

TOSHIBA
Leading Innovation >>>

REMOTE CONTROL R/F SYSTEM

ZEXIRATM
DREX-ZX80

FPD Version

ZEXIRA



TOSHIBA MEDICAL SYSTEMS CORPORATION

<http://www.toshibamedicalsystems.com>

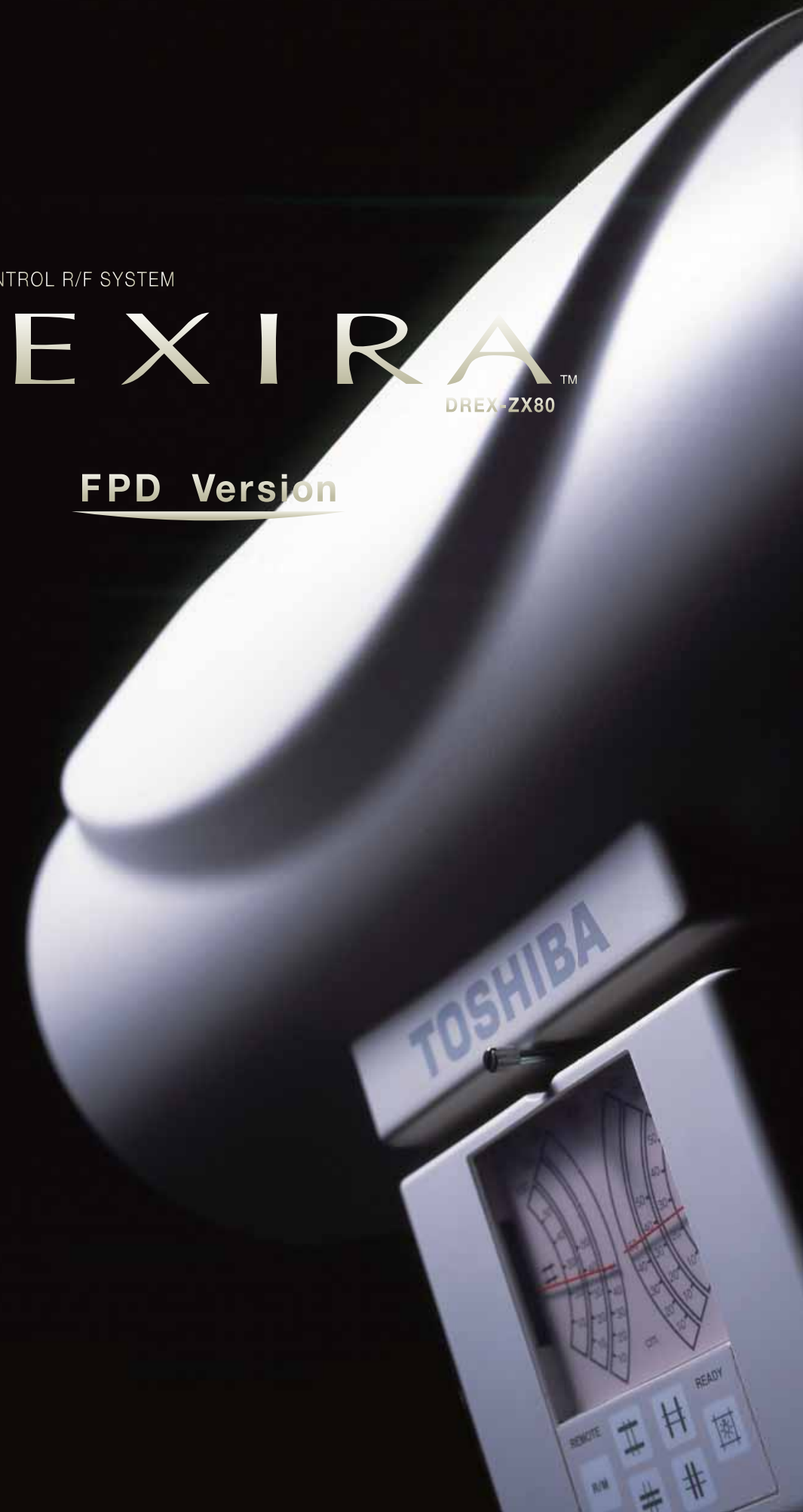
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The best selection you can make.

This system represents a dramatic evolution in the potential of full-digital systems with flat panel detectors. Incorporating a variety of flexible features, the Toshiba X-ray TV system ZEXIRA™ can support highly specialized examinations equivalent to those available with dedicated systems. The full capabilities of this high-performance system can be applied to a wide range of studies, such as gastrointestinal angiography, general-purpose examinations, and urological examinations. The system employs a people-friendly universal design, providing a comfortable examination environment both for operators and patients.

Highly advanced image processing technology concept

Toshiba's unique image processing technologies allow all elements that support high image quality, such as algorithms, system design, and firmware to be integrated at a high level.

This allows the following capabilities: sharp image quality achieved by the high S/N flat panel detector and 16-bit dynamic range, advanced DCF that permits images providing depth without black/white crush, auto window processing that allows image quality to be adjusted optimally, and SNRF, providing clear images with low exposure doses.

ZEXIRA

ZEXIRA : Zenithal X-ray imaging of radiography and fluoroscopy



Halation is suppressed, providing images that are distortion-free to all four corners.

The flat panel detector (FPD) ensures the best possible image quality.

The features of the FPD, which supports dynamic images, have been further improved. Even in peripheral parts of the image, distortion is eliminated and the effects of halation are minimized. ZEXIRA's sharp images approach the quality of the best X-ray TV systems.



Images that are distortion-free to all corners.

A large-field FPD with a 43 cm x 43 cm field of view is adopted. The field in fluoroscopic and radiographic images extends to all corners. In addition, the detector's flat surface always provides high-quality images that are distortion-free from the center to the edges of the image.

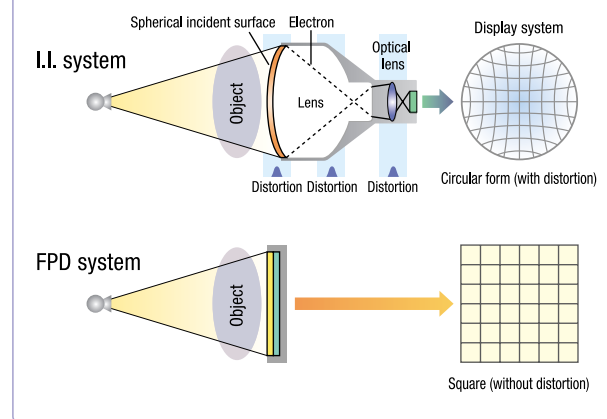
Comparison of field angle and image quality in images from the same patient



Image acquired with I.I. system

Image acquired with FPD system

Comparison of field and distortion in I.I. and FPD system

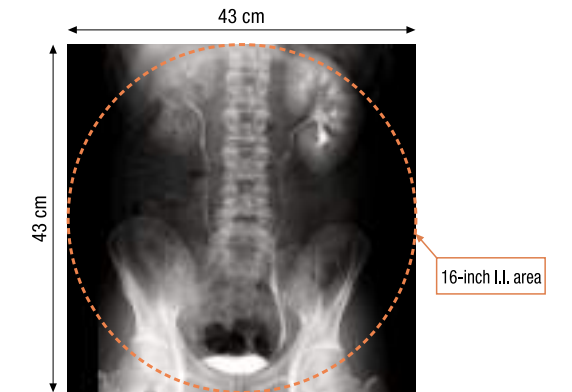


Reduced exposure dose and high image quality.

With a large field of 43 cm x 43 cm, the FPD supports efficient examination of each target region, making it possible to reduce fluoroscopy time, which contributes to reduced exposure dose for the operator and patient. The FPD is a revolutionary, sophisticated detector that combines high image quality with lower exposure doses.

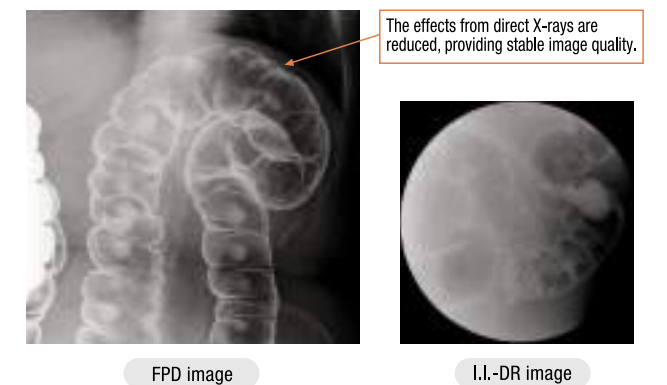
Large, square field of view.

Compared to a 16-inch I.I., the square-field FPD allows observation over a large field of view. In particular, it provides excellent performance for studies in which the region of interest is square, such as barium enemas.



Reduced halation provides stable image quality.

Even when direct X-rays enter the exposure field, the structure of the FPD reduces leakage to peripheral pixels. Therefore, the effects of halation are minimized and images providing depth are achieved by utilizing a 16-bit dynamic range with high S/N. In addition, the dynamic range of fluoroscopic images permits clear 14-bit images.



FPD image

I.I.-DR image

Recording and displaying fluoroscopic images in association with acquired images.

Fluoroscopic images can be recorded in association with acquired images. The recorded fluoroscopic images can be played back immediately if necessary, delivering new potential in fluoroscopic diagnosis.

Compact unit allows flexible operation. Examinations efficiently supported from a variety of viewing angles.

The compact design, wide clearance, and dynamic table movement of the system allow wider clinical application than ever before. Flexibly supports gastrointestinal tract studies and a range of other examinations.

Wide 133 cm coverage allows whole-body examinations.

The X-ray beam center can be moved approximately 133 cm, making it possible to increase the examination range. Without moving the tabletop in the longitudinal direction, it is possible to perform studies of the gastrointestinal tract, urinary system, and blood vessel system, as well as endoscopic examinations.



Oblique angle from +35° to -30° improves the flexibility of the irradiation field setting.

The X-ray tube angle can be set from +35° to -30°. The X-ray beam direction can be set as desired, facilitating cascade stomach examinations and preventing overlap in radiography of the intestinal tract.



Tilt angle from +89° (standing position) to -89° (head-down position).

A wide tilt angle range from +89° to -89° is available. In addition to routine studies of the gastrointestinal tract, various other studies can be performed, depending on the room layout, such as examinations of the lower extremities with the tabletop set to the head-down position and with the footrest mounted on the head end of the tabletop, and examinations of the urinary system using a cystoscope.



Supports TV-angiography (option).

An optional angiography package can be used in combination, providing excellent support for abdominal angiography, extremities, etc. Using an additional reference image monitor allows monitoring to accurately support IVR procedures.



Table with improved mobility.
Flexible movement facilitates patient transfer and supports a range of examinations.

Safety tilt mode prevents elderly patients from falling.

During positioning, "Safety tilt mode", the first function of its type in the industry, automatically stops the table temporarily at a preset angle before moving to the 89° position, to prevent elderly patients from falling from the table. It is also possible to limit the maximum head-down tilt angle if necessary.

* The temporary stop angle is set at the time of installation upon request from the customer.



Table can be lowered to 48 cm* above the floor for patient-friendly operation.

The table can be lowered to just 48 cm* above the floor. This provides easy transfer for elderly patients, children, and patients in wheelchairs when the table is set horizontally.



Oblique, tilt, and spot operation can be performed simultaneously.

Oblique movement, tilting, and imaging system longitudinal movement can be performed simultaneously. Using this function, stress-free operation can be performed in examinations that require simultaneous movement. For example, a contrast-enhanced study of the upper part of the gastrointestinal tract, in which the angle of the stomach is observed with angled radiography while controlling the flow of barium by tilting the table, can be performed at the optimum timing.

The system can be installed in rooms with ceilings as low as 250 cm.

The ZEXIRA system features a 133-cm longitudinal movement stroke, 30-cm minimum distance between the imaging center (beam center) and the foot end of the tabletop, and a 48-cm minimum table height, but the required ceiling height is only 250 cm. This means that installation is possible in facilities where the ceiling height is limited.

X-ray tube with large capacity and small focus size in standard configuration.

For examinations in which mainly fluoroscopy is performed, the X-ray tube is subject to heavy loads. In order to overcome this problem, three focus sizes are provided (0.4 mm, 0.6 mm, and 1.0 mm) and can be selected according to the purpose of examination. In addition, the anode heat storage capacity of the X-ray tube has been increased to 1500 kHU, supporting studies in which continuous radiography is mainly performed, such as angiography.

Diagnostic field expanded to the edge of the tabletop supports.

Allows examination positions equivalent to a dedicated table for urological examinations.

It is possible to set the edge of the imaging field to as little as 13 cm from the foot end of the table. The table is thin and projections below it have been eliminated, so operators can position their legs beneath it, as with a dedicated table for urological examinations, increasing operator comfort. A sensor* for detecting contact between the operator's knees and the table can be mounted. If there is interference, table vertical movement or tilting is stopped automatically. In addition, accessories for urological examinations such as knee holders, elbow holders, drain pan, and drainage bag are available. * Sensor and knee pads are provided together.



Flexibly supporting examination of the lower extremities.

With ZEXIRA, the edge of the imaging field can be set to as little as 13 cm from the foot end of the table (shortest in the industry) when the table is set in the standing position. Various studies of the lower extremities can be performed, such as imaging of leg veins under the gravity load, and imaging in the orthopedic field for the region below the knees.



Human friendly, stylish and functional concepts. Attractive, contoured tabletop.

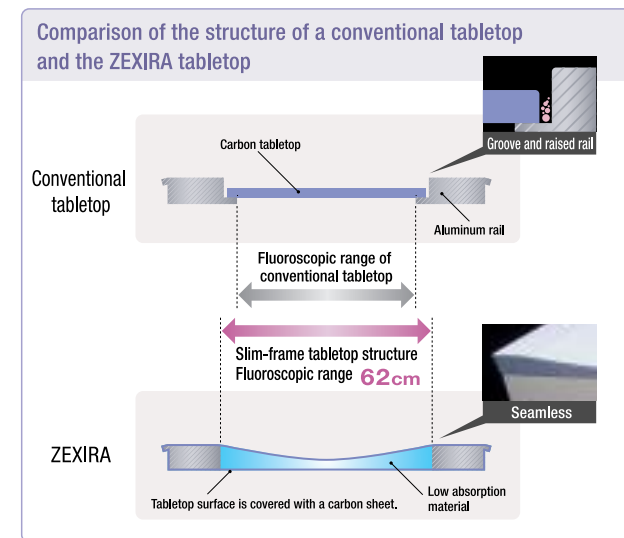
Contoured, ergonomically designed tabletop.

Advanced design provides a contoured tabletop with gentle concavity, minimizing patient discomfort during examinations. The patient can change position easily during examination of the upper part of the gastrointestinal tract, and can lie comfortably on the tabletop, even for long examinations such as ERCP.



Toshiba's unique slim-frame tabletop structure.

The width of the left and right margins of the tabletop is narrower, increasing the fluoroscopic range to 62 cm in the lateral direction. This allows better patient comfort during observation of the upper arm, shoulder, lumbar region, etc., as well as contrast-enhanced examinations of shunts.



Tabletop with CFRP wrapping structure is easy to clean.

The entire tabletop surface is wrapped in a carbon sheet (CFRP wrapping structure), eliminating bumps or grooves. In addition, the concavity of the tabletop allows liquids such as barium, contrast medium, and urine to pool when spilled, allowing easy cleaning.

With dead space eliminated, the system can be installed in compact spaces. Clearance around the table has been increased.

The table can be installed in contact with the wall, ensuring clearance around the unit.

The table can be installed in contact with the wall, ensuring sufficient clearance in front of the table. The support column for tabletop vertical movement is slim, and mechanical sections such as rails are built-in, permitting easy access from the back of the table. It has excellent support for ERCP, nephrostomy, and gynecological examinations.

The depth of the system is reduced, providing more working space.

The depth of the ZEXIRA system is reduced to 174 cm. Compared to conventional X-ray TV systems, by installing the system in contact with a wall, a larger working space can be ensured. Examination or intervention can be performed using an endoscope system or ultrasound system in the same room.



Carefully considered design contributes to highly reliable examinations.

Comfortable table mat.

Patient-friendly materials are used for the table mat, reducing patient discomfort during long examinations.



New shoulder rests improve contact with the patient's body.

The shape of the shoulder rests has been improved to best fit the shoulder size of the patient. Patient-holding capability has been improved and firmness optimized, allowing comfortable, reliable examinations.



Adjustable compression force.

Compression force can be increased up to 80 N. Within the movement range of the compression cone arm, it is possible to slide and stop the arm at the desired position. Compression force can be controlled freely from the remote or local control console (option).



Detachable grid.

The detachable grid can be removed for some procedures; for example, radiography of the extremities or pediatric radiography. This makes it possible to perform radiography under the optimum X-ray conditions, lowering the patient exposure dose.



Newly designed remote control panel. Accurately supports smooth examination flow.

New remote control panel is employed as a common unit for X-ray control and table control. As the remote control panel is separate from the desk, it can be positioned according to the layout of the monitor, keyboard, and other units.

Control panel focuses on usability.

The X-ray control and table control panels are integrated into a single control panel. Visibility and operability are further improved. The ergonomic design places frequently used switches adjacent to each other, allowing natural operation.



- **A handswitch is employed**
A handswitch is employed, making it possible to intuitively perform X-ray control. Quick and easy operation is possible without interrupting the examination flow.
- **Multifunctional dial**
A multifunctional dial is used for volume adjustment. Use of the different illumination colors makes it possible to quickly adjust fluoroscopy/radiography conditions.

- **High-resolution LCD**

A high-resolution LCD monitor with improved visibility is used.

- **Joystick for table operation**

Table operation can be performed comfortably regardless of whether the operator is standing or seated.

ABC* function provides stable pulsed fluoroscopic images.

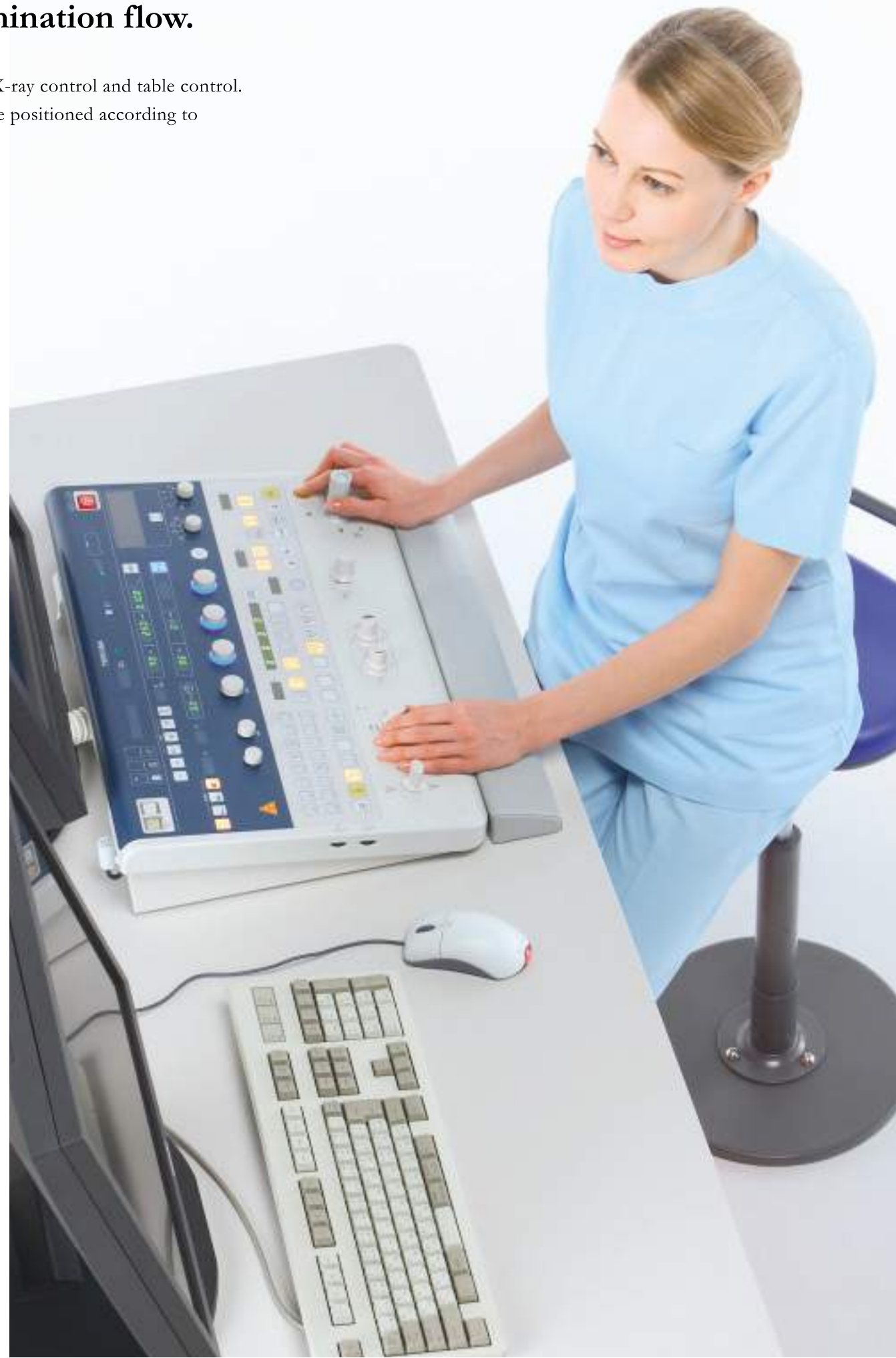
An automatic brightness control circuit (ABC function) automatically sets the appropriate fluoroscopic conditions, such as tube voltage and tube current. Fluoroscopic images with stable brightness can be acquired. In addition, use of angiography system algorithms makes it possible to obtain stable image quality in pulsed fluoroscopy (option). An ABC lock function is provided to ensure observation with stable brightness, even if the object moves slightly.

* Auto Brightness Control

ATR* function automatically sets fluoroscopic and radiographic conditions.

The ATR function permits radiographic conditions to be set automatically according to the fluoroscopic conditions. The optimum tube voltage and current are set automatically, providing stable image quality, reducing inconvenience to the operator, and increasing examination throughput.

* Auto Tube voltage Regulation



System operation status is managed by CPU control.

Data on system operation status, such as cumulative X-ray tube heat, date of error, radiographic conditions, and actual load measurement related to an error are automatically recorded. System logs are controlled by the CPU, permitting stable system operation.

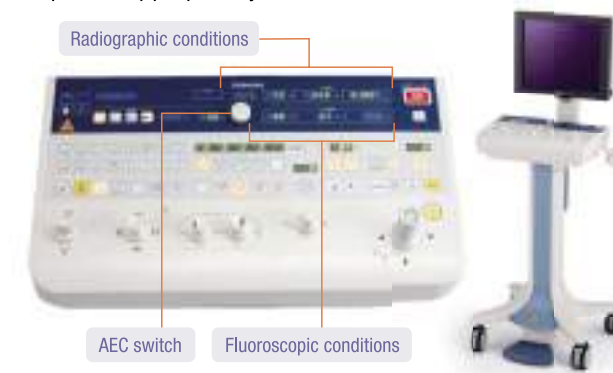
X-ray tube anode heat capacity is automatically monitored.

Maximum anode heat storage capacity of the X-ray tube is automatically calculated and managed. This protects the X-ray tube while allowing it to be utilized to its maximum capability.

<Local control console> (option)

Local control console displays X-ray conditions.

The X-ray conditions can be displayed on the local control console. Fluoroscopic conditions can be checked to control exposure appropriately.



Local control console equipped with microphone.

The local control console is equipped with a microphone. The voice of the patient and operator are transmitted via the table and remote control console microphones and output clearly.



Operating lever direction can be set according to examination type.

In some examinations, such as endoscopy, it is necessary to inversely position the patient on the table (positioning the head at the foot end). In this case, image orientation changes correspondingly on the monitor. However, the operating direction of the lever remains unchanged. The operating direction selection switch can be used to change the operating direction of the levers for the imaging system. System operation can then be performed in the same manner as normal procedures.

<APC panel> (option)

An LCD touch panel displaying the X-ray conditions for cassette radiography can be used in combination. It can be placed on a desk or wall-mounted.



Sharp images without blackout can be acquired, even in areas with only slight density differences. Simple operation reliably provides high-quality images.

Image quality adjustment, until now necessary for each radiographic exposure, has been fully automated. Blackout, unavoidable in film radiography, has also been eliminated. Digital + automatic function permits simple operation to acquire high-resolution images.

Advanced digital compensation filter (DCF)* eliminates blackout.

In the film/screen system or in conventional image processing, image correction cannot be performed properly in areas in which intestinal tracts with gas are overlapped and partial blackout occurs for areas in which the body cavity thickness differs. The advanced digital compensation filter corrects the density differences in single images such as these and improves the image quality. In examinations such as gastrointestinal angiography and orthopedic radiography, optimal images can always be acquired.

* Digital Compensation Filter

Regions in which the DCF works effectively

- Barium enema** Region in which intestinal tracts are overlapped or intestinal gas is pooled
- Barium swallow** Regions with significant differences in barium contrasting density and double contrast radiography for the fundus of the stomach
- General skeletal radiography** Regions with excessive blackness due to low body thickness and skin folds



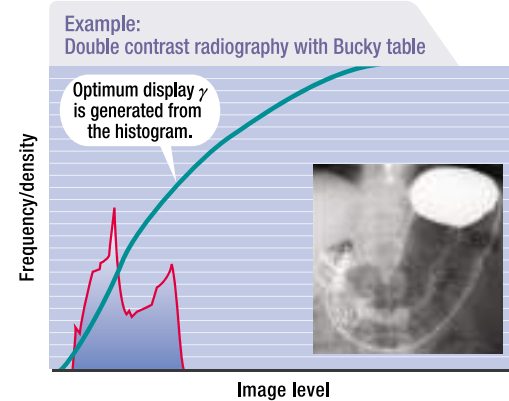
Before image processing with the DCF After image processing with the DCF

A range of automatic functions makes the operator's job easier.

- Auto window function + DCF image processing** The window level is automatically corrected to the optimum grayscale, making it possible to acquire easily viewable images.
- Auto filming function** Acquired images are automatically transferred to the imager and output to film.
- Auto filing function** Acquired images are automatically stored in the REV during examination.

Troublesome image quality adjustment is automated in Auto window function.

In actual practice, exposure doses and image levels are changed for each study according to the patient's physique, the region to be examined, and effects from direct X-rays and the beam limiting device. It is therefore necessary to correct images according to changes in the window or histogram by using the optimal gamma curve. ZEXIRA's unique Auto window function can generate the optimal gamma curve for the histogram distribution in the acquired image. The acquired images are always optimized.



New SNRF* noise reduction filter (option).

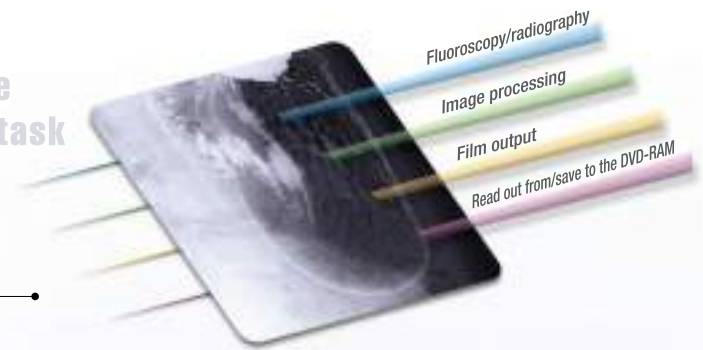
SNRF, a new noise reduction filter effective for reducing almost all noise to a specific level regardless of the frame rate, is available. The original image is classified into edges, flat parts, and bumps for analysis, and the filter coefficient is determined so that sections with the same image structure can be smoothed. Elements that affect images, such as blurring, after-image, and reduced contrast are eliminated, making it possible to improve S/N ratio to approximately four times that of our conventional systems.

* Super Noise Reduction Filter

Fluoroscopic DCF provides clear fluoroscopic images without halation.

Fluoroscopic DCF (digital compensation filter) allows the huge amount of digital fluoroscopic data acquired by the 14-bit dynamic range of the FPD to be processed digitally in real time. Fluoroscopic DCF permits optimal correction processing according to the examination type and provides clear fluoroscopic images with suppressed halation and black crush.

Realtime Multi-task



Parallel processing maximizes examination throughput.

Simultaneous parallel processing can be performed during fluoroscopy/radiography, including patient registration, image processing, written to the REV, film output, etc.

Sequence radiography/fluoroscopy and image acquisition are possible.

Rapid sequence radiography up to 15 fps is possible. Even with radiography of objects that move rapidly, images can be acquired at the optimum timing. In addition, 256 images*¹ (up to 15 fps*²) can be acquired each time fluoroscopy is performed, facilitating diagnosis with dynamic observation.

*¹ 512 images (option)
*² 30 fps (option)

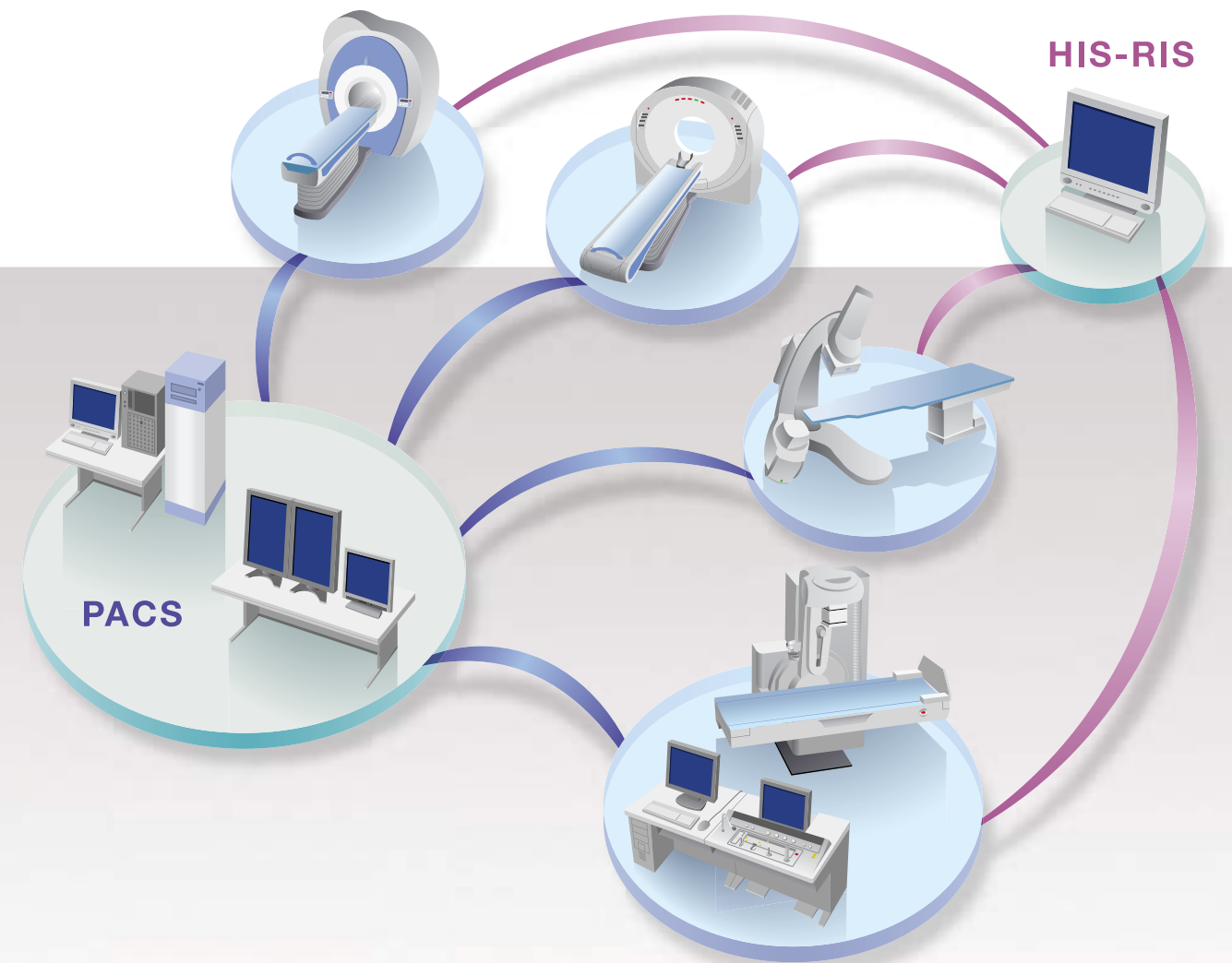


* Images on monitors are simulated.

Network transfer and digital storage.

Efficient workflow supports quick diagnosis.

Acquired images are quickly transferred to the intra-hospital network for immediate diagnosis.
 Huge number of images can be recorded and stored on REV.
 Increased information expansion capability by digitization completely changes the post-examination process flow.



ZEXIRA

Acquired images can be output in DICOM format*.

- DICOM PRINT
DICOM Storage** Images can be transferred to the dry/wet imager and image server in DICOM format.
- Option
DICOM Media Storage** Images can be written to a CD-R or DVD-R in DICOM DIR format.

* Depending on the equipment type or version, usage restrictions may apply.
 This should be confirmed in advance with the manufacturer of the equipment to be connected.

Patient information can be acquired.

- Option
Supporting the
intra-hospital network** Patient information can be acquired in the DICOM format from the terminal, which is connected to the intra-hospital network (HIS, RIS).
- Option
Online connection** Medical terminals that do not support DICOM are network-linked, enabling online information exchange.

Supporting the intra-hospital network (option).

Image transfer (Storage SCU), printing (Print SCU), patient information reception (MWM SCU), and study results response (MPPS SCU) can be performed in conformity with the worldwide medical image communication standard DICOM 3.0. Using online image transfer, image observation, storage, database construction, and online entry of the patient attribution information can be performed.

Recording of fluoroscopic images to a DVD recorder is possible.

Fluoroscopic images can be recorded to a DVD recorder or a VCR. This is useful for recording dynamic images of fast-moving regions or reconfirming an examination in which the examination sequence was terminated before starting radiography due to the condition of the patient.

* It is necessary to prepare the scan converter separately.

Highly reliable MHR** backup function is enabled by double-redundant HDD + REV*.

Acquired images are stored on the hard disk. The hard disk has a double-redundant (mirroring) structure in case of hard disk malfunction. Acquired images are stored on both disks at the same time, avoiding data loss if a malfunction occurs. In addition, a high-speed, large-capacity REV disk (option) is provided for backup of image data. Important data can be stored long-term on highly reliable external media.

* Removable hard disk ** Mirroring HDD and REV

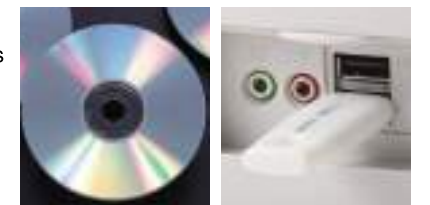
Up to 70,000 images* can be stored.

The main unit is equipped with a high-capacity hard disk. Up to 70,000 images can be stored. This makes it possible to easily perform examinations such as DSA (option) in which a large number of images are acquired.

* For 1024 x 1024 matrices

Writing/using image data to/from various types of media is possible.

The image processing system permits acquired image data to be written on various media types*. For example, image data is written in BMP format and saved to the PC via USB. The saved image data can then be processed to create slides and used in presentations on clinical cases. In addition, image data can be written using DICOM standards**, which are storage standards for clinical images, and evaluated using a DICOM viewer manufactured by our competitors.



* DVD-R, CD-R, etc. **Option