cavity, an outwardly positioned portion protruding into the exterior atmosphere, and a sealing portion disposed between the inwardly positioned portion and the outwardly positioned portion for coupling the electrical connector to the housing. The electrically insulating base has a multilayered structure with electrical traces extending between adjacent layers. The electrically insulating base may further include a first plurality of electrical leads disposed on one or both opposing peripheral surfaces of the outwardly positioned portion of the electrically insulating base. The base material may also include a second plurality of electrical leads disposed on the inwardly positioned portion of the electrically isolating base material, wherein each electrical lead of the first plurality of electrical leads has a corresponding and interconnected, via the electrical traces, electrical lead of the second plurality of electrical leads.

[0012a] According to an aspect, there is provided an apparatus, comprising: a housing comprising a feedthrough aperture; and an electrical connector coupled to the housing and extending through the feedthrough aperture, the electrical connector comprising: an electrically insulating base comprising at least first, second, and third layers of electrically insulating material with at least a first electrical trace extending between the first and second layers of electrically insulating material and at least a second electrical trace extending between the second and third layers of electrically insulating material, the electrically insulating base comprising an inwardly positioned portion disposed in an interior cavity, an outwardly positioned portion disposed external to the interior cavity, and a sealing portion disposed between the inwardly positioned portion and the outwardly positioned portion, the sealing portion being sealed to the housing; at least first and second electrical leads disposed on a same surface of the outwardly positioned portion of the electrically insulating base; and at least third and fourth electrical leads disposed on the inwardly positioned portion of the electrically insulating base, wherein the first electrical lead is electrically coupled to the third electrical lead via the first electrical trace and the second electrical lead is electrically coupled to the fourth electrical lead via the second electrical trace.

[0012b] According to another aspect, there is provided a hard disk drive, comprising: a hermetically sealed housing substantially isolating a hard drive cavity from an exterior atmosphere, the housing comprising a feedthrough aperture; and an electrical connector coupled to the housing and extending through the feedthrough aperture, the electrical connector comprising: an electrically insulating base comprising at least first, second, and third layers of electrically insulating material with at least a first electrical trace extending between the first and second layers of electrically insulating material and at least a second electrical trace extending between the second and third layers of electrically insulating material, the electrically insulating

base comprising an inwardly positioned portion disposed in the hard drive cavity, an outwardly positioned portion protruding into the exterior atmosphere, and a sealing portion disposed between the inwardly positioned portion and the outwardly positioned portion, the sealing portion being sealed to the housing wherein a length of the electrically insulating base extending transversely away from the feedthrough aperture is longer than a width of the electrically insulating base extending parallel to the feedthrough aperture, at least first and second electrical leads disposed on a same peripheral surface of the outwardly positioned portion of the electrically insulating base, and at least third and fourth electrical leads disposed on the inwardly positioned portion of the electrically insulating base, wherein the first electrical lead is electrically coupled to the third electrical lead via the first electrical trace and the second electrical lead is electrically coupled to the fourth electrical lead via the second electrical trace.

[0012c] According to yet another aspect, there is provided a hard disk drive, comprising: a hermetically sealed housing substantially isolating a hard drive cavity containing a helium enriched environment from an exterior atmosphere, the housing comprising a feedthrough aperture; and an electrical connector coupled to the housing and extending through the feedthrough aperture, the electrical connector comprising: an electrically insulating base comprising at least first, second, and third layers of electrically insulating material with at least a first electrical trace extending between the first and second layers of electrically insulating material and at least a second electrical trace extending between the second and third layers of electrically insulating material, the electrically insulating base comprising an inwardly positioned portion disposed in the hard drive cavity, an outwardly positioned portion protruding into the exterior atmosphere, and a sealing portion disposed between the inwardly positioned portion and the outwardly positioned portion, the sealing portion being sealed to the housing, wherein a cross-section of the sealing portion that is co-planar with the cross-section of the feedthrough aperture comprises a first and second dimension, wherein the first dimension is at least 5 times the length of the second dimension, at least first and second electrical leads disposed on a same peripheral surface of the outwardly positioned portion of the electrically insulating base, and at least third and fourth electrical leads disposed on the inwardly positioned portion of the electrically insulating base, wherein the first electrical lead is electrically coupled to the third electrical lead via the first electrical trace and the second electrical lead is electrically coupled to the fourth electrical lead via the second electrical trace.

[0013] The described features, structures, advantages, and/or characteristics of the subject matter of the present disclosure may be combined in any suitable manner in one or more embodiments and/or implementations. In the following description, numerous specific

details are provided to impart a thorough understanding of embodiments of the subject matter of the present disclosure. One skilled in the relevant art will recognize that the subject matter of the present disclosure may be practiced without one or more of the specific features, details, components, materials, and/or methods of a particular embodiment or implementation. In other instances, additional features and advantages may be recognized in certain embodiments and/or implementations that may not be present in all embodiments or implementations. Further, in some instances, well-known structures, materials, or operations are not shown or described in detail to avoid obscuring aspects of the subject matter of the present disclosure. The features and advantages of the subject matter of the present disclosure will become more fully apparent from the following description and appended claims, or may be learned by the practice of the subject matter as set forth hereinafter.

CLAIMS

1. An apparatus, comprising:

a housing comprising a feedthrough aperture; and

an electrical connector coupled to the housing and extending through the feedthrough aperture, the electrical connector comprising:

an electrically insulating base comprising at least first, second, and third layers of electrically insulating material with at least a first electrical trace extending between the first and second layers of electrically insulating material and at least a second electrical trace extending between the second and third layers of electrically insulating material, the electrically insulating base comprising an inwardly positioned portion disposed in an interior cavity, an outwardly positioned portion disposed external to the interior cavity, and a sealing portion disposed between the inwardly positioned portion and the outwardly positioned portion, the sealing portion being sealed to the housing;

at least first and second electrical leads disposed on a same surface of the outwardly positioned portion of the electrically insulating base; and

at least third and fourth electrical leads disposed on the inwardly positioned portion of the electrically insulating base, wherein the first electrical lead is electrically coupled to the third electrical lead via the first electrical trace and the second electrical lead is electrically coupled to the fourth electrical lead via the second electrical trace.

2. The apparatus of claim 1, wherein a seal between the sealing portion and the housing maintains the interior cavity as a hermetically sealed environment.

3. The apparatus of claim 2, wherein the interior cavity contains a helium-enriched environment.

4. The apparatus of claim 3, wherein the seal comprises one or more of solder, adhesive, and epoxy, the epoxy having a low helium permeability.

5. The apparatus of claim 1, wherein the first, second, and third layers of electrically insulating material extend through the feedthrough aperture of the housing perpendicular to a cross-section of the feedthrough aperture.

6. The apparatus of claim 1, wherein the electrically insulating base extends from the inwardly positioned portion to the outwardly positioned portion in a first direction, and wherein the first electrical lead is offset from the second electrical lead in the first direction.

7. The apparatus of claim 1, wherein the electrically insulating base comprises a printed circuit board.

8. The apparatus of claim 1, wherein a cross-sectional area of the electrical connector is less than about 200 square millimeters.

9. The apparatus of claim 1, wherein the cross-sectional area of the electrical connector in the feedthrough aperture is less than about 100 square millimeters.

10. The apparatus of claim 1, wherein the outwardly positioned portion of the electrical connector comprises a zero-insertion-force type connector.

11. The apparatus of claim 1, wherein a length and a height of the electrical connector are substantially greater than a width of the electrical connector, wherein the height of the electrical connector extends in a direction transverse to a cross-section of the feedthrough aperture and

the length and width of the electrical connector extend in directions parallel to the cross-section of the feedthrough aperture.

12. A hard disk drive, comprising:

a hermetically sealed housing substantially isolating a hard drive cavity from an exterior atmosphere, the housing comprising a feedthrough aperture; and

an electrical connector coupled to the housing and extending through the feedthrough aperture, the electrical connector comprising:

an electrically insulating base comprising at least first, second, and third layers of electrically insulating material with at least a first electrical trace extending between the first and second layers of electrically insulating material and at least a second electrical trace extending between the second and third layers of electrically insulating material, the electrically insulating base comprising an inwardly positioned portion disposed in the hard drive cavity, an outwardly positioned portion protruding into the exterior atmosphere, and a sealing portion disposed between the inwardly positioned portion and the outwardly positioned portion, the sealing portion being sealed to the housing wherein a length of the electrically insulating base extending transversely away from the feedthrough aperture is longer than a width of the electrically insulating base extending parallel to the feedthrough aperture,

at least first and second electrical leads disposed on a same peripheral surface of the outwardly positioned portion of the electrically insulating base, and

at least third and fourth electrical leads disposed on the inwardly positioned portion of the electrically insulating base, wherein the first electrical lead is electrically coupled to the third electrical lead via the first electrical trace and the second electrical lead is electrically coupled to the fourth electrical lead via the second electrical trace.

13. The hard disk drive of claim 12, wherein the third and fourth electrical leads are electrically connected to hard disk drive components within the hard drive cavity.

14. The hard disk drive of claim 12, wherein the hard drive cavity contains a helium-enriched environment.

15. The hard disk drive of claim 12, wherein the electrical connector is coupled to the housing via one or more of soldering, adhesive, and epoxy that has a low helium permeability.

16. The hard disk drive of claim 12, wherein the outwardly positioned portion of the electrically insulating base can be inserted into a mating electrical receptacle.

17. The hard disk drive of claim 16, further comprising a securing mechanism that fastens the outwardly positioned portion of the electrically insulating base to the mating electrical receptacle.

18. The hard disk drive of claim 12, wherein the outwardly positioned portion of the electrically insulating base has a rectangular cross-sectional shape with two long peripheral sidewalls and two short peripheral sidewalls, wherein the first and second electrical leads are disposed on one of the long peripheral sidewalls of the outwardly positioned portion of the electrically insulating base.

19. The hard disk drive of claim 12, wherein the cross-sectional area of the electrical connector in the feedthrough aperture is less than about 100 square millimeters.

20. A hard disk drive, comprising:

a hermetically sealed housing substantially isolating a hard drive cavity containing a helium enriched environment from an exterior atmosphere, the housing comprising a feedthrough aperture; and

an electrical connector coupled to the housing and extending through the feedthrough aperture, the electrical connector comprising:

an electrically insulating base comprising at least first, second, and third layers of electrically insulating material with at least a first electrical trace extending between the first and second layers of electrically insulating material and at least a second electrical trace extending between the second and third layers of electrically insulating material, the electrically insulating base comprising an inwardly positioned portion disposed in the hard drive cavity, an outwardly positioned portion protruding into the exterior atmosphere, and a sealing portion disposed between the inwardly positioned portion and the outwardly positioned portion, the sealing portion being sealed to the housing, wherein a cross-section of the sealing portion that is co-planar with the cross-section of the feedthrough aperture comprises a first and second dimension, wherein the first dimension is at least 5 times the length of the second dimension

at least first and second electrical leads disposed on a same peripheral surface of the outwardly positioned portion of the electrically insulating base, and

at least third and fourth electrical leads disposed on the inwardly positioned portion of the electrically insulating base, wherein the first electrical lead is electrically coupled to the third electrical lead via the first electrical trace and the second electrical lead is electrically coupled to the fourth electrical lead via the second electrical trace.