

GLS Equipment: Video

Because it is the central focus, a lot of attention is given to installing a center screen, with a bright projector, and *simple* seamless switching system. The screen and projector size are determined by:

- room size & shape
- audience size
- equipment availability
- amount of ambient light
- equipment budget & rental price

The screen should be positioned as close to the audience as possible and at a comfortable height for viewing. (This typically means that the bottom of the screen is around 120cm or 4 ft. from the stage).

As much as possible, position the projector in such a way that the facilitator (or band members) will not walk through the projection beam & cast a shadow on the screen while they are on stage, or while entering or exiting the stage.

For the highest quality possible, with the most reliable, simplest wiring, connection and operation, we HIGHLY recommend a video switcher/scaler (Analog Way, Barco, Folsom, Extron, Kramer or equal).

Connect the switcher to the LCD projectors using standard HD-15 (still called “VGA”) cables, at the native resolution of the projector (*typically 1024x768 or “XGA” resolution*).

Provide a professional clean & tested primary DVD player connected to the video switcher and the sound console.

A backup DVD player (started approximately 4 to 5 seconds behind the primary) is *required* and is *non-negotiable*. We recommend a consumer-grade DVD player as your backup (cleaned & tested); connected to the switcher and the sound console. The “diversity” of having a professional DVD player and a consumer-level player (made by a different manufacturer) is an advantage when playing burned discs.



Front & Back view of a Folsom Presentation Pro Switcher/Scaler



Both the switcher/scaler and the projector have “female” HD-15 inputs, so “male” HD-15 cable (as shown here) should be all that you need.

For long cable runs (over 50m) consider a distribution amplifier to boost the signal.

Using a computer to play the DVD is NOT recommended in ANY situation. Software-driven PC DVD players do not have the same kind of error-correction technology that even a low-cost consumer DVD player has. Additionally, computers must “scale” the video to the output size of the external display—putting unnecessary strain on the video card and causing most computers to behave unreliably.

Background applications, virus protection, screen savers, wireless signals, and power save modes are *always* a threat to a computer which is required to do the same exact thing (play a DVD smoothly and reliably) for 60 minutes straight.



Your DVD discs will arrive in the video standard of your nation (NTSC or PAL).

Additional instructions and notes are included. They re-iterate what you need to know about aspect ratio, and give you important information on audio tracks and other notes.

Upon its arrival, it is critical that someone watch all of the content from start-to-finish on the exact DVD player that you'll be using.

Due to the complexities of MPEG and DVD authoring, (and the wide range of DVD manufacturers) someone on your team must serve as the "quality control" to ensure smooth playback and operation.

The turnaround times for translation, DVD authoring and subtitling are so tight, occasionally there may be slight errors or programming mistakes made. There is ALWAYS a "workaround" for these issues, but if there is a slight issue, you'll want to identify it well in advance of your event, not during the GLS!

GLS Equipment: Video (continued)

Although your DVD will be delivered in the standard of your nation (NTSC or PAL), many sites prefer to lay off (copy) the DVD content onto a high-quality, reliable playback device. In some countries and in some facilities this will be a DVR (digital video recorder) or DDR (digital disk recorder). Others use DVCAM tape. Only if fully, completely tested from start-to-finish should you play the GLS content off of DVD.

A graphics workstation (PC with PowerPoint) is required for song lyrics, announcements and other GLS graphics.

If you use software other than PowerPoint to display worship lyrics (ProPresenter, EasyWorship, Media Shout, Sunday Plus, etc.) you'll need to determine if a second PC is required or if switching back and forth from PowerPoint is practical.

Avoiding DVD playback uncertainty

- Ensure that the DVD players are relatively new, late-generation models
- If needed, ensure that the DVD player has been cleaned using a laser lens cleaner (inexpensive, available at most photo and electronics stores)
- DVD players should be positioned on flat, solid surfaces that can't be easily bumped or moved by vibration
- Test all GLS content in the exact DVD players that will be used during the event
- Where possible, use two different models (Denon as the primary, LG as the backup, for example). Note that if the DVD players look the same but have different brand names (as in the case of LG and Panasonic) then for our purposes, they're the same. The idea is to implement two completely different sets of electronics (both of which should be tested) for true redundancy.
- Ensure that the power source is clean and uninterrupted. Consider a low-cost computer UPS backup system if there's any threat of power interruption.



If you have smaller “side screens” it’s likely that they won’t even be needed.

Some GLS sites use them for worship lyrics, then switch to a static logo during the teaching. In the photograph above, this site isn’t even using them since they would simply be a distraction.

Remember to place the screen as far downstage as possible—while still giving you room for the band, vocalists, facilitator or host. Placing the screen too far upstage will put too much space between the on-screen speaker and your audience.

Keeping the screen as close to the audience as possible will also result in a larger apparent screen size.



GLS at Bracknell Family Church, Bracknell, England (2005)

Video Screen Philosophy

A single big, bright center screen is nearly always critical in the success of the Global Leadership Summit. Even the most sophisticated churches and conference rooms do not typically have the type of installed projection equipment required to keep the audience's focus for two entire days (with nearly all of the content being presented by video).

The charts below can help with a general guideline of what size screen and projector you should be considering. The size of your venue, specific seating layout, and site lines (not to mention your equipment rental budget) should be carefully considered and could change the recommendations below.

Screen Size & Projector Brightness

The larger the screen, the brightness of the projector must increase proportionally. If you only have a 9,000 lumens projector available, start with the "minimum projector brightness" column and work backwards. You certainly can serve an audience of 1,200 attendees with a projector that size, but the screen CANNOT be 24' wide. Additionally, careful consideration must be given to your seating layout and the control of ambient light--especially around the screen.

Generally speaking, a rear-projected image is nearly always ideal for video projection--the image will appear slightly brighter, and the projection equipment is hidden from the audience. But a short-throw lens and a lot of space behind the screen it required. Another disadvantage is that the "viewing angle" (how far off-center the audience can be) is reduced from 90 degrees to (typically) around 60 degrees. The expense of the short-throw lens, the reduced viewing angle, and the sheer amount of space required often makes rear projection impractical for the GLS.

Using Screens with “Gain”

High-gain screens (typically 1.8 or 2.4) are reflective and can increase the brightness of your image. Some would consider the increased contrast that comes along with a high-gain screen to be a negative trade-off, but in the case of the GLS, both the increased brightness ("gain") and harsher contrast can be desirable. High-gain screens are only effective when the projector is near the same "plane" as the audience because the reflective screen surface will amplify the light (the video picture) back to where it originated. Positioning the projector on a scaffold near the back of the room, just a meter over the heads of the audience will result in a very bright image. A high-gain screen will not be effective with overhead (ceiling) mounted projectors. Positioning a projector in the balcony means that the attendees seated in the balcony will appreciate the higher gain created by the screen reflection, but the attendees on the main floor will not even have as good of an image as they would see with a regular screen surface.

Aspect Ratio

Because the GLS content is provided in a 16:9 aspect ratio, it's helpful to consider the size of a screen based on its width only. A 4m x 5.3m (12' x 16') screen is indeed a very large screen that seems like it can work in almost any application. But keep in mind that approximately 15% at the top and 15% at the bottom of the screen won't be used. The image (if displayed properly) will be 4m (16' ft.) wide, but only 3m (9 ft.) tall.

Most production companies and rental houses are most heavily invested in 4:3 screens and in many countries, 16:9 aspect ratio screens simply aren't available.

If you do end up with a 4:3 screen, just don't be distracted by the height or overall size of the screen--the height of a 4:3 screen will seem bigger than you need. *Make your size determinations based on width.*

A useful trick is to fill the top two-thirds of a 4:3 screen with the image, and "mask" the bottom third with drape. The image will fill the screen and will LOOK like a 16:9 screen to your audience.

4:3 screen



16:9 screen



Both of these images are displaying the Leadership Summit content correctly. The image on the left shows the 16:9 content centered on a 4:3 screen, with black bars at the top and bottom. This is the correct way to display "widescreen" content on a 4:3 screen.

The image on the right shows the content filling a 16:9 screen. Notice how much larger the image appears, despite the fact that the screens are exactly the same height.

Another advantage to widescreen aspect ratio screens, is that they are simply easier to install and position in nearly every facility due to the fact that they aren't unnecessarily taller than they need to be.

Projector & Screen Size Recommendations

In an ideal situation with controlled, ambient light and NO light hitting the screen, here are the recommended screen & projector sizes:

	<i>Minimum</i>	4:3	Recommended	16:9 Screen	<i>Minimum</i>	Recommended
Audience	Screen	Screen	Screen	Dimensions	Projector	Projector
Size	Width	Dimensions	Width	<i>recommended</i>	Brightness	Models:
100-200	12'	9' x 12'	14'	8'6" x 14'4"	6,500 lumens	Sanyo PLC-XP100L
	4m	3m x 4m	4.5m	2.6m x 4.6m		Sanyo PLC-XF60A
						Christie LX-66
200-400	14'	10.5' x 14'	16'	9' x 16'	8,000 lumens	Sanyo PLC-XF41
	4.6m		5.3m	3m x 5.3m		Sanyo PLC-XF42
						Christie LU-77
400-800	16'	12' x 16'	18'	10' x 18'	10,000 lumens	Sanyo PLC-XF45
	5.3m	4m x 5.3m	6m	3.3m x 6m		Barco SLM 9+
						Panasonic PT-D1000
800-1200	18'	15' x 20'	21'	12' x 21'	12,000 lumens	Sanyo PLC-XF46
	6m	7.3m x 6.6m	7m	4m x 7m		Barco SLM R12+
						Eiki LC-XT4
1200-1600	21'	18' x 24'	24'	13'6" x 24'	15,000 lumens	Sanyo PLC-XF47
	7m	6m x 8m	8m	4.3m x 8m		Eiki LC-XT5

In a situation with only moderately controlled or challenging ambient light situations, this should be your starting point:

	<i>Minimum</i>	4:3	Recommended	16:9 Screen	<i>Minimum</i>	Effective (or visible)
Audience	Screen	Screen	Screen	Dimensions	Projector	Lumens when
Size	Width	Dimensions	Width	<i>recommended</i>	Brightness	Dual-converging
						Projectors:
100-200	12'	9' x 12'	14'	8'6" x 14'4"	8,000 lumens	
	4m	3m x 4m	4.5m	2.6m x 4.6m		
200-400	14'	10.5' x 14'	16'	9' x 16'	8,000 lumens	12,000
	4.6m		5.3m	3m x 5.3m	X 2	
400-800	16'	12' x 16'	18'	10' x 18'	10,000 lumens	15,000
	5.3m	4m x 5.3m	6m	3.3m x 6m	X 2	
800-1200	18'	15' x 20'	21'	12' x 21'	12,000 lumens	16,000
	6m	7.3m x 6.6m	7m	4m x 7m	X 2	
1200-1600	21'	18' x 24'	24'	13'6" x 24'	15,000 lumens	21,500
	7m	6m x 8m	8m	4.3m x 8m	X 2	

Dual-Converging Projectors

Dual-converging projectors is a common way to achieve higher levels of output, but it's not as simple as adding the lumens of the two projectors together. As you can see from the "Effective Lumens" column on the chart from page 20, two identical projectors will only have a "visible" impact of 1.5 times the output of one projector. (Two dual-converged 5,000 lumens projectors will create 7,500 lumens, two dual-converged 10,000 lumens projectors will create 15,000 lumens, etc.)

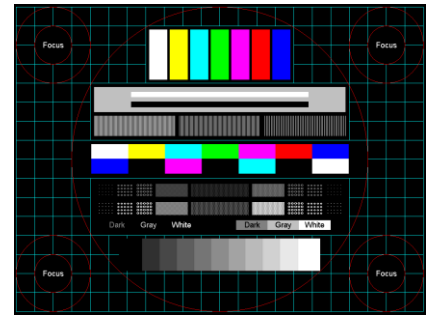
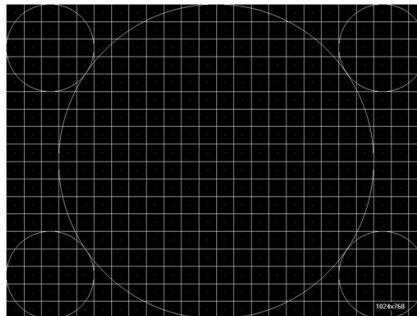
One advantage of dual-converging projectors is that you have a built-in backup. But with multi-lamp projectors, this isn't as much of a concern as it was just a few years ago. These days, whatever is going to "take out" one projector, will very likely disable the second one as well. (A power problem, severed or faulty cable, etc.)



So if renting a single 12,000 lumens projector is similarly priced to renting two 8,000 lumens projectors, it's a better choice to go with the single 12,000 lumens projector. Not only will you save a significant amount of time in set-up (you don't have to go through the exercise of projecting a grid and lining them up perfectly) but the contrast ratio, optics, and color depth on the latest generation of high-output LCD projectors is far superior.

Some projectors are designed to "interlock" for dual-projection.

Others require scaffolding or (as shown above) simple shelving to stack one over the other.



A variety of "test patterns" which can be generated from most switcher/scalers, (or downloaded for PowerPoint), are required to insure that the projectors are lined up perfectly.

It can take even an experienced professional video engineer as long as 60 minutes to dual-converge two identical projectors.



The Christie Roadrunner LX100 (shown here) is identical to the Sanyo PLC-XF-45, and Eiki CL-XT3.

It's manufactured by Sanyo/Fisher and marketed to different markets as a Christie, and Eiki model.

All of the Christie, Sanyo and Eiki lenses from this line of projectors are interchangeable.

Online lens calculators are free to use and can be very helpful in checking your work.

Additionally, certain projectors have larger LCD panels, changing the lens calculations slightly. (Enough to make these simple calculations unreliable.)

For Christie, Eiki, and Sanyo models, use this link:
www.us.sanyo.com/calc/index.cfm

For Barco projectors:
www.barco.com/presentation/en/support/lenscalculator.asp

For Panasonic projectors:
www.panasonic.com/business/projectors/calculate/calc26_b5/html/cal_menu.html

Lens Calculations

One of the exercises you'll need to go through is confirm the lens size that you'll need. The equipment rental companies in many GLS locations will handle this for you, but it's helpful for everyone to be able to "check their work" to avoid load-in problems and a last-minute scramble.

All projector lenses have a "throw ratio", which is your key to solving the equation. In the cast of a "fixed" lens, it'll have a simple throw ratio like this:

1.2:1

This means, quite simply, that the end of the lens must be positioned at a distance of *exactly* 1.2 times the width of the screen. This formula works in meters and feet.

A Sanyo LNS-01, "Short Fixed" lens (1.2:1 throw ratio) needs to be positioned 4.8 meters away from a 4 meter wide screen.

Only *slightly* more complicated is when lenses have a zoom function. The zoom function allows greater flexibility in set-up and positioning and whether zoomed all the way in or all the way out, the brightness level does not change.

Zoom lenses have a throw ratio that is expressed like this:

4.6 – 6.0:1

The positioning can be as close as 4.6 times the width of the screen, and as far as 6 times the width of the screen.

The Sanyo LNS-T02 "Long Zoom" lens (4.6 – 6.0:1 throw ratio) can be positioned anywhere between 18.4 meters and 24 meters away from a 4 meter wide screen.

You're solving a simple algebraic equation:

- If you know the throw ratio of the lens, and the size of your screen, you can easily calculate the distance (or range) required.
- If you know the distance (from a balcony, for instance), and your vendor has a limited number of screen sizes available, you have enough information to calculate the throw ratio of the lens you'll need.
- The least-likely scenario would be if you have a projector with only one lens, and there's only one location where the projector can sit . . . you have all the information you need to calculate the screen width. (This could be the case with hanging, balcony-throw, or rear-projected projector placement.)

Using a Switcher/Scaler

We emphasize the use of a switcher/scaler because

- They're easy to set up
- They automatically detect the input source (s-video, component, high-resolution, etc.)
- They operate in the native resolution of the projector (simplifying connections and reducing projector "latency" or delay)
- They're easy to operate
- They're hearty, travel well, and are always reliable
- All video and graphics remain as crisp, and clear as possible



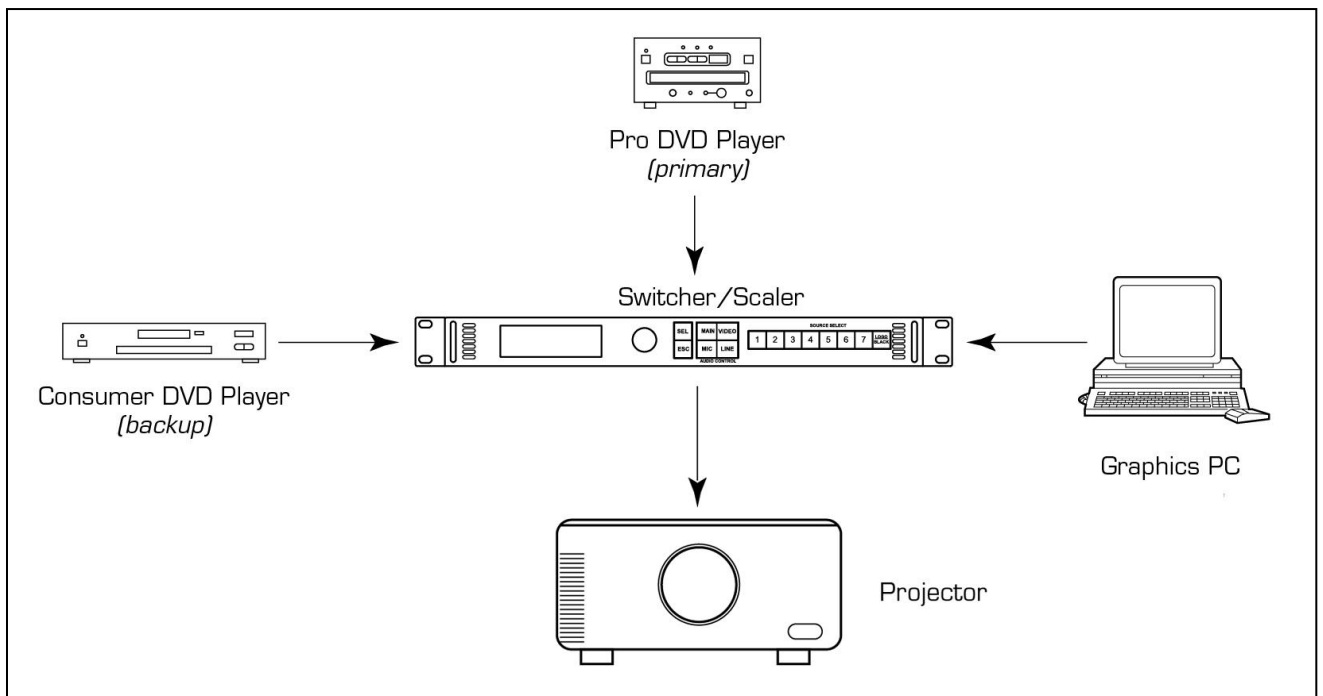
An inexpensive 400MHz distribution amplifier is "rated" to carry your switcher/scaler's output for as far as 75m. But most professionals agree that the signal can be extended for at least 100m and remain at full strength.

The diagram below indicates a simple (but complete) video and graphics switching and projection solution.

In this case, three input cables are required (one from each DVD player, and an HD-15 to HD-15 cable from the PC), and one output cable is required (an HD-15 from the switcher/scaler to the projector).

Most switcher/scalers (such as the Folsom Presentation Pro, shown in this diagram) have two HD-15 outputs, so a regular computer LCD or CRT output monitor can be added if the operator does not have a clear view of the screen. Using a "passive" splitter (a simple Y-cable) is NOT recommended, because it will compromise the signal strength.

We recommend that your HD-15 cable remain 50m or less. If you need a longer run than 50m, use a simple VGA distribution amplifier to "boost" the signal.



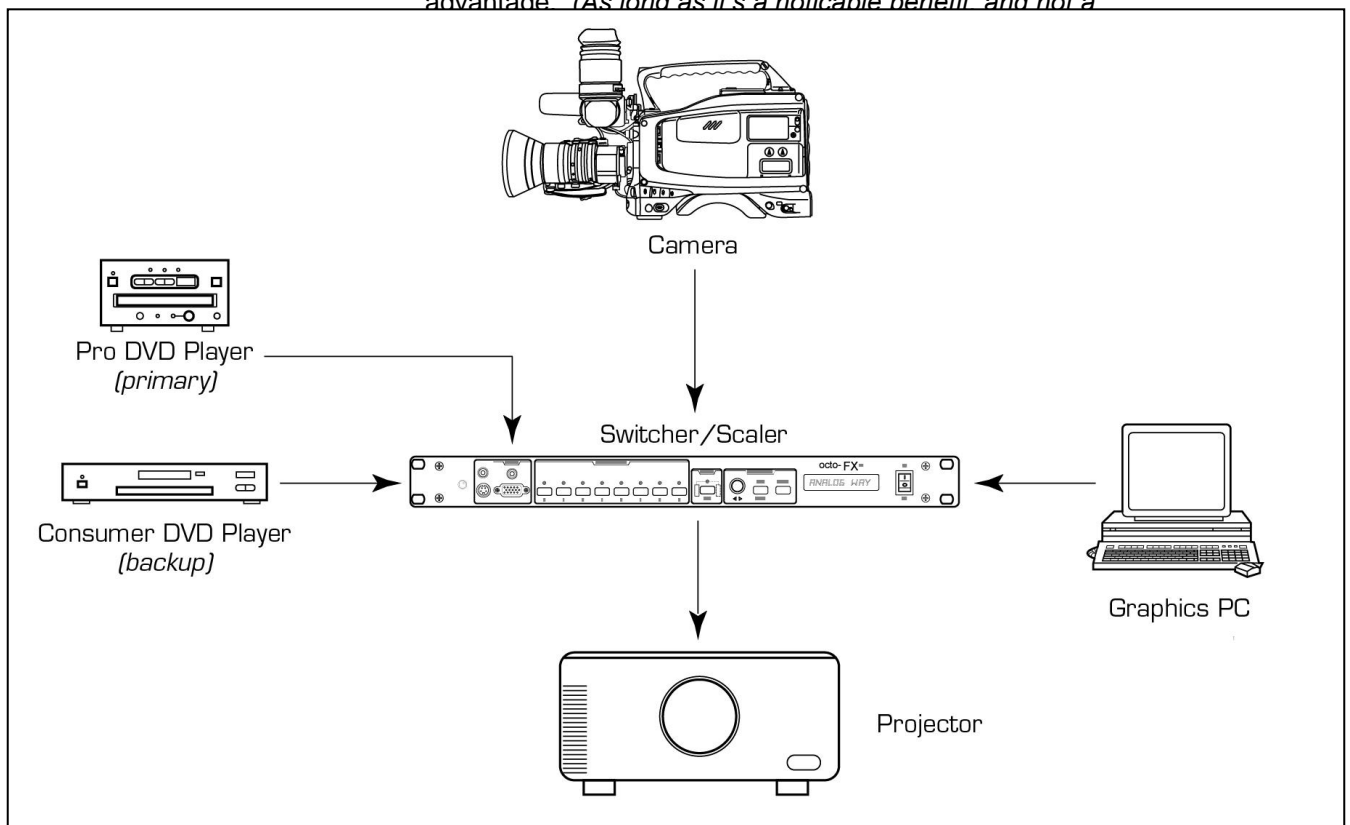
Using a Switcher/Scaler (continued)

Most single rack-unit Switcher/Scalers perform either a “dip through black” or “freeze-and-fade” transition when switching from one input source to the next. The result is that:

- You’ll want to record a “still store” of the GLS logo or other theme graphic to avoid potential distractions caused by this.
- You’ll want to wait until the video fades to black before making your transition
- It simply may not be practical to use IMAG without practicing the transitions to ensure that they are distraction-free.

However, some switcher/scalers can seamlessly switch from a “foreground” layer (any of the video inputs) to a graphics-only “background” layer that matches the native resolution of the system. (Your output monitor on the PC must be set to 1024 x 768 or “XGA” resolution. This ensures that the switcher/scaler doesn’t have to make any adjustments to the image).

The foreground/background functionality results in a transition that doesn’t have to “freeze-and-fade” or dip-through-black. This means that you could add a single camera in situations where using image magnification (IMAG) of the facilitator and host pastor might be an advantage. *(As long as it’s a noticeable benefit and not a*



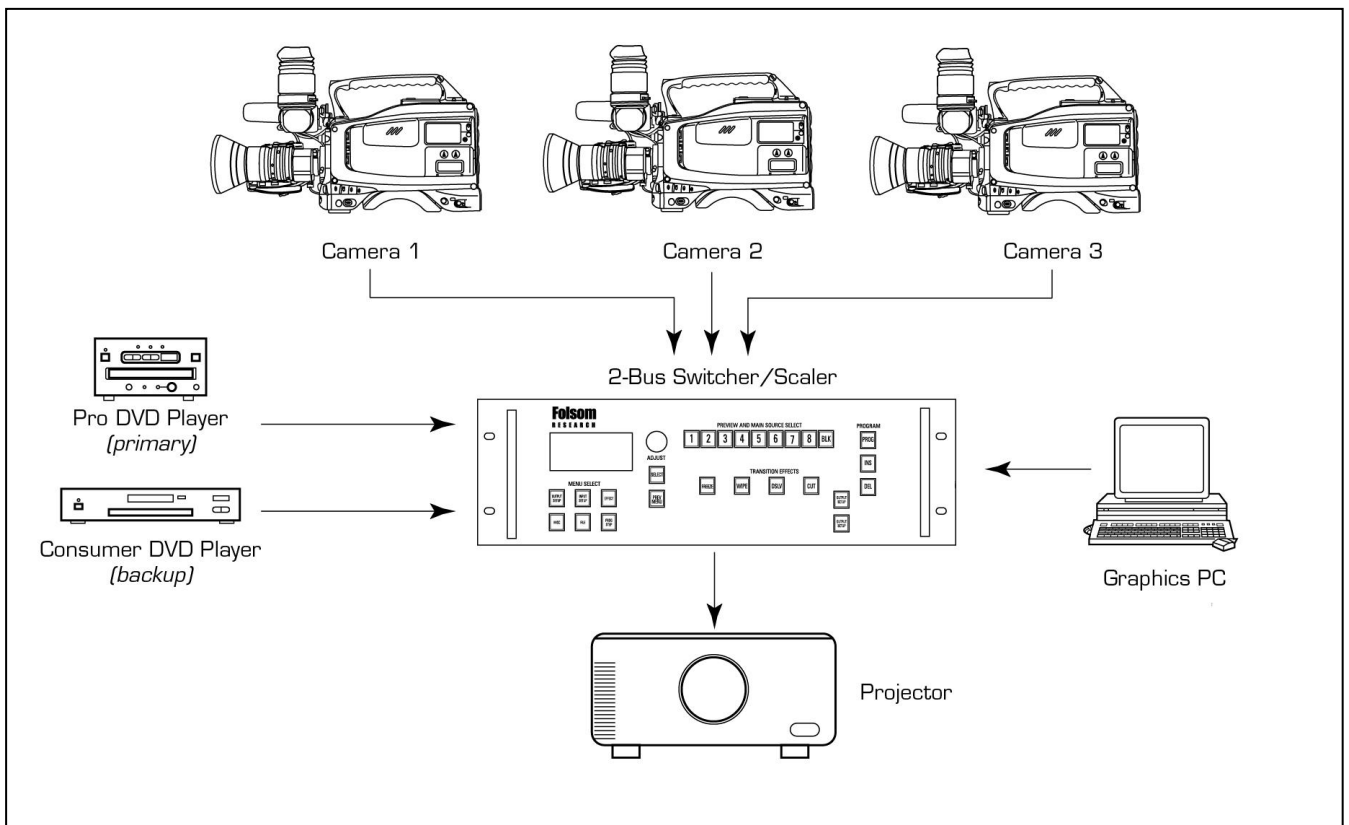
Using a Switcher/Scaler (continued)

Dual-bus switcher/scalers have a “preview” and “program” just like a traditional video switcher. (They have outputs connected to two LCD or CRT monitors which the operator would label “preview” and “program”. These are not shown in the diagram below.)

Dual-bus switcher/scalers make it practical to switch multiple camera IMAG. Just like their single-rack unit cousins, they keep graphics crisp and clear, and “scale” the video inputs up to match the native resolution of the projector.

Keep in mind that the very first generation or “legacy” dual-bus switcher/scalers have a noticeable delay (some take a third of a second to process the incoming video) which can be easily corrected for video playback, but can be very distracting for IMAG.

The latest generation of dual-bus switcher/scalers have only 3 frames of processing delay—unnoticeable to any audience and even most production professionals.



Using a Switcher/Scaler (continued)

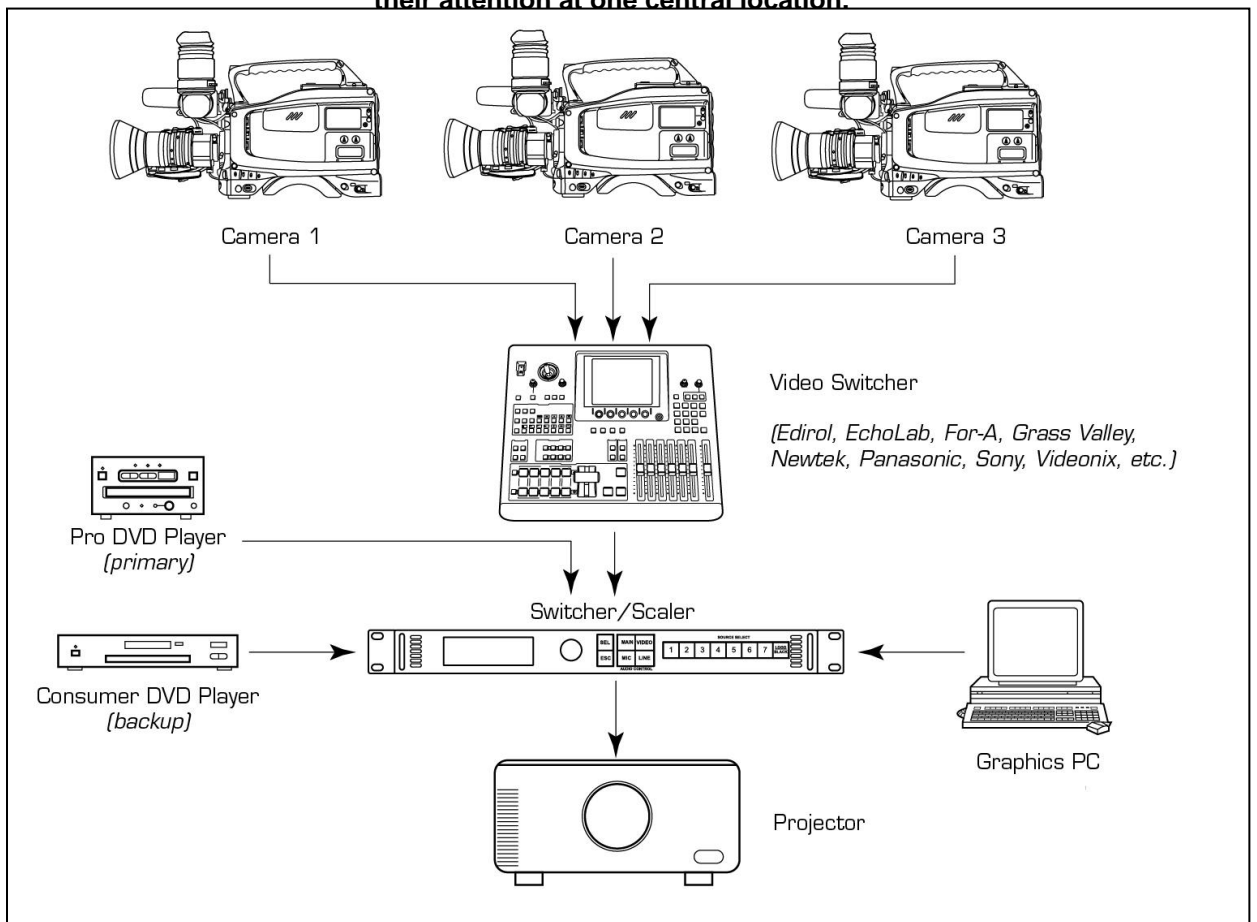
Large facilities with existing IMAG systems can benefit from the diagram below. We STRONGLY RECOMMEND that you switch your video and graphics “downstream” of your existing switching system.

Your switcher/scaler will recognize the output of your video switcher as a single video source. If anything goes wrong with the existing video system, “the show goes on” because the DVD players and graphics workstation are unaffected.

This typically requires:

- “inserting” of the switcher/scaler after your video switcher
- running high-resolution (HD-15) cable to your projector
- switching the input of your projector to the “PC” or “RGB” input

Alternately, another solution is to keep your existing IMAG on the side screens, and set up a simple system to feed the GLS content and graphics to a center screen. During the teaching, just put a GLS logo or other theme graphic on the side screens so your audience can focus their attention at one central location.



GLS Equipment: Audio



A stereo DI box (like the Whirlwind PC DI) should serve as the interface between your DVD players and your audio console. They turn stereo 3.5mm or dual RCA inputs into balanced XLR outputs, allowing long runs of cable with less threat of interference.

The purpose of the GLS TC orientation is not to train you or your staff on the basics of audio engineering. Some consider this a unique blend of art and science that can take years to understand even the basics. If basic equipment use, or fundamental concepts such as:

- the concepts of using input lists
- gain structure
- the use of compression & dynamic effects
- mute and cue management
- mic placement, or
- mixing techniques

. . . are new to you (or, more importantly, your audio engineer) please consult with your producer ASAP to discuss this critically missing component.

It's likely that one of the reasons your GLS site was chosen because it already has a complete professional sound system. You'll want to ensure that this system provides "even coverage" to all seats in the audience using reliable amplifiers (Crown, Crest, QSC, Yamaha or equal) and full range, brand-name loudspeakers (EAW, EV, JBL, Meyer, Turbosound or equal).

The sound system should include a professional audio console. Crest, Midas, Ramsa, Soundcraft, Yamaha (or equivalent) is preferred.

Ensure that there is a CD player or iPod for walk-in and walk-out music (to be agreed upon with your event producer).

Determine your need for microphones, DI boxes, and backline support equipment depending on the requirements of the worship band.

Older video switchers, some switcher/scalers and large "broadcast" systems have a noticeable video delay. You can compensate for this by "inserting" an audio delay device (or using built-in delay features on a digital console). If a video sync problem is noticeable, this usually means that the video is playing at least 5 frames behind the audio (sometimes as many as 7 or 8). Each frame of video (the measure used by video engineers) is equivalent 33 milliseconds (the measure used by audio engineers). So a good starting point for noticeable delay is for your audio engineer to insert 160 or 170 milliseconds of delay to the video playback channels. This will be a SIGNIFICANTLY higher amount of delay than audio engineers would normally apply (in a situation where they're matching up speakers), but it's a good start for getting the video soundtrack in sync.



*The Behringer DSP-110 (above)
And the Rane AD-22 (below)
Are examples of affordable audio delay units that can be used to "slow down" the audio so that the speakers' lips are in sync.*

