

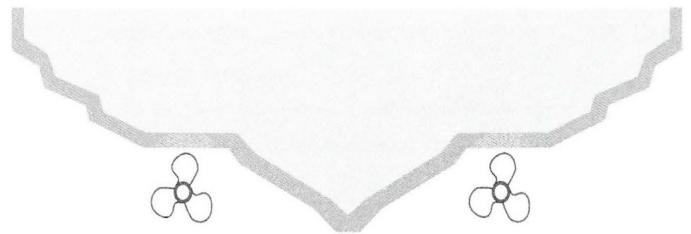
# TIDES MARINE

## Tube System Installation Overview

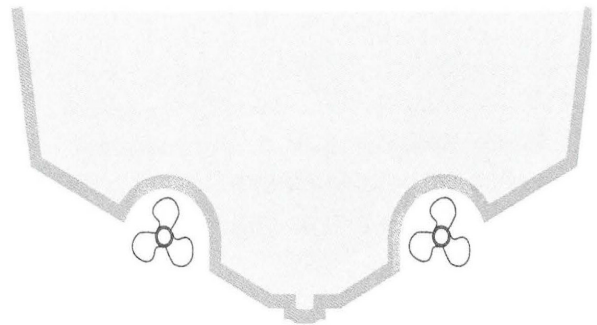
The procedure for modifying the mold and installing the Tube System before lay-up begins will differ slightly depending upon the type of hull being produced. The following represent the three most common variations.

### Installation Types

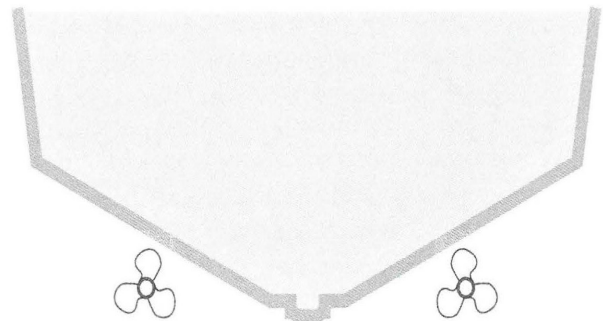
**Type One:** Molds with an existing “flat” at the rudder port location which will accept a standard FRP tube.



**Type Two:** Molds which require modification to achieve a “flat” surface or pocket to accept a standard FRP tube.



**Type Three:** Molds which require modification to accept an FRP tube with an angled liner to match dead rise and rocker angles.



# TIDES MARINE

## Tube System Installation Overview

### Installation Overview Type One

#### Mold Modifications

1. Locate the exact position of the rudder stock center in the mold surface.
2. Carefully drill a hole erpendicular to the mold surface large enough from the plug bolt and bushing.

#### Installation

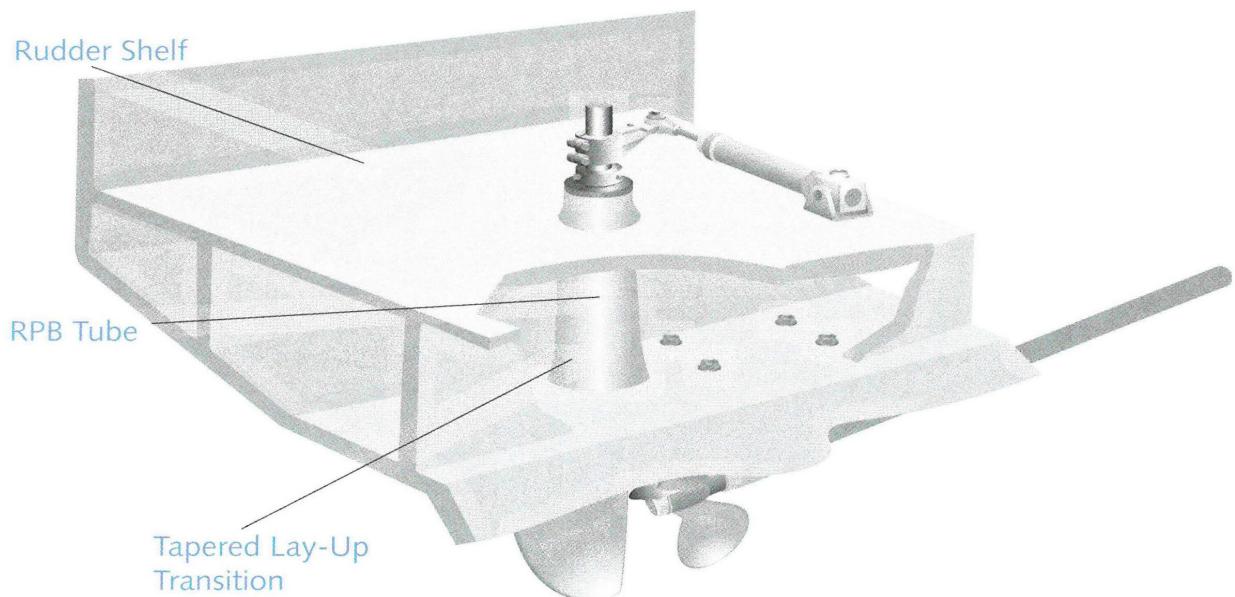
1. Prepare the tube for lay-up by roughing up the outer diameter surfaces with a grinder and wipe clean with thinner.
2. Mask the top of the assembly to protect it from overspray I excess resin.
3. Locate the assembly against the mold surface and bolt in place through the hole in the mold using the “plugs” provided by Tides.

#### Lay-Up Procedure

1. Begin the hull lay-up in the normal manner.
2. Cut an X in the cloth above the liner so that it can be laid down and around the base of the FRP tube with tabs against the outer wall of the tube.

3. On subsequent layers, stagger the position of the X cuts so the tabs overlay each other.
4. Taper the lay-up to at least 1” above the top of the lower bearing. Lay-up should radiate out away from the tube to at least 2 times the tube outside diameter.
5. **REMOVE THE LOWER PLUG AND BOLT.** Leave the upper plug in place until it is time to install the rudder.
6. When the rudder shelf is constructed, it should contain a hole through which the top of the FRP tube will pass. Once the shelf is in place, the upper end of the FRP tube is attached to the shelf using a lay-up procedure similar to the technique used during initial lay-up (staggered overlapping tabs throughout the lamination). Care should be taken to prevent excess resin and cloth from covering or entering the upper plug or tube insert.

**NOTE: Before installing the rudder, remove the upper re-usable plug and insert the red installation hat into the top of the tube. Confirm that it is protecting the “lip” portion of the seal. After installation, remove the red installation hat and discard.**



### Installation Overview Type Two

#### Mold Modifications

1. Locate the exact position of the rudder stock center in the mold surface.
2. Carefully drill a hole erpendicular to the mold surface large enough from the plug bolt and bushing.

#### Installation

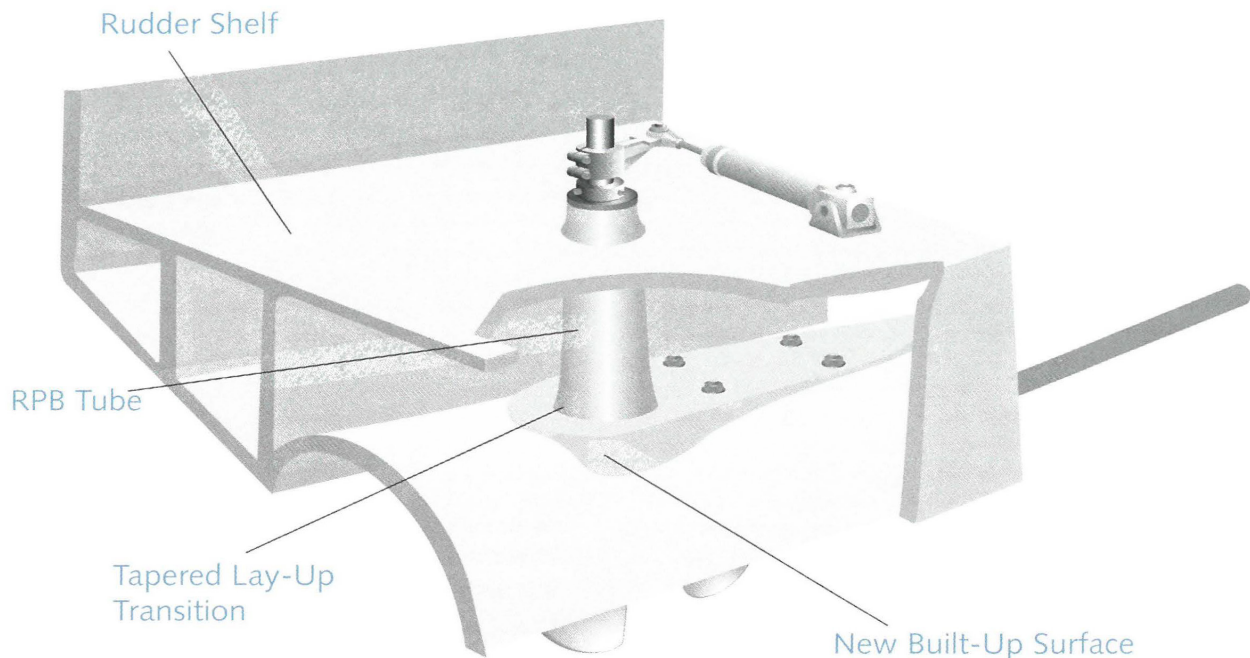
1. Prepare the tube for lay-up by roughing up the outer diameter surfaces with a grinder and wipe clean with thinner.
2. Mask the top of the assembly to protect it from overspray I excess resin.
3. Locate the assembly against the mold surface and bolt in place through the hole in the mold using the "plugs" provided by Tides.

#### Lay-Up Procedure

1. Begin the hull lay-up in the normal manner.
2. Cut an X in the cloth above the liner so that it can be laid down and around the base of the FRP tube with tabs against the outer wall of the tube.

3. On subsequent layers, stagger the position of the X cuts so the tabs overlay each other.
4. Taper the lay-up to at least 1" above the top of the lower bearing. Lay-up should radiate out away from the tube to at least 2 times the tube outside diameter.
5. **REMOVE THE LOWER PLUG AND BOLT.** Leave the upper plug in place until it is time to install the rudder.
6. When the rudder shelf is constructed, it should contain a hole through which the top of the FRP tube will pass. Once the shelf is in place, the upper end of the FRP tube is attached to the shelf using a lay-up procedure similar to the technique used during initial lay-up (staggered overlapping tabs throughout the lamination). Care should be taken to prevent excess resin and cloth from covering or entering the upper plug or tube insert.

**NOTE: Before installing the rudder, remove the upper re-usable plug and insert the red installation hat into the top of the tube. Confirm that it is protecting the "lip" portion of the seal. After installation, remove the red installation hat and discard.**



### Installation Overview Type Three

#### Mold Modifications

1. Locate the exact position of the rudder stock center in the mold surface.
2. Carefully drill a hole erpendicular to the mold surface large enough from the plug bolt and bushing.

#### Installation

1. Prepare the tube for lay-up by roughing up the outer diameter surfaces with a grinder and wipe clean with thinner.
2. Mask the top of the assembly to protect it from overspray I excess resin.
3. Locate the assembly against the mold surface and bolt in place through the hole in the mold using the "plugs" provided by Tides.

#### Lay-Up Procedure

1. Begin the hull lay-up in the normal manner.
2. Cut an X in the cloth above the liner so that it can be laid down and around the base of the FRP tube with tabs against the outer wall of the tube.

3. On subsequent layers, stagger the position of the X cuts so the tabs overlay each other.
4. Taper the lay-up to at least 1" above the top of the lower bearing. Lay-up should radiate out away from the tube to at least 2 times the tube outside diameter.
5. **REMOVE THE LOWER PLUG AND BOLT.** Leave the upper plug in place until it is time to install the rudder.
6. When the rudder shelf is constructed, it should contain a hole through which the top of the FRP tube will pass. Once the shelf is in place, the upper end of the FRP tube is attached to the shelf using a lay-up procedure similar to the technique used during initial lay-up (staggered overlapping tabs throughout the lamination). Care should be taken to prevent excess resin and cloth from covering or entering the upper plug or tube insert.

**NOTE: Before installing the rudder, remove the upper re-usable plug and insert the red installation hat into the top of the tube. Confirm that it is protecting the "lip" portion of the seal. After installation, remove the red installation hat and discard.**

