
**FIGURE 1**

The following are Instructions for wiring and installing the 12 VDC Veethree Competition Ski Speedometer Instrument and Sending Unit.

**CAUTION:**

**READ THESE INSTRUCTIONS THOROUGHLY BEFORE PROCEEDING WITH INSTALLATION. DO NOT DEVIATE FROM WIRING INSTRUCTIONS. INCORRECT WIRING COULD CAUSE ELECTRICAL SHORT AND POSSIBLE FIRE. ALWAYS DISCONNECT BATTERY BEFORE MAKING ANY ELECTRICAL CONNECTIONS.**

**PREPARATION FOR INSTALLATION**

1. Select a mounting location for gauge which provides easy readability from the operating position. Check behind mounting panel for sufficient installation clearance. Be sure an adequate location to install the External Cal. Pot. (Calibration Potentiometer) is within 18" of the instrument.
2. Cut a 3.396" +/- .032" (86mm) diameter hole through the panel at the desired speedometer instrument location.
3. Insert gauge in mounting hole and check for proper fit.
4. Fit 'U' bracket from hardware package over mounting studs on back of gauge and affix #8 star washers and #8 brass nuts. Trim bracket length as necessary for proper mounting. With the gauge fitted into the dash, tighten washers and nuts on mounting studs until gauge can no longer be rotated by hand.

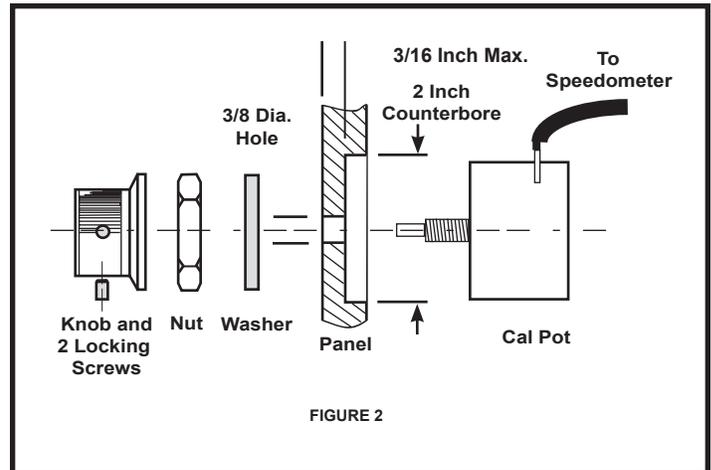
**CAUTION:**

**OVERTORQUING OF NUTS MAY CRACK GAUGE HOUSING OR MOUNTING PANEL.**

5. FIGURE 2. Mark an accessible location for the External Cal. Pot. and drill a 3/8" hole in the panel. NOTE: Panel material in area of Cal. Pot. should not be more than 3/16" thick. If no area of this thickness is available, counter-bore a 2" diameter inset from the rear of the panel with the 3/8" hole in the center. Install Cal. Pot. from rear with nut and washer on the front. Install knob with set screw from hardware kit. When installing the knob, turn shaft fully counter-clockwise and position knob with locator stripe at seven o'clock. Tighten set screw and rotate knob until locator stripe is at twelve o'clock. As you make timed runs, make your adjustments using the twelve o'clock position as a reference point. After calibrating, you may opt to reset the stripe to 12 o'clock for general reference in case the Knob is accidentally turned after calibrating.

**INSTALLATION OF SENSOR**

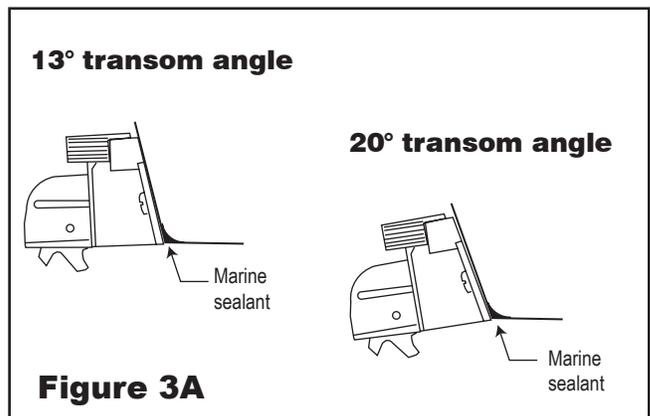
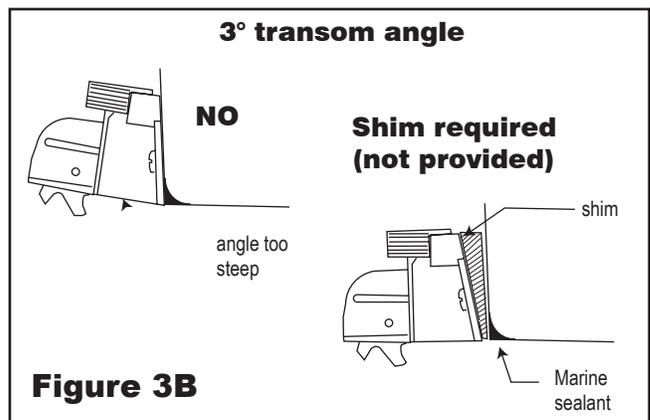
The sensor consists of a paddle-wheel and electronics integral with the mounting bracket. The kit also includes the appropriate hardware to install the unit on transoms with angles of 13° to 20°. If transom angle is less than 13° or greater than 20°; you will have to fabricate a shim from plastic, metal,


**FIGURE 2**

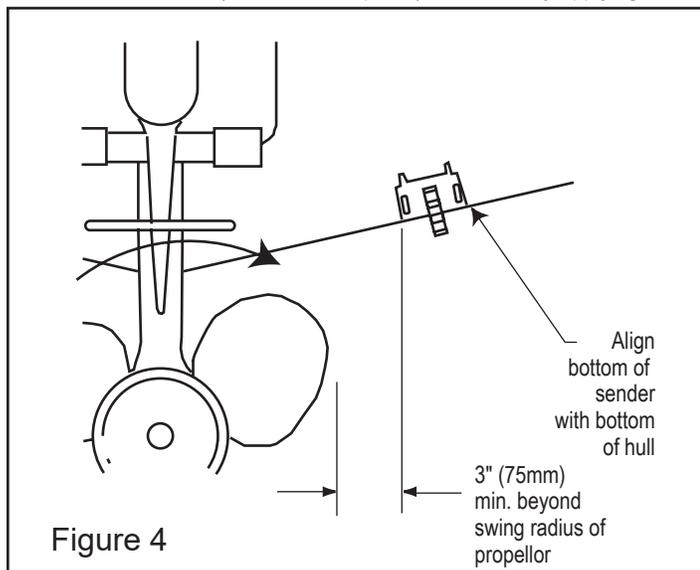
or an oily wood such as teak. (See Figures 3A & 3B.)

1. The location of the sensor will depend on the specific installation and your equipment. Locate sensor according to these guidelines:

- A) Single engine - mount the sensor on the side of the boat where propeller is rotating downwards, at least 3" beyond the swing radius of the propeller. (See Figure 4.)
  - B) Twin engines - mount the sensor between the drives.
  - C) AWSA Competition Rules require the use of two speedometers. In this case, locate one sensor on each side of the transom.
2. Do not locate the sensor behind any planing strake, ribs, struts or other protrusions which may disturb water flow to the paddle-wheel. If transom is stepped, mount the sensor on the step.


**Figure 3A**

**Figure 3B**

3. Hold the sensor (and shim if required) in the desired location, with its bottom parallel to the hull's bottom. Mark the outline of the slots in the sensor on the transom in the desired location. In the center of the slots, drill two holes 7/8" deep, using a #23 or 9/64" bit.
4. Position the sensor (with shim if required) and install by applying under-



water grade caulking to the screw threads and tighten the sensor lightly to the hull. Adjust the sensor so it is flush with the bottom of the hull and tighten the screws.

5. Fill any gap between the sensor and the hull with marine sealant using a putty knife for smoothing. This will ensure smooth water flowing over the paddle-wheel (see Figures 3 A and 3B).

#### Cable Routing

Route the sensor cable over the transom, through a drain hole or through a new hole drilled in the transom **above** the waterline.

**Caution: Never cut the cable.**

1. If a hole must be drilled, choose a location well above the waterline. Check for obstructions such as trim tabs, pumps or wiring inside the hull. Mark the location with a pencil. Drill a hole through the transom using a 19 mm (3/4") hole saw or spade bit (to accommodate the connector).

2. Route the cable over or through the transom.

3. On the outside of the hull secure the cable to the transom using the cable clamps. Position a cable clamp 50mm (2") above the bracket and mark the mounting hole with a pencil.

4. Position the second cable clamp halfway between the first clamp and the cable hole. Mark this mounting hole.

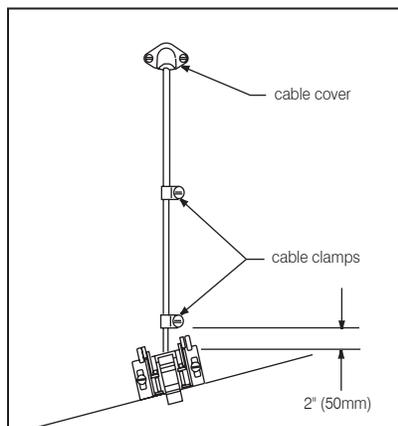
5. If a hole has been drilled through the transom, open the appropriate slot in the cable cover. Position the cover over the cable where it enters the hull. Mark the two mounting holes.

6. At each of the four marked locations, use a 3mm or 1/8" bit to drill a hole 10mm (3/8") deep. [To avoid drilling too deeply, wrap masking tape around the bit 10mm (3/8") from the point.]

7. Apply marine sealant to the threads of the four #6 x 1/2" self-tapping screws to prevent water from seeping into the transom. If you have drilled a hole in the transom, apply marine sealant to the space around the cable leading through the transom.

8. Position the cable clamps and screw them in place. If used, push the cable cover over the cable and screw it in place.

9. Route the cable to the instrument through the interior of the boat. Be careful not to tear the cable jacket when passing it through the bulkhead(s) and other parts of the boat. To reduce electrical interference or "noise", separate the sensor cable from other electrical wiring. Coil any excess cable and secure



it in place with zip-ties to prevent damage.

#### FINAL WIRING OF SPEEDOMETER

**MAKE SURE THAT ALL ELECTRICAL WIRING IS DRESSED AWAY FROM MOVING OR HOT ENGINE COMPONENTS.**

1. Install ring terminals on ends of sensor cable wires. See Figure 5. Using washers and nuts supplied, connect wires from sensor cable to instrument as follows:

- a) Blue wire from cable to IGN terminal.
- b) Bare wire from cable to GND terminal.
- c) Black wire from cable to SEND terminal

2. Run a lead from the 'GND' (ground) terminal on the gauge to the electrical system ground.

3. Run a lead from the 'LT' (light) terminal on the gauge to the panel light switch or the 'L' terminal of another gauge

4. Run a lead from the 'IGN' (Ignition) terminal on the Gauge to the 'I' terminal on the rear of the ignition switch. Alternatively you may connect this terminal to the 'IGN' terminal on another gauge.

#### CAUTION

**BEFORE RECONNECTING BATTERY TO ELECTRICAL SYSTEM, RE-CHECK ALL WIRING TO ENSURE ALL CONNECTIONS ARE PROPERLY MADE. INCORRECT CONNECTIONS OR ELECTRICAL SHORTS COULD CAUSE DAMAGE OR FIRE IN SYSTEM. ELEMENTS OF ELECTRICAL SYSTEMS SHOULD HAVE PROPER FUSES INSTALLED.**

When wiring is complete, connect power and calibrate instrument as described in the calibration section of this Instruction Sheet.

**KEEP THESE INSTRUCTIONS FOR FUTURE REFERENCE FOR CALIBRATION AND SERVICE**

#### CALIBRATING THE INSTRUMENT

The Speedometer is factory calibrated to a speed of 31 mph. Variations in installation and hull shape may require finer adjustment. Incorrect shimming of the sender bracket will affect readings. The External Cal. Pot. provides about +/- 5 mph from the factory calibration. In addition, the adjustment range may be shifted to favor higher or lower readings by adjusting the Internal Potentiometer.

#### COMPETITION CALIBRATION

1. Rotate the External Cal. Pot. knob and observe its limits of travel. Set it at the mid-point of its travel.
2. If you have selected the Men's Slalom speed of 36 miles per hour, for example, run through the course at a set speed. If your time is higher than 16.28 seconds, you must rerun the course adjusting your boat speed faster until you meet the tolerance of 15.88-16.28 seconds.
3. Once you meet this time tolerance maintain your speed and adjust the External Cal. Pot. so your gauge reads 36 MPH. Turning the External Cal. Pot. clock-wise will increase the reading. If your time is 15.88 or less, slow the boat down until you meet the time tolerance and adjust the speedometer to read 36 MPH.

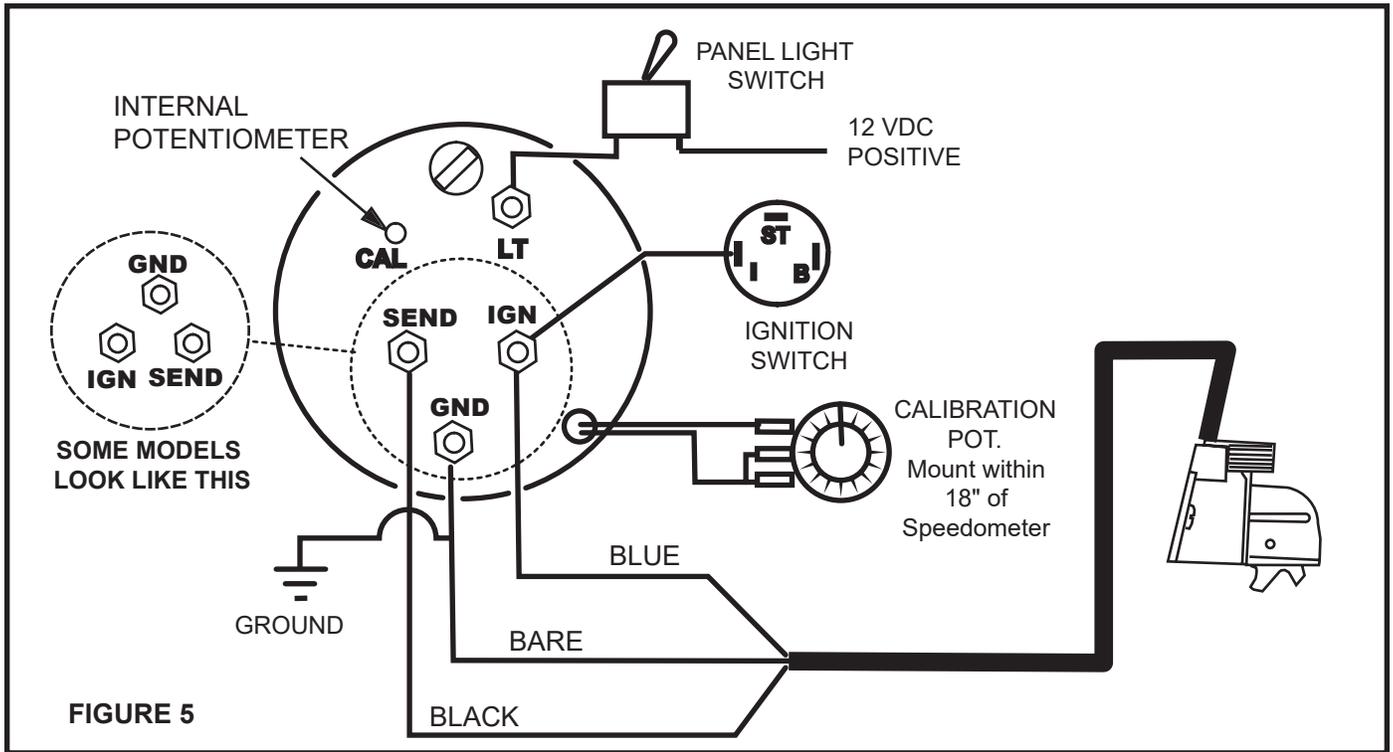
It should not take more than a few runs to get the Electronic Competition Ski Speedometer into the tolerance spread shown in the table below. If a slalom course is not available, measure a distance of 850 feet between marks on shore or other handy guide points.

4. If External Cal. Pot. adjustment will not bring reading to calculated speed, verify that sensor is properly located, and shimmed correctly. If installation is correct, see paragraph 'Adjusting Internal Potentiometer'.

#### STANDARD CALIBRATION

Calibrate the instrument in calm water, not in river current nor in tide-changing conditions. You will need a stop watch and a measured mile marked on shore. Your boat will also need to be equipped with an accurate tachometer.

1. Rotate the External Cal. Pot. knob and observe its limits of travel. Set it at the mid-point of its travel.
2. Bring boat to a given speed by monitoring RPM. Start through measured mile at constant speed, preferably 3500 RPM. Continue at constant speed through measured mile and monitor both time and RPM.
3. Rerun measured mile at same RPM to double check accuracy. Be sure boat has achieved constant RPM and speed before starting measured mile, and keep boat at speed as measured mile is completed.
4. Determine Speed at RPM by dividing the time required to complete the distance; by the distance. The result is your miles-per-hour speed. The graph



shown in these instructions can be used as an aid in determining speed. Place a straightedge at the point at the bottom of the chart and align the straightedge so it intersects the time at which you covered one mile. The straightedge will intersect the correct speed shown in the top line.

5. Rerun measured mile at 3500 RPM and use External Cal. Pot. to adjust speedometer to speed calculated in step 4. Turn the External Cal. Pot. clockwise to increase the reading, counter-clockwise to reduce it.

6. If External Cal. Pot. adjustment will not bring reading to calculated speed, verify that paddle-wheel sending unit is properly located, and wedged correctly. If installation is correct, see paragraph 'Adjusting Internal Potentiometer'.

#### ADJUSTING INTERNAL POTENTIOMETER

Set External Cal. Pot. at mid-travel. Insert a small, jeweler's screwdriver through the 'Cal' opening in the rear of the instrument case. Gently rotate the internal potentiometer counter-clockwise to increase speed range, or clockwise to lower the range.

**CAUTION: DO NOT FORCE ADJUSTMENT OR YOU WILL PERMANENTLY DAMAGE THE SPEEDOMETER.**

#### TRAILERING

If trailering for long distances, either prevent paddle-wheel from rotating by securing with a rubber band, or enclose paddle-wheel in a plastic bag to prevent rotation and abrasive damage from dust/dirt.

#### TROUBLESHOOTING

##### If speed seems incorrect::

- The Speedometer is factory calibrated, but incorrect shimming of the Sensor will affect readings. Check Sensor installation.
- The paddle-wheel bracket will "kick up" if an obstruction is hit. Make sure paddle-wheel bracket is in full "down" position.

##### If pointer will not move:

- Check wiring/power to instrument.
- Make sure paddle-wheel rotates freely.

##### Pointer "bounces" at very slow speed:

- Some bounce at 1 mph or less is normal, and should disappear above 1 mph.

SLALOM COURSE			
SPEED		TIME SECONDS	TOLERANCE
MPH	KMH		
22	36	26.33	25.75 - 26.95
24	39	24.14	23.65 - 24.65
26	42	22.28	21.86 - 22.72
28	45	20.69	20.33 - 21.07
30	48	19.31	19.00 - 19.64
32	51	18.11	17.83 - 18.39
34	55	16.95	16.65 - 17.25
36	58	16.08	15.88 - 16.28

## Maintenance, Repair and Replacement

### Cleaning

Clean the sensor with a soft cloth and mild household detergent. If the paddle-wheel becomes fouled or inoperable, unsnap the paddle-wheel assembly for cleaning. Severe cases may require removal of the paddle-wheel. Using a small screwdriver, remove the paddle-wheel shaft retainers. (If a retainer is lost, a dab of RTV calk on the end of the shaft will secure it.)

If necessary, use a stiff brush or putty knife to remove the growth. Wet sanding is permissible with fine grade wet/dry paper. (If there is a transducer, be careful to avoid scratching the face.)

### Anti-fouling Paint

Surfaces exposed to salt water that do not interlock, *must be* coated with anti-fouling paint. Use **water-based** anti-fouling paint only. *Never* use ketone based paint since ketones can attack many types of plastic. Apply paint every 6 months or at the beginning of each boating season.

### Replacement Parts

Complete replacement sensor with cable is Veethree P/N 55907P, available through Marine Dealers.

Replace broken or worn parts immediately. The water-lubricated paddle-wheel bearings have a life of up to 5 years on low-speed boats [less than 10kn (11 MPH)] and 2 years on high-speed vessels.

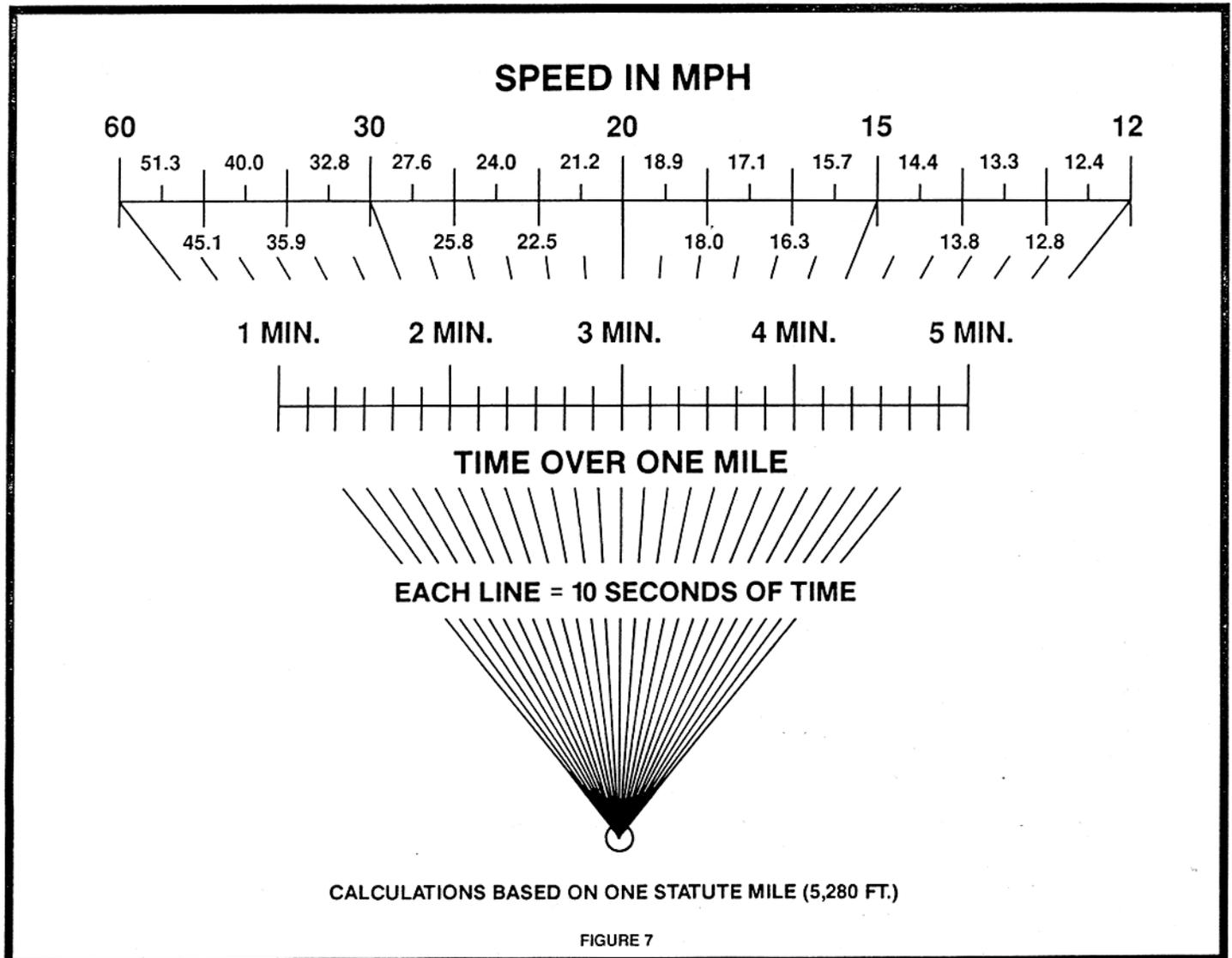
The shear pins on the paddle-wheel assembly are designed to break if

excessive force is applied to the speed sensor.

For a replacement snap-in paddle-wheel assembly **without** a cable (the cable is mounted in the bracket) order part number 33-105 from:

**Gem Electronics Company**  
**110 South Acline Ave.**  
**Lake City, SC 29560**

USA Sales/Support  
 Veethree Electronics and Marine  
 2050 47th Terrace East  
 Bradenton, FL 34203 USA  
 Tel 941-538-7775  
 Fax 941-775-1222  
 techservice@veethree.com  
 www.veethree.com



This calibration measures the speed of the boat through the water and does not account for the impact of water conditions on speed. Currents and changing tide conditions will alter actual boat speed. Manufacturer accepts no liability for speed accuracy, as actual speed is affected by outside conditions.