



6355C0001-01 Stabilizer Trim Motor

S/N 4580 Investigation

1. Background

A. Part Information:

<u>Eaton Part Number</u> 6355C0001-01	<u>Customer Part Number</u> 10-62233-7	<u>Serial Number</u> 4580
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B. Customer:

HAINAN AIRLINES CO., LTD

C. Investigation Date:

November 13, 2019

D. Participants:

Jay O’Neal – Eaton, Product Support Manager

Joey Hunt- Eaton, Repair Technician

E. Customer Reason for Removal:

HNA IMP. & EXP. CO., LTD Order number WRHUB24ZK –

STAB OUT OF TRIM light on, the light off after break AP

TSN: 25245.06	CSN: 12766
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F. References:

Component Maintenance Manual 27-40-10, Rev 8, Dated Oct 05/17
Inspection & Repair Report C302097

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 WARNING - THE TECHNICAL DATA HEREIN IS SUBJECT TO EXPORT ADMINISTRATION REGULATIONS
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2. Investigation:

A. Incoming Visual Inspection:

The removal/ return of 6355C0001-01 S/N 4580, modification level 7 was documented in C302097. The Stabilizer Trim Motor (STM) had minor scratches and dings, the paint was discolored and one of the connector caps was missing. None of these observations is believed to have caused the noted reason for removal.



Figure 1: Identification Plate 6355C0001-01 S/N 4580

B. Incoming Test Results:

Note: Item numbers refer to the IPL of CMM 27-40-10.

The 6355-0207-01 Cover (Item 1-51) was removed to read the non-volatile memory (NVM). No fault codes were present in NVM.

STM breakaway torque was 27 in-lb. in both clockwise and counter clockwise compared to a requirement of 18 in-lb maximum. The STM would not operate electrically and therefore failed multiple sections of the incoming test.

Due to the extent of the test failures vibration and thermal variation tests were not conducted.

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C. Disassembly Observations:

The 6355-0210-05 Brushless DC Motor Assembly S/N AM2736 (Item 1-35A) was removed to gain access to the Printed Wire Assemblies (PWA). No issues were identified with the Brushless DC Motor Assembly. The Control PWA 6355-0230-13 S/N 1824 (Item 1-50J) and Filter PWA 6355-0220-07 S/N 2996 (Item 1-70A) were removed. The Filter PWAs showed visual damaged of electrical over stress, Diodes (Items 2-160, 2-165, 2-235, 2-250, 2-260) were visibly damaged. See Figures 2 and 3.

The Control PWA 6355-0230-13 showed no visual sign of damage or deterioration. See Figure 4

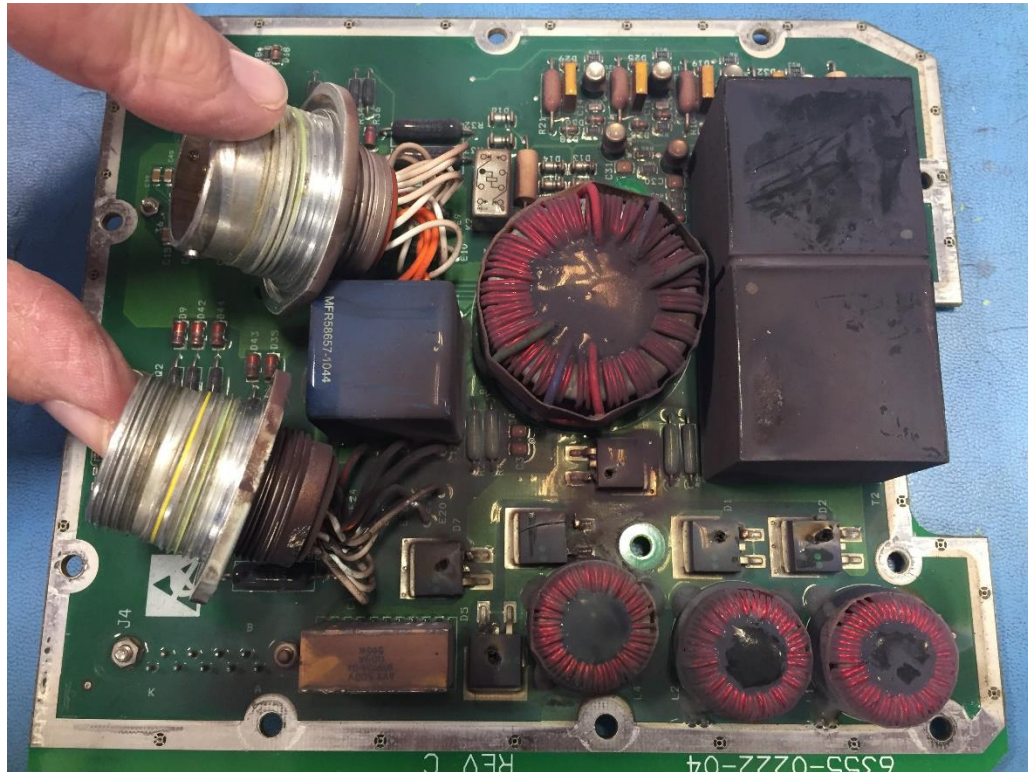


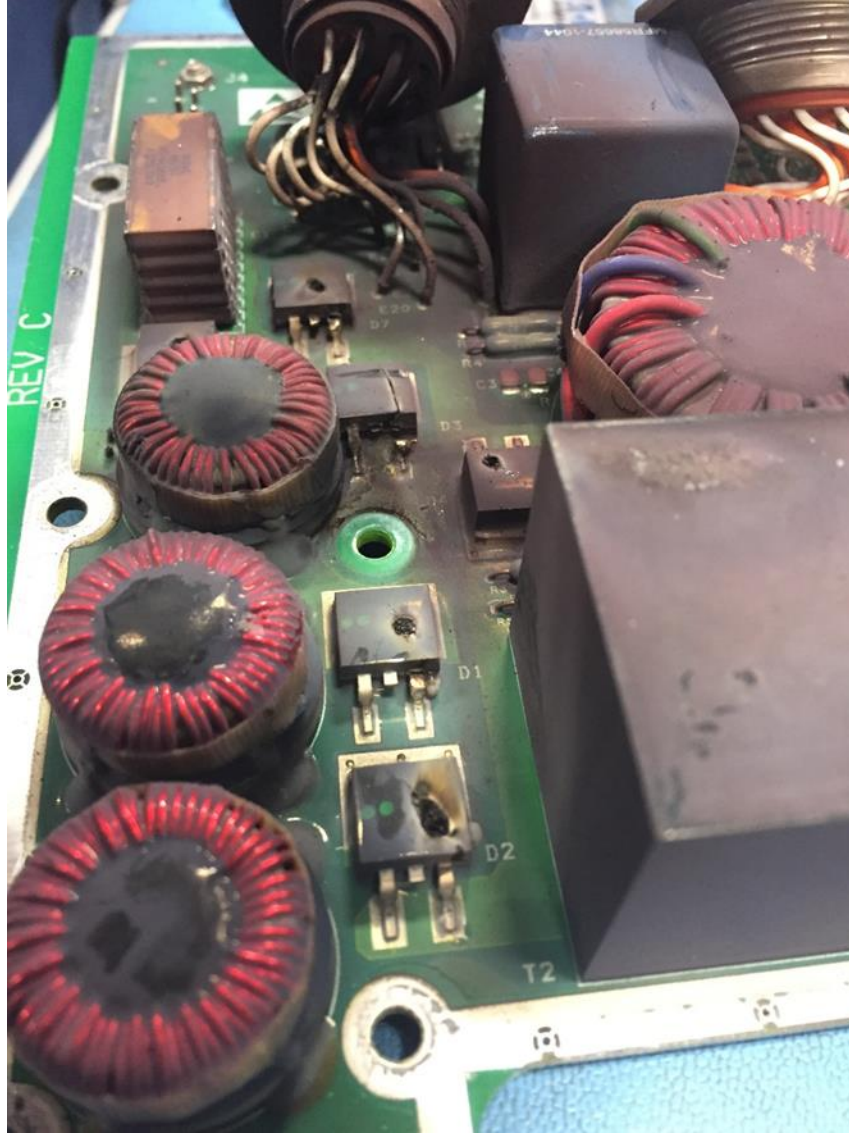
Figure 2: View of damaged components on the 6355-0220-07 Filter PWA

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Figure 3: View of damaged components on the 6355-0220-07 Filter PWA



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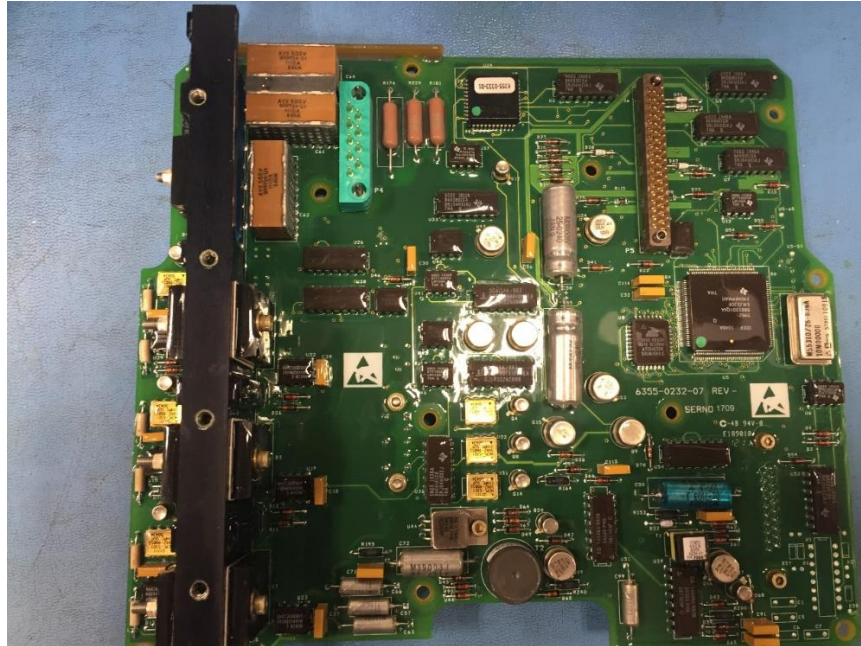


Figure 4: View of 6355-0230-13 Control PWA with no adverse visual indication

D. Investigation:

To determine the cause of the of the failed diodes of the 6355-0220-07 Filter PWA, the motor drive circuit was analyzed. It was determined that the Insulated-Gate Bipolar Transistors (IGBT) 10 & 13 (Items 3A-810, 3A-815) located on the 6355-0230-13 Control PWA (Item 1-50J) were shorted. When the 270 VDC current shorted to ground it resulted in the visual damage to the diodes and render the STM electrically inoperative.

The Filter and Control PWA work together to allow the STM to function properly. Aircraft power and commands are received by the Filter PWA before being supplied to the Control PWA. The Filter PWA also filters and rectifies the power used by the different circuits of Control PWA and the DC Motor itself. The Control PWA then validates the command, the functionality of the STM, supplies the current for the motor to execute the command and records any latching faults. The IGBTs are on the Control PWA as part of the 270VDC motor drive circuit, which failed releasing enough energy to permanently damage the Control PWA as well as damage the diodes of the Filter PWA that are part of that same circuit. In this instance the IGBTs were the root cause and the damaged diodes of the Filter PWA were collateral damage. Due to the extent of the damage to the Control and Filter PWAs, both will be replaced with new.

E. Conclusion:

The IGBTs were determined to be the root cause of the removal and both the Control and Filter PWAs were replaced to return the STM to service.

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