### Health problem addressed

This device is an image digitization system designed to acquire and digitize x-ray images from image storage phosphor plates. The patient positioning and imaging techniques used in CR imaging are identical to those used in conventional radiography. Clinical applications include all radiographic examinations performed by conventional table systems (e.g., pediatric, skeletal, abdominal, urologic imaging) and portable systems.

### Product description

A CR system consists of an image reader/digitizer, cassettes containing imaging receptors (photostimulable-phosphor plates), a computer console or workstation, software, monitors, and a printer. Single-plate readers (each cassette is loaded manually and read separately) and multiple-plate readers (multiple plates—up to 10—can be stacked and loaded automatically) are available.

### Principles of operation

Imaging plates are inserted in a radiographic table’s cassette holder and images are acquired using the x-ray system. When exposed to x-rays, electrons in the phosphor plate are excited into a higher energy state, forming a latent image. An image reader scans the phosphor plate with a laser spot. When the trapped electrons absorb the laser energy, they emit light as they return to their ground state. This light is collected by a light guide and transmitted to a photomultiplier tube, which produces an analog electrical signal that is amplified, converted to a digital signal, and digitally stored. The plate can be reused after it is exposed to an erasing light that removes residual radiation.

### Operating steps

- After the image has been captured on an image plate by a standard x-ray system, the technologist takes the plate to an image-plate reader to extract the image.
- The cassette is loaded (manually or automatically) into the reader.
- The digital image is produced in 30-120 seconds and downloaded to an image-processing system, usually a computer workstation, for display and manipulation.
- The plate is erased for reuse.

### Reported problems

Most reported problems involve the condition of imaging plates and pose little to no direct danger to the patient. Plates can be damaged by careless handling and are expensive to replace. Some readers have brushes or fans that automatically clear dust off plates, which helps to prevent scratches. Cracks or scratches would render the plate unusable for imaging. The light guide should be cleaned as part of routine maintenance (dirt accumulation can affect image quality).

### Use and maintenance

**User(s):** Radiologist; radiology technician; other medical staff  
**Maintenance:** Biomedical engineering staff and/or service contract with the manufacturer or third-party organization  
**Training:** Initial training by manufacturer; operator’s manuals; user’s guide  

### Environment of use

**Settings of use:** General radiology department; pediatric, orthopedic, or other hospital departments; clinic; dental office  
**Requirements:** Stable power source  

### Product specifications

- **Approx. dimensions (mm):** 800 x 600 x 700 for single-plate reader; 1300 x 600 x 800 for multi-plate reader
- **Approx. weight (kg):** 20-400 (100 typical) for single-plate reader; 200 for multi-plate reader
- **Consumables:** Photostimulable-phosphor imaging plate(s) housed in cassette(s)  
- **Price range (USD):** 27,000-209,000 (80,000 typical) for single-plate reader; 120,000-230,000 (170,000 typical) for multi-plate reader
- **Typical product life time:** 7 years  
- **Shelf life (consumables):** No expiration date if kept under optimal storage conditions

### Types and variations

- Single-plate reader/digitizer  
- Multi-plate reader/digitizer