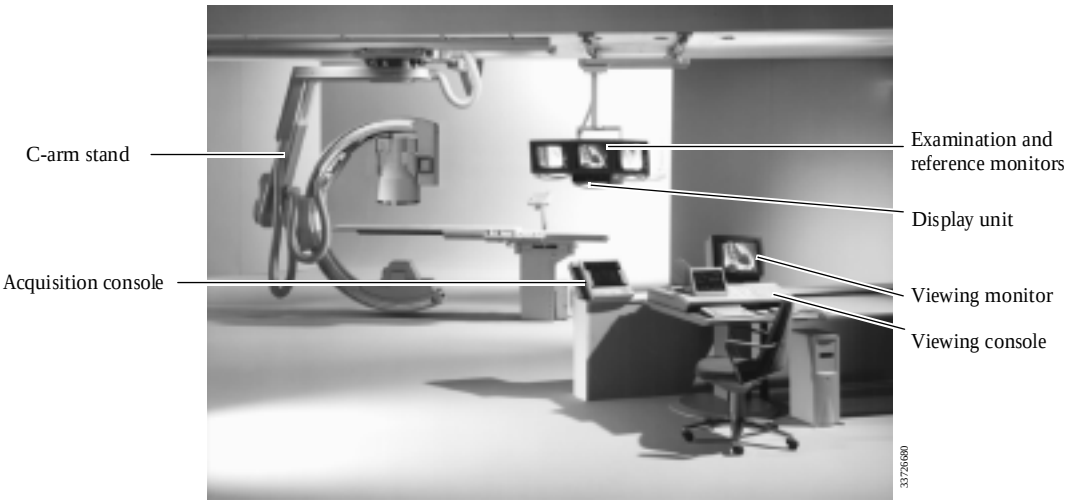
4 System overview

4.1 General layout



INTEGRIS V5000 system

4.2 Configuration and options

4.2.1 Geometry segment

The geometry segment provides total body coverage and offers a wide range of projections for PA and AP imaging for all vascular and neuro applications. The ceiling suspended C-arm with 38 cm (15 inch) or 30 cm (12 inch) image intensifier (II) is fully counterbalanced and can be rotated for three-sided patient approach with maximum free floor space.

The X-ray field is always aligned with the Image Intensifier entrance screen and the reference axis is always perpendicular to the Image Intensifier entrance plane.

The counterbalanced design permits manual operation of all stand movements. Rotation, angulation and II lift are also motorized.

Permissible movements with the C-arm stand in the head position (parallel with the table):

- Rotation (manual- or motor-driven):
  - 115° LAO to 195° RAO
- Cranial/caudal angulation, limited only by the patient and the table between the X-ray tube and II.

Permissible movements with the C-arm stand in the side position (perpendicular to the table):

- Rotation (manual- or motor-driven):
  - 90° LAO to 90° RAO

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- Cranial/caudal angulation, limited only by the patient and the table between the X-ray tube and II.

Image intensifier modes:
- 38 cm II: 38/31/25/20/17 cm (15/13/11/8/6 inch)
- 30 cm II: 30/22/17/12 cm (12/9/6/4.5 inch).

Focus to II input screen distance: 90 to 120 cm (35.4 to 47.2 inch) with counterbalanced/motor-driven II lift.

The C-arm is carried by an L-arm suspended from a ceiling rail which runs parallel to the longitudinal axis of the table. The L-arm can be moved manually or, optionally, it can be motor driven (parking movement) along the 3 m (118.1 inch) rail. The L-arm is able to pivot over 270° (2 x 135°).

Options

Short L-arm
The short L-arm allows the C-arm to be installed in rooms with a lower than normal ceiling height. By using the short L-arm, the minimum ceiling height is reduced from 290 cm (114.2 inch) to 270 cm (106.3 inch). The L-arm pivot rotation is reduced from 2 x 135° to 2 x 90°.

4.2.2 Patient support

'Angio Diagnost 5' (AD5) patient support provided with a flat carbon fibre tabletop:
- metal-free overhang of 125 cm (49.2 inch)
- floating tabletop movement of 100 cm (39.4 inch) in the longitudinal direction and 2 x 18 cm (2 x 7.1 inch) in the transverse direction
- maximum patient weight: 200 kg (440 lb)
- motorized height adjustment from 76 to 104 cm (29.9 to 40.9 inch).
- separate operating modules for geometry and imaging functions can be attached to either side of the table
- the set of patient accessories (supplied with the system) includes:
  - 5 rail accessory clamps
  - Head fixing aids
  - 2 tabletop accessory clamps
  - 4 restriction straps
  - Wedge shaped mattress
  - 2 arm supports
  - 1 cerebral filter
  - Translucent catheterization arm support
  - Peripheral filter
  - Drip stand

NOTE ***All accessories except the cerebral filter are mounted on the table.***

Options

Catheterization arm support
Height adjustable, for brachial catheterization and digital imaging. The support is made of X-ray transparent material with the exception of the fixing clamp and pivots.

Pivot for table base

For angiographic and interventional procedures on the upper peripherals. It improves table access for patient transfer.

The pivot option provides:
- pivoting of the table base around its vertical axis
- pivot range from -90° to +90° with locked positions on 0, -13°/ +13°(facilitating arm-angiography) and -90°/+90°
- pivot device with graduated scale, mounted on the universal floor plate of the table.

Radiation protection

To shield the head and neck of the attending physician from scattered radiation.

The option comprises:
- balanced ceiling suspended swing arm.
- tiltable lead glass 30 x 40 cm (11.8 x 15.7 inch) fitted in a metal U shaped frame with two handgrips and 15 x 40 cm (5.9 x 15.7 inch) lead apron.

Sterile covers can be fitted to the handgrips and apron.

Table mounted radiation shield

The table mounted radiation shield offers the physician and staff additional protection against scattered radiation.

The option allows three main operating modes at the doctor's and/or nurse's side of the table:
- working position with lower and upper shield
- working position with lower shield only (upper shield folded down)
- parking position (shield folded under the table).

The radiation shield is provided with a special AD5-table clamping device with clamping knob for mounting it to the table accessory rail. It is fabricated from 0.5 mm Pb equivalent material and can be swiveled into any working position.

To achieve optimal protection against scattered radiation use both the lower and the upper shield. The shield should be set between the radiated object and the physician. The upper shield can be folded down in situations where its use would unacceptably limit access to the patient. The shield can remain fitted to the accessory rail when cleaning the table and during patient preparation as it can fully be parked under the tabletop. The shield can be simply converted (by Service) for fitting to the nurse-side of the table. If necessary, two protection shields can be fitted - one on either side of the table. The option includes a docking rail which can be mounted to the wall.

Ratchet compressor

The option comprises:
- 3 cotton compression belts 23 cm (9.1 inch) wide
- a ratchet winding mechanism on one side for symmetrical compression.

SyncraTilt

SyncraTilt enhances the accuracy and efficiency of gravity-oriented procedures. SyncraTilt is ideal for interventional, myelography, phlebography and head down procedures because it provides more precise imaging of

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contrast medium, blood, or objects in the body. With SyncraTilt, the isocenter is automatically located at the isocenter of rotation and angulation of the stand. If the longitudinal position of the stand changes, the tilt isocenter is changed to match the new stand position, ensuring that the region of interest (ROI) is always centered.

As the table tilts, the X-ray beam automatically compensates for the movement. The table floats even when tilted and the ROI can be tracked by panning the tabletop. When combined with the Bolus Chase option, SyncraTilt allows phlebography to be performed with a head-up tilted patient.

The option provides:
- maximum tilt range: -28° head down tilt (HDT) to +20° head up tilt (HUT). For isocentric tilt, the tilt range depends on the distance between the isocenter of the stand and the table base
- an automatic safety system with manual override
- a panning range in tilted plane equal to the standard tabletop specifications (longitudinal movement of 100 cm (39.4 inch), lateral movement of 36 cm (14.2 inch)).

Accessories:
- foot support
- shoulder support
- ankle support
- chin support (cushion)
- 4 handgrips.

4.2.3 Geometry control

The geometry control console attached to the patient support can be used for the following functions:
- C-arm rotation/angulation
- tabletop panning movement
- table height movement
- store and recall of two projections, including the SID.
- image intensifier movement (Source Image Distance (SID))
- table tilt (if installed)
- stop.

Options

Pan handle

An extension of the control facility for floating movements of the tabletop, the pan handle is used to assist tabletop positioning at the tableside in parallel with the standard geometry Tableside Operation module (TSO). It can be attached anywhere to the tabletop and accessory rails without decreasing the floating range. The pan handle is connected to the table-base connection box in a master-slave configuration with the geometry TSO module. The connection offers a free choice of master and slave assignment. Any action at the master module immediately deactivates the slave module.

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Second geometry module

An extension of the control facility for geometry movements, the second geometry module is used to assist operation of the stand and table in parallel with the standard module at table side. Both modules are identical and have the same functionality. They are connected to the table-base connection box in a master-slave configuration. The connection offers a free choice of master and slave assignment. Any action at the master module immediately deactivates the slave module.

SyncraTrak Automatic Position Control (APC)

The automatic position controller has three operating modes. The stand rotation angle, angulation angle and wedge filter position are stored in all three modes:

- scratch mode: in this mode two projections can immediately be stored and recalled at any time during the examination
- sequencer mode: stand positions of one or more Service-installed sequences can be recalled. A total of 100 positions can be stored to be divided into a maximum 100 sequences and projections per sequence
- reference mode: a reference image driven mode, in which the stand position corresponding to the displayed reference images can be recalled. This enables accurate comparison of pre-intervention (reference) and post intervention (live) images.

The option includes a controller and APC module. The projections are indicated on the display unit.

4.2.4 Acquisition

General

- 100 kW X-ray power pack generator
- integrated generator/examination console
- X-ray depth collimator, including two independent semi-transparent wedged filters with automatic and manual positioning
- XTV16 Tv-chain with a high performance state of the art CCD camera with a digital output.

The chains include:

- pentaview 38 cm (15 inch) II or 4-fields 30 cm (12 inch) II
- digital scanning automatically matched to the C-arm position to maintain upright patient orientation on monitor
- intercom for communication with the control room.

XB Monitors and Room Facilities

Infrared receiver

The infrared receiver, for communication with the viewpad(s), is integrated into the monitor suspension and positioned just above the monitors.

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Monitor ceiling suspension

The monitor ceiling suspension provides flexible positioning of the monitors over a large range of up to 360 cm (141.7-inch) in longitudinal direction and 300 cm (118.1-inch) in lateral direction. Depending on the system configuration the suspension accommodates 1, 2, 3, 4 or 6 monitors, one or two near-monitor displays (display units) and the ultrasound scanner 200X.

Near-monitor display (display unit)

The near-monitor display (display unit) provides information to the operator in the examination room. Status information on stand rotation and angulation, system messages, X-ray tube load status (traffic lights), the selected fluoroscopy mode, the selected II fields and dose rate are displayed. There is also an intercom for communication with the control room.

XB monitors

Two sizes of XB monitors are specified with the system:

- a 21-inch monitor, with a concave front, used in the examination room and mounted in the monitor ceiling suspension
- a 17-inch monitor used for viewing in the control room.

The XB Progressive Display (PD) monitors with CyberScreen technology are for display of all live and reference images, featuring:

- extra bright images, high contrast and high resolution TripleGun monochrome CRT
- non-interlaced progressive display at 76 full images (frames) per second for a sharp, high resolution display of the finest details, eliminating both line and field flicker
- ambient light dependent contrast and brightness control and black level stabilization for constant brightness
- user programmable and standard reference settings
- on-screen display
- daisy chain capability providing single control for multiple monitors
- concave model for optimal viewing of the assembled live image monitor with (optional) monitors, as for example. reference image and dual fluoroscopy.

X-ray ON indicator lamp

The monitor suspension is provided with an X-ray ON indicator lamp.

X-ray tubes

The system is equipped with either an MRM or MRC X-ray tube:

MRM-GS 04 10

- MRM 04 10 Maximus ROTALIX Metal tube with grid switch and 0.4/ 1.0 mm nominal focal spot values, maximal 25 and 85 kW short time load
- grid switching in pulsed fluoroscopy mode
- anode heat storage capacity: 1.4 MHU
- continuous heat dissipation: 1.5 kW
- ROT GS-2502 tube housing for oil cooled X-ray tube with thermal safety switch.

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MRC-GS 03-10

- MRC-GS 160 03-10 Maximus ROTALIX Ceramic tube with grid switch and 0.3/1.0 mm nominal focal spot values, maximal 20 and 100 kW short time load
- grid switching in pulsed fluoroscopy mode
- anode heat storage capacity: 1.6 MHU
- continuous heat dissipation: 2.0 kW
- ROT GS-1002 tube housing for oil cooled X-ray tube with thermal safety switch.

NOTE ***The MRM-GS and MRC-GS X-ray tubes offer beam filtration for dose management. In the default settings, the MRM-GS tube offers beam filtration with a 0.2 mm Cu equivalent spectral filter and the MRC-GS tube offers beam filtration with a 0.2 or 0.7 mm Cu equivalent spectral filter (see also section 9 'Technical data').***

CAUTIONS ***In case a defective spectrabeam is detected, the user is warned that there might be a higher dose rate than usual during fluoroscopy. The following messages will then be displayed:***

- ***On the frontal display unit: 'Error'***
- ***On the acquisition console: 'Spectral filter defect Call Service'.***

In case a defective grid switch is detected, the user is warned that there might be a higher dose rate than usual during fluoroscopy. The following messages will then be displayed:

- ***On the frontal display unit 'Warning'***
- ***On the acquisition console: 'Failing gridswitch Call Service'.***

Beam limitation

The system has been provided with a beam limiting device (shutters) to limit the extent of the X-ray field. The extent of the X-ray field is automatically limited to just outside the edges of the maximum image reception area as displayed on the monitor. The size of the actual maximum image reception area is dependent on the selected II field size. The extent of the X-ray field can be manually limited with rectangular X-ray shutters.

Fluoroscopy

There are three programmable fluoroscopy modes (high, normal, and low).

The configuration of these modes is dependent on whether or not the system is fitted with the following options:

- dynamic pulsed fluoroscopy
- MRC-GS X-ray tube with SpectraBeam.

The high, normal and low fluoroscopy modes differ with regard to image quality, dose rate and image processing (dose level, pulsed/continuous fluoroscopy, beam filtration, noise reduction, adaptive contour enhancement and harmonization). The modes can be selected from the imaging TSO. The settings are configured by Service.

During fluoroscopy the dose rate is indicated on the display unit [127]. Dose reduction can be achieved by using Cu filters for X-ray beam filtration. In the default settings, with the standard MRM-GS X-ray tube a 0.2 mm Cu equivalent filter can be used in the low mode. The optional MRC-GS X-ray tube with SpectraBeam allows use of a 0.2 or 0.7 mm Cu equivalent filter.

Other fluoroscopy features:

- trace Subtract Fluoroscopy (TSF)

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- fluoroscopy image storage and archiving (frame grabbing)
- fluoroscopy stopwatch.

Options

Dynamic pulsed fluoroscopy

This option allows pulsed fluoroscopy at the frame rates indicated in the tables below, for both the basic system and the basic system with the dynamic imaging extension.

Pulse rates [pulses/s]:

50 Hz system:

Configuration	512^2 matrix	1024^2 matrix
Basic system and/or options	6, 12.5, 25	6, 12.5, 25

60 Hz system:

Configuration	512^2 matrix	1024^2 matrix
Basic system and/or options	7.5, 15, 30	7.5, 15, 30

Second TSO imaging module

An extension of the control facility for imaging selection, the second TSO can be used in parallel with the standard module at tableside. Both modules are identical and have the same functionality. They are connected to the table-base connection box. The connection offers a free choice of master and slave assignment. Any action at the master module immediately deactivates the slave module.

Parallel fluoro vascular

This option provides the parallel fluoroscopy mode, allowing the use of digitally processed fluoroscopy in parallel with viewing and processing of previously acquired images of the current and/or previous patient to increase patient throughput and procedure efficiency. Viewing console functions are suspended during exposures and enabled again after the exposures are made.

The option also provides a fluoro channel in parallel to the default fluoro channel, allowing fluoroscopy during image transfer i.e. to a CD-Medical or remote destination.

Dual fluoro

This is a digital subsystem with additional 21 inch XB monitor allowing:

- digitally processed fluoroscopy in parallel with viewing and processing of previously acquired images of the current and/or previous patient to increase patient throughput and procedure efficiency
- digitally processed fluoroscopy in parallel with Trace Subtract Fluoroscopy (TSF), providing a non-subtracted reference fluoro image for complex interventions

The option also provides a fluoro channel in parallel to the default fluoro channel, allowing fluoroscopy during image transfer i.e. to a CD-Medical or remote destination. Viewing console functions are suspended during exposures and enabled again after the exposures are made.

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Examination light

The monitor suspension is provided with a bracket for mounting the optional examination light.

4.2.5 Digital acquisition

General

The digital acquisition segment coordinates the parameters for automatic exposure control ensuring optimal X-ray tube loading.

It uses various different algorithms for different types of examinations/ exposure techniques:

- single shot mode with phototiming
- serial imaging based on image phototiming and kV control
- fast response DSA with automatic test shot and automatic exposure setting. Algorithms for ECG triggering and variable frame rate are included
- the acquisition segment includes an integrated (desktop or wall mounted) generator/examination console as the user interface for selecting and modifying acquisition protocols, display of acquisition protocols, X-ray parameters and system status messages

Storage capacity [images]:

50/60 Hz system (at 10 bits/pixel):

Configuration	512^2 matrix	1024^2 matrix
Basic or basic + DIE	57,600	14,400
Basic + SE or basic + DIE + SE	115,200	28,800

DIE = Dynamic Imaging Extension
SE = Storage Extension
- = Not possible

Frame speeds [images/s]:

Image technique DIGITAL VASCULAR (at 10 bits/pixel)

50 Hz system:

Configuration	512^2 matrix	1024^2 matrix
Basic or basic + DIE	25	6.25
Basic + SE or basic + DIE + SE	25	12.5 [1)]

60 Hz system:

Configuration	512^2 matrix	1024^2 matrix
Basic or basic + DIE	30	7.5
Basic + SE or basic + DIE + SE	30	15 [2)]

[1)] Or 25 at 8 bits/pixel.

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[2)] Or 30 at 8 bits/pixel.

Image technique DIGITAL-DYNAMIC (at 8 bits/pixel)

50 Hz system:

Configuration	512^2 matrix	1024^2 matrix
Basic system	-	-
Basic + DIE	25	6.25
Basic + DIE + SE	50	25

60 Hz system:

Configuration	512^2 matrix	1024^2 matrix
Basic system	-	-
Basic + DIE	30	7.5
Basic + DIE + SE	60	30

Image technique DIGITAL-DYNAMIC (at 10 bits/pixel):

50 Hz system:

Configuration	512^2 matrix	1024^2 matrix
Basic system	-	-
Basic + DIE	25	6.25
Basic + DIE + SE	50	12.5

60 Hz system:

Configuration	512^2 matrix	1024^2 matrix
Basic system	-	-
Basic + DIE	30	7.5
Basic + DIE + SE	60	15

- service configurable disk partition allowing allocation of the available disk capacity to two different users
- the image processor is designed for video speed image processing.

It includes:
- noise reduction (recursive filtering)
- adaptive contour enhancement with 9 x 9 kernel size
- harmonization.

Maximum patients and runs

The maximum number of patients (examinations) is 100 and the maximum number of runs is 999. Three runs are pre-set for each examination.

Options

Dynamic imaging extension

This option allows vascular and cardio-vascular dynamic imaging with continuous kV/mA control as well as locked kV/mA techniques.

The package increases the maximum digital acquisition frame speed, the maximum fluoro pulse rate and the storage capacity of the basic system. For vascular systems from release 11 onwards, this option provides dynamic pulsed fluoro with continuous kV/mA control as well.

Area Exposure Product (AEP) meter

The area exposure product meter provides patient dose measurement during examination. Measurements are shown on the near-monitor display (display unit).

Bolus chase plus

For visualization of vessel structures, especially in the lower peripherals, when the blood flow is difficult to estimate. It solves the problem of cumbersome step movements, the mismatch between blood flow and selected program, and lack of real time image information. During acquisition with uninterrupted real-time image display, the contrast bolus is permanently followed (chased) by the motorized table scan movement at a speed matched to the blood flow. For operator convenience bolus chase can be carried out using either interactive or programmed speed control with a choice of speed profile curves. Viewing is possible in subtracted and non-subtracted mode. The required acquisition program is selected from the acquisition console.

Interactive bolus chase

In interactive mode the operator uses a hand-held speed controller to match the table scan speed to the blood flow during digital acquisition in non-subtracted mode with real time image display. The frame speed can also be matched to flow. The bolus run is followed by a mask run which is carried out with the speed profile and frame speed used for the bolus run. Viewing is possible in subtracted and non-subtracted mode. If subtracted viewing is not required, the mask run can be skipped.

Automatic bolus chase

This provides digital acquisition in non-subtracted mode with real time image display. The table scan movement and frame speed are programmed but the operator has a choice of speed profile curves. The bolus run is followed by a mask run performed with the speed profile used for the bolus run. Viewing is possible in subtracted and non-subtracted mode. If subtracted viewing is not required, the mask run can be skipped.

Optimal table scan movement is achieved by adjustment for patient height. Further dose reduction is achieved by appropriate adjustment of the number of exposures during the scan movement.

The option comprises:

- tabletop motor drive and hand-held speed controller
- automatic exposure control.

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Dose/Examination report

This is an optional report facility for examination or dose data. The report can be printed, in A4 format using the standard ASCII character set, on any standard printer to complete the patient file. The printer is connected to the acquisition console via a parallel (centronics) interface. The report is printed at the touch of a button on the acquisition console at the end of the examination. The facility is configured (by Service) to print a condensed dose report or an extended examination report in one of the available languages (English, French, German or Spanish).

The dose report provides the following information:

- hospital name and city
- examination date and time of patient entry
- patient demographics
- cumulative fluoroscopy time
- cumulative fluoroscopy dose (see note)
- cumulative exposure dose (see note)
- cumulative total examination dose (see note)
- total number of runs
- per run: run number, real start time, kV, mA, mAs, ms (last used value, per channel).

NOTE ***Only with 'Area Exposure Product (AEP) meter' option***

The examination report gives the following information in addition to that provided in the dose report:

- per run: number of images, APR used, run speed, angulation/rotation per channel
- SID, II format used.

The option comprises:

- report software package
- standard parallel interface on the Acquisition console. The maximum cable length is 5 meters (196.9 inches).

Physio display

Extension for acquisition, storage and display of physiological signals.

The option provides:

- acquisition and storage of 8 channels of physio data with images
- display of one user-selected physio channel selected during image review.

Rotational Angiography

Rotational Angiography is an acquisition procedure that gives information on the 3-dimensional structure of blood vessels through rotation of the C-arm during image acquisition. One of the system acquisition programs is used to select the procedure and its specific parameters. The rotational end and start positions can be selected by the operator and stored using the store/recall buttons on the geometry module. The procedure is controlled using the exposure hand or foot switch, or the injector hand switch.

For subtraction rotational angiography, two acquisition runs are made. After the first (mask) run, the stand automatically returns to its start position, ready for the second (dye) run. The images are displayed in non-subtracted mode during acquisition. Subtraction can be carried out during viewing.

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The option provides:
- maximum rotation speed of 30°/s
- maximum scan ratio of 180°

frame speeds [images/s]:

PHOTOTIMED exposure technique:

50 Hz system:

Configuration	512^2 matrix	1024^2 matrix
Basic	15	8
Basic + SE	15	15

60 Hz system:

Configuration	512^2 matrix	1024^2 matrix
Basic	15	7.5
Basic + SE	15	15

kV/mA exposure technique (see note):

50 Hz system:

Configuration	512^2 matrix	1024^2 matrix
Basic system (see note)	25	Not possible
Basic + Storage extension	25	12.5

60 Hz system:

Configuration	512^2 matrix	1024^2 matrix
Basic system (see note)	30	Not possible
Basic + Storage extension	30	15

NOTE ***With the Dynamic Imaging Extension option installed the rotational angiography APRs use kV/mA exposure techniques, the other rotational angiography APRs use phototimed exposure techniques.***

200X Ultrasound Scanner

Required for all applications where ultrasound is used to support interventional procedures. The ultrasound unit is mounted on the monitor support for safe and convenient access and parking. Ultrasound images are displayed on the frontal Examination monitor in the examination room and in the control room. The user interface contains a storage facility for two probes and a control panel that provides the following functions: power on/off, time gain control (total gain, far gain and near gain), freeze image, increase/decrease image depth, biopsy line on/off, reverse image, probe selection, distance measurement, and toggle display between U.S./X-ray imaging.

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Any two of the following probes can be connected to the scanner: 7.5 MHz linear array, 3.5/5.0 MHz curved array, 3.5 MHz high-definition curved array and 5.0/7.5 MHz curved array. Needle guide accessories can be provided for the 7.5 MHz linear array, the 3.5/5.0 MHz curved array and the 3.5 MHz high-definition curved array probes.

4.2.6 Viewing

The viewing segment comprises:

- desktop viewing console with SyncraTouch control, providing direct access to multiple viewing/post-processing functions for efficient operation. It includes:
  - alphanumeric keyboard and display for patient administration, a control panel and a 17 inch XB monitor for permanent image viewing
  - clinical application software packages with short response times (optional)
- tableside viewing in the examination room using an infrared remote controlled SyncraTouch viewpad (2 viewpads included) or the Tableside Analysis Module (TAM).

The viewing console provides controls for image selection, processing, subtraction, photofile/reference, text & annotation, selection for transfer and other general functions.

Viewpad

Viewpad functionality can be configured to the user's preference at installation.

Options

CO_2 trace

Software package for stacking images acquired with CO_2 injections.

Coronary quantification software package

Functions:

- vessel diameter/stenotic index
- Automated Coronary Analysis (ACA)
- calibration routines.

Left ventricular quantification software

For analysis of left ventricular angiograms. Calculates the Ejection Fraction (EF), ventricular volumes and Wall Motion (WM) parameters.

Functions:

- Automated Left Ventricular Analysis (ALVA)
- manual EF
- regional wall motion
- centerline wall motion
- Slager wall motion
- calibration routines
- recalculate EF
- recalculate ALVA.

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Autocalibration
This option avoids the need for manual calibration for objects in the isocenter when using the left ventricular quantification software package.

Tableside Analysis Module (TAM)
Provides processing facilities and (optional) quantification software at the table to further improve procedure efficiency

With the TAM connected to the patient accessory rail via a dedicated holder the operator can perform post-processing and quantification functions without leaving the catheterization room.

The option comprises:
- a module (TAM) with five push-buttons and a joystick for (configuration dependent) control of image selection, processing, subtraction, photofile/ reference, text & annotation, selection for transfer and other general functions
- holder for infrared remote control SyncraTouch viewpad
- holder for module, which can be connected to the table accessory rail.

4.2.7 External communication

Digital output for connection to a digital laser Hard Copy Unit (HCU).

Options

Analog output
For connecting an (analog) PMI 11 RC or PMI 3000 multi-image camera.

CD-Medical interface
High speed digital interface for exporting digital images, and patient and examination data to compatible equipment.

Optical Disk Recorder (ODR)
Suitable for erasable 5 1/4 inch optical disks. Each disk holds approximately 300 high resolution X-ray images. Image transfer is performed in 'background mode' meaning that the system remains available for other functions during transfer.

Standard line rate video output
Standard 625 lines (50 Hz) or 525 lines (60 Hz) video output board. Required for connection of standard line rate video peripherals such as a Video Cassette Recorder (VCR) and/or extra monitor.

High-Speed DICOM Image Interface
Interface for the export of exposure runs, single images, heartbeats and photofile from INTEGRIS H and V systems to an external destination.

One output format can be selected from the following:
- DICOM secondary capture for photofile images
- DICOM XA, unprocessed and uncompressed images, multiframe XA objects for cardiac exposure runs
- original images, with all processing specified as private attributes, to be used with EasyVision release 4.2 onwards.

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The High-Speed DICOM Image Interface can be extended with the option:
- Compressed DICOM XA:
  providing JPEG lossless 2:1 compression and edge enhancement for cardiac exposure runs.

Radiology Information System (RIS) interface

Software package to allow communication of the INTEGRIS system with a departmental information system. The interface makes use of the DICOM Worklist Management (WLM) and Modality Performed Procedure Step (MPPS) protocols.

If a hospital has an INTEGRIS system and a Cardiac or Radiology Information System (CIS or RIS), it will be possible to import patient and examination information from the IS (request) and to report examination results to the IS in order to:
- eliminate the need for retyping patient information on the INTEGRIS system
- prevent errors in typing of patient name or examination ID. This ensures consistency with the information on the IS, and prevents problems in archive clusters or for searching for a name in case of later retrieval
- inform the IS about the acquired images and radiation dose.

Upon request from the INTEGRIS system, the complete worklist with all relevant patient and examination data is imported from the IS to the INTEGRIS system. For each patient the following information will be shown on the INTEGRIS system after it has been imported from the IS:
- patient data:
  - patient name
  - birth date
  - sex
  - examination ID.
- examination/request information:
  - accession number (displayed as examination ID)
  - scheduled start time
  - scheduled physician's name.

NOTE ***It will at all times be possible to enter manually patient demographics information within the Integris in case of an emergency or in case the IS connection is down. However, IS received patient data may not be modified within the Integris.***

On request of a clinical user, the INTEGRIS system will export the following information to the IS:
- patient data:
  - patient name
  - birth date
  - sex
  - examination ID.
- examination/request information:
  - accession number (displayed as examination ID)
  - performed procedure status, start/end date and time
  - performed physician's name
  - referenced image sequence.
- radiation dose:
  - total time of fluoroscopy
  - accumulated fluoroscopy dose
  - accumulated exposure dose

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- total dose
- total number of exposures
- total number of images.

Further detailed information can be found in the Integris DICOM Conformance Statement.

The interface requires EasyLink hardware and software if the IS is not DICOM Work List Management and Modality Performed Procedure Step compliant.

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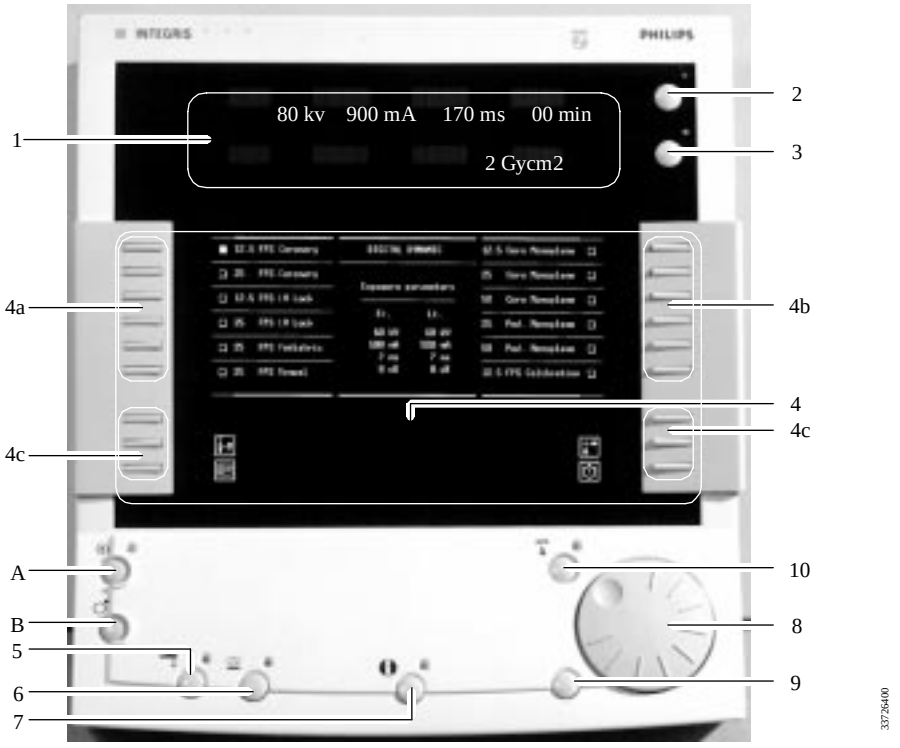
4.3 Controls and indicators

This Section describes all the controls, indicators and displays, and their interrelationships. The numbers refer to the key numbers shown on in-text illustrations and to the survey of all controls and indicators given in Section 11, 'Legend'.

4.3.1 Acquisition console

The Acquisition console can be placed on a table or mounted on a wall in the examination room or control room.



Acquisition console

A 

Power on and reset.

Pressing this key switches on the generator and all components of the system except the Digital Imaging System, which must be switched on separately. When the system is switched on, an automatic self-check will be performed. A message 'System Starting' is displayed with a walking busy indicator. The light next to key [A] comes on to indicate that the power is on.

NOTE ***To avoid malfunction, do not touch any key during the Switch-On process.***

The system is set to the default settings configured during installation. Pressing Power on when the system is already switched on, resets the system. After certain errors, the system will reset automatically. Notify Service if automatic resets occur frequently. After a system reset, most of the parameters will have the values they had previously.

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B 

Power off.

Switch off takes 2 seconds during which time the light next to key [A] will flash. The Digital Imaging System must be switched off separately.

1 **Display of generator related parameters**

Displays:

- radiation on
- fluoroscopy on ('eye' symbol)
- fluoroscopy or exposure parameters: kV, ms, mA or mAs, depending on the selected imaging technique.
- cumulative patient dose in $Gycm^2$ (4 digits). Every time X-radiation is stopped, the cumulative patient dose is displayed. The dose rate is updated every second.
- cumulative fluoroscopy time in intervals of 0.1 minute (4 digits)

2 **Reset fluorocopy time buzzer**

A buzzer sounds and the light next to the key goes on after every 5 minutes cumulative fluoroscopy time. Pressing this key switches off the buzzer and light. If this is not done, fluoroscopy is automatically switched off after a further 5 minutes. The light next to the key remains on and the buzzer will continue to sound.

NOTE ***The other audible signals from the acquisition console are an end of exposure radiation beep (0.1 s), and under/over exposure beep (0.1 s).***

3 **X-ray control**

When [3] is pressed, X-radiation is inhibited. This avoids accidental activation of X-radiation. All other user controls remain enabled. The inhibited status is indicated by an indicator lamp near the key and the message 'X-radiation disabled' displayed on the acquisition console and the display unit in the examination room. Press the key again to re-enable X-radiation.

4 **Display and selection keys for acquisition related parameters**

The display shows the imaging techniques that can be selected and, after an imaging technique has been selected, it shows the APRs available for acquisition together with the main exposure parameters and system and/or error messages when applicable. Main and sub APRs are available for digital vascular techniques. The layout and the type of information displayed depend on the imaging technique activated. For a survey of possible layouts see Section 4.5, Overview of Acquisition and Viewing Displays.

Screen saver

If configured, the display switches to a digital clock refreshed every 5 seconds, when nothing changes on the display for a pre-set period of time. This time can be set by Service to between 1 and 60 minutes. If a soft key [4a,b,c] is pressed, the screen is restored without performing the key's function. If any other key on the Acquisition console is pressed, the screen is restored and the key's function is performed.

4a/b **Select imaging technique or APR (main/sub)**

When power is switched on, the default APR for the default imaging technique is automatically selected. The corresponding boxes are highlighted. Another main APR can be selected by pressing one of the other keys [4a/b]. The APRs are configurable by Service. If 'Digital Vascular' is selected as

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imaging technique, the main APR can be selected with [4a] and the sub-APR with [4b]. The corresponding boxes will flash to indicate that the system is busy with this function. After some seconds the box will be highlighted, indicating that the system is ready to carry out this function. During this period another main APR or sub-APR can be selected. If another APR or sub-APR was already selected (box highlighted) the highlighting will be switched off. If the imaging technique page is displayed, after pressing the imaging technique function key [4c], keys [4a/b] can be used to activate another imaging technique. When a new imaging technique is selected, the last APR selected for that imaging technique becomes the current one, and user adjustments made for that imaging technique become applicable.

4c **Acquisition function keys**

The actions of the six acquisition function keys depend on the installed configuration and on the selected page displayed.
The following functions can be programmed for the acquisition function keys.

- imaging technique
- subtraction
- one/two-knob injection
- display stopwatch
- variable frame rate
- print dose/examination report

The system ignores selection of unprogrammed function keys.

Imaging technique.

Depending on the system configuration, the following Imaging Techniques can be selected:

- digital vascular:
  - lock-in mode
    Exposure characteristics are calculated on the basis of on one test shot with phototiming. kV/mA/ms is locked-in during the run.
    • single sequential scan mode:
    No integration of frame time periods. Frame rate ≤ 25 (30) images/second.
    • integrated sequential scan mode.
    A specific number of frame time periods are integrated during one exposure pulse to construct one image.
  - bolus Chase mode:
    • phototiming with kV control for frame rate ≤ 8 (10) images/second.
    • cine technique (automatic kV/mA): frame rate ≥ 12.5 (15) images/second.
  - user-defined subtracted Bolus Chase mode:
    • phototiming with kV control for frame rates ≤ 8 (10) images/second.
  - predefined subtracted Bolus Chase mode:
    • phototiming with kV control for frame rates ≤ 8 (10) images/ssecond.
  - rotational scan mode:
    • cine technique (kV/mA automatic): frame rates ≥ 12.5 (15) images/second.
    • phototimer technique (kV control): frame rates ≤ 12.5 (15) images/second.
- digital dynamic acquisition:
  - digital cine technique, kV/mA control (auto and manual mode (locked and unlocked)).

- digital dynamic + Cine
  - kV/mA control (auto and manual mode (locked and unlocked)).
- cine acquisition (conventional cine)
  - kV/mA control (auto and manual mode (locked and unlocked)).
- miscellaneous acquisition (monoplane only):
  - miscellaneous (stationary) mode, kV/mas and kV/mA/s control.

NOTE ***If fluoroscopy is active, Miscellaneous acquisition cannot be selected. All other imaging techniques can be selected during fluoroscopy.***

When the related function key is pressed, the APR page belonging to the selected imaging technique is displayed on the Acquisition console after a few seconds and the current APR for this technique is automatically selected. When an imaging technique is reselected, the last-used APR for that technique, including any user adjustments to its parameters, becomes the current APR.

When the imaging technique page is displayed, pressing the exposure hand switch or foot switch will result in:
- display of the current APR page belonging to the current imaging technique, and
- acquisition.

Subtraction.

Subtracted acquisition using this key is only possible when the digital dynamic technique has been selected.Once selected this function remains enabled and the 'Subtraction' box remains highlighted until another imaging technique or a new patient is selected or a reset is performed. Pressing the key a second time deselects subtraction.In the digital vascular imaging technique, subtraction is part of the APR program.

Selection of one- or two-knob acquisition.

Press this key to activate one-knob operation. The exposure is activated with the injector hand switch. The contrast medium is injected when the system is ready and the exposure run is made according to the currently-selected APR. Note that acquisition can still be activated with the foot switch or hand switch. If the injector hand switch is pressed during fluoroscopy, contrast medium will be injected but acquisition will not be activated. Deactivate one-knob acquisition when two-knob operation is required.

Use the foot switch or hand switch to start exposure and the injector hand switch for injection. Consult the injector manual for details of how to program and select injector parameters such as inject delay, flow rate, volume, pressure etc.

Display stopwatch.

Press the Display stopwatch key to select the Stopwatch function. The corresponding box is highlighted and a stopwatch symbol with the stopwatch time is displayed in the right corner of the Examination monitor, on the Acquisition console and on the Display unit. The initial display is '0'. Depending on the configured stopwatch type (Service), the stopwatch will behave like a normal stopwatch, up to 9 minutes 59 seconds or each time fluoroscopy is activated the stopwatch displays the elapsed time

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in seconds up to a maximum of 9 minutes 59 seconds (i.e. a display of 9:59). The function can be activated before and during fluoroscopy. Press this key again to deselect the function.

Variable Frame Rate (VFR).

If VFR values are included in the chosen APR for the Digital Vascular Imaging Technique it is possible to toggle between two acquisition speeds during digital acquisition using this key on the Acquisition console (or key [157] on the Imaging module). This function can be performed more than once during acquisition. The acquisition speed is displayed on the Acquisition console. The current acquisition speed is the first acquisition speed displayed.

Print dose/examination report.

Depending on the installed configuration, pressing this key prints either a dose or an examination report. The content of these reports is described in Section 5.6 'Archiving'. A maximum of 500 runs per patient can be stored. Cumulative time, cumulative dose and the total number of runs will not be reset. Pressing this function again before printing is complete cancels the printing process. Printing is performed in the background.

Patient orientation

5 

Legs up.

See [6].

6 

Nose down (patient prone).

These functions allow the orientation of the image display to match the position of the patient on the table and must be set before exposure.

The following conditions are assumed:
- the top of the monitor corresponds to the patient's head
- the bottom of the monitor corresponds to the patient's feet
- the right side of the monitor corresponds to the patient's left
- the left side of the monitor corresponds to the patient's right.

The default setting is nose up and legs down (keys unlit). Four orientations are possible:
- 'Normal': Patient on back with head at tabletop head
- 'Legs-up': Patient on back with feet at tabletop head
- 'Nose-down': Patient on stomach with head at tabletop head
- 'Legs-up' and 'nose-down': Patient on stomach with feet at tabletop head.

7 

Display information.

Pressing [7] displays detailed information on the current exposure and fluoroscopy parameters for the imaging technique selected. Only the exposure information for the active channel is displayed. Fluoroscopy information is displayed for both channels. To cancel the function, press [7] again or press the |Imaging technique| [4c] or |New patient| [4c] key. If fluoroscopy or exposure is started while this page is displayed, it remains displayed.

8 **Dial wheel.**

Used to decrease or increase a parameter value.

9 **Enter.**

Used to confirm a new choice of parameter or a change in parameter value.

10 

Alter APR parameters.

To change APR parameters.

4.3.2 Viewing console, TAM and viewpad

When digital acquisition or functions on the TAM/Viewpad are initiated in the examination room, all viewing functions at the viewing console are (temporarily) disabled. The 'Viewing mode frozen' symbol is displayed in the top right corner of the Viewing monitor, if the system is switched to parallel viewing mode. The 'Viewing mode frozen' symbol will disappear if a viewing function on the viewing console is activated or if the parallel viewing mode is disabled (see Section 4.5.2 'Monitors').

For a description of the viewing functions see Section 4.3.3 'Viewing functions'.

Viewing console

The viewing console consists of:

- power on/off keys, the power of the viewing subsystem (including the viewing console) is switched on or off with these keys. Depressing the on key immediately results in a reset of the viewing subsystem (warm-restart)
- a monitor for display of images and information related to the examination selected for viewing
- keys, for selection and processing of images
- a mouse, used for certain review functions
- a keyboard, for selecting the control and status pages (keys [F1] to [F10]), entering data, and selecting items on the screen with the cursor keys
- a text display and 8 keys for selecting functions on the control and status pages. These pages are described in Section 4.4
- an intercom unit, for communication between the examination and the control room.

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Text display

C 

Digital imaging system power on.

When the system is switched on, a self-test is performed at the end of which a start up page is displayed showing the release implemented and a copyright statement. The total start-up time is about 5 minutes. To prevent malfunction, do not touch any key during the Switch-on process. Pressing [C] when the system is already switched on resets the digital imaging system.

D 

Digital imaging system power off.

Pressing this key switches off power to the digital imaging system. During the shut down period (about 10 seconds) the light in [D] flashes and the Viewing console cannot be switched on. At the end of this period, the digital imaging system will be switched off.

15 **Function keys**

Keys to activate the functions of the control or status page displayed.

16 

Talk.

See [17].

17 

Listen.

The intercom system consists of a microphone, speaker, volume control and headset jackplug, together with two keys for selecting 'listen' or 'talk'. These two functions are not automatic and must be activated by the operator after the system has been started up. 'Talk' is only active while key [16] is held down. 'Listen' is activated when [17] is pressed. 'Listen' remains active until [17] is pressed again. 'Talk' overrides 'Listen'. An indicator [120] on the Display unit lights when the intercom is on.

NOTE ***When a headset is connected (jackplug), both the internal loudspeaker and microphone are bypassed.***

18 **Volume control.**

The volume control is situated near the speaker on the back of the console

NOTE ***A remote intercom with headset is available as an option. The 'listen' function can be selected separately on each intercom. Activating the talk function on one intercom deselects this function on the other intercom.***

Keyboard

The keyboard is used to select control and status pages with the function keys [F1] to [F10], to enter alphanumeric data and to select objects on the screen with the cursor keys [20].

20 **Cursor keys.**

Cursor up, cursor down, cursor left and cursor right. The cursor is visualized by means of a blinking underline.

21 **Enter.**

To confirm a keyboard entry or selection and to move to the next entry field.

22 **Delete.**

To delete the previous character/space.

23 **Tab.**

Not used.

24 **Function keys.**

These keys are used to display one of the Control and Status pages:

- F1 Schedule page: used to enter and select scheduled examinations for acquisition
- F2 Review page: used to select acquired examinations for viewing
- F3-F5 Function depends on system configuration, function keys [F3 to F5] can be configured to access the Transfer page, and the Transfer page can be configured to list all possible archiving systems. The remaining function keys can be configured to access separate archiving system pages. Configuration is carried out by Service. The following configurations are possible for keyboard function keys [F3 to F5]:
  - Report page: enables the user to report a selected examination to a connected information system
  - Export page: lists all examinations flagged for transfer to a configured export station.
  - ODR page: used to control all actions of an optical disk recorder
  - Copy page: used to copy photofiles from completed examinations to a remote HCU
  - Transfer page: All, or a selection of, the archiving functions: Report page, Export page, ODR page and/or copy page.
- F6 System page: to set the date and time, to make a test image and to enter ‘Service mode’

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- F7 Physician page: used to enter the physician names and codes with the related disk partition and station name
- F8 Reserved
- F9 Status page: displays information on the progress of actions started
- F10 Help page: displays an overview of all configured control and status pages.

An overview of the control and status pages is given in Section 4.4.

Mouse

The mouse is used to interact with the graphic elements (cursor etc.) displayed on the monitors.

25 **Accept.**

Click [25] to confirm a selected item or position.

26 **Action.**

Click [26] to activate a selected function.

27 **Reject.**

Click [27] to terminate a function.

Viewing keys

It is possible to assign selected functions to certain keys during installation (see table at end of section). The installed system may therefore be controlled by keys at other locations than those described here. Functions not available on the console can (if configured) be activated with one of the Menu keys or with keys on the tableside analysis module or viewpad. In general, the indicator light between a key and its nameplate or symbol will be on if the corresponding function is active. If the system is unable to perform a function, the key indicator flashes until the function key is released. If the current acquisition examination is the same as the current viewing examination, the viewing console indicators show the functions activated with the analysis module or viewpad in the examination room.

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Vascular viewing keys

The relevant viewing functions [32, 33 and 91] are described in section 4.3.3 ‘Viewing functions’.

For an overview of the viewing console functions see table at the end of this section. The viewing functions [30 - 98] are described in section 4.3.3 ‘Viewing functions’.

Tableside Analysis Module (TAM)

The TAM allows image processing and quantitative analysis to be performed at the tableside for rapid and reliable diagnosis in the examination room. A Viewpad can be parked on the TAM. The functions of both the TAM and the Viewpad are only active for the current acquisition patient.

For an overview of the TAM functions, see the table at the end of this section. The TAM functions [100 - 104] are described in section 4.3.3 ‘Viewing functions’.

Mouse functions can also be performed with the following keys on the TAM.

105 

Accept.

As [25]. Press to confirm a selected item or position.

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106 

Action.

As [26]. Press to activate a selected function.

107 

Reject.

As [27]. Press to terminate a function.

108 **Joystick**

This is used to simulate mouse movements (moving the joystick moves the cursor across the screen at a speed proportional to the displacement of the joystick from its central position) and for functions with a variable parameter (speed, contrast etc.), it can be used to increase or decrease the parameter when the function is activated.

Viewpad

The Viewpad is a remote control device using Infrared Radiation (IR). The IR transmitter is located on the front end of the Viewpad and, if obstructed, no signals will be transmitted. The location of the IR receiver is fixed during installation. A green light on the receiver indicates that the selected command has been accepted. The Viewpad will function when packed in a transparent sterile cover. During installation, some key functions can be configured to user's preference. The Viewpad is battery powered and the batteries must be replaced regularly.

CAUTION ***Remove the batteries when the Viewpad will not be used for a long time.***

Identical Viewpads are interchangeable. Therefore, if two identical Viewpads are used in the same room, they may interfere with each other if used simultaneously, causing uncontrolled behaviour. And, if several INTEGRIS systems are in the same room, Viewpad commands for one system may start actions on another.

WARNINGS

- ***Do not use the Viewpad when more than one INTEGRIS system is in use in the same room.***
- ***Infrared signals from the Viewpad may interfere with other infrared-controlled equipment in the room. Before using the Viewpad in a procedure, check that there is no interference with other equipment.***

Battery replacement

For safe operation, the batteries have to be replaced at regular intervals. To replace the batteries, open the cover on the rear of the Viewpad, remove the old batteries and place new batteries in the position indicated in the battery compartment. Battery type: Philips 'Penlite' LR03.

NOTE ***Batteries harm the environment; dispose of the old batteries in an environmentally sound way.***

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For an overview of the Viewpad functions, see the tables below. The corresponding Viewing console functions are described in section 4.3.3 ‘Viewing functions’.

Function overview

Selection

Key number			Function	Viewing console	TAM	Viewpad
Viewing console	TAM	Viewpad				
30/31		d, c	View forward/reverse	F	-	F
32/33			Step to next/previous run	F	C	C
34/35			Reserved	-	-	-
36		e	Cycle through run	S	C	S
37			Cycle through examination	C	C	C
38/39			Higher/lower speed	F	-	-
40			Run overview	S	C	C
41		f	Examination overview	S	C	S
42/43			Reserved	-	-	-

Processing

Key number			Function	Viewing console	TAM	Viewpad
Viewing console	TAM	View-pad				
45/46		i, h	Contrast increase/decrease	F	C	S
48/49			Brightness increase/decrease	F	C	C
51/52			Edge enhancement inc/dec.	F	C	-

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Key number			Function	Viewing console	TAM	Viewpad
Viewing console	TAM	View-pad				
54			Select video invert	F	C	C
55	103		Pan & zoom	S	S	-
56*		g	Center zoom	-	-	S
57			Position shutters	S	C	-
58			Override manual adjustments	F	C	-

Subtraction

Key number			Function	Viewing console	TAM	View-pad
Viewing console	TAM	View-pad				
60		a	Subtraction on/off	S	C	F
61			Move mask	F	-	-
62		b	New mask	F	C	F
63			Average mask	S	-	-
64	101		Pixel shift	S	S	-
65			Run subtract	C	C	-
66	104		Landmarking	S	S	-
67			View trace	S	-	-
68			CO_2 trace	C(o)	C(o)	-

Photofile/reference

Key number			Function	Viewing console	TAM	View-pad
Viewing console	TAM	View-pad				
70			Store image in photofile	F	C(k)	-
71			Delete image from photofile	F	C(k)	-
72/73			Reserved	-	-	-
74/75*		j,k	Store reference 1/2	-	-	S
76/77			Reserved	-	-	-
78/79*		l,m	View reference 1/2	-	-	S
80/81			Reserved	-	-	-

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Text & annotation

Key number			Function	Viewing console	TAM	View-pad
Viewing console	TAM	View-pad				
85			Add text	S	-	-
86			Annotation	S	-	-
87			Display physiological data	C	C	C

Selection for transfer

Key number			Function	Viewing console	TAM	View-pad
Viewing console	TAM	View-pad				
90			Flag image	C	C	C
91			Flag run	F	C	C
92			Flag heartbeat	C	C	C
93			Flag examination	C	C	-
94			Examination dump	C	C	C

General

Key number			Function	Viewing console	TAM	View-pad
Viewing console	TAM	View-pad				
95/96/97	102		Menu 1/2/3	F	F	-
98	100		Analytical programs	C(o)	C(o)	-

Legend

F	Fixed position	C(k)	Configurable as key, not in menu
S	System default but reconfigurable	C(o)	Only with option present
C	Configurable	C(v)	Only with vascular option
*	Only configurable on Viewpad(s)	S(k)	As S, but not configurable in menu
-	Not possible	-	-

NOTE

Configurable functions (indicated with a 'C') can be configured for:

- ***All keys on the two top rows of the Viewing console, except the Menu keys [95-97]; keys [34, 35] are also configurable)***
- ***All keys of the TAM, except the |Menu Tam| key [102]***
- ***Keys [e-m] of the Viewpad***

4.3.3 Viewing functions

Selection

30 

View forward.

See [31].

31 

View reverse.

During forward or reverse viewing, the images are displayed in the sequence in which they were acquired, or in reverse sequence. The image numbers are updated. If this function is activated when there is no current viewing run, the first (last) image of the first run of the current viewing or acquisition examination (not the photofile run) is displayed. If there is no run other than the photofile run, the middle image of the photofile is displayed first. Images are displayed with the current processing parameter settings. The image-processing functions (contrast, brightness and edge enhancement) applied to the current image are shown on the Viewing console. When a run boundary is reached the key must be released and pressed again to go to the next or previous run. If there is no next or previous run, pressing the key has no effect.

Fast viewing

When the forward or reverse key is held down for longer than 0.5 s, the next or previous images are displayed in the sequence in which they were acquired at a rate of 3 images/s for acquisition speeds < 3 images/s, ECG-triggered runs and photofile runs, or at the default speed for acquisition speeds > 3 images/s. The default speed is set during installation and can be increased or decreased with [38] or [39]. If the requested display speed exceeds the capability of the system, images are skipped. The maximum display speed for the photofile is the maximum rate at which images can be displayed without skipping. For VFR runs, the acquisition speed is taken to be the maximum speed during acquisition of the run.

32 

Step to next run.

See [33].

33 

Step to previous run.

These functions [32, 33] allow the operator to step quickly through the runs of the viewing examination. The middle image of the next/previous run is displayed. If the |Step to next run| [32] or |Step to previous run| [33] key is pressed during the last/first run, no action is performed. If either key is held down for more than 0.5 s, stepping is continuous at a rate of 1 step/s until the key is released, or the start or the end of the examination has been reached.

NOTE ***If [32+30] or [33+31] are pressed, the last or first run is displayed immediately, skipping the runs in between.***

The run information (number of images, current image and mask image) is updated continuously. For a run acquired with subtraction, the system displays a subtracted image constructed from the mask image selected during acquisition and the 'middle' image of the run. Otherwise the 'middle' image is displayed non-subtracted. For photofile runs the middle image is displayed.

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34-35 **Reserved.**

36 

Cycle through run.

If this function is activated immediately after acquisition, the images of the current run are displayed one after the other, starting with the first image. All viewing functions, such as increased contrast, pixel shift etc. are enabled. If there is no current viewing run, the first exposure run of the current viewing examination is used as the current viewing run. If there is no exposure run, the photofile run is used. When the last image has been displayed, the process is repeated from the first image. This continues until the key is pressed again or until a set time (configurable by Service) has elapsed. The currently displayed image will then remain visible on the monitor. The default cycle speed is set during installation (with possible values of 0.5, 1.5 or 2.0 times the acquisition speed) and can be increased with [38] or decreased with [39]. For photo and ECG-triggered runs, the display speed is set at 3 images/s. If the requested display speed exceeds the capability of the system, images are skipped.

37 

Cycle through examination.

If configured, pressing [37] cycles through all exposure runs in an examination (photofiles excluded). The Cycle through examination function begins with the current image. If there is no current run or if the current run is the photofile, the function starts with the first image of the first exposure run. The default cycle speed is the same as for the Cycle through run function [36] and is set during installation (with possible values of 0.5, 1.5 or 2.0 times the acquisition speed). The cycle speed can be adjusted with |Higher/lower speed| [38, 39]. For ECG-triggered runs, the display speed is set at 3 images/s. If the requested display speed exceeds the capability of the system, images are skipped. Cycle through examination continues until key [37] is pressed, or an examination has been displayed four times, or a new run or examination is selected. The last image displayed when the function stops remains on the monitor(s).

38 

Higher speed.

See [39].

39 

Lower speed.

The viewing speed for view forward/reverse [30, 31] and cyclic viewing [36, 37] of the current run can be modified.

Approximate speed settings [images/s] available:
- 50 Hz: 0.5, 1, 2, 3, 4, 6, 8, 12.5, 25, 50 and 100.
- 60 Hz: 0.5, 1, 2, 3, 4, 6, 7.5, 10, 15, 30, 60 and 120.

If either key is kept pressed for more than 0.5 second, the display speed increases or decreases at a rate of 2 steps/s until the key is released or the maximum or minimum speed has been reached. If the requested display speed exceeds the capability of the system, images are skipped. The maximum display speed for the photofile is the maximum speed at which images can be displayed without skipping.

40 

Run overview.

This function can be used to check whether all images of the current run are flagged for transfer. Pressing [40] displays 20 images (5 x 4 matrix) of the current run (16 images for a photofile) at lower

resolution with the current processing parameters for: Contrast, Brightness, Image inversion, Subtraction and Run subtract. The image sequence and symbols used are as follows:

a: first image displayed
b: previous page indicator
c: flagged image indicator
d: flagged heartbeat indicator
e: flagged run indicator
f: next page indicator
g: last image displayed

No flagging indicators will be shown if Run overview [40] is activated while the Run subtract function [65] is active. The upper left and lower right corners show the image number of the first/last image displayed. The symbols ← / →indicate the existence of a previous/next page. If the number of images in the run is less than 20 some of the frames will be blank. A rectangular frame marks the current image. The marker can be moved with the |View forward| [30] and view reverse [31] keys to select another current image. If the |View forward| [30] or |View reverse| [31] key is pressed for + 0.5 s, the marker moves at a rate of about 5 images/s. When the marker reaches the first or last image it stops at that position. Pressing [30, 31] when the current run marker is at the end or beginning of the overview page, displays the next or previous overview page , if present. If [30 or 31] is pressed before an overview page is completed, build-up of the next or previous overview page will start. The center image of the next or previous run can be selected with keys [32, 33]. During run overview, all image processing functions are disabled. Pressing [40] again, displays the selected (current) image of the current run at full-screen size. Pressing |Cycle through run| [36] starts cycling.

NOTES ***The time required to build up the overview display depends on the number of disks installed and the matrix resolution.***

41 

Examination overview.

This function can be used to check whether all runs in one examination are flagged for transfer. Pressing [41] displays the center images of 20 runs in the current examination (with the exception of the photofile run but including the current run) in a 5 x 4 matrix at lower resolution. The image sequence and symbols used are as follows:

a: center image of run 01
b: center image of run 06
c: center image of run 10
d: flagged image indicator
e: flagged heartbeat indicator
f: flagged run indicator
g: next page indicator
h: run number of first run displayed
i: previous page indicator
j: run number of last run displayed

The top left and bottom right corners show the run number of the first/last run displayed. The symbols ← / →indicate the existence of a previous/next page. If the number of runs in the examination is less than 20 some of the frames will be blank. The current run is marked with a rectangular frame. The marker can be moved with the forward and reverse keys [30, 31] to select another current run. If the |view forward| [30] or |View reverse| [31] key is pressed for + 0.5 s, the marker moves at a rate of about 5 images/s. When the marker reaches the first or last image it stops at that position. Pressing [30, 31] when the current run marker is at the end or beginning of the overview page displays the next or previous overview page, if present. If [30 or 31] is pressed before an overview page is completed, build-up of the next or previous overview page will start.

For runs containing a selected image for transfer, the center image of that run is marked accordingly. All image processing functions are disabled during examination overview. Pressing [41] again displays the selected (current) image of the current run at full-screen size. Pressing |Cycle through run| [36] starts cycling.

NOTES ***The time required to build up the overview display depends on the number of disks installed and on the matrix resolution.***

42 **Frontal channel.**
Not used.

43 **Lateral channel.**
Not used.

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Processing

During viewing, the operator can change the levels of contrast, brightness and edge enhancement applied to the displayed images. In the case of a single-shot image, the new levels are applied to that image only. In the case of a run, the new levels are applied to all the images in that run, separately for subtracted and non-subtracted images.

45  **Contrast increase.**

See [47].

46  **Contrast decrease.**

See [47].

47 **Contrast level indicator.**

31 levels of contrast can be applied to images during viewing. The level of contrast is shown on indicator [47] and can be increased or decreased with [45] or [46] respectively.

48  **Brightness increase.**

See [50].

49  **Brigtness decrease.**

See [50].

50 **Brightness level indicator.**

31 levels of brightness can be applied to images during viewing. The level of brightness is shown on indicator [50] and can be increased or decreased with [48] or [49] respectively.

NOTE ***The contrast and brightness indicators show the current settings. They each consist of a bar of 16 LEDs with pairs of adjacent LEDs used to denote intermediate levels.***

51  **Edge enhancement increase.**

See [53].

52  **Edge enhancement decrease.**

See [53].

53 **Edge enhancement level indicator.**

0 to 16 levels of edge enhancement can be applied to images during viewing. The level of edge enhancement is shown on indicator [53] and can be increased or decreased with [51] or [52] respectively.

NOTES ***If a contrast, brightness or edge enhancement control key is held down for longer than one second, the action is automatically repeated at a rate of 4 steps per second until the key is released or the maximum or minimum level is reached.***

54  **Select video invert.**

Pressing [54] displays the image within the circle and also the brightness setting with inverted polarity. The area outside the circle, added text, annotations and electronic shutters remain unchanged. Pressing [54] again restores the image to its default polarity.

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55 

Pan & zoom.

This function allows a part of the image to be zoomed to full screen size. Pressing [55] zooms the central part of the image by a factor of 2. The area zoomed can be changed by holding down |Action| [26] and moving the mouse. Clicking |Accept| [25] confirms the action, and the zoomed image remains on the viewing monitor. Clicking |Reject| [27] cancels the action and restores the original image. The required display area can be changed with the mouse. It is possible to step through a run with the same zoom factors.

NOTE ***Pan & zoom can also be performed with the joystick [108] on the Tableside analysis module.***

56 

Center zoom.

If configured on the viewpad, pressing [g (56)] zooms the central area of the currently displayed image by a factor of 2. Pressing [g (56)] again deactivates the zoom function and the image is displayed unzoomed. The Pan & zoom function [55, 103] can be used during viewing.

57 

Position shutters.

Mechanical collimation produces black borders around the image. If the image polarity is inverted these show up as white margins which may interfere with perception of image detail. This can be avoided by using the electronic shutters. These ensure that the images always have dark margins. One pair of shutters closes and opens horizontally, the other pair vertically. They are centered on the horizontal and vertical mid-lines of the screen respectively. The initial position of the shutters is calculated for normal images. As a result, with zoomed images the electronic shutters may be off the screen. Pressing [57], closes the electronic shutters by 10% on the currently displayed image. The pairs of horizontal and vertical shutters can be moved independently with the mouse or joystick [108]. Pressing |Action| [26, 106] activates the mouse or joystick. Moving the mouse or joystick upwards opens the horizontal shutters, moving it downwards closes them. Moving the mouse or joystick to the right opens the vertical shutters, moving it to the left closes them. The maximum setting for the shutters is 90% closed. The shutters can be 'locked' in the chosen position by pressing |Accept| [25, 105]. The functions for viewing images or masks in forward or reverse sequence are still available with the same shutter settings. Pressing [57] again or |Reject| [27, 107], or selecting another run for viewing terminates the function.

58 

Override Manual Adjustments (OMA).

All manually adjusted parameters applied to the run return to the setting they had when the run was viewed for the first time after acquisition.

Subtraction

60 

Subtraction on/off.

Pressing [60], displays the current image subtracted from the current mask. If no mask image has been selected, the first image of the run will be used as the mask. Pressing [60] again cancels all activated subtraction functions and redisplays the unsubtracted current image.

61 

Move mask.

This function is only available when subtraction [60] is on. Pressing [61] selects the Move mask function. |View forward/ reverse| [30, 31] can then be used to move the mask image. To make the selected image the new mask image, press new mask [62]. The function is canceled on reaching a boundary of the current run. Pressing [61] again restores the normal subtraction mode with the new selected mask.

62 

New mask.

This function is only available when subtraction [60] is on. The image currently displayed can be selected as the new mask by pressing [62].

63 

Average mask.

If configured, this function is only available when subtraction [60] is on. First select a new mask image and press new mask [62]. Pressing [63] loads a new (blurred) mask image, which is obtained from the average of a predefined number of images of the current run. The resulting subtracted images are displayed on the Viewing monitor(s). If activated, an average mask indicator (<—) is displayed on the Viewing monitor(s) (bottom right).

The following pre-set number of images may be used to build the average mask: 1-8, 10, 12, 14 or 16 (dependent on matrix size, see Section 10.2.3 ‘Mask averaging’).

When a specific image is selected as new mask [62] (in the current run), the corresponding average mask image is obtained by averaging the images that precede the selected mask image. The maximum number of images that can be used for averaging is given above. If this number is odd, the number used is equal to the maximum - 1. Press [63] again to terminate the function and return to the normal subtracted image. The scope of the function is restricted to the current run. While the function is active, Cycle through run [36] and View forward/reverse [30, 31] can be used to navigate through the run. Higher/lower speed [38, 39] can be used to change the cycle speed.

64 

Pixel shift.

The Pixel shift function allows correction of motion artifacts in subtracted images. It can only be applied to images of the current run if subtraction is on. Pressing [64] displays a square indicating the degree of pixel shift in the X and Y directions. The smallest possible shift is 1/8 of a pixel; the maximum shift is 128 pixels. If a non-shifted image is displayed, the mouse cursor is displayed at the center of the square. Clicking |Action| [26] and moving the mouse horizontally or vertically applies the pixel shift in the horizontal or vertical direction. Images and masks can be viewed in the forward or reverse direction with the same degree of pixel shift. Click |Accept| [25] to exit the function. The set degree of pixel shift is applied to all images in the run.

65 

Run subtract.

If configured, the Run subtract function generates subtracted images from two different runs (subtracted rotational angiography). The system displays a subtracted image using the images of the current run (contrast run) and the images of the next run (mask run) with the same image number as mask image (contrast(n) – mask(n)). If the next run has an incompatible format (i.e. matrix size or pixel-depth parameters), the system steps to the next run (and so on). If no run with a compatible

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format can be found, the system selects the contrast run as the mask run. The View forward/reverse [30, 31] and Cycle through run [36] functions can be used to display other subtracted images from two runs. When the run subtract function is active, some functions change as follows:

Display speed
The maximum display speed for dynamic viewing in run subtract mode is at least 2 images/s.

Status page
Only the contrast run is highlighted on display. When a run is selected in the Status page, the run subtract function is switched off.

Add text [85]
The item 'T-RUN' is removed from the text overlay as soon as |Run subtract| [65] is activated.

View forward/reverse [30, 31] and higher/lower speed [38, 39]
These functions are used to display the range of subtracted images produced from the contrast and mask runs ('Move mask' not active). As the contrast and mask runs need not be of equal length and the image pairs need not have the same image numbers, the 'View forward/reverse' function stops as soon as the first/last image of one of the runs is reached (if the viewing key is held down). If a run boundary is crossed, the system will step to the next/previous compatible contrast run.

'Move mask' can be used to select a different mask image to be subtracted from the contrast image (displayed image = contrast (n) - mask (n ± 1)). In this case, as the run boundary is crossed the system will step to the next/ previous compatible mask run, starting at image number one.

Move mask [61]
Only in monoplane operation, the 'Move mask' function allows another mask run to be selected and subtracted from the contrast run (step run with 'Move mask' active), or another mask image to be selected and subtracted from the contrast image (view forward/reverse with 'Move mask' active).

New mask [62]
The image number of the contrast run will be equal to the image number of the mask run ('Move mask' inactive). If 'Move mask' [61] is active, then this function does not operate.

Step run [32, 33]
This function can be used to change the contrast run. The system will only step to runs with compatible formats, skipping all runs in between. The image displayed will be the one with the same image number as the mask image. If the new contrast run has fewer images than the current image number of the mask image, both contrast and mask-image numbers are set to the highest image number in the new contrast run. If no compatible run can be found in the desired direction, no step run is performed. If 'Move mask' is active, it performs the same function as described above, except this time only on the mask run. It does not affect the image number in the mask run to be used as a mask (as this will be set to the same as the contrast image number).

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Cycle through run [36]

With this function, it is possible to cycle through the contrast and mask runs to view the subtracted image pairs ('Move mask' inactive). As the contrast and mask runs need not be of equal length and the image pairs need not have the same image numbers, the start of a cycle is defined as the lowest possible contrast run image number. Cycling starts again as soon as the last image of either the contrast run or the mask run has been displayed. If the 'Move mask' function is active, the cycle function cycles through the mask run.

Run overview [40]

This function causes an overview of run-subtracted images to be displayed, according to the specification of the run overview function.

During run subtract, the following functions are disabled:
- subtraction on/off [60]
- flag run/flag heartbeat [91, 92]
- view trace [67].

66 **Landmarking**

A subtracted image may lack necessary anatomical orientation. Landmarking (partial subtraction) allows a selectable degree of background anatomy to be added to the subtracted image. To provide optimal image information and to maintain vessel detail, the polarity of the landmark is opposite to that of the vessels. The Landmarking function can only be applied if Subtraction [60] is on. Pressing [66] displays an initial landmarking mask over the image with a subtraction factor equal to 75% of the original image. The subtraction factor can be increased or decreased by clicking |Action| [26] and moving the mouse up or down. The subtraction factor can be set between 0 and 100%. Images and masks can be viewed in the forward or reverse direction, with the same landmark. Clicking |Accept| [25] terminates the function. The set subtraction factor will be applied to all images in the run.

67 **View trace.**

This function allows a series of images, acquired during the flow of contrast medium, to be combined in one image, thus revealing the entire flow pattern. The composite image is constructed by setting each pixel equal to the maximum opacification value of the corresponding pixels in the selected images. Pressing [67] starts the function. A symbol is displayed to indicate that the function has been activated. Pressing |View forward| [30] adds the next image to the composite. Pressing |View reverse| [31] has no effect. Pressing [67] again terminates the function. The trace image is removed and the last image added is displayed. The behavior of the View trace function depends on the type of injection: Iodine or CO_2. The type of injection can be selected with |Co_2 trace| [68] or on one of the Menus [95-97, 102]. Iodine injection is the default when the system is switched on. If CO_2 injection is selected, the text 'CO_2' is added to the trace icon. If Iodine trace-mode is selected, the resultant image will contain the lowest pixel values of all processed images. If CO_2 trace-mode is selected, the resultant image will contain the highest pixel values of all the processed images.

68 **CO_2 trace.**

If configured, the behavior of the View trace function depends on the type of contrast medium: Iodine or CO_2. If this function is assigned to the key, pressing [68] displays a submenu over the image from which the type of contrast medium can be selected by pointing with the

mouse and clicking |Accept| [25, 105], otherwise one of the Menus [95-97, 102] must be selected. Iodine injection is the default setting when the system is switched on.

Photofile/reference

70 

Store image in photofile.

The currently displayed image, which can be; previously acquired images, fluoroscopy images or images from an external video source (e.g. VCR, ultrasound), can be stored in the photofile by pressing [70]. Any overlays, such as ROIs, curves, text and annotations, will be stored with the image. While the action is in progress the light next to [70] will be on. It will go off to indicate that the action has been completed. If the photofile is full, an audible signal is given and the message 'Photofile full' is displayed. The 'Store image in photofile' function is not permitted if the current examination is scheduled for transfer.

71 

Delete image from photofile.

A displayed photofile image can be deleted from the photofile by pressing [71] and holding it down for more than 1 s. During this period the light next to the key will flash. If the key is released during this period, the delete function is cancelled. When the image has been deleted, the screen is blank. Deleting photofile images does not usually affect the free image capacity or free photofile capacity. It only affects the free capacity if the deleted image was the last image in the photofile. The 'Delete image from photofile' function is not permitted if the current examination is scheduled for transfer.

72-73 **Reserved**

74 

Store reference 1.

See [75].

75 

Store reference 2.

Pressing [j (74), k (75)] on the viewpad 'grabs' (stores) an image displayed on the examination monitor to the photofile. The stored image is displayed on the reference monitor with its photofile number and the total number of photofile images in the lower right corner.

The following functions are available:

- fluoro frame grab (during fluoroscopy)

- external video grab (e.g. ultrasound)
- move acquired image to reference monitor.

During viewing, images can also be stored in the photofile with the 'Store image in photofile' function [70].

76-77 **Reserved**

78 

View reference 1.

See [79].

79 

View reference 2.

Images stored in the photofile with the 'Store reference' function can be viewed on the Reference monitor by pressing [l, m] on the Viewpad. The Viewpad functions 'View reverse' and 'View forward' [c, d] can be used to select the image. Pressing [l or m] again deactivates display of the photofile images and the 'View reverse' and 'View forward' keys revert to their normal functions. Only one Reference monitor can be active at any time. The total number of images in the photofile and the photofile image number are displayed in the lower right corner of the Reference monitor together with the 'View photofile' symbol.

NOTE ***Photofile images can also be viewed at the Viewing console by viewing the first run of the examination, in which case the images will be displayed on the Examination and Viewing monitors.***

80-81 **Reserved**

Text & annotation

85 

Add text.

Standard text for archiving purposes and the values of T-mask, T-image and T-run can be hidden or displayed on the image by pressing [85]. The layout of the text is the same as that of hard copies (see Section 4.5.3 'Hard copy layout').

86 

Annotate.

Alphanumeric characters can be added to the image in any position. Pressing [86] displays an empty white square on the displayed image. Text can then be added to the image via the keyboard. Initially, the size of the square is one character, and it changes as characters are added or deleted, or their size is changed.

The size of the characters can be increased or decreased before character entry with:
|>|: 2 x enlarged
|>||>|: 4 x enlarged (keep |Shift| key pressed)
|>||>||>|: 8 x enlarged (keep |Shift| key pressed)

The size of the square changes accordingly. The scale can also be reduced from large to small with |<|, |<||<| or |<||<||<| before character entry. The square, including any annotation, can be moved over the image by holding down |Action| [26] and moving the mouse. Clicking |Reject| [27] erases the currently entered text and displays a new empty square for input. All annotations can be erased by clicking |Reject| [27] immediately after starting the Annotate function before any text is entered.

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To accept the currently-entered text and annotation position:
- press |Accept| [25] to display a new text entry square
- press |Enter| [21] to leave the entered text displayed on the image.

The new text will be displayed on other images in the same run selected with View forward/reverse [30, 31]. If a run boundary is crossed all text will be removed. The function can be terminated by pressing [86] again.

NOTES

- ***Use a combination of horizontal and vertical arrows to draw a diagonal arrow.***
- ***Image detail within the square is not shown because the corresponding image data would be overlaid by the annotation. This must be borne in mind when positioning the square and before pressing |Accept| [25] or |Enter| [21].***
- ***The image area containing the image number etc. is not available for annotation.***

87 

Display physiological data.

When physiological data have been acquired during acquisition, they can be displayed together with the rotation and angulation angles on the Viewing monitor with this function. A maximum of 8 channels of physiological data can be acquired at the same time. The number of acquisition channels and the corresponding number of display channels are set during installation. It is possible to step through all acquired channels by repeatedly pressing the function key. An extra display channel is reserved for 'no data acquired' to disable the display of physiological data. The timebase of the input signal is modified so that the complete recorded sequence fits the monitor. ECG signals are specially processed to preserve the exact location of the R-peaks. A vertical bar indicates the position of the currently-displayed image in the run. During viewing this bar moves horizontally across the displayed physiological data. The function is disabled in overview mode and photofile viewing. The physiological data are removed when an overview mode is selected or a photofile image is displayed.

WARNING

A time delay of 10 to 300 ms may occur between the displayed image and the corresponding displayed ECG signal. This delay is caused by, and is dependent on, the type of connected Physiology system.

NOTE

If no physiological data have been acquired or the physio option is not installed, this key can be used to display the rotation/angulation angles.

Selection for transfer

90 

Flag image.

If configured, pressing [90] flags the current image for transfer to a workstation or local archive connected to the system. Flagging an image that has already been flagged deselects it. This function can also be activated in 'Run overview' mode [40]. If the image results from an analytical program, it must be stored in the photofile and flagged there.

91 

Flag run.

Pressing [91] flags the current run for transfer to a workstation or local archive connected to the system. Flagging a run that has already been flagged deselects it. This function can also be activated in 'Run' or 'Examination overview' mode [40 or 41].

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92 

Flag heartbeat.

If configured, pressing [92] flags the heartbeat surrounding the currently-displayed image for transfer to a workstation or local archive connected to the system. The function can also be activated in 'Run overview' mode [40]. If so, all images displayed within the heartbeat will be flagged. Flagging a heartbeat that has already been flagged deselects it.

93 

Flag examination.

If configured, this function supports configurations in which both CD-Medical and High-Speed DICOM Image Interface are used. Only 'Flag run' [91] can be used for transfer to CD-Medical and the High-Speed DICOM Image Interface. If configured, pressing [93] flags all runs (including the photofile) of the current viewing examination for transfer, if no runs were flagged before. Pressing [93] for an examination in which run(s) (excluding the photofile) are already flagged will unflag all runs (including the photofile) of this examination. If the 'Flag examination' function is activated, a 'Flag' indicator appears on the Viewing console text display and a Flag run indicator is displayed during 'Run overview' [40] or 'Examination overview' [41]. The 'Flag examination' function is disabled if another examination is being transferred or an analytical function is busy.

NOTES

- ***Flagging cannot be carried out on a current examination which is scheduled for transfer or being transferred.***
- ***If an image, heartbeat, or entire run has been flagged, the run concerned will be marked with a 'Flag' indication on the Status page (F9) [24].***
- ***Automatic Flag run and/or Flag heartbeat (as % of a total run) can be configured by Service.***
- ***The Flag examination function [93] also affects the behavior of the Examination dump function [94].***

94 

Examination dump.

If configured, pressing [94] replays the current examination on the examination monitor and on the system output for the VCR. If no runs are flagged for transfer (|Flag run for transfer| [91]), all runs including the photofile will be replayed. If runs are flagged, only these are replayed. If physiological data were acquired with the run, the latest selected channel is displayed. During system installation, replay can be set to 'Raw' or 'Processed'. If 'Raw' is configured, the images are replayed as acquired. If 'Processed' is configured, the images are replayed with the latest processing parameters. The function is terminated when acquisition is activated or at the end of the replay. During replay, all viewing functions are disabled.

NOTE

The disk power supply, tape and other control settings must be switched on before starting the examination dump.

General

95 

Menu 1.

See [97].

96 

Menu 2.

See [97].

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97 

Menu 3.

Possible configuration for Menu 1.

When one of the menu keys is pressed, the monitor on the viewing console is cleared and a menu is displayed. If a menu consists of more than 1 page, 'Previous' and/or 'Next' can be used to display the corresponding page. A menu item can be selected by moving the cursor with the mouse or joystick and pressing |Accept| [25 or 105]. After selection, the menu disappears, any image present is displayed normally, and the selected function starts up. The items in a menu can be configured during installation.

All viewing functions described in this manual, as well as clinical programs, are configurable as menu items.

NOTE ***The menu selected from the Tableside analysis module is shown as 'Menu TAM'.***

98 

Analytical programs

If configured, the following analytical programs can be selected from the Viewing console [98], the TAM (if configured)[102] and from the menus [95-97]:

- vascular quantification software package
- ventricular quantification software package
- coronary quantification software package
- manual quantification software package
- myocardial quantification software package

Any software package may consist of a combination of one or more specific analytical functions. From top to bottom, the symbols shown on the left represent the following functions: Automated Coronary Analysis (ACA), Automated Left Ventricular Analysis (ALVA), Vessel diameter, Calibration, Centerline wall motion, Regional wall motion and Automated vessel analysis (AVA). For descriptions of the analytical functions, see Section 5.5.3 'Clinical programs'.

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TAM functions

100 

Automated Vessel Analysis.

For descriptions of the analytical functions, see Section 5.5.3 'Clinical programs'.

101 

Pixel shift.

As [64], the Pixel shift function allows correction of motion artifacts in subtracted images. It can only be applied to images of the current run if subtraction is on. Pressing [101] displays a square indicating the degree of pixel shift in the X and Y directions. The smallest possible shift is 1/8 of a pixel; the maximum shift is 128 pixels. If a non-shifted image is displayed, the joystick cursor is displayed at the center of the square. Pressing |Action| [106] and moving the joystick [108] horizontally or vertically applies the pixel shift in the horizontal or vertical direction. Images and masks can be viewed in the forward or reverse direction with the same degree of pixel shift. Press |Accept| [105] to exit the function. The set degree of pixel shift will be applied to all images in the run.

102 

TAM menu.

This is equivalent to the Menu selection function [95-97]. The menu displayed is shown as 'Menu TAM' to distinguish it from menus that can be activated from the Viewing console [95-97]. Items in the TAM menu can be configured by Service. All the functions described in this manual, as well as the clinical programs, can be assigned to this menu.

103 

Pan & zoom.

Like key [55], this key is used to zoom a part of the image to full screen size. Pressing [103] zooms the central part of the image by a factor of 2. The zoomed region can be changed by pressing action [106] while moving the joystick [108]. Pressing accept [105] terminates the procedure, leaving the zoomed image displayed on the Viewing monitor. Pressing reject [107] terminates the procedure and restores the original image. It is possible to step through the run with the same zoom factor

104 

Landmarking.

As [66]. A subtracted image may lack necessary anatomical orientation. Landmarking (partial subtraction) allows a selectable degree of background anatomy to be added to the subtracted image. To provide optimal image information and to maintain vessel detail, the polarity of the landmark is the opposite of that of the vessels. The Landmarking is only possible if subtraction [60] is on. Pressing [104] displays an initial landmarking mask over the image with a subtraction factor equal to 75% of the original image. The subtraction factor can be increased or decreased by pressing |Action| [106] and moving the joystick [108] up or down. The subtraction factor can be set to any value between 0 and 100% . Images and masks can be viewed in the forward or reverse direction with the same landmark. Pressing |Accept| [105] terminates the function. The set subtraction factor will be applied to all images in the run.

Viewpad functions

For a description of the Viewpad functions, see the descriptions of the corresponding Viewing console functions in this section. The Viewing console functions are listed in the tables at the end of Section 4.3.2 'Viewing console, TAM and viewpad'.

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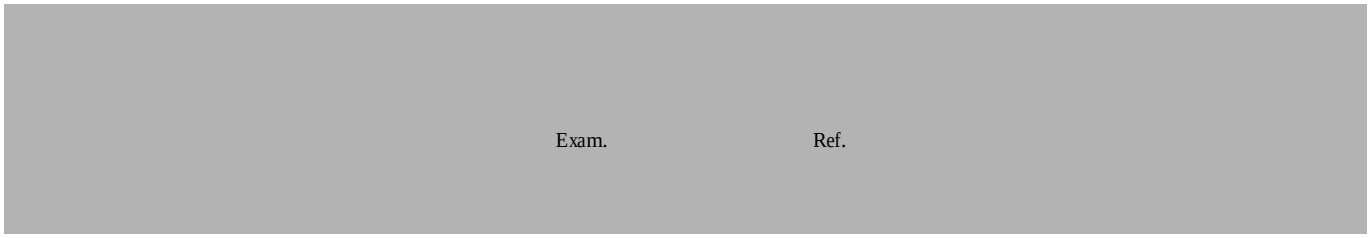
4.3.4 Monitors and room facilities

Monitors

Monitor allocation



Monitor configuration

Parallel viewing option

This option allows images to be viewed and post-processed on the viewing console, while examining another patient in the examination room.

Restriction

- parallel viewing is temporarily suspended during fluoroscopy or exposures.

When only this option is installed, then two monitors are available in the examination room.

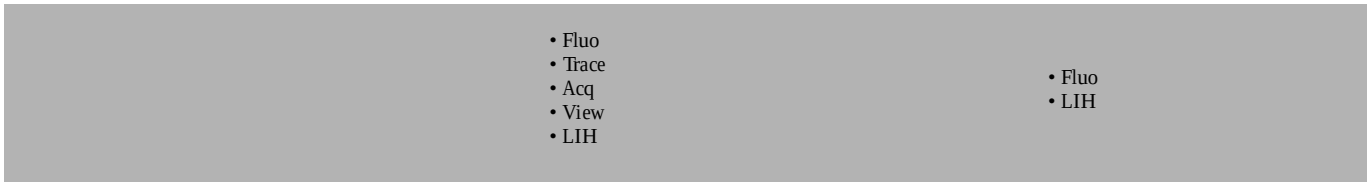
Parallel fluoro option

This option allows images to be viewed and post-processed on the viewing console, while examining another patient in the examination room. Viewing and post-processing is only suspended when an acquisition is made.

Restrictions

- parallel viewing is temporarily suspended during exposures
- parallel fluoro is deactivated as soon as the exposure switch is activated
- frame grabbing is not possible with parallel fluoro images
- trace subtract fluoroscopy is not available during parallel fluoro.

Dual fluoro option



Examination monitor Reference monitor Parallel monitor

This option makes it possible to perform trace subtract fluoroscopy (displayed on the examination monitor) and normal fluoroscopy (displayed on the parallel monitor) at the same time. Besides this, it also has the same functionality as the parallel fluoro option. It allows images to be viewed and post-processed on the viewing console while another patient is being examined in the examination room. Viewing and post-processing is suspended when trace subtract fluoroscopy is performed or a digital acquisition is made.

Restrictions

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- dual fluoro is deactivated as soon as the exposure switch is activated
- parallel fluoro is deactivated as soon as the exposure switch is activated
- viewing at the viewing console is temporarily suspended during exposures
- frame grabbing of images displayed on the parallel monitor is not possible, it is only possible to grab images displaed on the examination monitor.

Monitor positioning

The monitors in the examination room can be manually positioned using one of the hand grips underneath the monitors or display unit(s). The maximum longitudinal range is 360 cm (141.7-inch); the maximum lateral range is 300 cm (118.1-inch). The actual possible range may be restricted due, for example, to obstructions at the ceiling side. The monitors can be rotated over 360°. To position the monitors, slowly push or pull them to the required direction.

General

A typical feature of the XB monitors is the high brightness.

Two sizes of the XB monitors are specified with the system:
- a 21-inch monitor, with a concave front, used in the examination room and mounted in the monitor ceiling suspension
- a 17-inch monitor, used for viewing in the control room.

Both the 21-inch (Examination and Reference) and 17-inch (Viewing) monitors have four push buttons on the front cover for contrast and brightness control and status indicators.

110 **Power on/off and brightness/contrast setting indicator.**

- Green: reference setting
- Yellow: user reference setting
- Red: non-reference setting.

The power supply to the monitors is switched on and off with the system power.

111 **Sensor for automatic brightness and/or contrast control.**

112 **Brightness increase.**

113 **Brightness decrease.**

114 **Contrast increase.**

115 **Contrast decrease.**

Reference setting

Brightness and contrast are factory set to a reference level. Pressing [112 + 113] simultaneously activates this reference setting (indicator light [110] green).

User reference setting

Pressing [114 + 115] simultaneously activates the user reference setting (indicator light [110] yellow). Briefly pressing one of the brightness and/or contrast controls changes the setting to a non-reference value (indicator light [110] red). If the controls are pressed for longer than 0.5 s the setting changes continuously until the control is released. Pressing [112 + 115] simultaneously, stores the selected brightness and contrast setting as a new reference setting, denoted by a yellow light [110]. If the user reference setting is identical to the reference setting, the indicator light is green [110].

For more information on these settings, refer to Section 5.1.4 ‘XB monitors’.

Daisy chain

For optimal viewing of the monitors it is important that they have identical settings. The monitors in the examination room are provided with a daisy chain facilitating a master/slave control for the user settings. Thus, when the contrast setting on one monitor is altered, the contrast setting on the other monitors is altered as well. Any of the installed monitors can be used as master to control the others.

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Room facilities

InfraRed (IR) receiver

116 **Infrared receiver.**

Infrared receiver for viewpad signals.

Examination light

a. upper hand grip
b. lower hand grip.

117 **Power on/off and light intensity.**

Pressing [117] switches the examination light on/off. Rotating [117] adjusts the light intensity.

The longitudinal carriage of the monitor suspension is provided with a bracket for mounting the optional examination light. When positioning the monitors in longitudinal direction the light will move accordingly. The light may be moved independently to the required position using either the lower [b] or upper hand grip [a]. The lower hand grip will accommodate coverage with a (sterile) disposable cover. The hand grip can be rotated to adjust the required light focus on the work spot. |Power on/off and light intensity| [117] can be pressed to switch the light on and off and can be rotated to adjust the light intensity.

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CAUTION ***When positioning the light care should be taken to avoid collision between the light suspension arm and the X-ray On indicator lamp. Impact could break the lamp cover causing debris to drop into the working area or sterile region.***

X-ray on indicator

118 **X-ray indicator.**

Lights during X-ray preparation and radiation.

Display unit

The display unit is located in the examination room below the monitors. The display unit displays two title text lines and two information lines. The information displayed depends on the actual system status.

Indicators:

- stand position (ROT, ANG, SID etc)
- II-format: 2 digits in [cm] or [inch] (depending on system configuration).
- dose rate (if configured): 5 digits in [mGycm^2/s] or [cGycm^2/s] in the range of 0 - 99,999
- tube load indicator: green, orange or red light
- fluoroscopy mode indicator: 'high', 'normal', 'low' or 'reduced'
- fluoroscopy on/off indication (if Parallel viewing option is present)
- exposure/fluoroscopy 'Action/warning' indicator: displays 'action' or 'warning'
- X-rays on indicator
- integral fluoroscopy time (if configured): 4 digits, resolution 0.1 minute
- 'System starting' and 'X-ray disabled' messages
- FLUORO, FLUORO-VIEW, FLUORO-DUAL.

During system start-up, the message 'System starting' is displayed on the display unit. If X-ray generation is disabled with key [3] on the acquisition console, the message 'X-ray disabled' is displayed on the bottom line.

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Display unit

120 **Intercom 'listen' indicator.**

On the top left side of the display unit.

121 **X-radiation ON indicator.**

The indicator is on when there is a request for X-rays and during radiation.

NOTE ***The X-radiation ON indicator on the Acquisition console display is only switched on during radiation.***

122 **Tube load indicator.**

The following three levels can be indicated:
- green light: tube cold
- orange light: tube warm
- red light: tube hot, wait.

Audible tube load indicator.
The audible tube load indicator can be set by Service at installation. If set, during fluoroscopy or exposure a repeating 4-pulse (audible) signal (where T_{repeat} = 2 s; t_{pulse} = 125 ms and f_{pulse} = 488 H) is generated by the Display unit if the Tube load indicator [122] is showing red (Tube hot, wait).

Top line of both display units.
- During the system start-up procedure, the message 'System starting' is displayed
- During normal operation, the top line displays:

123 **Actual rotation/angulation angles.**

This indicates the actual projection angles relative to the patient. The text line displays 'ROT' for the rotation angle and 'ANG' for the angulation angle respectively. The rotation/angulation angles are shown with a prefixed '+' or '-' sign.

124 **Source-image distance/tilt angle indicator.**

This indicator shows the table tilt angle when the tabletop is tilted and the SID when the tabletop is horizontal. To distinguish between the two readings, the indicator shows either 'TILT' or 'SID cm' (or 'SID inches'), together with the value. For HDT the tilt value is shown as negative '-'. If the SID is changed when the table is tilted, the SID will be shown on the display for approximately 3 s.

125 **II field size.**

Displays the II-size used.

NOTE ***The display can show centimeters or inches (configured during installation).***

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Bottom line of the display unit.

During normal operation, the bottom line displays information concerning the operating mode:

126 **Fluoroscopy mode/Fluoroscopy level/APC information.**

Text displayed for fluoroscopy modes:
'FLUORO' (normal fluoroscopy mode), 'FLUORO-VIEW' (parallel fluoroscopy mode) or 'FLUORO-DUAL' (dual fluoroscopy mode).

Text displayed for fluoroscopy flavours:
'1' (low dose), '2' (normal dose) or '3' (high dose).

If the stand is moved to a previously stored position using the Auto Position Control (APC), indicator [126] shows the geometrical target position.

127 **Integrated fluoroscopy time.**

The following items can be displayed in this field:
- patient dose rate: the displayed dose rate in [cGycm^2/s] is updated every second. If fluoroscopy or acquisition is stopped, the cumulative patient dose is updated and also displayed on the acquisition console and on the viewing monitor (Status page).
- COLLIS: Collision indicator
- WARNING/ACTION: to indicate that a message is being displayed on the Acquisition console
- Stopwatch time; if activated, the time is displayed as: TIME mm:ss.

4.3.5 Connection box and tableside operation modules

General

Every system is supplied with a set of TableSide Operation (TSO) control modules. The specification of a TSO depends on the actual system configuration. The Geometry module is illustrated in the figures below. It may be mounted on either side of the table.

Pan handle

The Pan handle can be attached to the tabletop or to the patient accessory rail.

Pan handle attached to accessory rail Pan handle attached to the tabletop

a. Handle to tighten the clamp and lock the pan handle to the rail or table.
b. Clamp to fit the pan handle to the accessory rail.
c. Clamp to fit the pan handle to the tabletop.

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Connection box (at back of patient support)

Item	Connections
a	Earth (ground).
b	X-ray hand switch.
c	Injector.
d	Prepared for local mains connection.
e	ECG signal for injector triggering.
f	Prepared for connection of physiological measuring
	system.
g	X-ray foot switch.
h (see notes)	Inlet for: Pan handle, Geometry modules, Imaging module, TAM and Stand brake foot switch.

NOTES

- ***The two cables for the two TSOs must be run through a grommet at the top-rear of the table base.***
- ***To provide access to the connectors, the back cover can be opened by pulling it on the cable inlet side.***

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TableSide Operation modules (TSOs)

Geometry module

Monoplane geo vascular module (tilt option + mot. longitudinal movement option)

CAUTION ***If a second, identical geometry module is available, commands given on the module connected to the upper connector in the connection box have priority over commands given on the other geometry module.***

NOTE ***The geometry functions described below are illustrated in Section 10.4 'Stand and table movements'.***

130 

Emergency power off.

If an uncontrolled motorized movement occurs (which is identified as a movement emergency situation) pressing switch [130] stops all motorized movements and releases or blocks all brakes.

The following manual movements remain possible:
- C-arm: manual rotation and angulation is possible
- L-arm: rotation and longitudinal movement are possible
- II can be moved manually.

Patient support:
- AD5: transverse and longitudinal brakes are released
- AD5T (tilt): transverse and longitudinal brakes are on.

To reset the geometry system after an 'emergency power off' switch the system off [B] and then on again [A].

131 

Tabletop brakes on/off and logitudinal movements.

Releases the transverse and the longitudinal brakes to allow the tabletop to be moved manually.

During installation, this control can be configured to suit the user's preference:
- brakes remain released while [131] is held down (preferred condition), or
- press [131] briefly to release brakes, press again to apply brakes.

If the AD5 SyncraTilt option is installed and the tabletop is in a tilt position, the longitudinal movement is motorized. To activate the motorized longitudinal movement, press [131] down and then move it in the required direction. If the geometry module is mounted at the foot end, the behaviour

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of [131] is identical to the behaviour at doctor's side. As the speed of the table movement depends on the pressure applied to control [131], use gentle force to ensure a smooth floating movement. The maximum transverse shift of the AD5 is 2 x 18 cm (2 x 7 inch); the maximum longitudinal shift is 100 cm (39.4 inch).

NOTES
- ***This control is a large push button that can be used as a handgrip when moving the tabletop.***
- ***For releasing and applying the brakes, the optional Pan handle has the same functionality as this push button but it does not control motor speed.***

132 

Longitudinal tabletop brake off.

If the tabletop is in the horizontal position, this can be useful for a longitudinal scan under manual control. This switch only operates when [131] is not activated.

During installation, this control is configured so that either:
- pressing key [132] continuously, releases the longitudinal brake while the transverse brake is kept on (preferred configuration) or
- pressing key [132] once, releases the longitudinal brake while keeping the transverse brake on. Pressing key [131] activates the longitudinal brake.

If the AD5 SyncraTilt option is installed and the tabletop is in a tilt position, pressing switch [132] once, keeps the transverse brake on when [131] is used. Only longitudinal table movements are then possible.

133 

Table height adjustment.

Control knob [133] is used for motorized table height adjustment. To raise the table, push the control up (maximum height 104 cm/ 40.9 inch). To lower the table, pull the control down (minimum height AD5: 76 cm/29.9 inch). The rotational brakes are released while the table moves up.

NOTES
- ***If the Pivot option is installed, the height-range of the table is: 78.5 - 106.5 cm (30.9 - 41.9 inch).***
- ***If the Swivel option is installed, the height-range is 83 - 113.5 cm (32.6 - 44.6 inch).***

134 

SID adjustment.

Allows the SID to be varied under motor control by moving the II along the axis of the X-ray beam.
Joystick up: SID increases (II away from patient).
Joystick down: SID decreases (II towards patient).
The actual SID is displayed on the Display unit [124].

135 ***Reserved.***

136 

Motor-controlled rotation and angulation.

Joystick up/down: Rotation.
Joystick right/left: Angulation.

Both movements can be combined. The directions of the movements are relative to the position of the operator. The angles of rotation and angulation are displayed on the display unit [123].

TSO Position	Angulation		Rotation	
	+	-	+	-

TSO Position	Angulation		Rotation	
Doctor side	Right	Left	Up	Down
Nurse side	Left	Right	Down	Up
Foot end	Down	Up	Right	Left

'Angulation +' is a clockwise rotation around the angulation axis; 'Rotation +' is a clockwise rotation around the rotation axis.

137-138 Reserved.

NOTE ***Keys [139] and [140] are only available if the AD5 table is fitted with the 'SyncraTilt' option.***

139 

Table tilt movement.

The directions of the movements are relative to the position of the operator:

TSO Position	Tabletop head	
	Up	Down
Doctor side	Right	Left
Nurse side	Left	Right
Foot end	Right	Left

When the tabletop is moved from a head-down (maximum tilt -28°) to a head-up (maximum tilt +20°) position, or vice versa, the movement stops when the tabletop is in the horizontal position. To continue the movement, release the control knob then push it again in the required direction. The average speed is 2°/sec. The actual tilt angle is shown on a scale on the table column and on the Display unit [124]. The SID is normally indicated on the Display unit if the tabletop is in the horizontal position. If the SID is changed when the table is in a tilt position the SID will be shown on the display for approximately 3 s. To avoid an accidental tilt movement, lock the control knob [139] by pressing it down and turning it 90° counter-clockwise. To unlock, press the knob down and turn it 90° clockwise.

140 

Movement override.

Pressing this button disables the automatic tilt movement safety system which safeguards patient and equipment. If either the |Table tilt movement| [139] or |Table height adjustment| [133] joystick is then used, an audible signal warns the operator of the increased collision risk during a tilt or height adjustment.

141 

Motorized logitudinal movement.

Allows the L-arm to be moved under motor control (from its parking position to its working position and vice versa). There are automatic stops at the parking, neuro/cardio and lower peripherals position.

From doctor's side:

Joystick left: sets SID to 110 cm (43.3 inch) and then moves the L-arm towards the parking position (at 150 mm/s), with an automatic stop at the neuro/cardiac position.

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Joystick right: sets SID to 110 cm (43.3 inch) and then moves the L-arm towards the table base (at 150 mm/s), with an automatic stop at the neuro/ cardiac and (lower) peripheral positions.

For reasons of safety, the movements can only be carried out if:
- the stand rotation/angulation angle ±20°
- the tabletop is horizontal (untilted).

If these conditions are not satisfied when [141] is activated, a warning message is displayed on the acquisition console.

NOTE ***The C-arm stand can also be moved manually after releasing the brakes by pressing |Longitudinal movement brake release| [195] on the L-arm.***

142  **Store position 1.**

Store the current rotation, angulation and SID settings, the end position for Rotational angiography or the table end position for Bolus chase.

143  **Store position 2.**

Store the current rotation, angulation and SID settings, the start position for Rotational angiography or the table start position for Bolus chase.

144   **Recall position 1 or 2.**

Pressing the left-hand side of this control sets the rotation, angulation and SID to the values stored with |Store position 1| [142]. Pressing the right-hand side recalls the values set with |Store position 2| [143]. If no positions have been stored, using this control automatically moves the C-arm to the default positions.

NOTE ***The indicators next to the keys are on if the settings are stored or after a Recall request to confirm that the new position has been reached. These indicators flash when setting the Rotational angiography end and start positions or end and start positions of the tabletop scan. The indicators only remain on continuously once the positions have been stored.***

145 **Reserved**

Imaging module

Vascular monoplane imaging module

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CAUTION ***If a second, identical Imaging module is available, commands given on the module that is connected to the upper connector in the connection box have priority over commands given on the other Imaging module.***

150 

Fluoroscopy mode selection.

During installation, 3 fluoroscopy modes are programmed:
a: high
b: normal
c: low.

The mode selected is shown on the display unit [126]. During fluoroscopy the mode can be changed but, depending on the parameters set in the fluoroscopy APRs, the switch over will be smooth or discontinuous. During a smooth switch over, the image remains visible although a brief disturbance (change of contrast) may appear. When switch over is discontinous the radiation is temporarily inhibited.

NOTE ***To record fluoroscopy images with optimal image quality, use fluoroscopy mode A only. For image recording, a VCR must be correctly connected to the system and in 'stand-by' status when fluoroscopy mode A is selected.***

After every 5 minutes cumulative fluoroscopy time, the fluoroscopy time buzzer will sound. Pressing any of the keys [150a/b/c] switches off the time buzzer. No matter which key is pressed to switch off the time buzzer, the system stays in the selected fluoroscopy mode.

After terminating fluoroscopy by releasing [175], the system switches to the 'Normal' fluoroscopy mode.

151 

Shutter adjustment.

This control allows the user to adjust the field of view with the rectangular (mechanical) X-ray shutters during fluoroscopy. (The circular diaphragm is automatically adjusted to match the selected field size of the II and the SID).

Joystick up: Vertical shutters [a] open.
Joystick down: Vertical shutters [a] close.
Joystick to the right: Horizontal shutters [b] open.
Joystick to the left: Horizontal shutters [b] close.

Pressing the control down resets the shutter positions.

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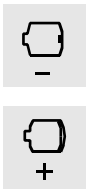
152 **Reserved.**

153 

II field size.

This key allows the II field sizes to be selected. Pressing the left side of the key selects the next smaller field size. Pressing the right side of the key selects the next larger field size. The field size selected is shown on the display unit [125]. The default Image Intensifier mode (small, medium,large or other field) at power on, or at new patient selection, can be set by Service at installation

154 **Reserved.**

155 

Position left wedge filter.

The wedge filter setting can be configured as 'Manual only' wedge control (Vascular APR) or 'Automatic/manual' wedge control (Cardiac APR).
Joystick up: wedge rotates clockwise.
Joystick down: wedge rotates counter-clockwise.
Joystick left: wedge moves outwards.
Joystick right: wedge moves inwards.

156 **Position right wedge filter.**

Joystick movements for the right wedge filter are the opposite of the movements for the left wedge filter, see [155].

For a more detailed description of the automatic/manual wedge filter control, refer to Section 10.3 'Wedge filters'.

157 

VFR/Dual/Parallel fluoroscopy.

Variable frame rate (VFR) is the same function as [4c] on the Acquisition console. During digital vascular acquisition it is possible to toggle between 2 acquisition speeds if VFR values are included in the chosen APR program. The function can be performed more than once during acquisition. The acquisition speed is displayed on the Acquisition console. The current acquisition speed is the first acquisition speed (V2) displayed. If the parallel fluoro or dual fluoro option is installed, the VFR key [157] on the imaging module will serve to toggle between the normal fluoroscopy mode and the parallel fluoroscopy mode.

Dual fluoroscopy mode

Trace Subtract Fluoroscopy (TSF) eliminates bone structures and is used extensively in complex interventions. Normally, two problems can arise with TSF:

1 During multi-stage embolization, the embolization material positioned in previous stages is no longer visible.
2 Patient movement produces subtraction artefacts which are not desirable during time-critical moments, e.g. glue injections.

The 'Dual fluoroscopy' mode solves these problems by displaying non-subtracted fluoroscopy alongside the TSF images.

Parallel fluoroscopy mode

This mode saves time during interventions by making it possible to view and post-process previously acquired images on the viewing console and examination monitor while fluoroscopy is being performed in the examination room.

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158 **Trace-subtract fluoroscopy (TSF).**

If available, TSF can be switched on and off with this key (toggle function). TSF is a reference technique for catheter guidance. The movement of guidewires and catheters can be displayed against an opacified trace image of the vessel structure. When trace-subtraction is selected, the TSF symbol is displayed in the upper right corner of the monitor.

Auto Position Control (APC)

APC module

160 **Emergency power off.**

If an uncontrolled motorized movement occurs (which is identified as a movement emergency), pressing switch [160] stops all motorized movements, brakes are released or blocked.

The following applies:
- C-arm: manual rotation and angulation not possible
- L-arm: rotation is possible
- II: can be moved manually.

Patient support:
- AD5: transverse and longitudinal brakes are released
- AD5T (tilt): transverse and longitudinal brakes are locked on.

To reset the geometry system after an emergency power off, switch the system off [B] and then on again [A].

161 **APC mode selection.**

a: Scratch mode

b: Sequencer mode

c: Reference mode

When a mode is selected the indicator next to the key switches on and the associated positions are displayed on the Display unit.

Scratch mode

Two scratch stand positions can be stored and recalled. When scratch mode is re-entered the previously stored positions are available provided that the system function ‘new patient’ has not been activated.

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162 

Store position 1.

See [163].

163 

Store position 2.

When one of the two buttons is pressed, the current stand position is stored as position 1(left button) or 2 (right button).

The current position is defined by the:
- angulation angle
- rotation angle
- SID.

Storing a new position overwrites the previously stored position. Initially, 1 is set for a position with a rotation and angulation of 0° and a SID of 1.0 m (39.4 inch). 2 is set for -45° rotation and 0° angulation and a SID of 1.0 m. Positions can be stored in all APC modes and are displayed on the display unit.

164 

Select position 1 or 2.

When the left side of the button is pressed, position 1 is recalled and displayed on the Display unit. When the right side of the button is pressed, position 2 is recalled and displayed.

165 

Accept and activate.

When the required position is displayed, it can be accepted by keeping [165] pressed until the stand stops moving (rotation and angulation). Thereafter, the II will move to the stored SID unless the movement is stopped by releasing key [165]. The operator is responsible for avoiding collisions. When the movement is complete, the other stored position is selected and displayed.

Sequencer mode

Stand positions from one or more service installed sequences can be recalled. When only one sequence is available, the user function 'select position' becomes immediately active without displaying the sequence identification.

164 

Select sequence.

Pressing the left side of the button selects the previous sequence and pressing the right side selects the next sequence. The current sequence is shown on the display unit.

165 

Accept and activate.

Pressing this button now accepts and activates the current sequence and displays the first position on the display unit.

164 

Select position.

Pressing the left side of the button selects the previous position and pressing the right side selects the next position . The current position is displayed on the display unit. By repeatedly pressing this key, all sequence positions can be displayed.

165 

Accept and activate.

When the required position is displayed, it can be accepted by keeping [165] pressed until the stand stops moving (rotation and angulation). Thereafter, the II will move to the stored SID unless the movement is stopped by releasing key [165]. The operator is responsible for avoiding collisions.

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Reference mode

Allows reproduction of the stand position corresponding to the image displayed on the reference monitor.

164 

Select reference position.

When the left side of the button is pressed, the left displayed reference geometry is selected. When the right side of the button is pressed, the right displayed reference geometry is selected. The selected position is displayed on the display unit.

165 

Accept and activate.

When the desired geometry position is displayed, the position can be accepted by keeping [165] pressed until the stand(s) stop(s) moving (rotation and angulation). Thereafter, the II will move to the stored SID unless the movement is stopped by releasing key [165]. The operator is responsible for avoiding collisions.

4.3.6 Tabletop Shifting Device / Speed control hand switch

For angiography of the lower peripherals images are acquired as the patient is moved in one continuous movement at a speed that matches the blood flow in the peripheral vessels (bolus chasing). This can be achieved automatically or interactively by the operator.

The table is provided with a motorized Tabletop Shifting Device (TSD) controlled by an automatic bolus chase program or by the operator using the TSD speed control (interactive mode).

170-171 **Reserved.**

Speed control hand switch

172 **Speed control hand switch.**

With interactive mode Bolus Chase the speed control hand switch is automatically enabled when the end and start positions have been selected. If a run is interrupted (automatic and interactive mode), the speed control hand switch can also be used to return to the start position.

The speed control hand switch is used in interactive Bolus Chase mode to control the scan movement. Pressing [172] starts the tabletop scan movement. The speed is controlled by the degree to which the button is pressed. The maximum average speed is about 15 cm/s (5.9 inch/s). As soon as the tabletop has been moved to its end position, the movement stops and the speed control must be released. Pressing the speed control again reverses

the scan movement. Acquisition is independent of scan direction. The system ensures smooth starting and stopping of each movement to avoid jolting the patient.

4.3.7 Foot switches, hand switch and stand switches

Acquisition foot switch

The acquisition foot switch is connected to the connection box and can be placed in a convenient position on the floor.

175 **Fluoroscopy.**

Pressing this pedal initiates radiation. Radiation continues until the pedal is released.

176 **Reserved.**

177 

Single-shot exposure/parallel fluoroscopy.

Depending on the configuration, pedal [177] is configured for either single-shot acquisition or parallel fluoroscopy.

Single-shot acquisition is only possible with the Digital Vascular (with lock-in APR) imaging technique. One knob acquisition is not possible.

If the 'Parallel fluoroscopy' option is installed, pressing [177] selects the parallel fluoroscopy mode. Pressing [177] again, selects the normal fluoroscopy mode (toggle function). The active fluoroscopy mode is displayed on the display unit [126].
The parallel fluoroscopy mode saves time during examinations by making it possible to view and post-process previously acquired images on the viewing console while fluoroscopy is being performed in the examination room.

178 **Reserved.**

179 

Exposure.

Pressing this pedal initiates preparation of the X-ray tube and exposure. Releasing the pedal ends the exposure.

Acquisition hand switch

The acquisition hand switch is connected to the Acquisition console.

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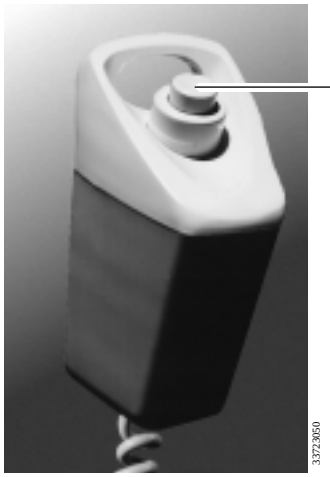

185 **Preparation/exposure.**

The two-level pushbutton on this hand switch has two functions:
1 Preparation of the X-ray tube; pressing the small button until it is flush with the large one initiates preparation of the X-ray tube.
2 Initiating exposure; pressing the two buttons together initiates exposure.
Releasing the button [185] ends the exposure.

Foot switch for C-arm stand brakes

The C-arm stand is held in position by electromagnetic brakes which can be released with a foot switch to allow manual movement. The foot switch is connected to the base of the table and can be placed in a convenient position on the floor. The C-arm stand is fully counterbalanced so that when the brakes are released the stand will not move until manually positioned. For this purpose, handgrips are located on the image intensifier housing and at both sides of the vertical arms of the C-arm stand.

190  **Rotation brake release.**

Pressing the pedal releases the rotation brakes. See also [192].

191 

Rotation/angulation stand brake release.

Pressing the pedal releases both the rotation and angulation brakes. See also [192].

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192 **Angulation brake release.**

Pressing the pedal releases the angulation brakes. When the brakes are released by pressing and holding down the foot switch, the C-arm can be moved with the handgrips mounted on the image intensifier. When the C-arm is in position, release the foot switch to apply the brakes.

NOTE ***Manual movements override motorized movements.***

Rotation, angulation

C-arm in line with the table (0° pos.) C-arm at right angles to the table (+90°)

Rotation and angulation are defined relative to the patient. This means that when:

- the C-arm is in line with the table (0° position):
  - pressing [190] allows 'propeller movement' (rotation) [a]
  - pressing [192] allows 'C-arm movement' (angulation) [b]
- the C-arm is at right angles to the table (+90° and -90° position):
  - pressing [190] allows 'C-arm movement' (rotation) [c]
  - pressing [192] allows 'propeller movement' (angulation) [d]

L-arm switches (C-arm)

The L-arm switches are duplicated on each side of the L-arm and operate in parallel.

L-arm switches on the ceiling suspended C-arm

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195 **longitudinal movement brake release.**

Pressing [195] releases the L-arm longitudinal brakes allowing longitudinal movement of the L-arm.

196 **Not used.**

197 

Stand rotation (pivot point) brake on/off.

When the brakes are released the L-arm can be rotated.

198-199 **Reserved.**

200 **Emergency brake release.**

Pressing [200] releases all brakes, except the L-arm rotation brake, so that the stand can be moved away from the patient in an emergency. Pressing [200] again reapplies all the brakes. Use of these switches is described in Section 10 'Stand and table movements'.

WARNING ***Take care to avoid collisions when moving the C-arm.***

4.3.8 HCU controls

For operating instructions, refer to the Operator's Manual supplied with the camera. If the camera can be controlled manually, it is possible to select and copy single images. The image copied is that displayed on the viewing console monitor.

4.3.9 Storage media.

Optical Disk Recorder (ODR)

The drive accepts both erasable and non-erasable 5.25-inch disks. Optical disks are mounted in cartridges. Images cannot be stored on a write-protected disk. Each disk has a storage capacity of 620 Mb, sufficient for approximately 2 x 150 images (1024^2) or 2 x 600 images (512^2 and 1024 x 512). New disks must be formatted before use (Format function on the Optical disk page). This takes about 10 minutes. Saving and retrieving images using an optical disk are background processes. This means that the system remains available for acquisition and viewing while images are being saved or retrieved.

Optical disk drive

a **Disk cartridge insertion slot.**

Insert the disk cartridge into the slot and and gently push it in until it loads.

215 **Power indicator.**

Lights when power to the ODR is switched ON.

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216 **LED indications.**

LED indications for each condition are as follows:

Drive condition/Mode	LED indications
When there is no disk	Green (flashing)
When a rewritable disk is loaded	Goes out
When a WORM disk is loaded	Green (flashing)
BUSY	Green (lights)
Heat alarm has occurred	Orange (flashing)

217 **Not used.**

218 **Eject switch.**

Press to eject the cartridge.

219 **Screwdriver hole for manual eject.**

To manually eject the cartridge from the drive, insert the supplied screwdriver into the manual eject screwdriver hole and, while pressing, turn the screw counterclockwise about 30 times and remove the cartridge.

CAUTION ***Before performing manual eject, ensure that the power to the ODR is switched OFF.***

CD-Medical recorder

The CD-Medical option allows cardiac examinations and their corresponding data to be recorded on a Compact Disk (CD). Each disk typically holds information for a single examination (maximum 32 examination runs). INTEGRIS systems can be enhanced with a CD-Medical (CD-M) recorder which receives data from the system through the CD-M interface. After storing the images and data in a buffer memory, the information is written on a blank CD in CD-M format. When stored on a CD-M, the CD-M can be viewed on the CD-M View station or on a standard CD-I (CD-Interactive) player. The CD-M recorder can record two disks simultaneously using the Twin Disk option. Data recorded on a CD-M cannot be erased.

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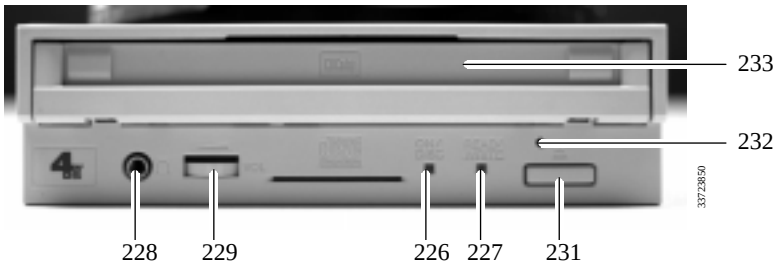
CD-Medical recorder

a. CD-M drive
b. Second CD-M drive (Twin Disk option)

E **Power on/off switch.**

225 **LCD display.**

Displays message and recording status.



CD-M drive

226 **On/Disk indicator.**

The following four status levels can be indicated:
- orange light: Ready (no disk inserted)
- flashing orange light: Inserting disk or error occurred
- green light: Ready (disk recognized)
- flashing green light: Ejecting disk.

227 **Read/Write indicator.**

The following four status levels can be indicated:
- flashing green light: Seek operation busy
- green light: Reading data
- flashing orange light: Preparing to write
- orange light: Writing data.

228 **Headphone jack.**

Not used.

229 **Headphone volume.**

Not used.

230 **Reserved.**

231 **Eject caddy.**

Pressing [231] ejects the caddy.

NOTE ***The caddy cannot be removed when the eject function is disabled.***

232 **Manual ejection pinhole.**

Used to eject the caddy manually only as a last resort in an emergency situation, such as malfunction of the unit.

233 **Caddy insertion slot.**

To insert/remove a caddy containing a CD-M.

4.3.10 200X Ultrasound scanner

200X Scanner

Item	Part
a	Scanner (mounted behind monitors)
b	Probe
c	Control panel
d	Monitors

The ceiling suspension allows the monitors and scanner to be moved horizontally and vertically and turned for accurate positioning over the image area.

Control panel

Scanner control panel

The control panel for the scanner is attached to a movable arm under the monitors. It can be moved into position for an examination and then stored back under the monitors after use.

F 

System on.

After switching on, the system is ready for use in 5 seconds (the key light up). The indicator lamp above the probe connection on the scanner also comes on. The examination monitor displays the ultrasound image automatically.

G 

System off.

After switching off the scanner, the examination monitor is switched back to normal mode. The indicator lamp above the probe connection on the scanner goes out.

NOTE ***The scanner will not start up if it is switched on again immediately after switching off. To start the scanner, switch it off, wait 10 seconds and then switch it on again.***

235 

Probe selection.

Two probes (single or dual frequency) may be connected to the scanner at the same time. Press the key repeatedly to select the required probe and frequency. The selected probe and frequency are displayed in the status field on the examination monitor. The green light on the 3.5/5.0 MHz and 3.5 MHz high-definition curved array probe indicates the orientation of the scan plane. In normal operation the position of the green light on the probe corresponds to the left side of the image on the monitor.

236 

Examination monitor.

Switches the ultrasound image to the examination monitor. The key lights when the monitor is displaying ultrasound images. To return to the X-ray display mode, initiate fluoroscopy [175, 178, 180], acquisition [179, 185] or select a viewpad function [a-m]. Once the |Examination monitor| key [236] is pressed it remains illuminated.

NOTE ***After switching the ultrasound system on, the examination monitor is automatically selected for ultrasound display.***

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237 

Grab image.

Not used.

238 

Distance measurements.

This key, in conjunction with the joystick [247], is used to measure the distance (in millimeters) between two points in the image. The procedure is described in Section 5.3.5 'Apply acquisition functions as required'.

239 

Freeze/Unfreeze.

Press [239] once to freeze the current image. Press [239] again to return the monitor to live mode. If the image is frozen, 'F' is highlighted in the image status field.

240 **Biopsy line on/off.**

Press [240] once to display a biopsy line (for the selected probe) in a non-frozen image. Press [240] again to erase the line.

NOTE ***Pressing |Biopsy line on/off| [240] when the image is frozen has no immediate effect. The biopsy line is only displayed after the image has been unfrozen.***

241 **Reverse on/off.**

Press [241] once to reverse the displayed image. Press [241] again to restore the display to normal. The status field indicates the image polarity.

NOTE ***Pressing |Reverse on/off| [241] when the image is frozen has no immediate effect. The image is only reversed after the image has been unfrozen.***

242 **Depth increase.**

Displays a larger image field (see also [243]).

243 **Depth increase.**

Displays a smaller image field. The depth of the displayed image can be changed with keys [242, 243]. The upper and lower limits of the image field depend on the probe type and frequency. A lower frequency gives a larger image field.

244 **Near gain control.**

Adjusts the gain level in the surface area of the image (see also [246]).

245 **Far gain control.**

Adjusts the gain level in the deeper area of the image (see also [246]).

246 **Total gain control.**

Adjusts overall gain level. In normal situations, the gain control is used to give the entire ultrasound image a consistent brightness. The normal setting is with all of the gain and depth controls set to their center position. For certain applications, the normal position is not desirable and the brightness level of the ultrasound image can be adjusted with controls [244 to 246].

NOTE ***Always try to optimize the image using the scanner's gain controls; the monitor controls should not be changed.***

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247 **Joystick.**

The joystick is used to move the on-screen measuring caliper to the desired measuring positions.

4.4 Overview of control, status and report pages

4.4.1 Viewing console text display

For an overview of the Control and Status Pages, press key [F10] to display the Help Page.

- F1 Schedule page: used to enter and select scheduled examinations for acquisition
- F2 Review page: used to select acquired examinations for viewing
- F3-F5 Function (1)) depends on system configuration, function keys [F3 to F5] can be configured to access the Transfer page, and the Transfer page can be configured to list all possible archiving systems. The remaining function keys can be configured to access separate archiving system pages. Configuration is carried out by Service. The following configurations are possible for keyboard function keys [F3 toF5]:
  - Report page: enables the user to report a selected examination to a connected information system
  - Export page: lists all examinations flagged for transfer to a configured export station.
  - ODR page: used to control all actions of an optical disk recorder
  - Copy page: used to copy photofiles from completed examinations to a remote HCU
  - Transfer page: All, or a selection of, the archiving functions: Report page, Export page, ODR page and/or copy page.
- F6 System page: to set the date and time, to make a test image and to enter 'Service mode'
- F7 Physician page: used to enter the physician names and codes with the related disk partition and workstation address
- F8 Reserved
- F9 Status page: displays information on the progress of actions started
- F10 Help page: displays an overview of all configured control and status pages.

Text display

When a page containing examination data is selected, the page with the current examination is displayed. When no current examination exists, the first page (if there are several) is displayed. To select other pages, use the

Previous or Next function. The current acquisition examination is displayed separately on the last line of the last page. The current examination and active function are highlighted. To select another examination, use the |Cursor up| or |Cursor down| keys [26] and confirm the selection by pressing |Enter| [27]. Help and error messages are displayed where applicable.

Schedule page (F1)

The Schedule page allows an examination schedule to be set up by the operator before acquisition is started. Up to 50 patients can be selected from this page for examination in any sequence. The system checks and displays the status of each examination on the Status page (F9) and the number of acquired runs and images on the Review page (F2).

For each examination, data can be entered under the headings:
- Name (patient's name - maximum 26 characters)
- Birth date (format configured during installation, e.g.: dd-mm-yyyy)
- Patient sex (1 character)
- Examination ID (maximum 16 characters)
- Physician (maximum 4 characters as entered on Physician page (F7) or as appropriate).

Entries under 'Name' and 'Date' are mandatory. All others can be skipped. The help and error lines give instructions and error messages to the operator.

The function line shows the selectable functions, which are (from left to right):
- select: select a new patient for acquisition
- add: enter data for new examinations
- delete: delete an examination
- modify: change patient or examination data
- previous: displays previous schedule page
- next: displays next schedule page.

Section 5 'Operation' describes the use of these functions.

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Review page (F2)

The Review page or pages give an overview of all completed examinations with the number of acquired runs and images. An examination can be selected from this page for viewing, amendment or deletion.

For a completed examination, the following data can be amended:
- Patient name
- Birth date
- Patient sex
- Examination ID
- Physician code.

The following functions can be selected from the function line (from left to right):
- Select: select examination for viewing
- Delete: delete examination
- Modify: modify examination data
- Disk A/B: select disk partition in multidisk systems (if configured)
- Previous: display previous Review page
- Next: display next Review page.

Section 5 ‘Operation’ describes the use of these functions.

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Report page

The Report page or pages give an overview of all completed examinations. For each examination the patient attributes derived from the scheduled patient record are shown. The acquisition examination, if present, will be highlighted (inversed video) and will be the default examination to be reported. The default examination to be transferred will be the acquisition examination. If more examinations exist than can fit on one page, then that page will be shown that contains the current acquisition examination.

For a completed examination, the following data can be amended:
- Patient name
- Birth date
- Patient sex
- Examination ID
- Physician code
- Status.

The following functions can be selected from the function line (from left to right):
- Report: send examination report to the connected information system
- Cancel: cancels current transfer
- Disk A/B: select disk partition in multidisk systems (if configured)
- Previous: display previous report page
- Next: display next report page.

Section 5 ‘Operation’ describes the use of these functions.

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Export page

The Export page or pages display all examinations flagged for transfer, including, if applicable, an examination with the status 'sending'. If there is no examination with the status 'sending' then the pct field is determined. For each examination the patient attributes derived from the scheduled patient record are shown. The default examination to be transferred will be the acquisition examination. If more flagged examinations exist than can fit on one page, then that page will be shown that contains the current acquisition examination.

For a completed examination, the following data can be amended:
- Patient name
- Birth date
- Patient sex
- Examination ID
- Physician code
- Run
- Pct (percent)
- Status.

The following functions can be selected from the function line (from left to right):
- Save: send selected images of the selected examination to the selected destination
- Cancel: cancels current transfer
- Disk A/B: select disk partition in multidisk systems (if configured)
- Previous: display previous export page
- Next: display next export page.

Section 5 'Operation' describes the use of these functions.

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ODR page

The ODR page allows examinations to be scheduled for saving to and retrieval from optical disk. The examinations shown are those on the Review page that are flagged for transfer. While saving or retrieval is in progress, the Review page displays the instantaneous number of images still to be saved or retrieved (counting down to zero). For biplane runs the total number of images is displayed. The number of runs with flagged items is shown under 'Runs'. The ODR page is only accessible if an optical disk drive is installed.

The status can be:
- scheduled: saving or retrieval selected
- busy: saving or retrieval in progress
- done: examination successfully saved
- retrieve: examination successfully retrieved
- error: an error has occurred that cannot be resolved by the operator
- warning: an error has occurred that can be resolved by the operator
- aborting/aborted: the save or retrieve process has been canceled.

The following functions can be selected from the function line (from left to right):
- Save: save examination to the optical disk
- Cancel: cancel current transfer
- Retrieve: retrieve examination from the optical disk
- Format: format the optical disk
- Disk A/B: select disk partition in multidisk systems (if configured)
- Previous: display previous page
- Next: display next page.

Section 5 'Operation' describes the use of these functions.

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Copy page

The Copy page allows photofiles from completed examinations to be copied to a remote HCU. While copying is in progress, the page shows the instantaneous number of runs and images still to be copied (counting down to zero). The Copy page is only accessible if a remote controlled HCU is installed.

The status can be:
- Scheduled: copying selected
- Busy: copying in progress
- Done: copying successfully completed
- Error: an error has occurred that cannot be resolved by the operator
- Warning: an error has occurred that can be resolved by the operator
- Cancelled: the copy process has been canceled.

The following functions can be selected from the function line (from left to right):
- Copy: copy flagged images of the photofiles to an HCU
- Cancel: cancel current transfer
- Disk A/B: select disk partition in multi-disk systems (if configured)
- Previous: display previous copy page
- Next: display next copy page.

Section 5 ‘Operation’ describes the use of these functions.

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Transfer page

The Transfer Page gives an overview of all accessible archiving systems. The archiving page is displayed when a system is selected.

The following can be selected from the function line (from left to right):
- REPORT: to select the report page
- EXPORT: to select the export page
- ODR: to select the ODR page
- COPY: to select the copy page

System page (F6)

The System page is used to set the time and date. Thereafter, the date and time are maintained by the system. The date and time appear on the header line of each page and are stored in the file for each examination.

The following functions can be selected from the function line (from left to right):
- Set time: the INTEGRIS system time is displayed and can be set (the time format is hh:mm)
- Set date: the INTEGRIS system date can be set (the format is configurable during installation)
- Service: gives access to the system for service purposes
- Test img: displays a test image intended for HCU calibration

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- IQtools: (for service only) starts the automated image quality measurement tool (password protected).

Section 5 'Operation' describes the use of these functions.

Physician page (F7)

The Physician page can contain up to 64 physician codes with the related disk partitions and network addresses, for use with the Schedule page. A physician code (max. 4 characters) is an abbreviation of the physician's name (max. 26 characters). The code can be used on the Schedule page but the full name of the physician will appear on films.

The following functions can be selected from the function line (from left to right):

- Add: to enter a physician's name, code, disk partition and network address
- Delete: to delete a physician's name, code, disk partition and network address
- Modify: to modify a physician's name, code, disk partition and network address.
- Previous: display previous physician page
- Next: display next physician page.

Section 5 'Operation' describes the use of these functions.

The disk partition is only available if a disk partition is configured, and a network address is only available if a network is connected.

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Status page (F9)

The Status page gives information on the status of the current acquisition and viewing examinations. The status and other relevant information on the current acquisition examination, as listed in the Schedule page, are displayed on the left of the page. The status of the current viewing examination, as listed in the Review page, is displayed on the right hand side, but only when this examination is not the current acquisition examination. The information on this page is updated automatically.

Examinations can have the following status:
- Current: currently selected for acquisition
- Examined: acquisition complete
- Scheduled: selected for archiving
- Busy: transfer in progress
- Retrieved: successfully retrieved from ODR disk
- Done: transfer successfully completed
- Error: an error has occurred that cannot be resolved by the operator
- Warning: an error has occurred that can be resolved by the operator
- Cancelled: transfer cancelled.

The 'Flag' information field indicates that an image, heartbeat, or complete run has been flagged. Flag status can be reviewed in 'Examination overview' or 'Run overview' mode [61 or 62].

The following functions can be selected from the function line (from left to right):
- Select: select a new viewing run from the acquisition or viewing examination
- Modify: to modify an APR name
- Previous: display status of previous acquisition runs or viewing examination
- Next: display status of next acquisition runs or viewing examination.

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4.5 Overview of acquisition and viewing displays

4.5.1 Acquisition console

Imaging technique Page

Digital dynamic (alter APR activated)

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Digital dynamic (info page) + alter APR

Digital vascular (display information activated)

4.5.2 Monitors

Examination/Viewing Monitor

General

- if the parallel viewing option is not installed the monitor layout is the same for both the Examination and Viewing monitors.
- if the parallel viewing option is installed:
  - when the system is busy with the current acquisition examination: the monitor layout is the same for both the Examination and the Viewing monitor.
  - when the system is busy with another viewing examination (= parallel viewing):
    • the examination monitor shows viewing and acquisition related information from the acquisition examination.
    • the viewing monitor shows viewing related information from the viewing examination and the viewing mode frozen icon (e.g. during acquisition, parallel viewing etc.).

Viewing related information

a Patient data and examination date (only if the 'Add text' function [85] is activated):
Patient name, patient birth date and sex, registration number and examination date.

b Image area:
live image (fluoroscopy or exposure).

d Additional examination information:
(only if the 'Add text' function [64] is activated)

T-mask (99.99): Time between the current mask image and the first image in the run.
T-image (99.99): Time between the current image and the first image in the run.
T-run (HH:MM:SS): Time that the run was acquired.

e Hospital name and physician name (only if the 'Add text' function [85] is activated):
Hospital name (2 lines); Physician name (1 line)

f 

View trace subtract mode.

Only if 'View trace' [67] is activated.

CO_2.

Only if 'CO_2 trace' [68] is selected in view trace subtract mode.

Photo.

Only for photofile images.
n1: Total number of images in photofile.
n2: Current photofile image number.

Viewing mode frozen.

Only if the 'Parallel viewing' option is installed and the Dual fluoroscopy or Parallel viewing mode is active. The symbol is displayed during/after fluoroscopy in the Parallel viewing mode.

Geometry angles.

Image information.

Run
Not for photofile images. 'Run' appears twice in Run-subtract viewing mode.
n1: Current run number.
n2: Total number of images in the run (or pairs of images, for biplane operation). Maximum three characters.

Mask
n3: Current mask (pair) number (maximum of three characters).

Image
n4: Current image number (or the image pair number, for biplane operation) (maximum of three characters).

Acquisition related information

c Delay time:
Delay bar in seconds (only for exposures with delay time > 0).

f 

Last Image Hold (LIH) image.

Only if configured (Service).

Trace image.

Only if Trace subtract fluoroscopy [158] is activated.

Trace subtract image.

Only if Trace subtract fluoroscopy [158] is activated.

Stopwatch.

Only if 'stopwatch' [4c] is activated.

Time left.

10 seconds left for acquisition before cyclic overwriting of the acquisition examination.

Overview related information

a **Previous overview page.**

Only if 'overview' [40, 41] is activated and the previous overview page contains images.

n1: image number of the first image displayed.

g **Next overview page.**

Only if 'overview' [40, 41] is activated and the next overview page contains images.

n1 : image number of the last image displayed.

Reference monitor

Reference related information

a Image area:
photofile image or expanded patient name (maximum 26 characters).

b **View reference.**

Displayed if viewpad function is activated.

Photo.

Only for photofile images.

n1: Total number of images in photofile.
n2: Current photofile image number.

4.5.3 Hard copy layout

The film layout depends on the type of hard copy unit (HCU) control:

- Manual control:

For the frontal/lateral run the film layout is the same as that of the frontal/lateral Viewing monitor during viewing. For a biplane run the film layout is the same as that of the frontal Viewing monitor (default). To change the film layout to that of the lateral viewing monitor (and vice versa) use the channel select [4c] or frontal/lateral [42/43] controls.

- Remote control:

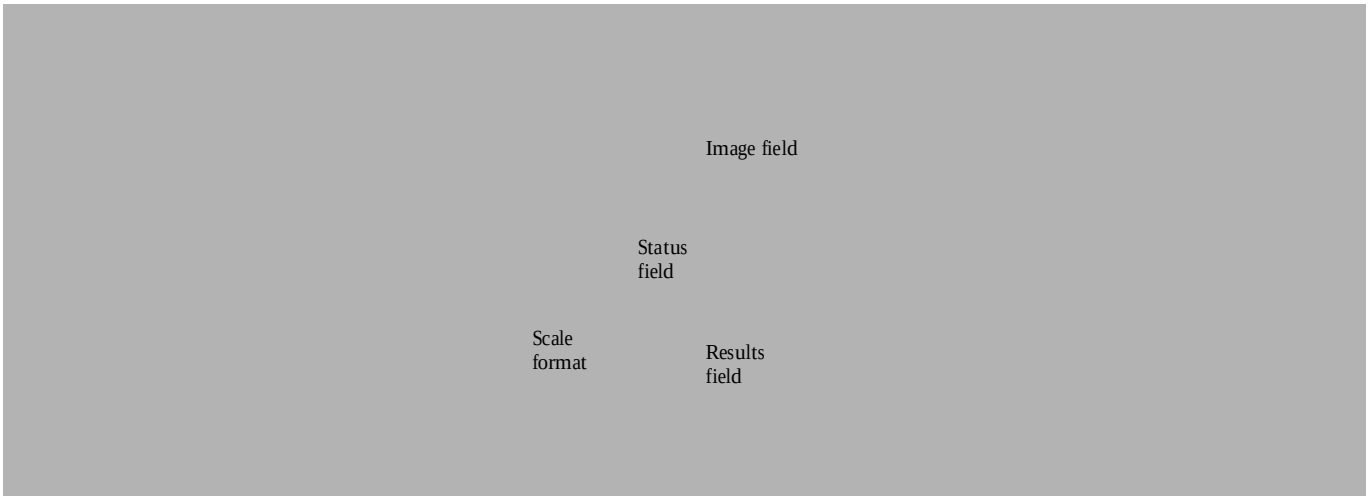
a Patient and examination data:
Patient name, patient birth date and sex, registration number and examination date.

b Image area:
Photofile image or expanded patient name (maximum 26 characters).

c Hospital name and physician code:
Hospital name (2 lines); Physician code (1 line)

For more information on viewing related information, refer to Section 4.5.2 'Monitors'.

4.5.4 Ultrasound image display



During acquisition

During acquisition the ultrasound image is displayed on the examination monitor as follows:

Item	Explanation	
Status field	Frequency (MHz)	For selected probe.
	F	freeze (highlighted)/Unfreeze
	← R(reversed)	Reverse on.
	R →	Reverse off.
	Frame rate:	Frames/s.
Scale format	A scale indicates the displayed depth.	
	The focus points are marked by arrows.	
Image field	Displays the ultrasound image.	
Results field	Displays the numerical results (measurements).	

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4.6 Accessories

Rail accessory clamps

Tabletop accessory clamps

Catheterization arm support

Mattress

Pan handle

Drip stand

Height-adjustable arm support

Restriction straps

Peripheral filters

Cerebral filter

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Arm supports

Sterile disposable covers (see note)

Head fixing aids

Ratchet compressor

Table mounted radiation shield

Examination light

NOTE ***Sterile disposable covers are not supplied and must be obtained locally.***

4.7

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