

RAD

Mobile X-Ray System MobileDaRt Evolution MX8 Version

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1. Introduction

To date, the MobileDaRt series has continued to improve popular features such as a digital radiography (DR) system highly integrated with the main unit using an embedded touch panel monitor, and power assist system for smooth driving, with MobileDaRt series products continually being launched to fulfill the requests of MobileDaRt series customers. This has led to the delivery of more than 3,400 MobileDaRt series units (as of October 2017) throughout the world.

This article introduces the newly developed MobileDaRt Evolution MX8 version mobile X-ray system. The design of the MX8 version has been rethought from the ground up to provide better working efficiency with improved operability and more convenient features (Fig. 1).

2. Main Features

(1) Telescopic Column

This is the first time a domestic Japanese manufacturer has incorporated a telescopic mechanism in the

column of a mobile X-ray system. The telescopic column extends to cover a wide range of imaging regions at focal height between 68 cm and 203 cm (Fig. 2), providing a high degree of freedom in positioning. During travel, the top of the column retracts to a height of 127 cm with the top of the X-ray tube at 124 cm, giving the operator a wide view in front of them and allowing technologists of smaller stature to drive the system with ease.

The MX8 version uses a booster mechanism with a spring and movable pulleys to replace the counterweight used in previous versions to balance the X-ray tube and reduce the weight of parts being raised and lowered by 40 %. This allows the system to be manipulated quietly and with less force, and greatly reduces the work involved in repositioning multiple times during a single day.

(2) Compact Body

The arrangement of parts inside the main unit has been rethought to remove redundant space and produce a gently refreshing, rounded design. Thanks to the telescopic column, the new design will not give a feeling of pressure to the surroundings during driving or during radiography. The cart is not overly

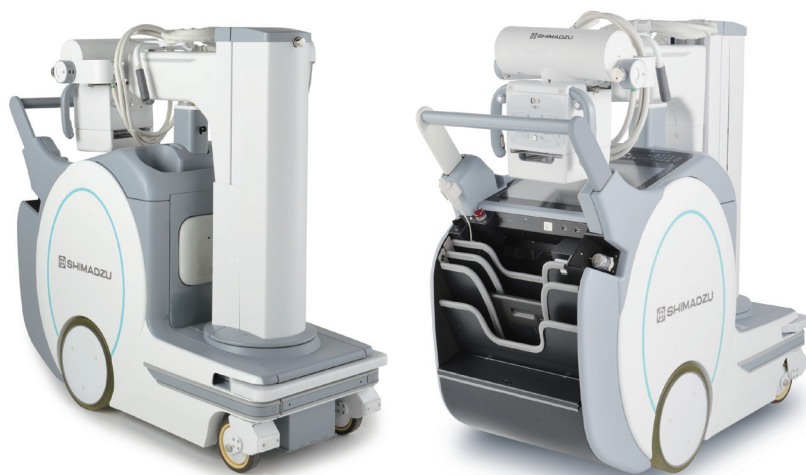


Fig.1 MobileDaRt Evolution MX8 Version



Fig.2 Column Extended to Focal spot of 203 cm height

tall and allows for easy visual confirmation of the lower, front part of the main body. The cart is also just 56 cm wide, giving improved maneuverability and safety in space-limited situations, such as when maneuvering the system in narrow rooms or hallways and passing through doorways.

The center of gravity has been lowered by mounting the battery and other heavy components in the base of the system, making the system feel more stable during travel. Overall system weight has also been reduced to 440 kg.

(3) Viewing Monitor

The system has a built-in 19-inch LCD touch panel monitor in the main cart (Fig. 3). The viewing monitor uses a vertical alignment (VA) panel to provide a wide viewing angle with little color change through viewing angles, which is useful to check the clinical image with multiple people. The square panel instead of the wide panel is adopted to provide a large display area for easy viewing of clinical images. The monitor surface uses a fully flat construction without grooves or protrusions that is easy to clean and keep clean.

At the upper side of the monitor is an X-ray control panel (Fig. 4) that displays exposure dose and remaining battery. Operating the system has also been made more convenient by making the monitor



Fig.3 19-inch size Touch Panel Monitor

accessible from the drive handle side, column side, and lateral sides of the system.

(4) Collimator

The collimator knobs and lamp button have been added to both the front (Fig. 5) and rear (Fig. 6) of the collimator. The irradiation field can be adjusted easily from both sides of the column or X-ray tube, allowing for more flexible positioning during any imaging situation. The inward swing angle of the collimator has also been increased from 20° to 30°, improving positioning for seated radiography in small rooms.

A new “All Free” switch (Fig. 7) has been added to the bottom of the collimator control handle so column brake can now be unlocked even when the X-ray tube is in an extended position simply by reaching for the bottom of the collimator handle, making control of the system easier for technologists of smaller stature. Other “All Free” switches can still be found in the middle of the arm and at the top of the cart (Fig. 8, 9), so positioning can be performed from various directions.

(5) Various Storage Pockets

The FPD box (Fig. 10) below the drive handle has slots for storing 1 large field-of-view FPD, 1 compact FPD, and 1 anti-scatter grid. Two slots for FPDs come with an inbuilt locking mechanism that prevents FPD theft when a technologist is temporarily away from the system.

A large amount of storage space for frequently used small items such as wet tissues, gloves, and



Fig.4 X-Ray Control Panel



Fig.5 Collimator Front



Fig.6 Collimator Rear



Fig.7 Lower switch of Operation Handle



Fig.8 Switch in Middle of Arm



Fig.9 Switch at Top of Cart



Fig.10 FPD Storage Box



Fig.11 Small Item Storage Pockets (Above Monitor)



Fig.12 Power Cable Storage



Fig.13 Status Indicator

sterile covers are placed at the upper side of the viewing monitor, and inside the FPD box (Fig. 11). A small item container with a lid can also be secured with a padlock.

The power cable storage space is located below the drive handle (Fig. 12), which allows easy access for recharging after the system has been moved to its storage area.

(6) Status Indicator

An LED light showing system status and radiography status has been embedded in the side of the X-ray tube support arm (Fig. 13). The light is located in an area that is easily visible from a distance to make other staff in the vicinity aware of radiography status.

(7) DR NEUTRAL

Shimadzu's unique "DR NEUTRAL" concept allows customers to combine the MX8 version with DR systems that meet their needs. Currently, under the DR NEUTRAL, Canon DR systems and Fujifilm DR systems are covered, which allows the customer to choose between systems capable of a high degree of compatibility and coordination with existing systems.

3. New Options

The options shown below have been added for further improvements in convenience.

(1) Wireless Hand Switch and Wireless Barcode Reader

A wirelessly connected barcode reader that prevents misidentification of patients and a wirelessly connected exposure hand switch have been added as options (Fig. 14, 15). The technologist can focus on caring about the patient without worrying about cable management.



Fig.14 Wireless Hand Switch **Fig.15** Wireless Barcode Reader

(2) IC Card Authentication

IC cards can be registered for individual users to allow users to log into the DR system simply by holding the IC card over a IC card reader (currently only an option for the MX8 version with a Fujifilm DR system).

4. Summary

The mobile X-ray system, “MobileDaRt Evolution MX8 version”, covered in this article has made large improvements in ease of use and convenience by introducing a telescopic column, large touch panel monitor, and rethinking system construction to achieve a smaller and lighter system while keeping the popular and strong features of previous systems. This system promises to reduce the burden on operators and patients, and help users to achieve greater efficiencies and improved quality of diagnosis not only during hospital rounds, but in a wide variety of situations including the operating room, ICU, emergency medicine, and NICU. Shimadzu will continuously listen to the wishes of its customers and develop even better systems.