ENGINE - FUEL AND CONTROL - TO PROVIDE A NEW SCN12/Q ELECTRONIC ENGINE CONTROL (EEC) - HAMILTON STANDARD SB EEC150-20-73-19 - CATEGORY CODE 4 - MOD.ENG-73-0121

See Vendor Bulletin EEC150-20-73-19

1. Planning Information

A. Effectivity

(1) Aircraft: Airbus A319, A320, A321

(2) Engine: V2522-A5 Engines Serial No. V10324
V2524-A5 Engines Serial No. V10324
V2527-A5 Engines Serial No. V10324
V2527E-A5 Engines Serial No. V10324
V2530-A5 Engines Serial No. V10325
V2533-A5 Engines Serial No. V10325

CAUTION: THE INTERMIX OF ELECTRONIC ENGINE CONTROLS MUST BE DONE BY THE INSTRUCTIONS GIVEN IN REFERENCE (3), AIRBUS SERVICE BULLETIN A320-73-1060.

B. Reason

(1) Condition

(a) 1.0 HEAT MANAGEMENT SYSTEM ENHANCEMENTS

1 1.1 IDG OIL CONTROLLING TEMPERATURE LIMIT: Durability of the airframe supplied IDG needs to be improved.

2 1.2 AIR MODULATING VALVE CYCLING: Unnecessary cycling of the Air Modulating Valve can occur following Heat Management System Mode changes.

(b) 2.0 AUTOSTART LOGIC ENHANCEMENTS

1 2.1 AUTOSTART IMPACT FOLLOWING DRY CRANKING: An autostart which is initiated following a manual dry crank, without resetting or depowering the EEC, can result in ignition and fuel being commanded "ON" prematurely during the subsequent autostart.

2 2.2 NUISANCE LOW STARTER AIR PRESSURE FAULT: A nuisance "ENG 1(2) START FAULT, LO START AIR PRESS" fault can be set following a manual dry crank that exceeds 50 seconds.

3 2.3 STARTER VALVE FEEDBACK FAULT ACCOMMODATION: Current EEC autostart logic does not optimally accommodate a local failure of the Starter Air Valve feedback.

4 2.4 HYSTERESIS ON FUEL/IGNITION SPEED: Current V2500-A5 ground autostart logic has the fuel/ignition N2 speed threshold set to a high level such that fuel/ignition will be commanded on by a timer, rather that the alternative N2 speed criteria. However, should this fuel/ignition speed be reduced in the future to utilize the alterantive N2 speed criteria for command of fuel and ignition, this logic could be susceptible to variation in the starter air pressure. If the available starter air pressure were to result in the engine cycling around the fuel ignition speed, it is possible to have the ignition cycle off and on, while fuel remains on, resulting in an aborted autostart.

5 2.5 DATA ENTRY PLUG (DEP) SELECTABLE CRANK REDUCTION: For all ground autostarts, the EEC currently provides for a 50 second extended dry crank prior to fuel/ignition being commanded on. This 50 second crank increases start times and has met with some customer dissatisfaction.

6 2.6 IGNITION COMMAND FOLLOWING DEPULSE ABOVE STARTER/IGNITION CUTOUT: In the event of an impending failed ground autostart, current V2500-A5 logic will apply fuel depulse which cycles fuel flow off, then back on, in order to eliminate potential HPC stall. If fuel depulse is applied above the starter/ignition cutout speed, the engine may not re-light following depulse application, resulting in EEC initiated start abort.

(c) 3.0 A319 OVERBOOST LOGIC ENHANCEMENT: Current A319 thrust overboost logic needs refinement to address: planned introduction of a modified PPH Fuel Metering Unit (FMU) required for the V2527M-A5 rating, a revised maximum thrust limit identified for the A319 and accommodation of a potential undetected stuck closed 7th stage HPC bleed valve.

(2) Background:

(a) 1.0 HEAT MANAGEMENT SYSTEM ENHANCEMENTS

1 1.1 IDG OIL CONTROLLING TEMPERATURE LIMIT: To try and improve the IDG reliability, the typical IDG oil temperature is being moved from the upper part of the range to the middle.

2 1.2 AIR MODULATING VALVE CYCLING: When the heat management System transitions from a non-recirculation mode to a recirculation mode, the Fuel-Back-To-Tank valve is commanded open and the controlling temperature limits are set to lower values. However, since the additional cooling effect of returning fuel to tank does not take effect immediately, the Air Modulating Valve can also be commanded open to provide additional cooling in attempting to achieve the lower limits.

(b) 2.0 AUTOSTART LOGIC ENHANCEMENTS

1 2.1 AUTOSTART IMPACT FOLLOWING DRY CRANKING: The ignition and fuel pressurization timer can get set and latched during a manual dry crank which exceeds 50 seconds. This will result in ignition and fuel being commanded "ON" at the initiation of the subsequent autostart if the timer is not cleared by resetting or depowering the EEC.

2 2.2 NUISANCE LOW STARTER AIR PRESSURE FAULT: The Hung Starter Flag can get set and latched during a manual dry crank which exceeds 50 seconds. Once the flag is latched, a nuisance fault is set when the crank is terminated and N2 drops below 10%.

3 2.3 STARTER VALVE FEEDBACK FAULT ACCOMMODATION: The accommodation of a local Starter Air Valve feedback failure could be improved.

4 2.4 HYSTERESIS ON FUEL/IGNITION SPEED: Current logic does not accommodate the potential for starter air pressure variation to result in the engine cycling around the fuel/ignition command speed.

5 2.5 DATA ENTRY PLUG (DEP) SELECTABLE CRANK REDUCTION: The 50 second extended crank was implemented as a precautionary measure for protection against a bowed rotor start.

6 2.6 IGNITION COMMAND FOLLOWING DEPULSE ABOVE STARTER/IGNITION CUTOUT: Current V2500-A5 logic will not re-energize the ignitors following depulse application, if fuel depulse is applied above the starter/ignition cutout speed.

(c) 3.0 A319 OVERBOOST LOGIC ENHANCEMENT: The original logic design did not encompass the above new requirements.

(3) Objective:

(a) 1.0 HEAT MANAGEMENT SYSTEM ENHANCEMENTS

1 1.1 IDG OIL CONTROLLING TEMPERATURE LIMIT: Though specific design enhancements are being pursued to the IDG itself, changes have been incorporated to the EEC Heat Management logic that will reduce the typical controlling limit for the IDG Oil Temperature from 100C to 85C when Fuel-Back-To-Tank is allowed. The mode change temperature limit of 100C, as well as the controlling limits in mode where no Fuel-Back-To-Tank is allowed, remain unchanged.

2 1.2 AIR MODULATING VALVE CYCLING: Changes have been incorporated in the EEC Heat Management logic that will close the Air Modulating Valve for 2 minutes following a change from a non-recirculation mode to a recirculation mode, This gives the Back-To-Tank valve a chance to open and reduce the Heat Management System fluid temperatures to the lower limits applicable in recirculation modes before utilizing the Air Modulating Valve, thus avoiding unnecessary cycling of the Air Modulating Valve and the potential for a performance impact.

(b) 2.0 AUTOSTART LOGIC ENHANCEMENTS

1 2.1 AUTOSTART IMPACT FOLLOWING DRY CRANKING: Modify the EEC logic to accommodate the potential lack of an EEC reset by clearing the ignition and fuel pressurization timer as necessary for all start modes.

2 2.2 NUISANCE LOW STARTER AIR PRESSURE FAULT: Modify the EEC logic to accommodate the potential lack of an EEC reset at the conclusion of a dry crank by clearing the Hung Starter Flag as necessary for all start modes.

3 2.3 STARTER VALVE FEEDBACK FAULT ACCOMMODATION: Modify the EEC autostart logic to utlilize the starter air valve command and disable the feedback in the event of a detected starter air valve feedback disagreement between channels.

4 2.4 HYSTERESIS ON FUEL/IGNITION SPEED: Modify the EEC logic to incorporate a hysteresis on the ground autostart fuel/ignition command speed such that fluctuations in engine speed will not result in cycling of the ignition command in the event that the alternative N2 speed criteria is utilized in the future.

5 2.5 DATA ENTRY PLUG (DEP) SELECTABLE CRANK REDUCTION: In the event planned development engine tests indicate that the 50 second crank is no longer required for bowed rotor prevention, modify the EEC logic to provide the option of a 30 second crank, selectable via the DEP, to provision for a future reduction in start times without introduction of a new EEC software standard.

6 2.6 IGNITION COMMAND FOLLOWING DEPULSE ABOVE STARTER/IGNITION CUTOUT: Modify the ground autostart logic such that if fuel depulse is activated, dual ignition is commanded on for the remainder of that start until N2 achieves a level 300 RPM below idle.

(c) 3.0 A319 OVERBOOST LOGIC ENHANCEMENT: Revise the EEC stability bleed scheduling associated with the current A319 overboost logic to satisfy the above new requirements.

(4) Substantiation

This change has been fully tested on the closed loop bench and on the Airbus Ironbird Test Bench, and run on Engine V10003/V10004 A319, Aircraft 546, using the applicable trims. In addition all of these trims were run on March 11, 1997 on a test engine. These trims were based on the heat management model (HMT) which has been verified by engine data.

(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 SCN12/Q software logic.

Part I - If the Electronic Engine Control is sent to one of the addresses listed in Paragraph 2. B., Accomplishment Instructions

(a) A new EEC can be obtained from the supplier referenced in Part I of this Service Bulletin. The removed part is returned, programmed, identified with the new part number, and installed again.

Part II - If IAE is requested to assist or coordinate the reprogramming of the Electronic Engine Control

(b) The EEC can be programmed on the engine, by the procedure given in part II of this Service Bulletin, and identified with the new part number.

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 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 Part I of this Service Bulletin (in service):

Venue	Estimated Manhours
(1) In service.. .. .. .. TOTAL:	1 hour 16 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 return to flyable status

(i) Install the EEC .. .. 28 minutes

(ii) Close the fan cowls .. .. 8 minutes

(iii) Remove the warning notices 5 minutes

TOTAL: 41 minutes

Estimated Manhours to incorporate the full intent of Part II of this Service Bulletin (in service):

Venue Estimated Manhours

(1) In service.. .. .. .. TOTAL: 1 hour 25 minutes

(a) To gain access

(i) Install warning notices .. 5 minutes

(ii) Open the fan cowls .. .. 7 minutes

(iii) Program the EEC .. .. .. 1 hour

TOTAL: 1 hour 12 minutes

(b) To return to flyable status

(i) Close the fan cowls .. .. 8 minutes

(ii) Remove the warning notices 5 minutes

TOTAL: 13 minutes

Estimated Manhours Part I or Part II (overhaul):

(3) At overhaul .. .. Not applicable

G. Material - Price and Availability

(1) Modification kit is not required.

(2) This Service Bulletin will be done at no cost to the operator for units that are reprogrammed in the field. See Paragraph 2., Accomplishment Instructions, Part II. Units that are returned to Hamilton Support Systems or PWORCE to incorporate this Service Bulletin will be charged to the operator. See Paragraph 2., Accomplishment Instructions, Part 1.

H. Tooling - Price and Availability

The tools and equipment that follow are necessary to do the procedure given in Part II of this Service Bulletin.

(1) A dedicated (recommendation) IBM compatible computer, with the following minimum requirements:

(a) 80286 processor

(b) 512 Kbytes RAM

(c) 1.44 Mbyte, 3.5" floppy disk drive

(d) Dual channel RS-422 asynchronous communication board (HS recommends Model DS202 by Qua Tech Incorporated) with the following setup:

Channel A EEC - COM3 (Base address 2E8, IRQ level 5)

Channel B EEC - COM4 (Base address 3E8, IRQ level 5)

(e) MSDOS operating system (version 3.0 or higher)

(f) Virus scan program such as "VI-SPY" or "McAfee" is recommended.

NOTE: The IBM computer date/time must be current prior to performing this procedure.

(2) Hamilton Standard diskette called out in Reference (2). This diskette contains the EEC150-20: application code, trims, memory clear utilities, and software loader. The diskette can be obtained from:

IAE Customer Support
400 Main Street
M/S 121-10
East Hartford
CT 06108 USA
Tel: 860-565-5515 Fax: 860-565-0600

Associated Engine Serial Numbers and IAE Tracking No. S306UI mut be stated on all correspondence.

(3) EEC150-20 communication cables as defined in Table 1.

EEC SIGNAL NAME	EEC CONNECTOR	QUA-TECH CONNECTOR	QUA-TECH SIGNAL NAME
UART IN LINE B CHA	P1-b	PA-2	TXD+
UART IN LINE A CHA	P1-H	PA-7	TXD-
UART OUT LINE A CHA	P1-c	PA-4	RXD+
UART OUT LINE B CHA	P1-J	PA-8	RXD-
BOOT DISC CHA	P1-D	N/A	N/A
BITE DISC CHA	P1-Z	N/A	N/A
BOOT/BITE RTN CHA	P1-m	N/A	N/A
UART IN LINE B CHB	P7-b	PB-2	TXD+
UART IN LINE A CHB	P7-H	PB-7	TXD-
UART OUT LINE A CHB	P7-c	PB-4	RXD+
UART OUT LINE B CHB	P7-J	PB-8	RXD-
BOOT DISC CHB	P7-D	N/A	N/A
BITE DISC CHB	P7-Z	N/A	N/A
BOOT/BITE RTN CHB	P7-m	N/A	N/A

Table 1
Communication Connections

de00e7528

Communication Connections
Table 1

(4) EEC150-20 NAMEPLATE PN 751333-1 or modified nameplate 822815-1.

(5) 28 VDC +/- 0.5A power supply and associated power cables as defined in Table 2.

de000e7529

EEC SIGNAL NAME	EEC CONNECTOR	POWER SUPPLY
GTP CHA	P3-m	+28VDC
GTP RTN CHA	P3-r	RTN
GTP CHB	P9-m	+28VDC
GTP RTN CHB	P9-r	RTN

Table 2
Power Supply Connections

Power Supply Connections
Table 2

I. Weight and Balance

(1)	Weight change	None
(2)	Moment arm	No effect
(3)	Datum	Engine front mount Centerline (Power Plant station (PPS) 100)

J. Electrical Load Data

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

K. References

(1) Internal Reference No.

97VZ014

(2) Other References

IAE V2500 Service Bulletins:

V2500-ENG-73-0052 (Engine - Fuel And Control - To Provide A New Electronic Engine Control (EEC) With The SCN9A Version 021/121 Software Configuration and Hardware Changes to Address Nacelle Drainage Requirements)

V2500-ENG-73-0080 (Engine - Fuel And Control - To Provide A New Electronic Engine Control (EEC) With The SCN10A Software Configuration Version (026/026 Trims)

V2500-ENG-73-0083 (Engine - Fuel and Control - To Provide A New Electronic Engine Control (EEC) with the SCN10B Software Configuration Version (027/027 Trims)

V2500-ENG-73-0086 (Engine - Fuel and Control - To Provide A New Electronic Engine Control (EEC) With The SCN11 Software Configuration Version 032/032 Trims)

V2500-ENG-73-0111 (Engine - Fuel and Control - To Provide A New SCN11/P (EEC)

Hamilton Standard Service Bulletin EEC-150-20-73-19.

Airbus Service Bulletin A320-73-1060.

Airbus Modification 27088.

V2500 Aircraft Maintenance Manual.

The V2500 Engine Illustrated Parts Catalog (S-V2500-2IA), Chapter/Section 73-22-34.

This VSB is subject to A/C Modification 27088

L. Other Publications Affected

(1) The V2500 Engine Illustrated Parts Catalog (S-V2500-2IA), Chapter/Section 73-22-34, Figure 1, to add the new parts.

2. Accomplishment Instructions

Part I - If the Electronic Engine Control is sent to one of the addresses listed in Paragraph 2.B. 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 Manager Maintenance Operations to determine if a qualification program can be initiated at their facility.

IAE-INTERNATIONAL AERO ENGINES AG
400 Main Street M/S 121-10
East Hartford, CT 06108 USA

B. Authorized Rework Vendors for this bulletin are listed below.

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

OR

Hamilton Standard Customer Support Center - Maastricht B. V.
Maastricht Aachen Airport
Horsterweg 7
P.O. Box 269
6190 AG Beek
The Netherlands

C. The designation by IAE of an authorized rework vendor indicates 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, other than when IAE is listed as the vendor. Authorized rework vendors do not act as agents or representatives of IAE.

D. Removal Instructions

(1) Remove the Old P/N (Table 4) Electronic Engine Control by the procedure given in Reference (4), Chapter/Section 73-22-34, Removal Installation. Refer to Figure 1.

E. Rework Instructions

(1) Do a modification of the Old P/N (Table 4) 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 Paragraph 2.B.	See Figure 1.

F. Installation Instructions

(1) Install the New P/N (Table 4), Electronic Engine Control (1 off) by the approved procedure given in Reference (4), Chapter/Section 73-22-34, Removal/Installation.

G. Recording Instructions

(1) A record of accomplishment is necessary.

Part II - If the Electronic Engine Control is Reprogrammed on site.

NOTE: This procedure can only be accomplished by maintenance personnel that have been trained by an IAE representative.

NOTE: In the following procedure, statements provided to show text copied from the computer screen:

are indented, bold, and as illustrated on this line. de000e7975

E7975
Fig.3

However the number 'E7975' is a SB graphic reference and does NOT appear on the computer screen.

A. Isolate aircraft electrical system and gain access to the EEC by doing the pre-requisite procedures given in Job Set-up in Reference (4), Chapter/Section 73-22-34, Removal/Installation (the removal procedure.

NOTE: Do not turn on aircraft 28VDC until instructed to do so in the following procedure.

NOTE: Reprogramming the EEC will clear the fault memory. It is recommended that a record of existing EEC faults be obtained before initiating reprogramming.

B. General

(1) Hamilton Standard electronic Engine Control Model EEC150-20, software is programmed into the EEC using an IBM compatible computer and Hamilton Standard supplied software.

(a) Disassembly of the EEC is not required.

(b) Data integrity of the Hamilton Standard supplied software is performed as part of the reprogramming procedure.

(c) A bit-for-bit memory verification test is included as part of the reprogramming procedure.

(d) No functional, thermal cycle, or vibration testing is required for units reprogrammed in accordance with this Service Instruction.

(e) The EEC can be programmed at room ambient conditions or while it is installed on the engine.

(2) The tools specified in Paragraph 1. H. are necessary to accomplish this procedure.

C. Do the steps that follow to reprogram the Electronic Engine Control (EEC) without removing it from the engine.

(1) Verify that the model number on the identification plate of the unit is"EEC150-20".

(2) Record the current unit part number and the unit serial number from the nameplate. This information will input into your computer.

(3) Connect commercial power to all necessary reprogramming equipment.

(4) Remove the harness connector from the EEC connector marked J1 and connect the programming harness connector marked P1 to the EEC connector marked J1. Ensure that the red engagement stripe on the EEC connector J1 is fully covered.

(5) Remove the harness connector from the EEC connector marked J7 and connect the programming harness connector marked P7 to the EEC connector marked J7. Ensure that the red engagement stripe on the EEC connector J7 is fully covered.

(6) If the computer and power supply connections to the cables are permanent, skip to step C. (9).

(7) Connect the programming harness connector marked "ch. a uart" to the IBM compatible computer UART board connectors for the channel A RS-422 Port (COM-3). Make sure that the connectors are properly mated.

(8) Connect the programming harness connector marked "ch. b uart" to the IBM compatible computer UART board connectors for the channel B RS-422 Port (COM-4). Make sure that the connectors are properly mated.

NOTE: UART connections can differ for different IBM Compatible Computers.

NOTE: It is important to verify that the connectors are correctly installed for correct loader operation. Hamilton Standard recommends labeling the RS-422 COM3 port as "ch. a uart" and COM4 port as "ch. b uart" on the computer to reduce errors.

(9) If the EEC is powered by aircraft 28VDC power supply, skip to step C. (13)

(10) If the computer and power supply connections to the cables are not permanent, connect the opposite end of P3 and P9 cables to the 28VDC power supply.

(11) Remove the harness connector from the EEC connector marked J3 and connect the power supply harness connector marked P3 to the EEC connector marked J3. Ensure that the red engagement stripes on EEC connector J3 are fully covered.

(12) Remove the harness connector from the EEC connector marked J9 and connect the power supply harness connector marked P9 to the EEC connector marked J9. Ensure that the red engagement stripes on EEC connector J9 are fully covered.

(13) Locate the BOOT/BITE switches for channel A and channel B. Set the Boot/BITE switches to the ON (closed) position.

(14) Turn on the aircraft 28VDC power supply to the EEC

(15) Turn on the power to the IBM compatible computer.

NOTE: Please make sure that the Disk Drive "A" has no disks present, prior to power on of the computer.

(16) Wait for the MSDOS prompt "C:\>"to appear on the IBM compatible computer.

NOTE: The procedure uses disk drive "A" to identify the location of the floppy drive in the computer system. If your computer is configured with the 3.5 inch floppy drive at a different designation, substitute that designation into the procedure.

(17) Obtain the Hamilton Standard reprogramming diskette which is given in Table 4 andReference (2).

(a) Make sure that the write protection tab of the diskette is covering the "hole".

NOTE: If necessary, you can remove the stickers from the corner of the disk and move the protecting device to close the hole.

(b) Insert the diskette into the floppy drive designated as "A" on the IBM computer.

(18) The display will show the "C:\>". Type a: then press the RETURN key.

NOTE: Some computers have the RETURN key designated ENTER.

(19) The display will show the "A:\>" prompt.

(a) Type LDR150 then press the RETURN key. this starts the UART programming utility.

1 Several messages will appear including the program identification, version number, time and the UTC/P&W document property rights notice.

2 If there is a configuration error on the diskette, the program will display the appropriate error message and abort the programming process. Refer to Table 3 for a summary of error code description and troubleshooting suggestions

(20) The UART programming utility LDR150, will display the following message:

Enter operators name performing download : [ ] >

de000e7963

E7963
Fig.4

(a) The field between the brackets will always be empty the first time the program is executed on the diskette.

(b) Subsequent execution of the program will display the last name entered.

1 If the operator is the same, press the RETURN key to continue.

2 If a different name is present than the operator or no name is present, the operator should enter his/her name and press the RETURN key.

(21) The LDR150 program will display the following message:

WARNING–EEC Fault Memory Will Be Cleared By This Program.
If an EEC Fault Dump Is Requested prior to Programming,
enter Q to Quit or C to Continue [Q/C] :>

de000e7964

E7964
Fig.5

(a) If a fault dump has already been accomplished or is not required, type C, then press the RETURN key.

(b) If a fault dump is required or the operator wishes to terminate the programming procedure, type Q. then press the RETURN key.

(c) If the operator selects the quit option, turn off the 28VDC power to the EEC and go to step C.(37).

(22) The LDR150 program will now prompt with the following message:

Enter the 9 character EEC Serial Number : [XXXX-XXXX]>

de000e7965

E7965
Fig.6

From the Hamilton Standard nameplate, enter the nine character EEC serial number and press the RETURN key.

NOTE: For steps (23) and (24), if the EEC150-20 part number on the nameplate between the dashes is a single digit, enter a zero immediately preceding this digit.

Example: P/N 808050-4-030 would be entered as 808050-04-030.

(23) The LDR150 program will now prompt with the following message:

Enter the 13 character Current EEC HW Part No.: [XXXXX-XX-XXX]> de000e7966

E7966
Fig.7

From the Hamilton Standard nameplate, enter the 13 character EEC Hardware Part Number and press the RETURN key.

(24) The LDR150 program will now prompt with the following message:

Enter the 13 character SB EEC HW Part No. : [XXXXX-XX-XXX]>

de000e7967

E7967
Fig.8

From Table 4 andReference (2), the Service Bulletin, enter the 13 character EEC Hardware Part Number and press the RETURN key.

(25) The LDR 150 program will now prompt with the following message:

Enter Trim Checksum Value for "XXXXXX.TRM" :

de000e7968

E7968
Fig.9

The xxxxxx.xxx designation is the name of the Trim File being loaded to the EEC. From Table 4 andReference (2), the Service Bulletin, enter the trim checksum value and press the RETURN key.

(26) The LDR150 program will now prompt with the following message:

Do you wish to reenter the above entries [Y/N/Q] :

de000e7969

E7969
Fig.10

(a) To proceed with programming process, type N, then press the RETURN key. Continue with step C. (27).

(b) To correct any errors in the data entered, type Y then press RETURN. continue with step C.(20).

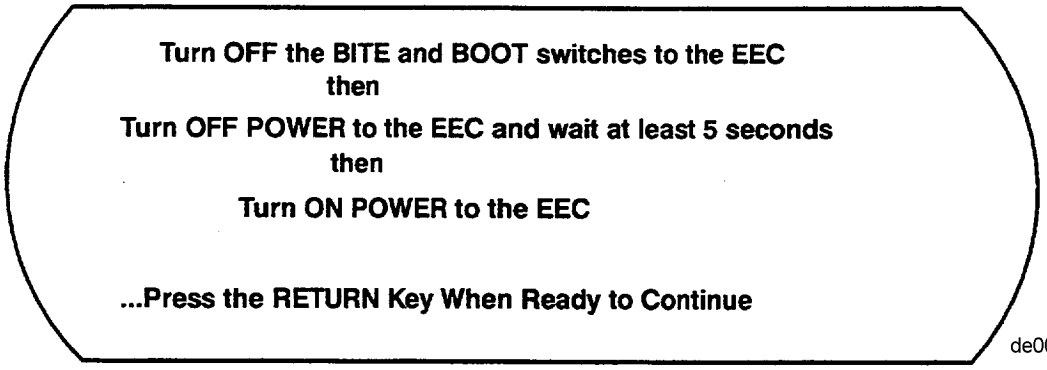
(c) To quit the programming process, type Q, then press RETURN. Turn off the 28VDC power to the EEC and continue with step C. (37).

(27) At this point the screen will be initialized to display the activity of the programming process.

(a) Status messages will scroll across the screen.

(b) If an error occurs, see Table 3 for a summary of error code description and troubleshooting suggestions.

(28) The LDR150 program will prompt with the following message:



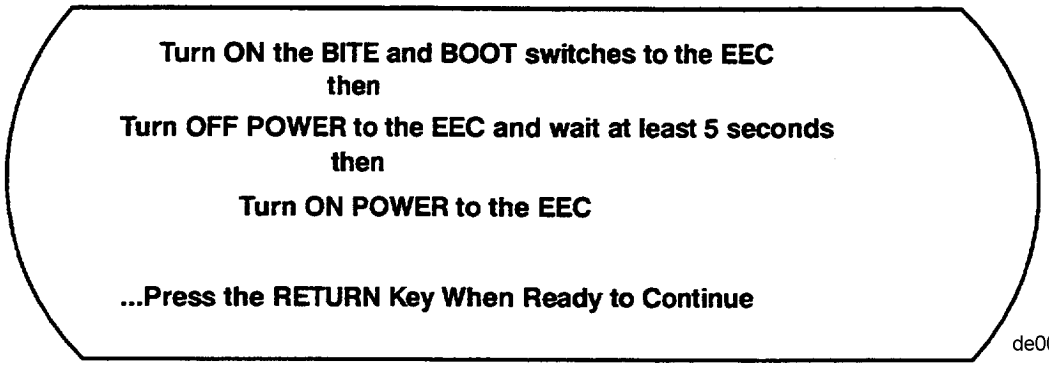
E7970
Fig.11

Locate the BOOT/BITE switches on your test equipment, and set the BOOT/BITE switches to the OFF (open) position.

(29) Switch off the 28VDC Aircraft supply to the EEC, wait 5 seconds, then switch on the 28VDC power supply to the EEC.

(30) On the IBM compatible computer, press the RETURN key.

(31) Wait until the LDR150 program prompts with the following message:



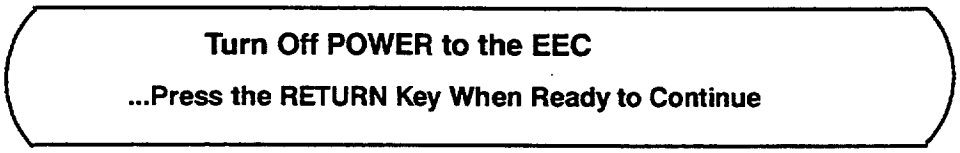
E7971
Fig.12

Locate the BOOT/BITE switches on your test equipment, and set the BOOT/BITE switches to the ON (closed) position.

(32) Switch off the 28VDC power supply to the EEC, wait 5 seconds, then switch on the 28VDC supply to the EEC.

(33) On the IBM compatible computer, press the RETURN key.

(34) Wait until the LDR150 program prompts with the following message:



de000e7972

E7972
Fig.13

Switch off the 28VDC supply to the EEC

(35) On the IBM compatible computer, press the RETURN key.

(36) The LDR150 program will now display the status of the programming process. Record the name of the log file for hard copy report of the process.

(a) If a successful programming occurred, the following message will be displayed:

******EEC PROGRAMMING SUCCESSFULLY COMPLETED******

Record the log file name "VLXXXX.LOG" for later printout.

de000e7973

E7973
Fig.14

If desired, record the log file name "VLXXXX.LOG" for later printout."

(b) If programming was unsuccessful, the following message will be displayed:

****DOWNLOAD PROCESS ABORTED – ERROR CODE "X"

Record the log file name "VLXXXX.LOG" for later printout.

de000e7974

E7974
Fig.15

If desired, record the log file name "VLXXXX.LOG" for later printout."

The "X" refers to the type of error that caused the process to abort. Table 3 describes the error codes and action to be taken.

(37) Press the RETURN key to terminate the program and return to the MSDOS prompt "A:\>".

(38) A paper copy of the log file can be made by the IBM compatible computer if a printer is available. You can do this as follows:

NOTE: You can remove the diskette, write protect the diskette, and move to a system with a printer if no printer is connected to the original system. Complete the commands listed below to make a paper copy.

(a) At the MSDOS prompt, type PRINT VLXXX.LOG.

(b) Press the RETURN key.

(c) Wait until the printer is finished before proceeding to the next step.

(d) Remove the diskette, write protect the diskette.

(39) Disconnect the EEC reprogramming electrical connectors from J1 and J7 and J3/9, if applicable.

(40) Reconnect the aircraft electrical harness connectors to J1 and J7 and J3/J9, if applicable.

(41) Identify the Electronic Engine Control by the procedure specified in Reference (2).

(42) Close-up the engine and remove the remaining notices by doing the post-requisite procedures given in Job Close-up in Reference (4), Chapter/Section 73-22-34, Installation.

(43) Do the post-installation test specified in Reference (4), Chapter/Section 71-00-00, as required for Removal/Installation of an Electronic Engine Control.

ERROR CODE	ERROR TYPE	ACTION
E1	EEC VERIFY ERROR - Data verify error in EEC - Compare failed or location could not be programmed	Try procedure 3 times, if still bad return EEC unit
E2	COMMUNICATION ERROR - Communication problem between EEC and IBM compatible computer	Check BITE, cables, power supply. UART board, and EEC. Retry 3 times.
E3	CONFIGURATION ERROR - Configuration data comparison failed. (Possible Hardware P/N mismatch, EEC compatibility mismatch, Trim Checksum mismatch)	Operator data entered incorrect or incorrect data on existing nameplate. Check data - retry with the correct information.
E4	SYSTEM PROBLEM - Poor operating environment, bad disk, or program aborted by operator.	If the process was not terminated by the operator, check that the disk is not write protected, or replace disk and retry.

Table 3
Error Code Definitions

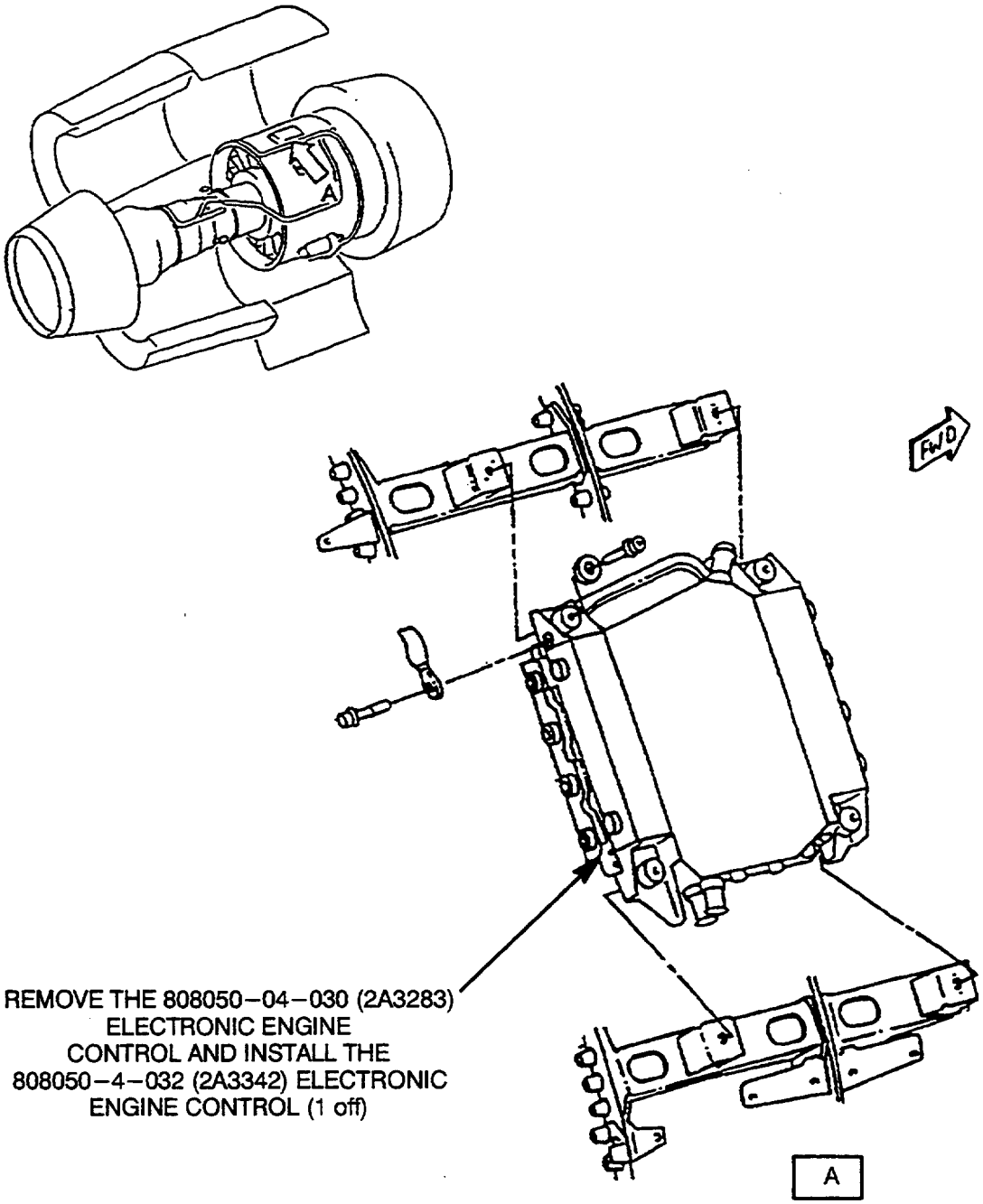
de000e7530

Error Code Definitions
Table 3

A5 SCN12/Q

	Old P/N	A5 SCN12/Q New P/N	SB Line Reference Paragraph	SB Line Reference Line
Reprogramming Diskette	n/a	819191-14	2. Part II	C. (17)
EEC: (HS) HW Part No.	808050-4-030	808050-4-032	2. Part I	D.(1), E.(1), F.(1),
			2. Part II	C. (24)
EEC: IAE P/N	2A3283	2A3342	2. Part I	D.(1), E.(1), F.(1)
Trim Checksum	n/a	31074	2. Part II	C. (25)

Table 4
Reprogramming Input Reference Table



de000e7853

Location of the Electronic Engine Control (EEC)
Fig.1

3. Material Information

A. Kit associated with this bulletin.

None

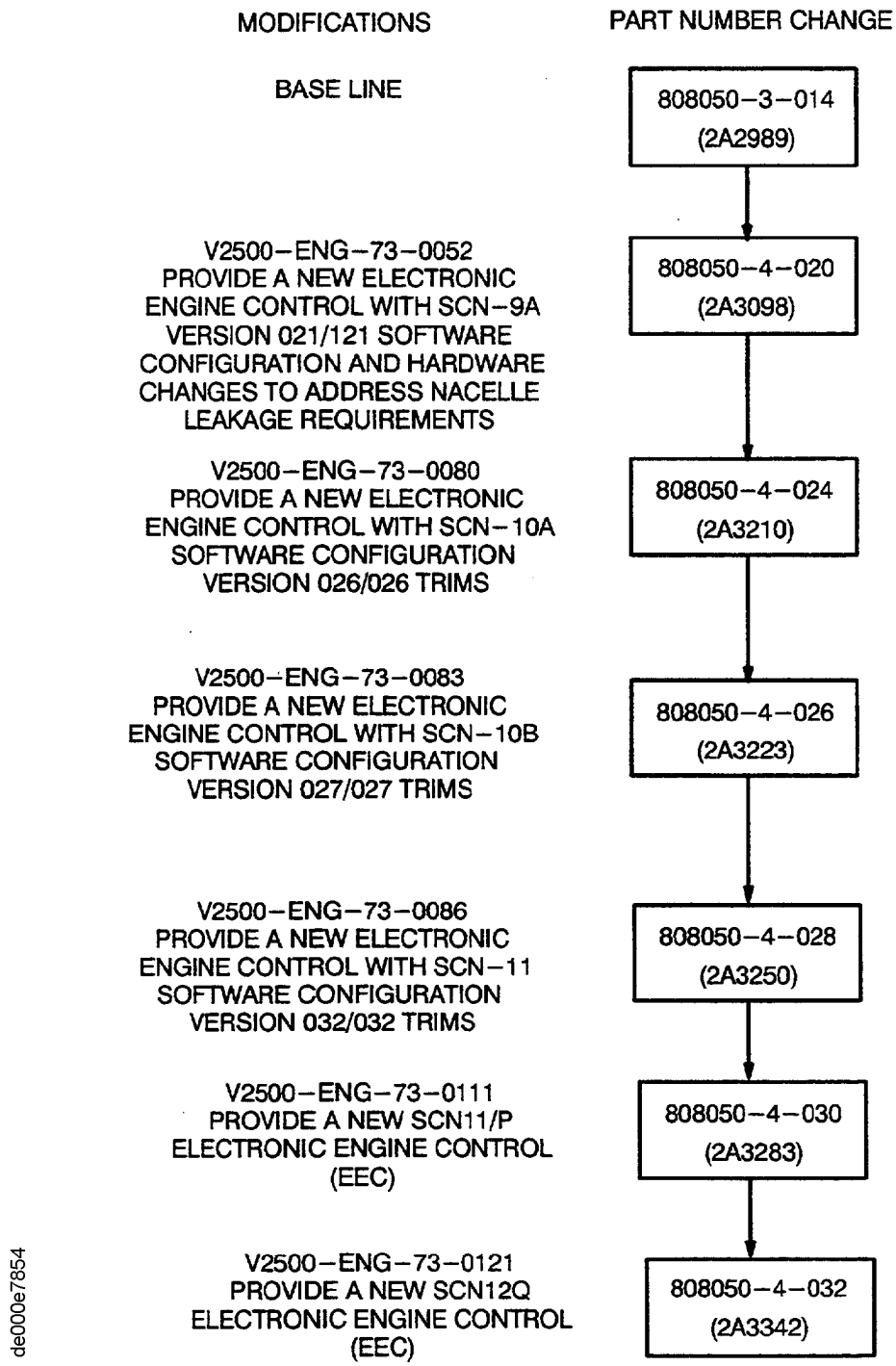
B. Parts affected by this bulletin.

New Part No. (ATA No.)	Qty	Est'd Unit Price ($)	Keyword	Old Part No. (IPC No.)	Instructions Disposition
Applicability: For each V2522-A5, V2524-A5, V2527-A5, V2530-A5 V2533-A5 Engine to incorporate this Service Bulletin					
808050-4-032 (2A3342) (73-22-34)	1		Control, Electronic Engine	808050-4-030 (2A3283) (01-280)	(1D)(A)

C. Instructions/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 one of the approved vendors listed in Paragraph 2. B. in the Accomplishment Instructions.
(A) The new part is currently available.

NOTE: The estimated 1998 unit prices shown 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) Ref. Catalog Sequence No. 73-22-34. Fig. 01 Item 280
Fig.2

Printed in Great Britain

Hamilton Standard
A United Technologies Company

SERVICE BULLETIN

ENGINE FUEL AND CONTROL - EEC150-20 - INCORPORATION OF NEW SOFTWARE CONFIGURATION: A5 SCN12/Q

1. Planning Information

A. Effectivity

All Hamilton Standard
EEC150-20 Units
Not Incorporating

808050-4-032

NOTE: Following incorporation of this service bulletin, the EEC150-20 can be installed on Airbus A319, A320 and A321 aircraft that use the IAE V2500-A5 engine.

B. Concurrent Requirements

(1) None

C. Reason

The purpose of this service bulletin is to allow the V2500-A5 operators to install new software in the EEC150-20.

(1) Problem

(a) IDG OIL CONTROLLING TEMPERATURE LIMIT

1 Durability of the airframe supplied IDG needs to be improved

(b) AIR MODULATING VALVE CYCLING

1 Unnecessary cycling of the Air Modulating Valve can occur following Heat Management System mode changes.

(c) AUTOSTART IMPACT FOLLOWING DRY CRANKING

1 An autostart which is initiated following a manual dry crank, without resetting or depowering the EEC, can result in ignition and fuel being commanded "ON" prematurely during the subsequent autostart.

(d) NUISANCE LOW STARTER AIR PRESSURE FAULT

1 A nuisance "ENG 1 (2) START FAULT, LO START AIR PRESS" fault can be set following a manual dry crank that exceeds 50 seconds.

(e) STARTER VALVE FEEDBACK FAULT ACCOMMODATION

1 Current EEC autostart logic does not optimally accommodate a local failure of the Starter Air Valve feedback.

(f) HYSTERESIS ON FUEL/IGNITION SPEED

1 Current V2500-A5 ground autostart logic has the fuel/ignition N2 speed threshold set to a high level such that fuel/ignition will be commanded on by a timer, rather than the alternative N2 speed criteria. However, should this fuel/ignition speed be reduced in the future to utilize the alternative N2 speed criteria for command of fuel and ignition, this logic could be susceptible to variation in starter air pressure. If the available starter air pressure were to result in the engine cycling around the fuel/ignition speed, it is possible to have the ignition cycle off and on, while fuel remains on, resulting in an aborted autostart.

(g) DATA ENTRY PLUG (DEP) SELECTABLE CRANK REDUCTION

1 For all ground autostarts, the EEC currently provides for a 50 second extended dry crank prior to fuel/ignition being commanded on. This 50 second crank increases start times and has met with some customer dissatisfaction.

(h) IGNITION COMMAND FOLLOWING DEPULSE ABOVE STARTER/IGNITION CUTOUT

1 In the event of an impending failed ground autostart, current V2500-A5 logic will apply fuel depulse which cycles fuel flow off, then back on, in order to eliminate potential HPC stall. If fuel depulse is applied above the starter/ignition cutout speed, the engine may not re-light following depulse application, resulting in an EEC initiated start abort.

(i) A319 OVERBOOST LOGIC ENHANCEMENT

1 Current A319 thrust overboost logic needs refinement to address: planned introduction of a 12000 PPH Fuel Metering Unit (FMU) required for the V2527M-A5 rating, a revised maximum thrust limit identified for the A319 and accommodation of a potential undetected stuck closed 7th stage HPC bleed valve.

(2) Cause

(a) IDG OIL CONTROLLING TEMPERATURE LIMIT

1 To try and improve the IDG reliability the typical IDG oil temperature is being moved from the upper part of the specification range to the middle.

(b) AIR MODULATING VALVE CYCLING

1 When the Heat Management System transitions from a non-recirculation mode to a recirculation mode, the Fuel-Back-To-Tank valve is commanded open and the controlling temperature limits are set to lower values. However, since the additional cooling effect of returning fuel to tank does not take effect immediately, the Air Modulating Valve can also be commanded open to provide additional cooling in attempting to achieve the lower limits.

(c) AUTOSTART IMPACT FOLLOWING DRY CRANKING

1 The ignition and fuel pressurization timer can get set and latched during a manual dry crank which exceeds 50 seconds. This will result in ignition and fuel being commanded "ON" at the initiation of the subsequent autostart if the timer is not cleared by resetting or depowering the EEC.

(d) NUISANCE LOW STARTER AIR PRESSURE FAULT

1 The Hung Start Flag can get set and latched during a manual dry crank which exceeds 50 seconds. Once the flag is latched, a nuisance fault is set when the crank is terminated and N2 drops below 10%.

(e) STARTER VALVE FEEDBACK FAULT ACCOMMODATION

1 The accommodation of a local Starter Air Valve feedback failure could be improved.

(f) HYSTERESIS ON FUEL/IGNITION SPEED

1 Current logic does not accommodate the potential for starter air pressure variation to result in the engine cycling around the fuel/ignition command speed.

(g) DATA ENTRY PLUG (DEP) SELECTABLE CRANK REDUCTION

1 The 50 second extended crank was implemented as a precautionary measure for protection against potential bowed rotor start.

(h) IGNITION COMMAND FOLLOWING DEPULSE ABOVE STARTER/IGNITION CUTOUT

1 Current V2500-A5 logic will not re-energize the ignitors following depulse application, if fuel depulse is applied above the starter/ignition cutout speed.

(i) A319 OVERBOOST LOGIC ENHANCEMENT

1 The original logic design did not encompass the above new requirements.

(3) Solution

(a) IDG OIL CONTROLLING TEMPERATURE LIMIT

1 Though specific design enhancements are being pursued to the IDG itself, changes have been incorporated to the EEC Heat Management logic that will reduce the typical controlling limit for the IDG Oil Temperature from 100 C to 85 C when Fuel-Back-To-Tank is allowed. The mode change temperature limit of 100 C, as well as the controlling limits in mode where no Fuel-Back-To-Tank is allowed, remain unchanged.

(b) AIR MODULATING VALVE CYCLING

1 Changes have been incorporated in the EEC Heat Management logic that will close the Air Modulating Valve for 2 minutes following a change from a non-recirculation mode to a recirculation mode. This gives the Back-To-Tank valve a chance to open and reduce the Heat Management System fluid temperatures to the lower limits applicable in recirculation modes before

utilizing the Air Modulating Valve, thus avoiding unnecessary cycling of the Air Modulating Valve and the potential for a performance impact.

(c) AUTOSTART IMPACT FOLLOWING DRY CRANKING

1 Modify the EEC logic to accommodate the potential lack of an EEC reset by clearing the ignition and fuel pressurization timer as necessary for all start modes.

(d) NUISANCE LOW STARTER AIR PRESSURE FAULT

1 Modify the EEC logic to accommodate the potential lack of an EEC reset at the conclusion of a dry crank by clearing the Hung Start Flag as necessary for all start modes.

(e) STARTER VALVE FEEDBACK FAULT ACCOMMODATION

1 Modify the EEC autostart logic to utilize the starter air valve command and disable the feedback in the event of a detected starter air valve feedback disagreement between channels.

(f) HYSTERESIS ON FUEL/IGNITION SPEED

1 Modify the EEC logic to incorporate a hysteresis on the ground autostart fuel/ignition command speed such that fluctuations in engine speed will not result in cycling of the ignition command in the event that the alternative N2 speed criteria is utilized in the future.

(g) DATA ENTRY PLUG (DEP) SELECTABLE CRANK REDUCTION

1 In the event planned development engine tests indicate that the 50 second crank is no longer required for bowed rotor prevention, modify the EEC logic to provide the option of a 30 second crank, selectable via the DEP, to provision for a future reduction in start times without introduction of a new EEC software standard.

(h) IGNITION COMMAND FOLLOWING DEPULSE ABOVE STARTER/IGNITION CUTOUT

1 Modify the ground autostart logic such that if fuel depulse is activated, dual ignition is commanded on for the remainder of that start until N2 achieves a level 300 RPM below idle.

(i) A319 OVERBOOST LOGIC ENHANCEMENT

1 Revise the EEC stability bleed scheduling associated with the current A319 overboost logic to satisfy the above new requirements.

(4) Substantiation

(a) None

D. Description

(1) The EEC150-20 is reprogrammed and reidentified with the new part number.

E. Compliance

(1) Category 4 - Accomplish on a planned basis when an installed EEC150-20 is at a maintenance base capable of compliance with the Accomplishment Instructions, regardless of other planned maintenance.

F. Approval

(1) The part number changes and/or modifications described in paragraphs 2. and 3. of this Service Bulletin have been shown to comply with the applicable Federal Aviation Regulations and are FAA-approved for the EEC150-20 Electronic Engine Control listed.

G. Manpower

(1) Approximately 1 man-hour is necessary to do these service bulletin procedures.

H. Material - Cost and Availability

(1) This service bulletin will be done at no charge to the operator for units that are reprogrammed in the field (3. Accomplishment Instruction, Alternate Reprogramming Method). EEC150-20 controls that are returned to one of the following addresses to incorporate this Service Bulletin will be charges to the operator:

(a) United Technologies Corporation
Hamilton Standard Division
Attention: Hamilton Support Systems
Electronics Service Center
97 Newberry Road
East Windsor, CT 06088
USA
FAA Repair Station Licence Number SI3R842L

(b) Pratt & Whitney
Overhaul and Repair Center - Europe (PWORCE)
Maastricht Airport
PO Box 269
6190 AG BEEK
Maastricht Airport
The Netherlands
FAA Repair Station Licence Number CW5Y794M

(2) The hard copy purchase order to perform this service bulletin must refer to the HS Service Bulletin number EEC150-20-73-19 and the IAE Service Bulletin Number V2500-ENG-73-0121.

(3) The parts required to accomplish this service bulletin are listed in Section 2, Material Information. These parts are available to the operator. Lead times can be obtained from Hamilton Standard by issuing a hard copy, purchase order for the quantity requested. Purchase orders for parts must refer to HS Service Bulletin number EEC150-20-73-19, to IAE Service Bulletin number V2500-ENG-73-0121, and must be addressed to:

Mail: Hamilton Standard Customer Support Service Center
47 Lakeshore Parkway

Rock Hill, SC 29730
Attn: Spare Parts Sales

Facsimile: 803-325-2849

I. Weight and Balance

(1) None

J. Electrical Load Data

(1) Not affected

K. Software Accomplishment Summary

(1) None

L. References

E9137 Standard Practices Manual
Component Maintenance Manual CMM 73-28-01
IAE Service Bulletin Number V2500-ENG-73-0121
HS Service Bulletin Number EEC150-20-73-19

M. Other Publications Affected

(1) Illustrated Parts Catalog 73-28-01

N. Interchangeability or Intermixability of Parts

(1) Reference IAE Service Bulletin Number V2500-ENG-73-0121

2. Material Information

A. This service bulletin change uses the parts in the list for each EEC150-20 that incorporates this service bulletin.

B. Any parts that usually are discarded when you disassemble the EEC150-20 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 multiple 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 short list under the list of parts tells you about the instruction codes that are used in the list.

F. New Parts Required

Table 1. New Parts

New PN	Qty	MSQ	Estimated Price	Key Word	PN Before this SB	Instruction Code
808050-4-032	1		--	Control	808050-4-030	A
819191-14	1	1	0.00	Diskette	819191-12	B, C
819104-6	1		0.00	S Record Format	819104-5	C

Instruction Code A: The PN Before this SB is used to make the New PN.

Instruction Code B: One reprogramming diskette can modify approximately 40 EEC150-20 units. You should order the proper quantity of diskettes to modify your fleet of EEC150-20 units.

Instruction Code C: The reprogramming diskette is provided to you at no charge by IAE. See your local IAE service representative for ordering information.

3. Accomplishment Instructions

CAUTION: REFER TO THE E9137 STANDARD ELECTRONIC PRACTICES MANUAL FOR SPECIAL PRECAUTIONS. ELECTROSTATIC DISCHARGE (ESD) CAN CAUSE DAMAGE TO THE ELECTRONIC COMPONENTS IN THE EEC150-20.

NOTE: The Alternate Reprogramming Method procedures may be used whenever the EEC electrical connectors are disconnected from the aircraft. If the EEC is reprogrammed using 28 VDC power from the aircraft, refer to the engine service bulletin.

NOTE: Refer to the E9137 Standard Electronic Practices Manual to do the procedure unless otherwise noted.

A. If you use the Alternate Reprogramming Method, skip to step 3.B. Otherwise refer to CMM 73-28-01, section 200 (ATLAS) to reprogram the EEC150-20. Use the program and version number shown below:

Replace Y811183-032 with Y811183-034
Replace Y811184-032 with Y811184-034
Replace Y811185-032 with Y811185-034

If you do not use the Alternate Reprogramming Method of programming, skip to step 3.AO.

B. If you use the Alternate Reprogramming Method, verify that the model number on the identification plate of the unit is EEC150-20.

C. Record the current unit part number and the unit serial number from the nameplate. You will enter this information into the computer.

D. Plug in all necessary equipment, but do not turn the equipment on.

E. Connect the programming harness connector marked P1 to the EEC connector marked J1. Ensure that the red engagement stripe on the EEC connector J1 is fully covered. Connections are given in Table 2.

F. Connect the programming harness connector marked P7 (Table 2) to the EEC connector marked J7. Ensure the red engagement stripe on the EEC connector J7 is fully covered. If the computer and power supply connections to the cables are permanent, skip to step 3.J.

G. Connect the programming harness connector marked CH A UART to the IBM compatible computer UART board connectors for the channel A RS-422 port (COM3). Ensure that these connectors are properly mated.

H. Connect the programming harness connector marked CH B UART to the IBM compatible computer UART board connectors for the channel A RS-422 port (COM4). Ensure that these connectors are properly mated.

NOTE: UART connections can differ for different IBM compatible computers.

NOTE: It is important to verify that the connectors are correctly installed for correct loader operation. HS recommends labeling the RS-422 COM3 port as CH A UART and COM4 port as CH B UART on the computer to reduce errors.

I. Connect the opposite end of P3 and P9 (Table 3) cables to the 28 VDC supply.

J. Connect the power supply harness connector marked P3 to the EEC connector marked J3. Ensure that the red engagement stripes on EEC connector J3 are fully covered.

K. Connect the power supply harness connector marked P9 to the EEC connector marked J9. Ensure that the red engagement stripes on EEC connector J9 are fully covered.

L. Locate the BOOT/BITE switches for Channel A and Channel B. Set the BOOT/BITE switches ON (closed).

M. Turn on the 28 VDC power supply to the EEC.

N. Turn on power to the IBM compatible computer.

O. Wait for the MSDOS prompt C:\> to appear on the IBM compatible computer.

NOTE: The procedure assumes the floppy disk is in drive A. If the floppy drive in your computer has another designation, substitute that designation in the procedure.

P. Obtain the Hamilton Standard reprogramming diskette PN 819191-14. Ensure that the write protection tab of the diskette is covering the "hole."

Q. Insert the diskette into the floppy drive designated A on the IBM compatible computer. The display shows C:\>.

R. Type **a:**, then press the RETURN key (ENTER key on some computers). The display shows A:\>.

S. Type **LDR150**, then press RETURN. This starts the UART programming utility. Several messages appear, including the program identification, version number, time, and the UTC/P&W document property rights notice.

NOTE: If there is a configuration error on the diskette, the program displays the appropriate error message and aborts the programming process. See Table 4 for a summary of error code descriptions and troubleshooting suggestions.

T. The UART programming utility LDR150 displays the following message: Enter operator's name performing download:[]>. The field between the brackets is always empty the first time the program is executed. Subsequent execution displays the last name entered.

(1) If this is not the first execution of the program, and the displayed name is unchanged, press RETURN and go to step V.

(2) If this is the first program execution (no name is displayed), or if the operator's name changes, enter the new name and press RETURN.

U. The LDR150 program displays this message:

WARNING - EEC Fault Memory Will Be Cleared By This Program. If an EEC Fault Dump is Required Prior to Programming, Enter Q to Quit or C to Continue [Q/C]:

(1) If a fault dump is already completed, or is not required, type C, then press RETURN, and go to step V.

(2) If a fault dump is required, or if you want to stop the programming procedure, type Q, then press RETURN. If the programming procedure is stopped, turn off 28 VDC power to the EEC and go to step 3.AK.

V. The LDR150 program displays this message: ENTER THE 9 CHARACTER EEC SERIAL NUMBER: [xxxx-xxxx].

W. Enter the nine character EEC serial number, from the nameplate, and press RETURN.

NOTE: For steps 3.X and Y, precede the middle part number digit with a zero. For example, enter 808050-4-032 as 808050-04-032.

X. The LDR150 program display shows: ENTER THE 13 CHARACTER CURRENT EEC HW PART NO.: [XXXXXX-XX-XXX]. Enter the part number and press RETURN.

Y. The LDR150 program display shows: ENTER THE 13 CHARACTER SB EEC HW PART NO.: [XXXXXX-XX-XXX]. Enter the new part number given in this service bulletin and press RETURN.

Z. The LDR150 program display shows: ENTER TRIM CHECKSUM VALUE FOR XXXXXX.XXX:>. The XXXXXX.XXX designation is the name of the Trim File being loaded into the EEC. Enter the trim checksum value 31074 and press RETURN.

AA. The LDR150 program display shows: DO YOU WISH TO ENTER THE ABOVE ENTRIES [Y/N/Q]:

(1) To proceed with the programming process, type N, then press RETURN. Go to step 3. AB.

(2) To correct any errors in the data entered, type Y, then press RETURN. Go to step 3. T.

(3) To quit the programming process, type Q, then press RETURN. Turn off the 28 VDC power to the EEC and continue with step 3. AL.

AB. At this point, the screen is initialized to display the activity of the programming process. Status messages scroll across the screen. If an error occurs, see Table 4 for a summary of error code descriptions and troubleshooting suggestions.

AC. The LDR150 program display shows:

Turn off the BITE and BOOT switches to the EEC
then
Turn Off POWER to the EEC and wait at least 5 seconds
then
Turn On Power to the EEC

Press the RETURN Key When Ready to Continue

(1) Locate the BOOT/BITE switches on your test equipment, and set them to OFF (open).

AD. Switch off the 28 VDC power to the EEC wait 5 seconds, then switch power on.

AE. On the IBM compatible computer, press RETURN.

AF. Wait until the LDR150 program display shows:

Turn ON the BITE and BOOT switches to the EEC
then
Turn Off POWER to the EEC and wait at least 5 seconds
then
...Press the RETURN Key When Ready to Continue

(1) Locate the BOOT/BITE switches on your test equipment, and set the BOOT/BITE switches to ON (closed).

AG. Switch off the 28 VDC power supply to the EEC, wait 5 seconds, then switch power on.

AH. On the IBM compatible computer, press RETURN.

AI. Wait until the LDR150 display shows:

Turn Off POWER to the EEC
... Press the RETURN Key When Ready to Continue

(1) Switch off the 28 VDC power supply to the EEC.

AJ. On the IBM compatible computer, press the RETURN key.

AK. The LDR150 program displays the status of the programming process. Record the name of the log file for hard copy report of the process.

(1) If programming is successful, the following message is displayed:

EEC REPROGRAMMING SUCCESSFULLY COMPLETED
Record the log file name VLXXXX.LOG for later printout

If desired, record the log file name VLXXXX.LOG for later printout.

(2) If the programming is unsuccessful, the following message is displayed:

DOWNLOAD PROCESS ABORTED - ERROR CODE X
Record the log file name VLXXXX.LOG for later printout.

If desired, record the log file name VLXXXX.LOG for later printout.

The X refers to the type of error that caused the process to abort. Table 4 describes the error codes and action to be taken.

AL. Press RETURN to stop the program and return to the MSDOS prompt: A:\>.

AM. If a printer is available, a paper copy of the log file can be generated by the IBM computer:

NOTE: If no printer is available, you can move the diskette to a system with a printer and do the next three steps.

At the MSDOS prompt, type PRINT VLXXXX.LOG.

(1) Press RETURN.

(2) Do not proceed to the next step until the file is printed.

AN. Disconnect the EEC electrical connectors from the J1, J3, J7, and J9 connectors.

AO. Put the information shown below on a new identification plate.

NOTE: EEC150-20 assemblies reprogrammed at one of the addresses given in 1.H. are returned with their assemblies reidentified.

NOTE: If Service Bulletin EEC150-20-73-16 (reference 1.L.) is incorporated, bypass (1) and (2) below and go to (3).

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

PART NUMBER BEFORE THIS SERVICE BULLETIN	PART NUMBER AFTER THIS SERVICE BULLETIN
808050-4-XXX	808050-4-032

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

EEC150-20 END ASSEMBLY	NEW IAE PART NUMBER
808050-4-032	2A3342

(3) Use a ballpoint pen or its equivalent to put the date and the last three digits of the new part number (3. AC. (1)) on the identification plate per HS Service Bulletin EEC150-20-73-16. Erase (scratch out) the existing HS and IAE part numbers (i.e., 030 and 2A3283

Table 2. Communication Connections

EEC SIGNAL NAME	EEC CONNECTOR	QUA-TECH CONNECTOR	QUA-TECH SIGNAL NAME
UART IN LINE B CHA	P1-b	PA-2	TXD+
UART IN LINE A CHA	P1-H	PA-7	TXD-
UART OUT LINE A CHA	P1-c	PA-4	RXD+
UART OUT LINE B CHA	P1-J	PA-8	RXD-
BOOT DISC CHA	P1-D	N/A	N/A
BITE DISC CHA	P1-Z	N/A	N/A
BOOT/BITE RTN CHA	P1-m	N/A	N/A
UART IN LINE B CHB	P7-b	PB-2	TXD+
UART IN LINE A CHB	P7-H	PB-7	TXD-
UART OUT LINE A CHB	P7-c	PB-4	RXD+
UART OUT LINE B CHB	P7-J	PB-8	RXD-
BOOT DISC CHB	P7-D	N/A	N/A
BITE DISC CHB	P7-Z	N/A	N/A
BOOT/BITE RTN CHB	P7-m	N/A	N/A

Table 3. Power Supply Connections

EEC SIGNAL NAME	EEC CONNECTOR	POWER SUPPLY
GTP CHA	P3-m	+28 VDC
GTP RTN CHA	P3-r	+28 VDC RTN
GTP CHB	P9-m	+28 VDC
GTP RTN CHB	P9-r	+28 VDC RTN

Table 4. Error Code Definitions

ERROR CODE	ERROR TYPE	ACTION
E1	EEC VERIFY ERROR - Data verify error in EEC - Compare failed or location could not be programmed.	Try procedure three times; if still bad return EEC unit.
E2	COMMUNICATION ERROR - Communication problem between EEC and IBM compatible computer.	Check BITE, cables, power supply, UART board, and EEC. Retry three times.
E3	CONFIGURATION ERROR - Configuration data comparison failed. (Possible hardware PN mismatch, EEC compatibility mismatch, trim checksum mismatch)	Operator data entered incorrectly or incorrect data on existing nameplate. Check data - retry with the correct information.
E4	SYSTEM PROBLEM - Poor operating environment, bad disk, or program aborted by the operator	If the process was not terminated by the operator, check that the disk is not write protected, or replace disk and retry.

Hamilton Standard Internal Reference Number 240572
IAE Engineering Change Number 97VZ014
IAE Service Bulletin Number V2500-ENG-73-012