ENGINE - FUEL AND CONTROL - TO PROVIDE A NEW ELECTRONIC ENGINE CONTROL (EEC) WITH THE SCN12B SOFTWARE CONFIGURATION - CATEGORY CODE 4 - MOD.ENG-73-0044

1. Planning Information

A. Effectivity

(1) Aircraft: Airbus A320

(2) Engine: V2500-A1 Engines before Serial No.V0354*

For the engines specified which incorporate this Service Bulletin the Bump configurations which follow are applicable.

BUMP 00 (No thrust bump)

BUMP 03(Improved Consolidated Thrust Bump)**

BUMP 04 (No Thrust Bump and 5 Deg. C Bias applied to measured EGT)

BUMP 07 (Improved Consolidated Thrust Bump and 5 Deg. C Bias applied to measured EGT)**

NOTE: *The Serial Number data shown is of a preliminary nature and is provided for advance planning only. A future revision to this Service Bulletin will confirm final serial number effectivity.

**The Flight Operations Manaul will have specific instructions for Aircraft which have Engines with one of these Thrust Bump Configurations.

This Service Bulletin must be incorporated concurrently on both the engines on the aircraft.

If Reference (1) is incorporated on the engine(s) when you do this Bulletin, it must be removed when this Service Bulletin is incorporated.

This Service Bulletin is not applicable to Engines which use BUMP 01 (Cyprus Thrust Bump). Replace this bump with BUMP 03 or BUMP 07, if a thrust bump configuration will be used.

You must contact your IAE Representative when you incorporate this Service Bulletin. You must obey the contractual obligations when you change from a no thrust bump configuration (00-04) to a thrust bump configuration (other than 00 or 04).

NOTE: If you now use the consolidated thrust bump (03-07) you will automatically get the improved consolidated thrust bump configuration option (03-07) when you incorporate this Service Bulletin.

B. Reason

(1) Condition

(a) Hung Starts: Several V2500-A1 engines have experienced hung starts at various levels of deterioration at the applicable ambient conditions.

(b) Thrust Shortfall at Pressure Altitudes Below Sea Level: The present SCN11H and SCN12A software versions have a thrust shortfall at altitudes below seal level.

(c) Heat Management System Mode that Switches from Mode 3 to Mode 5: This mode was introduced when the fuel temperature limit was reduced from 120 degrees C to 110 degrees C.

(d) Heat Management System Thermocouple Nuisance Fault: A nuisance fault was found during flight test. The CFDS message HMS-TC-FAILSAFED was recorded in the EEC fault memory. This fault was a result of the IDG oil temperature rate limit being exceeded.

(e) ATA Chapter Reference for the Fuel Temperature Thermocouple is not Correct: The SCN11H and SCN12A software for the V2500-A1 engines have the ATA chapter reference that is not correct being displayed when the fuel temperature sensor is failed.

(f) Modify the Thrust Reverser Menu Mode Test: Airbus requested a change to the thrust reverser menu mode test to prevent the confusion on the current words RETURN AND DISABLE TEST.

(g) Improve the Thrust Reverser Test Fault Isolation and Eliminate Momentary Energizing of the ARMING Solenoid: In all the software standards before the SGN12B the menu mode thrust reverser system test would not properly isolate an aircraft permission switch fault. This was due to the sequence in which the thrust reverser command logic was implemented and the actuators were enabled.

(h) Add an Additional ARINC Message Indicating TRA has been Set to Idle Due to an Inadvertant Thrust Reverser Deployment: Airbus has raised a concern that all software standards on the V2500 do not have a ARINC message which indicates that the TRA is being set to idle in the case of an inadvertent thrust reverser deployment.

(2) Background

(a) Hung Starts: The EEC schedules fuel during the start according to an N2 derivative schedule and a Wf/Pb ratio limit. The EEC then monitors engine acceleration throughout the start. If the engine does not accelerate at the selected rate for five seconds, it will abort an automatic start (shutoff fuel and motor as necessary).

(b) Thrust Shortfall at Pressure Altitudes Below Sea Level: All the software standards given before did not correctly implement the thrust versus altitude table. This table is used to set thrust for a given altitude.

(c) Heat Management System Mode that Switches from Mode 3 to Mode 5: This switching mode has existed in all the software standards.

(d) Heat Management System Thermocouple Nuisance Fault: This product improvement is not a current V2500-A1 problem. It is a possible problem. The same logic is used in other V2500 engine models which have demonstrated the fault.

(e) The ATA chapter reference for the fuel temperature thermocouple is not correct.

(f) Modify the Thrust Reverser Menu Mode Test: It is not easy to return out of the present menu mode test and cause confusion to the aircraft maintenance crew. This has resulted in EEC removals that were not necessary.

(g) Improve the Thrust Reverser Test Fault Isolation and Eliminate Momentary Energizing of the ARMING Solenoid: The menu mode thrust reverser system test is designed to permit the person to perform a functional test of the thrust reverser through the EEC command of the directional control and the ARMING valve solenoid. The EEC will monitor the system when you do the test for electrical and mechanical faults. This includes an aircraft permisssion switch that is stuck in the closed position. In software versions before the SCN12B, the thrust reverser solenoids were enabled before the activation of the thrust reverser command logic. If an aircraft permission switch fault was present, a wraparound fault would be detected immediately and the test would be aborted. The proper LRU would be recorded, but the aircraft permission switch fault would not be detected. This will not appear in the trouble shooting report.

(h) Add an Additional ARINC Message Indicating TRA has been Set to Idle Due to an Inadvertant Thrust Reverser Deployment: During the design of a new model installation, Airbus revised the requirement to have a cockpit indication when the TRA was set at idle during the thrust reverser operation.

(3) Objective

(a) Hung Starts: Changes were made for the hung start problems. One change will increase the starting fuel flow. The two other changes will minimize the EGT impact:

1 Increase the ground starting Wf/Pb schedule: The ground starting Wf/Pb schedule is a function of N2C2. This is trimmed two ratio units at speed above 5400 N2C2. This provides additional fuel flow will minimize the EGT impact:

2 Reduce the operating range of the stage 7C bleed during ground starts: With SCN12A logic druing ground starts, the transient (accel) detection logic keeps the stage 7C bleed open above the staedy state closing speed. The SCN12B will disable transient operation of the bleed below idle. This will close the bleed when N2C26 reaches the steady state closing point (which is being lowered by trims). This will keep to a minimum the increase in peak EGT that is induced by the increase in fuel scheduling.

3 Incorporate hot start logic that is used in the other V2500 engine models: Incorporation of this logic will bias the ground starting N2DOT accel schedulenased on the EGT proximity to the EGT starting limit. This will also prevent teh EGT from being exceeded during the start.

(b) Thrust Shortfall at Pressure Altitudes Below Seal Level: The break point temperatures used to read the rating tables is revised to fix an observed thrust shortfall at below sea level pressure altitudes.

(c) Heat Management System Mode that Switches from Mode 3 to Mode 5: The IDG oil temperature limit for modes that switch from Mode 3 to Mode 5 (no recirculation in the air) is reduced from 127 degrees C to 110 degrees C. This change fixes the mode 3 to mode 5 cycling that was introduced when the fuel temperature limit was reduced from 120 degrees C to 110 degrees C in the SCN12A. When you reduce the IDG control limit, mode 5 is selected when the IDG oil temperature increases more than 100 degrees C. It will effectively be latched until fuel return to tank is permitted. The fuel will not cool the IDG oil below the level that permits mode 3 to be selected.

(d) Heat Management System Thermocouple Nuisance Fault: The change in SGN12B requires the fault to exist for five seconds before it is latched and recorded in fault memory and shown on the clear language message.

(e) ATA Chapter Reference for the Fuel Temperature Thermocouple is not Correct: The ATA chapter referenced is corrected to read 73-35-15 FUEL TEMP SENS/HC/EEC.

(f) Modify the Thrust Reverser Menu Mode Test: Modified the thrust reverser test menu to read RETURN TO DISABLE TEST.

(g) Improve the Thrust Reverser Test Fault Isolation and Eliminate Momentary Energizing of the ARMING Solenoid: In SCN12B, when you reverse the sequence in which the EEC output drivers are enabled and the thrust reverser logic modules are activated, energizing of the ARMING valve is eliminated and the aircraft permisssion switch failed closed fault is properly isolated.

(h) Add an Additional ARINC Message Indicating TRA has been Set to Idle Due to an Inadvertant Thrust Reverser Deployment: A new bit has been created. This will be sent out over the ARINC to indicate when the TRA has been set to idle power should there be an inadvertant thrust reverser deployment.

(4) Substantiation

The flight simulation and flight testing of the SCN12B software logic was accomplished at Airbus in Toulouse, France.

(5) Effects of Bulletin on Workshop Procedures:

Removal/Installation	Not affected
Disassembly/Assembly	Not affected
Cleaning	Not affected
Inspection/Check	Not affected
Repair	Not affected
Testing	Not affected

(6) Supplemental Information

None.

C. Description

(1) To provide a new Electronic Engine Control (EEC) with SCN12B software logic that adds many improvements.

D. Approval

The Part Number Changes and/or part modifications described in Section 2 and 3 of this Service Bulletin have been shown to comply with the applicable Federal Aviation Regulations and are FAA-APPROVED for the Engine Model listed.

E. Compliance

Category Code 4.

Accomplish at the first visit of an engine or module to a maintenance base capable of compliance with the accomplishment instructions regardless of the planned maintenance action or the reason for engine removal.

F. Manpower

Estimated Manhours to incorporate the full intent of this Bulletin:

Venue	Estimated Manhours
(1) In Service	Total: 1 hour 21 minutes
(a) To gain access	
(i) Install warning notices ..	5 minutes
(ii) Open the fan cowls	7 minutes
(iii) Remove the EEC	23 minutes
TOTAL	35 minutes
(b) To remove the ACC Front Duct Cover Assembly, if required, Reference (1)	5 minutes
TOTAL	5 minutes
(c) To return to flyable status	
(i) Install the EEC	28 minutes
(ii) Close the fan cowl ..	8 minutes
(iii) Remove the warning notices	5 minutes
TOTAL	41 minutes
(2) At overhaul	Not applicable

G. Material - Price and Availability

(1) Modification Kit not required.

(2) See "Material Information" section for prices and availability of future spares.

H. Tooling - Price and Availability

None.

I. Weight and Balance

(1) Weight change .. .. .. None

(2) Moment arm .. .. .. No effect

(3) Datum .. .. .. Engine front mount Centerline (Powerplant station P.P.S. 100)

J. Electrical Load Data

This Service Bulletin has no effect on the aircraft electrical load.

K. Reference

(1) Internal Reference No

93VZ006

(2) Other References

V2500-ENG-75-0025 (Engine - HP/LP Active Clearance Control Ducts - To Provide A Front Duct Cover Assembly for Controlled Service Use).

Hamilton Standard Service Bulletin EEC150-73-26.

V2500 Aircraft Maintenance Manual.

V2500 Engine Illustrated Parts Catalog.

V2500 Engine Manual.

L. Other Publications Affected

(1) The V2500 Engine Illustrated Parts Catalog, Chapter/Section 73-22-34, Figure 1, to add the new parts.

2. Accomplishment Instructions

A. The Source Demonstration requirements of this rework means that any facility not authorized to accomplish this rework either utilize the Authorized Vendors listed below or contact IAE Technical Services to determine if a qualification program can be initiated at their facility.

IAE-INTERNATIONAL AERO ENGINES AG
Corporate Centre II
628 Hebron Ave.
Glastonbury, CT 06033-2595 USA
ATTN: Director Technical Services

B. Authorized Rework Vendors for this Bulletin are listed below:

Hamilton Support Systems
Customer Service Center
97 Newberry Road
East Windsor, CT 06088 USA

or

Pratt & Whitney Overhaul/Repair Center Europe (PWORCE)
Maastricht Airport
P.O.Box 269
6190 AG BEEK
The Netherlands

C. The designation by IAE of an authorized rework vendor indiactes that the vendor has demonstrated the necessary capability to enable it to carry out the rework. However, IAE makes no warranties or representations concerning the qualifications or quality standards of the vendors to carry out the rework, and accepts no responsibility whatsoever for any work that may be carried out by a rework vendor, othet than when IAE is listed as the vendor. Authorized rework vendors do not act as agents or representatives of IAE.

D. Pre-Requisite Instructions

(1) On the aircraft panel 115VU, put a warning notice to tell the persons not to start the engine.

(2) On the aircraft panel 50VU, make sure that the ON legend on the EDG FADEC GND PWR push button switch is OFF and install a warning notice.

(3) Open the Fan Cowls by the use of the approved procedure in Reference (3), Chapter/Section 71-13-00, (TASK 71-13-00-010-010).

E. Removal Instructions

(1) Remove the 2A2690, 2A2691, 2A2692 or 2A2757 Electronic Engine Control by the approved procedure given in Reference (3), Chapter/Section 73-22-34, Removal/Installation. Refer to Figure 1.

F. Rework Instructions

(1) Do a modification of the 2A2690, 2A2691, 2A2692 or 2A2757 Electronic Engine Control (See Reference (4), Chapter/Section 73-22-34, Fig/Item No.01-280) and reidentify by the procedures given in Reference (2).

Procedure	Supplementary Information
(a) Send the Electronic Engine Control to the approved vendor to be modified.	See Figure 1.

(2) Remove the Active Clearance Control (ACC) Front Duct Cover Assembly. Refer to Reference (1) and Figure 2.

(a) Locate the Front ACC Duct.

(b) Remove the two 4W0102 Bolts from the Front Duct Cover Assembly.

(c) Remove the 2A3637 Front Duct Cover Assembly.

NOTE: When you incorporate this Service Bulletin with the new SCN12B software logic, the Front Duct Cover Assembly given in Reference (1) must be removed.

G. Installation Instructions

(1) Install the 2A2990, 2A2991, 2A2992, or 2A2993 Electronic Engine Control (1 off) by the approved provedure given in Reference (3), Chapter/Section 73-22-34, Removal/Installation. See Figure 1.

WARNING: DO NOT INSTALL AN SCN12B ELECTRONIC ENGINE CONTROL ON AN ENGINE THAT USES THE -01 BUMP. IN SOME CONDITIONS THE RESULT CAN BE AN ENGINE POWER LEVEL THAT IS NOT SUFFICIENT.

CAUTION: MAKE SURE THAT THE DATA RECORD ON THE DEP BACKSHELL AGREES WITH THE DATA RECORD ON THE ENGINE IDENTIFICATION PLATE.

(2) Install the Data Entry Plug (with the applicable combination). See Reference (3), Chapter/Section 73-22-35, Removal/Installation.

NOTE: Before you incorporate this Service Bulletin do a check of the Data Entry Plug configurations in use. Make sure you have one of the permitted Bump configurations given in this Service Bulletin.

NOTE: If you a Bump configuration in use that is not one of the permitted Bump configurations given, you must change the wire configuration to one of the approved Bump configurations specified. Use the procedure specified in Reference (5), Chapter/Section 71-00-00 testing-11. You must change the engine records to include this modification.

When you change the wire configuration of the Data Entry Plug assembly you must do a check to make sure the new configuration is correct. Use the electrical tester specified. See Reference (5), Chapter/Section 71-00-00, Testing-11.

(a) Install a Data Entry Plug with the 00 Bump configuration for engines that will not use the Thrust Bump.

(b) Install a Data Entry Plug with the 03 Bump configuration for engines that will use the improved Consolidated Thrust Bump.

(c) Install the Data Entry Plug with the 04 Bump configuration for engines that will not use the Thrust Bump, but will use the 5 Deg. C Bias (applied to measured EGT).

(d) Install the Data Entry Plug with the 07 Bump configuration for engines that will use the improved Comsolidated Thrust Bump and the 5 Deg. C Bias (applied to measured EGT).

NOTE: When you either change or replace the Data Entry Plug Assembly to incorporate a Bump configuration you must install a new Engine Identification plate. Contact your IAE representive to get a new Engine Identification Plate.

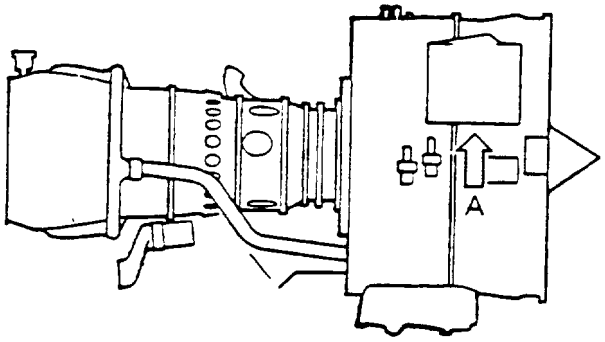
H. Post-Requisite Instructions

(1) Close the Fan Cowls by the use of an approved procedure in Reference (3), Chapter/Section 71-13-00 (TASK 71-13-00-410-010).

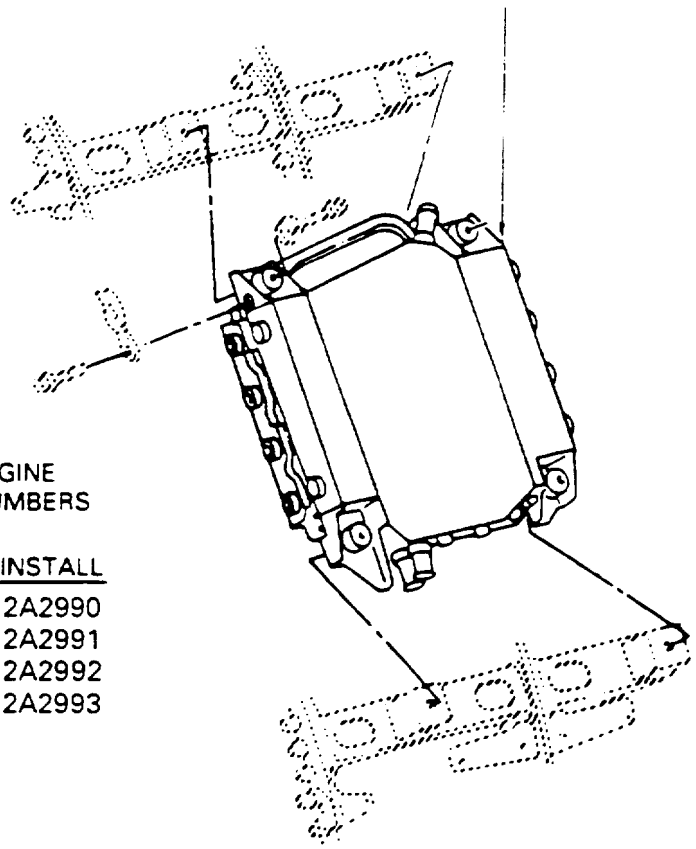
(2) Remove the warning notices.

I. Recording Instructions

(1) A record of accomplishment is necessary.



REMOVE THE APPLICABLE PART NUMBER * ELECTRONIC ENGINE CONTROL, DO A MODIFICATION, IDENTIFY AND INSTALL THE APPLICABLE PART NUMBER *
(1 Off)



* ELECTRONIC ENGINE CONTROL PART NUMBERS

REMOVE	INSTALL
2A2757	2A2990
2A2690	2A2991
2A2691	2A2992
2A2692	2A2993

A

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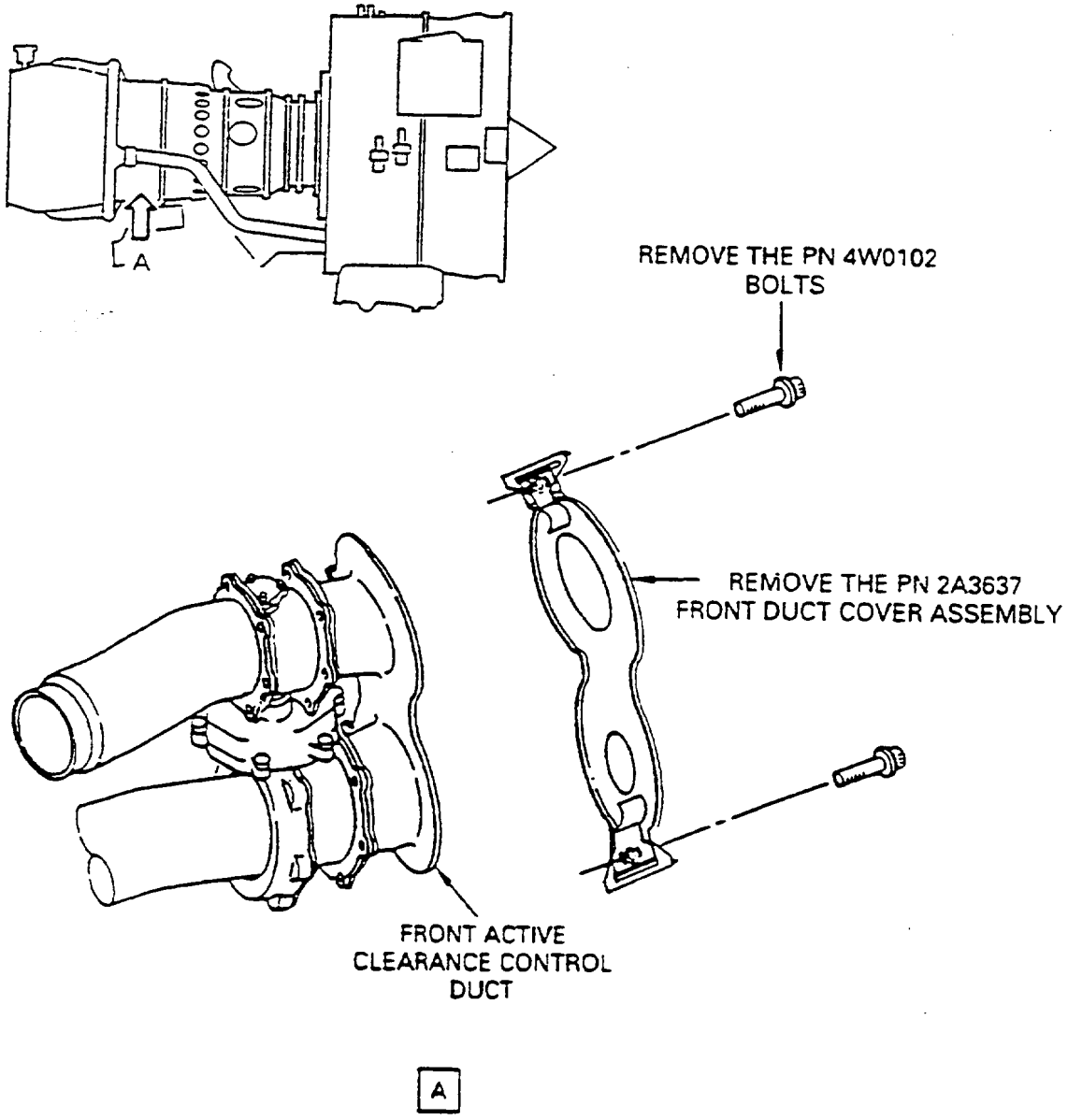
Location of Electronic Engine Control (EEC)
Fig.1



Location of ACC Front Duct Cover Assembly
Fig.2

3. Material Information

Applicability: For each V2500 Engine to incorporate this Bulletin.

A. Kits associated with this Bulletin:

None.

B. Parts affected by this Bulletin:

New Part No. (ATA No.)	Qty.	Est'd Unit Price ($)	Keyword	Old Part No. (IPC No.)	Instructions/ Disposition
Applicability: For each V2500 Engine that incorporates V2500-ENG-72-0007, V2500-ENG-73-0015, V2500-ENG-73-0024, V2500-ENG-70-0056, V2500-ENG-73-0027, V2500-ENG-73-0032 and V2500-ENG-73-0037 to incorporate this Bulletin.					
2A2993 (73-22-34)	1		Control, Electronic Engine	2A2692 (01-280)	(1D) (A) (B) (C)
Applicability: For each V2500 Engine that incorprates V2500-ENG-73-0007, V2500-ENG-73-0015, V2500-ENG-73-0024, V2500-ENG-73-0027, V2500-ENG-73-0032 and V2500-ENG-73-0037 but not incorporating V250-ENG-73-0056 to incorporate this Bulletin.					
2A2991 (73-22-34)	1		Control, Electronic Engine	2A2690 (01-280)	(1D) (A) (B) (E)
Applicability: For each V2500 Engine that incorporates V2500-ENG-73-0007, V2500-ENG-73-0015, V2500-ENG-73-0027, V2500-ENG-73-0032 and V2500-ENG-73-0037 but not incorporating V2500-ENG-73-0024 and V2500-ENG-73-0056 to incorporate this Bulletin.					
2A2990 (73-22-34)	1		Control, Electronic Engine	2A2757 (01-280)	(1D) (A) (B) (F)
Applicability: For each V2500 Engine that incorporates V25-ENG-73-0007, V2500-ENG-73-0015, V2500-ENG-73-0056, V2500-ENG-73-0027, V2500-ENG-73-0032 and V25-ENG-73-0037 but not incorporating V2500-ENG-73-0024 to incorporate this Bulletin.					
2A2992 (73-22-34)	1		Control, Electronic Engine	2A2691 (01-280)	(1D) (A) (B) (G)

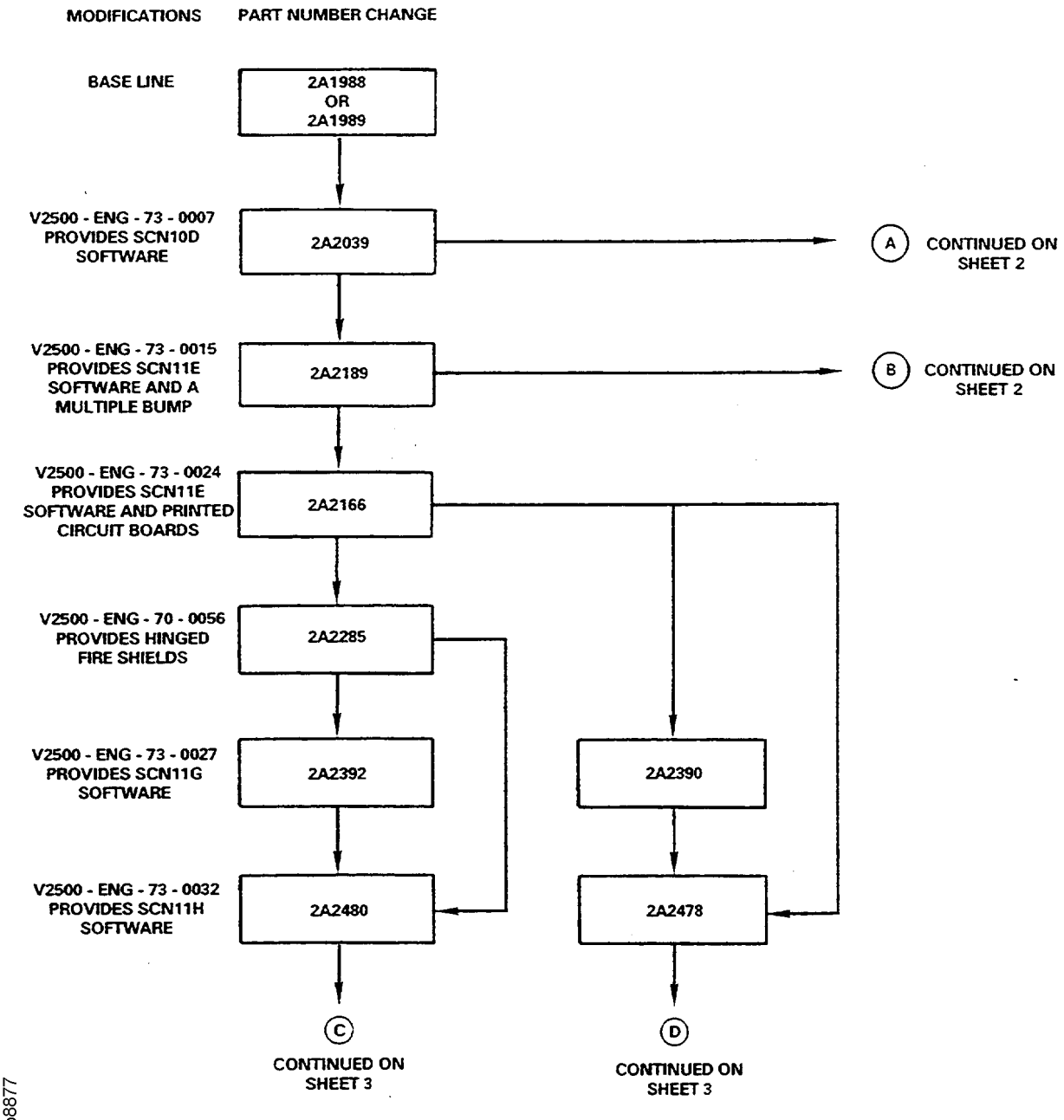
C. Instruction/Disposition Code Statements:

(1D) The New part can be obtained through modification by the approved procedure in Reference (2). Purchase the New parts from or return the Old parts for modification to the approved vendor given in the Accomplishment Instructions.

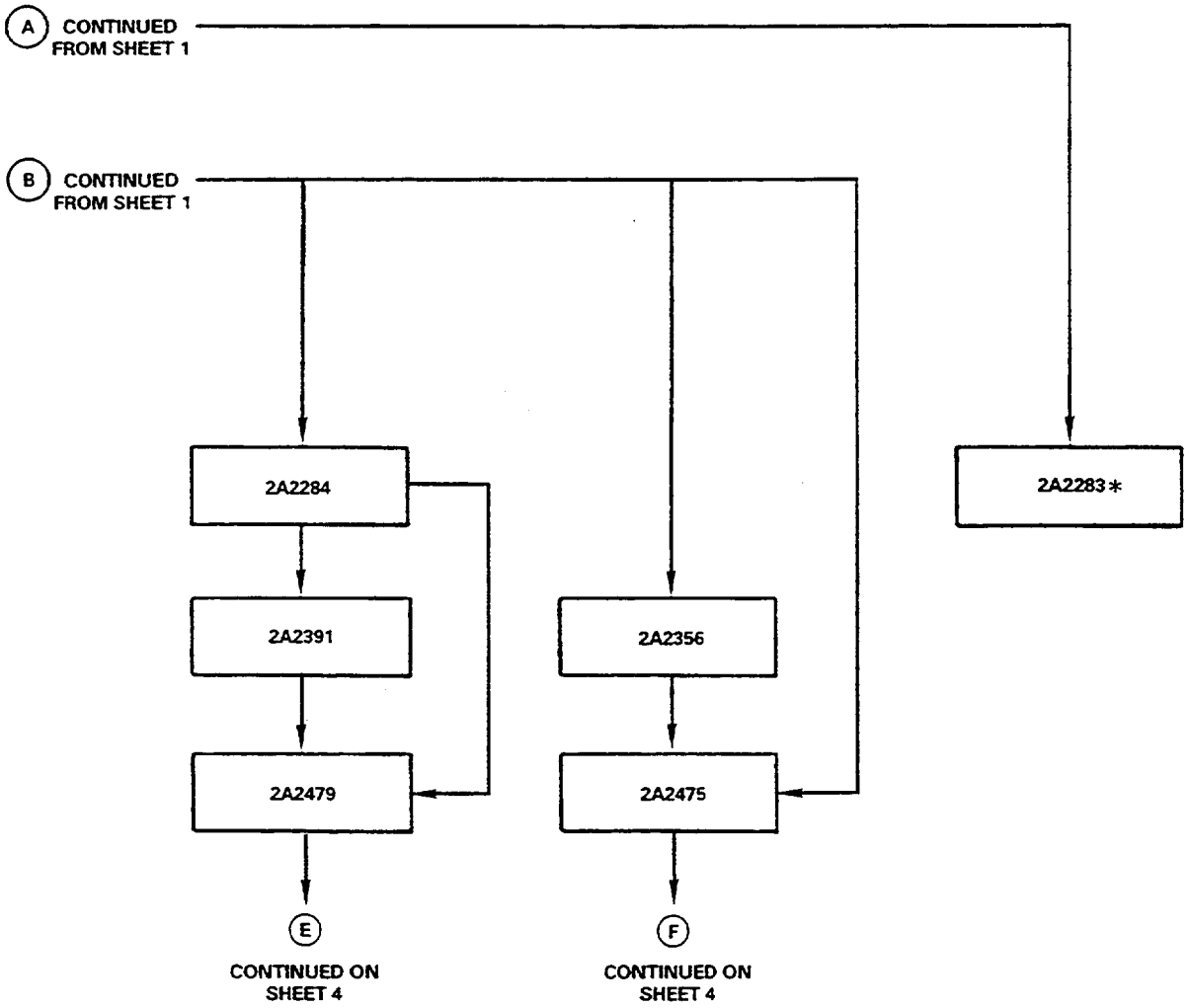
Notes (C), (E), (F) and (G) give the new Hamilton Standard part numbers.

(A) New part is currently available.
(B) The Old part will continue to be available upon request.
(C) HSD P/L 798300-14-045
(E) HSD P/L 798300-10-045
(F) HSD P/L 798300-8-045
(G) HSD P/L 798300-12-045

NOTE: The estimated 1994 unit priced are provided for planning purposes only and do not constitute a firm quotation. Consult the IAE Price Catalog or contact IAE's Spare Parts Sales Department for information concerning firm prices.



Family Tree - Electronic Engine Control (EEC) Catalog Sequence No. 73-22-34, Fig 01, Item 280
Fig.3 (Sheet 1)



*THERE IS NO PROCEDURE TO ADVANCE THIS CONFIGURATION

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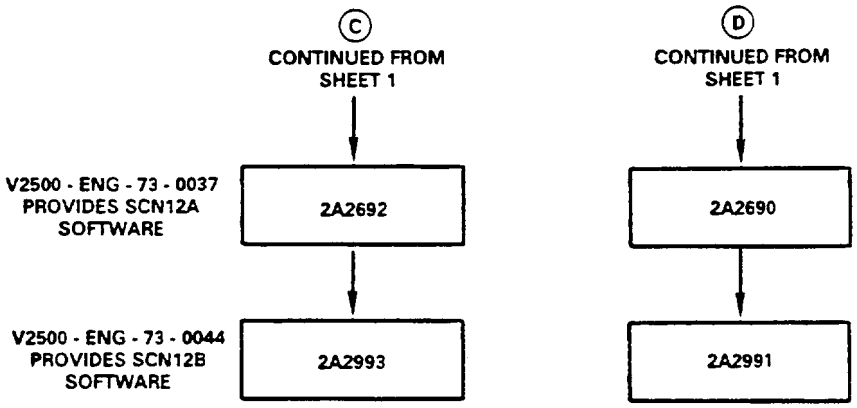
Family Tree - Electronic Engine Control (EEC) Catalog Sequence No. 73-22-34, Fig 01, Item 280
Fig.3 (Sheet 2)



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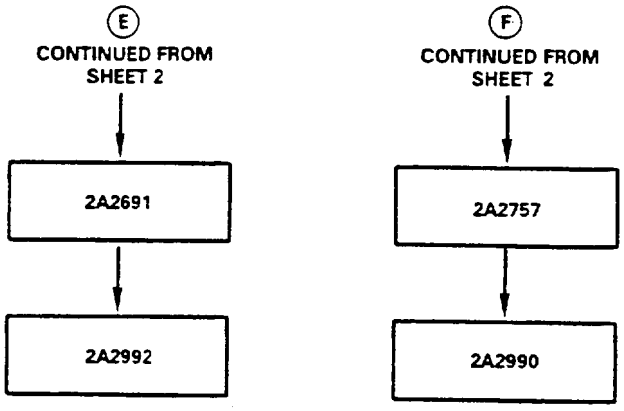
Family Tree - Electronic Engine Control (EEC) Calalog Sequence No. 73-22-34, Fig 01, Item 280
Fig.3 (Sheet 3)



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Family Tree - Electronic Engine Control (EEC) Catalog Sequence No. 73-22-34, Fig 01, Item 280
Fig.3 (Sheet 4)

Printed in Great Britain

UNITED TECHNOLOGIES
HAMILTON STANDARD

SERVICE BULLETIN

Engine Fuel and Control - EEC150-1 Electronic Engine Control - Incorporation of New Software Configuration

1. Planning Information

A. Effectivity

Hamilton Standard EEC150-1 Electronic Engine Controls

798300-8-XXX
798300-10-XXX
798300-12-XXX
798300-14-XXX

NOTE: The EEC150-1 is used on Airbus A320 aircraft that use the IAE V2500-A1 engine. XXX - Identifies all available software configurations.

B. Reason

(1) Problem

(a) Hung Starts: Several V2500-A1 engines have experienced hung starts at various levels of deterioration at the applicable ambient conditions.

(b) Thrust Shortfall at Pressure Altitudes Below Sea Level: The present software configurations, -038 (SCN11H) and -041 (SCN12A), have a thrust shortfall at altitudes below sea level.

(c) Heat Management System Mode That Switches From Mode 3 to Mode 5: This mode was introduced when the fuel temperature limit was reduced from 120 degrees C to 110 degrees C in SCN 12A software.

(d) Heat Management System Thermocouple Nuisance Fault: A nuisance fault was found during flight test. The Centralized Fault Display System (CFDS) message "Heat Management System-Thermalcouple-Failsafed" (HMS-TC-FAILSAFED) was recorded in the EEC fault memory. This fault was the result of exceeding the Integrated Drive Generator (IDG) oil temperature rate limit.

(e) ATA Chapter Reference for the Fuel Temperature Thermocouple is not Correct: The -038 (SCN11H) and -041 (SCN12A) software for the V2500-A1 engines have the ATA chapter reference that is not correct being displayed when the fuel temperature sensor failed.

(f) Modify the Thrust Reverser Menu Mode Test: Airbus requested a change to the thrust reverser menu mode test to prevent the confusion on the current words RETURN and DISABLE TEST.

(g) Improve the Thrust Reverser Test Fault Isolation and Eliminate Momentary Energizing of the ARMING Solenoid: In the earlier configuration software standards, the menu mode thrust reverser system test would not properly isolate an aircraft permission switch fault. This was due to the sequence in which the thrust reverser command logic was implemented and the actuators were enabled.

(h) Add an Additional ARINC Message Indicating TRA has been Set to Idle due to an Inadvertent Thrust Reverser Deployment: Airbus has raised a concern that all software standards on the V2500-A1 do not have an ARINC message which indicates the TRA is being set to idle in the case of an inadvertent thrust reverser deployment.

(2) Cause.

(a) Hung Starts: The EEC schedules fuel during the start according to an N2 derivative schedule and a Wf/Pb ratio limit. The EEC then monitors engine acceleration throughout the start. If the engine does not accelerate at the selected rate for five seconds, it will abort an automatic start. (shutoff fuel and motor as necessary).

(b) Thrust Shortfall at Pressure Altitudes Below sea Level: Software standards given before did not correctly implement the thrust versus altitude table. This table is used to set the thrust for a given altitude.

(c) Heat Management System Mode that Switches from Mode 3 to Mode 5: This switching mode has existed in all the software standards.

(d) Heat Management Systems Thermocouple Nuisance Faults: This product improvement is not a current V2500-A1 problem. It is a possible problem. The same logic is used in other V2500 engine models which have demonstrated the fault.

(e) The ATA chapter reference for the fuel temperature thermocouple is not correct.

(f) Modify the Thrust Reverser Menu Mode Test: It is not easy to return out of the present menu mode test and can cause confusion to the aircraft maintenance crew. This has resulted in EEC removals that were not necessary.

(g) Improve the Thrust Reverser Test Fault Isolation and Eliminate Momentary Energizing of the ARMING Solenoid: The menu mode thrust reverser system permits the person to perform a functional test of the thrust reverser through the EEC command of the directional control and the ARMING valve solenoid. The EEC will monitor the system when you do the test for electrical and mechanical faults. This includes an aircraft permission switch that is stuck in the closed position. In earlier software configurations, the thrust reverser solenoids were enabled before the activation of the thrust reverser command logic. If an aircraft permission switch fault was present, a wraparound fault would be detected immediately and the test would be aborted. The proper LRU would be recorded, but the aircraft permission switch fault would not be detected. This will not appear in the troubleshooting report.

(h) Add an Additional ARINC Message Indicating TRA has been Set to Idle due to an Inadvertent Thrust Reverser Deployment: During the design of a new model installation, Airbus revised the requirement to have a cockpit indication when the TRA was set at idle during the thrust reverser operation.

(3) Solution.

(a) Hung Starts: Changes were made for the hung start problems. One change will increase the starting fuel flow. The two other changes will minimize the EGT impact:

1 Increase the ground starting Wf/Pb schedule: The ground starting Wf/Pb schedule is a function of the N2 speed corrected for engine station 2 (N2C2). This is up-trimmed two ratio units at speeds above 5,400 N2C2. This provided additional fuel flow to prevent the engine from hanging due to running up against the Wf/Pb schedule.

2 Reduce the operating range of the stage 7C bleed ground starts: With the new -045 (SCN12B) software logic during ground starts, the transient acceleration (ACCEL) detection logic keeps the 7C bleed stage open above the steady state closing speed. The new software will disable transient operation of the bleed below idle. This will close the bleed when N2 speed correction for the 2.6 engine station (N2C26) reaches the steady state closing point (which is being lowered by trims). This will keep to a minimum the increase in peak EGT that is induced by the increase in fuel scheduling.

3 Incorporate hot start logic that is used on the other V2500 engine models. Incorporation of this logic will bias the ground starting N2DOT (N2 derivative) acceleration schedule based on the EGT proximity to the EGT starting limit. This will also prevent the EGT from being exceeded during the start.

(b) Thrust Shortfall at Pressure Altitudes Below Sea Level: The break point temperatures used to read the rating tables is revised to fix an observed thrust shortfall at below sea level pressure altitudes.

(c) Heat Management System Mode that Switches from Mode 3 to Mode 5: The Integrated Drive Generator (IDG) oil temperature limit for modes that switch from Mode 3 to Mode 5 (no recirculation in the air) is reduced from 127 Degrees C to 110 Degrees C. This change fixes the Mode 3 to Mode 5 cycling that was introduced when the fuel temperature limit was reduced from 120 Degrees C to 110 Degrees C in the SCN 12A software. When you reduce the IDG control limit, Mode 5 is selected when the IDG oil temperature increases more than 110 Degrees C. It will effectively be latched until fuel being returned to the tank is permitted. The fuel will not cool the IDG oil before the level that permits Mode 3 to be selected.

(d) Heat Management System Thermocouple Nuisance Fault: The change in this software requires the fault to exist for five seconds before it is latched and recorded in the fault memory and shown in the clear language message.

(e) ATA chapter Reference for the Fuel Temperature Thermocouple is not Correct: The ATA chapter referenced is corrected to read 73-35-15 FUEL TEMP SENS/HC/EEC.

(f) Modify the Thrust Reverser Menu Mode Test: Modified the thrust reverser test menu to read RETURN TO DISABLE TEST.

(g) Improve the Thrust Reverser Test Fault ISOLATION and Eliminate Momentary Energizing of the ARMING Solenoid: In SCN 12B, when you reverse the sequence in which the EEC output drivers are enabled and the thrust reverser logic modules are activated, energizing of the ARMING valve is eliminated and the aircraft permission switch failed closed fault is properly isolated.

(h) Add an Additional ARINC Message Indicating TRA has been Set to Idle Due to an Inadvertent Thrust Reverser Deployment: A new bit has been created. This will be sent out over the ARINC to indicate when the TRA has been set to idle power should there be an inadvertent thrust reverser deployment.

(i) The flight simulation and flight testing was accomplished at Airbus, Toulouse, France.

C. Description

The EEC150-1 is disassembled to remove the Channel A and B Processor/Input Modules. The Processor/Input Modules are reprogrammed. The EEC150-1 is then reassembled and a functional test is done.

D. Compliance

Category 4 - Regardless of other scheduled maintenance and at operator's experience, do this Service Bulletin when an Electronic Engine Control is at a maintenance base that can do the accomplishment instructions.

E. Approval

The part number changes and/or part modifications given in Paragraph 2. of this Service Bulletin obey the applicable Federal Aviation Regulations and are FAA-Approved for the Electronic Engine Controls given.

F. Manpower

Approximately 4 man-hours are necessary to do this Service Bulletin. This estimate does not include the time necessary to do functional tests.

G. Material - Cost and Availability

(1) This Service Bulletin will be done at no cost to the operator if the EEC is sent to one of these addresses:

(a) United Technologies Corporation
Hamilton Standard Division
Attention: Hamilton Support Systems
Customer Support Center
Electronics Service Center
97 Newberry Road
East Windsor, CT 06088

(b) Pratt & Whitney Overhaul/Repair Center Europe (PWORCE)
Maastricht Airport
P.O. Box 269
6190 AG BEEK
The Netherlands

(2) IAE funds this program. The no-charge purchase order to do this Service Bulletin must refer to this Service Bulletin and IAE Service Bulletin V2500-73-0044 to ensure accountability.

(3) If requested, Hamilton Standard can supply, at no charge, the material necessary to do this Service Bulletin. To get this material, the operator will send a no-charge purchase order for the necessary quantity to:

United Technologies Corporation
Hamilton Standard Division
Attention: Commercial After-Market Business
Mail Stop: 1504
One Hamilton Road
Windsor Locks, CT 06096-1010

The no-charge purchase order must refer to this Service Bulletin.

H. Tooling

None

I. Weight and Balance

None

J. Electrical Load Data

Not affected

K. References

IAE Service Bulletin No. V2500-73-0044
Component Maintenance Manual 73-22-34
E9137 Standard Electronic Practices Manual

L. Other Publications Affected

Illustrated Parts Catalog 73-22-34

2. Accomplishment Instructions

CAUTION: REFER TO THE E9137 STANDARD ELECTRONIC PRACTICES MANUAL FOR SPECIAL PRECAUTIONS. ELECTROSTATIC DISCHARGE (ESD) CAN CAUSE DAMAGE TO ELECTRONIC COMPONENTS IN THE EEC150-1.

A. Refer to REPAIR RSS-HS004 in Component Maintenance Manual (CMM) 73-22-34 to reprogram the EEC150-1. Use the program, version number, and engine trims shown below.

	Channel A	Channel B
Application Program:	Y805881	Y805881
Application Version Number:	074	074
Engine Trim Program:	Y806086	Y806086
Engine Trim Version Number:	174	174

B. Refer to the E9137 Standard Practices Manual for procedures to reidentify the Processor/Input Modules. Change the part numbers as shown below:

Assembly	Old Part Number	New Part Number
Processor/Input Module-Channel A	793610-14-XXX 793610-40-XXX	793610-14-045 793610-40-045
Processor/Input Module-Channel B	793612-14-XXX 793612-40-XXX	793612-14-045 793612-40-045

NOTE: XXX - Identifies all available software configurations.

C. Refer to the ASSEMBLY section of CMM 73-22-34 to reassemble the EEC.

D. Change the Hamilton Standard Part Number to show that this Service Bulletin is included into the end-assembly configuration. Refer to the E9137 Standard Practices Manual to put the information shown below on a new unit identification plate. EEC units reprogrammed at one of the addresses shown in paragraph 1.G. will be sent back with their assemblies re-identified as shown below.

(1) Put the new end-assembly part number in the "PART NO." area of the new identification plate:

PART NUMBER BEFORE THIS SERVICE BULLETIN	PART NUMBER AFTER THIS SERVICE BULLETIN
798300-8-XXX	798300- 8-045
798300-10-XXX	798300-10-045
798300-12-XXX	798300-12-045
798300-14-XXX	798300-14-045

(2) Put the new IAE part number in the "CI NO." area of the new identification plate.

EEC150-1 END-ASSEMBLY	NEW IAE PART NUMBER
798300- 8-045	2A2990
798300-10-045	2A2991
798300-12-045	2A2992
798300-14-045	2A2993

E. Refer to the TESTING AND TROUBLESHOOTING section of CMM 73-22-34 to do a functional test. Environmental Stress Screening (ESS) is not necessary.

3. Material Information

A. This Service Bulletin change will use the parts in the list for each EEC150-1 that is changed.

B. Parts that are usually discarded when you disassemble the EEC150-1 are not in the list.

C. In the list of parts for this change, MSQ is the "Minimum Sales Quantity". The parts that have an entry in this area of the list are supplied only in this quantity, or a whole-number multiplication of this quantity.

D. In the list of parts for this change, the "Key Word" is a one-word name for the part.

E. In the list of parts for this change, the "Instruction Codes" tell you what to do with the parts. A different list, under the list of parts, tells you about the instruction codes that are used in the list of parts.

F. Each price shown is an estimate for one part. When you buy a part, the price can be different. If more information is necessary, ask your Hamilton Standard account representative. If you do not have an account representative, ask Hamilton Standard's manager of commercial accounts.

Mail: United Technologies Corporation
Hamilton Standard Division
Attention: Director Material Service
P.O. Box 9154
One Hamilton Road
Windsor Locks, CT 06096-1010

Facsimile: (203) 654-6905
TELEX Number: 994439 HSD UTC WIND
TWX Number: 710-420-0584
Sita: HFDHT7X

G. New Parts Necessary

New PN	Qty	MSQ	Estimated Price	Key Word	PN Before this SB	Instruction Code
751333-1	1	20	1.80	Plate	751333-1	A, B
777613-1	10	100	0.43	Cover	777613-1	A, B

Instruction Code A: The "PN before the SB" has the same function as the "New PN".

Instruction Code B: You can continue to buy the "PN before the SB".

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Hamilton Standard Reference A320, IAE V2500-A1
IAE Engineering Change Number 92VZ006