

Full Scale Color Scanner

OPERATOR'S GUIDE



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PREFACE

The Contex Full Scale Color Scanner provides a complete solution for scanning drawings, maps and pictures for use with CAD, GIS, DTP, Color Reproduction/copying and Archival systems.

The built-in dedicated Feature Extraction hardware and high-speed Digital Signal Processor (DSP) do image processing and enhancement in real time.

The Full Scale Color Scanner's fast industry standard SCSI I/F makes it truly multi-platform. Allowing you to use the scanner with different computers and workstations.

The CADImage/SCAN color scanning software is available in WINDOWS 3.1x, 95 and NT editions for the PC or PS/2 computers,

This guide explains how to operate and maintain the Full Scale Scanner. It assumes a basic knowledge of your computer and operating system, it does not repeat material from this documentation.

SYSTEM REQUIREMENTS

- IBM PC or PS/2 compatible (Pentium recommended), or a supported workstation.
- CADImage/SCAN color scanning software edition and SCSI interface kit matching your workstation.

RELATED PUBLICATIONS

The "OPERATIONS GUIDE" which came with your computer.

The "OPERATING SYSTEM USER MANUAL" for your workstation.

The "CADImage/SCAN USER's GUIDE".

The "READ.ME" file on the distribution diskettes. Use your text editor or list command to look for latest news and updates.

HOW TO USE THIS GUIDE

This guide contains six chapters, and four appendices. Make sure you read Chapter on: "Installation" , before attempting to install or use the Full Scale Color Scanner and software described in this guide.

Chapter 1 is an introduction to the Full Scale Scanner and gives an overview of its use with CAD, GIS, Desktop Publishing, Color Reproduction/Copying and Archival applications.

Chapter 2 gives an overview of the Full Scale Color Scanner system and features.

Chapter 3 describes the functions and the use of the Full Scale Color Scanner operator panel and indicators.

Chapter 4 discusses the operation of the Full Scale Color Scanner.

Chapter 5 describes the installation of the Full Scale Color Scanner onto your system.

Chapter 6 describes how to perform user maintenance on the Full Scale Color Scanner.

Appendix A. contains a glossary.

Appendix B. lists the Full Scale Color Scanner Specifications.

Appendix C. contains the regulations applicable for the Full Scale Color Scanner.

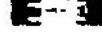
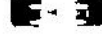
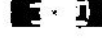
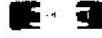
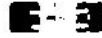
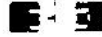
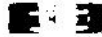
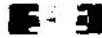
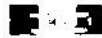
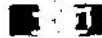
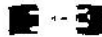
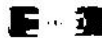
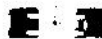
Appendix D. Full Scale Color Scanner License Agreement.

TABLE OF CONTENT

1. Introduction	1-1
1.1 Computer Aided Design	1-2
1.2 Large Format Color Reproduction	1-4
1.3 Mapping/GIS	1-4
1.4 Desk Top Publishing Systems	1-5
1.5 Drawing Archival and Management	1-5
1.6 Satellite Photo Scanning	1-6
2. System Overview	2-1
3. Operator Panel and Indicators	3-1
3.1 Original Insertion Slot and Ruler	3-4
4. Operating modes	4-1
4.1 24 bit RGB mode	4-1
4.2 Indexed color mode	4-1
4.3 Feature extraction (classified) color mode	4-1
4.4 Graytone mode	4-2
4.5 Line mode	4-2
4.6 Photo mode	4-2
4.7 Resolution and Scanwidth in all modes	4-2
5. Installation	5-1
5.1 Installation of the SCSI board in the PC	5-2
5.2 Scanner SCSI Address Setup	5-3
5.3 Installation verification	5-4
6. Maintenance	6-1
6.1 Cleaning of Original Scanning Area	6-1
6.2 Height adjustment of the CCD Cameras	6-2
6.3 Camera out of Light error	6-4
A. Glossary	A-1
B. FSC Scanner Specifications	B-1
C. Regulations	C-1
C.1 FCC Regulations	C-1
C.2 EC Regulations	C-2
D. Program License Agreement	D-1
E. Important safety instructions	E-1

LIST OF ILLUSTRATIONS

Fig.1.1 Full Scale Color Scanner	1.2
Fig.2.1 Full Scale Scanner System Overview	2.2
Fig.3.1 FSC Operator Panel	3.2
Fig.3.2 Original Insertion Slot and Ruler	3.4
Fig.6.1 Removal of front cover	6.1
Fig.6.2 CCD Camera Height Adjustment	6.2
Fig.6.3 Camera Height adjustment	6.3



1. Introduction

The Contex Full Scale Color Scanner is an affordable solution for large format, high volume color scanning.

- **FCS8000^{DSP}** Full Scale Color Scanner, scans originals up to E-Size(A0) Scan Width, and up to 800dpi resolution.

The Full Scale Color Scanner doubles as both a color scanner and a fully featured B/W and graytone scanner for technical documents, all built into the same scanner capable of handling large formats at up to 800 dpi scanning resolution. The built-in, dedicated Digital Signal Processor (DSP) performs image enhancement in real time.

The Full Scale Color Scanner is produced by Contex, the leading manufacturer of large format scanners, with many thousands of installations world-wide. The Full Scale Color Scanner is designed to work with many types of scanning applications:

1. **Reproduction (Large Format Color Copying)** The Full Scale Color Scanner scans large color maps, drawings and photos, for full color printing on e.g. large format ink-jet plotters.
2. **CAD (Computer Aided Design)** The Full Scale Color Scanner scans drawings and documents, in color or B/W into computers, and perform color feature extraction, so they can be used with CAD programs.
3. **Mapping/GIS (Geographic Information Systems)** The Full Scale Color Scanner scans maps and drawings for input and editing in GIS systems. The built-in color feature extraction importantly separates and combines map elements by their color.
4. **DTP (Desk Top Publishing)** The Full Scale Color Scanner scans large drawings and pictures to be used in technical and other documents, and laid out with DTP.
5. **Archival** The Full Scale Color Scanner scans large drawings, maps and pictures onto hard disks or optical disks for on-line access by drawing database systems. The built-in feature extraction and indexed color dramatically reduces file sizes.

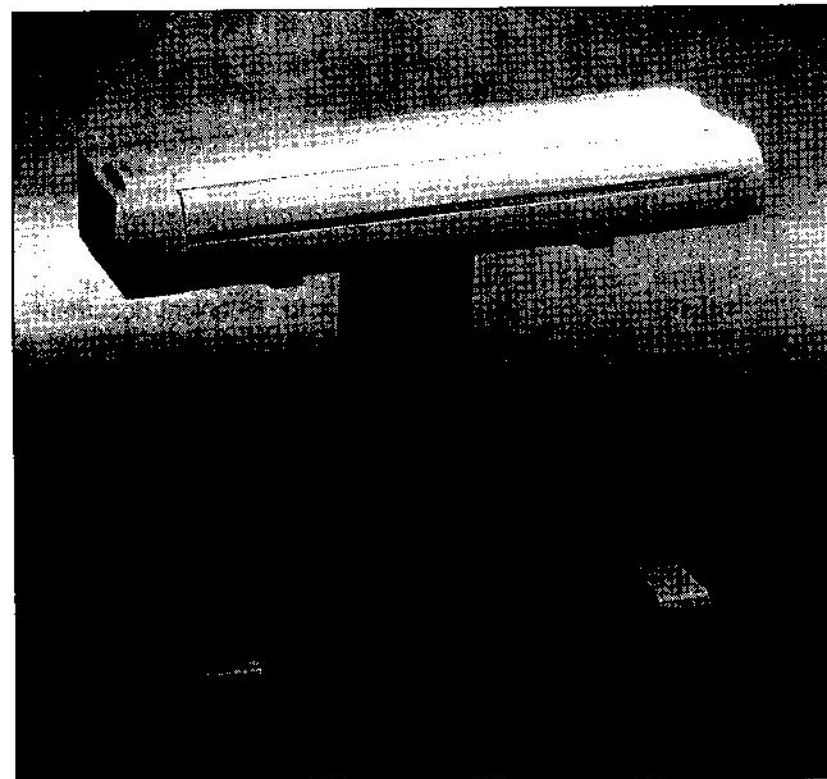


Fig.1.1 Full Scale Color Scanner

1.1 Computer Aided Design

Offering CAD-Systems easy access to architectural, civil and mechanical drawings in both color and B/W, the Full Scale Color Scanner (FSC) bridges the gap between CAD and hard-copy drawing media.

The FSC and the CADImage/SCAN+FEATURE program scans hard-copy originals directly into the workstation. Formats up to E-Size(A0) can be scanned, so you can capture drawings for modification, storage, or transmission, or bring hard-copy on-line.



The FSC scans original line art, maps, color schematics, photos, blueprints, sepias, vellum and mylar drawings in high resolution color, graytone or B/W. The Full Scale Scanner has a built-in reflecting spring-loaded background pressure platen, to support scanning of transparent originals.

The built-in color feature extraction hardware, together with the CADImage/SCAN+FEATURE editor, allows for easy classification and reduction of scanned colors to match those containing information in the scanned original, enhancing clarity and quality of duplicated, faded or printed (color dithered) documents, improving details in complex maps or drawings.

The real-time color feature extraction mode sorts the observed color features in the document into a set of color categories, by on-board mapping through a color LUT (Look Up Table). The color LUT is user generated once for a whole class of documents using the tools in CADImage/FEATURE, and downloaded into the scanner.

The scanner on-board color mapping through a 16 or 256 color extraction LUT, enhances CAD drawings, increases scan speed and minimizes disk storage requirements, only requiring 4-bit or 8-bit per color pixel (compared with 24-bit in true color mode).

In a CAD drawing the color features conceived by the human eye corresponds to the typically 8 colors used when it was originally drawn. The scanner though will see thousands of colors e.g. the edge pixels of a color on a white background will give many graduations of that color, or a red and blue line crossing each other will have pixels being a mixture of red and blue etc. The built-in feature extraction can automatically reduce the scanner output to the original 8 colors, ready for editing and replotting.

The unique two-dimensional 2D-Adaptive thresholding and built-in high-speed Digital Signal Processor provides clean crisp scans from poor quality drawings on-line without prescan. Automatically adapting to the drawing, compensating for varying background, faded areas and stains.

CAD-systems such as AutoCAD, VersaCAD etc. can make full use of the Full Scale Color Scanner, either directly or together with raster-editors, archiving, overlay or raster-to-vector conversion pro-

grams. The FSC is a time saving way to capture the machine-drawn or hand-drawn originals to an electronic medium.

Using the FSC and CADImage/SCAN+FEATURE with an ink-jet or laser printer provides an inexpensive and convenient way to transform any large format technical drawing into a handy-sized copy for enclosure in reports or documentation; or you can use them with an inkjet or laserplotter for a full size copy.

1.2 Large Format Color Reproduction

The Full Scale Color Scanner together with a large format ink-jet plotter is the perfect large format digital color copier.

Copying of graphics, posters, photos or complex maps takes place in a few minutes, with fully adjustable color parameters.

The Full Scale Color Scanner captures 30-bits of color data and selects the best 24-bits to pass to the computer. Enhancing color fidelity, capturing even subtle changes of color in the image.

Excellent color quality and resolution is achieved with color RIP software, or with the RIP built into some ink-jet plotters. RIP packages (Raster Image Processor) perform the color dithering/processing for achieving full true color output on color ink-jet plotters.

The variable scan resolution in 1 dpi increments between 25 dpi and 800 dpi ensures superior color copying results with any RIP color dithering cell size.

Using the FSC for color copying of large formats ensures precision in scanned details - e.g. small type in maps and drawings, as well as continuous color changes are copied clearly.

The FSC also supports overlength copying, three meters or more dependent on the RIP, as there is no restriction on scanlength.

1.3 Mapping/GIS

Extracting features from maps e.g. roads, rivers, lakes, buildings and agricultural areas by their color, is easy with the FSC's built-in on-the-fly feature extraction hardware and the CADImage/FEATURE software.

From a scanned representative sample of a class of maps, in 24 bit color, you automatically generate and edit a down-loadable feature table (LUT) in CADImage/FEATURE, using it's rich set of easy to use tools.

Downloading the feature table to the Full Scale Color Scanner, will automatically perform the designed feature extraction on-the-fly when scanning further maps belonging to the same class, without any increase in scanning time.

The FSC feature extraction copes with such problems as ink dispersion and variation, halftoning, line edge effects, color differences between different parts of a feature, and ink mixing in feature overlaps.

Feature extraction typically reduces the size of scanned color data by at least a factor of three, compared with full color (24 bit) scans, also extraction of different features can be done to separate files, e.g roads to one file and buildings to another file.

1.4 Desk Top Publishing Systems

With the FSC you can now scan originals of almost any size into the computer to include them as part of technical documents, user manuals, sales brochures, spare part catalogues, proposals and bids, and so on, using popular desk top publishing applications such as Aldus PageMaker or Windows Publisher.

Through CADImage/SCAN+FEATURE the FSC is compatible with most software, and standard DTP file formats. The FSC Window Scan feature allows you to cut and scissor parts of interest out of larger drawings.

With its ease of use and flexibility of original sizes and file formats, the FSC addresses the scanning needs of the technical publishing office.

1.5 Drawing Archival and Management

An organization's wealth is held in its archives. Electronic Drawing Management Systems allows on-line access and control of company assets such as scanned mechanical drawings, electrical sche-

matics and facility plans on hard- or optical disks. A single exchangeable 5 1/4 optical disk cartridge or CD-ROM can store 800 to 1000 E-Size drawings, so your archives could contain several hundreds of thousands of drawings.

Electronically accessing, viewing, modifying, converting and printing or plotting your drawings will save you time and money.

The FSC supports the Computer Acquisition and Logistics (CAL) and ISO-ODA standard CCITT Group4 (MIL 28002) drawing archival formats.

1.6 Satellite Photo Scanning

Use the Full Scale Color Scanner graytone scanning capability of 256 levels, together with applications like CADOverlay GS, to directly overlay satellite photos in AutoCAD, with image correction facilities.

2. System Overview

The Full Scale Color Scanner, shown in the system overview overleaf, uses triple 5000 RGB-triplet (15000 pixels), tri-linear color CCD cameras, with color balanced stabilized fluorescent lighting and individual adaptive light compensation of each pixel. The FSC includes the following features:

- Connection to the computer via standard SCSI Interface
- Scanning area sized from A5 up to A0 and E-Size (from 152mm. up to 914mm. wide). Media size: 152 to 1016 mm.
- Up to 800 dpi scan resolution at all original sizes in 8-bits and 4-bits color feature extracted or indexed, graytone and raster modes; the max. scan width (36" or 914mm.), in 24-bit true color mode at 600 dpi, reduces to 27" at 800 dpi.
- Individual tone adjustment for each color channel (RGB) by it's three loadable color tone tables (gamma), and independent user settable white and black point correction.
- Color calibration by tone tables and 3x3 matrix multiplier to international standards with the ANSI IT-8 color reference card delivered with the scanner. Improving long term stability of scanner color balance, linearity and chromacity.
- 30-bits of color data capture, selecting the best 24-bits to pass to the computer. Enhancing color fidelity, capturing even subtle changes of color in the image.
- Color feature extraction by built-in real-time hardware, without adding scanning time overhead. Extracts features from drawings and maps, enhances clarity and quality of duplicated, faded or printed (color dithered) documents, improves details in complex maps or drawings.
- Image Processing and Enhancement options includes: 2D-Adaptive thresholding, dynamic and thin-line pixel enhancement, histogram analysis, on-line threshold variation, on-line deskewing and despeckling for high quality raster scans.

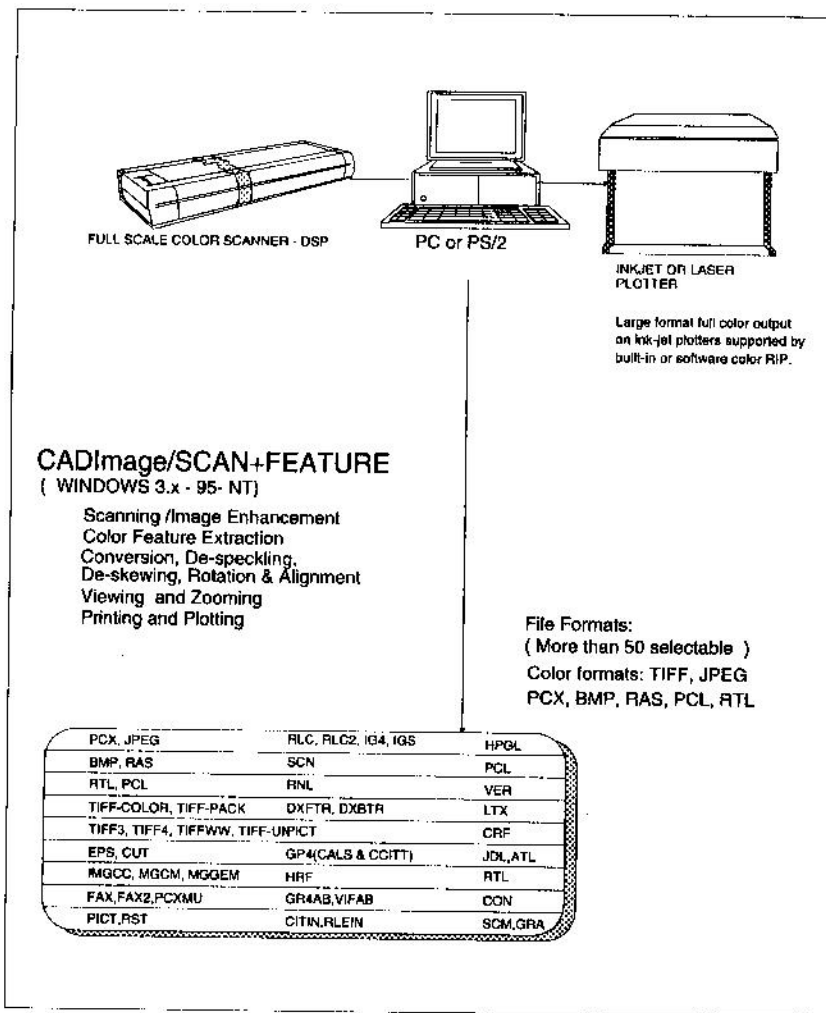


Fig.2.1 Full Scale Scanner System Overview

- Scanning modes: 16 million colors (24 bit RGB), 8 and 4 bit indexed color, 8 and 4 bit feature extracted color, 8 bit greytone, fixed and adaptive threshold black/white raster, and black/white dithered photo mode.

SCSI Interface. On workstations (e.g UNIX), the Full Scale Color Scanner connects directly to the SCSI I/F port on the processor unit using the SCSI cable that comes with the CADImage workstation interface kit.

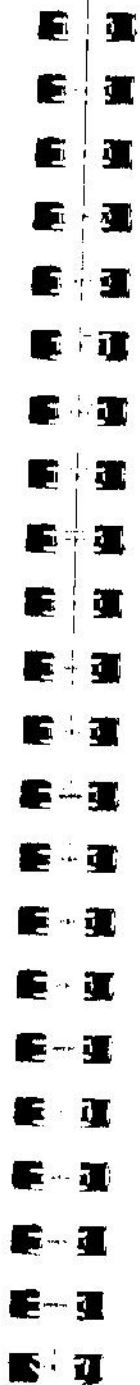
For the PC the CADImage interface kit contains a SCSI- PC extension board interfacing between the PC bus connector and the Full Scale Color Scanner.

CADImage/SCAN+FEATURE. The scanning program enables the user to control all the Full Scale Color Scanner functions and image processing features.

The program produces a multitude of industry standard color, grey-tone and B/W output image file formats compatible with CAD, GIS, Raster-Editor, Raster-to-Vector, Digitize, Overlay, Color reproduction and copying, RIP, and Archiving programs for Editing, Storing, Conversion and Print/Plot of scanned drawings, maps etc. to be used with CAD, GIS, DTP and Color Copying systems.

CADImage supports electronic Rotation and Alignment, as well as Converting, Viewing, Zooming and Print/Plot of scanned originals.

CADImage/FEATURE automatically can generate and edit color look-up tables for download into the scanner's built-in feature extraction engine. The intuitive user interface includes Color Wheel and Color Histogram views, tools for merging marked or similar colors, explode color, removing marked, similar or minor colors, insert color, and import colors.



3. Operator Panel and Indicators

The Full Scale Color Scanner Operator Panel layout shown overleaf is divided into two keys and four indicators. The two operating keys are positioned at the top: "The Paper Reverse key (C), and the Paper Feed/Forward key (A) with a Ready indicator (B) attached". Three indicators at the bottom: "Power on (D), Warm-Up (E), and Diagnostic (F) indicators". The detailed function of the keys and indicators are:

A, B : Paper Feed/Forward Key and Ready indicator.

Insert the drawing face down into the scanner original insertion slot, the green "Ready indicator (B)" turns "on" when the drawing is correctly positioned. Now press the "Feed Forward key (A)", and the drawing moves into the start-of-scan position. The "Ready indicator" stays "on", signifying that the scanner is ready for control from the computer.

During scanning the "Ready indicator" is blinking.

At end of scanning the "Ready indicator" is again steady "on" signifying that scanning can be redone from the computer, or finished by the operator pressing the "Paper Feed/Forward key" to eject the drawing from the scanner.

Pressing the "Paper Feed/Forward" key during scanning, stops the scanning and feeds the original as long as the key is pressed.

NOTE : If the drawing is removed from the scanner manually without pressing the "Paper Feed/Forward key" to eject, the "Ready Indicator" will stay on, this condition is reset by pressing the "Paper Feed/Forward key".

C : Paper Reverse Key.

The reverse key stops the scanning and reverses the original while the key is pressed.

D : Power On Indicator

Lights when scanner has power on.

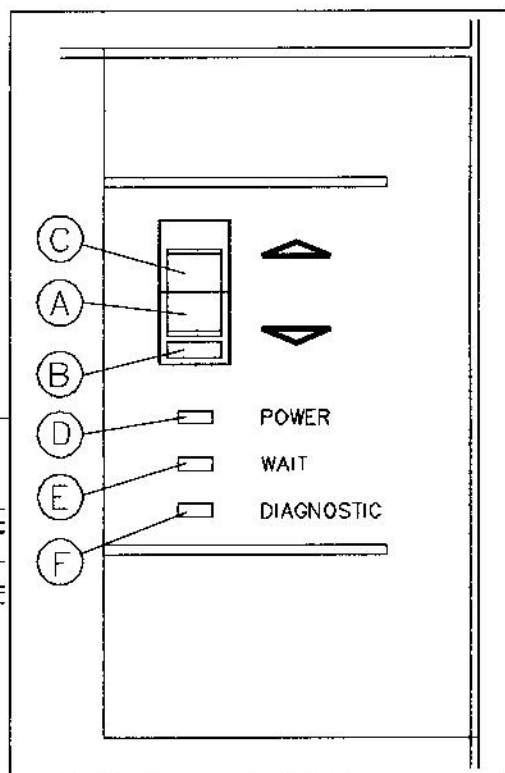


Fig.3.1 FSC Operator Panel

E : Warm Up Indicator (Wait).

Lights when the Full Scale Color Scanner power is turned on, and stays on during the internal diagnostic and stabilization phase. Keyboard input is prevented during this time.

F : Diagnostic Indicator.

Flashes if an error is detected by the built-in diagnostic. If both the "Diagnostic" and the "Warm up (Wait)" indicators flashes it signifies that too little light is seen by the cameras, this could stem from the user height adjustment being out of range, see the chapter:"Maintenance" for guidance.

3.1 Original Insertion Slot and Ruler

The original insertion slot shown below is marked with a measurement ruler from 0 to 8.5. The dividings corresponds to the Scan-Width setup in the CADImage scanning software (a second centered ruler is positioned on top, for optional centered paper feeding).

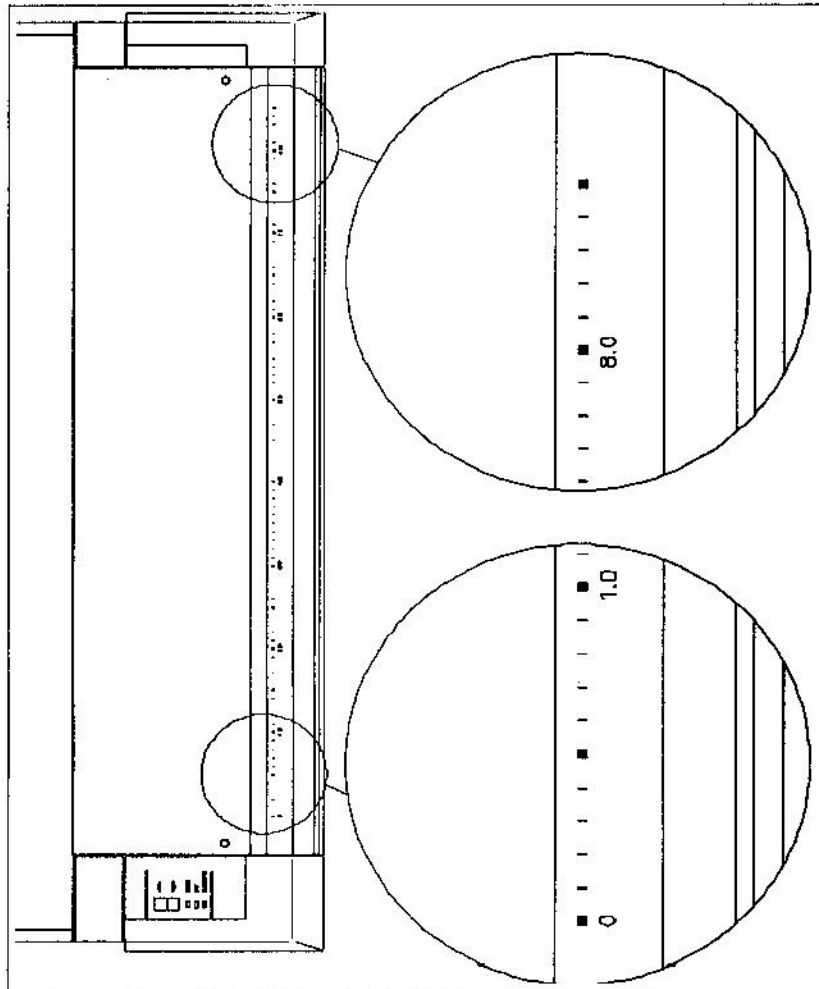


Fig.3.2 Original Insertion Slot and Ruler

3. Operating modes

The Full Scale Scanners work in six operating modes:

- 24 bit RGB color mode.
- 8 and 4 bit indexed color mode.
- 8 and 4 bit feature extraction color mode.
- Graytone mode (256 graytones).
- Line mode (bitmapped, 2-level).
- Photo mode (halftone dither)

4.1 24 bit RGB mode

Full 24-bit true color mode for 16.8 million colors (the max. scan width (36" or 914mm.), in 24-bit true color mode at 600 dpi, reduces to 27" at 800 dpi.)

4.2 Indexed color mode

An effective method for scanning documents displaying a limited range of colors, is mapping true colors to a selected color palette, the palette is generated automatically by an adaptive color optimizing prescan of the original.

The scanner on-board color transformation to a 16 or 256 color palette greatly reduces the data volume, increases scan speed and minimizes disk storage requirements, only requiring 4-bit or 8-bit per color pixel (compared with 24-bit in true color mode).

4.3 Feature extraction (classified) color mode

Real-time color classification mode sorts the observed color features in the document into a set of color categories, by on-board mapping through a classified color LUT (Look Up Table). The classified color LUT is user generated once for a whole class of documents using the tools in CADImage/FEATURE, and downloaded into the scanner.

The scanner on-board color mapping through a 16 or 256 classified color LUT, greatly enhances clarity and quality of duplicated, faded or printed (color dithered) documents, improves details in complex

maps or drawings, increases scan speed and minimizes disk storage requirements, only requiring 4-bit or 8-bit per color pixel (compared with 24-bit in true color mode).

4.4 Graytone mode

In Graytone mode, the actual graylevel of each pixel is scanned; 256 levels are recognized, corresponding to 1Byte (8 bits) per pixel. This results in graytone files are 8 times larger than uncompressed files scanned in line mode at the same resolution, for example an E-Size drawing scanned in graytone mode at 300 dpi has a file size of 150 MByte, compared with typical 0.4 -1.0 MByte for a compressed file in Line mode).

4.5 Line mode

In this mode, the Full Scale Scanner will output each scanned pixel as a single bit, either black (1) or white (0) depending on whether or not its graylevel is below or above the threshold level. Both fixed level and 2-D adaptive thresholding is supported.

4.6 Photo mode

In Photo mode, the graylevels of the scanned pixels are converted into halftones by dithering. This results in very high density line mode files, that are many times larger than uncompressed files scanned in line mode at the same resolution

4.7 Resolution and Scanwidth in all modes

The distance (both horizontal and vertical) between each pixel at resolutions representatively* used is:

200 dpi:	0.1270 mm.
300 dpi:	0.0846 mm.
400 dpi:	0.0635 mm.
600 dpi:	0.0423 mm.
800 dpi:	0.0317 mm.

*The Full Scale Color Scanner resolution is settable in 1 dpi increments from 25 to 800 dpi.

The resolution in dpi is always set from CADImage.

The Scan-width is likewise set from CADImage, in the units of the ruler printed at the original insertion slot on the Full Scale Color Scanner, see the Chapter: "Operator Panel and Indicators."

Insertion of the original is operator selectable from CADImage to be either left side aligned or centered. The ruler is used with side aligned insertion (zero at left side), and the upper ruler is used with centered insertion.

The following table shows the number of pixels (RGB triplets) per line resulting from various combinations of resolution and scanwidth on the side aligned ruler:

Resolution:	600 dpi	400 dpi	300 dpi	200 dpi
Scan-width:				
8.5	21,600	14,400	10,800	7,200
8.	20,352	13,568	10,176	6,784
6.	15,240	10,160	7,620	5,088
4.	10,176	6,784	5,088	3,392
3.	7,620	5,080	3,810	2,544
2.	5,088	3,392	2,544	1,696

The following table shows some common drawing widths and their required scan-width settings:

Scan-width:	Original Drawing Width*:	
	Minimum media size of FSC	6.0"/152mm.
1.4	Minimum Scan Width (A5)	6.0"/152mm
2.	A-Size (letter) and approx. A4	8.5"/216mm
2.6	B-Size (11")	11.0"/280mm
2.8	A3 (297mm)	11.9"/302mm
3.	Approx. A3 and approx B-Size	12.7"/323mm
3.9	A2 (420mm)	16.5"/420mm
4.	C-Size and approx. A2	17.0"/430mm
5.2	D-Size (22")	22.0"/560mm
5.5	A1 (594mm)	23.3"/592mm
6.	Approx. A1 and approx D-Size	25.4"/646mm
7.8	A0 (841 mm)	33.1"/840mm
8.	E-Size and approx. A0	34.0"/862mm
8.5	Max.ScanWidth of FSC	36.0"/914mm
	Max.Media size of FSC	40.0"/1016mm

*The required setting for an original drawing can be measured on the printed ruler on front of the Full Scale Color Scanner, when the original is inserted into the FSC.

5. Installation

The Full Scale Color Scanner should be placed on a table with the front of the machine overhanging the table edge by approximately 1 cm to ensure that the scanned original can hang freely from the original exit slot at the front of the machine. The table should be placed a few centimeters from the wall, to allow large size originals to hang down behind the table. Or you can place the FSC on the optionally available specially designed stand-alone floor stand.

Important: Before connecting the power cord to an electrical outlet, be sure that the voltage selector switch just above the mains inlet is set to the correct voltage.

Make sure that power is turned off, and connect the SCSI cable that came with your interface kit to one of the two SCSI connectors found at the back of the Full Scale Color Scanner.

If the scanner is the last device on the SCSI bus, turn on the built-in active SCSI terminator (see later section: Scanner SCSI address switch setup), otherwise make sure it is turned off.

For the PC you must now install the SCSI interface board that is part of your interface kit, as described in the following sections.

For UNIX workstations with a built-in SCSI interface, simply turn power off and connect the scanner SCSI cable.

You are now ready to install the CADImage/SCAN scanner control software and set up the SCSI address of the scanner, as described later in this chapter and in the CADImage User Manual and SCSI installation instructions that came with your interface kit.

5.1 Installation of the SCSI board in the PC.

The following describes installation in a PC

1. Set the PC-system unit power switch to OFF.
2. Set any external option power switches to OFF (such as printers, displays etc.).
3. Unplug the PC-system unit and all other options from the wall outlet.
4. Remove the cover of your computer to expose the expansion slots.
5. Align and insert the SCSI host adapter board into an empty slot, and use the expansion slot panel screw to secure the host adapter to the computer frame.
6. Connect the SCSI cable from the FSC Scanner to the connector on the SCSI board backpanel.
7. Scanner DIL Switch Set-up is described overleaf in section: "Scanner SCSI address setup".

For further installation description and installation of SCSI driver* please see the documentation that came with your interface kit.

*Note: SCSI driver installation will be dependent on your operating system e.g. DOS, Windows 3.1x, 95 or NT.

5.2 Scanner SCSI Address Setup

Turn off power to computer and scanner when setting the SCSI device number, it is only read from the scanner DIL-switch on power up of the scanner.

Set up the SCSI device no. on the DIL-switch found besides the SCSI connectors on the Full Scale Color Scanner to an unused SCSI device address no. according to the table below:

Switch no.:	1	2	3	4	5	6	7	8
SCSI device no. 0:	ON	ON	ON	X	X	X	X	X
SCSI device no. 1:	OFF	ON	ON	X	X	X	X	X
*SCSI device no.2:	ON	OFF	ON	X	X	X	X	X
SCSI device no. 3:	OFF	OFF	ON	X	X	X	X	X
SCSI device no. 4:	ON	ON	OFF	X	X	X	X	X
SCSI device no. 5:	OFF	ON	OFF	X	X	X	X	X
SCSI device no. 6:	ON	OFF	OFF	X	X	X	X	X
SCSI device no. 7:	OFF	OFF	OFF	X	X	X	X	X
Built-in SCSI termination:	X	X	X	ON	X	X	X	X
No synchronous transf.:	X	X	X	X	ON	X	X	X
No disconnect:	X	X	X	X	X	ON	X	X
Force boot start up:	X	X	X	X	X	X	ON	X
Cont. test mode:	X	X	X	X	X	X	X	ON
* Factory Default							X: Don't Care	

If the scanner is the last device on the SCSI bus turn on the built-in active SCSI termination, switch 4, above. If not the last device make sure switch 4 is off.

Make sure that none of the troubleshoot and test switches are on (switches 5, 6, 7 and 8)

Turn on power to the computer and scanner, and verify installation.

Below is a more detailed description of the troubleshoot and test switches:

Switch 5. No synchronous transf.: Disables SCSI synchronous transfer mode (reverts to asynchronous transfer). Only use this mode for test as it slows down the scanner.

Switch 6. No disconnect: Disables the SCSI disconnect command. Only use this mode for test as it slows down the scanner.

Switch 7. Force boot start up: If a malfunction occurred during an update of the scanner firmware, this switch forces the scanner into firmware boot mode, enabling you to download the firmware again.

Switch 8. Cont. test mode: The continuous test mode is only used for maintenance, the scanner is inaccessible.

5.3 Installation verification

Install the CADImage program as described in the USER GUIDE that came with the program.

Run the Height Adjustment of CCD Cameras described in the Chapter: "Maintenance" to verify above installation.



6. Maintenance

Clean the original scanning area, and adjust the height of the CCD-Cameras at regular intervals.

6.1 Cleaning of Original Scanning Area:

When cleaning the original scanning area, turn the power switch OFF and disconnect the Power plug.

1. Open the FSC Scanner front cover by gently pulling at the top of the cover.
2. Remove the original guide plate and gently wipe clean the glass plate and the white area on the Original Guide Plate.

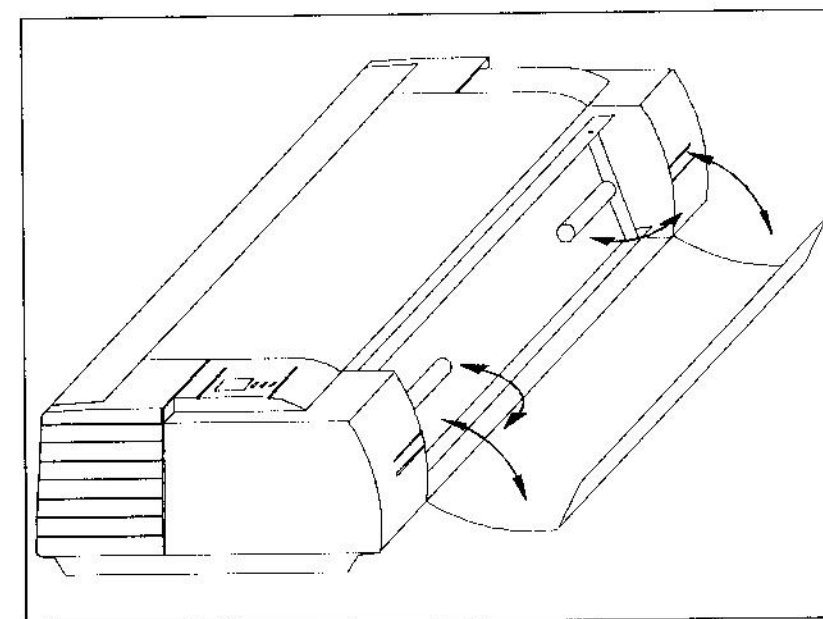


Fig.6.1 Removal of front cover

6.2 Height adjustment of the CCD Cameras

The following adjustment applies to the Full Scale Color Scanner:

FSC8000^{DSP}:

Insert the Height Alignment Chart delivered with the FSC into scanner and press the "Paper Feed/Forward key". In CADImage select B/W line mode and Scan-Width size of 8.5, and start prescan with "Forward". Press "Halt" to stop the prescan over the horizontal lines in the chart, and:

1. For the left CCD Camera (seen from front of scanner) adjustment, select a "detail window" centered about one-third in from the left in the "overview window". The "detail window" should show a picture similar to one of the three below.
2. Use a slim screw-driver to turn the heigh adjustment screw through the left side hole at the top of the FSC (see figure overleaf) clockwise or counter-clockwise so that the lines

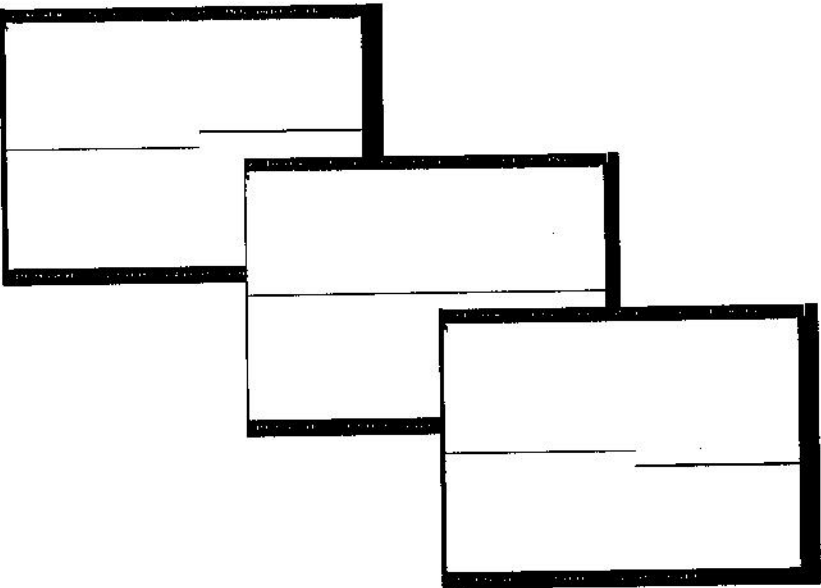


Fig.6.2 CCD Camera Height Adjustment

from the left and right CCD-Cameras make a continuous line on the down-scans on the screen:

Clockwise: Line at Left side of Screen moves Down.
Counterclockwise:Line at Left side of Screen moves Up.

3. For the right CCD Camera adjustment follow the procedure given above, but select a "detail window" centered about two-third in from the left in the "overview window" and adjust the CCD camera through the right side hole:

Note: Only judge the camera height adjustment on the repeated down-scans on the screen to omit angle errors.

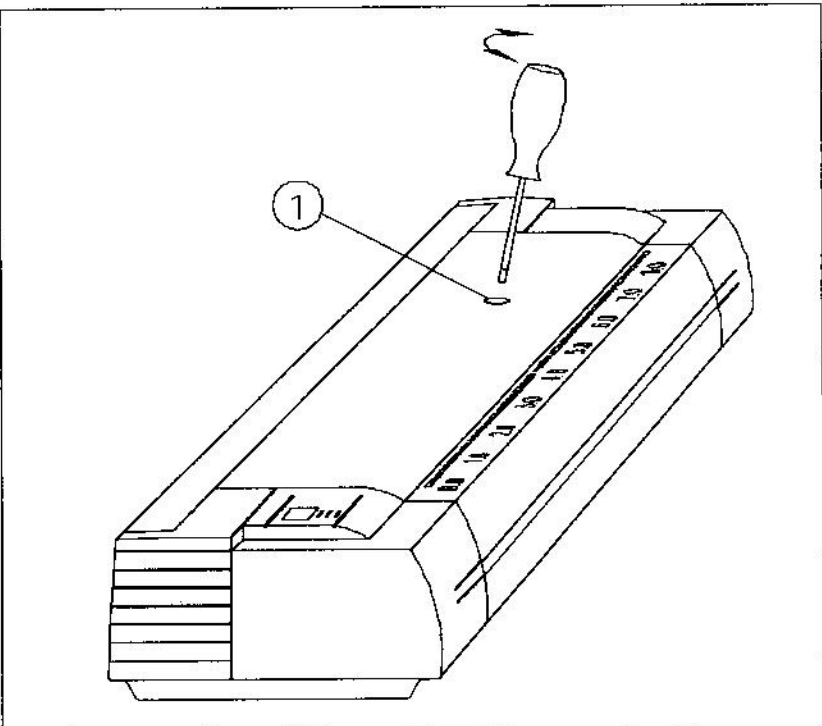


Fig.6.3 Camera Height adjustment



6.3 Camera out of Light error

If both "Diagnostic" and "Warm Up (Wait)" indicators start blinking on the Operator Panel during CCD Camera adjustment, this is because one of the CCD cameras has moved out of range during adjustment or transport, and gets too little light. The "Warm Up" indicator shows by the number of flashes per period which camera is out of light counted from the left side of the machine:

- Camera 1: 1 flash per period.
- Camera 2: 2 flashes per period.
- Camera 3: 3 flashes per period.

Before proceeding with the CCD camera height adjustment, do the following for the camera out of light:

1. Turn the height adjustment completely counterclockwise.
2. Turn the height adjustment one quarter of a turn clockwise.
3. Turn the FSC power off, and then on. If the error still shows, repeat step 2 and 3.

The middle Camera (2), is not user adjustable.

After clearing the "Camera out of light error", proceed with the CCD Camera Height Adjustment described previously.

A. Glossary

CALS

Computer-aided Acquisition and Logistics Support (CALS) standard, a US-Defense Department and industry initiative that addresses the design, manufacture and support issues of generation, access, management and use of technical data in digital form.

CCITT GROUP 3.

Standard runlength compression format used with FAX transmission. It utilizes modified Huffman coding to further compress the runlength numbers. Most scanner file formats are dialects of this format.

CCITT GROUP4

Two-dimensional compression format, giving very compact image files. Standardized by CALS (Mil 28002) and ISO-ODA for Drawing Archival and Interchange.

COMPRESSED

Reduces file and image sizes of raster images by encoding the data (See also Run Length Encoding and CCITT Group 3).

DISPLAY

Also called GRAPHIC DISPLAY or MONITOR. Refers to the computer screen attached to your computer, or to the portion of a drawing image, menu etc. shown on the Computer Screen.

HISTOGRAM

A bar graph representing the statistical distribution of gray-tones in an image. Each column represents the number of pixels at that graylevel.

PIXEL

Also called DOT. A single element of picture information, representing a small area in the raster image. The value of a pixel depends on the luminance of the area, and is either a single bit for a binary (black and white) image, or multi-bit for a grayscale image.

PROM

Programmable Read Only Memory

RAM

Random Access Memory

RASTER FILE

Also called **RASTER IMAGE** or **BITMAPPED IMAGE**. A picture composed of individual dots (picture elements, pixels) the way a scanner sees it. The rows in a high-resolution raster file typically contain 200 or 300 dots per horizontal inch of the original drawing, and there are typically 200 or 300 rows per vertical inch. As each of these dots is defined by location and whether it is *on* or *off*, raster images have large data files.

RESOLUTION

Defines the level of detail that can be captured or shown by a scanner, display or output device. On scanners the resolution is defined by the number of dots (pixels) per inch (dpi) that can be captured horizontally and vertically, e.g. 300 dpi equals 90,000 pixels per square inch.

RUNLENGTH ENCODING

A method of compressing raster or bitmap data by representing "runs" of white or black dots along a scanned line, as the number of dots in each run. Many variations exist of this scheme, with varying compression efficiency. Typically runlength compression formats yield a file 20-25 % the size of an uncompressed file.

SCANNING

The process of running a hardcopy drawing or document through an optical scanner. The scanner produces a digital image (raster image) of the hardcopy drawing, which is stored in RAM or on a disk.

VECTOR FILE

Also called **VECTOR DRAWING**. Consists of mathematically defined elements such as: *Line from A to B*, *Circle with center and radius etc.* CAD systems use vector drawings because of their accuracy and relatively low memory and data file sizes compared to raster images.

VECTORIZATION

Also called **RASTER TO VECTOR CONVERSION (RTV)**. The process of automatically converting a raster (bit-mapped) image into a vector (CAD) drawing.

B. FSC Scanner Specifications

To ensure state of the art products and design, Contex reserves the right to change specifications at any time.

Model	FSC8000^{DSP}
Sensors:	Triple CCDs (tri-linear color) 15,000 RGB triplet pixels. 30 bits color data capture.
Image Resolution (dpi):	setable in 1 dpi increments from 25 dpi to 800 dpi.
Scan Modes:	24 bit RGB color mode (16.8 million colors). 4-bit and 8-bit indexed color mode. 4-bit and 8-bit feature extraction color mode. 8-bit graytone mode. Black & White line mode. Photo, B/W dithered mode.
Color Adjustment:	3x3 Matrix Multiplier. R,G&B tone curves (Gamma). Independent white and black point setting.
Media and Scan Width:	Media Width:6.0 to 40.0" (1016mm.) Scan Width: 36 Inches (914 mm)
Scanner Measurements(inches/mm.):	Width: 49.25"/1250 Depth: 15.0"/380 Height: 7.9"/200
Power:	Consumpt.: 180W Voltage: 100/115/220/240V-50/60Hz
Weight:	46 kg.
Light Source:	Color balanced, stabilized fluorescent Lamps.
Optics:	Compact folded optical path, torsion stabilized for portability. Apochromatic color lenses.
Interface:	Industry standard SCSI2 I/F Transfer rate: up to 10 Mbit./sec.

Model

FSC8000^{DSP} (continued)**Image Processing:**

Single pass scanning for high speed and fine pitch color registration.

Color calibration by standard IT8 color reference card.

Individual color tone adjustments of R,G&B, and separate White/Black points setting.

Real-time compression of scanned data.

On-board, real time color feature extraction.

Digital Signal Processor, 2D-Adaptive Threshold.

On-line threshold, de-skewing and despeckling.

Individual pixel adaptive ampl. correction and graytone interpolation.

Image rotation, alignment, mirroring and reverse.

On-screen view, zoom, and print functions.

More than fifty Industry standard image file formats supported.

C. Regulations**C.1 FCC Regulations**

This equipment has been tested and found to comply with the limits for a class A digital device. Pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can generate radio frequency energy and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

You may find the following booklet prepared by the Federal Communications Commission helpful: "How to Identify and Resolve Radio-TV Interference Problems". This booklet is available from the U.S. Government Printing Office, Washington, D.C. 20402, Stock No. 004-000-00345-4.

C.2 EC Regulations

DECLARATION OF CONFORMITY

Manufacturer's Name: CONTEX A/S
Manufacturer's Address: Svanevang 2
 DK-3450 Allerod
 Denmark

Declares that the products:

Category: Large Format Scanners

Model/Type: FSC8000

Conforms to the following standards:

EMC: EN55022(1987)-Class A
 EN50082(1994)
Safety: EN60950

Following the provisions of Council Directive 89/336/EEC (EMC) and Council Directive 73/23/EEC (Low Voltage).

Allerod 960801 Asbjorn Smitt, Mng.Director

Supplementary Information:**Warning**

This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

D. Program License Agreement

You should carefully read the following terms and conditions before opening the diskette package. Opening the diskette package indicates your acceptance of the terms and conditions. If you do not agree with them you should promptly return the package unopened, and your money will be refunded.

Contex provides this program and licenses its use. You assume responsibility for the selection of the program to achieve your intended results, and for the installation, use and results obtained from the program.

LICENSE

1. You may use the program on a single machine.
2. You may modify the program and/or merge it into another program for your use on the single machine.
3. You may copy the program into any machine readable or printed form for backup or modification purposes in support of your use of the program on the single machine.
4. You may not use, copy, modify or transfer the program, or any copy, modification or merged portion, in whole or in part, to another party, except as expressly provided for in this license. If you do so you terminate your license.

TERM

The license is effective until terminated. You may terminate it at any time by destroying the program together with all copies. The license will also terminate upon conditions set forth elsewhere in this Agreement or if you fail to comply with any term or condition of the Agreement. You agree upon such termination to destroy the program together with all copies, modifications and merged portions in any form.

LIMITED WARRANTY

This program is provided as is without warranty of any kind, either stated or implied, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. The entire risk as to the quality and performance of the program is with you. Should the program or hardware provided with the program prove defective, you (and not Contex or an authorized dealer) assume the entire cost of all necessary servicing, repair or correction.

Some states do not allow the exclusion of implied warranties, so the above exclusion may not apply to you. This warranty gives you specific legal rights; you may also have other rights which vary from state to state. Contex does not warrant that the functions or the operation of the program will be uninterrupted or error free.

However, Contex warrants the diskette on which the program is furnished to be free from defects in materials and workmanship under normal use for a period of one (1) year from the date of delivery to you, as evidenced by a copy of your receipt.

LIMITATIONS OF REMEDIES

Contex's entire liability and your exclusive remedy shall be:

1. The replacement of any diskette not meeting the Contex "Limited Warranty" and which is returned to Contex or an authorized Contex dealer with a copy of your receipt, or

2. If Contex or the dealer is unable to deliver a replacement diskette which is free of defects in materials or workmanship, you may terminate this Agreement by returning the program and your money will be refunded.

In no event will Contex be liable to you for any damages including any lost profits, lost savings, or other incidental or consequential damages arising out of the use or inability to use such program, even if Contex or an authorized Contex dealer has been advised of the possibility of such damages, or for any claim by any other party. Some states do not allow the limitation or exclusion of liability for incidental or consequential damages, so the above limitation or exclusion may not apply to you.

GENERAL

You may not sublicense, assign or transfer the license of the program except as expressly provided in this Agreement. Any attempt otherwise to sublicense, assign or transfer any of the rights, duties or obligations hereunder is void.

This Agreement will be governed by the laws of Denmark. Should you have any questions concerning this Agreement, you may contact Contex.

You acknowledge that you have read this Agreement, understand it, and agree to be bound by its terms and conditions. You further agree that it is the complete and exclusive statement of the agreement, oral or written and any other communications between us relating to the subject matter of this Agreement.

CONTEX**E. Important safety instructions**

Read all of these instructions and save instructions for later use. Follow all warnings and instructions marked on the scanner.

A. Do not place the scanner on an unstable cart, stand, or table. The unit may fall, causing serious damage.

B. Power off this unit before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a damp cloth for cleaning.

C. The scanner should be operated from the type of power source indicated on the marking label. If you are not sure of the type of power available, consult your dealer or local power company.

D. The scanner is equipped with a three-wire grounding type plug. This plug will fit only into a grounding-type power outlet. This is a safety feature. If you are unable to insert the plug into the outlet, contact your electrician to replace your obsolete outlet. Do not defeat the purpose of the grounding-type plug.

E. Do not allow anything to rest on the power cord. Do not locate the scanner where persons will walk on the cord.

F. If an extension cord is used with the scanner, make sure that the total of the ampere ratings on the products plugged into the extension cord does not exceed the extension cord ampere rating. Also, make sure that the total of all products plugged into the wall outlet does not exceed 15 amperes.

G. Slots or openings in the cabinet and the back or bottom are provided for ventilation; to ensure reliable operation of the product and to protect it from overheating, these openings must not be blocked or covered. The openings should never be blocked by placing the unit on a bed, sofa, rug, or other similar surface. This product should never be placed near or over a radiator or heat register. This product should not be placed in a built-in installation unless proper ventilation is provided.

H. Never push objects of any kind into the scanner through cabinet slots since they may touch dangerous voltage points or short out parts that could result in a risk of fire or electrical shock. Never spill liquid of any kind on the scanner.

I. Do not attempt to service the scanner yourself. Opening or removing those covers requiring tools may expose you to dangerous voltage points or other risks. Refer all servicing in those compartments to authorized service personnel.

J. Unplug the scanner from the wall outlet and refer servicing to authorized service personnel under the following conditions:

- When the power cord or plug is damaged or frayed.
- If liquid has been spilled into the scanner.
- If the scanner has been exposed to rain or water.
- If the scanner does not operate normally when operating instructions are followed. Adjust only those controls that are covered by the operating instructions since improper adjustment of other controls may result in damage and will often require extensive work by a qualified technician to restore this product to normal operation.
- If the scanner has been dropped or the cabinet has been damaged.
- If the scanner exhibits a distinct change in performance, indicating a need for service.

