Purpose: The O-arm cone beam imaging system has gradually been accepted to support different orthopedic surgery applications such as spine surgical procedures, assessment of pedicle screw position, kyphoplasty procedures, etc. Its 3D mode provides enhanced imaging information and may lead to enhancement in the surgical procedure compared to radiographs or fluoroscopy alone. Dosimetric characterization of the O-arm imaging system has been presented in our previous study. This study aims to evaluate performance of the O-arm system. **Method and Materials:** Noise Power Spectrum (NPS), Modulation Transfer Function (MTF) and Detective Quantum Efficiency (DQE) were evaluated for a cone beam O-arm system. Image quality measurements were performed with a CATPHAN 424 phantom using a 120 kVp beam filtered with 1 mm Al and 0.1 mm Cu and an exposure range of 5.03 mGy to 8.17 mGy. The CPT445 Module was used to measure MTF. Water phantom images were used to calculate NPS. Then the NPS was normalized by dividing the square of the mean signal. The Photon fluence at each exposure (q) was estimated using the SpekCalc and compared to those by Monte Carlo simulation. The DQE was calculated using the measurements of the MTF, NNPS and q. **Results:** The MTF indicates that the reconstruction filter of the O-arm is over-enhancing, meaning that it yields values greater than unity. The system has a 10% MTF at 0.45mm. The NPS shows the low frequency structured noise present. The DQE reaches a maximum value of approximately 60% at low frequency. **Conclusion:** The physical characteristics, including the characteristic response, MTF, NPS and DQE of the O-arm with a Varian flat panel detector (PaxScan 4030CB) were evaluated. The O-arm system operated at 3D mode functions as a CT system, with comparable high spatial resolution but low spatial contrast and relatively large image noise.