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NAVY EXPERIMENTAL DIVING UNIT PANAMA CITY FL
FIRST ARTICLE TEST OF THE MK I MOD 0 MASK (U.S. DIVER'S), (U)
MAR 80 D J SCHMITT
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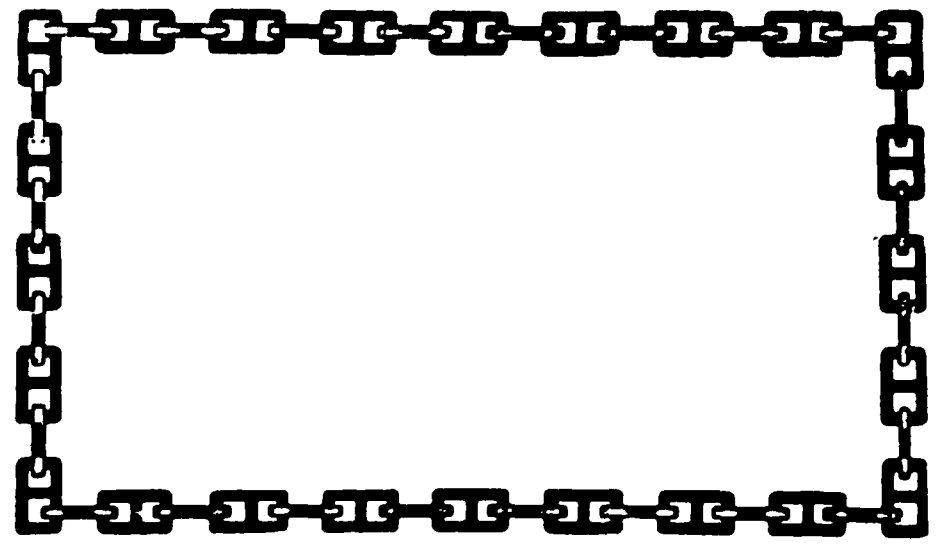


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DEPARTMENT OF THE NAVY
NAVY EXPERIMENTAL DIVING UNIT
PANAMA CITY, FLORIDA 32407

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FIRST ARTICLE TEST OF THE
MK I MOD 0 MASK (U.S. DIVER)

D. J. SCHMITT

MARCH 1980

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Submitted by:

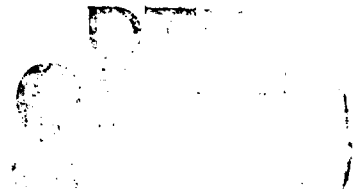
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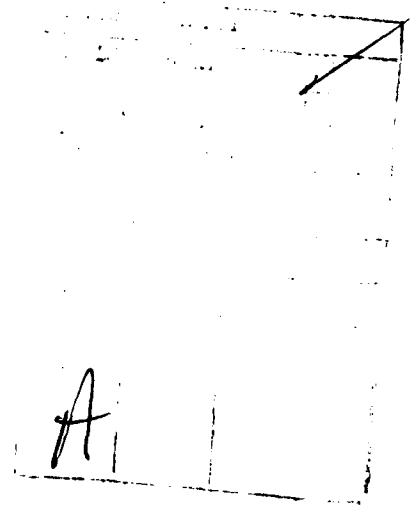
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A

Abstract

A MK I Mod 0 First Article Test, produced under U.S. Government Contract N-0024-79-C-4259 by U.S. Divers Company, Santa Ana, CA., was evaluated by Navy Experimental Diving Unit to determine if the First Article satisfactorily met contract drawing and performance specifications. Test results showed that the First Article performed in a satisfactory manner, and NEDU recommends that U.S. Divers Company be authorized to continue full production under contract specifications.

I. INTRODUCTION

A. Objectives

By direction of Commander, Naval Sea Systems Command (NAVSEA), (reference 1), the U.S. Navy Experimental Diving Unit has been designated the MK I Mod 0 Interim Configuration Manager. In this capacity, NEDU was tasked to conduct the MK I Mod 0 First Article Test under U.S. Government Contract N0024-79-C-4259, awarded to U.S. Divers Company, Santa Ana, CA.

B. Background

The U.S. Navy MK I Mod 0 Mask has been in active fleet diving commands for approximately five years. An adaptation of the U.S. Divers Kirby-Morgan KMB-9, the MK I Mod 0 Bandmask has been manufactured for Navy issue by the following contracts: Contract N0024-76-C-5477 U.S. Divers Company and Contract N0024-76-C-4184 Morse Diving Equipment Company, Inc. The current contract (N-0024-79-C-4259, U.S. Divers Company) called for First Article Testing to be conducted at Navy Experimental Diving Unit, Panama City, Florida. However, due to an NEDU manned saturation dive, and conflicting priorities with unmanned test facilities, equipment and personnel were not available to support First Article Testing at NEDU during the required time period. Therefore, by references 2 and 3, First Article Tests were conducted onsite at U.S. Divers Company, Santa Ana, CA., by two NEDU representatives during the period 2-15 December 1979, utilizing reference 4 as the approved NEDU Test Plan scenario.

II. DESCRIPTION

The MK I Mod 0 First Article test was conducted onsite at U.S. Divers Company, Santa Ana, CA, during the period 2-15 December 1979. A total of ten work days were required to set up the test equipment, conduct First Article testing, and to perform post-test disassembly of the test equipment. Following the First Article tests, a written response from NEDU to NAVSEA OOC-3 was forwarded (reference 5) providing notification of successful completion of the First Article Test.

III. TEST PROCEDURES

A. Preliminary Arrangements

The following test equipment was required to conduct MK I Mod 0 First Article Testing. Numbers in parentheses refer to items of test equipment shown in Figures 1, 2, 3, 4, and 5.

1. MK I Mod 0 Mask (1)

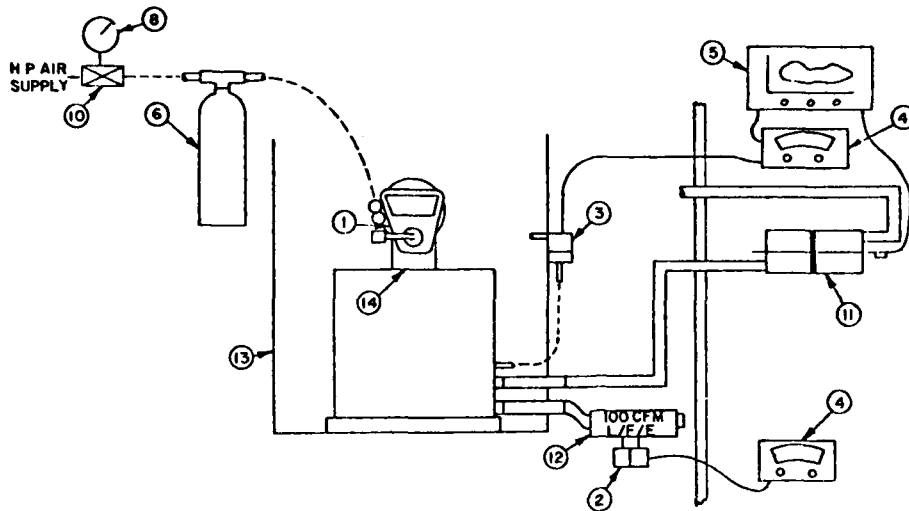


FIGURE 1. SETUP FOR TEST

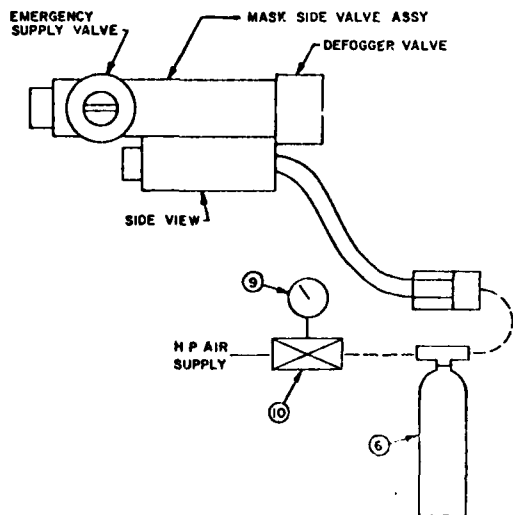


FIGURE 2. SETUP FOR TEST - Continued

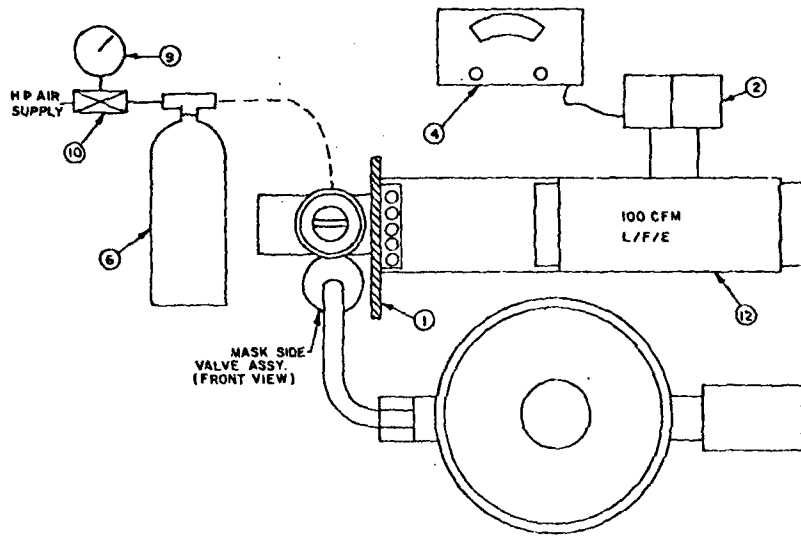


FIGURE 3. SETUP FOR TEST - Continued

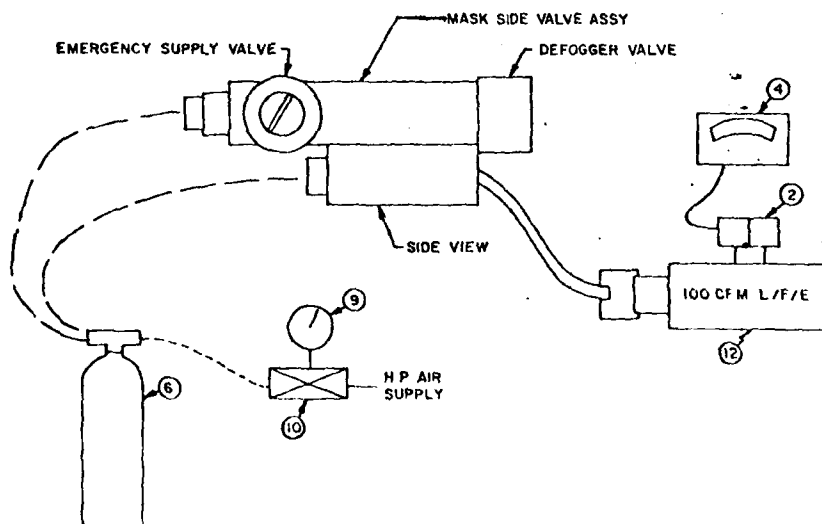


FIGURE 4. SETUP FOR TEST - Continued

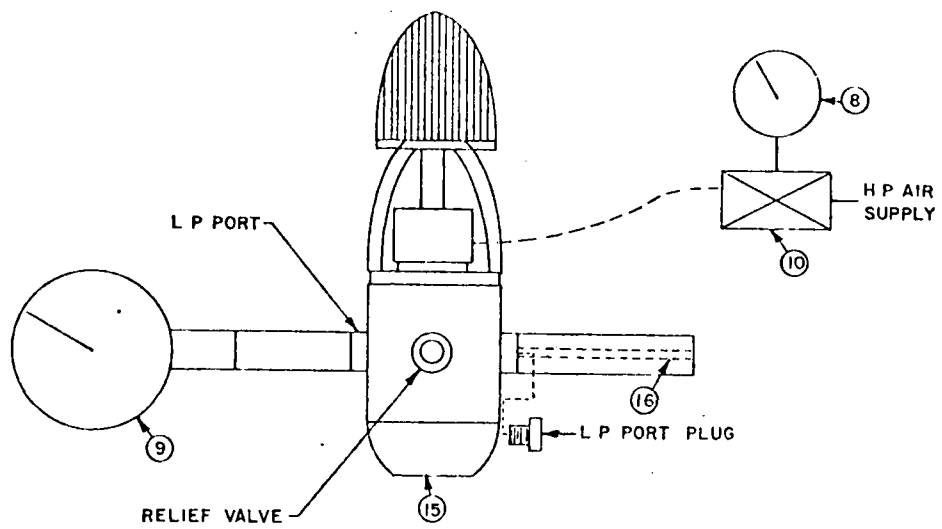


FIGURE 5: SETUP FOR TEST - Continued

2. Validyne Pressure Transducer with 0.50 psig diaphragm (2)
3. Validyne Pressure Transducer with 1.00 psig diaphragm (3)
4. Two Validyne CD-12 Transducer-Indicators (4)
5. X-Y Plotter (5)
6. Scuba Tank, 71.5 cw ft (6)
7. U.S. Divers Test Chamber (7)
8. Air Pressure Gauge, 0 to 3000 psig (8)
9. Air Pressure Gauge, 0 to 300 psig (9)
10. Dome Loader (10)
11. Breathing Machine with Piston Position Transducer (11)
12. Laminar Flow Element (LFE), 100 scfm (12)
13. Wet Test Box (13)
14. Mannikin Head (14)
15. First Stage Regulator with Relief Valve (15)
16. Flow Orifice, 0.03 0.001 dia X 1.700 long (16)

B. Controlled Parameters

During the test, the following parameters were controlled:

1. Supply pressure to sideblock
2. Supply pressure to first stage regulator
3. Position of "dial-a-breath" knob on second stage regulator
4. Position of defogger and emergency valve on sideblock
5. Static outlet pressure from first stage regulator

C. Measured Parameters

During the test, the following parameters were measured:

1. Flow into oral-nasal cup from second stage regulator

2. Flow out of side valve defogger
3. Flow out of tubing between side valve and second stage regulator
4. P (pressure differential) in oral-nasal cup
5. Relief valve setting on first stage regulator
6. Dynamic pressure at first stage outlet under various conditions
7. Leak integrity under all test conditions

D. Man-Hours Required for Test

The following NEDU man-hours were required for first article testing of the MK I Mod 0 Mask.

	<u>Man-Hours</u>
Complete setup/cleanup	2 men 80 MHR = 160
Reporting	1 man 16 MHR = 16
Duplicating	1 man 8 MHR = 8
TOTAL Man-Hours Required	184

IV. RESULTS AND DISCUSSIONS

A. MK I Mod 0 Inspection

A complete inspection of the mask was made in accordance with the receiving check list. The mask was checked for damaged or missing parts. The lens was checked for cracks, scratches and distortion, and the lens retaining screws were checked for tightness. The function of the nose clearing device was verified. MK I Mod 0 hood, spider and oral nasal mask were inspected for tears, cracks and deterioration. Finally, all metal parts were checked for corrosion, peeling, chipping, galling between mating parts, nicks, and burs. No defects were observed.

B. Second Stage Regulator Test

The test equipment was set up for this test as shown in Figure 1. The defogger and emergency valves were closed, and the second stage regulator was supplied air pressure at 60 psig. The dial-a-breath knob was turned fully out, and the Laminar Flow Gauge (LFG) indicated a free flow condition in the mask.

C. Side Valve Assembly Test

The test equipment was set up as shown in Figure 2 and the defogger and emergency valves were closed. Air supply was connected to the check valve body and set for 120 to 130 psig. Flow at the tubing outlet was measured at 54 scfm. A minimum flow at the outlet of 30 scfm is specified. The air supply was then adjusted between 245 and 255 psig, and flow at the tubing outlet was measured at 70 scfm. A minimum of 60 scfm is required. The air supply was then connected to the emergency valve and the emergency and defogger valves were opened. Air supply was set between 120 and 130 psig, and a flow of 31 scfm was attained. A minimum flow at the tubing outlet of 25 scfm is specified.

D. First Stage (Emergency) Regulator Test

The test equipment was set up as shown in Figure 5. A plug was installed in place of the orifice and air supply was adjusted to 250 + 50 psig (static). The first stage outlet pressure was adjusted to 175 + 25 psig to verify that the relief valve lifted within this range. The relief valve lifted at 190 psig. Burst strength of the hose between the first stage regulator and the side valve was verified to be 1600 psig, as specified in the contract drawings.

E. Emergency Cylinder

The hydrostatic test date on the emergency cylinder was 1-79, the + denoted that the tank can receive 10 percent overfill. The bottle was charged to 2500 psig, and the "K" valve was checked for leaks. The bottle was drained to 50 psig and checked for leaks again. None were observed.

F. Umbilical Test

The lifeline was verified to be 1/2 inch braided line with a breaking strength of 7000 pounds. The pneumofathometer hose and gas supply hose, both Swan hoses, are in accordance with military specification H-2815-E. The umbilical was pressurized to 300 psig and dip tested. No leaks were observed.

G. Tool Kit

The tool kit was inventoried and verified to contain the proper equipment as specified in the contract.

V. CONCLUSIONS AND RECOMMENDATION

A. Conclusions

The MK I Mod 0 First Article produced under the U.S. Government Contract No. N0024-79-C-4259 Item 002, U.S. Divers Company, Santa Ana, CA, successfully passed First Article Testing.

B. Recommendation

It is recommended that NAVSEA authorize U.S. Divers Company to proceed with production of MK I Mod 0 Lightweight Diving Equipment under Contract No. N0024-79-C-4259.

It should be noted that 1980 will be the last year steel cylinders will be manufactured by commercial contractors. Aluminum cylinders must be specified for the next MK I Mod 0 procurement contract.

VI. REFERENCES

1. NAVSEA OOC-3 Task 5-78 dated 7 Feb 1978
2. NEDU ltr 3933 Ser 451 dated 20 Nov 1979
3. U.S. Divers ltr dated 28 Nov 1979
4. NEDU Test Plan 79-59 dated Nov 1979
5. NEDU ltr 3933 dated 21 Dec 1979