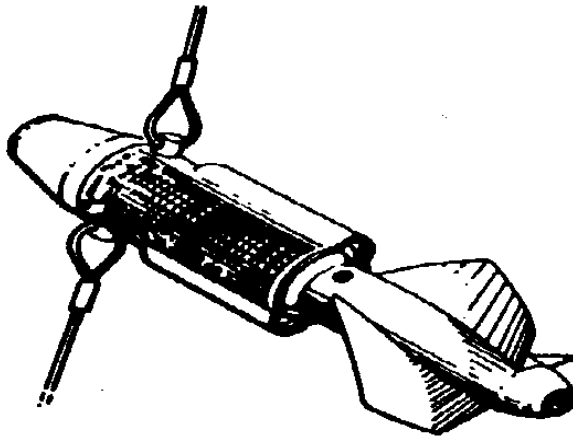


# **General Oceanics Digital Flowmeter Mechanical and Electronic Operators Manual**



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*Model 2030 Series*  
**Mechanical Flowmeters**



- Small and lightweight general purpose impeller instruments for use anywhere (in rivers, estuaries, canals, sewage outfalls, pipes, harbor entrances, offshore sites) and in association with plankton nets and other samplers. Balanced (in water) for dynamic stability. Unlimited

depth capability (free-flooding).

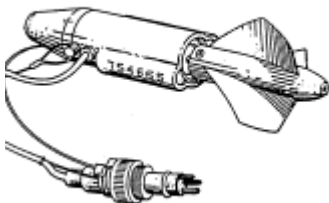
- Universal bridle mounting allows single- point connection for towing or 2- point connection within net mount.

**Model 2030R is a standard flowmeter. Model 2030R6 uses a high-resolution rotor for low-speed applications. Model 20307 uses seven digits to extend distance measurement from 14.5 to 145 nautical miles.**

- Response with standard rotor (2030R) threshold, approximately 10 cm/sec. (1/5 knots). Speed range approximately 10 cm/sec (1/5 knot) to 7.9 meters/sec. (15 knots)
- Response with optional rotor (2030R6) threshold, approximately 6 cm/sec. (3/25 knot). Speed range approximately 6 cm/sec. (3/25 knot) to 100 cm/sec. (2 knot)

**Note: Low speed rotor rotates in counterclock wise direction.**

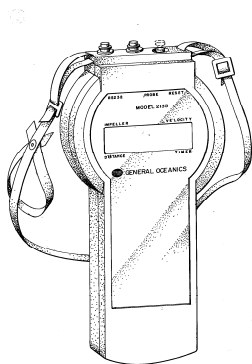
*Model 2031H Series Real-Time*  
**Electronic Flowmeters**



- Same uses as model 2030 series, but in addition to mechanical count, the 2031H and 2031HR6 (low-speed) models use 2 rare earth magnets which actuates a solid- state hall-effect generator, creating a signal for processing by the

2135 readout.

- Standard order of electronic flowmeter includes rotor (specify standard or low speed rotor), bridle and connecting cable. Order readout (model 2135) additionally.



***Model 2135***  
**Data Acquisition Readout**

**Hand held (1 lb .45kg) battery-operated data Display and acquisition readout converts signals from the 2031H series flowmeters.**

- Processed speed signal appears in (user programmable) cm/sec., ft/sec., or knots in addition to distance and elapsed time.
- Velocity- 0 to 9999 m/sec, cm/sec, ft/sec or Knots.
- Comes with 10 meter cable, additional lengths available.
- Optional 512K memory module, RS232 interface: software.



***Model 2135D***  
**Flowmeter Interface Module**

**This module and software allows users of our 2031H electronic flowmeter to use their own computer or data logger as a display and data logging device. The 2135D can also be used with a wide variety of PDAs and Pocket PCs. Flow\_Soft software provides a real-time display of date and time, elapsed time, speed and distance in user selectable units of measurement.**

## **1. Introduction**

**The Model 2030 series Digital, Mechanical Flowmeter is a compact, general purpose instrument for flow measurements in rivers, estuaries, canals, sewage outfalls, and offshore applications. It is ideal for use with plankton nets or other samplers, to determine the water volume associated with each tow. Please read Section 4 for calculating numbers.**

**The Flowmeter incorporates a precision molded rotor coupled directly to a**

six digit counter which registers each revolution of the rotor and displays it as an automobile odometer does. The counter is located within the body of the instrument and is read through clear plastic wall. The flowmeter is properly balanced to maintain horizontal position when suspended from the towing bridle at speed.

The Model 2031H Electronic Flowmeter incorporates the features of the standard 2030R, together with a Hall Effect Magnetic Switch, which produces a 9 volt square wave signal output (to the readout) for each half revolution of the rotor. The 2031H is used in conjunction with the Model 2135 Data Acquisition Readout which provides a remote display of current speed in meter/second. The readout automatically converts the flowmeter counter rotations to a current speed.

Both the 2030R and the 2031H Flowmeters can be fitted with the interchangeable large diameter, 2 bladed rotor for measuring low velocity flows.

## **2. Preparing The Flowmeter For Use** *(Refer to diagram for part number).*

**A. Remove the pan head stainless steel screw #30, which is located at the back of the flowmeter on the end plate #16. This screw hole provides access to the inside, for injecting tap water or silicon fluid with the supply syringe.**

**B. Fill the syringe provided, with tap water. Hold the flowmeter nose down and inject with tap water until full. Little or no air should be visible. CAUTION: DO NOT USE DISTILLED WATER! The filled housing helps reduce the osmotic pressure differential and the pressure change during towing.**

**C. Replace the panhead screw (with O-ring seal) after filling.**

**D. ENSURE THAT THE ROTOR SET SCREW IS TIGHT BEFORE DEPLOYMENT.**

**E. Immediately place into use. This is important since the flowmeter is not designed to be water tight and therefore will leak, creating an air bubble inside. At very low speeds this air bubble will tend to tilt the flowmeter away from the water-flow axis, thus providing readings which will be in error. The error produced by placing and recovering the flowmeter in the water is negligible if the sampling time is relatively long.**

**F. After use the flowmeter should be flushed clean (sect. 5) because the majority of tap water has been exchanged with the ambient water, such as dirty, polluted or salt water. If not properly cleaned, a residue will build up on the gear counter assembly and throw the calibration off.**

### 3. Uses of the flowmeter

The 2030R and 2031H Flowmeters are also designed to be used in towed plankton net systems. A bridle, composed of two monofilament lines attach the flowmeter to the plankton net mouth ring, across the center.

Some low velocity investigations may require that the flowmeter be prevented from tilting away from the axis of the water flow. This is done by adding a weight to one of the bridle lines allowing it to hang freely below the flowmeter with the other bridle line being fixed to the point of suspension.

Special care should be taken when beginning measurements. The flowmeters are bi-directional. That is, the rotor will turn in either direction along with the counter. It is therefore critical that the operator be aware that the flowmeter is always pointed into the flow direction for accurate readings.

General Oceanics does not provide a method for locking down the flowmeters from turning in a current. The flowmeters begin rotating as soon as they enter the water and continue until removed. Therefore the operator must either control the rotation or add a correction factor for the calculations to avoid additional counting when entering and exiting the water.

### 4. Calculations

10 counts are equal to 1 rotor revolution on the graphic labels on all flowmeters. The cts/sec. Is “counts per second” and must not be used as revolutions per second for calculations.

**ROTOR CONSTANTS:**     Standard Speed Rotor Constant = 26,873  
                                    Low Speed Rotor Constant R6 = 57,560  
                                    (R2) Low Speed Rotor Constant = 51,020  
                                    Speed Curve See Page 14

**A. DISTANCE in meters =  $\frac{\text{Difference in COUNTS (X) Rotor Constant}}{999999}$**

(Example: Where the graph may indicate 100 cts/sec this is also equal to 10 revolutions/sec). Therefore please ensure the correct units are being used when measuring and calculating.

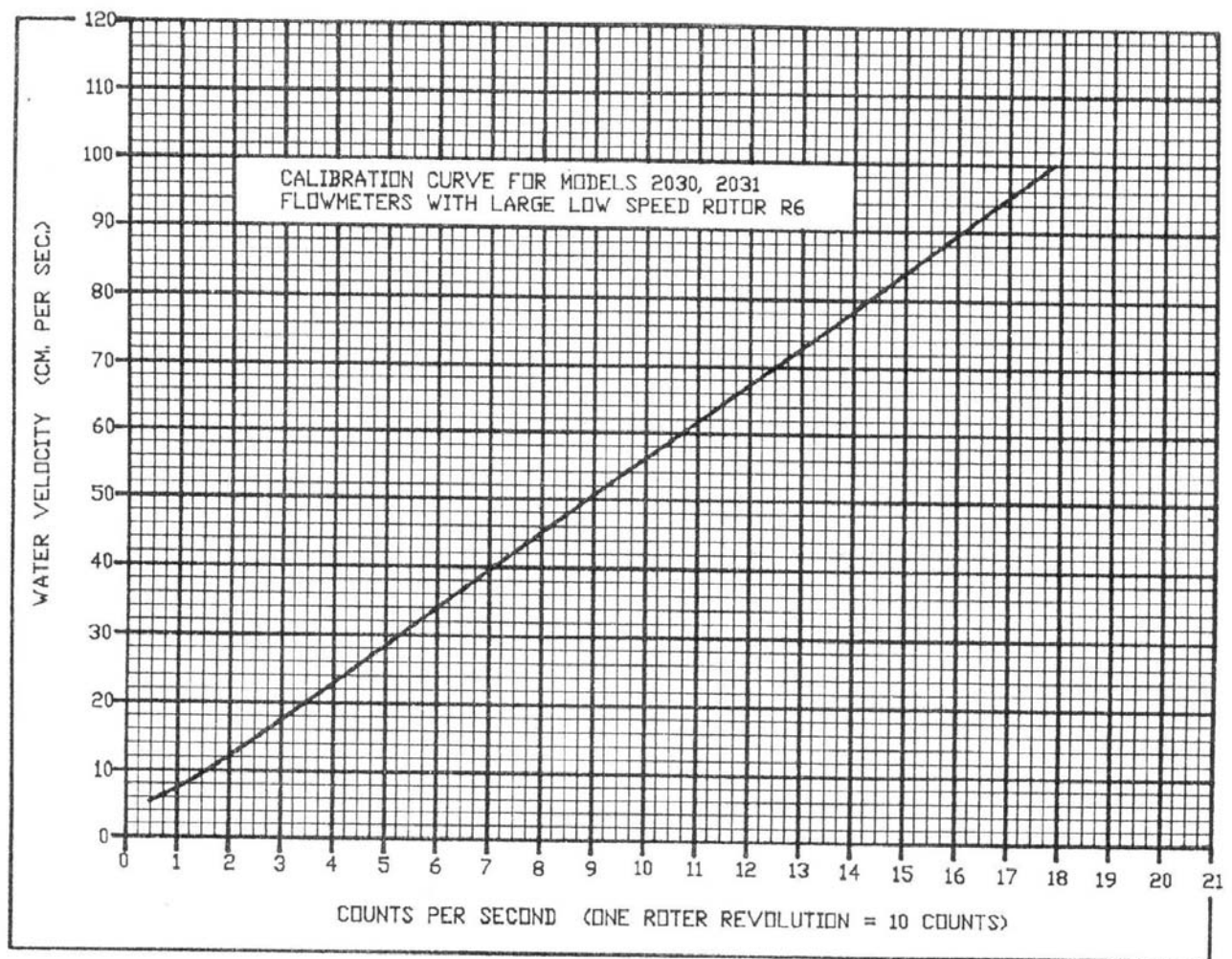
**B. SPEED in cm/sec =  $\frac{\text{Distance in meters (X) 100}}{\text{Time in seconds}}$**

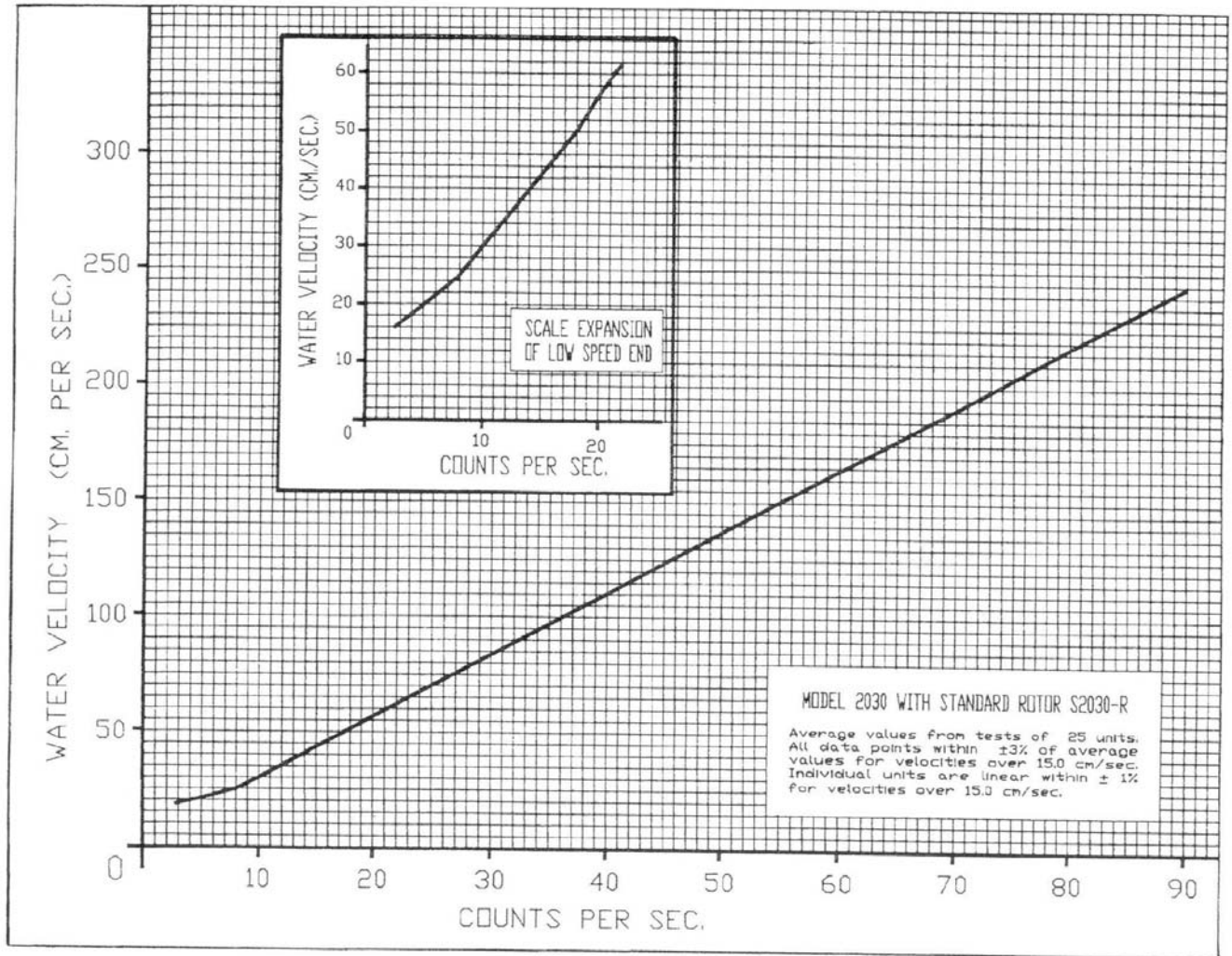
C. VOLUME cubic meters =  $\frac{3.14 (X) (\text{Net Diameter})^2 (X) \text{ Distance}}{4}$

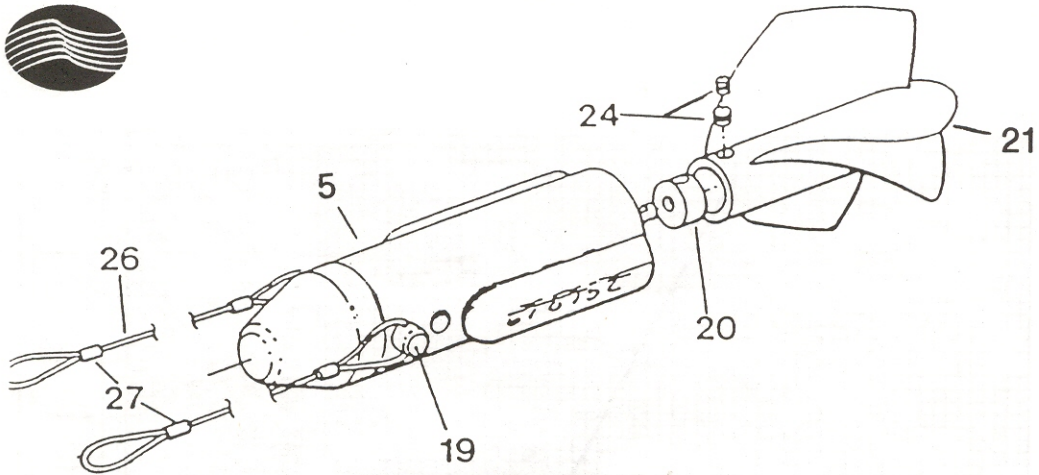
## 5. Repairs and Maintenance

For Storage, the flowmeter must be thoroughly flushed to remove any salt deposits. The flushing should first be done with a mixture of white vinegar and tap water. This solution should be left in the flowmeter for a few hours. Flowmeters that have been damaged or do not keep an accurate count should be returned to General Oceanics for a repair estimate. Please include a "letter of work" and a purchase order number with any equipment sent back.

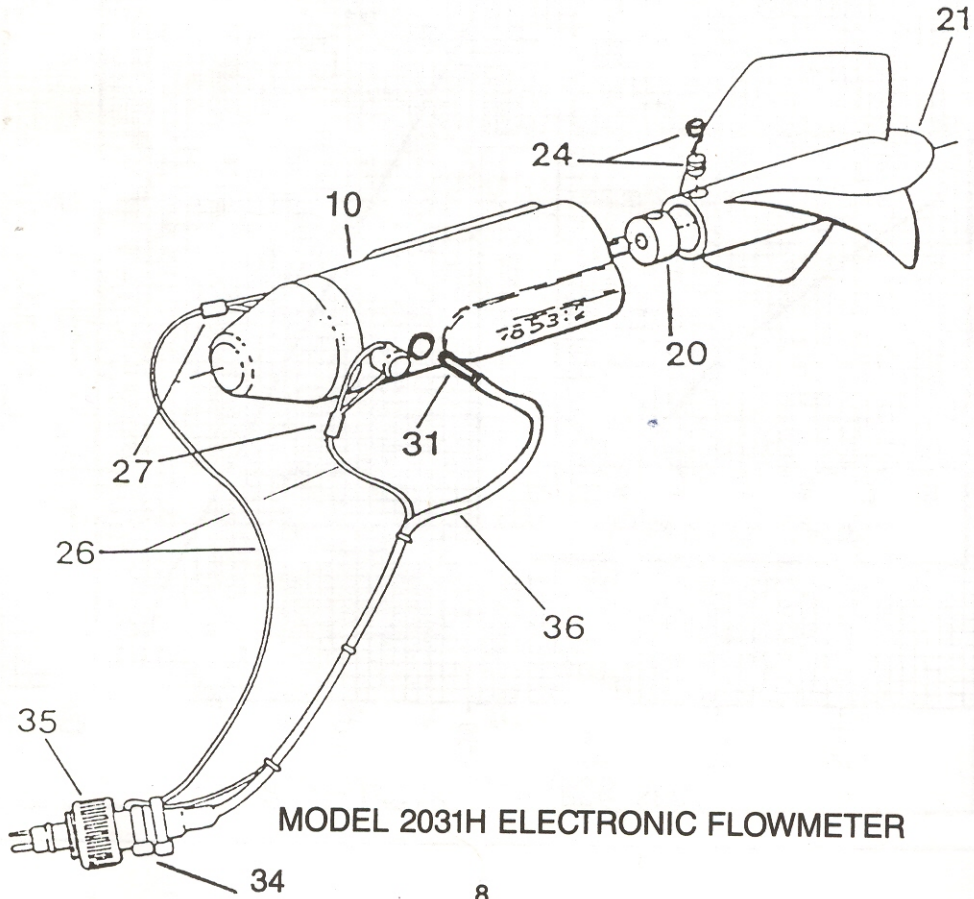
All Flowmeters are covered by 1 year warranty against defects in materials and workmanship.





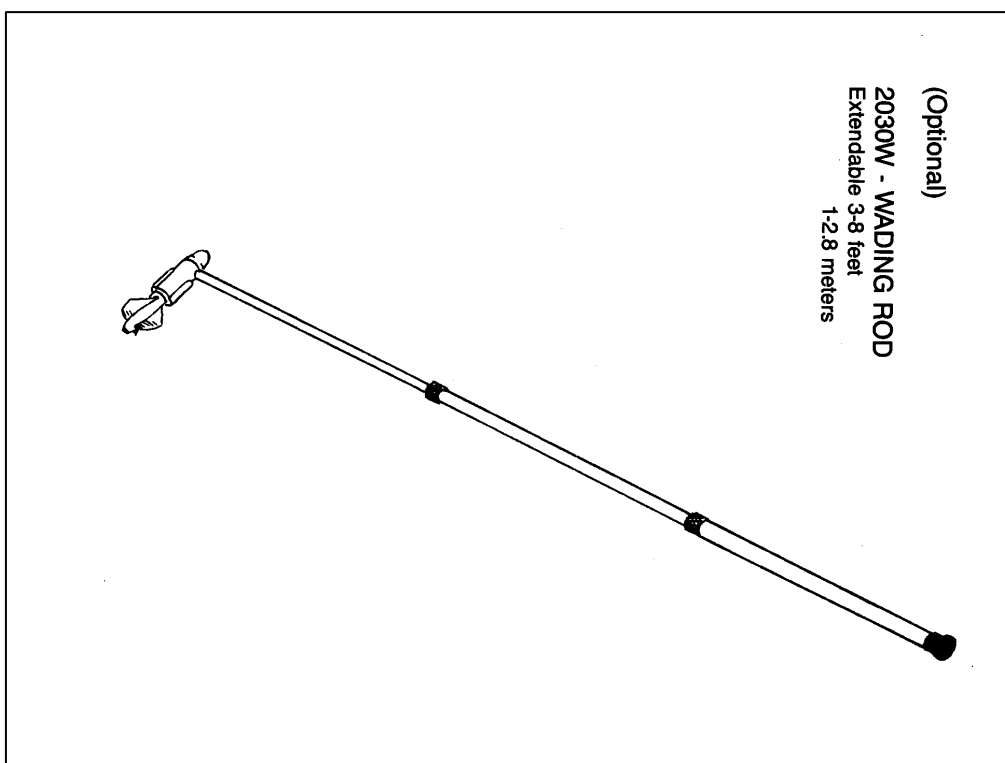
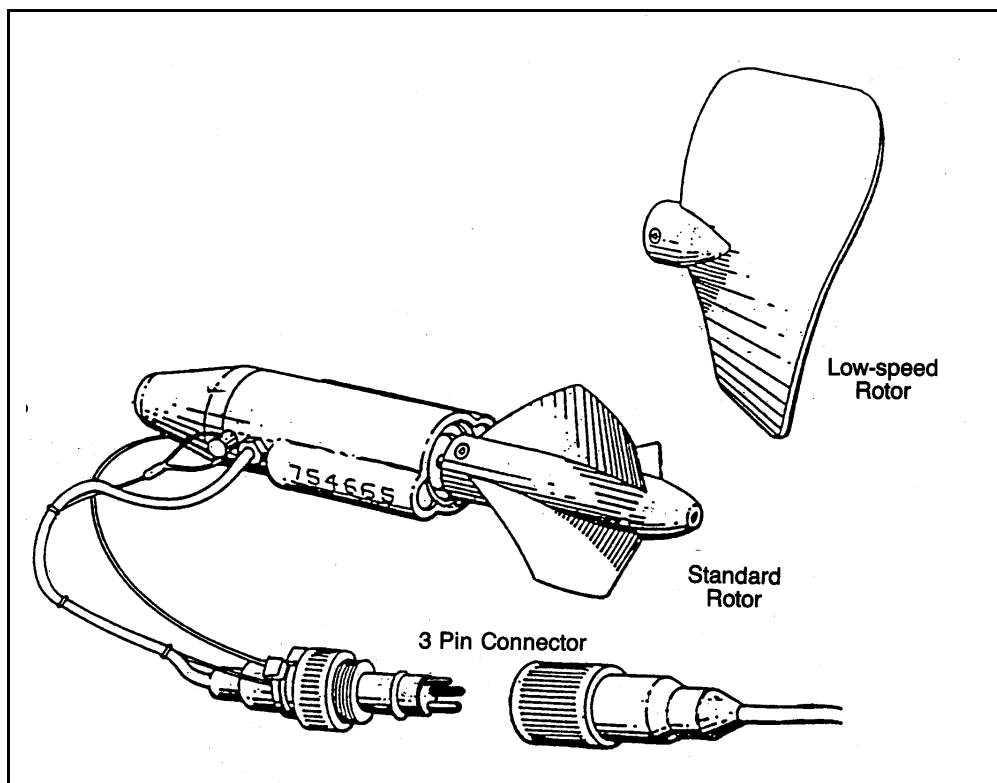


MODEL 2030R STANDARD FLOWMETER

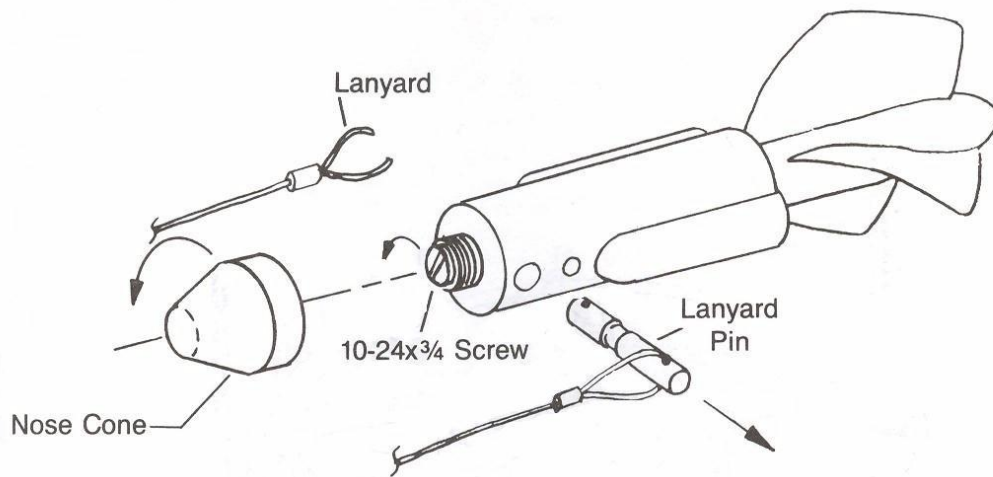


MODEL 2031H ELECTRONIC FLOWMETER



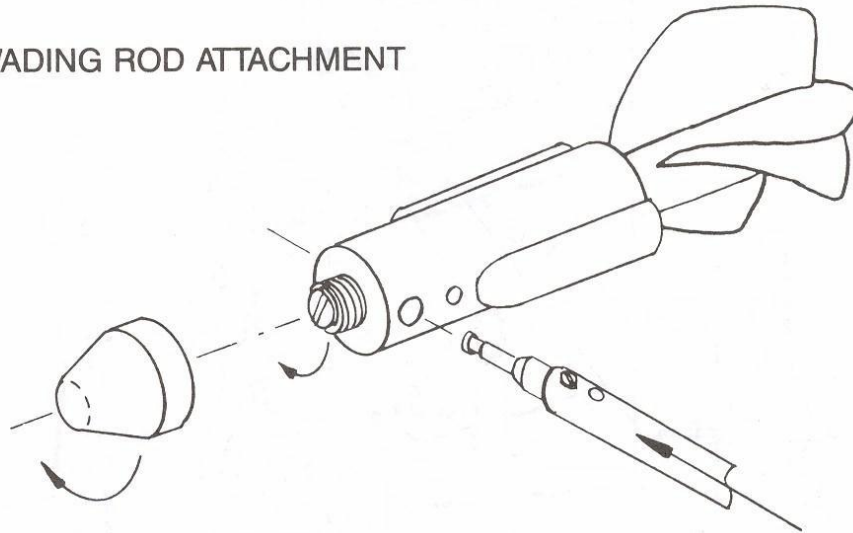


## LANYARD PIN REMOVAL

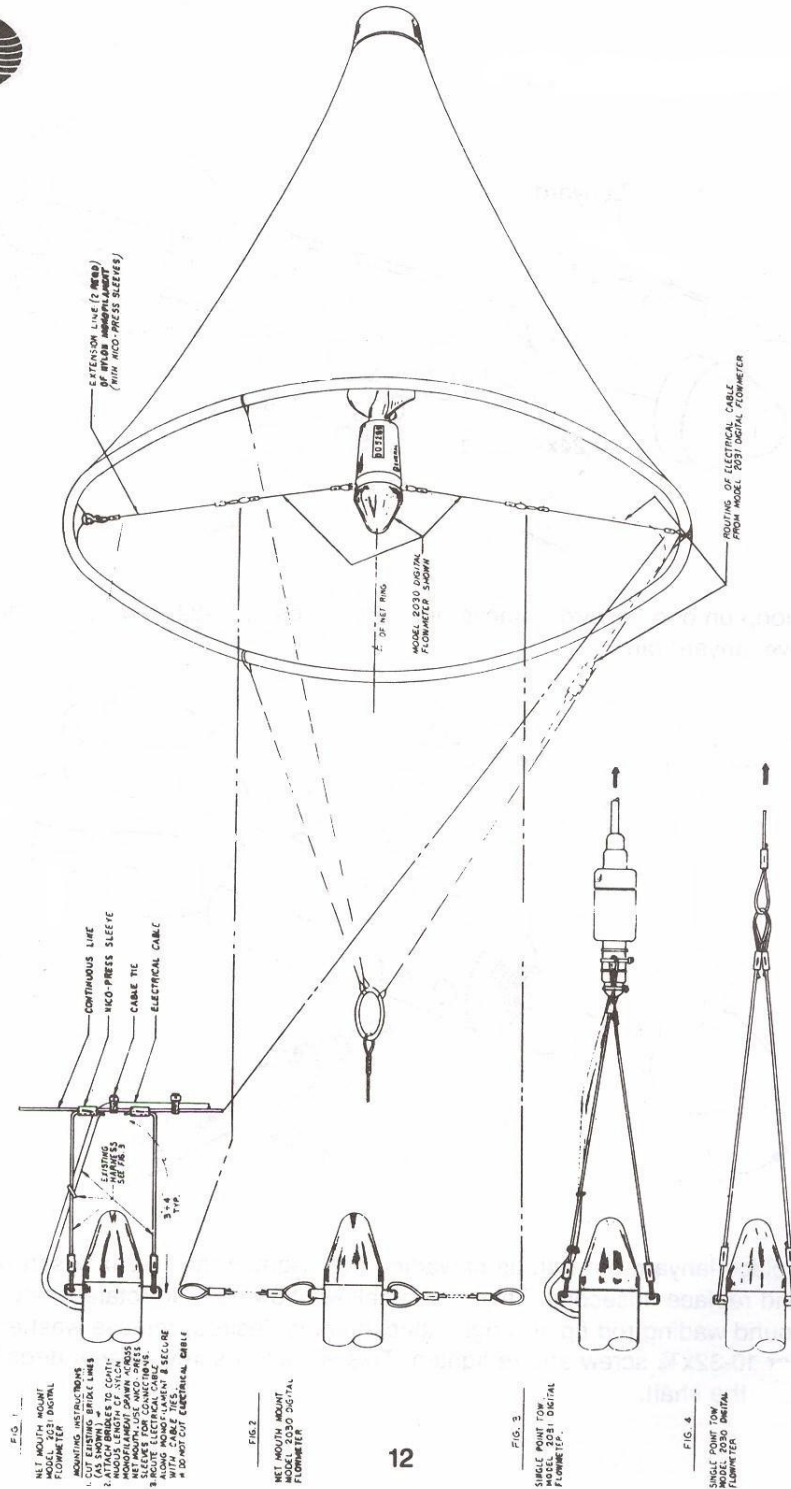


Cut loop on one lanyard, remove nosecone, loosen 10-24 x  $\frac{3}{4}$  screw and remove lanyard pin.

## WADING ROD ATTACHMENT

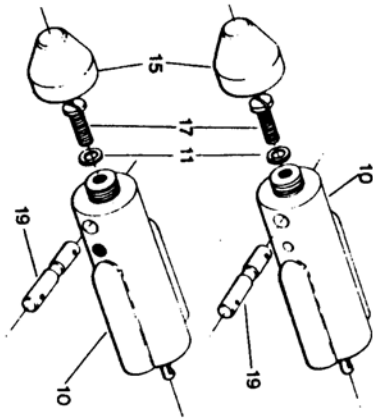
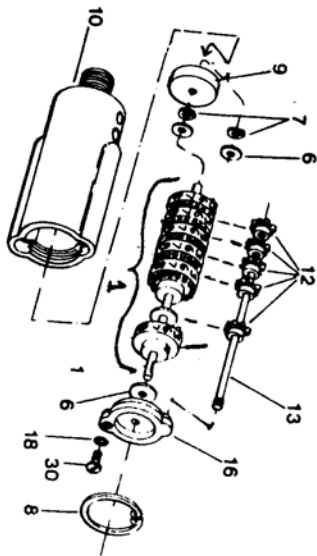


Replace lanyard pin with tip of wading rod. Tighten the 10-24x $\frac{3}{4}$  screw and replace nosecone. This method allows flowmeter to rotate freely around wading rod tip. If a rigid attachment is desired, remove washer under 10-32x $\frac{3}{4}$  screw and re-tighten. This will allow screw to seat directly against the shaft



STANDARD FLOWMETER PARTS  
2030R

PART NO.	DESCRIPTION	QTY.
1 13 12 6	COUNTER ASSY. WHEEL ASSY, 6 FIGURE PINION SHAFT PINION GEAR WASHER, S/S VR#1071 619 KT	1,000 1,000 5,000 1,000
15	NOSE CONE NOSE CONE, 2030	1,000
5 NOT SHOWN NOT SHOWN	HOUSING ASSY. HSG., FLOWMETER LABEL, MODEL 2032 & 2030 LABEL, ADH, 1"X4, 71-38967-2, GQ, INC.	1,000 1,000 1,000
21 24	IMPELLER ASSY. SMALL IMPELLER, 0-30 KNOTS SCREW, SET HEX, SOCK, 6-32 X 1/4	1,000 1,000
19 17 11 27 26	LANYARD PIN ASSY. PIN, LANYARD SCREW, MACH, ROUND HD, 10-24X3/4 CRES WASHER, INT, STAR, #10, CRESS NICHOPRESS CLAMP 1/16 COPPER MONOFIL, LINE 250LB TEST (1/16 DIA)	1,000 1,000 1,000 4,000 3,000
16 8 30 18	END PLATE ASSY. SMALL PLASTIC END PLATE 350,003 RETAINING RINGS MACH, SCREW, PIH, 5-40 X 1/4, CRESS O-RINGS	1,000 1,000 1,000 1,000
NOT SHOWN	SYRINGE SC21G, 1-1/2	1,000



ELECTRONIC FLOWMETER PARTS 2031H			
PART NO.	DESCRIPTION	QTY.	
1	COUNTER ASSY.	1,000	
7	WHEEL ASSY, 6 FIGURE	1,000	
13	MAGNET 1/8 DIA. X .14 NG RARE EARTH	2,000	
12	PINION SHAFT	1,000	
6	PINION GEAR	5,000	
9	WASHER, S/S VR#11071 619 KT	1,000	
	MAGNET HOLDER	1,000	
15	NOSE CONE		
	NOSE CONE, 2030	1,000	
10	HOUSING ASSY.		
NOT SHOWN	HSG., FLOWMETER, HALL EFFECT	1,000	
NOT SHOWN	LABEL, MODEL 2032 & 2030	1,000	
	LABEL, ADH, 1"X4, 71-38967-2, GQ, INC.	1,000	
21	IMPELLER ASSY.		
24	SMALL IMPELLER, 0-30 KNOTS	1,000	
	SCREW, SET HEX, SOCK, 6-32 X 1/4	1,000	
19	LANYARD PIN ASSY.		
17	PIN, LANYARD	1,000	
11	SCREW, MACH, ROUND HD, 10-24X3/4 CRESS	1,000	
27	WASHER, INT, STAR, #10, CRESS	1,000	
26	NICOPRESS CLAMP 1/16 COPPER	4,000	
	MONOFIL LINE 250LB TEST (1/16 DIA)	3,000	
16	END PLATE ASSY.		
8	SMALL PLASTIC END PLATE 3.50X0.03	1,000	
30	RETAINING RINGS	1,000	
18	MACH, SCREW, P/H, 5-40 X 1/4, CRESS	1,000	
	O-RINGS	1,000	
36	CABLE AND SWITCH ASSY.		
31	FLOWMETER PIG TAIL, 3 COND	1,000	
35	HALL SENSOR UGN 3040T SPRAGUE	1,000	
34	LOCKING SLEEVE, 5/8" LG	1,000	
6	CABLE TIE LOCK 6-3/4 SST2S-CP	3,000	
	WASHER SPLIT #6 MED SIL BRONZE	1,000	
NOT SHOWN	SYRINGE 5C21G, 1-1/2	1,000	

## General Oceanics Types of Flowmeter Systems

2030R	Mechanical, W/ Standard Rotor
2030R6	Mechanical, W / Low Velocity Rotor
1	With 7-digit counter
20307R6	L.V. Rotor and 7-digit count.
2031H	With Hall Sensor, Electronic.
2031HR6	L.V. Rotor, Hall Sensor

## Readout for Electronic Flowmeter 2031H and 2031HR6

## 2135 Data Acquisition Readout

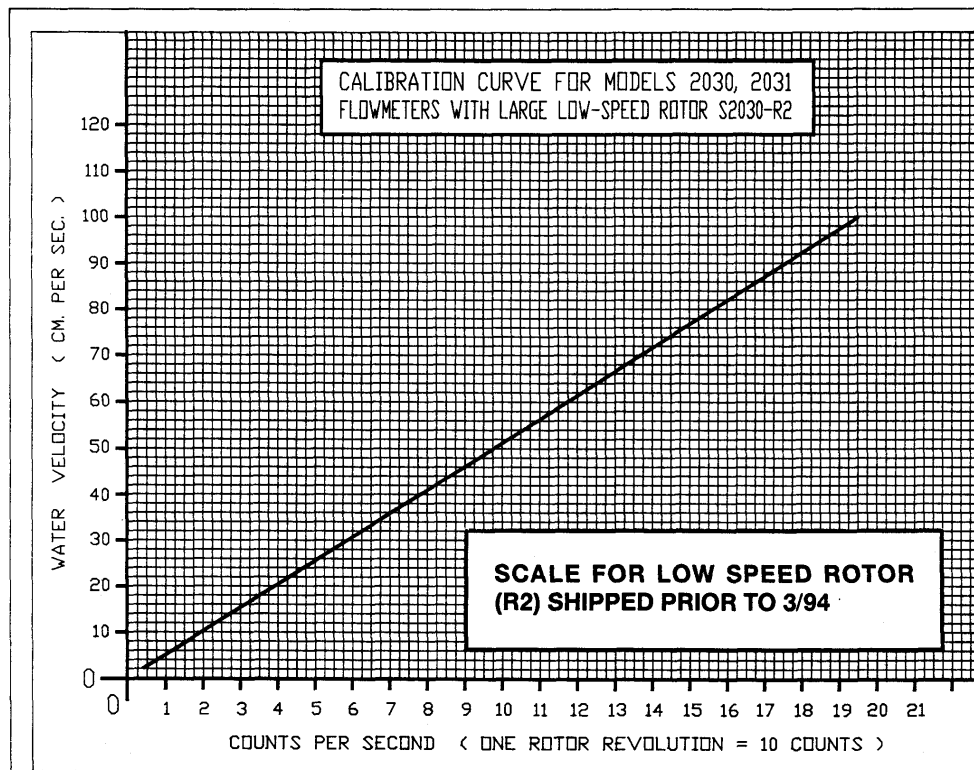
## Accessories and Spare Parts

203021	Rotor, Standard
203022	Rotor, Low Speed
2031RCH	Connecting Cable for 2031H, 2035HB

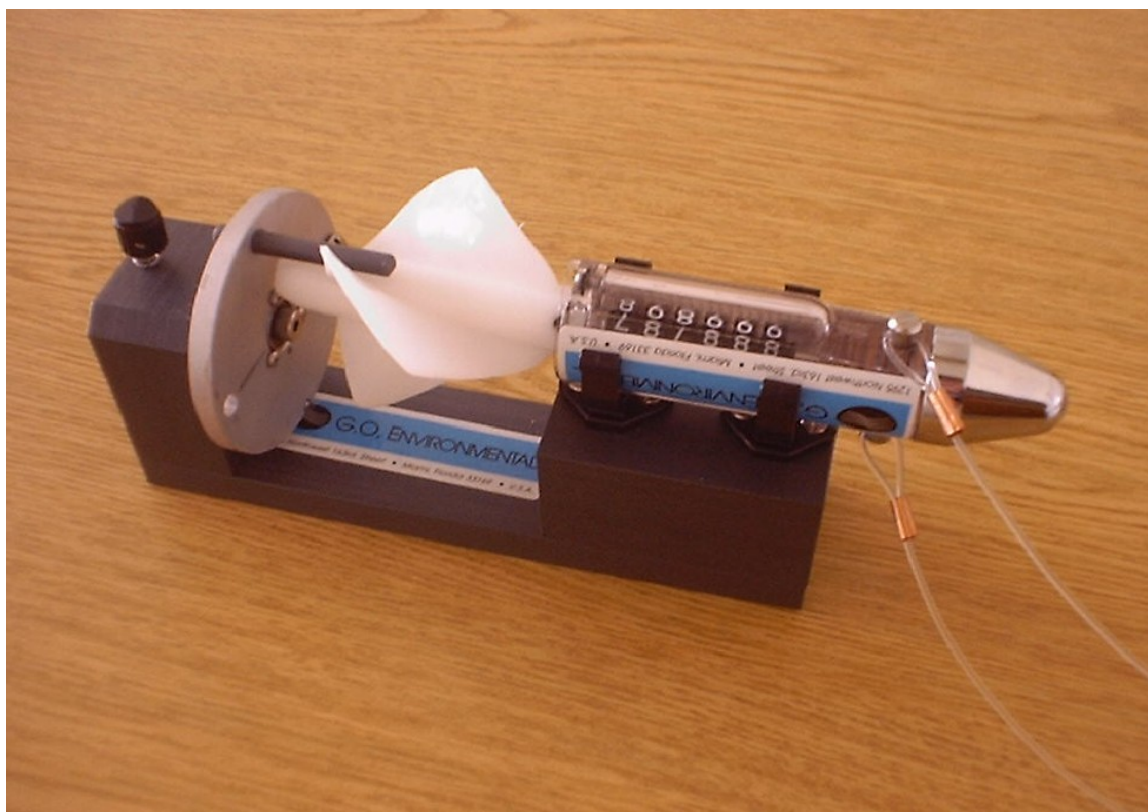
**203039      Oil, 20cS, Pint Bottle, Silicone Oil**  
**2030W      Wading RodB Extendable 3-8 Feet**

**Extension Cables**

**2030HC10    10 Meters (33 ft.)**  
**2030HC20    20 Meters (66 ft.)**  
**2030HC30    30 Meters (99 ft.)**  
**2030HC40    40 Meters (132 ft.)**  
**2030HC50    50 Meters (165 ft.)**



<b>USEFUL CONVERSIONS CHART</b>		
<b>MULTIPLY</b>	<b>By</b>	<b>TO OBTAIN</b>
Cubic Meters	264.20	Gallon
Cubic Meters	35.31	Cubic feet
Cubic Meters	1.308	Cubic yards
Cubic Meters	1000.00	Liters
Cubic Meters	61023.00	Cubic inches
Cubic feet	7.481	Gallons
Miles (nautical)	6080.00	Feet
Knots	1.152	Miles per hr.
Square centimeters	0.001077	Square feet
Feet per second	0.6818	Miles per hour
Centimeters per second	0.03281	Feet per second
Meters per second	2.237	Miles per hour
Meters per second	6.00	Kilometers per hour



**2030CF Calibration Frame**