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

Printed in Great Britain

V2500–A5 SERIES PROPULSION SYSTEM SERVICE BULLETIN

This document transmits the Initial Issue of Service Bulletin V2500-ENG-73-0203

Service Bulletin Initial Issue

Remove	Incorporate	Reason for change
	Pages 1 to 30 of the Service Bulletin	Initial Issue.
	Pages 1 to 6 of the Supplement (Parts Progression Charts)	Initial Issue.
	Page 1 of the Supplement (Prices and Availability)	Initial Issue.
	Page 1 of the Supplement (Added Data)	Initial Issue.

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Transmittal – Page 1 of 1

International Aero Engines™

SERVICE BULLETIN

ENGINE – FUEL AND CONTROL – PROVIDE A NEW ELECTRONIC ENGINE CONTROL (EEC) WITH A5 SCN20/Y SOFTWARE

1. Planning Information

   A. Effectivity

      (1) Airbus A319

         (a) All V2522-A5, V2524-A5, V2527M-A5 Engines.

      (2) Airbus A320

         (a) All V2527-A5, V2527E-A5 Engines.

      (3) Airbus A321

         (a) All V2530-A5, V2533-A5 Engines.

      NOTE: SCN20/Y is intended for use on SelectOne engines that are delivered prior to the release of the SCN20A software standard. Therefore, SCN20/Y effectivity is limited to operators who are taking delivery of SelectOne engines. Operators receiving SelectOne engines may install SCN20/Y into their spare EECs for logistical fleet support. Refer to the Reason section of this Service Bulletin for additional information.

   B. Concurrent Requirements

      None.

   C. Reason

      The V2500 SelectOne upgrade program has been launched by IAE for improved reliability, reduced fuel burn and increased time on wing for the V2500-A5 engine. The V2500 SelectOne consists of packages of modifications on the HPC, HPT, LPT module, EEC software and release of additional DEP variants.

      While the SCN20/Y software contains improvements that apply to the current engine configuration, this Service Bulletin only applies to customers receiving SelectOne engines. A subsequent software change (SCN20A) is planned for fleetwide incorporation in Q4 2008 and will contain all of the SCN20/Y changes and enhancements.

      (1) New SelectOne High Pressure Compressor Accommodation

         (a) Condition: For the SelectOne, optimization of High Pressure Compressor (HPC) efficiency, flow capacity, and stability margin is required. The HPC performance is improved relative to the current Bill of Material (BOM) engine and this could lead to N2 speed margin reduction for Engine Production.

(b) Background: The new HPC has a different speed/flow relationship and improved stability margin relative to current BOM engine.

(c) Objective: Introduce a dedicated variable stator vane (VSV) schedule for SelectOne. This schedule will open the vanes at corrected N2 speeds greater than 11200 rpm to increase HPC flow capacity. This schedule will open the vanes more than the current BOM engine schedule opens the vanes. The vanes are opened more at both sea-level and altitude.

(2) Eliminate EPR Fluctuations Caused by Engine 7C Bleed Fluctuation

(a) Condition: In-service reports have been received where EPR fluctuations have been observed at thrust reduction after takeoff. This is neither a safety issue nor a risk for surge.

(b) Background: The Engine 7C bleed is opened transiently during a pullback to climb power. For these in-service issues, the bleed was cycling (open/closed) and this caused EPR to fluctuate.

(c) Objective: Avoid EPR fluctuations by eliminating Engine 7C bleed cycling by increasing the hysteresis on the transient trip speeds. This change will be applied to both the current and SelectOne configurations.

(3) Improve Transient Detection Logic

(a) Condition: The current transient detection logic does not detect slow decelerations. This limitation prohibits improvements to the stability bleed scheduling. This issue has made it difficult to address current field concerns.

(b) Background: The logic needs to be enhanced to take advantage of the current standards for transient detection.

(c) Objective: Enhance the robustness of transient detection logic by the introduction of a new architecture. This change will be applied to both the current and SelectOne configurations.

(d) The new architecture will recognize accelerations and decelerations in two phases:

    (i)   Anticipation: Change of external parameters (EPR Command, N1 Command, N2 or Pb Idle Command).

    (ii)   Detection: Change of engine parameters (N2DOT).

(e) A heat soakage model will also be introduced to detect slow
decelerations.

The benefits of this new architecture are:

(i)   A simple logic structure has been implemented that protects
against transient detection being triggered by changes of N2
due to bleed valve opening or closing.

(ii)   The heat soakage model detects slow decelerations and opens
transient bleed valves; this makes it possible to lower the
steady state bleed valve trip speed at cruise conditions.

(iii) Transient detection during cruise has been enhanced and made
more robust.

(4) Improve Altitude Deceleration Stability

(a) Condition: Investigation of in-service engine surge events has
revealed that an engine stall can occur when the engine is commanded
to decelerate rapidly at high altitude.

(b) Background: The compressor stability margin for current Bill of
Material (BOM) engines for snap decelerations at altitude with zero
handling bleed extraction is low. The combination of events can cause
an unstable situation in the compressor and stall is possible

(c) Objective: Increase compressor stability margin by raising the Engine
7C handling bleed deceleration trip speed at altitudes higher than
20000 feet for current BOM engine. There will be no impact inside the
take-off envelope. This change does not affect the Engine 7A steady
state bleed and VSV schedules. This change will be applied only to the
current engine configurations.

(5) Improve Fuel Consumption at Cruise

(a) Condition: In-service experience has shown that the Engine 7A handling
bleed can be open for an extended period of time during high altitude,
low speed cruise. This has a negative impact on fuel consumption.

(b) Background: During low speed cruise, the engine sometimes operates in
the speed range of the Engine 7A bleed steady-state (N2C26) schedule.
This increases the chance that the bleed will be commanded open.

(c) Objective: Reduce the Engine 7A bleed steady state (N2C26) trip speed
for high altitudes by removing the altitude bias. This means there is
no change in the Engine 7A handling bleed schedule for altitudes lower
than 35000 feet and a maximum change of −445 rpm N2C26 at 42000 feet
and above. This change will be applied to both the current and
SelectOne configurations.

(6) Enhance Quick Relight

    (a) Condition: This change is a product improvement.

    (b) Background: Enhanced quick relight logic, based on experience from other engine programs, was added to cover the risk for the SelectOne engine. In addition, the enhancement can be applied to both engine configurations.

    (c) Objective: Provide the capability to derate the fuel scheduling during quick relight. A quick relight is defined as when the master lever is turned off and then back on again within 30 seconds while HP spool speed is above 10%. This change will be applied to both the current and SelectOne configurations.

(7) Maintain N1 Speed Margin for SelectOne Production

    (a) Condition: Production N1 speed margin for the SelectOne engine must be the same as the current production engine.

    (b) Background: SelectOne (production) cycle improvements result in a small change (less than 0.2%) in N1/EPR relationship at 33K maximum take-off thrust rating conditions. The current production engine also can benefit from this change.

    (c) Objective: Implement a 2-point EPR trimmer, defined by the data entry plug. The current EPR trimmer is a single value. With the 2-point trimmer, the first point will be fully applied to the MCL and MCT rating, so there will be no change to the MCL and MCT ratings as compared to the current method. The second point of the trimmer will be applied at take-off only (TLA position). The second point will be applied as a function of EPR to minimize impact at lower ratings. This change will be applied to both the current and SelectOne configurations.

(8) SelectOne Engine Configuration Will Be Data Entry Plug Selectable

    (a) Condition: The SelectOne engine requires certain features of the software to be uniquely defined as compared to the current engine software.

    (b) Background: The EEC software will be configured for the SelectOne through the data entry plug.

    (c) Objective: Add the capability to configure the software for the SelectOne engine.

(9) Substantiation: The V2500 SelectOne upgrade package was evaluated and
     certified by means of a 3 engine validation / FAR-33 certification
     program, consisting of sea level and altitude performance / operability
     tests and sea level mechanical integrity tests. Further to that, V2500
     Select engines were successfully flight tested at Airbus in support of
     JAR-25 certification.

     DEP Substantation: Each new DEP Select Variant was successfully tested on
     the Closed Loop Bench in March 2008. The test validated that the software
     reads and correctly responds to the new wiring configurations.

(10) Effects of Bulletin on:

     Removal/Installation: None

     Disassembly/Assembly: None.

     Cleaning: None.

     Inspection/Check: None.

     Repair: None.

     Testing: None.

(11) Supplemental Information

     None.

D. Description

    A new Electronic Engine Control is provided with SCN20/Y software in support of
    the new SelectOne Production Standard and current A5 configurations.

    The SCN20/Y software is the minimum standard required for the V2500-A5
    SelectOne Production engines.

E. Compliance

    For V2500-A5 SelectOne Production Standard Engines:

    Category 6

    Accomplish when the subassembly (i.e. modules, accessories, components, build
    groups) is disassembled sufficiently to afford access to the affected part and
    to all affected spare parts.

    For V2500-A5 Engines:

    Category 8

Accomplish based upon experience with the prior configuration.

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 models given.

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

G. Manpower

    (1)   Estimated man-hours to incorporate Part I (for engines installed on
        aircraft) of this Bulletin when the EEC is sent out for programming.

        Remove the EEC (includes installing warning notices and opening fan cowls)

        0.6

        Install the EEC (includes closing fan cowls, removing warning notices, and
        testing the EEC)

        1.3

        Total man-hours

        1.9

    (2)   Estimated man-hours to incorporate Part I (for engines installed on
        aircraft) of this Bulletin when the EEC is programmed on site.

        Install warning notices

        0.1

        Open fan cowls

        0.1

        Program the EEC

        1.0

        Close fan cowls

        0.2

        Remove warning notices

0.1

Test the EEC

0.5

Total man-hours

2.0

(3) Estimated man-hours to incorporate Part II (for engines removed from aircraft) when the EEC is sent out for programming.

Remove the EEC

0.4

Install the EEC (includes testing the EEC)

1.0

Total man-hours

1.4

(4) Estimated man-hours to incorporate Part II (for engines removed from aircraft) of this Bulletin when the EEC is programed on site.

Remove the EEC

0.4

Program the EEC

1.0

Test the EEC

0.5

Install the EEC

0.5

Total man-hours

2.4

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-72-0561 (Engine – High Pressure (HP) Compressor – V2500 SelectOne Production – HP Compressor Upgrade).

   (2) IAE V2500 Service Bulletin V2500-ENG-72-0562 (Engine – High Pressure Turbine (HPT) – V2500 SelectOne Production and Retrofit – HPT Upgrade).

   (3) IAE V2500 Service Bulletin V2500-ENG-72-0563 (Engine – LP Turbine – Introduction Of Turbine Vanes Stage 3).

   (4) IAE V2500 Service Bulletin V2500-ENG-72-0564 (Engine – High Pressure (HP) Compressor – V2500 SelectOne Production – Introduction Of Redesigned Variable Stator Vanes (VSV) System).

   (5) IAE V2500 Service Bulletin V2500-ENG-72-0565 (Engine – Provide The Requirements For Modification To The V2500 SelectOne Retrofit Standard).

   (6) IAE V2500 Service Bulletin V2500-ENG-72-0285 (Engine – Conversion – Provide Instructions To Change The V2500-A5 Engine Rating By Modifying The Data Entry Plug).

   (7) IAE V2500 Service Bulletin V2500-ENG-70-0888 (Engine – Fuel And Control – Electronic Engine Control (EEC) – New Slimline Casting).

   (8) 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).

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

(10) IAE V2500 Service Bulletin V2500-ENG-73-0189 (Engine - Fuel And Control - To Provide A New Electronic Engine Control (EEC) With A5 SCN18/W Software).

(11) IAE V2500 Service Bulletin V2500-ENG-73-0197 (Engine - Fuel And Control - To Provide A New Electronic Engine Control (EEC) With A5 SCN19/X Software).

(12) IAE V2500 Service Bulletin V2500-ENG-73-0200 (Engine - Fuel And Control - Replacement Of Resistors And Tough-Up Of Solder Joints For Engines With EEC150-40 Electronic Engine Control (EEC) Installed).

(13) IAE V2500 Service Bulletin V2500-ENG-70-0832 (Information - Electronic Engine Control (EEC) - Flame Shield Removal for EEC150-1 and EEC150-20).

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

(15) Hamilton Sundstrand Service Bulletin EEC-150-20-73-34 (Incorporation of New Software Configuration: A5 SCN19/X).

(16) Hamilton Sundstrand Service Bulletin EEC-150-40-73-20 (Incorporation of New Software Configuration: A5 SCN19/X).

(17) Hamilton Sundstrand Service Bulletin 150-40-73-25.

(18) Airbus Aircraft Modification No. 39030 and Airbus Service Bulletin A320-73-1092.

(19) IAE V2500 Engine Manual (E-V2500-1IA), Chapter/Section 73-22-34.

(20) IAE V2500 Illustrated Parts Catalogues (S-V2500-2SA, S-V2500-2SB, S-V2500-5SA, S-V2500-5SB, S-V2500-6SA, S-V2500-6SB, S-V2500-7SA, S-V2500-7SB), Chapter/Section 73-22-34.

(21) IAE Standard Practices/Procedures Manual, Chapter/Section 70-10-00.

(22) Airbus A319/A320/A321 Aircraft Maintenance Manual, Chapter/Section 73-22-34.

(23) Internal Reference No. - EC 07VZ009 and 08VA070.

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

L. Other Publications Affected

(1) For V2500-A5 SelectOne engines:

V2500 Engine Illustrated Parts Catalog (S-V2500-2SA, S-V2500-2SB, S-V2500-5SA, S-V2500-5SB, S-V2500-6SA, S-V2500-6SB, S-V2500-7SA, S-V2500-7SB), Chapter/Section 73-22-34, to add the new parts.

(2) For V2500-A5 engines:

IAE V2500 Illustrated Parts Catalogues (S-V2500-2IA, S-V2500-2IB, S-V2500-5IA, S-V2500-5IB, S-V2500-6IA, S-V2500-6IB, S-V2500-7IA, S-V2500-7IB), Chapter/Section 73-22-34, to add the new parts.

M. Interchangeability of Parts

For Production Engines:

For the V2500-A5; Old (SCN 19) and New (SCN 20) Electronic Engine Controls are fully interchangeable.

For the V2500-A5 SelectOne Production Standard Engines; the New Electronic Engine Control, PN 2A4212 must be used with Data Entry Plug Kit Assembly, PN 2A3106, Variants 6, 14, 34, 49, 54, 55 or 59.

For Delivered Engines:

For the V2500-A5: Old (SCN 19) Electronic Engine Controls, PN 2A4030, PN 2A4031, PN 2A4033, PN 2A4034, PN 2A4177, PN 2A4179, PN 2A4191, PN 2A4028 and PN 2A4029, are fully interchangeable with New (SCN 20) Electronic Engine Controls PN 2A4205, PN 2A4206, PN 2A4207, PN 2A4208, PN 2A4209, PN 2A4211, PN 2A4212, PN 2A4213 and PN 2A4214, respectively. The New Electronic Engine Controls may be used with their respective Data Entry Plug Variants.

The Data Entry Plug Kit Assembly, PN 2A3106, Variants 6, 14, 34, 49, 54, 55 or 59 cannot be used on Non-SelectOne V2500-A5 engines.

NOTE: SCN20 and SCN19 are functionally one way interchangeable with any prior software version. Either cannot be reverted to any prior software version due to the flex derate takeoff logic incorporated in SCN19. See Reference 19, Airbus Service Bulletin A320-73-1092 for additional information.

For aircraft installation observe the following:

Engines with SCN20 or SCN19 software must not be intermixed with engines having any prior software version, on the same aircraft, due to the flex derate takeoff logic incorporated in SCN19. See Reference 19, Airbus Service Bulletin A320-73-1092 for additional information.

N. <u>Information in the Appendix</u>

   Alternate Accomplishment Instructions (No)

   Progression Charts (Yes)

   Revision to Table of Limits (No)

   Inspection Procedures (No)

   Supplement (Yes)

   Added Data (Yes)

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2. Material Information

A. Material – Price and Availability

Modification kit is not required.

For Price and availability of spares refer to the supplement of this Service Bulletin.

B. Industry Support Program

Not Applicable.

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

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

FIG- ITEM NUMBER	NEW PART NUMBER	QTY	PART TITLE	MAT	OLD PN	INSTR - DISP
	73-22-34					
01-280	2A4212 (824972-11-018)	1	Control, Electronic Engine (SCN20)	–	2A4191 (824972 -11-016)	(1)(A)(F) (I)(V)

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

FIG- ITEM NUMBER	NEW PART NUMBER	QTY	PART TITLE	MAT	OLD PN	INSTR - DISP
	73-22-34					
01-280	2A4212 (824972-11-018)	1	Control, Electronic Engine (SCN20)	–	2A4191 (824972 -11-016)	(1)(A)(F) (I)(V)
01-280	2A4211 (824972-9-018)	1	Control, Electronic Engine (SCN20)	–	2A4179 (824972 -9-016)	(1)(A)(M) (I)(V)
01-280	2A4213 (808050-4-064)	1	Control, Electronic Engine (SCN20)	–	2A4028 (808050 -4-062)	(1)(A)(M) (I)(V)
01-280	2A4214 (808050-5-064)	1	Control, Electronic Engine (SCN20)	–	2A4029 (808050 -5-062)	(1)(A)(M) (I)(V)
01-280	2A4205 (824972-2-018)	1	Control, Electronic Engine (SCN20)	–	2A4030 (824972 -2-016)	(1)(A)(M) (I)(V)

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FIG- ITEM NUMBER	NEW PART NUMBER	QTY	PART TITLE	MAT	OLD PN	INSTR - DISP
01-280	2A4206 (824972-3-018)	1	Control, Electronic Engine (SCN20)	–	2A4031 (824972 -3-016)	(1)(A)(M) (I) (I)(V)
01-280	2A4207 (824972-4-018)	1	Control, Electronic Engine (SCN20)	–	2A4033 (824972 -4-016)	(1)(A)(M) (I)(V)
01-280	2A4208 (824972-5-018)	1	Control, Electronic Engine (SCN20)	–	2A4034 (824972 -5-016)	(1)(A)(M) (I) (I)(V)
01-280	2A4209 (824972-7-018)	1	Control, Electronic Engine (SCN20)	–	2A4177 (824972 -7-016)	(1)(A)(M) (I)(V)

D. <u>The material data that follows is for each engine.</u>

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

FIG- ITEM NUMBER	NEW PART NUMBER	QTY	PART TITLE	MAT	OLD PN	INSTR - DISP
	73-22-34					
01-280	2A4212 (824972-11-018)	1	Control, Electronic Engine (SCN20)	–	2A4191 (824972 -11-016)	(1)(A)(F) (I)(V)

E. <u>Instructions/Disposition Code Statements:</u>

Parts Modification Conditions

    (1) The new part can be obtained by modification of the old part as
specified in the Accomplishment Instructions.
    (2) The new part is a replacement part only, and cannot be obtained by
modification of the old part.

Spare Parts Availability

    (A) The old part is not available.
    (F) The new part will be available on a Full Manufacturing lead time quote
basis only.
    (M) It is possible to get the new part only by modification.
    (V) The part number in brackets "( )" is the Hamilton Sundstrand part
number.

Cleaning, Inspection and Repair Information

(I) The cleaning, inspection and repair requirements are the same for the old and new part. The applicable engine manuals will be revised.
(R) The cleaning, inspection and repair requirements are different for the old and new part. The applicable engine manuals will be revised to include the new requirements.

F. Tooling - Price and Availability

The tools and equipment that follow are necessary to reprogram the EEC on site.

The following equipment is required to accomplish this Service Bulletin and will be provided or loaned to the operator 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

(1) The Hamilton Sundstrand dedicated software reprogrammer system, identified as IAE PN IAE3R19290 and Hamilton Sundstrand PN AD42600-1, PN AD42600-2 or PN AD42600-3.

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

(2) Hamilton Sundstrand reprogramming diskette referenced in Accomplishment Instructions, Table 2. 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 Fleet Director

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

G. Reidentified Parts

Reidentified Parts Data

New PN	Keyword	Old PN
2A4211 (824972-9-018)	Control, Electronic Engine (SCN20)	2A4179 (824972-9-016)
2A4212 (824972-11-018)	Control, Electronic Engine (SCN20)	2A4191 (824972-11-016)
2A4213 (808050-4-064)	Control, Electronic Engine (SCN20)	2A4028 (808050-4-062)

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New PN              Keyword             Old PN

2A4214              Control, Electronic 2A4029
(808050-5-064)      Engine (SCN20)      (808050-5-062)

2A4205              Control, Electronic 2A4030
(824972-2-018)      Engine (SCN20)      (824972-2-016)

2A4206              Control, Electronic 2A4031
(824972-3-018)      Engine (SCN20)      (824972-3-016)

2A4207              Control, Electronic 2A4033
(824972-4-018)      Engine (SCN20)      (824972-4-016)

2A4208              Control, Electronic 2A4034
(824972-5-018)      Engine (SCN20)      (824972-5-016)

2A4209              Control, Electronic 2A4177
(824972-7-018)      Engine (SCN20)      (824972-7-016)
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H. Other Material Information Data

    Not Applicable.

3. <u>Accomplishment Instructions</u>

A. Part I - For Engines Installed on Aircraft

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

(1) Do this procedure when the EEC is sent out for programming.

  (a) Remove the EEC as specified in Reference 22, Aircraft Maintenance Manual, Chapter/Section 73-22-34.

  (b) Send your EEC to an authorized rework vendor for incorporation of Reference 17, Hamilton Sundstrand Service Bulletin 150-40-73-25:

> <u>NOTE</u>: Only fully authorized repair facilities are allowed to perform this rework.
>
> The designation by IAE of an authorized rework vendor indicates that the vendor has demonstrated the necessary capability 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 IAE. Authorized rework vendors do not act as agents or representatives of IAE.

  (i) Hamilton Sundstrand Corporation

       A United Technologies Company

       One Hamilton Road

       Dock W

       Windsor Locks, Ct. 06096-1010

       USA

  (ii) Hamilton Sundstrand Corporation

       A United Technologies Company

       Worldwide Repair - Maastricht

       Maastrich Airport

       Horsterweg

       6191 RX Beek

The Netherlands

    (c) Install the EEC as specified in Reference 22, Aircraft Maintenance Manual, Chapter/Section 73-22-34.

  (2) Do this procedure when the EEC is programmed on site.

    (a) Install warning notices as specified in Reference 22, Aircraft Maintenance Manual, Chapter/Section 73-22-34.

    (b) Open the fan cowls as specified in Reference 22, Aircraft Maintenance Manual, Chapter/Section 73-22-34.

    (c) Program your EEC on site as specified in Part III of this Service Bulletin.

    (d) Close the fan cowls as specified in Reference 22, Aircraft Maintenance Manual, Chapter/Section 73-22-34.

    (e) Remove warning notices as specified in Reference 22, Aircraft Maintenance Manual, Chapter/Section 73-22-34.

    (f) Test the EEC as specified in Reference 22, Aircraft Maintenance Manual, Chapter/Section 73-22-34.

B. Part II - For Engines Removed from Aircraft

  (1) Do this procedure when the EEC is sent out for programming.

    (a) Remove the EEC as specified in Reference 19, Engine Manual, Chapter/Section 72-00-32.

    (b) Send your EEC to an authorized rework vendor for incorporation of Reference 17, Hamilton Sundstrand Service Bulletin 150-40-73-25:

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

           The designation by IAE of an authorized rework vendor indicates that the vendor has demonstrated the necessary capability 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 IAE. Authorized rework vendors do not act as agents or representatives of IAE.

      (i) Hamilton Sundstrand Corporation

        A United Technologies Company

SERVICE BULLETIN

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(ii) Hamilton Sundstrand Corporation

A United Technologies Company

Worldwide Repair - Maastricht

Maastrich Airport

Horsterweg

6191 RX Beek

The Netherlands

(c) Install the EEC as specified in Reference 19, Engine Manual, Chapter/Section 72-00-32.

(2) Do this procedure when the EEC is programmed on site.

(a) Program your EEC on site as specified in Part III of this Service Bulletin.

(b) Test the EEC as specified in Reference 19, Engine Manual, Chapter/Section 72-00-32.

C. Part III - Programming the EEC on site

NOTE: This procedure may be used to program EECs that are either installed or removed from the engine.

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.

Reprogramming assistance is available from your local IAE representative.

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

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Not subject to the EAR per 15 C.F.R. Chapter 1, Part 734.3(b)(3).

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

In the following procedure, statements provided to show text as it appears on the computer screen will be as illustrated follows:

* *

Sample Computer Text (when typing text UPPER or lower case may be used)

* *

(1) Section 1

   (a) Hamilton Sundstrand Electronic Engine Control Model EEC150-20 or 150-40 software is loaded into the EEC using the Hamilton Sundstrand supplied reprogrammer and software.

      (i)   Disassembly of the EEC is not required.

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

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

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

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

(2) Section 2

   (a) Verify that the model number on the identification plate of the unit is "EEC 150-20" or "EEC 150-40".

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

   (c) Connect power to all necessary equipment.

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

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

(3) Section 3

(a) If the EEC is powered by aircraft 28VDC power supply, then go to the subsequent section titled: "Section 4"

(b) 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.

(c) 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.

(d) 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.

(4) Section 4

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

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

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

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

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

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

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CAUTION: 1) ENSURE THAT ORIGINAL DISKETTE IS PROVIDED IN A CLOSED
            ELECTROSTATIC DISPATCH BAG, IS UNDAMAGED, AND HAS THE CORRECT
            PART NUMBER.

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

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

           NOTE: Diskette may be used multiple times for multiple engines
                  (a log file is generated each time containing the engine
                  and EEC serial numbers).

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

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

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

    NOTE: Some computers have the RETURN key designated ENTER.

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

    Type "LDR150", then press the RETURN key. This starts the UART
    programming utility.

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

           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 1 for a summary of error
           code description and troubleshooting suggestions.

(5) Section 5

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

        *
        * * * * * * * * * * * * * * *

        Enter operators name performing download: [ ] >

```
* * * * * * * * * * * * * * * * * * * ** * * * * * * * * * * * * * *
* * * * * * * * * * * * * *
```

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

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

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

(ii)   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.

(b) 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] :>

```
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
* * * * * * * * * * * * * *
```

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

        Type "C", then press the RETURN key.

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

        Type "Q", then press the RETURN key.

(iii)   If the operator selects the quit option, turn off the 28VDC
        power to the EEC and go to the section titled: "Section 7"

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

```
* * * * * * * * * * * * * * * * * * * ** * * * * * * * * * * * * * *
* * * * * * * * * * * * * *
```

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

```
* * * * * * * * * * * * * * * * * * * ** * * * * * * * * * * * * * *
* * * * * * * * * * * * * *
```

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

NOTE: For the next two steps, 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: PN 808050-4-030 would be entered as 808050-04-030.

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

* *

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

* *

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

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

* *

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

* *

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

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

* *

Enter Trim Checksum Value for "XXXXXX.TRM" :

* *

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

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Not subject to the EAR per 15 C.F.R. Chapter 1, Part 734.3(b)(3).

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

* * * * * ** *
* * * * * * * * * * * * * *

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

* *
* * * * * * * * * * * * * *

    (i)   To proceed with programming process:

            Type "N", then press the RETURN key. Go to the subsequent
            section titled: "Section 6", then continue.

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

            Type "Y", then press the RETURN key. Then go back to the
            previous section titled: "Section 5"

    (iii)   To quit the programming process:

            Type "Q", then press the RETURN key. Turn off the 28VDC power
            to the EEC then go to the section titled: "Section 7"

(6) Section 6

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

    (i)   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.

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

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

* *
* * * * * * * * * * * * * *

Turn OFF the BITE and BOOT switches to the EEC

then

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```
          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

          * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
          * * * * * * * * * * * * * *

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

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

    (d) Press the RETURN key.

    (e) 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

          * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
          * * * * * * * * * * * * * *

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

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

    (g) Press the RETURN key.

    (h) 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.

(i) Press the RETURN key.

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

    (i)   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

    (ii)   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 1 describes the error codes and action to be taken.

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(7) Section 7

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

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

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

        (i) At the MSDOS prompt:

            Type "VLXXXX.LOG".

        (ii) Press the RETURN key.

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

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

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

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

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

        (i) If not already installed, install the software identification plate below the existing nameplate by the procedure specified in Reference 14, Hamilton Sundstrand SB EEC150-20-73-16.

        (ii) 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.

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

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

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

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(8) Section 8

Recording Instructions

(a) A record of accomplishment is required.

Table 1 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: 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.
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 incorrectly or incorrect data on existing nameplate. Check data – retry with the correct information.
E4	SYSTEM PROBLEM – Poor operating environment, bad disk, or program aborted by 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 2 Reprogramming Input Reference Table

A5 SCN20/Y

	New P/N	Old P/N
Trim Checksum	–17882	n/a
Reprogramming Diskette 150-20/150-40	819191-47	n/a

A5 SCN20/Y

	New P/N	Old P/N
Control, Electronic Engine (SCN20/Y) (HS) HW Part No. (PW Part No.)	824972-9-018 (2A4211)	824972-9-016 (2A4179)
Control, Electronic Engine (SCN20/Y) (HS) HW Part No. (PW Part No.)	824972-11-018 (2A4212)	824972-11-016 (2A4191)
Control, Electronic Engine (SCN20/Y) (HS) HW Part No. (PW Part No.)	808050-4-064 (2A4213)	808050-4-062 (2A4028)
Control, Electronic Engine (SCN20/Y) (HS) HW Part No. (PW Part No.)	808050-5-064 (2A4214)	808050-5-062 (2A4029)
Control, Electronic Engine (SCN20/Y) (HS) HW Part No. (PW Part No.)	824972-2-018 (2A4205)	824972-2-016 (2A4030)
Control, Electronic Engine (SCN20/Y) (HS) HW Part No. (PW Part No.)	824972-3-018 (2A4206)	824972-3-016 (2A4031)
Control, Electronic Engine (SCN20/Y) (HS) HW Part No. (PW Part No.)	824972-4-018 (2A4207)	824972-4-016 (2A4033)
Control, Electronic Engine (SCN20/Y) (HS) HW Part No. (PW Part No.)	824972-5-018 (2A4208)	824972-5-016 (2A4034)
Control, Electronic Engine (SCN20/Y) (HS) HW Part No. (PW Part No.)	824972-7-018 (2A4209)	824972-7-016 (2A4177)

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REPLACE ELECTRONIC
ENGINE CONTROL

FWD
A
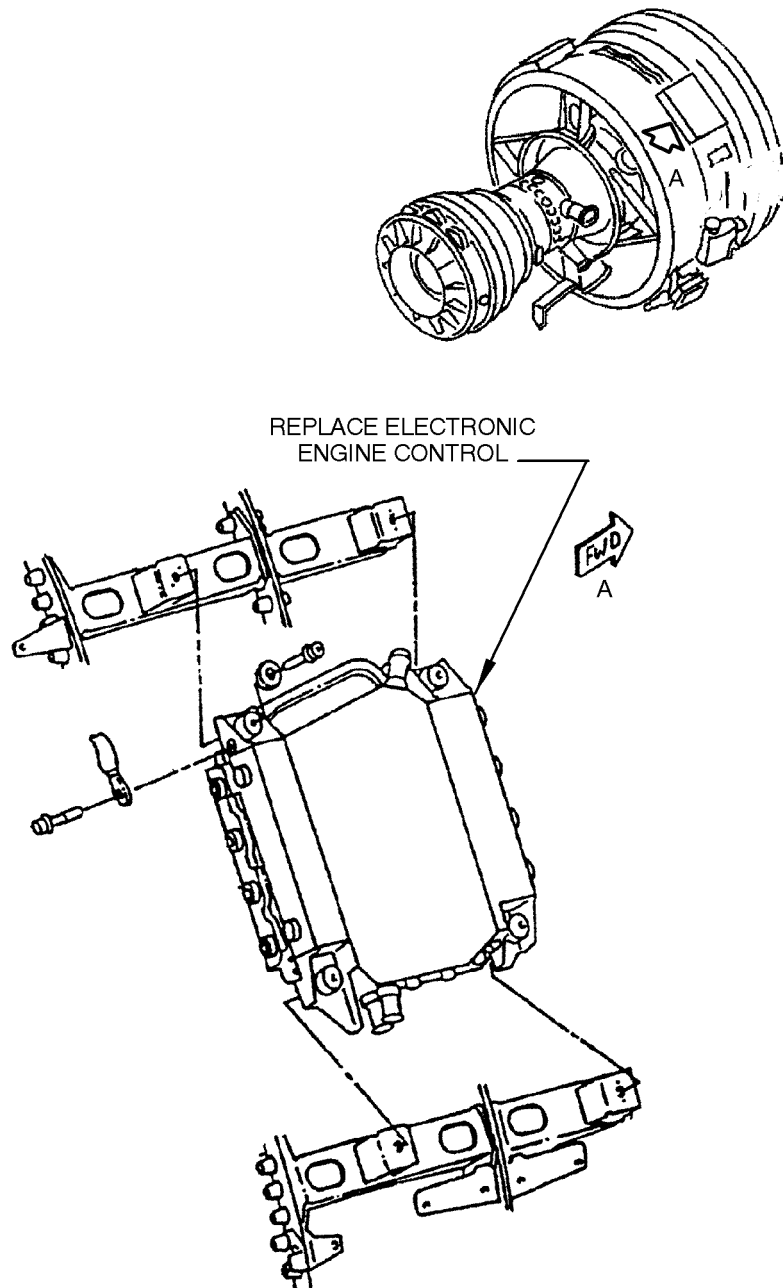
pw0b520207

LOCATION OF THE ELECTRONIC ENGINE CONTROL (EEC)
FIGURE 1

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SERVICE BULLETIN

ENGINE – FUEL AND CONTROL – PROVIDE A NEW ELECTRONIC ENGINE CONTROL (EEC) WITH A5 SCN20/Y SOFTWARE

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

FAMILY TREE - ELECTRONIC ENGINE CONTROL (EEC) REF. CATALOG SEQUENCE NO. 73-22-34.
FIG. 01 ITEM 280 - FOR V2500-A5 DELIVERED ENGINES
CHART A (SHEET 1 OF 4)
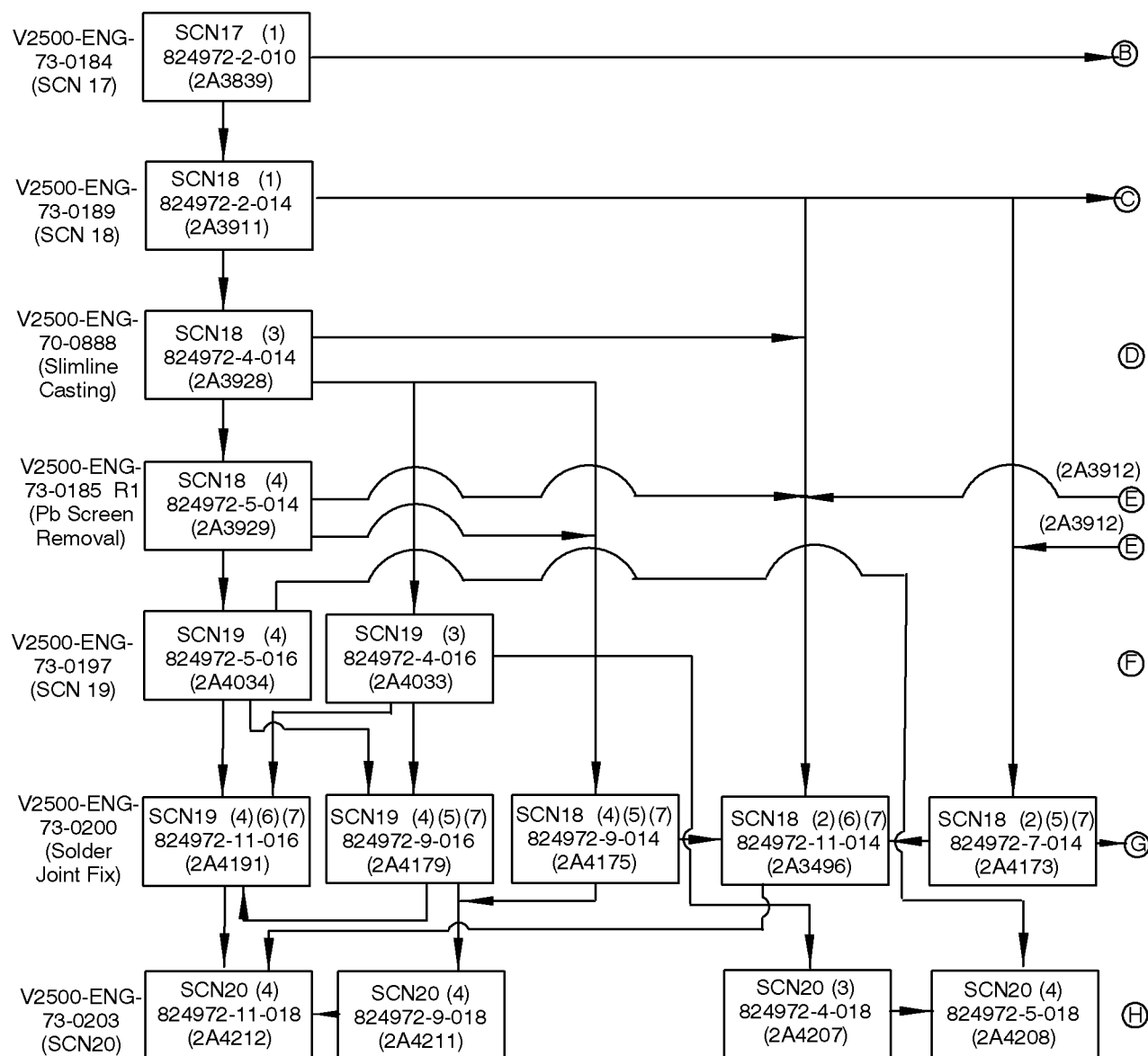
(1) With Pb Screen
(2) No Pb Screen
(3) With Pb Screen & Slimline Case
(4) No Pb Screen & Slimline Case
(5) The new part can be obtained by modification of the old part as specified in the Accomplishment Instructions.
(6) The new part is a replacement part only, and cannot be obtained by modification of the old part.
(7) With Reference 7, Service Bulletin No. V2500-ENG-73-0185 incorporated.

pw0b520209

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V2500-ENG-
73-0184
(SCN 17) Ⓑ ————————— (2A3839)

V2500-ENG-
73-0189
(SCN 18) Ⓒ ————— (2A3911)

V2500-ENG-
70-0888
(Slimline Ⓓ
Casting)

V2500-ENG-
73-0185 R1
(Pb Screen Ⓔ
Removal) Ⓔ

SCN18 (2)	SCN17 (2)
824972-3-014	824972-3-010
(2A3912)	(2A3894)

V2500-ENG-
73-0197 Ⓕ
(SCN 19)

SCN19 (1)	SCN19 (2)
824972-2-016	824972-3-016
(2A4030)	(2A4031)

V2500-ENG-
73-0200
(Solder Ⓖ
Joint Fix)

SCN19 (2)(5)(7)	SCN19 (4)(6)(7)	SCN17 (2)(5)(7)
824972-7-016	824972-11-016	824972-7-010
(2A4177)	(2A4191)	(2A4181)

V2500-ENG-
73-0203 Ⓗ
(SCN20)

SCN20 (2)	SCN20 (4)	SCN20 (2)	SCN20 (1)
824972-7-018	824972-11-018	824972-3-018	824972-2-018
(2A4209)	(2A4212)	(2A4206)	(2A4205)
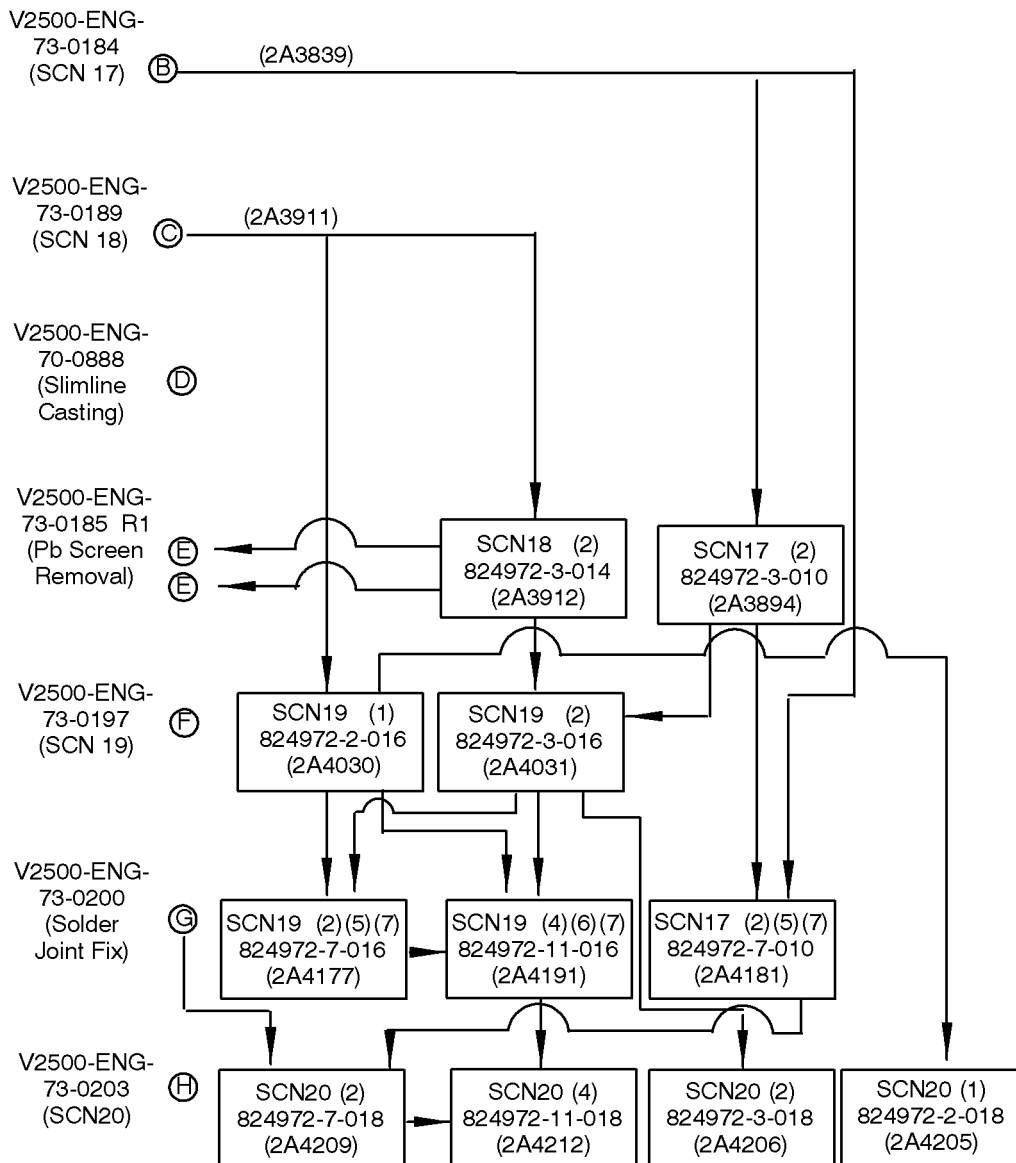
(1) With Pb Screen
(2) No Pb Screen
(3) With Pb Screen & Slimline Case
(4) No Pb Screen & Slimline Case
(5) New part can be obtained by modification of the old part as specified in the Accomplishment Instructions.
(6) New part is a replacement part only, and cannot be obtained by modification of the old part.
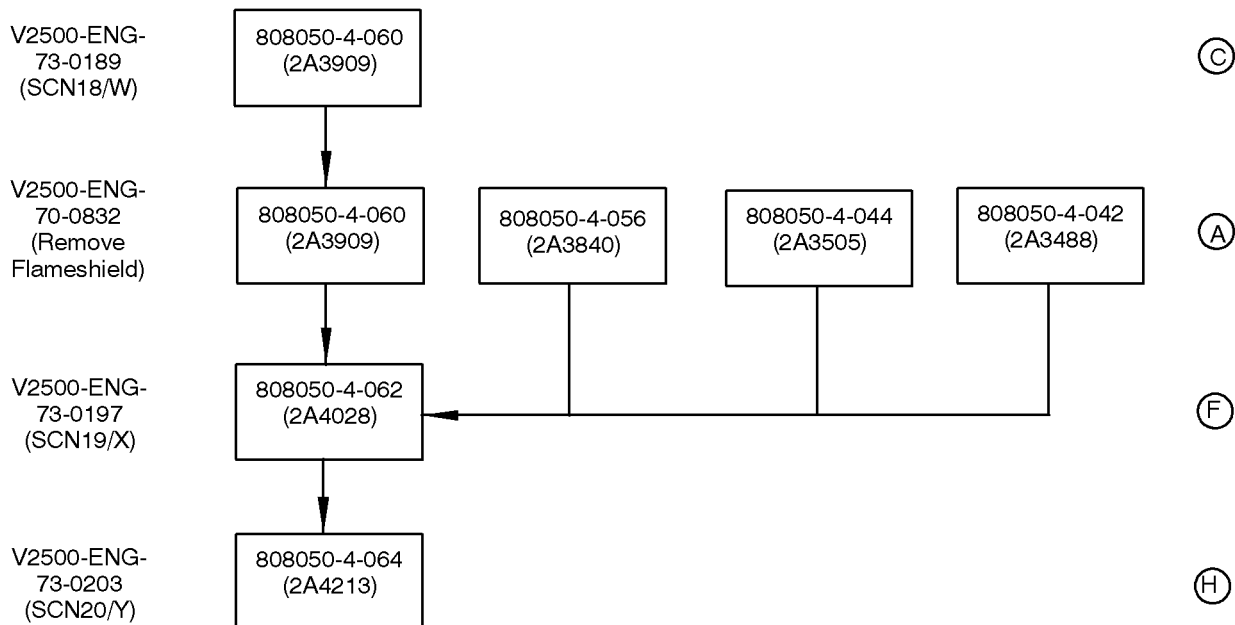(7) With Reference 7, Service Bulletin No. V2500-ENG-73-0185 incorporated.

pw0b520210

FAMILY TREE - ELECTRONIC ENGINE CONTROL (EEC) REF. CATALOG SEQUENCE NO. 73-22-34.
FIG. 01 ITEM 280 - FOR V2500-A5 DELIVERED ENGINES
CHART A (SHEET 2 OF 4)

MODIFICATIONS

PART NUMBER CHANGE
EEC 150-20

V2500-ENG-
73-0189
(SCN18/W)

808050-4-060
(2A3909)

Ⓒ

V2500-ENG-
70-0832
(Remove
Flameshield)

808050-4-060
(2A3909)

808050-4-056
(2A3840)

808050-4-044
(2A3505)

808050-4-042
(2A3488)

Ⓐ

V2500-ENG-
73-0197
(SCN19/X)

808050-4-062
(2A4028)

Ⓕ

V2500-ENG-
73-0203
(SCN20/Y)

808050-4-064
(2A4213)

Ⓗ

pw0b520340

FAMILY TREE — ELECTRONIC ENGINE CONTROL (EEC) REF. CATALOG SEQUENCE NO. 73-22-34.
FIG. 01 ITEM 280 — FOR V2500-A5 DELIVERED ENGINES
CHART A (SHEET 3 OF 4)

International Aero Engines™

SERVICE BULLETIN

MODIFICATIONS

PART NUMBER CHANGE
EEC 150-20

V2500-ENG-
73-0189
(SCN18/W) — Ⓒ

(No Pb Screen)
808050-5-060
(2A3910)

V2500-ENG-
70-0832
(Remove
Flameshield) — Ⓐ

(No Pb Screen)
808050-5-060
(2A3910)

(No Pb Screen)
808050-5-056
(2A3898)

(No Pb Screen)
808050-5-044
(2A3899)

(No Pb Screen)
808050-5-0042
(2A3901)

V2500-ENG-
73-0197
(SCN19/X) — Ⓕ

(No Pb Screen)
808050-5-062
(2A4029)

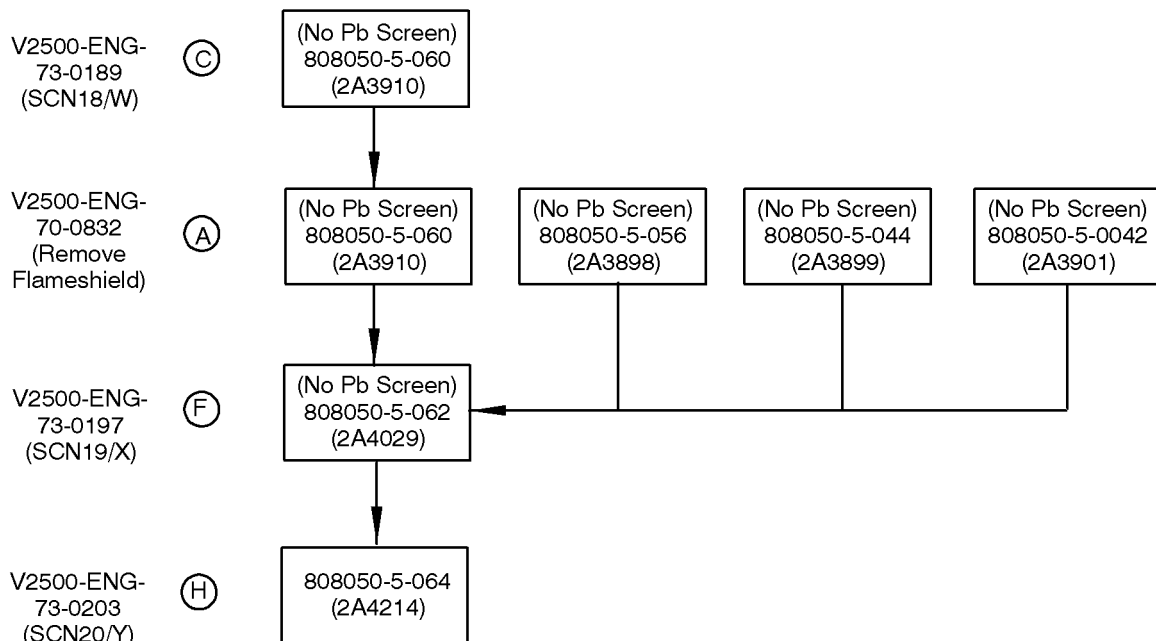V2500-ENG-
73-0203
(SCN20/Y) — Ⓗ

808050-5-064
(2A4214)

pw0b520341

FAMILY TREE – ELECTRONIC ENGINE CONTROL (EEC) REF. CATALOG SEQUENCE NO. 73-22-34.
FIG. 01 ITEM 280 – FOR V2500-A5 DELIVERED ENGINES
CHART A (SHEET 4 OF 4)

SERVICE BULLETIN

MODIFICATIONS   PART NUMBER CHANGE

V2500-ENG-
73-0200
(Solder
Joint Fix)

```
┌─────────────────┐
│     SCN19       │
│ 824972-11-016   │
│   (2A4191)      │
└─────────────────┘
         │
         ▼
```

V2500-ENG-
73-0203
(SCN20)

```
┌─────────────────┐
│     SCN20       │
│ 824972-11-018   │
│   (2A4212)      │
└─────────────────┘
```

pw0b520339

FAMILY TREE - ELECTRONIC ENGINE CONTROL (EEC) REF. CATALOG SEQUENCE NO. 73-22-34.
FIG. 01 ITEM 280 - FOR V2500-A5 SELECTONE PRODUCTION STANDARD ENGINES
CHART B

International Aero Engines™

SERVICE BULLETIN

APPENDIX 1

Supplement – Prices and Availability

V2500-A5 SelectOne Production Standard Engines:

1. Modification Kit

   A. There is no kit provided to do this Service Bulletin.

2. Material Cost

   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.

   A. The estimated price of new material to do this Service Bulletin when the part
      modification procedure is used is available on a Quote basis.

   B. The estimated price of new material to do this Service Bulletin using new
      replacement parts is available on a Quote basis.

3. New Production Parts

New Production Part Number	Description	Unit Price US Dollars
2A4212 (824972-11-018)	Control, Electronic Engine (SCN20)	Quote

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SERVICE BULLETIN

APPENDIX 2

Supplement – Added Data

Internal Reference Information

Revision No.	Reference Document	Origination
Original	EC 07VZ009	DL/TR