ENGINE – FUEL AND CONTROL – ENGINE – ELECTRONIC ENGINE CONTROL – PROVIDE A NEW ELECTRONIC ENGINE CONTROL (EEC) WITH THE SCN12D SOFTWARE CONFIGURATION – CATEGORY CODE 4 – MOD.ENG-73-0082

1. Planning Information

   A. Effectivity

     (1) Aircraft: Airbus A320

     (2) Engine: V2500-A1 Engines through Serial No. V0361

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

           Bump 00 (No Thrust Bump)

           Bump 04 (No Thrust Bump)

           Bump 07 (Improved Consolidated Thrust Bump)*

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

           This Service Bulletin may be intermixed with A1SCN12A/B/C on either of the engines on the aircraft.

           If Service Bulletin V2500-ENG-75-0025, specified in Reference (1) is incorporated on the engine(s) it must be removed when this Service Bulletin is incorporated.

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

   B. Reason

     (1) Condition:

        (a) 1.0 AUTOTHRUST INSTINCTIVE DISCONNECT (ID) LOGIC: Though no know problems have been experienced on the V2500 engine installation to date, sensitivity of the ID signal acquisition in the EEC could be too high.

        (b) 2.0 STATOR VANE ACTUATOR (SVA) TRACK CHECK DE-LATCHING: The ECAM warning "ENG 1(2) COMPRESSOR VANE" remains displayed even though the conditions that originally drove the message no longer exist.

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(c) 3.0 INTENTIONALLY OMITTED

(d) 4.0 MANUAL START LOGIC ENHANCEMENT: Manual starts in the field have not always been successful due to premature closure of the Starter Air Valve.

(e) 5.0 SCHEDULED MAINTENANCE REPORT ENHANCEMENT: Troubleshooting of current Scheduled Maintenance Report faults can be simplified.

(f) 6.0 THRUST REVERSER STOW TIME MONITORING: A clear "NO DISPATCH" indication is required for Thrust Reverser system faults which result in Thrust Reverser stow time exceedances.

(g) 7.0 SPURIOUS CLEAR LANGUAGE MESSAGE DUE TO AIRCRAFT BOUNCE ON LANDING: Spurious emission of the Clear Language Message "HC/PROX SW/T/R UP ACT" has been experienced in the field on landing.

(h) 8.0 THROTTLE LEVER ANGLE FAULT ACCOMMODATION ENHANCEMENT: Current aircraft procedures require that the engine be shutdown prior to landing in response to an "ENG THR LEVER FAULT" or "ENG THR LEVER DISAGREE" warning if autoland is not used.

(i) 9.0 INTENTIONALLY OMITTED

(j) 10.0 THRUST REVERSER THIRD LINE OF DEFENSE SHUT OFF VALVE MONITORING: Potential incorporation of an additional aircraft controlled Shut Off Valve to the Thrust Reverser system, up stream of the existing Hydraulic Control Unit, will rely on the EEC for functional verification and fault annunciation.

(k) 11.0 WEIGHT ON WHEELS VALIDATION WITH MACH NUMBER CONFIRMATION: Though no events have been seen in the field or at flight test, current EEC validation of Weight On Wheels from the aircraft with Mach Number could result in a spurious Weight On Wheels fault and subsequent inhibition of the Thrust Reverser on landing.

(l) 12.0 WEIGHT ON WHEELS ACCOMMODATION FOR ENGINE INTERFACE UNIT FAULTS: When the aircraft is on the ground, an intermittent Engine Interface Unit Label 31 can result in Weight on Wheels toggling between ground and air.

(m) 13.0 EEC INTERNAL CROSS LINK FAILURE ACCOMMODATION ENHANCEMENT: Failure accommodation of the loss of one EEC channel, or loss of the EEC internal cross channel data link, can be improved.

(2) Background:

(a) 1.0 AUTOTHRUST INSTINCTIVE DISCONNECT (ID) LOGIC: Analysis and test have demonstrated that the V2500 logic's susceptibility to spurious short duration signals on the ID line can be improved.

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V2500–ENG–73–0082

(b) 2.0 STATOR VANE ACTUATOR (SVA) TRACK CHECK DE-LATCHING: SVA track check faults which set this message are latched faults which can only be cleared by an EEC reset.

(c) 3.0 INTENTIONALLY OMITTED

(d) 4.0 MANUAL START LOGIC ENHANCEMENT: Current EEC logic requires detection of the transition of the Manual Start Push Button discrete from "OFF" to "ON" in order to initiate a manual start. A/C 28 VDC electrical transients, or a "quick" selection of the Manual Start Push Button after "IGN" selection, can result in one or both channels of the EEC missing this transition. This results in no command, or loss of command, to the Starter Air Valve and thus termination of the manual start sequence.

(e) 5.0 SCHEDULED MAINTENANCE REPORT ENHANCEMENT: The current Scheduled Maintenance Report fault data includes only the associated Clear Language Message and a 2 digit Fault Cell number, but the fault acronym that triggered the Clear Language Message is not accessible.

(f) 6.0 THRUST REVERSER STOW TIME MONITORING: The current "ENG 1(2) REVERSER FAULT" ECAM warning which is not latched and will be displayed only until the Thrust Reverser completes its stow cycle.

(g) 7.0 SPURIOUS CLEAR LANGUAGE MESSAGE DUE TO AIRCRAFT BOUNCE ON LANDING: The spurious emission of this message is the result of the Weight On Wheels indication from the aircraft bounce on landing. If the Thrust Reverser begins to deploy on initial touchdown, this spurious message can be generated when the aircraft Weight On Wheels transitions to "AIR" while the Reverser is "UNLOCKED". No maintenance action is required under these circumstances.

(h) 8.0 THROTTLE LEVER ANGLE FAULT ACCOMMODATION ENHANCEMENT: Current EEC Throttle Lever Angle Fault Resolver Angle fault detection and accommodation logic results in permanent latching of a Throttle Resolver Angle fault and a Throttle Resolver Angle accommodation at certain flight conditions that can result in the engine being set to a level of thrust that can not be accommodated at landing.

(i) 9.0 INTENTIONALLY OMITTED

(j) 10.0 THRUST REVERSER THIRD LINE OF DEFENSE SHUT OFF VALVE MONITORING: Third Line of Defense system design and potential retrofit considerations dictate use of the existing Hydraulic Control Unit pressure switch processing by the EEC to provide aircraft Shut Off Valve functional verification and fault annunciation.

(k) 11.0 WEIGHT ON WHEELS VALIDATION WITH MACH NUMBER CONFIRMATION: There is currently no confirmation time associated with this validation logic.

V2500-ENG-73-0082

(l) 12.0 WEIGHT ON WHEELS ACCOMMODATION FOR ENGINE INTERFACE UNIT FAULTS: When the A/C is on the ground, if the Engine Interface Unit Label 031 becomes invalid, Mach Number is no longer used but use of the Engine Interface Unit Weight On Wheels is delayed by 1/2 second during which time the default of "AIR" is set.

(m) 13.0 EEC INTERNAL CROSS LINK FAILURE ACCOMMODATION ENHANCEMENT: Current EEC fault accommodation logic inhibits certain faults from being set when status of the fault in the other channel is unknown.

(3) Objective:

(a) 1.0 AUTOTHRUST INSTINCTIVE DISCONNECT (ID) LOGIC: Modify the EEC ID logic to require a 2 pass confirmation of the same ID discrete input to the EEC before allowing disconnection of the Autothrust System to reduce the susceptibility to spurious signals on the ID line.

(b) 2.0 STATOR VANE ACTUATOR (SVA) TRACK CHECK DE-LATCHING: Modify the EEC logic to allow the SVA track check faults which set this message to clear if the SVA system returns to within the required tolerance for five seconds. The SVA track check fault is allowed to clear up to three times after which it will be latched until the next EEC reset. Additionally, the occurrence of any SVA track check fault in flight will be recalled on landing to provide a "NO DISPATCH" message to ensure appropriate maintenance action.

(c) 3.0 INTENTIONALLY OMITTED

(d) 4.0 MANUAL START LOGIC ENHANCEMENT: Modify the EEC logic to initiate a manual start based on the "ON" state of the Manual Start Push Button, rather than the transition from "OFF" to "ON" In addition, the same automatic starter crash re-engagement protection currently provided for automatic starts is incorporated for manual starts to cover Master Lever resets or A/C 28 VDC electrical transients when the Manual Start Push Button discrete is set to "ON".

(e) 5.0 SCHEDULED MAINTENANCE REPORT ENHANCEMENT: Replace the current 2 digit Fault Cell number in the Schedule Maintenance Report with the associated fault acronym to simplify the associated troubleshooting procedures.

(f) 6.0 THRUST REVERSER STOW TIME MONITORING: Modify the EEC logic to latch the "ENG 1(2) REVERSER FAULT" ECAM warning which is triggered for Thrust Reverser stow time exceedances to insure that this "NO DISPATCH" condition is reported to the maintenance crew for appropriate maintenance action prior to the next dispatch of the aircraft.

V2500-ENG-73-0082

(g) 7.0 SPURIOUS CLEAR LANGUAGE MESSAGE DUE TO AIRCRAFT BOUNCE ON LANDING: Modify the EEC logic to require a 3 second confirmation time on the emission of this Clear Language Message.

(h) 8.0 THROTTLE LEVER ANGLE FAULT ACCOMMODATION ENHANCEMENT: Modify the EEC Throttle resolver Angle Fault Resolver Angle fault to heal a limited number of times (3), if the input is validated again for a specified period of time (5 seconds). Utilize additional inputs (slats) to set the most appropriate fail-safe value of Throttle Resolver angle at the time of the failure and allow transition of this value to idle when the aircraft is in "APPROACH", thus precluding the need to shut down the engine at landing.

(i) 9.0 INTENTIONALLY OMITTED

(j) 10.0 THRUST REVERSER THIRD LINE OF DEFENSE SHUT OFF VALVE MONITORING: Modify the existing EEC Thrust reverser control logic, Menu Mode Thrust Reverser Test logic and existing Hydraulic Control Unit pressure switch processing logic to provide the potential to: (1) verify Shut Off Valve functioning during the normal thrust Reverser deploy/stow cycle on landing, (2) verify Shut Off Valve functioning during the Thrust Reverser Menu Mode test and (3) provide functional dispatch status of the total Thrust Reverser system, including the additional aircraft controlled Shut Off Valve when installed as noted by digital discrete from the aircraft Engine Interface Unit.

(k) 11.0 WEIGHT ON WHEELS VALIDATION WITH MACH NUMBER CONFIRMATION: Incorporate a 20 second confirmation on the Weight on wheels validation with Mach Number as a design enhancement before setting the associated fault and inhibiting the use of the Thrust Reverser on landing.

(l) 12.0 WEIGHT ON WHEELS ACCOMMODATION FOR ENGINE INTERFACE UNIT FAULTS: Additional logic was added to prevent this toggling of Weight On Wheels to "Air" while the 1/2 second confirmation timer elapses.

(m) 13.0 EEC INTERNAL CROSS LINK FAILURE ACCOMMODATION ENHANCEMENT: Modify the EEC logic to allow the controlling channel to set the relevant messages with its local information, if the crosslink is failed or one channel is down.

(4) Substantiation

The flight simulation and flight testing of the SCN12D software logic was accomplished at Airbus in Toulouse, France.

(5) Effects of Bulletin on Workshop Procedures:

V2500-ENG-73-0082

International Aero Engines — SERVICE BULLETIN

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

(6) Supplemental Information

None.

C. Description

(1) To provide a new Electronic Engine Control (EEC) with SCN12D software logic that adds many improvements.

D. Approval

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

E. Compliance

Category 4

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

F. Manpower

Estimated Manhours to incorporate the full intent of this Bulletin:

Venue   Estimated Manhours

(1) In service .. .. ..   TOTAL: 1 hour 21 minutes

   (a) To gain access

        (i) Install the warning notices ..   5 minutes

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

        (iii) Remove the EEC .. .. ..   23 minutes

V2500-ENG-73-0082

Not subject to the EAR per 15 C.F.R. Chapter 1, Part 734.3(b)(3).
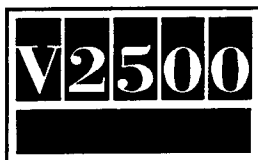
TOTAL 35 minutes

    (b) To remove the ACC Front
        Duct Cover Assembly, if required,
        Reference (1)   .. ..   5 minutes

    (c) To retain to flyable status

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

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

        (iii) Remove the warning notices ..   5 minutes

TOTAL 41 minutes

    (2) At overhaul   .. .. Not Applicable

G. Material – Price and Availability

   (1) Modification kit is not required.

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

H. Tooling – Price and Availability

   None.

I. Weight and Balance

   (1) Weight change   None

   (2) Moment arm   No effect

   (3) Datum   Engine Front mount Centerline
                         (Power Plant station (PPS) 100)

J. Electrical Load Data

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

K. References

   (1) Internal Reference No.

       95VZ016

   (2) Other References

IAE V2500 Service Bulletins:

V2500-ENG-70-0336 (Information - Provide A New Electronic Engine Control With SCN12B/N Software And Featuring Hardware Common To The A5)

V2500-ENG-70-0056 (Information - Fuel And Control - To Announce A Hinged Heatshield Configuration For The (EEC) Electronic Engine Control)

V2500-ENG-73-0007 (Engine - Fuel And Control - Incorporate A New Electronic Engine Control (EEC)

V2500-ENG-73-0015 (Engine - Fuel and Control - Incorporate A New Electronic Engine Control (EEC) Configuration And Rework the Data Entry Plug Assembly To The SCN11E Software Configuration)

V2500-ENG-73-0024 (Engine - Fuel And Control - Provide An Electronic Engine Control (EEC) With Improved Printed Circuit Boards)

V2500-ENG-73-0027 (Engine - Fuel And Control - To Provide A New Electronic Engine Control (EEC) With The SCN11G/J Software Configuration

V2500-ENG-73-0032 (Engine - Fuel And Control - To Provide A New Electronic Engine Control (EEC) With The SCN11H Software Configuration

V2500-ENG-73-0037 (Engine - Fuel And Control - To Provide A New Electronic Engine Control (EEC) With The SCN12A Software Configuration

V2500-ENG-73-0044 (Engine - Fuel And Control - To Provide A New Electronic Engine Control (EEC) With The SCN12B Software Configuration

V2500-ENG-73-0069 (Engine - Fuel And Control - To Provide A New Electronic Engine Control (EEC) With The SCN12C Software Configuration

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

Hamilton Standard Service Bulletin EEC150-20-73-1-73-13/ EEC150-1-73-30

Airbus Service Bulletin A320-73-1049 (A/C Modification 25720)

The V2500 Engine Illustrated Parts Catalog (S-V2500-1IA), Chapter/Section 73-22-34

V2500-ENG-73-0082

The V2500 Engine Manual (E-V2500-1IA), 71-00-00, Testing-11

The A320 Aircraft Maintenance Manual, Chapter/Section 71-13-00, 73-22-34, Removal/Installation and 73-22-35 Removal/Installation

L. Other Publications Affected

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

2. Accomplishment Instructions

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

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

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

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

        or

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

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

D. Pre-requisite Instructions

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

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

   (3) Open the fan cowls by use of the approved procedure in Reference (5) Chapter/Section 71-13-00, (TASK 71-13-00-010-010).

E. Removal Instructions

V2500-ENG-73-0082

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    (1)   Remove the 808050-4-046 (2A3148), 798300-15-046 (2A3149), 798300-16-046 (2A3150), 798300-17-046 (2A3151) or 798300-18-046 (2A3153) Electronic Engine Control by the approved procedure given in Reference (6), Chapter/Section 73-22-34, Removal/Installation. Refer to Figure 1.

F. Rework Instructions

    (1)   Do a modification of the 808050-4-046 (2A3148), 798300-15-046 (2A3149), 798300-16-046 (2A3150), 798300-17-046 (2A3151) or 798300-18-046 (2A3153) Electronic Engine Control (See Reference (4), Chapter/Section 73-22-34, Fig/Item No. 01-280) and identify with the new part number by the procedure given in Reference (2).

Procedure	Supplementary Information
(a) Send the Electronic Engine Control to the approved vendor to be modified. See paragraph 2.B.	See Figure 1.

    (2)   Remove the Active Clearance Control (ACC) Front Duct Cover Assembly. Refer to V2500-ENG-75-0025 specified in Reference (1), and Figure 2.

        (a) Locate the Front ACC Duct.

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

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

        NOTE: When you incorporate this Service Bulletin with the new SCN12D software logic, the Front Duct Cover Assembly given in V2500-ENG-75-0025 must be removed. See Reference (1).

G. Installation Instructions

    (1)   Install the 808050-04-048 (2A3224), 798300-15-048 (2A3225), 798300-16-048 (2A3226), 798300-17-048 (2A3227) or 798300-18-048 (2A3228) Electronic Engine Control (1 off) by the approved procedure given in Reference (6), Chapter/Section 73-22-34, Removal/Installation. Refer to Figure 1.

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

    (2)   Install the Data Entry Plug (with the applicable wire combination). See Reference (6), Chapter/Section 73-22-35, Removal/Installation.

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

V2500-ENG-73-0082

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

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

(a) Install a Data Entry Plug with the 00/04 Bump configuration for
    engines that will not use the Thrust Bump.

(b) Install a Data Entry Plug with the 07 Bump configuration for engines
    that will not use the Improved Consolidated Thrust Bump.

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

H. Post-Requisite Instructions

(1) Close the fan cowls by the use of the approved procedure in Reference
     (6), Chapter/Section 71-13-00 (TASK 71-13-00-410-010).

(2) Remove the warning notices.

I. Recording Instructions

(1) A record of accomplishment is necessary.

V2500-ENG-73-0082

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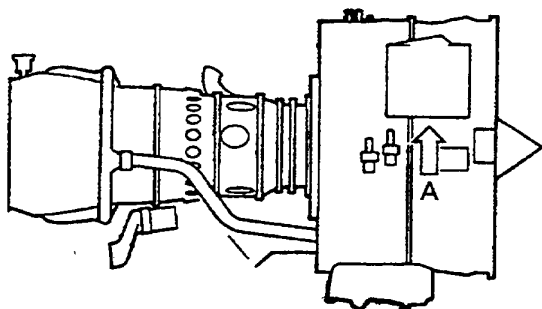
REMOVE THE ELECTRONIC ENGINE
CONTROL, DO THE CHANGE SPECIFIED,
IDENTIFY AND INSTALL THE NEW
ELECTRONIC ENGINE CONTROL (1 off) *
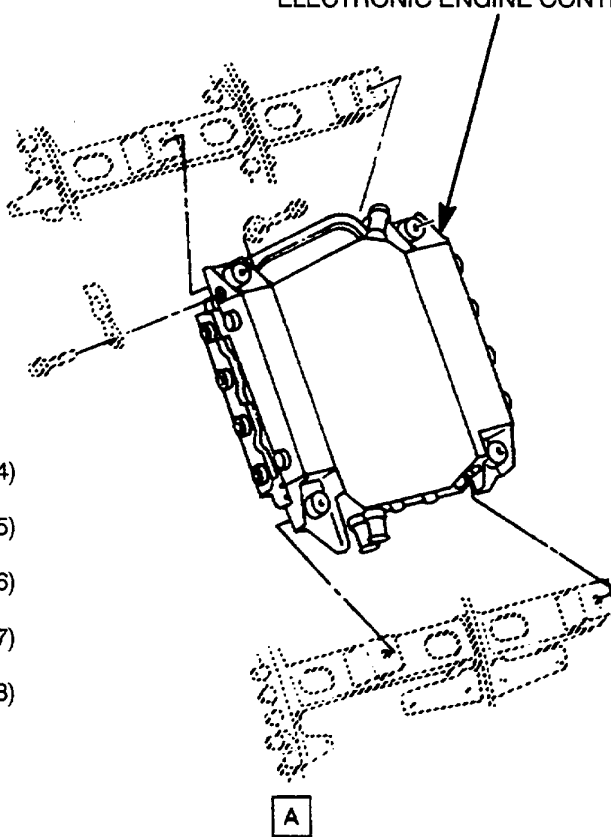
*NEW PART NUMBER

808050-04-048 (2A3224)
OR
798300-15-048 (2A3225)
OR
798300-16-048 (2A3226)
OR
798300-17-048 (2A3227)
OR
798300-18-048 (2A3228)

A

E7722

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

V2500-ENG-73-0082

REMOVE THE PN 4W0102
BOLTS

REMOVE THE PN 2A3637
FRONT DUCT COVER ASSEMBLY

FRONT ACTIVE
CLEARANCE CONTROL
DUCT

A

E7723

Location of the ACC Front Duct Cover Assembly
Fig.2

V2500-ENG-73-0082

3. <u>Material Information</u>

   A. <u>Kit associated with this bulletin.</u>

      None

   B. <u>Parts affected by this bulletin.</u>

```
New             Est'd                      Old
Part No.        Unit                       Part No.        Instructions
(ATA No.)   Qty Price ($)  Keyword         (IPC No.)       Disposition
-------------------------------------------------------------------------
```

Applicability: For each V2500 Engine to incorporate this Service Bulletin that
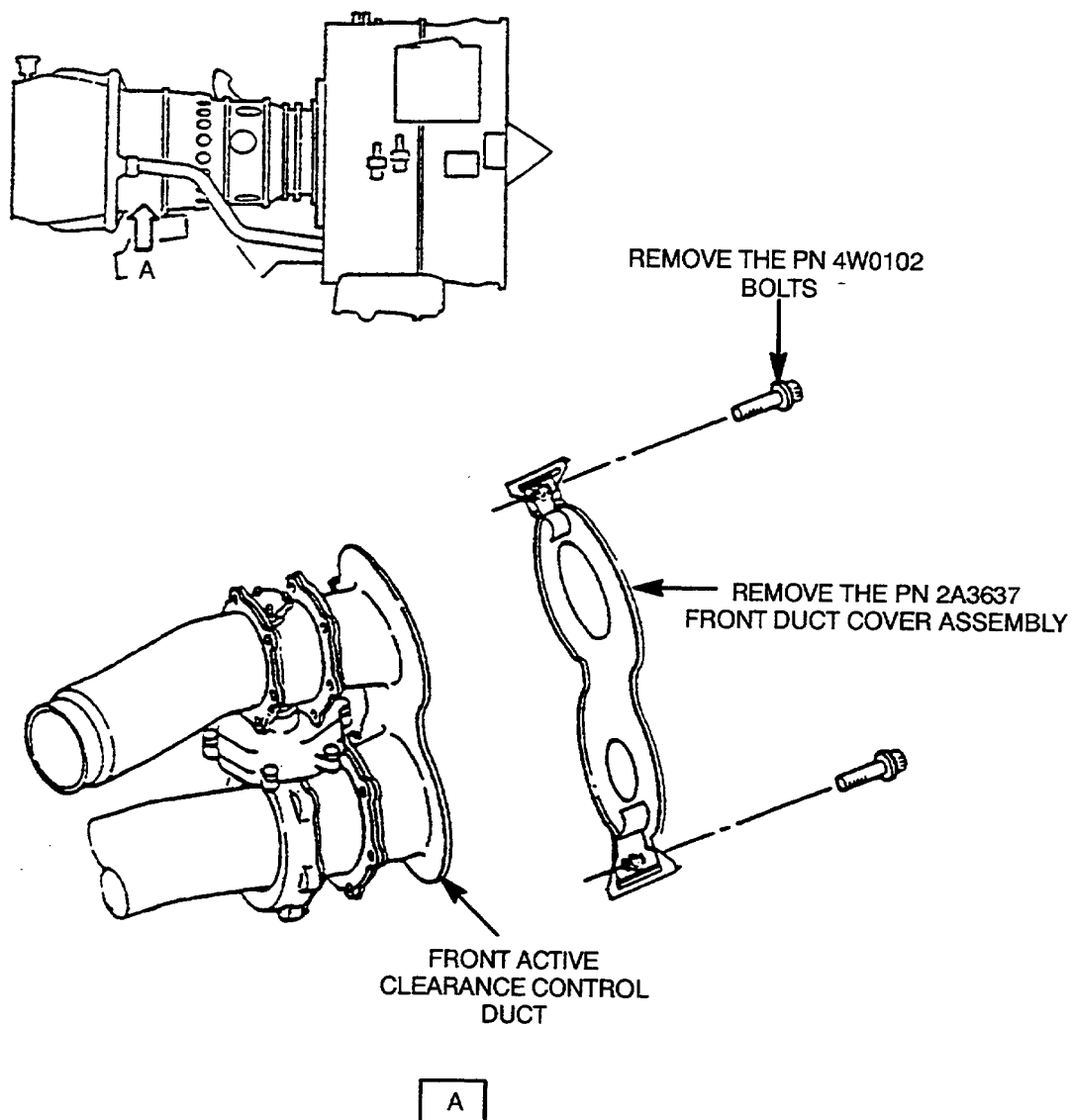incorporates V2500-ENG-70-0056, V2500-ENG-70-0336, V2500-ENG-73-0007,
V2500-ENG-73-0015, V2500-ENG-73-0024, V2500-ENG-73-0027, V2500-ENG-73-0032,
V2500-ENG-73-0037, V2500-ENG-73-0044 and V2500-ENG-73-0069.

```
808050-04-048 1              Control,      808050-4-046  (S1)(1D)(A)(B)
(2A3224)                     Electronic    (2A3148)
(73-22-34)                   Engine        (01-280)
```

Applicability: For each V2500 Engine to incorporate this Service Bulletin that
incorporates V2500-ENG-73-007, V2500-ENG-73-0015, V2500-ENG-73-0027,
V2500-ENG-73-0032, V2500-ENG-73-0037, V2500-ENG-73-0044 and V2500-ENG-73-0069,
but does not incorporate V2500-ENG-70-0056, V2500-ENG-70-0336 and
V2500-ENG-73-0024.

```
798300-15-048 1              Control,      798300-15-046 (S1)(1D)(A)(B)
(2A3225)                     Electronic    (2A3149)
(73-22-34)                   Engine        (01-280)
```

Applicability: For each V2500 Engine to incorporate this Service Bulletin that
incorporates V2500-ENG-73-0007, V2500-ENG-73-0015, V2500-ENG-73-0024,
V2500-ENG-73-0027, V2500-ENG-73-0032, V2500-ENG-73-0037, V2500-ENG-73-0044 and
V2500-ENG-73-0069, but does not incorporate V2500-ENG-70-0056 and
V2500-ENG-70-0336.

```
798300-16-048 1              Control,      798300-16-046 (S1)(1D)(A)(B)
(2A3226)                     Electronic    (2A3150)
(73-22-34)                   Engine        (01-280)
```

Applicability: For each V2500 Engine to incorporate this Service Bulletin that
incorporates V2500-ENG-70-0056, V2500-ENG-73-0007, V2500-ENG-73-0015,
V2500-ENG-73-0027, V2500-ENG-73-0032, V2500-ENG-73-0037, V2500-ENG-73-0044 and
V2500-ENG-73-0069, but does not incorporate V2500-ENG-70-0336 and
V2500-ENG-73-0024.

```
798300-17-048 1          Control,          798300-17-046 (S1)(1D)(A)(B)
(2A3227)                 Electronic        (2A3151)
(73-22-34)               Engine            (01-280)
```

Applicability: For each V2500 Engine to incorporate this Service Bulletin that
incorporates V2500-ENG-70-0056, V2500-ENG-73-0007, V2500-ENG-73-0015,
V2500-ENG-73-0024, V2500-ENG-73-0027, V2500-ENG-73-0032, V2500-ENG-73-0037,
V2500-ENG-73-0044 and V2500-ENG-73-0069 but does not incorporate
V2500-ENG-70-0336.

```
798300-18-048 1          Control,          798300-18-046 (S1)(1D)(A)(B)
(2A3228)                 Electronic        (2A3153)
(73-22-34)               Engine            (01-280)
```

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

(S1) This Service Bulletin may be intermixed with A1SCN12A/B/C on either
     of the engines on the aircraft.
(1D) You can obtain the new part by modification. Use the approved
     procedure given in Reference (2). Purchase new parts from or return
     the old parts for modification to the approved vendor given in the
     Accomplishment Instructions.
(A) The new part is currently available.
(B) The old part will no longer be supplied.

NOTE: The estimated 1996 unit prices shown are provided for planning purposes
      only and do not constitute a firm quotation. Consult the IAE Price
      Catalog or contact IAE's Spare Parts Sales Department for information
      concerning firm prices.

V2500-ENG-73-0082

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MODIFICATIONS

PART NUMBER CHANGE

BASE LINE

798300-8-026, L7
(2A1988)
OR
798300-8-026, L7
(2A1989)

V2500-ENG-73-0007
PROVIDES SCN10D
SOFTWARE

798300-027, L7
(2A2039)

CONTINUED ON
SHEET 2 → Ⓐ

V2500-ENG-73-0015
PROVIDES SCN11E
SOFTWARE AND A
MULTIPLE BUMP

798300-8-032, L12
(2A2189)

CONTINUED ON
SHEET 2 → Ⓑ

V2500-ENG-73-0024
PROVIDES SCN11E
SOFTWARE AND PRINTED
CIRCUIT BOARDS

798300-10-032, L12
(2A2166)

V2500-ENG-70-0056
PROVIDES HINGED
FIRE SHIELDS

798300-14-032
(2A2285)

V2500-ENG-73-0027
PROVIDES SCN11G
SOFTWARE

798300-14-037
(2A2392)

798300-10-037
(2A2390)

V2500-ENG-73-0032
PROVIDES SCN11H
SOFTWARE

798300-14-038
(2A2480)

798300-10-038
(2A2478)

CONTINUED ON
SHEET 3 Ⓒ

CONTINUED ON
SHEET 3 Ⓓ

E7724

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

V2500-ENG-73-0082

PART NUMBER CHANGE

*THERE IS NO PROCEDURE TO
ADVANCE THIS CONFIGURATION

(A) CONTINUED FROM
SHEET 1

(B) CONTINUED FROM
SHEET 1

```
        798300-12-032                    798300-12-027
        (2A2284)                         (2A2283)*

        798300-12-037        798300-18-037
        (2A2391)             (2A2356)

        798300-12-038        798300-8-038
        (2A2479)             (2A2475)

            (E)                  (F)
      CONTINUED ON         CONTINUED ON
        SHEET 4              SHEET 4
```

E7725

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

V2500-ENG-73-0082
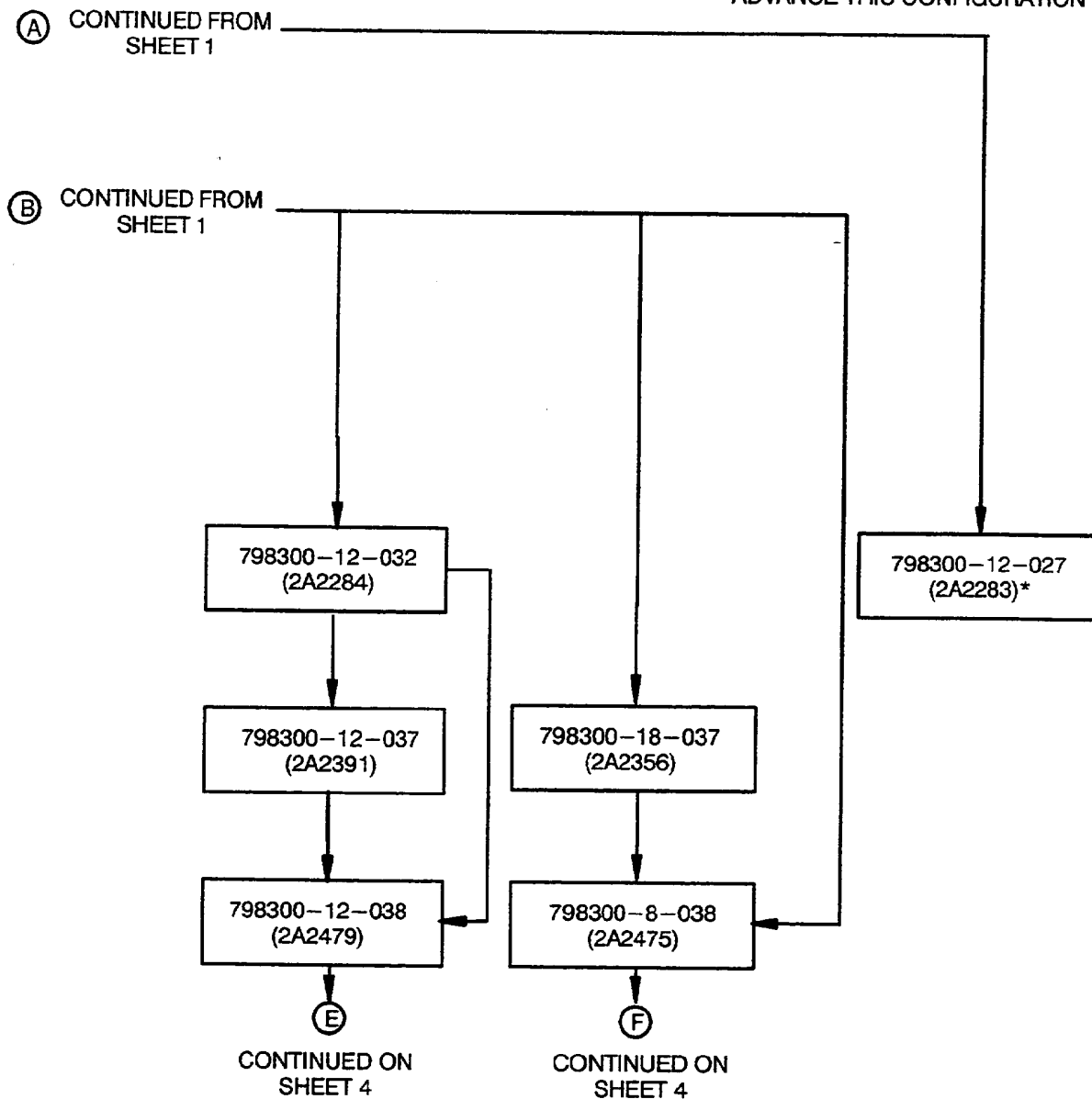
MODIFICATIONS　　　　　　　　　　**PART NUMBER CHANGE**

Ⓒ　　　　　　　　　　　　　Ⓓ
CONTINUED FROM　　　　　CONTINUED FROM
SHEET 1　　　　　　　　　　SHEET 1

V2500-ENG-73-0037 PROVIDES SCN12A SOFTWARE	798300-14-041 (2A2692)	798300-10-041 (2A2690)
V2500-ENG-73-0044 PROVIDES SCN12B SOFTWARE	798300-14-045 (2A2993)	798300-10-045 (2A2991)
V2500-ENG-70-0336 PROVIDES COMMON HARDWARE FOR THE V2500-A1 AND V2500-A5	2A2995*	2A2995*
V2500-ENG-70-0336 PROVIDES COMMON HARDWARE FOR THE V2500-A1 AND V2500-A5	808050-3-045 (2A3105)	808050-3-045 (2A3105)
V2500-ENG-73-0069 PROVIDES SCN12C/O SOFTWARE FOR THE V2500-A1	808050-4-046 (2A3148)	808050-4-046 (2A3148)
V2500-ENG-73-0082 PROVIDES SCN12D SOFTWARE FOR THE V2500-A1	808050-04-048 (2A3224)	808050-04-048 (2A3224)

Ⓖ　　　　　　　　　　　　　Ⓗ

*THIS PART IS SHOWN FOR THE RECORD ONLY　　　Ⓖ AND Ⓗ CONTINUED ON SHEET 5

E7726

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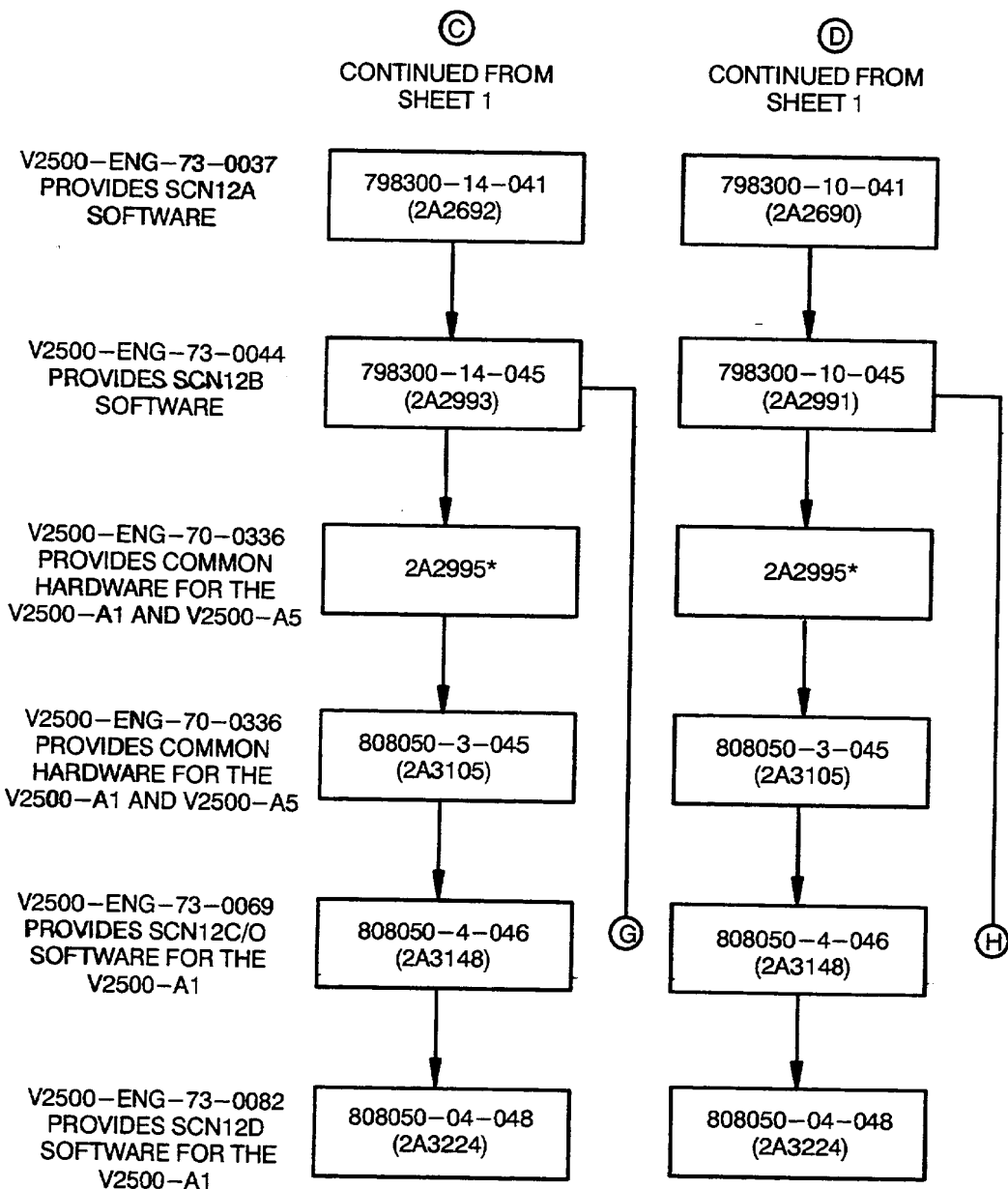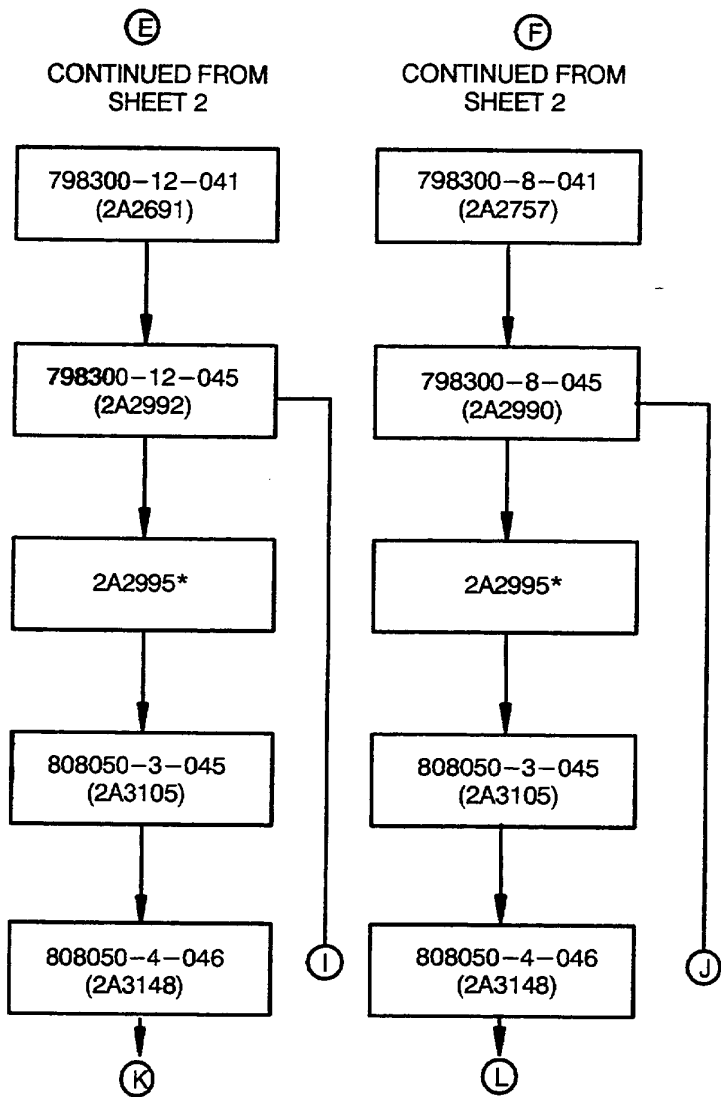01 Item 280
Fig.3 (Sheet 3)

V2500-ENG-73-0082

V2500

Printed in Great Britain

PART NUMBER CHANGE

Ⓔ CONTINUED FROM SHEET 2

Ⓕ CONTINUED FROM SHEET 2

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┌─────────────────┐        ┌─────────────────┐
│ 798300-12-041   │        │ 798300-8-041    │
│   (2A2691)      │        │   (2A2757)      │
└─────────────────┘        └─────────────────┘
         │                          │
         ▼                          ▼
┌─────────────────┐        ┌─────────────────┐
│ 798300-12-045   │        │ 798300-8-045    │
│   (2A2992)      │───┐    │   (2A2990)      │───┐
└─────────────────┘   │    └─────────────────┘   │
         │            │             │            │
         ▼            │             ▼            │
┌─────────────────┐   │    ┌─────────────────┐   │
│    2A2995*      │   │    │    2A2995*      │   │
└─────────────────┘   │    └─────────────────┘   │
         │            │             │            │
         ▼            │             ▼            │
┌─────────────────┐   │    ┌─────────────────┐   │
│ 808050-3-045    │   │    │ 808050-3-045    │   │
│   (2A3105)      │   │    │   (2A3105)      │   │
└─────────────────┘   │    └─────────────────┘   │
         │            │             │            │
         ▼            │             ▼            │
┌─────────────────┐   │    ┌─────────────────┐   │
│ 808050-4-046    │  Ⓘ   │ 808050-4-046    │  Ⓙ
│   (2A3148)      │        │   (2A3148)      │
└─────────────────┘        └─────────────────┘
         │                          │
         ▼                          ▼
        Ⓚ                          Ⓛ
```

Ⓘ Ⓙ Ⓚ AND Ⓛ CONTINUED ON SHEET 6

*THIS PART IS SHOWN FOR THE RECORD ONLY   E7727

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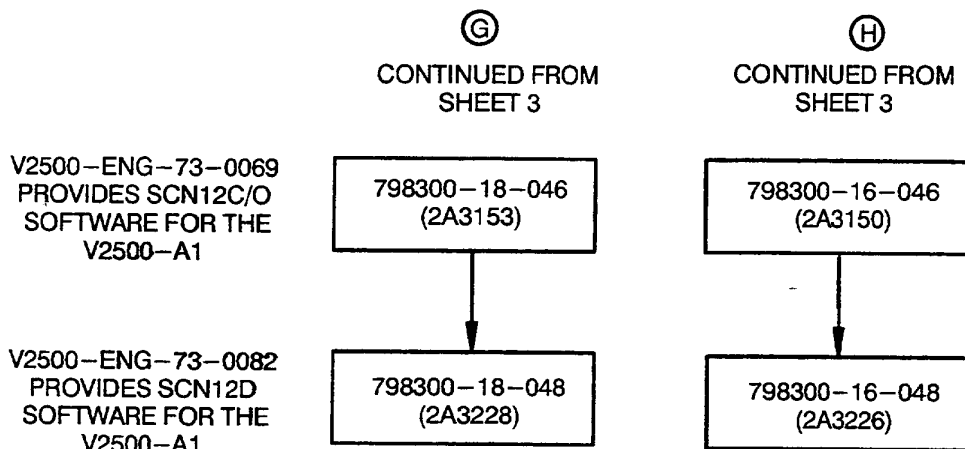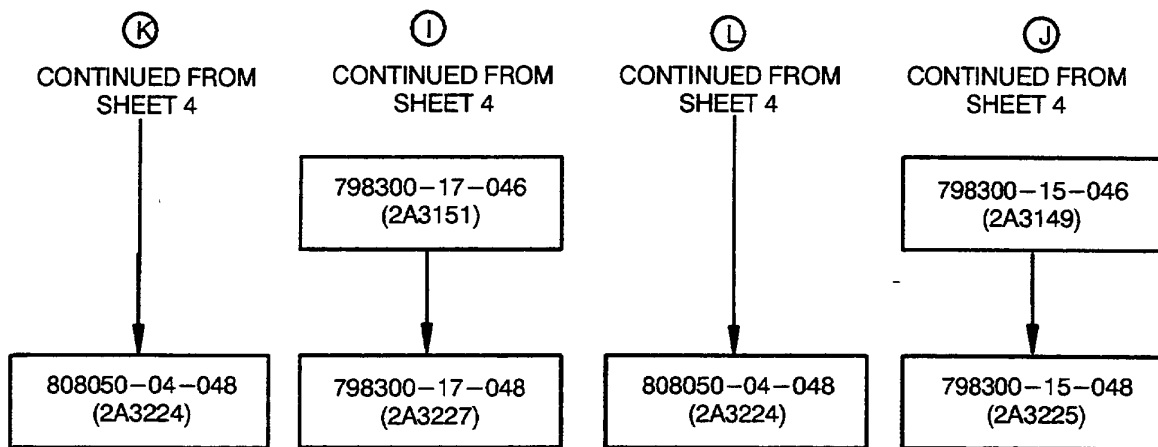Fig.3 (Sheet 4)

V2500-ENG-73-0082

Printed in Great Britain

MODIFICATIONS   PART NUMBER CHANGE

Ⓖ   Ⓗ

CONTINUED FROM   CONTINUED FROM
SHEET 3   SHEET 3

V2500-ENG-73-0069
PROVIDES SCN12C/O
SOFTWARE FOR THE
V2500-A1

| 798300-18-046 (2A3153) | 798300-16-046 (2A3150) |

V2500-ENG-73-0082
PROVIDES SCN12D
SOFTWARE FOR THE
V2500-A1

| 798300-18-048 (2A3228) | 798300-16-048 (2A3226) |

E7728

Family Tree - Electronic Engine Control (EEC) Ref. Catalog Sequence No. 73-22-34. Fig.
01 Item 280
Fig.3 (Sheet 5)

V2500-ENG-73-0082

V2500

PART NUMBER CHANGE

Ⓚ
CONTINUED FROM
SHEET 4

Ⓘ
CONTINUED FROM
SHEET 4

Ⓛ
CONTINUED FROM
SHEET 4

Ⓙ
CONTINUED FROM
SHEET 4

```
                  798300-17-046                        798300-15-046
                    (2A3151)                             (2A3149)

        │               │                  │                │
        ▼               ▼                  ▼                ▼
  808050-04-048   798300-17-048      808050-04-048    798300-15-048
    (2A3224)        (2A3227)           (2A3224)          (2A3225)
```

E7729

Family Tree - Electronic Engine Control (EEC) Ref. Catalog Sequence No. 73-22-34. Fig.
01 Item 280
Fig.3 (Sheet 6)

V2500-ENG-73-0082

SERVICE BULLETIN

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Engine Fuel and Control – EEC150–1 Electronic Engine Control –
Incorporation of New Software Configuration: Airbus A1 SCN12D

1. Planning Information

    A. Effectivity

        Hamilton Standard EEC150–1 Electronic Engine Controls

        798300–XX–XXX

        NOTE: The EEC150–1 is used on Airbus A320 aircraft that use the IAE
                V2500–A1 engine. XX – Identifies all available hardware configurations,
                and XXX identifies all available software configurations.

    B. Reason

        The purpose of this Service Bulletin is to allow the V2500–A1 operators to install
        SCN12D software in the EEC150–1.

        (1) Problem

            (a) AUTOTHRUST INSTINCTIVE DISCONNECT (ID) LOGIC

                 Though no known problems have been experienced on the V2500
                 engine installation to date, sensitivity of the ID signal acquisition in the
                 EEC could be too high.

            (b) STATOR VANE ACTUATOR (SVA) TRACK CHECK DE–LATCHING

                 The ECAM warning "ENG 1(2) COMPRESSOR VANE" remains
                 displayed even though the conditions that originally drove the
                 message no longer exist.

            (c) INTENTIONALLY OMITTED

            (d) MANUAL START LOGIC ENHANCEMENT

                 Manual starts in the field have not always been successful due to
                 premature closure of the Starter Air Valve.

(e) SCHEDULED MAINTENANCE REPORT ENHANCEMENT

Troubleshooting of current Scheduled Maintenance Report faults can be simplified.

(f) THRUST REVERSER STOW TIME MONITORING

A clear "NO DISPATCH" indication is required for Thrust Reverser system faults which result in Thrust Reverser stow time exceedances.

(g) SPURIOUS CLEAR LANGUAGE MESSAGE DUE TO AIRCRAFT BOUNCE ON LANDING

Spurious emission of the Clear Language Message "HC/PROX SW/T/R UP ACT" has been experienced in the field on landing.

(h) 8.0 THROTTLE LEVER ANGLE FAULT ACCOMMODATION ENHANCEMENT

Current aircraft procedures require that the engine be shutdown prior to landing in response to an "ENG THR LEVER FAULT" or "ENG THR LEVER DISAGREE" warning if autoland is not used.

(i) INTENTIONALLY OMITTED

(j) THRUST REVERSER THIRD LINE OF DEFENSE SHUT OFF VALVE MONITORING

Potential incorporation of an additional aircraft controlled Shut Off Valve to the Thrust Reverser system, upstream of the existing Hydraulic Control Unit, will rely on the EEC for functional verification and fault annunciation.

(k) WEIGHT ON WHEELS VALIDATION WITH MACH NUMBER CONFIRMATION

Though no events have been seen in the field or at flight test, current EEC validation of Weight On Wheels from the aircraft with Mach Number could result in a spurious Weight On Wheels fault and subsequent inhibition of the Thrust Reverser on landing.

(l) WEIGHT ON WHEELS ACCOMMODATION FOR ENGINE INTERFACE UNIT FAULTS

When the aircraft is on the ground, an intermittent Engine Interface Unit Label 31 can result in Weight On Wheels toggling between ground and air.

(m) EEC INTERNAL CROSS LINK FAILURE ACCOMMODATION ENHANCEMENT

Failure accommodation of the loss of one EEC channel, or loss of the EEC internal cross channel data link, can be improved.

(2) Cause.

(a) AUTOTHRUST INSTINCTIVE DISCONNECT (ID) LOGIC

Analysis and test have demonstrated that the V2500 logic's susceptibility to spurious short duration signals on the ID line can be improved.

(b) STATOR VANE ACTUATOR (SVA) TRACK CHECK DE-LATCHING

SVA track check faults which set this message are latched faults which can only be cleared by an EEC reset.

(c) INTENTIONALLY OMITTED

(d) MANUAL START LOGIC ENHANCEMENT

Current EEC logic requires detection of the transition of the Manual Start Push Button discrete from "OFF" to "ON" in order to initiate a manual start. A/C 28 VDC electrical transients, or a "quick" selection of the Manual Start Push Button after "IGN" selection, can result in one or both channels of the EEC missing this transition. This results in no command, or loss of command, to the Starter Air Valve and thus termination of the manual start sequence.

(e) SCHEDULED MAINTENANCE REPORT ENHANCEMENT

The current Scheduled Maintenance Report fault data includes only the associated Clear Language Message and a 2 digit Fault Cell number, but the fault acronym that triggered the Clear Language Message is not accessible.

(f)   THRUST REVERSER STOW TIME MONITORING

The current "ENG 1(2) REVERSER FAULT" ECAM warning which is triggered for Thrust Reverser stow time exceedances is not latched and will be displayed only until the Thrust Reverser completes its stow cycle.

(g)   SPURIOUS CLEAR LANGUAGE MESSAGE DUE TO AIRCRAFT BOUNCE ON LANDING

The spurious emission of this message is the result of the Weight On Wheels indication from the aircraft toggling in response to aircraft bounce on landing. If the Thrust Reverser begins to deploy on initial touchdown, this spurious message can be generated when the aircraft Weight On Wheels transitions to "AIR" while the Reverser is "UNLOCKED". No maintenance action is required under these circumstances.

(h)   THROTTLE LEVER ANGLE FAULT ACCOMMODATION ENHANCEMENT

Current EEC Throttle Lever Angle fault detection and accommodation logic results in permanent latching of a Throttle Resolver Angle fault and a Throttle Resolver Angle accommodation at certain flight conditions that can result in the engine being set to a level of thrust that can not be accommodated at landing.

(i)   INTENTIONALLY OMITTED

(j)   THRUST REVERSER THIRD LINE OF DEFENSE SHUT OFF VALVE MONITORING

Third Line of Defense system design and potential retrofit considerations dictate use of the existing Hydraulic Control Unit pressure switch processing by the EEC to provide aircraft Shut Off Valve functional verification and fault annunciation.

(k)   WEIGHT ON WHEELS VALIDATION WITH MACH NUMBER CONFIRMATION

There is currently no confirmation time associated with this validation logic.

(l) WEIGHT ON WHEELS ACCOMMODATION FOR ENGINE INTERFACE UNIT FAULTS

When the A/C is on the ground, if the Engine Interface Unit Label 031 becomes invalid, Mach Number is immediately used to set Weight On Wheels. When Label 031 is received again, Mach Number is no longer used but use of the Engine Interface Unit Weight On Wheels is delayed by 1/2 second during which time the default of "AIR" is set.

(m) EEC INTERNAL CROSS LINK FAILURE ACCOMMODATION ENHANCEMENT

Current EEC fault accommodation logic inhibits certain faults from being set when status of the fault in the other channel is unknown.

(3) Solution.

(a) AUTOTHRUST INSTINCTIVE DISCONNECT (ID) LOGIC

Modify the EEC ID logic to require a 2 pass confirmation of the same ID discrete input to the EEC before allowing disconnection of the Autothrust System to reduce the susceptibility to spurious signals on the ID line.

(b) STATOR VANE ACTUATOR (SVA) TRACK CHECK DE–LATCHING

Modify the EEC logic to allow the SVA track check faults which set this message to clear if the SVA system returns to within the required tolerance for five seconds. The SVA track check fault is allowed to clear up to three times after which it will be latched until the next EEC reset. Additionally, the occurrence of any SVA track check fault in flight will be recalled on landing to provide a "NO DISPATCH" message to ensure appropriate maintenance action.

(c) INTENTIONALLY OMITTED

(d) MANUAL START LOGIC ENHANCEMENT

Modify the EEC logic to initiate a manual start based on the "ON" state of the Manual Start Push Button, rather than the transition from "OFF" to "ON". In addition, the same automatic starter crash re–engagement protection currently provided for automatic starts is incorporated for manual starts to cover Master Lever resets or A/C 28 VDC electrical transients when the Manual Start Push Button discrete is set to "ON".

SERVICE BULLETIN

(e) SCHEDULED MAINTENANCE REPORT ENHANCEMENT

Replace the current 2 digit Fault Cell number in the Schedule
Maintenance Report with the associated fault acronym to simplify the
associated troubleshooting procedures.

(f) THRUST REVERSER STOW TIME MONITORING

Modify the EEC logic to latch the "ENG 1(2) REVERSER FAULT"
ECAM warning which is triggered for Thrust Reverser stow time
exceedances to insure that this "NO DISPATCH" condition is reported
to the maintenance crew for appropriate maintenance action prior to
the next dispatch of the aircraft.

(g) SPURIOUS CLEAR LANGUAGE MESSAGE DUE TO AIRCRAFT
BOUNCE ON LANDING

Modify the EEC logic to require a 3 second confirmation time on the
emission of this Clear Language Message.

(h) THROTTLE LEVER ANGLE FAULT ACCOMMODATION
ENHANCEMENT

Modify the EEC Throttle Resolver Angle fault logic to allow a detected
fault to heal a limited number of times (3), if the input is validated again
for a specified period of time (5 seconds). Utilize additional aircraft
inputs (slats) to set the most appropriate fail–safe value of Throttle
Resolver Angle at the time of the failure and allow transition of this
value to idle when the aircraft is in "APPROACH," thus precluding the
need to shut down the engine at landing.

(i) INTENTIONALLY OMITTED

(j) THRUST REVERSER THIRD LINE OF DEFENSE SHUT OFF VALVE
MONITORING

Modify the existing EEC Thrust Reverser control logic, Menu Mode
Thrust Reverser Test logic and existing Hydraulic Control Unit
pressure switch processing logic to provide the potential to (1) verify
Shut Off Valve functioning during the normal Thrust Reverser
deploy/stow cycle on landing, (2) verify Shut Off Valve functioning
during the Thrust Reverser Menu Mode Test and (3) provide functional
and dispatch status of the total Thrust Reverser system, including the
additional aircraft controlled Shut Off Valve when installed as noted by
digital discrete from the aircraft Engine Interface Unit.

(k) WEIGHT ON WHEELS VALIDATION WITH MACH NUMBER CONFIRMATION

Incorporate a 20 second confirmation on the Weight On Wheels validation with Mach Number as a design enhancement before setting the associated fault and inhibiting the use of the Thrust Revereser on landing.

(l) WEIGHT ON WHEELS ACCOMMODATION FOR ENGINE INTERFACE UNIT FAULTS

Additional logic was added to prevent this toggling of Weight On Wheels to "AIR" while the 1/2 second confirmation timer elapses.

(m) EEC INTERNAL CROSS LINK FAILURE ACCOMMODATION ENHANCEMENT

Modify the EEC logic to allow the controlling channel to set the relevant messages with its local information, if the crosslink is failed or one channel is down.

C. Description

The EEC150–1 is reprogrammed with SCN12D, reidentified and tested.

D. Compliance

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

E. Approval

The part number changes and/or part modifications given in Paragraphs 2 and 3 of this service bulletin obey the applicable Federal Aviation Regulations and are FAA–approved for the EEC150–1 Electronic Engine Control.

F. Manpower

Approximately 4 man–hours are necessary to do these Service Bulletin procedures when you do component maintenance (or overhaul). This estimate does not include any time necessary to do functional tests.

SERVICE BULLETIN

G.   Material – Cost and Availability

(1)   This service bulletin will be done at no charge to the operator if the EEC150–1 is sent to one of these addresses:

(a)   United Technologies Corporation
Hamilton Standard Division
Attention: Hamilton Support Systems
            Electronics Service Center
97 Newberrry Road
East Windsor, CT 06088
U.S.A.
(FAA Repair Liscense S13R842L)

(b)   Pratt & Whitney
Overhaul and Repair Center – Europe (PWORCE)
Maastricht Airport
P.O. Box 269
6190 AG BEEK
Maastricht Airport
The Netherlands
(FAA Repair Liscense CW5Y794M)

(2)   IAE funds this program. The hard copy, no–charge purchase order to perform this service bulletin must refer to the HS service bulletin number EEC150–1–73–30 and the IAE Service Bulletin Number V2500–ENG–73–0082.

(3)   The new parts required to accomplish this Service Bulletin are listed in Section 3, Material Information. These parts are available at no cost to the operator. Lead times can be obtained from Hamilton Standard by issuing a hard copy, no–charge purchase order for the quantitly requested. Purchase orders for parts must refer to the HS Service Bulletin Number EEC150–1–73–30, IAE Service Bulletin Number IAE Service Bulletin Number TBD, and be addressed to :

Hamilton Standard
  A United Technologies Company
  Attn: Manager Commercial Spares
          Mail Stop: 2MGGHH10
  One Hamilton Road
  Windsor Locks, CT 06096–1010
  USA
Facsimile: (860) 654–6905

H. Tooling

    None

I. Weight and Balance

    None

J. Electrical Load Data

    Not Affected

K. References

    E9137 Standard Electronic Practices Manual
    Component Maintenance Manual CMM 73-22-34
    IAE Service Bulletin Number V2500-ENG-73-0082
    Hamilton Standard Service Bulletin EEC150-1-73-30

L. Other Publications Affected

    Illustrated Parts Catalog 73-22-34

2. Accomplishment Instructions

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

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

    A. Refer to the REPAIR RSS-HS004 section of CMM 73-22-34 to reprogram the
        EEC150-1. Use the program, version number, and engine trims shown below.

	Channel A	Channel B
Application Program:	Y805881	Y805882
Application Version Number:	082	082
Engine Trim Program:	Y805886	Y805886
Engine Trim Version Number:	082	082

B. Re–identify the Processor/Input Modules. Change the part numbers as shown below:

Assembly	Old Part Number	New Part Number
Processor/Input Module – Channel A	793610–14–XXX	793610–14–048
	793610–40–XXX	793610–40–048
Processor/Input Module – Channel B	793612–14–XXX	793612–14–048
	793612–40–XXX	793612–40–048

NOTE: XXX – Identifies all available software configurations.

C. Change the Hamilton Standard Part Number to show that this Service Bulletin is included into the end–assembly configuration. Put the information shown below on a new unit identification plate. EEC150–1 units reprogrammed at one of the addresses shown in paragraph 1.G will be sent back with their assemblies re–identified as shown.

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

PART NUMBER BEFORE THIS SERVICE BULLETIN	PART NUMBER AFTER THIS SERVICE BULLETIN
798300–XX–XXX	798300–XX–XXX

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

EEC150–1 END–ASSEMBLY	NEW IAE PART NUMBER
798300–15–048	2A3225
798300–16–048	2A3226
798300–17–048	2A3227
798300–18–048	2A3228

D. Refer to the TESTING AND TROUBLESHOOTING section of the CMM 73–22–34 to test the EEC150–1. Environmental Stress Screening (ESS) is not required.

3. Material Information

A. This Service Bulletin change will use the parts in the list for each EEC150–1 that incorporates this service bulletin.

B. Any parts that usually are discarded when you disassemble the EEC150–1 are not in the list.

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

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

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

F. New Parts Required

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

Instruction Code A.   The Service Bulletin change adds the "New PN" to the EEC150–1.

Instruction Code B.   The Service Bulletin change removes the "PN before the SB" from the EEC150–1. Discard the part or use it in other equipment.

SERVICE BULLETIN

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Engine Fuel and Control – EEC150–20 Electronic Engine Control –
Incorporation of Software Configuration: Airbus A1 SCN12D

1. Planning Information

    A. Effectivity

        Hamilton Standard EEC150–20 Electronic Engine Controls

        808050–4–XXX

        NOTE: Following incorporation of this Service Bulletin, the EEC150–20 can be
                installed on Airbus A320 aircraft that use the IAE V2500–A1 engine.
                XXX – Identifies all available software configurations.

    B. Reason

        The purpose of this Service Bulletin is to allow the V2500–A1 operators to install
        SCN12D software in the EEC150–20.

        (1) Problem

             (a) AUTOTHRUST INSTINCTIVE DISCONNECT (ID) LOGIC

                  Though no known problems have been experienced on the V2500
                  engine installation to date, sensitivity of the ID signal acquisition in the
                  EEC could be too high.

             (b) STATOR VANE ACTUATOR(SVA) TRACK CHECK DE–LATCHING

                  The ECAM warning "ENG 1(2) COMPRESSOR VANE" remains
                  displayed even though the conditions that originally drove the
                  message no longer exist.

             (c) INTENTIONALLY OMITTED

             (d) MANUAL START LOGIC ENHANCEMENT

                  Manual starts in the field have not always been successful due to
                  premature closure of the Starter Air Valve.

(e) SCHEDULED MAINTENANCE REPORT ENHANCEMENT

Troubleshooting of current Scheduled Maintenance Report faults can be simplified.

(f) THRUST REVERSER STOW TIME MONITORING

A clear "NO DISPATCH" indication is required for Thrust Reverser system faults which result in Thrust Reverser stow time exceedances.

(g) SPURIOUS CLEAR LANGUAGE MESSAGE DUE TO AIRCRAFT BOUNCE ON LANDING

Spurious emission of the Clear Language Message "HC/PROX SW/T/R UP ACT" has been experienced in the field on landing.

(h) 8.0 THROTTLE LEVER ANGLE FAULT ACCOMMODATION ENHANCEMENT

Current aircraft procedures require that the engine be shutdown prior to landing in response to an "ENG THR LEVER FAULT" or "ENG THR LEVER DISAGREE" warning if autoland is not used.

(i) INTENTIONALLY OMITTED

(j) THRUST REVERSER THIRD LINE OF DEFENSE SHUT OFF VALVE MONITORING

Potential incorporation of an additional aircraft controlled Shut Off Valve to the Thrust Reverser system, upstream of the existing Hydraulic Control Unit, will rely on the EEC for functional verification and fault annunciation.

(k) WEIGHT ON WHEELS VALIDATION WITH MACH NUMBER CONFIRMATION

Though no events have been seen in the field or at flight test, current EEC validation of Weight On Wheels from the aircraft with Mach Number could result in a spurious Weight On Wheels fault and subsequent inhibition of the Thrust Reverser on landing.

(l)   WEIGHT ON WHEELS ACCOMMODATION FOR ENGINE
        INTERFACE UNIT FAULTS

        When the aircraft is on the ground, an intermittent Engine Interface
        Unit Label 31 can result in Weight On Wheels toggling between
        ground and air.

(m)   EEC INTERNAL CROSS LINK FAILURE ACCOMMODATION
        ENHANCEMENT

        Failure accommodation of the loss of one EEC channel, or loss of the
        EEC internal cross channel data link, can be improved.

(2) Cause.

(a)   AUTOTHRUST INSTINCTIVE DISCONNECT (ID) LOGIC

        Analysis and test have demonstrated that the V2500 logic's
        susceptibility to spurious short duration signals on the ID line can be
        improved.

(b)   STATOR VANE ACTUATOR (SVA) TRACK CHECK DE–LATCHING

        SVA track check faults which set this message are latched faults which
        can only be cleared by an EEC reset.

(c)   INTENTIONALLY OMITTED

(d)   MANUAL START LOGIC ENHANCEMENT

        Current EEC logic requires detection of the transition of the Manual
        Start Push Button discrete from "OFF" to "ON" in order to initiate a
        manual start. A/C 28 VDC electrical transients, or a "quick" selection of
        the Manual Start Push Button after "IGN" selection, can result in one
        or both channels of the EEC missing this transition. This results in no
        command, or loss of command, to the Starter Air Valve and thus
        termination of the manual start sequence.

(e)   SCHEDULED MAINTENANCE REPORT ENHANCEMENT

        The current Scheduled Maintenance Report fault data includes only
        the associated Clear Language Message and a 2 digit Fault Cell
        number, but the fault acronym that triggered the Clear Language
        Message is not accessible.

(f)   THRUST REVERSER STOW TIME MONITORING

The current "ENG 1(2) REVERSER FAULT" ECAM warning which is triggered for Thrust Reverser stow time exceedances is not latched and will be displayed only until the Thrust Reverser completes its stow cycle.

(g)   SPURIOUS CLEAR LANGUAGE MESSAGE DUE TO AIRCRAFT BOUNCE ON LANDING

The spurious emission of this message is the result of the Weight On Wheels indication from the aircraft toggling in response to aircraft bounce on landing. If the Thrust Reverser begins to deploy on initial touchdown, this spurious message can be generated when the aircraft Weight On Wheels transitions to "AIR" while the Reverser is "UNLOCKED". No maintenance action is required under these circumstances.

(h)   THROTTLE LEVER ANGLE FAULT ACCOMMODATION ENHANCEMENT

Current EEC Throttle Lever Angle fault detection and accommodation logic results in permanent latching of a Throttle Resolver Angle fault and a Throttle Resolver Angle accommodation at certain flight conditions that can result in the engine being set to a level of thrust that can not be accommodated at landing.

(i)   INTENTIONALLY OMITTED

(j)   THRUST REVERSER THIRD LINE OF DEFENSE SHUT OFF VALVE MONITORING

Third Line of Defense system design and potential retrofit considerations dictate use of the existing Hydraulic Control Unit pressure switch processing by the EEC to provide aircraft Shut Off Valve functional verification and fault annunciation.

(k)   WEIGHT ON WHEELS VALIDATION WITH MACH NUMBER CONFIRMATION

There is currently no confirmation time associated with this validation logic.

(l)   WEIGHT ON WHEELS ACCOMMODATION FOR ENGINE INTERFACE UNIT FAULTS

When the A/C is on the ground, if the Engine Interface Unit Label 031 becomes invalid, Mach Number is immediately used to set Weight On Wheels. When Label 031 is received again, Mach Number is no longer used but use of the Engine Interface Unit Weight On Wheels is delayed by 1/2 second during which time the default of "AIR" is set.

(m)   EEC INTERNAL CROSS LINK FAILURE ACCOMMODATION ENHANCEMENT

Current EEC fault accommodation logic inhibits certain faults from being set when status of the fault in the other channel is unknown.

(3)   Solution.

(a)   AUTOTHRUST INSTINCTIVE DISCONNECT (ID) LOGIC

Modify the EEC ID logic to require a 2 pass confirmation of the same ID discrete input to the EEC before allowing disconnection of the Autothrust System to reduce the susceptibility to spurious signals on the ID line.

(b)   STATOR VANE ACTUATOR (SVA) TRACK CHECK DE-LATCHING

Modify the EEC logic to allow the SVA track check faults which set this message to clear if the SVA system returns to within the required tolerance for five seconds. The SVA track check fault is allowed to clear up to three times after which it will be latched until the next EEC reset. Additionally, the occurrence of any SVA track check fault in flight will be recalled on landing to provide a "NO DISPATCH" message to ensure appropriate maintenance action.

(c)   INTENTIONALLY OMITTED

(d)   MANUAL START LOGIC ENHANCEMENT

Modify the EEC logic to initiate a manual start based on the "ON" state of the Manual Start Push Button, rather than the transition from "OFF" to "ON". In addition, the same automatic starter crash re-engagement protection currently provided for automatic starts is incorporated for manual starts to cover Master Lever resets or A/C 28 VDC electrical transients when the Manual Start Push Button discrete is set to "ON".

SERVICE BULLETIN

(e)   SCHEDULED MAINTENANCE REPORT ENHANCEMENT

Replace the current 2 digit Fault Cell number in the Schedule
Maintenance Report with the associated fault acronym to simplify the
associated troubleshooting procedures.

(f)   THRUST REVERSER STOW TIME MONITORING

Modify the EEC logic to latch the "ENG 1(2) REVERSER FAULT"
ECAM warning which is triggered for Thrust Reverser stow time
exceedances to insure that this "NO DISPATCH" condition is reported
to the maintenance crew for appropriate maintenance action prior to
the next dispatch of the aircraft.

(g)   SPURIOUS CLEAR LANGUAGE MESSAGE DUE TO AIRCRAFT
BOUNCE ON LANDING

Modify the EEC logic to require a 3 second confirmation time on the
emission of this Clear Language Message.

(h)   THROTTLE LEVER ANGLE FAULT ACCOMMODATION
ENHANCEMENT

Modify the EEC Throttle Resolver Angle fault logic to allow a detected
fault to heal a limited number of times (3), if the input is validated again
for a specified period of time (5 seconds). Utilize additional aircraft
inputs (slats) to set the most appropriate fail–safe value of Throttle
Resolver Angle at the time of the failure and allow transition of this
value to idle when the aircraft is in "APPROACH," thus precluding the
need to shut down the engine at landing.

(i)   INTENTIONALLY OMITTED

(j)   THRUST REVERSER THIRD LINE OF DEFENSE SHUT OFF VALVE
MONITORING

Modify the existing EEC Thrust Reverser control logic, Menu Mode
Thrust Reverser Test logic and existing Hydraulic Control Unit
pressure switch processing logic to provide the potential to (1) verify
Shut Off Valve functioning during the normal Thrust Reverser
deploy/stow cycle on landing, (2) verify Shut Off Valve functioning
during the Thrust Reverser Menu Mode Test and (3) provide functional
and dispatch status of the total Thrust Reverser system, including the
additional aircraft controlled Shut Off Valve when installed as noted by
digital discrete from the aircraft Engine Interface Unit.

    (k)   WEIGHT ON WHEELS VALIDATION WITH MACH NUMBER CONFIRMATION

            Incorporate a 20 second confirmation on the Weight On Wheels validation with Mach Number as a design enhancement before setting the associated fault and inhibiting the use of the Thrust Reverser on landing.

    (l)   WEIGHT ON WHEELS ACCOMMODATION FOR ENGINE INTERFACE UNIT FAULTS

            Additional logic was added to prevent this toggling of Weight On Wheels to "AIR" while the 1/2 second confirmation timer elapses.

    (m)   EEC INTERNAL CROSS LINK FAILURE ACCOMMODATION ENHANCEMENT

            Modify the EEC logic to allow the controlling channel to set the relevant messages with its local information, if the crosslink is failed or one channel is down.

C.   Description

The EEC150–20 is reprogrammed and re–identified with the new part number.

D.   Compliance

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

E.   Approval

The part number changes and/or part modifications given in Paragraphs 2 and 3 of this Service Bulletin obey the applicable Federal Aviation Regulations and are FAA–approved for the EEC150–20 Electronic Engine Control.

F.   Manpower

Approximately 1 man–hour is necessary to do these Service Bulletin procedures.

SERVICE BULLETIN

G. Material – Cost and Availability

(1) IAE funds this program. The hard copy, no–charge purchase order to perform this Service Bulletin must refer to the HS Service Bulletin number EEC150–20–73–13 and the IAE Service Bulletin Number V2500–ENG–73–0082.

This Service Bulletin will be done at no charge to the operator if the EEC150–20 is sent to one of these addresses:

(a) United Technologies Corporation
     Hamilton Standard Division
     Attention: Hamilton Support Systems
                Electronics Service Center
     97 Newberrry Road
     East Windsor, CT 06088
     U.S.A.

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

(2) You can do these Service Bulletin procedures at your own location at your own cost and expense using the "Alternate Reprogramming Method" described in the accomplishment instructions.   If you do these Service Bulletin procedures with the "Alternate Reprogramming Method", you need to obtain the software diskette used to reprogram the EEC. Refer to Material Information to order the Reprogramming Diskette.

(3) One Reprogramming Diskette can be used to modify approximately 40 EEC150–20 units. The Software Loader Utility used to reprogram the EEC creates a log file on the Reprogramming Diskette. When the log file is filled or when your fleet of EEC's is modified, return the Reprogramming Diskette to Hamilton Standard. Contact your local Hamilton Standard Field Support Representative if you need assistance to return the Reprogramming Diskette.

(4) The new parts required to accomplish this Service Bulletin are listed in Section 3, Material Information.

H. Tooling

NOTE: The following tools and equipment are necessary to perform the "Alternate Reprogramming Method" procedures:

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

(a) 80286 processor

(b) 512 Kbytes RAM

(c) 1.44Mbyte, 3.5" floppy disk drive

(d) Dual channel RS–422 asynchronous communication board (HS recommends Model DS202 by Qua Tech Incorporated) with the following setup:
Channel A EEC – COM3 (Base address 2E8, IRQ level 5)
Channel B EEC – COM4 (Base address 3E8, IRQ level 5)

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

NOTE: THE IBM COMPUTER DATE/TIME MUST BE CURRENT PRIOR TO PERFORMING THIS PROCEDURE.

(2) Hamilton Standard diskette called out in the Service Bulletin which is being incorporated. This diskette contains the EEC150–20: application code, trims, memory clear utilities, and software loader.

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

(4) 28VDC, 5.0 +/– 0.5A power supply and associated power cables as defined in Table 2.

I. Weight and Balance

None

J. Electrical Load Data

Not Affected

K. References

E9137 Standard Electronic Practices Manual
Component Maintenance Manual CMM 73–28–01
IAE Service Bulletin Number V2500–ENG–73–0082
Hamilton Standard Service Bulletin EEC150–1–73–29

L. Other Publications Affected

Illustrated Parts Catalog 73-28-01

2. <u>Accomplishment Instructions</u>

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

<u>NOTE</u>: Refer to the E9137 Standard Electronic Practices Manual to do the procedures unless otherwise noted.

A. If you use the "Alternate Reprogramming Method" skip to step 2.B. Otherwise refer to CMM 73-28-01, section 200 (ATLAS) to reprogram the EEC150-20. Use the program, version number, and engine trims shown below.

	Channel A	Channel B
Application Program:	Y805881	Y805882
Application Version Number:	082	082
Engine Trim Program:	Y805886	Y805886
Engine Trim Version Number:	082	082

If you do not use the "Alternate Reprogramming Method" of programming, skip to step 2.AM

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

C. Record the current unit part number and the unit serial number from the nameplate. This information will be input into the computer.

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

E. Connect the programming harness connector marked P1 to the EEC connector marked J1. Ensure that the red engagement stripe on the EEC connector J1 is fully covered.

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

SERVICE BULLETIN

G. Connect the programming harness connector marked "ch. a uart" to the IBM compatible computer UART board connectors for the channel A RS–422 Port (COM3). Ensure that these connectors are properly mated.

H. Connect the programming harness connector marked "ch. b uart" to the IBM compatible computer UART board connectors for the channel B RS–422 Port (COM4). Ensure that these connectors are properly mated.

   NOTE: UART CONNECTIONS CAN DIFFER FOR DIFFERENT IBM COMPATIBLE COMPUTERS.

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

I. Connect the opposite end of P3 and P9 cables to the 28VDC supply.

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

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

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

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

N. Turn on the power to the IBM compatible computer.

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

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

P. Obtain the Hamilton Standard reprogramming diskette P/N 819191–3. Ensure that the write protection tab of the diskette is covering the "hole". Insert the diskette into the floppy drive designated as "A" on the IBM compatible computer.

Q. The display will show the "C:\>". Type a: then press the **RETURN** key (note: some computers have the **RETURN** key designated as **ENTER**).

R. The display will show the "A:\>" prompt. Type **LDR150** then press the **RETURN** key. This starts the UART programming utility. 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. See Table 3 for a summary of error code description and troubleshooting suggestions.

S. The UART programming utility **LDR150**, will display the following message: "**Enter operator's name performing download : [   ] >**". 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. If the operator is the same, press the **RETURN** key to continue. If a different name is present than the operator's or no name is present, the operator should enter his/her name and press the **RETURN** key.

T. The LDR150 program will display the following message:

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

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

If a fault dump is required, or the operator wishes to terminate the programming procedure, type **Q**, then press the **RETURN** key. If the operator selects the quit option, turn off the 28VDC power to the EEC and go to step 2.AI.

U. The LDR150 program will now prompt with the following message: "**Enter the 9 character EEC Serial Number   : [XXXX–XXXX] > **". From the Hamilton Standard nameplate, enter the nine character EEC serial number and press the **RETURN** key.

   NOTE: For steps 2.V and 2.W, if the EEC150–20 part number on the nameplate between the dashes is a single digit, enter a zero immediately preceding this digit.
   Example: P/N 808050–4–025 would be entered as 808050–04–025.

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

W. The LDR150 program will now prompt with the following message: **"Enter the 13 character SB EEC HW Part No. : [XXXXXX–XX–XXX] >** ". From the Service Bulletin, enter the new 13 character EEC Hardware Part Number and press the **RETURN** key.

X. The LDR150 program will now prompt with the following message: **"Enter Trim Checksum Value for "xxxxxx.xxx" : >** ". The xxxxxx.xxx designation is the name of the Trim File being loaded to the EEC. Enter the trim checksum value **13565** and press the **RETURN** key.

Y. The LDR150 program will now prompt with the following message: **"Do you wish to reenter the above entries [Y/N/Q] :** ".

   (1) To proceed with programming process, type **N**, then press the **RETURN** key. Continue with step 2.Z.

   (2) To correct any errors in the data entered, type **Y,** then press **RETURN**. Continue with step 2.S.

   (3) To quit the programming process, type **Q**, then press **RETURN**. Turn off the 28VDC power to the EEC and continue with step 2.AJ.

Z. At this point the screen will be initialized to display the activity of the programming process. Status messages will scroll across the screen. If an error occurs, see Table 3 for a summary of error code description and troubleshooting suggestions.

AA. The LDR150 program will prompt with the following message:

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

Press the RETURN Key When Ready to Continue

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

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

AC. On the IBM compatible computer, press the **RETURN** key.

SERVICE BULLETIN

AD. Wait until the LDR150 program prompts with the following message:_

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

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

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

AF. On the IBM compatible computer, press the **RETURN** key.

AG. 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 28 VDC power supply to the EEC .

AH. On the IBM compatible computer, press the **RETURN** key.

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

> (1) If successful programming occurred, the following message will be displayed:
>
> ****** EEC REPROGRAMMING SUCCESSFULLY COMPLETED *****
>
> **Record the log file name "VLXXXX.LOG" for later printout.**
>
> If desired, record the log file name "VLXXXX.LOG" for later printout."

(2) If the programming 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.

AJ. Press the **RETURN** key to terminate the program and return to the MSDOS prompt "**A:\>**".

AK. If a printer is available, a paper copy of the log file can be generated by the IBM compatible computer. To do this, at the MSDOS prompt, type **PRINT VLXXXX.LOG**, then press the **RETURN** key. Wait until the printer is finished before proceeding with the next step. If the printer is not available remove the diskette and move it to a system that has a printer and type the preceding command for a paper copy.

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

AM. Change the Hamilton Standard Part Number to show that this Service Bulletin is included into the end–assembly configuration. Put the information shown below on a new unit identification plate. EEC150–20 units reprogrammed at one of the addresses shown in paragraph 1.G.1 will be sent back with their assemblies re–identified as shown.

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

PART NUMBER BEFORE THIS SERVICE BULLETIN	PART NUMBER AFTER THIS SERVICE BULLETIN
808050–4–XXX	808050–4–048

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

EEC150–20 END–ASSEMBLY	NEW IAE PART NUMBER
808050–4–048	2A3224

SERVICE BULLETIN

Table 1. COMMUNICATION CONNECTIONS

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

Table 2. POWER SUPPLY CONNECTIONS

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

SERVICE BULLETIN

Table 3. 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 return EEC unit
E2	COMMUNICATION ERROR– Communication problem between EEC and IBM compatible computer	Check BITE, cables, power supply, UART board, and EEC. Retry 3 times.
E3	CONFIGURATION ERROR – Configuration data comparison failed. (Possible Hardware P/N mismatch, EEC compatibility mismatch, Trim Checksum mismatch)	Operator data entered incorrect or incorrect data on existing nameplate. Check data – retry with the correct information.
E4	SYSTEM PROBLEM – Poor operating environment, bad disk, or program aborted by operator.	If the process was not terminated by the operator, check that the disk is not write protected, or replace disk and retry.

3. Material Information

A. This Service Bulletin change will use the parts in the list for each EEC150–20 that incorporates this Service Bulletin.

B. Any parts that usually are discarded when you disassemble the EEC150–20 are not in the list.

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

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

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

F. New Parts Required

SERVICE BULLETIN

New PN	Qty	MSQ	Estimated Price	Key Word	PN Before this SB	Instruction Code
751333–1	1	20	1.80	Plate	751333–1	A, B
819191–3	1	1	$ 0.00	Diskette	–	B,C

Instruction Code A.   The Service Bulletin change adds the "New PN" to the EEC150–20.

Instruction Code B.   The Service Bulletin change removes the "PN before the SB" from the EEC150–20. Discard the part or use it in other equipment.

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

Hamilton Standard Service Bulletin EEC150–20–73–13
Hamilton Standard Internal Reference Number EC236225
Hamilton Standard Reference A320, IAE V2500–A1
IAE Engineering Change Number 95VZ016
IAE Service Bulletin Number V2500–ENG–73–0082