TAC-TR-63-31(D)
January 1964

OPERATIONAL TEST AND EVALUATION

EXPOSURE SUIT, CWU-10/P

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HEADQUARTERS
TACTICAL AIR COMMAND
United States Air Force
Langley Air Force Base, Virginia

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Publications Review

This report has been reviewed and is approved

for Harry R Logan Jr. Lt Col

J. H. MOORE
Major General, USAF
Deputy for Operations

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TACTICAL AIR COMMAND
United States Air Force
Langley Air Force Base, Virginia

FOREWORD

The authority for TAC Test 63-31(D), CWU-10/P Exposure Suit, is contained in Air Force Regulation 80-14 and TAC Regulation 80-1. The test was conducted by the TAC Sea Survival School at Langley AFB, Virginia.

The following individuals were responsible for the test management and preparation of the final report:

TEST PROJECT OFFICER	WAYNE E. WILLIAMS Captain, USAF TAC Sea Survival School Langley AFB, Va.
TAC TEST MONITOR	CLIFFORD J. WHITHAM, JR. Major, USAF Hq TAC (DORQ-T) Langley AFB, Va.

ABSTRACT

The CWU-10/P Anti-exposure Coverall was evaluated to determine its overall suitability. The tests revealed that the coverall did have some improvements over previous types but is unacceptable in that it does not provide adequate protection for the extremities during immersion in cold water. Other deficiencies were revealed that will require correction before the CWU-10/P can be considered a suitable anti-exposure coverall.

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1. BACKGROUND:

a. The Type CWU-10/P Anti-exposure Coverall is a result of development efforts to produce a continuous wear flight garment satisfactory for operational use while being capable of providing protection from exposure to extreme environmental conditions in the event of an emergency requiring abandonment of an aircraft during over-water flights.

b. The CWU-10/P Coverall is an improved version of the CWU-3/P which was previously evaluated by TAC and other commands. The CWU-3/P was found to be unsatisfactory. The CWU-10/P was designed to have improved fit and closure, reduced bulk and weight, and easier donning.

c. This evaluation was initially scheduled to commence in June 1963 but the necessary test garments could not be obtained. In July 1963, ASD requested TAC coordination on the assignment of a Standard classification to the CWU-10/P. TAC withheld coordination on the status classification until an evaluation could be conducted. Due to an urgent requirement by ASD for an early decision on the status classification of the CWU-10/P, the test was started in November 1963. The test was conducted under less than ideal conditions due to the unavailability of some components of the suit in proper size and other accessories. The MK-4 coverall liners were utilized as the CWU-9/P underclothes were not available. Socks of the proper size were not available and placing the boots over socks of too large a size caused some problems. However, these factors did not effect the findings contained in this report.

2. DESCRIPTION:

a. The Coverall, Flying, Anti-exposure, Type CWU-10/P is a one piece garment sized over the twelve size height-weight system. It has body circling closure, relief port, wrist and neck seals, and provisions for integration with the ventilation garment MA-2 and anti-G suit type CWU-3/P. The relief portal and coverall openings are closed with water immersion slide fasteners which are protected by cover flaps fastened with a two part nylon fastening tape. Accessories for the coverall consist of two separate lower leg pockets, a one size sealed insulation hood, a pair of one size five fingered sealed insulation gloves and a special pocket for the parachutists knife Type MC-1. Separate impermeable rubber socks for field installation after fitting to the individual and joining to the coverall legs complete the coverall assembly. (See Fig. 1)

b. The coverall is fabricated from a neoprene coated nylon oxford cloth, the neck seals from a natural rubber which is coated with a protective coating of chlorosulfonated polyethelene to resist deterioration from ozone, ultra-violet, and oils and greases. The hose apertures are of plastic and the air dump valves for the ventilation system are of aluminum. The sealed insulation gloves and hood are fabricated from a polyvinyl chloride coated nylon twill and an insulator of double faced fleece made of dacron polyester fibers.

c. The impermeable rubber socks are produced from a natural rubber and flocked on the outside and inside with cotton fibers. The socks are supplied in eight sizes and two widths to fit the foot snuggly and to integrate with the alert flight boot, Type FWU-3/P.

d. The one-size glove is of a curved palm design and utilizes the sealed insulation principle (the insulation material which is sealed between two impermeable layers of fabric remains dry regardless of immersion in water for an indefinite period). A rubber wrist seal on the inside of the gauntlet and an adjustable take-up strap on the gauntlet end of the glove keeps the hand dry. (See Fig. 2)

e. The one-size hood is fabricated from the same materials and manner as the gloves and is designed to fit snuggly around the face without the use of a draw cord. A coated stretch type fabric is used as an insertion on the bottom of the hood under the chin to permit fast donning and forming of the face pattern.

3. PURPOSE OF THE TEST: The purpose of this test was to determine the overall suitability of the CWU-10/P Anti-exposure Coverall.

4. SCOPE OF THE TEST: The test was directed toward the determination of the following:

a. Functional suitability of the coverall to include ease of donning, operational use and overall design.

b. Adequacy of protection afforded by the coverall.

c. Suitability and adequacy of accessories required with the coverall.

d. Identification of deficiencies that would limit the usefulness of the coverall.

5. CONCLUSIONS:

a. Donning was relatively easy for all three test subjects. The body circling closure represents a great improvement over the entrance portal of previous suits of this type.

b. The air exhaust valves allowed water to enter the suit during two of the three tests conducted.

c. The impermeable rubber socks were judged inferior to the overshoes installed on previous constant wear coveralls in exposure protection.

d. The sealed insulation hood provided excellent protection for the head and neck.

e. The sealed insulation gloves were too difficult to don. Only one of three test subjects succeeded in getting them completely on his hands after a ten minute period.

f. The socks were white in color. This feature is highly undesirable due to the possibility of the contrast provided attracting shark and barracuda attacks.

g. The suit provided buoyancy to a degree that the test subjects floated horizontally. Constant effort was required to keep the body vertical.

h. The accessories stowed in the thigh pockets made for excessive bulk. Control problems in jet aircraft are foreseen due to this factor.

6. RECOMMENDATIONS:

a. The socks should be replaced with heavier socks or overshoes. The color of the socks should be sage green or black.

b. The five-finger gauntlets should be replaced with mittens having thumb and forefinger provisions.

c. The hood and gloves should be packed under pressure to reduce bulk. Packages containing hood and gloves should be attached inside the pocket with lightweight cord to prevent loss upon initial opening under survival conditions.

d. The coveralls must have more thorough air-exhaust provisions installed on the legs.

7. DEFICIENCIES:

a. The air exhaust valves on the arms and legs of the coveralls leaked during the test.

b. The rubber socks do not provide adequate protection for the feet during immersion in cold water.

c. The gloves were difficult-to-impossible to don with wet, cold hands. The difficulties consisted of:

(1) Being unable to force hands through rubber wrist seal of the glove.

(2) Insulation made it too difficult to force the fingers into glove fingers. The insulation tended to "bunch up" inside the glove making it impossible to even begin forcing the hand into the glove.

d. The white color of the socks provides a contrast with the color of water, thus providing a source of attraction for dangerous marine life.

e. The folded hood and mittens caused excessive bulk in the thigh area. Stick/Control wheel travel problems are anticipated.

f. An unconscious man wearing this suit will float in a prone (horizontal) position. This could mean his drowning even though he was wearing an inflated underarm life preserver.

8. TEST ENVIRONMENT: The tests were conducted in the Chesapeake Bay area by personnel of the Tactical Air Command Sea Survival School. Three test subjects wore thermal kit underwear, cotton socks and MK-4 exposure suit liners beneath the CWU-10/P Coverall. Standard combat boots were worn by two subjects; one wore commercially obtained boots due to incorrect rubber sock size. Air temperatures ranged from 45 degrees F to 60 degrees F; water temperatures ranged from 49 degrees F to 56 degrees F.

9. DISCUSSION:

a. This coverall represents a significant improvement over previous types in many respects. Comfort, ease of donning and lessening of water leakage were impressive on the three suits worn during the tests.

b. The CWU-10/P Coverall is considered unsatisfactory in its present configuration due primarily to a lack of adequate protective provisions for the extremities. During a series of three water tests, all three subjects reported very cold feet after 30 minutes in the 56 degree F water.

c. Due to the gloves being impossible to don, most of the tests were conducted without them. On one occasion R1A exposure suit mittens were used for hand protection.

FIGURE 1. CWU-10/P EXPOSURE SUIT

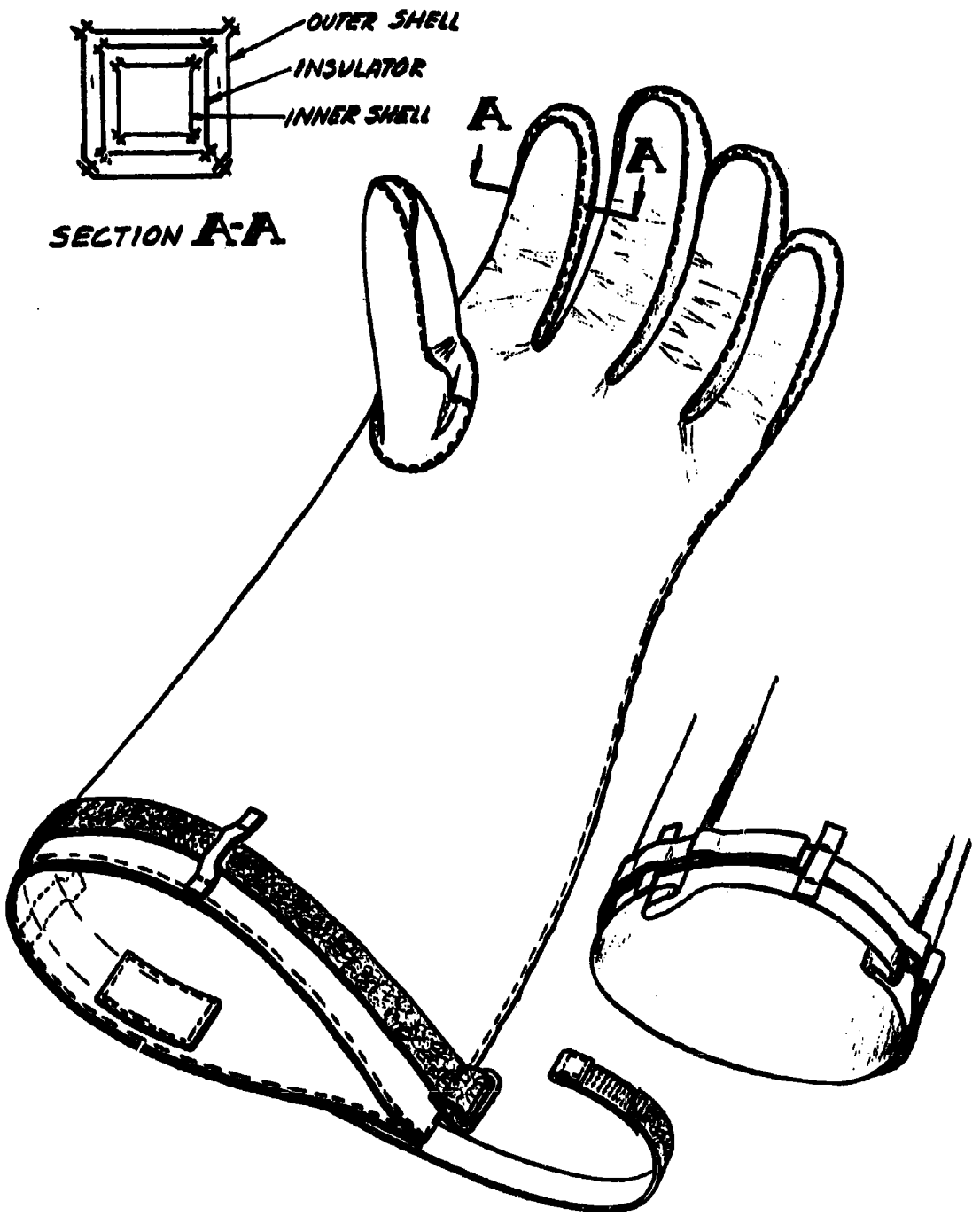

FIGURE 2. ONE-SIZE GLOVE.

DISTRIBUTION LIST

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ASD SEG	
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LN	2
OIH	1
DORQ-T	10