CLAIMS

1. A retainer mountable on an exterior surface of an insertable supply item of an image forming device, the retainer for holding a circuit board having processing circuitry with a plurality of contacts, the retainer comprising:

a top having an undersurface having first and second supports depending therefrom and a mounting platform for retaining and aligning the circuit board positioned intermediate the first and second supports;

the mounting platform comprising:

a pair of opposed side walls positioned intermediate to the first and second supports and extending between a front and a rear of the retainer; the front facing a direction of insertion of the supply item into the image forming device;

a rear wall positioned transversely to the pair of opposed side walls and adjacent the rear of the retainer, the pair of opposed side walls and transverse rear wall forming a cavity for receiving the circuit board therein; and

a portion of the rear wall and a portion of at least one side wall of the pair of opposed side walls forming a mounting plane for mounting the circuit board, the mounting plane spaced apart from the undersurface of the top and, when the retainer is mounted on the supply item, away from the outer surface of the supply item, the portions of the rear wall and the at least one side wall of the pair of opposed side walls further defining a datum point for locating a corner of the circuit board on the retainer for aligning the circuit board and the plurality of contacts with respect to the retainer;

the top, the first and second supports defining an opening sized to receive therebetween a connector mounted within the image forming device, the connector having a plurality of electrically conductive connecting pins in electrical communication with a controller in the image forming device; and,

an alignment device provided on the retainer for engaging with a corresponding alignment device on the supply item to establish a reference datum for the retainer when installed on the supply item for aligning the retainer with the supply item;

wherein, when the retainer and circuit board are mounted on the supply item and the supply item is inserted into the image forming device, the first and second supports align the plurality of connecting pins of the connector with corresponding ones of the plurality of contacts of the circuit board for electrical interconnection therebetween.

2. The retainer of claim 1, wherein the other side wall of the pair of opposed side walls comprises a plurality of deformable ribs extending toward the one side wall of the pair of opposed

side walls, the plurality of deformable ribs exerting a force on the circuit board, when installed, to bias it against the one side wall of the pair of opposed side walls.

3. The retainer of claim 2, wherein the pair of opposed side walls and the rear transverse wall each have a recess formed in their distal ends with the respective bottom surfaces of the recesses forming the mounting plane for the circuit board within the cavity, a side surface of the recess in the rear wall and a side surface of the one side wall of the pair of opposed side walls forming the datum point and a side surface of the recess of the other side wall of the pair of opposed side walls having the deformable ribs extending therefrom along a portion of a bottom surface of the recess of the other side wall of the pair of opposed side walls.

4. The retainer of claim 3, wherein the recesses in the pair of opposed side walls are angled downwardly going from the front of the retainer to the rear of the retainer for similarly angling the circuit board when mounted thereon.

5. The retainer of claim 2, wherein a front transverse wall depending from the undersurface of the top is provided opposite the rear transverse wall, the front transverse wall comprising a second plurality of deformable ribs extending toward the rear transverse wall, the second plurality of deformable ribs exerting a second force along a front edge of the circuit board, when installed, to bias the circuit board against the rear transverse wall.

6. The retainer of claim 5, wherein the pair of opposed side walls and the rear transverse wall each have a recess formed in their distal ends with respective bottom surfaces of the recesses forming the mounting plane for the circuit board with the cavity, a side surface of the recess in the rear wall and a side surface of the one side wall of the pair of opposed side walls forming the datum point and side surfaces of the recess in the other side wall of the pair of opposed side walls having the first plurality of deformable ribs extending therefrom, respectively, along the bottom surface of the recess.

7. The retainer of claim 6, wherein the first plurality of deformable ribs extend into the cavity a greater distance from the side wall of the recess of the other side wall of the pair of opposed side walls than the second plurality of deformable ribs extend from the side of the front transverse wall into the cavity.

8. The retainer of claim 5, wherein a mounting boss for the circuit board depends from the undersurface of the top within the cavity and a top surface of the mounting boss is coplanar with the mounting plane, the mounting boss receiving a fastener for retaining the circuit board.

9. The retainer of claim 1, wherein the alignment device on the retainer comprises at least one of a slot in the undersurface of the top, a post extending from the undersurface of the top, two spaced

apart posts in the undersurface of the top, a slot spaced apart from a hole in the undersurface of the top, and a post extending from the undersurface of the top spaced apart from an opening in the undersurface of the top.

10. A toner cartridge removably installable in an image forming device, comprising:

a housing forming an enclosed reservoir for holding a quantity of toner;

a retainer assembly removably attached on an outer surface of the housing, the retainer assembly comprising:

a circuit board having processing circuitry with a plurality of contacts;

a retainer having a top that includes an undersurface having first and second supports depending therefrom and a mounting platform, the mounting platform comprising:

a pair of opposed side walls positioned intermediate the first and second supports and extending between a front and a rear of the retainer, the front facing a direction of insertion of the toner cartridge into the image forming device;

a rear wall positioned transversely to the pair of opposed side walls and adjacent the rear of the retainer, the pair of opposed side walls and transverse rear wall forming a cavity receiving the circuit board therein;

a portion of the rear wall and a portion of at least one side wall of the pair of opposed side walls forming a mounting plane, the circuit board being mounted in the mounting plane, the mounting plane spaced apart from the undersurface of the top and away from the outer surface of the toner cartridge, the portions of the rear wall and the at least one side wall of the pair of opposed side walls further defining a datum point locating a corner of the circuit board on the retainer and aligning the plurality of contacts of the circuit board with respect to the retainer; and

a mounting boss depending from the undersurface of the top within the cavity, the mounting boss having a top surface being substantially coplanar with the mounting plane, the mounting boss receiving a fastener retaining the circuit board within the cavity; and

an alignment device provided on the retainer engaged with a corresponding alignment device on the exterior surface of the toner cartridge establishing a reference datum for the retainer and aligning the retainer with the toner cartridge;

wherein the outer surface of the housing and the top, the first and second supports of the retainer define an opening sized to receive therebetween a connector mounted within the image forming device in electrical communication with a controller in the image forming device, the connector having a plurality of electrically conductive connecting pins connectable with and aligned to corresponding ones of the plurality of contacts on the circuit board when the toner cartridge is installed in the image forming device.

11. The toner cartridge of claim 10, wherein the housing includes an inclined surface portion positioned in front of the retainer assembly, the inclined surface portion inclining outwardly and rearwardly from a front wall of the housing toward the outer surface of the housing, the inclined surface portion initially engaging a back surface of the connector during the insertion of the toner cartridge in the image forming device.

12. The toner cartridge of claim 10, wherein the housing includes a plurality of spaced apart inclined ribs forming a ramp for lifting the connector into contact with the plurality of contacts of the circuit board, the plurality of spaced apart inclined ribs inclining outwardly and rearwardly from the outer surface of the housing toward a projection having a surface offset from and substantially parallel with respect to the outer surface of the housing and positioned in front of the retainer assembly, the plurality of spaced apart ribs initially engaging a back surface of the connector during the insertion of the toner cartridge in the image forming device.

13. The toner cartridge of claim 10, wherein the housing includes a pair of opposed guide walls positioned in front of the retainer assembly and on opposite sides of the opening of the retainer and extending outwardly from the outer surface of the housing, the pair of opposed guide walls engaging at least a side surface of the connector during the insertion of the toner cartridge in the image forming device such that the connector rotates and aligns vertically with respect to a midline of the retainer, the pair of opposed guide walls each including a chamfered first segment having an outwardly angled planar surface with respect to the outer surface of the housing and a second segment substantially parallel to the outer surface of the housing, the first segments of the pair of opposed guide walls are angled with respect to the retainer and converge inwardly toward the first and second supports.

14. The toner cartridge of claim 10, wherein the housing includes a pair of cam surfaces and a corresponding pair of supports spaced apart and positioned between first and second supports of the retainer and extending from the outer surface of the housing, each of the corresponding pair of supports having an upper planar surface spaced apart from a contact surface of the circuit board for supporting the connector and moving the plurality of connecting pins into electrical contact with corresponding ones of the plurality of contacts, each of the pair of cam surfaces sloping outwardly from the outer surface of the housing and rearwardly from the opening toward the upper planar surface.

15. The toner cartridge of claim 10, wherein the mounting plane for mounting the circuit board is angled downwardly from the undersurface from the front of the retainer to the rear of the retainer for similarly angling the circuit board when mounted thereon.

16. The toner cartridge of claim 10, wherein the alignment device on the retainer comprises at least one of a slot in the undersurface of the top, a post extending from the undersurface of the top, two spaced apart posts in the undersurface of the top, a slot spaced apart from a hole in the undersurface of the top, and a post extending from the undersurface of the top spaced apart from an opening in the undersurface of the top.

CLAIMS

1. A replaceable unit for an electrophotographic image forming device, comprising:

a housing having an internal reservoir for storing toner, the housing having a front, a rear, a top, a bottom, a first side and a second side;

a circuit board mounted within a pocket on a surface of the first side of the housing, the pocket having an opening facing the front of the housing to permit an electrical connector of the image forming device to enter the pocket and mate with the circuit board when the replaceable unit is installed in the image forming device;

a first outer ramp and a second outer ramp outside the pocket on the surface of the first side of the housing closer to the front of the housing than the opening, the first outer ramp positioned closer to the top of the housing and the second outer ramp positioned closer to the bottom of the housing, the first and second outer ramps inclining outwardly and rearwardly from the surface of the first side of the housing to lift the electrical connector of the image forming device toward the circuit board during insertion of the replaceable unit into the image forming device; and

an inner ramp on the surface of the first side of the housing inside the pocket inclining outwardly and rearwardly from the surface of the first side of the housing to lift the electrical connector of the image forming device toward the circuit board during insertion of the replaceable unit into the image forming device.

2. The replaceable unit of claim 1, further comprising a third outer ramp on the surface of the first side of the housing outside the pocket and spaced closer to the front of the housing than the first and second outer ramps, the third outer ramp inclining outwardly and rearwardly from the surface of the first side of the housing.

3. The replaceable unit of claim 1, wherein the first and second outer ramps lead rearwardly to a first and a second outer planar surface, respectively, on the surface of the first side of the housing outside the pocket, the first and second outer planar surfaces being offset from and substantially parallel to the surface of the first side of the housing.

4. The replaceable unit of claim 1, wherein the inner ramp leads rearwardly to an inner planar surface on the surface of the first side of the housing inside the pocket, the inner planar surface being offset from and substantially parallel to the surface of the first side of the housing.

5. The replaceable unit of claim 1, wherein the inner ramp includes a pair of inner ramps, a first of the pair of inner ramps positioned closer to the top of the housing and a second of the pair of inner ramps positioned closer to the bottom of the housing.

6. The replaceable unit of claim 1, wherein the first and second outer ramps are angled toward each other as the first and second outer ramps extend rearwardly to funnel the electrical connector of the image forming device toward the pocket during insertion of the replaceable unit into the image forming device.

7. A replaceable unit for an electrophotographic image forming device, comprising:

a housing having an internal reservoir for storing toner; and

a circuit board retainer on an exterior surface of the housing, the retainer including:

a top having an undersurface having first and second supports extending away from the undersurface of the top toward a bottom of the retainer and extending in a direction from a front of the retainer to a rear of the retainer, the front of the retainer facing a direction of insertion of the replaceable unit into the image forming device, the bottom of the first and second supports positioned proximate the exterior surface of the housing;

a pair of opposed side walls on the undersurface of the top, the opposed side walls positioned intermediate the first and second supports and extending away from the undersurface of the top toward the bottom of the retainer and extending in the direction from the front of the retainer to the rear of the retainer, each opposed side wall includes a bottom surface that faces toward the bottom of the retainer and is spaced apart from the bottom of the retainer;

a circuit board seated against the bottom surfaces of the opposed side walls, the circuit board including processing circuitry and electrical contacts, the electrical contacts of the circuit board facing toward the bottom of the retainer; and

the top and the first and second supports form an opening at the front of the retainer sized to receive an electrical connector of the image forming device for mating with the circuit board when the replaceable unit is installed in the image forming device.

8. The replaceable unit of claim 7, wherein the first and second supports are positioned to contact the electrical connector of the image forming device and align the electrical connector of the image forming device with the circuit board for electrical interconnection therebetween when the replaceable unit is inserted into the image forming device.

9. The replaceable unit of claim 7, further comprising a first alignment device on the bottom of the first support and a second alignment device on the bottom of the second support engaging with a corresponding first and second alignment device on the housing and aligning the retainer on the housing.

10. The replaceable unit of claim 9, wherein the first alignment device includes a first alignment hole on the bottom of the first support and the second alignment device includes a second alignment hole on the bottom of the second support.

11. The replaceable unit of claim 7, further comprising a first mounting device on the bottom of the first support and a second mounting device on the bottom of the second support mounting the retainer on the exterior surface of the housing.

12. The replaceable unit of claim 11, wherein the first mounting device includes a first fastener receiving hole on the bottom of the first support and the second mounting device includes a second fastener receiving hole on the bottom of the second support.

13. The replaceable unit of claim 7, further comprising a mounting boss on the undersurface of the top extending away from the undersurface of the top intermediate the opposed side walls and proximate the rear of the retainer ~~for~~ retaining the circuit board on the retainer.

14. The replaceable unit of claim 7, wherein the bottom surface of each opposed side wall includes a recessed ledge, the circuit board is seated against each recessed ledge.