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Contractor: Westinghouse Electric Corporation

Underseas Division

Contract No: DA-18-035-AMC-123(A)

SECOND QUARTERLY PROGRESS REPORT

COVERING THE PERIOD

July 1, 1964 thru September 30, 1964

WATER INTAKE AND RESUSCITATION EQUIPMENT FOR PROTECTIVE MASKS

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I. INTRODUCTION

This is the second quarterly progress report under a contract to develop drinking equipment and resuscitation capability for battlefield casualties while wearing service protective masks.

The program has been divided into four phases:

1. Development - up to 3 models of three units each.
2. Prototype - 6 units of best development model.
3. Pre-Production - 36 units of improved prototype.
4. Production - 50 units of government-approved design.

This report covers phase 1 and 4, since phases 2 and 3 have been postponed until a later date.

II. DEVELOPMENT AND FABRICATION

Work under this contract was begun 1 April 1964. During the period covered by the first quarterly report, the first model, a test procedure, and test equipment were developed. During this, the second quarterly report period, another developmental model was produced and three units delivered to CRDL on 24 July 1964 for leakage tests at the U.S. Army Biological Laboratories, Fort Detrick, Maryland.

These three units were first tested by Westinghouse personnel using freon gas and the Westinghouse Electronegative Gas Detector (EGAD) as described in the first quarterly report.

At CRDL the units were tested using dioctyl phtalate (DOP) smoke to determine leakage. There was good correlation between the results of the freon gas and DOP smoke tests. This verifies that the EGAD-freon gas test can be used in future tests to make testing easier, quicker, and more portable than the DOP smoke test and still have comparable results.

At Fort Detrick the units were tested for leakage using B. Globigii aerosol. The three units completed a series of tests with no appreciable increase in leakage above that found in an unmodified M-17 mask. The Westinghouse units use a rotary-actuated mechanism. For comparison, a push-pull type unit was also tested. Pulling action used to actuate this unit's mechanism tended to pull the mask away from the operator's face, causing some leakage if the seal was broken by pulling away too far. Operation of the rotary-actuated unit was a little more difficult and tiring at times than operation of the push-pull unit. However, for best over-all considerations, the choice was the rotary-actuated Westinghouse model.

Design changes to improve operation were made in the Westinghouse model, including: the return spring, the operating knob, and the gear sectors. Also, a spacer was added to maintain a constant relationship between the two gear sector shafts; and another O-ring was added to the shaft for better

sealing. These changes are being incorporated into the design for the 50 units orginally scheduled for delivery 15 September 1964, which were added by amending the original contract. CRDL personnel delayed design approval for the 50 units because they wanted to throughly evaluate the results of the leak tests on the three units tests at Fort Detrick before Westinghouse went into production. This did not allow encugh time for manufacture so that the 15 September 1964 date could be met. Delivery of these units is expected to be delayed until November 1964.

Design of the 50 units is similar to the developmental model, except for the changes and additions noted. There is a flexible tube from the canteen which can be coupled to a tube from the mask by a quick-disconnect-type coupling. This provides a water passage from the canteen to the user's mouth. By opening a shut-off valve which at the same time moves a drinking tube into the wearer's mouth, water may be sucked from the canteen similar to drinking liquids through a straw. The mask-to-canteen connection is self sealing; thus, it can be quickly broken, if necessary, and yet protect the wearer.

To drink, the wearer couples the tube, stored in a small pouch attached to the canteen cover, with the mask tube, which is stored in the mask's rubber cover. Then he rotates the knob on the mask's left side counter-clockwise. This opens a rotary shut-off valve and moves the drinking tube from its storage position near the mask's front to a position at or near the man's mouth where he can grab it with his lips. By holding the valve open, his suction on the drinking tube draws up water from the canteen, which remain's on the wearer's hip. When finished drinking, he releases tube from his mouth and releases the knob. The spring-loaded knob returns to the shut-off position and returns the drinking tube to its normal storage position in the mask.

Both the resuscitation and drinking tubes are moved by a pair of sectors on intersecting shafts, translating the knob's rotary motion to a fore and aft motion of the tubes. An extension spring has been added to help the resuscitation tube return to its storage position, thus not depending solely

upon its resilience. A mushroom-type check valve similar to the mask exhaust valve replaces the flapper-type check valve, which impeded air flow out of the mask and created back pressure inside the mask. The new valve is pressed into the housing that fits over the voicemitter plate, and it is built principally of aluminum for weight reduction.

To resuscitate a person the wearer inserts a coupling on the oronasal mask into the mask exhaust valve well by pushing the coupling into it like one would push a stopper into a bottle. Then the wearer turns the knob on the mask's left side counterclockwise, just as in drinking, to move the resuscitation tube into his mouth's reach. When he has the mouthpiece in his mouth, he releases the knob. Holding the mouthpiece firm in his mouth, he can perform mouth-to-mouth resuscitation in the prescribed manner.

III. SCHEDULE

The 50 units now being produced are expected to be used at the start of service testing. A similar model with separate drinking and resuscitation tubes is being built by CRDL. Drawing packages of both models (the 50 and CRDL) are being made so that large quantities of each model may be made. It is planned that 400 of one or the other of these two models will be made for ET/ST testing to start in early 1965. The balance of the models scheduled for delivery during November 1964 (phases 2 and 3) under this contract would be delivered at that time by extending the duration of this contract.