Purpose:
To implement in software the procedures described in AAPM Task Group 150's draft recommendations for image receptor performance testing, and to evaluate the effectiveness and practicality of these procedures.

Methods:
Images of flat fields were acquired using digital x-ray image receptors at 6 cooperating institutions. Four flat field images obtained with each detector spanned a range of input detector air kerma. Software based on AAPM TG150's draft report processed the test images and generated results. Image receptor response and several measures of non-uniformity were evaluated. Images were divided into 10 mm square regions, after eliminating 10 mm borders. For each region, signal (mean), noise (standard deviation) and SNR were calculated. Characteristic signal, noise and SNR were calculated based on average values from all regions. Local non-uniformity for signal (SLN), noise (NLN) and SNR (SNRLN) were expressed as the maximum ratio of the absolute difference between each region's value and its 4 nearest neighbors, to the respective characteristic value. Global non-uniformity (SGN, NGN, SNRGN) were expressed similarly but differences between maximum and minimum values obtained from the regions were used (without comparison to local neighbors).

Results:
TG150 tests discriminated between good and poorly performing detectors. Improper detector calibration was detectable, with noise non-uniformity proving to be a more sensitive measure than signal or SNR non-uniformity. Detector rotation relative to calibration conditions produced a greater change in signal non-uniformity than the other measures. Image receptor structured noise was characterized by an increase in noise non-uniformity with incident air kerma.

Conclusions:
AAPM TG150's proposed approach to image receptor testing was implemented and evaluated. The approach appears to be an effective and practical one for routine quality assurance testing of digital radiographic image receptors.