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Stewart Firehawk Screen

he modern home-theater screen evolved around the prevailing technology of the past twenty years, the CRT projector. Consequently, screens were designed to complement the strengths and weaknesses of CRT. The traditional white screen with a gain of 1.3 perfectly suits CRT-with CRT's low light output of perhaps 230 ANSI lumens, 1.3 gain is the ideal tradeoff among high image brightness, "hot spotting" (where some areas of the picture are brighter than others), color uniformity (the evenness with which colors are reflected from screen edge to screen edge), and viewing angle. Similarly, CRT projectors don't have a problem producing deep blacks; consequently, the white screen and moderately high gain don't compromise contrast ratio or black level.

But the projector world has changed radically in the past few years, and screen technology is only now adapting to that change. Where we once had

CRT projectors with superb

black level and low light output, today's fixed-pixel projectors (DLP, D-ILA, and LCD) exhibit the opposite characteristics of relatively poor black level and high light output. It follows that we need a very different screen material for today's fixed-pixel displays.

Specsmanship and Contrast Ratio

Although high contrast ratio is vital to image quality, "specsmanship" can distort reality. Everyone knows that CRT projectors deliver the best image quality available today, although their light output is typically about 200–280 lumens. So why do some fixed-pixel projectors, with much superior light output of perhaps 1200–1500 lumens, end up looking washed out (i.e., far lower in contrast ratio) by comparison?

The answer lies in how the eye perceives contrast ratio. You can double an image's measurable contrast ratio either by doubling the intensity of white *or* by halving the intensity of black. On paper, both techniques yield identical improvements in contrast ratio (and identical specifications). But the image with blacks that are half as bright will look *vastly* better than the image with whites that are twice as bright, with far higher perceived contrast ratio, better depth, and a much more pleasing picture. CRT projectors have much deeper blacks because they can simply shut off the electron beam driving the phosphors, producing black that is truly black. That's why a CRT projector with one-seventh the light output of a DLP projector looks like it has a brighter picture and higher contrast ratio.



Enter the Gravhawk and Firehawk screen materials from Stewart Filmscreen. These new materials are grey (rather than white) for improved black-level performance and greater contrast ratio. You can choose between two gains in this gray material, 0.95 (Grayhawk) and 1.35 (Firehawk). Whereas the negative-gain Grayhawk trades off improved black level for slightly lower light output, the Firehawk seemingly gives you the best of both worlds-improved black levels with more light output from the 1.35 gain screen. Which gain is best for your application depends largely on screen size and your projector's light output (more on this later). For my home theater, I switched from a white screen (1.3 gain) to Firehawk, which was a good match for the light output of the Seleco HT300 (700 ANSI lumens) reviewed elsewhere in this issue. I also took the opportunity to increase the screen size from 84"



wide (16:9 aspect ratio) to 92" wide (also a 16:9 aspect ratio).

Before seeing the Firehawk in my theater room, I'd witnessed a side-byside comparison of white material on one half of a screen and Grayhawk on the other. Frankly, the Grayhawk made whites look murky and gave colors a darker cast. Yes, the blacks were much deeper on the Grayhawk, but the gray material seemed to dull whites and rob colors of their vibrancy when compared with the white screen. (In other projector demonstrations at the same trade show which used an entire Grayhawk screen, I saw no such tradeoffs, only greatly improved black levels.)

My initial reservation about gray screens disappeared about thirty seconds after installing the Firehawk. When viewed in my theater room, without a white reference nearby, whites from the Firehawk were just as bright, clean, and natural as I saw from my white screen. Apparently, the brain makes some compensation in the absence of a white reference.

In fact, switching to the Firehawk from a white screen (still with the Seleco projector) rendered one of the single biggest improvements that I've experienced in home theater since I started reviewing. Although the Seleco HT300 has, on its own, better black level and wider contrast ratio than other DLP projectors I've tried, projecting its image onto the Firehawk took its performance to another level entirely. The big difference was in the depth of black, which resulted in an image with greater contrast. You hear black level discussed as if it were just one of many other performance attributes, but I've come to the conclusion that it is perhaps the most important factor in achieving a great picture. Without deep blacks, the image lacks definition, depth, and punch. After switching to the Firehawk with its vastly better blacks, the sense of immersion in the film (or concert video) increased significantly. There was greater realism to the image, and thus to the characters, dialogue, settings, and narrative.

For example, the dark opening scene of *The Red Violin*, set in an

Eighteenth Century Italian violin workshop, revealed greater detail in the shop and the period clothing, drawing me into the atmosphere of the workplace and setting the stage for the rest of the film. The exquisitely beautiful cinematography of Barry Lyndon, from the painterly landscapes to the candle-lit interiors, was rendered with far greater expressiveness when projected on the Firehawk compared to a white screen. I also thought the Firehawk produced a slightly muted rendering of color that gave images a softer, more film-like quality, making it easier to forget I was watching video.

Firehawk also improved perceived contrast ratio when displaying images wider or narrower than the 16:9 screen (film with an aspect ratio of 2.35:1, and conventional 4:3 material, for examples). That's because the unused screen area surrounding the picture is darker than when using a white screen, which makes the image seem to have greater contrast. Ideally, a screen will employ various retractable masks to cover the unused screen areas, but this feature adds considerably to its price. With Firehawk, I felt much less of a need for motorized masking. With widescreen material, the surrounding screen material was much less apparent than with a white screen; the image seemed to hang in space rather that appear "on" the projection screen.

Another benefit of Firehawk is that it is much more tolerant of ambient light. Its gray material is less reflective, allowing it to hold an image better during bright scenes in which light from the projector is reflected by the room back onto the screen, reducing contrast, as well as in situations where light control is a problem.

There's absolutely no doubt that Firehawk is a significant improvement in screen material. But should you get Firehawk with its 1.35 gain, or Grayhawk with the lower .95 gain? There are three considerations in making that choice. The first two are related: screen size and the projector's light output. A lowish light output (700 lumens), coupled with a large screen (94" wide, 16:9 aspect ratio), suggest the 1.35-gain Firehawk is the better choice. Theaters with smaller screens, or those employing a projector with high light output (1000 or more lumens) will benefit from Grayhawk.

The third consideration is viewing angle. Firehawk has a viewing angle of 100 degrees, compared with the 160 degrees of Grayhawk. This means that as you move off-axis from screen center, image brightness will fall off sooner with Firehawk. If your room has seats far off axis from the screen center, go for the Grayhawk (provided the screen size and projector's light output are appropriate). You should know that because of its lower gain, Grayhawk also has less propensity for hot-spotting and skewed spectral response. Spectral response, also called "color uniformity," is the measure of how evenly a screen reflects certain colors. For example, poor color uniformity may cause the picture to have a slight blue cast on one side of the screen, and a red cast on the other. The higher the screen gain, the greater the propensity for poor color uniformity. I saw no such problems with the Firehawk, so if you don't need the wider viewing angle of Grayhawk, I'd opt for the Firehawk.

Finally, if you think you'll ever buy a CRT projector, don't get Firehawk or Grayhawk screens; they simply won't work with the low light output of CRT projectors.

If you own a DLP projector and a white screen, you're in for a pleasant surprise if you decide to upgrade to Firehawk. And if you're buying a DLP projector for the first time, there's no question that Firehawk is the screen of choice for high-end home theater.

MANUFACTURER INFORMATION STEWART FILMSCREEN 1161 West Sepulveda Blvd. Torrance, California 90502 (800) 762-4999 www.stewartfilm.com Price: Varies with configuration