SIGNETMARINE Inc.
signetmarine.com

MK152 / SYSTEM 2000

Instruction Manual

1500 Pier C Street
Long Beach, CA 90813
(310) 320-4349
www.signetmarine.com
service@signetmarine.com

1-3402.090

TABLE OF CONTENTS

1.0 INTRODUCTION

The System 2000 is the most advanced wind instrumemt ever developed for racing yachts. Besides sensing and displaying boatspeed, apparent windpoint, and apparent windspeed, the System 2000 can compute and display true windpoint, true windspeed, and VMG (velocity-made-good). VMG is the true vector of a boat's speed relative to wind direction.

In addition to performance indication, the System 2000 incorporates a countdown timer to assure the best possible race start.

The System 2000 consists of an indicator with microprocessor-based circuitry, a masthead unit, and a cable for interfacing with any Signet knotmeter. Microprocessor circuitry reduces discrete component number, improves reliability and accuracy, and provides capabilities previously unavailable in marine instruments.

Read this manual carefully before installing your System 2000. It will answer your questions about installation, calibration, and operation. By carefully following these instructions, you will prevent problems stemming from improper installation and calibration.

1.1 FEATURES

The System 2000's 4 digit, 0.7" high liquid crystal display (LCD) features low power drain and high visibility, even in direct sunlight. The function being shown is indicated in abbreviated form on the display. The indicator face is protected by a touch Lexan shield. The display incorporates a glass inlay. The indicator face is completely sealed to withstand weather and washdown.

Also mounted on the front panel are "touch plate" electronic switches to control various instrument functions. The utilization of touch switches ensures the waterproof integrity of the front panel while allowing easy access to all controls.

System 2000 functions include:

* BOAT SPEED (KM): 0-50 knots displayed in hundredths of a knot to show the smallest change in boat performance.
* VMG: Also in hundredths displays the critical upwind or downwind velocity vector.
* APPARENT WIND SPEED AND WIND DIRECTION
* TRUE WIND DIRECTION: Shown in degrees regardless of heading or boat speed.
* TRUE WIND SPEED: Computed and displayed by the microprocessor.
* START TIME: Counts down in seconds. Can be set up to 15 minutes

The indicator electronics are completely solid-state, assuring reliability and lasting accuracy after initial calibration.

The trend indicator reads data over a preset period of time and computes the boat's velocity trend. This trend is indicated by a " ▲ " on the display for acceleration and a " ▼ " on the display for deacceleration. The trend display is blank if velocity trend is random or below the preset threshold. Velocity change must be greater than 0.05 knots for two consecutive update periods to be indicated.

The graph (Figure 1.1) shows a typical example of the trend display indication as a function of velocity change. The indication is particularly helpful in "staying the groove" when sailing to weather. Once maximum boatspeed is obtained, blank trend displays should be maintained to avoid "pinching" or pointing too high into the wind.

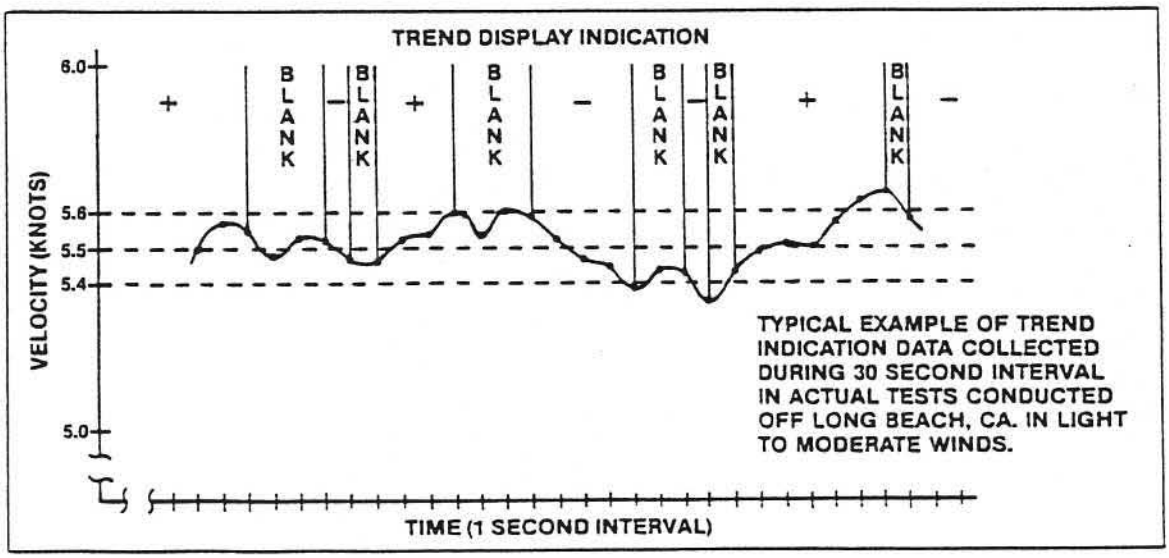


FIGURE 1.1

1.2 SPECIFICATIONS

KNOTMETER

Range	0.00 to 50.00 knots
Accuracy	+1% of full scale
Averaging Period	Automatically controlled by microprocessor

WINDSPEED

Range	0.0 to 99.9 knots
Accuracy	±1% of full scale
Averaging Period	Automatically controlled by microprocessor

WINDPOINT

Range	0 to 180° port and starboard
Accuracy	±1°
Averaging Period	Automatically controlled by microprocessor

GENERAL

Power	12 VDC ±1% contains reverse polarity protection
Power Drain	Less than 175 ma without lights Less than 250 ma with lights
Display	Approximately 1 second
Case Size	5.0" sq. case. 5.5" bezel

2.0 UNPACKING AND INSPECTION

When unpacking the System 2000 be sure that all parts are present (See Figure 2.1 and 2.2). Carefully check each part for any damage incurred during shipment. If damage has occurred, promptly notify your dealer and the carrier.

The System 2000 package contains the following items:

1. System 2000 Indicator
2. Indicator Mounting Clamps and Hardware
3. Knotmeter Y-cable
4. Masthead Sensor with 80 ft. cable (Masthead sensor units are shown in Figure 2.2 The particular unit included is dependent upon the System 2000 configuration ordered.)
5. Power Cable
6. Instruction Manual and Warranty Card

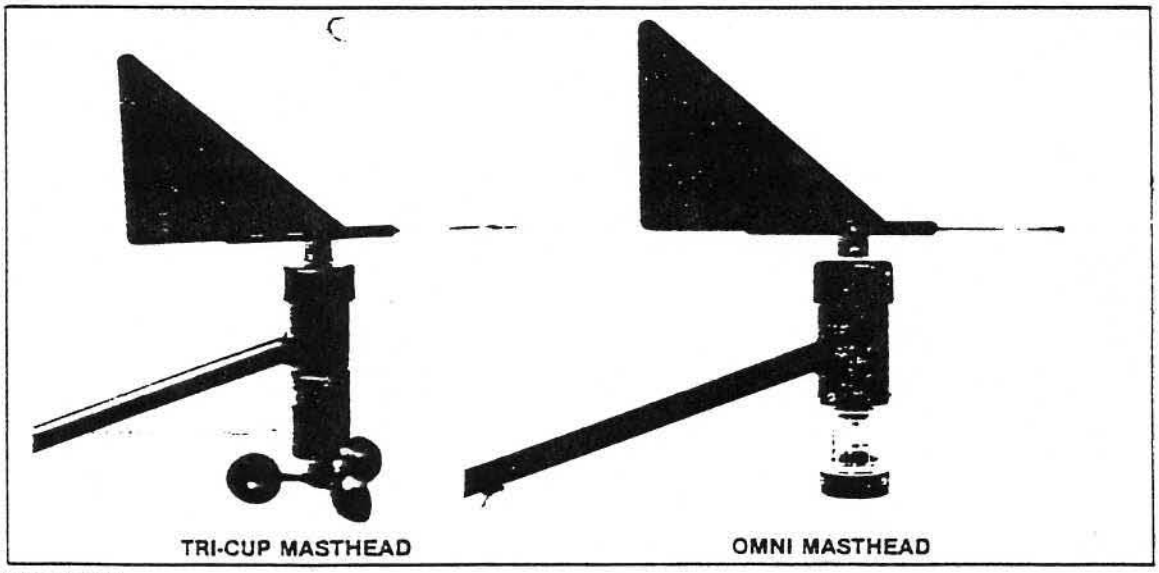


Figure 2.2

3.0 INSTALLATION

3.1 KNOTMETER SENSOR INSTALLATION (OPTIONAL)

NOTE: THE SYSTEM 2000 DOES NOTE INCLUDE A KNOTMETER SENSOR. IT IS DESIGNED TO BE USED IN CONJUNCTION WITH ANY SIGNET KNOTMETER. THE KNOTMETER SENSOR INSTALLATION IS INCLUDED ONLY AS A REFERENCE.

The paddlewheel sensor should be installed forward of the keel in an area of minimum turbulence (i.e. free from protruding fittings) as close to the centerline as is possible (see Figure 3.1). A clearance radius of 5" is necessary inside the bilge for transducer insertion and/or removal.

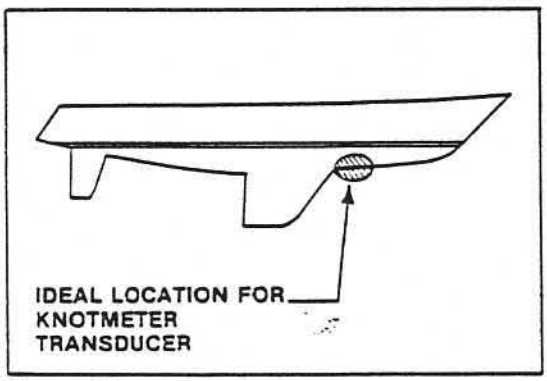


Figure 3.1

Installation Tools:

1. 3/8" diameter drill
2. 1-5/8" diameter hole saw, or 1 blade Signet thru-hull cutter (MK 15.37), or 3 blade Signet production thru-hull cutter (MK 15.80).

   NOTE: SIGNET THRU-HULL CUTTERS ARE DESIGNED TO DRILL THE PROPER COUNTERSINK FOR THE THRU-HULL FITTINGS.
3. Bedding compound
4. 1-7/8" open end wrench or crescent wrench.

Installation:

1. Remove the boat from the water.
2. Select sensor location forward of the keel, as close to the centerline as possible, and free from turbulence. Allow 5" clearance radius on inside of hull. A flat run of 6" to 12" ahead of the thru-hull fitting is desirable.
3. Drill a 3/8" pilot hole through the hull from the inside of the bilge.

4. a) If a MK 15.80 thru-hull cutter is used, it will cut the 1-5/8" hole and countersink the bore in one step. Drill the hole for the fitting using the 3/8" pilot hole as a center guide (see Figure 3.2).

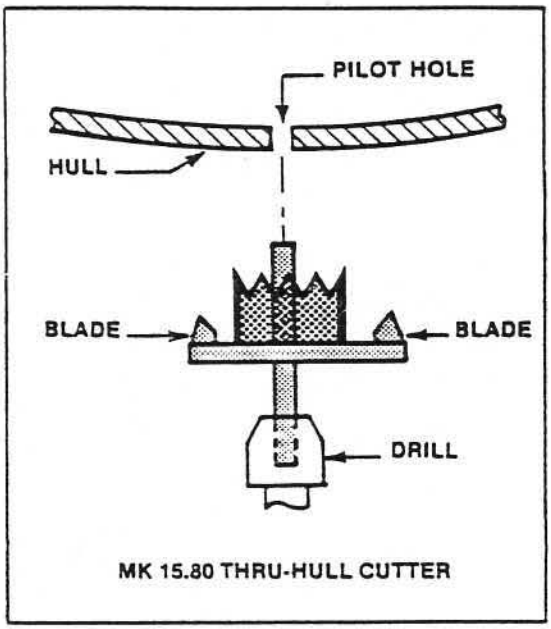


Figure 3.2

b) If a MK 15.37 thru-hull cutter is used, it must be used to cut the countersink before the hole is cut. Use the pilot hole as a center guide. Once the hull is bevelled, drill a 1-5/8" hole with the hole saw using the 3/8" hole as a guide (see Figure 3.3).

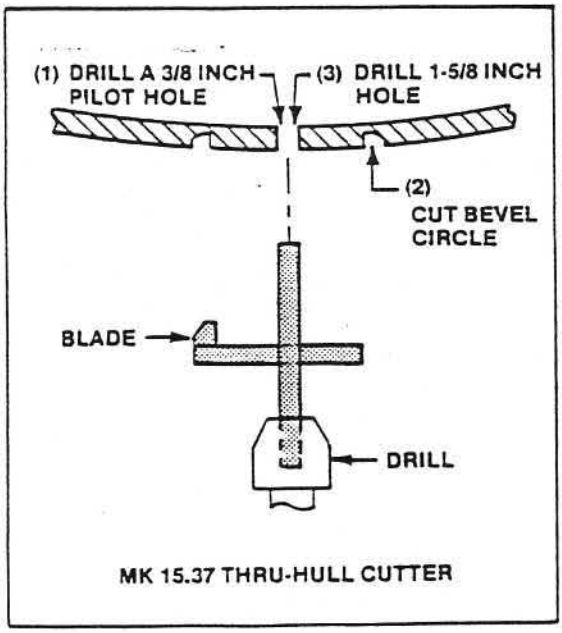


Figure 3.3

c) If you do not possess a Signet thru-hull cutter, drill the 1-5/8" hole with the hole saw using the pilot hole as a guide. Use a rasp to countersink the hole to a 2½" diameter to make its shape acceptable to the thru-hull fitting.

NOTE: IF YOUR HULL IS LESS THAN 3/4" THICK, A BACKING PLATE SHOULD BE CONSIDERED.

5. Install the thru-hull fitting using the bedding compound. Make sure the arrow stamped on the outer face of the fitting points towards the bow of the boat, paralled to the flow of water over the hull (see Figure 3.4).

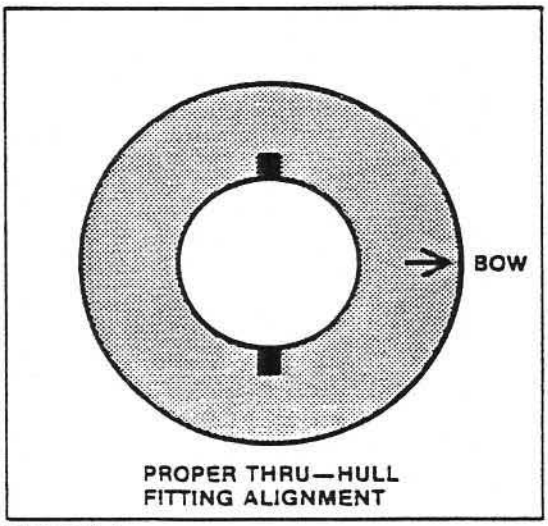


Figure 3.4

6. Install the large nut on the fitting using a wrench. Insert the thru-hull installation tool into the notches of the fitting to hold it in place while the nut is tightened. Once installed, the fitting should not move or rotate.
7. Check the position of the arrow to insure correct direction (refer to step 5). Reposition if necessary.
8. Check the inside of the fitting for any foreign materials. Clean if required.
9. Make sure the paddlewheel transducer spins freely.
10. Insert the transducer into the thru-hull fitting. The wire handle should be aligned fore and aft (see Figure 3.5). Make sure it clicks down into the notch on the thru-hull fitting. When properly installed, the transducer body will not rotate.

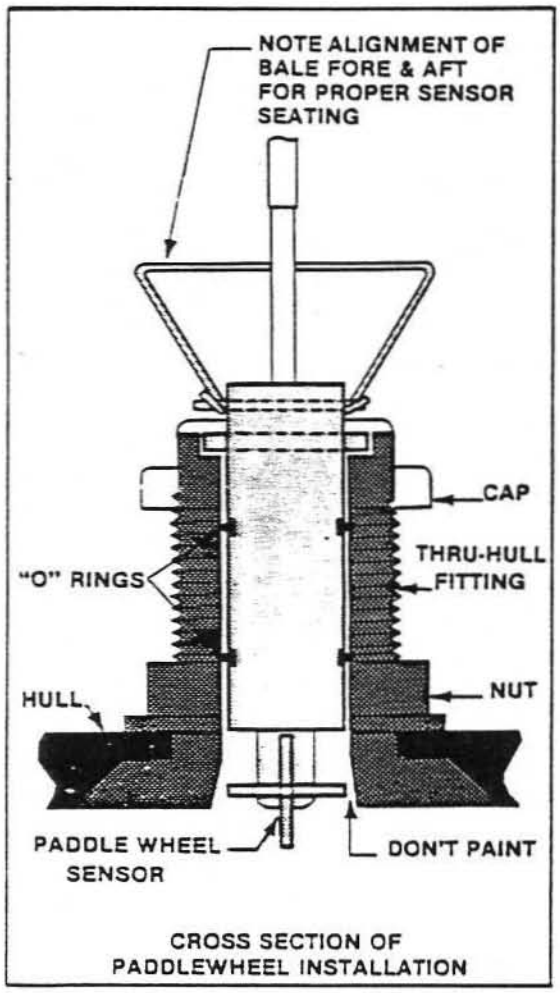


Figure 3.5

NOTE: TIGHTEN TRANSDCUER CAP BY HAND ONLY. DO NOT USE ANY TOOLS ON THE CAP.

11. A plug is provided to seal the thru-hull bore when the transducer is not in use.

NOTE: DO NOT SPLICE OR CUT THE SENSOR CABLE

12. Silicon grease can be used on the sensor O-rings to facilitate insertion and on the connector pins to retard corrosion.

3.2 MASTHEAD SENSOR INSTALLATION

To install WP/WS Combo Masthead Staff see Figure 3.6.

This masthead unit should be installed in two steps: (1) before the mast is stepped, and (2) after the mast is stepped and in position on the boat. While the mast is on the ground, the masthead base should be installed and the cable run down the mast to its exit. Once the mast is stepped and properly aligned fore-and-aft and arthwartships, the masthead unit may be installed. On a mast with internal halyards, protect the cable by inserting a PVC tube down the length of the mast and securing it away from the halyards. Then run the masthead cable inside the P.V.C. tube.

NOTE: DO NOT CUT THE MASTHEAD CABLE AT THE MASTHEAD OR INSIDE THE THE MAST ITSELF. ALL SPLICES IN THE CABLE SHOULD BE IN A DRY AND ACCESSIBLE AREA.

Installation Tools:

1. #7 drill
2. ¼-20 tap
3. 5/64" allen wrench
4. G.E. Silicone Seal
5. 2 grommets - 1/8" panel, 3/8" hole, ½" I.D. wire cutter

NOTE: A JUNCTION BOX, SIGNET MK 20.91 MAY BE INSTALLED IN A DRY AREA AT THE BASE OF THE MAST TO FACILITATE CABLE DISCONNECT WHEN REMOVING MAST.

NOTE: THE STAFF, VANE AND WINDSPEED SENSOR MAY BE MOUNTED BEFORE THE MAST IS STEPPED, HOWEVER, CARE MUST BE EXERCISED TO AVOID DAMAGE TO THESE COMPONENTS DURING THE MAST STEPPING OPERATION.

Installation - Before stepping mast:

1. Using the Masthead Base as a template, drill two 0.20" dia. holes and tap with a ¼-20 tap. Mount the base with the taller end aft and secure loosely with the bolts and lock washers provided. (See figure 3.3).
2. If the MK 20.91 Junction Box is used, the masthead cable may be cut into two lengths. One, mueasured from the single connector end, is the total distance from the top of the mast down to the exit point over to the Junction Box. The other length, measured from the end with two connectors, is the distance from the Junction Box to the MK 181. The cable may be cut before threading it down the mast so the exit holes are small.
3. Run the cable down the mast. If the boat has internal halyards, run the cable inside a P.V.C. tube.

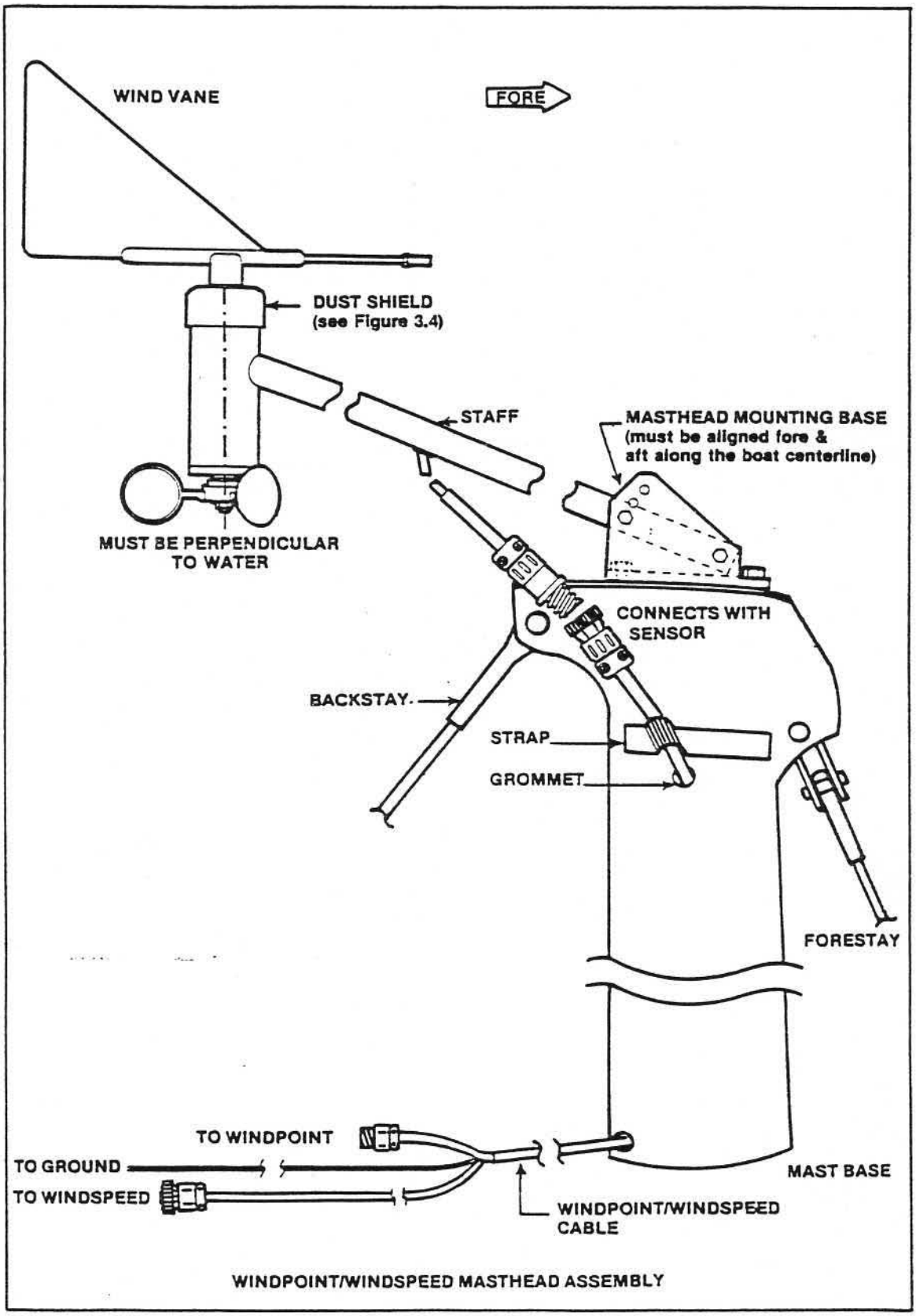

WIND VANE
FORE
DUST SHIELD
(see Figure 3.4)
STAFF
MASTHEAD MOUNTING BASE
(must be aligned fore &
aft along the boat centerline)
MUST BE PERPENDICULAR
TO WATER
CONNECTS WITH
SENSOR
BACKSTAY
STRAP
GROMMET
FORESTAY
TO WINDPOINT
TO GROUND
TO WINDSPEED
MAST BASE
WINDPOINT/WINDSPEED
CABLE
WINDPOINT/WINDSPEED MASTHEAD ASSEMBLY

Figure 3.6

NOTE: GROMMETS AT CABLE EXIT POINTS ON THE MAST SHOULD BE INSTALLED. WEATHERPROOF THESE INSTALLATIONS WITH SILCONE SEALANT.

Installation - After Mast is Stepped and Rigged:

1. Before going up the mast, execute the following alignment procedures;

   a. Turn the upper unit dust shield (shown in Figure 3.7) until the MK 76 notch matches the white line on the transducer body.

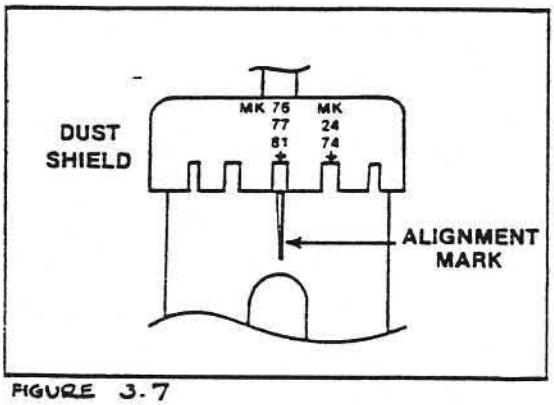


FIGURE 3.7

   b. Holding the dust shield in place, mount the vane pointing over the staff and tighten the two set screws with an Allen head wrench.

NOTE: IF THE MASTHEAD BASE WAS INSTALLED SO THAT THE STAFF MUST POINT FORWARD, BE SURE TO INSTALL THE VANE POINTING FORWARD(AWAY FROM THE STAFF).

   c. Remove the 10-32 lock nut and washer from the Windspeed transducer.

   d. FOR THE TRI-CUP ONLY: Install Tri-Cup by fitting it over the remaining nut with recessed area of the Tri-Cup facing up. Replace washer and 10-32 lock nut, and tighten firmly.

2. At the top of the mast, place the staff in the mounting base and adjust the staff angle until the transducer body is vertical (refer to Figure 3.6). A shim under the base may be used to assume a vertical position.

3. With the mounting base bolts loose, align the staff with the backstay. When properly aligned on a fore-aft axis, secure the mounting base and seal any holes in the mast with silcone putty.

4. Connect the masthead cable and the masthead unit.

5. Secure the masthead cable to the mast to relieve any pressure from the cable connection. (Refer to Figure 3.6).

6. Back down below, if a Junction Box is used, attach the wires in the cable from the mast and the wires in the cable from the MK 181 at the Junction Box. Be sure to match the wires color to color.

3.3 INDICATOR INSTALLATION

The indicator may be installed in a bulkhead or instrument panel. The location must have a clearance of 5½" and a rear clearance of 4½".

Installation Tools:

1. Sabre Saw
2. Screw driver
3. Bedding compound

NOTE: DO NOT USE POLYSULFIDE BEDDING COMPOUNDS LIKE 3M 3700, BOAT LIFE, OR LIFE CAULK.

Installation:

1. Choose location. Make sure it has suitable clearances.
2. Cut a 5-3/16" square hole.
3. Install the indicator with bedding compound or sealant around the rear of the flange.
4. Loosen the clamp ring. Install on the case from the rear as shown in Figure 3.8. With the indicator flange against the bulkhead, position the clamp against rear of the bulkhead and tighten securely around the indicator. Turn the two bracket screws clockwise until the indicator flange is seated snuggly against the bulkhead. Do not over-tighten. Over tightening will cause the clamp to slip.
5. Connect cables as shown in Figure 3.9.
6. The System 2000 is designed to be connected to a standard 12 VDC power source. The indicator 12 VDC cable mates with the included power cable. This cable can be connected to a switch panel. If connected to a switch panel, the System 2000 should be on a separate circuit to reduce electrical noise from other units. A 1 amp fuse can be utilized if desired.

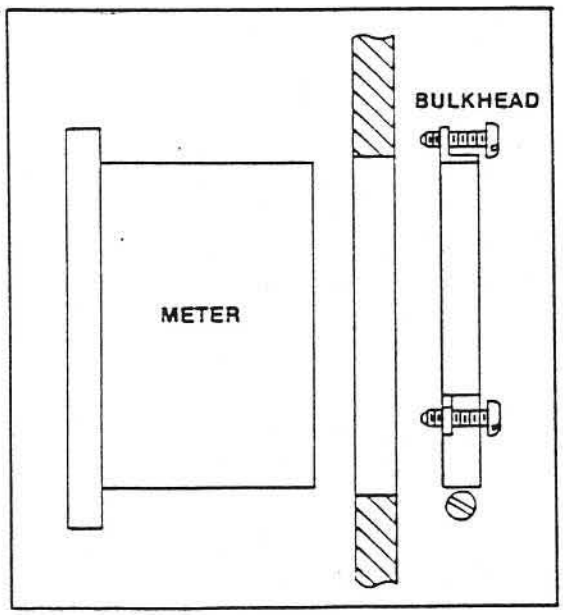


Figure 3.8

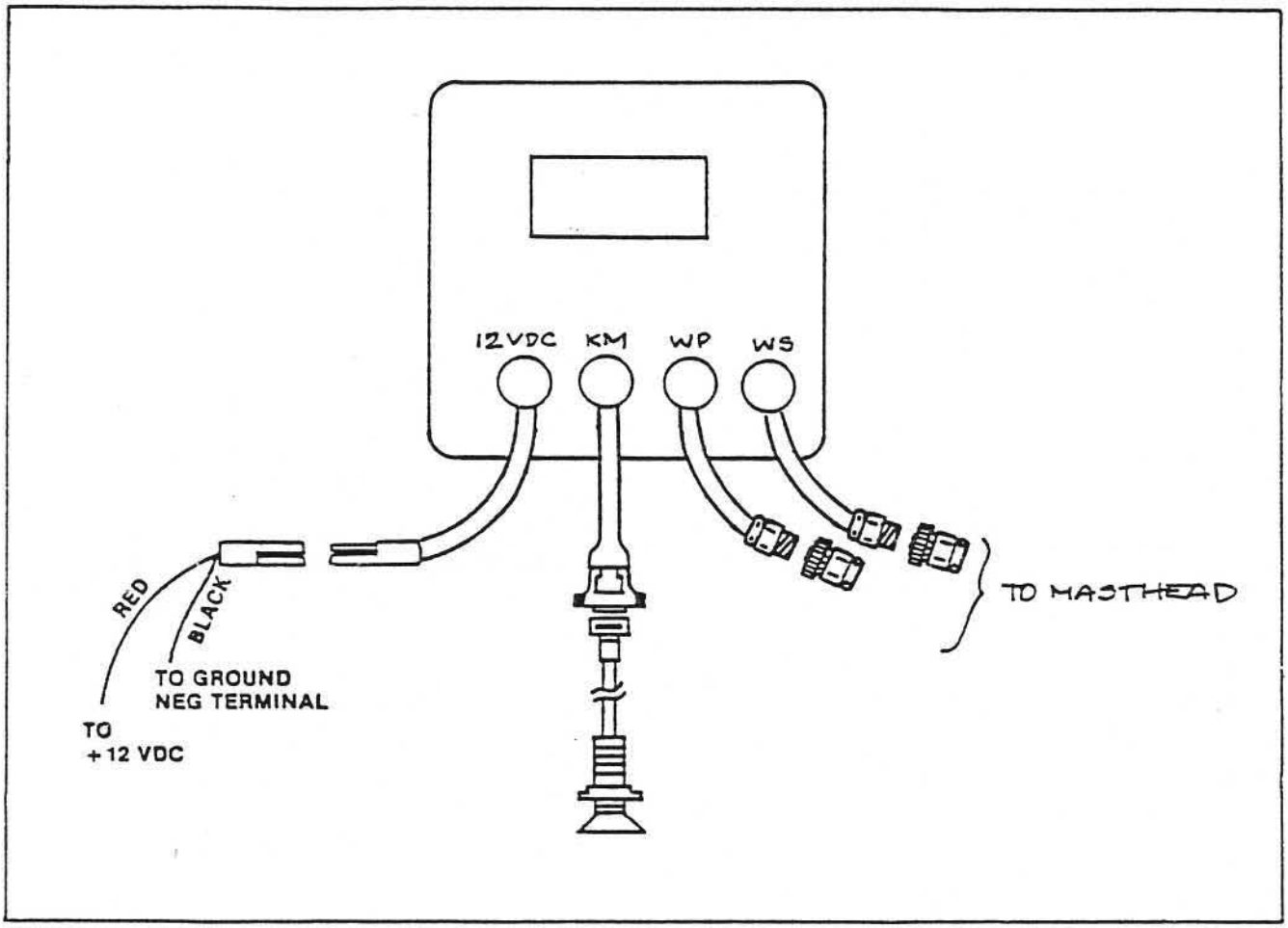

12VDC
KM
WP
WS
RED
BLACK
TO GROUND
NEG TERMINAL
TO
+12 VDC
TO MASTHEAD

FIGURE 3.9

4.0 OPERATION

4.1 FRONT PANEL KEYBOARD CONTROLS

MODE

Activation of the mode switch selects the bottom function in the double function switches. For instance, depressing MODE, the WS/TR would display true windspeed.

KM

Activation of this switch displays boatspeed and velocity trend indication.

VMG

VMG, (velocity-made-good) displayed in 0.01 knot increments, is the critical wind or downwind vector component of the boat's velocity. Simply stated, VMG is upwind or downwind speed.

VMG = BS x cos (TWS + leeway)

Leeway is estimated by the computer program based on apparent windangle. For further information see section on VMG.

WP

Apparent windpoint from 0-180° port and starboard, is indicated in 1° increments.

TR WP

Computation of true wind direction (relative to boat's heading) is valuable for starting line positioning, determining optimum tacking points to mark, and creating polar performance charts. True wind direction is computed from the following formula:

TWD = AWD + arc sin (BS x sin AWD/TWS)

WS	The System 2000 indicated apparent windspeed to 100 mph in 0.1 mph increments.
TR WS	True windpseed is a valuable aid both in sail selection and determining the boat's performance by comparing boatspeed with true windspeed. The System 2000 computes the true windspeed from the following algorithm: $TWS = BS^2 + ASW^2 - 2BS \times AWS \times \cos AWD$
POWER ON/OFF	Controls power to the unit. Instant on. Hold for 2 seconds to turn off.
TIMER START	Depressing this switch activates and displays the countdown timer. The countdown timer can be programmed up to 15 minutes and provides audible indication at each minute mark. Note that countdown sequence is not affected by switching to other modes. Pushing TIMER START during countdown displays time but does not reset sequence.
TIMER SET	Depressing this switch displays time set on clock. To set timer simply hold switch down. Timer will reset to 15 minutes and then countdown in one minute increments. Release switch at desired time.
LIGHT ON/OFF	This switch controls the night lighting.

The nomenclature used to identify the function being displayed is shown in Figure 4.2

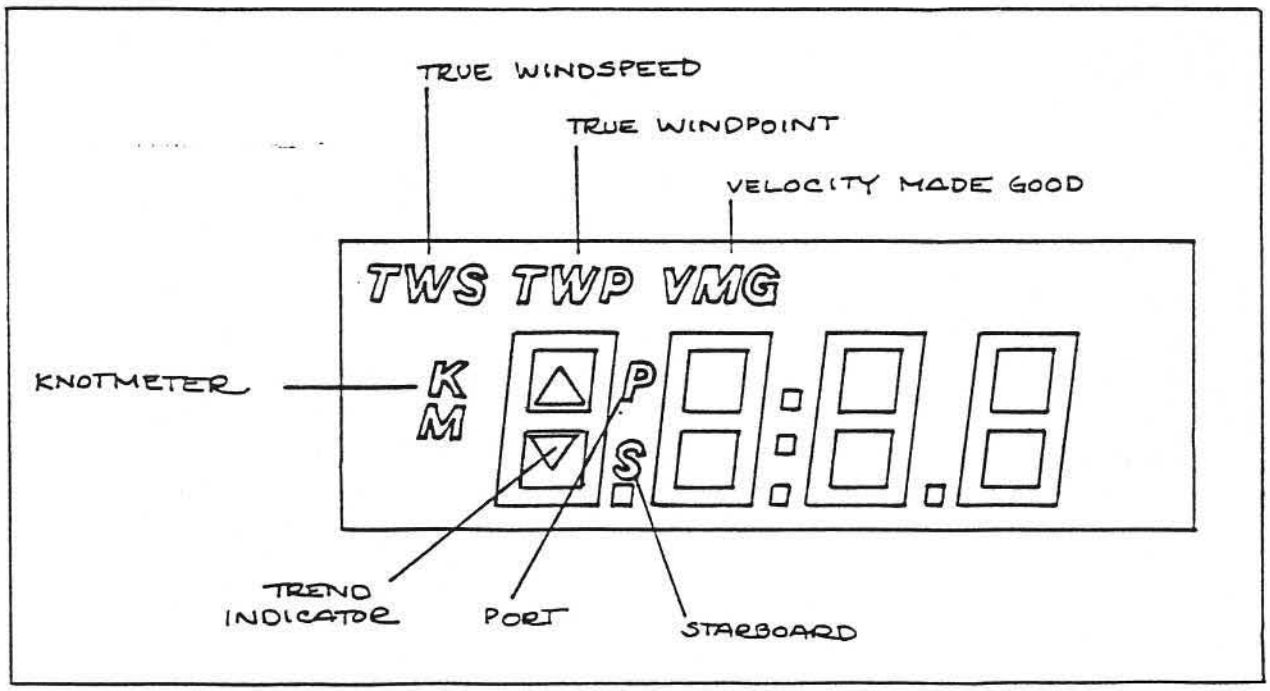


FIGURE 4.2

4.2 REAR PANEL CONTROLS

Rear panel controls are shown in Figure 4.3. The 4 rotary switches are used for calibration of the knotmeter and windspeed functions. There use is explained in section 5.0. The slide switch is used to determine instrument function. It should normally be in the MST (Master) position. If the system 2000 is to be used as a repeater instrument, the slide switch should be placed in the RPT (repeater) position.

The adjustment pots labeled "180" and "0" are used to calibrate the windpoint function at the factory. These adjustments should not require field calibration.

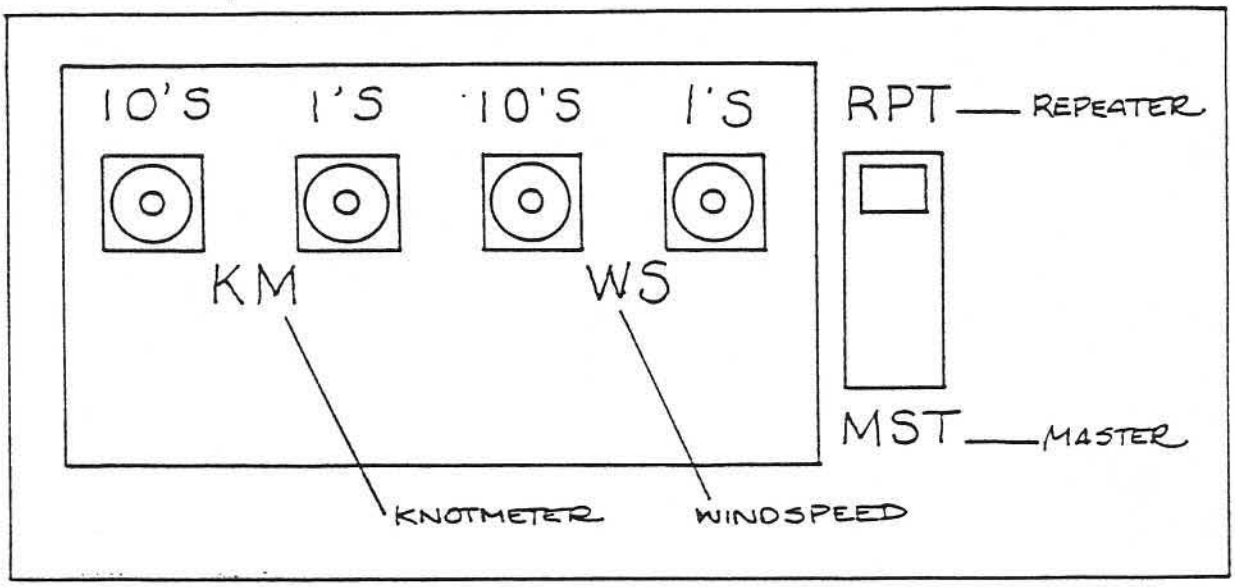


FIGURE 4.3

What is the most efficient course to the mark? This is the classic sailing problem in both racing and cruising. If the mark lies on a reach there is no problem, but if the mark is directly upwind or downwind, the choice becomes a compromise somewhere between the fastest boatspeed and the shortest distance.

The important consideration in selecting the most efficient solution is not just boatspeed or course direction, but the actual velocity-made-good (VMG) towards the mark (or towards the direction of the wind). Maximizing a boat's VMG provides the solution to the speed/distance question.

In long beats to weather, VMG replaces boatspeed as the prime performance indicator. Maximizing the VMG reading puts the boat on the most efficient sailing course to the mark.

VMG indication is also useful on downwind legs. In heavy air, VMG may be increased by sailing dead downwind (in which case VMG = BS). In lighter air or high performance boats, VMG may indicate that downwind reaching is more efficient.

5.0 CALIBRATION

5.1 KNOTMETER CALIBRATION

NOTE: ROTARY KM CALIBRATION SWITCHES SHOULD BE SET AT 50 BEFORE CALIBRATION PROCEDURE IS INITIATED.

1. Under power, use a stopwatch to time a measure ½ mile or 1 mile run at a constant rate of speed. Run the course first in one direction, then the other.

NOTE: COURSE MUST BE RUN IN BOTH DIRECTIONS TO MINIMIZE THE EFFECT OF WIND AND CURRENT.

2. Average the two time measurements.
3. Determine the boat's average speed by refering to Table 1.

RATE (KNOTS)	1 MILE TIME	½ MILE TIME
4.0	15:00	7:30
4.1	14:38	7:19
4.2	14:17	7:09
4.3	13:57	6:59
4.4	13:38	6:49
4.5	13:20	6:40
4.6	13:03	6:31
4.7	12:46	6:23
4.8	12:30	6:15
4.9	12:15	6:07
5.0	12:00	6:00
5.1	11:46	5:53
5.2	11:32	5:46
5.3	11:19	5:40
5.4	11:06	5:33
5.5	10:54	5:27
5.6	10:43	5:21
5.7	10:32	5:16
5.8	10:21	5:10
5.9	10:10	5:05
6.0	10:00	5:00
6.1	9:50	4:55
6.2	9:41	4:50
6.3	9:31	4:46
6.4	9:22	4:41
6.5	9:14	4:37
6.6	9:05	4:33
6.7	8:57	4:29
6.8	8:49	4:25
6.9	8:42	4:21
7.0	8:34	4:17

Compare this True Speed (TS) with the speed indicated on the indicator display (DS). The following equation is used to determine the Calibration Number (CN):

$$\left(\frac{TS}{DS} \times 100\right) - 50 = CN$$

The Calibration Number is then dialed into the "KM" switches (See Figure 4.3) with the 10's digit into "KM(10's)" and the 1's digit into "KM(1's)".

4. The power must be turned off and then back on to reset the microprocessor to the new calibration data.

5. Repeat procedure to assure accuracy.
Example: Over a 1 mile course, the first run is 10 min., 15 sec. The second run is 10 min., 5 sec. The average is 10 min., 10 sec. Table 1 shows this to be a speed of 5.9 knots. The indicator display shows 6.42 knots.

$$\left(\frac{5.9}{6.42} \times 100\right) - 50 = CN$$

$$41.9 = CN$$

$$42 = CN$$

To calibrate, dial "4" on "KM(10's)" and "2" on "KM(1's)".

If you do not have a marked ½ mile or 1 mile course near you, the following formula will allow you to calculate your speed over any known distrance:

$$\frac{\text{DISTANCE (In nautical miles)} \times 60}{\text{TIME (in minutes)}} = \text{KNOTS}$$

NOTE: SECONDS MUST BE CONVERTED TO TENTHS OF A MINUTE.

Example: A run over a 5/8 mile course requires 8 minutes, 6 sec.

$$\frac{5/8 \times 60}{8.1} = 4.6 \text{ knots}$$

Calibrate unit to this speed as described.

6.0 TROUBLESHOOTING

6.1 INDICATOR

The System 2000 is a complex electronic device which should normally be serviced only by a qualified technician with the proper equipment. It contains no user-servicable parts.

6.2 KNOTMETER SENSOR

If the indicator display suddenly reads zero, is erractic, or consistently reads low, the problem is usually in the cables or at the transducer location. First, check the power and sensor cables. If they are aged or broken, they must be repaired or replaced. If the cables appear to be working properly, then the problem is probably a jammed paddlewheel or a dirty thru-hull bore.

To check the paddlewheel sensor, remove it from the thru-hull fitting and replace it with the dummy plug. (If done quickly, very little water will enter the bilge). The paddlewheel can be cleaned with a small, stiff brush (e.g. a tooth brush) and a toothpick. The paddle can be removed for a thorough cleaning by carefully prying the transducer 'ears' apart with a screwdriver and pressing the rotor out (see Figure 6.1). After cleaning, the paddle should spin freely.

If the paddlewheel appears to be clean, then the problem may be growth fouling the thru-hull fitting. If this is the case, the fitting must be cleared by a diver.

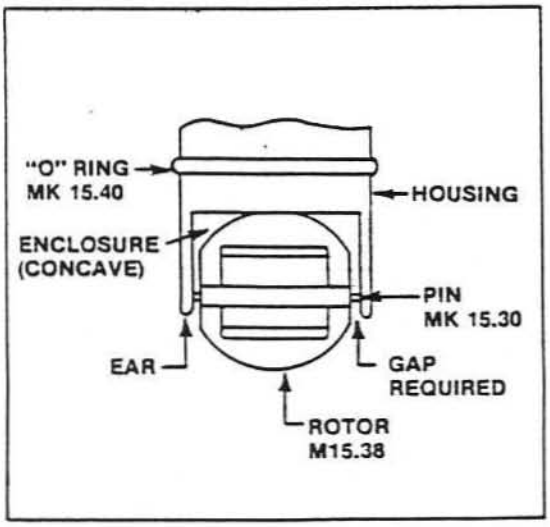


Figure 6.1

5.2 WINDSPEED CALIBRATION

The windspeed function of the System 2000 is calibrated at the factory and should not require further calibration after installation. Calibration at the factory is accomplished by testing each unit in an open wind tunnel.

Calibration can be checked by comparing the displayed windspeed with the reading at a local, stationary windmeter such as a Coast Guard Station. If necessary, the windspeed function can be calibrated with the following procedure:

1. Set WS calibration switches at 50.
2. Use the following equation to determine the proper Calibration Number (CN):

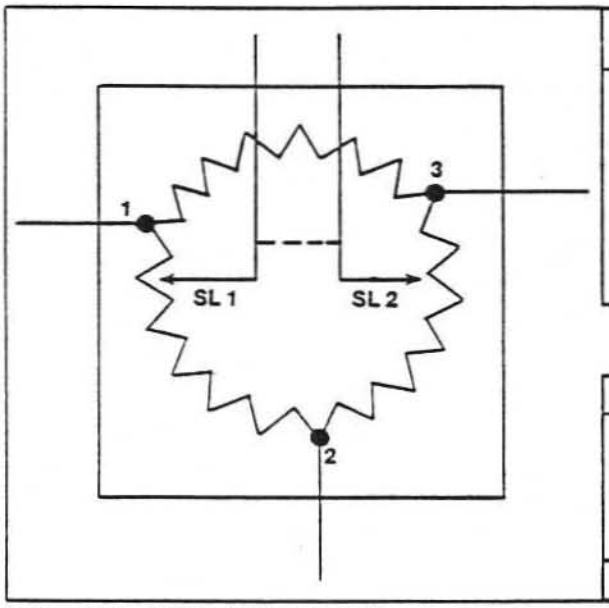
$$\left(\frac{\text{Actual Wind Speed}}{\text{Displayed Wind Speed}} \times 100\right) - 50 + CN$$

3. The calibration number is then dialed into the WS switches.

6.4 WINDPOINT SENSOR

The sensor can be checked using an ohmmeter. With power to the MK 181 off, disconnect the sensor cable and check the resistance values listed in Figure 6.1. If the sensor is found to be operating correctly refer to Table 6.2 for other problems and causes.

NOTE: IF THE POSSIBILITY OF LIGHTNING DAMAGE EXISTS, DISCONNECT THE MASTHEAD CABLE FROM THE INDICATOR.



POT	CONN PIN	WIRE COLOR
SL 1	1	BLACK
SL 2	2	ORANGE
1	5	RED
2	6	WHITE
3	7	GREEN

CONN. PINS	RESISTANCE
5-6	1110 Ω
5-7	
6-7	
1-2	1250 Ω

Figure 6.1 RESISTANCE CHECK

PROBLEM	POSSIBLE CAUSE	CURE
Windpoint is 180°F	1. Vane on backward	Reverse vane direction
Windpoint works in only two quadrants	1. Damaged cable 2. Bad transducer pot 3. Amplifier section of Windpoint PC board is inoperative	Inspect and repair cable Return for service Repair or replace board
Display is erratic only when engines are running	1. Engine noise is being picked up by Windpoint electronics.	Put noise suppression equipment on engines. Reroute transducer cable away from engine noise.

TABLE 6.2 WINDPOINT TROUBLESHOOTING

6.3 WINDSPEED SENSOR

Windspeed sensor should spin freely in the wind. If erratic readings appear on the display, check all cables and connections. If the sensor and all cables appear to be in good condition, refer to the following table:

PROBLEM	PROBABLE CAUSE	CURE
Display reads zero only	1. Windspeed cups or paddle blade (omni) are not turning. 2. Cable is damaged or broken.	1. Transducer repaired 2. Have bearings replaced 3. Repair damaged cable
Display does not read zero when transducer is not connected	1. Windspeed zero is not properly adjusted	1. Re-adjust zero (See Calibration Section 5.2)
Display is erratic or reads low all the time	1. Tri-Cups or paddle blade (omni) are damaged 2. System out of calibration	1. Recalibrate 2. Check cables and connections
Display is erratic only when boat engines are running	1. Engine noise is being picked up by Windspeed electronics	1. Put noise suppression equipment on engines 2. Re-route transducer cable away from engine noise
Windspeed display is blank	1. Power off or disconnected	1. Turn power on

7.0 APPENDICES

7.1 PARTS LIST

Part	Number
Protective Cover	M15112
Spare Rotor Kit	MK 15.31
Cap for Plug Sensor	MK 15.42
KM Sensor (complete w/25' cable)	MK 15.3
Extension Cable (10')	MK 15-E010
Extension Cable (20')	MK 15-E020
O-ring (4)	MK 15.40

7.2 WARRANTY

SIGNET SCIENTIFIC COMPANY LIMITED TWO YEAR WARRANTY

Signet warrants its instruments to be free from defects in material and workmanship under normal use for a period of two years from date of purchase by initial owner, or three years from date of manufacture, whichever comes first.

Warranty does not cover defects caused by abuse or electrical damage. Signet will not cover under warranty any instruments damaged during shipment to the factory less case or improperly packed. Repair attempts by other than authorized service will void warranty. Proof of date of purchase will be required.

Parts, which prove to be defective in the first year, will be repaired or replaced free of charge including labor, F.O.B. our factory, or designated service centers (addresses furnished upon request).

Parts which prove defective in the second year will only cover non-moving parts, such as electrical components. Meter movements will not be covered. All units qualifying for warranty after one year are subject to maximum service charge of $15.00 for replacement of non-moving parts.

Items returned for warranty repair must be prepaid and insured for shipment. Warranty claims are processed on the condition that prompt notification of a defect is given to Signet within the warranty period. Signet shall have the sole right to determine whether in fact a warranty situation exists.

Signet warranty does not cover travel time, mileage expenses, removal, reinstallation, or calibration.

Signet is continually making design changes and improvements, that adapt to original circuit configuration. These will be incorporated as required in older units on a minimal charge basis while under warranty.

CONSEQUENTIAL DAMAGES

Signet Scientific Company shall not be liable for special consequential damages of any nature with respect to any merchandise or service sold, rendered or delivered.

This warranty gives you specific legal rights and you may also have other rights which vary from state to state.

8.0 MANUAL CHANGE INFORMATION

At Signet, we continually strive to keep up with the latest electronic and design developments by adding circuity, component and design improvements to our instruments as soon as they are developed and tested.

Sometimes, due to printing and shipping requirements, we can't get these changes immediately into printed manuals. Hence, your manual may contain new change information on the following pages.

A single change may affect several sections. Be sure to apply all changes to the appropriate sections of the manual.