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EVALUATION OF KMB-10 BANDMASK.(U)
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NAVY EXPERIMENTAL DIVING UNIT

DEPARTMENT OF THE NAVY
NAVY EXPERIMENTAL DIVING UNIT
Panama City, Florida 32401

NAVY EXPERIMENTAL DIVING UNIT
REPORT 11-76

(6) EVALUATION OF KMB-10 BANDMASK.

(10) HTC(DV) C.G. GIBSON

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ABSTRACT

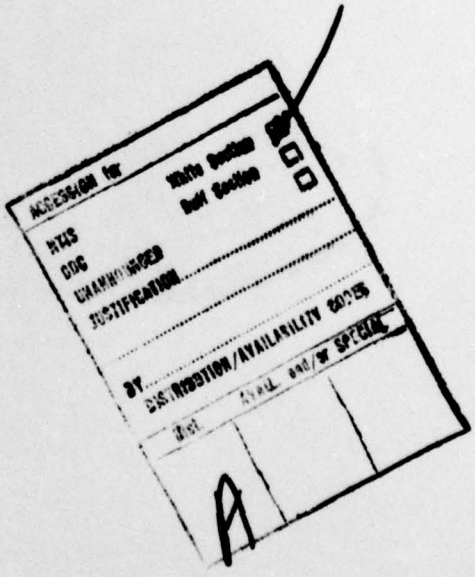
To evaluate the performance of the U.S. Divers KMB-10 Bandmask, it was tested by the Navy Experimental Diving Unit in Chamber C. Testing was conducted as specified in MIL-R-24169A for a simulated breathing test.

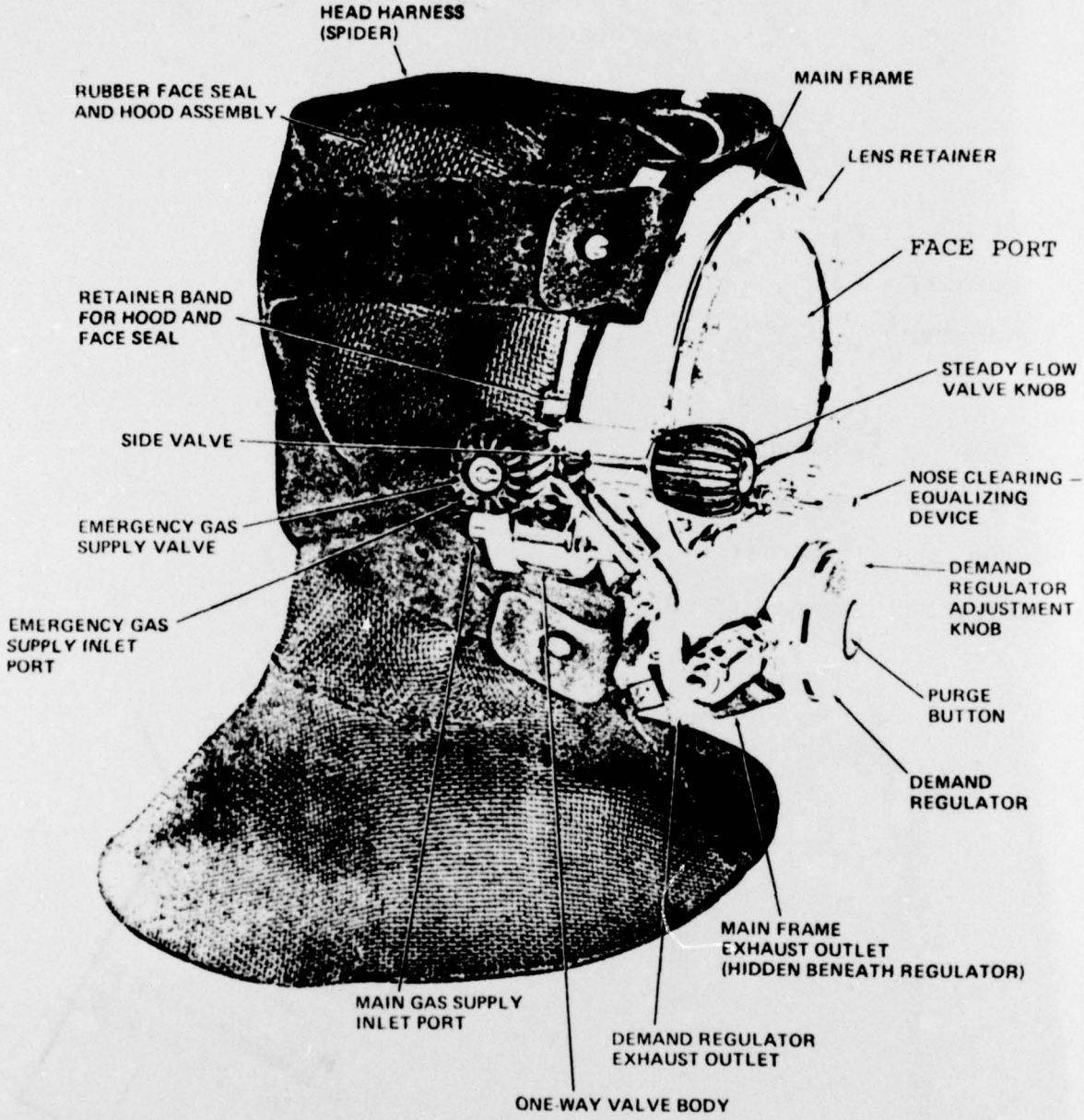
The bandmask was tested using a volume of 2 liters set at 20 breaths per minute. At this rate, the KMB-10 performance was totally unsatisfactory.

At the request of the test engineer, who noted a shortage of air supply at 100-psig overbottom pressure, an increase was made to 180 psig. The test engineer considered the KMB-10 capable of performing well at this setting.

Inhalation and exhalation pressures were not satisfactory at more than 150 feet of sea water (fsw); therefore, the KMB-10 is not recommended for service use or as a replacement for the KMB-8 or KMB-9 without modification by the vendor. When the KMB-10 Bandmask is modified, further testing is recommended.

TABLE OF CONTENTS





KMB-10 BANDMASK

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

To evaluate the performance of the U.S. Divers KMB-10 Bandmask, it was tested by the Navy Experimental Diving Unit in Chamber C. Testing was conducted as specified in MIL-R-24169A for a simulated breathing test. The bandmask was tested using a volume of 2 liters set at 20 bpm. At this rate, the KMB-10 performance was unsatisfactory. At the request of the test engineer, who noted a shortage of air supply to the mask at 100-psig

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overbottom pressure, an increase was made to 180 psig. The test engineer considered the KMB-10 capable of performing well at this setting. Inhalation and exhalation pressures were not satisfactory at more than 150 fsw; therefore, the KMB-10 is not recommended for service use or as a replacement for the KMB-8 or KMB-9 without modification by the vendor. When the KMB-10 Bandmask is modified, further testing is recommended.

INTRODUCTION

The KMB-10 Bandmask manufactured by U.S. Divers was developed from the KMB-8 and KMB-9 models in answer to a growing demand for these units in the fleet/shore station. The Navy Experimental Diving Unit conducted evaluation testing of the KMB-10 Bandmask on September 11, 1975.

Because the KMB-10 is basically a demand regulator that operates on the same principles as a second stage on a single-hose regulator, testing was conducted in accordance with MIL-R-24169A, which covers the requirements for single-hose, nonmagnetic air regulators.

TEST EQUIPMENT

Testing the KMB-10 Bandmask in Chamber C of the NEDU ocean simulation facility required the use of a respiratory simulator (breathing machine), Validyne pressure transducer DP-15, Validyne transducer indicator CD-12, and MFE x-y plotter 715M.

TEST PROCEDURE

The test equipment was arranged as shown in Figure 1. Test depths ranged from 0 through 199 fsw in 33-foot increments and readings were taken at each test depth. All tests were made with the unit underwater with supply pressures of 100 and 180 psig above ambient bottom pressure. The breaths per minute (bpm) were varied at 20, 25, 30, and 35. A Validyne DP-15 pressure transducer was used to sense differential pressure. The transducer signal was conditioned by a Validyne CD-12 transducer indicator and results were recorded with an MFE-715M x-y plotter.

As outlined in MIL-R-24169A, the simulated breathing test was performed with a tidal volume of 2 liters set at 20 breaths per minute.

The overbottom pressure was increased during the test to 180 psig at the request of the test engineer, who noted a shortage in the air supply to the mask at 100 psig. With the increase, the test engineer considered the KMB-10 capable of performing well.

RESULTS

All test data were evaluated on the basis of the performance limits given in MIL-R-24169A governing single-hose regulators. The results are shown graphically in Figures 2 and 3.

EXHALATION PRESSURE

The measured exhalation pressure resistance levels were unacceptable at all depths and pressures tested except for 66 and 99 feet of sea water at 20 bpm. In all other tests, the exhalation pressures were outside the limits specified. The exhalation resistance was also outside the specified limits at 35 bpm, a rate used only for heavy work and for short periods of time.

For record purposes only the breathing test was conducted at 35 bpm, using 2-liter volume both at 100- and 180-psig overbottom pressure (see Figure 3). Under these test conditions, the KMB-10 Bandmask performance was totally unacceptable.

INHALATION PRESSURE

Inhalation pressure, at 35 bpm and 100-psig overbottom pressure, was outside the specified limits from 53 fsw. Only at 20 bpm could the inhalation readings meet specification requirements.

At 35 bpm and 180-psig overbottom pressure, inhalation pressure was acceptable only to a depth of 150 fsw.

MAN-HOURS REQUIRED FOR TEST

Man-hours required for testing the KMB-10 Bandmask were as follows:

	Man-hours
Chamber C, 3 men, 8 hours	24
Reporting, 2 men, 8 hours	16
Duplicating, 1 man, 4 hours	4
Total	44 Man-hours

CONCLUSIONS AND RECOMMENDATIONS

For the KMB-10 Bandmask to be accepted for service use or as a replacement for the KMB-8 or KMB-9 models, it must perform within the limits given in MIL-R-24169A to 200 fsw. As the KMB-10 failed to perform as specified, it is not recommended for Navy approval.

With some modification, the KMB-10 could probably be made to perform within specified limits. If U.S. Divers modify the KMB-10 Bandmask, however, further testing is recommended.

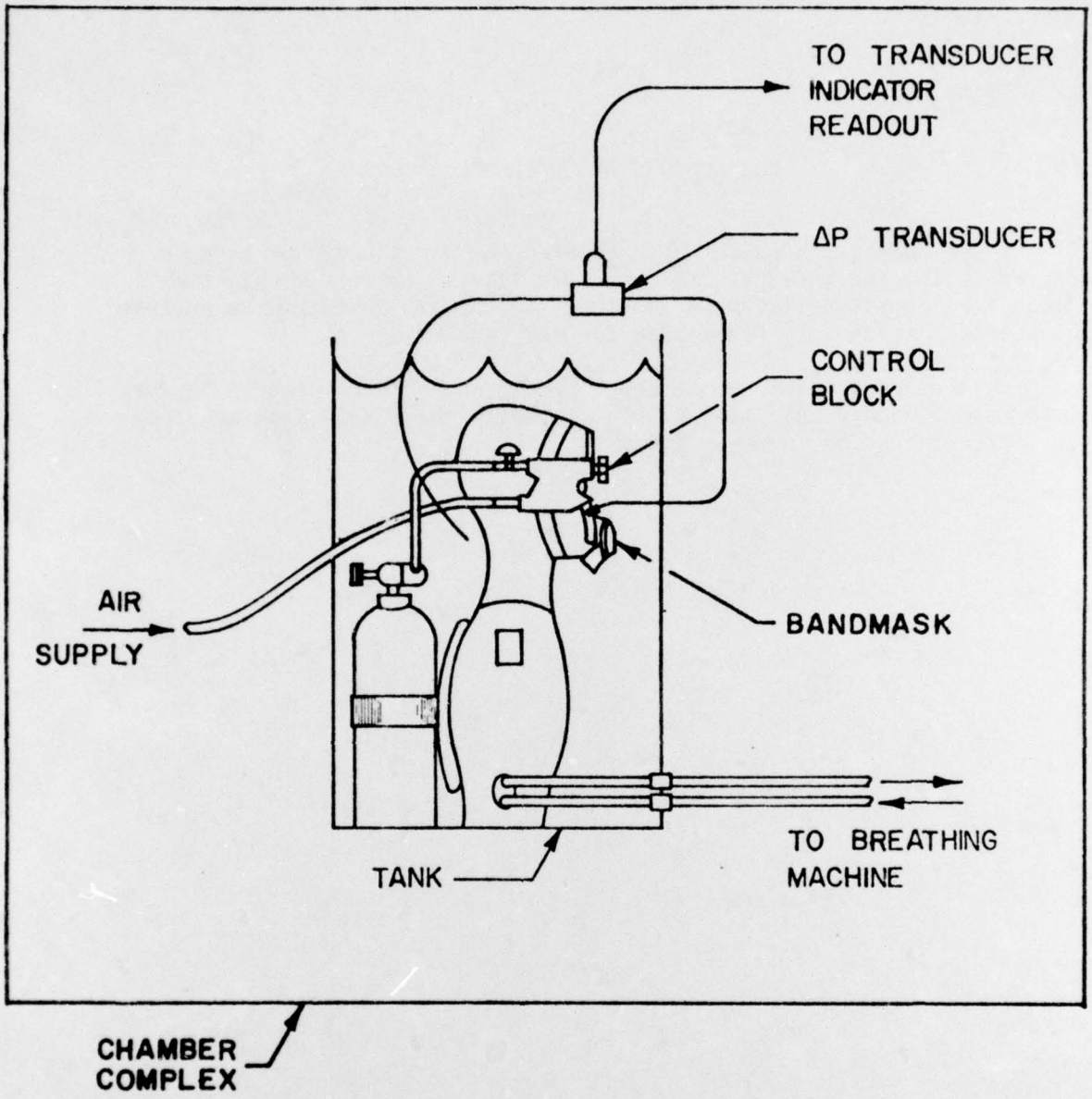

FIGURE 1. BANDMASK EQUIPMENT TEST ARRANGEMENT

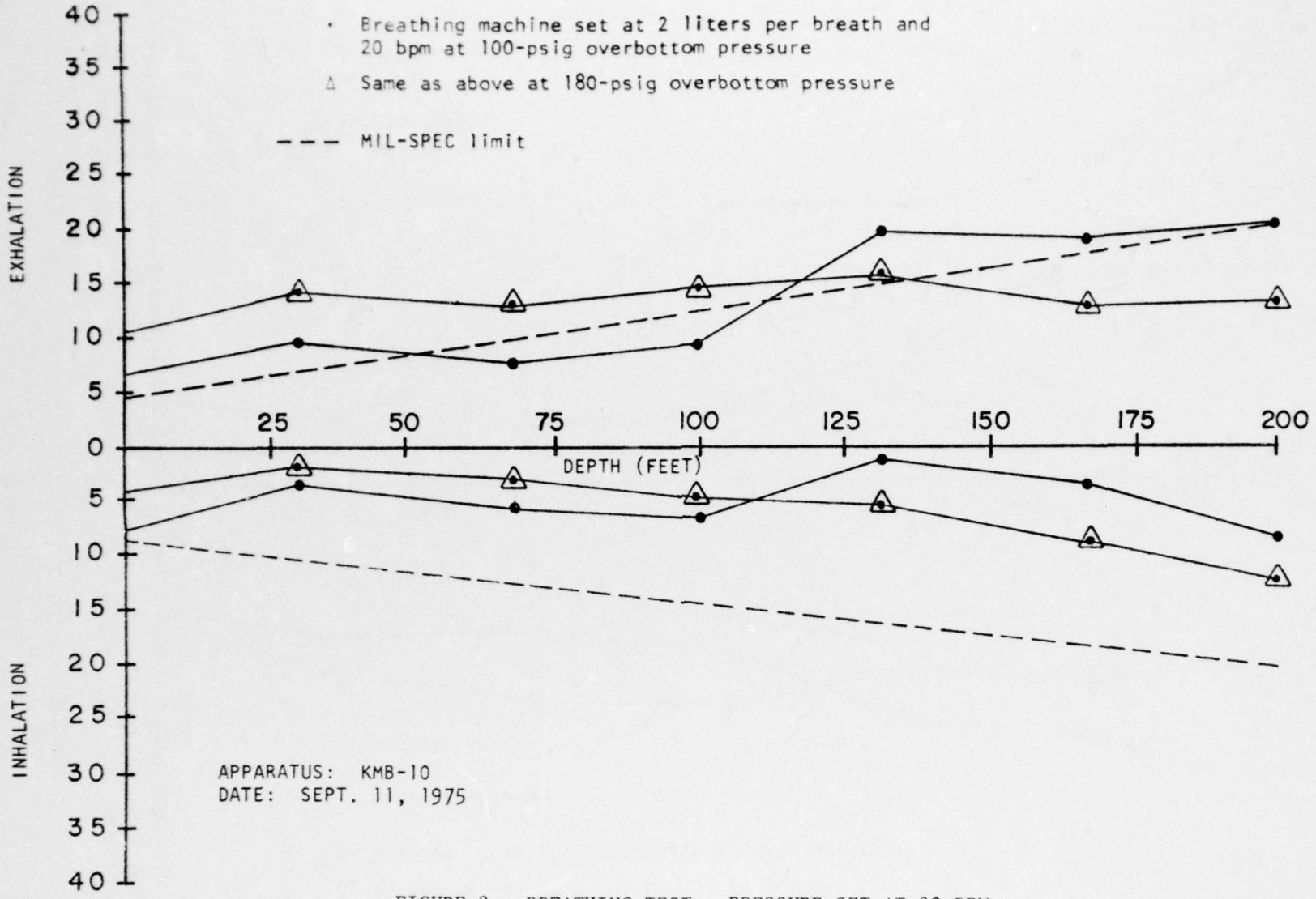

FIGURE 2. BREATHING TEST - PRESSURE SET AT 20 BPM

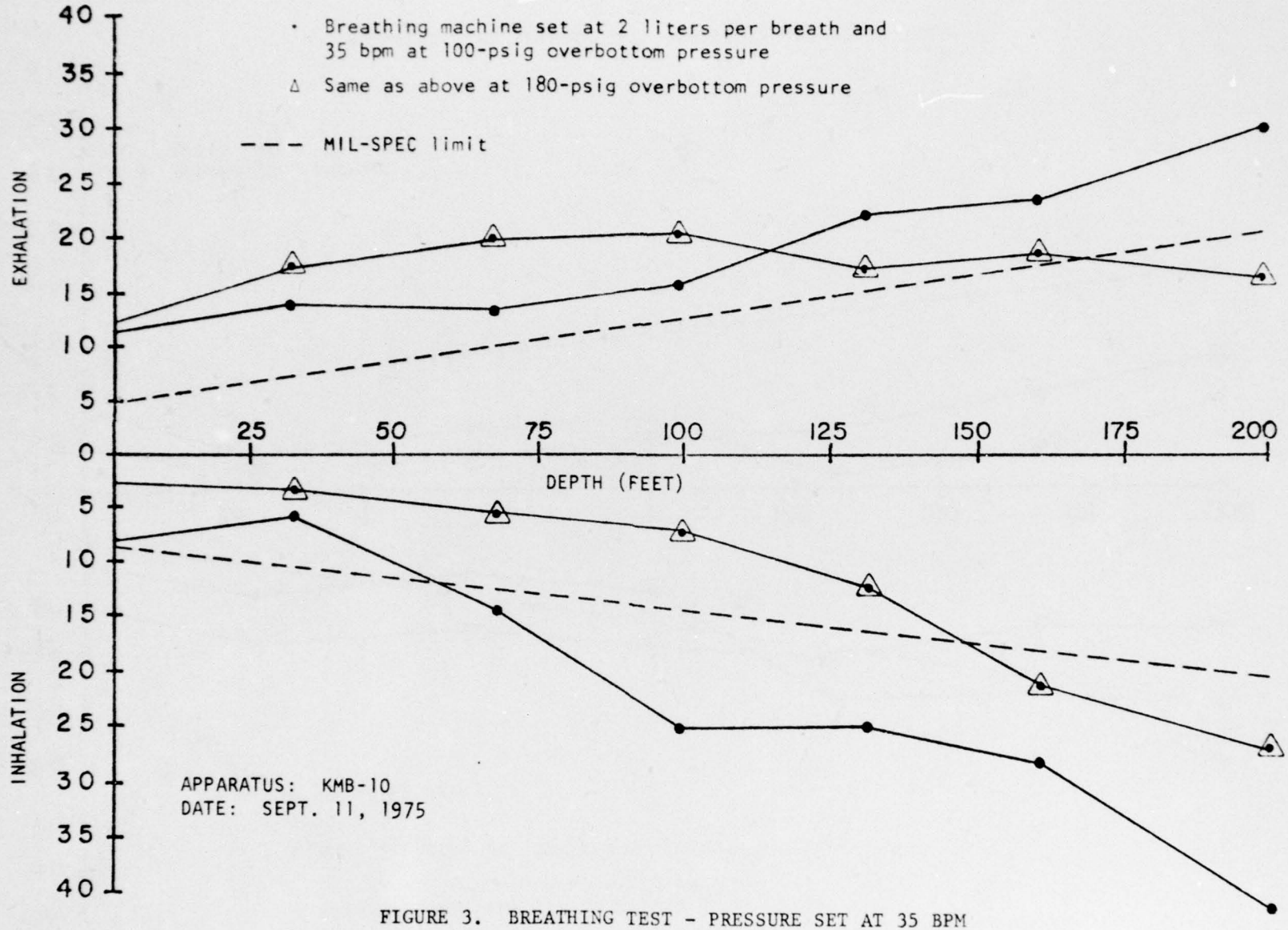

FIGURE 3. BREATHING TEST - PRESSURE SET AT 35 BPM