Electronic Spot Imaging CCD
GENERAL DESCRIPTION

- The **BIS CD** is an integral part of modern radiography diagnostics system.
  - The **BIS CD** lets you acquire, process and view high quality, high resolution images in the following modes:

  CONTINUOUS DIGITAL FLUOROSCOPY
  PULSED DIGITAL FLUOROSCOPY
  NON SUBTRACTED DIGITAL RADIOGRAPHY
  REAL TIME D.S.A.

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*The BIS CD is the best possible investment a modern, multi-purpose computerised radio-diagnostic department can make.*

- 1kx1kx10 bits resolution, CCD technology
- Higher performances at a lower price
- Digital adjustment only, minimum time requested for installation and service
- High reliability, more than 1000 BIS CD installed worldwide
- Networking connectability with Dicom 3 protocol
APPLICATIONS

The **BIS CD** is the result of ten years in the field of digital video image processing, with numerous ESI systems already installed world-wide.

The **BIS CD** has been specifically designed for all routine examinations currently made using remote-controlled and conventional X-ray diagnostics:

- **GASTROENTEROLOGY**
- **GYNAECOLOGY**
- **SKELETAL**
- **UROGRAPHY**
- **CHOLANGIOGRAPHY**
- **ALL R&F PROCEDURES**

The **BIS CD** with its D.S.A. option extends the range of examinations possible to include angiography.

The **BIS CD** with its pulsed digital high contrast fluoroscopy function (HCF) lets you perform advanced interventional procedures with maximum visual comfort.

The **BIS CD** is recommended for all cases where a low X-ray dose, high speed and immediate dynamic display of the acquired images are essential requirements (paediatric, interventional procedures, etc.).
FEATURES

**Digital Fluoroscopy**

- Acquisition in continuous fluoroscopy \((1024 \times 1024\) or \(1024 \times 512\)) with high resolution display \((1024 \times 1024)\), last image hold.
- Automatic registration of a run of images with a variable rate of:
  - \(1 \text{ i/sec}, 3 \text{ i/sec}, 6 \text{ i/sec}, 12 \text{ i/sec}, 24 \text{ i/sec}\) and instant display of the complete run in “cine-loop” mode.
- Noise reduction using a recursive filter with automatic correction of movement.
- Image orientation: digital reverse (horizontal, vertical) and 90° rotation.
- Fast saving of a series or single image of interest to Hard Disk.

**Digital Pulsed Fluoroscopy**

- Acquisition in pulsed mode \((1024 \times 1024\) or \(1024 \times 512\)) with high contrast and rates of:
  - \(1 \text{ i/sec}, 3 \text{ i/sec}, 6 \text{ i/sec}, 12 \text{ i/sec}, 24 \text{ i/sec}\) and instant display of the complete run in “cine-loop” mode.
- High resolution display \((1024 \times 1024)\), last image hold.
- Sharp images thanks to optimised KV-mA and brief duration of x-ray pulses (10 msec).
- Noise reduction using a recursive filter (12 and 24 i/sec) with automatic correction of movement.
- Image orientation: digital reverse (horizontal, vertical) and 90° rotation.
- Fast saving of a series or single image of interest to Hard Disk.

**Digital Radiography**

- Automatic acquisition and processing with instant reproduction on the TV monitor.
- Automatic saving to RAM and HARD DISK.
- One-shot acquisition or acquisition of a run of images at a rate of 1/s, 2/s, 3/s, 4/s or 6/s.
- High resolution display \((1024 \times 1024)\) and last image hold.
- Automatic acquisition of “positive” and “negative” polarity (grey scale).
- Image orientation: digital reverse (horizontal, vertical) and 90° rotation.
- Automatic X-ray dose control by means of a solid state exposure meter (photodiode).
- Digital tomography.

BMI
**SUBTRACTED DIGITAL RADIOGRAPHY (D.S.A.)**

- Acquisition of a run of images at a rate of 1/s, 2/s, 3/s, 4/s or 6/s with subtraction and real time display of subtracted images.
- Possibility to use variable acquisition rates during the run, ranging from 6 images per second to 1 image every 10 seconds.
- Five different runs can be programmed at different rates.
- Possibility to select the subtraction mask manually or automatically.
- Possibility to program the start of the contrast injector.
- Automatic saving to RAM and HARD DISK.

**IMAGES “POST-PROCESSING”**

- Digital contrast (window) and brightness (level) controls using dedicated keys with indication on the TV monitor of the relevant numerical values.
- Digital **edge enhancement**.
- Reversed polarity B/W.
- Horizontal and Vertical **reversal**.
- **90°** rotation.
- **Overview** of 4 or 16 images on TV monitor.
- **Zoom x2** with horizontal and vertical shift in the area of interest.
- **Tagging** of images to protect from accidental deletion.
- Electronic **diaphragm** opening in the area of interest.
- Treatment **filter** dedicated to skeletal.
- Display of images in **“cine-loop”** mode.
- Management of **patient lists**, new patients and hospital data.
- **Overlay** of pre-programmed text or free text on images.
- **Deletion** of single images, groups of 16, an entire scan or a selected group of scans.
- **Pixel shift**, image mask shift in subtracted mode.*
- **Subtracted/non-subtracted** image display.*
- **Stenosis** measurement in %.*
- **Measurement** of distances/angles via calibration.
- Choice of new **mask**.*

* only with the DSA option.
IMAGE PRINTING

- Digital laser imager interface (1024 x 1024), optional.
- Analog video interface 1249/1049 lines (50/60 Hz).

ARCHIVING

- Possibility to save images to optical disk, optional.

NETWORKING

- Possibility to connect the BIS CD to Ethernet using TCP/IP protocol in order to send images in DICOM 3 mode (with BIS CD option)

TECHNICAL DATA

**SYSTEM CONFIGURATION**

- Image intensifier: S S
- CD1000 camera complete with optical relays: S S
- Cabinet containing video processor, system controller and feeder: S S
- 17” monitor: S S
- Reference monitor: O O
- Monitor stand: O O

**IMAGE INTENSIFIER**

- 9” HP and 9”, 12”, 14”, 16”, Thomson HX models and 9” HP models: S S

**TV CAMERA**

- 2/3” CCD sensor, 1300 x 1030 pixels, progressive scanning: S S

**ACQUISITION**

- 10 bit analog/digital converter: S S
- 24 i/sec with 1024 x 512 matrix (continuous and pulsed HCF fluoroscopy): S S
- 12i/sec with 1024x1024 matrix (continuous and pulsed HCF fluoroscopy): S S
- 6 i/sec with 1024 x 1024 matrix (radiography): S S

**OPTICAL UNIT**

- Relays, with incorporated photodiode for dose control: S S
- Motorised iris and neutral filter: S S

*S = standard  
O = optional*
• VIDEO PROCESSOR
SIEMENS SMP-E20 microcontroller S S
SIEMENS RMOS operating system S S
40 Mbytes RAM S S
80 Mbytes RAM O O
160 Mbytes RAM O O
320 Mbytes RAM O O
4 Gbytes Hard Disk memory S S
3 video outputs, 1249/1049 interlaced lines (50/60 Hz) S S
Digital laser imager interface, 3M-959 protocol O O
PC keyboard with dedicated function keys S S
Infrared remote control O S
4 Gbytes optical disk, SCSI2 interface O O
D.S.A. features O S

• MONITORS
Model 17 H, 17" flat screen, anti-reflection, 1249/1024 interlaced lines (50/60 Hz) S S
Reference monitor, model 17 H O S

• NETWORK INTERFACE
DICOM 3 protocol, via BIS CD DIC module O O
Class Print & Store as an alternative O O

• SYSTEM CONTROLLER
Radiography and fluoroscopy dose control S S
Optical iris and neutral filter control S S
X-Ray generator and accessories interface S S

• FUNCTIONS
Entry of patient and hospital data S S
Automatic indication of patient and hospital data on image S S

• REAL TIME ACQUISITION FUNCTIONS
Recursive filter in continuous and pulsed fluoroscopy, with automatic correction of movement S S
Automatic saving of fluoroscopy images to RAM S S
Automatic saving of fluoroscopy images to HARD DISK S S
Window, level and edge enhancement S S
Reverse polarity (radiography) S S
Digital image reversal, horizontally and vertically S S
Digital 90° rotation S S
Last image hold S S
Road mapping - S
Mask image acquisition - S
Digital image subtraction - S
Contrast injector start control - S

S = standard
O = optional
• **POST PROCESSING FUNCTIONS**
  
  Patient recall S  
  Window, level and edge enhancement S  
  Reverse polarity (radiography) S  
  Digital zoom, max x2 S  
  Electronic shutter S  
  Overlay of test on image S  
  Measurements S  
  Selection of images via guide image S  
  Selection of reference images O  
  Overview, 4 images/16 images S  
  Cine loop S  
  Remasking -  
  Digital image subtraction -  
  Pixel shifting -  

S = standard  
O = optional

• **Power Supply**
  
  - 230 Vac 50/60 Hz  
  - 450 VA (with two monitors)

• **Reference standards**
  
  - EN 60 601-1  
  - EN 60 601-1-2  
  - EEC Directive 93/42 (class IIb)

• **Classification (EN 60 601-1)**
  
  - Class I  
  - Type B  
  - Continuous operation