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

International Aero Engines

400 MAIN STREET, MAIL STOP 121-10
EAST HARTFORD, CT 06108, USA.
TELEPHONE:- 860 565 5515

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V2500-A5 SERIES PROPULSION SYSTEMS SERVICE BULLETIN

This document transmits the Revision 3 of Service Bulletin V2500-ENG-73-0189.

Document History

Service Bulletin Revision Status

Initial Issue	May 25/04.
Revision 1	Apr. 5/07.
Revision 2	Mar.22/07.

Service Bulletin Revision 3

Remove	Incorporate	Reason for change
All pages of the Service Bulletin.	Pages 1 to 38 of the Service Bulletin.	To reformat the Accomplishment Instructions and include instructions for the use of new EEC Software Loader, P/N IAE2P16552.
All pages of the Appendix.	Pages 1 to 3 of the Supplement.	No change.

CHECK THAT ALL PREVIOUS TRANSMITTALS HAVE BEEN INCORPORATED
If any have not been received please advise IAE International Aero Engines AG

SERVICE BULLETIN

ENGINE – FUEL AND CONTROL – TO PROVIDE A NEW ELECTRONIC ENGINE CONTROL (EEC) WITH A5 SCN18/W SOFTWARE

1. Planning Information

A. Effectivity Data

(1) (For Airbus A319)

Engine Models Applicable

V2522-A5, V2524-A5, V2527M-A5

Engine Serial Nos. V10001 thru V11742

(2) (For Airbus A320)

Engine Models Applicable

V2527-A5, V2527E-A5

Engine Serial Nos. V10001 thru V11742

(3) (For Airbus A321)

Engine Models Applicable

V2530-A5, V2533-A5

Engine Serial Nos. V10001 thru V11742

B. Concurrent Requirements

Engine Models V2527E-A5 and V2533-A5 (Base and Bump Ratings) must have Service Bulletins V2500-ENG-73-0152 and V2500-NAC-71-0206 incorporated prior to or concurrently with this bulletin.

C. Reason

(1) A319/V2527M Max Continuous Rating Increase.

(a) Problem: The A319/V2527M Maximum Continuous EPR rating does not provide the desired thrust for high altitude operation for an engine out situation.

(b) Evidence: This change is a product improvement.

(c) Objective: Incorporate a higher Max Continuous EPR power-setting for the V2527M rating. The increased Max Continuous thrust levels are limited to 8,000-ft pressure altitude and above (approximately 20% at 20,000-ft/ISA flight conditions). There is no increase below 5,000-ft except for hot day, low Mach number conditions (approximately 5% at ISA+40 deg C, 0.4-mach and below).

For A319/V2527M rating only, the transition from Max Continuous to Max Climb rating is extended from 20,000-ft to 25,000-ft pressure altitude. The new transition is 100% washed out at 27,000-ft pressure altitude.

(2) Enhanced Relight Capability.

(a) Problem: During 1998/99 Airbus experienced a number of unsuccessful starter-assisted autostart relights, at the top left corner of the starter assisted relight envelope, during production aircraft acceptance flights.

(b) Evidence: The unsuccessful relights are linked by a common set of pre-start conditions:

(i) Low aircraft speed during starter-assisted relight attempts in the top left corner of the envelope.

(ii) Engine (N2) speed still decreasing following engine shutdown.

(iii) Autostart initiated above the fuel on threshold of 10% N2C2.

R R (c) Objective: Modify the in-flight starter-assist autostart logic to ensure that there is at least a 5-second delay between commanding the starter air valve open and commanding fuel on for the conditions described above. This delay allows time for the engine to respond to the starter assist and start spooling up.

There are two cases when the delay in fuel command shall be applied:

(i) When the autostart is initiated, if engine speed is less than 10% N2, apply the delay to the fuel command.

(ii) When the autostart is initiated, if the engine is greater than 10% N2 and the aircraft speed is less than a MN threshold based on altitude, apply the delay to the fuel command.

NOTE: The current requirement that corrected engine speed (N2C2) must be greater than 10% before the fuel is commanded on still applies.

(3) Derated Take-Off To MCL Smooth Transition.

(a) Problem: There is a concern with the smooth transition logic from derate take-off to climb rating between 0.3 and 0.4 Mach introduced by SCN-17. There is a potential for commanded EPR to differ between engines by up to 0.004 EPR. The problem is limited to the 22K, 24K, and 30K ratings.

(b) Evidence: Logic was added to allow full 24% derate to drop below Maximum Climb (MCL) and increase power gradually from derate take-off to climb between 0.3 and 0.4 Mach. The Mach number used in the smooth transition logic is determined from engine P2. Under certain conditions and depending on the magnitude of the difference between left engine P2 and right engine P2 this problem could potentially introduce up to 0.004 difference in EPR command between engines during the smooth transition phase. For all other rating requirements, Mach number is determined from the (aircraft) ADC P2 and used for both engines to ensure a consistent EPR command.

(c) Objective: Modify the logic to use (aircraft) ADC P2 to calculate Mach number for the smooth transition logic.

(4) Improved N1 Topping Logic.

(a) Problem: Field experience and development engine testing indicates the N1 topping can be improved.

(b) Evidence: Investigation has shown that under certain conditions the N1 topping logic is not optimized. The N1 topping logic is intended to minimize the transient overshoot peak N1 level.

(c) Objective: Modify the N1 topping logic: (1) to more aggressively control the transient overshoot, and (2) to have the same affect on the control of fuel flow as current software after approximately 7 seconds from the start of take-off.

(5) Disable The P2T2 Probe Correction Logic.

(a) Problem: Field data from V2527E and V2533 operators with the longer P2T2 probe installed indicates that up to 0.4% differences in P2 between aircraft and engine are possible that result in engine overboost and possibly an N1 over limit event.

(b) Evidence: An investigation has identified the P2T2 (short) probe correction logic is the main cause of the engine overboost. The probe correction is applied to the P2 reading for both the long and short P2T2 probe. Based on the data available at the time the probe correction was introduced, it was determined that it would be acceptable to apply the correction to both the long and short probe. Therefore, no provision was included to distinguish between the probes.

(c) Objective: Restore N1 margin during initial take-off operation by removing the probe correction for both the current and bump ratings for the V2527E and V2533 models. This can be done because these models operate with the longer P2T2 probe.

(6) Rating reduction at 0.05 Mach.

(a) Problem: A reduction in Max Take-off EPR rating at 0.05 MN and below is being incorporated to provide an additional 1% N1 redline margin at critical N1 conditions. This change does not impact typical engine operation at lower altitudes, including sea level static conditions.

(b) Evidence: This change is a new requirement to complement change items 3.4 and 3.5.

(c) Objective: Modify the base and bump maximum N1 EPR limit tables at 0.05 Mach only to achieve the additional 1% N1 margin. No change will be made for lower altitudes, and for 0.1 Mach and above.

R Analysis indicates that the impact on take-off distance is negligible therefore there will be no adverse impact on aircraft performance.

(7) Improvement For Troubleshooting The Fuel Re-Circulation Cooling System.

(a) Problem: When troubleshooting heat management system issues, it can be difficult to determine if the aircraft or engine conditions are inhibiting the fuel return to tank valve from opening.

(b) Evidence: There is no indication in the cockpit for the aircraft inhibit of fuel return to tank.

(c) Objective: Provide a new ARINC output, Label 275, Bit 11. The new ARINC bit will be set when the aircraft is inhibiting fuel return to tank (EIU Label 031, Bit 22 is set). This will allow the maintainer to determine if the recirculation inhibition comes from the aircraft or from the engine conditions.

(8) A320 27/27E Enhanced Max Continuous Rating.

(a) Problem: The A320/V2527 and A320/V2527E Maximum Continuous EPR rating does not provide the desired thrust for high altitude operation for an engine out situation.

(b) Evidence: This change is a product improvement.

(c) Objective: Incorporate a higher Max Continuous EPR power-setting for the V2527E and V2527, equivalent to +5% thrust, for altitude range between 12,500ft to 25,000ft and Mach 0.5 and above.

(9) AVAIL (Engine Has Reached Stabilized Idle) Indication.

(a) Problem: A cockpit indication is required to inform the crew when the engine has started, successfully reached an idle condition, and is able to respond properly to commanded thrust. This indication needs to work for both ground and flight conditions. The current logic for this indication does not work correctly under all conditions and therefore
R is not activated in the aircraft.

(b) Evidence: The current indication is set when N2 reaches a level of 150 rpm below the N2 idle schedule. The N2 idle schedule alone is not sufficient to determine engine stabilization when at altitude.

(c) Objective: Modify the logic to determine when the engine has started and stabilized at idle to be based on both N2 and Pb. Set the AVAIL indication in the cockpit when both N2 and Pb are within 1% of their respective idle schedules. The indication will be on ARINC Label 066 bit 27.

NOTE: Contact Airbus for information on activating this feature.

(10) Thrust Bumps

(a) Problem: The thrust bumps incorporated in SCN 17 were not activated in software. This means that they were not selectable with a DEP change.

(b) Evidence: : The final size and shape of the thrust bumps incorporated in SCN 17 were not finalized until this (SCN18/W) software version.

(c) Objective: Modify the logic to incorporate the final definition of the thrust bumps and activate them in software so that they can be selected with a DEP and Aircraft changes.

NOTE: Contact IAE for information regarding DEP change.

Contact Airbus for Aircraft change.

(i) A320/V2527E Bump Rating Description: This bump increases the V2527E maximum take-off rating to the V2533 rating primarily for hot day conditions. When the bump is used, the EGT margin is reduced as compared to the base rating. The bump does not increase flat rated thrust at and below 5,000-ft, but increases thrust for hot day at 2,000-ft and above to the V2533 rating. Above 5,000-ft, the bump increases flat rated thrust up to the current V2527E at 5,000-ft and increases thrust for hot day to the V2533 rating.

(ii) A321/V2533 Bump Rating Description: This bump provides up to 6.5% thrust increase at Las Vegas airport and less thrust increase at higher altitudes, hot day conditions. When the bump is used, the EGT margin is reduced as compared to the base rating. The new HPC R4 blade is required for the 33K bump. This allows the high compressor stator vane schedule to revert back to SCN-11 standard: 3 degrees more open stator vane schedule during take-off operation when N2 speed is greater than 14,000-rpm. This stator vane schedule is required to maintain the current N2 redline margin.

(11) Watchdog Timer Nuisance Fault.

(a) Problem: While in the "Ground Scanning" menu, a nuisance fault can occur that will cause Menu Mode to exit. The fault, ECAM Warning "ENG 1(2) FADEC A(B) FAULT", indicates there is an internal EEC problem. The fault is not real and can not be prevented with a procedure change. The ECAM Warning is driven by EEC ARINC Output Label 155 bit 14. The fault that causes the ARINC bit to be set is WDTPOR (Watchdog timer error caused reset).

(b) Evidence: The spurious WDTPOR fault can potentially occur when the maintainer selects "Ground Scanning". After all of the ground cell faults are displayed the EEC software executes a loop to check and see if any class 3 or scheduled maintenance faults are currently set. Faults that are found set are then displayed on the Ground Scanning screen with either a "C3" or "SM" in place of the fault cell number. For SCN 17 there are 114 of these faults that need to be scanned so this loop takes over 1 msec to execute. This loop does not check to see if the watchdog timer needs to be serviced. If the watchdog timer is not serviced within the appropriate time, the WDTPOR fault will be set.

(c) Objective: Modify the "Ground Scanning" menu logic to avoid this nuisance fault. Change the "Ground Scanning" logic to include servicing of the watchdog timer.

(12) Channel Switchover Hardware Nuisance Fault.

(a) Problem: A nuisance fault may be annunciated during the EEC self-tests run during engine spool-down. This may lead to unnecessary EEC removals, as well as delays and cancellations. The fault, ECAM Warning "ENG 1(2) FADEC A(B) FAULT", indicates there is an internal EEC problem. The fault is spurious and can not be prevented with a procedure change. The ECAM Warning is driven by EEC ARINC Output Label 155 bit 26. The fault that causes the ARINC bit to be set is XSWDOA (Remote channel did not take control when local channel requested a switchover).

(b) Evidence: As part of the normal engine spool-down test the EEC attempts to confirm that the controlling channel is able to give control to the non-controlling channel. If it is unable to do so the EEC will set the fault XSWD0A (remote channel did not take control when local channel attempted a switchover). The intent is that XSWD0A will only be set if the remote/non-controlling channel will not take control because of an internal EEC failure and not because the EEC has detected an external electrical fault in one of the output circuits, for example, detected torque motor or solenoid electrical fault. The EEC channel confirms that the remote channel did not take control due to an external fault by comparing each channel's health before and after the switchover attempt. However, because of a flaw in the logic when comparing the two channel's health, XSWD0A can be set spuriously as a result of an external fault. In order for XSWD0A to be spurious it requires specific multiple fault scenarios, including at least one fault that has different health points above and below idle.

(c) Objective: Modify the EEC self-test logic to avoid this nuisance fault. Modify the logic to correct the way the XSWD0A logic stores and compares channel health points at time of switchover attempt and when determining the cause for the other channel not taking control.

(13) Supplemental Information

Substantiation Data

(a) Airbus Iron Bird testing in December 2003.

(b) Pratt Whitney Closed Loop Bench (CLB) testing September 2003-January 2004.

R

(c) Successful Airbus flight test on EEC150-20 and EEC150-40 in December 2003.

(d) SCN18/W completed soft ware certification process on 23 January 2004.

D. Description

Program the EEC with SCN18/W software or replace the EEC with a new EEC that has SCN18/W software.

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.

NOTE: Service Bulletin incorporation on engines installed on aircraft may be desirable and should be individually evaluated.

Incorporation on aircraft must be accomplished in accordance with Airbus Service Bulletin A320-73-1082. See reference 10.

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.

The compliance statement described in this Service Bulletin have been shown to comply with the applicable Federal Aviation Regulations and are FAA-APPROVED for the Engine Model listed.

R The technical content of this Service Bulletin has been approved under the
R authority of the EASA Design Organization Approval N° EASA.21J.031.

G. Manpower

R For Part A - Replacement or Programming of the EEC by an Authorized Rework
R Vendor (for Engines Installed on Aircraft)

R (1) In Service: 1.9 hours total

R For Part B - Programming of the EEC Using Software Loader, PN IAE2P16552 (for
R Engines Installed on Aircraft)

R (1) Prepare EEC for software load: 0.4 hours

R (2) Set-up Software Loader, PN IAE2P16552: 0.1 hours

R (3) Install EEC software: 0.4 hours

R (4) Shut down PN IAE2P16552 after reprogramming: 0.1 hours

R (5) Total: 1.0 hours

R For Part C - Programming of the EEC Using Software Reprogrammer System, PN
R IAE3R19290 (for Engines Installed on Aircraft)

R (1) Prepare EEC for software load: 0.4 hours

R (2) Set-up Software Loader, PN IAE3R19290: 0.1 hours

R (3) Install EEC software: 1.0 hours

R (4) Total: 1.5 hours

R For Part D - Replacement or Programming of the EEC by an Authorized Rework
R Vendor (for Engines Removed from Aircraft)

R (1) At Overhaul: 1.4 hours total

R For Part E - Programming of the EEC Using Software Loader, PN IAE2P16552 (for
R Engines Removed from Aircraft)

R (1) At Overhaul: 0.6 hours total

R For Part F - Programming of the EEC Using Software Reprogrammer System, PN
R IAE3R19290 (for Engines Removed from Aircraft)

R (1) At Overhaul: 1.2 hours total

H. Weight and Balance

(1) Weight Change

None.

(2) Moment Arm

No Effect.

(3) Datum

R 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-NAC-71-0206 (Nacelle - Power Plant -
R Cowl, Air Intake - Rework To Accommodate Longer P2T2 Probe).

(2) IAE V2500 Service Bulletin V2500-ENG-73-0152 (Engine - Introduction Of Longer P2T2 Probe).

(3) IAE V2500 Service Bulletin V2500-ENG-73-0184 (Engine - Fuel And Control - To Provide A New Electronic Engine Control (EEC) With A5 SCN17/V Software).

(4) IAE V2500 Service Bulletin V2500-ENG-73-0185 (Engine - Fuel And Control - EEC150-40 Pressure Burner Sensor Port Screen Deletion (Controlled Service Use Only)).

(5) IAE V2500 Service Bulletin V2500-ENG-73-0186 (Engine - Fuel And Control - EEC150-1/EEC150-20 Pressure Burner Sensor Port Screen Deletion (Controlled Service Use Only)).

(6) IAE V2500 Service Bulletin V2500-ENG-73-0200 (Engine - Fuel And Control - Replacement of Resistors and Touch-up of Solder Joints For Engines With EEC150-40 Electronic Engine Control (EEC) Installed).

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

(8) Hamilton Sundstrand Service Bulletin EEC-150-20-73-31 (Incorporation of New Software Configuration: A5 SCN18/W).

(9) Hamilton Sundstrand Service Bulletin EEC-150-40-73-12 (Incorporation of New Software Configuration: A5 SCN18/W).

(10) Airbus Service Bulletin A320-73-1082 and Aircraft Modification No. 34221.

R This Service Bulletin is subject to Aircraft Modification Number: 34221
R and is covered by A/C Service Bulletin Number A320-73-1082. Under no
R circumstances shall the modified equipment, resulting from the application
R of this SB, be installed on the aircraft type unless the corresponding
R modification, and if applicable, its aircraft SB are approved.

R (11) V2500 Aircraft Maintenance Manual, Chapter/Section 73-22-34.

(12) V2500 Engine Manual (E-V2500-1IA), Chapter/Section 72-00-32.

(13) V2500 Engine Illustrated Parts Catalogs (S-V2500-2IA, S-V2500-2IB, S-V2500-5IA, S-V2500-5IB, S-V2500-6IA, S-V2500-6IB, S-V2500-7IA, and S-V2500-7IB), Chapter/Section 73-22-34.

R (14) Internal Reference No. - 03VZ001, 07VC015, 07VC350, IEN 10VC025 and IEN
R 10VC057.

(15) ATA Locator - 73-22-00.

L. Interchangeability of Parts

SCN18 is two way functionally interchangeable with SCN17 subject to concurrency requirements and only under specific conditions driven at an aircraft level. Refer to Airbus Service Bulletin A320-73-1082 (Ref 9.) for the definition of those conditions.

NOTE: SCN18 is functionally one way interchangeable with SCN16 or prior version and subject to concurrency requirements (SCN18 can not be reverted to SCN16 or prior software version due to the fan keep out zone logic incorporated at SCN17).

NOTE: For Aircraft Installation observe the following:

Engines with SCN18 software must not be intermixed with engines having SCN16 software or prior version software, on the same aircraft, due to the fan keep out zone logic incorporated at SCN17.

Engines with SCN18 software can only be intermixed with engines having SCN17 software on the same aircraft under specific conditions. Refer to Airbus Service Bulletin A320-73-1082 (REF 9.) for the definition of those conditions.

M. Information in the Appendix

Alternate Accomplishment Instructions (No)

Progression Charts (Yes)

Added Data (Yes)

Revision to Table of Limits (No)

Inspection Procedures (No)

2. Material Information

A. Material - Price and Availability

R (1) * IAE will provide free of charge the software diskettes required for reprogramming the EEC. Contact your local IAE Customer Support Representative who will coordinate the reprogramming effort with each customer.

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

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

B. Industry Support Program

Not Applicable.

C. The material data that follows is for each engine.

NOTE: The prices shown are for estimating purposes only and as such are given in good faith without commercial liability for advanced planning purposes only. Refer to IAE Spares and/or current Price Catalog for current prices.

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

73-22-34

FIG ITEM NO.	NEW PART NO.	QTY	Estimate of Price ($)	PART TITLE	OLD PART NO.	INSTR DISP
01280	808050-4 -060 (2A3909)	1	*	Control, Electronic Engine (150-20 with Pb screen)	808050-4 -056 (2A3840)	(V) (1)(A)(B)
				OR		
01280	808050-5 -060 (2A3910)	1	*	Control, Electronic Engine (150-20 without Pb screen)	808050-5 -056 (2A3898)	(V) (1)(A)(B)
				OR		
01280	824972-2 -014 (2A3911)	1	*	Control, Electronic Engine (150-40 with Pb screen)	824972-2 -010 (2A3839)	(V) (1)(A)(B)
				OR		
01280	824972-3 -014 (2A3912)	1	*	Control, Electronic Engine (150-40 without Pb screen)	824972-3 -010 (2A3894)	(V) (1)(A)(B)

D. Instructions/Disposition Code Statements:

(1) The new part can be obtained through modification by the approved procedure in the Accomplishment Instructions. Obtain the new parts from or return the old parts for modification to one of the approved vendors listed in the Accomplishment Instructions.
(A) The new part will be available approximately March, 2004.
(B) The old part will no longer be supplied.
(V) This is the Hamilton Sundstrand part number.

E. Tooling - Price and Availability

R The following equipment is required to accomplish this Service Bulletin for units that are reprogrammed in the field. Units that are returned to Hamilton Sundstrand Support Systems or Maastricht Aachen Airport to incorporate this Service Bulletin will be charged to the operator.

R (1) IAE Software Loader, PN IAE2P16552

R NOTE: The IAE software loader must be used with the appropriate reprogramming SD card to accomplish this Service Bulletin. This equipment can be obtained by contacting your Customer Fleet Director.

R The reprogramming SD card is referenced in Accomplishment Instructions, Table 2. This reprogramming SD card contains the EEC 150-20/150-40 application code, trims, memory clear utilities, and software loader. The reprogramming SD card can be obtained from your Customer Fleet Director.

R OR

R Hamilton Sundstrand Software Reprogrammer System, PN IAE3R19290 and Hamilton Sundstrand PN AD42600-1, PN AD42600-2, or PN AD42600-3.

R NOTE: The Hamilton Sundstrand software reprogrammer system must be used with the appropriate reprogramming diskette to accomplish this Service Bulletin. This equipment can be obtained by contacting your Customer Fleet Director.

R The reprogramming diskette is referenced in Accomplishment Instructions, Table 2. This reprogramming diskette contains the EEC 150-20/150-40 application code, trims, memory clear utilities, and software loader. The reprogramming diskette can be obtained from your Customer Fleet Director.

R (2) EEC 150-20/150-40 Name Plate PN 751333-1 or modified Name Plate PN R 822815-1.

F. Reidentified Parts

R Reidentified Parts Data

	New PN	Keyword	Old PN
R	808050-4-060 (2A3909)	Control, Electronic Engine (150-20 with Pb screen)	808050-4-056 (2A3840)
R	808050-5-060 (2A3910)	Control, Electronic Engine (150-20 without Pb screen)	808050-5-056 (2A3898)
R	824972-2-014 (2A3911)	Control, Electronic Engine (150-40 with Pb screen)	824972-2-010 (2A3839)
R	824972-3-014 (2A3912)	Control, Electronic Engine (150-40 without Pb screen)	824972-3-010 (2A3894)

G. Other Material Information Data

Not Applicable.

3. Accomplishment Instructions

R A. Part A - Replacement or Programming of the EEC by an Authorized Rework Vendor
R (for Engines Installed on Aircraft)

R NOTE: Service Bulletin incorporation on engines installed on aircraft may be
R desirable and should be individually evaluated.

R (1) Remove the EEC as specified in Reference 11, Aircraft Maintenance Manual,
R Chapter/Section 73-22-34, Task 73-22-34-000-010. See Figure 1 for the
R location of the part.

R (2) Replace the old EEC with a new one as specified in the Material
R Information Section.

R OR

R Send your EEC to one of the authorized rework vendors that follows:

R NOTE: Only fully authorized repair facilities are allowed to perform this
R rework.

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

R (a) Hamilton Sundstrand Corporation

R A United Technologies Company

R One Hamilton Road

R Dock W

R Windsor Locks, Ct. 06096-1010

R USA

R (b) Hamilton Sundstrand Corporation

R A United Technologies Company

R Worldwide Repair - Maastricht

R Maastricht Airport

R Horsterweg

R 6191 RX Beek

R The Netherlands

R (3) Install the EEC as specified in Reference 11, Aircraft Maintenance Manual, Chapter/Section 73-22-34, Task 73-22-34-400-010. See Table 2 for old and new part numbers.

R (4) Recording Instructions

R (a) A record of accomplishment is required.

R B. Part B - Programming of the EEC Using Software Loader, PN IAE2P16652 (for R Engines Installed on Aircraft)

R NOTE: Service Bulletin incorporation on engines installed on aircraft may be desirable and should be individually evaluated.

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

R Reprogramming assistance regarding proper use of Software Loader, PN IAE2P16552 is available from your local IAE representative.

R Reprogramming the EEC will clear the fault memory. Fault dump will be automatically stored in the TDS Ranger device that is included with Software Loader, PN IAE2P16552 and may be retrieved at a later time.

R NOTE: Disassembly of the EEC is not required.

R Data integrity check of the Hamilton Sundstrand supplied software is performed as part of the reprogramming procedure.

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

R No functional, thermal cycle, or vibration testing is required for units reprogrammed in accordance with this Service Bulletin.

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

R (1) Section 1 - Prepare EEC for Software Load

R (a) Open the nacelle and prepare the aircraft for servicing as specified in Reference 11, Aircraft Maintenance Manual, Chapter/Section 73-22-34, Task 73-22-34-000-010. See Figure 1 for the location of the part.

R (b) Remove the EEC harness connector from J1, J3, J7 and J9.

R (c) If desired, remove the EEC as specified in Reference 11, Aircraft Maintenance Manual, Chapter/Section 73-22-34, Task 73-22-34-000-010. See Figure 1 for the location of the part.

R (2) Section 2 - Initial Setup of Software Loader, PN IAE2P16552

R CAUTION: DO NOT ATTACH YELLOW Y CABLE CONNECTORS TO THE TDS RANGER OR PN IAE2P16552 UNTIL INSTRUCTED OR SOFTWARE LOADING WILL NOT BE SUCCESSFUL.

R (a) Make sure the power switch for PN IAE2P16552 is in the OFF position.

R (b) Make sure that no cables are connected to the TDS Ranger.

R (c) Prepare the TDS Ranger for operation as follows:

R Depress the green power button on the TDS Ranger and hold it until the word "Booting" appears at the bottom of the screen. The "V2500 Front End Program" screen will be displayed.

R (d) Connect Red Z and Blue X cables as labeled to PN IAE2P16552 and EEC at J1, J3, J7 and J9 connectors.

R (e) Connect PN IAE2P16552 to an external power source 120VAC/60Hz or 240VAC/50Hz.

R (3) Section 3 - Install EEC Software

R Do the steps that follow:

R NOTE: The center of the "D-Pad" or the "Enter Key" can be used interchangeably throughout the following procedure.

R	Step	Action	Result(s)	Additional Information
R	1	Move the main power switch, labeled "AC POWER INPUT" on PN IAE2P16552, to the ON position.	The orange "AC PWR ON" light will become illuminated.	The orange light means the equipment is powered and ready for use.

R	2	Connect Yellow Y Cable to PN IAE2P16552 and TDS Ranger as labeled.		System set up is complete.
R	3	a) Use the "D-Pad" on the TDS Ranger and highlight "Go to Engine Support Program". b) Depress the "Enter Key".	The "V2500 Engine Support Programs" screen will be displayed.	At this screen there will be three options: 1) V2500 Loader. 2) DEP Tester. 3) Administrative Functions.
R	4	a) Use the "D-Pad" on the TDS Ranger and highlight "V2500 Loader". b) Depress the "Enter Key".	The "V2500 Data Loader" screen will be displayed.	At this screen there will be two options: 1) Load Software. 2) Test equipment and cables.
R	5	a) Use the "D-Pad" on the TDS Ranger and highlight "Load Software". b) Depress the "Enter Key".	The Document Property Rights Notice will be displayed.	NOTE: YOU MUST AGREE TO THE TERMS AND CONDITIONS OR IT IS NOT PERMISSIBLE TO USE THIS DEVICE.
R	6	a) To agree to the terms and conditions, use the "D-Pad" to highlight the check box, and depress the "Enter Key". b) Use the "D-Pad" to highlight continue, and depress the "Enter Key".	The "V2500 Data Loader" screen will be displayed with instructions to: 1) Connect all Cables 2) Ensure main power switch is in the ON position.	Cables should already be connected by this time.

R	7	a) Use the "D-Pad" on the TDS Ranger and highlight "Continue". b) Depress the "Enter Key".	The TDS Ranger will perform an "integrity check". If the check is acceptable, the "V2500 Data Loader Screen" will be displayed with fields to enter Service Bulletin, EEC Serial Number, and Trim Checksum Number.	If cables are not connected properly, a screen will appear which will instruct you to "check cable connections". Check cable connections and select "Retry". If problems persist, disconnect all cables and return to the beginning of this section. NOTE: DURING INTEGRITY CHECK, RED "28 VDC EEC PWR" LIGHT WILL BECOME ILLUMINATED PROVIDING 28VDC TO THE EEC. WHILE RED LIGHT IS ILLUMINATED, DO NOT CONNECT OR DISCONNECT CABLES AT THE EEC.

R	8	a) Use the "D-Pad", "Tab Key" and "Key Pad" on TDS Ranger to select a Service Bulletin for the desired software standard, enter last 4 digits of EEC Serial Number and the Trim Checksum Value. b) Use the "D-Pad" on the TDS Ranger to highlight "Continue". c) Depress the "Enter Key". NOTE: THE TRIM CHECKSUM VALUE IS LOCATED IN TABLE 2 FOR THE SOFTWARE YOU ARE INSTALLING.	The "V2500 Data Loader Screen" will be displayed with a blue progress bar, indicating that the software load is in progress. On EEC -40 units, software loading should take approximately 5 - 7 minutes. For EEC -20 units, software loading may take more than 20 minutes.	If the "Incorrect checksum value" appears in red after selecting "Continue", re-enter the correct trim checksum number. NOTE: DURING SOFTWARE LOAD, RED "28 VDC EEC PWR" LIGHT WILL BECOME ILLUMINATED PROVIDING 28VDC TO THE EEC. WHILE RED LIGHT IS ILLUMINATED, DO NOT DISCONNECT CABLES FROM THE EEC. NOTE: IF SERVICE BULLETIN FOR DESIRED SOFTWARE STANDARD IS NOT AVAILABLE IN THE DROP DOWN MENU, GO TO SECTION 8 TO LOAD SOFTWARE INTO THE TDS RANGER. CAUTION: DEPRESSING ANY KEY DURING SOFTWARE LOAD WILL CAUSE THE SYSTEM TO ABORT. IF THIS OCCURS, TURN OFF POWER, DISCONNECT ALL CABLES AND RETURN TO THE BEGINNING OF THIS SECTION.

R	9	a) Wait for the software load to finish before pressing any buttons. b) After software load is successful, make note of new PN for EEC. This must be scribed on the EEC. Use a ballpoint pen or equivalent to put the last three digits of the new Hamilton Sundstrand hardware part number from Table 2 in the software "S/W NO." column of the identification plate, and the date in the "DATE" column of the software identification plate. See Table 2 for old and new part numbers.	When loading is complete, "Loading successful" will be displayed with the new part number for the EEC.	If "software load failed" is displayed, verify cable connections and retry.
R	10	a) Use the "D-Pad" to highlight "Finish". b) Depress the "Enter Key".	The "V2500 Engine Support Programs" screen will be displayed.	Loading has been successful.

R (4) Section 4 - Shut down PN IAE2P16552 After Installation of EEC Software

R (a) Make sure the power switch for PN IAE2P16552 is in the OFF position and disconnect power cable.

R (b) Disconnect Red Z Cable, Blue X Cable and Yellow Y Cable from PN IAE2P16552, EEC and TDS Ranger.

R (c) To shut down the TDS Ranger, depress the green power button on the TDS Ranger and hold it until the countdown begins, then let it go. It should take approximately 3 seconds for the countdown to begin. If you hold the power button too long, the TDS Ranger will reset itself.

R (d) At the "Power Menu", use the "D-Pad" on the TDS Ranger to highlight "Shutdown".

R (e) Depress the "Enter Key" to shutdown the TDS Ranger.

R (f) If necessary, install the EEC as specified in Reference 11, Aircraft
R Maintenance Manual, Chapter/Section 73-22-34, Task 73-22-34-400-010.

R Reconnect harness connectors to EEC J1, J3, J7 and J9 connectors.

R (g) Close the nacelle and return the aircraft to service as specified in
R Reference 11, Aircraft Maintenance Manual, Chapter/Section 73-22-34,
R Task 73-22-34-400-010.

R (h) Recording Instructions

R (i) A record of accomplishment is required.

R (5) Section 5 - Initial Setup for Equipment and Cable Self Test

R NOTE: The procedures in Sections 5 thru 7, for equipment and cable
R self test, are optional.

R CAUTION: ALL CABLES ARE CONNECTED TO PN IAE2P16552 FOR THIS TEST. IF
R CABLES ARE CONNECTED TO EEC, TEST WILL FAIL.

R CAUTION: DO NOT ATTACH YELLOW Y CABLE CONNECTORS TO THE TDS RANGER OR PN
R IAE2P16552 UNTIL INSTRUCTED OR CABLE TEST WILL NOT BE
R SUCCESSFUL.

R (a) Make sure the power switch for PN IAE2P16552 is in the OFF position.

R (b) Make sure that no cables are connected to the TDS Ranger.

R (c) Prepare the TDS Ranger for operation as follows:

R Depress the green power button on the TDS Ranger and hold it until the
R word "Booting" appears at the bottom of the screen. The "V2500 Front
R End Program" screen will be displayed.

R (d) Connect Red Z cable as labeled to PN IAE2P16552 at connectors Z, J9W
R and J3W.

R (e) Connect Blue X cable as labeled to PN IAE2P16552 at connectors X, J7W
R and J1W.

R (f) Connect PN IAE2P16552 to an external power source 120VAC/60Hz or
R 240VAC/50Hz.

R (6) Section 6 - Test Cables and Equipment

R Do the steps that follow:

R NOTE: The center of the "D-Pad" or the "Enter Key" can be used
R interchangeably throughout the following procedure.

	Step	Action	Result(s)	Additional Information
R	1	Move the main power switch, labeled "AC POWER INPUT" on PN IAE2P16552, to the ON position.	The orange "AC PWR ON" light will become illuminated.	The orange light means the equipment is powered and ready for use.
R	2	Connect Yellow Y Cable to PN IAE2P16552 and TDS Ranger as labeled.		System set up is complete.
R	3	a) Use the "D-Pad" on the TDS Ranger and highlight "Go to Engine Support Program". b) Depress the "Enter Key"	The "V2500 Engine Support Programs" screen will be displayed.	At this screen there will be three options: 1) V2500 Loader. 2) DEP Tester. 3) Administrative Functions.
R	4	a) Use the "D-Pad" on the TDS Ranger and highlight "V2500 Loader". b) Depress the "Enter Key".	The "V2500 Data Loader" screen will be displayed.	At this screen there will be two options: 1) Load Software. 2) Test equipment and cables.
R	5	a) Use the "D-Pad" on the TDS Ranger and select "Test Equipment and Cables". b) Depress the "Enter Key".	The "Data Loader Cable Test Screen" will be displayed with instructions to connect cables.	Cables should already be connected by this time. If not, connect them now.
R	6	a) Use the "D-Pad" on the TDS Ranger and select "Continue". b) Depress the "Enter Key".	The "Data Loader Cable Test Screen" will be displayed with instructions to press start and shake cables during 30 seconds test.	
R	7	a) Use the "D-Pad" on the TDS Ranger and select "Start". b) Depress the "Enter Key".	A blue progress bar will begin to move from left to right across the screen. Test takes 30 seconds.	Shake cables during 30 seconds test to ensure there are no intermittent faults with the cables and equipment.

R	8	Wait for Equipment and Cable Test to finish.	The words "Data Loader Cable Test Passed" will be displayed.	If the words "Test Failed" appear, ensure cables are properly connected and retry.
R	9	a) Use the "D-Pad" on the TDS Ranger and select "Finish". b) Depress the "Enter Key".	The "V2500 Engine Support Programs" screen will be displayed.	Equipment and cable Test was successful. If desired, the test can be repeated by selecting "Repeat Test".

R (7) Section 7 - Shut Down PN IAE2P16552 After Equipment and Cable Test

R (a) Make sure the power switch for PN IAE2P16552 is in the OFF position
R and disconnect power cable.

R (b) Disconnect Red Z Cable, Blue X Cable and Yellow Y Cable from PN
R IAE2P16552 and TDS Ranger.

R (c) To shutdown the TDS Ranger, depress the green power button on the TDS
R Ranger and hold it until the countdown begins, then let it go. It
R should take approximately 3 seconds for the countdown to begin. If you
R hold the power button too long, the TDS Ranger will reset itself.

R (d) At the "Power Menu", use the "D-Pad" on the TDS Ranger to highlight
R "Shutdown".

R (e) Depress the "Enter Key" to shutdown the TDS Ranger.

R (8) Section 8 - Load Software into TDS Ranger

R NOTE: This section is not required, unless the Service Bulletin for the
R desired software standard does not appear in the drop down menu
R during EEC software load.

R (a) Make sure that no cables are connected to the TDS Ranger.

R (b) Prepare the TDS Ranger for operations as follows:

R Depress the green power button on the TDS ranger and hold it until the
R word "Booting" appears at the bottom of the screen. The "V2500 Front
R End Program" screen will be displayed.

R (c) At the "V2500 Front End Program" screen, use the "D-Pad" to highlight
R "Install Update to Ranger". Depress the "Enter Key". A pop up screen
R will appear with the words, "Please open the top of this device,
R insert the Program Update SD card and hit OK".

R (d) Loosen the screw at the top of TDS Ranger.

R (e) Remove the black lid from the TDS Ranger.

R (f) If the SD slot already has an SD card installed, remove the SD card.

R (g) Insert the Reprogramming SD Card, PN 1018294-1 or PWA 107829 into slot
R labeled "SD".

R (h) Use the "D-Pad" to highlight "OK". Depress the "Enter Key".

R (i) When the words "Press any key to continue" appear at the bottom of the
R log file, press any key to continue.

R The TDS Ranger has been successfully updated with the appropriate
R software standard.

R (j) Place the black lid on top of the TDS Ranger and tighten the screw.

R (k) Use a ballpoint pen or equivalent to mark the date and the part number
R of the reprogramming SD card from Table 2 on the software
R identification plate on PN IAE2P16552. See Table 2 for old and new
R part numbers.

R (l) To shutdown the TDS Ranger, depress the green power button on the TDS
R Ranger and hold it until a countdown begins, then let go. It should
R take approximately 3 seconds for the countdown to begin. If you hold
R the power button too long, the TDS Ranger will reset itself. At the
R "Power Menu", use the "D-Pad" on the TDS Ranger to highlight
R "Shutdown". Depress the "Enter Key" to shutdown.

R C. Part C - Programming of the EEC Using Software Reprogrammer System, PN
R IAE3R19290 (for Engines Installed on Aircraft)

R NOTE: Service Bulletin incorporation on engines installed on aircraft may be
R desirable and should be individually evaluated.

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

R Reprogramming assistance regarding proper use of Software Reprogrammer
R System, PN IAE3R19290 is available from your local IAE representative.

R Do not turn on aircraft/external supply 28VDC power until instructed to
R do so.

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

R NOTE: Hamilton Sundstrand Electronic Engine Control Model EEC150-20 or 150-40
R software is loaded into the EEC using the Hamilton Sundstrand supplied
R reprogrammer and software.

R Disassembly of the EEC is not required.

R Data integrity check of the Hamilton Sundstrand supplied software is
R performed as part of the reprogramming procedure.

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

R No functional, thermal cycle, or vibration testing is required for units
R reprogrammed in accordance with this Service Bulletin.

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

R (1) Section 1

R (a) Open the nacelle and prepare the aircraft for servicing as specified
R in Reference 11, Aircraft Maintenance Manual, Chapter/Section
R 73-22-34, Task 73-22-34-000-010.

R (b) Verify that the model number on the identification plate of the unit
R is "EEC 150-20" or "EEC 150-40". See Figure 1 for the location of the
R part.

R (c) If desired, remove the EEC as specified in Reference 11 Aircraft
R Maintenance Manual, Chapter/Section 73-22-34, Task 73-22-34-000-010.
R See Figure 1 for the location of the part.

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

R (e) Connect power to all necessary equipment.

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

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

R (h) If the computer and power supply connections to the cables are
R permanent, then go to the subsequent section titled: "Section 2"

R (i) Connect the programming harness connector marked CH A UART to the IBM
R compatible computer UART board connectors for the channel A RS-422
R Port (COM3). Make sure that the connectors are properly mated.

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

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

R (j) Connect the programming harness connector marked CH B UART to the IBM
R compatible computer UART board connectors for the channel B RS-422
R Port (COM4). Make sure that the connectors are properly mated.

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

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

R (2) Section 2

R (a) If the EEC is powered by aircraft 28VDC power supply, then go to the
R subsequent section titled: "Section 3"

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

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

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

R (3) Section 3

R (a) Set the BOOT/BITE switches to the ON (closed) position.

R NOTE: These switches are located in the junction box on the EEC
R Programming Harness that is attached to the computer.

R (b) Turn on the power to the reprogramming computer.

R (c) Turn on the 28VDC power supply to the EEC.

R NOTE: Make sure that the disk drive "A" has no disks present prior to
R power on of the computer.

R (d) Wait for the MSDOS prompt "C:\>" to appear on the reprogramming
R computer.

R (e) Obtain the Hamilton Sundstrand reprogramming diskette which is
R identified in Table 2 of these Accomplishment Instructions.

R CAUTION: ENSURE THAT ORIGINAL DISKETTE IS PROVIDED IN A CLOSED
R ELECTROSTATIC DISPATCH BAG, IS UNDAMAGED, AND HAS THE CORRECT
R PART NUMBER.

R HANDLE DISKETTE WITH CAUTION. DO NOT EXPOSE TO STRONG MAGNETIC
R FIELDS, EXTREME TEMPERATURE, DUST OR WATER, ETC.

R (i) Make sure that the write protection tab of the diskette covers
R the "hole".

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

R NOTE: The diskette may be used multiple times for multiple
R engines. A log file is generated each time containing
R the engine and EEC serial numbers.

R (ii) Insert the diskette into the floppy drive of the reprogramming
R computer.

R (f) The display will show the "C:\>" prompt.

R Type "a:", then press the RETURN key.

R NOTE: Some computers have the RETURN key designated ENTER.

R (g) The display will show "A:\>" prompt.

R Type "LDR15O", then press the RETURN key. This starts the UART
R programming utility.

R NOTE: Several messages will appear including the program
R identification, version number, time and the UTC/PW document
R property rights notice.

R If there is a configuration error on the diskette, the program
R will display the appropriate error message and abort the
R programming process. Refer to Table 1 for a summary of error
R code description and troubleshooting suggestions.

R (4) Section 4

R (a) The UART programming utility LDR15O will display the following
R message:

R "Enter operators name performing download: [ ] >"

R NOTE: The field between the brackets will always be empty the first
R time the program is executed on the diskette.

R Subsequent execution of the program will display the last name
R entered.

R (i) If the operator is the same, press the RETURN key to continue.

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

R (b) The LDR15O program will display the following message:

R "WARNING-EEC Fault Memory Will Be Cleared By This Program"

R "If an EEC Fault Dump Is Requested prior to Programming, enter "Q" to
R Quit or "C" to Continue [Q/C] :>"

R (i) If a fault dump has already been accomplished or is not
R required:

R Type "C", then press the RETURN key.

R (ii) If a fault dump is required or the operator wishes to terminate
R the programming procedure:

R Type "Q", then press the RETURN key.

R (iii) If the operator selects the quit option, turn off the 28VDC
R power to the EEC and go to the section titled: "Section 6"

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

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

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

R NOTE: For the next two steps, if the EEC 150-20 or EEC 150-40 part
R number on the nameplate between the dashes is a single digit,
R enter a zero immediately preceding this digit.

R Example: PN 808050-4-030 would be entered as 808050-04-030.

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

R "Enter the 13 character Current EEC HW Part No.: [XXXXXX-XX-XXX]>"

R From the Hamilton Sundstrand nameplate, enter the 13 character EEC
R hardware part number and press the RETURN key.

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

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

R From Table 2 enter the 13 character EEC hardware part number and press
R the RETURN key.

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

R "Enter Trim Checksum Value for "XXXXXX.TRM" :"

R The XXXXXX.TRM designation is the name of the trim file being loaded
R to the EEC. From Table 2, enter the trim checksum value and press the
R RETURN key.

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

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

R (i) To proceed with programming process:

R Type "N" , then press the RETURN key. Go to the subsequent
R section titled: "Section 5", then continue.

R (ii) To correct any errors in the data entered:

R Type "Y", then press the RETURN key. Then go back to the
R beginning of Section 4.

R (iii) To quit the programming process:

R Type "Q", then press the RETURN key. Turn off the 28VDC power
R to the EEC then go to the section titled: "Section 6"

R (5) Section 5

R (a) At this point the screen will display the progress of the programming
R process.

R (i) Status messages will scroll across the screen.

R NOTE: For a successful reprogramming operation, this step will
R take the following approximate times:

R EEC 150-20: 30 minutes.

R EEC 150-40: 10 minutes.

R (ii) If an error occurs, see Table 1 for a summary of error code
R description and troubleshooting suggestions.

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

R "Turn OFF the BITE and BOOT switches to the EEC"

R "then"

R "Turn OFF POWER to the EEC and wait at least 5 seconds"

R "then"

R "Turn ON POWER to the EEC"

R "... Press the RETURN Key When Ready to Continue"

R Set the BOOT/BITE switches to the OFF (open) position.

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

R (d) Press the RETURN key.

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

R "Turn ON the BITE and BOOT switches to the EEC"

R "then"

R "Turn OFF POWER to the EEC and wait at least 5 seconds"

R "then"

R "Turn ON POWER to the EEC"

R "... Press the RETURN Key When Ready to Continue"

R Set the BOOT/BITE switches to the ON (closed) position.

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

R (g) Press the RETURN key.

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

R "Turn OFF POWER to the EEC"

R "... Press the RETURN Key When Ready to Continue"

R Switch off the 28VDC supply to the EEC.

R (i) Press the RETURN key.

R (j) The LDR150 program will now display the status of the programming
R process.

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

R "****EEC PROGRAMMING SUCCESSFULLY COMPLETED****"

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

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

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

R "****DOWNLOAD PROCESS ABORTED - ERROR CODE "X" "

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

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

R The "X" refers to the type of error that caused the process to
R abort. Table 1 describes the error codes and action to be
R taken.

R (6) Section 6

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

R (b) A Paper copy of the log file can be made from the reprogramming
R computer if a printer is available. You can do this as follows:

R NOTE: You can remove the diskette and move to a computer with a
R printer if no printer is connected to the original system.
R Complete the following commands to make a paper copy.

R (i) At the MSDOS prompt:

R Type "VLXXXX.LOG".

R (ii) Press the RETURN key.

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

R (iv) Remove the diskette, write protect the diskette.

R (c) Disconnect the EEC reprogramming electrical connectors from J1 and J7
R and J3/J9, if applicable.

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

R (e) Identify the EEC by the procedure as follows:

R (i) If not already installed, install the software identification
R plate below the existing nameplate by the procedure specified
R in Reference 7, Hamilton Sundstrand SB EEC 150-20-73-16.

R (ii) Use a ballpoint pen or equivalent to put the last three digits
R of the new Hamilton Sundstrand hardware part number from Table
R 2 in the software "S/W NO." column of the identification plate,
R and the date in the "DATE" column of the software
R identification plate. See Table 2 for old and new part numbers.

R (iii) Erase (scratch out) the existing Hamilton Sundstrand hardware
R part number and date, if previously marked on the software
R identification plate.

R (iv) Erase (scratch out) the last three digits of the Hamilton
R Sundstrand hardware part number from the nameplate above the
R software identification plate.

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

R (g) If necessary, install the EEC as specified in Reference 11, Aircraft
R Maintenance Manual, Chapter/Section 73-22-34, Task 73-22-34-400-010.

R (h) Close the nacelle and return the aircraft to service as specified in
R Reference 11, Aircraft Maintenance Manual, Chapter/Section 73-22-34,
R Task 73-22-34-400-010.

R (7) Recording Instructions

R (a) A record of accomplishment is required.

R D. Part D - Replacement or Programming of the EEC by an Authorized Rework Vendor
R (for Engines Removed from Aircraft)

R (1) Remove the EEC as specified in Reference 12, Engine Manual,
R Chapter/Section 72-00-32, Removal 08, Task 72-00-32-050-001. See Figure 1
R for the location of the part.

R (2) Replace the old EEC with a new one as specified in the Material
R Information Section.

R OR

R Send your EEC to one of the authorized rework vendors that follows. See
R Figure 1 for the location of the part. See Table 2 for old and new part
R numbers.

R NOTE: Only fully authorized repair facilities are allowed to perform this
R rework.

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

R (a) Hamilton Sundstrand Corporation

R A United Technologies Company

R One Hamilton Road

R Dock W

R Windsor Locks, Ct. 06096-1010

R U.S.A.

R (b) Hamilton Sundstrand Corporation

R A United Technologies Company

R Worldwide Repair - Maastricht

R Maastricht Airport

R Horsterweg

R 6191 RX Beek

R The Netherlands

R (3) Install the EEC as specified in Reference 12, Engine Manual,
R Chapter/Section 72-00-32, Installation 08, Task 72-00-32-450-001.

R (4) Recording Instructions

R (a) A record of accomplishment is required.

R E. Part E - Programming of the EEC Using Software Loader, PN IAE2P16552 (for
R Engines Removed from Aircraft)

R See Part B of this Service Bulletin for Accomplishment Instructions, except
R disregard the steps to open and close the nacelle.

R F. Part F - Programming of the EEC Using Software Reprogrammer System, PN
R IAE3R19290 (for Engines Removed from Aircraft)

R See Part C of this Service Bulletin for Accomplishment Instructions.

R Table 1 Error Code Definitions

R ERROR CODE	ERROR TYPE	ACTION
R 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: return the unit OR successfully reprogram the unit to the prior A5 Software Standard, as defined by the corresponding Software Service Bulletin in the Family Tree.
R E2	COMMUNICATION ERROR - Communication problem between EEC and IBM compatible computer.	Check BITE, cables, power supply, UART board, and EEC. Retry 3 times.

R	E3	CONFIGURATION ERROR - Configuration data comparison failed. (Possible Hardware P/N mismatch, EEC compatibility mismatch, Trim Checksum mismatch).	Operator data entered incorrectly or incorrect data on existing nameplate. Check data - retry with the correct information.
R	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.

R Table 2 Reprogramming Input Reference Table
R A5 SCN18/W

	New P/N	Old P/N
R Reprogramming SD Card for IAE2P16552 R 150-20/150-40	1018294-1 or PWA 107829	n/a
R Reprogramming Diskette R 150-20/150-40	819191-38 R OR	n/a
R Reprogramming Diskette (Revised) R 150-20/150-40	819191-41	n/a

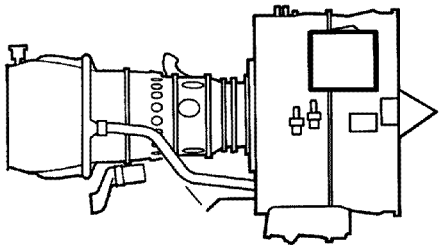
R NOTE: Revised disk can be used with old and new Hamilton Sundstrand laptop loaders. Existing disk can only be used with old loaders. All new loaders have a "-3" at the end of the part number. Old loaders have a "-1" or "-2" at the end of the part number. Please contact IAE Technical Service if there is any question concerning loader version.

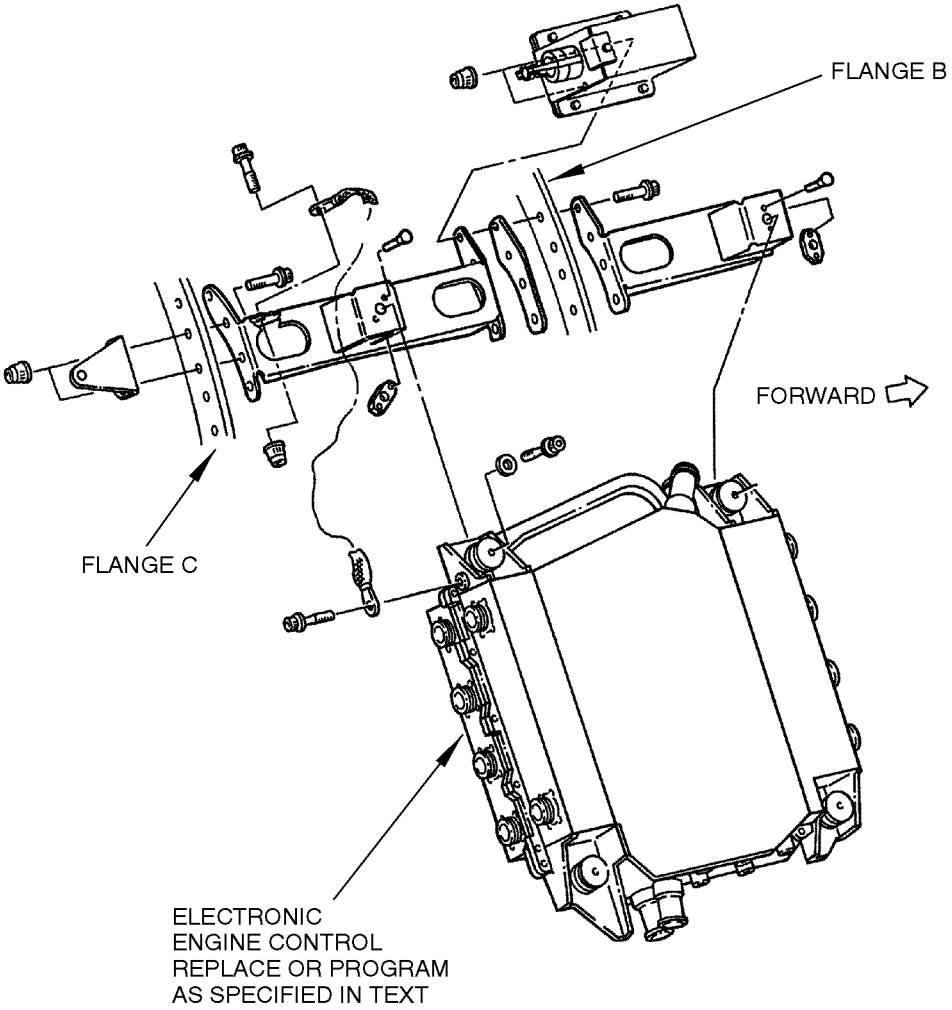
R Reprogramming Diskette R 150-20/150-40	819191-45	n/a

R NOTE: This disk contains the addition of post SB 73-0200 part numbers for EEC 150-40's with solder joint corrected circuit boards and SCN 18 installed. Please refer to SB 73-0200 for a complete description of the issue along with part number interchangeability and the family tree.

R EEC: (with Pb screen) R (HS) HW Part No.		
R 150-20	808050-4-060	808050-4-056
R 150-40	824972-2-014	824972-2-010

		New P/N	Old P/N
R	A5 SCN18/W		
R	EEC: (without Pb screen) (HS) HW Part No.		
R	150-20	808050-5-060	808050-5-056
R	150-40	824972-3-014	824972-3-010
R	EEC: (with Pb screen) IAE P/N		
R	150-20	2A3909	2A3840
R	150-40	2A3911	2A3839
R	EEC: (without Pb screen) IAE P/N		
R	150-20	2A3910	2A3898
R	150-40	2A3912	2A3894
R	Trim Checksum	40409	n/a





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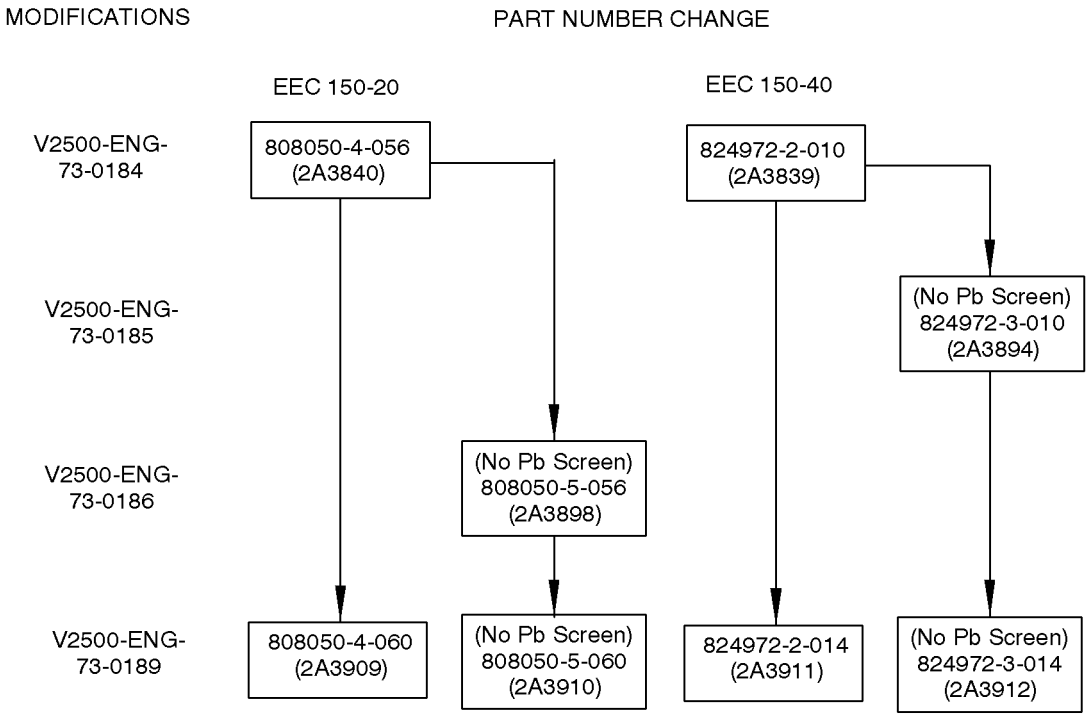
R LOCATION OF THE ELECTRONIC ENGINE CONTROL (EEC)
R 73-22-34
R Figure 1

APPENDIX

Parts Progression To Show the Changed Part in Relation to Other Parts



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FAMILY TREE - ELECTRONIC ENGINE CONTROL (EEC) REF. CATALOG SEQUENCE NO. 73-22-34.
FIG. 01 ITEM 280
Chart A

R Added Data

R Number values shown in parentheses adjacent to U.S. values are International System
R of units (SI) equivalents.

R Internal Reference Information

R Revision No.	Reference Document	Origination
R Original	ECO3VZOO1	DL/MN
R 1	ECO3VZOO1, IENO7VCO15	DL/MN
R 2	ECO3VZOO1, IENO7VCO15, IENO7VC35O	DL/MN
R 3	IEN1OVCO25, IEN1OVCO57	AR/JDH