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NAVAL APPLIED SCIENCE LAB BROOKLYN N Y  
CABLE, ELECTRO-MECHANICAL TOW TYPE AN/SQA-13 (NEW) FOR VARIABLE--ETC(U)  
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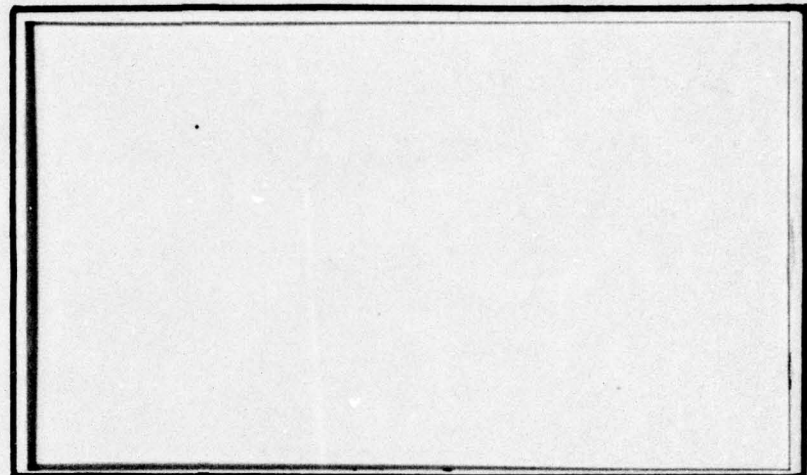
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# TECHNICAL MEMORANDUM

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CABLE, ELECTRO-MECHANICAL TOW  
TYPE AN/SQA-13 (NEW)  
FOR  
VARIABLE DEPTH SONAR APPLICATIONS.

SF001-03-02, TASK 8366

⑬ F00103

LAB. PROJECT 9400-53, TECHNICAL MEMORANDUM 5 ✓

⑪ 21 SEP 1964

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- Ref: (a) BUSHIPS ltr 9670/13 Ser 689A-464 of 12 Sep 1961  
(b) NAVAPLSCIENLAB Program Summary dated 1 May 1964, SF001-03-02, Task 8366  
(c) FONECON BUSHIPS, Code 689A (Mr. G. Skidmore) and Code 632G (Mr. H. Shipley) to NAVAPLSCIENLAB, Code 9360 (Mr. C. Chatten)  
(d) Conference at Telephonics Corp., Huntington, N. Y., 20 Jul 1964 - Messrs S. H. Behr and J. Macco, NAVAPLSCIENLAB; Messrs P. Hlesciak and M. Jackson, Telephonics; and Messrs J. Statz and W. Brown, A.S.&W. Co.  
(e) Telephonics Corp. purchase specification 13075-141-2 for original 35 conductor AN/SQA-13 cable

Appendix: A- Tentative Specification for AN/SQA-13 (NEW) Cable (47+1 Common Return Conductor) (5 pp, 1 Table and 1 Figure)

1. The U. S. Naval Applied Science Laboratory is conducting investigations to improve the performance of electro-mechanical tow cables for variable depth sonar applications in accordance with references (a) and (b). As a result of reference (c), this Laboratory prepared a tentative contract specification for the design of a new type AN/SQA-15 (48 conductor) towline to be purchased by the Telephonics Corporation, Huntington, New York. Consultation services were furnished during a review of the specification on the occasion of reference (d) and mutual agreement concerning the cable make-up and construction was reached. A copy of the proposed specification is forwarded under Appendix A.

2. The general design features proposed in a preliminary draft of the specification as prepared by this Laboratory were accepted by the conferees during reference (d). The major cable design modifications made in this specification compared to reference (e) construction follow:

a. The color coding scheme for the ANG #22 conductors was arranged as shown under Appendix A to assist the purchaser in determining visually whether a single wire crossover exists within a cable length.

b. The interstices between insulated conductors will be made axially water-tight with an elastomeric sealing compound to eliminate compound migration within the cable when it is run over a sheave and being compressed.

c. Rubber filled fabric tape will be heat bonded to the inner and outer sheath surface to provide a stronger and more abrasion resistant cable jacket.

d. The lay of the outer layer of armor wires will be right-hand as requested by BUSHIPS, Code 632G.

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- e. The ultimate cable strength is 70,000 pounds minimum and the overall diameter 1.02 inches.
- f. Hydrostatic tests for both sheath imperviousness and axial water flow are included under "Cable Tests and Requirements."
- g. Requirements for no damage under load when operated over a sheave and minimum twisting under load are included under "General Requirements and Notes."
- h. A guarantee of "no mechanical or electrical failure of the cable under normal handling and towing operations" has been included under paragraph 6.0.

3. The U. S. Naval Applied Science Laboratory considers the cable design described under Appendix A acceptable for the intended AN/SQA-13 (NEW) application. However, because of the American Steel and Wire Company cable armoring machinery limitation of being able to apply only a maximum of 24 wires per layer, the resultant cable overall diameter and ultimate strength depend upon the geometric armoring factor that will match the limitations of the armoring machine. As an example, the original design of the AN/SQA-13 (NEW) cable made by this Laboratory was for a cable with 60,000 pound ultimate strength and approximately 0.93 inch overall diameter. The final design under Appendix A, based on American Steel and Wire Company armoring machinery, has a breaking strength of 70,000 pounds and is 1.02 inches in diameter. In the interest of obtaining cables of minimum diameter to reduce towing drag and with ultimate strength as required from design parameters, this Laboratory is surveying other cable manufacturers' capabilities in manufacturing VDS tow cables.

TABLE I

CONDUCTOR COLOR CODE

CONDUCTOR NUMBER	BLK	WHT	RED	GRN	ORN	BLU	BRN
	1	3	4	5	6	7	8
	2	10	11	12	13	14	15
	9	17	18	19	20	27	28
	16	23	24	25	26	34	35
	21	30	31	32	33	41	42
	22	37	38	39	40		
	29	44	45	46	47		
	36						
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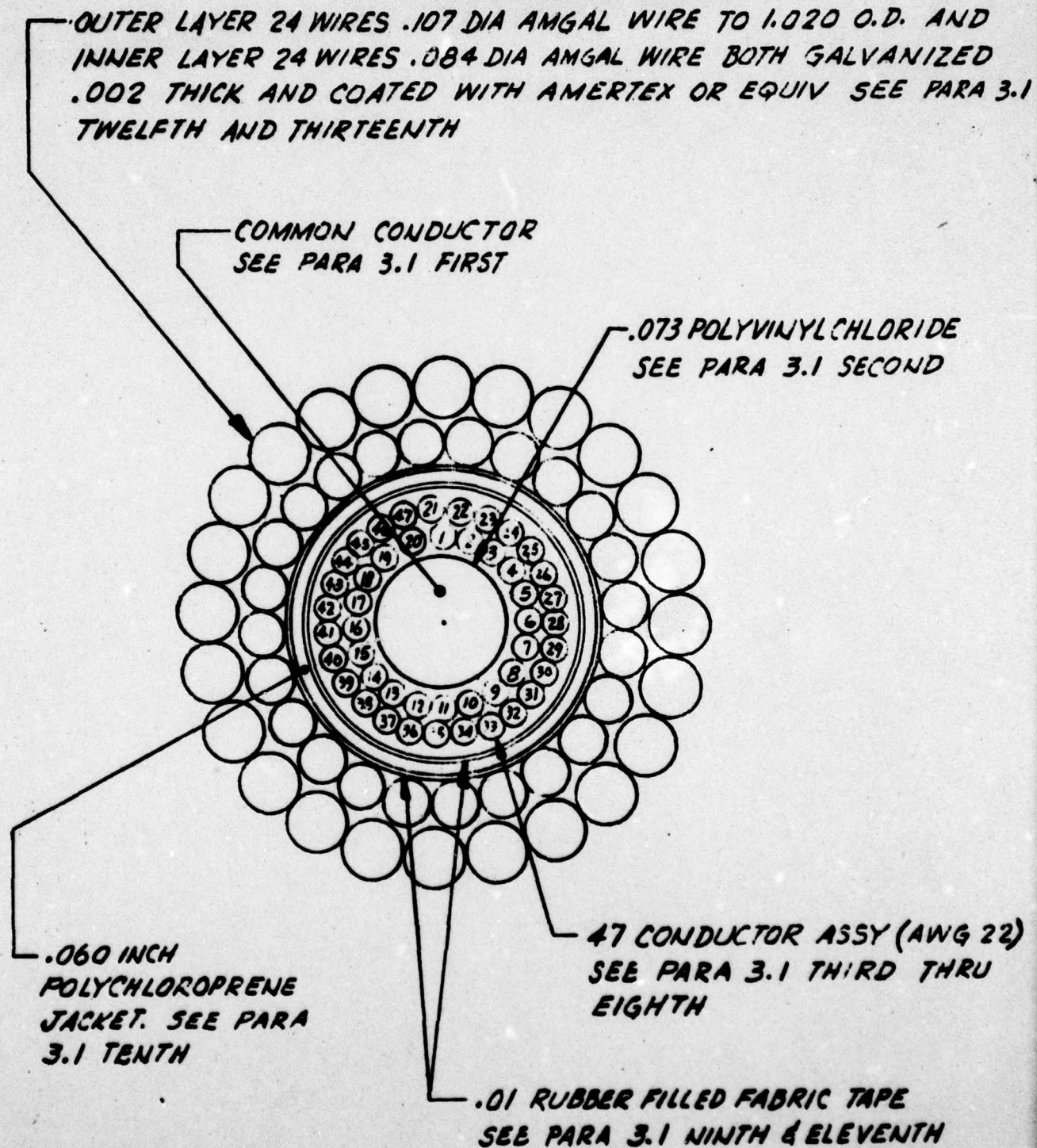


FIGURE 1

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APPENDIX A

TENTATIVE SPECIFICATION FOR

AN/SQA-13 (NEW) CABLE

(47+1 COMMON RETURN CONDUCTOR)

TENTATIVE SPECIFICATION FOR AN/SQA-13 (NEW) CABLE

(47 + 1 COMMON RETURN CONDUCTORS)

1.0 SCOPE:-

1.1 This specification covers the procurement of an electro-mechanical tow cable.

2.0 GENERAL:-

2.1 The cable furnished under this specification shall be constructed as described to provide a watertight assembly that will meet with the performance test requirements. The materials used shall be of a type and quality to assure physical and electrical compatibility to meet the requirements as specified by contract.

3.0 CONSTRUCTION:-

3.1 The nominal construction shall be as follows:

First:

A center conductor comprising 19 strands, each .0253 inch diameter tinned annealed copper made watertight with a strand sealing material to meet a hydrostatic test. Diameter over the stranded conductor shall be approximately 0.130 inch.

Second:

A covering of 0.073 inch thick polyvinylchloride insulation measuring approximately 0.276 inch outside diameter.

Third:

20 Conductors, AWG size 22 of 7 strand 0.010 inch annealed tinned copper wire made axially watertight with strand sealing compound to meet the hydrostatic test. Conductors shall be color coded as shown under table I and figure 1 and shall be applied with a left hand lay.

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Fourth:

Polypropylene insulation around each conductor with a minimum thickness of 0.008 inch to an approximate outside diameter of 0.046 inch.

Fifth:

The interstices between insulated conductors shall be filled with a pliable, low bonding, non-deteriorating and non-contaminating sealing material which will effectively prevent the axial flow of water to meet test requirements. An approved separator tape may be used over these cabled conductors at the manufacturers option.

Sixth:

27 Conductors of the same size as described under "Third" applied with a right hand lay.

Seventh:

Insulated conductors same as "Fourth". Conductors shall be color coded as shown under table I and figure 1 and to be applied with a right hand lay.

Eighth:

Water sealing same as "Fifth".

Ninth:

A layer of 0.010 inch thick rubber filled fabric tape shall be applied with a lap.

Tenth:

A dense, homogeneous, oil and grease resistant, waterproof polychloroprene jacket applied concentrically and with a minimum thickness of 0.060 inch to an approximate outside diameter of 0.615 inch.

Eleventh:

A rubber filled fabric tape 0.010 inch thick and applied with a lap. The curing of the polychloroprene shall provide a strong bond to the inner and outer rubber filled tapes.

Twelfth:

An inner layer of armor wires applied with a left hand lay. The armor wires shall consist of 24 wires of 0.084 inch diameter improved plow steel and have a galvanized coating approximately .002 inch thick. The diameter over the armor wires shall be approximately 0.800 inch. Each armor wire is to be coated with a non-water soluble lubricating material such as Amertex (equivalent or better).

Thirteenth:

An outer layer of armor wires wound with a right hand lay. The armor wires shall consist of 24 wires of 0.107 inch diameter improved plow steel and have a galvanized coating approximately .002 inch thick. The maximum diameter over these wires shall be 1.020 inches. Each armor wire shall be coated with a non-water soluble lubricating material such as Amertex (equivalent or better).

**4.0**      CABLE TESTS AND REQUIREMENTS:-

4.1      Sampling and testing procedures shall be in accordance with the referenced specification as applicable.

- a) Visual and dimensional (MIL-C-915A).
- b) Sheath physical properties (MIL-C-915A).
- c) Proof voltage (MIL-C-915A)
  - 1) Conductor to armor    800 volts, A.C.
  - 2) Conductor to conductor    1600 volts, A.C.

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- d) Insulation resistance (MIL-C-915A)  
100 megohms-1000 feet minimum at 15.5°C  
between any conductor and all others  
connected to armor.
  - e) Capacitance approximately 85 mmfd/foot  
between any AWG #22 conductor and all others  
connected to armor.
  - f) Conductor resistance, D.C. (MIL-C-915A)
    - 1) AWG #22 conductors - 16.4 ohms per  
1000 ft. (max.).
    - 2) Center conductor - 0.89 ohms per 1000  
ft. (max.).
  - g) Breaking strength of cable shall be 70,000  
pounds minimum.
  - h) Water Leakage (sheath) MIL-C-915A except  
a water pressure (only) test shall be made  
at 450 p.s.i. on selected lengths.
  - i) Watertightness (MIL-C-915A) of complete  
cable core (axial flow). There shall be  
zero water leakage through a five foot cable  
specimen when subjected to 25 p.s.i.

## 5.0

GENERAL REQUIREMENTS AND NOTES:-

5.1 The length of lay of the inner and outer layer of insulated conductors shall be sufficient to provide adequate flexibility and prevent damage when the completed cable is operated over a sheave 32 inches in diameter with a 16000 lb. load.

5.2 The length of lay of the inner and outer armor wires shall be such that minimum rotation (twisting) will occur when the cable is operating under load.

5.3 The finished cable shall be marked off in 100 foot intervals.

5.4 The finished cable shall be wound on a suitable size reel and prepared for domestic shipment in accordance with the requirements of specification MIL-C-915A unless otherwise specified.

5.5 The cable manufactured under this specification shall be subject to government inspection as directed by the Inspector of Naval Material.

5.6 Unless otherwise specified, certified test reports shall accompany the shipment of each reel of cable.

6.0 GUARANTEE: -

6.1 There shall be no mechanical or electrical failure of the cable under normal handling and towing operations for a minimum of 2000 hours of towing or one year of service, whichever comes first.

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