



GOLDEN EYE
FILM SCANNER

RESTORATION | ARCHIVE | DI

Overview

Developed over 20 years ago for automotive testing and air defence reconnaissance, the Golden Eye has matured into the leading film scanner for DI, restoration and archive. With high quality LED light source the Golden Eye Scanner heralds a new era of unparalleled image quality film scanning previously unavailable at this price point.

The Golden Eye is a high speed and high-resolution film scanner for motion picture film. The high performance and flexibility makes the scanner the perfect tool for DI, restoration and preservation.

All in One - Several Applications, Flexibility & Cost-Efficiency

DI & Restoration

Golden Eye can perform high res scans for DI or restoration, as well as real-time Digital Dailies.

Clip lists can be loaded into Golden Eye, which executes the clip list as 2K or 4K scans, which is immediately accessible for any grading suite as 10 bit Log DPX or other formats.

Preservation

High speed: Up to 15 fps in 2K and 4 fps in 4K, Golden Eye is one of the most cost-efficient, high-quality film scanners for preservation available.

Immediate primary grading can be carried out on the system before scanning, using the colour management controls and operator panel. Video SDI/HD output is available as colour reference.

8mm, 16mm, 35mm or 70mm* film can be scanned into SD, HD, 2K, 4K or custom size.

Non-contact gate, capstan drive with continuous movement of the film and optical registration, results in minimum wear of fragile film and its perforations.

The overall scanner design means Golden Eye is able to handle film in almost any condition. Film that is heavily shrunk, warped or has damaged perforations is scanned without any problems.

* GEII platform with halogen light source only



Features

Multi-File format output into most common file formats on the market, including DPX, Quicktime, MPEG, multiple TIFF and AVI. New formats are added continuously. If you require a special format, we will implement it.

Different film types and format processing is handled by easy configurations in the Golden Eye user interface. Running colour or B/W, positive or negative film, 2, 3, 4 or 6 perforations are just some of the available possibilities.

LED light source means superb image quality, long lifetime and absolute tuning of illumination for different film-bases.

Clip lists can be imported into the system and be used for batch recording based on keycode, timecode or frame number. An example is automatic scan from EDL clip list.

Image caching with preview will enhance and speed any workflow. Use the cached frames for finding and detecting punch hole and scene changes or for primary grading of clips before a batch recording. Using the cache to navigate on the film will also minimise the wear of the film in the scanner.

Image overlays of TC, decoded KK and frame counter, dynamically per frame, and/or additional custom information. This makes the Golden Eye the Digital Telecine.

The colour management within the Golden Eye software offers a basic set of tools for image enhancement including total colour balance control in lowlights, midtones and highlights.

Tangent wave panel integration enables easy and quick access to the Golden Eye colour management, which makes up for simple primary grading directly before scanning.

Video SDI/HD Output from the scanner enables preview on a reference video monitor for professional image quality judgements and primary grading.

Keycode is automatically read and handled by the Golden Eye software package. No need for complicated (and expensive) mechanical solutions that introduce operational failures and demand a continuous maintenance program.

Optical analogue sound tracks can be decoded and transferred into WAV files. The decoding is made using image processing, which means that the decoding can be done at any speed. As the decoding is done in parallel with the image acquisition there is no problem with synchronisation of the sound to the image sequence.

Auto Map automatically prepares reels before restoration, creating a digital map of the whole reel. Specifically aimed at Broadcast film archives with large reel volumes of unknown or mixed content, this powerful feature is a great time- saving device in any scanning workflow.

No manual setup or navigation on the film is required. Auto Map will create pre-scan setup of all parameters needed - detect Punch Hole frame and sync to Time Code, identify scene changes and film splices, create an EDL, set RGB exposures and adapt to the correct filmbase and density. The auto set parameters are directly applied on cached images for easy overview and feedback before the scan is performed.

Products & Configurations

The Golden Eye film scanner is available in two products. Golden Eye III and Golden Eye Archiver. Customised combinations are available to you through these options.

Golden Eye III

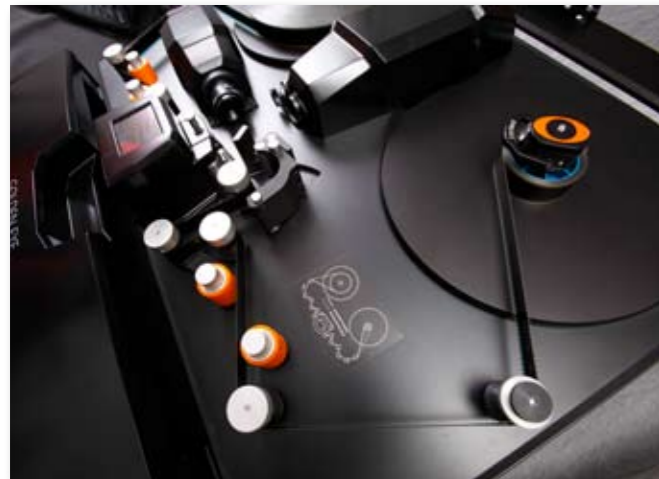
The Golden Eye III is the high-end solution for any DI or preservation workflow.

- LED light source for high image quality
- Multiple film formats included for 2K: Regular 16, Super 16, Regular 35 and Super 35 mm
- New design that meets the future of film scanning
- Quick change optics enables swap optics in seconds instead of minutes
- Adjustable focus on optics
- Fibrechannel interface
- Batch recording from clip lists including image cache with preview
- Output to multiple image formats
- KK reader
- Optical sound decoding
- Project management
- Colour management

Golden Eye Archiver

The Golden Eye Archiver is the cost effective high quality film scanner for the limited budget.

- Halogen light source
- GEII design
- One single film format for 2K
- Basic GE Control SW
- Video SDI/HD output
- Tangent wave panel integration including panel



Products & Options Overview

| Hardware | GE Archiver | GE III |
|--|-------------------|--------------------------------------|
| Halogen light source | ✓ | ✗ |
| LED light source | * | ✓ |
| 2K resolution | 2k standard | 2k standard |
| 4K resolution | * | * |
| Film formats | 1 format standard | 16 / S16, 35 / S35 in standard price |
| Quick change mounting for optics | ✗ | ✓ |
| Adjustable focus | ✗ | ✓ |
| Operator touch display (on scanner) | * | ✓ |
| Fibrechannel interface | * | ✓ |
| Tangent wave panel integration including panel | ✓ | * |
| SDI / HD output for viewing | ✓ | * |

| Software | GE Archiver | GE III |
|--|-------------|--------|
| Golden Eye basic control software | ✓ | ✓ |
| Image cache with preview | ✓ | ✓ |
| Batch recording including: | | |
| - EDL handling | * | ✓ |
| - Project management (attributes) | * | ✓ |
| Colour management package: | | |
| - Vectorscope and histogram | * | ✓ |
| - Multiple film bases preloaded | * | ✓ |
| - Auto Dmin and Dmax | * | ✓ |
| Multiple file formats: Quick time, AVI, Multiple TIFF, etc. | * | ✓ |
| File recorder converter | * | ✓ |
| High speed scanning in down sampled mode: real-time or faster, available speed depends on file and film format | * | ✓ |
| Key code reader | * | ✓ |
| New splice functionality | * | ✓ |
| Sound option | * | ✓ |
| Auto Map | * | ✓ |

Key: ✓ Included as standard in product * Optional extra ✗ Not Available



Physical Layout

The Golden Eye Film Scanner is a compact and portable unit, which makes it very easy to move. The scanner can be transported to the film archive to avoid moving classified and sensitive film and also to avoid complex transfers of large image sequences.

The main structural part of the scanner is the deck. Optics and cameras are mounted on top while the mechanical and electronic parts such as lighting, motors etc., are mounted at the back.

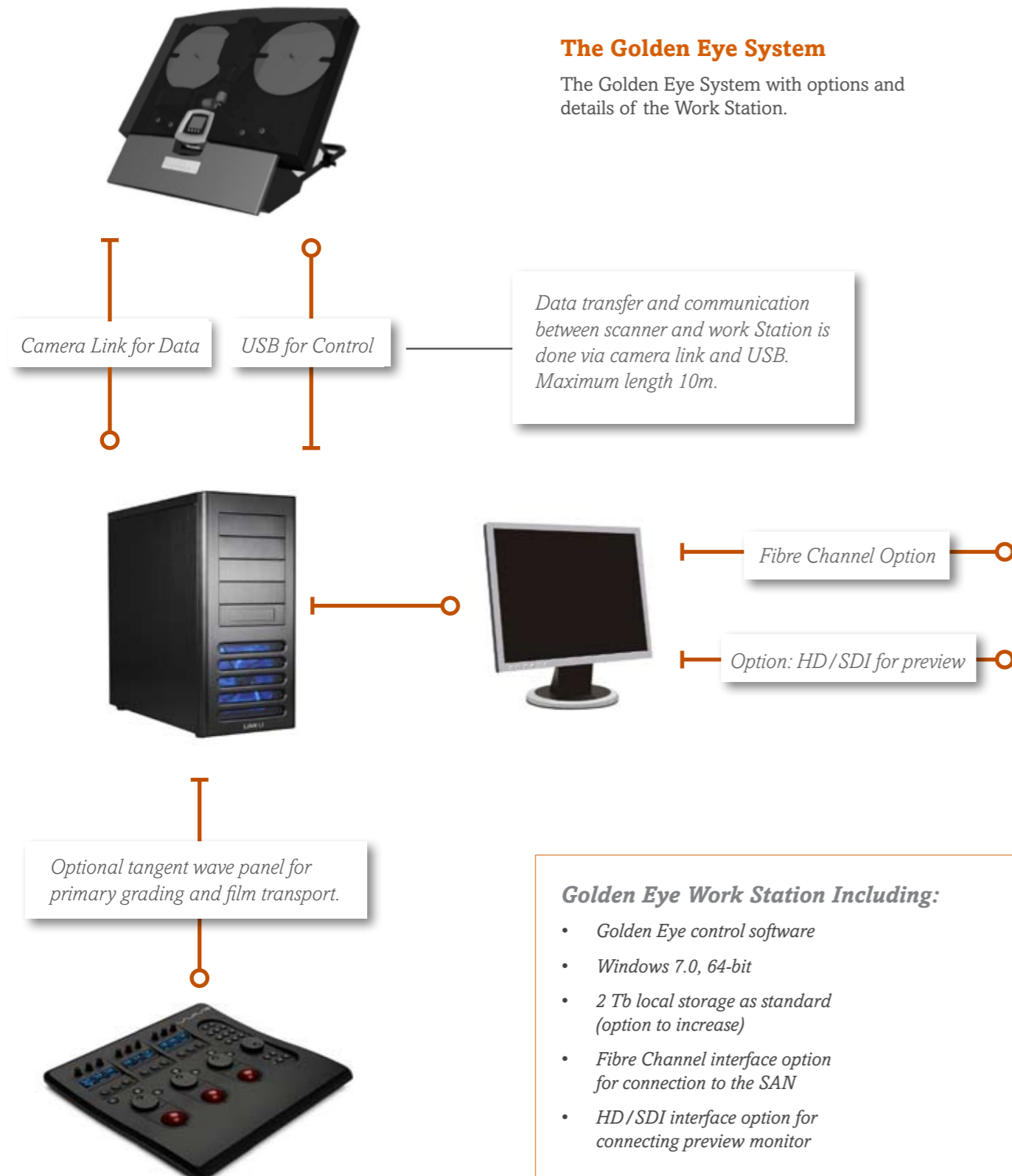
The scanner rests upon a stable adjustable gantry. This gantry can be folded below the scanner for transportation. The complete unit can be put in a vertical position to enhance service.

The most basic operating functions can be controlled via a small interface on the scanner, without software assistance; opening and closing the gate, winding of film etc. This is useful when the scanner is placed away from the Golden Eye Work Station.

A top mounted operator display presents various scanner diagnostics and status during operation.

The Golden Eye Solution

The Golden Eye system consists of Film Scanner, Work Station and Golden Eye control software, controlled by a standard Windows-based work station.



The Film Scanner

The Golden Eye Film Scanner is a line scanner. The film is transported past the camera at constant speed, using a Capstan, with an illumination source backlighting the film.

The main image camera in the scanner is equipped with a triple CCD line sensor with 12 bit/colour in dynamic range, one sensor per RGB colour. The colours are separated with an optical prism, which makes the different sensors perfectly aligned without need for interpolation. 2K and/or 4K sensor resolutions are available. To obtain the best image quality, high quality apochromatic camera lenses are used.

From the Golden Eye control software, the exposure times in the sensor are fine-tuned in order to achieve the best image quality and to compensate for possible variations of the LED illumination across the film. The required calibration is done fully automatically.

Film Transport with Optical Registration

Two Cameras for optimal performance

To optimise performance, two cameras are used. The main camera captures the film's active area, while an additional synchronisation camera is used for optical frame registration and control of film transport speed and stability.

As an option, the additional camera can also be used for decoding keycode and optical soundtrack.

Constant Speed for highest stability

The Golden Eye Film Scanner transports the film with continuous motion.

Because of the Capstan drive and the use of optical registration, the perforation holes of the film are never used to transport the film. In this way wear and tear of the film and the perforations are avoided, which makes the system suitable for archive applications.

The constant speed of the film is obtained using a continuous feedback loop: optical readings of the film perforation positions are sent from the synchronisation camera to the control unit in the scanner. This analyses the speed of the film based on the positions of the film perforations. After analysis, speed corrections are sent to the speed servo, which controls the movement of the Capstan.

This setup provides an even speed of the film through the scanner, which is essential for the high image quality produced by the Golden Eye Film Scanner.

Unique splice handling

The use of optical registration enables detecting and adjustment for bad perforations and splices during scanning. Using image processing, Golden Eye determines that a splice has been scanned and makes speed adjustments accordingly.

The unique Golden Eye splice handling measures the offset in position of the perforation following the splice and adjusts the position of the frame during registration.

This means that hardly any movement of the frame following the splice is noticed.



Optical registration by secondary camera



Constant Speed for highest stability

Illumination

There are two options of illumination in Golden Eye. LED or Halogen.

The LED light source makes up for high image quality. It consists of a cluster of LEDs that are colour balanced to obtain a strong light tuned for different film stock.

For both light sources, the light is led into a fibre optics cable that distributes the light to the film gate. Line illumination through optical fibre provides an even and smooth illumination across the frames.

The light source itself has been placed below the deck to reduce the risk of heat close to the film. Also, should the film movement stop, the light exposing the film will be shut off automatically.

Although the optical fibre and diffuser makes an even light there are still some variations of the light level across the film. The shading correction adjusts this light level. The Golden Eye control software uses a shading correction algorithm with separate coefficients for each pixel. This method corrects any shading from the light source as well as PRNU, fix pattern noise and nonlinearities in the camera.

Input & Output Formats and Types

Input

Film Formats:

- 35, 16, 8, 70*mm
- Any number of perforations
- Prepared for new film formats

Film Types:

- Colour print / negative
- B/W print / negative
- Intermediate

* 70mm GEII platform with halogen light source only

Input & Output

Input - Film Formats

The scanner handles film with perforations on one or both sides. colour print, colour negative, B/W print, B/W negative and intermediate film are handled.

The Line Scan Principle with continuous motion allows handling of any length film frame, (1-8 perforations per frame) without changing mechanical configuration. Even special formats, such as Cordin, where film is treated as one very long single image, can be handled.

The Golden Eye uses different pre-calibrated optics set-ups for each film format, which allows the scanner to have full resolution of the active area of the image for different film types. The optics set-ups can easily be changed within minutes.

Output - File Formats

Golden Eye supports the most commonly used file formats available in the DI and Restoration market today, multiple file as well as single-file formats. The scanning is made directly to the chosen file format.

A secondary output is available. This means high resolution DPX and Quicktime for preview can be output at the same time. There is no need for multiple transfer of sensitive film.



Output

Formats:

- DPX (8, 10, 16 bit log or linear)
- Multiple Tiff
- (Optional compression)
- Quicktime - uncompressed or PCinstalled codecs (16-bit QT, DNxHD for AVID, H.264 and more)
- MPEG, AVI, WMV
- Other formats on request

Golden Eye Control Software

The Golden Eye basic control software offers all necessary functionality for scanning control as well as providing all settings for the image before scanning to disk. From here the user is in charge of all actions that are taken before, during and after scanning.

Input/Output Control

From the Control software's user interface, the operator has full control of the content to be scanned and output.

Input Image Ratio - Full frame, predefined image ratios; 2K, HD, SD or any other custom format.

Output Format - Any selected image ratio can be output to any of the supported image file formats, to other ratio if desired (Cinescope frames can be stretched to full format etc.). The basic control software package includes scanning into 10 bit DPX logarithmic and linear.

Before scanning to disk, preview backwards or forwards can be done at variable speed. Fast wind with preview image in both directions to a predefined image or until commanding halt is possible.

The software includes functions to keep track of image numbers, timecode and keycode (optional). This makes it very easy to jump to a certain image or to perform image enhancement on a certain image sequence.

Session Control

All settings in a project can be stored away as sessions to be opened later. The Golden Eye control software can be opened directly into a stored session by clicking on a file icon in windows

Image Cache with Preview

To speed up any workflow, DI or restoration, Golden Eye can cache images during overview with the image cache option.

The cached images can be used for detecting punch hole and scene changes and there is with no need to navigate on the film.. This is fine for fragile film, as there is no need to skip back and forth on the film.

The cached images can be used for thumbnails in the optional EDL interface. Each clip can be easily identified using the thumbnail as the first image in each clip. Clips can also be reviewed from the cache instead of running the film through the scanner.

Primary grading can also be done on the cached images. The grading can then be stored together with the clip and applied on the images when the EDL is executed on the scanner.

Quick, simple and very gentle handling of any film.

Colour Management

Logarithmic colour management with up-to-date colour negative film base compensation and automatic Exposure and Dmin correction. Dmax correction is also possible, especially suitable for scanning prints.

Image correction is a step-by-step process, starting with gain/exposure setting in the camera followed by shading correction, Log calibration and finally linear calibration. The Golden Eye control software handles all these steps automatically.

The result from each step can be output as images. For instance: Raw sensor data, neutral log for grading, basic linear or customer pre-graded for previews.

Additional user colour customisation can be added on top of general colour management.

The available tools offer total control of colour balance in shadows, midtones and highlights. The optional wave panel integration speeds up the process.

Golden Eye Options

There are various options available with Golden Eye, allowing you to create customised combinations to meet your needs.

Image Overlays

Golden Eye can add text and metadata overlays to the images. Examples of data are:

- TC (updated per frame)
- Decoded KK (updated per frame)
- Frame counter (updated per frame)
- Settable attributes (like operator, date, time, scanner, project, customer etc.)
- Custom text
- Images, logos etc.

Advanced Colour Management

The advanced colour management option includes an extended set of film base corrections for Kodak and Fujifilm to complete the generic small standard set. The option also has automatic exposure control, auto Dmin/Dmax settings and RGB vectorscope and histogram colour adjustment tools.

Batch Recordings

Golden Eye can import and read EDL clip list files. Batch recording of selected clips on a roll can be captured from instructions in such file. The software can load one or multiple EDL files.

Through the interface, the user generates the required clip list from the available EDLs, rolls and clips that are displayed in the user interface. Custom settings of colour management, recording window, output formats and more can be set separately for each clip.

The batch recording is selected automatically in order according to the clip list or in order of physical appearance on the reel.

The image cache preview and thumbnails are available in the EDL setup.

Auto Map

Golden Eye film scanner's new Auto Map option enables fast, effortless and completely automatic setup for restoration material. The Auto Map option means there's no more manual work, other than loading.

It is specifically aimed at restoration of Broadcast film archives that have large volumes of reels with mixed content of prints and other, making this a great time-saving option. The function makes a digital map of the reel before the scan.

It automatically:

- Identifies scene changes and film splices and creates an EDL based on the reel's content.
- Makes an on-the-fly framewise analysis and finds the best exposures for the scan.
- Detects if the film is print or intermediate.
- Detects and sets the correct film density for film negatives.
- Assigns the correct film base correction for film negatives, based on decoded Key Code.
- Detects and sets the correct levels for positive prints.

The procedure is done as one initial fast film prescan from start to end of the reel. When the Auto mapping is done, the created EDL can be batch scanned in high resolution into one sequence per clip, with all above parameters correctly set for each and every frame.

Project Management

The Project management in Golden Eye enables effortless and streamlined system of dynamic file naming and output directories. The setup is totally flexible to fit any workflow and standard.

Preset strings for e.g. date, time, operator and other can be combined with customized keywords (e.g. Reel, Project, Customer or other). Those key attributes can then be used for smart file naming and/or output folders structure. Indexing of files can use Time Code, decoded Key Codes or plain counter. The same key words and frame indexing can also be used and found in the image overlays option.

Keycode Decoding

As an option, the input from the synchronisation camera can be used for decoding keycodes. The decoded information is put together with the scanned images. As a result, the Golden Eye Film Scanner fits into any keycode workflow

Optical Sound Decoding

The input from the synchronisation camera can be used for decoding optical sound, stereo or mono. Golden Eye uses image processing for the decoding which allows automatic adjustment for different density in old film base and automatic dust correction.

The soundtrack is automatically detected and the decoding algorithm follows the soundtracks through the scanning. This means that old shrunken film will be handled without problem. The decoding can be done at any scanning speed up to real-time which allows slow scanning of old sensitive film.

As the decoding is carried out at the same time as the image recording there are no synchronisation problems. The decoded sound is scanned into a WAV file and saved together with the scanned image files.

This is the perfect tool for easy publishing of archive material for the web or other media.

Archive Scanning Extension

The overall design of the Golden Eye Film Scanner is a perfect fit for archive scans in general. A set of options are available to enable the system to handle film in almost any condition including extreme warping or shrinkage. These are a full-support gate and a non-sprocket rubberised index wheel

Golden Eye File Converter

With the help of the add-on program Golden Eye File Converter, scanned material on disk can be converted to many other formats, codecs or compressions.

The File Converter includes the same colour management tools as in Golden Eye control software: RGB-waveform, vector scope and histogram, which means that the File Converter can be used for generating previews such as Quicktime out of high resolution DPX scans. There is no need for re-scanning old sensitive films.

The Golden Eye File Converter can be installed on any Windows-based computer. A free multiple license version of the Golden Eye File Converter comes with the purchase of the Golden Eye Film Scanner.

Image Cache with Preview (see page 10)

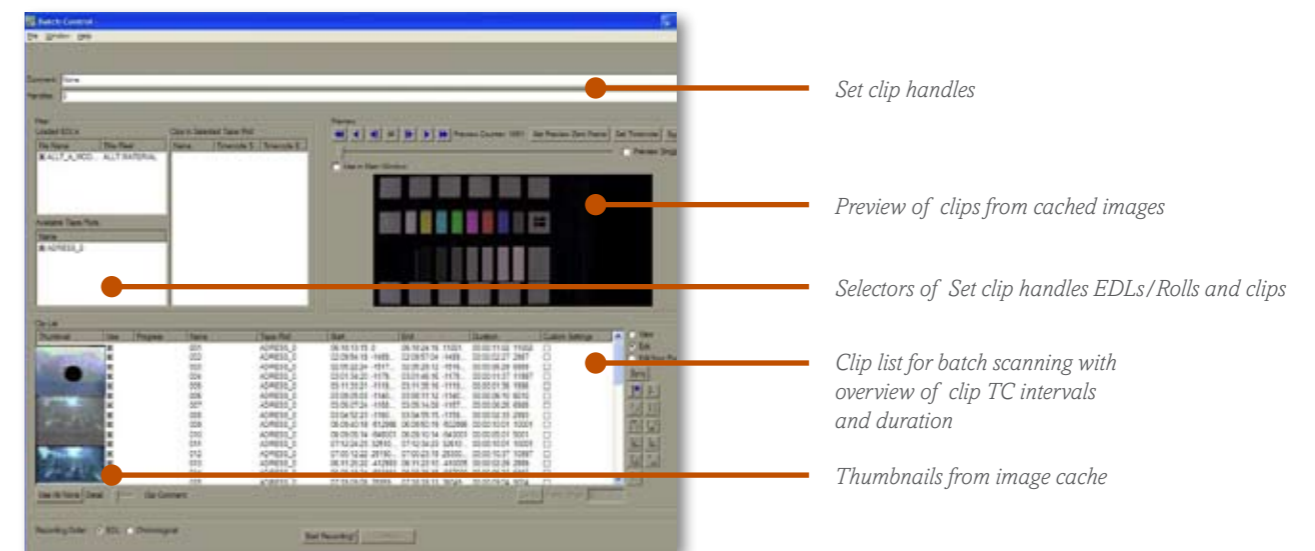
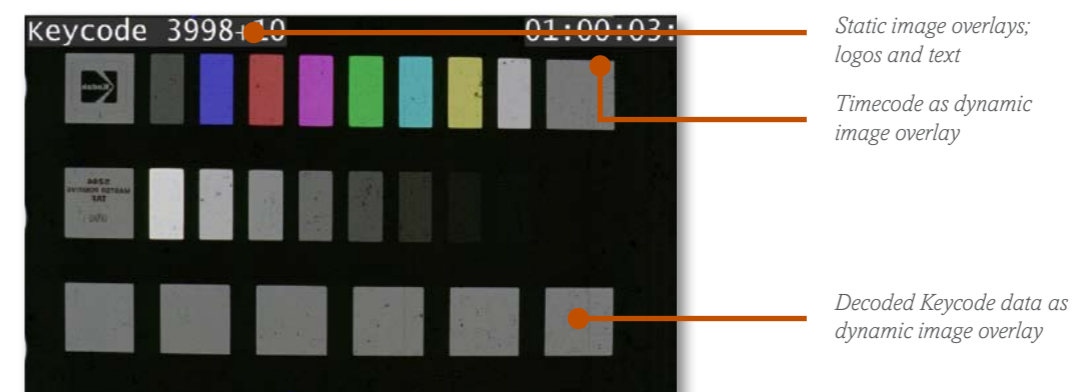


Image Overlays (see page 11)



Technical Specifications

Applications

- Restoration of old shrunken film in SD, HD, 2K or 4K resolution
- High-resolution scanning for DI grading
- Real-time scanning into digital dailies or web/DVD distribution

Sensor

- 2K or 4k sensor
- 2K sensor size 2048 pixels, pixel size 14x14 um
- 4K sensor size 4096 pixels, pixel size 10x10 um
- True RGB: One sensor per colour
- Bit depth: 12 bits per colour

Illumination

- RGB LED light source speeds
- Up to 15 fps in full 2K resolution
- Up to 4 fps in full 4K resolution
- Real-time scanning in automatic down

Sampling Mode

- Overview speed up to 65 fps
- Variable winding speed up to 4 m/s (200 fps)

Film Types

- Colour print and negative
- B/W print and negative
- Intermediate

Mechanics

- Maximum reel size 2000 feet
- Gentle film transport with continuous movement
- Film gate options: Non-Con
- Scanner dimensions (mm): 1000 x 800 x 400
- Portable device: ~ 90 kg

Film Formats

- 8mm (Regular and Super)
- 16mm (Regular and Super)
- 35mm (Academy and Super)
- 70mm (GEII platform with halogen light source only)
- Other film formats available on request
- Any number of perforations per frame

Optical Registration

- Image registration and synchronisation performed in software
- Any film format scanning without major changes to the scanner

Colour Management

- Automatic Dmin and Dmax calibration
- Automatic exposure control
- Film base correction
- Colour balance and levels control in lowlights, midtones and highlights
- RGB waveform, vector scope and histogram

Output/Supported File Formats

- DPX (8, 10, 16 bit log or linear)
- Quicktime: Uncompressed or PC-installed codecs
- Multiple Tiff (optional compression)
- MPEG, AVI, WMV and more
- Video SDI/HD for preview

Acquisitions

- Free format or fixed scan ratios (4:3) (16:9)
- Windowed acquisition,
- Image rotation, flip and mirroring

Options

- Keycode reader
- Optical sound decoding
- Automatic scan from EDL-clip list
- Image cache with preview
- Image overlays (TC, KK or customised)
- Tangent wave panel integration



Installation & Training

Every Golden Eye system will be professionally installed by personnel from Image Systems AB or a certified partner. At the time of installation, training will be given for operating the scanner.

Extended Service

Extended service is available as an option, for any amount of time. This will act as extended warranty and includes on-site service on a regular basis.

Support

The purchase of a Golden Eye Film Scanner is the start of a long-term relationship. The Image Systems service team, or our certified partners, will take care of any issues with the Scanner. A one year warranty with telephone and email support, free software upgrades and off-the-shelf spares, is included in your purchase.

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