

National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



ERA24LA010

MATERIALS LABORATORY

Factual Report 24-075

October 23, 2024

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A. ACCIDENT INFORMATION

Location: Southport, North Carolina
Date: October 15, 2023
Vehicle: Czech Aircraft Works Spol Sro SportCruiser, N72FU
Investigator: Todd Gunther, AS-ERA

B. COMPONENTS EXAMINED

Carburetors (Bing) from Rotax 912 ULS series engine

C. EXAMINATION PARTICIPANTS

Specialist Michael Meadows
National Transportation Safety Board
Washington, District of Columbia

D. DETAILS OF THE EXAMINATION

On October 15, 2023, at 0753 eastern daylight time near Southport, North Carolina, the accident aircraft was substantially damaged during an emergency landing in a vacant lot after a reported total loss of engine power shortly after takeoff. The student pilot sustained minor injuries. The airplane was operated as a Title 14 Code of Federal Regulations Part 91 personal flight.

The NTSB materials laboratory received the 1/3-cylinder and 2/4-cylinder carburetors from the accident aircraft for closer examination.

Figure 1 shows the 1/3 carburetor (left), and the 2/4 carburetor (right) viewed from the cylinder side as received. The fuel lines appeared to have been cut near the end of the inlet fitting. Approximately 6.5 inches and 8 inches of black rubber drain line extended from the 1/3 carburetor and 2/4 carburetor, respectively. The free end of the 1/3 carburetor drain line was locally bulged and exhibited radial cracks in the bulged area and at the free end. An imprint consistent with being secured with a cable tie was observed around the outer surface near the free end. The free end of the 2/4 carburetor drain line exhibited a flat smooth end with exposed fiber reinforcement, consistent with a cut end. The bent tube assembly for the choke cable, which retained a portion of the Bowden cable housing was fractured and separated from the 1/3 carburetor and neither the choke nor throttle cables were present. The choke cable for the 2/4 carburetor was not present and approximately 5.5 inches of the throttle cable was retained and was fractured near the throttle valve lever attachment. The remaining portion of throttle cable retained lubricant but exhibited evidence of internal and external cable wear. The throttle valve lever on the 2/4

carburetor was bent towards the carburetor housing by approximately 0.3 inch relative to the 1/3 carburetor throttle valve lever as indicated in figure 2.

The 1/3 carburetor was stamped 64/32/421A on the upper web of the carburetor body at the cylinder side socket, consistent with Bing part designation. A string of numbers, 078473, was vibro-etched on the side of the carburetor body opposite of the clutch placement. The 2/4 carburetor was similarly stamped and vibro-etched with 64/32/422A and 078866.

When manually actuated, the choke levers rotated relatively smoothly over the full distance between mechanical stops on both carburetors. The choke lever return spring was received separated from the 2/4 carburetor, however no obvious damage was observed with respect to the spring. When manually actuated, the throttle lever on the 1/3 carburetor rotated smoothly over the full distance between mechanical stops and the valve returned to the fully open position under spring tension. When manually actuated, the throttle lever on the 2/4 carburetor rotated smoothly, however impinged on the chamber top before reaching the throttle valve stop screw. The 2/4 carburetor throttle valve returned to the fully open position under spring tension. The internal piston slid smoothly up and down along the internal bore of both carburetor housings.

Figure 3 shows a view of both carburetors with the float chamber removed. Two black floats were present in each chamber and all four floats moved freely on their respective posts. A light green gasket was present at each float chamber interface and the gasket on each carburetor appeared continuous and intact. The float bracket on the 2/4 carburetor was bent and impinged against the main jet housing which restricted movement as shown more closely in figure 4. The float bracket on the 1/3 carburetor appeared undamaged and moved freely when manually actuated and returned to a neutral position with spring action.

Figure 5 shows the interior surfaces of each float chamber after the floats were removed. Areas of white film and accumulations of white and yellow material deposits were observed, particularly around the base of the chamber. The float chamber from the 1/3 carburetor exhibited a greater degree of these white and yellow material deposits. A similar buildup of material was observed around the sidewall of the float chamber jet port on the 1/3 carburetor as indicated by a yellow arrow. Closer views of this area are shown in figure 6 where white deposits were observed on and around the float chamber jet and port sidewall as indicated by yellow arrows.

The composition of the float chamber was analyzed using x-ray fluorescence spectroscopy (XRF) and was predominantly zinc with smaller concentrations of aluminum and copper, consistent with a cast zinc alloy.

A sample of the white and yellow material deposits was removed from the 1/3 carburetor float chamber for closer examination. When disturbed with tweezers, the deposits broke down into a powdery consistency which was collected and affixed to carbon tape on an aluminum stub to facilitate compositional analysis using energy dispersive x-ray spectroscopy (EDS). Resulting spectra for the samples are shown in figure 6. Both samples exhibited large peaks of zinc and oxygen, consistent with oxides associated with the zinc float chamber. Both samples also exhibited smaller peaks of sulfur, aluminum, and chlorine, although these peaks were higher for the yellow deposits. The yellow deposits additionally exhibited smaller peaks of magnesium, iron, silicon, and calcium.

Submitted by:

Michael Meadows
Materials Engineer

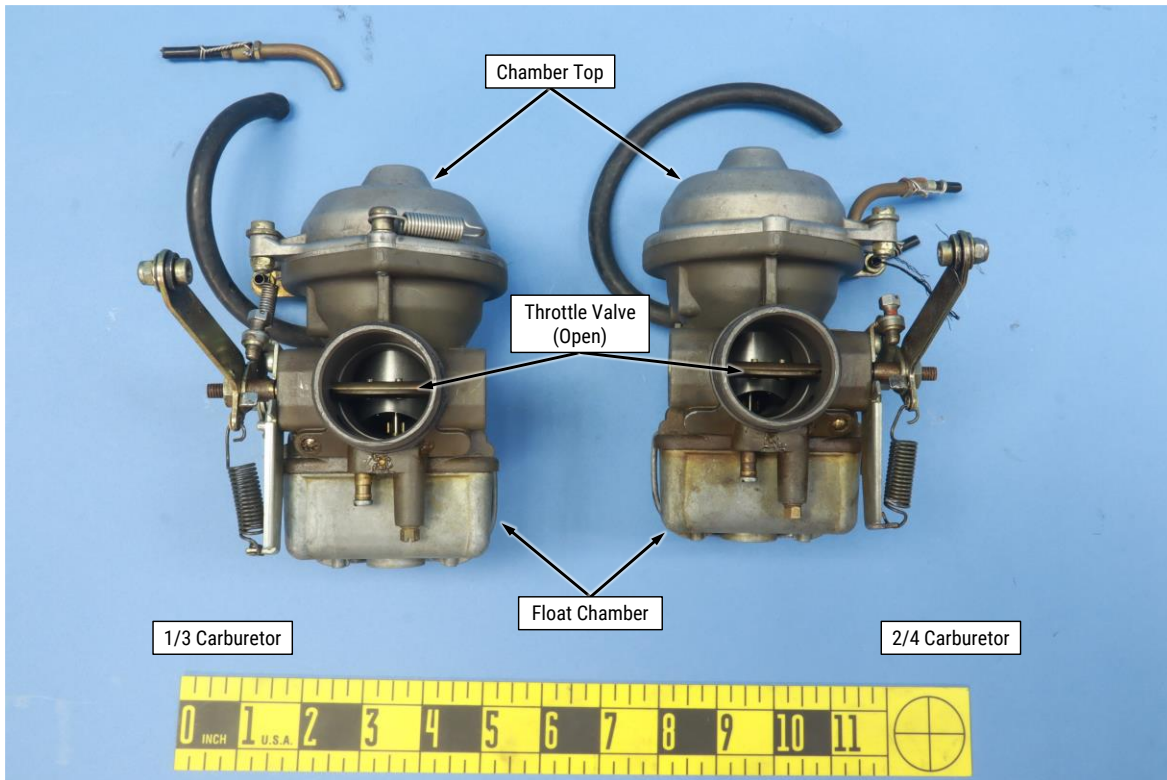


Figure 1. Photograph of the 1/3 carburetor (left) and the 2/4 carburetor (right) viewed from the cylinder side, as received.

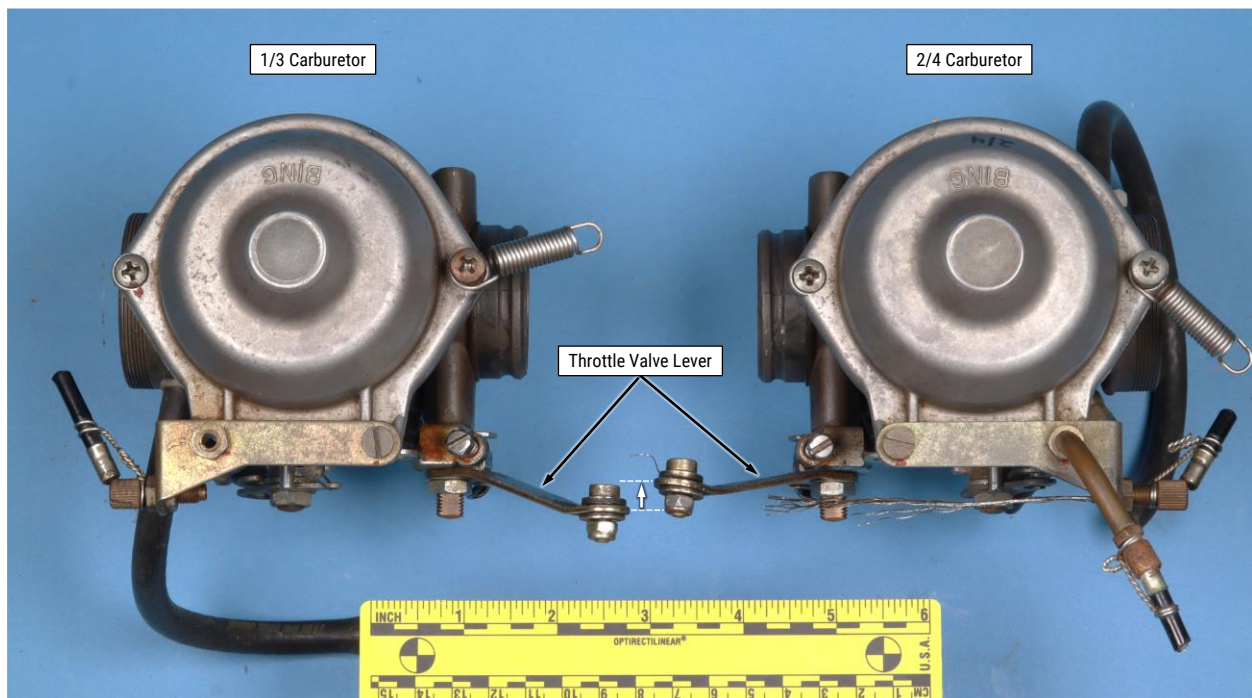


Figure 2. Top-view photograph of the carburetors indicating the bent throttle valve lever of the 2/4 carburetor relative to the 1/3 carburetor.

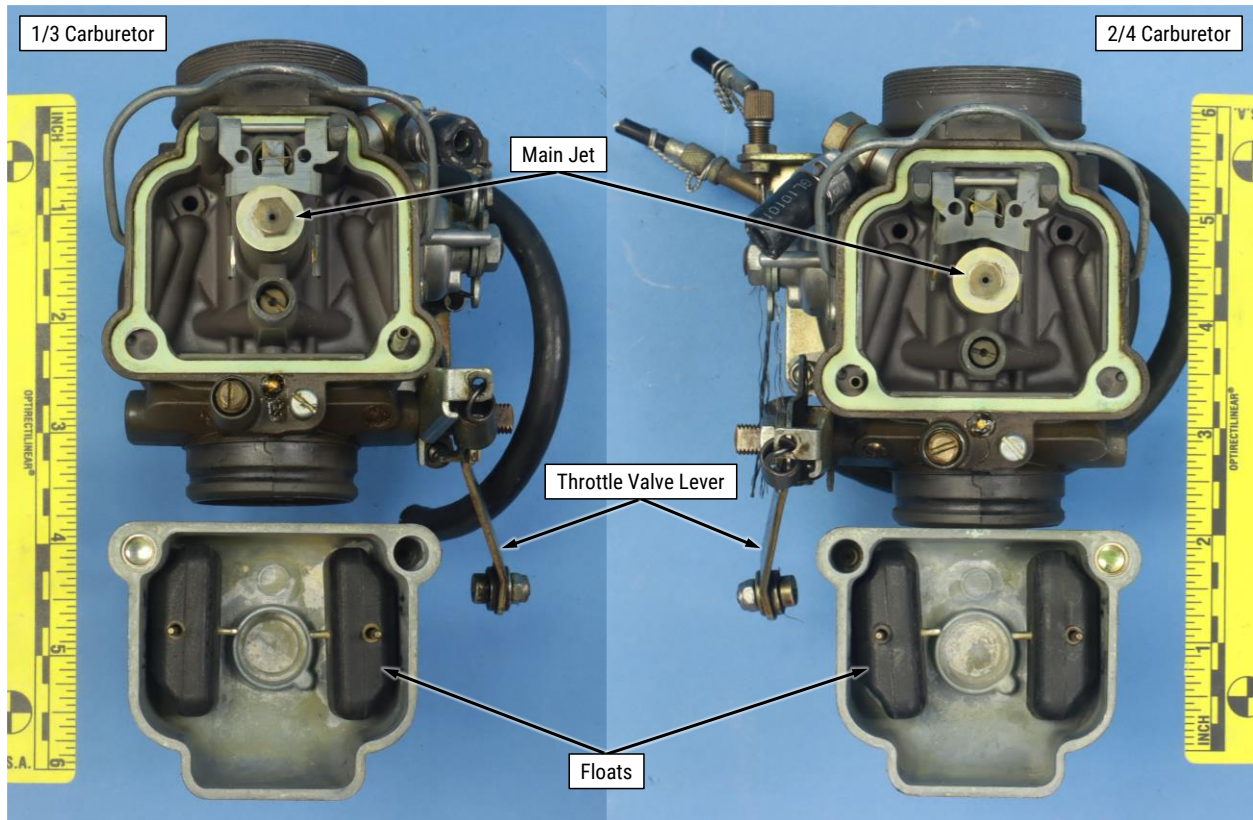


Figure 3. Photograph of the carburetors with the float chambers removed.

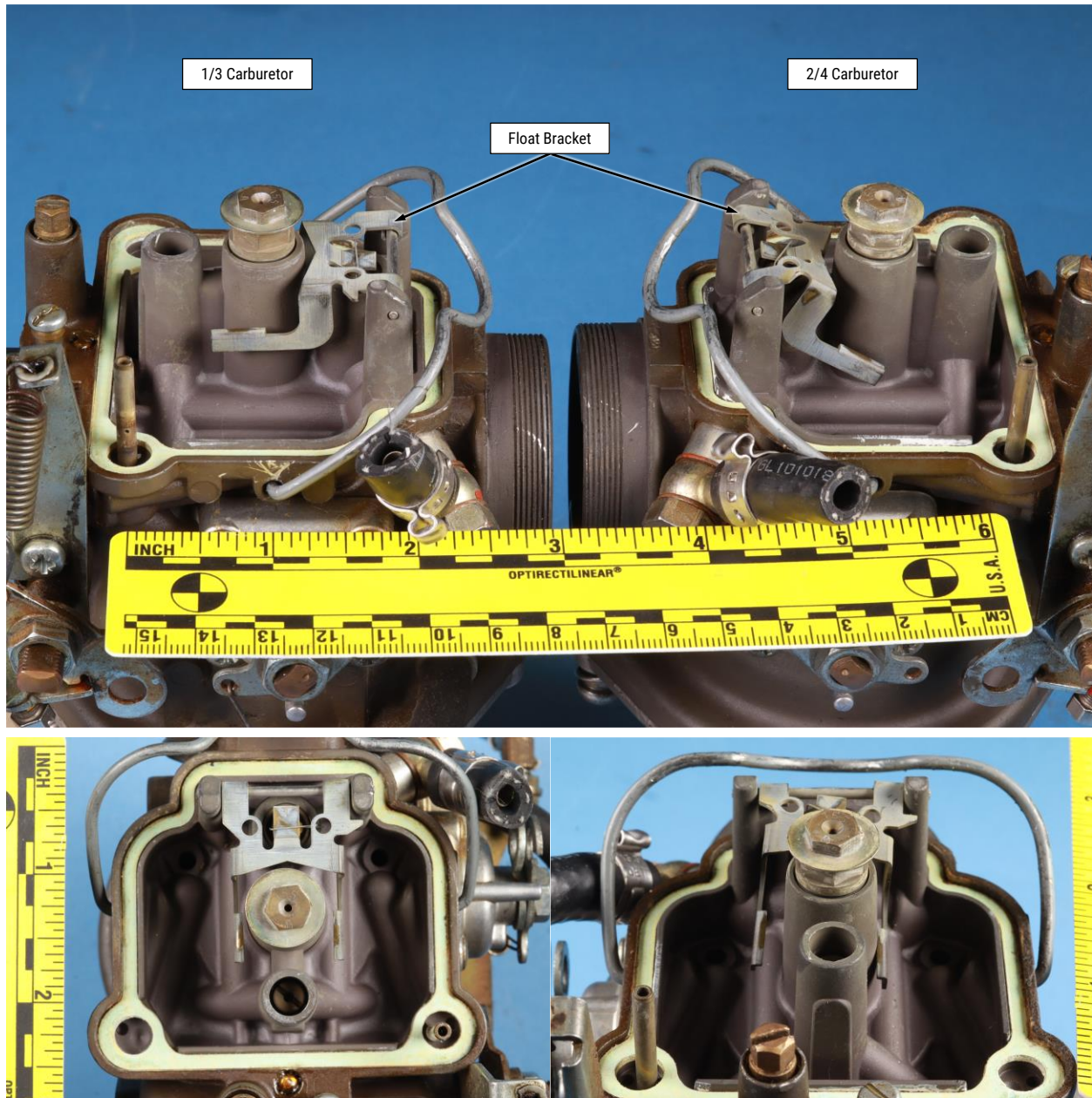


Figure 4. Photographs of the carburetors showing the bent float bracket observed on the 2/4 carburetor.



Figure 5. Closer photographs of the interior of the float chamber with the floats removed. Areas of white film and accumulations of white and yellow material deposits were observed on the base of both float chambers. Similar white deposits were observed around the sidewall of the 1/3 carburetor float chamber jet as indicated by the yellow arrow.

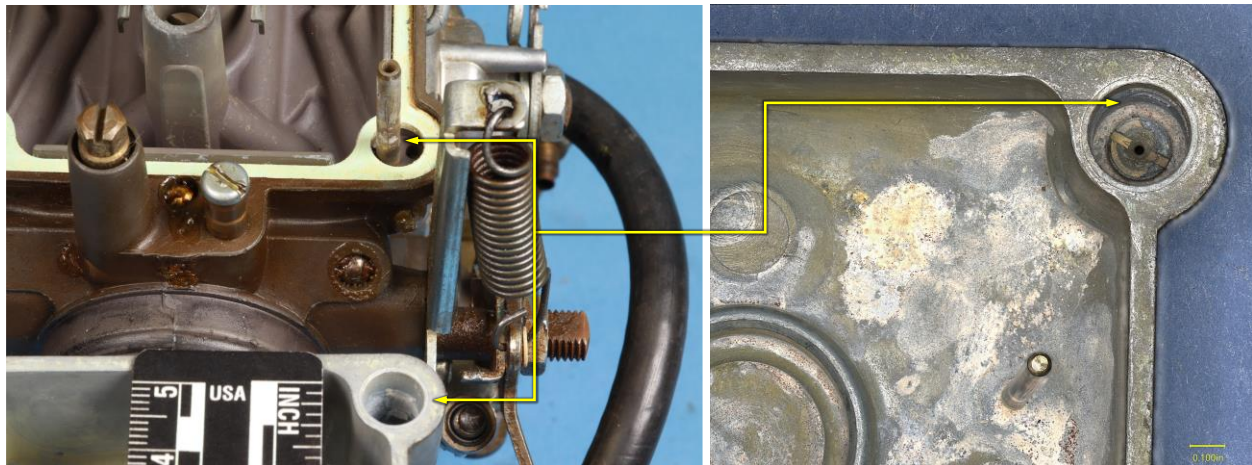
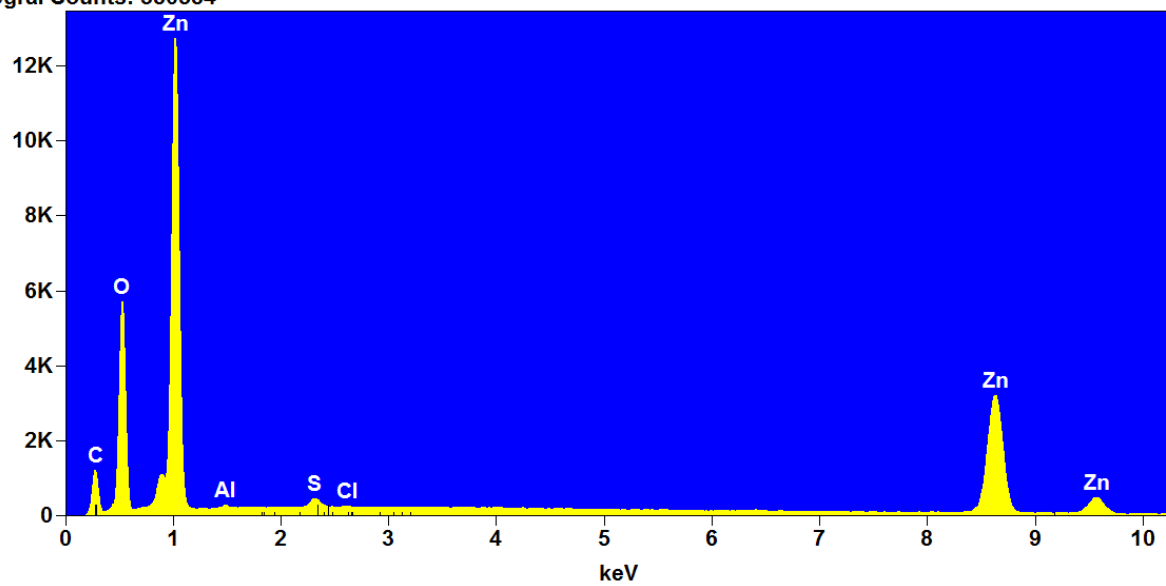


Figure 6. A closer view of the 1/3 carburetor float chamber jet showing closer views of accumulations of white and yellow material deposits on and around the float chamber jet as indicated by yellow arrows.

Full scale counts: 12734
Integral Counts: 380584

1/3 Carburetor – White Deposits



Full scale counts: 10649
Integral Counts: 439066

1/3 Carburetor – Yellow Deposits

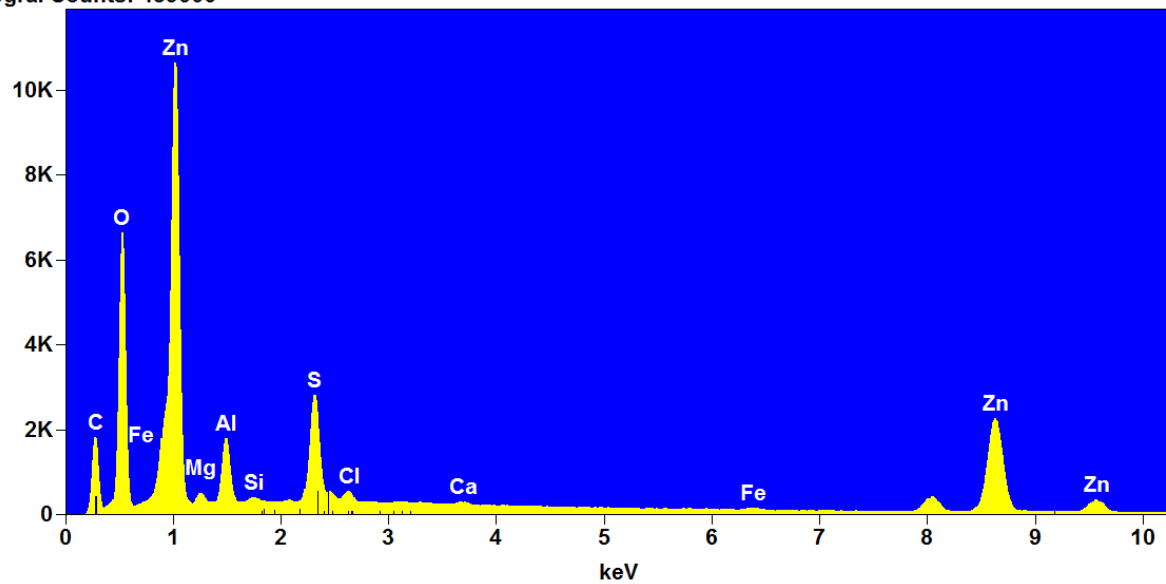


Figure 7. Representative spectra from EDS analysis of samples of white (top) and yellow (bottom) material deposits from the 1/3 carburetor float chamber.