

ROYAL CANADIAN AIR FORCE



ENGINEERING
GUIDES & PROCEDURES

SALVAGE ACTION
AIRCRAFT SUBMERGED IN WATER

"REVISION"
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ISSUED ON AUTHORITY OF THE CHIEF OF THE AIR STAFF

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SALVAGE ACTION - AIRCRAFT SUBMERGED IN WATER

GENERAL

1 RCAF equipment that has been submerged in water under the following conditions may be destroyed, abandoned or otherwise disposed of, as beyond economical repair as and when authorized by AMCHQ:

(a) Equipment submerged in isolated or inaccessible locations such that salvage is impossible or uneconomical.

(b) Equipment damaged, as a result of a crash, to the extent that salvage is uneconomical.

(c) Equipment so badly corroded that deep pits, holes or cracks have been produced in the material.

2 Aircraft submerged under the following conditions may be considered satisfactory for further use insofar as the damage to the structure from corrosion is concerned:

(a) Aircraft structures that have been totally or partially submerged in salt water less than 48 hours and can be flushed with fresh water within 24 hours after removal from the salt water.

(b) Aircraft structures that have been totally or partially submerged in fresh water for a period less than 30 days.

3 If necessary and practicable, submerged aircraft will be salvaged to determine the cause of an accident regardless of the final disposition.

4 The Officer, Warrant Officer or NCO in charge of the salvage operation is to be responsible that equipment and material is available for carrying out anti-corrosive treatment on the engines, airframe, accessories and components as necessary. Any corrosion evident will be removed before treatment is carried out.

5 When a crashed aircraft, by reason of being submerged or partly submerged in water, is in danger of loss or destruction, it is the duty of all personnel to safeguard it with every means available. While this danger persists standing orders prohibiting the handling of the aircraft by unauthorized persons may be disregarded until the danger has passed.

6 Salvage of aircraft from the water is a difficult task. In all instances a marker buoy with ample length of mooring line should be made fast to the wreckage as soon as possible. Towing of the wreck to the nearest water shelter or the lee of a ship is only to be done by securing the tow to components that will take the necessary stress. Because of the great weight of an aircraft when filled or partly filled with water, extreme care must be taken when the aircraft is to be hoisted above the surface in order to avoid possible damage to the structure and lifting gear. All compartments entrapping water should be punctured sufficiently to permit the free drainage of water as the aircraft is lifted. Alternatively, where compartments are accessible to pumps, they may be pumped clear as the aircraft is raised. Apart from such obvious spaces as hulls or fuselages, particular attention should be given to wings and control surfaces where drainage eyelets are usually insufficient to carry off the large volume of water entrapped. Lifting should be effected in short stages and at such a speed as to permit the free outflow of water.

7 The contents of oil and gasoline tanks is to be drained into containers before dismantling commences, precautions being taken to avoid risk of fire during this operation.

CLEANING AND TREATMENT

8 Action with respect to the various components is to be carried out as follows:

Airframe

(a) The fabric components of aircraft are to be removed at once in the case of submersion

in salt water and the whole airframe washed down with hot water or steam as soon as possible. Rapidity of action is one of the foremost factors in the prevention of corrosion. Circumstances permitting, the activities of all personnel of suitable trades are to be diverted from other work to the application of the measures given here when the emergency arises. Immediately an aircraft has been taken out of the water the following anti-corrosion measures are to be taken:

- (1) The fabric components are to be removed, the fabric being ripped open in the first instance to permit as much water as possible to be drained away. This action is to be followed by the removal of the whole of the fabric and the washing of all accessible metal parts with hot water. These parts are then to be thoroughly dried.
- (2) The fuselage is to be opened and drained. All accessible metal parts are to be washed with hot water and thoroughly dried.
- (3) Care is to be taken that salt water is drained from all hollow members into which it may have penetrated; where possible hollow members are to be flushed with hot water and drained thoroughly.
- (4) Fuel and oil systems are to be drained thoroughly, flushed with hot water and dried.
- (5) Wheels are to be thoroughly washed inside and out and dried.
- (6) Radiators and oil coolers are to be submerged in washing tanks or flushed inside and out with water.
- (7) Control and retracting mechanisms will have all grease removed, and will then be cleaned and flushed with water, followed by application of hydraulic fluid, 34A/100 if fitted with synthetic rubber glands, or 34A/169 if fitted with natural rubber glands, as a corrosion preventive treatment.

Aero Engines

- (b) The engine(s) are to be removed from the airframe as quickly as possible and completely dismantled. All components are to be examined during dismantling operations and are to be rejected as unserviceable if they have been damaged or have become deeply corroded.

All pistons, and components made from magnesium, or high carbon steel including springs and ball and roller races, are to be rejected after immersion in salt water. The remaining components are to be given the following treatment:

Light Alloy Components

- (1) Light alloy components are to be washed in hot water at a temperature of 93°C (200°F) in order to remove salt water and to dry the parts more quickly prior to degreasing in an ICI degreasing plant, if available. The parts should be perfectly dry before degreasing by this method, otherwise a corrosive action on the metal will take place when water comes into contact with trichloroethylene. If an ICI degreaser is not available the components are to be cleaned thoroughly by normal methods or the method outlined in (2) below. Any light alloy components showing signs of corrosion in the form of white or grey deposits are then to be immersed in a solution of water and tartaric acid, Ref. 33C/307 in the proportion of 100 gals to one lb., heated to a temperature of not less than 90°C (195°F). The strength of the solution must not be increased otherwise the metal will be attacked. The alloy parts should remain in the solution until the corrosion deposits have been dissolved, after which the parts should be washed in clean hot water; in instances where the tartaric acid solution is not available the deposits should be removed by hand cleaning, prior to washing in hot water. After cleaning by either method the parts should be immersed in the following solution:

Chromic acid (33C/494)	0.75 lb.
Phosphoric acid (33C/3)	0.50 lb.
Distilled water	100 lb. (10 gals)

The solution should be maintained at a temperature of from 90°C to 100°C (195 to 212°F) and the light alloy engine components allowed to remain in the solution for not longer than 1 hour. The solution should be orange-red in colour and when this changes to a greenish hue the solution should be renewed. After removing the parts from the chromic acid solution they should be thoroughly washed in hot water and quickly dried.

Engine Components Other Than Light Alloy

- (2) Engine components carrying carbon deposits or paint should be immersed in cleaner,

carbon removal, Ref. 33C/633 either cold, or hot if facilities are available, but in no case exceeding 65° C (150° F) for 15 minutes to 1 hour. This material removes carbon, gum or varnish deposits, is an excellent paint stripper and is non-corrosive to metals. For this reason, it may also be used on aluminum pistons and engine components such as fuel pumps or carburetors; but rubber components should be removed prior to immersion, and contact with skin is to be avoided. Corrosion protection should be given to material cleaned in this solution by use of rust preventive, dewatering type, Ref. 40D/588.

Instruments

(c) Instruments, other than wireless instruments, should be removed, washed in hot water, dried and immersed in oil general purpose, anti-corrosive, low temperature, Ref. 34A/124. When it is suspected that salt water has gained access to the interior of the instrument the bezel should be removed prior to commencement of the above operation. Following this treatment instruments will be quarantined and reported for reconditioning action. Equipment will be tagged and clearly marked as having been submerged in (salt) water.

NOTE

Repairable equipment listed in RCAF Pamphlet 98 with automatic issue to a designated repair facility will be actioned as indicated. Repairable equipment listed in RCAF Pamphlet 98 as RR will be put up for disposal in accordance with CAP 16, Chap. 13 as surplus repairable material. Components not listed in RCAF Pamphlet 98 will be reported in the normal manner.

Wireless And Electrical Gear.

(d) Wireless and electrical gear should be

taken out, immersed in warm water at 70°C (160° F) for 2 seconds and dried immediately both inside and outside by means of a hot air blast when available. Following this treatment equipment will be quarantined and reported for reconditioning action. Equipment will be tagged and clearly marked as having been submerged in (salt) water.

NOTE

Repairable equipment listed in RCAF Pamphlet 98 with automatic issue to a designated repair facility will be actioned as indicated. Repairable equipment listed in RCAF Pamphlet 98 as RR will be put up for disposal in accordance with CAP 16, Chap. 13 as surplus repairable material. Components not listed in RCAF Pamphlet 98 will be reported in the normal manner.

Photographic Equipment

(e) Immersed accessories should be dismantled, mechanical parts immersed in hot water, dried and then submerged in oil GP, anti-corrosive, low temperature, Ref. 34A/124. Remaining parts are to be washed in hot water, dried by means of a hot air blower and then treated with petrolatum Ref. 34A/165. Care is to be taken that rust preventive does not come in contact with the lens.

9 It is emphasized that careful salvage practice will save many times the cost of the salvage work. The officer in charge of the salvage of an aircraft is to take every precaution to avoid additional damage during salvage operations and transit.

NOTE

Reference should be made to EO 45-1-4 which lists corrosion preventative materials and their uses and application.

