ENGINE – FUEL AND CONTROL – TO PROVIDE A NEW ELECTRONIC ENGINE CONTROL (EEC) WITH THE SCN12A SOFTWARE CONFIGURATION – CATEGORY CODE 4 – MOD.ENG–73–0037

1. Planning Information

   A. Effectivity

      (1) Aircraft: Airbus A320

      (2) Engine: V2500–A1 Engines before Serial No.V0309

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

                   BUMP 00 (No thrust bump)

                   BUMP 03 (Improved Consolidated Thrust Bump)*

                   BUMP 04 (No Thrust Bump and 5 deg. C Bias applied to measured EGT)

                   BUMP 07 (Improved Consolidated Thrust Bump and 5 Deg. C Bias applied to measured EGT)*

      NOTE: *The Flight Operations Manual will have specific instructions for Aircraft which have Engines with one of these Thrust Bumps.

             This Service Bulletin is not applicable to Engines which use BUMP 01 (Cyprus Thrust Bump). Replace this bump with BUMP 03 OR BUMP 07, if a thrust bump will be used.

             This Service Bulletin must be incorporated concurrently on both the engines on the aircraft.

             If Reference (1) is incorporated on the engine(s) when you do this bulletin, it must be removed when this Service Bulletin is incorporated.

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

             If you now use the the consolidated thrust bump (03 or 07) you will automatically get the improved consolidated thrust bump configuration option (03 or 07) when you incorporate this Service Bulletin.

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B. <u>Reason</u>

   (1) Condition

      (a) Track Check Faults: It is possible to get nuisance track check faults if an engine In Flight Shutdown occurs and the flight condition causes windmilling, when there is a mechanical N2 speed of less than 850 rpm. This is a confirmed revenue service fault with the 2.5 bleed track check logic.

      (b) Bodie Reset: The bodie reset function can be in operation below 15,000 feet.

      (c) Response to inadvertent deploy: The engine is not commanded to the lowest possible idle during an inadvertent deploy.

      (d) Overspeed Faults: Incorrect ENG 1 (2) OVSPD PROT FAULT" warnings have been reported. This is a confirmed revenue service fault. The cause is not determined. When the review of the overspeed test was done, a possible cause for this incorrect warning was found. (See the Background Information).

      (e) Calculation of Maximum Continuous Rating in N1 Rated Mode: It is possible to have an engine overboost condition after a reversion to the N1 rated mode at high altitude.

      (f) Calculation of TRA position following when both TRAS do not operate: If the selection of the TRA position is flex takeoff, or takeoff, and both TRA inputs do not operate, the incorrect TRA selection can be made in the air, with the slats extended. This was found in-house and has not happened in revenue service.

      (g) ECAM Warning "ENG compressor Fault": The display of the ECAM Warning "ENG COMPRESSOR FAULT" continues, although the condition which first caused the message is gone. This is a confirmed revenue service fault.

      (h) Class 3 fault incorporation: Some faults which have no effect on operation, and can be corrected at A check, are not included in the group of Class 3 faults. When one of these faults occurs, it must be corrected the first time that the aircraft is at a maintenance base which can do the work (within a maximum of ten days, and before the A check is done, if necessary). This can cause airline people to do work that is not necessary.

        (i)   Switchover: The FADEC changes channels because of track check faults. If the channel which the FADEC changes to has a wraparound fault, this channel can stay in control, although wraparound faults are more important faults.

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(j) Consolidated Bump Revision A (Improved Consolidated Bump): The V2500 engine has the possibility for more thrust at low altitude.

(k) Maximum HP Fuel Temperature Limits (Heat Management System): It is thought that at some time there can be the possibility of problems with fuel coking.

(l) Autothrust System: The FADEC operates the same for voluntary (pilot initiated) and involuntary (system fault initiated) autothrust disconnections.

(m) New bit to indicate TRA not at idle for start added to ARINC output: The next Flight Warning Computer modification will give a warning to the pilot to show that TRA is not at idle for start initiation. The FADEC does not show that TRA is not at idle for start initiation.

(n) Setting of Bite History flag: If a Class 3 fault 3 fault occurs when the PHASE is 1 or 2, and no faults have occurred in the 63 flights before this one, the bite history flag will stay clear and not be set, as it must be.

(o) EGT Spiking: EGT Spiking occurred during revenue service. This condition causes amber or red indications for EGT in the cockpit.

(2) Background

(a) Track Check Faults: The operation of the check logic is stopped if the selection for N2 is less than 4000 rpm (an rpm of less than 4000 shows that there is not sufficient hydraulic pressure to move an actuator.) The EEC uses N2 synthesis, if local or remote N2 is not available. N2 synthesis can be above 4000 rpm when there is not sufficient hydraulic pressure to move an actuator.

(b) Bodie Reset: The bodie reset function in use permits a small bodie reset factor to be locked in below 15,000 ft. This can occur when a deceleration is done in many steps, at an altitude near 15,000 feet. The deceleration which occurs almost immediately after the aircraft goes below 15,000 feet will cause the applied bodie reset to be locked in. This was found during the software testing.

(c) Response to inadvertent deploy: P5 is not accurate in reverse, because of flow changes by the thrust reverser. This makes sensed EPR look lower.

(d) Overspeed Faults: At this time the overspeed spool down test can occur when N1 is alreasy below its test trip point. If it is the time for the N1 circuitry to do the test, the result will be a nuisance fault.

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(e) Calculation of Maximum Continuous Rating in N1 Rated Mode: When N1
reversion occurs, the MCL (Max Climb) EPR value for the condition of
operation is locked in. The EEC uses this value to calculate the MCT
(Max Continuous) for the remainder of the flight. The higher the
altitude is when the reversion occurs, the higher the EPR MCL value
will be; and thus, the larger the possible overboost as altitude
decreases.

(f) Calculation of TRA position following condition when both TRAS do not
operate: When the slats are retracted, there is no path in the logic
to make the selection of the last TRA value selection. When this
condition occurs, and weight on the wheels indicates air, the
selection of a TRA of max continuous is made, not the last TRA
selection.

(g) ECAM Warning "ENGINE COMPRESSOR FAULT": The 2.5 bleed fault that
causes this message is latched. Both the 2.5 bleed track check and
failsafed faults are latched faults that can only clear by FADEC
reset.

(h) Class 3 fault incorporation: Before SCN12, no faults were in the
group of Class 3 faults.

   (i)   Switchover: Track check and wraparound faults are equally
         important in relation to their position on the list of very
         important faults.

(j) Consolidated Bump Revision A (Improved Consolidated Bump): In the
initial design, the engine cannot give the maximum thrust performance
that is possible.

(k) Maximum HP Fuel Temperature Limits (Heat Management System): The heat
management logic uses values for the fuel temperature limits that
will possibly permit fuel coking.

(l) Autothrust System: The aircraft will get new autothrust logic. This
logic can identify the difference between voluntary and involuntary
disconnections. At this time, the FADEC cannot interface with this
new logic.

(m) New bit to indicate TRA not at idle for start added to ARINC output:
At this time, no bit is output on the ARINC from the FADEC to show
that TRA is not at idle for start initiation. This bit is necessary
with the new logic.

(n) Setting of Bite history flag: At this time, a scan of Class 3 fault
memory is not made.

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(o) EGT spiking: The EGT system is very sensitive and it gets indications of EGT spikes. The usual excursions related to off-idle throttle movements cause these spikes.

(3) Objective

(a) Track Check Faults: Do a modification to the track check disable logic so that it uses Pb to see if there is sufficient hydraulic pressure, when the mechanical N2 is not available.

(b) Bodie Reset: Do a modification to the bodie reset logic so that it is not set to operate below 15,000 feet.

(c) Response to inadvertent deploy: Add a delta to the EPR idle for reverse to prevent the higher idle if there is an accidental in-flight reverser deployment.

(d) Overspeed Faults: Do a modification to prevent an overspeed test if the speed is below the trip point speed of the circuitry that will be tested.

(e) Calculation of Max Continuous Rating in N1 Rated Mode: Do a modification to the logic so that it uses the EPR MCL value that is not locked in, to calculate MCT during the N1 rated mode.

(f) Calculation of TRA position following a condition when both TRAS do not operate: Do a modification to the logic so that it uses the last value selection made when there is a condition when both TRAS do not operate.

(g) ECAM Warning "ENG COMPRESSOR FAULT": Permit the 2.5 bleed track check and failsafed faults to clear when the conditions will not cause unsatisfactory operation.

(h) Class 3 fault incorporation: All faults related to T3, P12.5, and P2.5 are included in the group of Class 3 faults. These faults are seen only in the menu mode (i.e. no pilot visibility).

(i) Switchover: Give the three most important loops (Fuel flow, stator vanes and 2.5 bleed) separate weightings for track check and wraparound faults.

(j) Consolidated Bump Revision A (Improved Consolidated Bump): Change the consolidated bump to make the performance better. Stop use of the -01 bump, so that all operators will get the revised consolidated bump.

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(k) Maximum HP Fuel Temperature Limits (Heat Management System): Decrease the maximum HP fuel temperature limits from 120 Deg C/ 100 Deg C (248 Deg F/ 212 Deg F) to 110 Deg C/ 90 Deg C (230 Deg F/ 194 Deg F). Change the value of failsafe fuel temperature from 90 Deg C to 80 Deg C (194 Deg F to 176 Deg F). The lower temperature limits decrease the possibility of fuel coking.

(l) Autothrust System: Add two bits to the EIU label 34 to interface with the new logic. After a voluntary autothrust disconnection the FADEC will go to Manual mode and after an involuntary disconnection the FADEC will go into memo mode.

(m) New bit to indicate TRA not at idle for start added to ARINC output: Add a new bit to label 270 bit 26 to indicate that TRA is not at idle for start initiation. The bit is output by the FADEC to provide the new pilot warning.

(n) Setting of BITE history flag: Modify the logic to look at the Class 3 fault memory when determining the status of the BITE history flag.

(o) EGT spiking: Applied a variable filter to the sensed EGT as a function of N1C2 for cockpit display. This filter is active outside the start mode.

(4) Substantiation

The flight simulation and flight testing of the SCN12A software logic was accomplished at Airbus in Toulouse, France.

(5) Effects of Bulletin on Workshop Procedures:

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

(6) Supplemental Information

None.

C. Description

(1) To provide a new Electronic Engine Control (EEC) with SCN12A software logic that adds many improvements.

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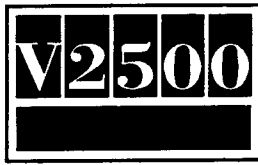
D. Approval

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 Code 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 warning notices ..   5 minutes

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

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

                             TOTAL   35 minutes

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

                             TOTAL   5 minutes

  (c) To return to flyable status

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

    (ii) Close the fan cowls   ..   8 minutes

   (iii) Remove the warning notices   5 minutes

                             TOTAL   41 minutes

(2) At overhaul   .. .. ..   Not Applicable

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G. <u>Material – Price and Availability</u>

   (1)   Modification Kit not required.

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

H. <u>Tooling – Price and Availability</u>

   None.

I. <u>Weight and Balance</u>

   (1)   Weight change   ..   ..   ..   None

   (2)   Momemt arm   ..   ..   ..   No effect

   (3)   Datum   ..   ..   ..   Engine front mount Centerline
                                        (Powerplant station P.P.S.100)

J. <u>Electrical Load Data</u>

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

K. <u>Reference</u>

   (1)   Internal Reference No.

         92VZ004

         92VA139

         91VC046H

   (2)   Other References

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

         V2500-ENG-73-0043 (Engine – Fuel And Control – Do a Check To Find
         The Short Data Entry Plug Backshell Assemblies).

         Hamilton Standard Service Bulletin EEC150-73-23.

         V2500 Aircraft Maintenance Manual.

         V2500 Engine Illustrated Parts Catalog.

         Airbus Industrie Service Bulletin A320-73-1024.

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V2500 Engine Manual.

L. <u>Other Publications Affected</u>

    (1) The V2500 Engine Illustrated Parts Catalog, Chapter/Section 73-22-34, Figure 1, 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 or 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. Authorised 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 Europ (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 vedor 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, out 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 button switch is OFF and install a warning notice.

   (3) Open the Fan Cowls by the approved procedure in Reference (3), Chapter/Section 71-13-00, (TASK 71-13-00-010-010).

E. Removal Instructions

   (1) Remove the 2A2475, 2A2478, 2A2479, or 2A2480 Electronic Engine Control by the approved procedure given in Reference (4), Chapter/Section 73-22-34 Removal/Installation. Refer to Figure 1.

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F. Rework Instructions

(1) Do a modification of the 2A2475, 2A2478, 2A2479 or 2A2480 Electronic
     Engine Control (See Reference (5), Chapter/Section 73-22-34, Fig/Item
     No.01-280) and reidentify by the procedure given in Reference (3).

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

(2) Remove the Active Clearance Control (ACC) Front Duct Cover Assembly.
     Refer to 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 SCN12A
               software logic, the Front Duct Cover Assembly given in
               Reference (1) must be removed.

G. Installation Instructions

(1) Install the 2A2690, 2A2691, 2A2692, or 2A2757 Electronic Engine Control
     (1 off) by the approval procedure given in Reference (4), Chapter/Section
     73-22-34, Removal/Installation. See Figure 1.

     WARNING: DO NOT INSTALL AN SCN12A ELECTRONIC ENGINE CONTROL ON AN ENGINE
              THAT USES THE -01 BUMP. IN SOME CONDITIONS THE RESULT CAN BE AN
              ENGINE POWER LEVEL THAT IS NOT SUFFICIENT.

     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 (4), Chapter/Section 73-22-35, Removal/Installation.

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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 Bumps given in this Service Bulletin.

        If you have a Bump in use that is not one of the permitted
        Bumps given, you must change the wire configuration to one of
        the approved Bump configurations specified. Use the procedure
        specified in Reference (7), Chapter/Section 71-00-00
        testing-11. You must change the engine records to include this
        modification.

NOTE: 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 tester specified. See Reference
        (7), Chapter/Section 71-00-00, Testing-11.

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

(b) Install a Data Entry Plug with the 03 Bump configuration for engines
     that will use the Consolidated Thrust Bump.

(c) Install the Data Entry Plug with the 04 Bump configuration for
     engines that will not use the Thrust Bump, but will use the 5 Deg. C
     Bias (applied to measured EGT).

(d) Install the Data Entry Plug with the 07 Bump configuration for
     engines that will use the Consolidated Thrust Bump and the 5 Deg. C
     Bias (applied to measured EGT).

     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 use of the approved procedure in Reference (3),
        Chapter/Section 71-13-00, (TASK 71-13-00-410-010).

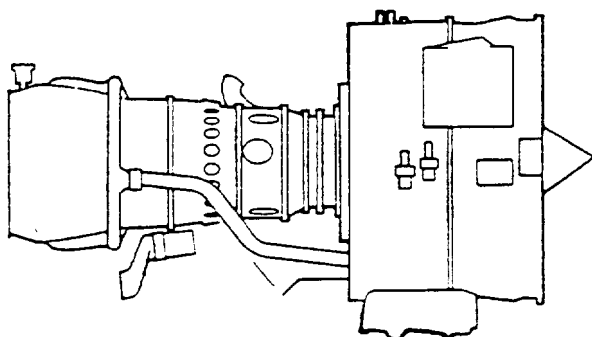   (2) Remove the warning notices.

I. Recording Instructions

   (1) A record of accomplishment is necessary.

V2500-ENG-73-0037
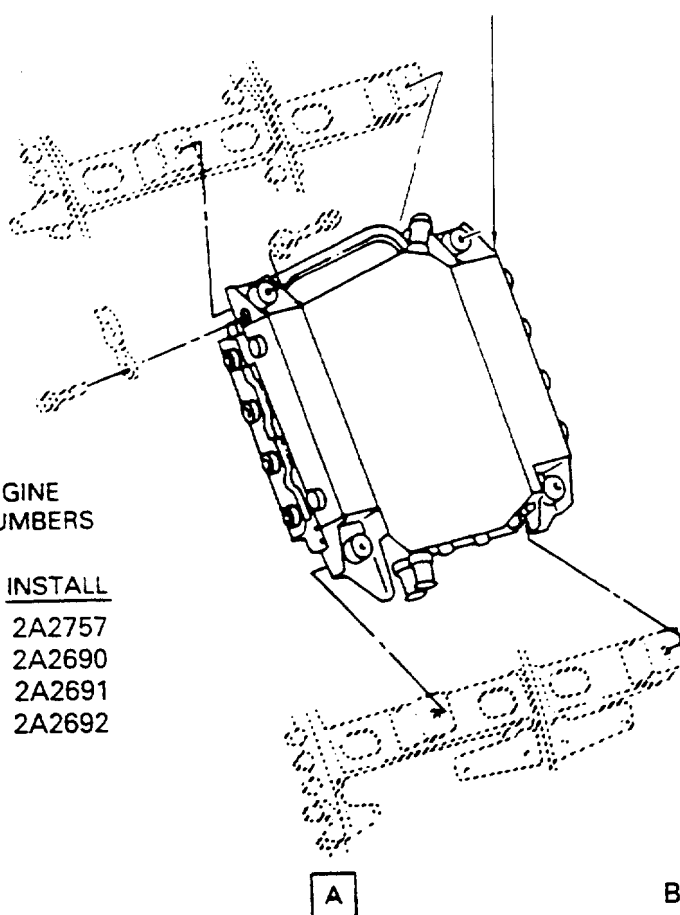
REMOVE THE APPLICABLE PART NUMBER ✶
ELECTRONIC ENGINE CONTROL, DO A
MODIFICATION, IDENTIFY AND INSTALL
THE APPLICABLE PART NUMBER ✶
(1 Off)

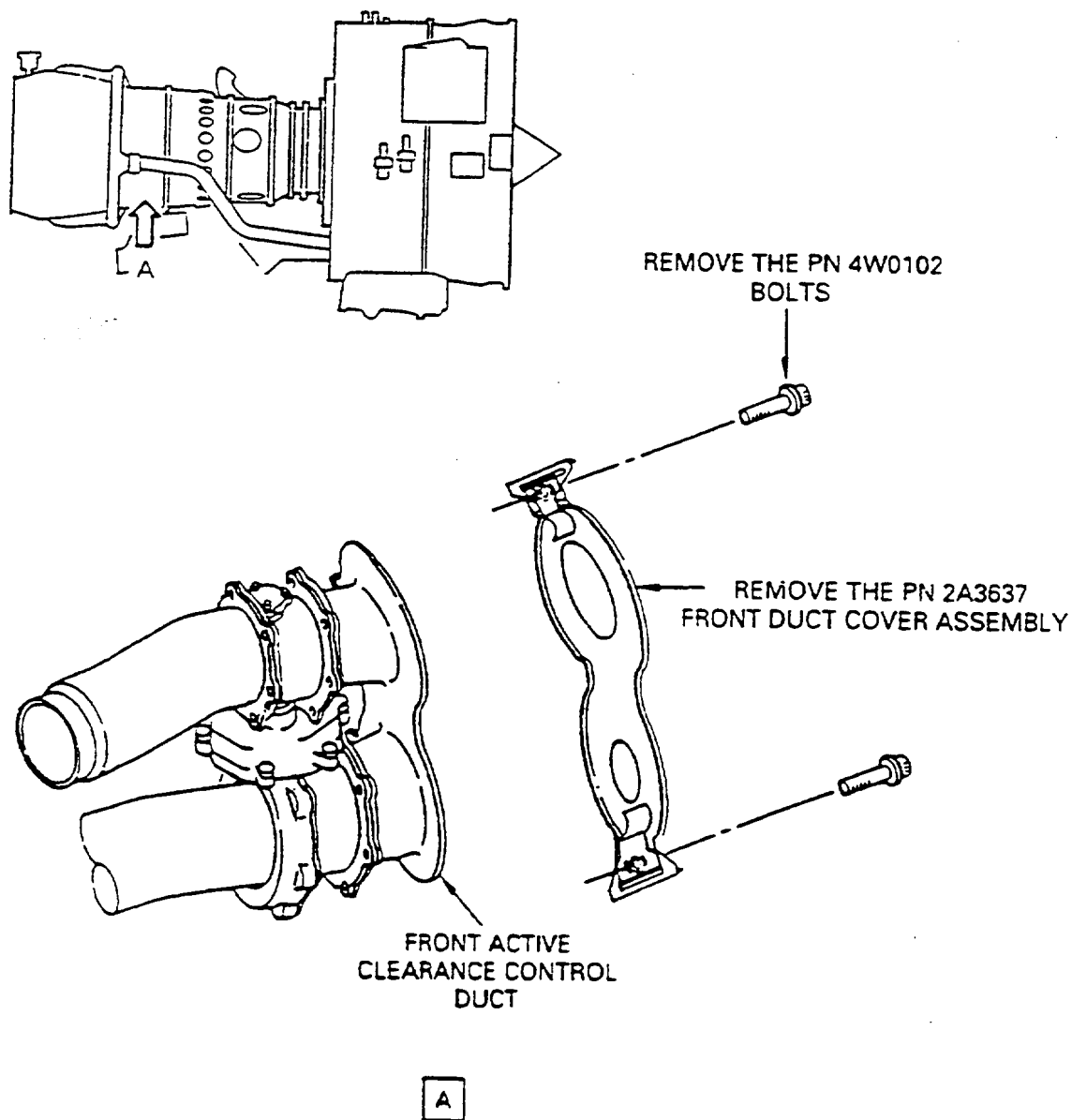✶ ELECTRONIC ENGINE
CONTROL PART NUMBERS

REMOVE	INSTALL
2A2475	2A2757
2A2478	2A2690
2A2479	2A2691
2A2480	2A2692

A

B8577

Location of Electronic Engine Control (EEC)
Fig.1

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REMOVE THE PN 4W0102
BOLTS

REMOVE THE PN 2A3637
FRONT DUCT COVER ASSEMBLY

FRONT ACTIVE
CLEARANCE CONTROL
DUCT

A

B5118

Location of ACC Front Duct Cover Assembly
Fig.2

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3. <u>Material Information</u>

   Applicability: For each V2500 Engine to incorporate this Bulletin.

   A. <u>Kits associated with this Bulletin:</u>

   None.

   B. <u>Parts affected by this Bulletin:</u>

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

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

| 2A2692 (73-22-34) | 1 | | Control, Electronic Engine | 2A2480 (01-280) | (1D) (A) (B) (C) |

   Applicability: For each V2500 Engine that incorporates V2500-ENG-73-0007, V2500-ENG-73-0015, V2500-ENG-73-0024, V2500-ENG-73-0027 and V2500-ENG-73-0032 but not incorporating V2500-ENG-70-0056 to incorporate this Bulletin.

| 2A2690 (73-22-34) | 1 | | Control, Electronic Engine | 2A2478 (01-280) | (1D) (A) (B) (E) |

   Applicability: For each V2500 Engine that incorporates V2500-ENG-73-0007, V2500-ENG-73-0015, V2500-ENG-73-0027 and V2500-ENG-73-0032 but not incorporating V2500-ENG-73-0024 and V2500-ENG-70-0056 to incorporate this Bulletin.

| 2A2757 (73-22-34) | 1 | | Control, Electronic Engine | 2A2475 (01-280) | (1D) (A) (B) (F) |

   Applicability: For each V2500 Engine that incorporates V2500-ENG-73-0007, V2500-ENG-73-0015, V2500-ENG-70-0056, V2500-ENG-73-0027 and V2500-ENG-73-0032 but not incorporating V2500-ENG-73-0024 to incorporate this Bulletin.

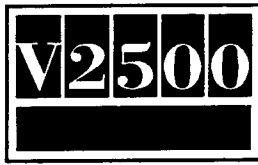| 2A2691 (73-22-34) | 1 | | Control, Electronic Engine | 2A2479 (01-280) | (1D) (A) (B) (G) |

   Applicability: For each V2500 Engine that incorporates V2500-ENG-73-0007, V2500-ENG-73-0015, V2500-ENG-73-0024, V2500-ENG-70-0056, and V2500-ENG-73-0032 and incorporates the software changes added by V2500-ENG-73-0027*,to incorporate this Bulletin.

| 2A2692 (73-22-34) | 1 | | Control, Electronic Engine | 2A2480 (01-280) | (1D) (A) (B) (C) |

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Applicability: For each V2500 Engine that incorporates V2500-ENG-73-0007,
V2500-ENG-73-0015, V2500-ENG-73-0024 and V2500-ENG-73-0032, does not
incorporate V2500-ENG-70-0056 and incorporates the software changes added by
V2500-ENG-73-0027*.

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2A2690         1                    Control, Electronic   2A2478      (1D) (A) (B)
(73-22-34)                          Engine                (01-280)    (E)
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Applicability: For each V2500 Engine that incorporates V2500-ENG-73-0007,
V2500-ENG-73-0015, and V2500-ENG-73-0032, does not incorporate
V2500-ENG-73-0024 and V2500-ENG-70-0056 and incorporates the software changes
added by V2500-ENG-73-0027*.

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2A2757         1                    Control, Electronic   2A2475      (1D) (A) (B)
(73-22-34)                          Engine                (01-280)    (F)
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Applicability: For each V2500 Engine that incorporates V2500-ENG-73-0007,
V2500-ENG-73-0015, V2500-ENG-70-0056, and V2500-ENG-73-0032, does not
incorporate V2500-ENG-73-0024 and incorporates the software changes added by
V2500-ENG-73-0027*, to incorporate this Bulletin.

```
2A2691         1                    Control, Electronic   2A2479      (1D) (A) (B)
(73-22-34)                          Engine                (01-280)    (G)
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C. Instruction/Disposition Code Statements:

        (1D) The New part can be obtained through modification by the approved
             procedure in Reference (2). Purchase the New parts from or return
             the Old parts for modification to the approved vendor given in the
             Accomplishment Instructions.
        (A) New part is currently available.
        (B) The Old part will continue to be available upon request.
        (C) HSD P/L 798300-14-041
        (E) HSD P/L 798300-10-041
        (F) HSD P/L 798300-8-041
        (G) HSD P/L 798300-12-041

Notes (C) (E) (F) and (G) give the new Hamilton Standard part numbers.

    * Incorporation of the latest software configuration, given in
      V2500-ENG-73-0032, will include all the software improvements which were
      made in V2500-ENG-73-0027. This is why there is more than one old part
      number progressing up to the same new part number.

    NOTE: The estimated 1992 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.

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MODIFICATIONS   PART NUMBER CHANGE

BASE LINE

2A1988
OR
2A1989

V2500 - ENG - 73 - 0007
PROVIDES SCN10D
SOFTWARE

2A2039

Ⓐ CONTINUED ON
SHEET 2

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

2A2189

Ⓑ CONTINUED ON
SHEET 2

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

2A2166

V2500 - ENG - 73 - 0056
PROVIDES HINGED
FIRE SHIELDS

2A2285

V2500 - ENG - 73 - 0027
PROVIDES SCN11G
SOFTWARE

2A2392

2A2390

V2500 - ENG - 73 - 0032
PROVIDES SCN11H
SOFTWARE

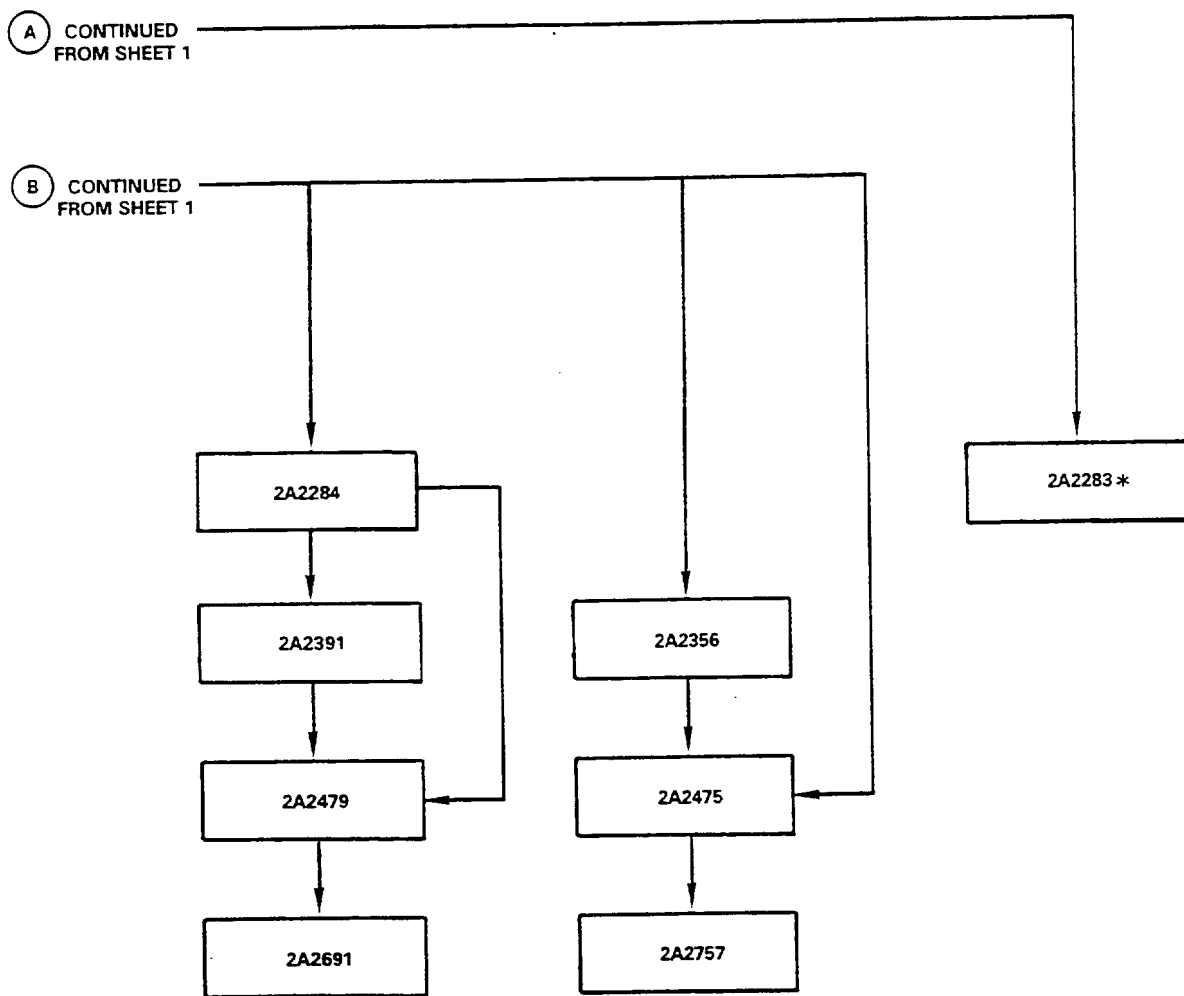2A2480

2A2478

V2500 - ENG - 73 - 0037
PROVIDES SCN12A
SOFTWARE

2A2692

2A2690

B8578

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

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Ⓐ CONTINUED
FROM SHEET 1

Ⓑ CONTINUED
FROM SHEET 1

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┌──────────────┐                              ┌──────────────┐
│    2A2284    │                              │   2A2283 *   │
└──────────────┘                              └──────────────┘
       │
┌──────────────┐              ┌──────────────┐
│    2A2391    │              │    2A2356    │
└──────────────┘              └──────────────┘
       │                             │
┌──────────────┐              ┌──────────────┐
│    2A2479    │              │    2A2475    │
└──────────────┘              └──────────────┘
       │                             │
┌──────────────┐              ┌──────────────┐
│    2A2691    │              │    2A2757    │
└──────────────┘              └──────────────┘
```

*** THERE IS NO PROCEDURE TO
ADVANCE THIS CONFIGURATION**

B8579

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

V2500-ENG-73-0037

UNITED TECHNOLOGIES HAMILTON STANDARD

SERVICE BULLETIN

ENGINE FUEL AND CONTROL - EEC150-1 ELECTRONIC ENGINE CONTROL - INCORPORATION OF NEW SOFTWARE CONFIGURATION

1. ## Planning Information

    A. ## Effectivity

    ### Hamilton Standard EEC150-1 Electronic Engine Controls

    798300-8-XXX
    798300-10-XXX
    798300-12-XXX
    798300-14-XXX

    NOTE: The EEC150-1 is used on Airbus A320 aircraft that use the IAE V2500-A1 engine. XXX - Identifies all available software configurations.

    B. ## Reason

    (1) Problem.

    (a) If an In-Flight-Shutdown (IFSD) occurs and the engine windmills (mechanical N2 speed less than 850 rpm), it is possible to get an unwanted track-check fault indication.

    (b) The bodie reset function can operate below 15000 feet.

    (c) The engine is not set to the lowest possible idle speed during an accidental in-flight use of the thrust reverser.

    (d) Unwanted "ENG 1(2) OVSPD PROT FAULT" indications can occur.

    (e) At high altitudes, it is possible for the engine to enter an overboost condition after a change to the N1 mode.

    (f) If both TRA inputs do not operate and the TRA position is set to flex-takeoff or takeoff, the incorrect TRA can be set in the air with the slats extended.

(g) The ECAM warning "ENG COMPRESSOR FAULT" stays on after the condition that caused it was corrected.

(h) Some faults do not affect engine operation and are not put in as Class 3 faults. When one of these faults occurs, it must be examined at the subsequent maintenance base instead of at A-check. This can cause more work for airline maintenance people.

(i) The EEC changes between channels because of track check failures. If the channel that takes control has a wraparound failure, the channel can stay in control even if the wraparound failures are more critical than the failures in the other channel.

(j) The V2500 engine does not give full thrust at low altitudes.

(k) High fuel temperatures can cause the fuel to coke.

(l) The EEC operates the same for voluntary (pilot controlled) and involuntary (system fault controlled) autothrust disconnections.

(m) The Flight Warning Computer will be changed to give the pilot a warning that identifies the TRA is not at idle for an engine start. The EEC must output an ARINC bit to identify this condition.

(n) The BITE history flag does not get set if a Class 3 fault occurs when PHASE is 1 or 2 and no faults have occurred during the last 63 flights.

(o) EGT spikes (a fast increase then decrease in temperature) cause amber and red EGT indications in the cockpit display.

(2) Cause.

(a) The track-check logic is turned off if N2 is less than 4000 rpm. An N2 speed less than 4000 rpm identifies that the hydraulic pressure is not sufficient to operate an actuator. If local or remote N2 is not available, N2 will be synthesized. The synthesized N2 speed can incorrectly be above 4000 rpm when the hydraulic pressure is not sufficient to operate an actuator.

(b) The bodie reset function that is now used permits a small bodie reset value to be locked in below 15000 feet. This can occur when a deceleration is done in many steps around 15000 feet. The deceleration that occurs immediately after the aircraft goes below 15000 feet locks in the bodie reset value.

(c) During reverse engine thrust, the thrust reverser causes flow changes that make the P5 measurement inaccurate. This causes the sensed EPR to have a lower value.

(d) The overspeed spool-down test now in use can be started when N1 is below its test trip point. If it is the N1 circuit's turn to do the test, an unwanted fault indication will be set.

(e) When the change to N1 mode occurs, the MCL (Max Climb) EPR value is kept at a constant value. This constant value is used to calculate MCT (Max Continuous) for the remaining part of the flight. The higher the altitude at the time of change to N1 mode, the larger the EPR MCL value will be. The larger the MCL value, the larger the possible overboost will be as the altitude decreases.

(f) When the slats are retracted, there is no procedure for the logic to stay to the last-set TRA value. In this case, if Weight On Wheels identifies air, then TRA is set to max-continuous instead of the the last-set TRA.

(g) The 2.5 bleed fault that caused this fault indication is latched. Both the 2.5 bleed track check and failsafed faults are latched faults. They can be removed only when the EEC is reset.

(h) There were no Class 3 faults before SCN12.

(i) Track check failures and wraparound failures have the same weightings.

(j) The engine is not permitted to make maximum thrust.

(k) The heat management logic uses high fuel temperature limits that can cause fuel coking.

(l) New autothrust logic can tell the difference between voluntary and involuntary disconnections. The EEC cannot interface with this new logic.

(m) For the new logic, the EEC does not output an ARINC bit to identify that the TRA is not at idle.

(n) The EEC does not examine Class 3 fault memory to find the status of the BITE history flag.

(o) Off-idle throttle position changes will cause fast changes in the EGT. The EGT system has a fast response. It can measure the EGT spikes which occur during changes in the off-idle throttle position.

(3) Solution. Install new software (SCN12A) that has:

(a) Better track-check disable logic. The new logic uses the PB pressure to find out if there is sufficient hydraulic pressure when the mechanical N2 speed is not available.

(b) Better bodie reset logic. The bodie reset logic is turned off when the aircraft goes below 15000 feet.

(c) An EPR Idle value. A different EPR Idle value is used during accidental in-flight operation of the thrust reverser to keep the engine at the lowest possible idle.

(d) Better overspeed test logic. The overspeed spool-down test will not be done if the N1 speed is below the trip-point speed of the circuits that are tested.

(e) Better N1 rate mode logic. The EEC will use a variable EPR MCL value to calculate MCT during the N1 rated mode.

(f) Better TRA logic. The EEC will use the last set TRA value during this condition.

(g) Better fault reset logic. The EEC can remove 2.5 bleed and failsafed fault indications during safe conditions.

(h) A new fault classification. All faults related to T3, P12.5, and P2.5 will be classified as Class 3 faults. These faults can only be shown during the menu mode.

(i) Different fault weightings. The three most critical loops (WF, SVA, 2.5 Bleed) were given different weightings for track check and wraparound failures.

(j) A better consolidated bump to increase low-altitude thrust. The "-01" bump will be removed.

(k) Decreased fuel temperature limits. The maximum HP fuel temperature limits are decreased from 120 °C/100 °C (248 °F/212 °F) to 110 °C/90 °C (230 °F/194 °F). The failsafe fuel temperature is decreased from 90 °C to 80 °C (194 °F to 176 °F). These decreased temperatures make it less possibile for the fuel to coke.

(l) New ARINC bits. Two bits were added to EIU label 34 to interface with the new logic. The EEC will go into manual mode after a voluntary autothrust disconnect. The EEC will go into memo mode after an involuntary autothrust disconnect.

(m) ARINC label. Bit 26 was added to ARINC label 270 to identify that the TRA is not at idle for engine starts. The EEC outputs this bit to supply the new warning for the pilot.

(n) Better BITE logic. EEC logic is changed to examine Class 3 fault memory when the status of the BITE history flag is found.

(o) EGT filter. A variable filter is used to remove EGT spikes from the EGT cockpit display. This filter functions for all modes of engine operation except for the start mode.

C. Description

The EEC150-1 is disassembled to remove the Channel A and B Processor/Input Modules. The Processor/Input Modules are reprogrammed. The EEC150-1 is then reassembled and a functional test is done.

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 Paragraph 2. of this Service Bulletin obey the applicable Federal Aviation Regulations and are FAA-Approved for the Electronic Engine Controls given.

SERVICE BULLETIN

F. Manpower

    Approximately 4 man-hours are necessary to do this Service Bulletin.
    This estimate does not include the time necessary to do functional
    tests.

G. Material - Cost and Availability

    (1) This Service Bulletin will be done at no cost to the operator
         if the EEC is sent to one of these addresses:

         (a) United Technologies Corporation
              Hamilton Standard Division
              Attention: Hamilton Support Systems
                          Customer Support Center
                          Electronics Service Center
              97 Newberry Road
              East Windsor, CT 06088

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

    (2) IAE funds this program. The no-charge purchase order to do
         this Service Bulletin must refer to this Service Bulletin and
         IAE Service Bulletin V2500-ENG-73-0037 to ensure account-
         ability.

    (3) If requested, Hamilton Standard can supply, at no charge, the
         material necessary to do this Service Bulletin. To get this
         material, the operator will send a no-charge purchase order for
         the necessary quantity to:

              United Technologies Corporation
              Hamilton Standard Division
              Attention: Commercial After-Market Business
                          Mail Stop: 1504
              One Hamilton Road
              Windsor Locks, CT 06096-1010

         The no-charge purchase order must refer to this Service
         Bulletin.

H. Tooling

    None

SERVICE BULLETIN

I.   Weight and Balance

     None

J.   Electrical Load Data

     Not affected

K.   References

     IAE Service Bulletin No. V2500-ENG-73-0037
     Component Maintenance Manual 73-22-34
     E9137 Standard Electronic Practices Manual

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 ELECTRONIC COMPONENTS IN THE EEC150-1.

    A.   Refer to REPAIR RSS-HS004 in Component Maintenance Manual (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:	071	071
Engine Trim Program:	Y806086	Y806086
Engine Trim Version Number:	071	071

B.   Refer to the E9137 Standard Practices Manual for procedures to re-identify the Processor/Input Modules. Change the part numbers as shown below:

Assembly	Old Part Number	New Part Number
Processor/Input	793610-14-XXX	793610-14-041
Module-Channel A	793610-40-XXX	793610-40-041
Processor/Input	793612-14-XXX	793612-14-041
Module-Channel B	793612-40-XXX	793612-40-041

NOTE: XXX - Identifies all available software configurations.

C.   Refer to the ASSEMBLY section of CMM 73-22-34 to reassemble the EEC.

D.   Change the Hamilton Standard Part Number to show that this Service Bulletin is included into the end-assembly configuration. Refer to the E9137 Standard Practices Manual to put the information shown below on a new unit identification plate. EEC units reprogrammed at one of the addresses shown in paragraph 1.G. will be sent back with their assemblies re-identified as shown below.

(1) 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
798300-8-XXX	798300-8-041
798300-10-XXX	798300-10-041
798300-12-XXX	798300-12-041
798300-14-XXX	798300-14-041

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

EEC150-1 END-ASSEMBLY	NEW IAE PART NUMBER
798300-8-041	2A2757
798300-10-041	2A2690
798300-12-041	2A2691
798300-14-041	2A2692

E.   Refer to the TESTING AND TROUBLESHOOTING section of CMM 73-22-34 to do a functional test. Environmental Stress Screening (ESS) is not necessary.

3. Material Information

A. This Service Bulletin change will use the parts in the list for each EEC150-1 that is changed.

B. Parts that are usually 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 whole-number 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 different list, under the list of parts, tells you about the instruction codes that are used in the list of parts.

F. Each price shown is an estimate for one part. When you buy a part, the price can be different. If more information is necessary, ask your Hamilton Standard account representative. If you do not have an account representative, ask Hamilton Standard's manager of commercial accounts.

Mail:	United Technologies Corporation
	Hamilton Standard Division
	Attention: Director Material Service
	P.O. Box 9154
	One Hamilton Road
	Windsor Locks, CT 06096-1010

Facsimile:	(203) 654-6905
TELEX Number:	994439 HSD UTC WIND
TWX Number:	710-420-0584
Sita:	HFDHT7X

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
777613-1	10	100	0.43	Cover	777613-1	A, B

Instruction Code A: The "PN before the SB" has the same function as the "New PN".

Instruction Code B: You can continue to buy the "PN before the SB".

Hamilton Standard Internal Reference 227731, 227732, 227733
Hamilton Standard Internal Document Identification Number EEC15073.23
Hamilton Standard Reference A320, IAE V2500-A1
IAE Engineering Change Number 92VZ004