GENERAL OCEANICS
DIGITAL FLOWMETER
MECHANICAL & ELECTRONIC
OPERATORS MANUAL

GENERAL OCEANICS INC.

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Name: _____ Date: _____

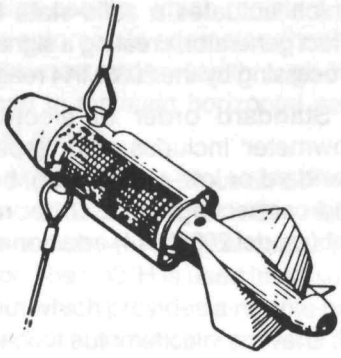
Address: _____

Seriel No. _____ Model No. _____

NOTES:

Model 2030 Series

MECHANICAL FLOWMETERS



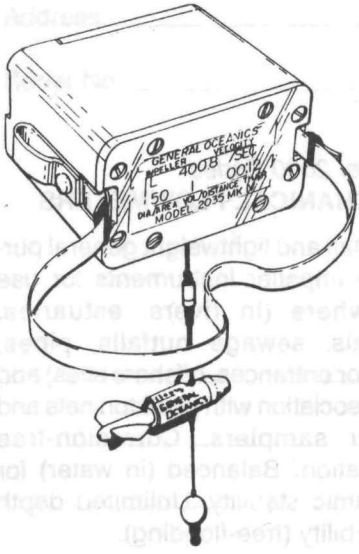
• Small and lightweight general purpose impeller instruments for use anywhere (in rivers, estuaries, canals, sewage outfalls, pipes, harbor entrances, offshore sites) and in association with plankton nets and other samplers. Corrosion-free operation. Balanced (in water) for dynamic stability. Unlimited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

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

• Model 2030R is a standard flowmeter. Model 2030R2 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.

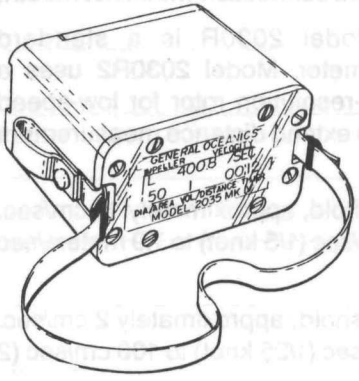
• Response with standard rotor (2030R) threshold, approximately 10 cm/sec. (1/5 knots). Speed range approximately 10 cm/sec (1/5 knot) to 7.9 meters/sec (15 knots).

• Response with optional rotor (2030R2) threshold, approximately 2 cm/sec. (1/25 knot). Speed range approximately 2 cm/sec (1/25 knot) to 100 cm/sec (2 knots).



Model 2031H Series Real-Time
ELECTRONIC FLOWMETERS

- Same uses as model 2030 series. Same specifications as 2030, but in addition to mechanical count, the 2031H and 2031H2 (lowspeed) models use 2 rare earth magnets which actuates a solid-state hall-effect generator, creating a signal for processing by the 2035MK4 readout.
- Standard order of electronic flowmeter includes rotor (specify standard or low-speed rotor), bridle and connecting cable. Order readout (model 2035MK4) additionally.



Model 2035MK4
DATA ACQUISITION READOUT

- Hand held (2.1 lbs. .98 kg) battery-operated data display and acquisition readout converts signals from the 2031H series flowmeters.
- Processed speed signal appears in (user programmable) cm/sec, m/sec, ft/sec or knots in addition to total volume or distance and elapsed time.
- Full-scale range to 1000 cm/sec
- Comes with 10 meter cable, additional lengths available.
- Optional 128K memory module, RS232 interface; software.

1. INTRODUCTION

The Model 2030 series Digital, Mechanical Flowmeter is a compact, general purpose instrument for flow measurements in rivers, estuaries, canals, sewerage 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 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 2035HB Flowmeter Readout which provides a remote display of current speed in meters/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 supplied syringe.

B. Fill the syringe provided, with tap water. Hold the flowmeter nose down and inject with 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 Pan head 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 the tap water has been exchanged with the ambient water, such as dirty, polluted or seawater. 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 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 in into the flow direction for accurate readings.

General Oceanics does not provide a method for locking 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 = 51,020

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 = $\frac{\text{Distance in meters (X) 100}}{\text{Time in seconds}}$

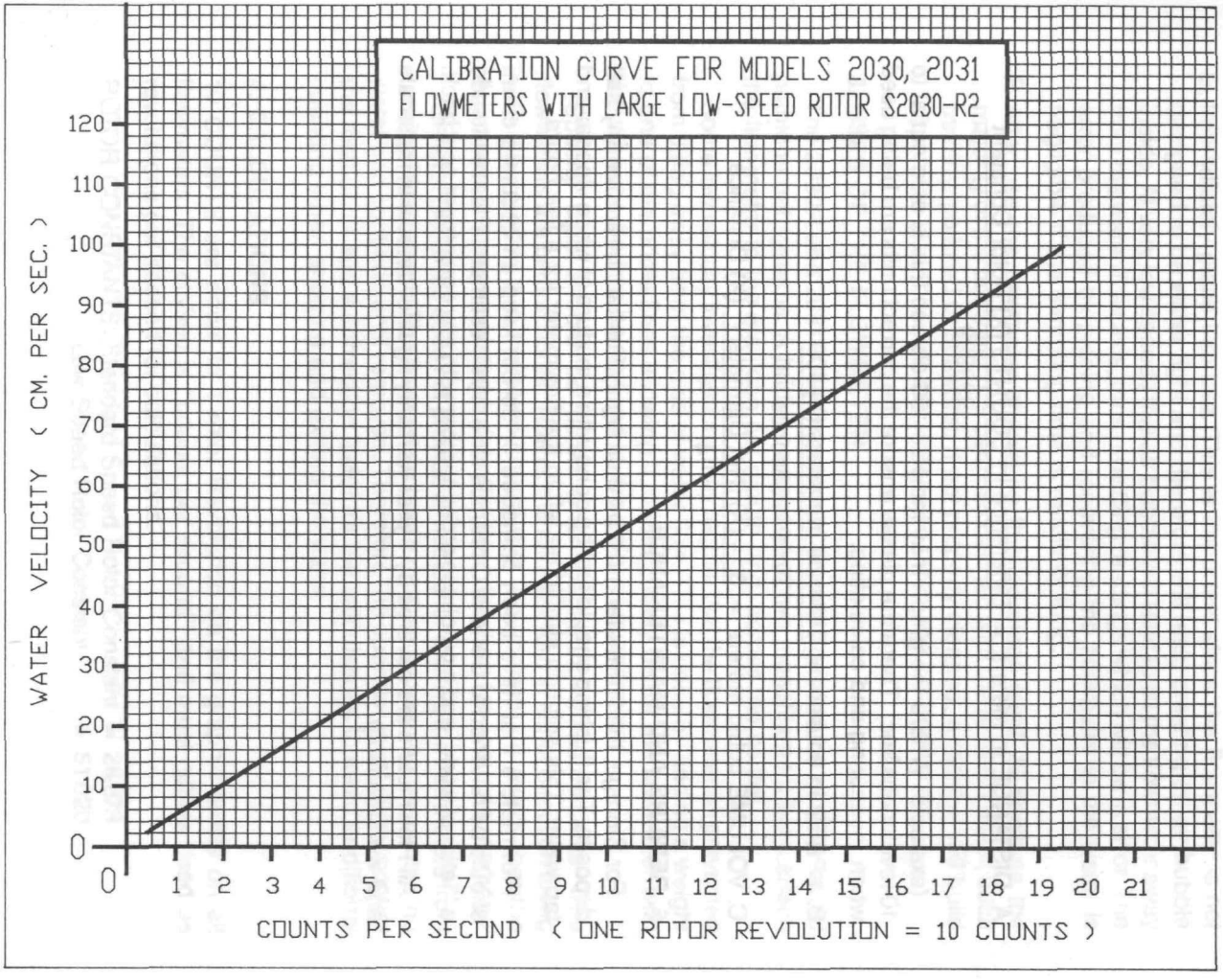
C. VOLUME cubic meters = $\frac{3.14 \text{ (X) (Net Diameter)}^2 \text{ (X) Distance}}{4}$

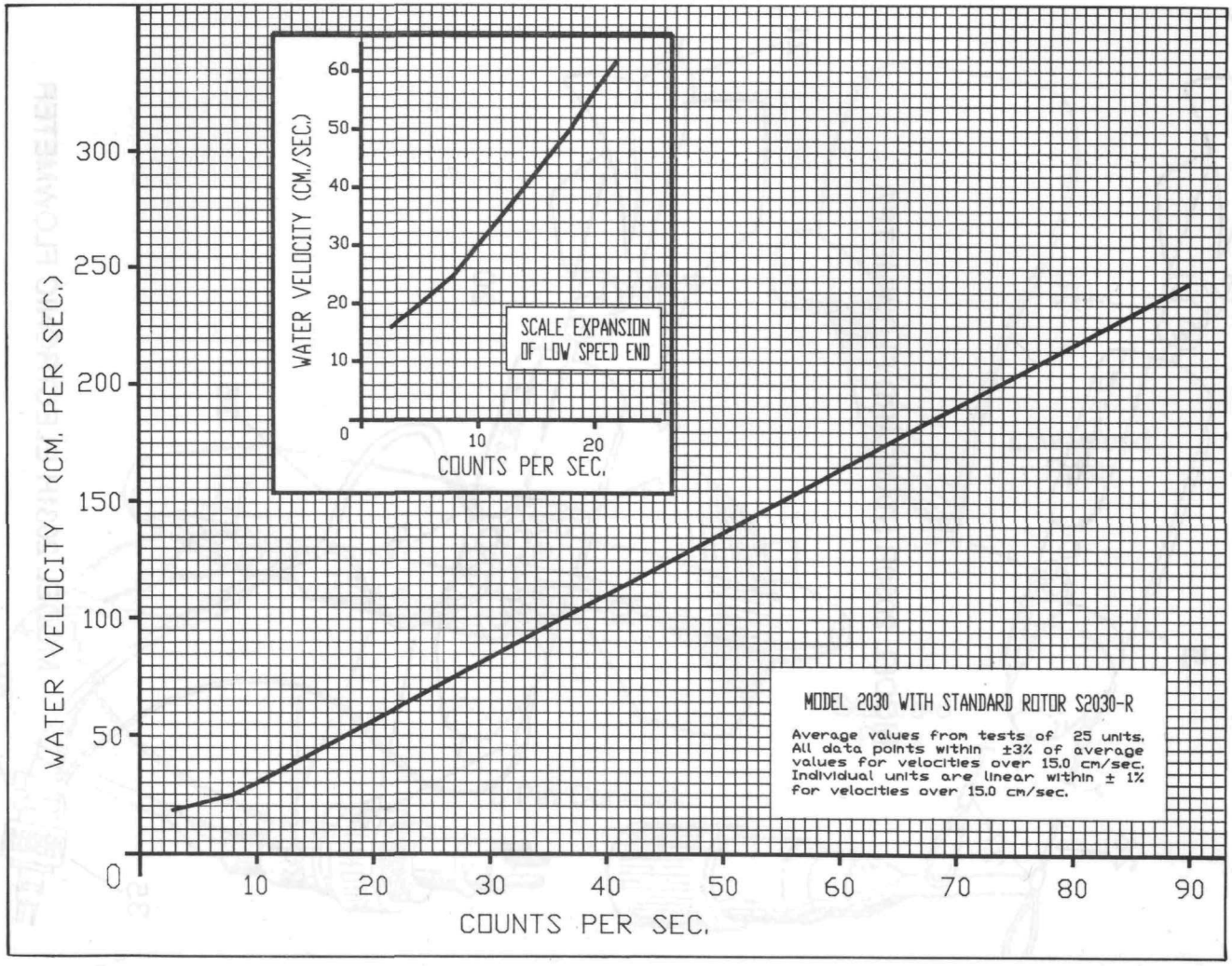
5. REPAIRS AND MAINTENANCE

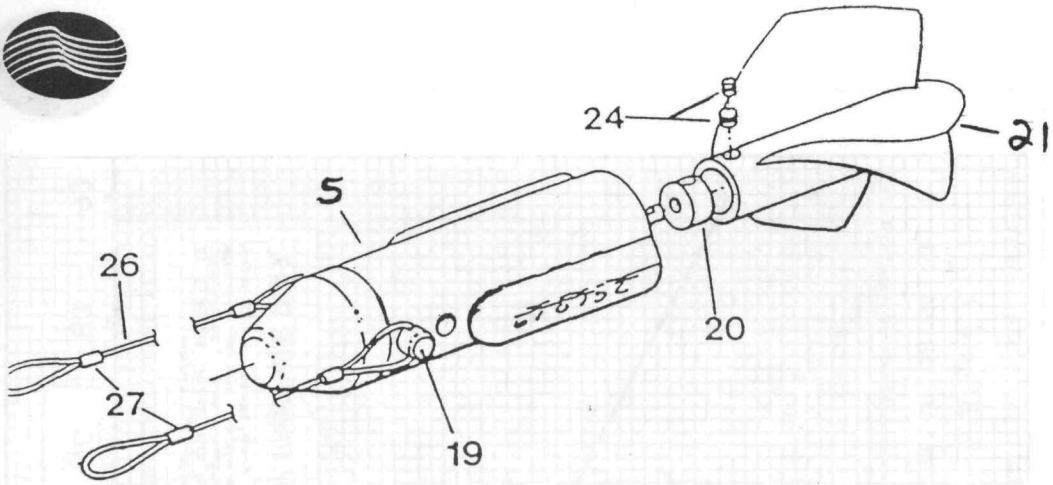
For Storage, the flowmeter must be thoroughly flushed to remove any salt deposits. The flushing should first be done with a mixture of white vinegar and tap water. This solution should be left in the flowmeter for a few hours.

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.

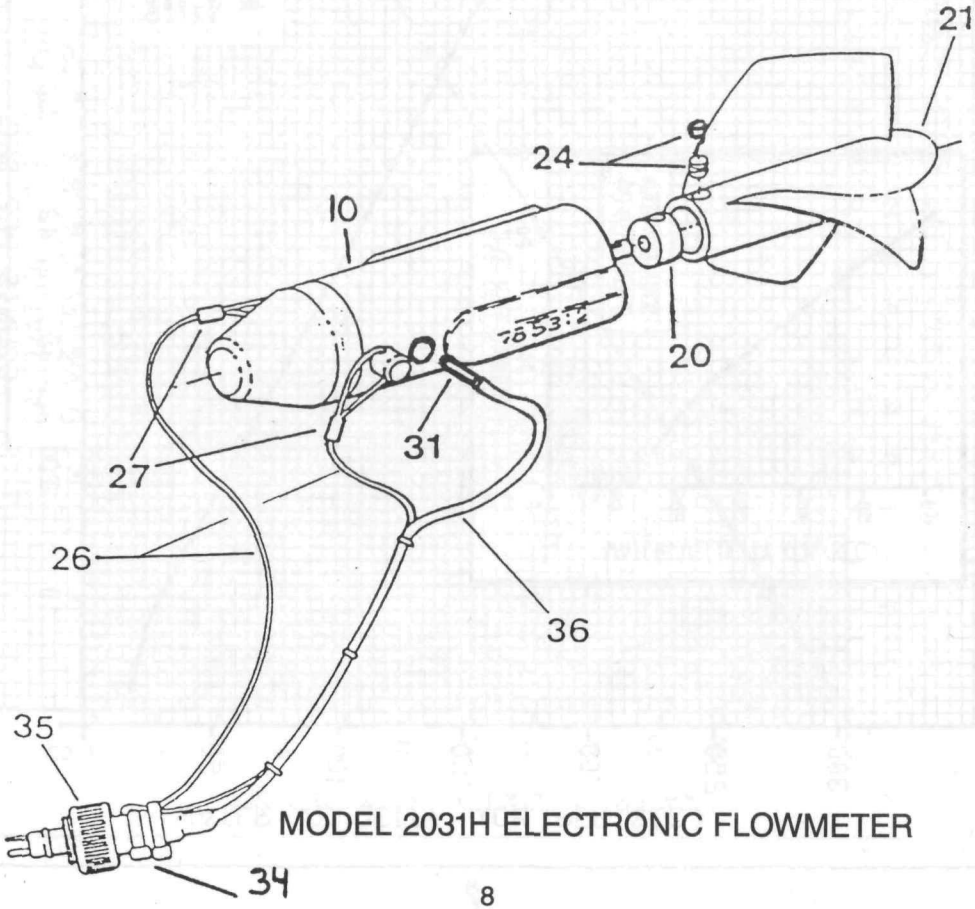
All Flowmeters are covered by 1 year warranty against defects in materials and workmanship.


CALIBRATION CURVE FOR MODELS 2030, 2031
FLOWMETERS WITH LARGE LOW-SPEED ROTOR S2030-R2
WATER VELOCITY (CM. PER SEC.)
0
10
20
30
40
50
60
70
80
90
100
110
120
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
COUNTS PER SECOND (ONE ROTOR REVOLUTION = 10 COUNTS)

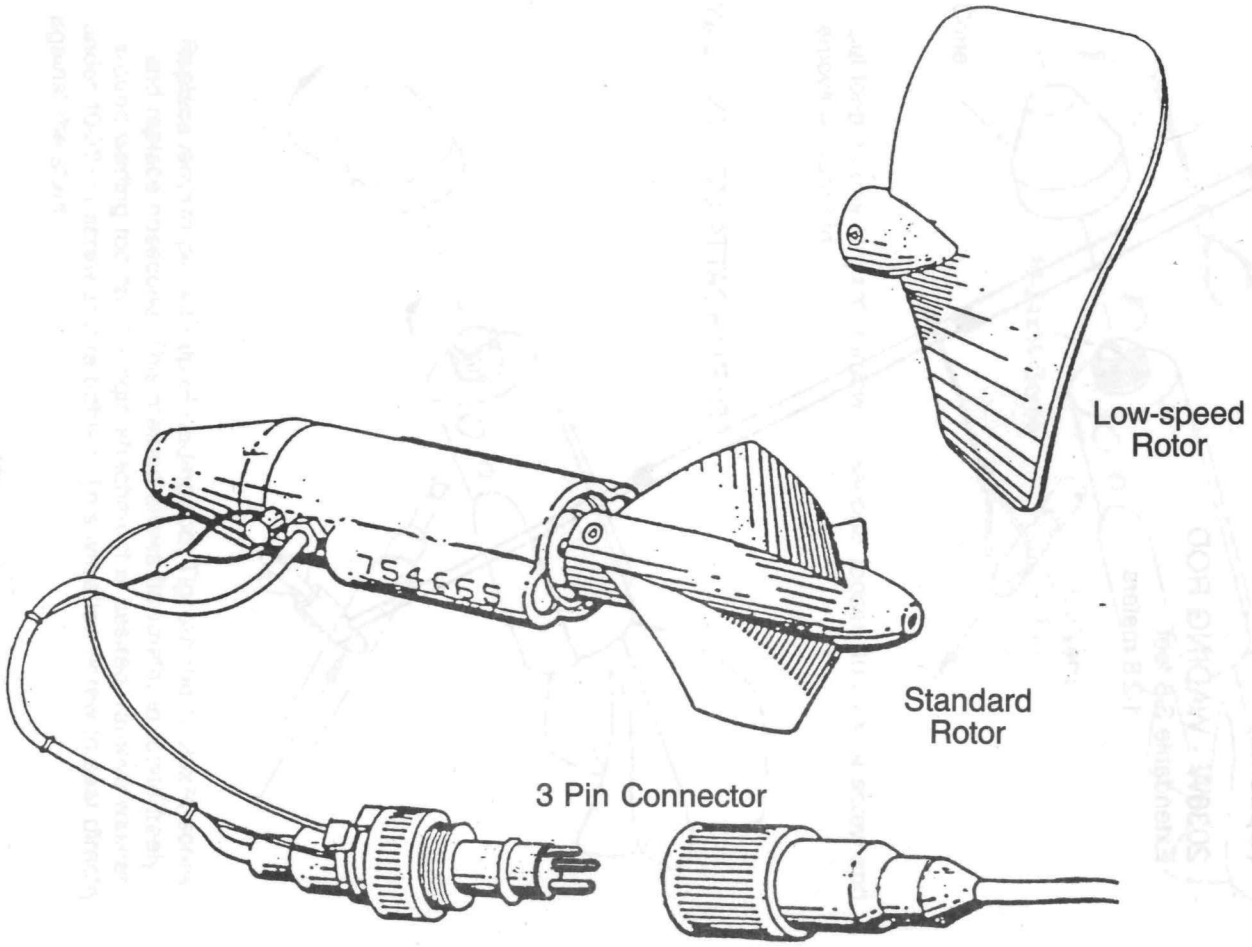

WATER VELOCITY (CM. PER SEC.)
300
250
200
150
100
50
0
10
20
30
40
50
60
70
80
90
COUNTS PER SEC.
WATER VELOCITY (CM./SEC.)
60
50
40
30
20
10
0
10
20
COUNTS PER SEC.
SCALE EXPANSION
OF LOW SPEED END
MODEL 2030 WITH STANDARD ROTOR S2030-R
Average values from tests of 25 units.
All data points within ±3% of average
values for velocities over 15.0 cm/sec.
Individual units are linear within ± 1%
for velocities over 15.0 cm/sec.



MODEL 2030R STANDARD FLOWMETER



MODEL 2031H ELECTRONIC FLOWMETER

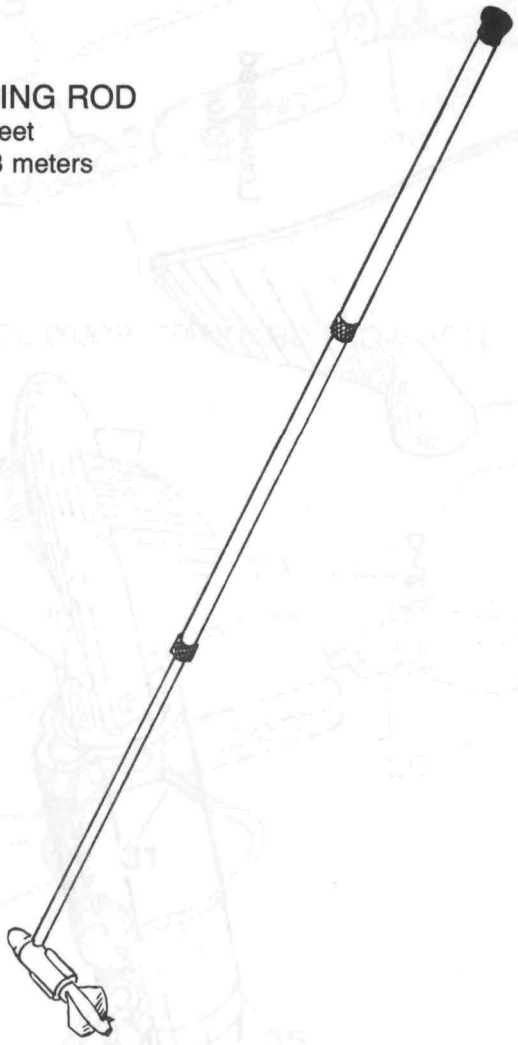

154665
Low-speed
Rotor
Standard
Rotor
3 Pin Connector

(Optional)

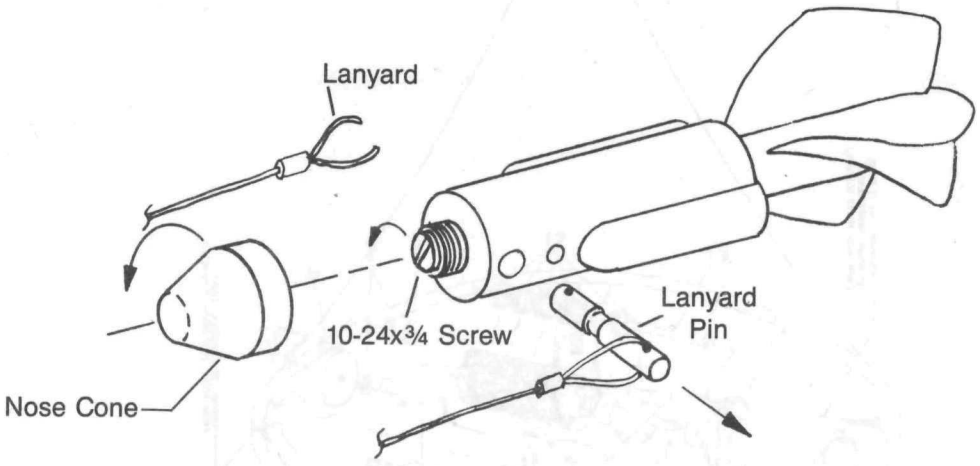
2030W - WADING ROD

Extendable 3-8 feet

1-2.8 meters

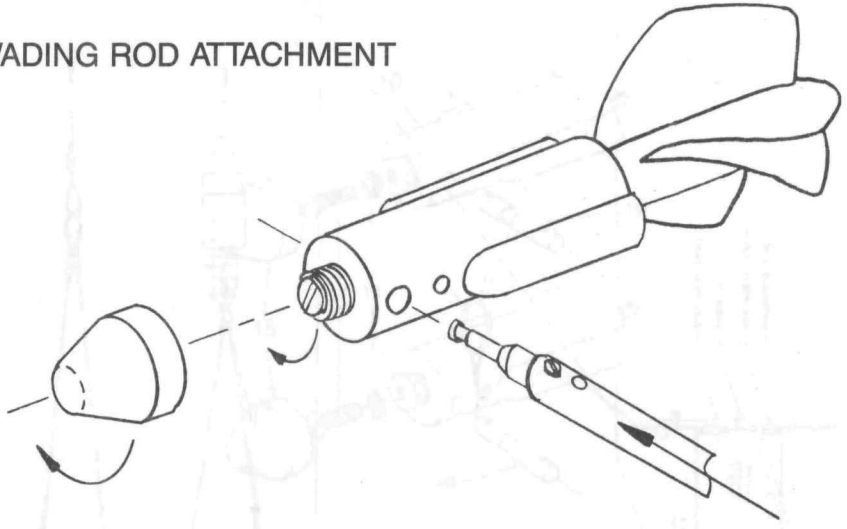


LANYARD PIN REMOVAL



Cut loop on one lanyard, remove nosecone, loosen 10-24 x ¾ screw and remove lanyard pin.

WADING ROD ATTACHMENT



Replace lanyard pin with tip of wading rod. Tighten the 10-24x¾ screw and replace nosecone. This method allows flowmeter to rotate freely around wading rod tip. If a rigid attachment is desired, remove washer under 10-32x¾ screw and re-tighten. This will allow screw to seat directly against the shaft.

FIG. 1

NET MOUTH MOUNT
MODEL 2031 DIGITAL
FLOWMETER

MOUNTING INSTRUCTIONS

1. CUT EXISTING BRIDLE LINES (AS SHOWN) ✂
2. ATTACH BRIDLES TO CONTINUOUS LENGTH OF NYLON MONOFILAMENT DRAWN ACROSS NET MOUTH. USE NICO-PRESS SLEEVES FOR CONNECTIONS.
3. ROUTE ELECTRICAL CABLE ALONG MONOFILAMENT & SECURE WITH CABLE TIES. ✂ DO NOT CUT ELECTRICAL CABLE

FIG. 2

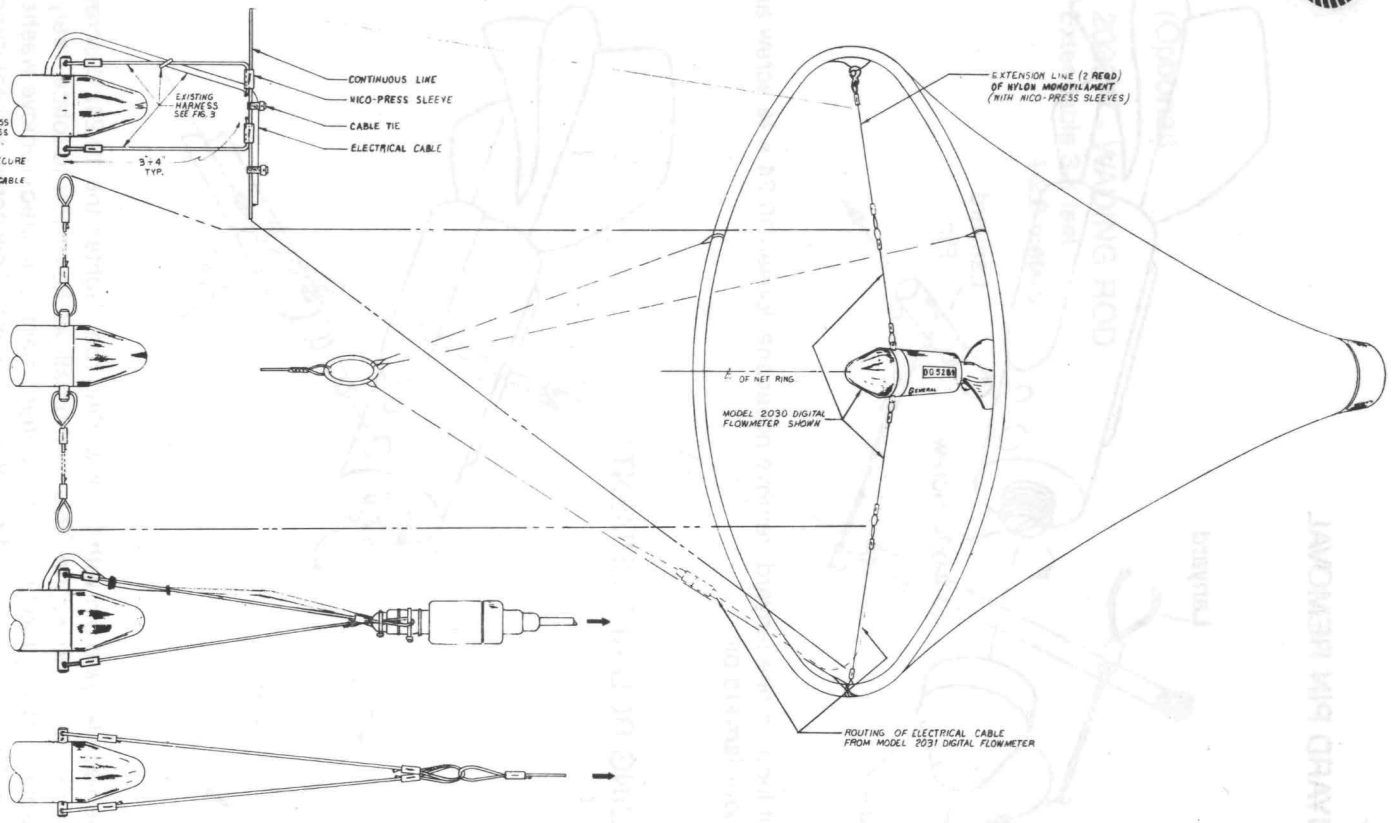
NET MOUTH MOUNT
MODEL 2030 DIGITAL
FLOWMETER

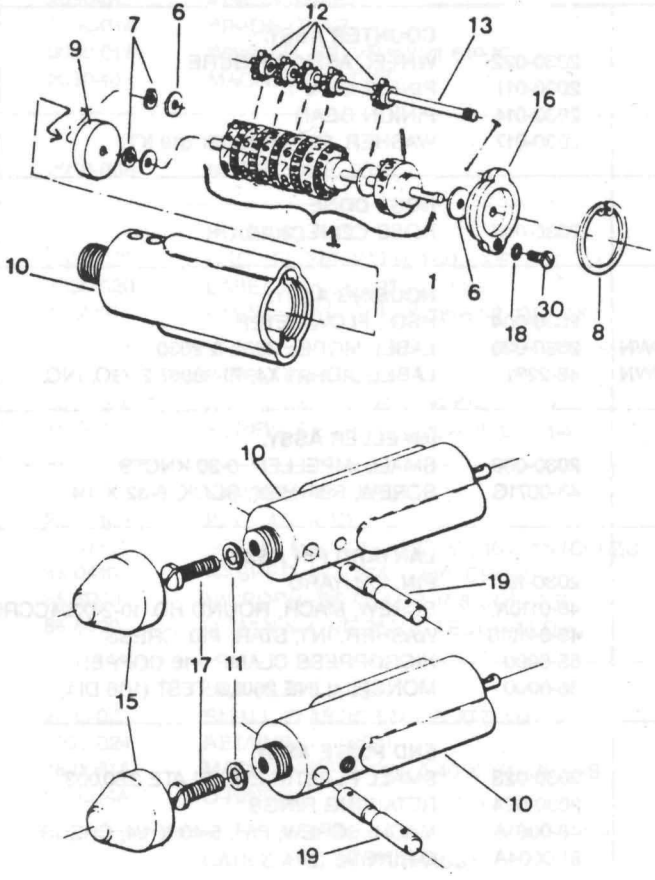
FIG. 3

SINGLE POINT TOW,
MODEL 2031 DIGITAL
FLOWMETER.

FIG. 4

SINGLE POINT TOW
MODEL 2030 DIGITAL
FLOWMETER




12
13
7
6
9
16
1
10
1
6
30
18
8
10
19
17
11
15
10
19

STANDARD FLOWMETER PARTS
2030R

	PART NO.	DESCRIPTION	QTY.
		COUNTER ASSY.	
1	2030-022	WHEEL ASSY. 6 FIGURE	1.000
13	2030-011	PINION SHAFT	1.000
12	2030-014	PINION GEAR	5.000
6	2030-017	WASHER, S/S VR#11071 619 KT	1.000
		NOSE CONE	
15	2030-006	NOSE CONE, 2030	1.000
		HOUSING ASSY.	
5	2030-004	HSG., FLOWMETER	1.000
NOT SHOWN	2030-020	LABEL MODEL 2032 & 2030	1.000
NOT SHOWN	48-2231	LABEL, ADH, 1'X4, 71-38967-2, GO, INC.	1.000
		IMPELLER ASSY.	
21	2030-000	SMALL IMPELLER, 0-30 KNOTS	1.000
24	48-0071G	SCREW, SET HEX, SOCK, 6-32 X 1/4	1.000
		LANYARD PIN ASSY.	
19	2030-103	PIN, LANYARD	1.000
17	48-0110A	SCREW, MACH, ROUND HD, 10-24X3/4CCRES	1.000
11	48-0410IS	WASHER, INT, STAR, #10, CRESS	1.000
27	65-6000	NICROPRESS CLAMP 1/16 COPPER	4.000
26	86-6000	MONOFIL.LINE 250LB TEST (1/16 DIA)	3.000
		END PLATE ASSY.	
16	2030-023	SMALL PLASTIC END PLATE 3.50.003	1.000
8	2030-024	RETAINING RINGS	1.000
30	48-0061A	MACH, SCREW, P/H, 5-40 X 1/4, CRESS	1.000
18	81-0004A	O-RINGS	1.000
NOT SHOWN	2030-021	SYRINGE 5C21G, 1-1/2	1.000

ELECRTONIC FLOWMETER PARTS
2031H

	PART NO.	DESCRIPTION	QTY.
		COUNTER ASSY.	
1	2030-022	WHEEL ASSY. 6 FIGURE	1.000
7	48-9954	MAGNET 1/8 DIA.X .14' NG RARE EARTH	2.000
13	2030-011	PINION SHAFT	1.000
12	2030-014	PINION GEAR	5.000
6	2030-017	WASHER, S/S VR#11071 619 KT	1.000
9	2030-10	MAGNET HOLDER	1.000
		NOSE CONE	
15	2030-006	NOSE CONE, 2030	1.000
		HOUSING ASSY.	
10	2030-029	HSG., FLOWMETER, HALL EFFECT	1.000
NOT SHOWN	2030-020	LABEL MODEL 2032 & 2030	1.000
NOT SHOWN	48-2231	LABEL, ADH, 1'X4, 71-38967-2, GO, INC.	1.000
		IMPELLER ASSY.	
21	2030-000	SMALL IMPELLER, 0-30 KNOTS	1.000
24	48-0071G	SCREW, SET HEX, SOCK, 6-32 X 1/4	1.000
		LANYARD PIN ASSY.	
19	2030-103	PIN, LANYARD	1.000
17	48-0110A	SCREW, MACH, ROUND HD, 10-24X3/4CCRES	1.000
11	48-0410IS	WASHER, INT, STAR, #10, CRESS	1.000
27	65-6000	NICROPRESS CLAMP 1/16 COPPER	4.000
26	86-6000	MONOFIL.LINE 250LB TEST (1/16 DIA)	3.000
		END PLATE ASSY.	
16	2030-023	SMALL PLASTIC END PLATE 3.50.003	1.000
8	2030-024	RETAINING RINGS	1.000
30	48-0061A	MACH, SCREW, P/H, 5-40 X 1/4, CRESS	1.000
18	81-0004A	O-RINGS	1.000
		CABLE AND SWITCH ASSY.	
36	51-0049	FLOWMETER PIG TAIL, 3 COND	1.000
31	59-0122	HALL SENSOR UGN 3040T SPRAGUE	1.000
35	52-0022	LOCKING SLEEVE, 5/8'' LG	1.000
34	48-1220	CABLE TIE LOCK 6-3/4 SST2S-CP	3.000
6	48-0406L	WASHER SPLIT #6 MED SIL BRONZE	1.000
NOT SHOWN	2030-021	SYRINGE 5C21G, 1-1/2	1.000

GENERAL OCEANICS
TYPES OF FLOWMETER SYSTEMS

2030R	Mechanical, W/ Standard Rotor
2030R2	Mechanical, W/ LOW Velocity rotor.
20307	With 7-digit counter.
20307R2	L.V. rotor and 7-digit count.
2031H	With hall sensor, electronic.
2031HR2	L.V. rotor, hall sensor.

READOUT FOR ELECTRONIC FLOWMETER 2031H AND 2031HR2

2035 MK IV	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 Rod - 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.)