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BULOVA WRIST WATCH, SUBMERSIBLE, (II)

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Navy Experimental Diving Unit
Washington, D.C.

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ABSTRACT

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EVALUATION REPORT 7-58

BULOVA WRIST WATCH, SUBMERSIBLE, (II)

PROJECT NS186-200 SUBTASK 4 TEST 43

7 May 1958

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ABSTRACT

Three Bulova submersible wrist watches, the second submission for test of preproduction samples, are evaluated for conformance with the water-tightness specifications of MIL-SHIPS-W-2181. Other specification tests were satisfactory as reported in Evaluation Report 5-58. Of three watches tested, one failed in that positive indication was recorded on the color indicator. The watch which failed, however, continued to run and did not show evidence of moisture, fog or droplets on the underside of the crystal or on the face. It is suspected that the watch which failed was watertight and that the indicator was faulty.

SUMMARY

PROBLEM:

Do the three preproduction samples (second submission) of the Bulova submersible wrist watch meet the watertightness tests specified in Ships W-2181?

FINDINGS:

Of three watches tested, two passed and the third gave a positive color indication on the moisture color indicator. The latter watch, however, continued to run and no moisture, fog or droplets were noted on the underside of the crystal or on the face.

The general dissatisfaction of all subjects with the watch strap was reiterated.

RECOMMENDATION:

It is recommended that the watch which failed be opened and carefully inspected for residue or effects of moisture. It is suspected that the watch was watertight and that the indicator was faulty.

A. ADMINISTRATIVE INFORMATION

On 3 April 1958 representatives of BuShips, Codes 538 and 565 and of Bulova Corporation delivered five Bulova submersible wrist watches (preproduction samples) for test in accordance with contract NObs-73016. These watches were similar to those previously evaluated at the Experimental Diving Unit as reported by Prickett, Wheat and Searle (EDU Evaluation Report 5-58; "Bulova Wrist Watch, Submersible," 10 March 1958) but with minor modifications towards final acceptance.

The five watches were given a chamber run (as reported in EDU Evaluation Report 5-58) to 392 feet in order that the Bulova representative could witness. Of the five watches, two failed (both showing internal moisture, one stopping). The remaining three watches were left at EDU for evaluation along the same lines as Report 5-58.

Work at the Experimental Diving Unit was performed, as for the initial evaluation of the watches, under the continuing project NS186-200, SubTask 4, Test 43 entitled, "Miscellaneous Swimmers Auxiliary Equipment." Charges incurred were lodged against allotment 16102/58.

C. M. Prickett, GM1(DV), USN, was designated Project Engineer and LCDR W. F. Searle, Jr., USN as Project Officer. Detailed testing was commenced on 8 April and completed on 23 April.

The following breakdown indicates the manpower expended on this project.

<u>DESCRIPTION</u>	<u>MANHOURS</u>
Preliminary runs (April 1958)	6
Depth runs (chamber)	88
Subjective working dives	18
Report preparation	10
Clerical work	10
	<hr/>
TOTAL	52

The three watches tested were returned to Code 538 BuShips on 2 May 1957. This is the second report on the subject watches. A subsequent report will be furnished if and when improved preproduction samples are submitted.

This report is issued in the evaluation report series and is distributed only by the Bureau of Ships.

1. OBJECT

1.1 Objectives

1.1.1 The object of this project is to evaluate the preproduction samples of the Bulova Submersible Wrist Watch to determine conformance with BuShips Contract Specification SHIPS-W-2181 of 5 December 1955.

1.2 Scope

1.2.1 This report covers only those portions of the specifications dealing with watertightness since no changes have been made effecting luminosity or physical features subjectively commented upon in the previous evaluation.

1.3 Background

1.3.1 Experimental Diving Unit Evaluation Report 5-58 was the first evaluation of the preproduction models of the subject submersible watches. The watches were not accepted because of failure of the watertightness tests. The watches were modified (magnetic characteristics were also improved though they are not evaluated at this activity) and resubmitted for a second series of evaluation tests.

2. DESCRIPTION

2.1 General

2.1.1 The watches evaluated and reported herein were essentially as described in Evaluation Report 5-58. The manufacturer had made internal modifications to meet test specifications but, the modifications were not described to this activity.

3. PROCEDURE AND RESULTS

3.1 Depth Runs

3.1.1 Watertightness or depth runs on the watches were conducted in the same manner as described in paragraph 3.1.1 of Evaluation Report 5-58. The three watches were worn by divers on all working dives during the period 8 through 22 April after which the deep chamber runs were conducted. Water temperature, as before, was maintained at approximately 75° throughout all runs.

3.1.2 As noted under "Administrative Information," five watches were delivered on 3 April and given a preliminary chamber run (in a beaker of water) to 392 feet. Two of these watches indicated color change and were, therefore, not left for further evaluation. The three watches which were retained and are reported herein had unchanged color indicators.

3.1.3 The results of the test of each watch, presented chronologically is as follows:

(a) #0019

During the period 8 through 23 April, watch was worn on all working dives. A listing of the dives and total time follows:

<u>Dive Depth/Time on bottom</u>	<u>Number of dives</u>	<u>Total time</u>
80/60	4	240 min.
90/60	4	240 min.
100/60	4	240 min.
160/15	5	75 min.
180/15	3	45 min.
200/15	5	75 min.

Commencing after the first dive on 8 April (80/60) this watch's indicator began to slowly change and after about two weeks had finally completely changed.

22 April	Test run #1. Vertical 1 hour at 392 feet	Color had already changed. No additional change. No indication of droplets inside. Watch running normally.
23 April	Test run #2. Horizontal 1 hour at 392 feet	Same as run #1.
2 May	Returned to BuShips	Color changed as before. No indication of droplets. Watch running.

(b) #0034

During the period 8 through 23 April, watch was worn on working dives as listed for #0019. Watch ran normally throughout entire period. No moisture indicated. No droplets observed. Colors remained as new.

22 April	Test run #1. Vertical 1 hour at 392 feet	No color change. No droplets. Watch run- ning normally.
23 April	Test run #2. Hori- zontal 1 hour at 392 feet	Same as run #1.
2 May	Returned to BuShips	No color change or indication of moisture. Watch running.

(c) #0120

Results exactly the same as 0034. Watch returned to BuShips on 2 May. No indication of moisture.

3.2 Other Tests

3.2.1 In view of previous satisfactory results, luminosity and bezel ring tests were not run.

4. DISCUSSION

4.1 Watertightness

4.1.1 The discussion presented in Evaluation Report 5-58 applies equally well in this second formal test. The watch #0019 wherein the color indicator changed slowly over a period of two weeks is suspect. However, we have no idea of the amount of moisture which entered. The duration and amount of testing with no eventual accumulation of observable moisture within the case leads us to suggest that the indicator was faulty and no actual moisture entered.

4.1.2 The recommendation of the previous report that the watches which indicate moisture be opened and inspected or else very carefully weighed to verify moisture is reiterated.

4.1.3 The two watches which failed on the preliminary run are not considered here. Of the three watches left for evaluation, two passed; one failed by virtue of positive indication on the moisture color indicator.

4.2 Other Comments

4.2.1 The discussion of luminosity, bezel ring and general subjective impressions given in Evaluation Report 5-58 apply to this report.

4.2.2 It is reiterated that all subjects are dissatisfied with the watch strap furnished.

5. CONCLUSION

5.1 Conclusion

5.1.1 One of three watches failed to pass the watertightness test (excluding two watches which failed on preliminary runs and were not left for evaluation). The extent of tests and the slowness with which the indicator changed color leads to the suspicion that the indicator may be faulty rather than the watch casing leaking.

5.2 Recommendations

5.2.1 It is recommended that the watch which failed be opened, inspected, and a determination be made as to whether moisture entered.

5.2.2 On subsequent tests, it is recommended that the manufacturer open watches immediately after color changes. If desired, instrument scales are available at this activity for minute weighing before and after tests.