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Report No. 27A1381

Evaluation Test Report of Haskel

Hydraulic Decontamination Unit

Drawing No. 24000-Haskel Co.
MPS 124.01

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PREPARED BY

F. L. Costa
F. L. Costa
Test Engineer

CHECKED BY

J. A. Denneny
J. A. Denneny
Lead Engineer

APPROVED BY

G. W. Conroy
G. W. Conroy

Sr. Test Lab Grp Engineer

APPROVED BY Components Test Lab

Checked by

R. T. Tuttobene
R. T. Tuttobene
Ass't. Test Lab Grp. Engineer
Mech. Comp. Test Lab

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1.0 **INTRODUCTION:** - The function of the portable MIL-N-3600A hydraulic fluid decontamination unit is to pump the missile hydraulic oil supply through its filters, reducing the water and contamination level to within acceptable limits and return it to the missile system.)

2.0 **OBJECTIVE:** - One objective of this test was to compare the decontamination unit performance to the Pre-operational and Operational test requirements, of MPS 124.01.

Another objective of this test was to determine the capability of the Briggs Model BFS-5-V1 water removal unit to remove all water concentrations greater than twenty-five (25) parts per million by weight from the fluid being filtered.

The third objective of this test was to determine the capability of the Briggs Model DI-AR-SV-2B five micron filter to remove ninety-eight (98) percent of all solids greater than two (2) microns from the fluid being filtered.

3.0 **CONCLUSION:** - The test specimen satisfied the M.P.S. 124.01 Pre-Operational and Operational test requirements.

The water removal unit did not reduce the amount of entrained water in solution to twenty-five (25) parts per million as specified in the Haskel Manual Number 24000. (Ref. Figure 1).

Test results indicated that the filter removed more than ninety-eight (98) percent of all particles greater in size than two microns. (Ref. Figure 2)

4.0 **TEST SPECIMEN:** - The test specimen was a portable water removal and decontamination unit manufactured by the Haskel Engineering and Supply Company. It conforms to the Haskel Job Number 4826, Report Number 24000. The test specimen consisted basically of a forty (40) gallon tank on a casted frame. On top of the tank, the necessary drive motor, pump, filters, related plumbing, and control valves were mounted. (Ref. Schematic Figure 3)

5.0 **TEST PROCEDURE:** -

5.1 **PRE-OPERATIONAL CHECK:** - Manufacturing Specification Number 124.01, Paragraph 1, was followed for the pre-operational check.

5.2 **OPERATIONAL LEAK CHECK:** - Manufacturing Specification Number 124.01, Paragraph 2, was followed for the operational leak check.

- 5.3 WATER REMOVAL TEST:** - The test specimen was initially prepared by cleaning all the components both internally and externally with solvent. The sump was then filled with forty (40) gallons of fresh MIL-H-5606A oil. The test was then conducted as follows:
- 5.3.1** A one hundred (100) milliliter sample of the oil in the sump was analyzed for water content. As a result of this analysis, one fluid ounce of water was added to the sump to raise the water content to greater than 200 parts per million. The oil and water were mixed thoroughly by means of an external circulating pump. A second oil sample was then taken and analyzed to establish the water content. The unit was then started, and the oil in the sump was circulated through the filter and water removal unit and back into the sump. Eleven (11) oil samples were taken at prescribed intervals and analyzed for water content.
- 5.4 FILTRATION EFFICIENCY TEST:** -
- 5.4.1** The Filtration Efficiency Test was accomplished by passing a prepared quantity of oil through a separate filter assembly and analyzing the effluent. The test filter case was cleaned and a new filter element installed. The test case was filled with Millipore filtered oil. Then, filtered gaseous nitrogen was admitted through a fitting in the top, forcing out oil until the level fell below the side mounted exhaust port. A slurry of 2000 milliliters of Millipore filtered oil, to which six (6) grams of F9 glass beads had been added, was then passed into the test case. This was followed by a 6000 milliliter quantity of Millipore filtered oil. Filtered gaseous nitrogen was again admitted through the top of the test case, forcing out oil to the level of the side mounted exhaust port. The 8000 milliliter effluent was retained for contamination analysis.
- 6.0 TEST RESULTS:** -
- 6.1 PRE-OPERATIONAL CHECK:** - (Reference Manufacturing Specification 124.01, Paragraph 1) The test specimen inspection failed to disclose any discrepancies.
- 6.2 OPERATIONAL LEAK CHECK:** - (Reference Manufacturing Specification 124.01, Paragraph 2) The test specimen did not exhibit any leakage during this test.
- 6.3 WATER REMOVAL TEST:** - Two (2) samples of fresh oil were

analyzed for water content and the results were 50 and 53 parts per million. The amount of water necessary to raise forty (40) gallons of oil represented by the above samples to 200 parts per million was reported to be 0.65 fluid ounces. (Ref. M.D.R. No. A62-0333, dated 1-19-62) The results of the water removal test are presented in the Table of Water Content Analysis. (Ref. Figure 1)

6.4 FILTRATION EFFICIENCY TEST: - The total weight of F-9 glass beads introduced into the test filter was six (6) grams. The total weight of contaminants recovered in the 8000 milliliter effluent was 31.7 milligrams. (Ref. Figure 2)

7.0 TEST EQUIPMENT: - In addition to the test specimen, the following equipment was used:

- a) Gaseous nitrogen "K" bottle and Victor regulator.
- b) A two (2) micron filter. (for the GN_2)
Purulator P/N 6657825.
- c) Two (2) Briggs No. D1-AR-SV-2B filters, one for use of the case as a slurry sump and one for use as the contamination removal test specimen.
- d) Three (3) five gallon bottles, containers for storage of the test slurry, clean oil, and effluent of the contamination test.

8.0 BIBLIOGRAPHY: -

- 8.1 The test data from which this report was prepared are recorded in Engineering Test Laboratories Data Book Number 7658.
- 8.2 Haskel Engineering and Supply Company Operation and Maintenance Manual No. 24000.
- 8.3 Manufacturing Specification 124.01 (through Paragraph 2.8 only).

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Table of

Water Content Analysis of MIL-H-5606 Oil Samples

Water content determined by the Karl Fisher titration method.
(parts per million by weight) (Ref. MDR No. A62-0483, dated 1-31-62)

<u>Sample No.</u>	<u>Run Time</u> <u>Minutes</u>	<u>Water Content</u> <u>PPM</u>
1	0	80
2	8	54
3	18	58
4	24	60
5	32	88
6	56	72
7	72	48
8	88	52
9	104	80
10	120	63
11	136	55
12	160	66

Figure 1

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Table of
Effluent Contamination Analysis

(Ref. MDR No. A61-9994, dated 1-22-62)

<u>Particle Size</u> <u>Microns</u>	<u>Count</u>
5-30	48,000
30-90	25

Notes:

- a) The majority of the particles were in the ten to twenty (10-20) micron range.
- b) The original weight of F-9 glass beads used in the test slurry was six (6) grams.
- c) The total weight of contaminants in the effluent was 31.7 milligrams.
- d) The largest identifiable glass bead in the effluent was thirty (30) microns in diameter.
- e) There were six (6) black shiny beads eighty-five (85) microns in diameter in the effluent.

Figure 2

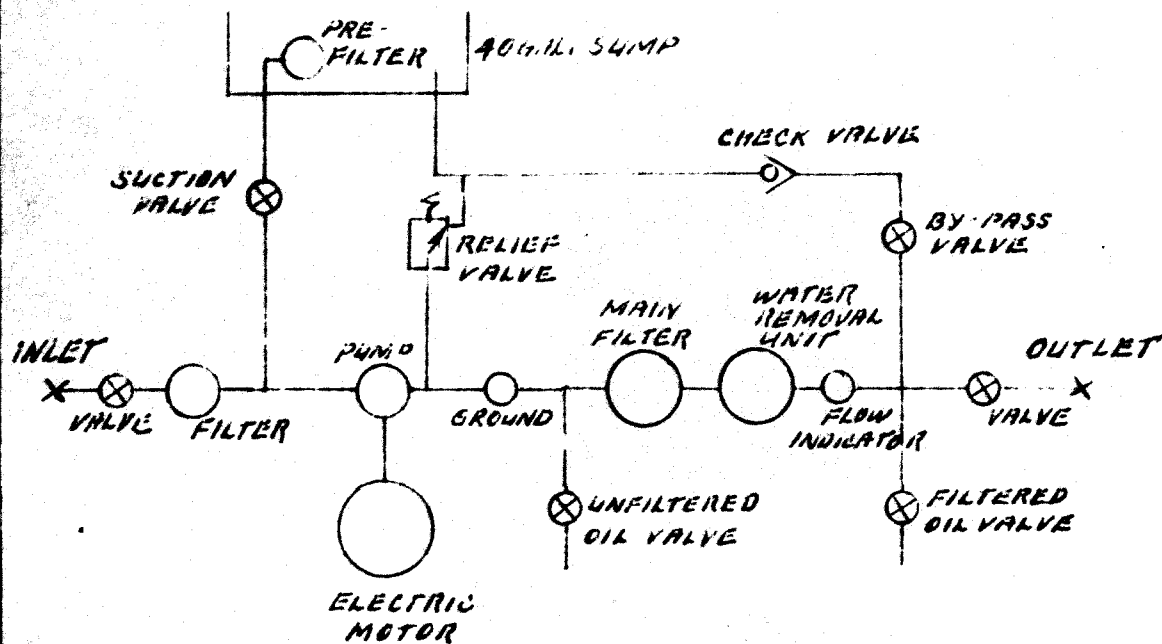
SCHEMATIC-TEST SPECIMEN

FIG. 3