

MIL-U-18033F (SHIPS)
AMENDMENT-2
28 July 1967

SUPERSEDING
Amendment-1
12 April 1963

MILITARY SPECIFICATION

UNDERWATER LOG EQUIPMENT

ELECTROMAGNETIC TYPE

This amendment forms a part of Military Specification: MIL-U-18033F (SHIPS), 20 November 1962.

- # Page 1, paragraph 2.1: Under "Specifications", "Military", "Standards", "Military", delete reference to "MIL-C-3655/2" and "MS3102", and, under "Specifications", "Military", add:

"MIL-B-23921 - Bronze, Nickel Aluminum Castings for Seawater Service".

- # Page 1, paragraph 2.1, continued: Under "Drawings" add:

"CHESAPEAKE INSTRUMENT CORPORATION

H3061 - Underwater Log Equipment (Electromagnetic Type) Outline and Installation

H3465 - Rodmeter Assembly IC/E-72-6F"

- # Page 2, paragraph 2.2: Delete:

"AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

B-148 - Specification for Aluminum Bronze Sand Castings."

- # Page 5, paragraph 3.4.1.2, line 3: Delete "5" and substitute "8".

1/CHANGES FROM PREVIOUS ISSUE. THE OUTSIDE MARGINS OF THIS DOCUMENT HAVE BEEN MARKED "#" TO INDICATE WHERE CHANGES (DELETIONS, ADDITIONS, ETC.) FROM THE PREVIOUS ISSUE HAVE BEEN MADE. THIS HAS BEEN DONE AS A CONVENIENCE ONLY AND THE GOVERNMENT ASSUMES NO LIABILITY WHATSOEVER FOR ANY INACCURACIES IN THESE NOTATIONS. BIDDERS AND CONTRACTORS ARE CAUTIONED TO EVALUATE THE REQUIREMENTS OF THIS DOCUMENT BASED ON THE ENTIRE CONTENT AS WRITTEN IRRESPECTIVE OF THE MARGINAL NOTATIONS AND RELATIONSHIP TO THE LAST PREVIOUS ISSUE.

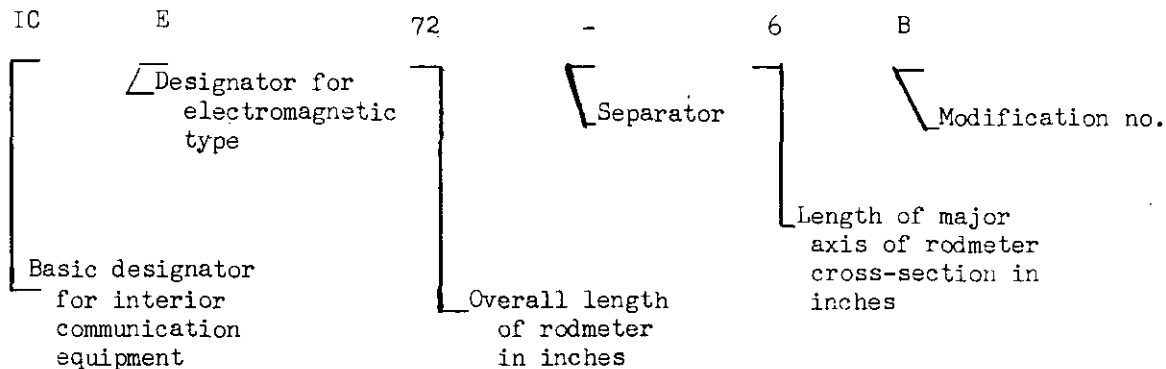
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Page 5, paragraph 3.4.1.3: Delete and substitute:

"3.4.1.3 Distance indication.- The error of conversion from speed to distance from above 4 knots to full scale shall not exceed 1 percent of the distance traveled, and the error from speed to distance from 0.5 to 4 knots shall not exceed 2 percent of distance traveled."

Page 5, paragraph 3.5.1: Delete and substitute:

"3.5.1 Rodmeters.- Rodmeters shall be of the types designated in the following form, as specified (see 6.1):



Standard lengths for rodmeters shall be 72 and 100 inches. The contour of the rodmeter shall be in strict accordance with that shown on Drawing 3,315,217. Herringbone on the sensing element shall be eliminated. The top portion shall consist of a detachable watertight terminal box not over 5 inches in diameter, which will accommodate one cable connector for the cable from the rodmeter to the indicator-transmitter. The cover of this box shall be of sufficient strength to act as a positive stop against a bearing surface secured to the structure of the ship to prevent the rodmeter from being forced out of the seavalue extension. This box shall be removeable such that the rodmeter can be ejected outboard from the ship, if necessary. The box shall be rotatable through 180 degrees in either direction, and shall be equipped with a connector in accordance with Chesapeake Instrument Corporation Drawing 3465 through which connections to the pickup plates and electromagnet shall be made. The main body of the rodmeter shall be constructed of nickel-copper alloy, class A, in accordance with QQ-N-286 and provide a working strength of at least 65,000 p.s.i. in the outer fibers. The lower 12 to 13 inches of the rodmeter which contains the sensing element, shall be fabricated from a type C plastic embedding compound in accordance with MIL-I-16923. The shell of this plastic section shall be reinforced with a suitable glass fabric or glass roving. The rodmeter shall be designed so as

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to reduce to a minimum, the tendency to foul from seaweed and marine growth, and the necessity for withdrawal for repairs or cleaning. The rodmeter shall not bend or twist, when in maximum extended position, when used at the maximum speed and depth for which the equipment is designed. The embedded sensing element shall consist of an electromagnet having an impedance such that 750 ± 5 percent milliampers flow through the coil when energized at 50 volts at 60 Hz. Under these operating conditions the rodmeter speed signal sensitivity, when measured at the pick-up buttons, shall be 325 ± 5 percent microvolts per knot. Quadrature or transformer voltage shall not exceed 50 microvolts. The pick-up plates in the sensing element of the rodmeter shall be constructed of material identical to that in the main body of the rodmeter, and shall be approximately $3/8$ inch in diameter. Throughout the speed range of 0 to 40 knots, the rodmeter shall not cavitate when operating in water at a depth of 3 feet."

Pages 5 and 6, paragraph 3.5.2: Delete and substitute:

"3.5.2 Indicator-transmitter.- The indicator-transmitter shall be of dripproof construction designed for bulkhead mounting, and shall have overall and mounting dimensions and cable connections shown on Chesapeake Instrument Corporation Drawing H3061. The indicator-transmitter shall be designed so that the internal units can be removed from the case or hinged to permit maintenance without disturbing the ship's wiring. Component subassemblies such as amplifiers shall be repairable and shall not be potted. Solid state devices shall be protected against transients of 3 milliseconds duration and 7 times their rated voltages. Adequate heat transfer provisions shall be made to permit full operation in ambient temperatures up through 149°F. Speed shall be indicated on a dial in accordance with figure 29 of Drawing 9000-S6504-73687, except that the dial diameter shall be 6-3/4 inches. Distance shall be indicated by means of a six-digit counter from 0000.00 to 9999.99 nautical miles; the first four numerals shall be white on dull black background; the last two numerals (tenths and hundredths) shall be black on dull white background. Digits on the distance counter shall be at least 1/4 inch high. These indications shall be visible through windows in the cover of the unit. The indicator-transmitter shall be designated type IT-C and shall comprise:

- (a) A feedback type servo system which shall convert the rodmeter speed voltage signal to visual indications of speed, and which shall position one type 37TRX6 to operate synchro repeaters at 40 knots per revolution, one type 18CX6 to transmit a speed signal of 100 knots per revolution, and three type 18CX4 synchros to transmit speed signals of 10, 40, and 100 knots per revolution to control transformers in navigation and fire control systems. Potentiometers used shall be dry, long life, precision type. The speed servo shall incorporate a device to permit changing the output response time from zero to full scale. The device

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shall have a manual-variable and an automatic variable mode of operation. Either mode of operation shall be selected by means of a switch which is accessible without removing the cover. In the manual variable mode of operation the output response time from zero to full scale shall be selected by means of a switch to be either 60 ± 10 seconds or $8 \pm 1/2$ minutes. In the automatic-variable mode of operation the output response rate shall be a function of speed error. If the absolute value of the indicated speed minus actual speed is less than 0.500 ± 10 percent knots the output rate of response shall be $8 \pm 1/2$ minutes for 0 to full scale. If the absolute value of the indicated speed minus actual speed is greater than 0.500 ± 10 percent knots than the output rate of response shall be 60 ± 10 seconds for 0 to full scale. Also, the speed servo shall incorporate a hand crank to permit hand positioning the speed servo to any speed throughout the range of 0 to 40 knots.

- (b) A solid state integrator (no moving parts) shall convert the speed indication to electrical pulses proportional to distance traveled. The output of the integrator shall drive a servo system (step motor) which shall convert the pulse rate to visual indication of distance traveled (6076.10 foot/mile) and rotate a type 37TRX6 synchro at a rate of 360 revolutions per nautical mile.
- (c) Devices that can be adjusted to correct for errors, both constant and variable with speed, which may be caused by flow characteristics in the region of the rodmeter sensing element. This shall consist of nine devices which will compensate plus or minus 0.40 knot at 4., 8., 12., 16., 20., 24., 28., 32., and 36 knot scale positions independently and without interaction with each other. In addition, a device shall be provided to compensate plus or minus 1 knot for error indications at zero speed and a scale factor adjustment which can adjust the scale factor plus or minus 4 knots. Accuracy between dial calibration and correction entered shall be ± 1.0 percent.
- (d) A dummy signal circuit which can supply speed signals in lieu of the rodmeter to check system operation continuously from 0 to 40 knots. Provision shall be made whereby the dummy signal circuit can be remotely operated. The remote dummy log speed control unit shall be enclosed, and shall contain lamps to indicate when the unit is connected to control the speed indicated.
- (e) An amplifier unit as specified in 3.5.3.

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- (f) All synchro transmitters and control transformers shall be in accordance with MIL-S-20708 and MIL-STD-710.
- (g) A four-digit running time meter which will provide accumulated hours of services. The devices shall operate whenever the 60 Hz power is applied to the indicator-transmitter.
- (h) Unpotted repairable plug-in circuit cards shall be utilized in the design of the indicator-transmitter. (All electronic components.)
- (i) A device to provide the excitation current to the rodmeter type IC/E/72-6F of:
 - (1) For general application--0.750 amperes at 60 Hz.
 - (2) For MSO application--see Confidential Amendment to this specification."

Page 7: Delete figure 1.

Page 8, paragraph 3.5.4: Delete and substitute:

"3.5.4 Seavalve assembly (see 6.1).-

"3.5.4.1 Seavalve assembly (surface ships).- The seavalve assembly shall consist of a valve, a rodmeter packing or sealing gland, and a hull fitting or flange in accordance with Drawing 3,304,063. The main body of the seavalves shall be cast of aluminum bronze in accordance with MIL-B-23921. Repair of castings shall be in accordance with MIL-STD-278. The top cover piece for the rodmeter packing gland shall have a 3-inch cup-well designed to hold the rodmeter in alignment for passing into the packing gland, and to permit a small "alarm" stream of water to squirt up if a broken rodmeter should be withdrawn beyond the packing gland when the valve gate is still open. The hull fitting or flange shall be similar to the hull bearing specified herein, having a "cutlass" type bearing to cushion the rodmeter at the hull line. The seavalve, both opened and closed, shall withstand for 1 hour without leakage, deformation, or operational failure, a hydraulic pressure of 750 p.s.i. When both opened and closed the valve shall withstand a test pressure of 1500 p.s.i. In addition, the valve shall withstand the simulated depth charge test outlined in MIL-I-983. The seavalve shall be designated type SV-C.

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"3.5.4.2 Seavalve assembly (submarines).- The seavalve assembly shall consist of a valve, a rodmeter packing or sealing gland, and a hull fitting or flange in accordance with Drawing 3,304,063. The main body of the seavalves shall be cast of nickel aluminum bronze in accordance with class 4 (heat treated) of MIL-B-16033. The nickel aluminum bronze shall contain a minimum of 4 percent nickel. Repair of castings shall be in accordance with MIL-STD-278. The top cover piece for the rodmeter packing gland shall have a 3-inch cup-well designed to hold the rodmeter in alignment for passing into the packing gland, and to permit a small "alarm" stream of water to squirt up if a broken rodmeter should be withdrawn beyond the packing gland when the valve gate is still open. The hull fitting or flange shall be similar to the hull bearing specified herein, having a "cutlass" type bearing to cushion the rodmeter at the hull line. An additional fitting, a hull bearing (see 6.1), shall be furnished. This bearing shall be of the "cutlass" bearing type, and shall be generally in accordance with Drawing 3,304,063. The seavalve, both opened and closed, shall withstand for 1 hour without leakage, deformation, or operational failure, a hydraulic pressure of 750 p.s.i. When both opened and closed the valve shall withstand a test pressure of 1500 p.s.i. In addition, the valve shall withstand the simulated depth charge test outlined in MIL-I-983. The seavalve shall be designated type SV-C. Each valve including the hull fitting shall be radiographed in accordance with MIL-STD-271. The valve shall have a by-pass feature to bleed pressure around the gate permitting unaided opening at full test pressure."

Page 11, paragraph 5.1.1.2, line 4: Delete "Unifrom" and substitute "Uniform".

Page 12, paragraph 6.1, item (g): Delete and substitute:

"(g) Whether hull bearing is required (see 3.5.4.2)."

Page 12, paragraph 6.1: Add as item (1):

"(1) Whether surface or submarine seavalve is required (see 3.5.4)."

Preparing activity:
 Navy - SH
 (Project 6320-N011)