CLAIMS:

1. A method of creating an optical security element in a value document using a low-cost printing device of a data processing terminal, the method comprising:

providing a flexible substrate having a pre-printed ink portion; wherein the pre-printed ink portion comprises two layers of ink, a first ink layer having a wavelength shifting property which absorbs light at a first wavelength and reflects light at a different wavelength, and a second ink layer being sensitive to laser radiation, and the second ink layer is provided in an unexposed state which does not provide an optical security function of the security element;

configuring a variable laser irradiation device to determine a part of the unexposed second ink layer ~~pre-printed ink portion~~ to be exposed to laser radiation in a machine-controlled manner, and

exposing the unexposed second ink layer ~~pre-printed ink portion~~ to laser radiation in the machine-controlled manner to create ~~from the pre-printed ink portion~~ a ~~predefined~~ patterned stencil within the second ink layer, the patterned stencil being superimposed on the first ink layer, such that the wavelength shifting properties of the first ink layer are available through the patterned stencil to create ~~wherein the optical characteristics of the pattern provide~~ the optical security element.

~~2. A method according to Claim 1, wherein the exposing step comprises exposing a layer of the value document at an irradiated location above or below the unexposed pre-printed ink portion such that the pre-printed ink portion is optically exposed at this irradiated location.~~

~~3. A method according to Claim 2, wherein the exposing step comprises creating a stencil within the layer of the value document above or below the pre-printed ink portion.~~

~~4. A method according to any of Claims 1 to 3, wherein the exposing step comprises irradiating portions of the pre-printed ink portion to create the predefined pattern from within the ink portion.~~

~~5.~~2. A method according to Claim ~~4~~1, where in the ~~pre-printed ink portion~~first ink layer comprises an Electromagnetic-sensitive colour-shifting ink or optically varying ink (OVI) or optically varying magnetic ink (OVMI).

~~6.~~3. A method according to Claim ~~4~~1, where in the ~~pre-printed ink portion~~first ink layer comprises an electromagnetic-sensitive metallic layer.

~~7.~~4. A method according to Claim ~~6~~3, wherein the ~~value document~~first ink layer comprises a metallic layer adjacent the ~~pre-printed~~second ink layer and the step of creation of the stencil within the second ink ~~portion~~ layer exposes the metallic layer as part of the optical security element.

~~8.~~5. A method according to any of Claims 1 to ~~7~~4, wherein the ~~pre-printed ink portion~~second ink layer comprises a plastic strip portion containing a reactive ink, the plastic strip portion having

predefined areas of weakness and the exposing step comprises exposing a selected plurality of the predefined areas of weakness to laser radiation causing the reactive ink to leak from these irradiated areas of weakness out of the plastic strip onto ~~an adjacent~~the first ink layer of the value document.

~~9.~~6. A method according to Claim ~~8~~5, wherein the exposing step comprises perforating the plastic strip portion at a plurality of predefined locations to create the ~~predefined pattern~~optical security element.

~~10. A method according to Claim 9, wherein the pre-printed ink portion is optically reactive when exposed to the atmosphere, and the exposing step causes the pre-printed ink portion at the location of the pattern to change in its optical characteristics.~~

~~11.~~7. A method according to any of Claims 1 to ~~7~~4, wherein the pre-printed ink portion is provided on a first face of a substrate and the exposing step is carried out on a second face of the substrate, such that the security element created has different optical characteristics when viewed from the first face of the substrate and the second face of the substrate.

~~12.~~8. A method according to any of Claims 1 to ~~7~~4, further comprising providing an upper and a lower light transparent covering layer over the pre-printed ink layer, the upper covering layer being transparent to the wavelength of the laser radiation and the lower layer being sensitive to the wavelength of the laser radiation, providing a reactive chemical layer between the upper and lower covering layers, and the exposing step causing ablation of the pattern in the lower covering layer thereby releasing the contents of the chemical layer onto the pre-printed ink layer to form the pattern in the ink layer.

~~13.~~9. A method according to Claim ~~12~~8, wherein the exposing step releases the contents of the chemical layer causing a chemical reaction with the pre-printed ink layer in the vicinity of the exposure to create an area of the pre-printed ink portion where the pre-printed ink is not visible.

~~14.~~10. A method according to any of Claims 1 to ~~13~~9, wherein the ~~pre-printed ink portion comprises two layers of ink, the lower~~first ink layer ~~of ink having~~has a wavelength shifting property which absorbs light at a first wavelength in a non-visible electromagnetic spectrum and transmits light at a different wavelength in a visible part of the electromagnetic spectrum.

~~15.~~11. A method according to Claim ~~14~~10, wherein the ~~lower~~ first ink layer comprises a electromagnetic-radiation resistant ink and the ~~upper~~ second ink layer comprises a electromagnetic-radiation sensitive ink.

~~16.~~12. A method according to any of Claims 1 to ~~15~~11, wherein the exposing step creates a pattern of characters having a non-adjustable font.

~~17.~~13. A method according to any of Claims 1 to ~~16~~12, wherein the providing step comprises providing a low-cost thermographic paper substrate and the method further comprises printing on the thermographic substrate using a thermographic printer.

~~18.~~14. A method according to any of Claims 1 to ~~17~~13, further comprising heating the substrate to cure the ink layer prior to issuing the value document for use.

~~19.~~15. A method according to any of Claims 1 to ~~18~~14, wherein the method is implemented on a print terminal where the terminal is selected from the set comprising: a lottery terminal, a kiosk, a bank terminal, a point of sale terminal, an automated teller machine, a cash register and an instant ticket vending machine.

~~20.~~16. A method according to Claim ~~19~~15, wherein the security element is a validation identifier and the method further comprises reading a pre-printed serial identifier provided on the substrate and deriving from the serial identifier the validation identifier to be exposed in the pre-printed ink portion using machine-stored information provided at the print terminal or remotely at a central server that is connectable to the terminal.

~~21.~~17. A method according to Claim ~~20~~16, further comprising providing a pre-printed series of characters under the pre-printed ink layer and exposing selected portions of the pre-printed ink layer to reveal characters which in combination make up the security element.

~~22.~~18. A method according to Claim ~~21~~17, wherein the step of providing the pre-printed series of characters comprises providing a series of concentric bands of characters and the exposing step comprises revealing one character from each band.

~~23.~~19. A method according to Claim ~~22~~18, wherein the exposing step comprises creating a visible link between each of the exposed characters to indicate the correct order in which the characters are to be read.

~~24.~~20. A method according to any of Claims ~~21~~ 17 to ~~23~~19, wherein the step of providing the pre-printed series of characters comprises providing an exposed set of registration marks for locating the relative positions of the series of pre-printed characters.

~~25.~~21. A data processing terminal for creating an optical security element in a value document, the terminal comprising:

a low-cost printing device comprising a variable irradiation device;

a module for providing a flexible substrate having a pre-printed ink portion; wherein the pre-printed ink portion comprises two layers of ink, a first ink layer having a wavelength shifting property

which absorbs light at a first wavelength and reflects light at a different wavelength, and a second ink layer being sensitive to laser radiation, and the second ink layer is provided in an unexposed state which does not provide an optical security function of the security element;

a processor for determining a part of the unexposed ~~pre-printed~~second ink ~~portion~~ layer to be exposed to radiation in a machine-controlled manner,

a controller for controlling the variable irradiation device to expose the unexposed ~~pre-printed~~second ink ~~portion~~ layer to radiation in the machine-controlled manner to create ~~from the pre-printed ink portion~~ a ~~predefined~~ patterned stencil being superimposed on the first ink layer, such that the wavelength shifting properties of the first ink layer are available through the patterned stencil to create~~, wherein the optical characteristics of the pattern provide~~ the optical security element.

~~26.~~22. A data processing terminal according to Claim ~~25~~21, wherein the irradiation device comprises a diode infrared laser or a low-cost ultraviolet laser.

~~27.~~23. A printing device for creating an optical security element in a value document, the device comprising:

a variable electromagnetic energy irradiation device;

a module for providing a flexible substrate having a pre-printed ink portion; wherein the pre-printed ink portion comprises two layers of ink, a first ink layer having a wavelength shifting property which absorbs light at a first wavelength and reflects light at a different wavelength, and a second ink layer being sensitive to laser radiation, and the second ink layer is provided in an unexposed state which does not provide an optical security function of the security element;

a processor for determining a part of the unexposed ~~pre-printed~~second ink ~~portion~~ layer to be exposed to radiation in a machine-controlled manner;

a controller for controlling the variable irradiation device to expose the unexposed ~~pre-printed~~second ink ~~portion~~ layer to electromagnetic radiation in the machine-controlled manner to create ~~from the pre-printed ink portion~~ a ~~predefined~~ patterned stencil being superimposed on the first ink layer, such that the wavelength shifting properties of the first ink layer are available through the patterned stencil to create~~, wherein the optical characteristics of the pattern provide~~ the optical security element.

~~28.~~24. A printing device according to Claim ~~27~~23, wherein the variable irradiation device includes at least one exposure stencil.

~~29.~~25. A printing device according to Claim ~~28~~24, wherein the variable irradiation device comprises a plurality of fixed exposure stencils.

~~30.~~26. A printing device according to Claim ~~29~~25, wherein the plurality of fixed exposure stencils are provided as difference faces of a rotatable drum.

~~31.~~27. A printing device according to Claim ~~30~~26, wherein a plurality of rotatable drums are provided, each having its own electromagnetic radiation source.

~~32.~~28. A printing device according to any of Claims ~~29~~ 25 to ~~31~~27, further comprising a diffraction element for diffusing the radiation created from a radiation source to the plurality of different stencils.

~~33.~~29. A printing device according to Claim ~~27~~26, wherein the variable irradiation device comprises a machine-controlled configurable stencil.

~~34.~~30. A printing device according to Claim ~~33~~29, wherein the machine-controlled configurable stencil comprises an electronically controllable matrix of LCD elements.

~~35.~~31. A printing device according to any of Claims ~~27~~ 23 to ~~34~~30, further comprising a sensor for sensing at least one characteristic of the value document to be printed, and determining means for determining the quality of the value document based on the at least one sensed characteristic, the controller being operable to create the ~~pre-defined~~ patterned stencil in the ~~pre-printed~~second ink ~~portion~~layer in response to a positive determination by the determining means of the quality of the value document.

~~36.~~32. A printing device according to any of Claims ~~27~~ 23 to ~~35~~31, further comprising an image capture device for capturing an image of a user identifier and wherein the controller is arranged to use the captured image as at least part of the ~~predefined~~ patterned stencil.

~~37.~~33. A printing device according to Claim ~~36~~32, wherein the image capture device is arranged to capture a user signature and the controller is arranged to use the captured image as at least part of the ~~predefined~~ patterned stencil.

~~38.~~34. A printing device according to Claim ~~27~~23, wherein the variable electromagnetic energy irradiation device comprises a maser.

~~39.~~35. A method according to Claim 1, wherein the exposing step comprises creating in the pre-printed ink portion, the pattern comprising a plurality of sub-regions which are in turn created by applying a perforation mask to the exposing step.

~~40.~~36. A method according to Claim 1, wherein the pre-printed ink portion comprises a transparent ink, and the exposing step comprises creating an opaque pattern in the transparent ink layer as a result of the exposure of regions of the pre-printed transparent ink portion to the laser radiation.