

# Development of MobileArt Plus X-ray System for Mobile Diagnostics

Medical Systems Division, Shimadzu Corporation  
Toshiaki Nakamura, Hiroshi Miyata, Tatsuya Araki, Akira Nakagawa, Takahiro Kamitake, Kimihiro Takahama

## 1. Introduction

When technicians use a mobile X-ray system, they strongly desire it to have the following features of safety and reliability:

- mobility for through the hospital
- operability for easy positioning of the X-ray tube in narrowest to places in the hospital
- safety

In response to customer opinions and suggestions about MobileArt, a product that set the standard for electric mobile X-ray systems with easy running and positioning, the MobileArt Plus was developed to increase the level of perfection for MobileArt (Fig. 1).



Fig. 1 MobileArt Plus

## 2. System Features

### 2.1 Arm Handle for Easy Positioning

The addition of this one-touch locking and unlocking “All Free” button on the handle equipped in the middle of the expanding arm allows positioning of the X-ray tube position from the column side and makes it easier to position the X-ray tube from the main unit side. (Fig. 2).

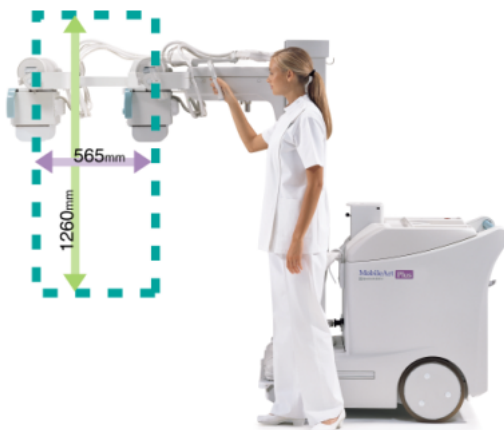


Fig. 2 Arm handle with “All Free” button

### 2.2 System Status Displayed with Illumination

The front of the collimator and the top of the main unit are now equipped with illumination to indicate status of imaging operations, such as “Standby” or “Exposure.” These brightly colored lights allow verification of the system status from afar.

### 2.3 Application of New Collimator

A multiple aperture with high removal power for extra-focal radiation has been installed. While reducing patient exposure,

this installation also provides good resolution even for CR, which is easily influenced by extra-focal radiation (Fig. 3).



Fig. 3 New collimator and illumination

## 3. Features Taken for the Previous Model

### 3.1 Excellent Running by Power Assist Optimized System (“PAO”)

PAO power assist control sets the optimal running speed based on the force applied to the handle. This control system gives the vehicle natural motion that feels exactly the same as pushing a light cart.

### 3.2 Smooth Positioning and Wide Filming Range

A telescopic column that rotates  $\pm 270^\circ$  and an expanding arm with a maximum length of 1200mm allow coverage of a wide area for the filming range.

The “Inch-mover” on the collimator front panel controls forward and backward movement of the main unit from the collimator side.

When positioning for filming, focal spot movement, device movement, exposure field setting, exposure lamp illumination, and other operations can all be done from the collimator side to allow speedy positioning.

### **3.3 Sharp Imaging with Small Focal Spot X-ray Tube Unit and High-frequency Inverter**

The installation of an X-ray tube device with a focal spot size of 0.7mm reduces distortion due to geometric expansion.

Additionally, the high voltage generator uses an inverter system with a maximum frequency of 60 kHz. Using this high-frequency inverter allows short exposure times and a stable tube voltage with low ripple.

The settings of 1kV steps for the tube voltage and 12.5% steps for the current time product (mAs) allow extremely fine exposure parameter settings. These settings make it possible to take high-grade X-ray images without any blurring.

## **4. Optional Settings**

For better resolution and improved mobile diagnostic management, the following functions have been added to make options replete, in addition to options previously available, such as the photo-timer option and the remote control option.

### **4.1 Protection Partition**

The protection partition reduces radiation exposure to the technician during filming.

### **4.2 Grid Holder**

A grid holder has been installed for carrying grids. This can be used to protect the grid or to carry exposure records.

### **4.3 Large Cassette Compartment**

This cassette compartment carries up to 15 14"x17" cassettes. The box allows carrying of more than the standard amount for one round of mobile diagnosis for improved work efficiency.

## **5. Conclusions**

The MobileArt Plus mobile X-ray system is a device that adheres closely to the principle of user-friendly down to every detail, combining the mobility, the operability and the reliability demanded in a mobile X-ray system. The MobileArt Plus will contribute greatly to efficiency in mobile diagnostic work and to the quality of diagnosis.