CLAIMS

1. A method for disconnecting a floating vessel moored to a tower structure at sea, comprising:

providing a floating vessel comprising:

a support structure mounted on an upper deck thereof;

one or more extension arms suspended from the support structure;

a ballast tank connected to the one or more extension arms, the ballast tank configured to oscillate back and forth underneath the support structure;

a yoke extending from and connected to the ballast tank at a first end thereof, the yoke comprising a tower connector disposed on a second end thereof;

a first winch system located on the support structure, the first winch system connected to the yoke proximate the second end of the yoke via a first line or cable; and

a second winch system connected to the ballast tank via a second line or cable, wherein the tower connector is attached to a yoke head connector disposed on the tower structure;

releasing the tower connector from the yoke head connector;

controlling vertical movement of the yoke using the first winch system located on the support structure;

controlling the back and forth movement of the ballast tank using the second winch system; and

upon releasing the tower connector from the yoke head connector, mechanically linking the ballast tank with a first transit arm to the support structure and mechanically linking the second end of the yoke with a second transit arm to the support structure, wherein the first and second transit arms prevent the ballast tank and the yoke, respectively, from moving independent of the vessel.

2. The method of claim 1, wherein the support structure comprises a generally vertical portion and a cantilevered generally horizontal portion, wherein the first winch system is located on the cantilevered generally horizontal portion of the support structure, and wherein the second winch system is located beneath the first winch system on the generally vertical portion of the support structure or on a deck of the floating vessel.

3. The method of claim 1, further comprising applying thrust to the vessel, prior to releasing the tower connector from the yoke head.

4. The method of claim 1, wherein the first winch system is located above the ballast tank.

5. The method of claim 1, wherein each winch system is electric, pneumatic, hydraulic or a combination thereof.

6. The method of claim 1, wherein each winch system comprises both electric and hydraulic actuated components.

7. A method for disconnecting a floating vessel moored to a tower structure at sea, comprising:

providing a floating vessel comprising:

a support structure mounted on an upper deck thereof;

one or more extension arms suspended from the support structure;

a ballast tank connected to the one or more extension arms, the ballast tank configured to move back and forth underneath the support structure;

a yoke extending from and connected to the ballast tank at a first end thereof, the yoke comprising a tower connector disposed on a second end thereof;

a first winch system located on the support structure, the first winch system connected to the yoke proximate the second end of the yoke via a first line or cable; and

a second winch system connected to the ballast tank via a second line or cable, wherein the tower connector is attached to a yoke head connector disposed on the tower structure;

orienting the yoke head connector and the tower connector to be substantially horizontal;

releasing the tower connector from the yoke head connector;

controlling vertical movement of the yoke using the first winch system located on the support structure;

controlling the back and forth movement of the ballast tank using the second winch system; and

upon releasing the tower connector from the yoke head connector, mechanically linking the ballast tank with a first transit arm to the support structure and mechanically linking the

second end of the yoke with a second transit arm to the support structure, wherein the first and second transit arms prevent the ballast tank and the yoke, respectively, from moving independent of the vessel.

8. The method of claim 7, further comprising applying thrust to the vessel, prior to releasing the tower connector from the yoke head connector.

9. The method of claim 7, wherein the support structure comprises a generally vertical portion and a cantilevered generally horizontal portion, wherein the first winch system is located on the cantilevered generally horizontal portion of the support structure, and wherein the second winch system is located beneath the first winch system on the generally vertical portion of the support structure or on a deck of the floating vessel.

10. The method of claim 7, wherein releasing the tower connector from the yoke head connector comprises releasing pressure in a hydraulic cylinder to disconnect a collet connection between the yoke head connector and the tower connector.

11. The method of claim 7, wherein the tower connector comprises a mating hub having a recess and a notched profile disposed on an outer surface thereof, the hub being an annular member having a bore formed therethrough.

12. The method of claim 7, wherein each winch system is electric, pneumatic, hydraulic or a combination thereof.

13. The method of claim 7, wherein each winch system comprises both electric and hydraulic actuated components.

14. A method for disconnecting a floating vessel moored to a tower structure at sea, comprising:

providing a floating vessel comprising:

a support structure mounted on an upper deck thereof;

one or more extension arms suspended from the support structure;

a ballast tank connected to the one or more extension arms, the ballast tank configured to oscillate back and forth underneath the support structure;

a yoke extending from and connected to the ballast tank at a first end thereof, the yoke comprising a tower connector disposed on a second end thereof;

a first winch system located on the support structure, the first winch system connected to the yoke proximate the second end of the yoke via a first line or cable for controlling vertical movement of the yoke;

a second winch system connected to the ballast tank via a second line or cable for controlling back and forth horizontal movement of the ballast tank; and

a third winch system connected to the ballast tank via a third line or cable for controlling side to side movement of the ballast tank, wherein the tower connector is attached to a yoke head connector disposed on the tower structure;

orienting the yoke head connector and the tower connector to be substantially horizontal;

applying thrust to the vessel, away from the tower structure;

releasing the tower connector from the yoke head connector;

controlling vertical movement of the yoke using the first winch system located on the support structure;

controlling the back and forth movement of the ballast tank using the second winch system; and

controlling side to side movement of the ballast tank using the third winch system, wherein the tower connector is released from the yoke head connector after the stern thrust is applied to the vessel.

15. The method of claim 1, wherein the floating vessel further comprises a third winch system connected to the ballast tank via a third line or cable for controlling side to side movement of the ballast tank, the method further comprising controlling side to side movement of the ballast tank using the third winch system.

16. The method of claim 1, wherein the ballast tank comprises a ballast medium disposed within an internal volume thereof such that the ballast tank provides a counterbalance or restoring force as the vessel moves at sea.

17. The method of claim 7, wherein the floating vessel further comprises a third winch system connected to the ballast tank via a third line or cable for controlling side to side

movement of the ballast tank, the method further comprising controlling side to side movement of the ballast tank using the third winch system.

18. The method of claim 7, wherein the ballast tank comprises a ballast medium disposed within an internal volume thereof such that the ballast tank provides a counterbalance or restoring force as the vessel moves at sea.

19. A method for disconnecting a floating vessel moored to a tower structure at sea, comprising:

providing a floating vessel comprising:

a support structure mounted on an upper deck thereof;

one or more extension arms suspended from the support structure;

a ballast tank connected to the one or more extension arms, the ballast tank configured to oscillate back and forth underneath the support structure;

a yoke extending from and connected to the ballast tank at a first end thereof, the yoke comprising a tower connector disposed on a second end thereof;

a first winch system located on the support structure, the first winch system connected to the yoke proximate the second end of the yoke via a first line or cable;

a second winch system connected to the ballast tank via a second line or cable, wherein the tower connector is attached to a yoke head connector disposed on the tower structure; and

a third winch system connected to the ballast tank via a third line or cable for controlling side to side movement of the ballast tank;

releasing the tower connector from the yoke head connector;

controlling vertical movement of the yoke using the first winch system located on the support structure;

controlling the back and forth movement of the ballast tank using the second winch system; and

controlling side to side movement of the ballast tank using the third winch system.