
CONTENT SPECIFICATIONS FOR THE EXAMINATION IN RADIOGRAPHY



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The purpose of the ARRT Examination in Radiography is to assess the knowledge and cognitive skills underlying the intelligent performance of the tasks typically required of the staff technologist at entry into the profession. To identify the knowledge and skills covered by the examination, the ARRT periodically conducts practice analysis studies involving a nationwide sample of staff technologists¹. The results of the most recent practice analysis are reflected in this document. The complete task inventory, which serves as the basis for these content specifications, is available from our website www.arrt.org.

The table below presents the five major content categories, along with the number and percentage of test questions appearing in each category. The remaining pages provide a detailed listing of topics addressed within each major content category.

This document is not intended to serve as a curriculum guide. Although certification programs and educational programs may have related purposes, their functions are clearly different. Educational programs are generally broader in scope and address subject matter not included in these content specifications.

CONTENT CATEGORY	PERCENT OF TEST	NUMBER OF QUESTIONS ²
A. Radiation Protection	20%	40
B. Equipment Operation and Quality Control	12%	24
C. Image Production and Evaluation	25%	50
D. Radiographic Procedures	30%	60
E. Patient Care and Education	<u>13%</u>	<u>26</u>
	100%	200

1. A special debt of gratitude is due to the hundreds of professionals participating in this project as committee members, survey respondents, and reviewers.
2. Each exam includes up to an additional 20 unscored (pilot) questions. On the pages that follow, the approximate number of test questions allocated to each content category appears in parentheses.

A. RADIATION PROTECTION (40)

I. Biological Aspects of Radiation (10)

- A. Radiosensitivity
 - 1. dose-response relationships
 - 2. relative tissue radio sensitivities (e.g., LET, RBE)
 - 3. cell survival and recovery (LD_{50})
- B. Somatic Effects
 - 1. short-term versus long-term effects
 - 2. acute versus chronic effects
 - 3. carcinogenesis
 - 4. eye/thyroid
 - 5. reproductive (sterility)
- C. Systemic Responses
 - 1. CNS
 - 2. hemopoietic
 - 3. skin
 - 4. GI
- D. Embryonic and Fetal Risks
- E. Genetic Impact
 - 1. genetic significant dose
 - 2. goals of gonadal shielding

II. Minimizing Patient Exposure (12)

- A. Exposure Factors
 - 1. kVp
 - 2. mAs
- B. Shielding
 - 1. rationale for use
 - 2. types
 - 3. placement
- C. Beam Restriction
 - 1. purpose of primary beam restriction
 - 2. types (e.g. collimators)
- D. Filtration
 - 1. effect on skin and organ exposure
 - 2. effect on average beam energy
 - 3. NCRP recommendations (NCRP #102, minimum filtration in useful beam)
- E. Exposure Reduction
 - 1. patient positioning
 - 2. automatic exposure control (AEC)
 - 3. patient communication
- F. Image Receptors (e.g., types, relative speed, digital vs. film)
- G. Grids
- H. Fluoroscopy
 - 1. pulsed
 - 2. exposure factors
 - 3. grids
 - 4. positioning
 - 5. fluoroscopy time

(Section A continues on the following page)

A. RADIATION PROTECTION (cont.)

III. Personnel Protection (9)

- A. Sources of Radiation Exposure
 - 1. primary x-ray beam
 - 2. secondary radiation
 - a. scatter
 - b. leakage
 - 3. patient as source
- B. Basic Methods of Protection
 - 1. time
 - 2. distance
 - 3. shielding
- C. Protective Devices
 - 1. types
 - 2. attenuation properties
 - 3. minimum lead equivalent (NCRP #102)
- D. Special Considerations
 - 1. portable (mobile) units
 - 2. fluoroscopy
 - a. protective drapes
 - b. protective Bucky slot cover
 - c. cumulative timer
 - 3. guidelines for fluoroscopy and portable units (NCRP #102, CFR-21)
 - a. fluoroscopy exposure rates
 - b. exposure switch guidelines

IV. Radiation Exposure and Monitoring (9)

- A. Units of Measurement*
 - 1. absorbed dose (rad)
 - 2. dose equivalent (rem)
 - 3. exposure (Roentgen)
- B. Dosimeters
 - 1. types
 - 2. proper use
- C. NCRP Recommendations for Personnel Monitoring (NCRP #116)
 - 1. occupational exposure
 - 2. public exposure
 - 3. embryo/fetus exposure
 - 4. ALARA and dose equivalent limits
 - 5. evaluation and maintenance of personnel dosimetry records

*Conventional units are generally used. However, questions referenced to specific reports (e.g., NCRP) will use SI units to be consistent with such reports.

B. EQUIPMENT OPERATION AND QUALITY CONTROL (24)

I. Principles of Radiation Physics (10)

- A. X-Ray Production
 - 1. source of free electrons (e.g., thermionic emission)
 - 2. acceleration of electrons
 - 3. focusing of electrons
 - 4. deceleration of electrons
- B. Target Interactions
 - 1. bremsstrahlung
 - 2. characteristic
- C. X-Ray Beam
 - 1. frequency and wavelength
 - 2. beam characteristics
 - a. quality
 - b. quantity
 - c. primary vs. remnant (exit)
 - 3. inverse square law
 - 4. fundamental properties (e.g., travel in straight lines, ionize matter)
- D. Photon Interactions with Matter
 - 1. Compton effect
 - 2. photoelectric absorption
 - 3. coherent (classical) scatter
 - 4. attenuation by various tissues
 - a. thickness of body part (density)
 - b. type of tissue (atomic number)

II. Radiographic Equipment (10)

- A. Components of Basic Radiographic Unit
 - 1. operating console
 - 2. x-ray tube construction
 - a. electron sources
 - b. target materials
 - c. induction motor
 - 3. automatic exposure control (AEC)
 - a. radiation detectors
 - b. back-up timer
 - c. density adjustment (e.g. +1 or -1)
 - 4. manual exposure controls
 - 5. beam restriction devices
- B. X-Ray Generator, Transformers, and Rectification System
 - 1. basic principles
 - 2. phase, pulse, and frequency
- C. Fluoroscopic Unit
 - 1. image intensifier
 - 2. viewing systems
 - 3. recording systems
 - 4. automatic brightness control (ABC)
- D. Image Display
 - 1. viewing conditions (i.e., luminance, ambient lighting)
 - 2. spatial resolution
 - 3. contrast resolution/dynamic range
 - 4. DICOM gray scale function
 - 5. window level and width function
- E. Image Acquisition and Readout
 - 1. PSP (photo-stimulable phosphor)
 - 2. flat panel detectors (direct and indirect)

(Section B continues on the following page)

B. EQUIPMENT OPERATION AND QUALITY CONTROL (cont.)

F. Types of Units

1. stationary
2. portable (mobile)
3. dedicated units* (i.e., chest, tomography, panorex, bone densitometry unit, mammography)

G. Accessories

1. stationary grids
2. Bucky assembly
3. image receptors

III. Quality Control of Radiographic Equipment and Accessories (4)

A. Beam Restriction

1. light field to radiation field alignment
2. central ray alignment

B. Recognition of Malfunctions

C. Digital and Film-screen Image Receptor Systems

1. artifacts (e.g., non-uniformity, erasure)
2. maintenance (e.g., detector fog)

D. Shielding Accessories (e.g., lead apron testing)

C. IMAGE PRODUCTION AND EVALUATION (50)

I. Selection of Technical Factors (30)

A. Factors Affecting Radiographic Quality. Refer to Attachment C to clarify terms that may occur on the exam. (X indicates topics covered on the examination)

	1.	2.	3.	4.
	Density**	Contrast	Recorded Detail	Distortion
a. mAs	X			
b. kVp	X	X		
c. OID		X (air gap)	X	X
d. SID	X		X	X
e. focal spot size			X	
f. grids*	X	X		
g. filtration	X	X		
h. film-screen combinations	X		X	
i. beam restriction	X	X		
j. motion			X	
k. anode heel effect	X			
l. patient factors (e.g., size, pathology)	X	X	X	X
m. angle (tube, part or receptor)			X	X

* Includes conversion factors for grids

** 'Brightness' when referring to digital images

B. Technique Charts

1. caliper measurement
2. fixed versus variable kVp
3. special considerations
 - a. casts
 - b. anatomic and pathologic factors
 - c. pediatrics
 - d. contrast media

C. Automatic Exposure Control (AEC)

1. effects of changing exposure factors on radiographic quality
2. detector selection
3. anatomic alignment
4. density control (+1 or -1)

D. Image Receptors

1. system speed
 - a. film characteristics
 1. film contrast
 2. film latitude
 3. exposure latitude
 - b. screen characteristics
 1. phosphor type
 2. single versus double film/screen system
2. digital image characteristics
 - a. spatial resolution
 1. sampling frequency
 2. DEL (detector element size)
 3. receptor size and matrix size
 - b. image signal (exposure related)
 1. quantum mottle
 2. SNR (signal to noise ratio) or CNR (contrast to noise ratio)

Section C continues on the following page.

C. IMAGE PRODUCTION AND EVALUATION (cont.)

II. Image Processing and Quality Assurance (12)

- A. Film Storage
- B. Cassette Loading
- C. Image Identification
 - 1. methods (e.g., photographic, radiographic, electronic)
 - 2. legal considerations (e.g., patient data, examination data)
- D. Automatic Film Processor
 - 1. components*
 - a. developer
 - b. fixer
 - c. wash
 - d. dry
 - 2. systems
 - a. transport
 - b. replenishment
 - c. temperature regulation
 - d. recirculation
 - e. dryer
 - 3. maintenance
 - a. start up and shut down procedure
 - b. removal and cleaning of crossover assembly
 - c. sensitometric monitoring
 - 4. system malfunction
 - a. observable effects (e.g., artifacts, fluctuations in density, contrast)
 - b. possible causes (e.g., improper temperature, contamination, roller alignment, replenishment, water flow)
- E. Digital Systems
 - 1. electronic collimation
 - 2. grayscale rendition or look-up table (LUT)
 - 3. edge enhancement/noise suppression
 - 4. contrast enhancement
 - 5. system malfunctions (e.g., ghost image, banding, erasure, dead pixels, readout problems, printer distortion)

- F. PACS
 - 1. HIS (hospital information system) - work list
 - 2. RIS (radiology information system)
 - 3. DICOM
 - 4. Workflow (inappropriate documentation, lost images, mismatched images, corrupt data)
 - 5. windowing and leveling

III. Criteria for Image Evaluation (8)

- A. Density (mAs, distance, film-screen combination)
- B. Contrast (kVp, filtration, grids)
- C. Recorded Detail (motion, poor film-screen contact)
- D. Distortion (magnification, OID, SID)
- E. Demonstration of Anatomical Structures (positioning, tube-part-image receptor alignment)
- F. Identification Markers (anatomical, patient, date)
- G. Patient Considerations (pathologic conditions, motion)
- H. Digital and film artifacts (film handling artifacts, static, pressure artifacts, grid lines, Moiré effect or aliasing)
- I. Fog (age, chemical, radiation, temperature, safelight)
- J. Noise
- K. Acceptable Range of Exposure
- L. Exposure Indicator Determination
- M. Gross Exposure Error
- N. Image Degradation (mottle, light or dark, low contrast)

*Specific chemicals in the processing solutions will not be covered (e.g., glutaraldehyde).

D. RADIOGRAPHIC PROCEDURES (60)

This section addresses radiographic procedures for the anatomic regions listed below (I through VII). Questions will cover the following topics:

- Positioning (topographic landmarks, body positions, path of central ray, etc.).
- Anatomy (including physiology, basic pathology, and related medical terminology).
- Technical factors (including adjustments for circumstances such as body habitus, trauma, pathology, breathing techniques, etc.).

The specific positions and projections within each anatomic region that may be covered on the examination are listed in Attachment A. A guide to positioning terminology appears in Attachment B.

I. Thorax (6)

- A. Chest
- B. Ribs
- C. Sternum
- D. Soft Tissue Neck

II. Abdomen and GI Studies (9)

- A. Abdomen
- B. Esophagus
- C. Swallowing Dysfunction Study
- D. Upper GI Series, Single or Double Contrast
- E. Small Bowel Series
- F. Barium Enema, Single or Double Contrast
- G. Surgical Cholangiography
- H. ERCP

III. Urological Studies (4)

- A. Cystography
- B. Cystourethrography
- C. Intravenous Urography
- D. Retrograde Pyelography

IV. Spine and Pelvis (10)

- A. Cervical Spine
- B. Thoracic Spine
- C. Scoliosis Series
- D. Lumbosacral Spine
- E. Sacrum and Coccyx
- F. Sacroiliac Joints
- G. Pelvis And Hip

V. Cranium (7)

- A. Skull
- B. Facial Bones
- C. Mandible
- D. Zygomatic Arch
- E. Temporomandibular Joints
- F. Nasal Bones
- G. Orbits
- H. Paranasal Sinuses

VI. Extremities (22)

- A. Toes
- B. Foot
- C. Calcaneus (Os Calcis)
- D. Ankle

VI. Extremities (cont.)

- E. Tibia, Fibula
- F. Knee
- G. Patella
- H. Femur
- I. Fingers
- J. Hand
- K. Wrist
- L. Forearm
- M. Elbow
- N. Humerus
- O. Shoulder
- P. Scapula
- Q. Clavicle
- R. Acromioclavicular Joints
- S. Bone Survey
- T. Long Bone Measurement
- U. Bone Age
- V. Soft Tissue/Foreign Bodies

VII. Other (2)

- A. Arthrography
- B. Myelography
- C. Venography

E. PATIENT CARE AND EDUCATION (26)

I. Ethical and Legal Aspects (5)

A. Patient's Rights

1. informed consent (e.g., written, oral, implied)
2. confidentiality (HIPAA)
3. additional rights (e.g., Patient's Bill of Rights)
 - a. privacy
 - b. extent of care (e.g., DNR)
 - c. access to information
 - d. living will; health care proxy
 - e. research participation

B. Legal Issues

1. examination requisition
2. common terminology (e.g., battery, negligence, malpractice)
3. legal doctrines (e.g., *respondeat superior*, *res ipsa loquitur*)

C. ARRT Standards of Ethics

II. Interpersonal Communication (3)

A. Modes of Communication

1. verbal/written
2. nonverbal (e.g., eye contact, touching)

B. Challenges in Communication

1. patient characteristics
2. explanation of medical terms
3. strategies to improve understanding

C. Patient Education

1. explanation of current procedure
2. respond to inquiries about other health care related services (e.g., CT, MRI mammography, sonography, nuclear medicine, bone densitometry, clergy, social services, and rehabilitation)

III. Infection Control (8)

A. Terminology and Basic Concepts

1. asepsis
 - a. medical
 - b. surgical
 - c. sterile technique
2. pathogens
 - a. fomites, vehicles, vectors
 - b. nosocomial infections

B. Cycle of Infection

1. pathogen
2. source or reservoir of infection
3. susceptible host
4. method of transmission
 - a. contact (direct, indirect)
 - b. droplet
 - c. airborne/suspended
 - d. common vehicle
 - e. vector borne

C. Standard Precautions

1. handwashing
2. gloves, gowns
3. masks
4. medical asepsis (e.g., equipment disinfection)

D. Additional or Transmission-Based Precautions (e.g., hepatitis B, HIV, rubella, tuberculosis)

1. airborne (e.g., respiratory protection, negative ventilation)
2. droplet (e.g., particulate mask, restricted patient placement)
3. contact (e.g., gloves, gown, restricted patient placement)

E. Disposal of Contaminated Materials

1. linens
2. needles
3. patient supplies (e.g., tubes, emesis basin)

(Section E continues on the following page)

E. PATIENT CARE AND EDUCATION (cont.)

IV. Physical Assistance and Transfer (2)

- A. Patient Transfer and Movement
 - 1. body mechanics (balance, alignment, movement)
 - 2. patient transfer
- B. Assisting Patients with Medical Equipment
 - 1. infusion catheters and pumps
 - 2. oxygen delivery systems
 - 3. other (e.g., nasogastric tubes, urinary catheters, tracheostomy tubes)
- C. Routine Monitoring
 - 1. equipment (e.g., stethoscope, sphygmomanometer)
 - 2. vital signs (e.g., blood pressure, pulse, respiration, temperature)
 - 3. physical signs and symptoms (e.g., motor control, severity of injury)
 - 4. documentation

V. Medical Emergencies (2)

- A. Allergic Reactions (e.g., contrast media, latex)
- B. Cardiac or Respiratory Arrest (e.g., CPR)
- C. Physical Injury or Trauma
- D. Other Medical Disorders (e.g., seizures, diabetic reactions)

VI. Contrast Media (6)

- A. Types and Properties (e.g., iodinated, water soluble, barium, ionic versus non-ionic)
- B. Appropriateness of Contrast Media to Exam and Patient Condition (e.g., perforated bowel, patient age, patient weight, laboratory values)
- C. Patient History
 - 1. premedications
 - 2. contraindications
 - 3. scheduling and sequencing examinations
- D. Patient Education
 - 1. verify informed consent
 - 2. instructions regarding preparation, diet, and medications
 - 3. post-examination instructions
- E. Venipuncture
 - 1. venous anatomy
 - 2. supplies
 - 3. procedural technique
- F. Administration
 - 1. routes (e.g., IV, oral)
 - 2. supplies (e.g., enema kits, needles)
- G. Complications/Reactions
 - 1. local effects (e.g., extravasation/infiltration, phlebitis)
 - 2. systemic effects
 - a. mild (e.g., flushing, hives, nausea)
 - b. severe (e.g., shock, hypotension)
 - 3. radiographer's response and documentation

Attachment A

Radiographic Positions and Projections

I. Thorax

- A. Chest
 1. PA upright
 2. lateral upright
 3. AP Lordotic
 4. AP supine
 5. lateral decubitus
 6. posterior oblique
 7. anterior oblique
- B. Ribs
 1. AP and PA, above and below diaphragm
 2. anterior and posterior oblique
- C. Sternum
 1. lateral
 2. RAO breathing technique
 3. RAO expiration
 4. LAO
 5. PA sternoclavicular joints
 6. anterior oblique sternoclavicular joints
- D. Soft Tissue Neck
 1. AP upper airway
 2. lateral upper airway

II. Abdomen and GI studies

- A. Abdomen
 1. AP supine
 2. AP upright
 3. lateral decubitus
 4. dorsal decubitus
- B. Esophagus
 1. RAO
 2. left lateral
 3. AP
 4. PA
 5. LAO
- C. Swallowing Dysfunction Study
- D. Upper GI series*
 1. AP scout
 2. RAO
 3. PA
 4. right lateral
 5. LPO
 6. AP
- E. Small Bowel Series
 1. PA scout
 2. PA (follow through)
 3. ileocecal spots
 4. enteroclysis procedure
- F. Barium Enema*
 1. left lateral rectum
 2. left lateral decubitus
 3. right lateral decubitus
 4. LPO and RPO
 5. PA
 6. RAO and LAO
 7. AP axial (butterfly)
 8. PA axial (butterfly)
 9. PA post-evacuation
- G. Surgical Cholangiography
 1. AP
- H. ERCP
 1. AP

III. Urological Studies

- A. Cystography
 1. AP
 2. LPO and RPO 60°
 3. lateral
 4. AP 10-15° caudad
- B. Cystourethrography
 1. AP voiding cystourethrogram female
 2. RPO 30°, voiding cystogram male
- C. Intravenous Urography
 1. AP, scout and series
 2. RPO and LPO 30°
 3. PA post-void
 4. AP post-void, upright
 5. nephrotomography
 6. AP ureteric compression
- D. Retrograde Pyelography
 1. AP scout
 2. AP pyelogram
 3. AP ureterogram

IV. Spine and Pelvis

- A. Cervical spine
 1. AP angle cephalad
 2. AP open mouth
 3. lateral
 4. cross table lateral
 5. anterior oblique
 6. posterior oblique
 7. lateral swimmers
 8. lateral flexion and extension
 9. AP dens (Fuchs)
 10. PA dens (Judd)
- B. Thoracic Spine
 1. AP
 2. lateral, breathing
 3. lateral, expiration
- C. Scoliosis Series
 1. AP/PA scoliosis series (Ferguson)
- D. Lumbar Spine
 1. AP
 2. PA
 3. lateral
 4. L5-S1 lateral spot
 5. posterior oblique 45°
 6. anterior oblique 45°
 7. AP L5-S1, 30-35° cephalad
 8. AP right and left bending
 9. lateral flexion and extension
- E. Sacrum and Coccyx
 1. AP sacrum, 15-25° cephalad
 2. AP coccyx, 10-20° caudad
 3. lateral sacrum and coccyx, combined
 4. lateral sacrum or coccyx, separate
- F. Sacroiliac Joints
 1. AP
 2. posterior oblique
 3. anterior oblique

G. Pelvis and Hip

- 1. AP hip only
- 2. cross-table lateral hip
- 3. unilateral frog-leg, non-trauma
- 4. axiolateral inferosuperior, trauma (Clements-Nakayama)
- 5. AP pelvis
- 6. AP pelvis, bilateral frog-leg
- 7. AP pelvis, axial anterior pelvic bones (inlet, outlet)
- 8. anterior oblique pelvis, acetabulum (Judet)

V. Cranium

- A. Skull
 1. AP axial (Towne)
 2. lateral
 3. PA (Caldwell)
 4. PA no angle
 5. submentovertical (full basal)
 6. PA 25-30° angle (Haas)
 7. trauma cross table lateral
 8. trauma AP, 15° cephalad
 9. trauma AP, no angle
 10. trauma AP, axial (Towne)
- B. Facial Bones
 1. lateral
 2. parietoacanthial (Waters)
 3. PA (Caldwell)
 4. PA (modified Waters)
- C. Mandible
 1. axiolateral oblique
 2. PA no angle
 3. AP axial (Towne)
 4. PA semi-axial, 20-25° cephalad
 5. PA (modified Waters)
 6. submentovertical (full basal)
- D. Zygomatic arch
 1. submentovertical (full basal)
 2. parietoacanthial (Waters)
 3. AP axial (Towne)
 4. axial oblique
 5. lateral
- E. Temporomandibular Joints
 1. lateral (Law)
 2. lateral (Schuller)
 3. AP axial (Towne)
- F. Nasal Bones
 1. parietoacanthial (Waters)
 2. lateral
 3. PA (Caldwell)
- G. Orbits
 1. parietoacanthial (Waters)
 2. lateral
 3. PA (Caldwell)
- H. Paranasal Sinuses
 1. lateral
 2. PA (Caldwell)
 3. parietoacanthial (Waters)
 4. submentovertical (full basal)
 5. open mouth parietoacanthial (Waters)

* single or double contrast

VI. Extremities

A. Toes

1. AP, entire foot
2. oblique toe
3. lateral toe

B. Foot

1. AP angle toward heel
2. medial oblique
3. lateral oblique
4. mediolateral
5. lateromedial
6. sesamoids, tangential
7. AP weight bearing
8. lateral weight bearing

C. Calcaneus (Os Calcis)

1. lateral
2. plantodorsal, axial
3. dorsoplantar, axial

D. Ankle

1. AP
2. AP mortise
3. mediolateral
4. oblique, 45° internal
5. lateromedial
6. AP stress views

E. Tibia, Fibula

1. AP
2. lateral
3. oblique

F. Knee

1. AP
2. lateral
3. AP weight bearing
4. lateral oblique 45°
5. medial oblique 45°
6. PA
7. PA axial – intercondylar fossa (tunnel)

G. Patella

1. lateral
2. supine flexion 45° (Merchant)
3. PA
4. prone flexion 90° (Settegast)
5. prone flexion 55° (Hughston)

H. Femur

1. AP
2. mediolateral

I. Fingers

1. PA entire hand
2. PA finger only
3. lateral
4. oblique
5. AP thumb
6. oblique thumb
7. lateral thumb

J. Hand

1. PA
2. lateral
3. oblique

K. Wrist

1. PA
2. oblique 45°
3. lateral
4. PA for scaphoid
5. scaphoid (Stecher)
6. carpal canal

L. Forearm

1. AP
2. lateral

M. Elbow

1. AP
2. lateral
3. external oblique
4. internal oblique
5. AP partial flexion
6. axial trauma (Coyle)

N. Humerus

1. AP non-trauma
2. lateral non-trauma
3. AP neutral trauma
4. scapular Y trauma
5. transthoracic lateral trauma
6. lateral, mid and distal, trauma

O. Shoulder

1. AP internal and external rotation
2. inferosuperior axial, non-trauma
3. posterior oblique (Grashey)
4. tangential non-trauma
5. AP neutral trauma
6. transthoracic lateral trauma
7. scapular Y trauma

P. Scapula

1. AP
2. lateral, anterior oblique
3. lateral, posterior oblique

Q. Clavicle

1. AP
2. AP angle 15-30° cephalad
3. PA angle 15-30° caudad

R. Acromioclavicular joints

1. AP bilateral with and without weights

S. Bone Survey

T. Long Bone Measurement

U. Bone Age

V. Soft Tissue/Foreign Body

VII. Other Procedures

A. Arthrography

B. Myelography

C. Venography

Attachment B
Standard Terminology
for Positioning and Projection

Radiographic View: Describes the body part as seen by the x-ray film or other recording medium, such as a fluoroscopic screen. Restricted to the discussion of a radiograph or image.

Radiographic Position: Refers to a specific body position, such as supine, prone, recumbent, erect, or Trendelenburg. Restricted to the discussion of the patient's physical position.

Radiographic Projection: Restricted to the discussion of the path of the central ray.

POSITIONING TERMINOLOGY

A. Lying Down

1. *supine* – lying on the back
2. *prone* – lying face downward
3. *decubitus* – lying down with a horizontal x-ray beam.
4. *recumbent* – lying down in any position

B. Erect or Upright

1. *anterior position* – facing the film
2. *posterior position* – facing the radiographic tube
3. *oblique position* – (erect or lying down)

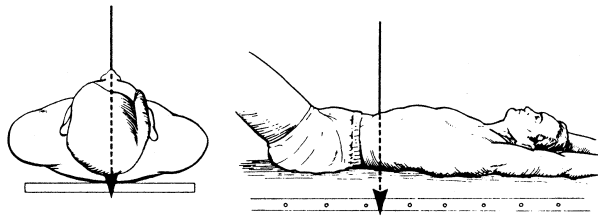
a. anterior (facing the film)

- i. *left anterior oblique* body rotated with the left anterior portion closest to the film.
- ii. *right anterior oblique* body rotated with the right anterior portion closest to the film

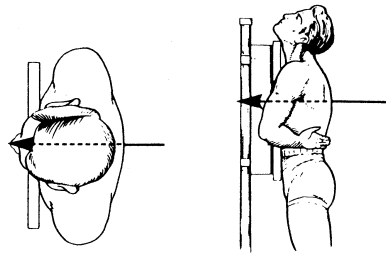
b. posterior (facing the radiographic tube)

- i. *left posterior oblique* body rotated with the left posterior portion closest to the film.
- ii. *right posterior oblique* body rotated with the right posterior portion closest to the film

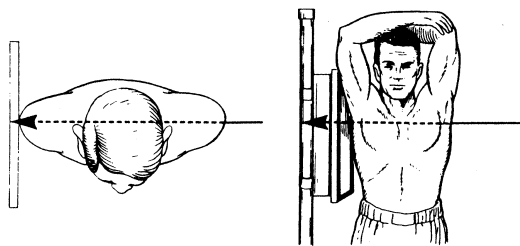
Anteroposterior Projection



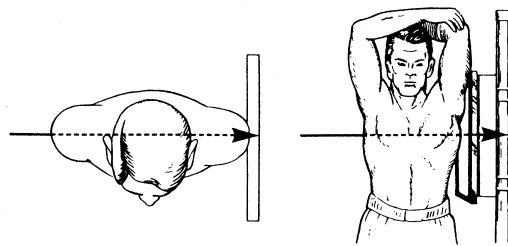
Posteroanterior Projection



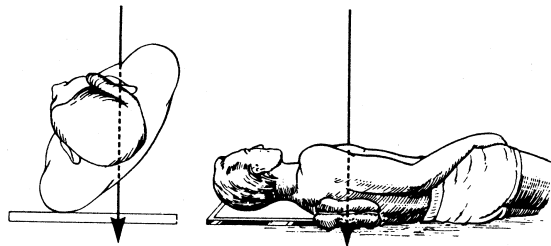
Right Lateral Position



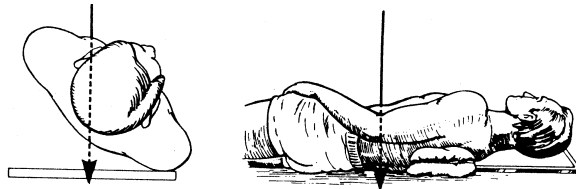
Left Lateral Position



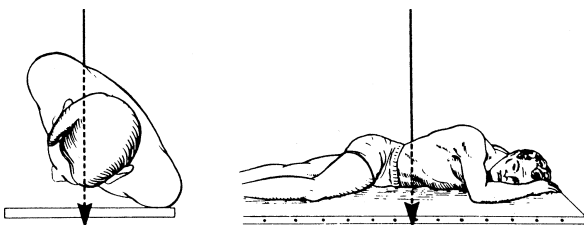
Left Posterior Oblique Position



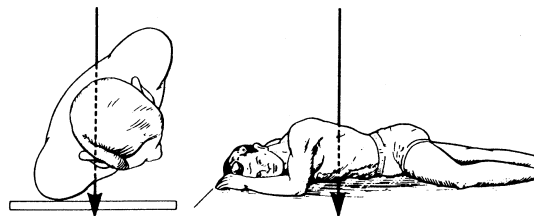
Right Posterior Oblique Position



Left Anterior Oblique Position



Right Anterior Oblique Position



Attachment C

ARRT Standard Definitions

Term	Film-Screen Radiography	Term	Digital Radiography
Recorded Detail	The sharpness of the structural lines as recorded in the radiographic image.	Recorded Detail	The sharpness of the structural edges recorded in the image.
Density	Radiographic density is the degree of blackening or opacity of an area in a radiograph due to the accumulation of black metallic silver following exposure and processing of a film. Density = $\text{Log} \frac{\text{incident light intensity}}{\text{transmitted light intensity}}$	Brightness	Brightness is the measurement of the luminance of a monitor calibrated in units of candela (cd) per square meter on a monitor or soft copy. Density on a hard copy is the same as film.
Contrast	Radiographic contrast is defined as the visible differences between any two selected areas of density levels within the radiographic image. <i>Scale of Contrast</i> refers to the number of densities visible (or the number of shades of gray). <i>Long Scale</i> is the term used when slight differences between densities are present (low contrast) but the total number of densities is increased. <i>Short Scale</i> is the term used when considerable or major differences between densities are present (high contrast) but the total number of densities is reduced.	Contrast	Image contrast of display contrast is determined primarily by the processing algorithm (mathematical codes used by the software to provide the desired image appearance). The default algorithm determines the initial processing codes applied to the image data. <u>Scale of Contrast</u> is synonymous to "gray scale" and is linked to the bit depth of the system. 'Gray scale' is used instead of 'scale of contrast' when referring to digital images.
Film Latitude	The inherent ability of the film to record a long range of density levels on the radiograph. Film latitude and film contrast depend upon the sensitometric properties of the film and the processing conditions, and are determined directly from the characteristic H and D curve.	Dynamic Range	The range of exposures that may be captured by a detector. The dynamic range for digital imaging is much larger than film.
Film Contrast	The inherent ability of the film emulsion to react to radiation and record a range of densities.	Receptor Contrast	The fixed characteristic of the receptor. Most digital receptors have an essentially linear response to exposure. This is impacted by contrast resolution (the smallest exposure change or signal difference that can be detected). Ultimately, contrast resolution is limited by the dynamic range and the quantization (number of bits per pixel) of the detector.
Exposure Latitude	The range of exposure factors which will produce a diagnostic radiograph.	Exposure Latitude	The range of exposures which produces quality images at appropriate patient dose.
Subject Contrast	The difference in the quantity of radiation transmitted by a particular part as a result of the different absorption characteristics of the tissues and structures making up that part.	Subject Contrast	The magnitude of the signal difference in the remnant beam.