

ATTACHMENT 1

DEEC Circuit Card Examination – Honeywell Report

This report is the documentation associated with the DEEC CCA Download attempt that occurred on March 29, 2016 at the HON Tucson facility. Oversight was provided by the NTSB.

The first Digital Electronic Engine Controller (DEEC) Circuit Card Assembly (CCA) examined was the one located during the wreckage review at Hanger 6.



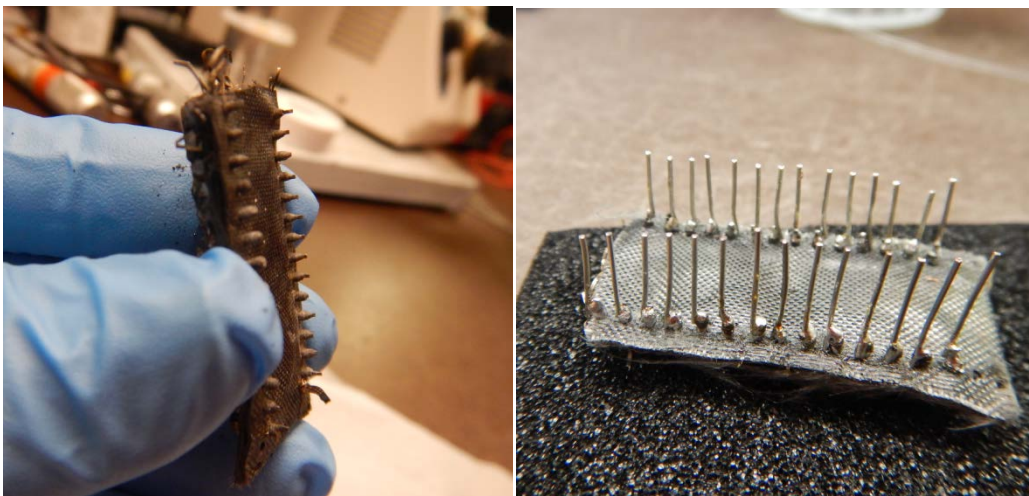
The U26 Integrated Circuit (IC) chip was damaged. The Plastic was melted and appear to have been partially consumed by the post-crash fire. A crack was identified in the IC die.



The U26 chip was removed by cutting through the CCA fiber layers from the backside (opposite of the attachment) in effort to maintain as much structural integrity of the IC leads. Upon removal it was noted that IC leads 3,4,6,7 & 8 were loose from their attachment point on the IC due to material loss.



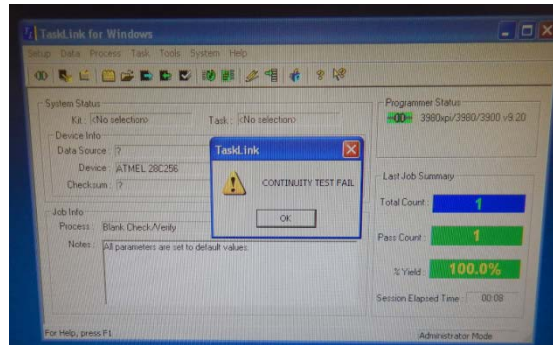
The U26 chip was installed in the Data I/O 3980 XPI with a resulting lack of connection in the socket due to the additional material on IC leads. Lead extensions were soldered onto the IC leads in order to interface with the Data I/O 3980 XPI socket.



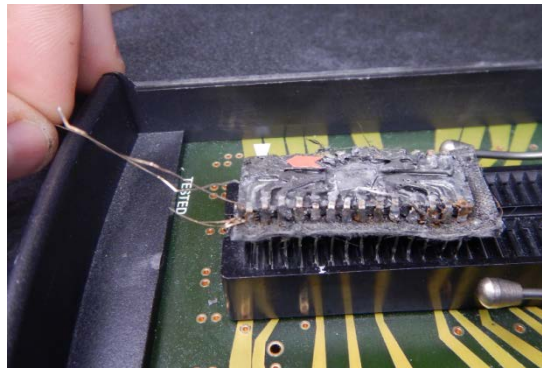
The IC was installed in the Data I/O.



- 1st attempt: “Continuity Test Fail” Message received.



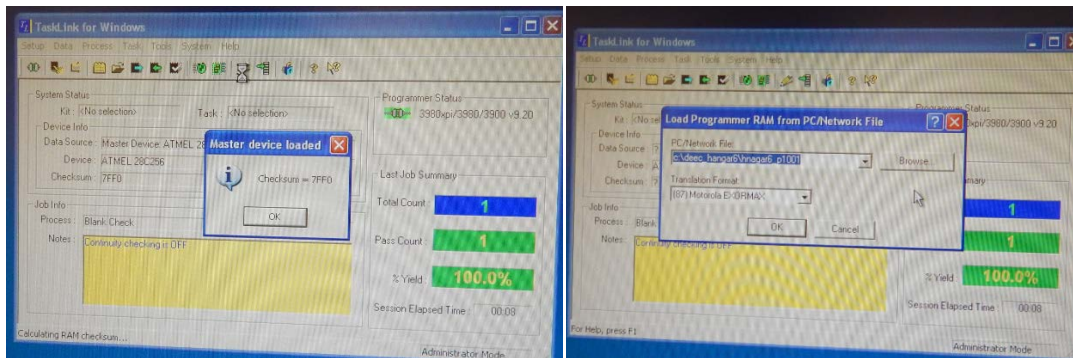
- The copper tracks remaining within CCA material were removed to eliminate the possibility of short circuits between the leads.



- Reseated IC in test socket



- 2nd attempt: “Continuity Test Fail” Message received.
 - Reseated IC in test socket
- 3rd attempt: “Continuity Test Fail” Message received.
 - Disabled Continuity Test in software
 - Software identified IC Data CHECKSUM 8000 (Equivalent to empty device)
- 4th attempt:
 - Reseated IC in test socket
 - Software identified IC Data CHECKSUM 7FF0 (Small amount of data) – File saved “DEEC_hanger6\hanger6_P1001”



- Enabled Continuity Test in software
- 5th attempt: “Continuity Test Fail” Message received.
 - Attempted to hold IC in socket with light pressure in effort to make contact with leads.
 - “Empty Socket” message – Executed query operation 4 times with repeated failure message.

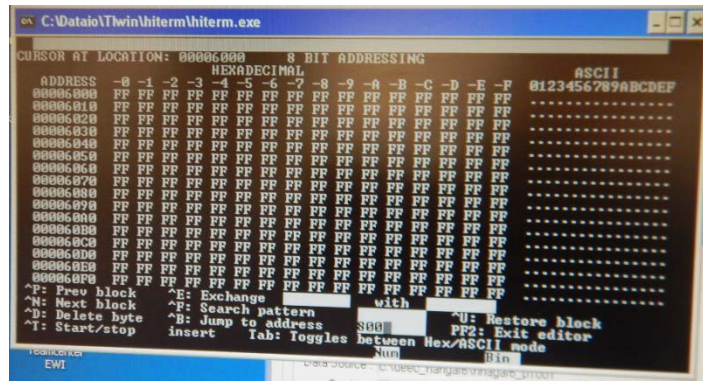


- Disabled Continuity Test in software
- 6th attempt:
 - “Empty Socket” message – Executed query operation 4 times with repeated failure message.
 - Removed Hanger6 IC and installed new IC to verify functionality of Data I/O 3980 XPI test setup - Operation normal.
 - Reinstalled Hanger6 IC
- 7th attempt:
 - “Empty Socket” message when program executed.
- 8th attempt:
 - Attempted to hold IC in socket with light pressure in effort to make contact with leads.
 - “Empty Socket” message when program executed.

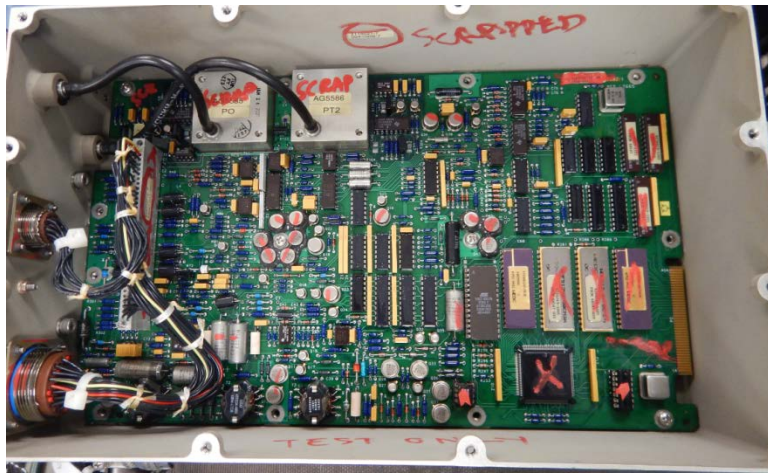
Additional review at this time appeared to show that all leads were loose to some degree. Download attempt terminated.

The IC manufacturer could be consulted to assess the die damage and the possibility of data retrieval at the die level. The IC is a ATMEL AT28C256.

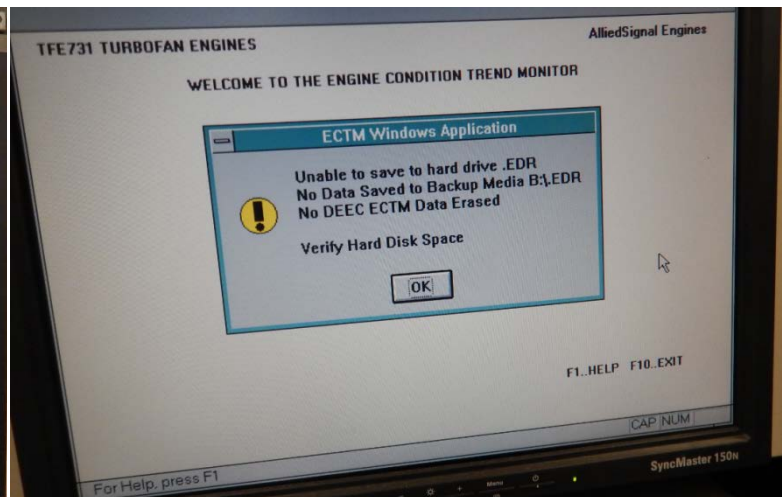
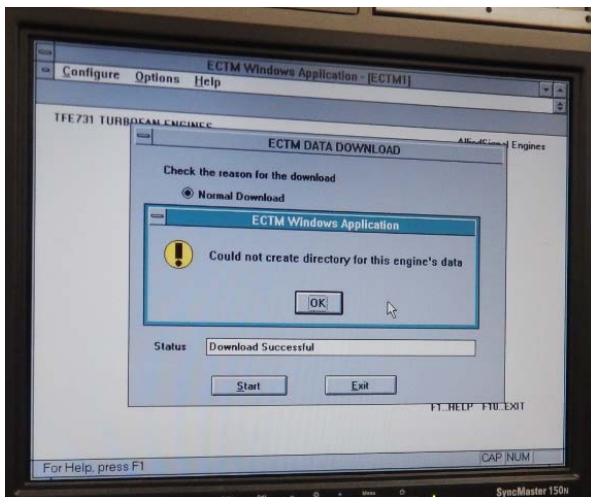
Data reviewed manually. A minimal amount of bytes were Zeros. The data appeared to be invalid.



The saved file was copied onto a slave U26 IC and installed in a slave socketed DEEC for download and interrogation by the Honeywell ENGINE CONDITION AND TREND MONITORING SOFTWARE (ECTM).



ECTM stated the download operation was successful. However, the operation of creating and saving the directory (output) failed during multiple attempts.



The "On-Scene" located DEEC CCA was examined.

- It was identified that the U26 IC was not present on the CCA.



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