AMBER

Advanced Multiple Beam Equalization Radiography

Historisch overzicht

Amber is een groot filmformaat, gemoduleerde Rö-bron Thorax systeem dat het probleem van weefseldichtheid oplost. In de periode 1989-1994 zijn 124 systemen voortgebracht. Ook na 1994 is Amber in volle serieproductie.◊

AMBER has revolutionised thoracic X-ray imaging by solving the problem of varying tissue density. Until now, separate X-ray exposures had to be made of lung areas and mediastinum, often using multiple films to create a single image. AMBER scans the patient's thorax using independently modulated rays of a sub-divided fan beam, which regulates X-ray intensity to automatically correspond to the tissue density of each area of the patient's lungs and mediastinum. AMBER's independently modulated multiple beam also reduces scatter radiation. The result is a clearer picture for pathology and anatomy, and in one exposure. In addition, radiographs are more accurate and easier to read than traditional thoracic X-rays.◊

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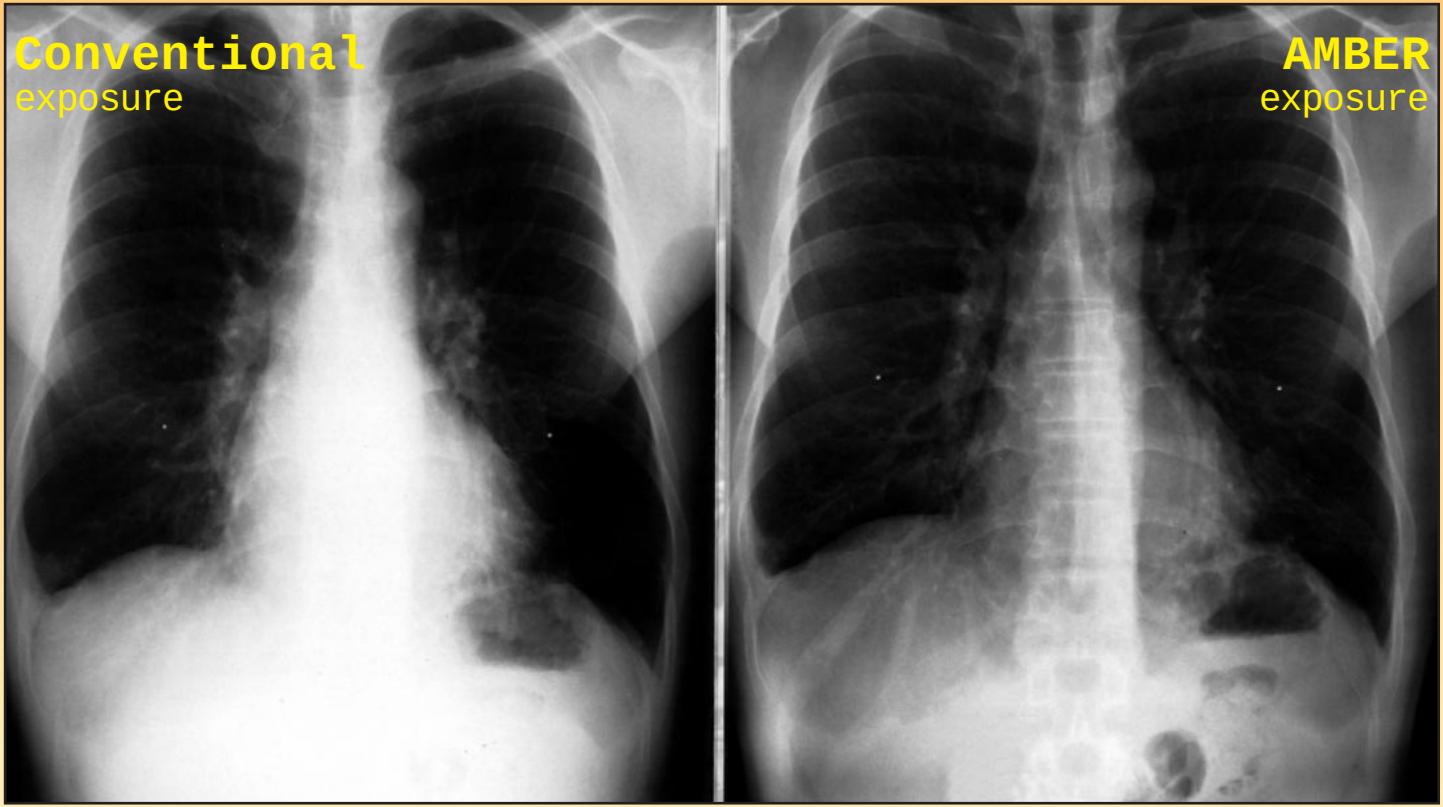

Conventional chest radiographs always contain under- or over-exposed areas due to the difference in dynamic range of X-ray transmission and film emulsion. AMBER enables the make of X-ray pictures with high contrast in both the lung tissue and the mediastinum/vertebral area that offer a significantly higher diagnostic value for almost all chest-related diseases compared with conventional systems.◊

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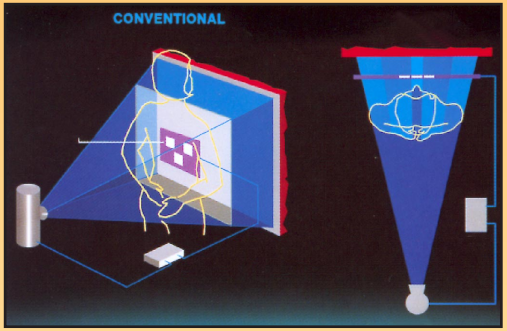
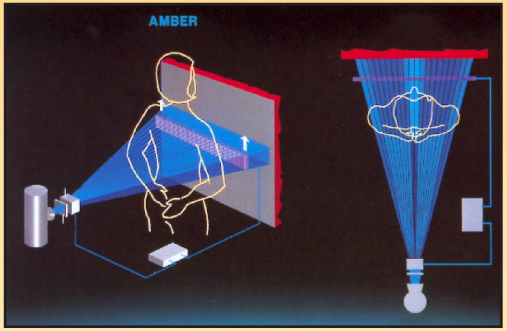
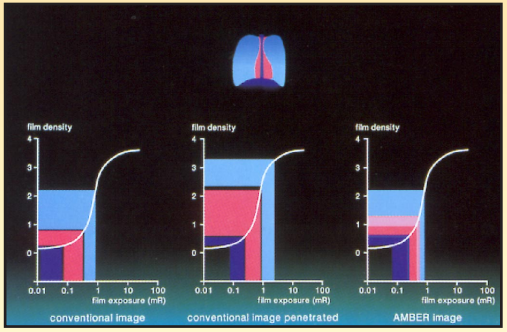


Conventional technique is characterized by a homogeneous full area X-ray beam and a photo timer to control the optical density of the film, based on average exposure.



With AMBER a fan shaped beam is used, sub-divided in 21 pencil beams, to regulate the exposure per area. The array of pencil beams, controlled by the modulator, scans over the patient's thorax in less than 1 second. The local exposure level is determined by the measured transmission in the detector, related to a pre-set curve value in the micro processor. The detector is an ionisation chamber having a high X-ray transmission and is free of any visible structure.



The effect of the AMBER technique is clearly visible in this comparison of graphics. With conventional technique the obese areas give a too low output resulting in underexposed film. In the conventional penetrated technique these parts are better visible, but the lungs will be overexposed. The AMBER technique controls local exposure and brings all image data within the correct part of the curve.

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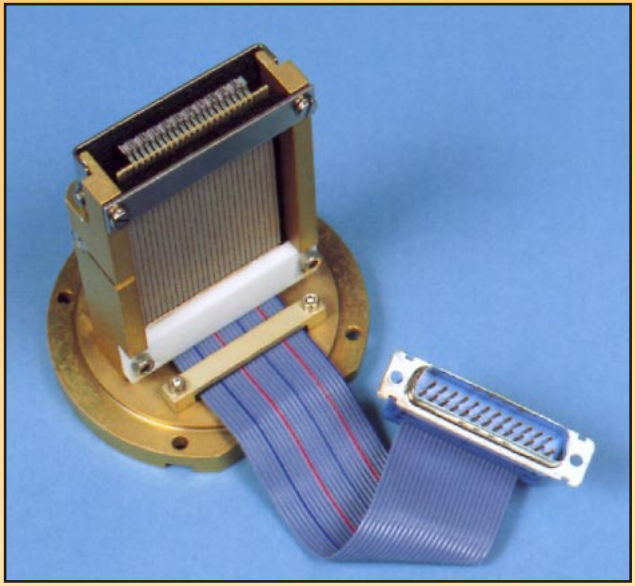
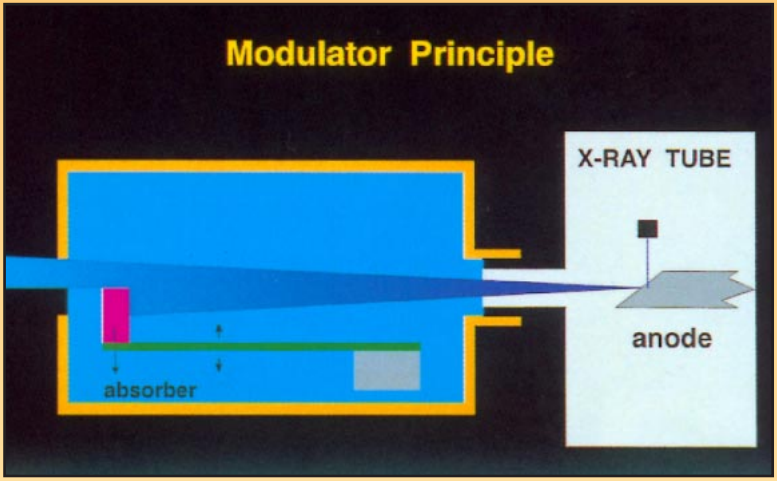
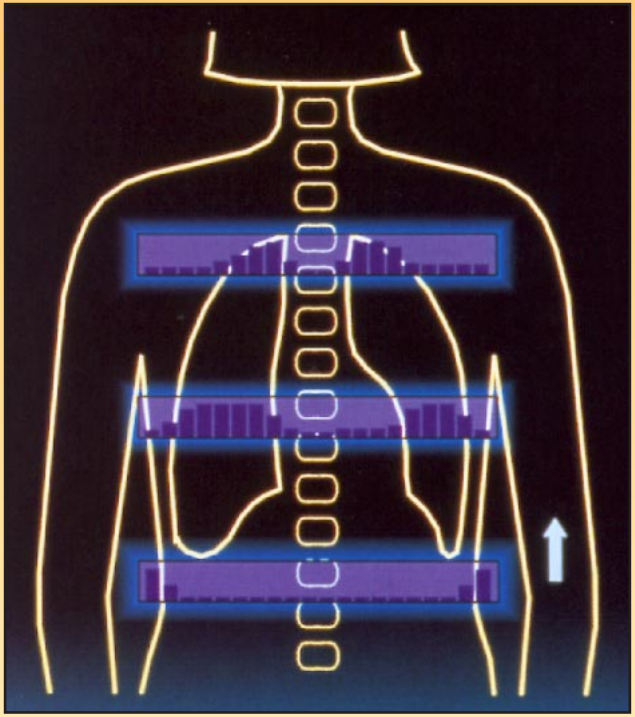
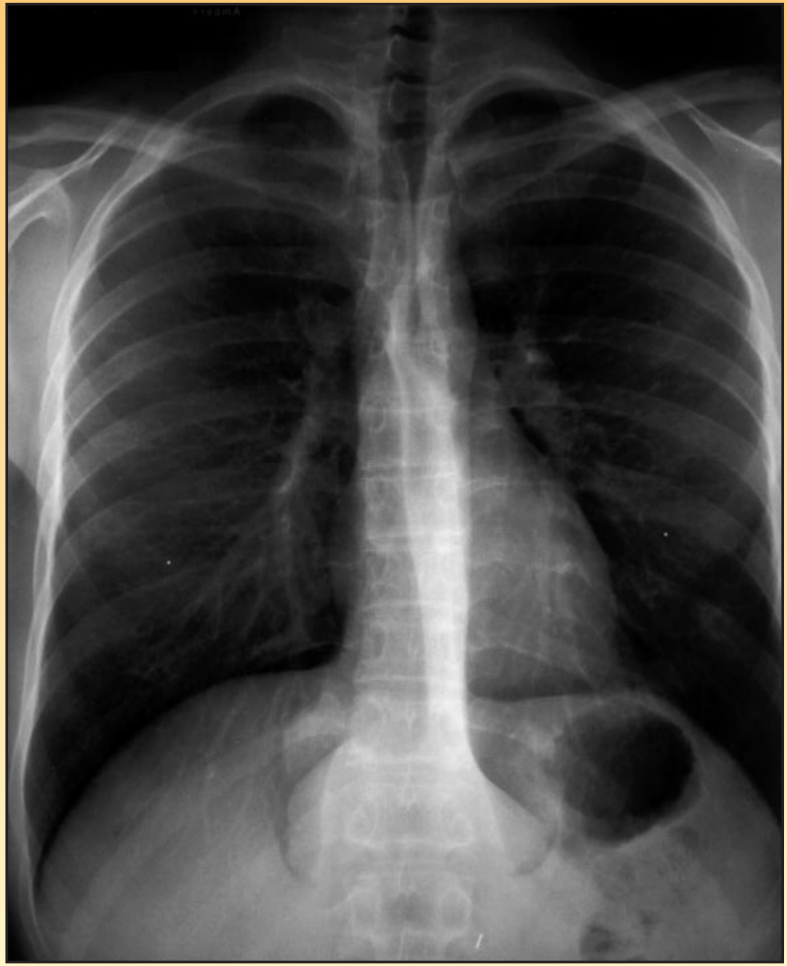




The modulator is the heart of the system and comprises an array of 21 X-ray absorbers positioned in front of the slit creating the fan-shaped beam. Each absorber, mounted on a ceramic finger, can independently cover up to 90% of its slit. The fan beam profile is controlled by the microprocessor to correspond to the measured densities of the patient. The absorbers are mainly closed for lung areas and open for the retrodiaphragmic region.◊





This schematic shows the slit profile in three positions of the scan. The scan is made in one continuous movement. At the scantime of 0.8 seconds the average exposuretime is 35 msec. Records are made on standard film size 35 x 43 cm.◊

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