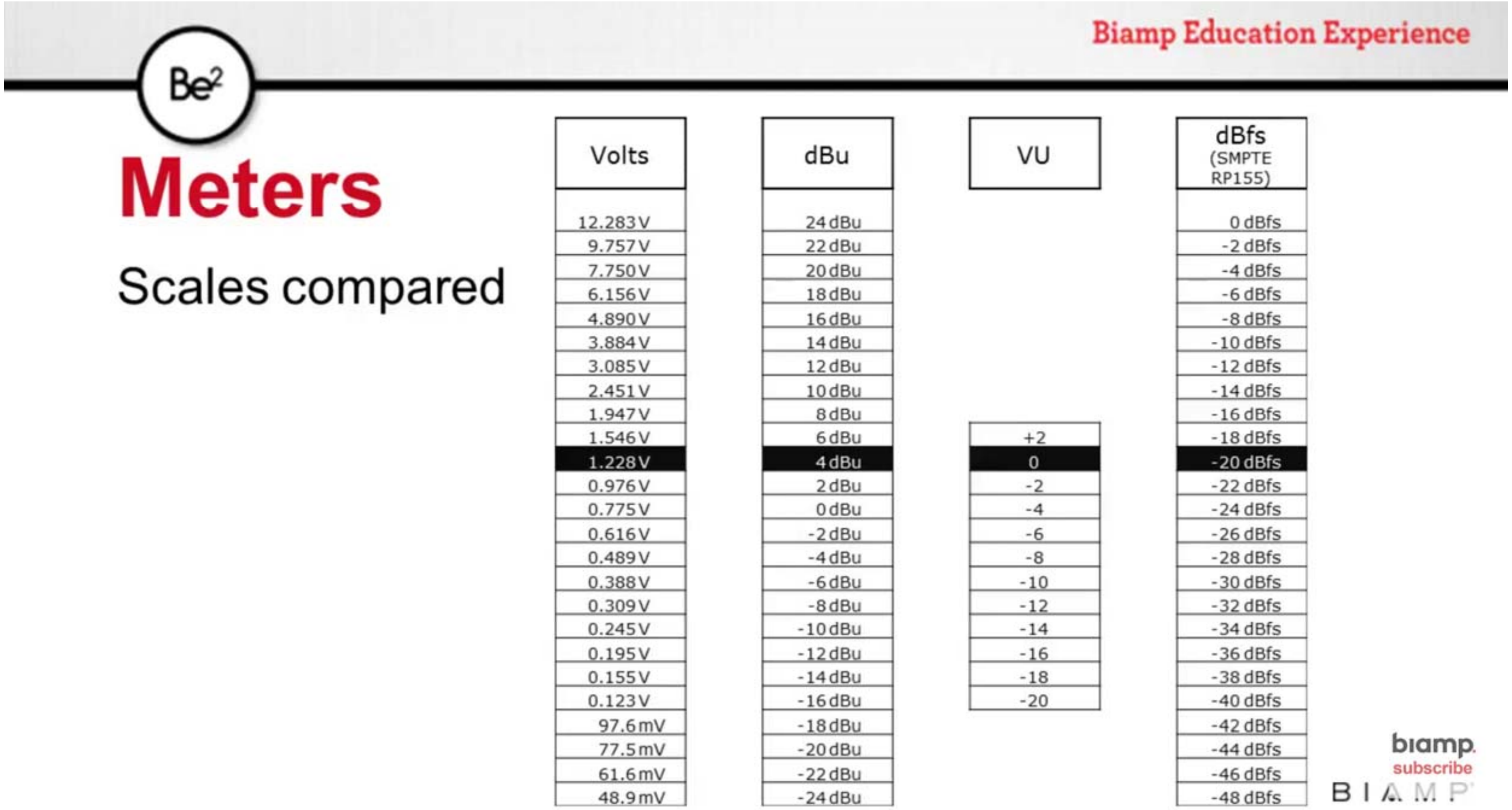
Typically Input

Typically output

Analog Gain Points



Biamp Education Experience

Be²

Meters

Scales compared

Volts	dBu	VU	dBfs (SMPTE RP155)
12.283V	24 dBu		0 dBfs
9.757V	22 dBu		-2 dBfs
7.750V	20 dBu		-4 dBfs
6.156V	18 dBu		-6 dBfs
4.890V	16 dBu		-8 dBfs
3.884V	14 dBu		-10 dBfs
3.085V	12 dBu		-12 dBfs
2.451V	10 dBu		-14 dBfs
1.947V	8 dBu		-16 dBfs
1.546V	6 dBu	+2	-18 dBfs
1.228V	**4 dBu**	**0**	**-20 dBfs**
0.976V	2 dBu	-2	-22 dBfs
0.775V	0 dBu	-4	-24 dBfs
0.616V	-2 dBu	-6	-26 dBfs
0.489V	-4 dBu	-8	-28 dBfs
0.388V	-6 dBu	-10	-30 dBfs
0.309V	-8 dBu	-12	-32 dBfs
0.245V	-10 dBu	-14	-34 dBfs
0.195V	-12 dBu	-16	-36 dBfs
0.155V	-14 dBu	-18	-38 dBfs
0.123V	-16 dBu	-20	-40 dBfs
97.6mV	-18 dBu		-42 dBfs
77.5mV	-20 dBu		-44 dBfs
61.6mV	-22 dBu		-46 dBfs
48.9mV	-24 dBu		-48 dBfs

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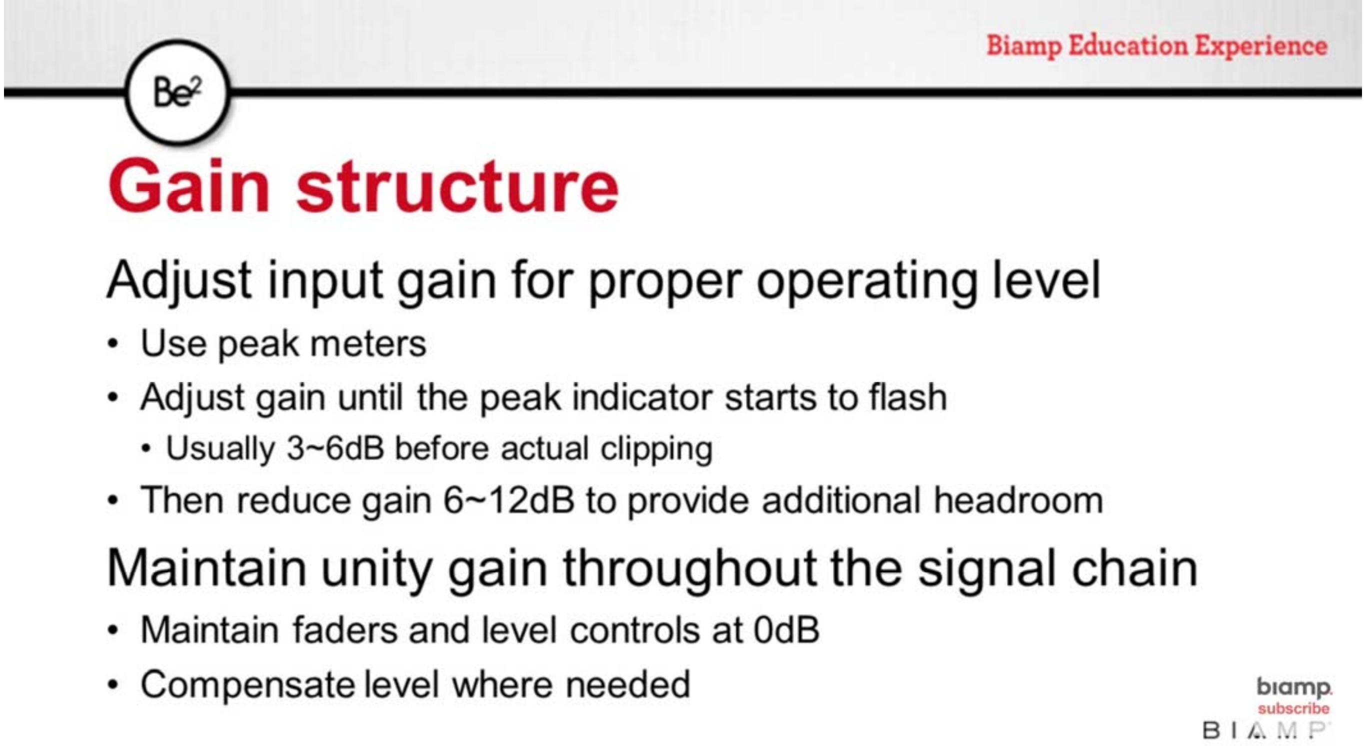
BIAMP

“Unity Gain”

Audio Processing



Biamp Education Experience

Be²

Gain structure

Adjust input gain for proper operating level

- Use peak meters
- Adjust gain until the peak indicator starts to flash
  - Usually 3~6dB before actual clipping
- Then reduce gain 6~12dB to provide additional headroom

Maintain unity gain throughout the signal chain

- Maintain faders and level controls at 0dB
- Compensate level where needed

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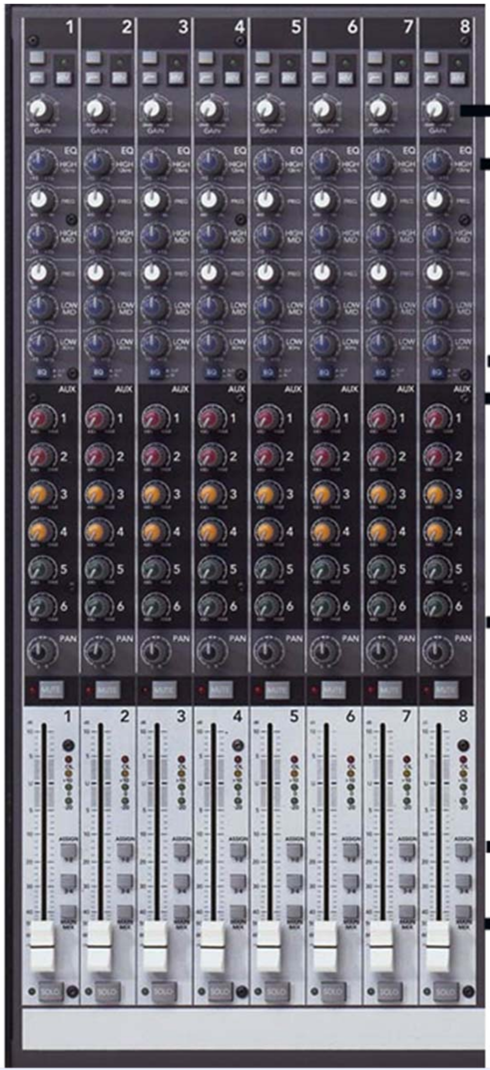
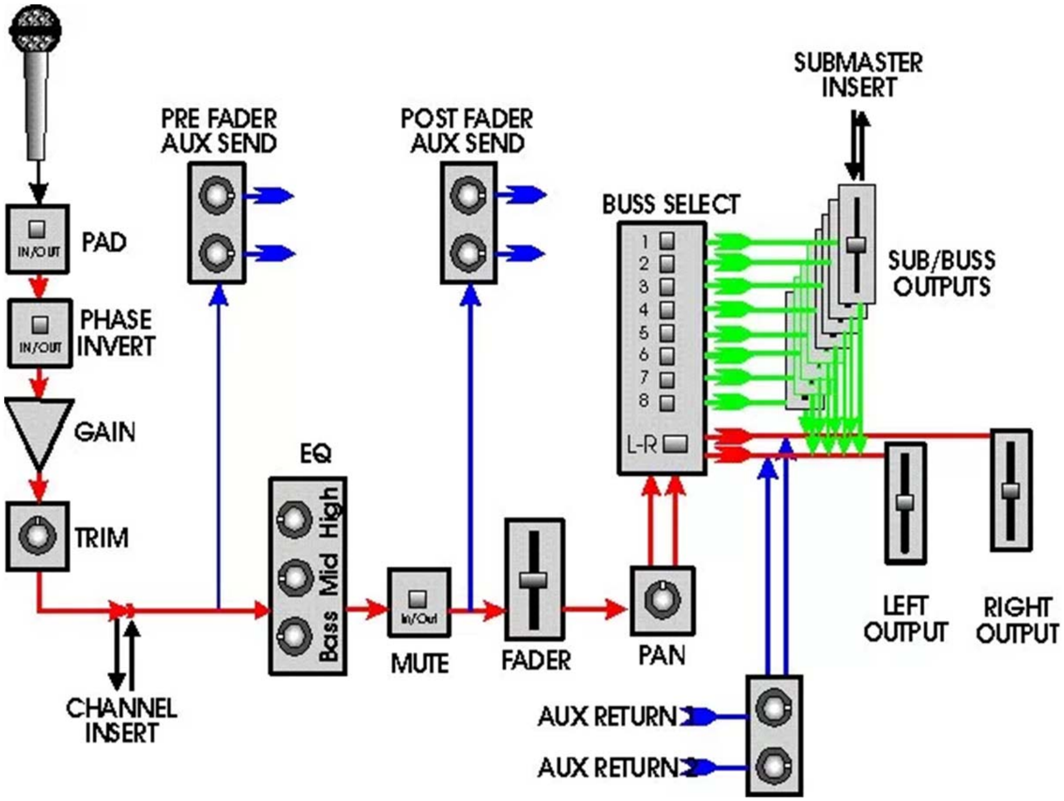


Gain Knobs

EQ Section

Aux Section

Assign Buttons

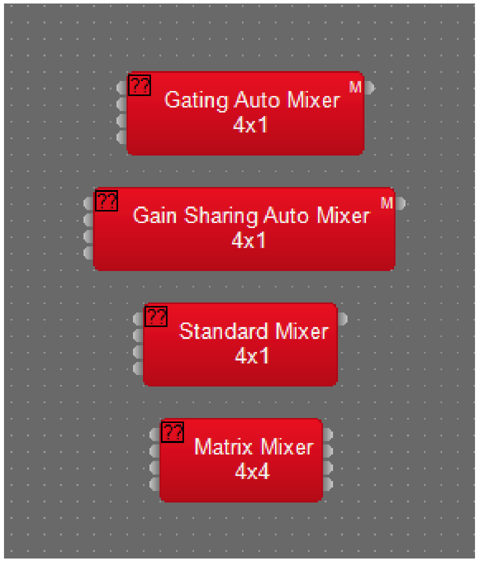

PRE FADER AUX SEND
POST FADER AUX SEND
SUBMASTER INSERT
BUSS SELECT
1
2
3
4
5
6
7
8
L-R
SUB/BUSS OUTPUTS
PAD
IN/OUT
PHASE INVERT
IN/OUT
GAIN
TRIM
EQ
High
Mid
Bass
In/Out
MUTE
FADER
PAN
LEFT OUTPUT
RIGHT OUTPUT
CHANNEL INSERT
AUX RETURN
AUX RETURN

Audio Processing

- Mixer = Combines sound levels
- Equalizer = adjust frequencies (filter or enhance)
- Reverb and Delay = adjust for reflections
- Compressors & Limiters = adjust frequency range
- Gates and Expanders = eliminate low noise

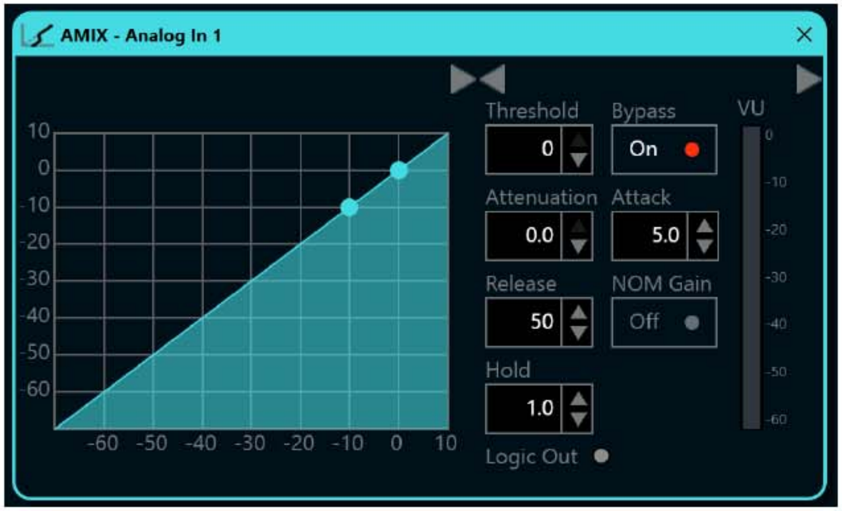
Audio Processing

– Mixer = Combine sound levels


Gating Auto Mixer
4x1
Gain Sharing Auto Mixer
4x1
Standard Mixer
4x1
Matrix Mixer
4x4

Automatic mixer suggested settings:

- Threshold: -40 dB
- Attenuation: -40 dB
- Attack: 1.0 ms
- Release: 50 ms
- NOM Gain: On
- Hold: 1.0 seconds
- Last Mic: Last
- NOM Limit: 4



AMIX - Analog In 1

Threshold: 0

Bypass: On ●

Attenuation: 0.0

Attack: 5.0

Release: 50

NOM Gain: Off ●

Hold: 1.0

Logic Out ●

10
0
-10
-20
-30
-40
-50
-60
-60 -50 -40 -30 -20 -10 0 10
VU
0
-10
-20
-30
-40
-50
-60

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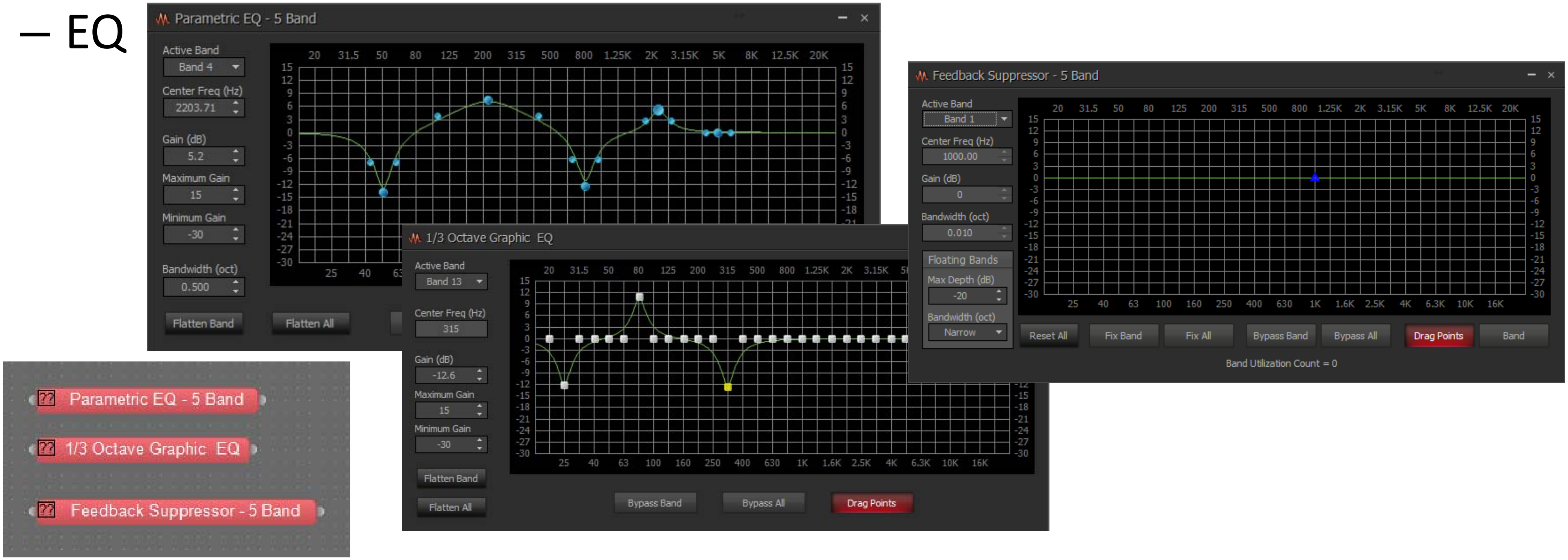
Audio Processing

– EQ



Parametric EQ - 5 Band

Active Band: Band 4
Center Freq (Hz): 2203.71
Gain (dB): 5.2
Maximum Gain: 15
Minimum Gain: -30
Bandwidth (oct): 0.500

1/3 Octave Graphic EQ

Active Band: Band 13
Center Freq (Hz): 315
Gain (dB): -12.6
Maximum Gain: 15
Minimum Gain: -30

Feedback Suppressor - 5 Band

Active Band: Band 1
Center Freq (Hz): 1000.00
Gain (dB): 0
Bandwidth (oct): 0.010
Floating Bands
Max Depth (dB): -20
Bandwidth (oct): Narrow

Band Utilization Count = 0

Flatten Band
Flatten All
Bypass Band
Bypass All
Drag Points
Reset All
Fix Band
Fix All
Band
20 31.5 50 80 125 200 315 500 800 1.25K 2K 3.15K 5K 8K 12.5K 20K
25 40 63 100 160 250 400 630 1K 1.6K 2.5K 4K 6.3K 10K 16K
15 12 9 6 3 0 -3 -6 -9 -12 -15 -18 -21 -24 -27 -30
Parametric EQ - 5 Band
1/3 Octave Graphic EQ
Feedback Suppressor - 5 Band

– EQ – Starting Points

Vocals

- < 200 Hz: Cut for clarity
- 150 Hz – 600 Hz: Warmth
- 500 Hz – 2 kHz: Nasal (Cut to eliminate) Around 350
- 3 kHz – 5 kHz: Sibilance (Cut to eliminate) Around 2750
- 1.5 kHz – 8 kHz: Clarity and Presence 2-4K sweet spot
- 10 kHz+: Airy (Breathy)

– EQ

First, understand that prerecorded program sources like Blu Rays, DVDs, and music CDs have been optimized as audio sources when produced

Therefore, other than gain, these sources do not need any other input processing

If these don't sound good through the system loudspeakers, look to improper equalization on the output processing strip feeding the loudspeakers

– EQ

Input source parametric equalization is only for

- Microphone
- Telephone
- CODEC optimization

Fixing its response if:

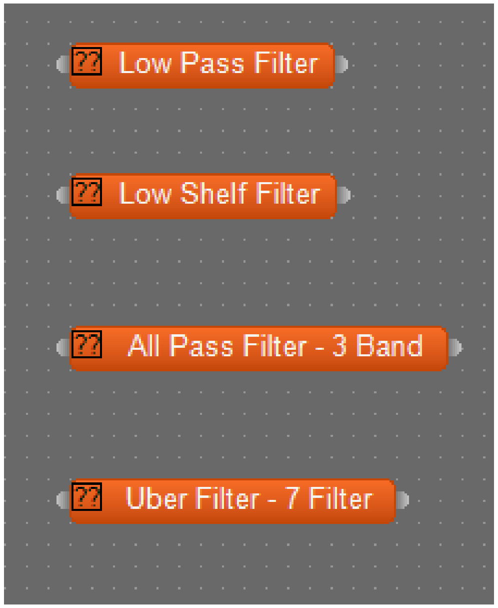
It is too thin or tinny

Has too much bass

To notch out feedback ringing in the case of local mics

Audio Processing

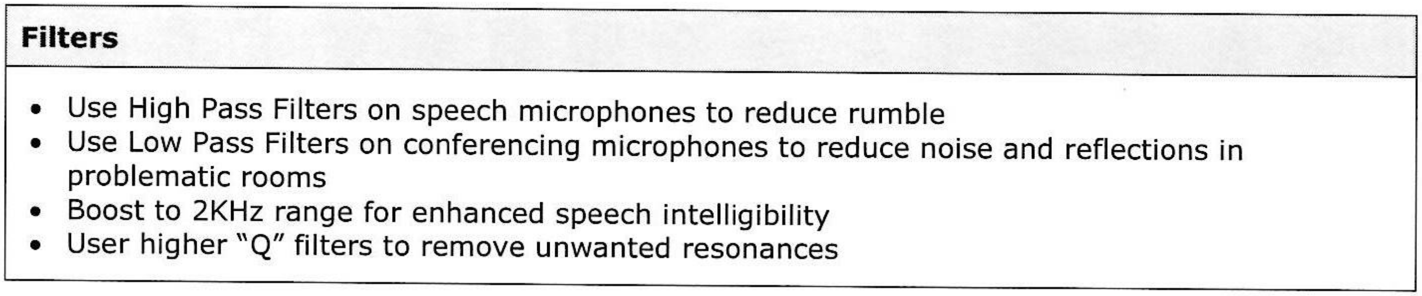
– Filters


Low Pass Filter
Low Shelf Filter
All Pass Filter - 3 Band
Uber Filter - 7 Filter

4 Way
Crossover
Hi
MH
LM
Lo

Audio Processing

– Filters

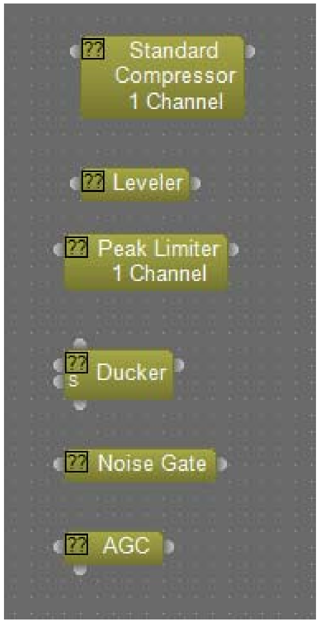


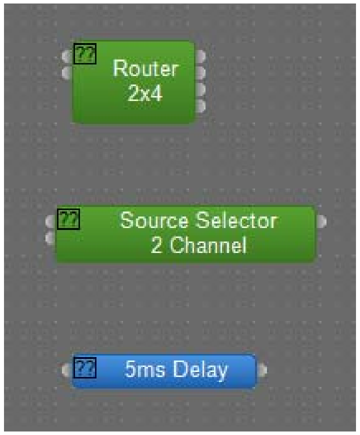
Filters

- Use High Pass Filters on speech microphones to reduce rumble
- Use Low Pass Filters on conferencing microphones to reduce noise and reflections in problematic rooms
- Boost to 2KHz range for enhanced speech intelligibility
- User higher "Q" filters to remove unwanted resonances

Audio Processing

- Dynamics


Standard Compressor 1 Channel
Leveler
Peak Limiter 1 Channel
Ducker
S
Noise Gate
AGC


Router 2x4
Source Selector 2 Channel
5ms Delay

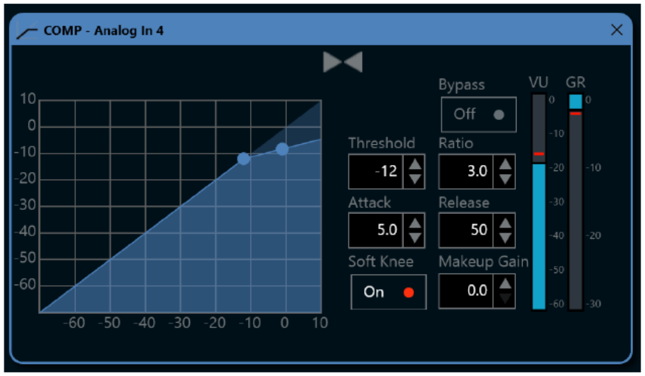
Input CoMPression (CMP):

A compressor is used to reduce the level of overly loud signal sources

Since recorded and broadcast sources are already level-limited, only microphone, telephone and CODEC conference sources can benefit from compression

A good rule of thumb for setting parameters of an Avia input compressor is:

- Threshold: -12 dB, Ratio: 3:1
- Attack: 5.0 ms, Release: 50 ms
- Soft knee: On, Makeup gain: Off



Bypass: Off
Threshold: -12
Ratio: 3.0
Attack: 5.0
Release: 50
Soft Knee: On
Makeup Gain: 0.0

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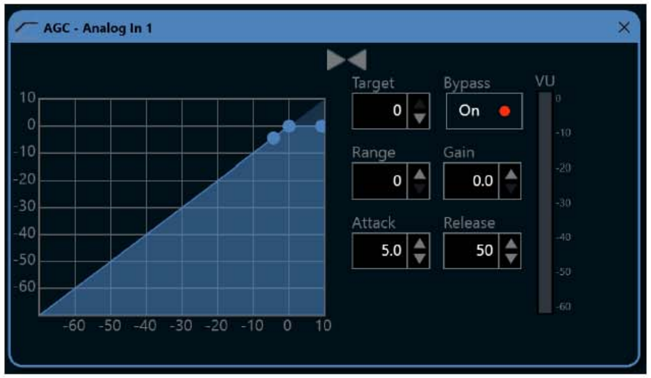
Input Automatic Gain Control (AGC):

Automatic Gain Control (AGC) is generally used in broadcasting to limit the dynamic range of a signal source whose nominal level varies too much

It is tempting to employ AGC for that soft talker who is afraid to speak loudly into their mic, and isn't loud enough in the local loudspeakers

But often feedback will occur before they are loud enough

AGC should only be used if absolutely necessary, and only on remote outputs like far-end teleconferencing telephones & CODECs or recording feeds



AGC - Analog In 1

Target: 0

Bypass: On

Range: 0

Gain: 0.0

Attack: 5.0

Release: 50

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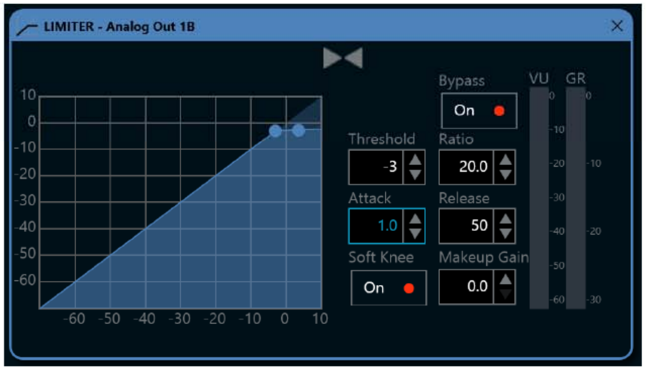
Output LIMiter (LIM):

To prevent excessive output levels:

- Threshold: -3 dB
- Ratio: 20:1
- Attack: 0.1 ms
- Release: 50 ms
- Soft knee: ON
- Makeup Gain: 0 dB

For a 14-dB crest factor (headroom):

- Threshold: -10 dB
- Ratio: 10:1
- Attack: 0.1 ms
- Release: 50 ms
- Soft knee: ON
- Makeup gain: +6 dB



LIMITER - Analog Out 1B

Bypass: On

Threshold: -3

Ratio: 20.0

Attack: 1.0

Release: 50

Soft Knee: On

Makeup Gain: 0.0

10
0
-10
-20
-30
-40
-50
-60
-60
-50
-40
-30
-20
-10
0
10
VU
GR
0
-10
-20
-30
-40
-50
-60
0
-10
-20
-30

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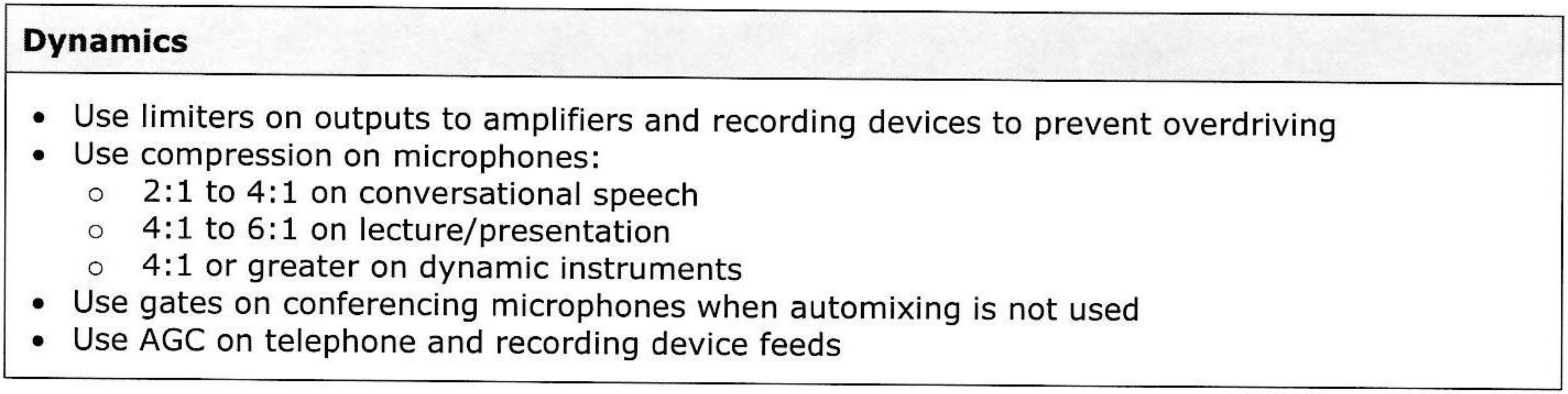
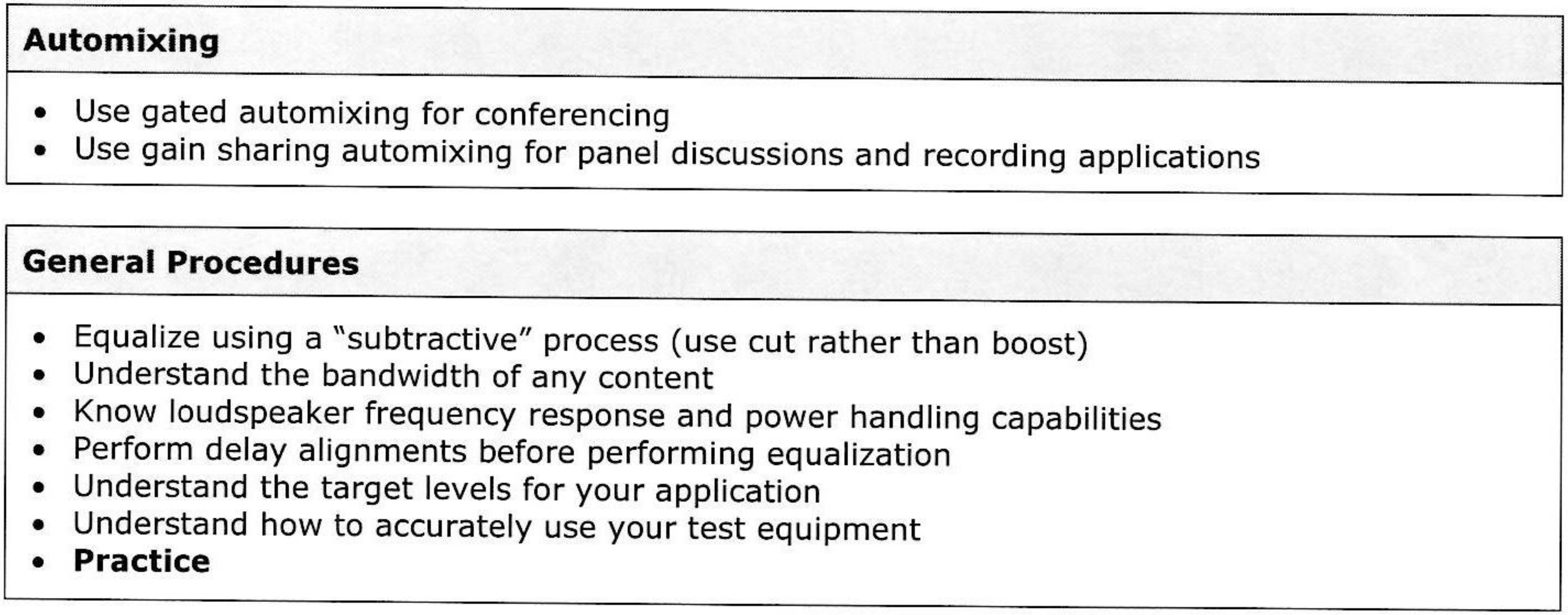
Audio Processing



Dynamics

- Use limiters on outputs to amplifiers and recording devices to prevent overdriving
- Use compression on microphones:
    - 2:1 to 4:1 on conversational speech
    - 4:1 to 6:1 on lecture/presentation
    - 4:1 or greater on dynamic instruments
- Use gates on conferencing microphones when automixing is not used
- Use AGC on telephone and recording device feeds

Audio Processing



Automixing

- Use gated automixing for conferencing
- Use gain sharing automixing for panel discussions and recording applications

General Procedures

- Equalize using a "subtractive" process (use cut rather than boost)
- Understand the bandwidth of any content
- Know loudspeaker frequency response and power handling capabilities
- Perform delay alignments before performing equalization
- Understand the target levels for your application
- Understand how to accurately use your test equipment
- **Practice**

Audio Processing

Room Acoustics

Reflection

Absorption

Diffusion

Which is a correct statement?

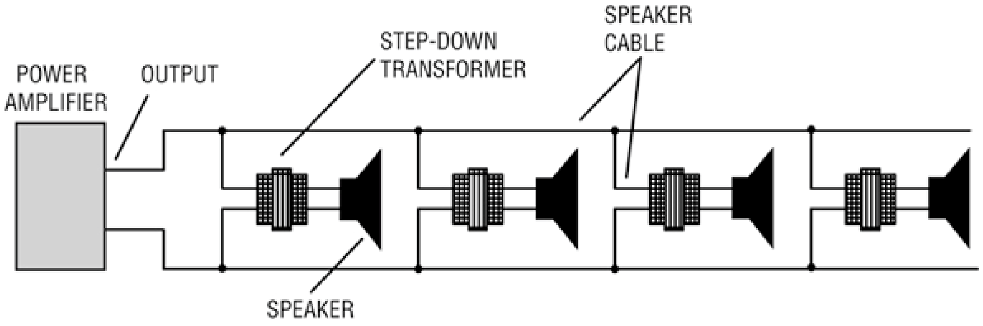
A.
Start with the amplifier and work back to set levels

B.
Amplifiers can handle any level sent to them and you just attenuate the signal if it is too loud

C.
Processing can fix any audio issue and especially if you use a lot of processing options

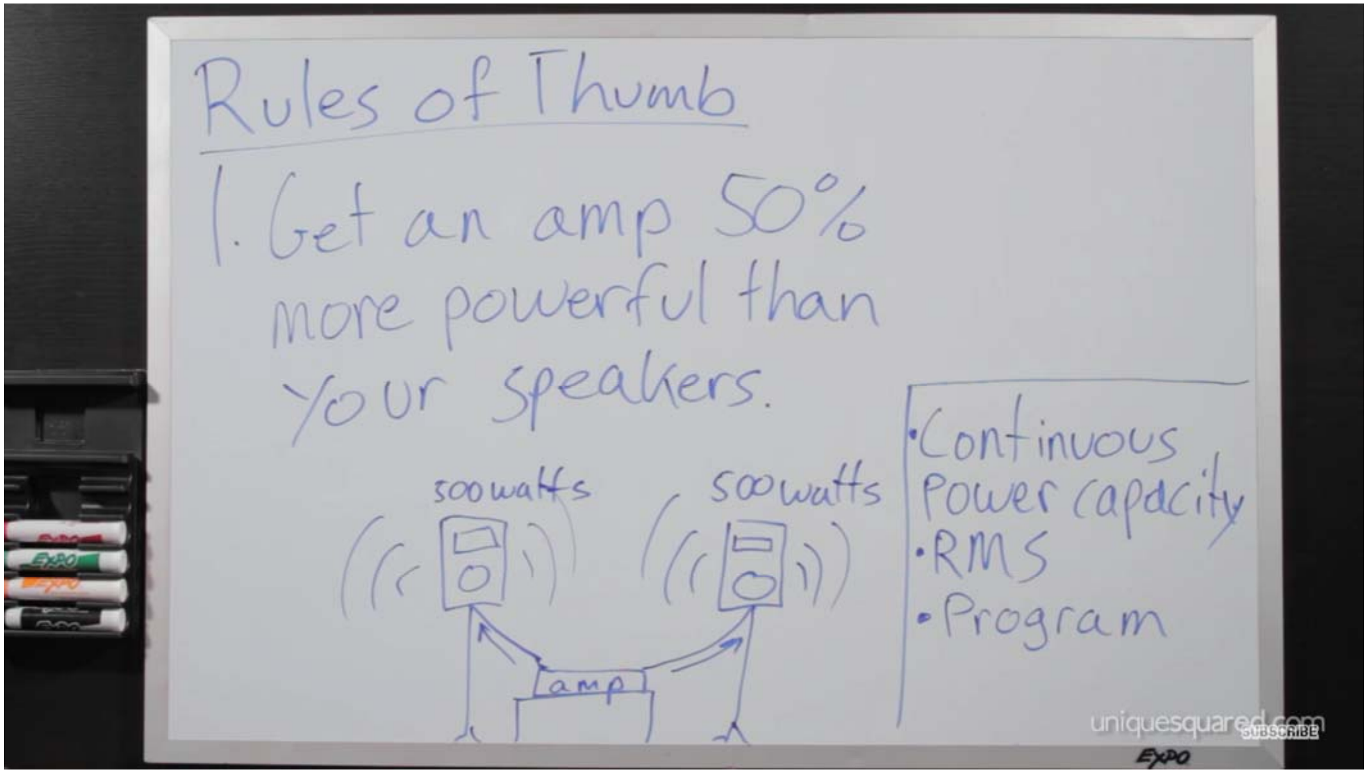
D.
Get input to Unity Gain asap and then maintain throughout

Audio Amplifiers


SPEAKER CABLE
STEP-DOWN TRANSFORMER
POWER AMPLIFIER
OUTPUT
SPEAKER

Constant Voltage Easy:
Calculate 80% of Power
(example: 100w = 80%)
Tap speakers so that total amount of taps is within that range

Audio Amplifiers



Rules of Thumb

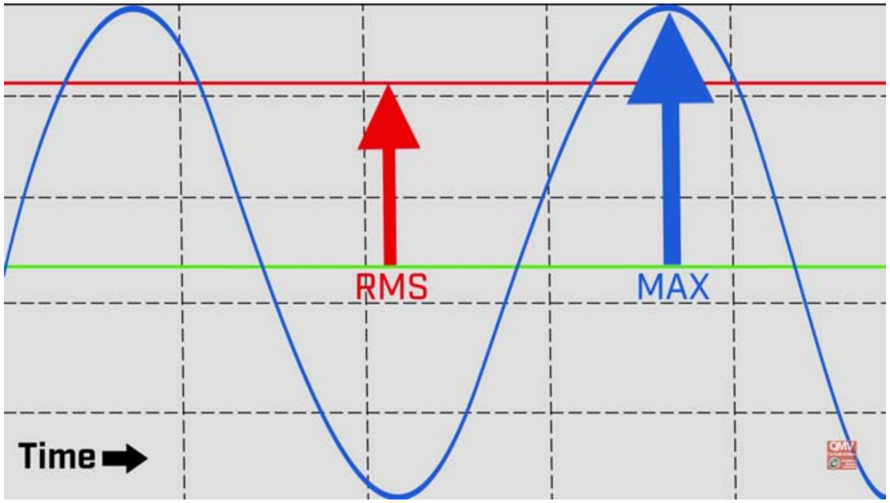
1. Get an amp 50% more powerful than your speakers.

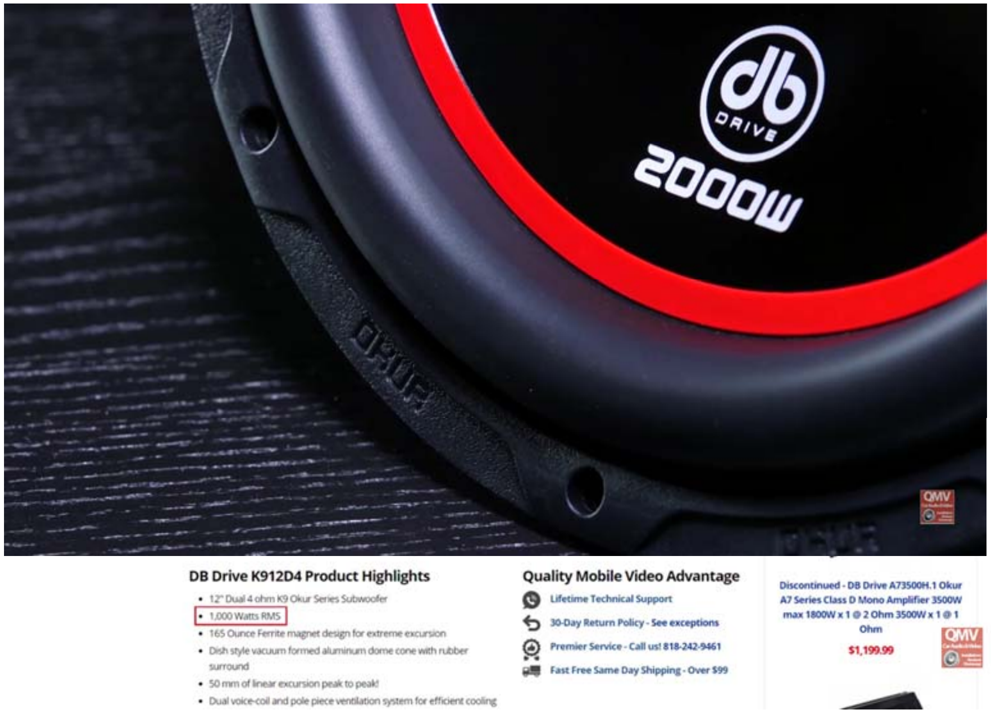
- Continuous Power capacity
- RMS
- Program

500 watts
500 watts
amp
uniquesquared.com
SUBSCRIBE
EXPO

At minimum – 20%

Audio Amplifiers





DB Drive K912D4 Product Highlights

- 12" Dual 4 ohm K9 Okur Series Subwoofer
- 1,000 Watts RMS
- 165 Ounce Ferrite magnet design for extreme excursion
- Dish style vacuum formed aluminum dome cone with rubber surround
- 50 mm of linear excursion peak to peak!
- Dual voice-coil and pole piece ventilation system for efficient cooling

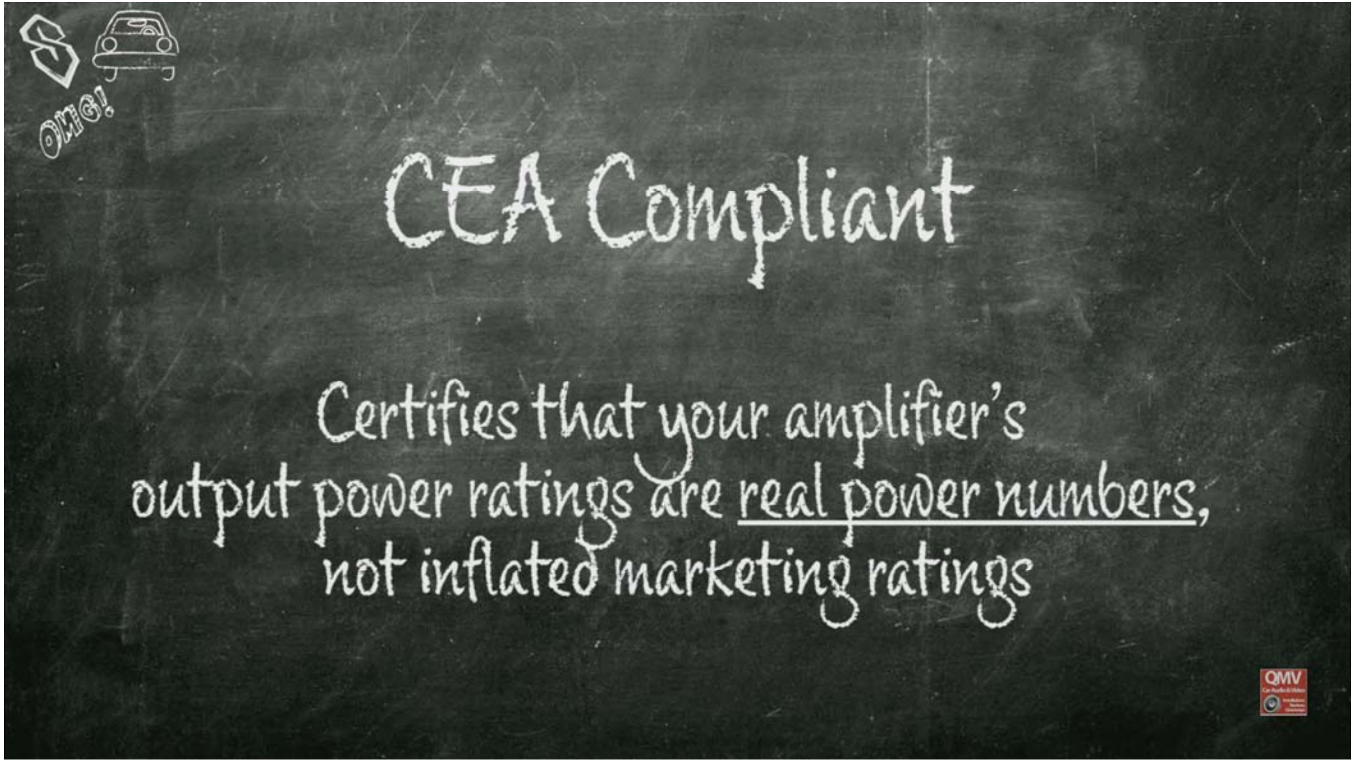
Quality Mobile Video Advantage

- Lifetime Technical Support
- 30-Day Return Policy - See exceptions
- Premier Service - Call us! 818-242-9461
- Fast Free Same Day Shipping - Over $99

Discontinued - DB Drive A73500H.1 Okur A7 Series Class D Mono Amplifier 3500W max 1800W x 1 @ 2 Ohm 3500W x 1 @ 1 Ohm

$1,199.99

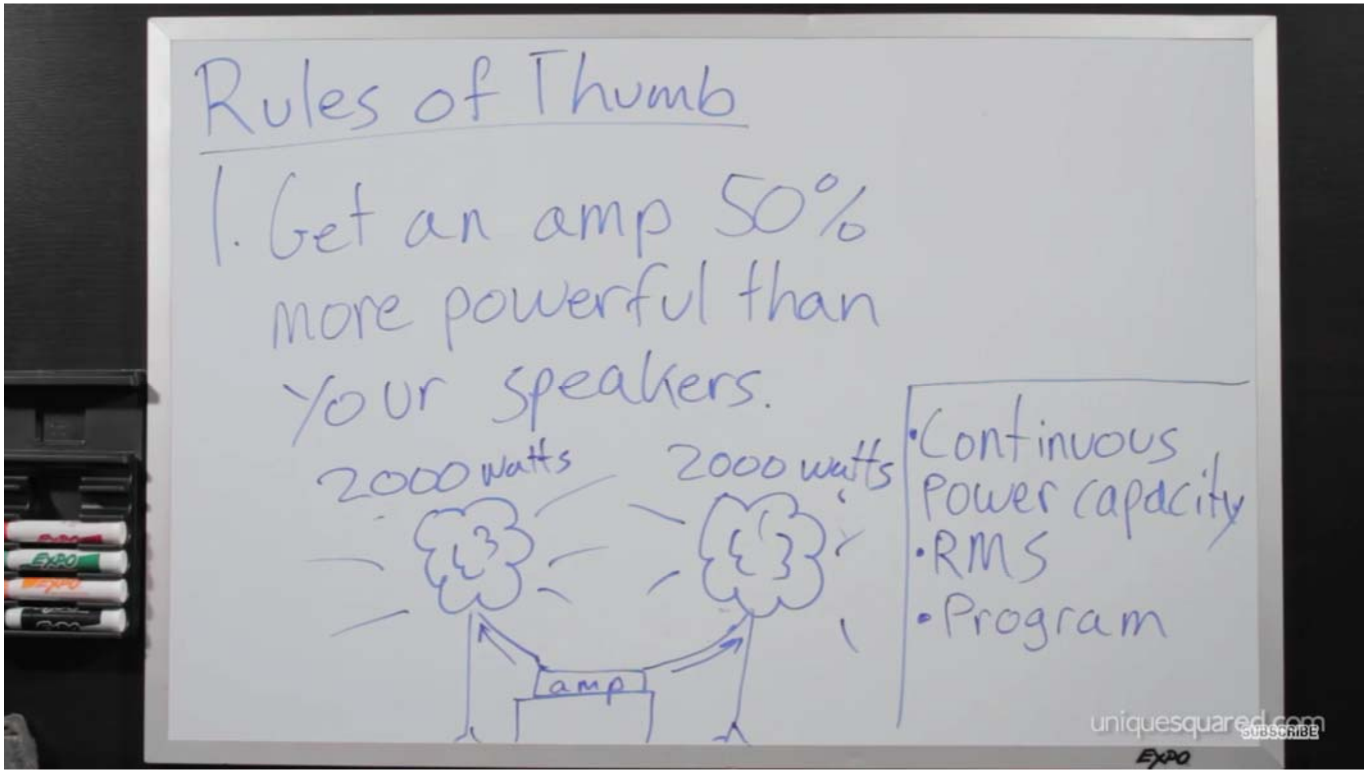
Audio Amplifiers



CEA Compliant

Certifies that your amplifier's output power ratings are real power numbers, not inflated marketing ratings

Audio Amplifiers



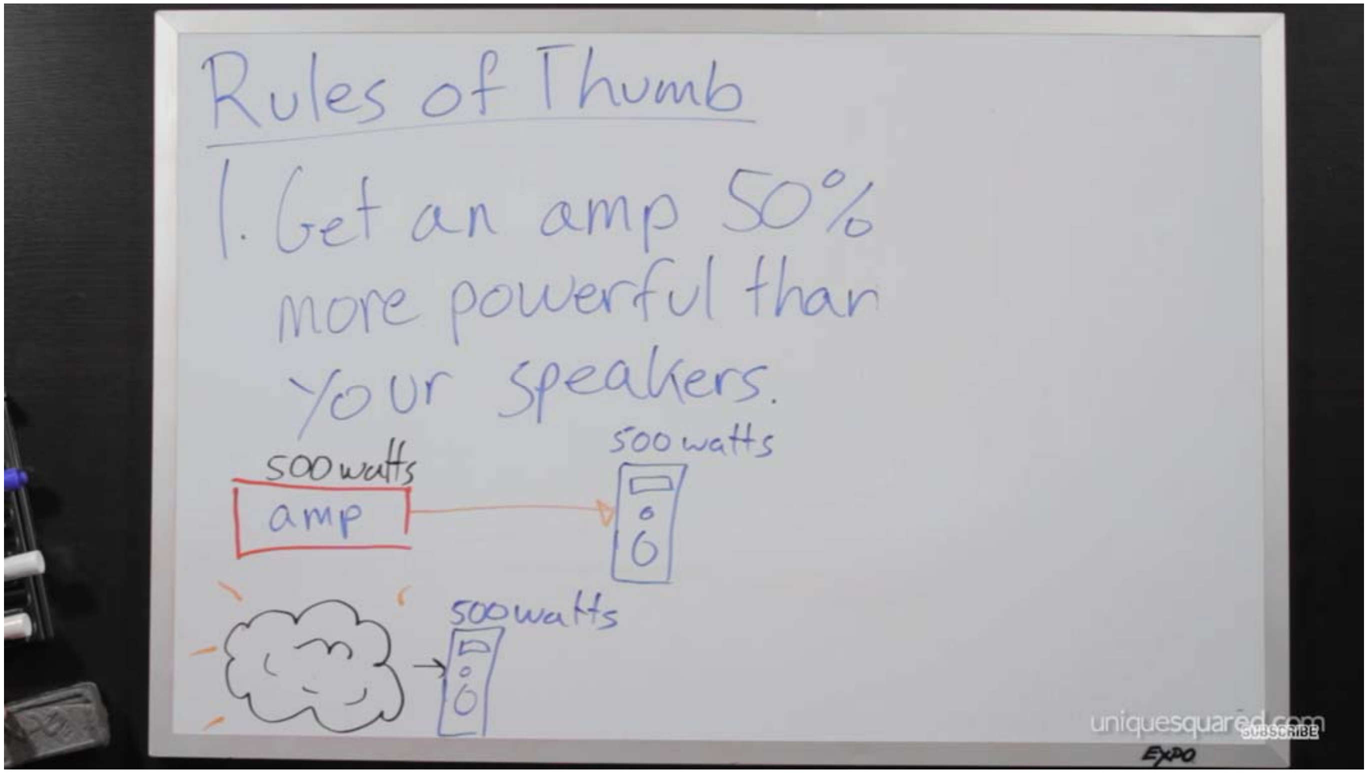
Rules of Thumb

1. Get an amp 50% more powerful than your speakers.

- Continuous power capacity
- RMS
- Program

2000 watts
2000 watts
amp
uniquesquared.com
SUBSCRIBE
EXPO

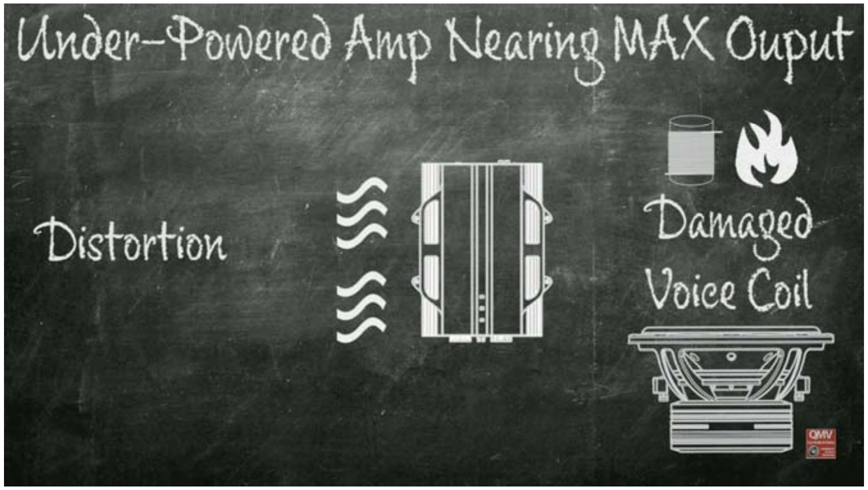
Audio Amplifiers

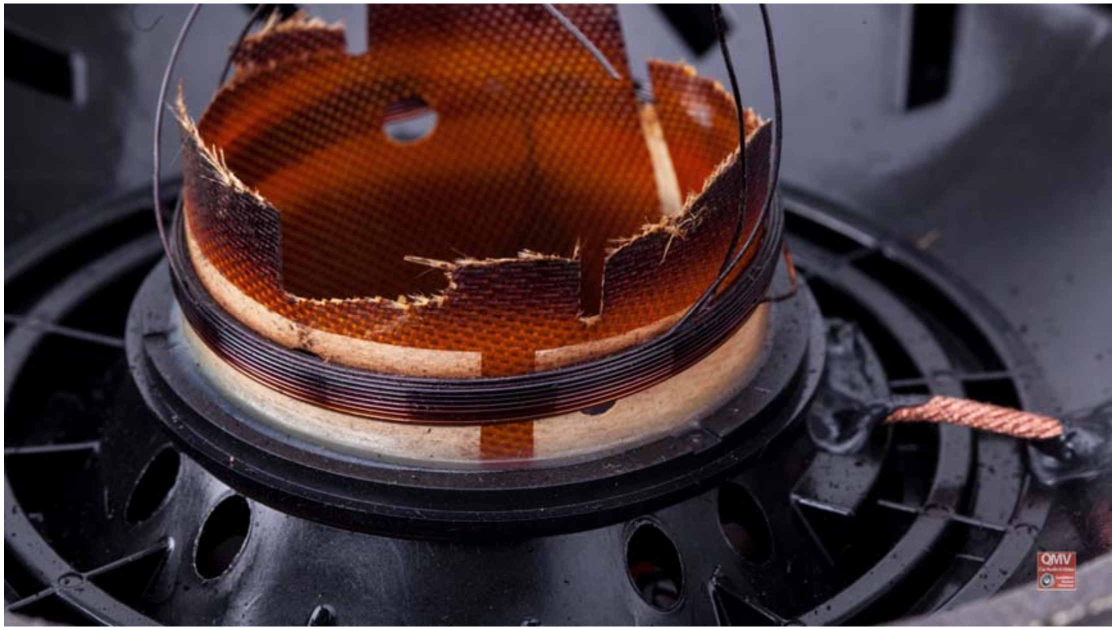


Rules of Thumb

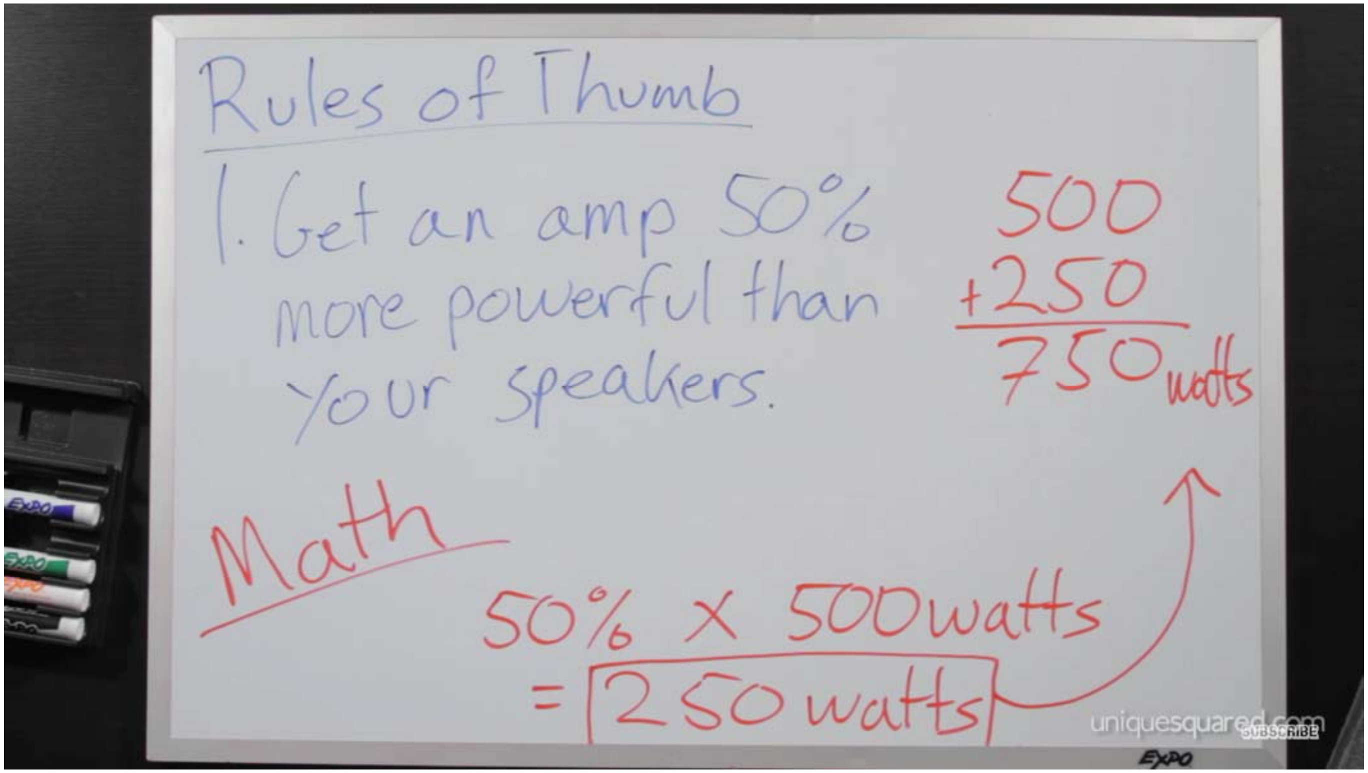
1. Get an amp 50% more powerful than your speakers.

500 watts
amp
500 watts
500 watts
uniquesquared.com
SUBSCRIBE
EXPO


Under-Powered Amp Nearing MAX Ouput
Distortion
Damaged
Voice Coil
QMV


QMV

Audio Amplifiers



Rules of Thumb

1. Get an amp 50% more powerful than your speakers.

$$\begin{array}{r} 500 \\ +250 \\ \hline 750 \text{ watts} \end{array}$$

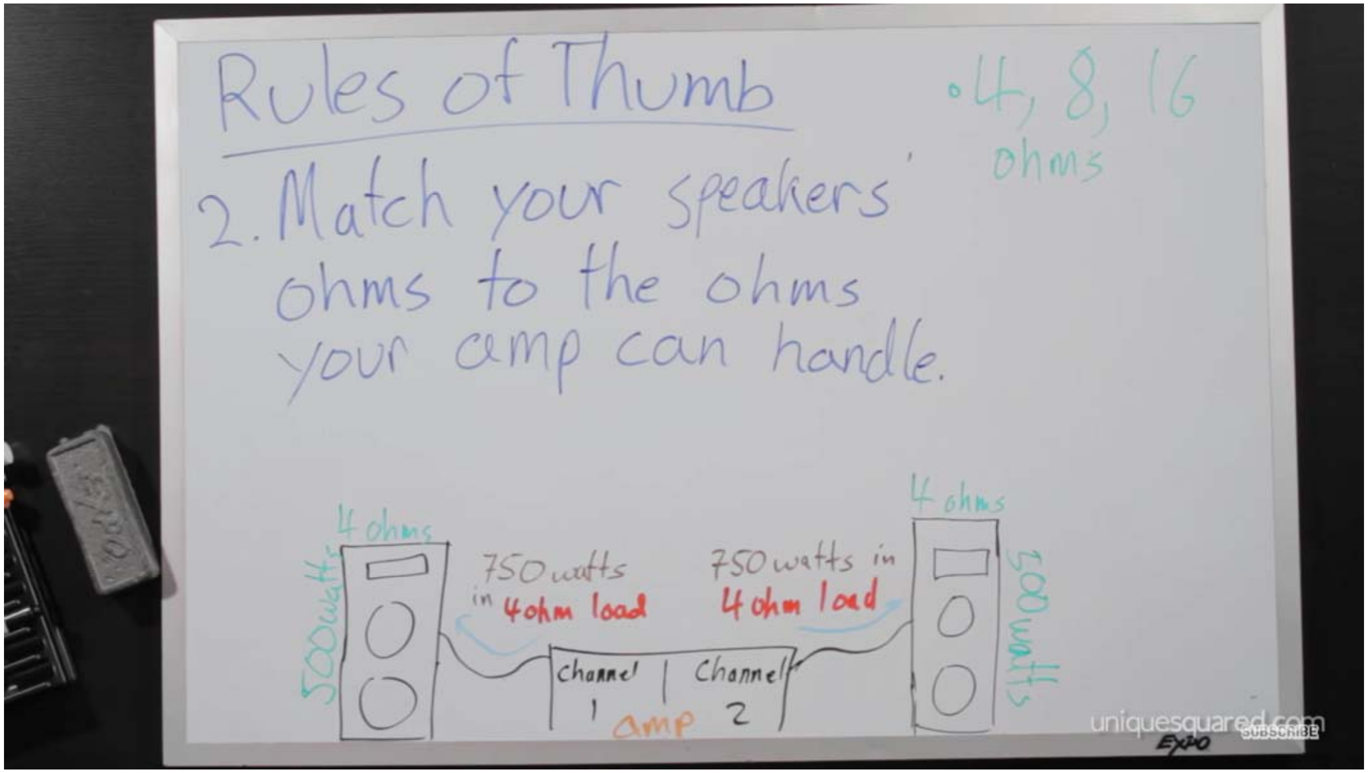
Math

50% x 500watts

= $\boxed{\text{250 watts}}$

uniquesquared.com
SUBSCRIBE
EXPO

Audio Amplifiers



Rules of Thumb

2. Match your speakers' ohms to the ohms your amp can handle.

• 4, 8, 16 ohms
4 ohms
500 watts
750 watts in 4ohm load
750 watts in 4 ohm load
Channel 1
Channel 2
amp
4 ohms
500 watts
uniquesquared.com
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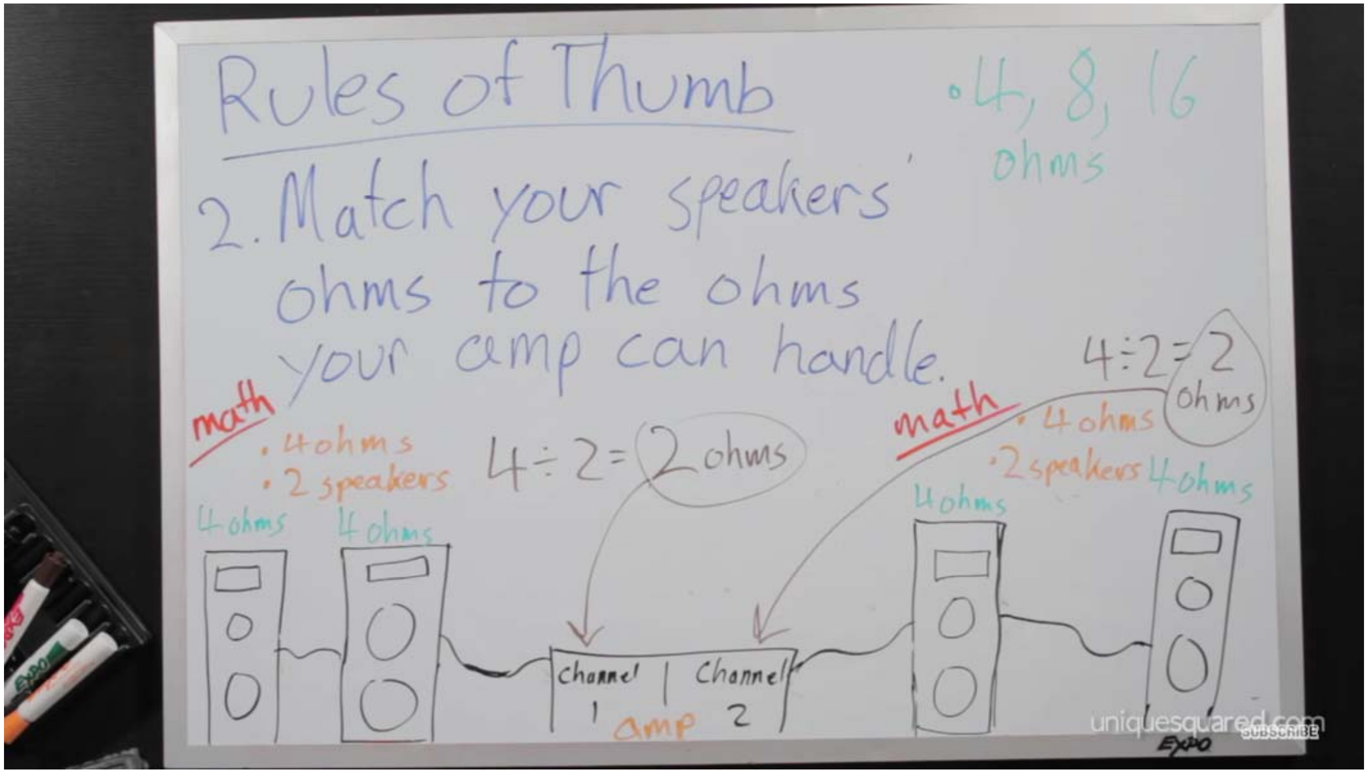
Audio Amplifiers

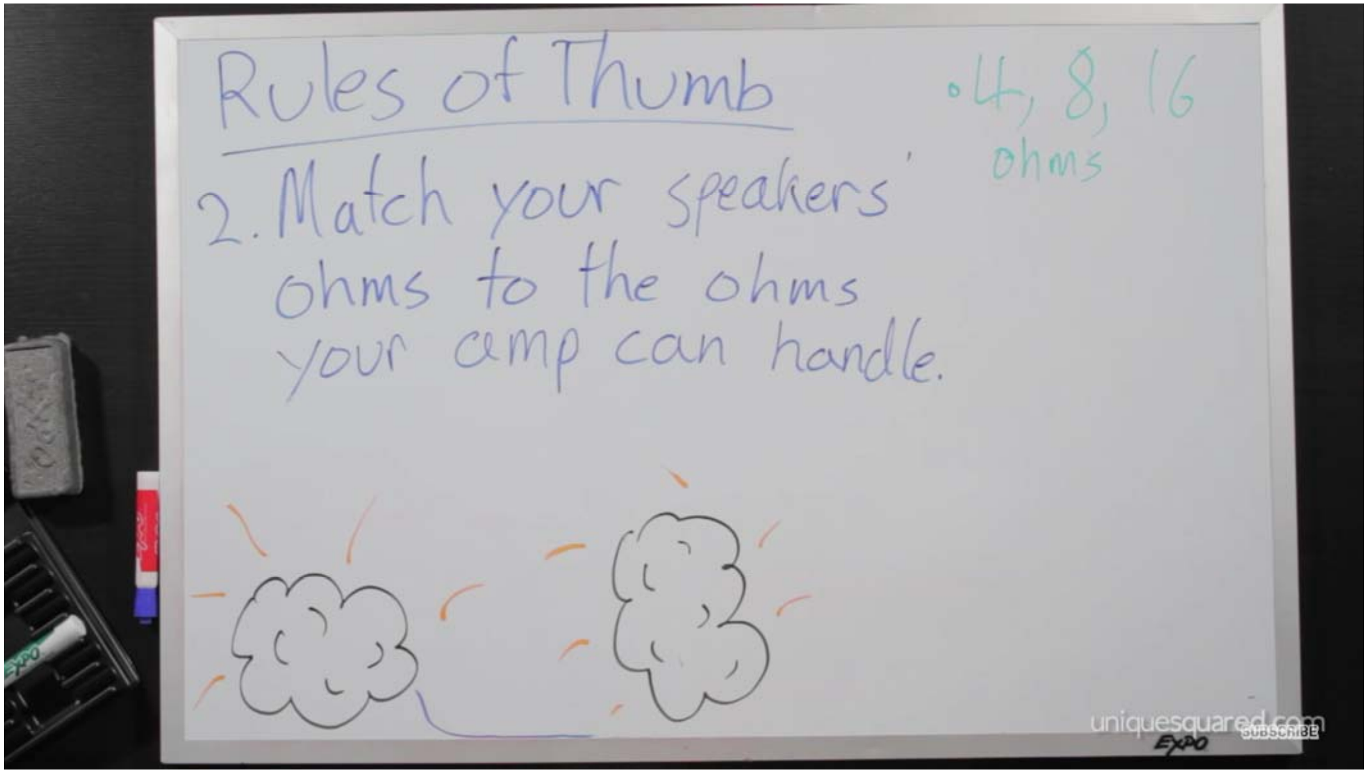


Rules of Thumb

2. Match your speakers' ohms to the ohms your amp can handle.

• 4, 8, 16 ohms
math
• 4 ohms
• 2 speakers
4 ÷ 2 = 2 ohms
math
• 4 ohms
• 2 speakers
4 ÷ 2 = 2 ohms
4 ohms
4 ohms
4 ohms
4 ohms
Channel 1
Channel 2
amp
uniquesquared.com
SUBSCRIBE
EXPO

Audio Amplifiers



Rules of Thumb

2. Match your speakers' ohms to the ohms your amp can handle.

• 4, 8, 16 ohms

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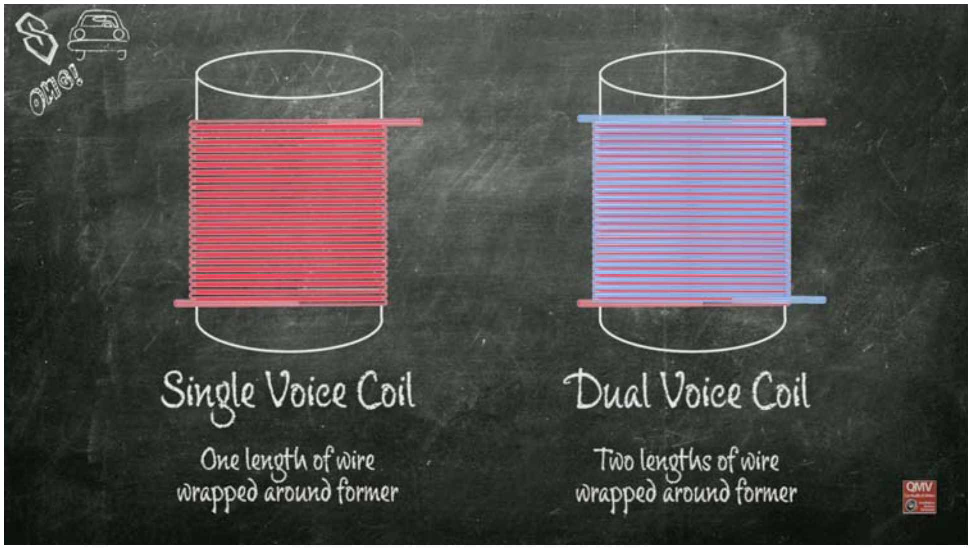

OHG!
Single Voice Coil
One length of wire wrapped around former
Dual Voice Coil
Two lengths of wire wrapped around former
QMV

QMV

OHG!
COMP
12
KICKER
QMV

OHG!
KICKER
Comp
QMV

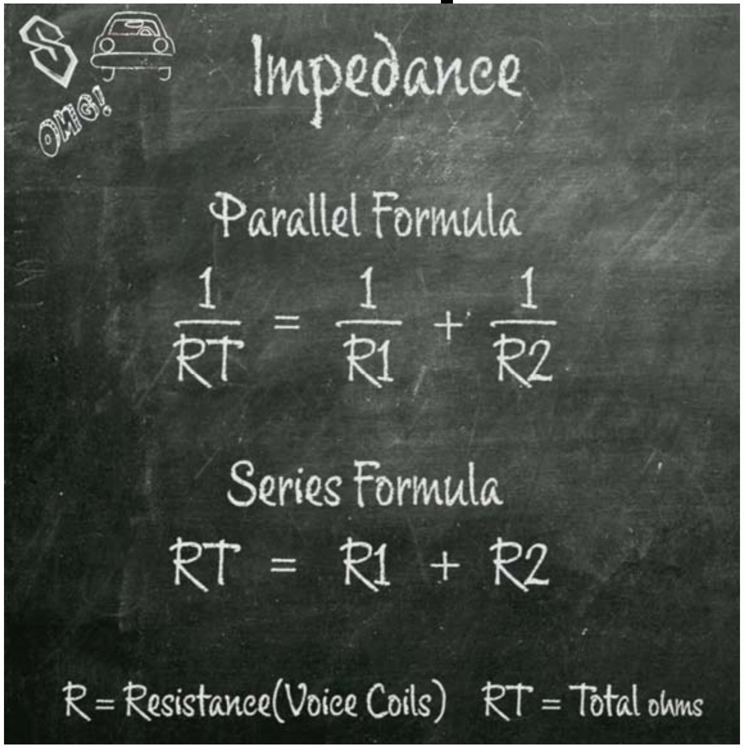
Audio Amplifiers

If all of the coils are the same impedance, it is very easy to calculate final impedance. You will take the impedance of the voice coils and divide by the number of voice coils. This formula only works if all the voice coils are the same impedance.

You have two 4 Ω speakers and an 8 Ω speaker:

1/4 Ω + 1/4 Ω + 1/8 Ω = 1/Rtotal
.25 + .25 + .125 = 1/Rtotal
.625 = 1/Rtotal
= 1.6 Ω

***not all the speakers will get the same power



Impedance

Parallel Formula

$$\frac{1}{RT} = \frac{1}{R1} + \frac{1}{R2}$$

Series Formula

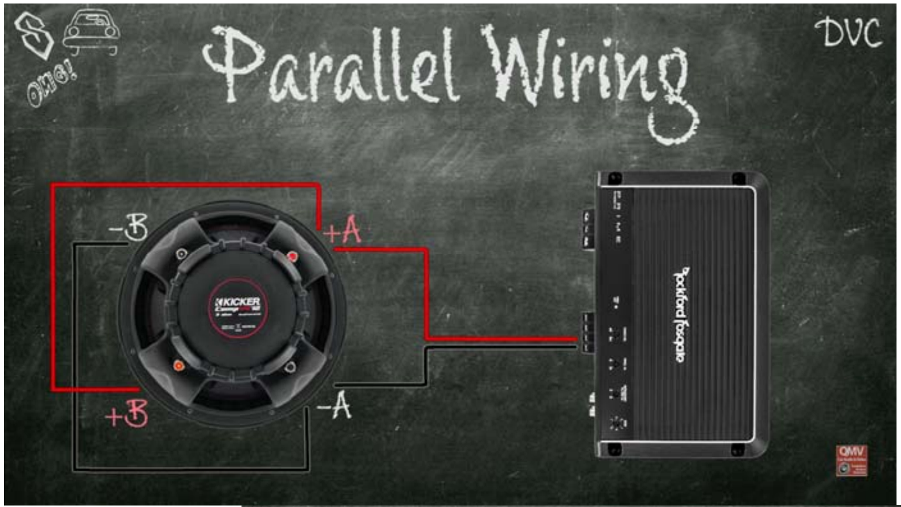
$$RT = R1 + R2$$

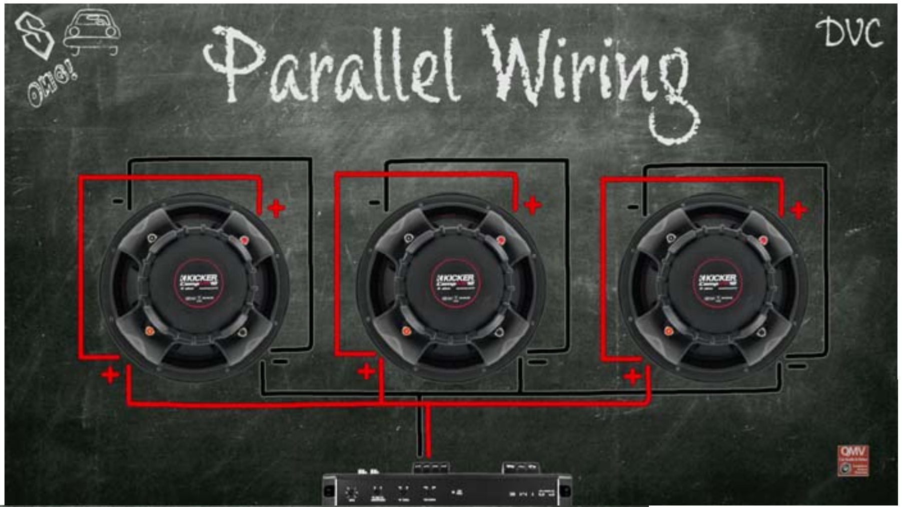
R = Resistance (Voice Coils) RT = Total ohms

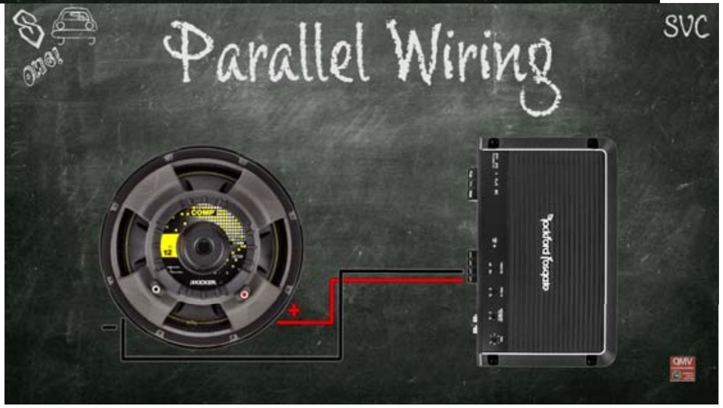
When you wire voice coils in series, you will simply add the resistance of all the voice coils to know what the impedance will be at the amplifier.

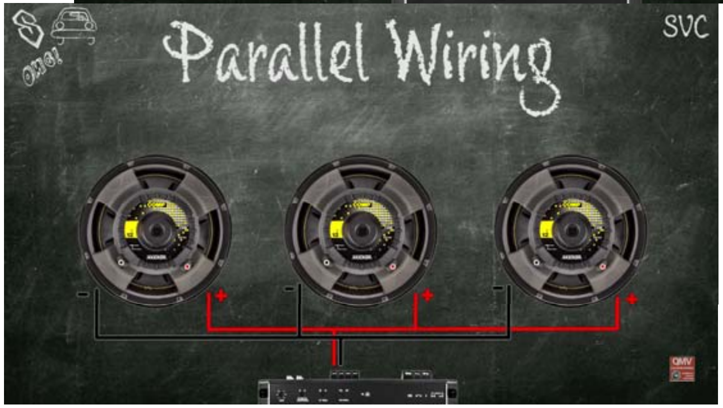
The coils do not need to be the same impedance but it will affect how much power each speaker receives from the amplifier.

It is never recommended to mix impedances of speakers connected to the same terminals.


Parallel Wiring
DVC
-B
+A
+B
-A

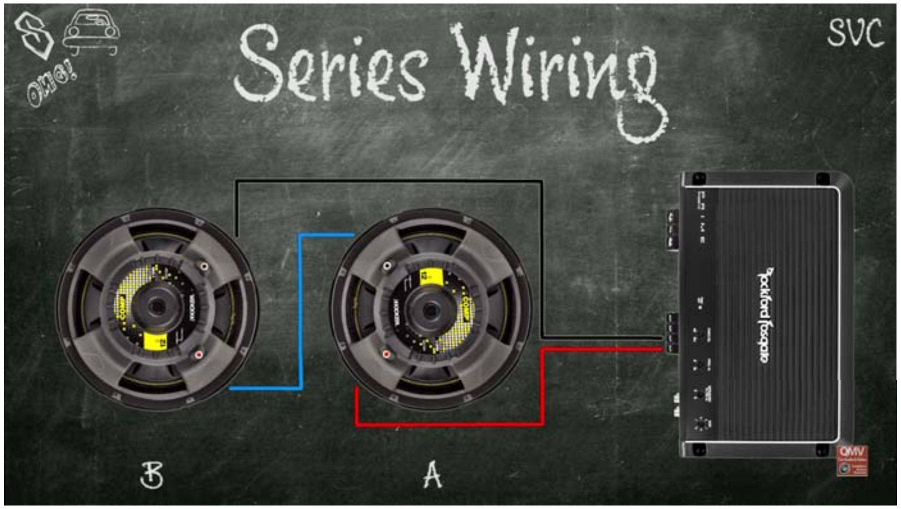

Parallel Wiring
DVC
-
+
-
+
-
+
+
-
+
-
+
-

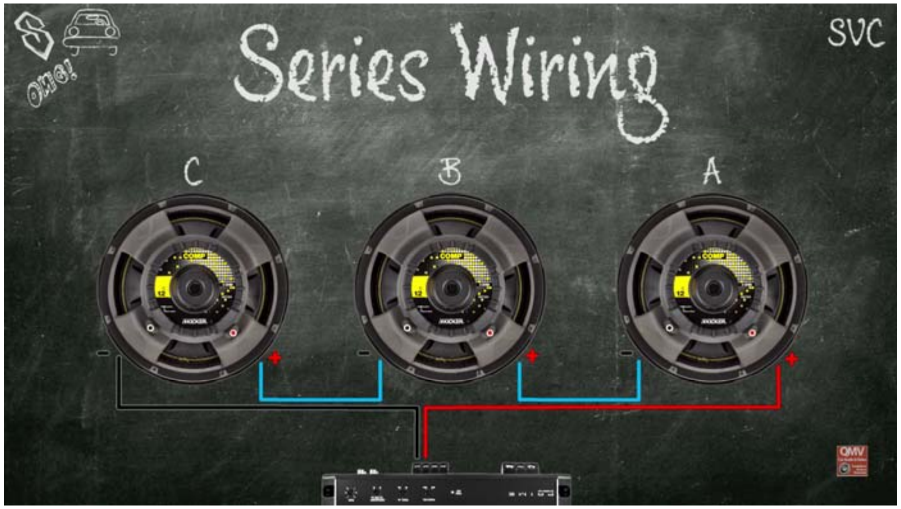

Parallel Wiring
SVC
+
-


Parallel Wiring
SVC
-
+
-
+
-
+

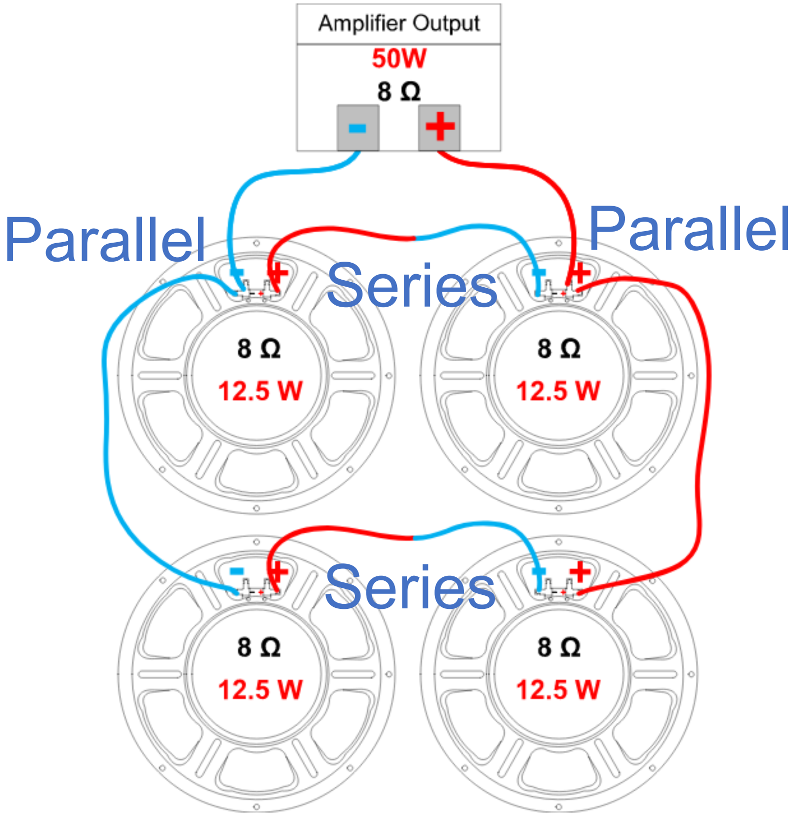
Daisy chain the + on speakers to the + on the amp

Daisy chain the – on the speakers to the – on the amp


Series Wiring
SVC
Rockford Fosgate
B
A


Series Wiring
SVC
C
B
A
-
+
-
+
-
+

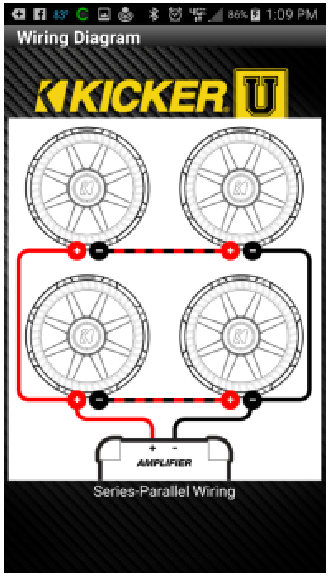
Home run a + then send the – of that speaker to the + of the next
Continue to last speaker and then home run -


Amplifier Output
50W
8 Ω
-
+
Parallel
Parallel
Series
Series
8 Ω
12.5 W
8 Ω
12.5 W
8 Ω
12.5 W
8 Ω
12.5 W

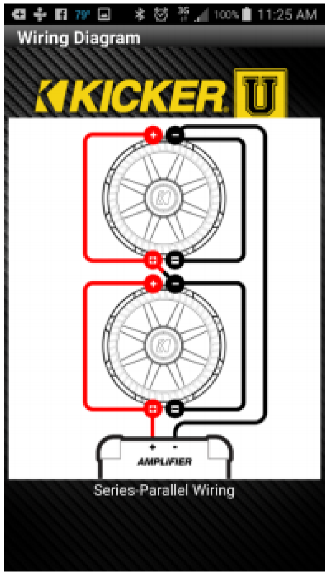
Se /Parallel iring
DVC

Need 4 Single Coil speakers.
Should have even number of voice coils

Four single voice coil speakers


1:09 PM
Wiring Diagram
KICKER U
+
-
AMPLIFIER
Series-Parallel Wiring

two dual voice coils speakers

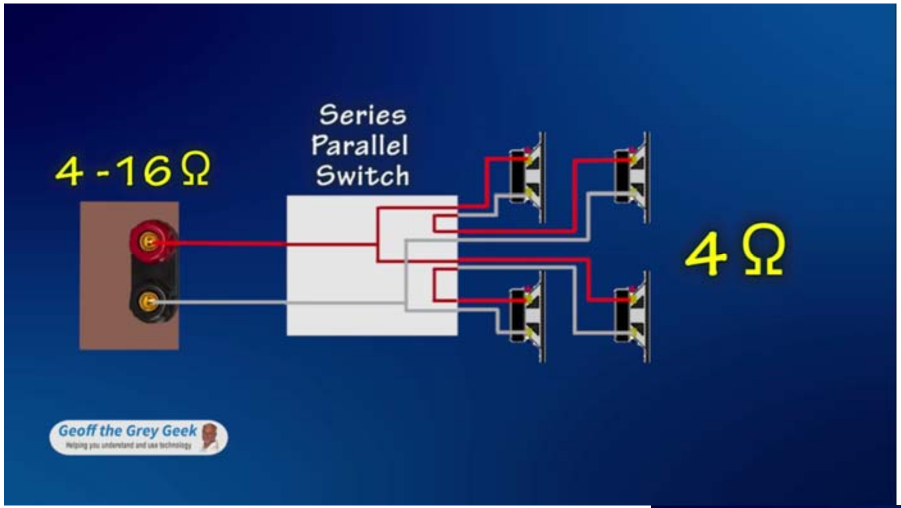

11:25 AM
Wiring Diagram
KICKER U
+
-
AMPLIFIER
Series-Parallel Wiring

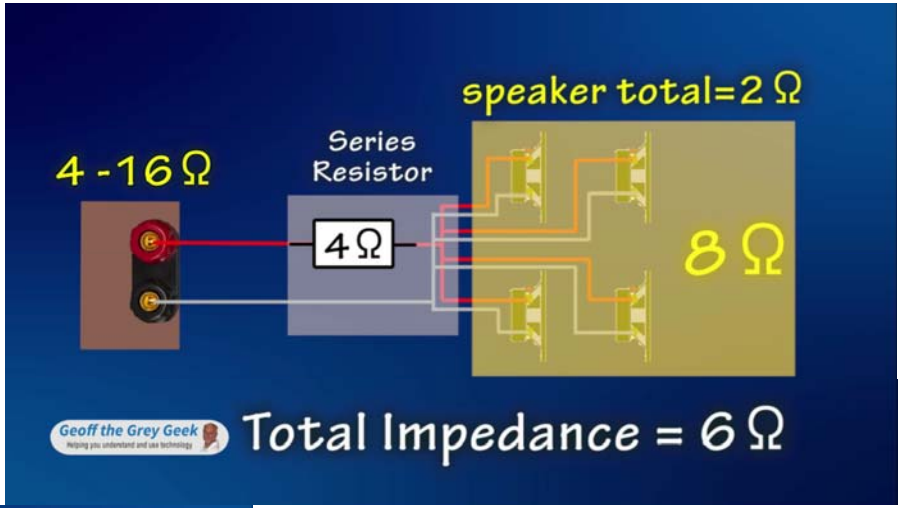
If all four speakers have the same impedance, with series-parallel wiring, the final impedance will be the same as the impedance of a single speaker.

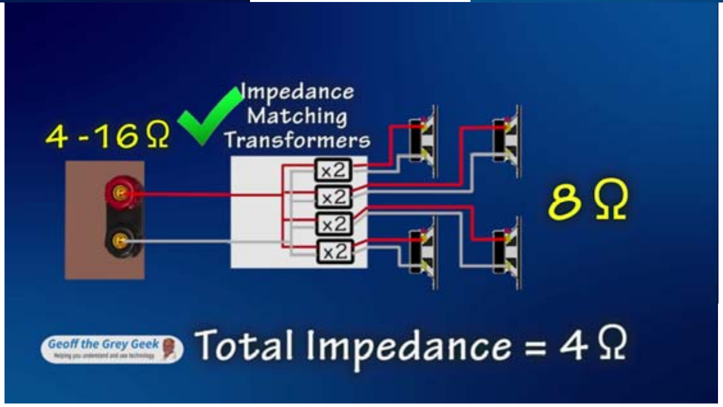
4 Single Coil 4 Ω speaker OR 2 Dual Coil 4 Ω speakers

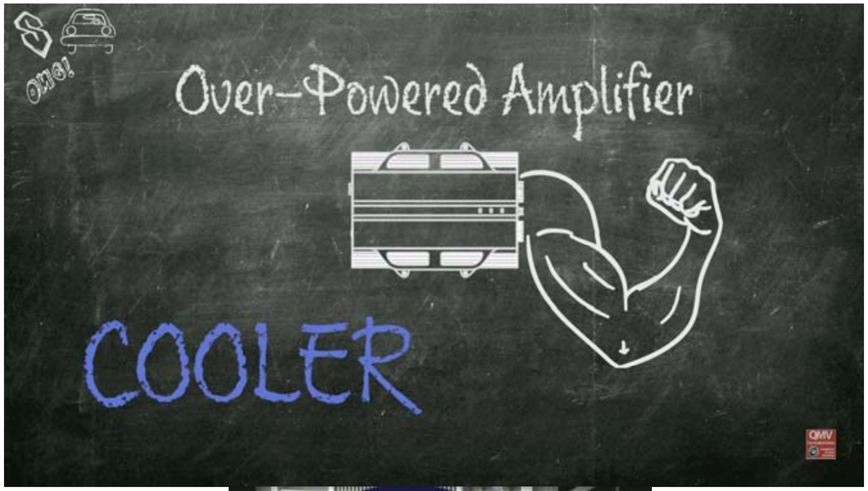
4 Ω + 4 Ω // 4 Ω + 4 Ω = 4 Ω

8 Ω // 8 Ω = 4 Ω


4 - 16 Ω
Series
Parallel
Switch
4 Ω
Geoff the Grey Geek

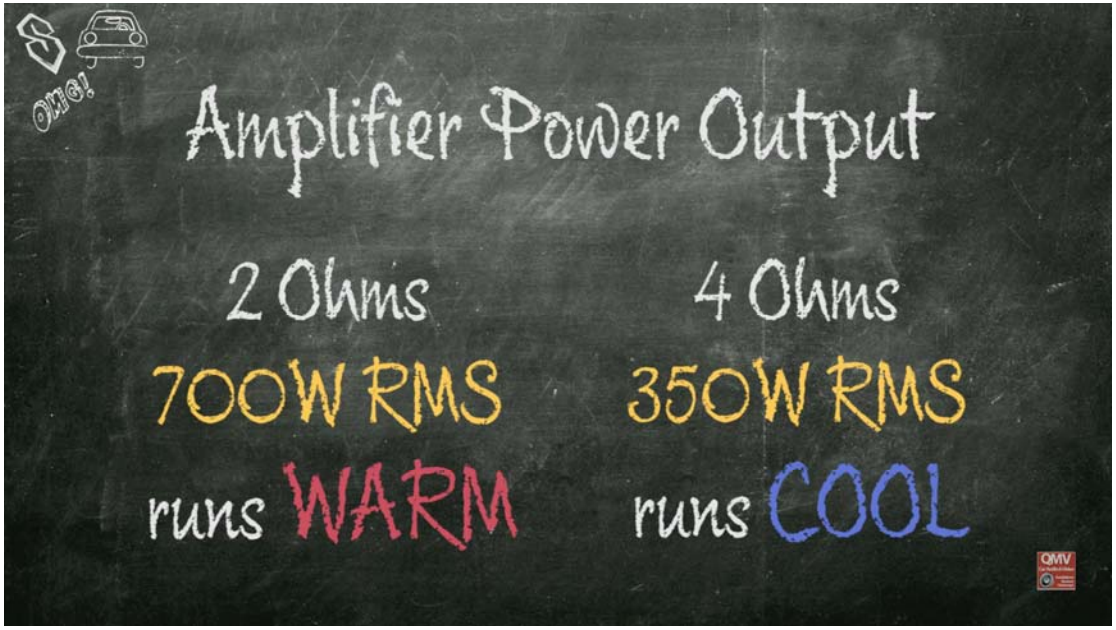

speaker total=2 Ω
4 - 16 Ω
Series
Resistor
4 Ω
8 Ω
Geoff the Grey Geek
Total Impedance = 6 Ω


4 - 16 Ω
✓
Impedance
Matching
Transformers
x2
x2
x2
x2
8 Ω
Geoff the Grey Geek
Total Impedance = 4 Ω



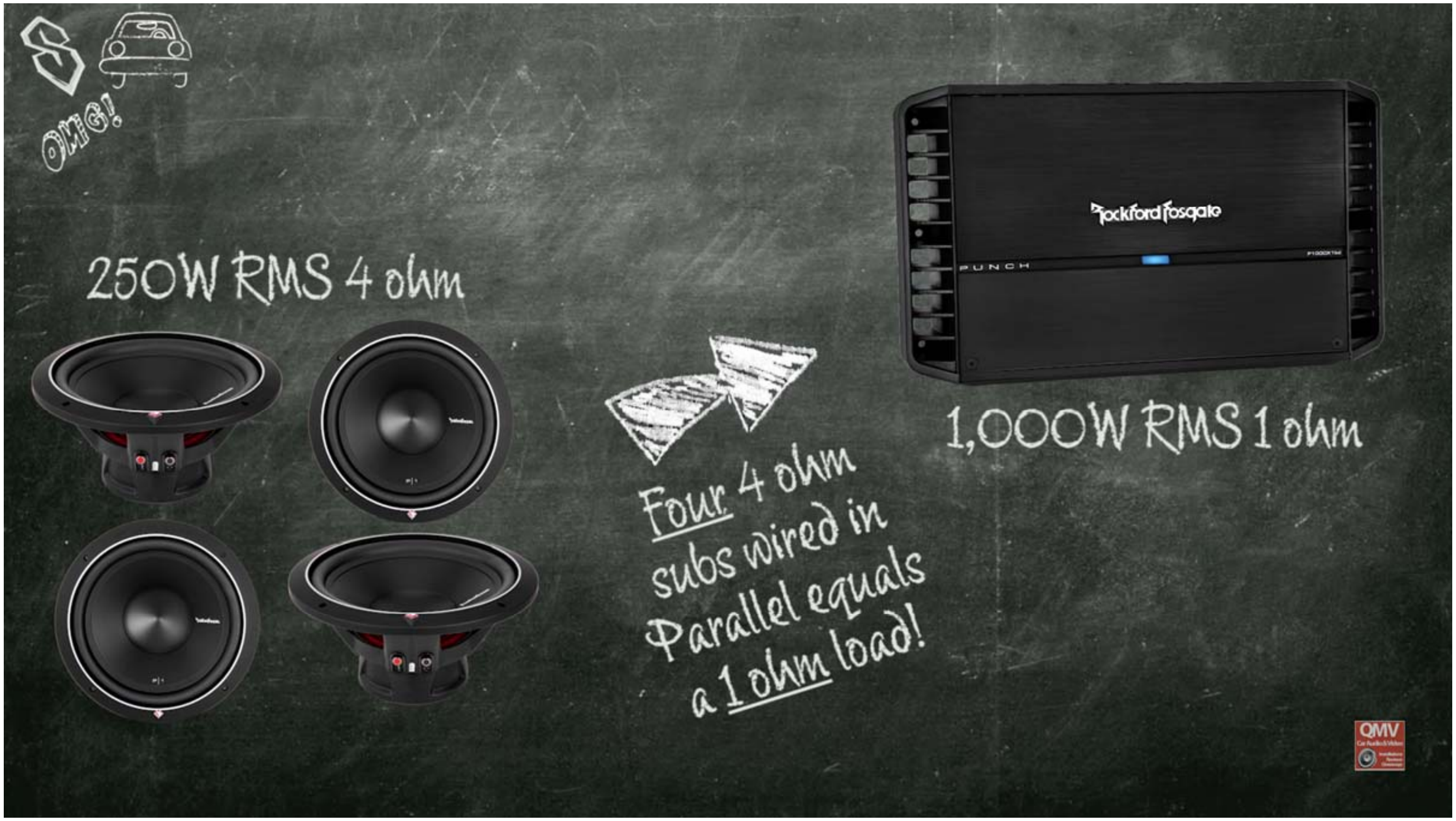
Over-Powered Amplifier

COOLER



Amplifier Power Output

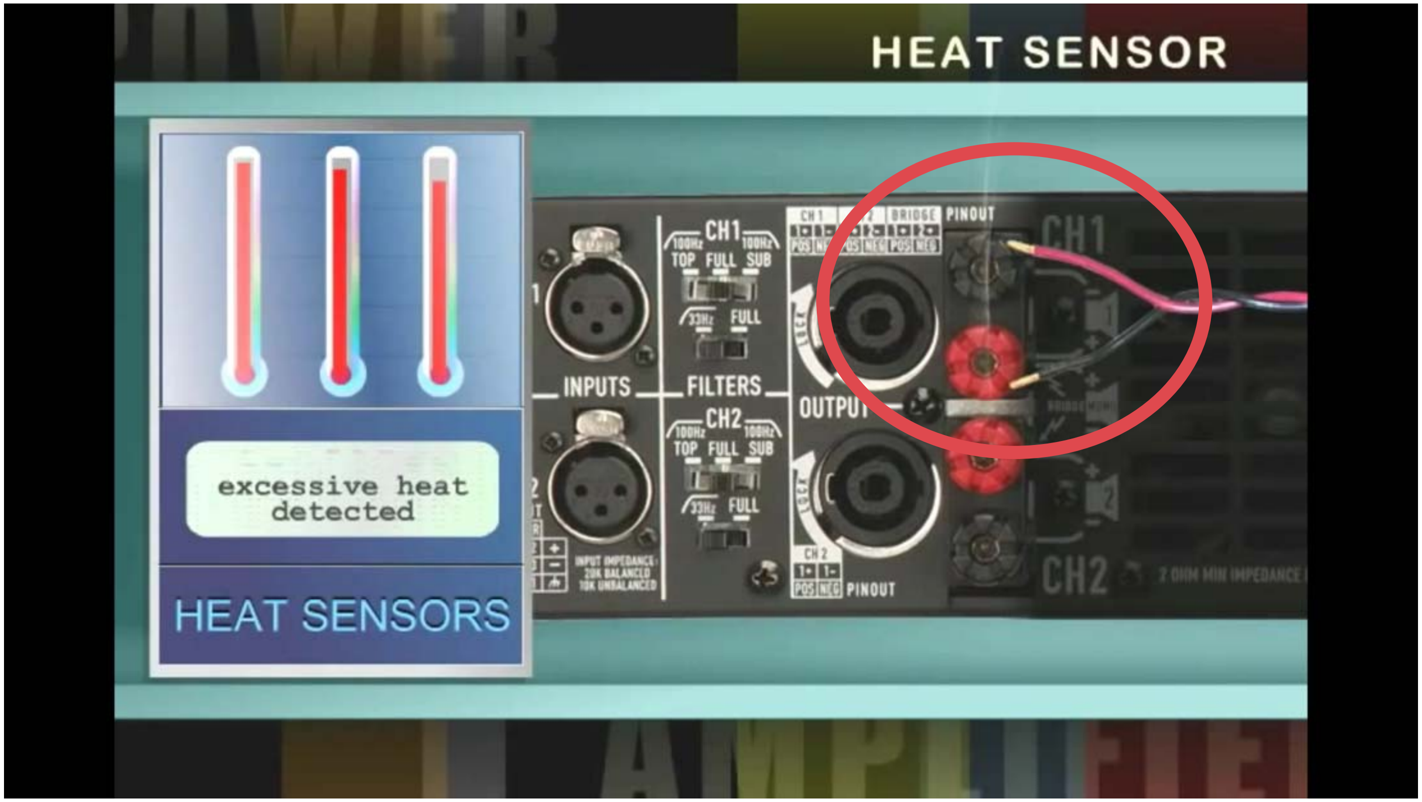
2 Ohms	4 Ohms
700W RMS	350W RMS
runs WARM	runs COOL

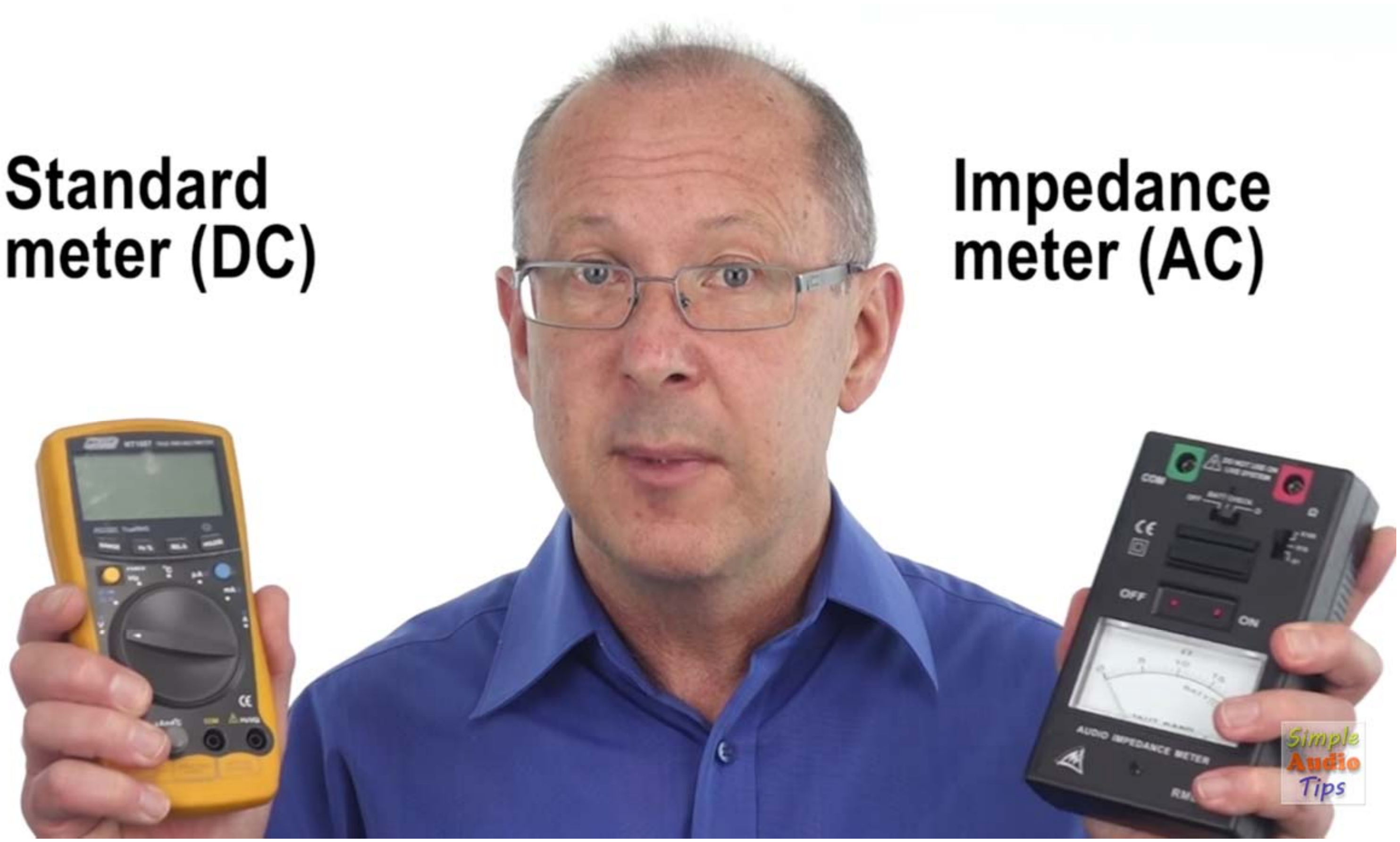

OMG!
Rockford Fosgate
PUNCH
QMV

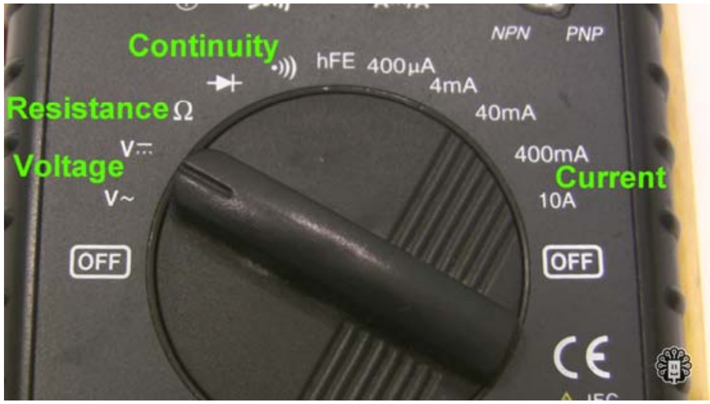
250W RMS 4 ohm

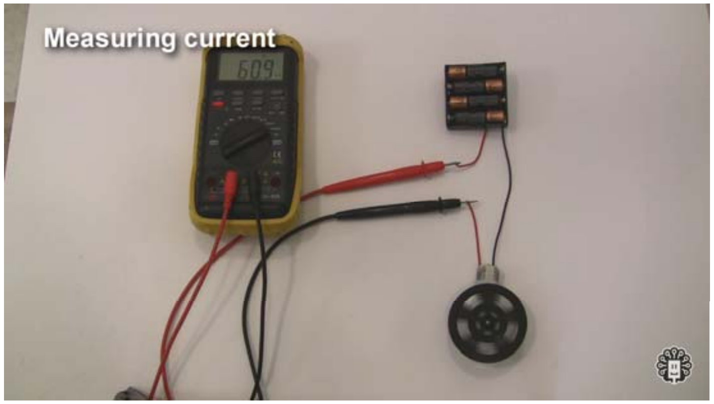
1,000W RMS 1 ohm

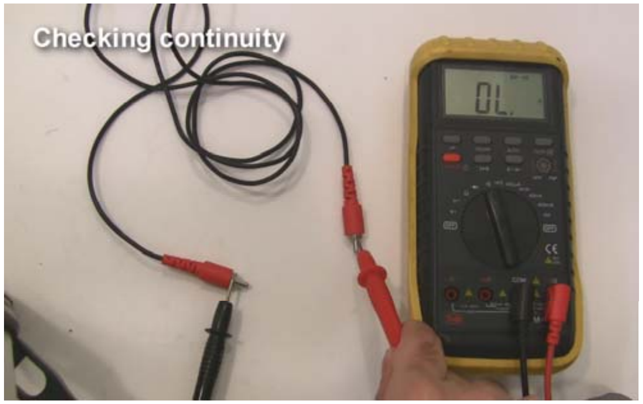
Four 4 ohm subs wired in Parallel equals a 1 ohm load!

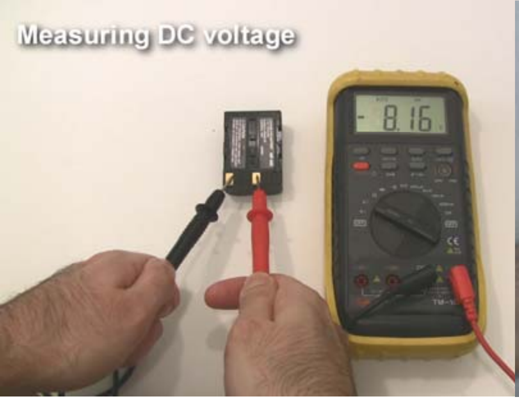

HEAT SENSOR
excessive heat detected
HEAT SENSORS
INPUTS
FILTERS
CH1
CH2
TOP
FULL
SUB
OUTPU
PINOUT
BRIDGE
POS
NEG

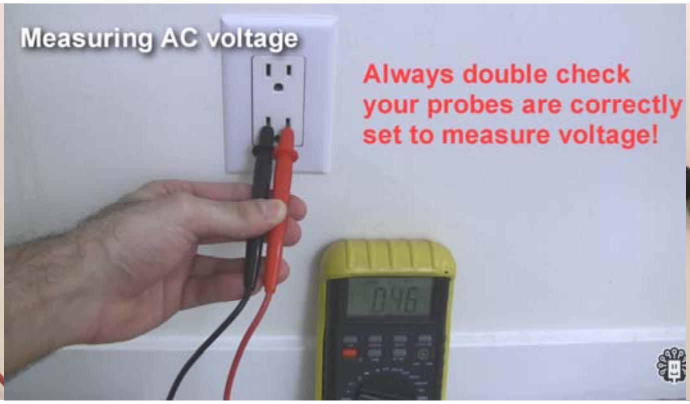

Standard meter (DC)
Impedance meter (AC)
AUDIO IMPEDANCE METER
OFF
ON
COM
Simple Audio Tips


Continuity
Resistance Ω
Voltage
V⎓
V~
hFE 400µA
4mA
40mA
400mA
Current
10A
NPN
PNP
OFF
OFF

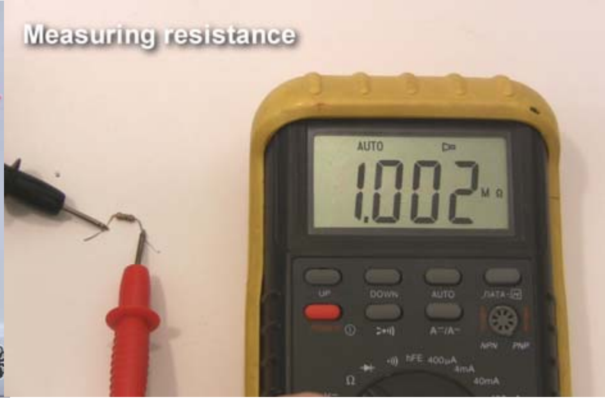

Measuring current
609


Checking continuity
0L.

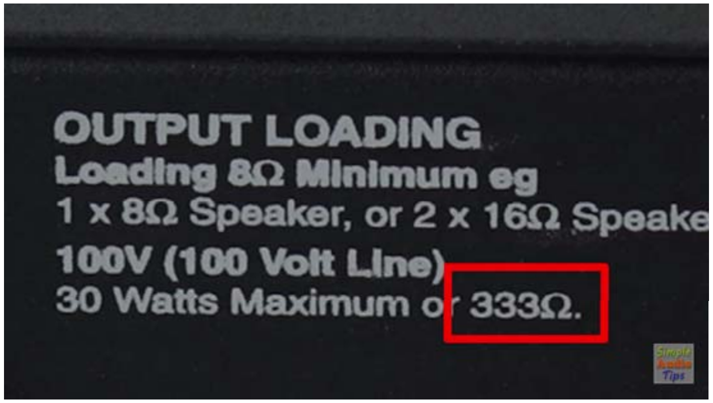

Measuring DC voltage
- 8.16


Measuring AC voltage
046

Always double check your probes are correctly set to measure voltage!


Measuring resistance
AUTO
1.002 MΩ

10W
10W
Simple Audio Tips



OUTPUT LOADING

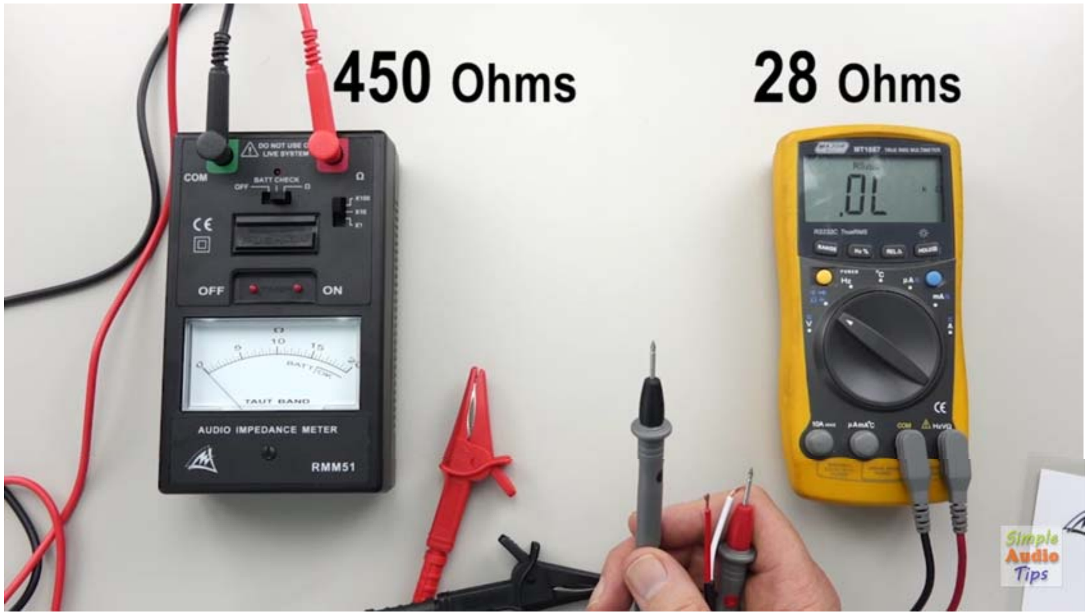
Loading 8Ω Minimum eg

1 x 8Ω Speaker, or 2 x 16Ω Speake

100V (100 Volt Line)

30 Watts Maximum or 333Ω.

Simple Audio Tips



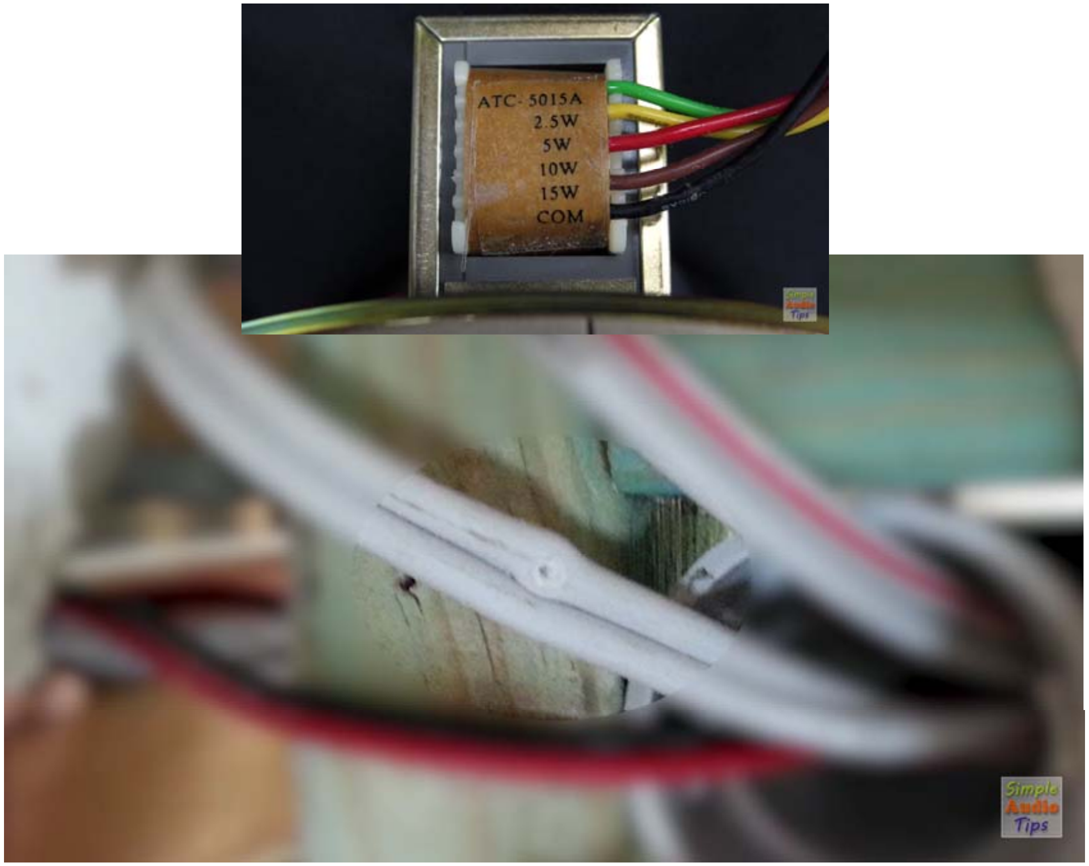
450 Ohms

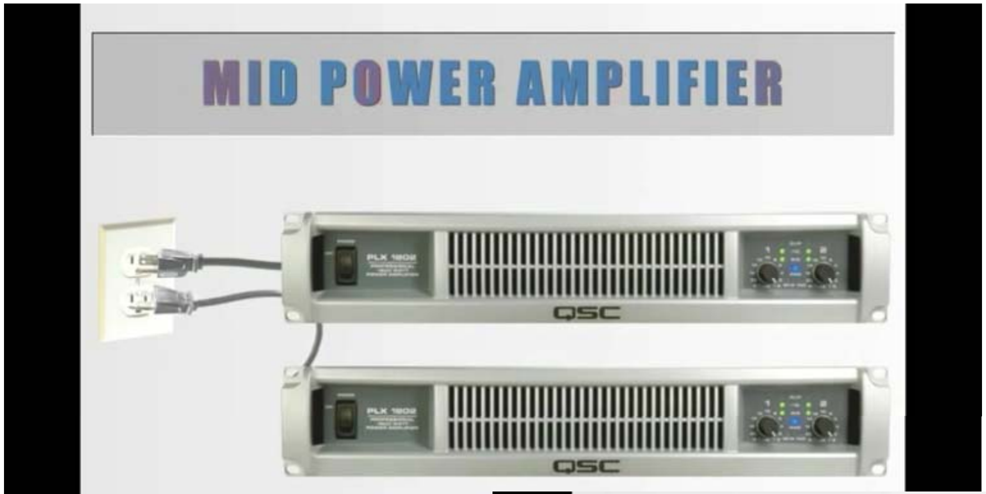
28 Ohms

COM
Ω
OFF
ON
AUDIO IMPEDANCE METER
RMM51
TAUT BAND
.0L
Simple Audio Tips

Simple Audio Tips

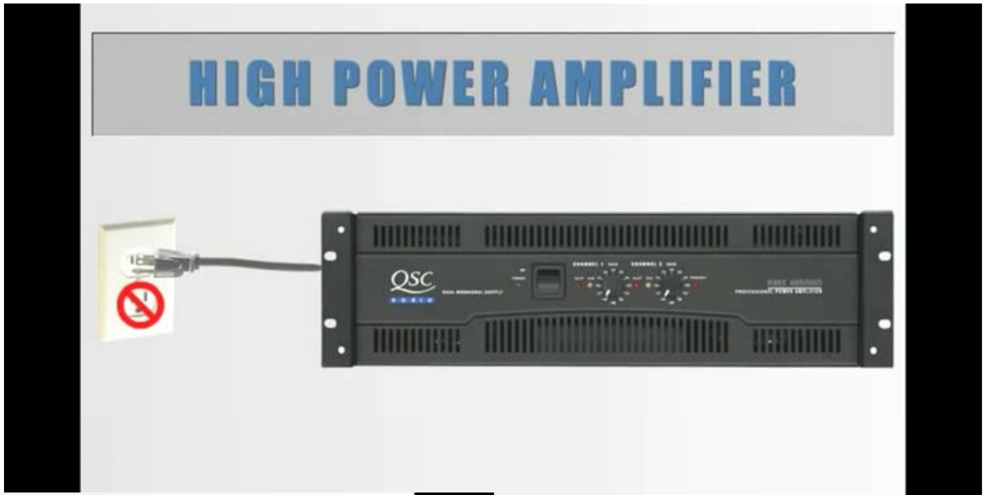
Simple Audio Tips


ATC-5015A
2.5W
5W
10W
15W
COM
Simple Audio Tips
Simple Audio Tips



MID POWER AMPLIFIER

PLX 1802
QSC
PLX 1802
QSC



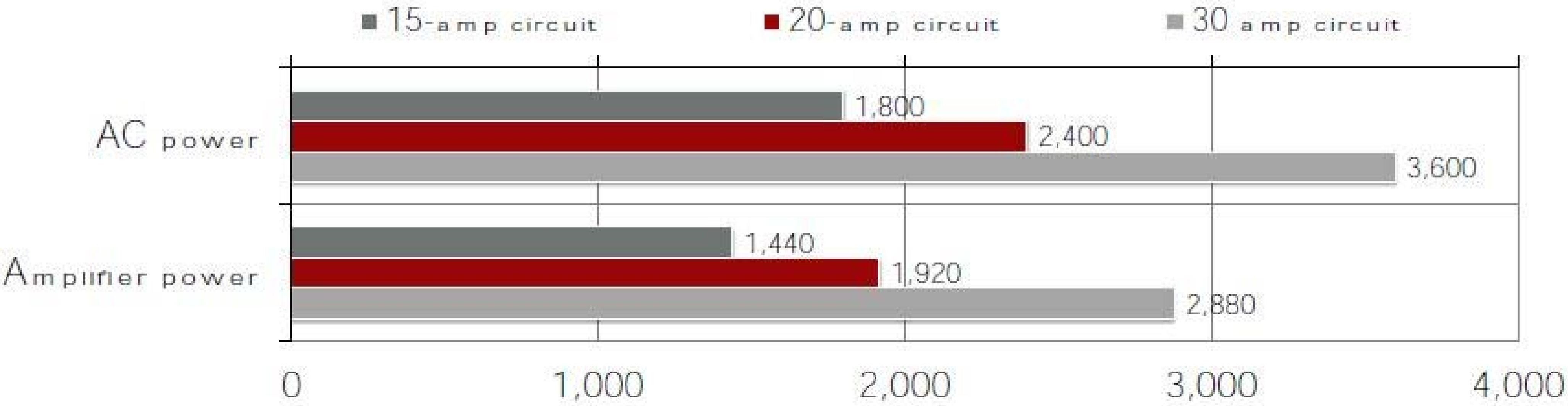
HIGH POWER AMPLIFIER

REMEMBER

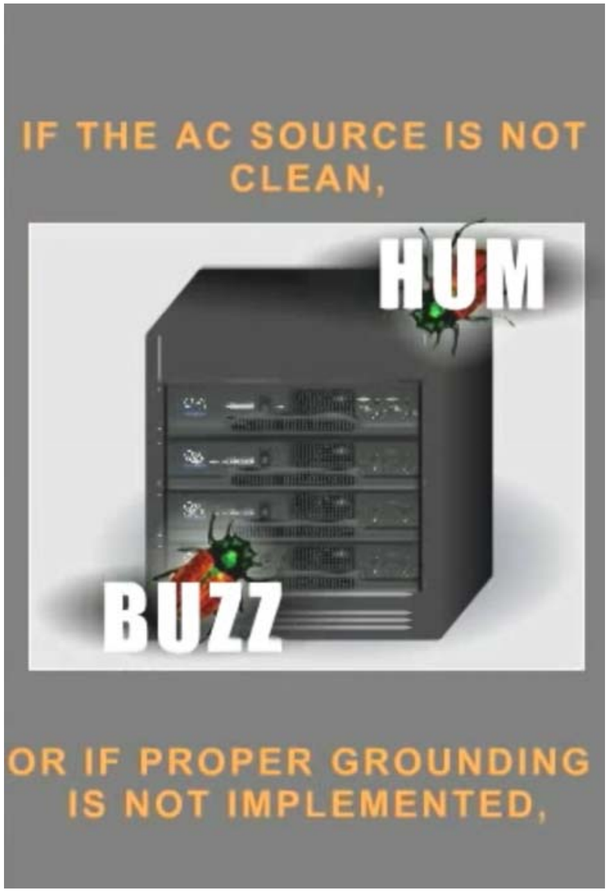
THE POWER AMPLIFIER IS DEPENDENT ON THE AC POWER SOURCE TO PRODUCE THE POWER IT WAS DESIGNED TO DELIVER

Amplifier sizing:

Class D amplification is fairly efficient, so given 80% efficiency:

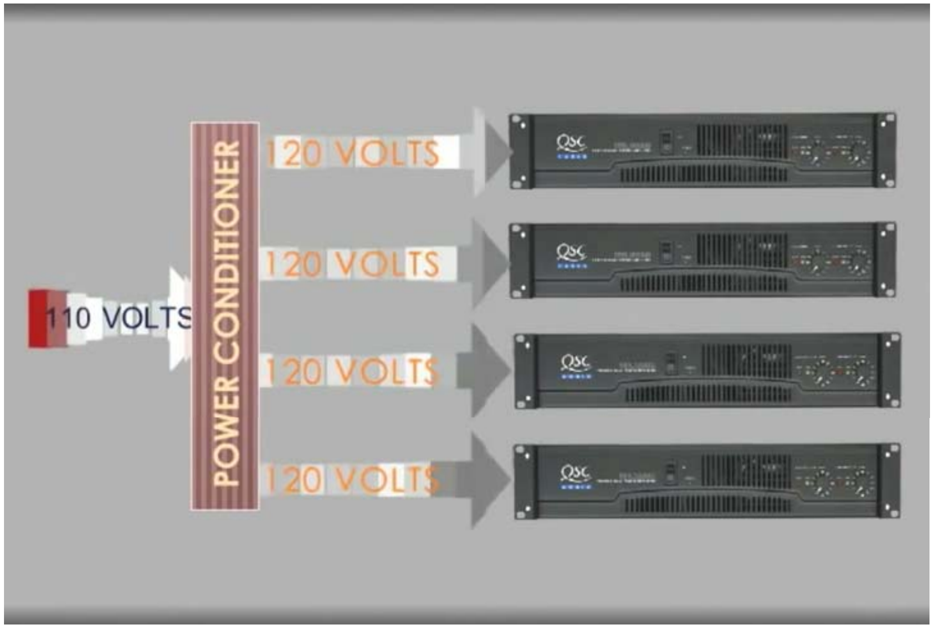


A single 15-amp circuit at 120 VAC delivers 1800 watts (15 X 120) of long-term power, so no matter what an amplifier's power rating is, the AC circuit is the limiting factor

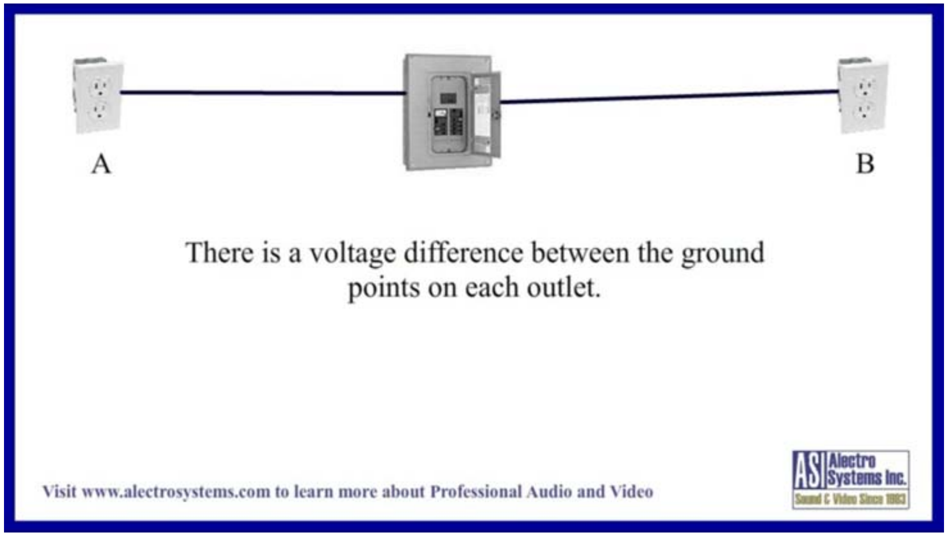


IF THE AC SOURCE IS NOT CLEAN,

OR IF PROPER GROUNDING IS NOT IMPLEMENTED,

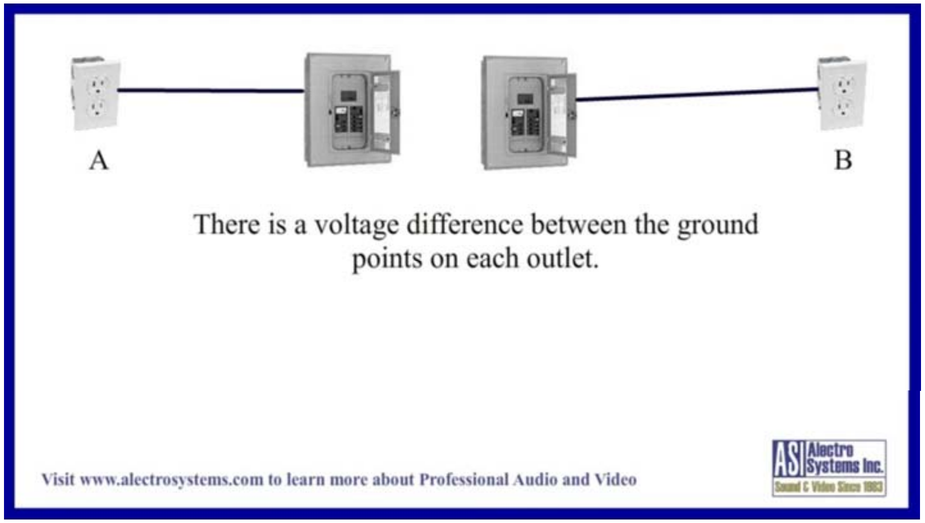


110 VOLTS
POWER CONDITIONER
120 VOLTS
120 VOLTS
120 VOLTS
120 VOLTS



There is a voltage difference between the ground points on each outlet.

Visit www.alectrosystems.com to learn more about Professional Audio and Video



There is a voltage difference between the ground points on each outlet.

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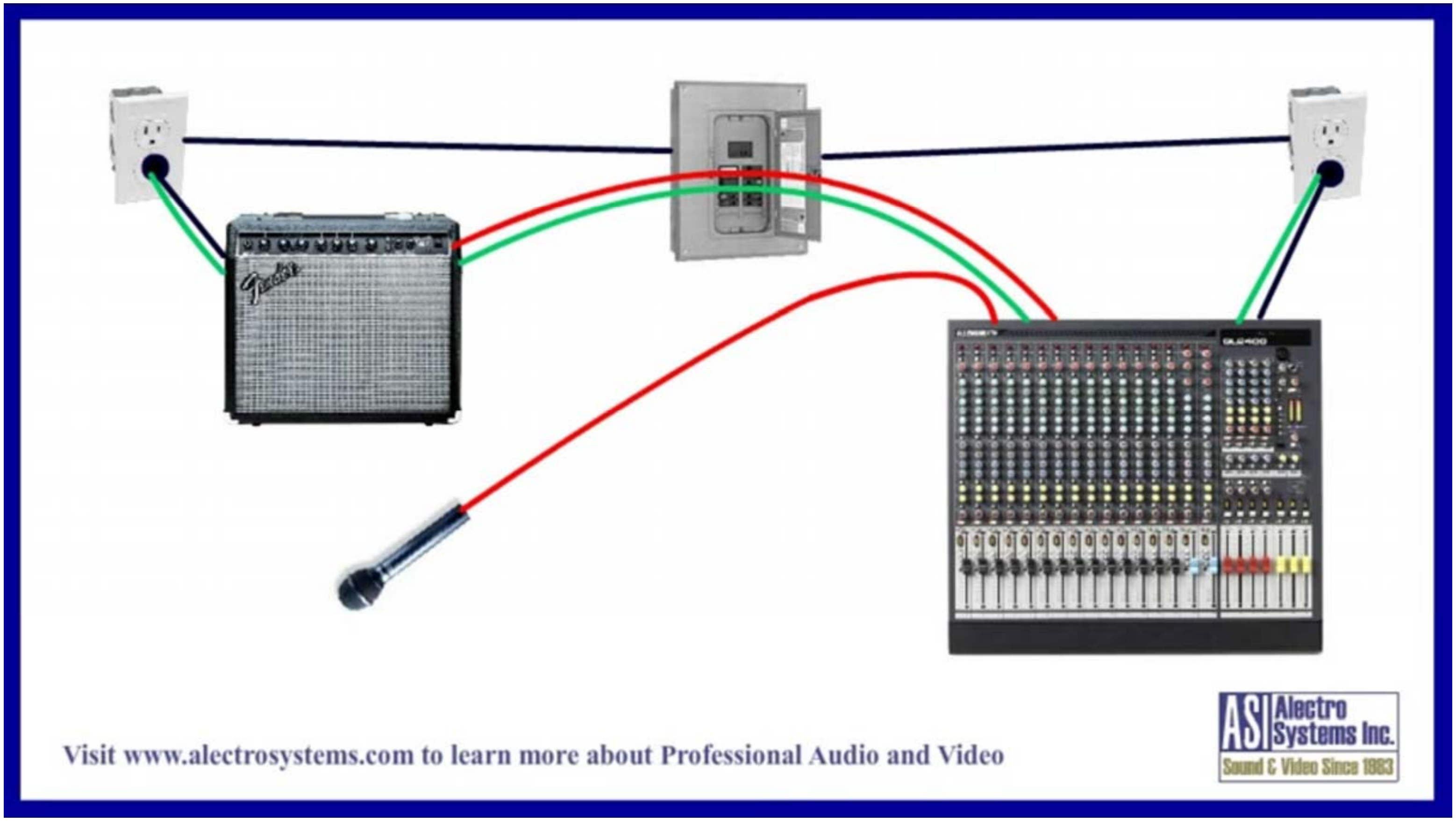
ASI Alectro Systems Inc.
Sound & Video Since 1983

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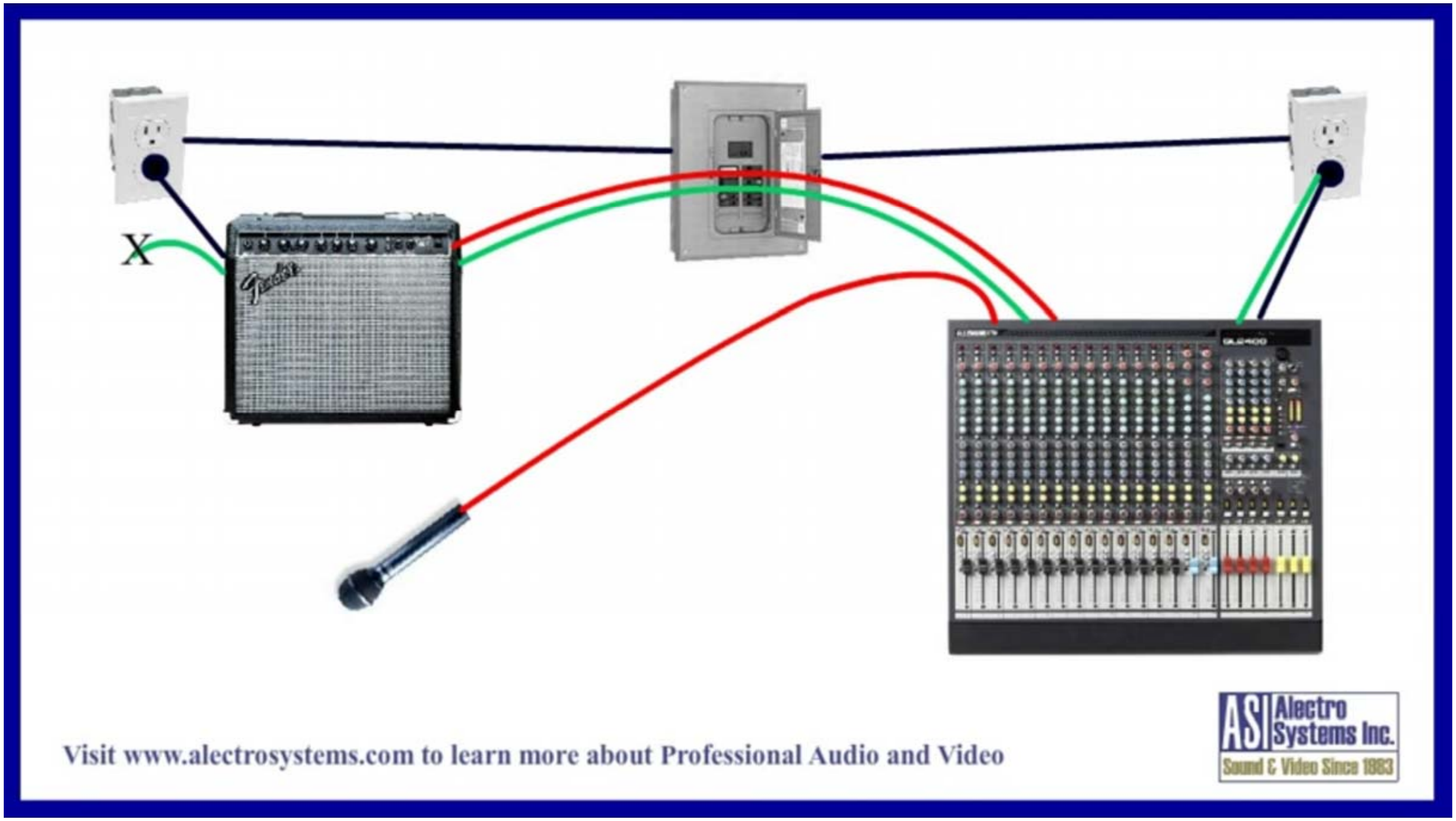
X
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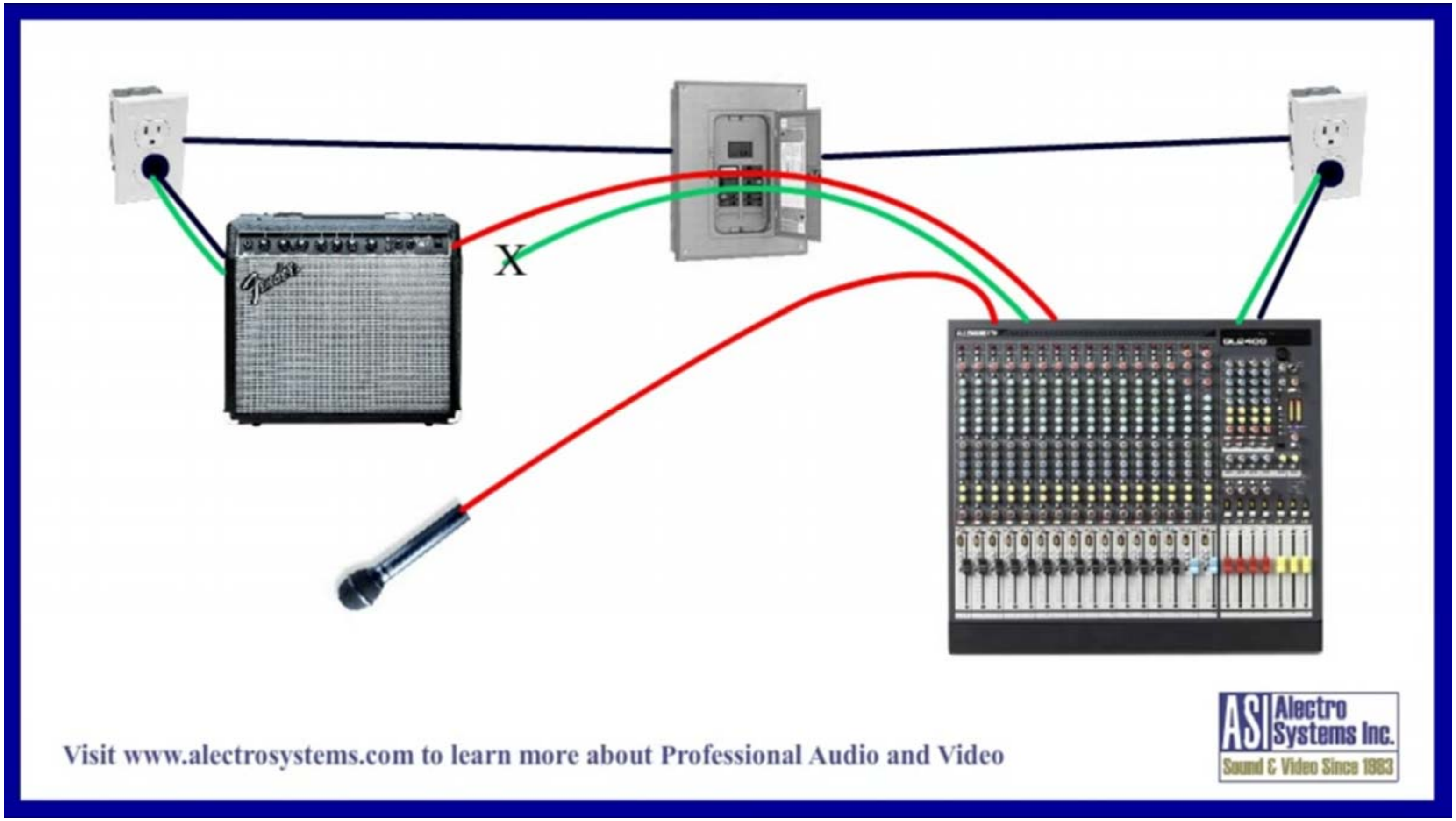
ASI Alectro Systems Inc.
Sound & Video Since 1983


X
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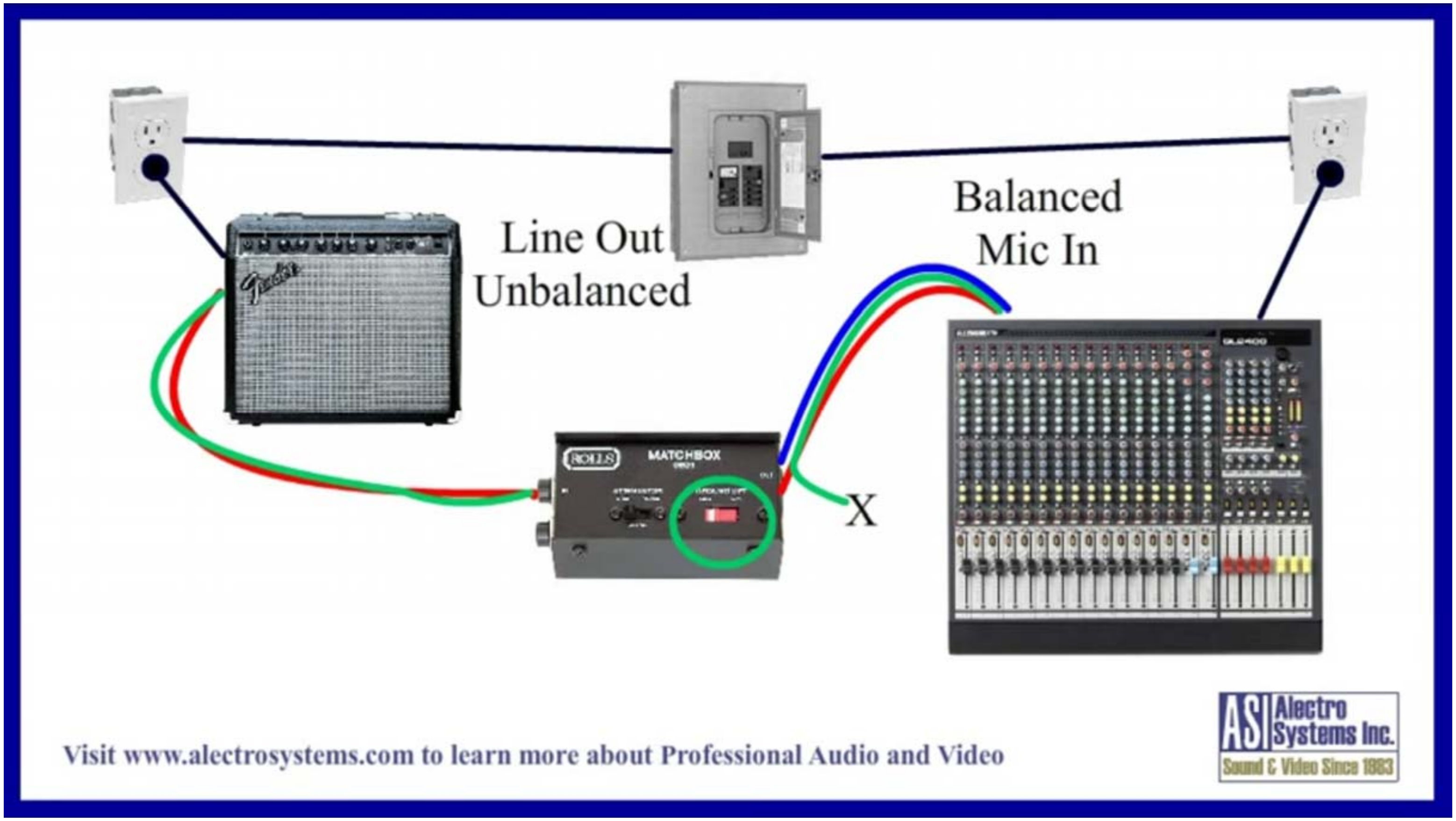
ASI Alectro Systems Inc.
Sound & Video Since 1983


Line Out
Unbalanced
Balanced
Mic In
X
ROLLS
MATCHBOX
GL2400
ASI Alectro Systems Inc.
Sound & Video Since 1983

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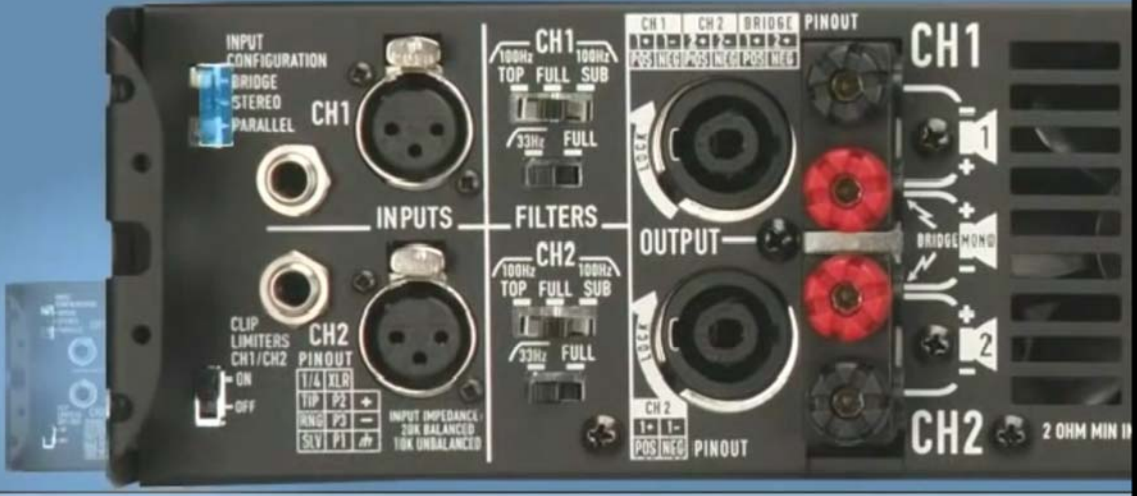
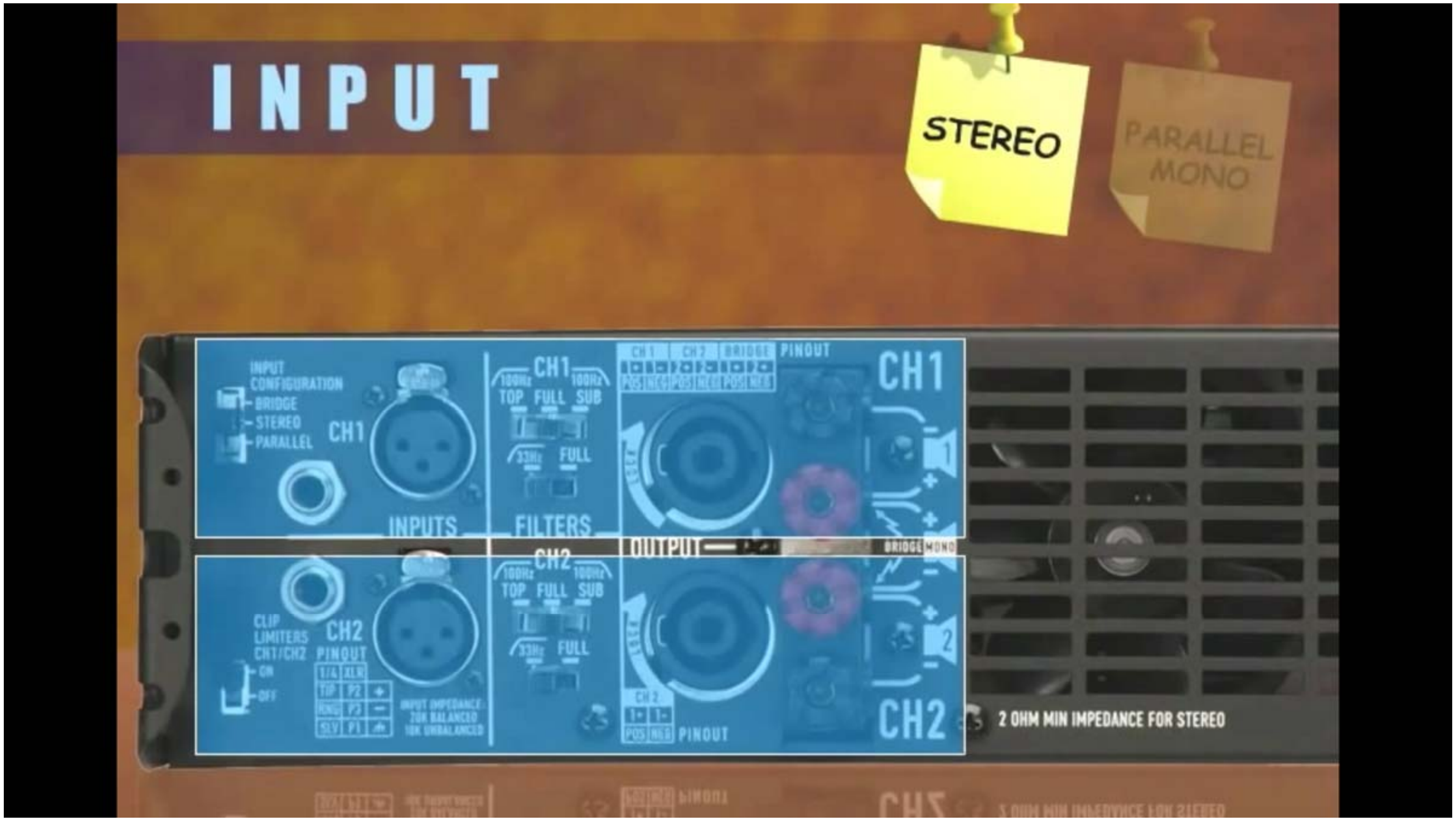
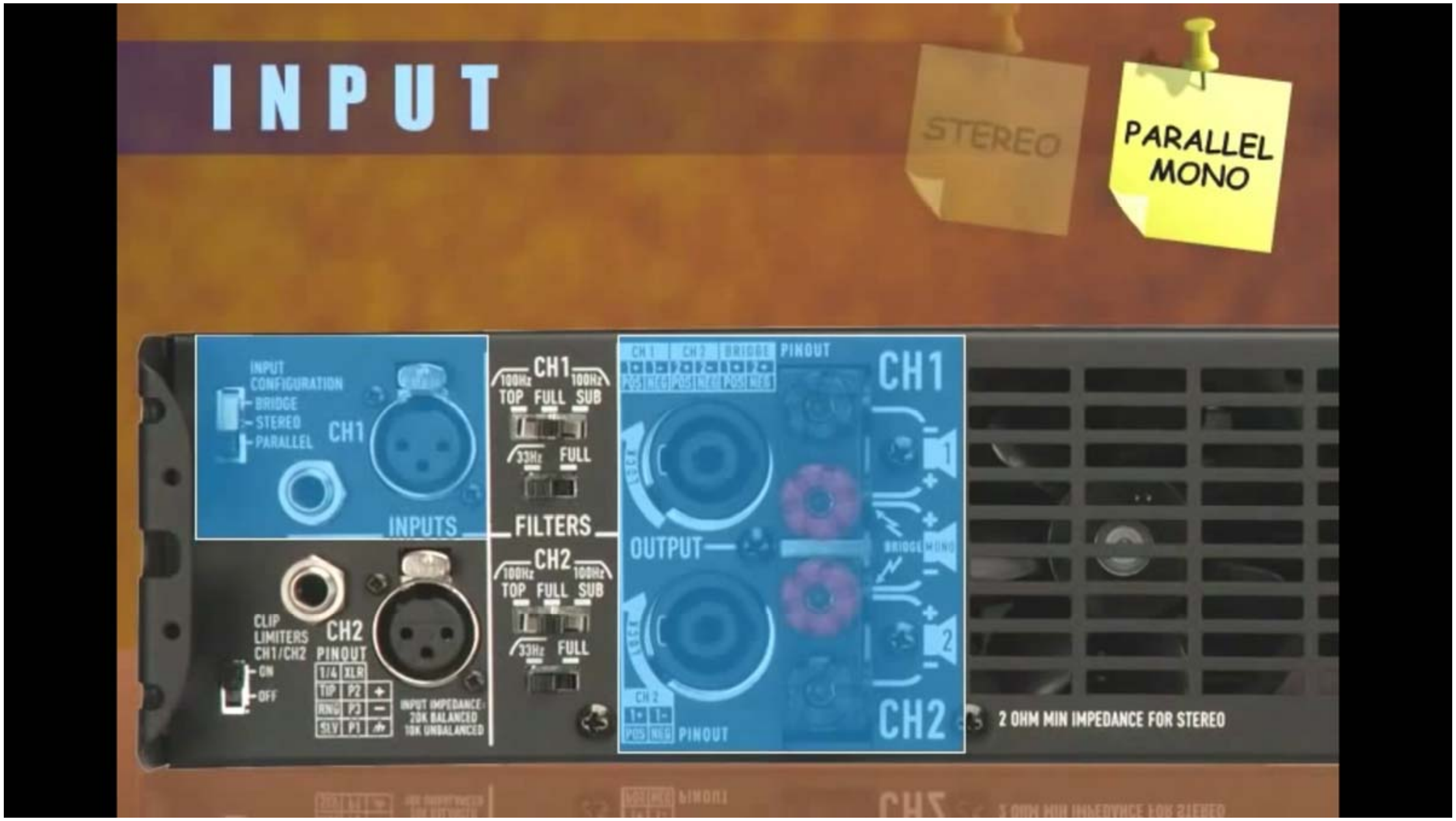
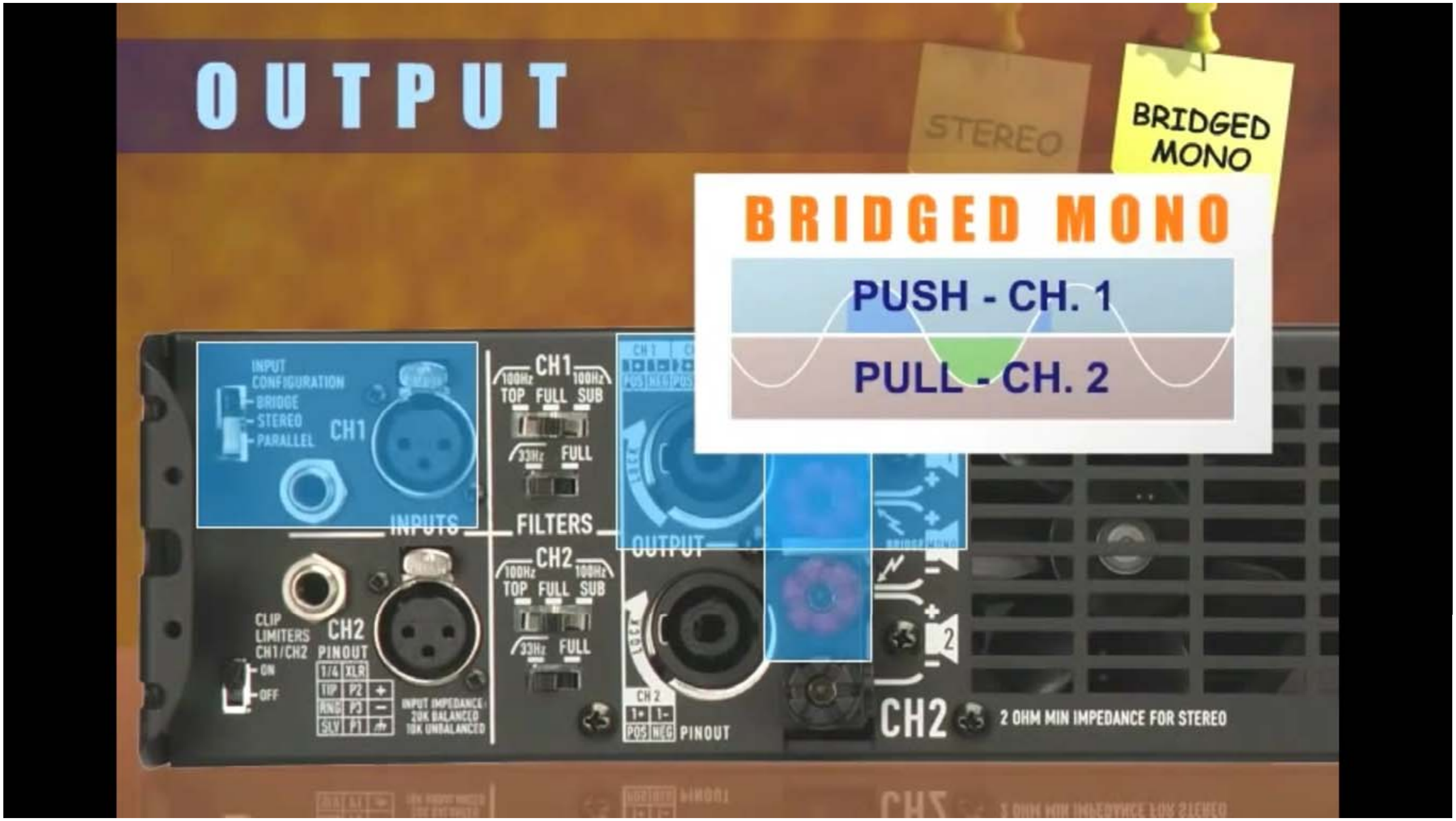
PROPER SETTINGS



INPUT CONFIGURATION
BRIDGE
STEREO
PARALLEL
CH1
INPUTS
CLIP LIMITERS CH1/CH2
ON
OFF
CH2
PINOUT
1/4 XLR
TIP P2 +
RNG P3 −
SLV P1
INPUT IMPEDANCE: 20K BALANCED 10K UNBALANCED
FILTERS
CH1
100Hz TOP FULL 100Hz SUB
33Hz FULL
CH2
100Hz TOP FULL 100Hz SUB
33Hz FULL
CH1 CH2 BRIDGE PINOUT
POS NEG POS NEG POS NEG
LOCK
OUTPUT
CH 2
1+ 1−
POS NEG
PINOUT
CH1
1
2
BRIDGE MONO
CH2
2 OHM MIN


INPUT
STEREO
PARALLEL MONO
INPUT CONFIGURATION
BRIDGE
STEREO
PARALLEL
CH1
INPUTS
CH1
100Hz TOP FULL 100Hz SUB
33Hz FULL
FILTERS
CH1 CH2 BRIDGE PINOUT
CH1
OUTPUT
BRIDGE MONO
CH2
100Hz TOP FULL 100Hz SUB
33Hz FULL
CLIP LIMITERS CH1/CH2
ON
OFF
CH2
PINOUT
1/4 XLR
TIP P2 +
RNG P3 −
SLV P1
INPUT IMPEDANCE: 20K BALANCED 10K UNBALANCED
CH2
PINOUT
CH2
2 OHM MIN IMPEDANCE FOR STEREO


INPUT
STEREO
PARALLEL MONO
INPUT CONFIGURATION
BRIDGE
STEREO
PARALLEL
CH1
INPUTS
CLIP LIMITERS CH1/CH2
ON
OFF
CH2
PINOUT
1/4
XLR
TIP
P2
+
RNG
P3
−
SLV
P1
INPUT IMPEDANCE: 20K BALANCED 10K UNBALANCED
CH1
100Hz TOP
FULL
100Hz SUB
33Hz
FULL
FILTERS
CH2
100Hz TOP
FULL
100Hz SUB
33Hz
FULL
CH1
CH2
BRIDGE
POS
NEG
PINOUT
OUTPUT
CH1
1
BRIDGE MONO
2
CH2
2 OHM MIN IMPEDANCE FOR STEREO



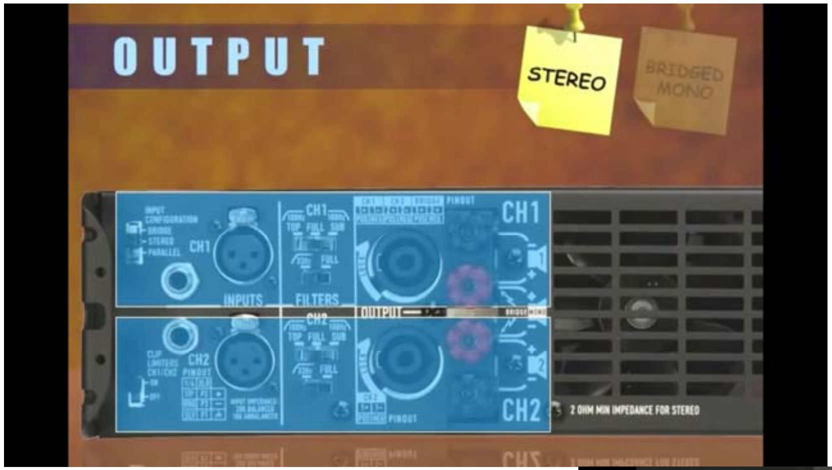
OUTPUT

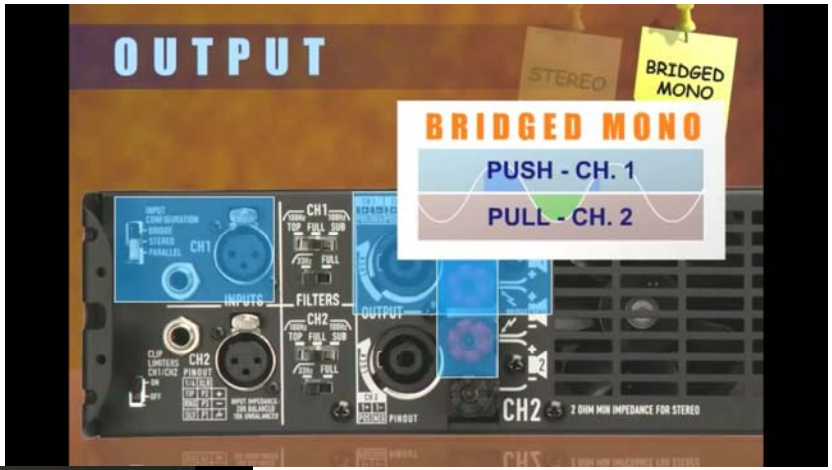
BRIDGED MONO

PUSH - CH. 1

PULL - CH. 2

STEREO
BRIDGED MONO
INPUT CONFIGURATION
BRIDGE
STEREO
PARALLEL
CH1
INPUTS
CLIP LIMITERS CH1/CH2
ON
OFF
CH2
PINOUT
1/4 XLR
TIP P2 +
RNG P3 −
SLV P1
INPUT IMPEDANCE: 20K BALANCED 10K UNBALANCED
CH1
100Hz TOP FULL 100Hz SUB
33Hz FULL
FILTERS
CH2
100Hz TOP FULL 100Hz SUB
33Hz FULL
OUTPUT
CH 2
1+ 1−
POS NEG
PINOUT
BRIDGE MONO
CH2
2 OHM MIN IMPEDANCE FOR STEREO


OUTPUT
STEREO
BRIDGED MONO
CH1
INPUTS
FILTERS
OUTPUT
BRIDGE MONO
CH2
PINOUT
2 OHM MIN IMPEDANCE FOR STEREO


OUTPUT
STEREO
BRIDGED MONO
BRIDGED MONO
PUSH - CH. 1
PULL - CH. 2
INPUTS
FILTERS
OUTPUT
CH2
2 OHM MIN IMPEDANCE FOR STEREO

POWER AMPLIFIER
MODERN AMPLIFIER
CH 1
CH 2
BRIDGE
PINOUT
CH1
OUTPUT
CH2
PINOUT

Which is NOT a correct statement?

A.
Use an amp 20-50% more than your speakers

B.
Speaker wiring and total does not change resistance

C.
A standard meter can be used to check a lot in audio but to measure resistance you should use an impedance meter

D.
You have to pay attention to settings and power for amplifiers to ensure best audio

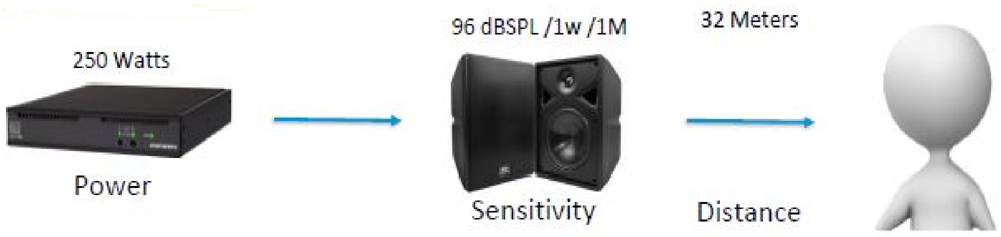
Sound Pressure Level –SPL:

Loudspeaker Sensitivity: dB SPL 1 watt @ 1 meter

Power: +3dB for every 2x watts

Distance: -6dB for every 2x distance

- 0dB faintest audible sound
- 50-60dB normal conversation
- 120dB painful


250 Watts
Power
96 dBSPL /1w /1M
Sensitivity
32 Meters
Distance

96 dB SPL @ loudspeaker1W/1M
+ 24 dB (250 W) [8 x 3dB] Amplifier Gain
-30 dB (32 M) [5 x -6dB] Distance Loss
----
90 dB SPL at the listener

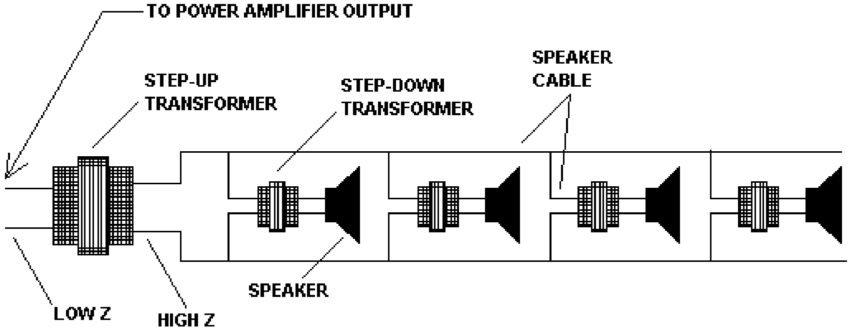
Doubling
1
2
4
8
16
32
64
128
256

To make the system appreciably louder, the amplifier should be replaced with an amplifier 4 to 10 times more powerful

- 4X the power =6 dB louder, which is perceptively louder in volume
- 10X the power =10 dB louder, which is perceptively twice as loud
- Be sure that the existing loudspeakers can handle the additional power

Over-Powered Amplifier
COOLER
QMV

Crestron – “If you are without a 70-volt amplifier, but need to drive a 70-volt loudspeaker line, a low-impedance amplifier channel rated for 600 watts @ 8 ohms supplies a 69-volt line, for a 100-volt line, 1250 watts @ 8 ohms”

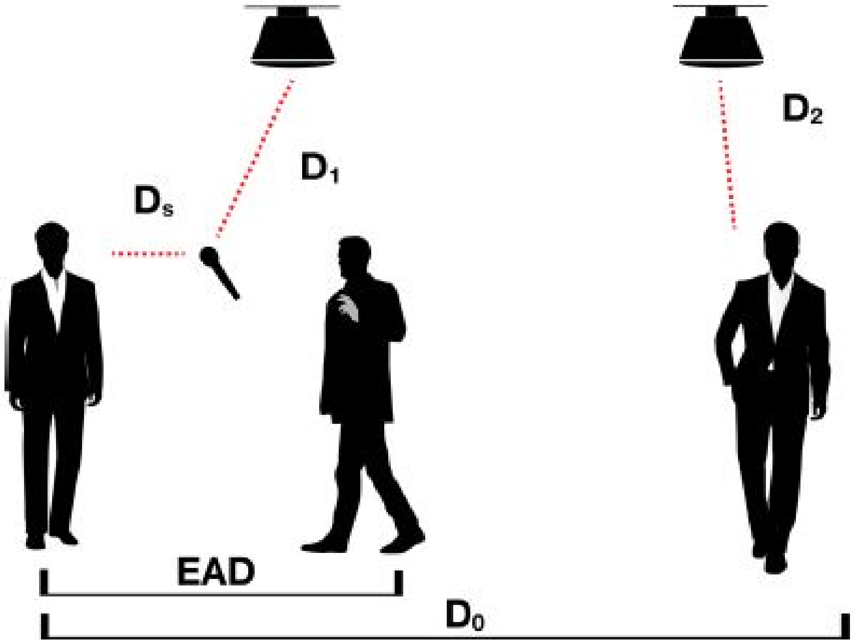

TO POWER AMPLIFIER OUTPUT
STEP-UP TRANSFORMER
STEP-DOWN TRANSFORMER
SPEAKER CABLE
SPEAKER
LOW Z
HIGH Z

CONSTANT-VOLTAGE DISTRIBUTED SYSTEM

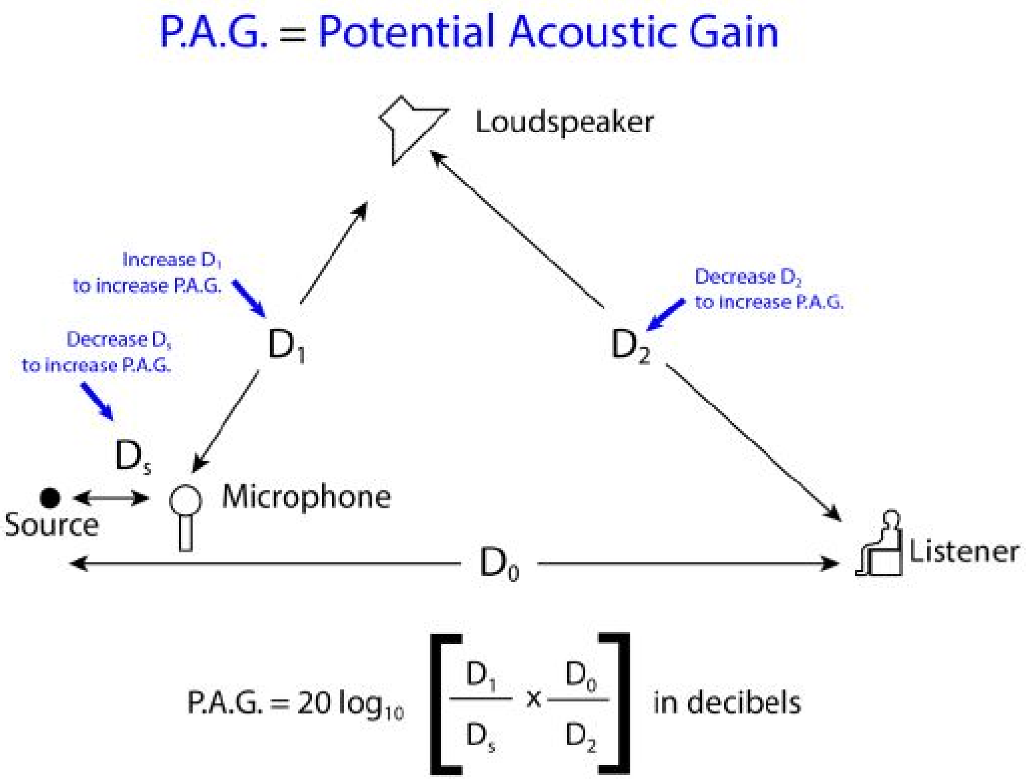
PAG/NAG (Potential Acoustic Gain/Needed Acoustic Gain):

Definitions:

- **D0**Talker-to-farthest-listener distance
- **D1**Mic-to-closest-loudspeaker distance
- **D2**Listener-to-closest-loudspeaker distance
- **DS**Talker-to-mic distance
- **EAD**Equivalent Acoustic Distance, the desired virtual distance between the talker and furthest listener
- **NOM**Number of Open Microphones, always set to 1 when using automatic mixer function
- **FSM**Feedback Stability Margin



Potential Acoustical Gain:



P.A.G. = Potential Acoustic Gain

Loudspeaker
Increase D1 to increase P.A.G.
D1
Decrease D2 to increase P.A.G.
D2
Decrease Ds to increase P.A.G.
Ds
Source
Microphone
Listener
D0

$$P.A.G. = 20 \log_{10} \left[\frac{D_1}{D_s} \times \frac{D_0}{D_2} \right] \text{ in decibels}$$

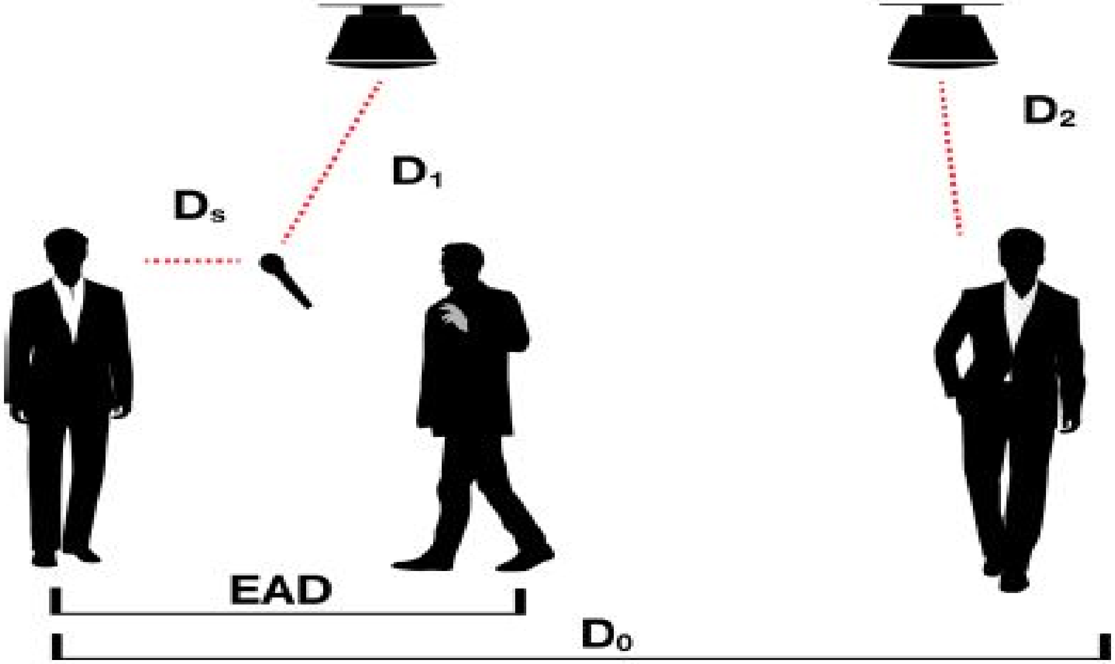
PAG/NAG (Potential Acoustic Gain/Needed Acoustic Gain):

NAG formula:

- NAG = 20Log(D0/EAD)

For example (imperial):

- NAG = 20Log(50 ft./8 ft.)
- NAG = 20Log(6.25)
- NAG = 15.9 dB



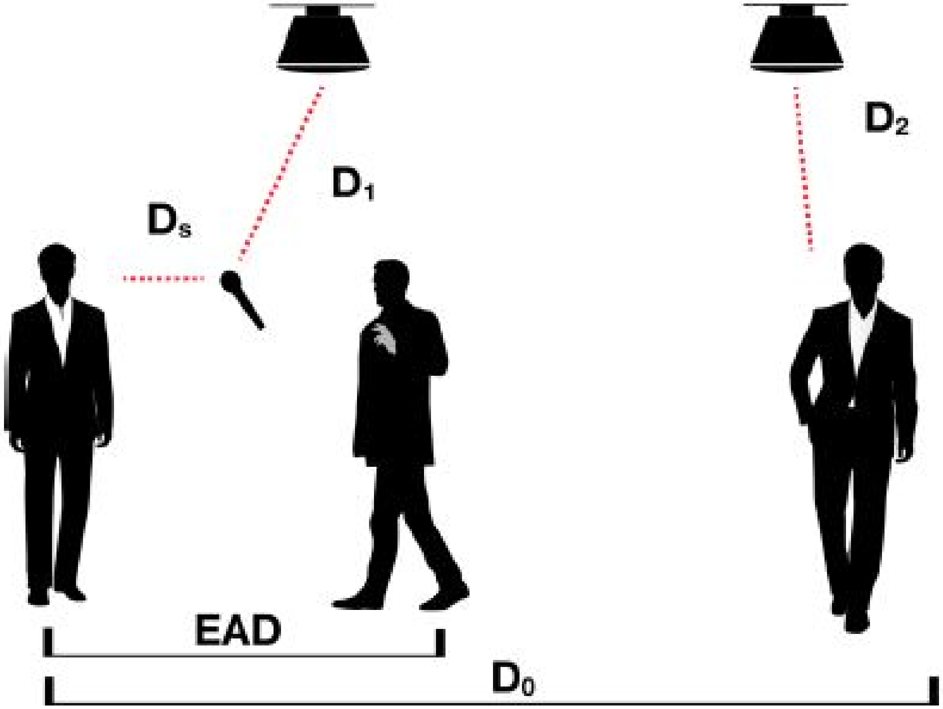
PAG/NAG (Potential Acoustic Gain/Needed Acoustic Gain):

PAG = 22.5 dB [22.4 dB]

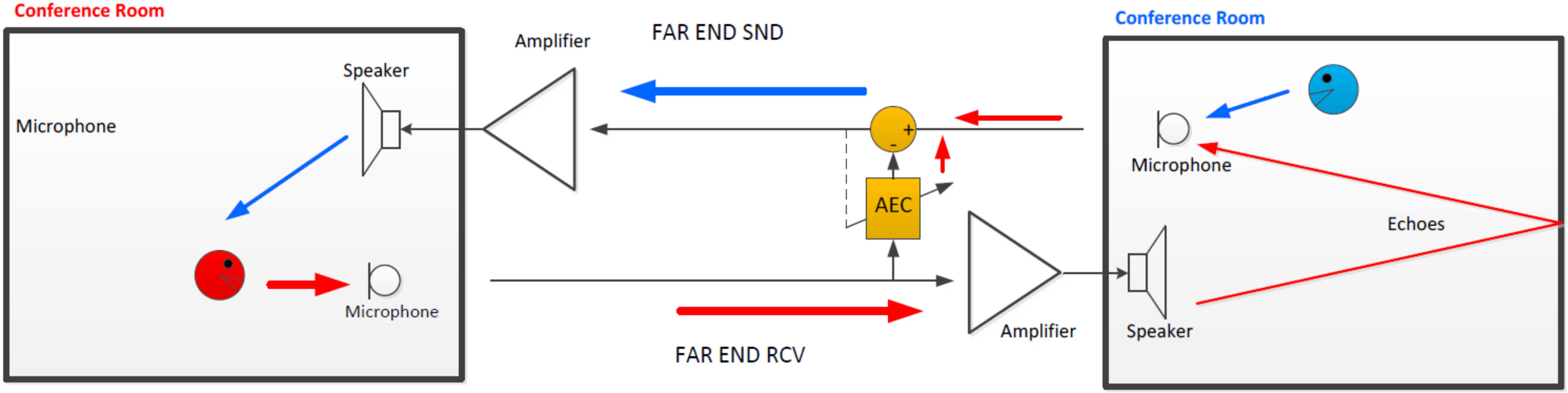
NAG = 15.9 dB [15.6 dB]

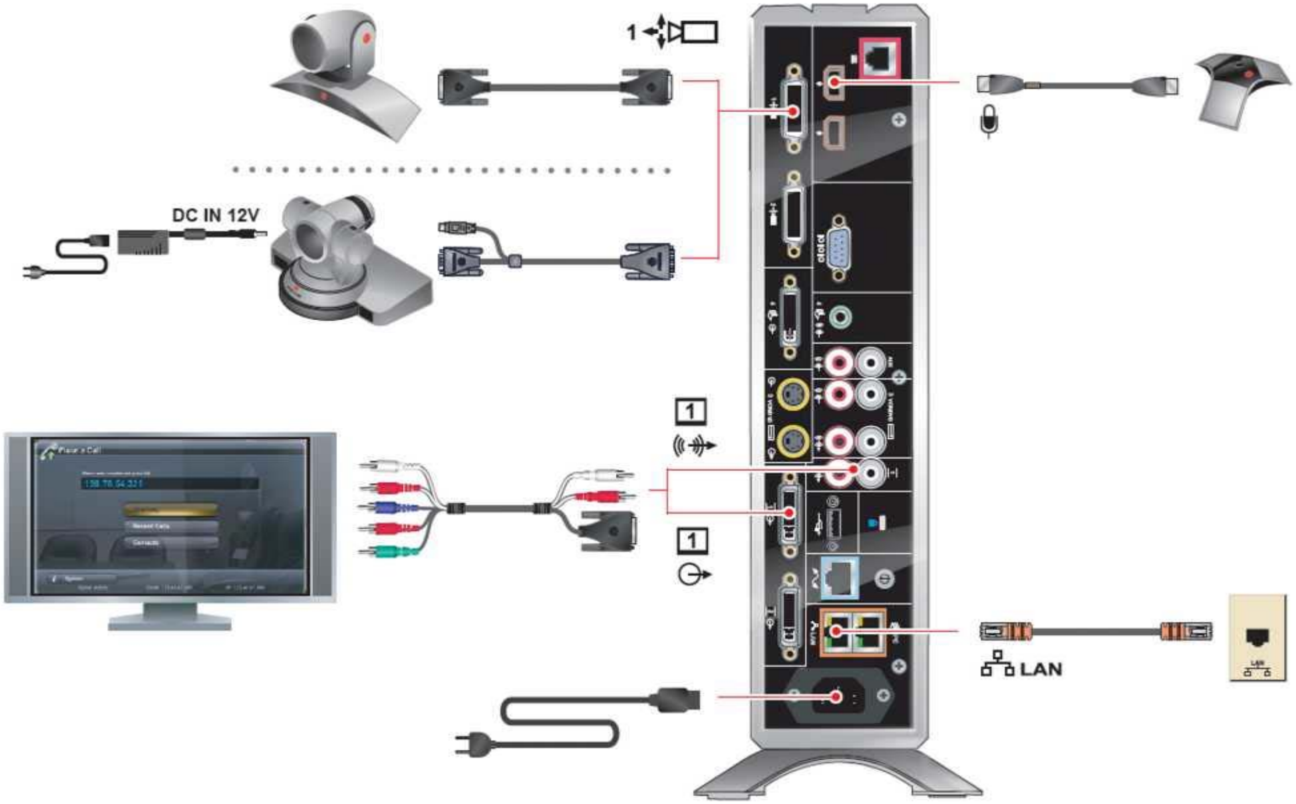
PAG > NAG

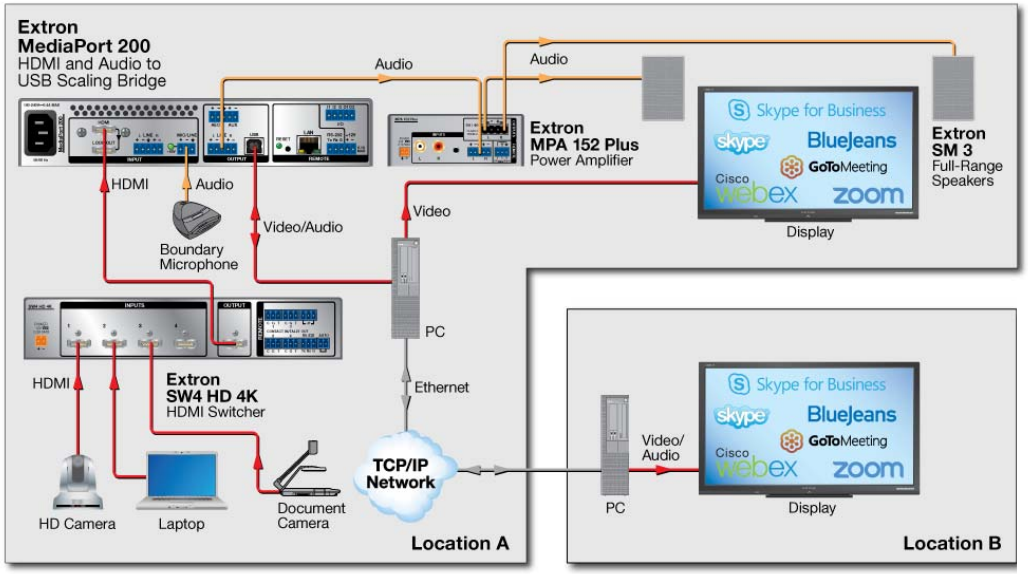
The system parameters will provide enough gain-before-feedback to acoustically locate all listeners within 8 ft. [2.5 m] of the talker

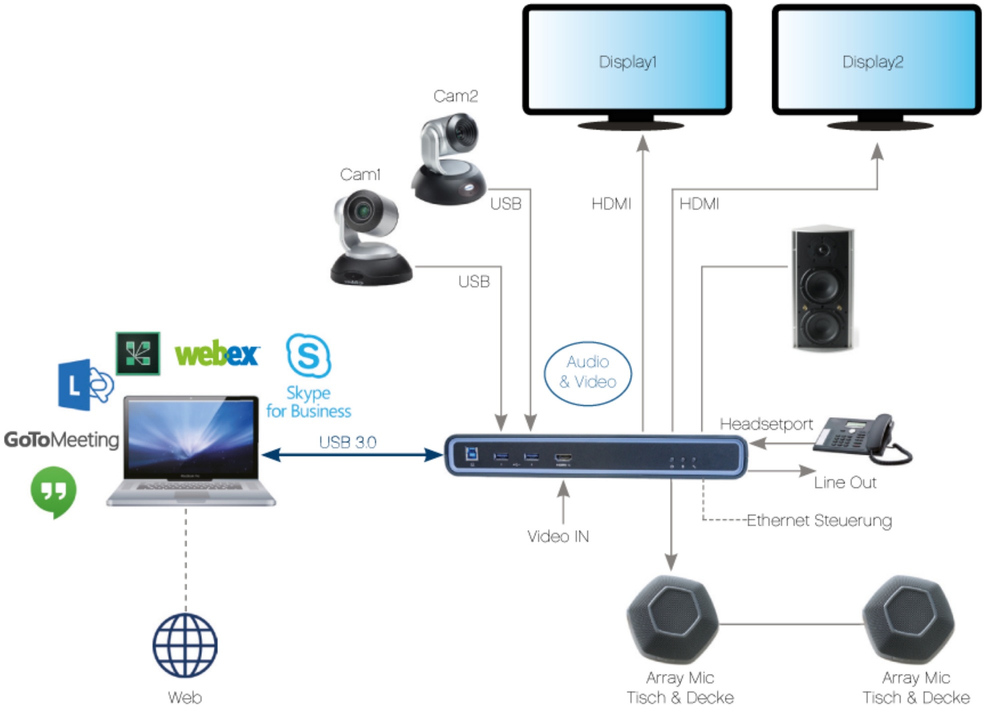


AEC


Conference Room
Speaker
Microphone
Microphone
Amplifier
FAR END SND
AEC
+
-
FAR END RCV
Conference Room
Microphone
Echoes
Amplifier
Speaker


DC IN 12V
LAN


Extron
MediaPort 200
HDMI and Audio to
USB Scaling Bridge
Audio
Audio
Extron
MPA 152 Plus
Power Amplifier
Skype for Business
skype
BlueJeans
GoToMeeting
Cisco
webex
zoom
Display
Extron
SM 3
Full-Range
Speakers
HDMI
Audio
Boundary
Microphone
Video/Audio
Video
PC
HDMI
Extron
SW4 HD 4K
HDMI Switcher
Ethernet
TCP/IP
Network
HD Camera
Laptop
Document
Camera
Location A
PC
Video/
Audio
Skype for Business
skype
BlueJeans
GoToMeeting
Cisco
webex
zoom
Display
Location B


Display1
Display2
Cam2
Cam1
USB
USB
HDMI
HDMI
webex
Skype
for Business
GoToMeeting
USB 3.0
Audio
& Video
Headsetport
Line Out
Video IN
Ethernet Steuerung
Web
Array Mic
Tisch & Decke
Array Mic
Tisch & Decke

Which is NOT a correct statement?

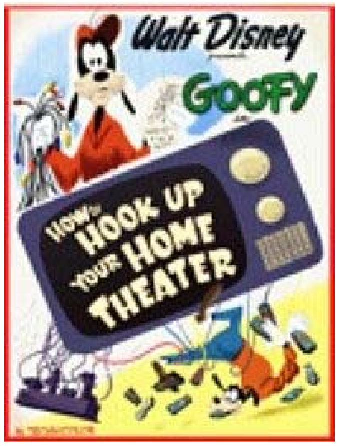
A.
You will have to do a lot of math to get best audio

B.
If a person on the far end is hearing themselves in a conference call it is a problem on your side with AEC

C.
Feedback issues are due to frequency and distances

D.
The most secured and easiest method of video conferencing is still with a codec and not soft conferencing

Step 5 – Control


Walt Disney
presents
GOOFY
How to
HOOK UP
YOUR HOME
THEATER

Touch Panels

Keypad

POWER
LIGHTS OFF
LIGHTS ON
SCREEN DOWN
SCREEN UP
VOLUME
PC
LAPTOP
DVD
DOC CAMERA
AUTO IMAGE
MENU
CRESTRON
MPC-M20

User Interfaces

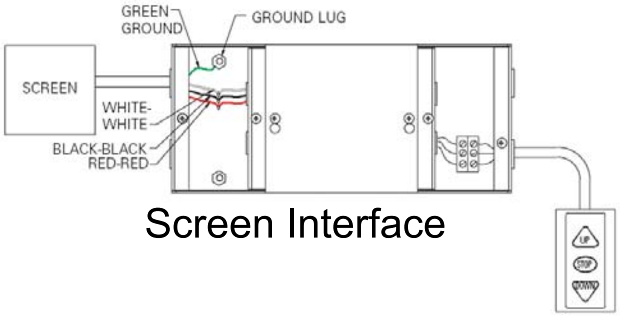
PROFESSIONAL CONTROL PROCESSOR
Main Menu *
PANEL INFO TEST
01/24/01 04:27:42pm
MSG TIME COM
MENU
BKLT
CRESTRON
PRO2
C2ENET-2 ETHERNET INTERFACE
MEMORY EXPANSION
COMPUTER
COM A
COM B
COM C
COM D
COM E
COM F
S5 INFRARED - SERIAL OUTPUT
S6 I/O
S7 RELAY OUTPUT
C2COM-3 RS-232 / 422 / 485 INTERFACE
C2VEQ-4 VOLUME/EQUALIZER CONTROL
C2IR-8 INFRARED - SERIAL OUTPUT
24VDC 50W

Control Processor

- Control processor with touch panel/software app
- Button panel
- Browser control
- Control anything with
  - Serial
  - IR
  - Ethernet
  - Relay /Contact Closure

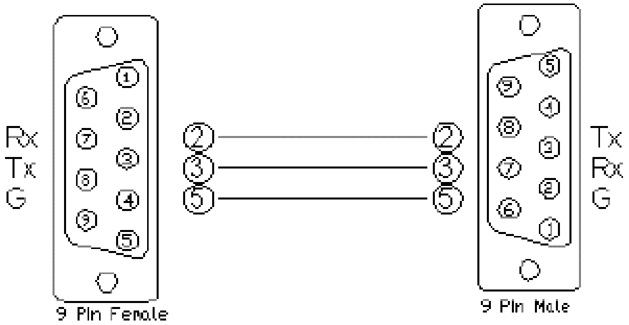
ACTIVE VIDEO CALIBRA
VP683U
ACT
RJ45

Infrared Emitter

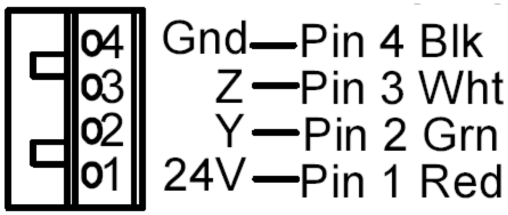

GREEN GROUND
GROUND LUG
SCREEN
WHITE-WHITE
BLACK-BLACK
RED-RED
UP
STOP
DOWN

Screen Interface

Projector Lift


Rx
Tx
G
1
2
3
4
5
6
7
8
9
2
3
5
2
3
5
Tx
Rx
G
9 Pin Female
9 Pin Male

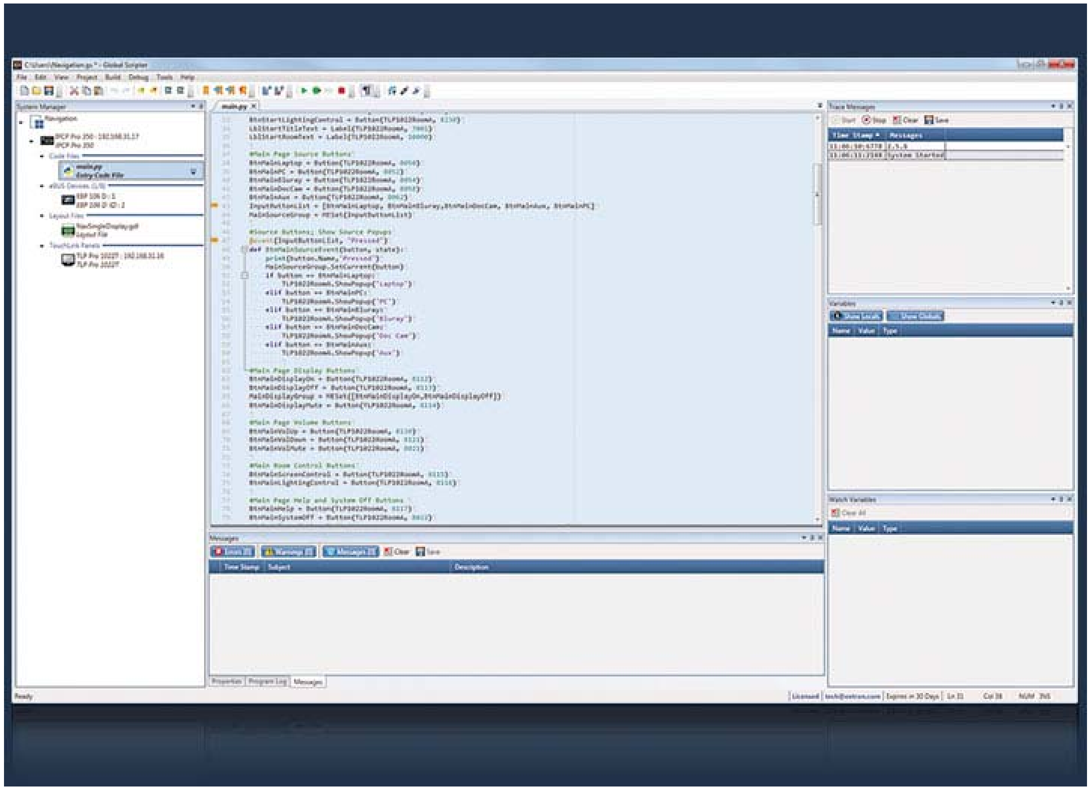
RS232 Cable



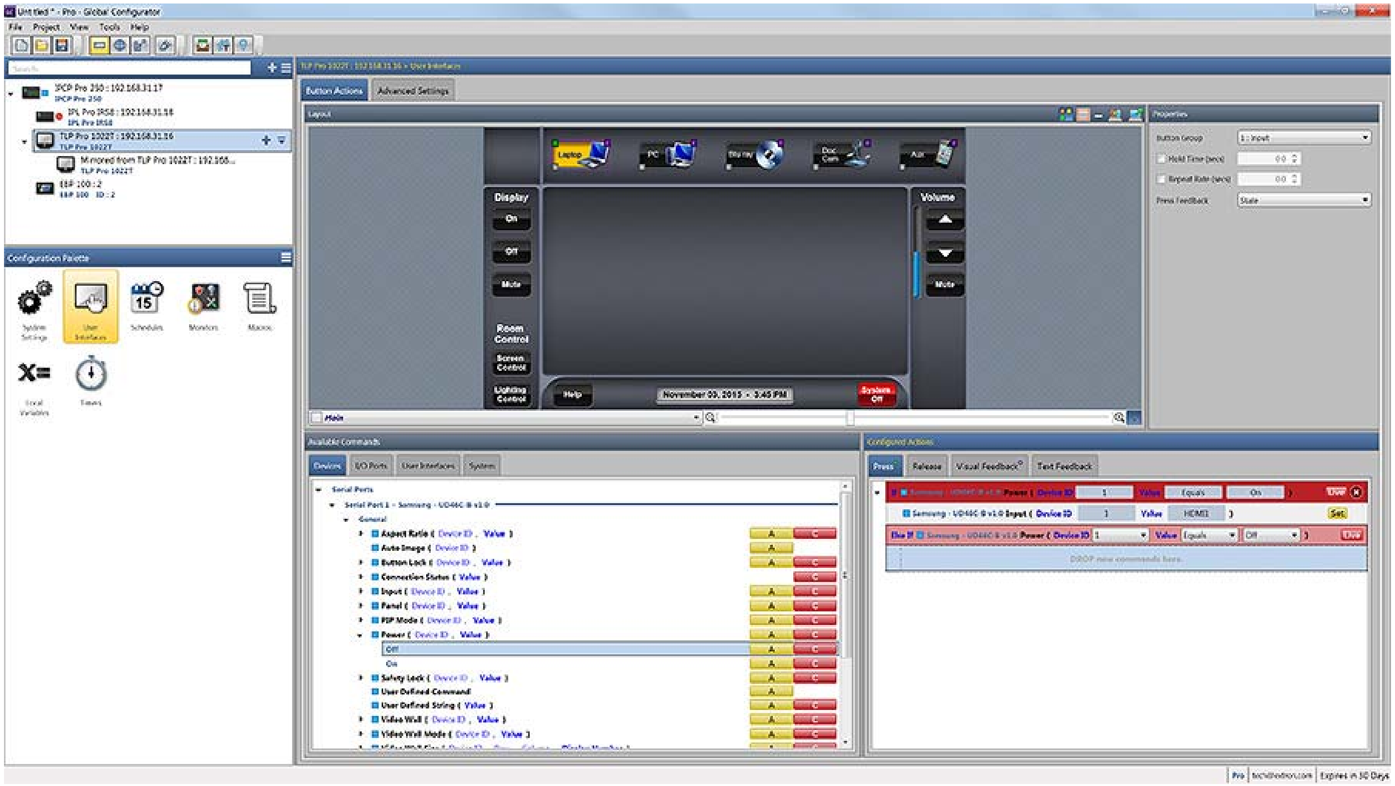
Gnd—Pin 4 Blk
Z—Pin 3 Wht
Y—Pin 2 Grn
24V—Pin 1 Red

Cresnet Wiring

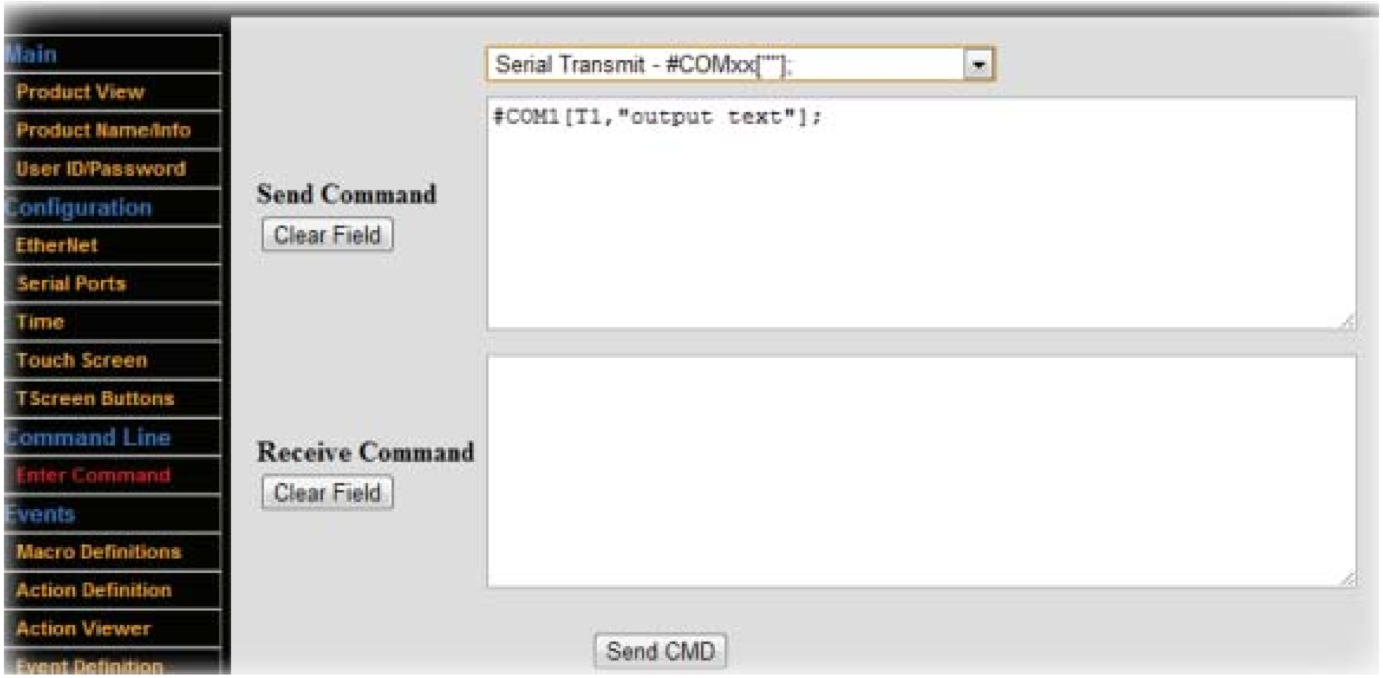
Programmable Systems



Configurable Systems


Untitled * - Pro - Global Configurator
File
Project
View
Tools
Help
IPCP Pro 250 : 192.168.31.17
IPL Pro IRS8 : 192.168.31.18
TLP Pro 1022T : 192.168.31.16
Mirrored from TLP Pro 1022T : 192.168...
EBP 100 : 2
Configuration Palette
System Settings
User Interfaces
Schedules
Monitors
Macros
Local Variables
Timers
Button Actions
Advanced Settings
Layout
Properties
Button Group
Hold Time (secs)
Repeat Rate (secs)
Press Feedback
Laptop
PC
Blu-ray
Doc Cam
AUX
Display
On
Off
Mute
Room Control
Screen Control
Lighting Control
Help
November 03, 2015 • 3:45 PM
System Off
Volume
Mute
Main
Available Commands
Devices
I/O Ports
User Interfaces
System
Serial Ports
Serial Port 1 - Samsung - UD46C-B v1.0
General
Aspect Ratio (Device ID , Value)
Auto Image (Device ID)
Button Lock (Device ID , Value)
Connection Status (Value)
Input (Device ID , Value)
Panel (Device ID , Value)
PIP Mode (Device ID , Value)
Power (Device ID , Value)
Off
On
Safety Lock (Device ID , Value)
User Defined Command
User Defined String (Value)
Video Wall (Device ID , Value)
Video Wall Mode (Device ID , Value)
Configured Actions
Press
Release
Visual Feedback
Text Feedback
Samsung - UD46C-B v1.0 Input (Device ID 1 Value HDMI1)
DROP new commands here.
Pro
Expires in 30 Days

Conprogable Systems



Main
Product View
Product Name/Info
User ID/Password
Configuration
EtherNet
Serial Ports
Time
Touch Screen
TScreen Buttons
Command Line
Enter Command
Events
Macro Definitions
Action Definition
Action Viewer
Event Definition
Serial Transmit - #COMxx[""];
Send Command
Clear Field
Receive Command
Clear Field
Send CMD

```
#COM1[T1,"output text"];
```

Which is NOT a correct statement?

A.
You have to have years of training to be a good programmer

B.
As long as a device has Ethernet, Serial, IR, Contact, or Relay control capabilities we can control it with AV system

C.
The type of user interface for controls depends on inputs and outputs and user perception to simplicity

Let’s Put into Practice

Let’s Put into Practice

What you do, ask, and look for in a job walk/review?

- Determine sources & outputs – “Uses of system”
- Determine locations, distances, pathways
- What’s existing – likes and dislikes
- Customer Expectations
- Determine existing network and required additions
- Who are the contacts and roles
- Expected timelines

Let’s Put into Practice

What tools do you need on a job walk?

- Camera
- Digital Notepad
- Distance Meter
- Stud finder
- Ladder & Tools for access
- Keys

Let’s Put into Practice

Scenario 1

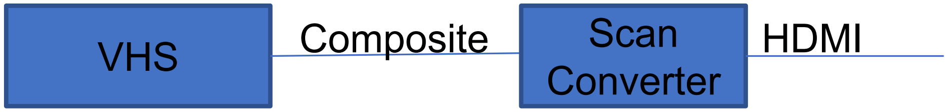
Customer wants a VHS with composite output, Blu Ray with HDMI output, Rack PC with Display Port Output, and Laptop

Show on a TV in a room that seats about 6 people

Does not want multiple remote controls

Scenario 1

Inputs = Customer wants a VHS



VHS

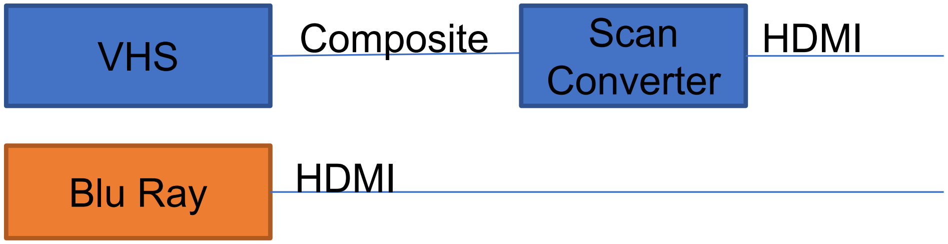
Composite

Scan Converter

HDMI

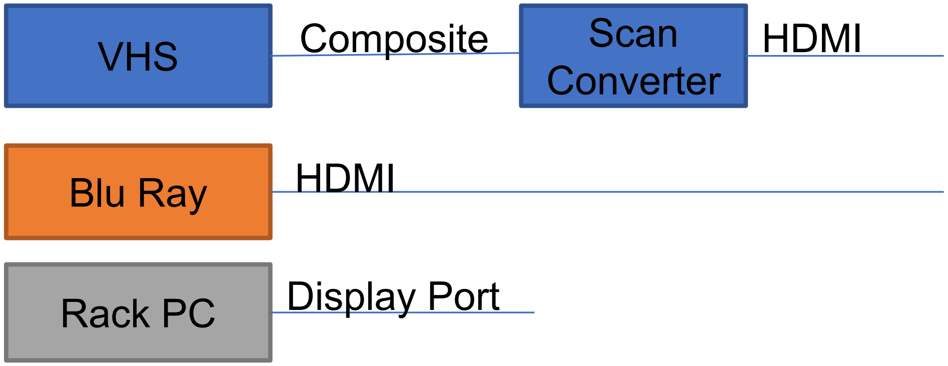
Scenario 1

Inputs = Customer wants a Blu Ray


VHS
Composite
Scan Converter
HDMI
Blu Ray
HDMI

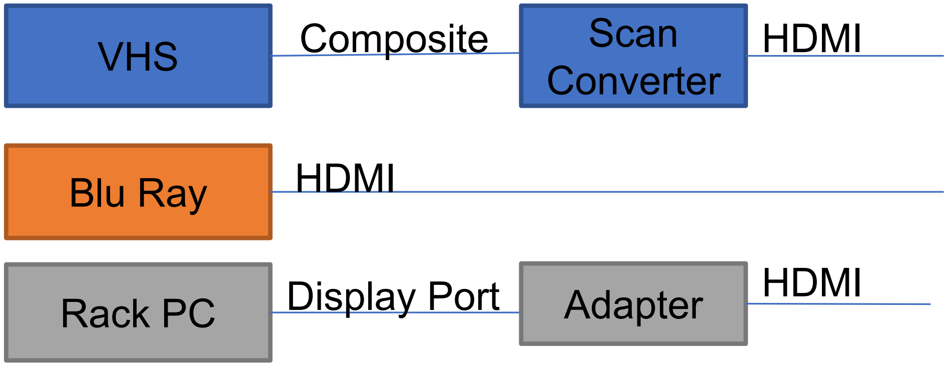
Scenario 1

Inputs = Customer wants a Rack PC


VHS
Composite
Scan Converter
HDMI
Blu Ray
HDMI
Rack PC
Display Port

Scenario 1

Inputs = Customer wants a Rack PC



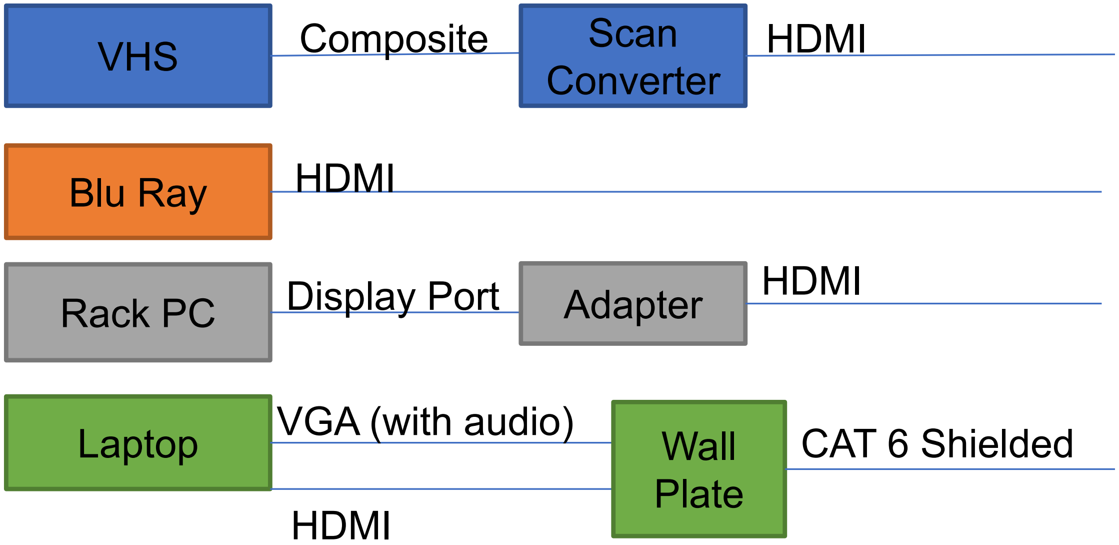
VHS
Composite
Scan Converter
HDMI

Blu Ray
HDMI

Rack PC
Display Port
Adapter
HDMI

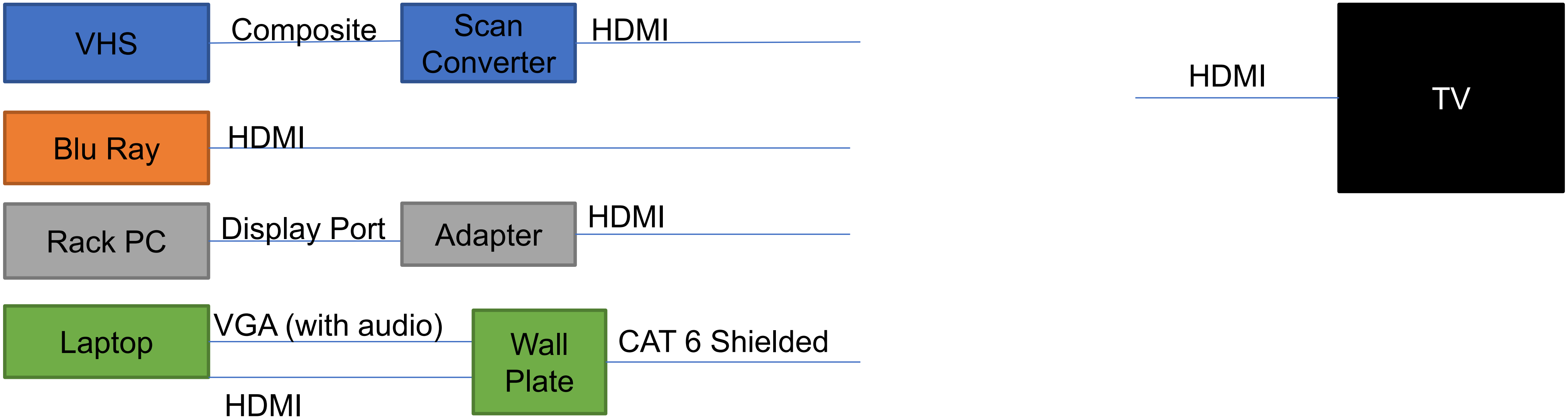
Scenario 1

Inputs = Customer wants a Laptop

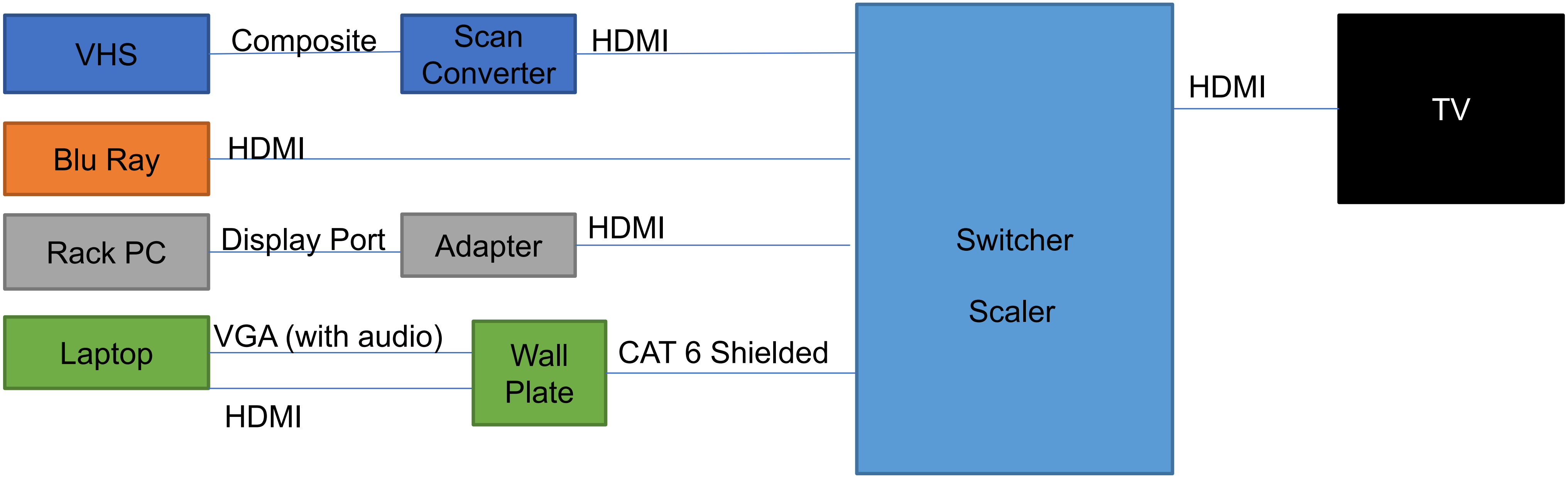

VHS
Composite
Scan Converter
HDMI
Blu Ray
HDMI
Rack PC
Display Port
Adapter
HDMI
Laptop
VGA (with audio)
HDMI
Wall Plate
CAT 6 Shielded

Scenario 1

Outputs = Customer wants a TV


VHS
Composite
Scan Converter
HDMI
Blu Ray
HDMI
Rack PC
Display Port
Adapter
HDMI
Laptop
VGA (with audio)
HDMI
Wall Plate
CAT 6 Shielded
HDMI
TV

Scenario 1
Process The Signal


VHS

Composite

Scan Converter

HDMI

Blu Ray

HDMI

Rack PC

Display Port

Adapter

HDMI

Laptop

VGA (with audio)

HDMI

Wall Plate

CAT 6 Shielded

Switcher

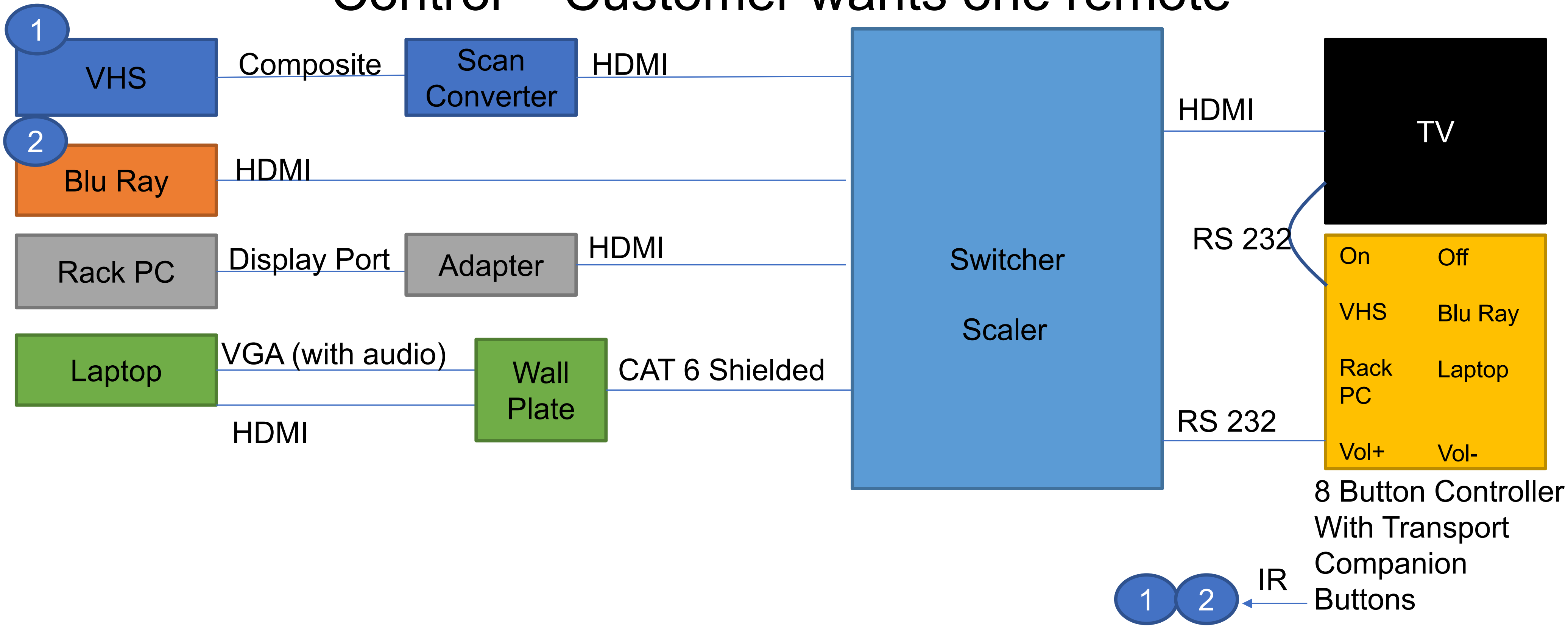
Scaler

HDMI

TV

Scenario 1

Control = Customer wants one remote



1

VHS

Composite

Scan Converter

HDMI

2

Blu Ray

HDMI

Rack PC

Display Port

Adapter

HDMI

Laptop

VGA (with audio)

HDMI

Wall Plate

CAT 6 Shielded

Switcher

Scaler

HDMI

TV

RS 232

On Off

VHS Blu Ray

Rack PC Laptop

Vol+ Vol-

RS 232

8 Button Controller With Transport Companion Buttons

IR

1 2

Let’s Put into Practice

Scenario 2

2 - Divisible Room with TV tuners, Floor Box Input, BYOD

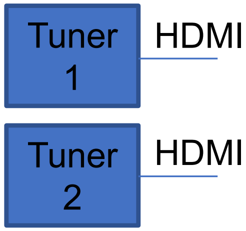
Automatic Switch of controls based on wall status

Projector in each room and monitor at lectern

Want Lesson capture/Streaming

Scenario 2

Inputs = Customer wants TV Tuners


Tuner 1
HDMI
Tuner 2
HDMI

Scenario 2

Inputs = Customer wants Floor Box Inputs

Tuner 1 HDMI

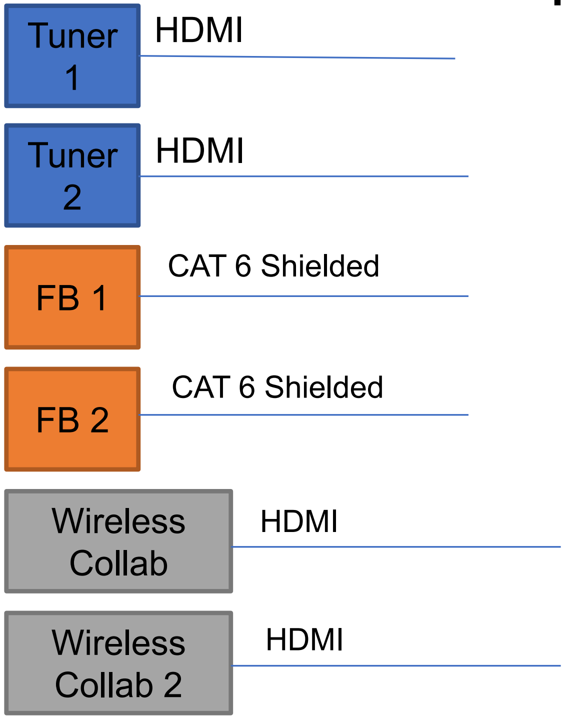
Tuner 2 HDMI

FB 1 CAT 6 Shielded

FB 2 CAT 6 Shielded

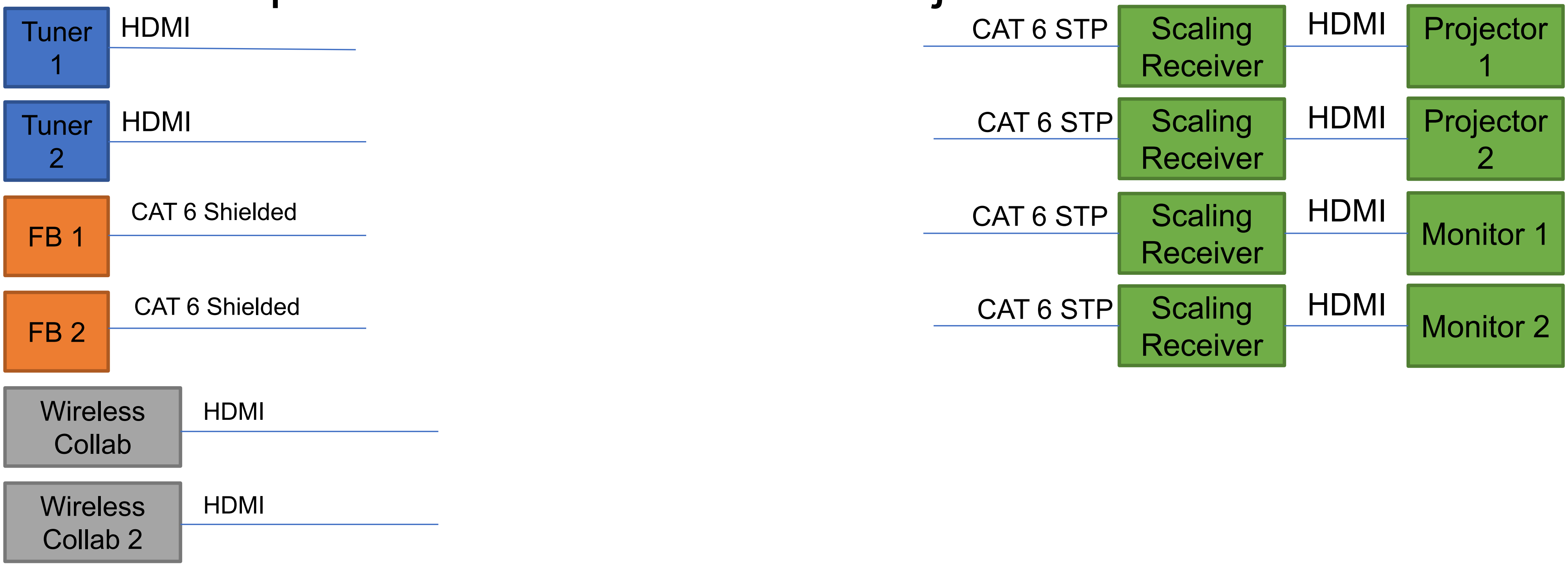
Scenario 2

Inputs = Customer wants B.Y.O.D.


Tuner 1
HDMI
Tuner 2
HDMI
FB 1
CAT 6 Shielded
FB 2
CAT 6 Shielded
Wireless Collab
HDMI
Wireless Collab 2
HDMI

Scenario 2

Outputs = Customer wants Projectors and Monitors



Tuner 1 — HDMI

Tuner 2 — HDMI

FB 1 — CAT 6 Shielded

FB 2 — CAT 6 Shielded

Wireless Collab — HDMI

Wireless Collab 2 — HDMI

CAT 6 STP — Scaling Receiver — HDMI — Projector 1

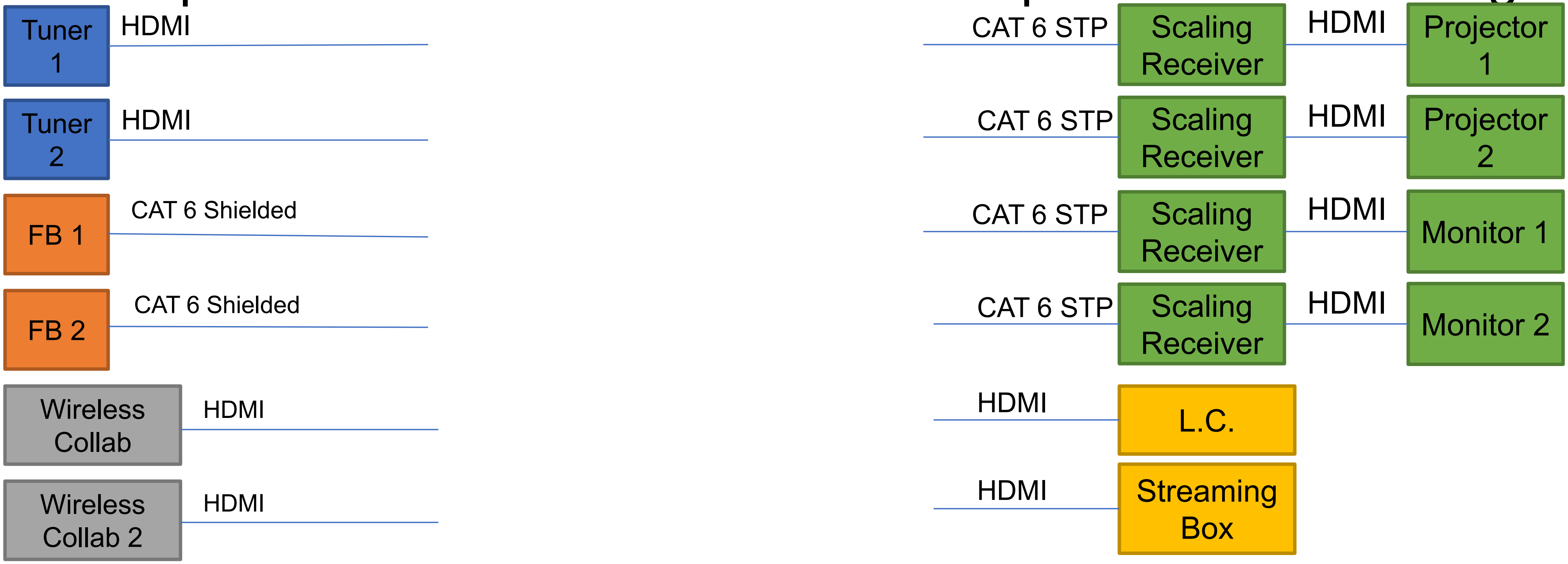
CAT 6 STP — Scaling Receiver — HDMI — Projector 2

CAT 6 STP — Scaling Receiver — HDMI — Monitor 1

CAT 6 STP — Scaling Receiver — HDMI — Monitor 2

Scenario 2

Outputs = Customer wants Lesson Capture and Streaming



Tuner 1 — HDMI

Tuner 2 — HDMI

FB 1 — CAT 6 Shielded

FB 2 — CAT 6 Shielded

Wireless Collab — HDMI

Wireless Collab 2 — HDMI

CAT 6 STP — Scaling Receiver — HDMI — Projector 1

CAT 6 STP — Scaling Receiver — HDMI — Projector 2

CAT 6 STP — Scaling Receiver — HDMI — Monitor 1

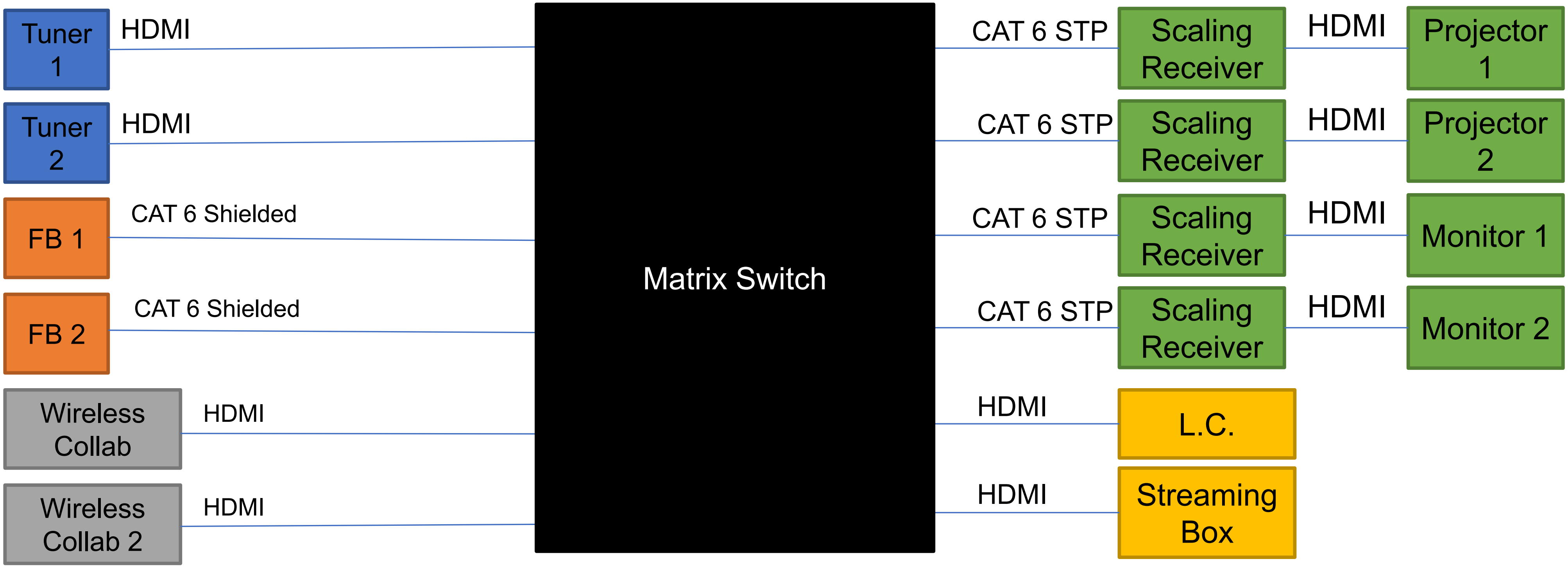
CAT 6 STP — Scaling Receiver — HDMI — Monitor 2

HDMI — L.C.

HDMI — Streaming Box

Scenario 2

Connect our Video Pieces



Tuner 1 — HDMI — Matrix Switch

Tuner 2 — HDMI — Matrix Switch

FB 1 — CAT 6 Shielded — Matrix Switch

FB 2 — CAT 6 Shielded — Matrix Switch

Wireless Collab — HDMI — Matrix Switch

Wireless Collab 2 — HDMI — Matrix Switch

Matrix Switch — CAT 6 STP — Scaling Receiver — HDMI — Projector 1

Matrix Switch — CAT 6 STP — Scaling Receiver — HDMI — Projector 2

Matrix Switch — CAT 6 STP — Scaling Receiver — HDMI — Monitor 1

Matrix Switch — CAT 6 STP — Scaling Receiver — HDMI — Monitor 2

Matrix Switch — HDMI — L.C.

Matrix Switch — HDMI — Streaming Box

Scenario 2

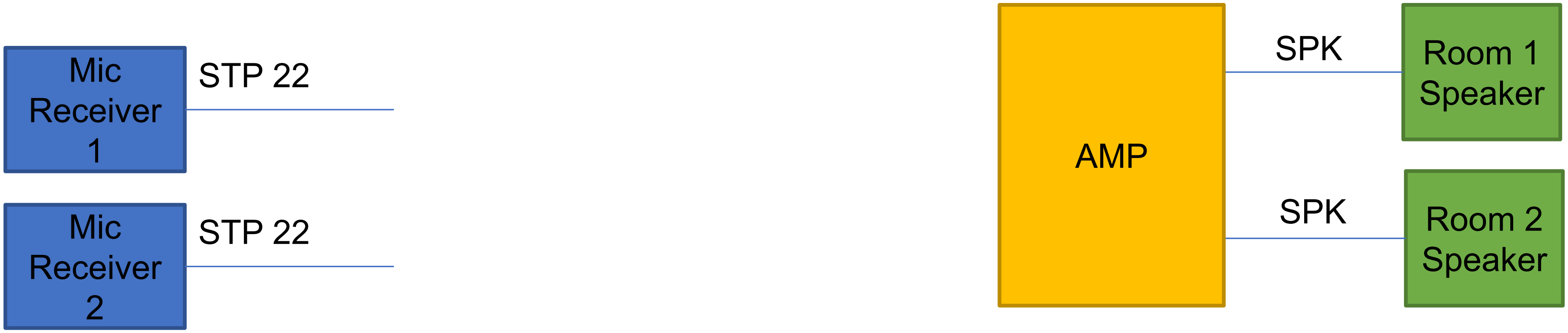
Don’t Forget the Audio! = Inputs

Mic Receiver 1 — STP 22

Mic Receiver 2 — STP 22

Scenario 2

Don’t Forget the Audio! = Outputs


Mic Receiver 1

STP 22

Mic Receiver 2

STP 22

AMP

SPK

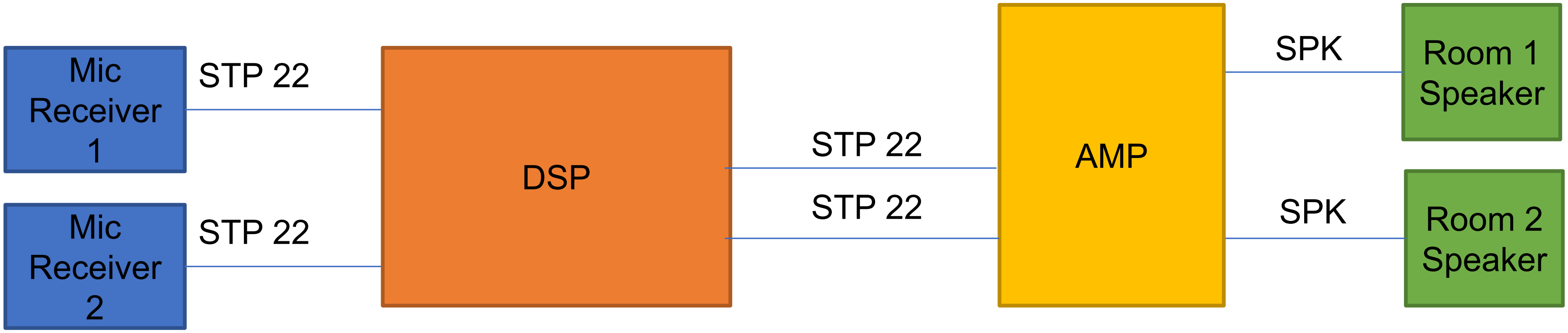
Room 1 Speaker

SPK

Room 2 Speaker

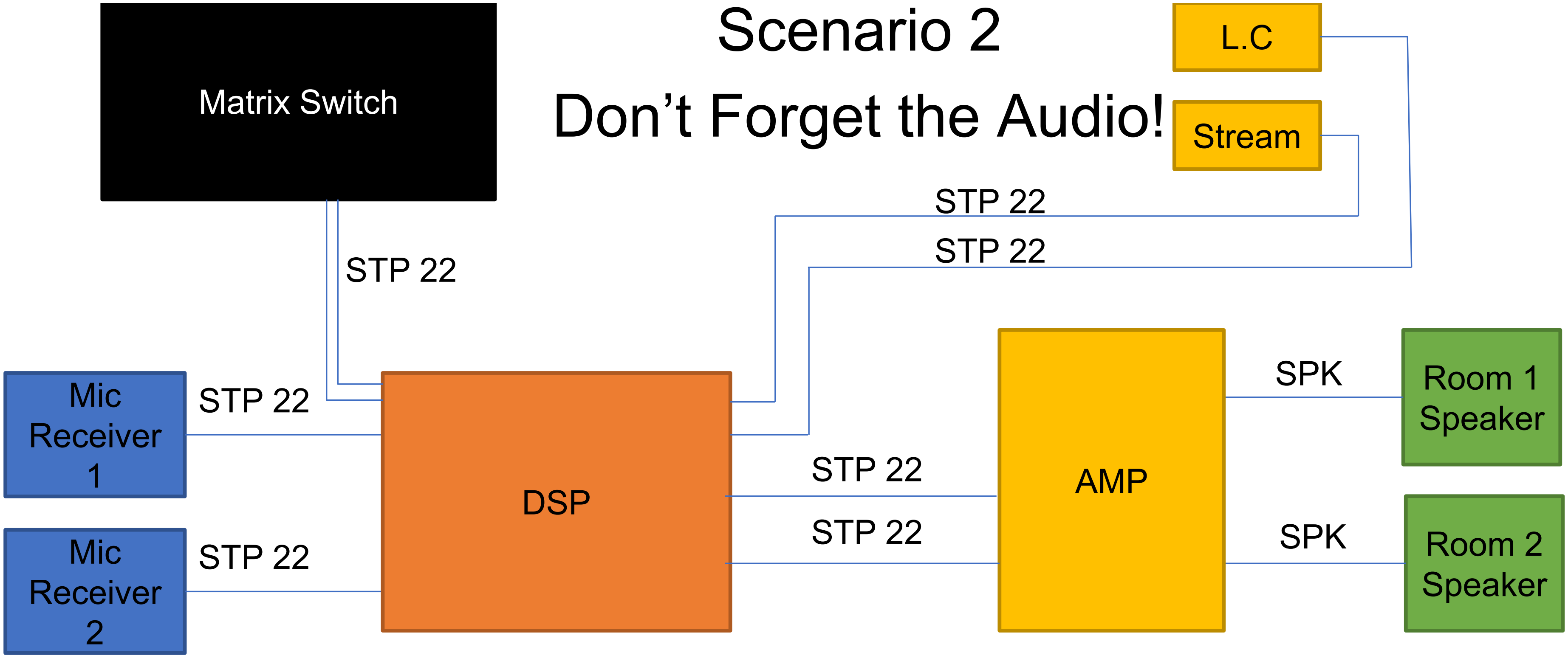
Scenario 2

Don’t Forget the Audio! = Process


Mic Receiver 1
STP 22
Mic Receiver 2
STP 22
DSP
STP 22
STP 22
AMP
SPK
Room 1 Speaker
SPK
Room 2 Speaker

Scenario 2

Don’t Forget the Audio!

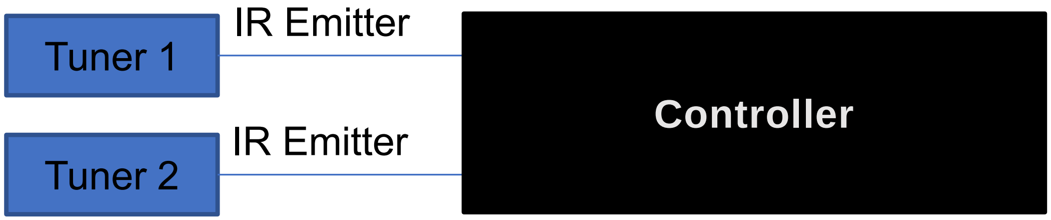

Matrix Switch
L.C
Stream
STP 22
STP 22
STP 22
Mic Receiver 1
STP 22
Mic Receiver 2
STP 22
DSP
STP 22
STP 22
AMP
SPK
Room 1 Speaker
SPK
Room 2 Speaker

Scenario 2
Don’t Forget Control!

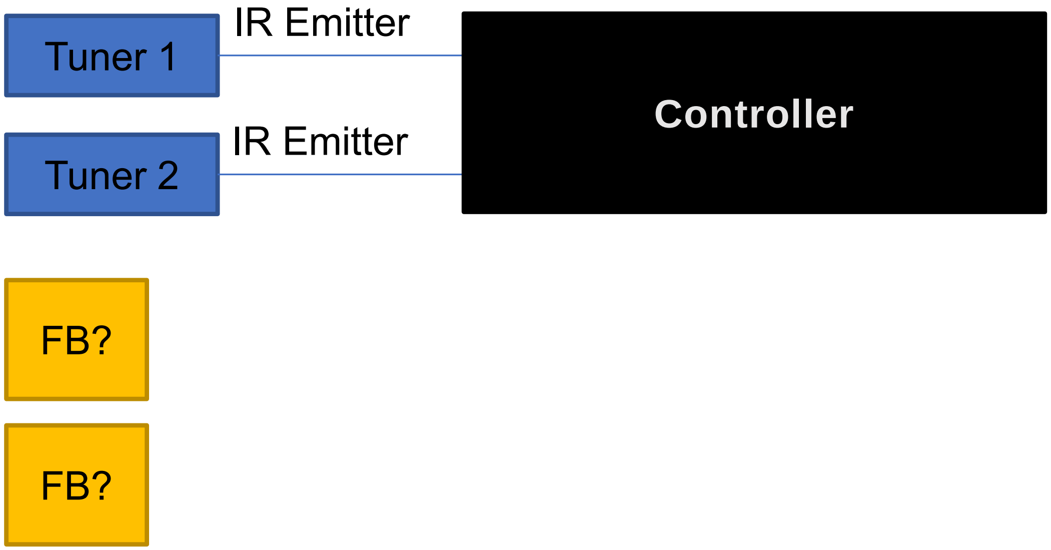
Controller

Scenario 2

Don’t Forget Control!

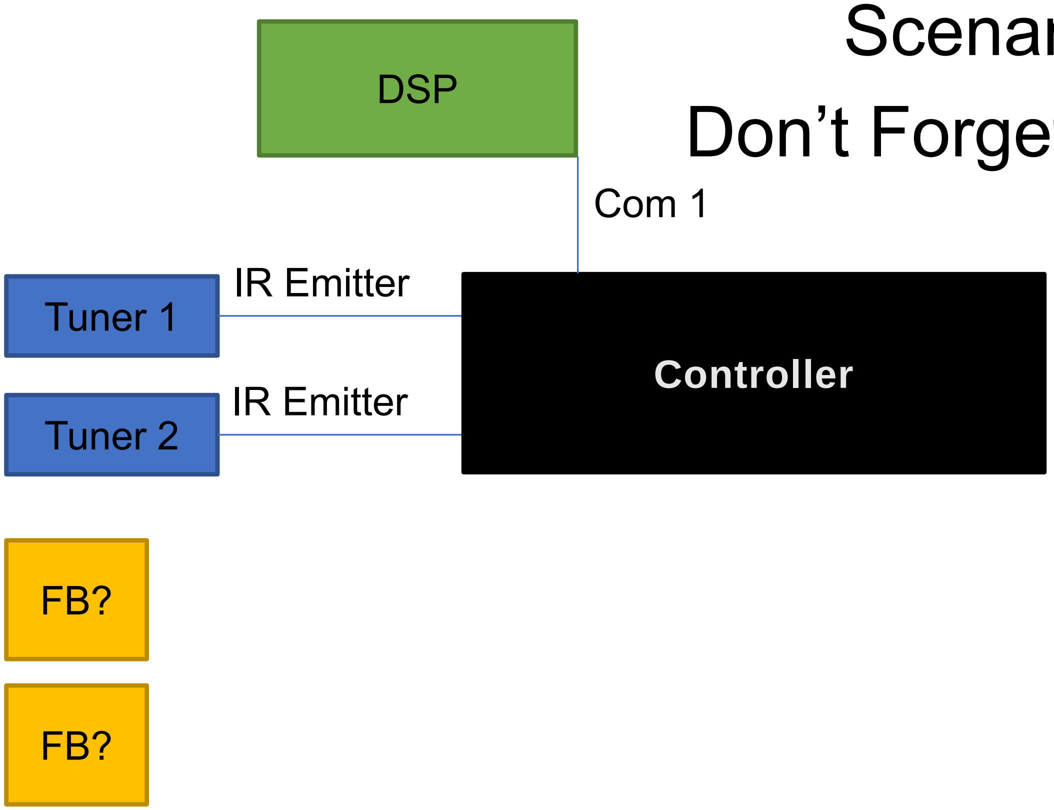

Tuner 1
IR Emitter
Tuner 2
IR Emitter
Controller

Scenario 2
Don’t Forget Control!


IR Emitter
Tuner 1
IR Emitter
Tuner 2
Controller
FB?
FB?

Scenario 2

Don’t Forget Control!



DSP

Com 1

Tuner 1

IR Emitter

Tuner 2

IR Emitter

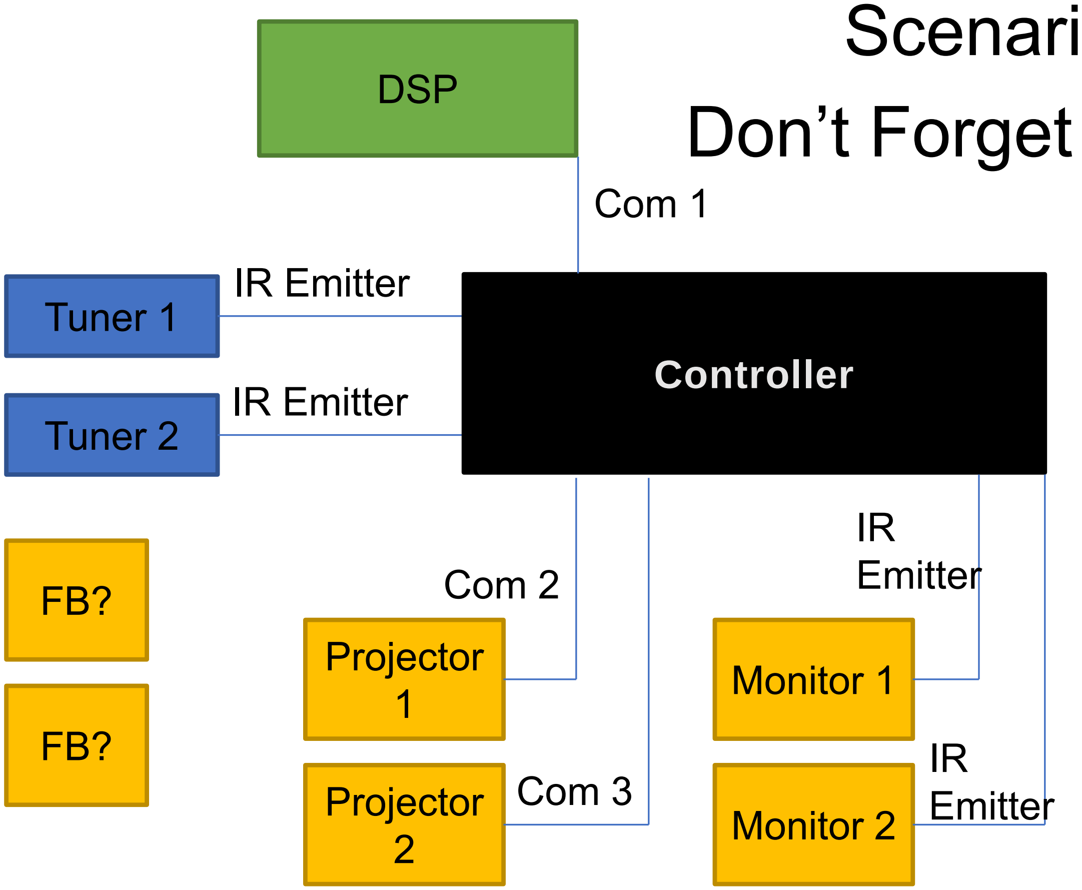
Controller

FB?

FB?

Scenario 2

Don’t Forget Control!



DSP

Com 1

Tuner 1

IR Emitter

Tuner 2

IR Emitter

Controller

FB?

FB?

Com 2

Projector 1

Projector 2

Com 3

IR Emitter

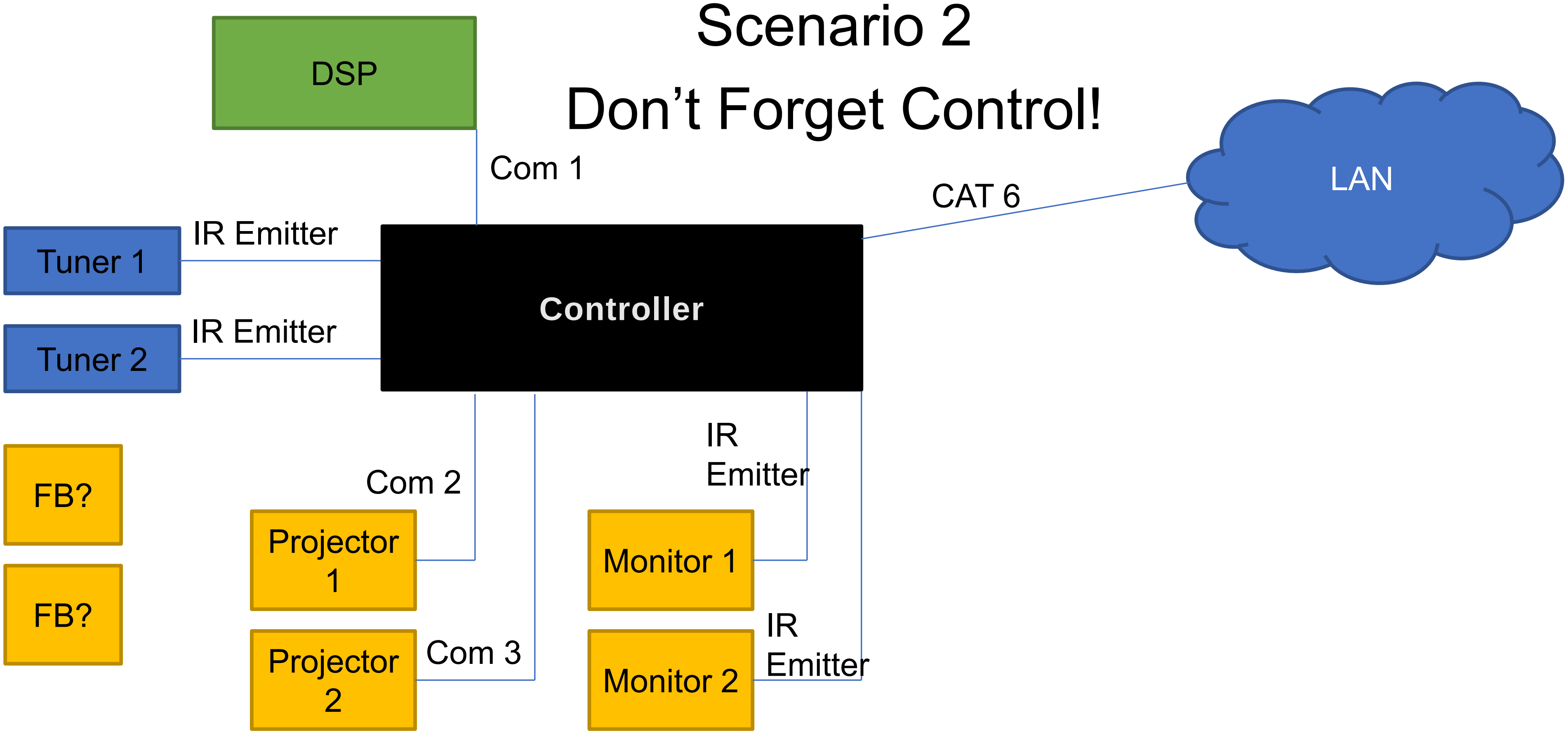
Monitor 1

Monitor 2

IR Emitter

Scenario 2

Don’t Forget Control!



DSP

Com 1

CAT 6

LAN

Tuner 1

IR Emitter

Tuner 2

IR Emitter

Controller

FB?

FB?

Com 2

Projector 1

Com 3

Projector 2

IR Emitter

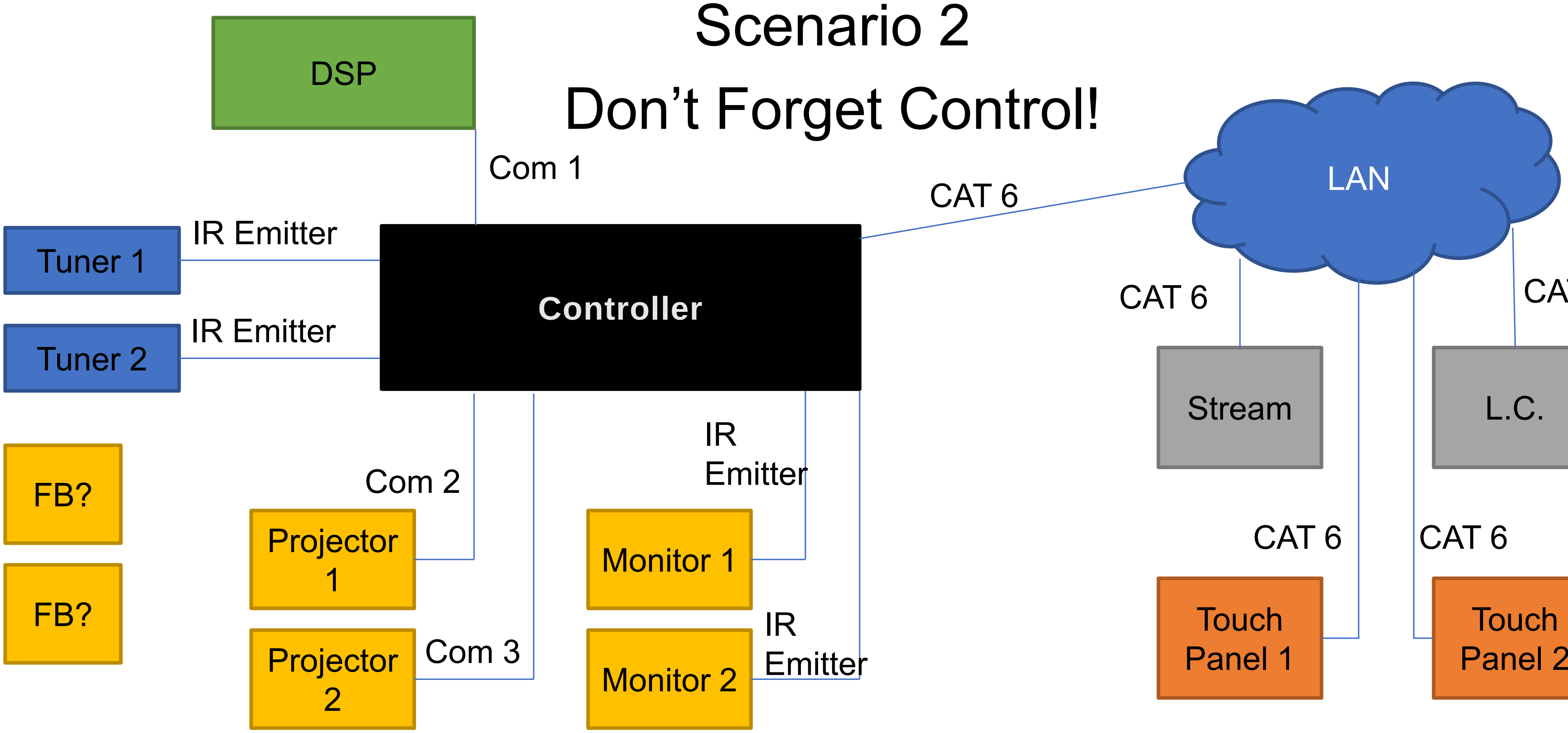
Monitor 1

IR Emitter

Monitor 2

Scenario 2

Don’t Forget Control!



DSP

Com 1

Tuner 1

IR Emitter

Tuner 2

IR Emitter

Controller

CAT 6

LAN

FB?

FB?

Com 2

Projector 1

Com 3

Projector 2

IR Emitter

Monitor 1

IR Emitter

Monitor 2

CAT 6

Stream

CAT 6

L.C.

CAT 6

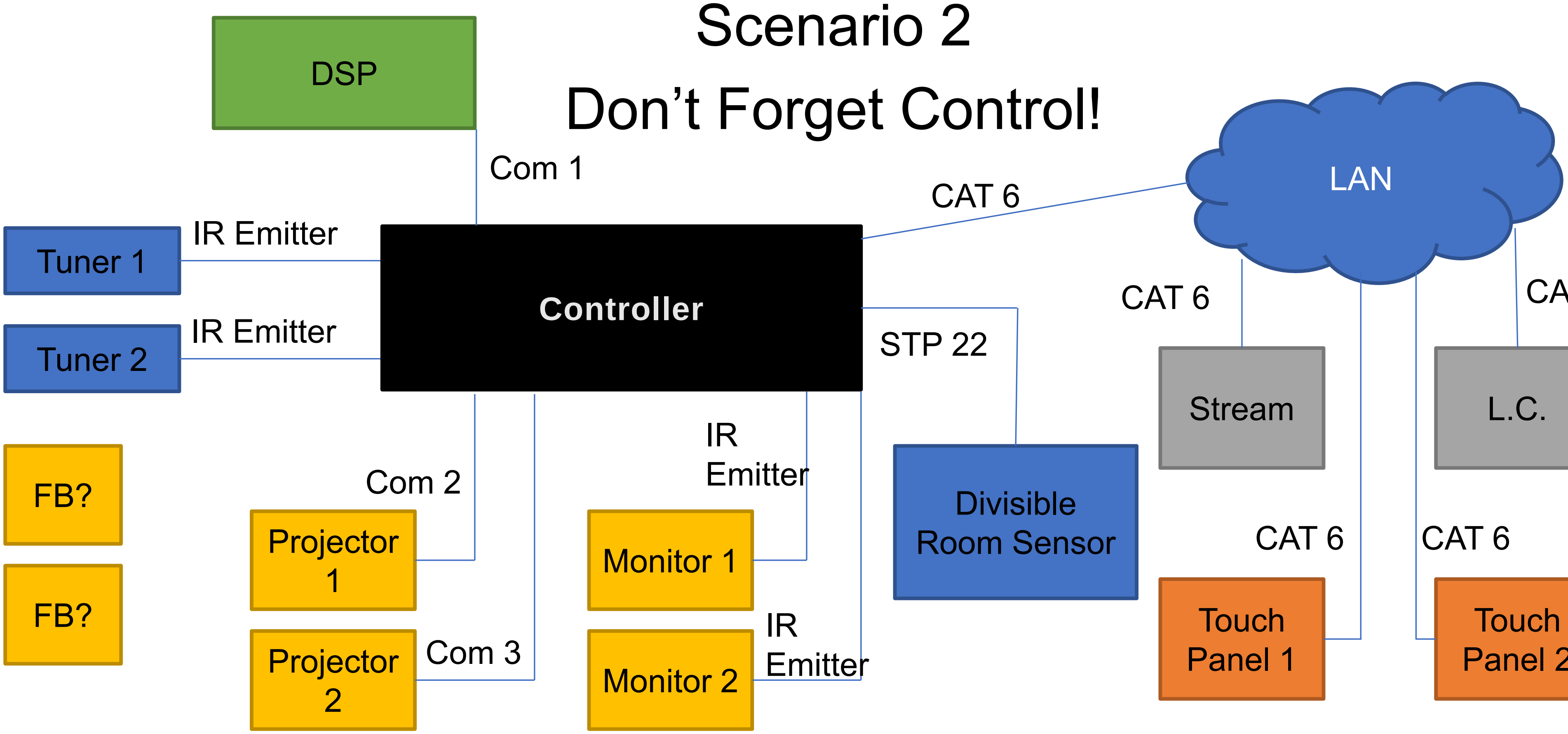
Touch Panel 1

CAT 6

Touch Panel 2

Scenario 2

Don’t Forget Control!



DSP

Com 1

Controller

IR Emitter

Tuner 1

IR Emitter

Tuner 2

CAT 6

LAN

CAT 6

CAT 6

STP 22

Stream

L.C.

FB?

FB?

Com 2

Projector 1

Com 3

Projector 2

IR Emitter

Monitor 1

IR Emitter

Monitor 2

Divisible Room Sensor

CAT 6

CAT 6

Touch Panel 1

Touch Panel 2

Let’s Put into Practice

Scenario 3

Board Room with – Rack Pc, 1 Table inputs, BluRay, TV Tuner, 1 Guest Input, Document Camera, Two Room Cameras

2 Side TVs for Audience

10 preview monitors for Board Table

Recording Streaming

Video Conference

Soft Codec conferencing

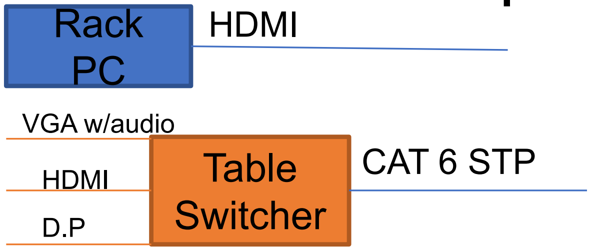
Scenario 3

Inputs = Customer wants Rack PC

Rack PC
HDMI

Scenario 3

Inputs = Customer wants Table Input



Rack PC

HDMI

VGA w/audio

HDMI

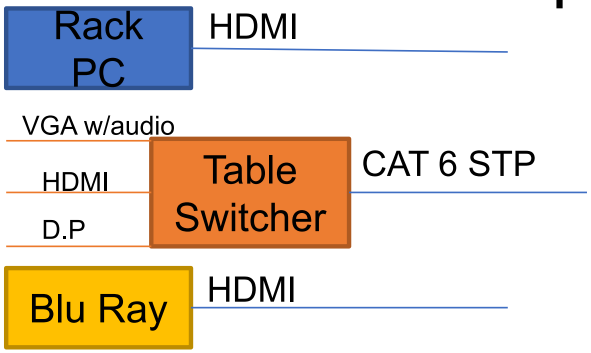
D.P

Table Switcher

CAT 6 STP

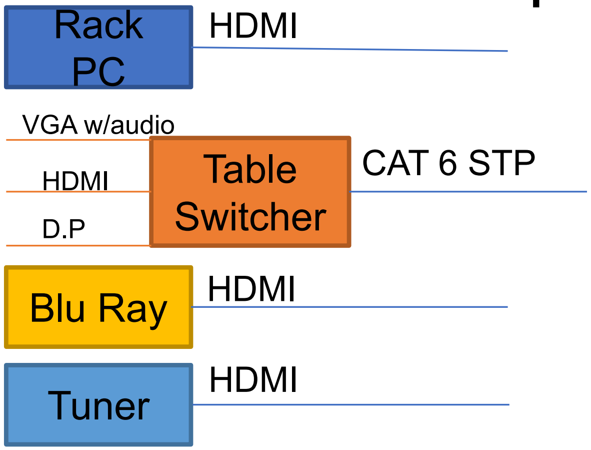
Scenario 3

Inputs = Customer wants Blu Ray


Rack PC
HDMI
VGA w/audio
HDMI
D.P
Table Switcher
CAT 6 STP
Blu Ray
HDMI

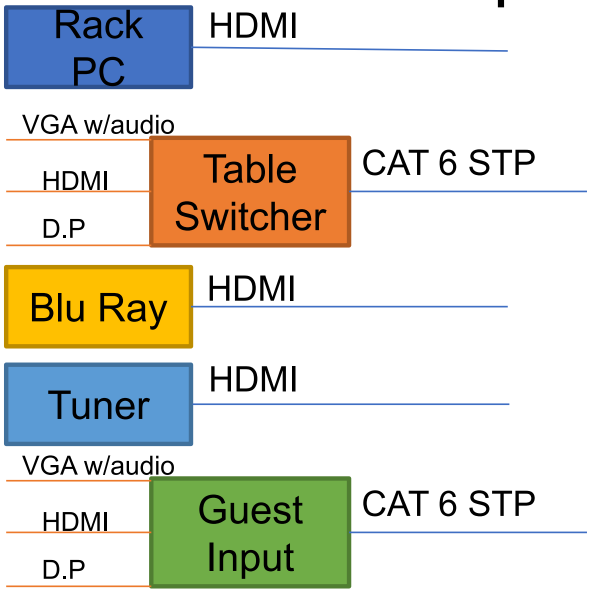
Scenario 3

Inputs = Customer wants TV Tuner


Rack PC
HDMI
VGA w/audio
HDMI
D.P
Table Switcher
CAT 6 STP
Blu Ray
HDMI
Tuner
HDMI

Scenario 3

Inputs = Customer wants Guest Input



Rack PC
HDMI

VGA w/audio
HDMI
D.P
Table Switcher
CAT 6 STP

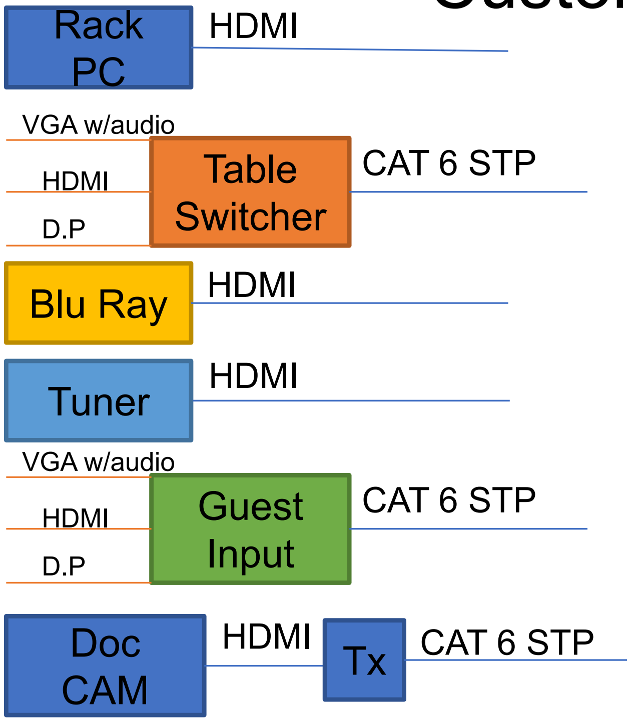
Blu Ray
HDMI

Tuner
HDMI

VGA w/audio
HDMI
D.P
Guest Input
CAT 6 STP

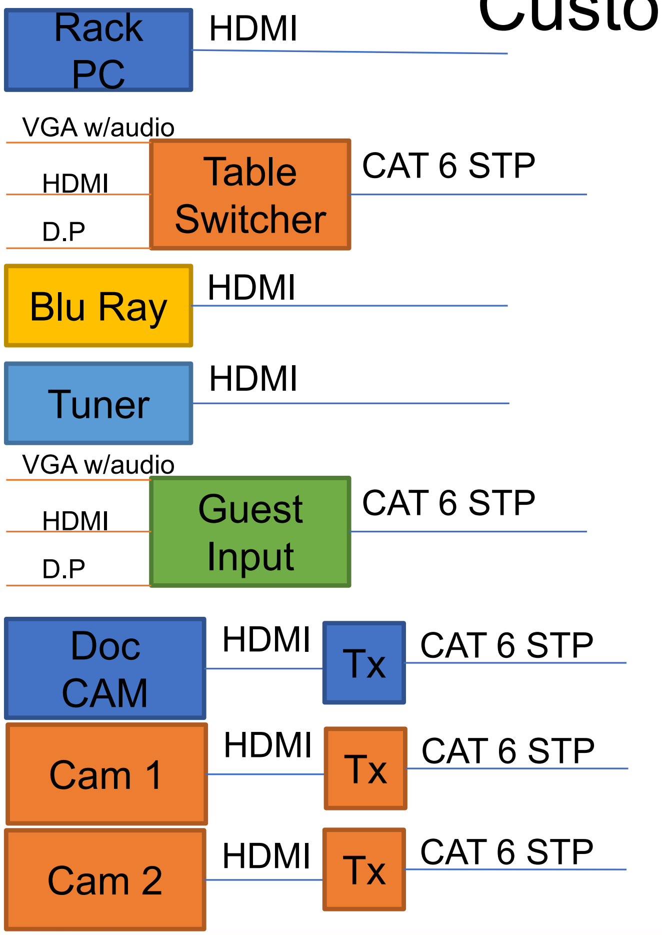
Scenario 3

Customer wants a Document Camera


Rack PC
HDMI
VGA w/audio
HDMI
D.P
Table Switcher
CAT 6 STP
Blu Ray
HDMI
Tuner
HDMI
VGA w/audio
HDMI
D.P
Guest Input
CAT 6 STP
Doc CAM
HDMI
Tx
CAT 6 STP

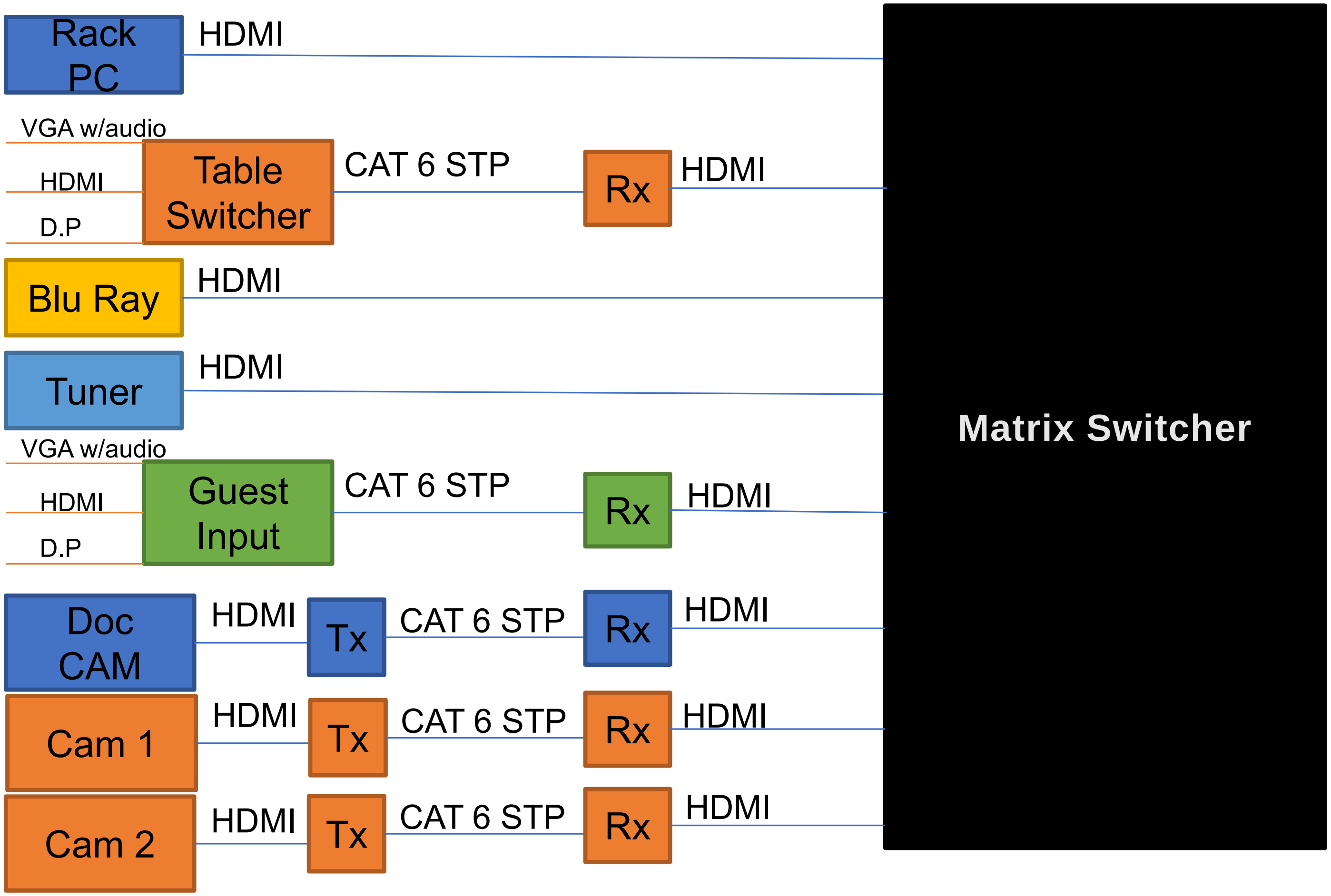
Scenario 3

Customer wants 2 Room Cameras


Rack PC
HDMI
VGA w/audio
HDMI
D.P
Table Switcher
CAT 6 STP
Blu Ray
HDMI
Tuner
HDMI
VGA w/audio
HDMI
D.P
Guest Input
CAT 6 STP
Doc CAM
HDMI
Tx
CAT 6 STP
Cam 1
HDMI
Tx
CAT 6 STP
Cam 2
HDMI
Tx
CAT 6 STP

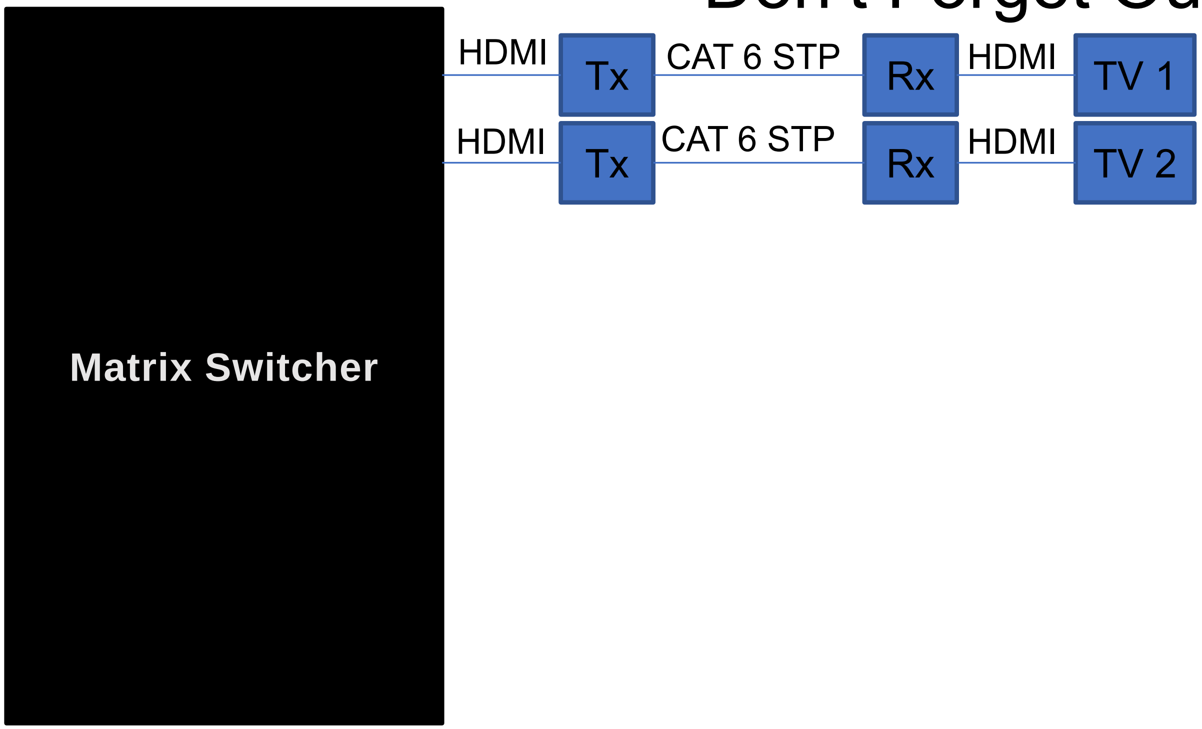
Scenario 3

Process = Connect to Matrix


Rack PC
HDMI
VGA w/audio
HDMI
D.P
Table Switcher
CAT 6 STP
Rx
HDMI
Blu Ray
HDMI
Tuner
HDMI
VGA w/audio
HDMI
D.P
Guest Input
CAT 6 STP
Rx
HDMI
Doc CAM
HDMI
Tx
CAT 6 STP
Rx
HDMI
Cam 1
HDMI
Tx
CAT 6 STP
Rx
HDMI
Cam 2
HDMI
Tx
CAT 6 STP
Rx
HDMI
Matrix Switcher

Scenario 3

Don’t Forget Outputs



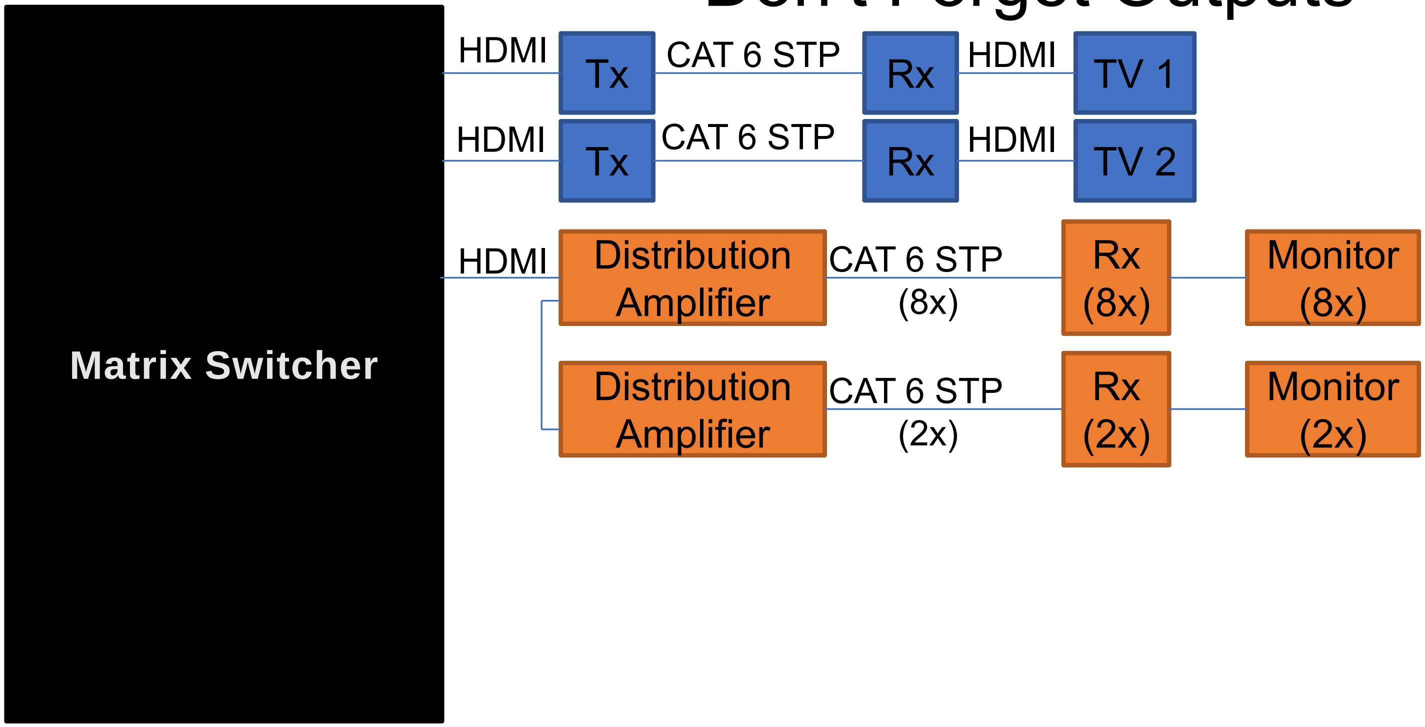
Matrix Switcher

HDMI – Tx – CAT 6 STP – Rx – HDMI – TV 1

HDMI – Tx – CAT 6 STP – Rx – HDMI – TV 2

Scenario 3

Don’t Forget Outputs



Matrix Switcher

HDMI
Tx
CAT 6 STP
Rx
HDMI
TV 1

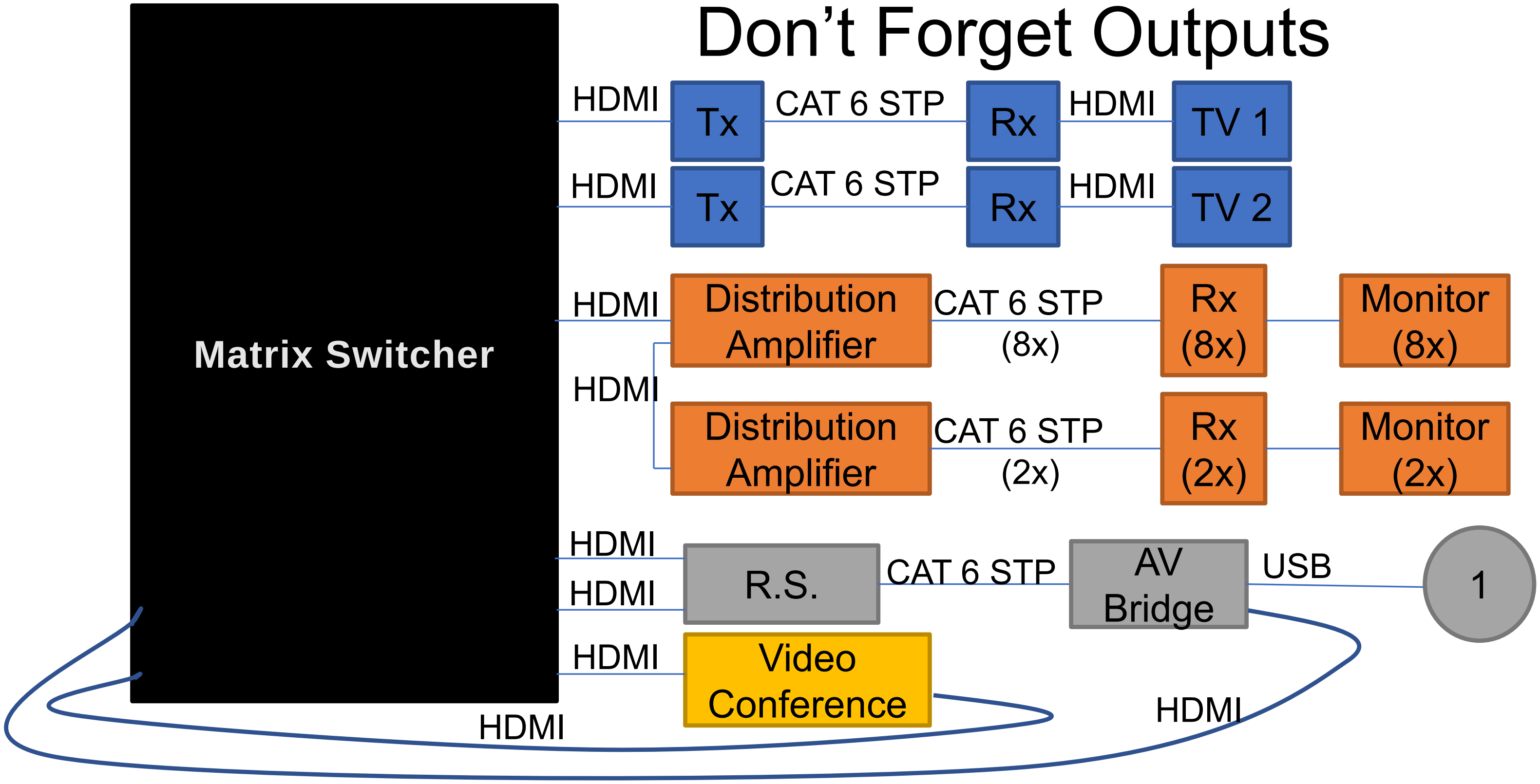
HDMI
Tx
CAT 6 STP
Rx
HDMI
TV 2

HDMI
Distribution Amplifier
CAT 6 STP (8x)
Rx (8x)
Monitor (8x)

Distribution Amplifier
CAT 6 STP (2x)
Rx (2x)
Monitor (2x)

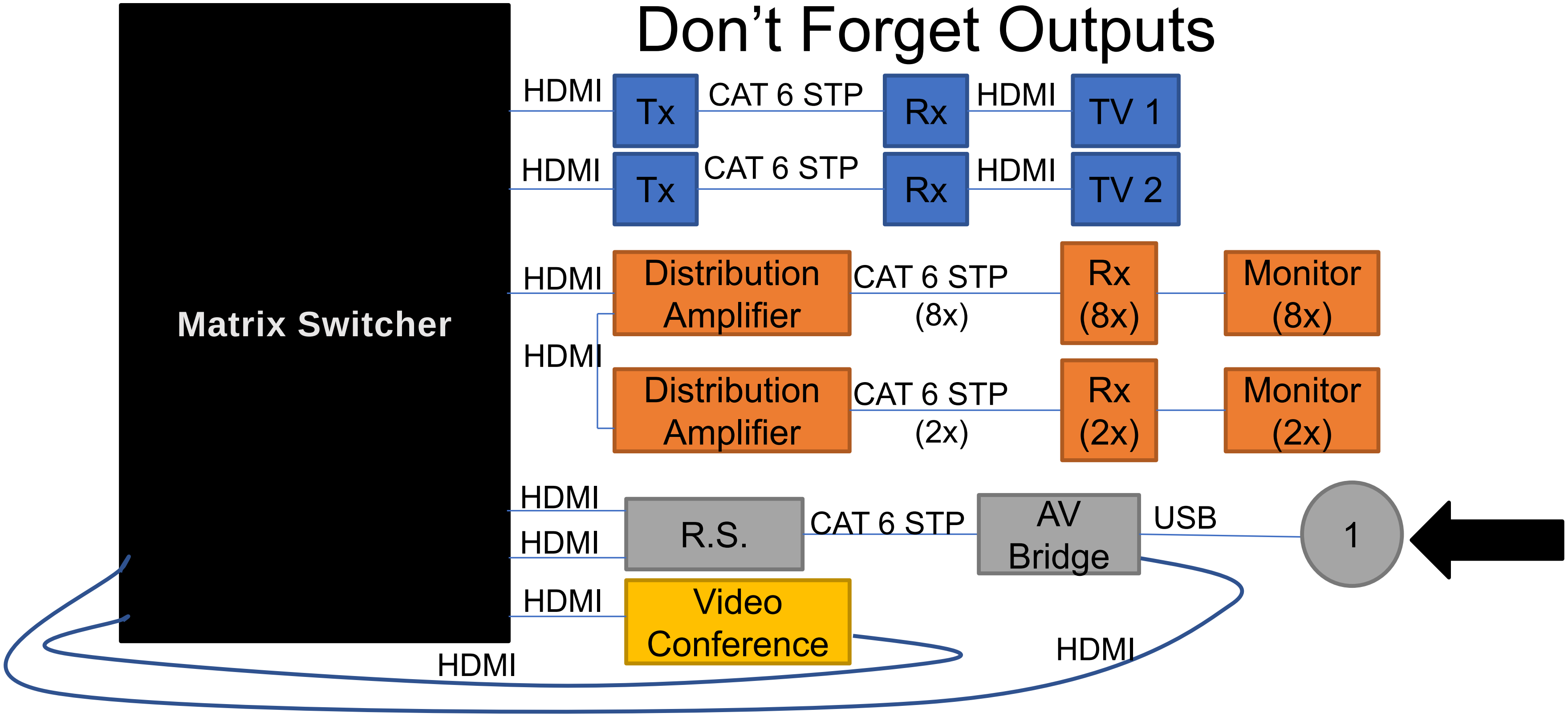
Scenario 3

Don’t Forget Outputs

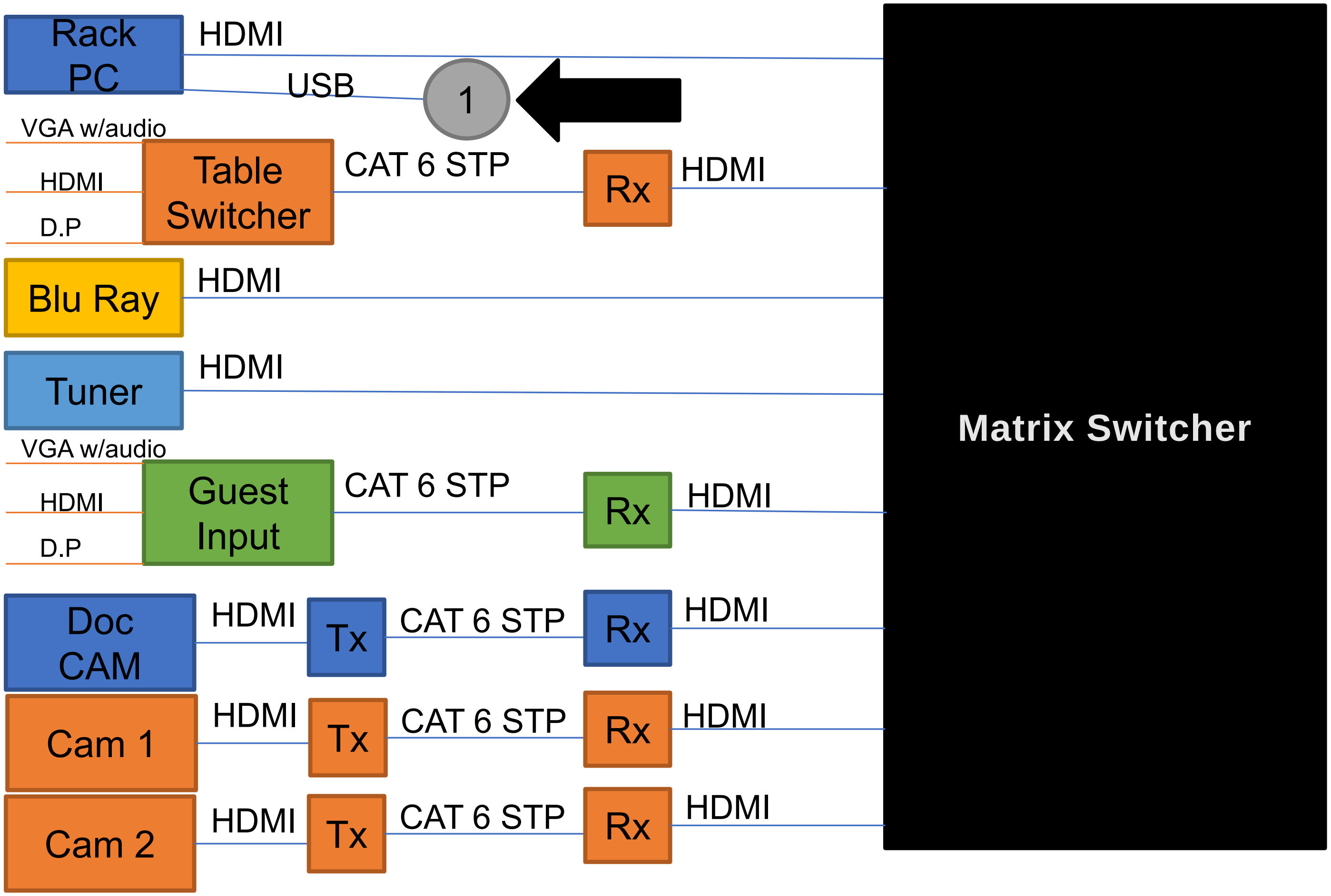

Matrix Switcher
HDMI
Tx
CAT 6 STP
Rx
HDMI
TV 1
HDMI
Tx
CAT 6 STP
Rx
HDMI
TV 2
HDMI
Distribution Amplifier
CAT 6 STP (8x)
Rx (8x)
Monitor (8x)
HDMI
Distribution Amplifier
CAT 6 STP (2x)
Rx (2x)
Monitor (2x)
HDMI
HDMI
R.S.
CAT 6 STP
AV Bridge
USB
1
HDMI
Video Conference
HDMI
HDMI

Scenario 3

Don’t Forget Outputs

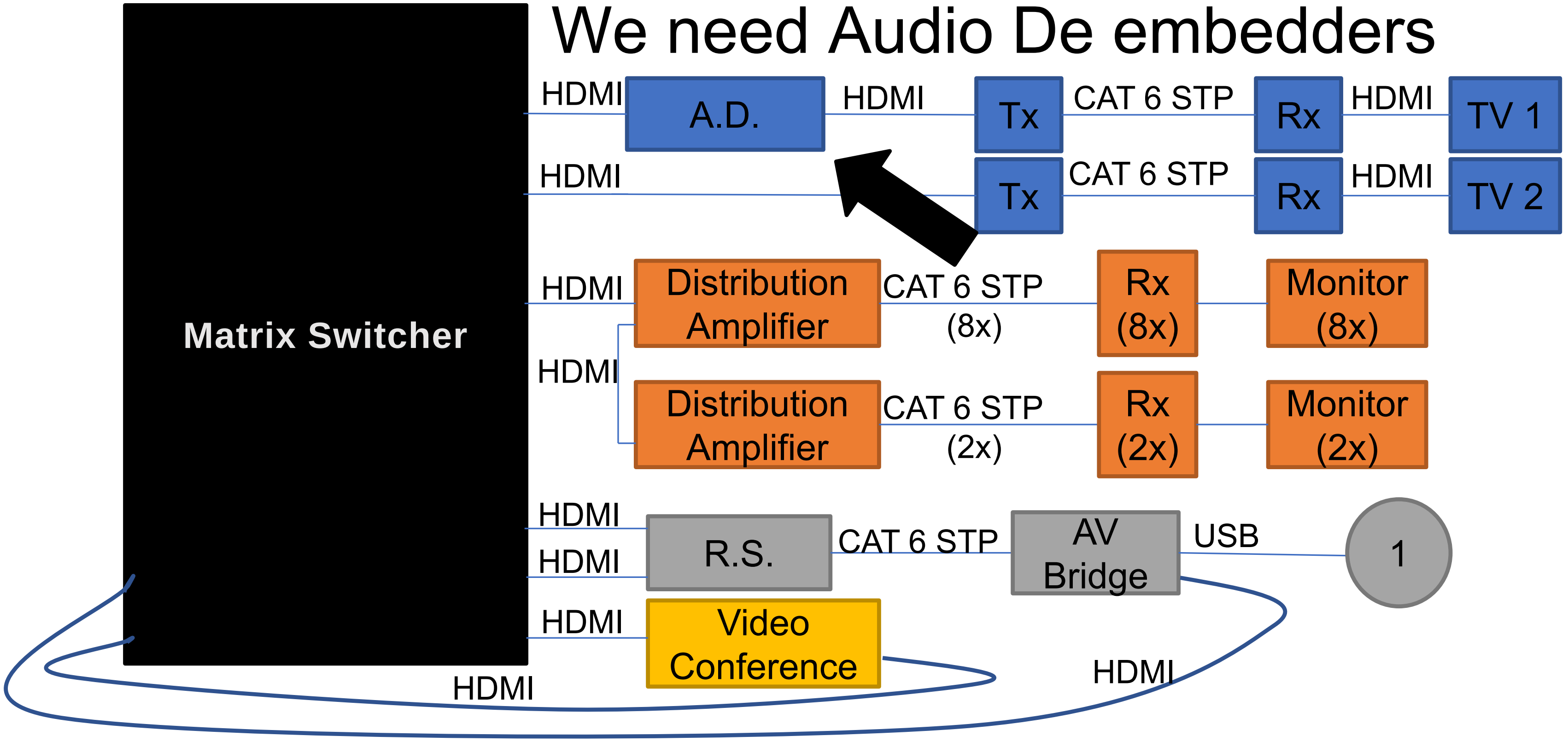

Matrix Switcher
HDMI
Tx
CAT 6 STP
Rx
HDMI
TV 1
HDMI
Tx
CAT 6 STP
Rx
HDMI
TV 2
HDMI
Distribution Amplifier
CAT 6 STP (8x)
Rx (8x)
Monitor (8x)
HDMI
Distribution Amplifier
CAT 6 STP (2x)
Rx (2x)
Monitor (2x)
HDMI
HDMI
R.S.
CAT 6 STP
AV Bridge
USB
1
HDMI
Video Conference
HDMI
HDMI

Scenario 3
USB
Connection


Rack PC
HDMI
USB
1
VGA w/audio
HDMI
D.P
Table Switcher
CAT 6 STP
Rx
HDMI
Blu Ray
HDMI
Tuner
HDMI
VGA w/audio
HDMI
D.P
Guest Input
CAT 6 STP
Rx
HDMI
Doc CAM
HDMI
Tx
CAT 6 STP
Rx
HDMI
Cam 1
HDMI
Tx
CAT 6 STP
Rx
HDMI
Cam 2
HDMI
Tx
CAT 6 STP
Rx
HDMI
Matrix Switcher

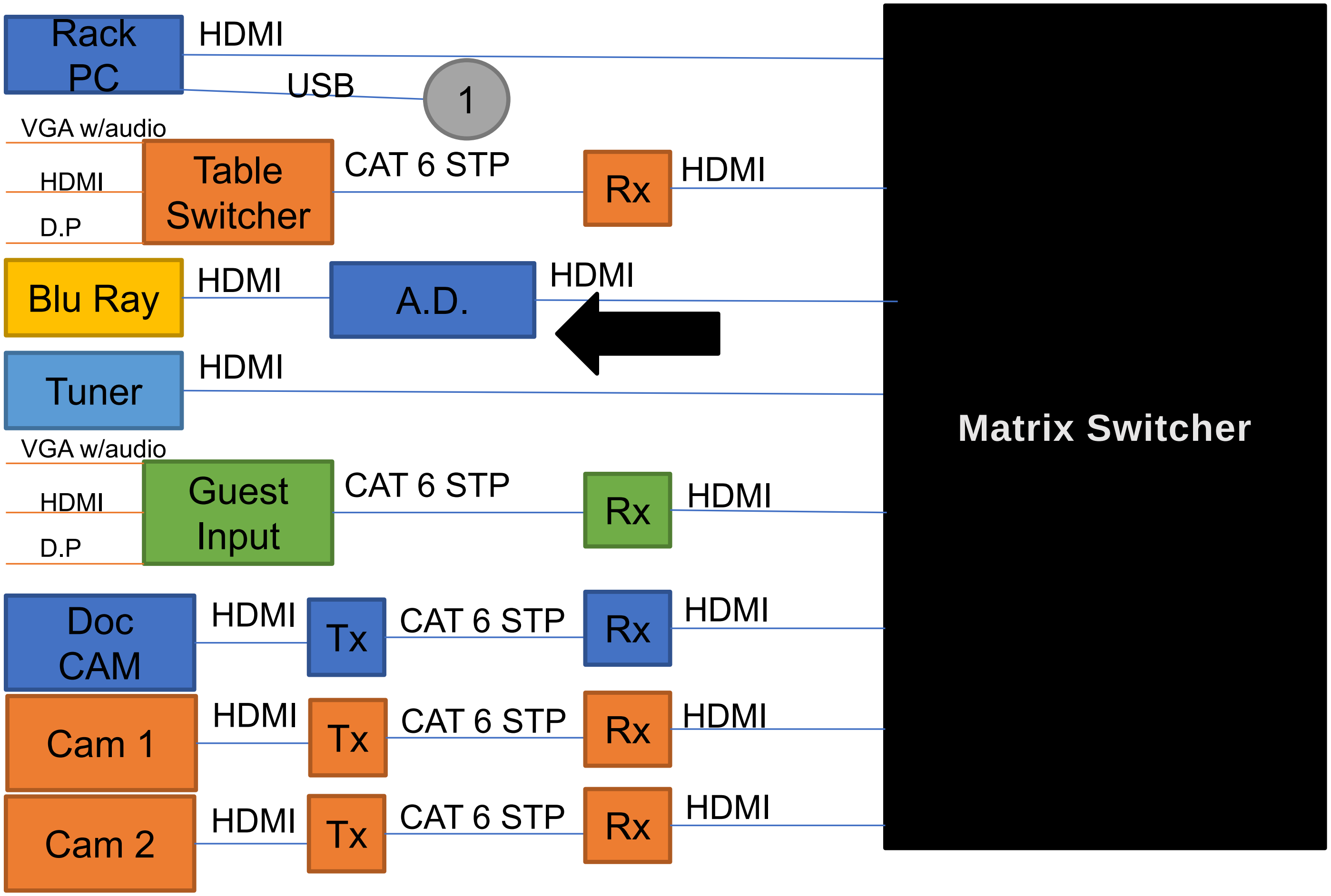
Scenario 3

We need Audio De embedders

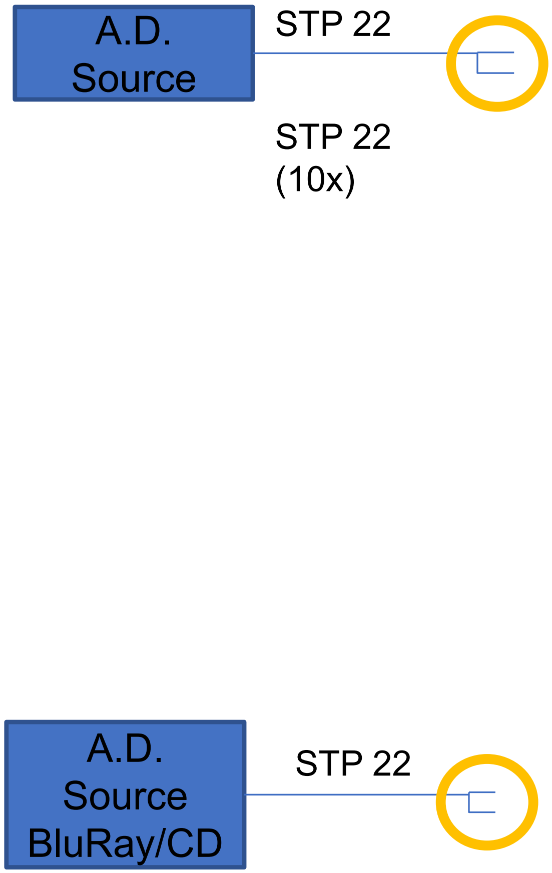

Matrix Switcher
HDMI
A.D.
HDMI
Tx
CAT 6 STP
Rx
HDMI
TV 1
HDMI
Tx
CAT 6 STP
Rx
HDMI
TV 2
HDMI
Distribution Amplifier
CAT 6 STP (8x)
Rx (8x)
Monitor (8x)
HDMI
Distribution Amplifier
CAT 6 STP (2x)
Rx (2x)
Monitor (2x)
HDMI
HDMI
R.S.
CAT 6 STP
AV Bridge
USB
1
HDMI
Video Conference
HDMI
HDMI

Scenario 3

We need Audio De-embedders


Rack PC
HDMI
USB
1
VGA w/audio
HDMI
D.P
Table Switcher
CAT 6 STP
Rx
HDMI
Blu Ray
HDMI
A.D.
HDMI
Tuner
HDMI
VGA w/audio
HDMI
D.P
Guest Input
CAT 6 STP
Rx
HDMI
Doc CAM
HDMI
Tx
CAT 6 STP
Rx
HDMI
Cam 1
HDMI
Tx
CAT 6 STP
Rx
HDMI
Cam 2
HDMI
Tx
CAT 6 STP
Rx
HDMI
Matrix Switcher

Scenario 3
Don’t Forget Audio



A.D. Source

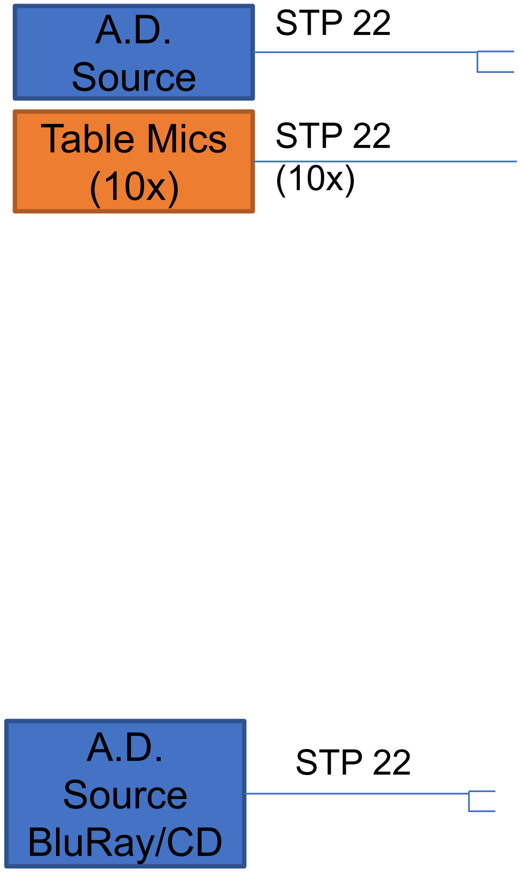
STP 22

STP 22 (10x)

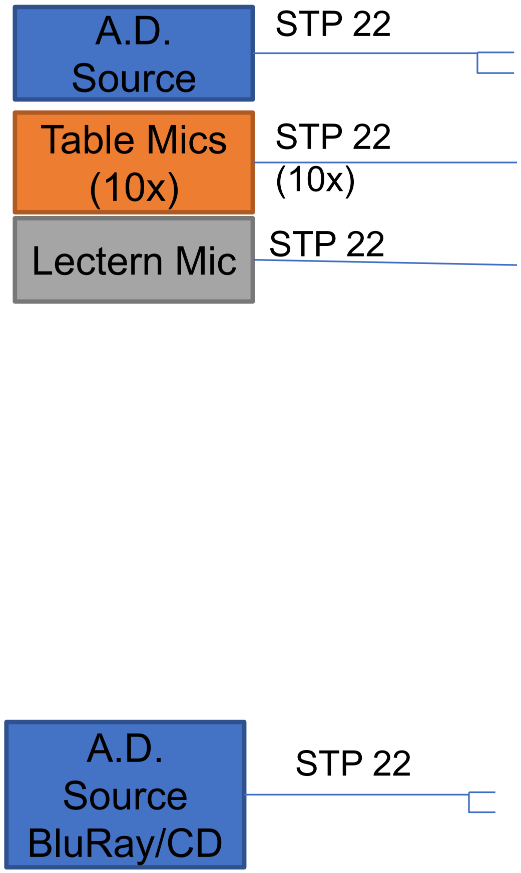
A.D. Source BluRay/CD

STP 22

Scenario 3
Don’t Forget Audio


A.D. Source
STP 22
Table Mics (10x)
STP 22 (10x)
A.D. Source BluRay/CD
STP 22

Scenario 3
Don't Forget Audio



A.D. Source

STP 22

Table Mics (10x)

STP 22 (10x)

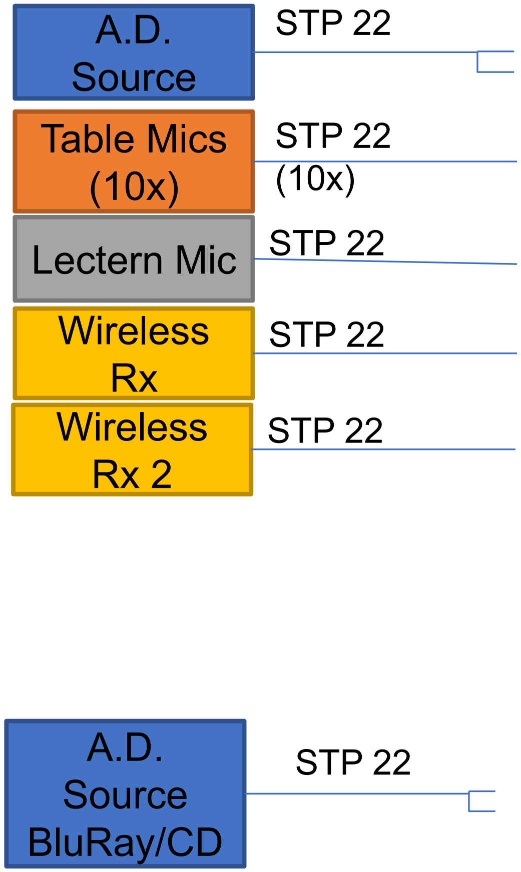
Lectern Mic

STP 22

A.D. Source BluRay/CD

STP 22

Scenario 3
Don't Forget Audio



A.D. Source — STP 22

Table Mics (10x) — STP 22 (10x)

Lectern Mic — STP 22

Wireless Rx — STP 22

Wireless Rx 2 — STP 22

A.D. Source BluRay/CD — STP 22

Scenario 3
Don’t Forget Audio

A.D. Source — STP 22

Table Mics (10x) — STP 22 (10x)

Lectern Mic — STP 22

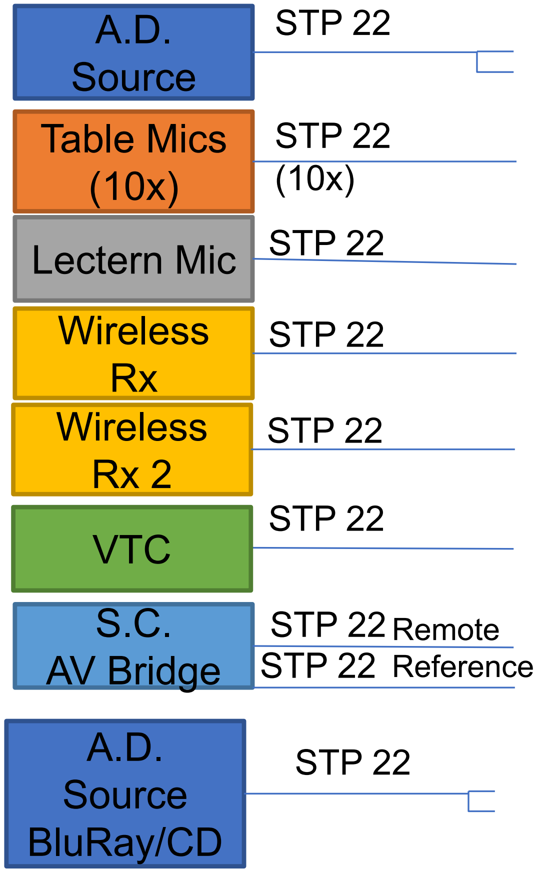
Wireless Rx — STP 22

Wireless Rx 2 — STP 22

VTC — STP 22

A.D. Source BluRay/CD — STP 22

Scenario 3
Don’t Forget Audio



A.D. Source — STP 22

Table Mics (10x) — STP 22 (10x)

Lectern Mic — STP 22

Wireless Rx — STP 22

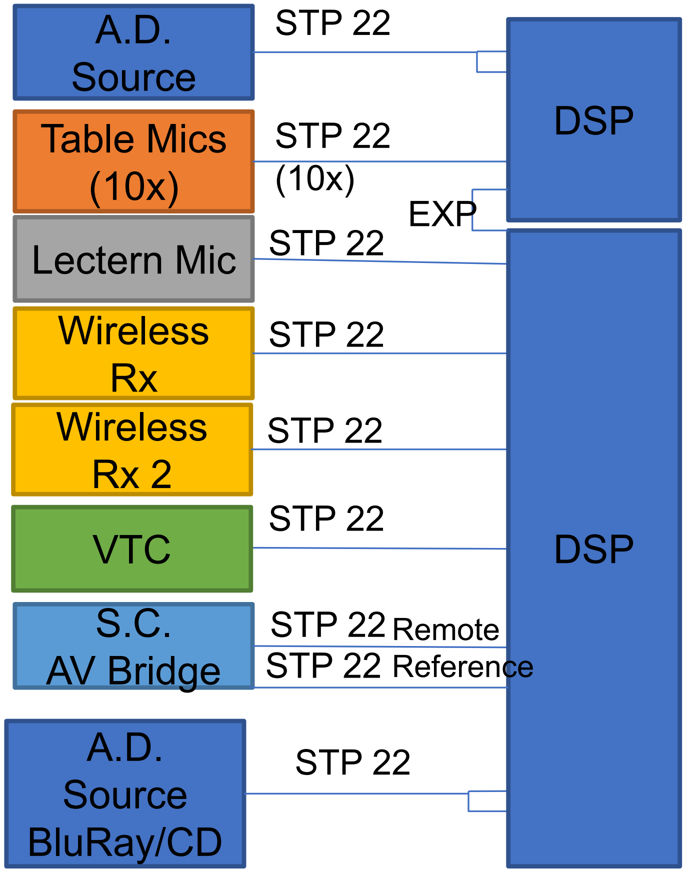
Wireless Rx 2 — STP 22

VTC — STP 22

S.C. AV Bridge — STP 22 Remote; STP 22 Reference

A.D. Source BluRay/CD — STP 22

Scenario 3
Don't Forget Audio



A.D. Source — STP 22 — DSP

Table Mics (10x) — STP 22 (10x) — DSP

EXP

Lectern Mic — STP 22 — DSP

Wireless Rx — STP 22 — DSP

Wireless Rx 2 — STP 22 — DSP

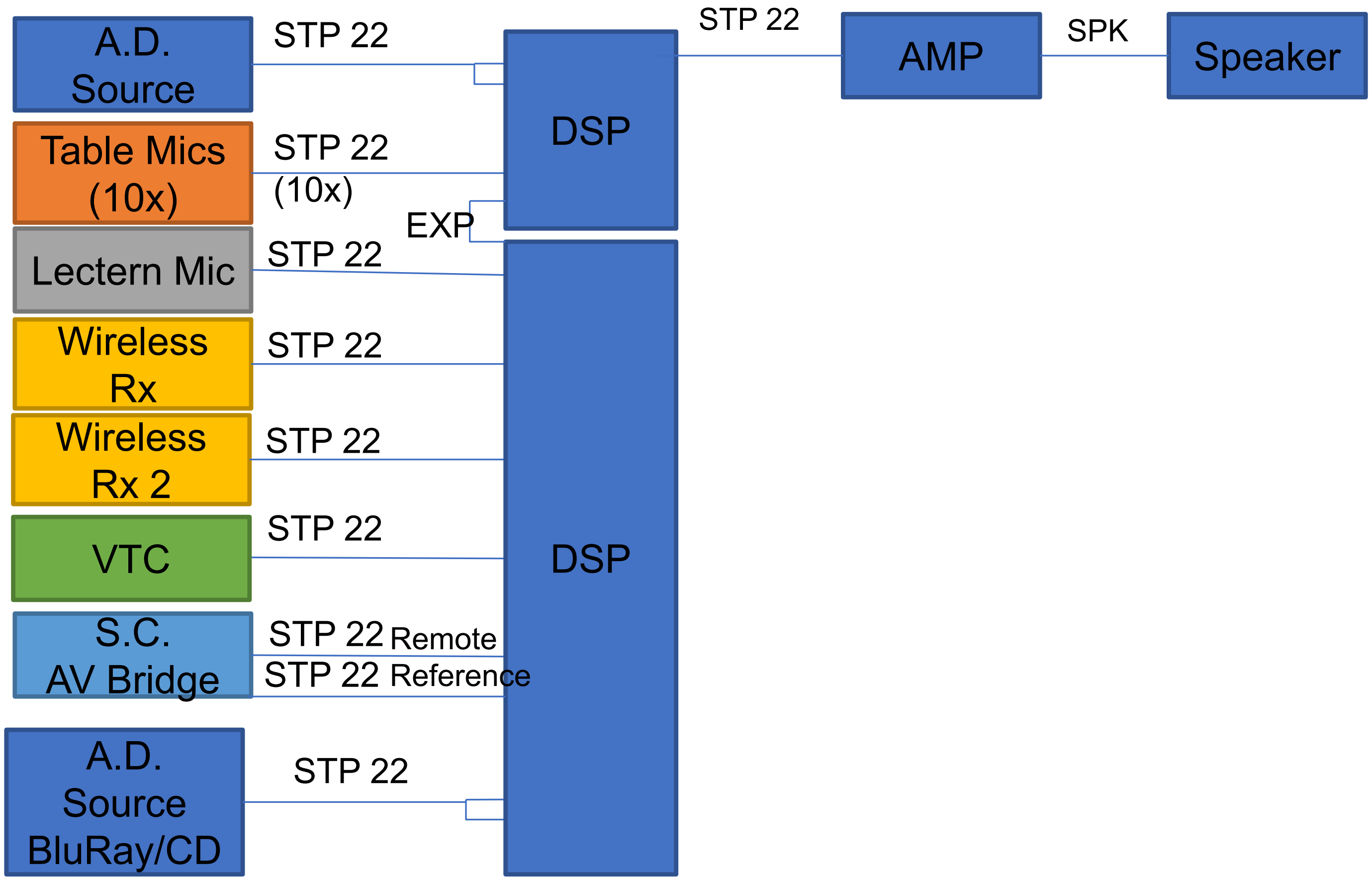
VTC — STP 22 — DSP

S.C. AV Bridge — STP 22 Remote — DSP

S.C. AV Bridge — STP 22 Reference — DSP

A.D. Source BluRay/CD — STP 22 — DSP

Scenario 3
Don't Forget Audio



A.D. Source

STP 22

Table Mics (10x)

STP 22 (10x)

EXP

Lectern Mic

STP 22

Wireless Rx

STP 22

Wireless Rx 2

STP 22

VTC

STP 22

S.C. AV Bridge

STP 22 Remote

STP 22 Reference

A.D. Source BluRay/CD

STP 22

DSP

DSP

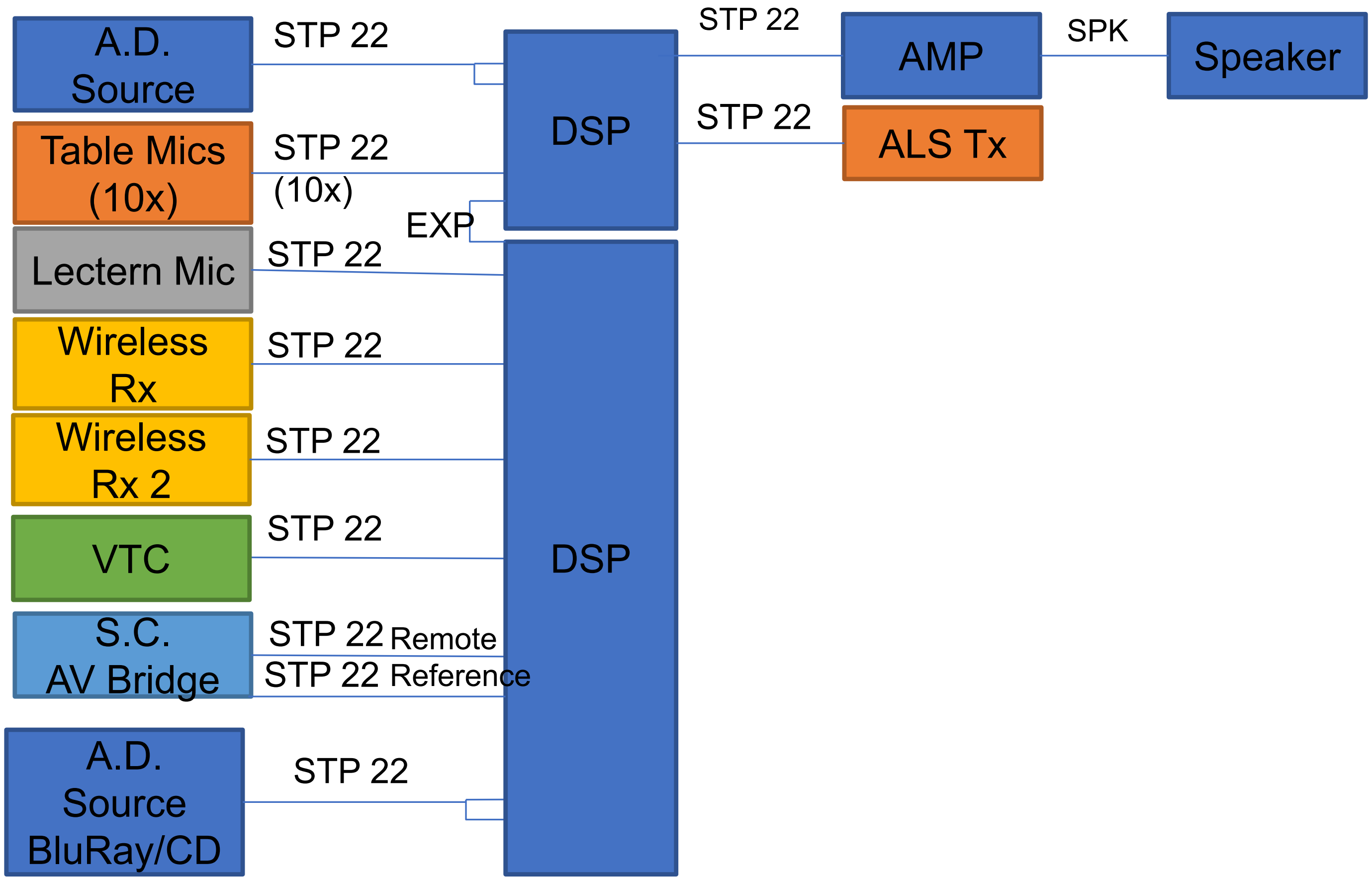
STP 22

AMP

SPK

Speaker

Scenario 3
Don’t Forget Audio



A.D. Source

Table Mics (10x)

Lectern Mic

Wireless Rx

Wireless Rx 2

VTC

S.C. AV Bridge

A.D. Source BluRay/CD

STP 22

STP 22 (10x)

EXP

STP 22

STP 22

STP 22

STP 22

STP 22 Remote

STP 22 Reference

STP 22

DSP

DSP

STP 22

STP 22

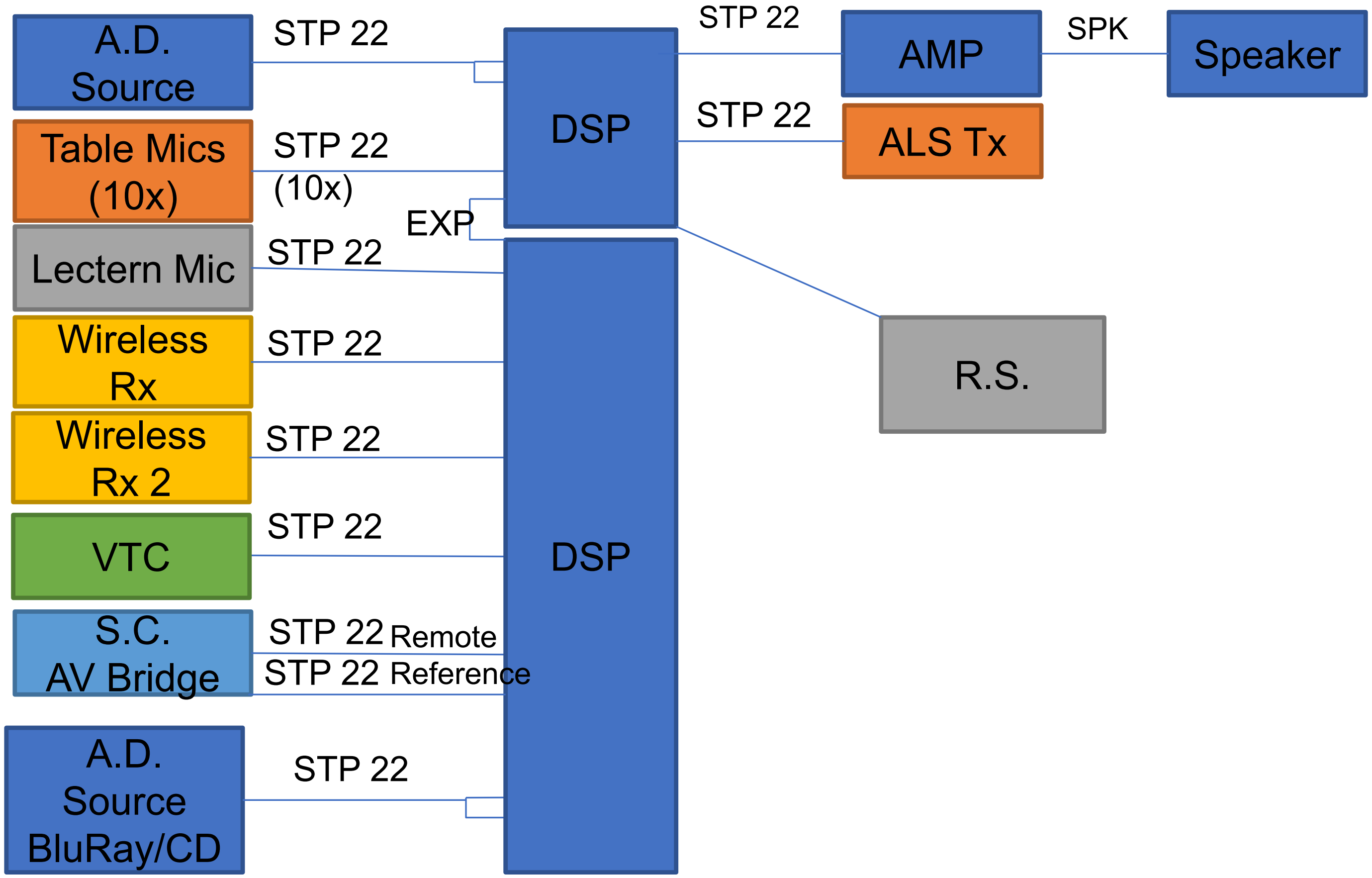
AMP

ALS Tx

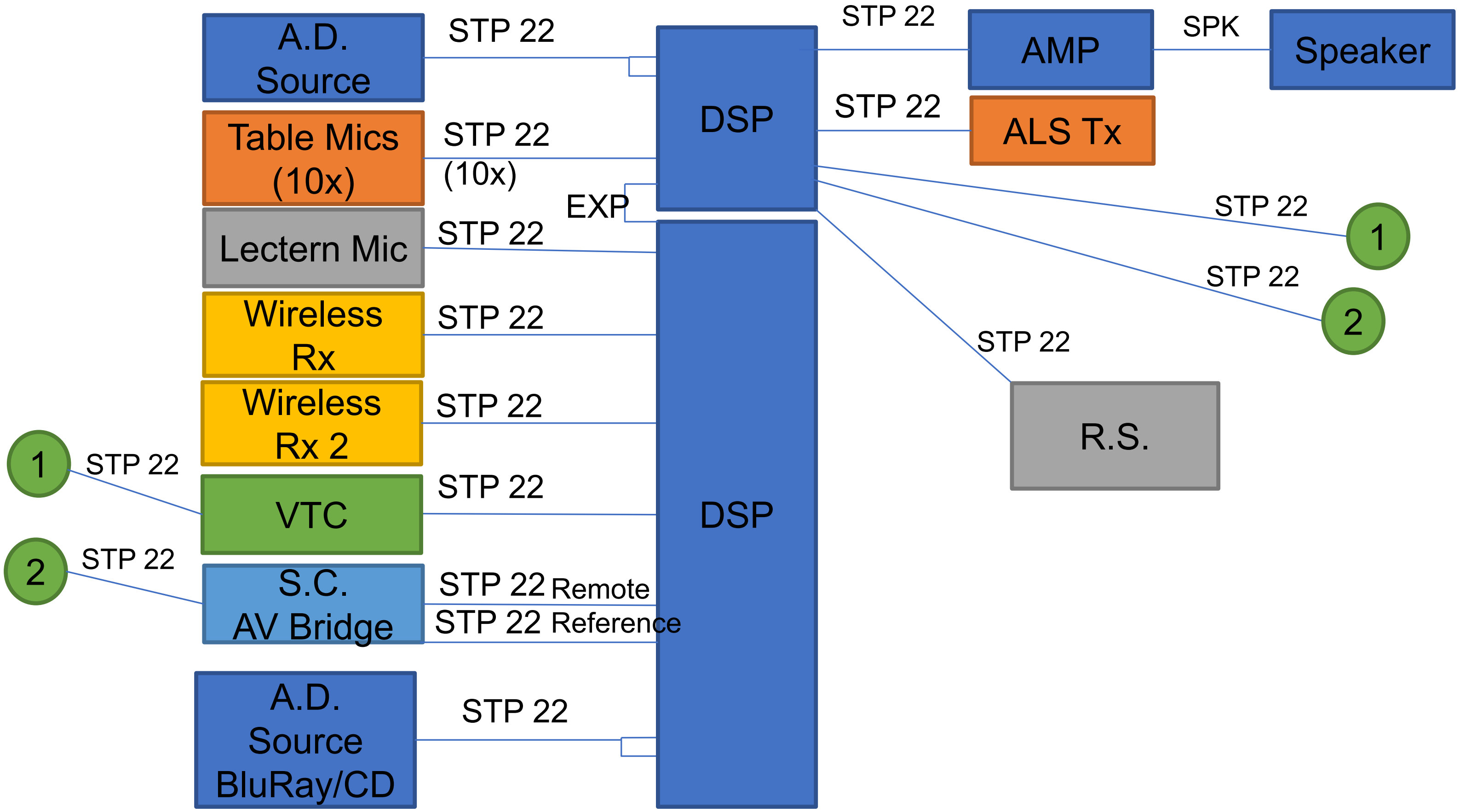
SPK

Speaker

Scenario 3
Don't Forget Audio


A.D.
Source
STP 22
Table Mics
(10x)
STP 22
(10x)
EXP
Lectern Mic
STP 22
Wireless
Rx
STP 22
Wireless
Rx 2
STP 22
VTC
STP 22
S.C.
AV Bridge
STP 22 Remote
STP 22 Reference
A.D.
Source
BluRay/CD
STP 22
DSP
DSP
STP 22
AMP
SPK
Speaker
STP 22
ALS Tx
R.S.

Scenario 3
Don’t Forget Audio



A.D. Source — STP 22 — DSP

Table Mics (10x) — STP 22 (10x) — DSP

EXP

Lectern Mic — STP 22 — DSP

Wireless Rx — STP 22 — DSP

Wireless Rx 2 — STP 22 — DSP

1 — STP 22 — VTC — STP 22 — DSP

2 — STP 22 — S.C. AV Bridge — STP 22 Remote / STP 22 Reference — DSP

A.D. Source BluRay/CD — STP 22 — DSP

DSP — STP 22 — AMP — SPK — Speaker

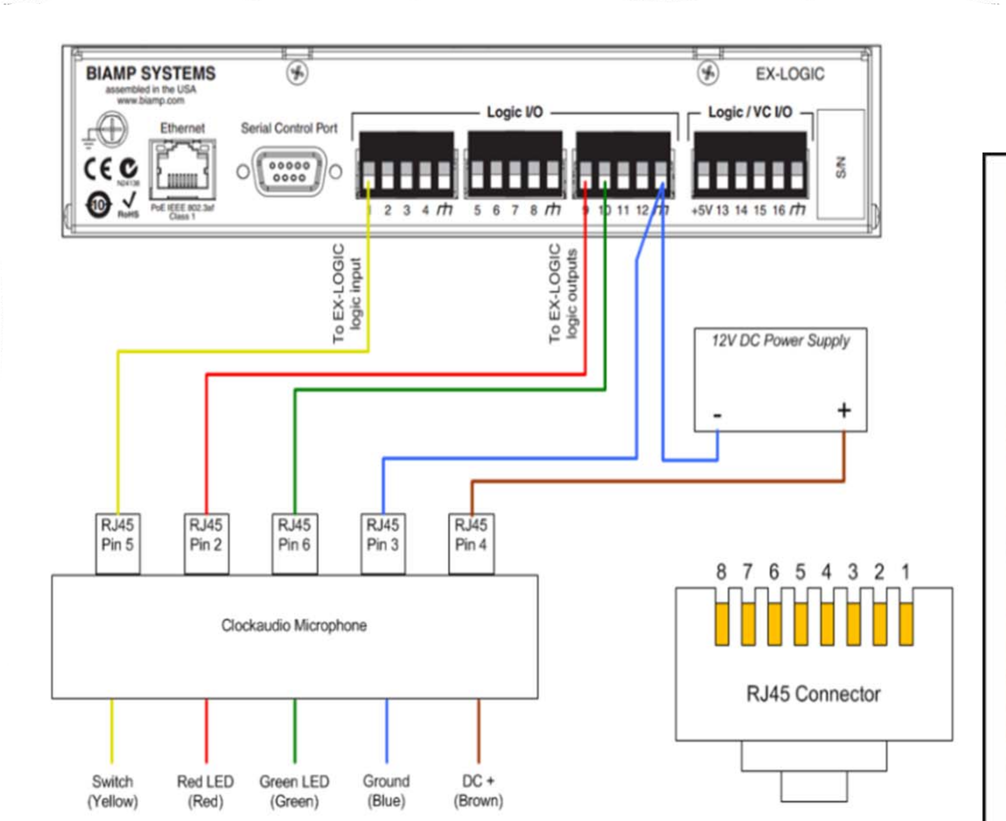
DSP — STP 22 — ALS Tx

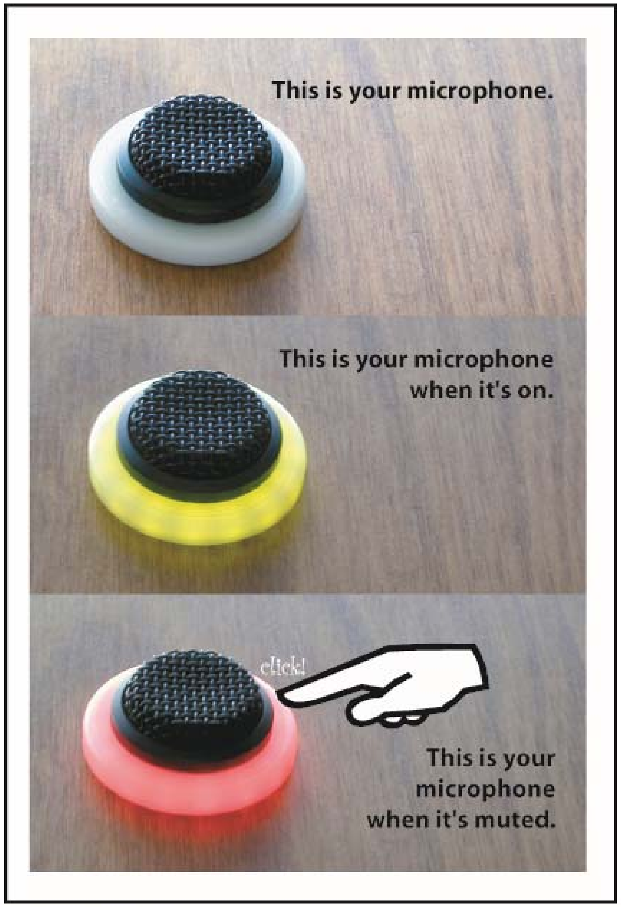
DSP — STP 22 — 1

DSP — STP 22 — 2

DSP — STP 22 — R.S.

Scenario 3
Push to Talk Buttons


BIAMP SYSTEMS
assembled in the USA
www.biamp.com
EX-LOGIC
Ethernet
PoE IEEE 802.3af Class 1
Serial Control Port
Logic I/O
Logic / VC I/O
S/N
1 2 3 4
5 6 7 8
9 10 11 12
+5V 13 14 15 16
To EX-LOGIC logic input
To EX-LOGIC logic outputs
12V DC Power Supply
-
+
RJ45 Pin 5
RJ45 Pin 2
RJ45 Pin 6
RJ45 Pin 3
RJ45 Pin 4
Clockaudio Microphone
Switch (Yellow)
Red LED (Red)
Green LED (Green)
Ground (Blue)
DC + (Brown)
8 7 6 5 4 3 2 1
RJ45 Connector


This is your microphone.
This is your microphone when it's on.
click!
This is your microphone when it's muted.

Scenario 3

Don’t forget Control!

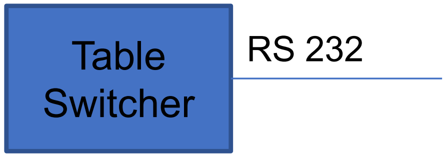


Table Switcher
RS 232

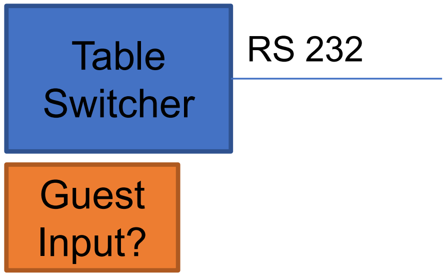


Table Switcher
RS 232
Guest Input?

Scenario 3

Don’t forget Control!

Scenario 3

Don’t forget Control!

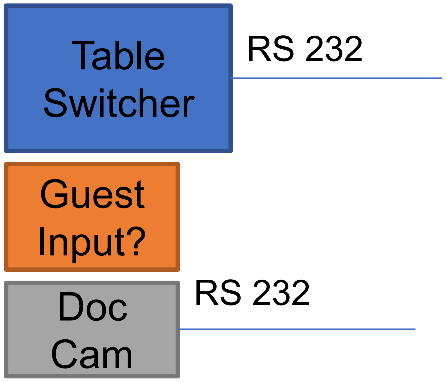


Table Switcher
RS 232
Guest Input?
Doc Cam
RS 232

Scenario 3

Don’t forget Control!

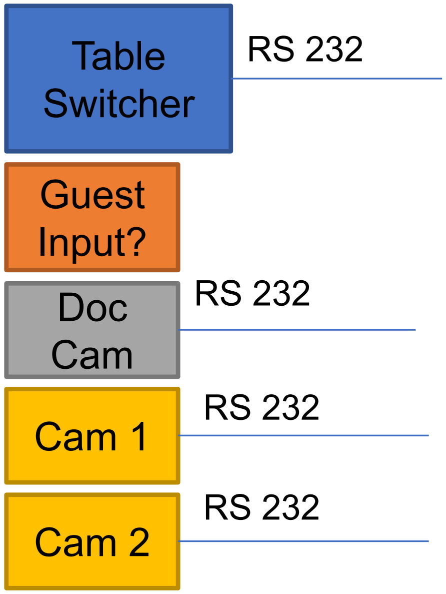


Table Switcher

RS 232

Guest Input?

Doc Cam

RS 232

Cam 1

RS 232

Cam 2

RS 232

Scenario 3

Don't forget Control!

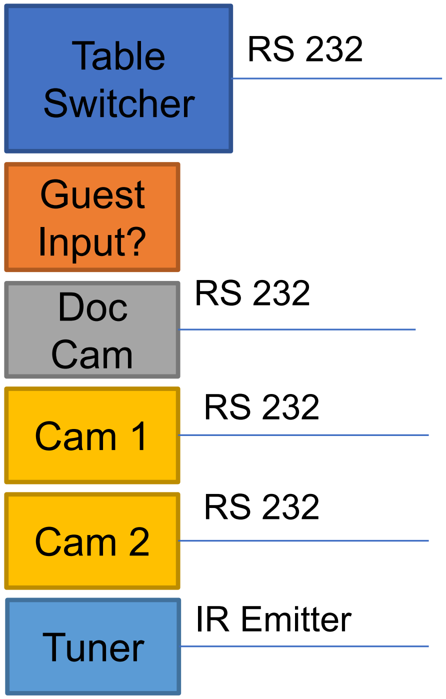


Table Switcher
RS 232
Guest Input?
Doc Cam
RS 232
Cam 1
RS 232
Cam 2
RS 232
Tuner
IR Emitter

Scenario 3

Don’t forget Control!

Table Switcher — RS 232

Guest Input?

Doc Cam — RS 232

Cam 1 — RS 232

Cam 2 — RS 232

Tuner — IR Emitter

B.R. — IR Emitter

Scenario 3

Don't forget Control!

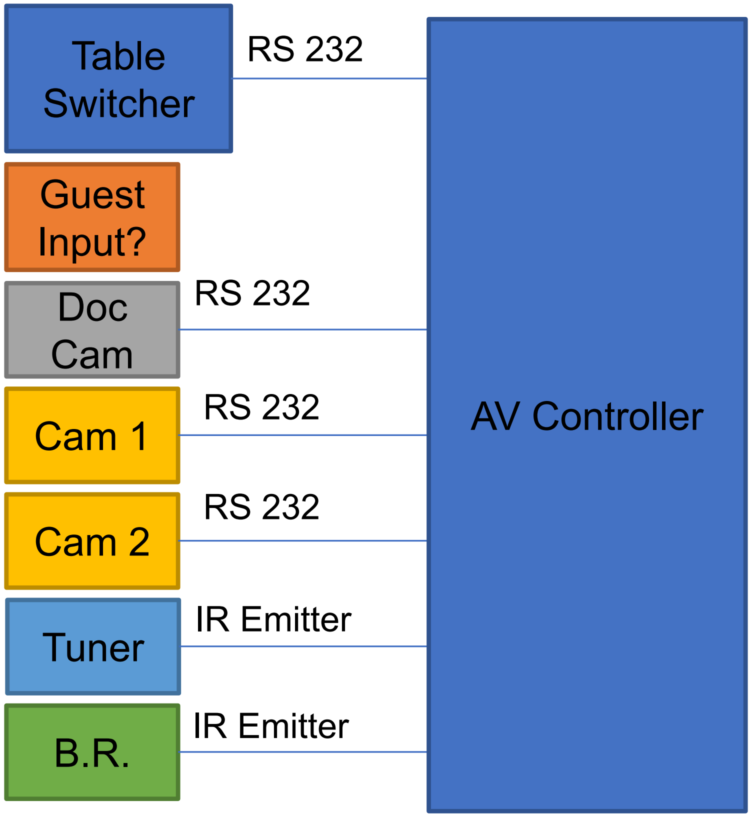


Table Switcher
RS 232
Guest Input?
Doc Cam
RS 232
Cam 1
RS 232
Cam 2
RS 232
Tuner
IR Emitter
B.R.
IR Emitter
AV Controller

Scenario 3

Don’t forget Control!

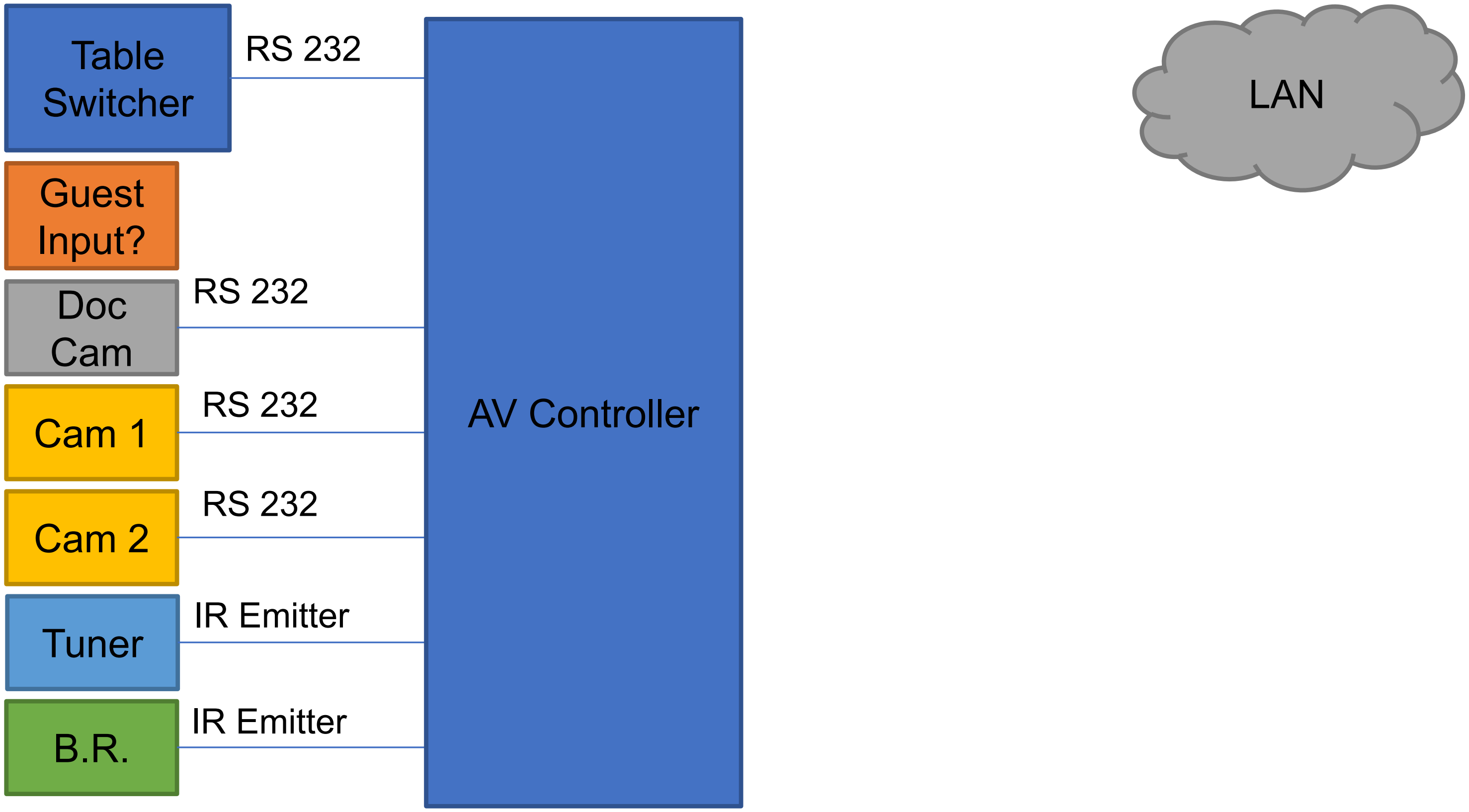


Table Switcher
RS 232
Guest Input?
Doc Cam
RS 232
Cam 1
RS 232
Cam 2
RS 232
Tuner
IR Emitter
B.R.
IR Emitter
AV Controller
LAN

Scenario 3

Don’t forget Control!

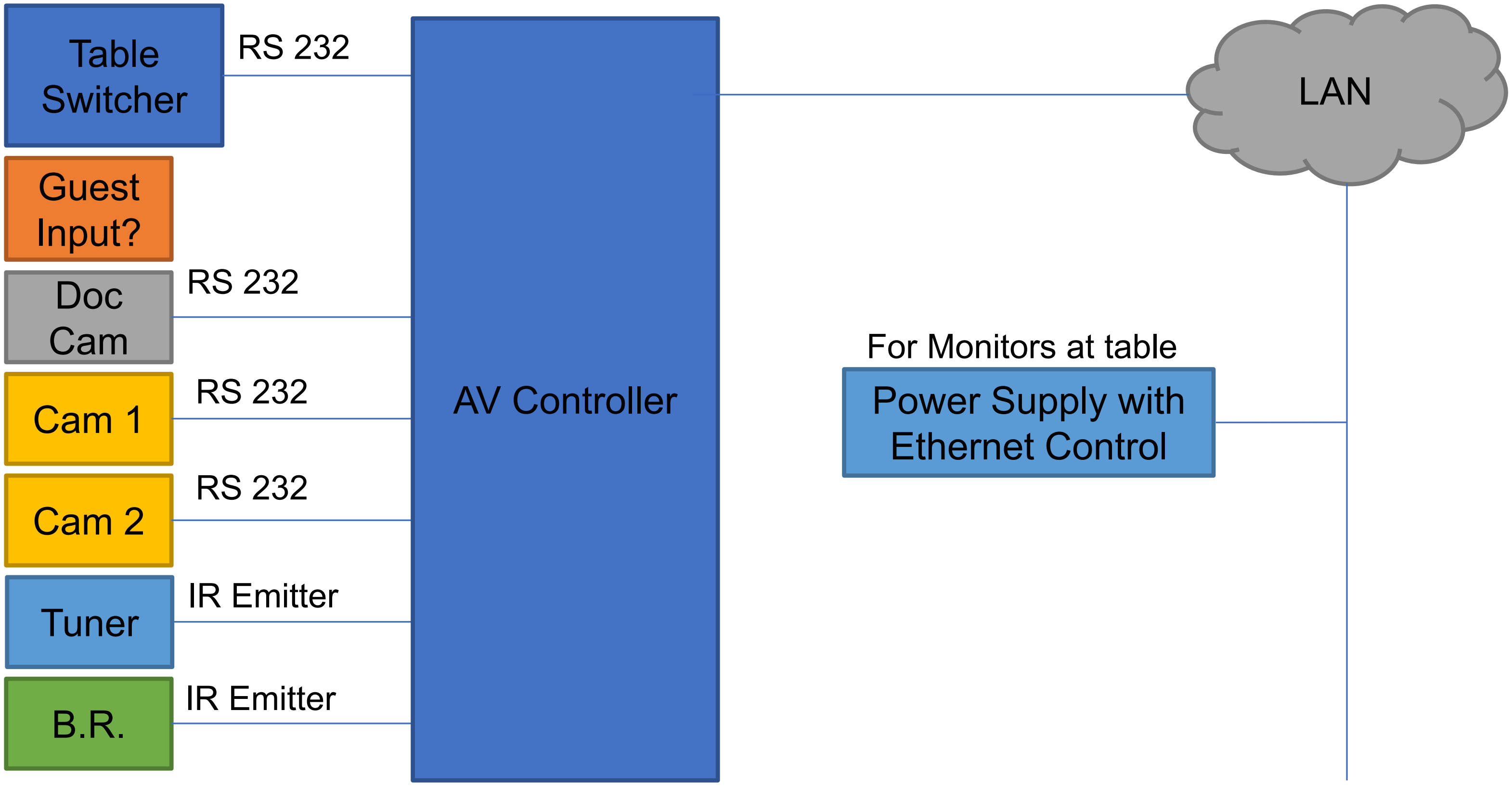


Table Switcher
RS 232
Guest Input?
Doc Cam
RS 232
Cam 1
RS 232
Cam 2
RS 232
Tuner
IR Emitter
B.R.
IR Emitter
AV Controller
LAN
For Monitors at table
Power Supply with Ethernet Control

Scenario 3
Don’t forget Control!

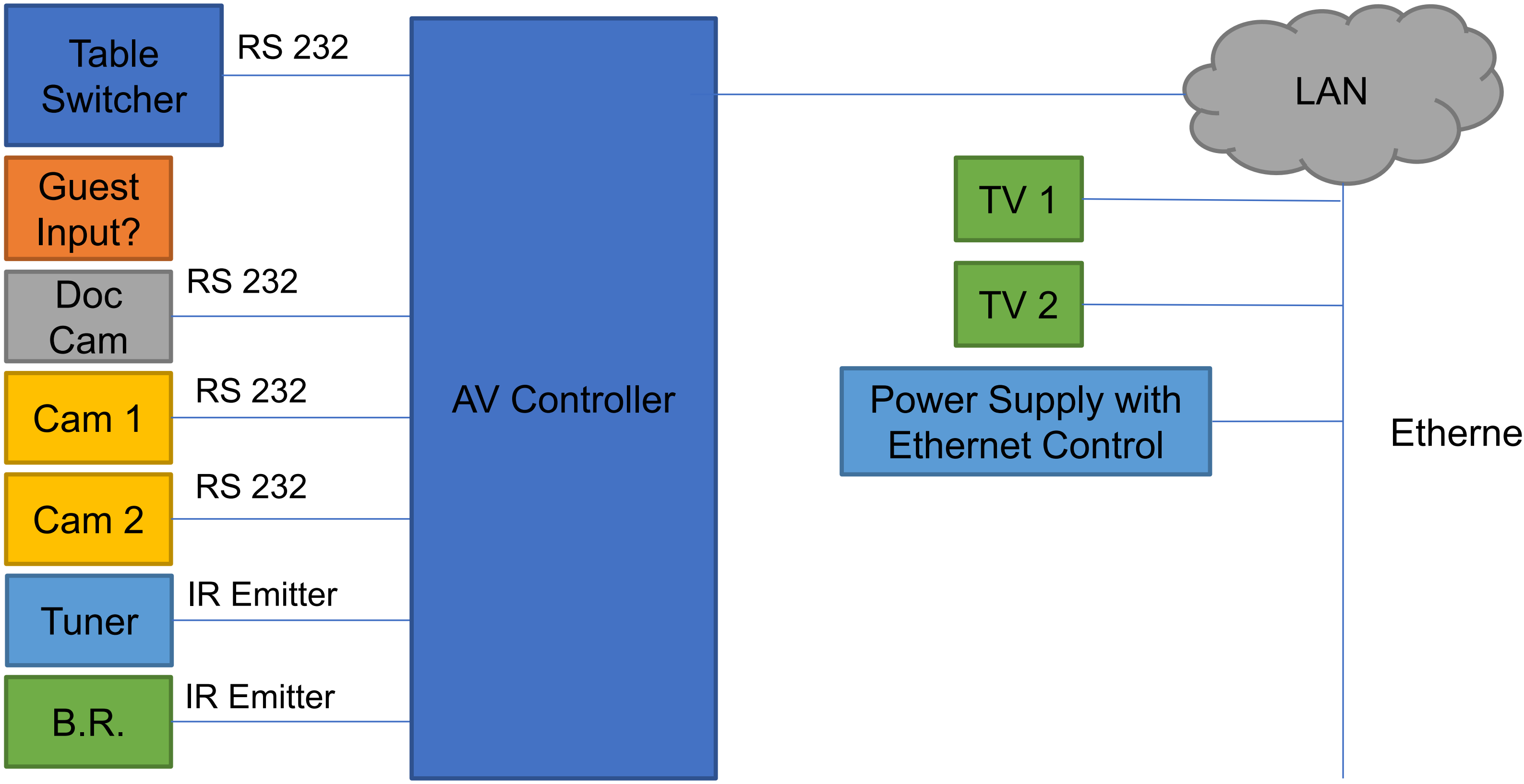


Table Switcher

RS 232

Guest Input?

Doc Cam

RS 232

Cam 1

RS 232

Cam 2

RS 232

Tuner

IR Emitter

B.R.

IR Emitter

AV Controller

LAN

TV 1

TV 2

Power Supply with Ethernet Control

Ethernet Connection

Scenario 3

Don’t forget Control!

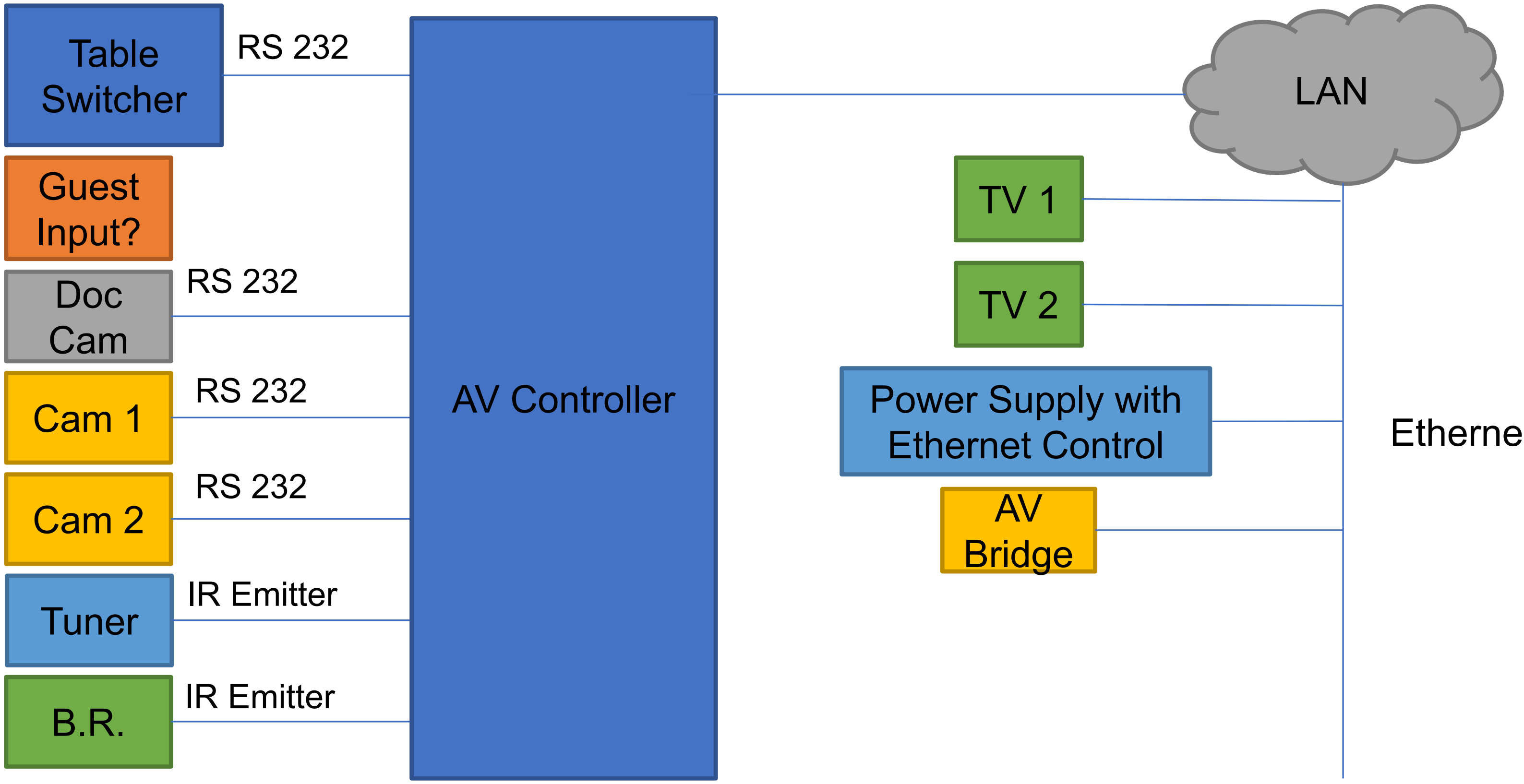


Table Switcher

RS 232

Guest Input?

Doc Cam

RS 232

Cam 1

RS 232

Cam 2

RS 232

Tuner

IR Emitter

B.R.

IR Emitter

AV Controller

LAN

TV 1

TV 2

Power Supply with Ethernet Control

AV Bridge

Ethernet Connection

Scenario 3

Don't forget Control!

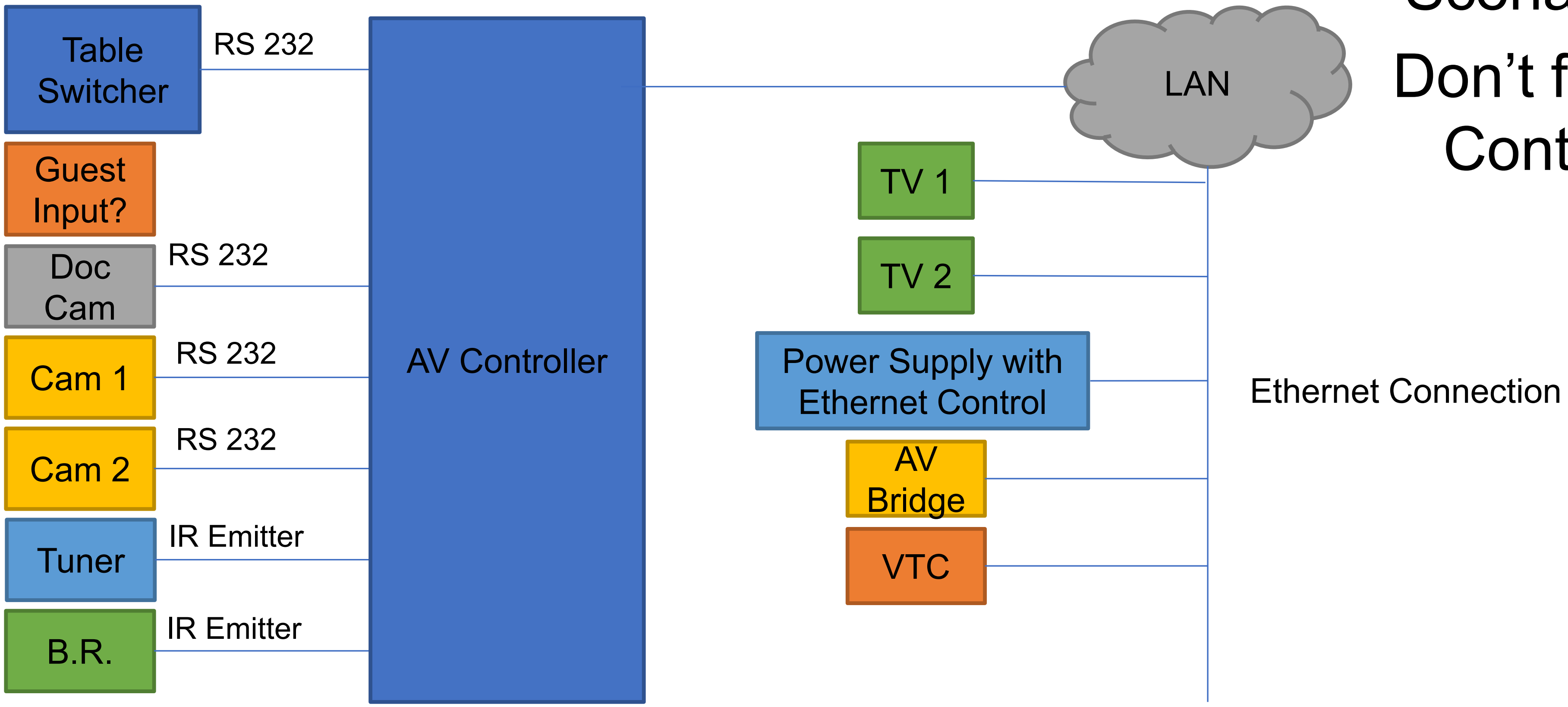


Table Switcher

RS 232

Guest Input?

Doc Cam

RS 232

Cam 1

RS 232

Cam 2

RS 232

Tuner

IR Emitter

B.R.

IR Emitter

AV Controller

LAN

TV 1

TV 2

Power Supply with Ethernet Control

AV Bridge

VTC

Ethernet Connection

Scenario 3

Don’t forget Control!

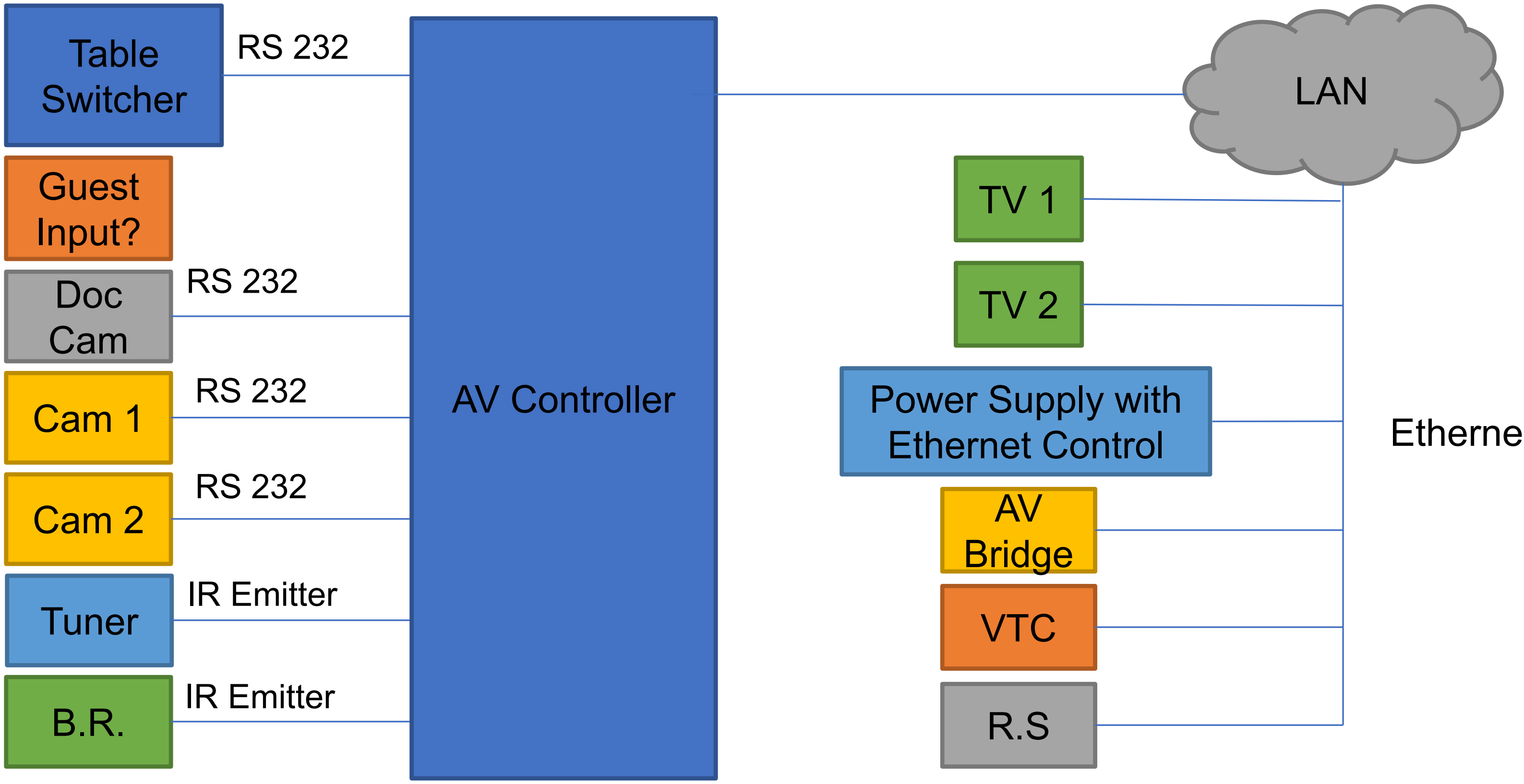


Table Switcher

RS 232

Guest Input?

Doc Cam

RS 232

Cam 1

RS 232

Cam 2

RS 232

Tuner

IR Emitter

B.R.

IR Emitter

AV Controller

LAN

TV 1

TV 2

Power Supply with Ethernet Control

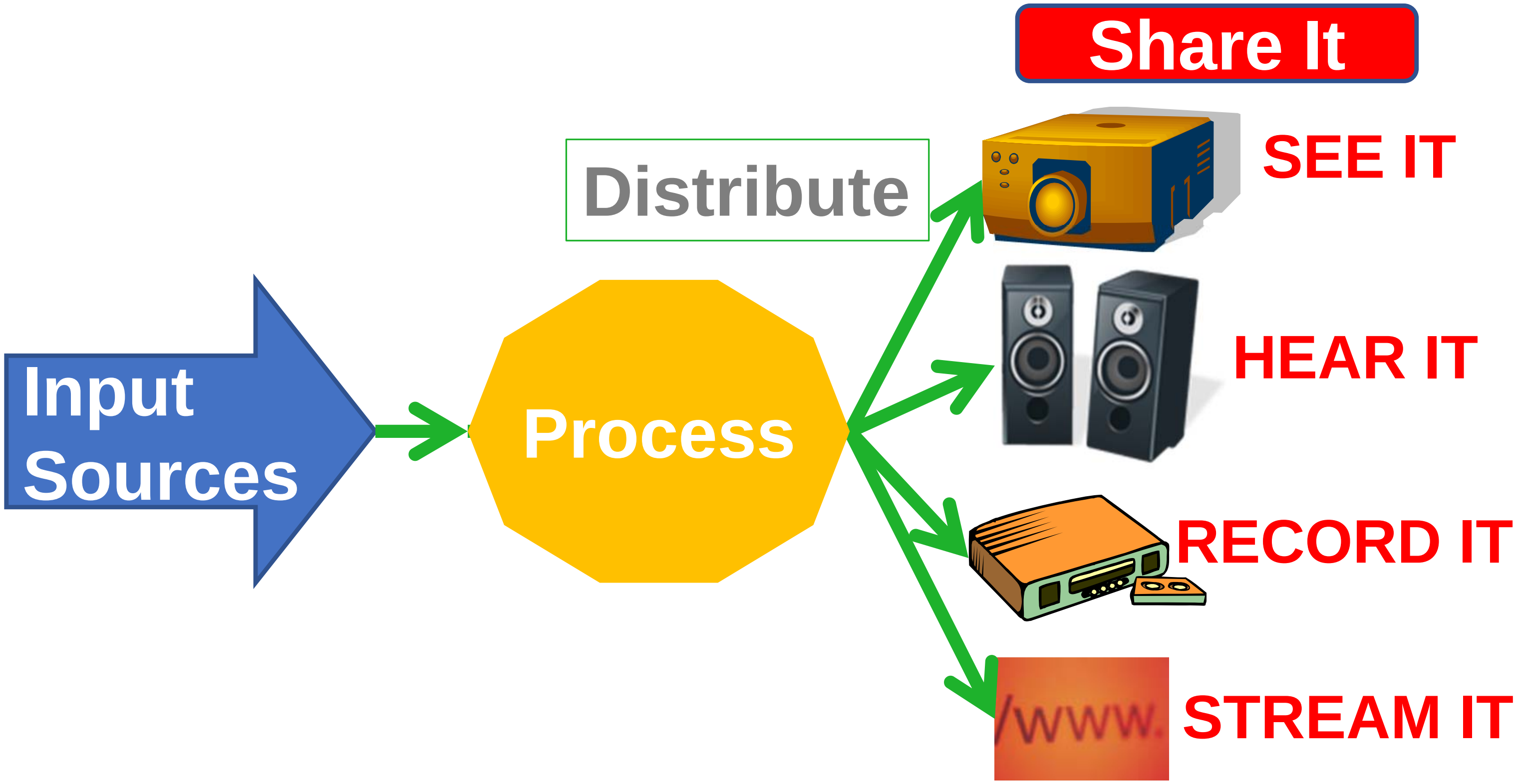
AV Bridge

VTC

R.S

Ethernet Connection

4 Steps of AV



Input Sources

Process

Distribute

Share It

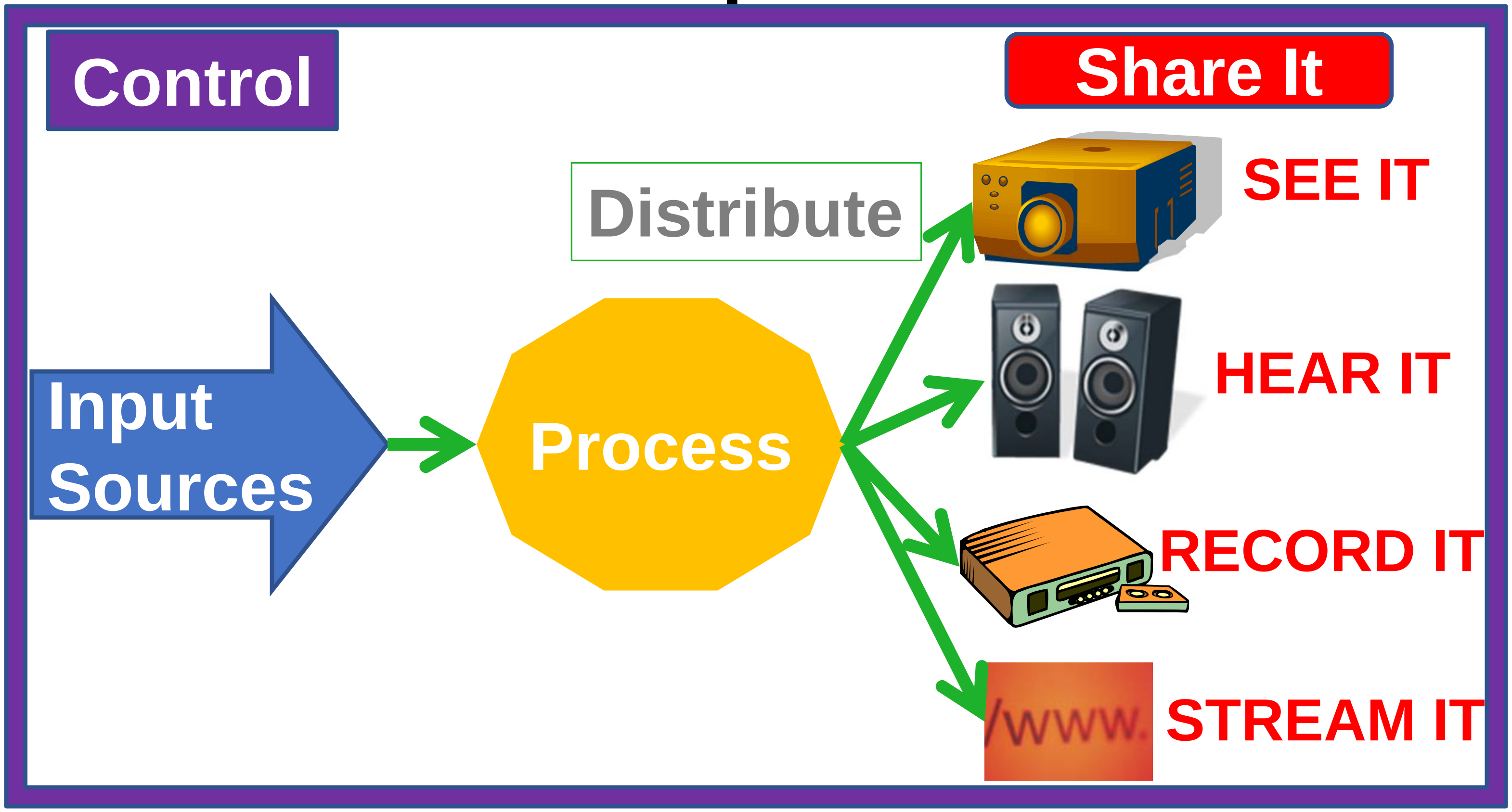
SEE IT

HEAR IT

RECORD IT

STREAM IT

5th Step of AV



Control

Share It

Distribute

Input Sources

Process

SEE IT

HEAR IT

RECORD IT

STREAM IT

Feel free to contact me:

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