NOAA NGDC has a solar image scanning data rescue effort funded by the NOAA CDMP (Climate Database Modernization Program) program.

The National Oceanic and Atmospheric Administration (NOAA) Climate Database Modernization Program (CDMP) funds some data rescue efforts within NOAA line organizations to make climate and environmental data more accessible and easier to use. Data restricted to file cabinets and Warehouse storage are becoming accessible via the World Wide Web. NOAA's National Geophysical Data Center (NGDC) holds solar imagery back to the 1920s, available on 35 mm microfilm, as well as printed photos and drawings. A CDMP project was funded to scan many solar images to digital format and make them available on the NGDC Website. The scanned daily images document many phases of solar activity, from decadal variation to rotation variation to daily changes. The images include the wavelengths Calcium K, Hydrogen Alpha, and white light photos, as well as sunspot drawings and the comprehensive drawings of a multitude of solar phenomena on one daily map (Fraunhofer maps and Wendelstein drawings).

Boulder H-alpha film strips are scanned at 4000 pixels per inch 16-bit gray scale on a Nikon Super Coolscan 500 ED scanner (see PDF description) with a density range of 4.8. The scanner has a 3,964-pixel, two-line linear CCD image sensor. The Boulder H-alpha film strips have 12 images per day, with two overexposed images showing the solar prominences on the limb of the solar disk, and occasionally an underexposed black background image that can be used to subtract out any artifacts in the system. Daily images can be 10 seconds apart and are useful for identifying scratches, lint, speckling, and emulsion deposits or other non-solar phenomena on each individual frame.

On the daily images, North is at the top and East is on the left. No corrections are made for the solar P (position angle of axis), Bo (heliographic latitude), and Lo (heliographic longitude) angles. The file names indicate the approximate time of observation (YYYYMMDD_HHMMHFxBO, where HFx=Hydrogen, Film, sequence letter, and BO indicates the station Boulder). The user should read the actual time of observation from the clock located at the top of the image. Some off-band images are available, as well as some blowup images of interesting regions of solar activity.

Original text by Helen Coffey (dated 31 May 2005)

Information

News Release
SUPER COOLSCAN 5000 ED
October 2003

Nikon SUPER COOLSCAN 5000 ED

The professional 135/IX240 film scanner that satisfies the need for quality and speed

TOKYO – Nikon Corporation is pleased to announce the introduction of its new film scanner – the SUPER COOLSCAN 5000 ED.

Designed for use by imaging professionals, the SUPER COOLSCAN 5000 ED offers 135/IX240 film scanning at an amazing 20 seconds per image (including image transfer to display) — at 4,000 dpi true optical resolution. Highly accurate color reproduction and representation of detail are made possible by the 16-bit A/D converter and 16-bit output channel.

The SUPER COOLSCAN 5000 ED targets primarily business users such as professional photographers and photo finishers, who require superb image quality and high-speed scanning capability. Private users of 135/IX240 format cameras — advanced amateur SLR photographers, for example — will welcome the scanner's speed and image quality. Users who deal with numerous slide mounts and uncut film rolls will appreciate the increased ease of use and productivity afforded by optional accessories like the SLIDE FEEDER SF-210 and ROLL FILM ADAPTER SA-30. The SUPER COOLSCAN 5000 ED offers the performance and efficiency to make it the ideal digital archiving solution.

The scanner's 16-bit A/D input conversion enables a significantly broader dynamic range. It also works with the 16-bit output and the Multi-sample scanning feature to reveal details hidden in shadowy and highlighted portions of a scene, while virtually eliminating noise. Super-fast 20-second scanning and enhanced image quality are supported by newly developed high-quality 2-line CCD sensors.

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At the heart of the SUPER COOLSCAN 5000 ED's excellent performance are Nikon's exclusive core technologies. The scanner incorporates Scanner Nikkor ED (Extra-low Dispersion) glass lens elements for superior edge-to-edge sharpness, definition and contrast, as well as outstanding color fidelity. The employment of LED illumination enables the stable, precise provision of light with no risk of heat-related damage to films. Furthermore, the LED requires neither maintenance nor warmup time. And for consistently accurate representation of color on displays and prints, the SUPER COOLSCAN 5000 ED features the Nikon Color Management System (Nikon CMS). Color data can be manipulated in multiple RGB color spaces, for unprecedented accuracy. These core technologies are what set Nikon COOLSCAN series scanners apart from the rest.

By simply attaching the optional ROLL FILM ADAPTER SA-30 to the SUPER COOLSCAN 5000 ED, batch-scanning of uncut film rolls comprising up to 40 frames becomes possible. The optional SLIDE FEEDER SF-210 lets you scan up to 50 mounted slides, giving you time-efficient, high-quality scanning capability.

The SUPER COOLSCAN 5000 ED also features unparalleled image restoration functions. Digital ICE^4 Advanced™, the newly upgraded digital image correction technology, consists of Digital ICE™ (Image Correction & Enhancement), Digital ROC™ (Reconstruction Of Color), Digital GEM™ (Grain Equalization & Management), and the brand-new Digital DEE™ (Dynamic Exposure Extender). There's also Scan Image Enhancer, which offers one-touch brightness and color saturation adjustment.

With fast, easy image transfer thanks to the USB 2.0 interface, the SUPER COOLSCAN 5000 ED is an extremely powerful, extremely fast, extremely efficient desktop film scanner that will augment your productivity and give you scanned images that will take your breath away.

Note: Specifications, design, product name and standard accessories may differ by country or area.

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Nikon SUPER COOLSCAN 5000 ED Feature Highlights

- **Ultra-fast scanning**
  The SUPER COOLSCAN 5000 ED features a newly-developed, low-noise 2-line CCD sensor for an amazing scanning speed of 20 seconds at 4,000 dpi — ideal for imaging professionals and other users who value high productivity. Autofocusing speed has been reduced to a mere 4 seconds. The scanner also offers the plug-and-play USB 2.0 interface, which dramatically increases data transfer speed.

- **Tremendous image quality**
  The SUPER COOLSCAN 5000 ED's 4,000-dpi true optical resolution and 16-bit A/D converter enable the reproduction of stunning images in vibrant color and astonishing detail — even in darker portions of scenes. Nikon's exclusive Scanner Nikkor ED lens elements are superior in edge-to-edge sharpness, definition and contrast, as well as color registration, saturation and accuracy. The low-heat, highly accurate LED light source further ensures stability in color characteristics and faithful overall reproduction.

- **Unmatched image restoration functions**
  - Scan Image Enhancer
  The Scan Image Enhancer function automatically adjusts brightness and color saturation, producing images with optimal contrast.
  - Digital ICE^4 Advanced™
  Digital ICE^4 Advanced™ is an impressive suite of four image correction technologies. Digital ICE™ works with LED illumination to remove surface dust and scratches without altering image composition. Digital ROC™ automatically rebuilds and restores deteriorated color values for faithfully rendered images. Digital GEM™ reduces the effects of film grain, producing sharp, clear images without clumping or graininess. The newly added Digital DEE™ uses exposure compensation to help reveal details that may be hidden in shadowy or highlighted portions of scenes.

- **Quality accessories enhance scanning versatility and efficiency**
  Nikon offers a variety of optional holders and adapters to augment productivity. Attaching the SLIDE FEEDER SF-210, for example, lets you batch-scan as many as 50 mounted slides based on settings made prior to scanning. The ROLL FILM ADAPTER SA-30 enables the batch scanning of an uncut film roll of up to 40 frames.

Nikon SUPER COOLSCAN 5000 ED Major Features

- **4,000-dpi** true optical-resolution scanning, **16-bit A/D** converter featuring 16-/8-bit output for crisp, color-true images
- Exclusive **Scanner Nikkor ED high-performance lens elements** for reduced color aberration and minimized image distortion
- Proprietary **LED illumination technology** ensures consistently accurate color reproduction
- **Amazingly fast scanning (approx. 20 seconds** including image transfer to display) at 4,000 dpi
- **Newly-developed, high-quality 2-line CCD sensor**
- Improved image processing algorithm for significant boost in scan quality of color negative film
- **Multi-sample scanning** capability of up to 16 passes for faithful reproduction and smoother gradation
- **Quick AF & Quick Preview** enhance operability and convenience
- High-speed **USB 2.0 interface** for fast, easy image transfer
- Compatible with various film formats (**35mm [135], IX240**, etc.)
- Enhanced Color Management System for higher precision, in compliance with ICC (International Color Consortium) version 4 standards.
- **Digital ICE^4 Advanced™** automatic correction function
  1. **Digital ICE™** (Image Correction & Enhancement) removes dust, scratches and fingerprints from scanned images
  2. **Digital ROC™** (Reconstruction Of Color) recreates and restores faded color values for vivid, faithfully rendered images

3. **Digital GEM™** (Grain Equalization & Management) equalizes image grain for sharp, clear images with no clumping or graininess
4. **Digital DEE™** (Dynamic Exposure Extender) helps reveal details lost in shadows and highlights

- New **Scan Image Enhancer** for one-touch image correction
- Optional **SLIDE FEEDR** SF-210 for up to 50 mounted slides
- Optional **ROLL FILM ADAPTER** SA-30 for uncut film rolls of up to 40 frames
- **Layout-free design** lets users position the scanner vertically or horizontally to best meet their individual requirements
- Driver software **Nikon Scan 4** features an intuitive GUI (Graphical User Interface) that enables easy, comprehensive scanner control
- **Easy Scanning Guide** CD-ROM helps users setup and operate the scanner
- **Nikon View Software** for simplified viewing and archiving of scanned images

Digital ICE^4 Advanced™ is Digital ICE™, Digital ROC™, Digital GEM™ and Digital DEE™.
Digital ICE^4 Advanced™ are technologies developed by Applied Science Fiction.

Nikon SUPER COOLSCAN 5000 ED Specifications

Media	Negatives and positives, in color and monochrome
35mm slides	Slides with mounts 1.0 – 3.2mm thick, 49 – 50.8mm wide; optional SLIDE FEEDER SF-210 can be used to scan up to 50 slides with mounts 1.5mm thick
35mm film strips	2 – 6 frames (2 – 40 frames with optional ROLL FILM ADAPTER SA-30); strips of 1 – 6 frames can be scanned with optional STRIP FILM HOLDER FH-3
APS (IX240) film	Cartridges of 15, 25, and 40 frames can be scanned with optional IX240 FILM ADAPTER IA-20(S)
Preparates (slide glass for microscope)	Prepared slides (26 x 76mm, 0.8 – 1.5 mm thick) can be scanned with optional MEDICAL SLIDE HOLDER FH-G1

Aperture/Scan range/Effective aperture

MA-21, SF-210	25.1 x 36.8mm/3,946 x 5,782 pixels/Same as slide mount
SA-21, SA-30	25.1 x 38.0mm/3,946 x 5,959 pixels/23.4 x 36.0mm
IA-20 (S)	18.6 x 28.4mm/2,916 x 4,453 pixels/16.1 x 27.4mm
Scanning system	Fixed film, movable plane single-pass optical scanning system
Light source	R, G, B and Infrared (IR) LEDs
Image sensor	3,964-pixel, two-line linear CCD image sensor
Color separation	Performed by RGB LEDs
Optical resolution	Up to 4,000 pixels per inch
A/D conversion	16 bits per color
Density range	4.8
Output	Full color or grayscale at 8 or 16 bits per channel
Focus	Auto and manual; autofocusing point selectable
Interface	USB 2.0
Power requirements	AC 100–240V, 50/60Hz
Operating environment	
Temperature	10 – 35°C (50 – 95°F)
Relative humidity	20 – 60%

Dimensions	96 x 172 x 315mm (3.8 x 6.8 x 12.4 in.) (W x H x D)
Weight (approx.)	3kg (6.6 lbs)
Orientation	Horizontal or vertical (with SF-210: horizontal only; with SA-30: vertical only)
Scanning time	Preview: 11 seconds Scan*: 20 seconds (time to complete preview or scan when no options selected) *Includes time required to display the scanned image

Nikon SUPER COOLSCAN 5000 ED Accessories

STRIP FILM ADAPTER SA-21 (supplied)
For 35mm (135) strip film with 2 to 6 frames

SLIDE MOUNT ADAPTER MA-21 (supplied)
For slide-mounted 35mm (135) film

IX240 FILM ADAPTER IA-20(S) (optional)
For IX240 (Advanced Photo System™) film cartridge

SLIDE FEEDER SF-210 (optional)
For slide-mounted 35mm (135) film – up to 50 slides

ROLL FILM ADAPTER SA-30 (optional)
For 35mm (135) strip and roll film with 2 to 40 frames

MEDICAL SLIDE HOLDER FH-G1 (optional)
For 26 x 76mm preparates (slide glass)

STRIP FILM HOLDER FH-3 (optional)
For scanning film strips (one to six frames) with the MA-21

Nikon Scan 4 System Requirements

Windows

CPU	Pentium® 300MHz or faster
OS	Windows® 98SE, Windows® Me, Windows® 2000 Professional, Windows® XP Home Edition, Windows® XP Professional pre-installed model
RAM*	128MB or more (512MB or more recommended)
Hard disk**	40MB required for installation (200MB recommended), with an additional 200MB of free disk space available while Nikon Scan is running
Display	800 x 600 with 16-bit colors (full color recommended)
Interface	USB***: Built-in USB 1.1 ports, USB 2.0. IEEE 1394: OHCI-compliant IEEE 1394 interface required.
Others	CD-ROM drive required for installation

Macintosh

CPU	Power PC G3 or later (G4 or later recommended)
OS	Mac® OS 9 (9.1 or later), Mac® OS X (10.1.5 or later)
RAM*	Mac® OS 9: 64MB or more (256MB or more recommended) Mac® OS X: 128MB or more (512MB or more recommended)
Hard disk**	70MB required for installation (200MB recommended), with an additional 200MB (Mac® OS 9) or 550MB (Mac® OS X) of free disk space available while Nikon Scan is running
Display	800 x 600 with 16-bit colors (full color recommended)
Interface	USB***: Built-in USB 1.1 ports, USB 2.0 Firewire: Only built-in Firewire ports supported
Others	CD-ROM drive required for installation

* More memory may be required depending on film type, scan size, resolution, bit depth, the number of scans performed in each session, the film holder or adapter used, and whether Digital ROC™ or Digital GEM™ are used. A system with more than the minimum amount of memory is recommended.

** More free disk space may be required depending on the film type and number of frames. Nikon recommends having as much free disk space as possible when running Nikon Scan.

*** Depending on the type of interface installed, USB will operate at high speed (USB 2.0 only; maximum transfer rate 480 Mbps) or full speed (USB 1.1/USB 2.0; maximum transfer rate 12 Mbps). Computers running Windows® XP and Windows® 2000 Professional with a USB 2.0 interface support high-speed USB. For more information, consult the manufacturer. Users of Windows® XP, Windows® 2000 Professional or Mac OS X whose computer is not equipped with USB 2.0 can install a RATOC PCIU3U USB 2.0 interface board (for more information, visit Ratoc Systems English-language web site at http://www.ratocsystems.com/english/index.html).

Nikon View System Requirements

Windows

CPU	Pentium® 300MHz or faster
OS	Windows® 98SE, Windows® Me, Windows® 2000 Professional, Windows® XP Home Edition, Windows® XP Professional pre-installed model
RAM	64MB or more recommended
Hard disk	60MB required for installation
Display	800 x 600 with 16-bit colors (full color recommended)
Others	CD-ROM drive required for installation

Macintosh

Models	iMac™, iMac™ DV, Power Macintosh® G3 (Blue & White), Power Mac™ G4 or later, iBook™, PowerBook® G3 or later (only built-in USB ports supported)
OS	Mac® OS 9.0 – 9.2 (only built-in USB ports are supported), Mac® OS X (10.1.3 or later)
RAM	64MB or more recommended
Hard disk	60MB required for installation
Display	800 x 600 with 16-bit colors (full color recommended)
Others	CD-ROM drive required for installation

Note: Scanning times and other performance-related statistics are based on Nikon internal testing results.

Digital ICE4 Advanced™ is Digital ICE™ , Digital ROC™, Digital GEM™ and Digital DEE™.
Digital ICE4 Advanced™ are technologies developed by Applied Science Fiction.
Digital ICE Professional™ is technology developed by Applied Science Fiction.
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