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location of primary operating controls for spot-film devices

NEMA

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION ■ 2101 L STREET, N.W., WASHINGTON, DC 20037

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LOCATION OF PRIMARY OPERATING CONTROLS FOR SPOT-FILM DEVICES

Foreword

User needs have been considered throughout the development of this publication.

This standards publication has been prepared by the Spot-film Device Subcommittee of the Medical Diagnostic X-ray Equipment Group, X-ray Imaging Products Section, of the National Electrical Manufacturers Association. This effort was undertaken at the request of the Manufacturers Committee of the Radiological Society of North America.

The scope of this publication was determined during several meetings held between representatives of the Manufacturers Committee of the Radiological Society of North America and of the Medical Diagnostic X-ray Equipment Group of the National Electrical Manufacturers Association.

NEMA standards publications are required to be reviewed periodically and are frequently revised to reflect changing conditions and technical progress. Comments are welcomed and should be addressed to:

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Purpose

The purpose of this standards publication is an attempt to standardize the general location of specifically selected spot-film device controls to aid the radiologist in processing patients with fewer delays and to add that small, but nevertheless, extra measure of safety that may be associated with standardized control location.

Scope

This standards publication provides definitions for and the general location of the specific controls encompassed by this document. The controls covered by this document will be designed for operation by a hand wearing a lead-lined glove where technically compatible with the requirements of Part 4. Alternatively, where sufficient radiation protection for the hand is provided, the controls may be designed for operation by an ungloved hand.

All control locations are described looking at the spot-film device with the table in the horizontal position from the operator's side. The forward direction is defined as toward the operator.

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Part 1
DEFINITIONS

XR 6-1.01 SPOT-FILM DEVICE POSITIONING HANDLE

The spot-film device positioning handle is the handle on the spot-film device utilized to position the device vertically and horizontally relative to the tabletop. Power assist may or may not be provided.

NEMA Standard 3-14-1979.

XR 6-1.02 RECORD PREPARE CONTROL

The record prepare control prepares the system for an image recording, e.g., transfers the cassette to the radiographic position.

NEMA Standard 3-14-1979.

XR 6-1.03 SHUTTER CONTROLS

The shutter controls manually control the shutter position which sizes and shapes the useful X-ray field.

NEMA Standard 3-14-1979.

XR 6-1.04 SHUTTER MODE SELECTOR (AUTO-MANUAL)

The shutter mode selector (auto-manual) allows selection of the manual or automatic shutter control mode.

NEMA Standard 3-14-1979.

XR 6-1.05 X-RAY EXPOSURE CONTROL

The X-ray exposure control initiates the X-ray exposure.

NEMA Standard 3-14-1979.

XR 6-1.06 FORMAT SELECTION

Format selection is the selection of the size and number of divisions on the spot-film receptor.

NEMA Standard 3-14-1979.

XR 6-1.07 TABLETOP MOTION CONTROLS

The tabletop motion controls allow movement of the tabletop in the longitudinal and transverse directions.

NEMA Standard 3-14-1979.

XR 6-1.08 TABLETOP TILT CONTROLS

The tabletop tilt controls allow angular positioning of the table.

NEMA Standard 3-14-1979.

XR 6-1.09 FLUOROSCOPIC ASSEMBLY LOCKS

The fluoroscopic assembly locks provide for locking compression, transverse, and longitudinal motions.

NEMA Standard 3-14-1979.

XR 6-1.10 LATERAL SHUTTERS

Lateral shutters shall mean those shutters that move laterally across the width of the tabletop.

NEMA Standard 3-14-1979.

XR 6-1.11 LONGITUDINAL SHUTTERS

Longitudinal shutters shall mean those shutters that move longitudinally along the length of the tabletop.

NEMA Standard 3-14-1979.

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Part 2
GENERAL REQUIREMENTS

XR 6-2.01 GENERAL

The area(s) of the controls encompassed by this standards publication shall be provided with protective radiation barrier(s).

NEMA Standard 3-14-1979.

XR 6-2.02 SYMBOLS OR INDICATORS

Symbols or indicators which may be used to identify control functions, control condition, position or function selected shall be high contrast so as to enhance visibility in subdued room lighting.

NEMA Standard 3-14-1979.

XR 6-2.03 AUTOMATIC EXPOSURE

Automatic exposure following transfer of the cassette is not permitted without a separate action to initiate exposure. [Record prepare control and exposure control may be a combined function control requiring two distinct or separate actions (this sentence is approved as Authorized Engineering Information).]

NEMA Standard 3-14-1979.

XR 6-2.04 SHUTTER MODE SELECTOR

The shutter mode selector selects the mode of field limitation for radiography; fluoroscopic field control is not affected.

In the automatic mode, the beam size shall conform to the format selected for radiography.

In the manual mode, the beam size shall be limited to either the format selected for radiography, or the fluoroscopic field size, whichever is smaller.

A visual indication shall be provided to indicate that the automatic mode has been selected by the shutter mode selector.

NEMA Standard 3-14-1979.

XR 6-2.05 X-RAY EXPOSURE CONTROL(S)

The X-ray exposure control(s) shall be a deadman switch(es). This does not exclude the use of other X-ray exposure controls where the same measure of protection is provided.

NEMA Standard 3-14-1979.

XR 6-2.06 FORMAT SELECTION

The format selection must provide at least a 1 on 1, 2 on 1 vertical, and a 4 on 1 format with a positive indication of the format selected. A positive indication of the next area to be exposed shall be provided.

NEMA Standard 3-14-1979.

XR 6-2.07 TABLETOP MOTION CONTROLS

The movement of tabletop motion controls shall relate directly to patient movement. The movement of table tilt controls shall relate directly to the angular motion of the patient.

NEMA Standard 3-14-1979.

XR 6-2.08 UNIFORM MOTIONS OF DIAPHRAGMS CONTROLLING FIELD SIZE

The purpose of this paragraph is the establishment of uniform motions for opening and closing the diaphragms controlling field size. This paragraph covers diaphragm levers, knobs, bars or other means of operating the diaphragms.

When diaphragm levers on the top face or side faces of screen or spot-film devices, the right-hand or lower lever shall control the lateral pair. Moving the levers toward the back of the table, away from the front of the table, shall close the shutters.

Where a single diaphragm lever is used, on the top face of the screen or spot-film device, moving or tilting the lever toward the rear of the spot-film device shall close the lateral shutters. Moving the lever toward the left shall open the longitudinal shutters.

Moving the lever toward the left and toward the front of the spot-film device, i.e., the lower left corner, shall open both sets of shutters simultaneously. Moving the lever toward the upper right shall close both sets of shutters simultaneously.

If the diaphragm levers are on the front face of the screen or spot-film device, the shutters shall be closed by moving the levers to the right; the near or lower lever shall control the lateral diaphragm shutters and the upper lever shall control the longitudinal diaphragm shutters.

If the diaphragms are operated by knobs or other forms of rotating control, turning the knob clockwise shall close the diaphragms. The lower knob shall control the lateral diaphragm shutters and the upper knob the longitudinal diaphragm shutters.

NEMA Standard 3-14-1979.

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XR 6-2.09 RECORD PREPARE CONTROL

The record prepare control shall require constant pressure to stay in that mode or a visual indication shall be provided to show that the system is in the record prepare mode.

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Part 3
SYMBOLS

XR 6-3.01 GENERAL

The International Electrotechnical Commission (IEC) has done considerable work in the area of attempting to create international symbols for X-ray equipment. Should a spot-film device manufacturer decide to utilize symbols to identify control functions, then the proposed IEC symbols specified in this Part 3 should be used.

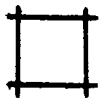
Authorized Engineering Information 3-14-1979.

XR 6-3.02 SPECIFIC CONTROLS AND APPROPRIATE SYMBOLS

Refer to Table 3-1 for specific controls and appropriate symbols. Symbols are not available for the spot-film device positioning handle nor should they be considered appropriate for this control.

Authorized Engineering Information 3-14-1979.

Table 3-1
SPECIFIC CONTROLS AND APPROPRIATE SYMBOLS

Control	Symbol	IEC Definition
(a) Record prepare		Stand-by (internal).
(b) Shutter controls		Beam limiting device (open).
		Beam limiting device (shut).
		Beam limiting device, to open set of shutters (as indicated by thick lines).
		Beam limiting device, to close set of shutters (as indicated by thick lines).
(c) Shutter mode (auto-manual)		Manual operation.
		Automatic.

(Continued)

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Table 3-1 (Cont.)
SPECIFIC CONTROLS AND APPROPRIATE SYMBOLS

Control	Symbol	IEC Definition
(d) X-ray exposure switch		Radiography (exposure general).
		Indirect radiography; the format size may be indicated.
		Fluoroscopy.
(e) Format selector, format indicator, and next exposure indicator		Film format and orientation selection, single exposure (nominal film size may be indicated).
		Film format and orientation selection, single exposure (nominal film size may be indicated).
		Film format and orientation selection, single exposure (nominal film size may be indicated); subdivision is indicated.
		Film format and orientation selection, single exposure (nominal film size may be indicated); subdivision is indicated.
(f) Tabletop motion controls		Movement in plane of tabletop.
		Tabletop movement in direction indicated.
		Tabletop movement in direction indicated.
		Tabletop movement in direction indicated.

(Continued)

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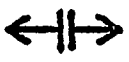
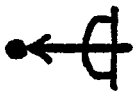
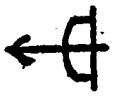
Table 3-1 (Cont.)
SPECIFIC CONTROLS AND APPROPRIATE SYMBOLS

Control	Symbol	IEC Definition
(f) Tabletop motion controls (continued)		Tabletop movement in direction indicated.
		Tabletop or foot rest movement.
		Tabletop or foot rest movement.
(g) Table tilt control		Tilting of table in direction indicated.
(h) Fluoroscopic assembly lock		To lock (locked).
		To unlock (unlocked).
		To brake (brakes applied).
		To release brake (brakes off).
		Setting to central position.
		To release.
		Compression (pressure applied).
		Movement of compressor.

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Part 4
CONTROL LOCATION

XR 6-4.01 GENERAL

It is not the intent of this standards publication to specifically denote the precise location of any control. Rather, it is intended to specify a general location which may be analogous to the location of the primary operating controls on an automobile (this sentence is approved as Authorized Engineering Information).

All control locations are described looking at the spot-film device with the table in the horizontal position from the operator's side. The forward direction is defined as toward the operator.

The spot-film device positioning handle is utilized as the reference point for all control locations encompassed by this standards publication.

The primary operating controls (defined in pars. 4.02 through 4.06) are to be conveniently grouped in close proximity to the operator's hand to permit easy access for operation by the hand utilizing the spot-film device positioning handle.

NEMA Standard 3-14-1979.

XR 6-4.02 SPOT-FILM DEVICE POSITIONING HANDLE

The spot-film device positioning handle shall be located such that it is operable from the forward right side of the spot-film device.

NEMA Standard 3-14-1979.

XR 6-4.03 RECORD PREPARE CONTROL

The record prepare control shall be located on the forward right-hand side in close proximity to the spot-film device positioning handle.

NEMA Standard 3-14-1979.

XR 6-4.04 SHUTTER CONTROLS

Shutter controls shall be located on the forward right-hand side in close proximity to the spot-film device positioning handle.

NEMA Standard 3-14-1979.

XR 6-4.05 SHUTTER MODE SELECTION (AUTO-MANUAL)

The shutter mode selector (auto-manual) shall be located on the forward right-hand side in close proximity to the spot-film device positioning handle.

NEMA Standard 3-14-1979.

XR 6-4.06 X-RAY EXPOSURE CONTROL(S)

One X-ray exposure control shall be located on the forward right-hand side in close proximity to the spot-film device positioning handle. The location of other X-ray exposure controls is optional (this sentence is approved as Authorized Engineering Information).

NEMA Standard 3-14-1979.

XR 6-4.07 FORMAT SELECTOR CONTROL(S)

Format selector control(s) need not be within close proximity to the operator's hand but shall be so located that they can be conveniently utilized by the operator's hand.

NEMA Standard 3-14-1979.

XR 6-4.08 FORMAT SELECTION AND EXPOSURE INDICATIONS

The format selected and position of next exposure indications shall be located such that they are readily visible to the operator.

NEMA Standard 3-14-1979.

XR 6-4.09 TABLE TILT CONTROLS AND FLUOROSCOPIC ASSEMBLY LOCKS

Table tilt controls and fluoroscopic assembly locks shall be grouped according to function and located such that they do not interfere with the primary operating controls.

NEMA Standard 3-14-1979.

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September 1984

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The purpose of NEMA Standards, their classification and status are set forth in certain clauses of the NEMA Bylaws, which are quoted below:

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(Bylaw—Art. V, Sec. 1)

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A standard of the National Electrical Manufacturers Association defines a product, process or procedure with reference to one or more of the following: nomenclature, composition, construction, dimensions, tolerances, safety, operating characteristics, performance, rating, testing, and the service for which they are designed.

(Bylaw—Art. V, Sec. 2, Subsection A)

Dimensions

Where dimensions are given for interchangeability purposes, alternate dimensions satisfying the other provisions of the standards publication may be capable of otherwise equivalent performance.

(NEMA Policy Memorandum 84-2, dated June 7, 1984)

Classes of Standards

National Electrical Manufacturers Association Standards are of two classes:

1. NEMA Standard, which relates to a product commercially standardized and subject to repetitive manufacture, which standard has been approved by at least 90 percent of the members of the Subdivision eligible to vote thereon;
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(Bylaw—Art. V, Sec. 2, Subsection B)

Authorized Engineering Information

Authorized Engineering Information consists of explanatory data and other engineering information of an informative character not falling within the classification of NEMA Standard or Suggested Standard for Future Design.

(Bylaw—Art. V, Sec. 6, 1st Sentence)

Official Standards Proposal

An Official Standards Proposal is an official draft of a proposed standard which is formally recommended to an outside organization(s) for consideration, comment and/or approval.

(Bylaw—Art. V, Sec. 4, Subsection A)

Identification of Status

Standards in NEMA Standards Publications are identified in the foreword or following each standard as "NEMA Standard" or "Suggested Standard for Future Design." These indicate the status of the standard. These words are followed by a date which indicates when the standard was adopted in its present form by the Association.

The material identified as "Authorized Engineering Information" and "Official Standards Proposal" is designated similarly.

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