

CLAIMS

1. A method of determining the power of a lens, the method comprising:
 - a. displaying a test pattern on a planar display surface;
 - b. positioning a test lens between the display surface and a digital camera
 - 5 at a first position where the test lens is at a first lens distance from the display surface and using the camera to capture an image of the test pattern as seen through the test lens in a first lens image (“the first lens image test pattern”);
 - c. positioning the test lens between the display surface and the camera at a second position where the test lens is at a second lens distance from the display
 - 10 surface different from the first lens distance and using the camera to capture an image of the test pattern as seen through the test lens in a second lens image (“the second lens image test pattern”);
 - d. analysing each of the first and second lens image test patterns to determine the magnitude of magnification M_1 of the test pattern at the first
 - 15 position and the magnitude of magnification M_2 of the test pattern at the second position;
 - e. calculating the power P of the test lens from the magnification values M_1 , M_2 at the first and second positions respectively and the change Δdl in the lens distance between the first and second positions.
- 20 2. A method of determining the power of a test lens as claimed in claim 1 wherein the power P of the test lens is determined using the following equation or an equivalent:

$$P = \frac{1}{f} = \frac{\frac{1}{M_1} - \frac{1}{M_2}}{\Delta dl}$$

25 where M_1 and M_2 are the values of the magnification determined at the first and second positions respectively and Δdl is the change in lens distance between the first and second positions.

3. A method of determining the power of a test lens as claimed in any one of claims 1 to 3, wherein the method comprises moving the test lens by a predetermined amount Δdl from the first position to the second position.

4. A method of determining the power of a test lens as claimed in any one of claims 1 to 3, wherein the method comprises moving the test lens from the first position to a second position where at least a predetermined change in magnification of the test pattern when compared with the magnification at the first position is present and determining the change in lens distance Δdl between the first and second positions.
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5. A method of determining the power of a test lens as claimed in any one of claims 1 to 4 wherein the method comprises monitoring the position of the test lens, either directly or indirectly, in order to determine the change in lens distance Δdl between the first and second positions.
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6. A method of determining the power of a test lens as claimed in any one of claims 1 to 5 wherein the method comprises mounting the test lens in a lens carriage for holding the test lens between the display surface and the camera and wherein the lens carriage is movable relative to the display surface in a linear direction perpendicular to the display surface to vary the lens distance of a test lens mounted to the lens carriage in use.
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7. A method of determining the power of a test lens as claimed in claim 6 wherein the method comprises moving the lens carriage in said linear direction to place the test lens at the second position after the first lens image test pattern has been captured.
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8. A method of determining the power of a test lens as claimed in claim 7 wherein the method comprises determining the change in lens distance Δdl between the first and second positions from the movement of the lens carriage.
9. A method of determining the power of a test lens as claimed in any one of claims 1 to 8 wherein the method is used to determine the lens power at multiple locations within an area of interest of the test lens.
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10. Apparatus for determining the power of a test lens, the apparatus comprising a planar display surface for displaying a test pattern, a digital camera having a lens whose optical axis is aligned perpendicular to the display surface, a lens carriage for holding a test lens between the display surface and the camera lens, the lens carriage being movable in a linear direction perpendicular to the display surface to vary the distance between the test lens and the display surface, the
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apparatus including an electronic control system for controlling movement of the lens carriage in said linear direction.

11. Apparatus as claimed in claim 10 comprising an electronic actuator operating under the control of the electronic control system for controlling movement of the lens carriage.
12. Apparatus as claimed in claim 11, wherein the actuator comprises a stepper motor.
13. Apparatus as claimed in any one of claims 10 to 12, the apparatus comprising a system for measuring or detecting movement in said linear direction by the lens carriage.
14. Apparatus as claimed in any one of claims 10 to 13, the apparatus being configured in use to move the lens carriage to a first position the test lens mounted to the carriage is at a first lens distance from the display surface and to subsequently move the lens carriage to a second position in which the test lens is at a second lens distance from the display surface different to the first lens distance.
15. Apparatus as claimed in any one of claims 10 to 14 wherein the apparatus is configured in use to use the digital camera to capture an image of the test pattern as seen through the test lens by the camera when the lens carriage is at the first position (“the first lens image test pattern”) and to capture a further image of the test pattern as seen through the test lens by the camera when the lens carriage is at the second position (“the second lens image test pattern”) and to analyse each of the first and second lens image test patterns to determine the magnitude of magnification of the test pattern at the first position and the second position respectively.
16. Apparatus as claimed in claim 15 the apparatus being configured to move the lens carriage by pre-determined distance between the first and second positions.
17. Apparatus as claimed in claim 15 the apparatus being configured to move the lens carriage from the first position until a second position is reached at which the change in magnification of the test pattern is at or above a pre-determined amount and to determine the distance moved by the lens carriage from the first position to the second position.

18. Apparatus as claimed in any one of claims 15 to 17 comprising a computing device which forms part of or is associated with the electronic control system and which computing device is programmed to carry out the image data processing and analysis steps for determining the magnitude of magnification of the test pattern at the first position and the second position.
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19. Apparatus as claimed in any one of claims 10 to 18 comprising computing means programmed to carry out the image processing and analysis steps of the method of any one of claims 1 to 9.
20. Apparatus as claimed in any one of claims 10 to 19, the apparatus being configured to carry out the method according to and one of claims 1 to 9.
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21. Use of apparatus as claimed in any one of claims 10 to 20 to carry out the method as claimed in any one of claims 1 to 9.