

**“Dampening Device for a Storage Device Tester and a Storage Device
Tester Including Same”**

FIELD OF THE INVENTION

The present invention relates to a dampening device for a storage device
5 tester and a storage device tester including same. The invention is
particularly suited to testing of Small Form Factor (“SFF”) storage devices.

BACKGROUND TO THE INVENTION

The following discussion of the background to the invention is intended to
facilitate an understanding of the present invention. It should be appreciated
10 that the discussion is not an acknowledgment or admission that any of the
material referred to was published, known or part of the common general
knowledge in any jurisdiction as at the priority date of the application.

Storage devices undergo testing after manufacture to ensure that they
operate within certain performance specifications. However, factors such as
15 vibration of the storage device can affect the performance of the storage
device during testing. The effect on performance can be so great that a
storage device that is operable within the performance specifications may fail
the testing.

One way of solving the vibration problem during testing is to apply a
20 dampener or clamping device to the storage device. While this has been
successful, the methods of applying the dampener or clamping device to the
storage device have previously been distinct from the method of operation of
the testing unit. In performing two separate methods of operation to prepare
for testing, the operator thereby loses time that could otherwise be spent on
25 testing.

It is therefore an object of the present invention to overcome, at least in part,
some or all of the aforementioned problems.

SUMMARY OF THE INVENTION

Throughout the specification, unless the context requires otherwise, the word
30 “comprise” or variations such as “comprises” or “comprising”, will be

understood to imply the inclusion of a stated integer or group of integers, but not the exclusion of any other integer or group of integers.

In accordance with a first aspect of the invention there is a dampening device for a storage device tester comprising:

- 5 a slider slidably mounted on a base surface;
- at least one crowder located in close proximity to a recess in the base surface.

where, when the slider is positioned at a first position, a portion of the slider disengages a compression connector module and, when the slider is

10 positioned at a second position, the portion of the slider engages the compression connector module and the at least one crowder moves to dampen any storage device received in the recess.

The slider ideally has a handle to facilitate movement between the first position and the second position.

- 15 The crowder comprises at least one wedge protrusion and a compression spring and the slider comprises a corresponding number of recesses, such that when the at least one wedge protrusion is received within its recess, the compression spring relaxes and moves the crowder to dampen any storage device received in the recess and when the at least one wedge protrusion is
- 20 not received within its recess the compression spring is compressed and forces the crowder away from the recess.

The crowder may comprise angled slides to facilitate the change in position of the crowder.

- 25 Alternatively, the crowder may comprise at least one rotating body having a guiding pin, a spring arm and an engaging arm and the slider having a corresponding aperture therein for receiving the guiding pin, such that, when the slider is positioned at the first position, a compression spring attached to the spring arm is unable to rotate the rotating body and when the slider is positioned at the second position, the compression spring may partially relax
- 30 and thereby rotate the rotating body to a second position such that the

engaging arm connects with, and provides a dampening effect to, any storage device received in the recess.

The corresponding aperture may widen at a midpoint to facilitate the change in position of the crowder.

5 In accordance with a second aspect of the invention there is a test carrier comprising:

a slider slidably mounted on a carrier base;

a compression connector module mounted to the carrier base

10 at least one crowder located in close proximity to a recess in the carrier base.

where, when the slider is positioned at a first position, a portion of the slider disengages the compression connector module and, when the slider is positioned at a second position, the portion of the slider engages the compression connector module and the at least one crowder moves to
15 dampen any storage device received in the recess.

BRIEF DESCRIPTION OF THE DRAWINGS

The following invention will be described with reference to the following drawings of which:

Figure 1 is a first isometric view of a test carrier in accordance with a first
20 embodiment of the invention.

Figure 2 is an isometric view of the test carrier as shown in Figure 1 with the slider housing removed.

Figure 3 is a second isometric view of the test carrier as shown in Figure 1.

Figure 4 is a first isometric view of a test carrier in accordance with a second
25 embodiment of the invention.

Figure 5 is an isometric view of a crowder.

Figure 6 is an isometric view of a slider

Figure 7 is a partitioned view of the slider of Figure 6 having a series of crowders received therein.

Figure 8 is a partial isometric view of the test carrier as shown in Figure 4 in a second position.

Figure 9 is a partial isometric view of the test carrier as shown in Figure 4 in a first position.

- 5 Figure 10 is a first isometric view of a test carrier in accordance with a third embodiment of the invention with the test carrier set to an open position.

Figure 11 is a second isometric view of the test carrier shown in Figure 10, the test carrier set to a closed position.

- 10 Figure 12 is an isometric view of a nest used in the test carrier shown in Figure 10.

Figure 13 is an isometric view of a slider in the test carrier shown in Figure 10.

Figure 14 is an isometric view of a crowder arranged to engage the slider shown in Figure 12.

- 15 Figure 15 is a first isometric view of a test carrier in accordance with a fourth embodiment of the invention with the test carrier set to an open position.

Figure 16 is a second isometric view of a test carrier shown in Figure 14, the test carrier set to a closed position.

- 20 Figure 17 is an isometric view of a nest used in the test carrier shown in Figure 14.

Figure 18 is an isometric view of a slider used in the test carrier shown in Figure 14.

PREFERRED EMBODIMENTS OF THE INVENTION

- 25 In accordance with a first embodiment of the invention there is a SFF storage device test carrier 10. The test carrier 10 is shown in Figure 1. As shown, the test carrier 10 is particularly adapted to test a 1.8 inch storage device 12.

The test carrier 10 incorporates a carrier base 14. The carrier base 14 has a slider housing 16 mounted thereon.

Also mounted on the carrier base 14 is a compression connector module ("CCM") 18. The CCM 18 is the subject of a corresponding application to be simultaneously filed by the applicants and as such will not be described in more detail here.

- 5 The slider housing 16 houses portions of a slider 20 and two opposing crowders 22. The slider 20 comprises a handle portion 24, a CCM activator portion 26 and four recesses 28. The four recesses 28 are arranged in opposing pairs.

The opposing crowders 22 are positioned at opposite sides of a first end 30
10 of the carrier base 14. (The CCM 18 is positioned at a second end 32 of the carrier base 14, opposite the first end 30). Each crowder 22 comprises a base 34, wedge protrusions 36 and an engaging portion 38.

Each crowder 22 is arranged such that the base 34 sits underneath the slider 20 at the position of each pair of recesses 28 (or adjacent thereto depending
15 on the current position of the slider 20). The wedge protrusions 36 extend from one end of the base 34. The wedge protrusions 36 are adapted to engage the recesses 28. The recesses 28 have angled sides to facilitate such engagement and disengagement.

Extending from the other end of the base 34 is the engaging portion 38. The
20 engaging portion 38 is equal in length to the storage device 12. Positioned at opposite ends of each engaging portion 38 are dampeners 40. Each dampener 40 is spaced from the carrier base 14 at a height substantially equivalent to the height of the storage device 12.

Interposed between the slider 20 and each engaging portion 38 are two
25 compression springs 42. Each compression spring 42 connects with the engaging portion 38 at a position almost directly opposite a dampener 40.

This embodiment of the invention will now be described in the context of its intended use.

As best shown in Figure 2, in its first position the slider 20 is positioned such
30 that wedge protrusions 36 do not engage the recesses 28. This causes significant compression of the compression springs 42.

When arranged in the first position, a user (not shown) can insert a 1.8 inch storage device 12 having a flexible printed circuit ("**FPC**") cable attached thereto. The inserted position of the storage device 12 is such that the FPC cable overlays the CCM 18 and the sides thereof are in general alignment with the engaging portions 38. This is shown in more detail in Figure 3.

Once the storage device 12 has been correctly inserted into the test carrier 10, the user moves the handle portion 24 in the direction A, thus moving the slider to a second position.

When moved to the second position, the CCM activator portion 26 engages the CCM 18 and pushes the CCM 18 to a closed position. Thus, the FPC cable is clamped by the CCM 18 ready for testing.

Additionally, the wedge protrusions 36 are aligned with the recesses 28, allowing engagement of same. This engagement allows the compression springs 42 to at least partly relax. In turn, this pushes the engagement portions 38 against the storage device 12. In this state, the dampeners 40 sit directly over the top of the storage device 12. The end result is that the storage device 12 is prevented from significant movement in any direction.

To remove the storage device 12, the user moves the handle portion 24 in the direction B back to the first position. In doing so, the angled sides of each recess 28 facilitate disengagement of the wedge protrusions 36.

Disengagement of the wedge protrusions 36 pushes the wedge protrusions 36 back against side walls 44 of the test carrier 10. Due to its unitary construction, this also causes the engaging portions 38 to retract from the storage device 12 – again applying compression to the compression springs 42.

Additionally, when in the first position, the CCM activator portion 26 disengages the CCM 18. This allows the CCM 18 to move to an open position and release the hold it previously had on the FPC cable.

With the retraction of the engaging portions 38 and the release of the FPC cable, the storage device 12 may then be easily removed from the test carrier 10.

In accordance with a second embodiment of the invention, where like numerals reference like parts, there is a test carrier 100.

The test carrier 100 is shown in Figure 4. It comprises a slider 102, two CCMs 18, a carrier base 104 and a plurality of crowders 106.

- 5 The slider 102 is substantially "T" shaped. The slider 102 is slidably mounted to the carrier base 104 such that one part of the slider 102 bisects the carrier base 104 and the other part sits behind the two CCMs 18. Positioned at the intersection of the two parts of the slider 102 is a slider handle 108.

- 10 The part of the slider 102 that bisects the carrier base 104 has a series of apertures 112 provided therein. This part is also received within a slider housing 110. Another series of apertures 115 are provided on side surfaces 117 of the slider housing 110.

- Each crowder 106 comprises a rotatable body 114 an engaging arm 116 and a spring arm 118. The rotatable body 114 is mounted to a top surface (not shown) of the slider housing 110 using a screw and nut assembly.
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The spring arm 118 has a compression spring 120 extending therefrom in a direction parallel to the rotational axis of the rotatable body 114. Mounted on the rotatable body 114 at a position near to the engaging arm 116 is a guiding pin 122. Figure 7 shows this arrangement in more detail.

- 20 When properly mounted to the slider housing 110, each crowder 106 is arranged such that the compression spring 120 makes contact with a side wall of the slider housing 110 at a position between two retaining bars 124. Further, the guiding pin 122 of the crowder 106 is received within its corresponding aperture 112.

- 25 This second embodiment of the invention will now be described in the context of its intended use.

- In its open position, the compression spring 120 applies force to the spring arm 118 with the intention of rotating the rotatable body 114 in a first direction A. However, the receipt of the guiding pin 122 in its aperture 112 prevents this rotation. Furthermore, the receipt of the guiding pin 122 in its aperture
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112 positions the engaging arm 116 at its retracted position. This allows a user to insert the storage devices desired to be tested.

Once the storage devices desired to be tested have been inserted, the user then guides the slider handle 108 towards a closed position.

5 As the slider handle 108 is moved towards the closed position, the guiding pin 122 traverses the length of its corresponding aperture 112. About midway along the length of the aperture 112, the aperture 112 widens. This increase in width allows the force of the compression spring 120 to finally move the guiding pin 122. As a result, the guiding pin 122 is moved to a
10 position closer to the side wall of the slider housing 110 adjacent the storage device the crowder 106 is designed to clamp.

Because of the location of the guiding pin 122 relative to the engaging arm 116, the movement of the guiding pin 122 towards the side wall of the slider housing 110 also moves the engaging arm 116 to its engaged position. In its
15 engaged position, the contact pressure applied to the storage device is maintained by the compressive force of the compression spring 120.

When positioned in the second position, the slider 102 engages the CCMs 18 and pushes them to the closed position.

In accordance with a third embodiment of the invention, where like numerals reference like parts, there is a test carrier 200 as shown in Figure 10. The test carrier 200 comprises a carrier base 202, a nest 204, a slider 206 and CCMs 18.
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The nest 204 is fixedly mounted to the carrier base 202. The configuration of the nest 204 is such that, when mounted to the carrier base 202, two
25 recesses 208a, 208b are formed.

As shown in Figure 12, the nest 204 comprises three vertical struts 210a, 210b, 210c interconnected by two lateral struts 212a, 212b. Located on lateral strut 212a are four polyurethane pads 214. Pad 214a is positioned in close proximity to vertical strut 210a. Pad 214d is positioned in close
30 proximity to vertical strut 210c. Pads 214b, 214c are positioned in close

proximity to vertical strut 210b, on either side of the vertical strut 210b. In this manner, each recess 208 has two pads 214 projecting therein.

Vertical struts 210a and 210c have a guiding channel 216 provided along the majority of their vertical length. Each guiding channel 216 opens onto its
5 respective recess 208.

Vertical strut 210b has approximately positioned at its mid-point a wedge 218. The wedge 218 is retractable into the carrier base 202. The importance of the wedge 218 will be discussed in more detail below.

Spaced from the wedge 218, in a direction towards lateral strut 212a, is an
10 abutment 220. The portion of the vertical strut 210b extending from the abutment 220 almost the full distance to lateral strut 212b is a slider guide channel 222. In this manner, the wedge 218 is received within the slider guide channel 222.

The slider 206 is substantially "T"-shaped having a lateral arm 224 and a
15 vertical arm 226. The lateral arm 224 has four crowders 228 protruding therefrom. The crowders 228 are positioned such that, when the slider 206 is received within the slider guide channel 222, the crowders 228 are substantially aligned with the pads 214.

Each crowder 228 comprises a squat, elongated "U" portion 230. The "U"
20 portion 230 has a lateral contact surface 231. Extending from the lateral contact surface 231 is a dampening arm 232. The dampening arm 232 has an inverse trapezoidal head 234.

Also, positioned at each end of the lateral arm 224 is a guide member 236.

The vertical arm 226 has a cut-away portion 238. Positioned at opposing
25 ends of the cut-away portion 238 are locking tabs 240a, 240b

The slider 206 is adapted to be received within the slider guide channel 222.

The third embodiment of the invention will now be described in the context of its intended use.

The slider 206 is positioned within the slider guide channel 222 such that
30 locking tab 240b faces the tapered portion of the wedge 218. At the same

time, each guide member 236 is received within its respective guiding channel 216. When the slider 206 is positioned thus, the slider 206 is considered to be in an open position.

When the slider 206 is in an open position, each recess 208 is able to receive
5 a storage device 242 to be tested. Due to the configuration of the test carrier 200, each storage device 242 may be placed in the recess 208 with true zero-force application, while still allowing for any FPC cable attached to the storage device 242 to be received within the CCM 18 associated with the recess 208

- 10 The position of the crowders 228 relative to the received storage device 242 is such that at least a portion of the trapezoidal head 234 is lower than the top of the received storage device 242.

In order to test the received storage devices 242, the slider 206 is moved from an open position to a closed position by manipulation of locking tab
15 240b. Movement of the slider 206 in this manner sees the slider 206 make contact with the inclined portion of the wedge 218. This contact causes the wedge 218 to retract into the carrier base 202 until such time as the locking tab 240b contacts the abutment 220. At this position, the wedge 218 is aligned with the cut-away portion 238. Furthermore, as the slider 218 no
20 longer applies a retraction force to the wedge 218, the wedge 218 returns to the same position it holds when the slider 206 is set to the open position. However, in this instance, the wedge 218 is now received within the cut-away portion 238 – thereby locking the slider 206 in the closed position.

The movement of the slider 206 from an open to a closed position also sees
25 the lateral arm 224 move forward in direction A as guided by the guide members 236 being received within the guide channels 216. As the lateral arm 224 makes contact with the CCMs 18, the force applied by the movement causes the CCM 18 to clamp the FPC Cable of the storage device 242. The size of the slider 206 is such that, when the wedge 218 is received
30 within the cut-away portion 238, the lateral arm 224 remains positioned over the top of the CCMs 18. In this manner the bias of the CCM 18 towards the

closed position is negated until such time as the slider 206 is returned to an open position.

As the lateral arm 224 moves in direction A, an inclined surface of the inverse trapezoidal heads 234 of the crowdors 228 makes contact with their
5 respective storage devices 242 as does the contact surfaces 231. Due to the inclination of the contacting surface of the inverse trapezoidal head 234, the dampening arm 232 flexes until contact between the inverse trapezoidal head 234 and the storage device 242 is achieved substantially by means of dampening surface 244. The dampening arm 232 creates additional vertical
10 pressure which is applied to the dampening surface 244 as it seeks to resist the flexing and return to its original position.

Similarly, contact between the contact surfaces 231 and their respective storage devices 242 causes lateral pressure to be applied to the storage devices 242. Thus vibration of the storage device 242 along two axes is
15 dampened.

In order to return the slider 206 to an open position, the wedge 218 is depressed to a level where the slider 206 may again move relatively freely. The slider 206 is then moved in an opposite direction to direction A by applying force to locking tab 240a.

20 In accordance with a fourth embodiment of the invention, where like numerals reference like parts, there is a test carrier 300 as shown in Figure 15. The test carrier 300 comprises a carrier base 302, a nest 304, a slider 306 and CCMs 18. The carrier base 302 has side channels 309 located on opposing sides of the carrier base 302. Two retaining holes 307 are formed
25 in each side channel 309.

The nest 304 is fixedly mounted to the carrier base 302. The nest 304 has four receiving apertures 308 formed therein. Each receiving aperture 308 has a hemi-spherical portion 310. Situated on each side of the hemi-spherical portions 310 are polyurethane pads 312.

30 Extending from the sides of the apertures 308 adjacent the side containing the hemi-spherical portion 310 are supporting guides 311.

When the nest 304 is mounted to the carrier base 302, the receiving apertures 308 create four recesses 314a, 314b, 314c, 314d.

The slider 306 has guide rails 316 on opposing sides thereof. Positioned approximately at the mid-point of each guide rail 316 is a retaining clip 318.

5 Also positioned on the slider 306 are contact surfaces 320. A plurality of crowder fingers 322, 324 extend from the slider 306. Crowder fingers 322 extend perpendicular to the slider 324 while crowder fingers 324 extend horizontally in the same plane as the slider 306. Crowder fingers 324 each have an inverse trapezoidal head 326.

10 Positioned at one side of the slider 306, in between the sides to which the guide rails 316 are attached, is a semi-circle recess 328. This recess 328 acts as a handle.

The slider 306 also has four apertures 330 provided therein. The apertures 330 are of roughly the same dimensions as recesses 314. However, each
15 aperture 330 includes a hemi-spherical portion 332 and a rectangular portion 334.

The various components of the slider 306 and the other components of the test carrier 300 will be described in more detail in the context of the following example.

20 The slider 306 is inserted into the test carrier 300. This is achieved by aligning the guide rails 316 with the side channels 309 such that the guide rails 316 are able to move along the side channels 309. Once so inserted, the slider 306 has limited movement relative to, and is securely retained to, the carrier base 302.

25 Correct insertion of the slider 306 relative to the carrier base 302 sees the vertical crowder fingers 322 are directed towards the carrier base 302. Furthermore, each apertures 330 substantially corresponds with a recess 314 and the contact surfaces 320 are positioned above the CCMs 18.

With the slider 306 correctly inserted into the test carrier 300, the test carrier
30 is moved to an open position as shown in Figure 15. As is indicated in this

Figure, in this open position crowder fingers 322 extend perpendicular towards the carrier base 302..Crowder fingers 324 extend horizontally.

When the slider 306 is in an open position, each recess 314 is able to receive a storage device 336 to be tested. Due to the configuration of the test carrier
5 300, each storage device 336 may be placed in the recess 314 with true zero-force application, while still allowing for any FPC cable attached to the storage device 336 to be received within the CCM 18 associated with the recess 314.

Correct insertion of each storage device 336 is further facilitated by the
10 supporting guides 311 which assist in correct alignment of the storage device 336.

In order to test the received storage devices 336, the slider 306 is moved from an open position to a closed position by manipulation of recess 328. Manipulation of the recess 328 sees the slider 306 move relative to the
15 carrier base 302 by way of the guide rails 316 within the side channels 309.

Moving the slider 306 from an open position to a closed position (as shown in Figure 17) sees each brace arm 338 of the slider 306 make contact with a CCM 18. As each brace arm 338 makes contact with its corresponding CCM 18, the force applied by the movement causes the CCM 18 to clamp the FPC
20 cable of the storage device 336 retained in the recess to which the CCM 18 relates. The bias of the CCM 18 towards the closed position is negated until such time as the slider 306 is returned to an open position.

Movement of the slider 306 in this manner also causes a face 340 of each crowder finger 322 to apply force to its respective storage device 336 so as
25 to push the storage device 336 against its respective pad 312. Thus, crowder finger 322 applies a lateral dampening force to each storage device 336.

Crowder fingers 324 also make contact with their respective storage devices 336 when the slider 306 is in a closed position. As with the third embodiment
30 of the invention, due to the inclination of the contacting surface of the inverse trapezoidal head 326, the slider finger 324 flexes until contact between the inverse trapezoidal head 326 and the storage device 336 is achieved

substantially by means of dampening surface 342. In this manner, crowder finger 324 applies a vertical dampening force to each storage device 336.

To ensure that the test carrier 300 remains in its set position during operation, the retaining clips 318 are adapted to engage retaining holes 307.

5 When in the open position, a substantially trapezoidal locking portion 344 of the retaining clip 318 is received within retaining hole 307a. When in the closed position, locking portion 344 of the retaining clip 318 is received within retaining hole 307b.

To allow for movement between the open and closed positions, each locking
10 portion 344 is mounted to a spring arm 346. By mounting the locking portion 344 on the spring arms 346, the locking portions 344 are able to be depressed to allow free movement between the open and closed positions. The substantially trapezoidal shape of the locking portions 344 also facilitates this free movement. On completion of the transition from the open position to
15 closed position, or vice-versa, each spring arm 346 causes the locking portion 344 to return to a position whereby it engaged the appropriate retaining hole 307.

It should be appreciated by the person skilled in the art that the present invention is not limited to the embodiments described. It should be further
20 appreciated by the person skilled in the art that the features described above, where not mutually exclusive, can be combined to form yet further embodiments of the invention.

- Crowders 22, 106, 228, 322, 324 may take the form of separate components or may be integrated with other nearby components.
25 However, it is preferred that the crowders 22, 106, 228 be separate components to facilitate interchanging of crowders of varying size and flexibility as are necessary to suit the storage device to be tested.
- The test carriers 10, 100 may be adapted to be used in storage device tester units having a test bed size greater than or less than the 1.8"
30 HDD tester unit mentioned above.

- The test carriers 10, 100 may be adapted to test storage devices other than SFF storage devices. It should be understood however, that the invention has particular suitability for use with SFF storage devices.
- 5 • The slider 20, 102 may be provided with retention clips that engage suitable retaining mechanisms provided for on their respective carrier base 14, 104 when the slider 20, 102 moves from the first position to the engaged position. Alternatively, other forms of retaining the slider 20, 102 in the engaged position may be implemented.
- 10 • The carrier base 14, 104 and associated components can be modified from that described in the above embodiments to allow for multiple SFF storage devices to be tested using a single carrier base 14, 104 configuration.
- 15 • The retention clip 318 arrangement provided for in the fourth embodiment of the invention may be replaced by any other retention system as would be apparent to the person skilled in the art.

It should be further appreciated by the person skilled in the art that the features described above, where not mutually exclusive, can be combined to form yet further embodiments of the invention.

We Claim:

1. A dampening device for a storage device tester comprising:

a slider slidably mounted on a base surface;

at least one crowder located in close proximity to a recess in the base surface.

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where, when the slider is positioned at a first position, a portion of the slider disengages a compression connector module and, when the slider is positioned at a second position, the portion of the slider engages the compression connector module and the at least one crowder moves to dampen any storage device received in the recess.

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2. A dampening device according to claim 1, where the slider includes a handle to facilitate movement between the first position and the second position.

3. A dampening device according to any preceding claim, where the crowder comprises at least one wedge protrusion and a compression spring and the slider comprises a corresponding number of slider recesses, such that when the at least one wedge protrusion is received within its slider recess, the compression spring relaxes and moves the crowder to dampen any storage device received in the recess and when the at least one wedge protrusion is not received within its slider recess the compression spring is compressed and forces the crowder away from the recess.

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4. A dampening device according to claim 3, where the crowder has angled slides to facilitate the change in position of the crowder.

5. A dampening device according to claim 1 or claim 2, where the crowder comprises at least one rotating body having a guiding pin, a spring arm and an engaging arm and the slider having a corresponding aperture therein for receiving the guiding pin, such that, when the slider is positioned at the first position, a compression spring attached to the spring arm is unable to rotate the rotating body and when the slider is positioned at the second position, the compression spring may partially relax

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and thereby rotate the rotating body to a second position such that the engaging arm connects with, and provides a dampening effect to, any storage device received in the recess.

5 6. A dampening device according to claim 5, where the corresponding aperture widens at a midpoint to facilitate the change in position of the crowder.

7. A dampening device according to any preceding claim, further comprising a retention system for at least locking the slider in the second position.

8. A test carrier comprising:

10 a slider slidably mounted on a carrier base;

a compression connector module mounted to the carrier base

at least one crowder located in close proximity to a recess in the carrier base.

15 where, when the slider is positioned at a first position, a portion of the slider disengages the compression connector module and, when the slider is positioned at a second position, the portion of the slider engages the compression connector module and the at least one crowder moves to dampen any storage device received in the recess.

20 9. A test carrier according to claim 8, where the slider includes a handle to facilitate movement between the first position and the second position.

25 10. A test carrier according to claim 8 or claim 9, where the crowder comprises at least one wedge protrusion and a compression spring and the slider comprises a corresponding number of slider recesses, such that when the at least one wedge protrusion is received within its slider recess, the compression spring relaxes and moves the crowder to dampen any storage device received in the recess and when the at least one wedge protrusion is not received within its slider recess the compression spring is compressed and forces the crowder away from the recess.

11. A test carrier according to claim 10, where the crowder has angled slides to facilitate the change in position of the crowder.

5 12. A test carrier according to claim 8 or claim 9, where the crowder comprises at least one rotating body having a guiding pin, a spring arm and an engaging arm and the slider having a corresponding aperture therein for receiving the guiding pin, such that, when the slider is positioned at the first position, a compression spring attached to the spring arm is unable to rotate the rotating body and when the slider is positioned at the second position, the compression spring may partially
10 relax and thereby rotate the rotating body to a second position such that the engaging arm connects with, and provides a dampening effect to, any storage device received in the recess.

13. A test carrier according to claim 12, where the corresponding aperture widens at a midpoint to facilitate the change in position of the crowder.

15 14. A test carrier according to any one of claims 8 to 13, where the slider has a retention mechanism for retaining the slider in the second position.

15. A dampening device according to any one of claims 8 to 14, further comprising a retention system for at least locking the slider in the second position.

20 16. A dampening device substantially as described herein with reference to the Figures.

17. A test carrier substantially as described herein with reference to the Figures.