grass valley

Viper FilmStream Camera System

Uncompromised Digital Cinematography

Grass Valley™ products from Thomson offer the industry's most comprehensive set of multi-format, high-quality solutions for acquisition, production, and post production. Our focus is on creating the most varied and flexible range of tools possible for digital cinema acquisition and production professionals.

We have a tradition of creating groundbreaking film-imaging technologies for directors, cinematographers, and post-production professionals. Today, whether you're shooting in digital or film, our broad line of products lets you work in the medium that perfectly suits your requirements.

To that end, our Viper FilmStream™ Camera System has no equal. While other manufacturers may claim to offer digital cinematography cameras, the Viper FilmStream camera is the only one designed from the ground up to capture every detail you need for brilliant, uncompromised, uncompressed output.

With three 9.2-million pixel Frame Transfer CCDs capturing 1920x1080 resolution, the Viper FilmStream camera system delivers an RGB 4:4:4 10-bit log output uncompromised by electronic camera signal processing. There is no color sub-sampling, color-space conversion, irreversible video manipulation, or compression. In short, nothing is done to the image: what the lens sees is what the camera delivers. Every pixel is there in full resolution.

The Viper FilmStream camera is part of the Grass Valley FilmStream workflow. This workflow also includes our Venom solid-state recorder. Both the camera and the recorder deliver their output directly into the post-production process for finishing.

True Digital Cinematography

The Viper FilmStream camera system gives you the freedom to create a look that matches your artistic vision—and the confidence that it will capture that vision faithfully and perfectly. Best of all, the camera delivers these capabilities without changing the way you work.

There is no need, for example, to delve into video processing menus to create a particular look, using settings which may limit your choices in post production. Simply set the aperture and focus as you would using a film camera and let the wide latitude of the Viper FilmStream camera capture all the details of the scene you've created, as you envisioned it.

key features

Viper Features

- 9.2 million pixel CCD sensor for each color channel

- Captures raw data directly from CCDs without video-style signal processing

- Unique 4:4:4 RGB dual link FilmStream output

- Native 16:9 or 2.37:1 aspect ratios without vertical resolution loss using Dynamic Pixel Management™ technology (HD-DPM)

- 12-bit linear A-D conversion, mapped to 10-bit logarithmic signals for downstream processing

- Patented Frame Transfer (FT) CCD technology

- Mechanical shutter guarantees no vertical smear

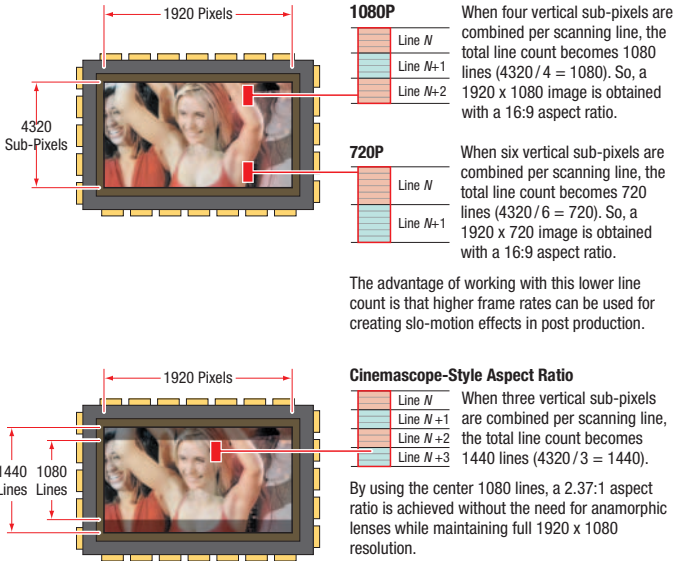- Electronic viewfinder focus assist tools: crawler and zoom

- Standard B4 lens mount for popular digital cinematography prime and zoom lenses

- Multiple format support:
  —1080p @ 23.98, 24, 25, and 29.97 frames per second (fps)
  —1080i @ 50 and 59.94 Hz
  —720p @ 23.98, 24, 25, 29.97, 50, and 59.94 fps

- Multiple field recording options:
  —Solid-state, on-camera Venom recorder for cable-free operation
  —High-capacity field recorder with exchangeable disk packs
  —Third-party field recording support

- Full range of third-party accessories, including extension viewfinder tubes, matte boxes, filters, color viewfinders, additional power taps, Steadicam low/high mounts, and more

Venom Features

- Solid-state recorder

- Dockable, compact, rugged design

- Portable, easy-to-mount

- Generous recording capacity
  —10 minutes in FilmStream mode
  —18 minutes in 4:2:2 HD mode

- Compatible with Grass Valley Viper FilmStream Digital Cinematography camera

- Compatible with Grass Valley LDK 6000 mk II WorldCam camera

- Standard Bluetooth interface

- Can output to a variety of third-party devices

THOMSON
images & beyond

Dynamic Pixel Management

By grouping the 4320 vertical sub-pixels on the CCDs to map to the desired line rate, you can acquire all popular video formats without compromising image quality.

1920 Pixels

4320 Sub-Pixels

1080P

Line *N*
Line *N*+1
Line *N*+2

When four vertical sub-pixels are combined per scanning line, the total line count becomes 1080 lines (4320 / 4 = 1080). So, a 1920 x 1080 image is obtained with a 16:9 aspect ratio.

720P

Line *N*
Line *N*+1

When six vertical sub-pixels are combined per scanning line, the total line count becomes 720 lines (4320 / 6 = 720). So, a 1920 x 720 image is obtained with a 16:9 aspect ratio.

The advantage of working with this lower line count is that higher frame rates can be used for creating slo-motion effects in post production.

1920 Pixels

1440 Lines   1080 Lines

Cinemascope-Style Aspect Ratio

Line *N*
Line *N* +1
Line *N* +2
Line *N* +3

When three vertical sub-pixels are combined per scanning line, the total line count becomes 1440 lines (4320 / 3 = 1440).

By using the center 1080 lines, a 2.37:1 aspect ratio is achieved without the need for anamorphic lenses while maintaining full 1920 x 1080 resolution.

That's because the output of the Viper FilmStream Camera is not processed in any way: it is recorded as a stream of data in each of the three primary colors. This approach ensures that every pixel is accurately rendered into the post-production process, giving colorists an uncompromised signal with which to work. There is no irreversible camera processing such as gamma, knee, contouring, white balance, or clipping. From this stream of digital data, using a workstation running software such as our Bones™ open post-production environment, a colorist has a full-resolution image with which to work.

Like a professional 35 mm film camera, you focus the Viper FilmStream camera by measuring the camera-to-object distance and setting the lens. The camera offers both a crawler tool and an instantaneous 2X electronic viewfinder zoom to provide a quick and easy confirmation of focus without affecting the picture at the main output.
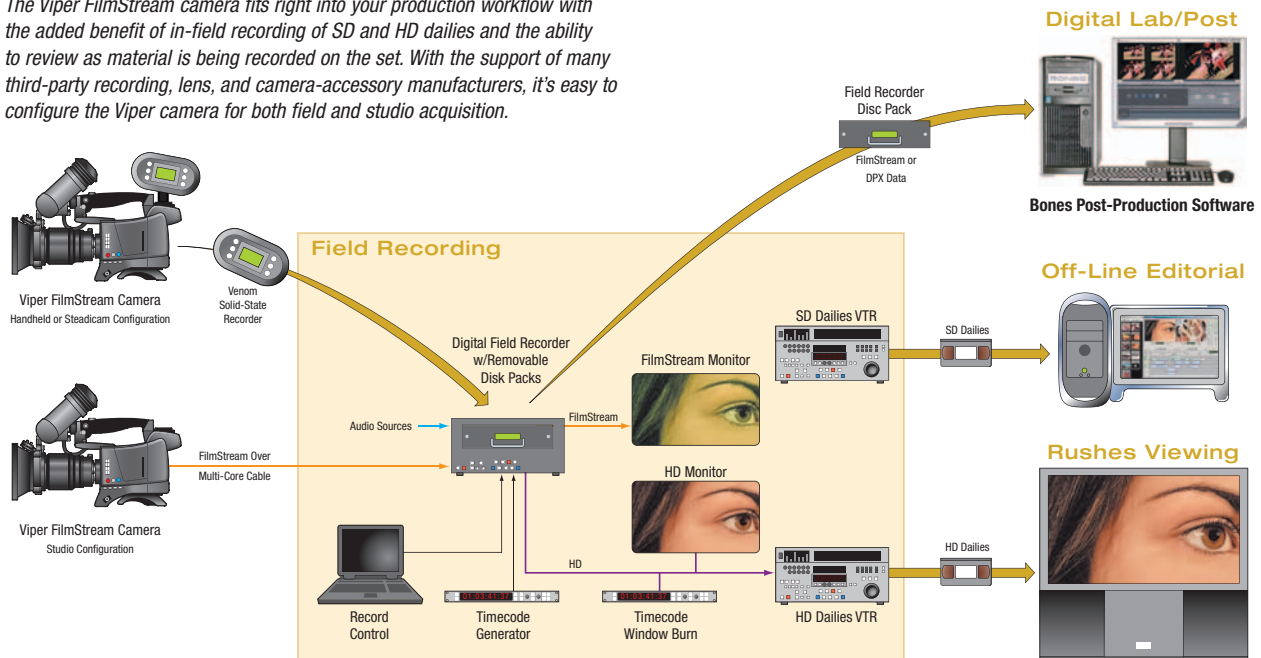
Providing a perfect complement for theatrical release motion pictures, the Viper FilmStream camera system supports the 2.37:1, Cinemascope-style aspect ratio without the need for anamorphic lenses. There is no need to crop the image and lose vertical resolution to get this aspect ratio. By using our unique HD-DPM sensor technology, the height of the individual pixel grouping can be changed, letting you switch the camera from 16:9 to 2.37:1, while maintaining full vertical resolution.

On the output side, the Viper FilmStream camera can record onto a field digital disk recorder. The camera supports a variety of third-party field-recording technologies. Removable disk packs are available in capacities up to more than an hour, providing far more recording time than a film magazine. This extended recording time makes for fewer reloads that interrupt the flow of shooting and make special-purpose shoots—such as those in helicopters or underwater—far more practical and efficient. For hand-held or tight shots, the compact and lightweight Viper FilmStream camera supports the Venom solid-state Flash RAM recorder which clips onto the back of the camera for cable-free shooting.

In other words, with its small size and weight and its flexible recording modes, you can take a Viper FilmStream camera anywhere.

The Viper FilmStream Workflow

The Viper FilmStream camera fits right into your production workflow with the added benefit of in-field recording of SD and HD dailies and the ability to review as material is being recorded on the set. With the support of many third-party recording, lens, and camera-accessory manufacturers, it's easy to configure the Viper camera for both field and studio acquisition.

Digital Lab/Post

Field Recorder Disc Pack

FilmStream or DPX Data

Bones Post-Production Software

Viper FilmStream Camera
Handheld or Steadicam Configuration

Venom Solid-State Recorder

Field Recording

Viper FilmStream Camera
Studio Configuration

FilmStream Over Multi-Core Cable

Digital Field Recorder w/Removable Disk Packs

Audio Sources

FilmStream

FilmStream Monitor

HD Monitor

SD Dailies VTR

SD Dailies

Off-Line Editorial

HD

Record Control

Timecode Generator

Timecode Window Burn

HD Dailies VTR

HD Dailies

Rushes Viewing

Viper FilmStream Workflow

If you're used to shooting 16 mm or 35 mm film, your on-set workflow remains the same with a Viper FilmStream camera. That's because it's as convenient to set up as a film camera. And because it delivers uncompromised, wide-latitude output to post production, it has no equal in digital cinematography. It intercuts very well with 16 mm and 35 mm film, allowing you to get the shot the way you want in the medium most effective for your vision.

On set with the Viper FilmStream camera, a cinematographer uses his or her experience and skill to create the look as envisioned for that production. The camera captures that look: digitally and completely. The filmmakers can then look at its output—either instantly with an on-set monitor or via digital dailies—to ensure that every shot meets their exacting standards.

This scenario is far different from workflows based around high-definition (HD) HD cameras for digital cinematography. The biggest difference is that the RGB 4:4:4 10-bit log output of the Viper FilmStream camera is untouched by any video signal processing. By capturing exactly what the camera sees there is no risk of making irreparable changes to image quality that can tie a filmmaker's hands downstream. Work on set is also faster using a Viper FilmStream camera because it eliminates the interruptions and delays caused by engineers needing to make adjustments to an HD camera's video processing.

As in traditional film post production, the director and cinematographer have the chance to adjust the color balance of the Viper FilmStream camera's output in a timing session, but with instant and precise results: there is no waiting for answer prints to be struck. And with digital intermediate production becoming increasingly common, the Viper FilmStream camera system delivers right into the heart of the process, bypassing negative processing and film scanning.

Operational Modes

The Viper FilmStream camera can be operated in four different modes: a FilmStream 4:4:4 log output, which offers uncompressed, uncompromised, unprocessed output; a 4:4:4 RGB video output that adds video processing to create a full-bandwidth, full-resolution camera with color balance, colorimetry, gamma, highlight handling, and detail enhancement at the camera; an HDStream mode, which still benefits from the wide-latitude image capture, but provides an output as 4:2:2 HD, which is very similar to the FilmStream output, but with color balancing to true 3200° or 5600°; and a YUV mode, which offers superior image quality for fully processed HD productions.

In FilmStream mode, because there is no video signal processing, the output on a monitor appears flat and with a pronounced green cast. To view this output on set, the camera includes digital HD and analog standard-definition monitoring outputs. You can color correct these outputs using the color temperature switch on the camera, thus creating an appealing HD-image for the untrained eye. This correction has absolutely no effect on the FilmStream output, which remains unprocessed and uncompromised.

Viper Specifications

FilmStream Camera Head	VIPER – Model No. LDK 7500			
General				
Power	DC 12V; 44W incl. 2" viewfinder & FilmStream/HD Compact adapter			
Temperature range	Operating: -20°C to 40°C (-4°F to 104°F); Storage: -20°C to 60°C (-4°F to 140°F)			
Weight	4.3 kg (9.6 lbs.) incl. 2" viewfinder and FilmStream/CompactHD adapter			
Dimensions	214 (H) x 125 (W) x 241 mm (L) with FilmStream/CompactHD adapter			
Camera				
Optical system	F1.4 prism			
Optical filter wheels	2x motorized wheels			
Optical filters on first wheel	Clear, 1/4 ND, 1/16 ND, 1/64 ND			
Optical filters on second wheel	Clear, four-point star, six-point star, soft focus			
Pickup device	3 x 2/3" 16:9 HD-DPM+ CCDs			
Picture elements	9.2 million pixels 1920 (H) x 4320 (V) effective			
Smear	No vertical smear			
Digital quantization	12-bit A/D			
S/N ratio in Y signal	54 dB typical (video mode, 1080i/59.94)			
Shutter	Variable shutter 90° to 310°; electronic exposure down to 1/200s			
Mode	**HD Video – YCrCb**	**HD Video – RGB**	**HD Stream**	**FilmStream**
Video outputs	Single HD SDI	Dual HD SDI	Single HD SDI	Dual HD SDI
Video sampling	4:2:2	4:4:4	4:2:2 10-bit log	4:4:4 10-bit log
Video processing	Full video processing >22 bits	Full video processing >22 bits	Limited processing (white balance only)	Not active
Color balance for video outputs	3200K, 4700K, 5600K, 7200K, auto white	3200K, 4700K, 5600K, 7200K, auto white	3200K, 5600K, native (no correction)	No correction
Color balance for viewing channel	3200K, 4700K, 5600K, 7200K, auto white	3200K, 4700K, 5600K, 7200K, auto white	3200K,5600K, native	3200K, 4700K, 5600K, 7200K, native
Aspect ratio	16:9 and 2.37:1	16:9 and 2.37:1	16:9 and 2.37:1	16:9 and 2.37:1
Sensitivity	2000 lux (186 ft. cd) at F9.0 (typical, 1080p24 video mode)	2000 lux (186 ft. cd) at F9.0 (typical, 1080p24 video mode)	Effective ASA 320 in 16:9 and ASA 400 in 2.37:1	Effective ASA 320 in 16:9 and ASA 400 in 2.37:1
Gain	-3 dB to 12 dB in 3 dB steps	-3 dB to 12 dB in 3 dB steps	-6 dB to +12 dB in 6 dB steps in the viewing channel	-6 dB to +12 dB in 6 dB steps in the viewing channel
Temporal Frequencies				
720p (with 2:3 frame repeat to give 50/59.94 Hz)	23.98 fps			
720p (with 2x frame repeat to give 50/59.94 Hz)	25/29.97 fps			
720p	50/59.94 fps			
1080p (with 3:2 pull down to give 1080i 59.94 Hz)	23.98 fps			
1080p (segmented frame output)	23.98/24/25/29.97 fps			
1080i	50/59.94 Hz			
Camera Connectors				
Front microphone input	XLR-3 female, balanced +48V selectable			
Lens connector	12-pin			
Control input	9-pin RS-232C compatible			
Viewfinder connector	20-pin			
Supplied accessories	Operator's manual			

Viper Specifications (cont.)

Options	
2" HD viewfinder	**Model No. LDK 5302**
Display	HD B/W CRT
Resolution	>600 TV lines (center)
FilmStream/CompactHD adapter	**Model No. LDK 5490**
Multi-core connector	23 + 3 pole-record start, return video (SD) in, genlock, DC in, camera control, tally, viewing out, audio out, HD-SDI out, dual link HD SDI out
Dual-link HD-SDI	2 x BNC, SMPTE 372M, 0.8 Vp-p, 1.5 Gb/s, 75Ω (FilmStream or 10-bit 4:4:4 RGB)
HD-SDI out	1 x BNC, SMPTE 292M, 0.8 Vp-p, 1.5 Gb/s, 75Ω
CVBS out	1x BNC. 1.0 Vp-p, 75Ω, NTSC or PAL viewing quality only
Viewfinder out	1x BNC, Y component of viewfinder or external, 1.0 Vp-p, 75Ω
DC 12V in	XLR-4 male
DC 12V out	4-pin Fischer, 12V 1.5A
LCP connector	12p Hirose for dedicated local control panel
Tripod adapter plate	**Model No. LDK 5031/10**
Multi-core HD cable	**Model No. LDK 8175**
	LDK 8175/01	Full function, 10 meter
	LDK 8175/04	Full function, 40 meter
	LDK 8175/11	Standard, 10 meter
	LDK 8175/14	Standard, 10 meter
HD multi-core breakout box	**Model LDK 8275/01**
DC 12V in	XLR-4 male (active via Select power switch 12/24V)
DC 24V in	2-pin Fischer (active via Select power switch 12/24V)
HD-SDI (A-channel) out	2 x BNC, Dual Link SMPTE 372M or Single Link SMPTE 292M; 0.8 Vp-p, 1.5 Gb/s, 75Ω
HD-SDI (B-channel) out	2 x BNC, Dual Link SMPTE 372M or Single Link SMPTE 292M; 0.8 Vp-p, 1.5 Gb/s, 75Ω
Viewing HD-SDI out	2 x BNC, SMPTE 292M, 0.8 Vp-p, 1.5 Gb/s, 75Ω
CVBS out	1x BNC. 1.0 Vp-p, 75Ω, NTSC or PAL viewing quality only
Audio out	1 x XLR3, -24 dBu to -64 dBu (sensitivity control in camera)
Playback input	1x BNC. 1.0 Vp-p, 75Ω, NTSC or PAL
Sync input	1 x BNC, HD Tri-level sync, 0.6 Vp-p, 75Ω
Control	1 x 9p sub D for VTR start/stop; control

Venom FlashPack

The latest addition to the FilmStream workflow lineup is the Venom FlashPak, a dockable solid-state recorder that extends the capabilities of our Viper FilmStream camera and LDK 6000 mk II WorldCam multi-format HD camera.

Compact, Dockable, Lightweight Recorder

The easy-to-mount Venom FlashPak recorder is a complete, portable solution for both digital cinematography and high-quality HD content origination. As a solid-state recorder it has no moving parts, making it durable and rugged for production work.

The recorder captures the uncompressed output of the Viper FilmStream camera. When shooting with the camera in FilmStream mode—the highest standard for digital cinematography—each Venom FlashPak recorder has a 10-minute capacity; shooting in the camera's 4:2:2 HD mode extends this capacity to 18 minutes.

Directors using the Viper FilmStream camera can also use multiple Venom FlashPak modules to speed their on-set workflows. A typical set would use three modules: one for the shoot, one replacement, and one for writing to a transport medium for delivery to a post house.

The Venom FlashPak system also supports the Grass Valley LDK 6000 mk II WorldCam camera, the market-leading camera for HD production. Its 18-minute HD capacity makes it an ideal

camcorder for field productions shot with the LDK 6000 mk II WorldCam, including episodic and dramatic television series and commercials.

The dockable Venom FlashPak can output to a range of devices. Equipped with a Bluetooth interface, it also allows a production assistant to wirelessly create and edit metadata which is recorded and permanently associated with the content. This is an elegant replacement for the conventional paper notes associated with film shoots, which can all too easily become separated from the content to which they refer.

Ordering Information

Please contact your authorized Grass Valley representative.

Support Services & Training

The Grass Valley Support Services & Training team delivers complete service solutions that enhance your return on Grass Valley products and global systems solutions. Advanced training and proactive support, by reducing down time, keeps your equipment and staff performing at optimum productivity and quality.

Our pre-packaged suite of SupportPRO Services provides support though the whole process:

- StartPRO Commissioning Support
- Factory, On-Site and Web Training Classes
- TechPRO On-Site and Comprehensive Software and Hardware Support
- ServicePRO Comprehensive Software and Hardware Support
- PartsPRO Advanced Exchange Hardware Support
- Critical Spares Kits for Most Products

For specific requests, our worldwide experienced Support Services & Training experts can build and assist you with customized solutions.

For more information contact your authorized Grass Valley representative or visit us online at www.thomsongrassvalley.com/support.

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