P U B L I C A T I O N T R A N S M I T T A L

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V2500 A5 PROPULSION SYSTEMS SERVICE BULLETIN

This document transmits Revision 1 to Service Bulletin EV2500-73-0170

Document History

Service Bulletin Revision Status		Supplement Revision Status
Initial Issue	Oct.10/00	

Bulletin Revision 1

Remove	Incorporate	Reason for change
All pages of the Service Bulletin	Pages 1 to 29 of the Service Bulletin	To revise Effectivity

V2500-ENG-73-0170

CHECK THAT ALL PREVIOUS TRANSMITTALS HAVE BEEN INCORPORATED
If any have not been received please advise Publication Services, Rolls-Royce plc, Derby, England

LIST OF EFFECTIVE PAGES

The effective pages to this Service Bulletin following incorporation of Revision 1 are as follows:

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	Bulletin		
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ENGINE - FUEL AND CONTROL - TO PROVIDE A NEW A5 SCN16/U ELECTRONIC ENGINE CONTROL (EEC)

1. Planning Information

A. Effectivity

(1) Airbus A319

R V2522-A5, V2524-A5, V2527M-A5 Engines Serial No. V10001 thru V10897 and
R including V10899 and V10901

(2) Airbus A320

R V2527-A5, V2527E-A5 Engines Serial No. V10001 thru V10897 and including
R V10899 and V10901

(3) Airbus A321

R V2530-A5, V2533-A5 Engines Serial No. V10001 thru V10897 and including
R V10899 and V10901

(4) ATA Locator

73-22-00

CAUTION: THE INTERMIX OF ELECTRONIC ENGINE CONTROLS MUST BE DONE BY THE INSTRUCTIONS GIVEN IN REFERENCE (14), AIRBUS SERVICE BULLETIN A320-73-1073.

B. Concurrent Requirements

There are no concurrent requirements.

C. Reason

(1) Problem:

(a) TOP OF DESCENT STALL - BLEED RESCHEDULING:

Several V2500-A5 operators have experienced Top of Descent Stalls that cannot be attributed to mechanical damage.

(b) PROVISION FOR FUTURE DELETION OF 10TH STAGE MAKE-UP AIR (TURBINE COOLING) SOLENOID CONTROL VALVE - LOGIC CORRECTIONS:

The TMA valve Removal detection logic incorporated in A5 SCN 14 resulted in setting the solenoid group failsafe failure on engines without the TMA valves installed. This is not a problem in the field because the TMA valve will not be removed from production engines until this software change is incorporated.

(c) ENGINE STALL MAINTENANCE MESSAGE:

Field experience has shown that aircrews often hear engine stalls but no cockpit indication is present. These stalls are short in duration, that is, less than 2 seconds. Certain Airlines require engine inspection for all stalls observed by the aircrew. After landing, there is no information available from the EEC to determine which engine experienced the stall. This can lead to inspection of both engines.

(d) AUTOSTART ABORT AUTOCRANK COCKPIT INDICATION IMPROVEMENTS:

For a typical autostart abort, the cockpit indication on the ECAM display is "AUTO CRANK IN PROGRESS". This leads the pilot to wait for the abort auto dry crank to finish before shutting the engine down. This will happen for all starts that abort below starter cutout.

If an abort occurs above starter cutout, the engine must spool down to starter engagement speed before the dry crank can begin. For this situation, the ECAM displays "ENG MASTER 1 (2) OFF". The indication that a dry crank is in progress will not be displayed until the starter is commanded again at 10 per cent N2. The pilot will shut down the engine in response to the first ECAM instruction, terminating the dry crank prematurely.

(e) VARIABLE STATOR VANE SCHEDULE CHANGE:

The V2500-A5 High Pressure Compressor (HPC) is experiencing rotor 4 blade fracture problems in service.

(f) CMS MENU MODE - PRESSURE SENSOR STATIC TEST NUISANCE FAILURES:

The CMS menu mode-Pressure Sensor Static Test incorrectly indicates failures of the pressure sensors. This problem occurs frequently with the EEC 150-40 only. These failures are not real pressure sensor failures and they only occur when running the FADEC self-test in menu mode.

(2) Background:

(a) TOP OF DESCENT STALL - BLEED RESCHEDULING:

The stall boundary of the High Pressure Compressor (HPC) has degraded such that it is coincident with, and in places overlapping, the current stability bleed valve schedule. In addition, the Aircraft Environmental Control System (ECS) bleed switching between 7th and 10th stage air from the engine may add to the problem.

(b) PROVISION FOR FUTURE DELETION OF 10TH STAGE MAKE-UP AIR (TURBINE COOLING) SOLENOID CONTROL VALVE - LOGIC CORRECTIONS:

The current design/implementation of the TMA removal detection logic resulted in TMA wraparound faults being set on engines without the TMA valve installed.

(c) ENGINE STALL MAINTENANCE MESSAGE:

When an engine stall occurs, the EEC responds to recover the engine from the stall. If the duration of the stall exceeds 2 seconds, a Class 1 fault will be recorded and annunciated in the cockpit. Generally, most stalls recover within 2 seconds and are not fault-recorded and are not annunciated in the cockpit.

(d) AUTOSTART ABORT AUTOCRANK COCKPIT INDICATION IMPROVEMENTS:

The current autostart abort logic does not indicate that a dry crank is in process immediately after the abort if it occurs above starter cutout.

(e) VARIABLE STATOR VANE SCHEDULE CHANGE:

The Rotor 4 blade fractures are primarily occurring when the stress on the blade peaks during transient maneuvres. The current HPC variable stator vane (VSV) schedule can be improved for engine decelerations.

(f) CMS MENU MODE - PRESSURE SENSOR STATIC TEST NUISANCE FAILURES:

The EEC logic is not processing the pressure sensor data correctly.

(3) Objective:

(a) TOP OF DESCENT STALL - BLEED RESCHEDULING:

Change the Engine -7A steady-state bleed schedule to increase HPC stall margin. The schedule change will ensure that the bleed is open during ECS bleed switching.

(b) PROVISION FOR FUTURE DELETION OF 10TH STAGE MAKE-UP AIR (TURBINE COOLING) SOLENOID CONTROL VALVE - LOGIC CORRECTIONS:

Improve the logic so that the solenoid group does not failsafe when the TMA valve is not installed.

(c) ENGINE STALL MAINTENANCE MESSAGE:

Modify the EEC logic such that for every engine stall, of any duration, a Class 3 Fault will be recorded. This will allow a maintenance crew the ability to determine which engine experienced a stall by examining the Class 3 faults. The existing Class 1 Fault logic will not be changed.

(d) AUTOSTART ABORT AUTOCRANK COCKPIT INDICATION IMPROVEMENTS:

Modify the autostart logic such that all aborted starts will cause the ECAM to display "AUTO CRANK IN PROCESS" as soon as the abort occurs.

(e) VARIABLE STATOR VANE SCHEDULE CHANGE:

As part of the fleet management plan for controlling the V2500-A5 rotor 4 blade fracture problem, change the VSV schedule to include a reset that will schedule the VSV more closed (up to 5 degrees) at the start of engine deceleration.

This change is NOT ACTIVE FOR THIS SCN. It has been included for development test only.

(f) CMS MENU MODE - PRESSURE SENSOR STATIC TEST NUISANCE FAILURES:

Correct the EEC logic such that the pressure sensor data will be correctly processed and nuisance failure indications will not occur. The interim solution for the EEC 150-40's that are in service is to repeat the menu mode test until the FADEC self-test passes.

(4) Substantiation: The following tests were satisfactorily completed:

(a) Airbus Iron Bird test July 2000.

(b) Pratt and Whitney closed loop bench (CLB) testing for flight test July 2000.

(c) Verification of new 7A engine bleed schedule for top of descent on engine V10095, December 1999.

(d) Verification of the TMA valve not installed detection on engine V10817 per pilot lot 81022, August 2000.

(e) Verification that new 7A bleed schedule does not affect engine acceleration requirements on V10817 per pilot lot 81022, August 2000.

(f) Successful Airbus flight test on EEC 150-40 on 21 July, 2000 and on 150-120 on 26 July, 2000.

(5) Effects of Bulletin on:

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.

D. Description

1. To provide a new Electronic Engine Control (EEC) with SCN16/U software logic.

2. The A5 SCN 16/U Electronic Engine Control provides a modified 7A steady state engine bleed schedule to address potential top of descent stalls, an improvement to TMA solenoid removal detection logic, recording of Class 3 fault for maintenance purposes when the EEC detects an engine stall, improvement to autocrank in progress indication for aborted starts above starter cutout, provision for VSV schedule decel reset, and EEC Menu Mode Pressure Sensor Self Test correction to prevent possible nuisance faults when the test is run.

Part I - If the Electronic Engine Control is sent to one of the addresses listed in Paragraph 3. B.

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 the Electronic Engine Control is Reprogrammed on site.

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

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. Approval Data

The part number changes and/or part modifications specified in the Accomplishment Instructions and Material Information sections of this Service Bulletin have been shown to comply with the applicable Federal Aviation Regulations and are FAA-APPROVED for the engine model(s) given.

G. Manpower

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

(1) In service

Total - 1 hour 16 minutes:

(a) To gain access

(i) Install warning notices

5 minutes

(ii) Open 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 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):

(1) In service

Total - 1 hour 25 minutes

(a) To gain access

(i) Install warning notices

5 minutes

(ii) Open fan cowls

7 minutes

(iii) Program the EEC

1 hour

TOTAL: 1 hour 12 minutes

(b) To return to flyable status

(i) Close fan cowls

8 minutes

(ii) Remove the warning notices

5 minutes

TOTAL: 13 minutes

Estimated Manhours Part I or Part II (overhaul):

Not applicable.

H. Weight and Balance

(1) Weight Change

None.

(2) Moment Arm

No effect

(3) Datum

Engine front mount centerline (Power Plant Station (PPS) 100).

I. Electrical Load Data

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

J. Software Accomplishment Summary

Not Applicable.

K. References

1. IAE V2500 Service Bulletin V2500-ENG-72-0285 (Engine - Provide Instructions to change the V2500-A5 Engine Rating by Modifying the Data Entry Plug).

2. IAE V2500 Service Bulletin 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).

3. IAE V2500 Service Bulletin 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).

4. IAE V2500 Service Bulletin 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).

5. IAE V2500 Service Bulletin 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).

6. IAE V2500 Service Bulletin V2500-ENG-73-0111 (Engine - Fuel And Control - To Provide A New SCN11/P Electronic Engine Control (EEC)).

7. IAE V2500 Service Bulletin V2500-ENG-73-121 (Engine - Fuel And Control - To Provide A New SCN12/Q Electronic Engine Control (EEC)).

8. IAE V2500 Service Bulletin V2500-ENG-73-159 (Engine - Fuel And Control - To Provide A New SCN14/S Electronic Engine Control (EEC)).

9. IAE V2500 Service Bulletin V2500-ENG-73-0160 (Engine - Fuel And Control - To Provide A New SCN14B/S Electronic Engine Control (EEC)).

10. IAE V2500 Service Bulletin V2500-ENG-73-0169 (Engine - Fuel And Control - To Provide A New SCN15/T Electronic Engine Control (EEC)).

11. Hamilton Sunstrand Service Bulletin EEC-150-20-73-16 (Install Software Identification Plate).

12. Hamilton Sunstrand Service Bulletin EEC-150-20-73-26 (Incorporation of New Software Configuration: A5 SCN16/U).

R 13. Hamilton Sunstrand Service Bulletin EEC-150-40-73-4 (Incorporation of New
R Software Configuration: A5 SCN16/U).

14. Airbus Service Bulletin A320-73-1073 and Aircraft Modification No. 30794..

15. V2500 Aircraft Maintenance Manual.

16. V2500 Engine Illustrated Parts Catalogs (S-V2500-1IA, S-V2500-2IA, S-V2500-2IB, S-V2500-5IA, S-V2500-5IB, S-V2500-6IA, S-V2500-6IB, S-V2500-7IA, and S-V2500-71B), Chapter/Section 73-22-34, Figure 2, to add the new parts.

17. IAE Information Letter, SIL 066 Issue 4, 17 July 1997.

18. IAE all operators wire, AOW 1041, 16 December 1997.

L. Interchangeability of Parts

Old and new parts are directly interchangeable.

M. Information in the Appendix

Alternate Accomplishment Instructions (No)

Progression Charts (Yes)

Added Data (No)

Revision to Table of Limits (No)

Inspection Procedures (No)

2. Material Information

A. Prices:

PART NO.	UNIT PRICE US DOLLARS
808050-4-44 (2A3505)	*
824972-2-008 (2A3504)	*

NOTE: The unit prices, if shown, are an estimate and they are given in good faith without commercial liability for advanced planning purposes only. For actual prices, refer to the IAE Price Catalogue or contact IAE's spare parts sales department.

B. Material - Price and Availability

(1) * Part prices were not available at the time of Service Bulletin publication. Contact IAE's Spare Parts Sales Department for firm quotations.

(2) There is no kit provided to do this Service Bulletin.

(3) Part availability information is provided in material data Instructions-Disposition.

C. Industry Support Program

Not Applicable.

D. The Material data that follows is for each engine

73-22-34

For V2522-A5, V2524-A5, V2527-A5, V2527E-A5, V2527M-A5, V2530-A5, V2533-A5 Engines:

FIG ITEM NO.	NEW PART NO.	QTY	PART TITLE	MAT	OLD PART NO.	INSTR DISP
01280	808050-4-44 (2A3505)	1	Control, Electronic Engine (150-20)	-	808050-4-042 (2A3488)	(1D)(A)(B)
			OR			
01280	824972-2-008 (2A3504)	1	Control, Electronic Engine (150-40)	-	824972-2-006 (2A3489)	(1D)(A)(B)

Printed in Great Britain

E. Instructions/Disposition Code Statements:

(1D) The new part can be obtained through modification by the approved procedure in the Accomplishment Instruction. Purchase the new parts from or return the old parts for modification to one of the approved vendors listed in Paragraph 1. A. in the Accomplishment Instructions.

(A) The new part will be available approximately November, 2000..

(B) The old part will no longer be supplied.

F. Tooling - Price and Availability

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

The following equipment is required to accomplish this Service Bulletin and will be provided or loaned at no charge to the operator for units that are reprogrammed in the field. See the Accomplishment Instructions, Part II. Units that are returned to Hamilton Sundstrand Support Systems or Maastricht Aachen Airport to incorporate this Service Bulletin will be charged to the operator.

(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 inch 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 3)

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

NOTE: The IBM computer date/time must be current prior to performing this procedure. In MS DOS systems (as in the ReProgramming Box PC), at the prompt (C:\>), enter "date" or "time" and the computer will display the current value. If necessary, type in the correct value, and press the Return key.

(2) Hamilton Sundstrand diskette referenced in Table 4 (Figure 1 Sheet 10). This diskette contains the EEC 150-20/150-40 application code, trims, memory clear utilities, and software loader. The diskette can be obtained from your:

Customer Support Manager

(3) EEC 150-20 Programming Harness Definition as defined in Table 1 (Figure 2).

(4) BOOT/BITE switches are defined as:

1. Single pole, single throw

2. Closed contact resistance of 50 ohms maximum

3. Open contact resistance of 100 Kohms minimum

4. Closed contact current of 20 mA minimum

5. Open contact voltage of 20VDC minimum and wired between BOOT DISC and BOOT/BITE RTN and BITE DISC and BOOT/BITE DISC for each channel. Reference Table 1 (Figure 2) for EEC connector pins.

(5) EEC 150-20/150-40 NAMEPLATE PN 751333-1 or modified nameplate 822815-1.

(6) 28 VDC +/- 0.5A power supply and associated power cables as defined in Table 2 (Figure 2).

G. Other Material Information Data

Not Applicable.

3. Accomplishment Instructions

A. Part I - If the Electronic Engine Control is sent to one of the addresses listed in Paragraph 1. A. (1) or (2)

(1) 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 AG400 Main Street M/S 121-10East Hartford, CT 06108 USA

(a) Authorized Rework Vendors for this bulletin follows:.

(i) Customer Service CenterHamilton Sundstrand Support Systems97 Newberry RoadEast Windsor, CT 06088 USA

(ii) Hamilton Sundstrand Customer Support Center - Maastricht B. V.Maastricht Aachen AirportHorsterweg 7P.O. Box 2696190 AG BeekThe Netherlands

(b) 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.

(c) Removal Instructions

(i) Remove the Old P/N (See Table 4 Figure 1 Sheet 10) Electronic Engine Control by the procedure given in Reference (15), Chapter/Section 73-22-34, Removal Installation. See Figure 3.

(d) Rework Instructions

(i) Do a modification of the Old P/N (See Table 4 Figure 1 Sheet 10) Electronic Engine Control (See Reference (15), Chapter/Section 73-22-34, Fig/Item No. 01-280) and reidentify by the procedures given in Reference (14).

(1) Send the Electronic Engine Control to the approved vendor to be modified. See Paragraph 1. A. (1) or (2). See Figure 3.

(e) Installation Instructions

(i) Install the New P/N (See Table 4 Figure 1 Sheet 10), Electronic Engine Control (1 off) by the approved procedure given in Reference (15), Chapter/Section 73-22-34, Removal/Installation.

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

(3) Refer to Figure 1 Sheets 1 through 10 for detailed instructions on reprogramming the EEC on site.

(4) Recording Instructions

(a) A record of accomplishment is required.

Part I I – If the Electronic Engine Control is Reprogrammed on site.

NOTE: The latest software standard may be loaded directly into any prior approved software standard. It is not required to load all the interim software standards.

NOTE: Reprogramming assistance is available from your local 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.

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 power 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 Sundstrand electronic Engine Control Model EEC150–20 or 150–40, software is programmed into the EEC using an IBM compatible computer and Hamilton Sundstrand supplied software.

(a) Disassembly of the EEC is not required.

(b) Data integrity of the Hamilton Sundstrand 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. I. are necessary to accomplish this procedure.

C. Do the steps that follow to reprogram the Electronic Engine Control (EEC).

(1) Verify that the model number on the identification plate of the unit is “EEC 150–20” or “EEC 150–40”.

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

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

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PWH

Accomplishment Instructions for Part II - If the Electronic Engine Control is Reprogrammed on site
Figure 1 (Sheet 1)

(4) Remove the harness connector from the EEC connector marked J1 and connect the **programing 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 **programing 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, go to step (9).

(7) Connect the **programing harness connector** marked CH A UART to the IBM compatible computer UART board connectors for the channel A RS−422 Port (COM3). Make sure that the connectors are properly mated.

(8) Connect the **programing harness connector** marked CH B UART to the IBM compatible computer UART board connectors for the channel B RS−422 Port (COM4). 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 Sundstrand 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, go to step (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 28VDC power supply to the EEC.

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PWH

Accomplishment Instructions for Part II - If the Electronic Engine Control is Reprogrammed on site
Figure 1 (Sheet 2)

(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 Sundstrand reprogramming diskette which is given in Table 4 (Figure 1 Sheet 10) and Reference (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 (Figure 1 Sheet 9) 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 : [ ] >

(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.

E8266
PWH

Accomplishment Instructions for Part II - If the Electronic Engine Control is Reprogrammed on site
Figure 1 (Sheet 3)

(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] :>

(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 (37).

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

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

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

NOTE: For steps (23) and (24), if the EEC 150–20 or EEC 150–40 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]>

From the Hamilton Sundstrand 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]>

From Table 4 (Figure 1 Sheet 10) and Reference (2), the Service Bulletin, enter the 13 character EEC Hardware Part Number and press the **RETURN** key.

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Accomplishment Instructions for Part II - If the Electronic Engine Control is Reprogrammed on site
Figure 1 (Sheet 4)

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

Enter Trim Checksum Value for "XXXXXX.TRM" :

The xxxxxx.xxx designation is the name of the Trim File being loaded to the EEC. From Table 4 (Figure 1 Sheet 10) and Reference (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] :

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

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

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

NOTE: For a successful Reprogramming operation, this step will take the following approximate times:.
EEC 150−20 30 minutes.
EEC 150−40 10 minutes.

(b) If an error occurs, see Table 3 (Figure 1 Sheet 9) for a summary of error code description and troubleshooting suggestions.

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

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

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

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Accomplishment Instructions for Part II - If the Electronic Engine Control is Reprogrammed on site
Figure 1 (Sheet 5)

(29) Switch off the 28VDC 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:

Turn ON 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

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:

Turn Off POWER to the EEC

...Press the RETURN Key When Ready to Continue

Switch off the 28VDC supply to the EEC.

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

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Accomplishment Instructions for Part II - If the Electronic Engine Control is Reprogrammed on site
Figure 1 (Sheet 6)

(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.

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.

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 (Figure 1 Sheet 9) 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/J9, if applicable.

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

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Accomplishment Instructions for Part II - If the Electronic Engine Control is Reprogrammed on site
Figure 1 (Sheet 7)

(41) Identify the Electronic Engine Control by the procedure as follows and in Reference (2).

(a) If not already installed, install the Software Identification Plate below the existing nameplate by the procedure specified in HS SB EEC150−20−73−16 Reference (2), as shown below:

Hamilton Sundstrand
A United Technologies Company

S/W NO.	DATE

(b) Use a ballpoint pen or its equivalent to put the last three digits of the HS HW New Part Number from Table 4 (Figure 1 Sheet 10) under “S/W No.”, and the Date under “DATE”, on the Software Identification Plate.

(c) Erase (scratch out) the existing HS HW Part Number and Date if previously marked on the Identification Plate.

(d) Erase (scratch out) the the last three digits fo the HS HW Part Number from the Master Nameplate above the Soaftware Identification Plate, if not already done.

(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.

(44) For this reprogramming diskette, make (add to) a record of accomplishment, listing diskette part number, operator, EEC serial number, and date.

(45) When fleet reprogramming is complete, return reprogramming diskette and record of accomplishment to IAE representative, for return to IAE.

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Accomplishment Instructions for Part II − If the Electronic Engine Control is Reprogrammed on site
Figure 1 (Sheet 8)

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 3 times, if still bad, operator has the option to a.) return the unit, or b.) successfully ReProgram the unit to a prior A5 Software Standard, as listed in Figure 4 – Family Tree, and as defined by the corresponding Software Service Bulletin
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 the disk and retry.

Table 3
Error Code Definitions

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Accomplishment Instructions for Part II - If the Electronic Engine Control is Reprogrammed on site
Figure 1 (Sheet 9)

Reprogramming Input Reference Table

A5 SCN16/U				
	Old P/N	A5 SCN16/U New P/N	SB Line Reference Paragraph	Line
Reprogramming Diskette 150−20 150−40	n/a	819191−25 819191−26	2. Part I I	C. (17)
EEC: (HS) HW Part No. 150−20 150−40	808050−4−042 824972−2−006	808050−4−044 824972−2−008	2. Part I	D. (1), E. (1), F. (1)
EEC: IAE P/N 150−20 150−40	2A3488 2A3489	2A3505 2A3504	2. Part I	D. (1), E. (1), F. (1)
Trim Checksum	n/a	23523	2. Part I I	C. (25)

Table 4
Reprogramming Input Reference Table

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Accomplishment Instructions for Part II − If the Electronic Engine Control is Reprogrammed on site
Figure 1 (Sheet 10)

EEC 150-20 Programming Harness Definition as defined in Table 1.

EEC SIGNAL NAME	PROGRAMMING HARNESS 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
Programming Harness Definition

Power Supply Connections

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

Table 2
Power Supply Connections

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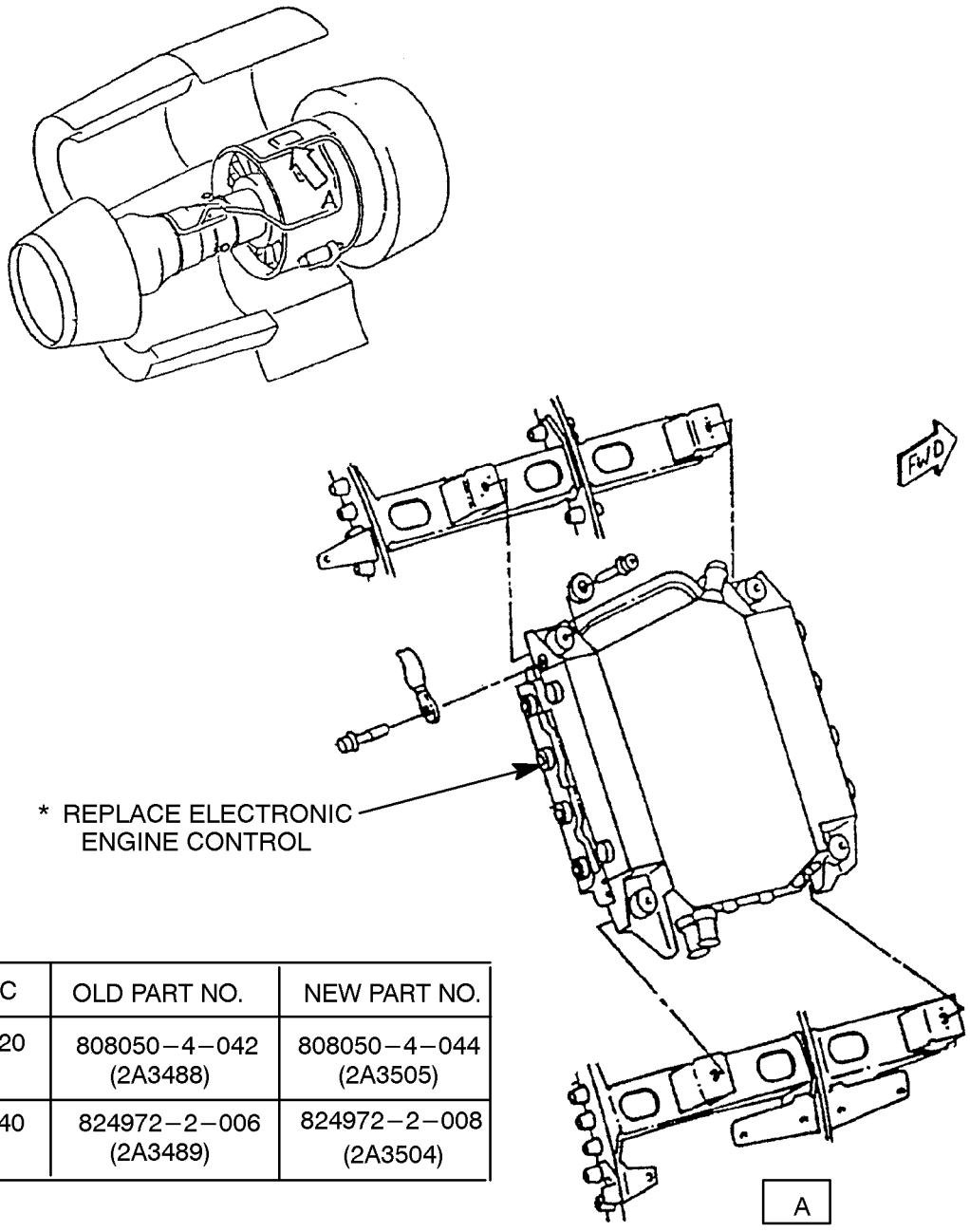
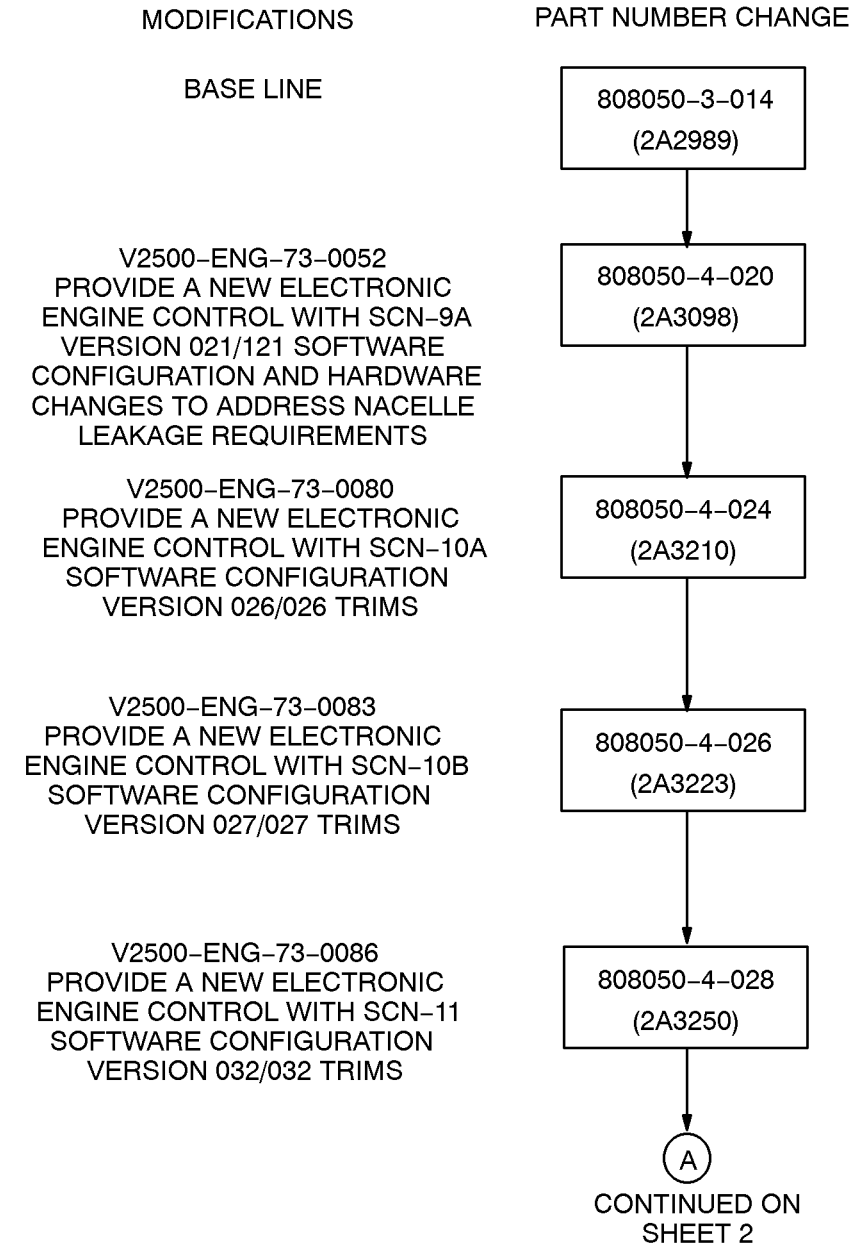
Programming Harness Definition Table 1 and Power Supply Connections Table 2
Figure 2



* EEC	OLD PART NO.	NEW PART NO.
150−20	808050−4−042 (2A3488)	808050−4−044 (2A3505)
150−40	824972−2−006 (2A3489)	824972−2−008 (2A3504)

Location of the Electronic Engine Control (EEC)
Figure 3



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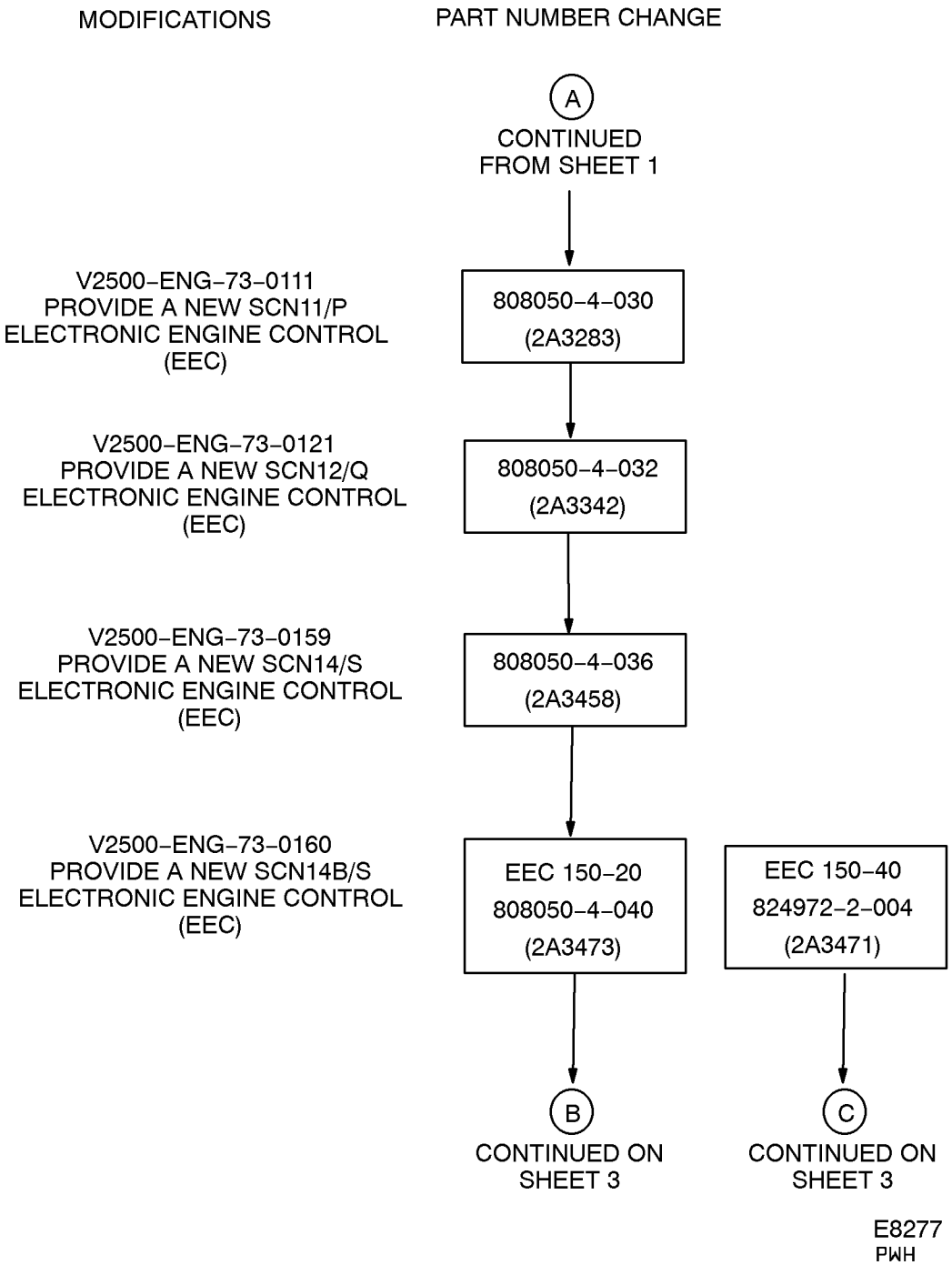
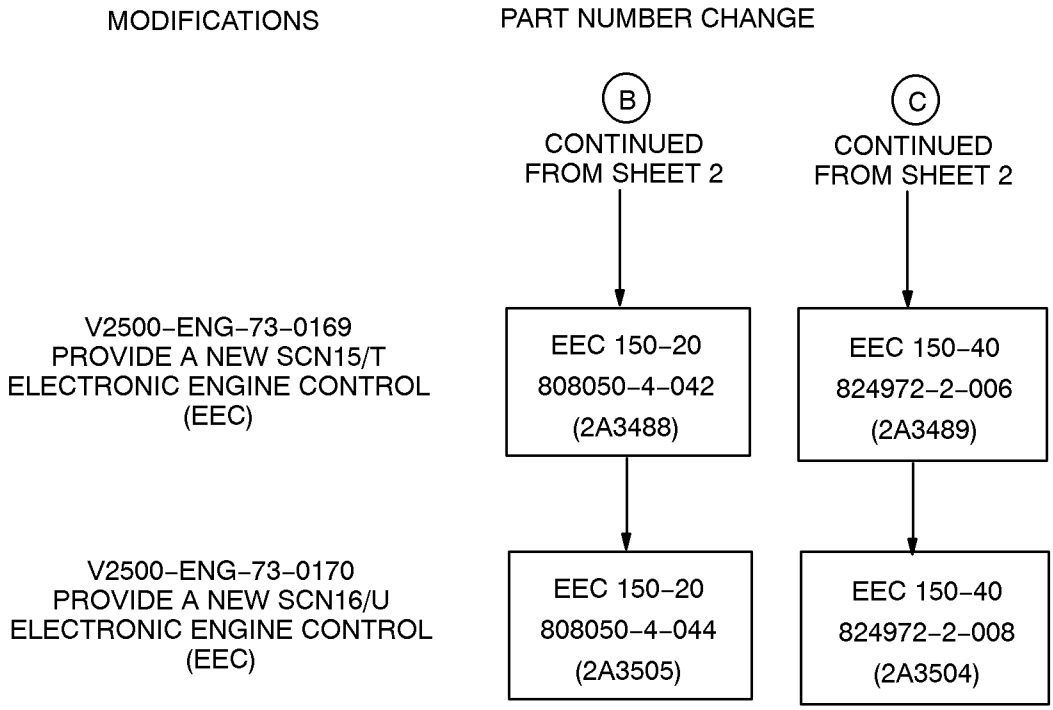
Family Tree - Electronic Engine Control (EEC) Ref. Catalog Sequence No. 73-22-34.
Fig.01 Item 280
Figure 4 (Sheet 1)



Family Tree - Electronic Engine Control (EEC) Ref. Catalog Sequence No. 73-22-34.
Fig.01 Item 280
Figure 4 (Sheet 2)



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