

DISTRIBUTION MODULE**CROSS REFERENCE TO OTHER APPLICATION**

[0001] This application claims the benefit of and priority to U.S. Provisional Application No. 63/393,743 filed July 29, 2022, the contents of which are incorporated by reference.

BACKGROUND

[0002] The present disclosure is directed to an apparatus useful in a system configured to stabilize a watercraft while it is traveling on the water. In particular, the present disclosure is directed to a module of the system, including the mounting assembly therefor, and the method of installation thereof. More particularly, the present disclosure is further directed towards a distribution module with a housing, a mounting bracket, a connector plate, a sealing gasket, connecting hardware, and mounting hardware.

[0003] A watercraft moving through the water is free to rotate in three directions corresponding to its three principal axes. The front of the watercraft, or bow, may rotate along its vertical axis by turning left or right—known as yaw. The bow may rotate along the watercraft's transverse axis by moving up or down—known as pitch. The watercraft may rotate along the watercraft's longitudinal axis, by tilting to the left or right—known as roll. Unintentional rotation along these axes is caused by water currents, waves, and wind. Unchecked, a watercraft's yaw, roll, or pitch can lead to inefficient travel, damage to the watercraft or its cargo, and can be dangerous to individuals aboard the watercraft.

[0004] To lessen unintentional yaw, pitch, or roll while moving, watercraft have traditionally used various methods and apparatuses to make water travel smoother and safer. For example, ballast devices have been used for centuries to increase stability to lessen unintentional rotation. Ballast is by design heavy, often bulky, and generally positioned at the lower point of the vessel, generally below the water line. Additionally, deep rudders or keels have long been used to stabilize a watercraft from unintentional roll or pitch. Rudders or keels extend below the hull of a watercraft into the water and create resistance to unintentional rotation caused by current, waves, or wind. Many modern watercraft use water engagement devices, such as,

trim tabs, wake gates, interceptors, fins and other similar devices, in a system powered by the on-board electrical system and controlled by an on-board computer system.

[0005] These conventional methods and system to reduce unintentional rotation have disadvantages. Traditional ballast is heavy and occupies the limited space on the watercraft. Not all watercraft may be equipped with a deep keel or rudder – either due to speed constraints or water depth constraints. And motor fins are limited in size and are generally affixed directly to the motor, limiting their range of motion. Finally, all traditional means of reducing unintentional rotation while traveling are static or at least very slow to respond to changing conditions. Currents, waves, and wind are not static. Conditions on the water, especially on the ocean, can change quickly and unpredictably. Further, each of the forces—currents, waves, and wind—act on a watercraft simultaneously, to different degrees, and with non-corresponding magnitudes or directions, making traditional methods of watercraft stabilization ill-equipped to accurately and nimbly respond to changing water conditions. Moreover, on-board power and computer systems are influenced, disrupted or interfered with by the vibrations in the marine vessel as a result of the engines, waves and other inputs.

[0006] Thus, there exists a long-felt, unmet need for a means of watercraft stabilization which is not bulky, is compatible with all watercrafts, easily installed and removed, and which can isolate the sensitive electronics from disruptive vibrations.

SUMMARY

[0007] An embodiment of the present disclosure may be mounted adjacent the transom of a watercraft by a mounting bracket and corresponding mounting hardware.

[0008] An embodiment of the present disclosure may be in communication with other watercraft stabilization components.

[0009] An embodiment of the present disclosure may be used in fresh water environments.

[0010] An embodiment of the present disclosure may be used in salt water environments.

[0011] A distribution module assembly configured for mounting to a marine vessel comprises a mounting bracket including a mounting base plate disposed between a first end portion and a second end portion, wherein the first and second end portions are parallel to the mounting base plate and disposed offset in a direction from the mounting base plate. Each of the first and second end portions includes a standoff, and wherein the mounting bracket is configured to be connected to a surface of the marine vessel. A housing including a centrally disposed compartment defined by a plurality of perimeter compartment walls with an open top, a pair of pockets each defined by a plurality of pocket walls extending from oppositely disposed compartment walls, and a volume defined by the perimeter compartment wall that extends between the pair of pockets, a rear edge of the housing and the surface of the marine vessel. The housing is connected to the mounting bracket such that the first and second end portions are each disposed in one of the pair of pockets and the mounting base plate is disposed in the volume.

[0012] In an aspect of the present disclosure, a method of installing a distribution module to a transom of a marine vessel comprises the steps of: (1) connecting a mounting bracket on a surface of a marine vessel, wherein the mounting bracket includes a mounting base plate disposed between a first end portion and a second end portion, wherein the first and second end portions are parallel to the mounting base plate and disposed offset in a direction from the mounting base plate, wherein each of the first and second end portions includes a standoff; and (2) connecting a housing to the mounting bracket, wherein the housing includes a compartment defined by a plurality of perimeter compartment walls with an open top and a pair of pockets each defined by a plurality of pocket walls extending from oppositely disposed compartment walls, and a volume defined by the perimeter compartment wall that extends between the pair of pockets, a rear edge of the housing and the surface of the marine vessel wherein the first and second end portions are each disposed in one of the pair of pockets and the mounting base plate is disposed in the volume.

[0013] Accordingly, it is an object of the disclosure to not encompass within the disclosure any previously known product, process of making the product, method of using the product, or method of treatment such that Applicants reserve the right and

hereby disclose a disclaimer of any previously known product, process, or method. It is further noted that the disclosure does not intend to encompass within the scope of the disclosure any product, process, or making of the product or method of using the product, which does not meet the written description and enablement requirements of the USPTO (35 U.S.C. §112, first paragraph) or the EPO (Article 83 of the EPC), such that Applicants reserve the right and hereby disclose a disclaimer of any previously described product, process of making the product, or method of using the product.

[0014] It is noted that in this disclosure and particularly in the claims and/or paragraphs, terms such as "comprises", "comprised", "comprising" and the like can have the meaning attributed to it in U.S. Patent law; e.g., they can mean "includes", "included", "including", and the like; and that terms such as "consisting essentially of" and "consists essentially of" have the meaning ascribed to them in U.S. Patent law, e.g., they allow for elements not explicitly recited, but exclude elements that are found in the prior art or that affect a basic or novel characteristic of the disclosure.

[0015] These and other embodiments are disclosed or are obvious from and encompassed by the following Detailed Description.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] The following brief description of the drawings, given by way of example, but not intended to limit the disclosure solely to the specific embodiments described, may best be understood in conjunction with the accompanying drawings.

[0017] FIG. 1 is a front perspective view of an embodiment of a distribution module in accordance with the present disclosure.

[0018] FIG. 2 is a rear perspective view of the distribution module of FIG. 1.

[0019] FIG. 3 is a bottom perspective view of the distribution module of FIG. 1.

[0020] FIG. 4a is a front perspective view of an embodiment of a housing of the distribution module of FIG. 1 in accordance with the present disclosure.

[0021] FIG. 4b is a first bottom perspective view of the housing of FIG. 4a.

[0022] FIG. 4c is a rear perspective view of the housing of FIG. 4a.

[0023] FIG. 4d is a second bottom perspective view of the housing of FIG. 4a.

[0024] FIG. 5a is a front perspective view of an embodiment of a mounting bracket of the distribution module of FIG. 1 in accordance with the present disclosure.

[0025] FIG. 5b is a front perspective view of another embodiment of a mounting bracket of the distribution module of FIG. 1 in accordance with the present disclosure.

[0026] FIG. 6a is a front perspective view of an embodiment of a connector plate of the distribution module of FIG. 1 in accordance with the present disclosure.

[0027] FIG. 6b is a rear perspective view of the connector plate of FIG. 6a.

[0028] FIG. 7a is a front perspective view of internal components of an embodiment of the connector plate of FIG. 6a in accordance with the present disclosure.

[0029] FIG. 7b is a rear perspective view of the internal components of FIG. 7a.

[0030] FIG. 8a is a front perspective view of an embodiment of a printed circuit board of the connector plate of FIG. 6a in accordance with the present disclosure.

[0031] FIG. 8b is a rear perspective view of the printed circuit board of FIG. 8a.

[0032] FIG. 9 is a front perspective view of an embodiment of a gasket in accordance with the present disclosure.

[0033] FIG. 10 is a perspective exploded view of the distribution module of FIG. 1.

[0034] FIG. 11 is a bottom exploded view of the distribution module of FIG. 1.

DETAILED DESCRIPTION

[0035] FIGS. 1 – 5 generally illustrate the exterior of a distribution module 100 according to one aspect of the present application. The external portion of the distribution module generally 100 comprises a housing 102, a connector plate 104, a mounting bracket 106, and hardware connectors 108. FIG. 1 depicts a front perspective view of an embodiment of a distribution module in accordance with the present disclosure. FIG. 2 depicts a rear perspective view of the distribution module of FIG. 1. FIG. 3 depicts a bottom perspective view of the distribution module of FIG. 1 wherein the connector plate 104 and connectors 108 are shown.

[0036] The distribution module 100 is preferably installed onto the transom of a watercraft. This is beneficial because the distribution module 100 is compatible with most transoms and does not need to be specially fitted to a watercraft in order to be

used. Further, since the transom is commonly subject to considerable vibrations from the engines the operational sensors and software may be located remotely from the transom. The distribution module 100 cannot be easily opened. This ensures the internal components are not damaged by water or other contaminants. Preferably, as a step in the manufacturing process, the interior of the distribution module 100 may be potted with a solid or gelatinous compound.

[0037] The distribution module 100 is equipped with several connectors 108 which may receive electronic cables from other components in the system. A user can install or remove the distribution module 100 while it is connected to various other components without having to disconnect any electronic cables connected to a connector 108. This is possible due to the shape of the mounting bracket 106 and stand-offs 114 which extend from the mounting bracket 106.

[0038] The mounting bracket 106 facilitates easy mounting to the transom of a watercraft. FIGS. 10 and 11 depict the mounting bracket 106 separate from the distribution module 100. The mounting bracket 106 may be affixed to a watercraft transom by means of four mounting holes 118. Screws or any other affixing means may be used to affix the mounting bracket 106 to a transom. The mounting bracket 106 may also include a stand-off 114 connected to each opening 116 by a threaded fastener or a similar apparatus to provide the same functionality. The shape of the mounting bracket 106 further facilitates the installation of the mounting bracket onto a transom. The mounting bracket comprises a mounting base plate (or mounting face) 122 disposed between a first end portion and a second end portion, wherein the first and second end portions are parallel to the mounting base plate and disposed offset in a direction (shown as arrow 103 in FIGS. 3 and 5a) from the mounting base plate 122.

[0039] As illustrated, the mounting base plate/face 122 of mounting bracket 106 lays flush against a transom and contains two wing flanges 120 which extend away from the mounting face 122 of the mounting bracket 106. The wings 120 allow a user to secure the distribution housing 102 to the mounting bracket 106 by means of a screw or other securing mechanism onto the stand-offs 114 after the stand-offs 114 have been aligned with the openings on the front of the distribution housing 102. The distribution housing 102 may include a pair of opposed pockets each configured

to receive and cover the first end and second end portions of the mounting bracket 106, including the stand-offs 114.

[0040] The location of the mounting bracket 106 in relation to the remaining external components of the distribution module is beneficial as the distribution module 100 may be affixed or removed from the mounting bracket 106 without disconnecting any electronic or power cables connected to the connectors 108 on the adjacent side of the distribution module.

[0041] FIGS 4a, 4b, 4c, and 4d depict various views of the housing 102. The housing 102 includes a centrally disposed compartment defined by a plurality of perimeter compartment walls with an open top, a pair of pockets each defined by a plurality of pocket walls extending from oppositely disposed compartment walls, and a volume defined by the perimeter compartment wall that extends between the pair of pockets, a rear edge of the housing and the surface of the marine vessel. The housing is connected to the mounting bracket 106 such that the first and second end portions of the mounting bracket 106 are each disposed in one of the pair of pockets and the mounting base plate is disposed in the volume of the housing. The housing 102 is a custom shape designed to protect the hardware and printed circuit board (not depicted in FIG. 4) inside the distribution module 100. The housing 102 is not readily removable from the remainder of the distribution module 100 to ensure the internal components remain secure. The housing 102 shape can accommodate a mounting bracket 104 (shown in FIG. 11) to facilitate connecting the distribution module directly on to the transom of a watercraft.

[0042] FIGS. 5a and 5b generally depict two views of the mounting bracket 106. The mounting bracket 106 contains a mounting base plate 122, a pair of wing flanges 120, mounting holes 118, and stand-off mounting holes 116. The mounting base plate 122 may lay flat against a transom when fully installed and is secured by means of the mounting hole 118. The distribution module 100 is connected to the bracket 106 by aligning the openings on the front of the distribution module 100 with the stand-offs 114 (shown in FIG. 5a) and securing the module 100 with a set of screws.

[0043] FIGS. 6a and 6b generally depict two views of the connector plate 104. The connector plate facilitates the electronic connections to other system components not described herein. For example, the connector plate may be in communication

with a system monitor, a central computer system, stabilizing actuators, the motor, or other electronic features necessary to propel and stabilize a watercraft. The connector plate 104 depicted in FIGS. 6a and 6b contains connectors 108 for coupling or interfacing with stabilizing components on the watercraft. FIG. 6a depicts the external-facing side of the connector plate 104. FIG. 6b depicts the internal-facing side of the connection plate 104.

[0044] FIGS. 7 – 9 generally relate to internal components of the present disclosure. In general, the internal components of the distribution module 100 comprise: a gasket 112, a printed circuit board 110, and connecting hardware 108. The connectors 108 generally are coupled to the printed circuit board 110 to facilitate communicative connection therebetween.

[0045] FIGS. 7a and 7b depict two views of the internal components of the distribution module 100 without the external components visible.

[0046] FIGS. 8a and 8b depict the printed circuit board 110. The printed circuit board 110 communicates between other stabilizing components on the watercraft to provide sufficient power and control to counteract any unwanted rotational forces acting upon the watercraft. The printed circuit board 110 may be a printed circuit board or other similar printed circuit board system as would be understood by those of ordinary skill in the art. The printed circuit board 110 may be capable of interfacing with connectors from various electronic components, such as a software control module, an engine control module, a navigation system, a gyroscopic stabilizer, a water engagement device, an engine, and other similar components that could provide the intended functionality. The printed circuit board 110 may be preprogrammed to be off-the-shelf ready to be used.

[0047] FIG. 9 depicts a sealing gasket 112. The gasket 112 ensures no water is able to penetrate into the internal components of the distribution module 100 when in use.

[0048] All references, including publications, patent applications, and patents cited herein are hereby incorporated by reference to the same extent as if each reference were individually and specifically indicated to be incorporated by reference and were set forth in its entirety herein.

[0049] The use of the terms “a” and “an” and “the” and similar referents in the context of describing the disclosure (especially in the context of the following claims) is to be construed to cover both the singular and the plural, unless otherwise indicated herein or clearly contradicted by context. The terms “comprising,” “having,” “including,” and “containing” are to be construed as open-ended terms (i.e., meaning “including, but not limited to,”) unless otherwise noted. Recitation of ranges of values herein are merely intended to serve as a shorthand method of referring individually to each separate value falling within the range, unless otherwise indicated herein, and each separate value is incorporated into the specification as if it were individually recited herein. All methods described herein can be performed in any suitable order unless otherwise indicated herein or otherwise clearly contradicted by context. The use of any and all examples, or exemplary language (e.g., “such as”) provided herein, is intended merely to better illuminate the disclosure and does not pose a limitation on the scope of the disclosure unless otherwise claimed. No language in the specification should be construed as indicating any non-claimed element as essential to the practice of the disclosure.

[0050] Preferred embodiments of this disclosure are described herein, including the best mode known to the inventors for carrying out the disclosure. Variations of those preferred embodiments may become apparent to those of ordinary skill in the art upon reading the foregoing description. The inventors expect skilled artisans to employ such variations as appropriate, and the inventors intend for the disclosure to be practiced otherwise than as specifically described herein. Accordingly, this disclosure includes all modifications and equivalents of the subject matter recited in the claims appended hereto as permitted by applicable law. Moreover, any combination of the above-described elements in all possible variations thereof is encompassed by the disclosure unless otherwise indicated herein or otherwise clearly contradicted by context.

[0051] Although the present disclosure and its advantages have been described in detail, it should be understood that various changes, substitutions and alterations can be made herein without departing from the spirit and scope of the disclosure as defined in the appended claims. Having thus described in detail preferred embodiments of the present disclosure, it is to be understood that the disclosure

defined by the above paragraphs is not to be limited to particular details set forth in the above description as many apparent variations thereof are possible without departing from the spirit or scope of the present disclosure.

CLAIMS

1. A distribution module assembly configured for mounting to a marine vessel, the distribution module assembly comprising:
 - a mounting bracket including a mounting base plate disposed between a first end portion and a second end portion, wherein the first and second end portions are parallel to the mounting base plate and disposed offset in a direction from the mounting base plate, wherein each of the first and second end portions includes a standoff, and wherein the mounting bracket is configured to be connected to a surface of the marine vessel; and
 - a housing including a centrally disposed compartment defined by a plurality of perimeter compartment walls with an open top, a pair of pockets each defined by a plurality of pocket walls extending from oppositely disposed compartment walls, and a volume defined by the perimeter compartment wall that extends between the pair of pockets, a rear edge of the housing and the surface of the marine vessel;
 - wherein the housing is connected to the mounting bracket such that the first and second end portions are each disposed in one of the pair of pockets and the mounting base plate is disposed in the volume.
2. The assembly of claim 1, further comprising a printed circuit board disposed within the housing.
3. The assembly of claim 1, further comprising a sealing gasket disposed within the housing.
4. The assembly of claim 1, wherein an interior of the distribution model is filled with a solid or gelatinous compound in order to ensure that the internal components of the distribution module are not damaged or compromised by water or other contaminants.
5. The assembly of claim 2, wherein the printed circuit board is further configured to interface with various electronic components on the marine vessel such as a software control module, an engine control module, a navigation system,

a gyroscopic stabilizer, a water engagement device, an engine, and other similar components that could provide the intended functionality and stability during operation of a marine vessel.

6. A method of installing a distribution module to a transom of a marine vessel, the method comprising the steps of:

connecting a mounting bracket to a surface of a marine vessel, wherein the mounting bracket includes a mounting base plate disposed between a first end portion and a second end portion, wherein the first and second end portions are parallel to the mounting base plate and disposed offset in a direction from the mounting base plate, wherein each of the first and second end portions includes a standoff;

connecting a housing to the mounting bracket, wherein the housing includes a compartment defined by a plurality of perimeter compartment walls with an open top and a pair of pockets each defined by a plurality of pocket walls extending from oppositely disposed compartment walls, and a volume defined by the perimeter compartment wall that extends between the pair of pockets, a rear edge of the housing and the surface of the marine vessel and wherein the first and second end portions are each disposed in one of the pair of pockets and the mounting base plate is disposed in the volume.

7. The method of claim 6, further comprising a printed circuit board disposed within the housing.

8. The method of claim 6, further comprising a sealing gasket disposed within the housing.

9. The method of claim 7, wherein the printed circuit board is further configured to interface with various electronic components on the marine vessel such as a software control module, an engine control module, a navigation system, a gyroscopic stabilizer, a water engagement device, an engine, and other similar

components that could provide the intended functionality and stability during operation of a marine vessel.

10. A marine vessel, comprising:
a distribution module assembly connected to a surface of a marine vessel,
the distribution module assembly further comprising:
a mounting bracket including a mounting base plate disposed between a first end portion and a second end portion, wherein the first and second end portions are parallel to the mounting base plate and disposed offset in a direction from the mounting base plate, wherein each of the first and second end portions includes a standoff, and wherein the mounting bracket is configured to be connected to a surface of the marine vessel; and
a housing including a centrally disposed compartment defined by a plurality of perimeter compartment walls with an open top, a pair of pockets each defined by a plurality of pocket walls extending from oppositely disposed compartment walls, and a volume defined by the perimeter compartment wall that extends between the pair of pockets, a rear edge of the housing and the surface of the marine vessel, wherein the housing is connected to the mounting bracket such that the first and second end portions are each disposed in one of the pair of pockets and the mounting base plate is disposed in the volume.

11. The marine vessel of claim 10, further comprising a printed circuit board disposed within the housing.

12. The marine vessel of claim 10, further comprising a sealing gasket disposed within the housing.

13. The marine vessel of claim 10, wherein an interior of the distribution model is filled with a solid or gelatinous compound in order to ensure that the

internal components of the distribution module are not damaged or compromised by water or other contaminants.

14. The marine vessel of claim 11, wherein the printed circuit board is further configured to interface with various electronic components on the marine vessel such as a software control module, an engine control module, a navigation system, a gyroscopic stabilizer, a water engagement device, an engine, and other similar components that could provide the intended functionality and stability during operation of a marine vessel.