

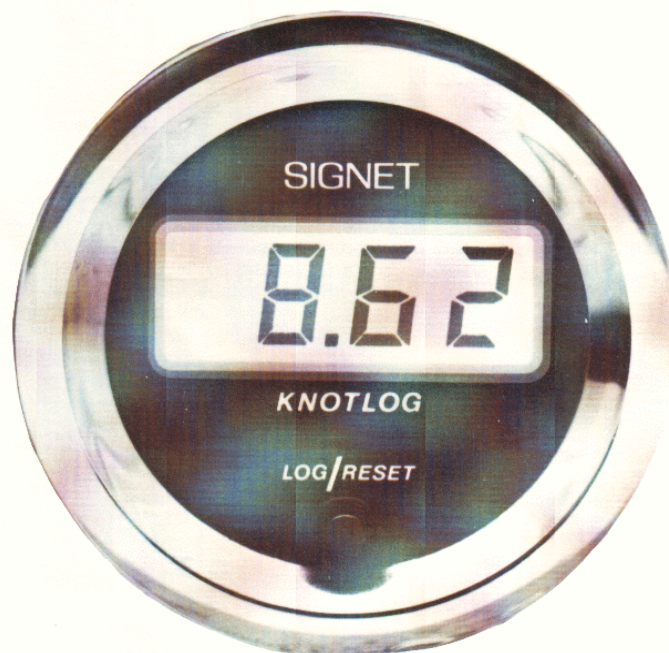
SIGNET SCIENTIFIC

**MK 267
DIGITAL KNOTLOG**

Instruction Manual



MK 267
DIGITAL KNOTLOG



1.0 INTRODUCTION

The MK 267 is a state-of-the-art speed and distance indicator for racing and cruising; boats. The Digital Knotlog is the result of continuous development by Signet mentation specialists. The MK 267's processor-based circuitry provides accuracy and reliability previously unavailable in the marine instrumentation industry. The speed indicator is capable of sensing and displaying variations as small as 0.01 knot, while log records distance to 1999 nautical miles. An auto-range feature In the log places the decimal point for maximum resolution.

The MK 267 consists of an indicator instrument and paddlewheel sensor mounted thru-hull fitting.

Read this manual carefully before installing: your MK 267. It will answer most of your questions about installation, calibration maintenance. By carefully following instructions, you will prevent problems stemming from improper installation and calibration.

1.1 MK 267 FEATURES

The MK 267 Digital Knotlog's 3-1/2 digit. 0 7' high LCD display features low power drain and high visibility, even in direct sunlight. The indicator face is composed of a tough plastic shield with a glass inlay over the display. The display face is completely sealed to stand weather and wash down.

The display face also incorporates a pushbutton switch used to control the log function. The display normally shows boat speed. Pushing the switch displays the log for 10 seconds. The log is reset to zero by depressing the switch and *holding* it for 6 seconds.

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

The patented Signet open paddlewheel sensor is durable, difficult to foul, and easily removed for inspection and cleaning. It's frontal area of only 0.25 sq. in. creates negligible drag. It boasts an industrially tested linearity of 1%. A plug is provided to seal the thru-hull fitting when the sensor is removed.

1.2 MK 267 SPECIFICATIONS

RANGE

| | |
|----------------|--|
| Knotmeter | 0.00 to 19.99 knots |
| Log | 0.00 to 1999 nautical miles |
| ACCURACY | +/- 1 % of full scale |
| DISPLAY | 3-1/2 digit, 0.7" high Liquid Crystal Display |
| AVERAGING | Fixed at "Medium" (8-10 seconds) |
| DISPLAY UPDATE | Every 2 seconds |
| POWER | 12 VDC \pm 2 VDC at 125 ma |
| CASE | 5-1/2" diameter Bezel, requires 4-5/8" diameter bulkhead aperture. |

2.0 UNPACKING AND INSPECTION

When unpacking your MK 267 Knotmeter, be sure that all parts are present (see Figure 2.1). Carefully check each part for any damage incurred during shipment. If damage has occurred, promptly notify your dealer and the carrier.

The MK 267 package contains the following items:

1. MK 267 Indicator
2. Indicator Mounting Clamp
3. MK15 Sensor Assembly with integral Cable
4. MK 15.36 Thru-hull Plug
5. MK 15.33 Thru-hull Fitting with Nut
6. Protective Cover
7. Installation Tool for Thru-hull Fitting
8. Instruction Manual and Warranty Card

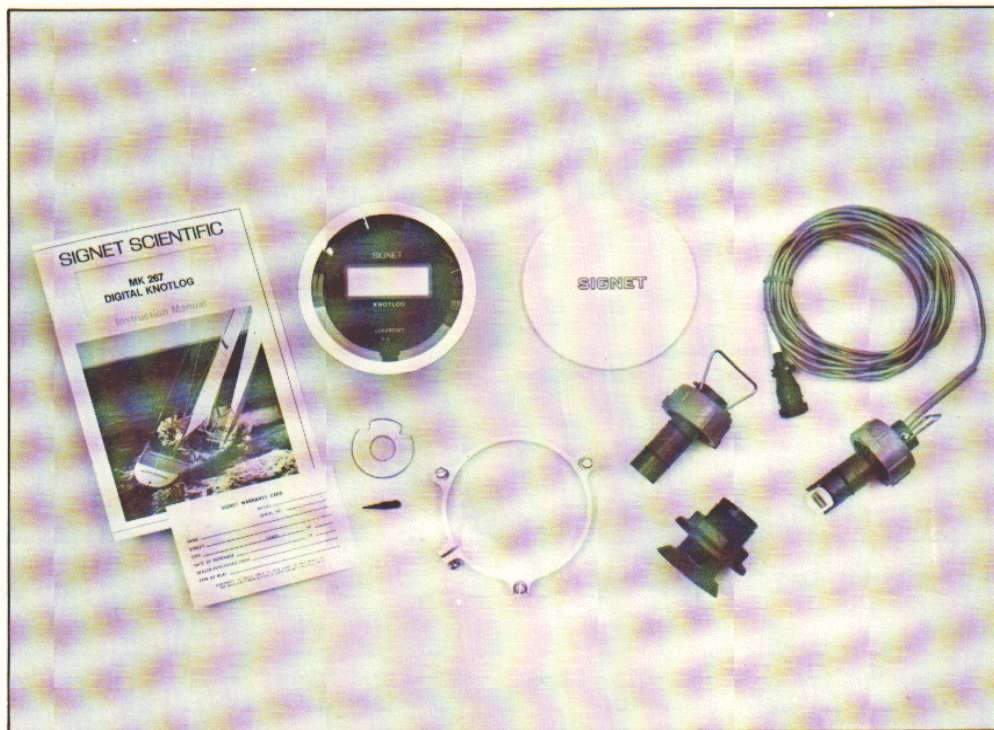


Figure 2.1

3.0 INSTALLATION

3.1 SENSOR INSTALLATION

The paddle wheel 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.

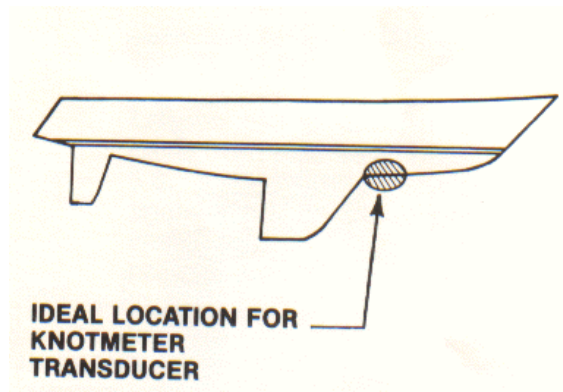


Figure 3.1

Installation Tools:

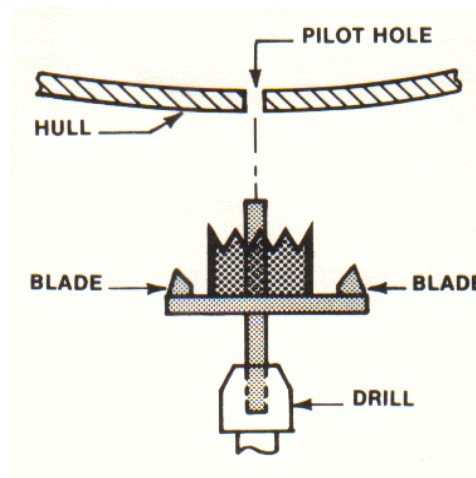
1. 3/8" diameter drill
2. 1-5/8" diameter hole saw, or
1 blade Signet thru-hull cutter (MK 15.37), or
3 blade Signet production thru-hull cutter (MK 15.80)

NOTE: SIGNET THRU-HULL CUTTERS ARE DESIGNED TO DRILL THE PROPER COUNTERSINK FOR THE THRU-HULL FITTING.

3. Bedding compound (Kuhl's Bedlast or similar compound)
4. 1-7/8" open end wrench or crescent wrench

Installation:

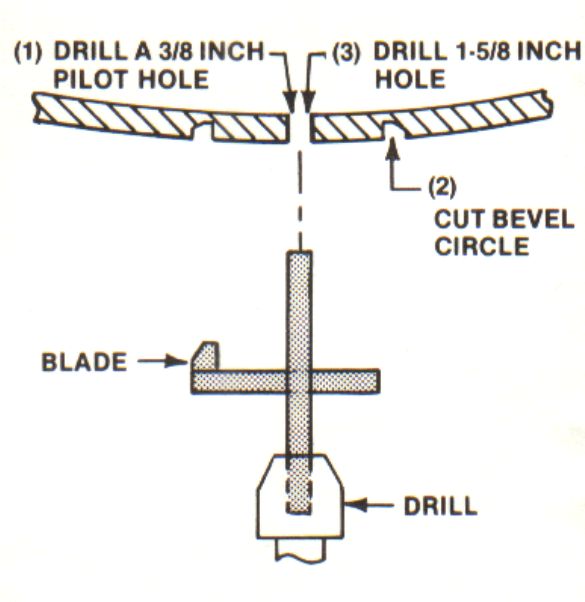
1. Remove the boat from the water.
2. Select sensor location forward of the keel, as close to the centerline as possible, and free from turbulence. Allow 5" clearance radius on inside of hull. A flat run of 6" to 12" ahead of the thru-hull is desirable.
3. Drill a 3/8" pilot hole through the hull from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



MK 15.80 THRU-HULL CUTTER

Figure 3.2

- c) 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).



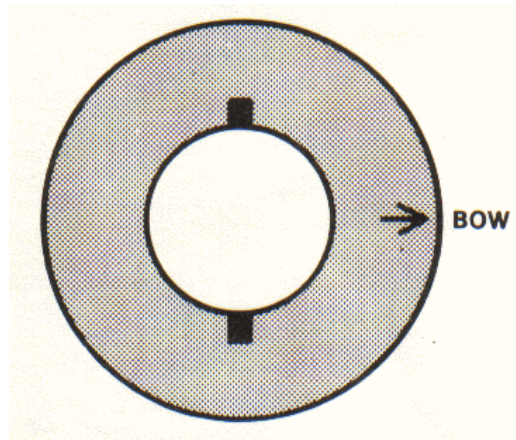
MK 15.37 THRU-HULL CUTTER

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 2-1/2" 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, parallel to the flow of water over the hull (see Figure 3.4).

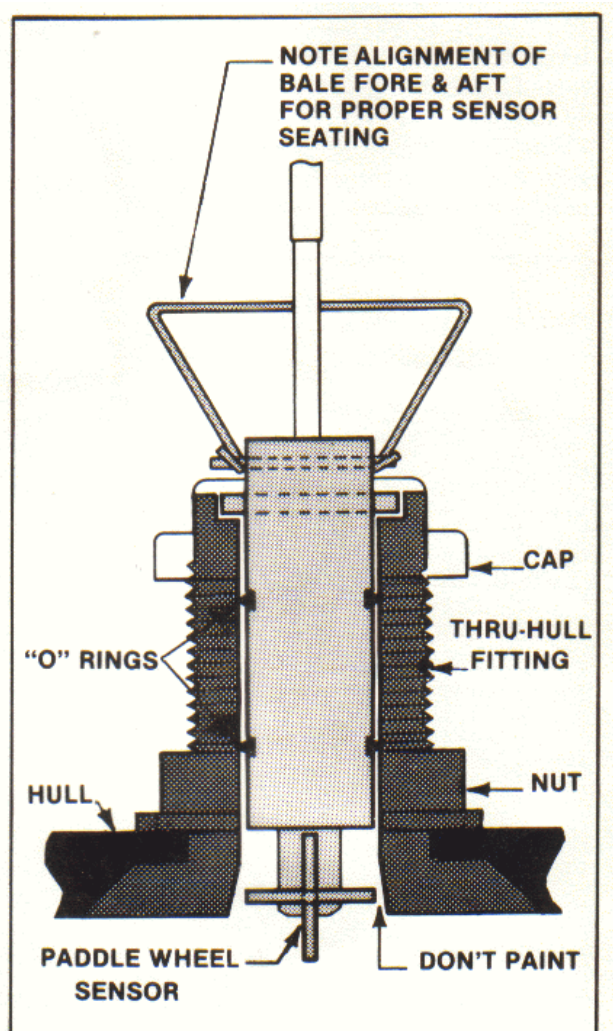


PROPER THRU-HULL FITTING ALIGNMENT

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 paddle wheel 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.

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



**CROSS SECTION OF
PADDLEWHEEL INSTALLATION**

Figure 3.5

11. A plug is provided to seal the thruhull bore when the transducer is not in use.

NOTE: DO NOT SPLICE OR CUT THE SENSOR CABLE.

3.2 INDICATOR INSTALLATION

The indicator may be installed in a bulkhead or instrument panel. The location must have a clear diameter of 5-1/2" and a rear clearance of 3-1/2".

Installation Tools:

1. 4-5/8" diameter hole saw
2. Screwdriver
3. Bedding compound

NOTE: DO NOT USE POLYSULFIDE BEDDING COMPOUNDS LIKE 3M 3700.

Installation:

1. Choose location. Make sure it has suitable clearances.
2. Cut a 4-5/8" diameter hole.
3. Install the indicator with bedding compound or sealant around the rear of the flange.
4. Loosen clamp ring. Install on the case from rear as shown in Figure 3.6. With the indicator flange against the bulkhead position the clamp against the rear of the bulkhead and tighten securely. Turn the three bracket screws clockwise until the indicator flange is seated snugly against the bulkhead. Do not over-tighten. Over tightening will cause the clamp to slip.
5. Connect cables.
6. Your MK 267 is designed to be connected to 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, dimmer, or directly to the battery. (See Figure 3.7).

NOTE: IF UNIT IS CONNECTED DIRECTLY TO BATTERY, IT MUST BE DISCONNECTED TO TURN THE UNIT POWER OFF.

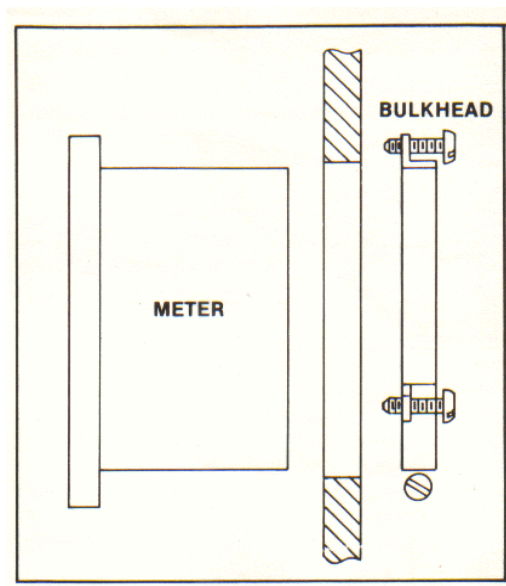


Figure 3.6

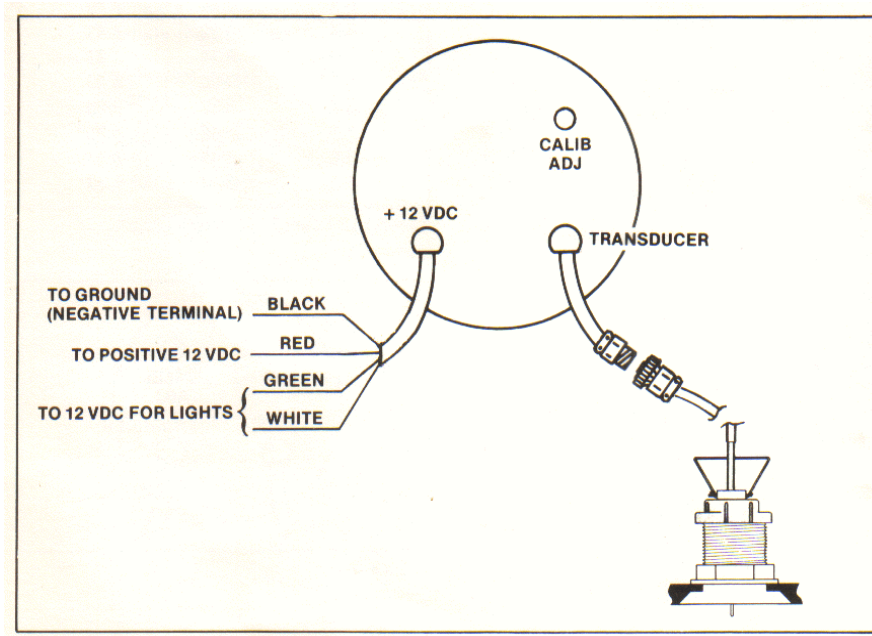


Figure 3.7

4.0 CALIBRATION

Your MK 267 was tested at the factory and calibrated to ideal conditions. However, variations caused by hull configuration and sensor location may cause an error of up to 25% in the meter's indication, requiring recalibration after the unit is installed.

4.1 KNOTMETER/LOG CALIBRATION

1. Under power, use a stopwatch to time a measure 1/2 mile or 1 mile run at a constant rate of speed. Run the course first in one direction, then in the other.

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

2. Average the two time measurements.
3. Determine the boat's average speed by referring to Table 1. Without reducing speed, compare the calculated speed from the table with the displayed speed on the indicator. If they differ, use the calibration screwdriver to turn the "CALIB ADJ" pot on the back of the indicator until the display speed equals the calculated speed (see Figure4.1).

Example: Over a 1/2 mile course, the first turn required 5 minutes, 44 seconds. A second turn in the opposite direction requires 5 minutes, 36 seconds. The average time is 5 minutes, 40 seconds which indicates a speed of 5.3 knots on the table. The display must be adjusted to indicate this speed.

If you do not have a marked 1/2 mile or 1 mile course near you, the following formula will allow you to calculate your speed over any known distance:

$$\frac{\text{Distance (in nautical miles)} \times 60}{\text{Time (in minutes)}} = \text{KNOTS}$$

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

Example: A run over a 5/8 mile course between two bouys required 8 minutes, 6 seconds.

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

Meter should be adjusted to this speed.

| RATE (KNOTS) | 1 MILE TIME | 1/2 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 |

Table 1

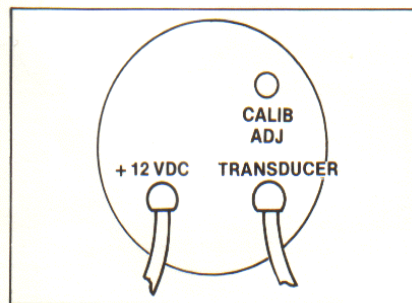


Figure 4.1

4.2 ALTERNATE CALIBRATION METHOD

1. Run a course of known distance and record the log reading for this distance.
2. Calculate the error percentage of the log reading.
3. Under a constant speed, adjust the knotmeter by the calculated error.
4. Repeat procedure to assure accuracy.

Example: Over a 2 mile course, the log shows 2.3 miles

$$\% \text{ error} = \frac{\text{recorded distance} - \text{actual distance}}{\text{actual distance}}$$

$$\% \text{ error} = \frac{2.3-2}{2}$$

$$\% \text{ error} = .3/2 = .15 = 15\%$$

Since the error is high the unit must be adjusted 15% lower.

Sailing at a constant speed of 4.55 knots (shown on the unit), we calculate the true speed:

$$\text{Indicated speed} - 15\% = \text{True speed}$$

$$4.55 - 15\% = \text{TS}$$

$$4.55 - 0.68 = \text{TS}$$

$$3.87 = \text{True speed}$$

Adjust knotmeter to read 3.87 knots

5.0 TROUBLESHOOTING

5.1 SENSOR

If the indicator display suddenly reads zero, is erratic, 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 paddle wheel 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 'ear' apart with a screwdriver and pressing the rotor out (see Figure 5.1). After cleaning, the paddle should spin freely.

If the paddle wheel appears to be clean, then the problem may be growth fouling the thruhull fitting. If this is the case, the fitting must be cleared by a diver.

5.2 INDICATOR

The MK 267 Indicator is virtually trouble-free. If the indicator reading is wrong, the trouble can usually be traced to the transducer or cables. If the trouble does appear to be in the indicator, contact your dealer or Signet Scientific.

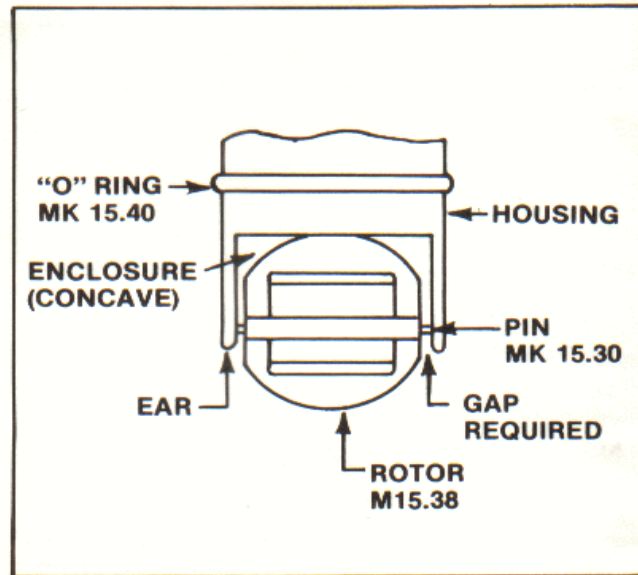


Figure 5.1

6.0 CARE AND MAINTENANCE

6.1 SENSOR

Other than occasional cleaning (see section 5.1), the sensor requires no regular maintenance. Local experience with bottom fouling will dictate the frequency of cleaning.

In areas of rapid bottom growth, it is recommended that the transducer be removed, and the plug inserted, when the boat is not in use.

6.2 INDICATOR

Your Signet MK 267 Knotmeter has been specifically designed to require only minimal care. Periodically check the connections for proper attachment and clean the face of the display.

If a question should arise, your inquiry will be promptly answered by Signet technicians, or your local dealer.

7.0 APPENDICES

7.1 REPLACEMENT PARTS LIST

| Part | Number |
|---|------------|
| Protective Cover | M0212-01 |
| Spare Rotor Kit | MK 15.31 |
| Cap for Plug Sensor | MK 15.42 |
| Sensor (complete w/25' cable) | MK 15.3 |
| Extension Cable (10' 1) | MK 15-EO10 |
| Extension Cable (20') | MK 15-EO20 |
| 0-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 circuit, 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.