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GENERAL DYNAMICS | CONVAIR

Report No. 8926-156

Material - Aluminum - 2024-T86

Corrosion Evaluation, Service Items

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31 August 1961

Published and Distributed
under
Contract AF33(657)-8926

Post Office Box 1950, San Diego 12, California 296-6611
Material Post Office Box 2071 273-8000 | Accounting Post Office Box 510

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Abstract:

Two F-102 airplane wing access doors received from Naha, A.F.B., Okinawa about five years subsequent to manufacture were examined for corrosion damage incidence. The doors were made of clad 2024-T86 aluminum alloy and their exterior surfaces were originally treated with Alodine 600 (American Chemical Paint Co.) chemical and coated with a baked Scotchweld primer, EC 1290 (Minnesota Mining and manufacturing Co.). Upon receipt, the EC 1290 primer was missing from interior surfaces accessible to fuel impingement. These areas exhibited corrosion pitting ranging 6 to 35 mils depth and 20 to 120 pits per door as a result of "general" corrosive attack which appeared to have been caused by marine atmosphere impingement. Examination revealed that the clad 2024-T86 aluminum alloy was normal with respect to intergranular corrosion susceptibility.

Reference: George, J. C., Sutherland, W. M., "Corrosion Evaluation of F-102 Wing Access Doors," General Dynamics/Convair Report MP 61-139, San Diego, California, 31 August 1961. (Reference attached).

CONVAIR
A DIVISION OF GENERAL DYNAMICS CORPORATION
SAN DIEGO

REPORT MP-61-139
DATE 31 August 1961
MODEL F-102

TITLE

REPORT NO. MP-61-139

CORROSION EVALUATION
OF
F-102 WING ACCESS DOORS

CONTRACT NO. AF 33(600)-36546

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NO. OF PAGES 6

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REVISIONS

NO.	DATE	BY	CHANGE	PAGES AFFECTED

FORM 1812A-4

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OBJECT:

To evaluate two F-102 wing access doors obtained from Naha AFB, Okinawa, for extent, depth and possible cause of corrosion.

CONCLUSIONS:

1. One door had about 20 corrosion pits in the recessed area of the door. The deepest pit was 6 mils.

2. The second door had about 120 pits in the recessed area. The deepest pits were approximately 35 mils in depth.

3. The door with the most severe corrosive attack was evaluated for intergranular corrosion and found to be normal.

4. The corrosive cause could not be definitely established. The doors had been reworked prior to receipt in the laboratory.

TEST SPECIMENS AND PROCEDURES:

Two F-102 wing access doors, part No. 8-17662-7, were received from Naha AFB, Okinawa. These doors were date stamped January 19, 1956, and March 12, 1956, respectively, indicating the time of Scotchweld cure. The doors were constructed of Clad 2024-T86 aluminum alloy. The exterior surface had been originally treated with Alodine 600 chemical film and coated with bake type Scotchweld primer, EC 1290, manufactured by Minnesota Mining and Manufacturing Co. The doors were approximately 1/8"x32"x41" in size with six recessed slots mechanically milled in the interior surface of each door. The slots were approximately 6"x31" in size and 55 mils deep. The Scotchweld primer was no longer present on most of the recessed sections of both doors.

A photograph of the door date stamped January 19, 1956 is shown in Figure 1. A photograph of the most corroded section of the same door is shown in Figure 2. A photograph of the door date stamped March 12, 1956 is shown in Figure 3. The most corroded section of the same door is shown in Figure 4. The corroded areas of both doors were examined microscopically. Sections were removed from the most severely attacked door to evaluate for susceptibility to intergranular corrosion. The EC-1290 Scotchweld primer on the door was evaluated for degree of cure by comparing its resistance to methyl ethyl ketone wipe with that of properly applied and cured EC-1290 control coating. The depth of the pits was determined by a Micrometer.

RESULTS AND DISCUSSION:

The appearance of the corrosion pits when observed under the microscope seemed to be identical to those normally found on aluminum after prolonged outside storage in marine atmosphere. The F-102 aircraft stationed at Naha AFB is located very near the ocean. The wing access doors in some instances have been open for prolonged periods of time. This condition could have caused the corrosion found on the doors. Because of prior cleaning and repairs on these doors it could not be determined if microbial growth had contributory effects. The appearance of the corrosion was not the same as that found on a competitor's wing section where corrosion was caused by microbial attack. The corrosion on this section appeared to occur in a horizontal plane and generally followed the grain direction of the metal. The corrosion the F-102 access doors,as formerly mentioned, was of a pitting nature. The EC-1290 Scotchweld coating on the non-recessed portions (flange areas) of the interior surfaces of the doors, appeared to be fully cured as specified by Engineering. The EC-1290 coating on the recessed slots, however, appeared to be a repair touch-up approximately half cured, and inadequate as a corrosion preventive device in marine atmospheric exposures.

NOTE:

The data from which this report was prepared are recorded in Materials and Processes Laboratory Data Notebook No. 3082.

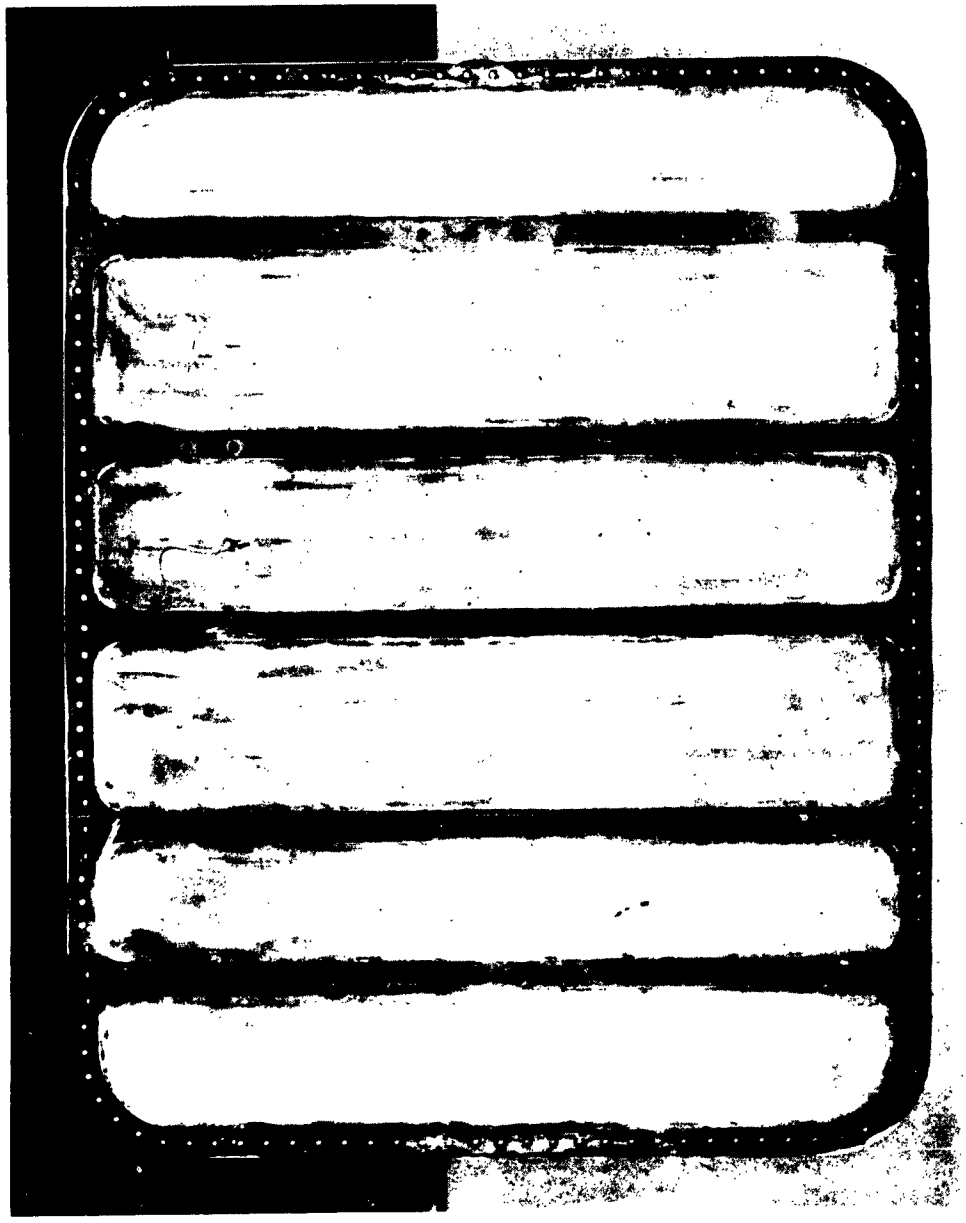

FIGURE 1. F-102 WING ACCESS DOOR DATE STAMPED JANUARY 19,1956.

FIGURE 2. CORRODED SECTION OF F-102 WING ACCESS DOOR
DATE STAMPED JANUARY 19, 1956.

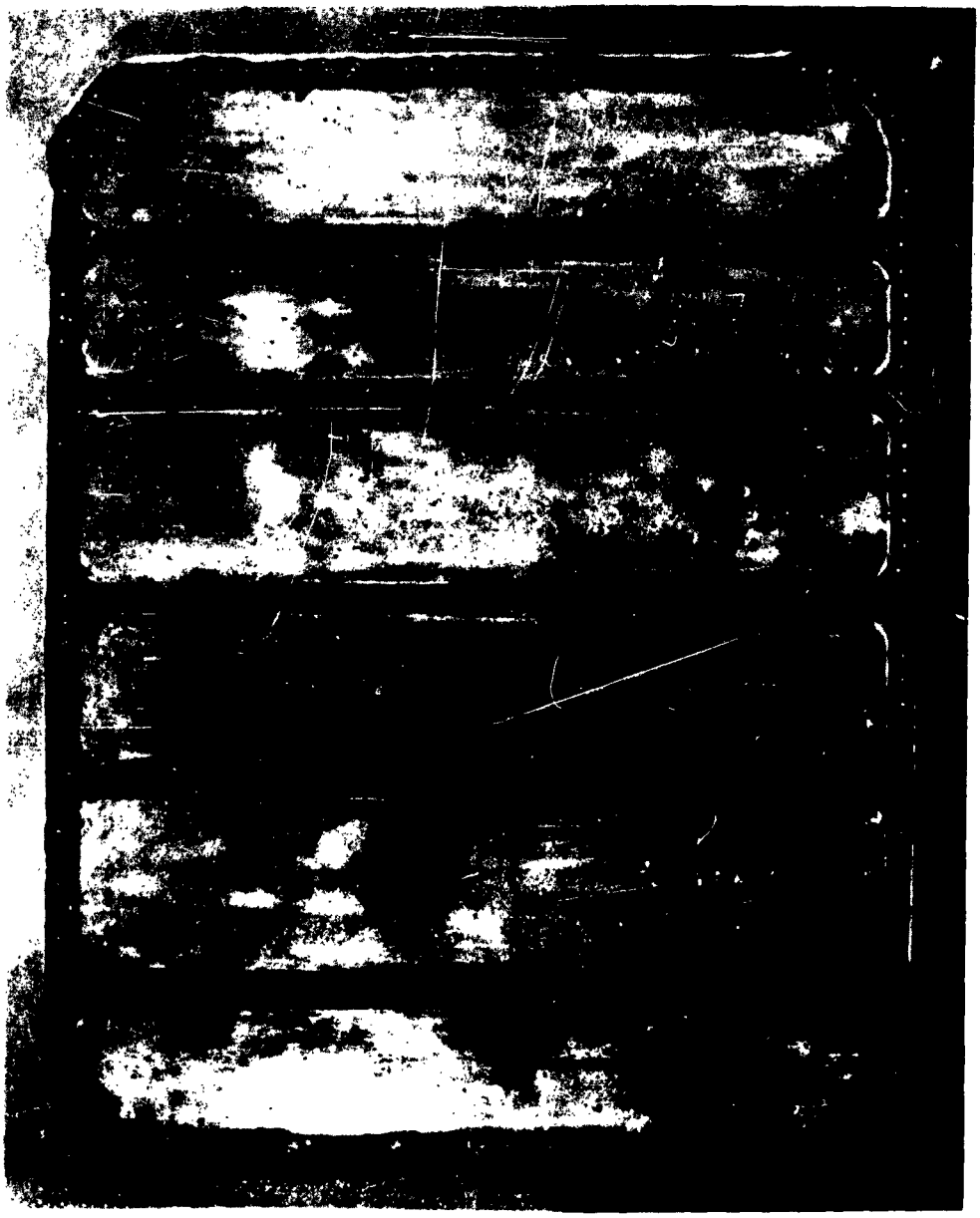

FIGURE 3. F-102 WING ACCESS DOOR DATE STAMPED MARCH 12, 1956.

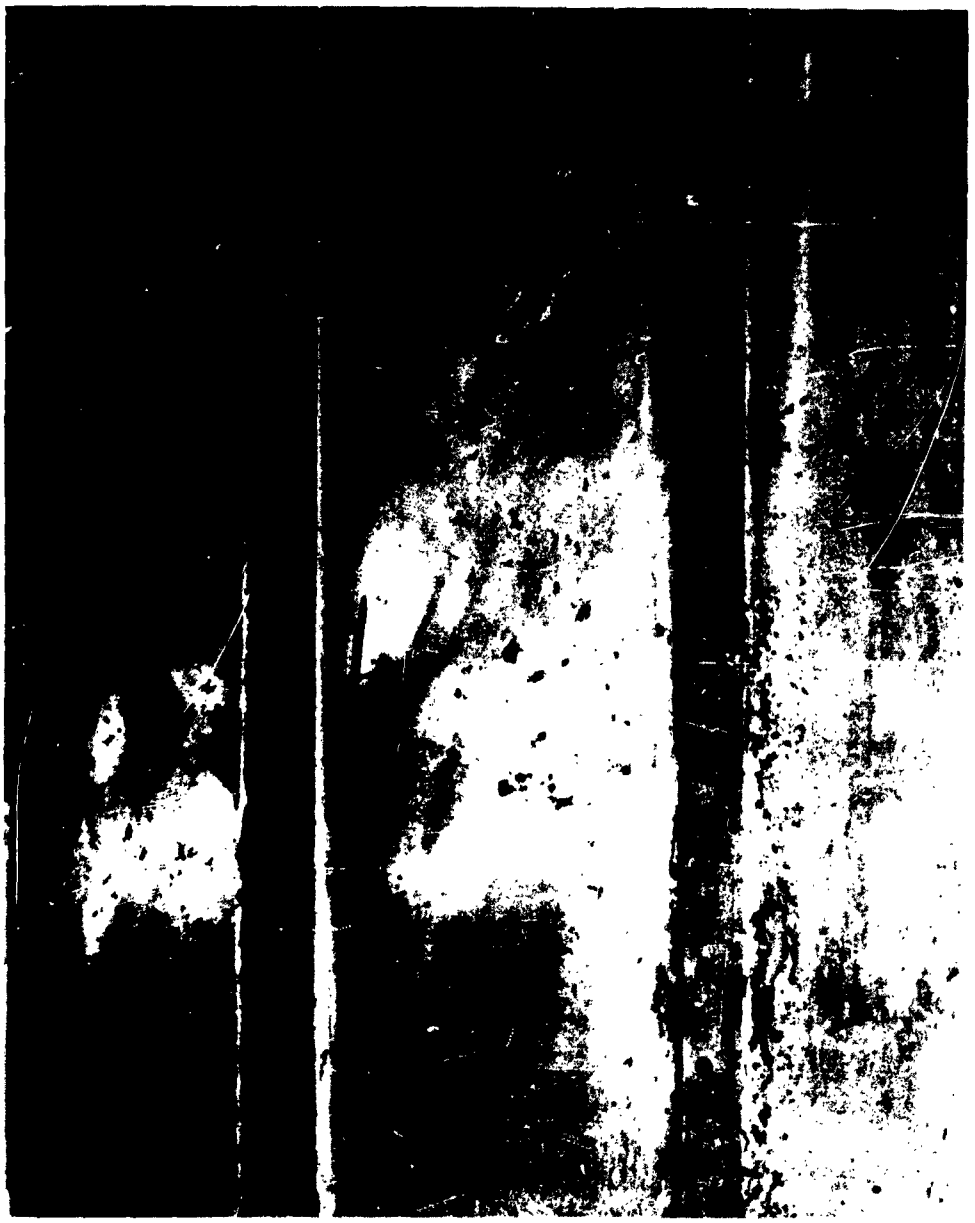

FIGURE 4. CORRODED SECTION OF F-102 WING ACCESS DOOR DATE STAMPED MARCH 12, 1956.