International Aero Engines

SERVICE BULLETIN

ENGINE - AIR - INTRODUCE A NEW LPC BLEED MASTER ACTUATOR FEATURING A LINEAR VARIABLE DIFFERENTIAL TRANSFORMER (LVDT) WITH IMPROVED WIRE TERMINATION - CATEGORY CODE 4, 7 - MOD.ENG-75-0041

1. Planning Information

A. Effectivity

(1) Aircraft: (a) Airbus A320/A321
(b) McDonnell Douglas MD-90

(2) Engine: (a) V2500-A1 engine prior to Serial No. V0355.
(b) V2500-A5 engine prior to Serial No. V10069.
(a) V2500-D5 engine prior to Serial No. V2009.

B. Concurrent Requirements

None

C. Reason

(1) Condition

Detail inspection on some returned units from operators revealed internal wire cut on Linear Variable Differential Transformer (LVDT) in the LPC Bleed-Master Actuator. This could cause damages to the coil.

(2) Background

The problem was identified in service.

(3) Objective

Incorporation of this Service Bulletin is to improve mechanical integrity of internal winding wires of LVDT and unit reliability.

(4) Substantiation

Substantiation test has been completed successfully at the vendor.

(5) Effect of Bulletin on workshop procedure:

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

(6) Supplemental Information

Not applicable.

(D) Description

(1) The changes introduced by this Service Bulletin is as follow:

(a) Existing part number of LPC Bleed-Master Actuator is changed to a new part number.

(2) Existing LPC Bleed-Master Actuator can be reworked and reidentified to a new part number.

E. Approval

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

F. Compliance

(For the V2500-A1 Engine Model)

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.

(For the V2500-A5 and V2500-D5 Engine Models)

Category Code 7

Accomplish when supply of superseded parts has been depleted.

G. Manpower

(For V2500-A1 Engine only)

Estimated manhours to incorporate the full intent of this Bulletin:

Venue	Estimated Manhours
(1) In service	TOTAL 1 hour 44 minutes
(a) To gain access	
(i) Open fan cowl doors ..	7 minutes
(ii) Open 'C' duct	9 minutes

TOTAL 16 minutes

(b) To embody

(i) Remove unit .. .. 33 minutes

(ii) Install unit .. .. 35 minutes

TOTAL 1 hour 8 minutes

(c) To return engine to flyable status

(i) Close 'C' duct .. .. 12 minutes

(ii) Close fan cowl doors .. 8 minutes

TOTAL 20 minutes

(2) At overhaul

Refer to Lucas Aerospace Service Bulletin No.1666-75-004 (for V2500-A1), No.1777-75-002 (for V2500-A5) and No.1797-75-001 (for V2500-D5).

H. Material - Price and Availability

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

I. Tooling - Prices and Availability

Special tools are not required.

J. Weight and Balance

(1) Weight change .. .. None

(2) Moment Arm .. .. No effect

(3) Datum .. .. Engine front mount centerline (Power Plant Section - PPS 100)

K. Electrical Load Data

This modification has no effect on the aircraft electrical load.

L. Reference

(1) Internal Reference No.

EC93VJ107

(2) Other References

A320/A321 Aircraft Maintenance Manual.

MD-90 Aircraft Maintenance Manual.

Lucas Aerospace, Service Bulletin No. 1666-75-004 (for V2500-A1).

Lucas Aerospace, Service Bulletin No. 1777-75-002 (V2500-A5).

Lucas Aerospace, Service Bulletin No. 1797-75-001 (for V2500-D5).

V2500 Illustrated Part Catalog (V2500-A1/A5/D5).

M. Other Publications Affected

(1) V2500 Illustrated Parts Catalog, Chapter/Section 75-31-42.

(2) V2500 Power Plant Illustrated Parts Catalog, Chapter/Section 75-31-42.

(3) V2500 Power Plant Illustrated Parts Catalog, Chapter/Section 75-32-42.

(4) The Dowty & Smith Industries Controls Limited, Component Maintenance Manual, 75-31-42 (for V2500-A1), 75-38-02 (for V2500-A5) and 75-38-22 (for V2500-D5).

2. Accomplishment Instructions

A. Prerequisite Instructions

WARNING: BE CAREFUL WHEN YOU WORK ON THE ENGINE COMPONENTS IMMEDIATELY AFTER THE ENGINE SHUTDOWN. THE ENGINE COMPONENT CAN STAY HOT FOR UP TO ONE HOUR.

(1) For V2500-A1 and V2500-A5 Engines

(a) Remove the 5L0034 (1666MK4), for V2500-A1 and (1777MK1) for V2500-A5, LPC Bleed-Master Actuator by the approved procedure in Reference (1), Chapter/Section 75-31-42, Removal/Installation.

(2) For V2500-D5 Engine

(a) Remove the 5L0043 (1797MK1), LPC Bleed-Master Actuator by the approved procedure in Reference (2), Chapter/Section 75-32-43, Removal/Installation.

B. Rework Instructions

(1) For all V2500 engines

(a) For rework of existing 5L0034 (1666MK4), LPC Bleed-Master Actuator refer to Reference (3).

(b) For rework of existing 5L0038 (1777MK1), LPC Bleed-Master Actuator refer to Reference (4).

(c) For rework of existing 5L0043 (1797MK1), LPC Bleed-Master Actuator refer to Reference (5).

C. Post-Requisite Instructions

(1) For V2500-A1 and V2500-A5 Engines

(a) Install the 5L0059 (1666MK5) for V2500-A1 and 5L0057 (1777MK2) for V2500-A5, LPC Bleed Master Actuator by the approved procedure in Reference (1), Chapter/Section 75-31-42, Removal/Installation.

(b) Do a Leak Test of the LPC Bleed-Master Actuator by the approved procedure in Reference (1), Chapter/Section 71-00-00, Maintenance Practices.

NOTE: Leaks are not permitted.

(2) For V2500-D5 Engine

(a) Install the 5L0058 (1797MK2), LPC Bleed-Master Actuator by the Approved procedure in Reference (2), Chapter/Section 75-32-43, Removal/Installation.

(b) Do a Leak Test of the LPC Bleed-Master Actuator by the Approved Procedure in Reference (2), Chapter/Section 71-00-00, Page 501.

NOTE: Leaks are not permitted.

D. Recording Instructions

(1) A record of accomplishment is necessary.

3. Material Information

Applicability: For each V2500 engine to incorporate this Bulletin.

A. Kits associated with this Bulletin:

None.

B. Parts affected by this Bulletin:

New Part No. (ATA No.)	Qty	Est'd Unit Price ($)	Keyword	Old Part No. (IPC No.)	Instructions Disposition
5L0059 (75-31-42)	1	*	.Actuator,Master LPC Bleed (for A1)	5L0034 (01-100C)	(A) (B) (C) (S1) (1D)
5L0057 (75-31-42)	1	*	.Actuator,Master LPC Bleed (for A5)	5L0038 (01-100)	(A) (B) (D) (S1) (1D)
5L0058 (75-31-42)	1	*	.Actuator,Master LPC Bleed (for D5)	5L0043 (01-100)	(A) (B) (E) (S1) (1D)

C. Instruction/Disposition Code Statements:

(A) New part is currently available for sale.
(B) Old part will no longer be available for sale.
(C) 1666MK5 is new vendor P/N (1666MK4 is old vendor P/N).
(D) 1777MK2 is new vendor P/N (1777MK1 is old vendor P/N).
(E) 1797MK2 is new vendor P/N (1797MK1 is old vendor P/N).
(S1) Old and new part is freely and fully interchangeable, both physically and functionally.
(1D) Old part can be reworked and reidentified to the new part number in accordance with each vendor Service Bulletin.

NOTE: * Contact the following vendor for information concerning firm price

Lucas Aerospace Ltd. Engine Systems
Arle Court, Cheltenham
Glos GL51 0TP, England.
(For the attention of the Customer Support Engineer, V2500).

Lucas Aerospace

SERVICE BULLETIN

1797-75-001

ENGINE COMPRESSOR CONTROL - LPC BLEED - MASTER ACTUATOR - INTRODUCTION OF LINEAR VARIABLE DIFFERENTIAL TRANSFORMER (LVDT), WITH IMPROVED WIRE TERMINATION

(IAE SB V2500-ENG-75-041, Revision 1)
(LUCAS ENGINE SYSTEMS MOD. D.TV.050)

1. Planning Information.

A. Effectivity.

(1) McDonnell - Douglas MD90.

V2500-D5100000. All 1797 Mk1 Units, pre D.TV.042(O). Units which have had modification D.TV.042(O) included, do not require this Service Bulletin.

Note: Units which have had the above modification included, will have **D.TV.042** marked in the MOD. No. box, on the identification plate.

(2) LPC Bleed Master Actuator Units.

This bulletin applies to new manufacture; the point of embodiment is unit serial number 1797011.

B. Reason.

(1) Condition.

The current standard of Linear Variable Differential Transformer (LVDT), (in the LPC Bleed Master Actuator Unit), is prone to chlorine corrosion failure of the winding wire at the soldered joints.

(2) Background.

The condition was identified during the investigation of similar units returned from service.

(3) Objective.

Incorporation of the changes introduced by this Service Bulletin (Modification), are designed to simplify and improve the wire termination process. The opportunity has also been taken to improve the method of sealing the winding area of the LVDT, against the ingress of fluids.

(4) Substantiation.

The changes introduced by this Service Bulletin (Modification), have been shown by testing, to improve the reliability of the LVDT.

C. Description.

(1) This Service Bulletin (Modification) introduces an LVDT with revised coil winding termination and additional sealing features as a product improvement.

(2) This Service Bulletin is in two parts. Part 1 is to accomplish this Service Bulletin at the Operator's facility (Contractor Working Party). Part 2 is to accomplish this Service Bulletin by unit replacement.

D. 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.

E. Approval.

Service Bulletin No. 1797-75-001 (Mod. D.TV.050), (IAE SB V2500-ENG-75-041, Revision 1), was technically approved by IAE on 2nd May 1994. The part number changes and/or part modifications described in this Service Bulletin have been shown to comply with the appropriate Federal Aviation Administration (FAA) Regulations and are FAA approved for those units listed in this Bulletin.

F. Manpower.

2.25 man hours are necessary to accomplish this Service Bulletin (Modification), at Engine Maintenance Level (Part 1). 1.73 man hours are necessary to accomplish this Service Bulletin (Modification), by unit replacement (Part 2).

G. Material - Price and Availability.

See the supplement to this Bulletin.

H. Tooling - Price and Availability.

(1) Additional tools:

None (Equipment required for Part 1 accomplishment will be available to Contractor's Working Party).

(2) Tools made redundant:

None.

I. Weight and Balance.

(1) Weight change ..... Nil

(2) Moment arm ..... No effect

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

J. References.

(1) Lucas Aerospace Limited, Component Maintenance Manual (CMM) 75-38-22.

(2) IAE Service Bulletin V2500-ENG-75-041, Revision 1.

(3) Lucas Engine Control Systems Mod. D.TV.050.

K. Other Publications Affected.

Nil.

2. Accomplishment Instructions.

This Service Bulletin can be accomplished by change of parts at engine maintenance level or by unit replacement. 2.A are the engine maintenance accomplishment instructions. 2.B are the unit replacement instructions.

A. The engine maintenance level accomplishment instructions (Part 1), of this Service Bulletin are as follows:

(1) Remove the LPC Bleed Master Actuator Unit (Actuator), as instructed by IAE Service Bulletin V2500-ENG-75-041, Revision 1.

(2) Allow the fuel to drain from the actuator and, where possible, install the transport blanks called up in CMM 75-38-22.

(3) Refer to CMM 75-38-22 and Figure 1 of this Service Bulletin and release the label retaining strap (1-20); remove the label retaining strap (1-20) and the identification plate (1-30) from the actuator.

(4) Discard the label retaining strap (1-20) but keep the identification plate (1-30) until the Service Bulletin accomplishment (Part 1), is complete.

CAUTION: KEEP THE UNIT AND COMPONENTS CLEAN. COMPLETE THE WORK IN AN AREA WHICH IS CLEAR OF DIRT AND OTHER UNWANTED MATERIAL/CONTAMINATION.

(5) Check the local electrical supply voltage (120v or 240v). Refer to Figure 2 and set the voltage selector switch on the LVDT indicator unit EL4049, to equal the supply voltage. Connect the indicator unit to the mains supply and switch the on/off switch to the ON (down) position.

(6) Set the winding selector switch to the PRIMARY position and adjust the energising voltage to 6.000 ± 0.005v by means of the 6v adjustment potentiometer on the front panel of the indicator unit.

Note: Keep the indicator unit switched on while the change of LVDT is completed; this will permit the energising voltage to become stable.

(7) Remove the LVDT, Figure 1.

(a) Extend the actuator jack piston (3-150) by hand to approximately the mid-stroke position.

(b) Remove the lockwire and slacken the two locknuts (3-10) which secure the stem of the LVDT (3-70) to the fork end (3-20). Remove the outer locknut (3-10) completely.

(c) Remove the three machine bolts (3-80) which secure the LVDT flange to the actuator body. Withdraw the LVDT until the stem of the LVDT is clear of the fork end (3-20) and remove the second (inner), locknut (3-10) from the LVDT stem; remove the LVDT from the actuator body.

(d) Remove the toroidal sealing rings (3-90) and (3-100) from the LVDT; discard the sealing rings.

(e) Attach a label to the removed LVDT; the label must contain this data:

REMOVED FROM UNIT SERIAL No. 1797***

UNIT HOURS RUN:

Note: 1797*** as shown on the data plate (1-30), which was removed at the start of these instructions. The unit hours run should be added if they are known or are available from the operator.

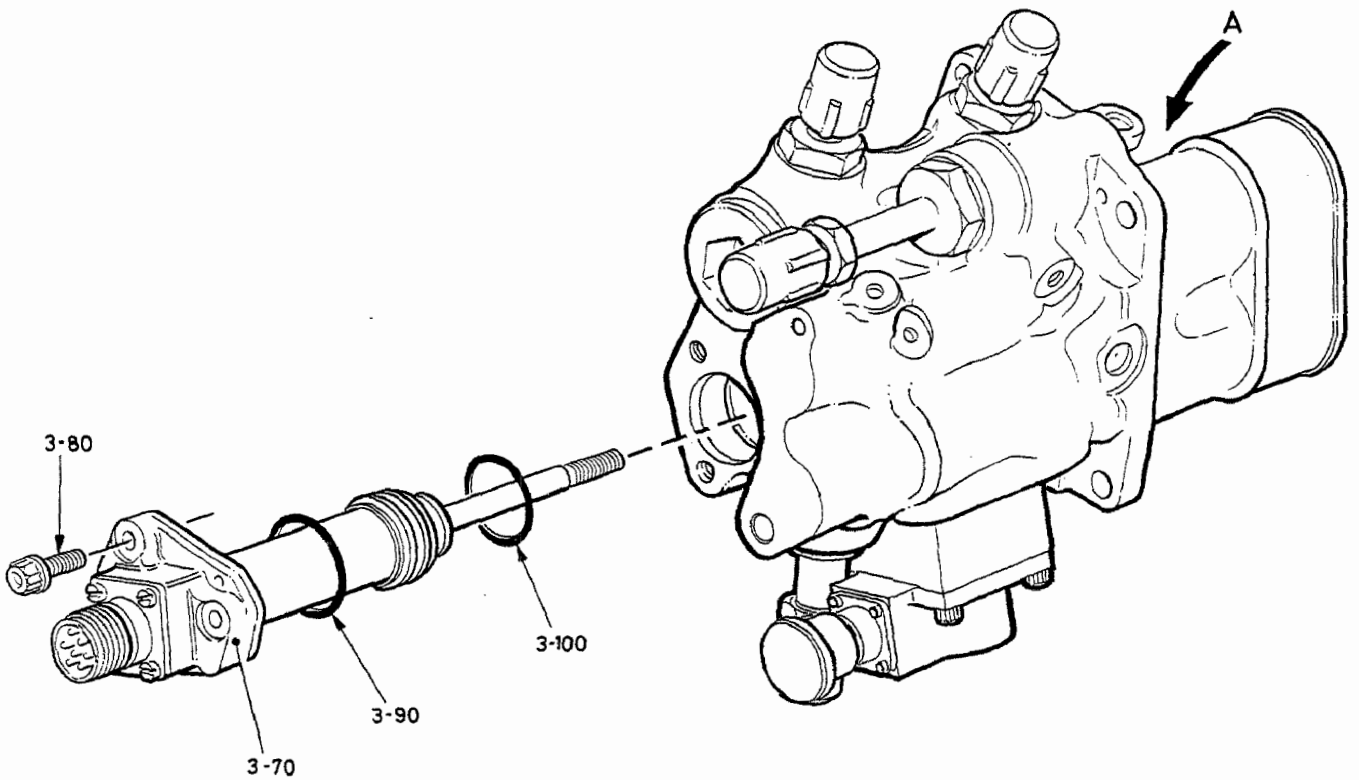
(8) Install the Replacement LVDT, Figure 1.

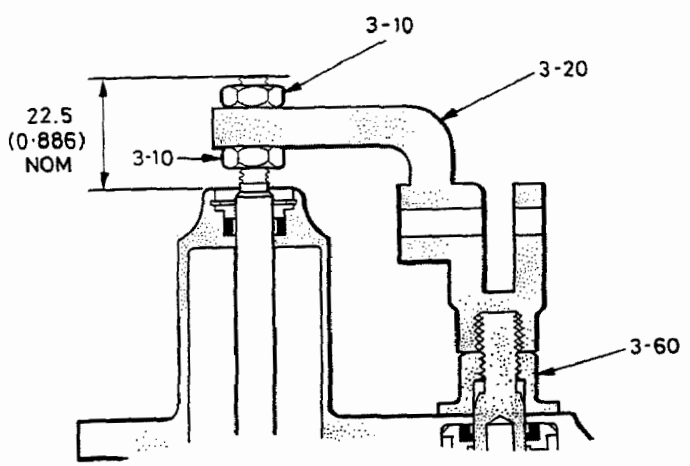
(a) Carefully remove the replacement LVDT (1777-4000) from the protective package. Make sure that the Supplier's Certificate is with the LVDT; make sure also that the Serial Number on the Certificate is the same as that on the flange of the LVDT.

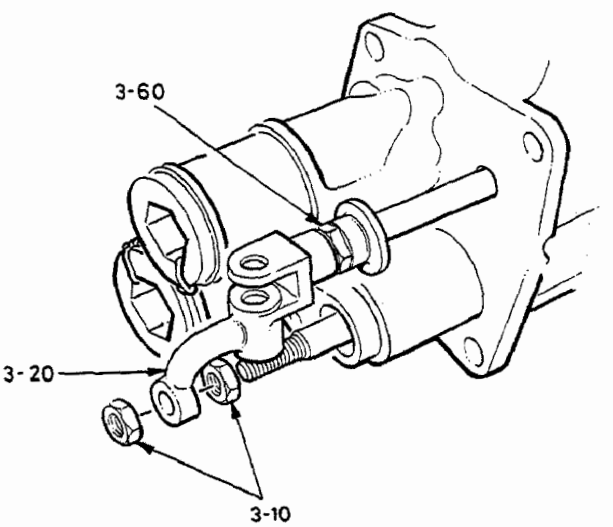
CAUTION: KEEP THE SUPPLIER'S CERTIFICATE AVAILABLE THROUGHOUT THE REMAINDER OF THESE INSTRUCTIONS.

(b) Write on the Supplier's Certificate, the serial number of the actuator unit into which the LVDT is to be installed (1797*** - see the Note at sub. para. (7). (e)).

(c) Remove the LVDT (1777-4000) from the polythene bag and clean all the surfaces with a dry, lint-free cloth.

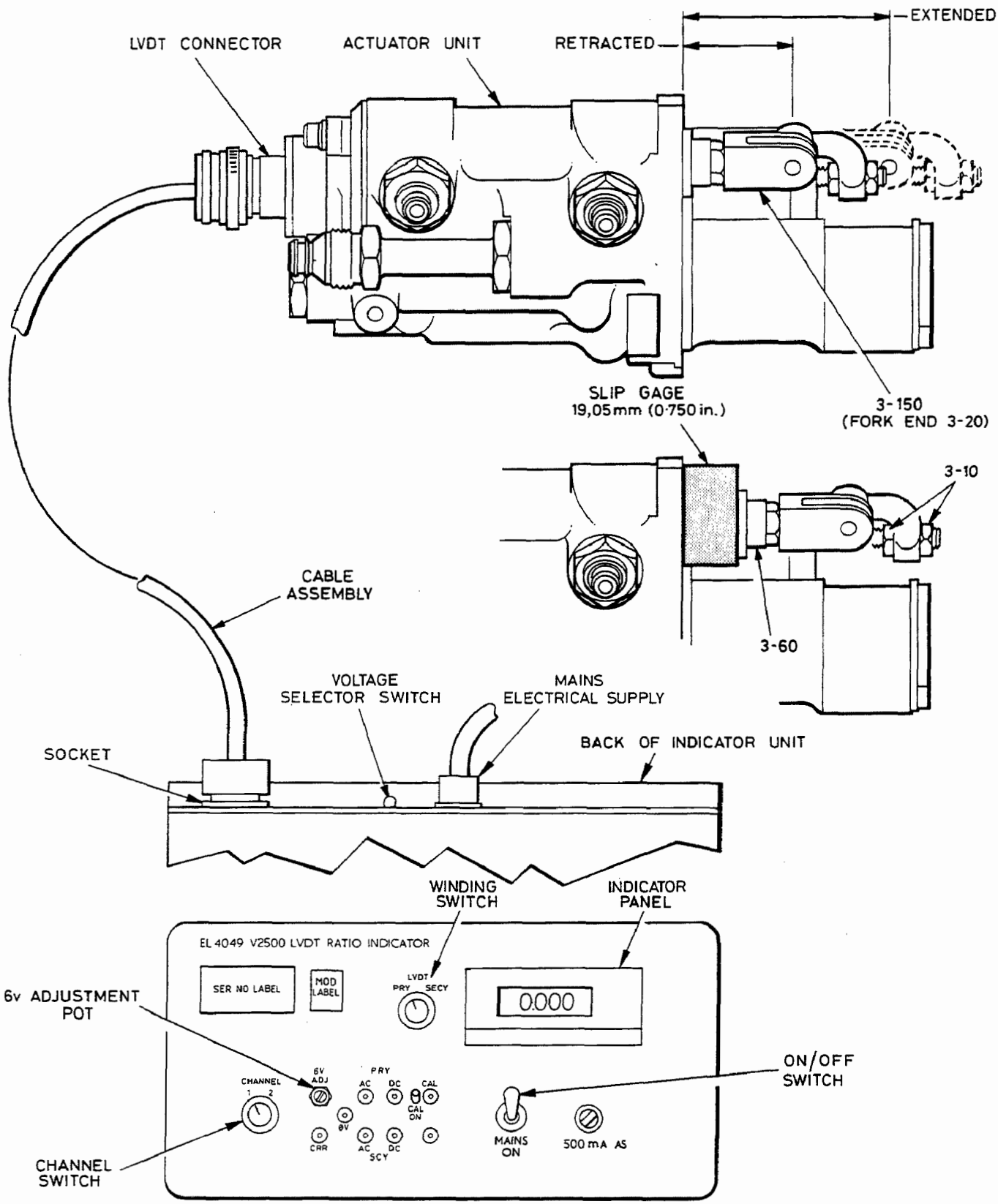






VIEW ON ARROW 'A'

Removal and Installation of the LVDT
Figure 1



LVDT Output Voltage Checks
Figure 2

(d) Get the replacement toroidal sealing rings STD1031-4121, (3-90) and STD1031-4120, (3-100); remove the sealing rings from the protective packages and assemble them to the LVDT. Make sure the seals are not twisted in the grooves.

(e) Position the ram piston (3-150) to approximately the mid stroke position. Extend the stem of the LVDT (3-70) and install the LVDT to the actuator body. When the stem (of the LVDT), comes through the hole in the actuator body, assemble one locknut (3-10) to the stem before the stem goes through the hole in the fork end (3-20). Assemble the second lock nut (3-10) to the LVDT stem, but do not tighten the locknuts at this stage.

(f) Align the three holes in the flange of the LVDT with the three holes in the actuator body and assemble the three machine bolts (3-80).

(g) Check, when the machine bolts are tightened, that there is a minimum of 0,23 Nm (2 lbf.in.) inbuilt torque in each of the inserts. If the inbuilt torque is less than this figure, reject the unit for Repair. Torque tighten the machine bolts to 4,5 Nm (40 lbf.in.).

(h) Move the jack piston (by hand) to the fully retracted position (with the flanged nut (3-60) in contact with the face of the actuator body). By adjustment of the two lock nuts (3-10), set the stem of the LVDT to the dimension shown in Figure 1; use a vernier calliper or depth gage to measure the standout. Tighten the lock nuts (3-10), hand tight only.

(9) Check the LVDT Adjustment, Figure 2.

(a) Connect the cable assembly to the socket on the LVDT indicator unit (EL4049), and the LVDT connector on the Actuator unit.

CAUTION: THROUGHOUT THE PROCEDURE, MAKE SURE THAT THE ENERGISING VOLTAGE REMAINS WITHIN THE LIMIT OF 6.000 ± 0.005v; RE-ADJUST THE VOLTAGE AS NECESSARY.

(b) If necessary, adjust the energising voltage to 6.000 ± 0.005v by means of the 6v adjustment potentiometer on the indicator unit; check that the winding switch is in the PRIMARY position and the channel switch is in the CHANNEL 1 position.

(c) Move the ram piston (3-150) to the fully retracted position (with the flanged nut (3-60) in contact with the face of the actuator body).

(d) Turn the winding switch to the SECONDARY position and read the LVDT output voltage on the indicator panel. Write the indicated voltage down under the heading CHANNEL 1 - Retracted (for future reference).

(e) Turn the channel switch to the CHANNEL 2 position and repeat sub. para. (d). Write the indicated voltage down under the heading 'Channel 2 - Retracted'.

(f) Adjust the position of the stem of the LVDT to obtain a nominal output voltage of 2.870v (use Channel 1 voltage only). Tighten the lock nuts (3-10), hand tight only.

Note: Outward movement of the LVDT stem reduces the output voltage.

(g) Move the ram piston (3-150) to approximately the mid stroke position and then back to the retracted position; check that the voltages are within the limits of 2.816 to 2.930v.

(h) Move the ram piston (3-150) to the extended position and place a 19,05mm (0.750in.) slip gage against the actuator body, between the actuator body and the flanged nut (3-60); move the ram piston in the retract mode until the flanged nut just contacts the slip gage. Hold the ram piston in this position and check the LVDT output voltages (Channel 1 and Channel 2); both voltages must be within the limit of 1.438 to 1.552v.

(i) Remove the slip gage and move the ram piston (3-150) (by hand) to the fully extended position. Check the LVDT output voltages (Channel 1 and Channel 2), at this position; both voltages must be within the limit of 0.470 to 0.584v.

(j) If the LVDT output voltages (Channel 1 and Channel 2), are within the limits given in sub. paras. (9) (g), (h) and (i), torque tighten the two lock nuts (3-10) to 12 Nm (105 lbf. in.), against the fork end (3-20). Repeat the voltage check for the retracted position as given in sub. para. (9) (c) thru. (e), to make sure that the stem of the LVDT did not move when the lock nuts (3-10) were torque tightened.

(k) Disconnect the cable assembly from the connector on the actuator.

Note: If it is possible that the LVDT indicator unit EL4049 is to be used in the accomplishment of this Service Bulletin (on another actuator), within the next two hours it is advisable to keep it switched ON.

(10) Complete the Assembly of the Unit, Figure 1.

(a) Wirelock the two lock nuts (3-10) to each other, around the lug on the fork end (3-20) as shown in CMM 75-38-22, Assembly; use lockwire (1-40) (STD945-1).

(b) Apply Ardrox 3302 to the areas of the joint faces of the LVDT and the unit body, as given in CMM 75-38-22, Assembly.

(11) Re-identify the Actuator, Figure 1.

(a) Get the new identification plate (1-30) (215-4009) (supplied with the Mod. kit).

(b) Refer to the information marked on the first identification plate (1-30) and mark the new identification plate as follows (use 1,6mm (1/16in.), letter/ number stamps), with the identification plate held on a flat surface:

IAE No. - Mark: **5L0058**

TYPE No. - Mark: **1797 Mk2**

SERIAL No. - Mark as on the original plate.

INSP/TEST - Keep blank.

MOD No. - Mark as on the original plate.

(c) Where possible, fill in the stamped letters and numbers with black paint and wipe away the surplus.

(d) Destroy the first data plate.

(e) Install the identification plate on the actuator unit as given in CMM 75-38-22, Assembly; use the new label retaining strap (1-20) (215-410) (supplied with the Mod. kit).

(12) Install the Actuator and do the necessary leakage tests as instructed by IAE Service Bulletin V2500-ENG-75-041, Revision 1.

(13) A record of accomplishment is required.

(14) Place the removed LVDT, labelled as in sub. para (7), (e), in a clean polythene bag and, if possible, heat seal the bag. Pack the LVDT, together with the Supplier's Certificate (for the replacement LVDT), in the package material from which the replacement LVDT was removed.

(15) Return the LVDT package to:

Lucas Aerospace Ltd
Engine Control Systems
Shaftmoor Lane
Birmingham B28 8SW
England.
(For the attention of the Customer Support Manager, V2500).

B. Part 2 of this Service Bulletin is by unit replacement only:

(1) Remove the L.P.C. Bleed Master Actuator (Actuator), Unit as instructed by IAE Service Bulletin V2500-ENG-75-041, Revision 1.

Note: Removed Actuator units should be returned to:

Lucas Aerospace Ltd
Engine Control Systems
Shaftmoor Lane
Birmingham B28 8SW
England.
(For the attention of the Customer Support Manager, V2500).

(2) Install the replacement Actuator unit as instructed by IAE Service Bulletin V2500-ENG-75-041, Revision 1. The part number identification, 1797 Mk2, will show that this Service Bulletin has been incorporated.

(3) A record of accomplishment is required.

3. Material Information.

A. Modification Kit.

Modification kit D.TV.050 (comprises the parts given in Para. C.).

B. Parts to be Re-worked.

None.

C. New Production Parts.

The following new parts will be available as spares:

New Part No.	Qty.	Keyword	Old Part No.
1777-4000	1	LVDT	1666-4013
STD1031-4121	1	Ring, sealing	STD1031-4121
STD1031-4120	1	Ring, sealing	STD1031-4120
215-410	1	Strap, label retaining	215-410
215-4009	1	Plate, identification	215-4009

D. Redundant Parts.

IPL Fig./Item	New Part No.	Qty	Keyword	Old Part No.
3-70	-	1	LVDT	1666-4013
3-70A	1777-4000	1	LVDT	-

E. Identification of Units.

The type of equipment affected by this Service Bulletin (Modification), is:

Unit	Type No.
L.P.C. Bleed Master Actuator	1797 Mk1, pre D.TV.042(O) (Becomes 1797 Mk2).

Lucas Aerospace

SERVICE BULLETIN

1797-75-001 (SUPPLEMENT)

ENGINE COMPRESSOR CONTROL - LPC BLEED - MASTER ACTUATOR - INTRODUCTION OF LINEAR VARIABLE DIFFERENTIAL TRANSFORMER (LVDT), WITH IMPROVED WIRE TERMINATION.

(IAE SB V2500-ENG-75-041, Revision 1)
(LUCAS ENGINE SYSTEMS MOD. D.TV.050)

1. Modification Kit.

Modification kit D.TV.050 comprises the parts given in Para. 2.

2. New Production Parts.

Part No.	Qty per unit	Keyword	Gross World List Price (Dollars)	Availability on Receipt of Order
1777-4000	1	LVDT	$ 3921.20	90 days
STD1031-4121	1	Ring, sealing	$ 14.51	90 days
STD1031-4120	1	Ring, sealing	$ 13.71	90 days
215-410	1	Strap, label retaining	$ 4.25	90 days
215-4009	1	Plate, identification	$ 33.80	90 days

3. New Tooling.

None.

4. Spare Parts Supply.

Spares distribution and Customer Service is available from the following Lucas Aerospace Customer Support Centres:

REGION	ADDRESS	COMMUNICATION	
AMERICAS	LUCAS AEROSPACE CUSTOMER SUPPORT, AMERICAS ONE CIRCLE WEST STAMFORD CONNECTICUT 06902 USA	PHONE/AOG TELEX FAX SITA/ARINC	(1) 203 351 8400 4750339 (1) 203 351 8444 BDRLU7X

Continued....

REGION	ADDRESS	COMMUNICATION	
EUROPE/MIDDLE-EAST/AFRICA	LUCAS AEROSPACE CUSTOMER SUPPORT, EUROPE BIRMINGHAM ROAD WEST BROMWICH WEST MIDLANDS B71 4JR ENGLAND	PHONE/AOG TELEX FAX SITA/ARINC	(44) 21 627 6767 334174 (44) 21 500 6405 BHXLW7X
ASIA/PACIFIC	LUCAS AEROSPACE CUSTOMER SUPPORT, ASIA/PACIFIC 35 - 37 LOYANG WAY SINGAPORE 1750	PHONE FAX SITA/ARINC AOG	(65) 545 9975 (65) 545 9965 SINLU7X (65) 545 6253

Lucas Aerospace

SERVICE BULLETIN

1777-75-002

ENGINE COMPRESSOR CONTROL - LPC BLEED - MASTER ACTUATOR - INTRODUCTION OF LINEAR VARIABLE DIFFERENTIAL TRANSFORMER (LVDT), WITH IMPROVED WIRE TERMINATION

(IAE SB V2500-ENG-75-041, Revision 1)
(LUCAS ENGINE SYSTEMS MOD. D.TV.050)

1. Planning Information.

A. Effectivity.

(1) Airbus - A320/A321.

V2500-A5100000. All 1777 Mk1 Units, pre D.TV.042(O). Units which have had modification D.TV.042(O) included, do not require this Service Bulletin.

Note: Units which have had the above modification included, will have **D.TV.042** marked in the MOD. No. box, on the identification plate.

(2) LPC Bleed Master Actuator Units.

This bulletin applies to new manufacture; the point of embodiment is unit serial number 1777076.

B. Reason.

(1) Condition.

The current standard of Linear Variable Differential Transformer (LVDT), (in the LPC Bleed Master Actuator Unit), is prone to chlorine corrosion failure of the winding wire at the soldered joints.

(2) Background.

The condition was identified during the investigation of similar units returned from service.

(3) Objective.

Incorporation of the changes introduced by this Service Bulletin (Modification), are designed to simplify and improve the wire termination process. The opportunity has also been taken to improve the method of sealing the winding area of the LVDT, against the ingress of fluids.

(4) Substantiation.

The changes introduced by this Service Bulletin (Modification), have been shown by testing, to improve the reliability of the LVDT.

C. Description.

(1) This Service Bulletin (Modification) introduces an LVDT with revised coil winding termination and additional sealing features as a product improvement.

(2) This Service Bulletin is in two parts. Part 1 is to accomplish this Service Bulletin at the Operator's facility (Contractor Working Party). Part 2 is to accomplish this Service Bulletin by unit replacement.

D. 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.

E. Approval.

Service Bulletin No. 1777-75-002 (Mod. D.TV.050), (IAE SB V2500-ENG-75-041, Revision 1), was technically approved by IAE on 2nd May 1994. The part number changes and/or part modifications described in this Service Bulletin have been shown to comply with the appropriate Federal Aviation Administration (FAA) Regulations and are FAA approved for those units listed in this Bulletin.

F. Manpower.

2.25 man hours are necessary to accomplish this Service Bulletin (Modification), at Engine Maintenance Level (Part 1). 1.73 man hours are necessary to accomplish this Service Bulletin (Modification), by unit replacement (Part 2).

G. Material - Price and Availability.

See the supplement to this Bulletin.

H. Tooling - Price and Availability.

(1) Additional tools:

None (Equipment required for Part 1 accomplishment will be available to Contractor's Working Party).

(2) Tools made redundant:

None.

I. Weight and Balance.

(1) Weight change ..... Nil

(2) Moment arm ..... No effect

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

J. References.

(1) Lucas Aerospace Limited, Component Maintenance Manual (CMM) 75-38-02.

(2) IAE Service Bulletin V2500-ENG-75-041, Revision 1.

(3) Lucas Engine Control Systems Mod. D.TV.050.

K. Other Publications Affected.

Nil.

2. Accomplishment Instructions.

This Service Bulletin can be accomplished by change of parts at engine maintenance level or by unit replacement. 2.A are the engine maintenance accomplishment instructions. 2.B are the unit replacement instructions.

A. The engine maintenance level accomplishment instructions (Part 1), of this Service Bulletin are as follows:

(1) Remove the LPC Bleed Master Actuator Unit (Actuator), as instructed by IAE Service Bulletin V2500-ENG-75-041, Revision 1.

(2) Allow the fuel to drain from the actuator and, where possible, install the transport blanks called up in CMM 75-38-02.

(3) Refer to CMM 75-38-02 and Figure 1 of this Service Bulletin and release the label retaining strap (bonding strip), (1-20); remove the label retaining strap (1-20) and the identification plate (1-30) from the actuator.

(4) Discard the label retaining strap (1-20) but keep the identification plate (1-30) until the Service Bulletin accomplishment (Part 1), is complete.

CAUTION: KEEP THE UNIT AND COMPONENTS CLEAN. COMPLETE THE WORK IN AN AREA WHICH IS CLEAR OF DIRT AND OTHER UNWANTED MATERIAL/CONTAMINATION.

(5) Check the local electrical supply voltage (120v or 240v). Refer to Figure 2 and set the voltage selector switch on the LVDT indicator unit EL4049, to equal the supply voltage. Connect the indicator unit to the mains supply and switch the on/off switch to the ON (down) position.

(6) Set the winding selector switch to the PRIMARY position and adjust the energising voltage to 6.000 ± 0.005v by means of the 6v adjustment potentiometer on the front panel of the indicator unit.

Note: Keep the indicator unit switched on while the change of LVDT is completed; this will permit the energising voltage to become stable.

(7) Remove the LVDT, Figure 1.

(a) Extend the actuator jack piston (3-150) by hand to approximately the mid-stroke position.

(b) Remove the lockwire and slacken the two locknuts (3-10) which secure the stem of the LVDT (3-70) to the fork end (3-20). Remove the outer locknut (3-10) completely.

(c) Remove the three machine bolts (3-80) which secure the LVDT flange to the actuator body. Withdraw the LVDT until the stem of the LVDT is clear of the fork end (3-20) and remove the second (inner), locknut (3-10) from the LVDT stem; remove the LVDT from the actuator body.

(d) Remove the toroidal sealing rings (3-90) and (3-100) from the LVDT; discard the sealing rings.

(e) Attach a label to the removed LVDT; the label must contain this data:

REMOVED FROM UNIT SERIAL No. 1777***

UNIT HOURS RUN:

Note: 1777*** as shown on the data plate (1-30), which was removed at the start of these instructions. The unit hours run should be added if they are known or are available from the operator.

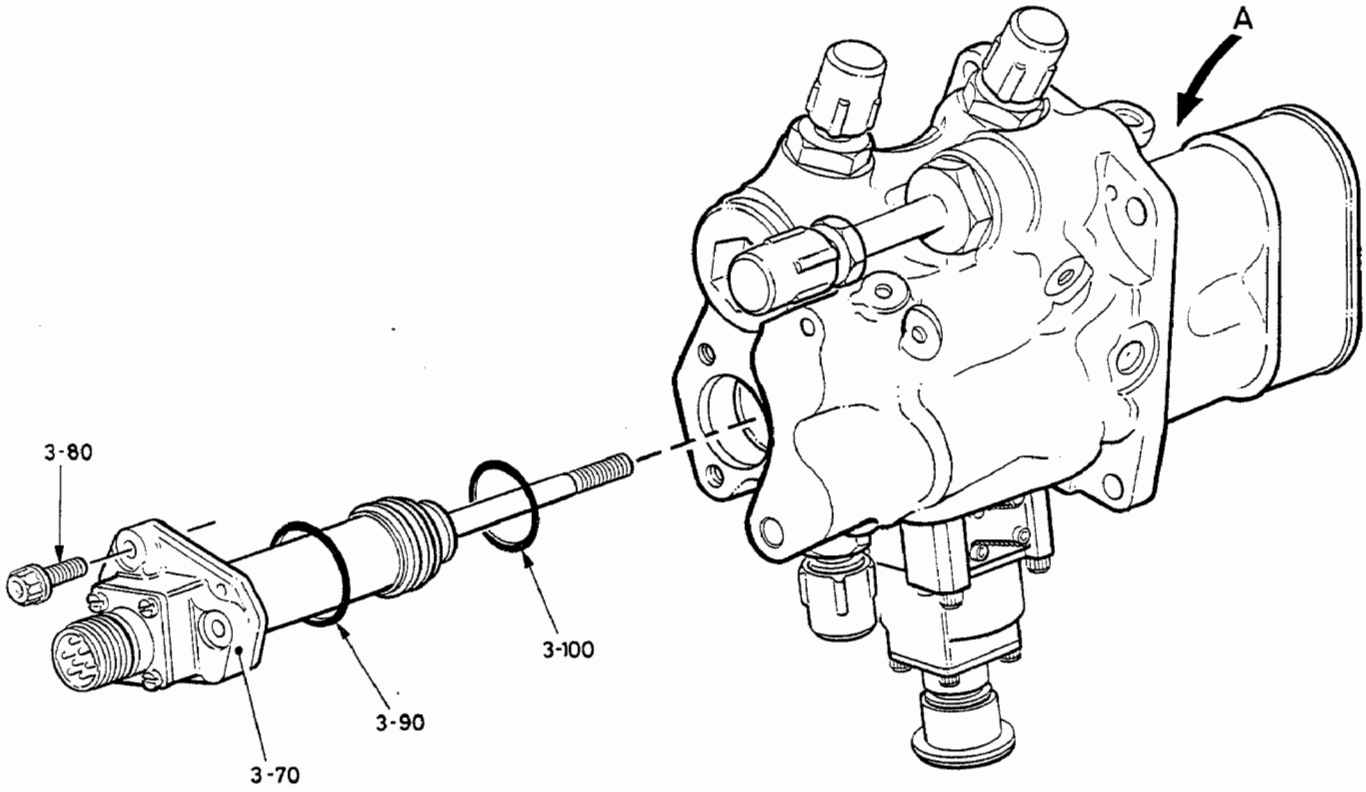
(8) Install the Replacement LVDT, Figure 1.

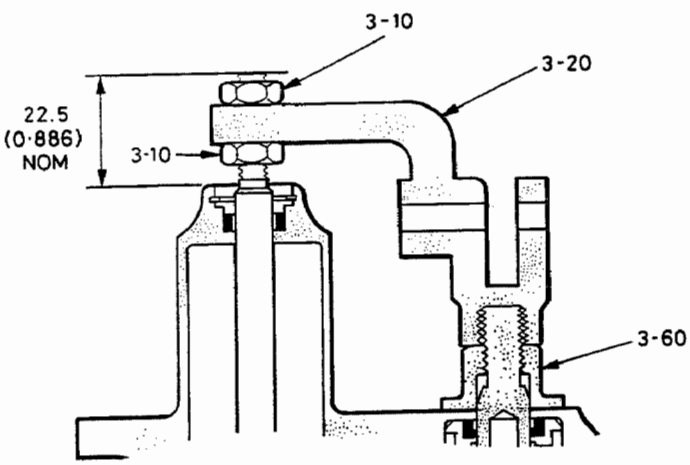
(a) Carefully remove the replacement LVDT (1777-4000) from the protective package. Make sure that the Supplier's Certificate is with the LVDT; make sure also that the Serial Number on the Certificate is the same as that on the flange of the LVDT.

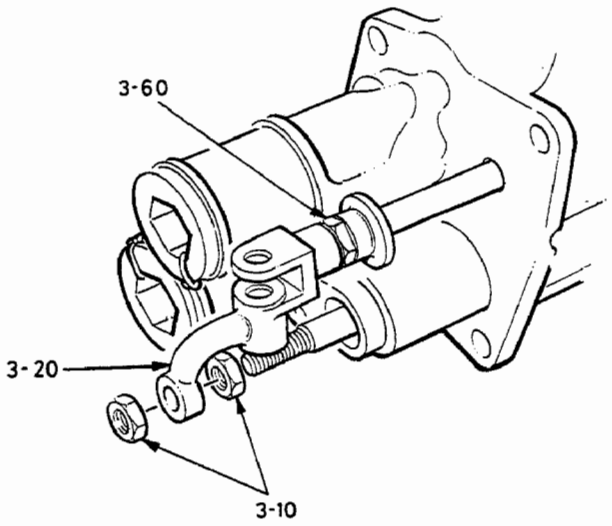
CAUTION: KEEP THE SUPPLIER'S CERTIFICATE AVAILABLE THROUGHOUT THE REMAINDER OF THESE INSTRUCTIONS.

(b) Write on the Supplier's Certificate, the serial number of the actuator unit into which the LVDT is to be installed (1777*** - see the Note at sub. para. (7). (e)).

(c) Remove the LVDT (1777-4000) from the polythene bag and clean all the surfaces with a dry, lint-free cloth.

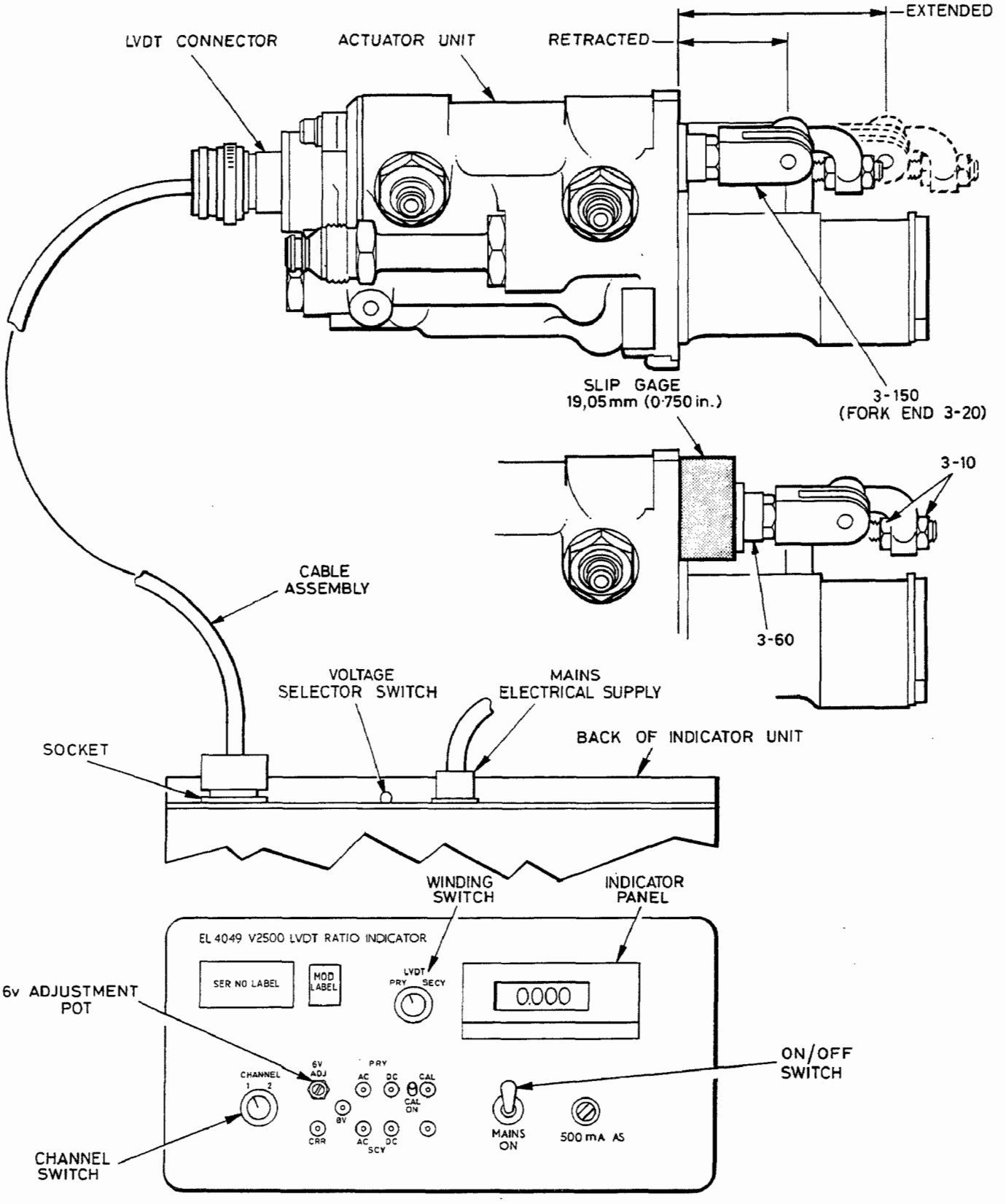






VIEW ON ARROW 'A'

Removal and Installation of the LVDT
Figure 1



LVDT Output Voltage Checks
Figure 2

(d) Get the replacement toroidal sealing rings STD1031-4121, (3-90) and STD1031-4120, (3-100); remove the sealing rings from the protective packages and assemble them to the LVDT. Make sure the seals are not twisted in the grooves.

(e) Position the ram piston (3-150) to approximately the mid stroke position. Extend the stem of the LVDT (3-70) and install the LVDT to the actuator body. When the stem (of the LVDT), comes through the hole in the actuator body, assemble one locknut (3-10) to the stem before the stem goes through the hole in the fork end (3-20). Assemble the second lock nut (3-10) to the LVDT stem, but do not tighten the locknuts at this stage.

(f) Align the three holes in the flange of the LVDT with the three holes in the actuator body and assemble the three machine bolts (3-80).

(g) Check, when the machine bolts are tightened, that there is a minimum of 0,23 Nm (2 lbf.in.) inbuilt torque in each of the inserts. If the inbuilt torque is less than this figure, reject the unit for Repair. Torque tighten the machine bolts to 4,5 Nm (40 lbf.in.).

(h) Move the jack piston (by hand) to the fully retracted position (with the flanged nut (3-60) in contact with the face of the actuator body). By adjustment of the two lock nuts (3-10), set the stem of the LVDT to the dimension shown in Figure 1; use a vernier calliper or depth gage to measure the standout. Tighten the lock nuts (3-10), hand tight only.

(9) Check the LVDT Adjustment, Figure 2.

(a) Connect the cable assembly to the socket on the LVDT indicator unit (EL4049), and the LVDT connector on the Actuator unit.

CAUTION: THROUGHOUT THE PROCEDURE, MAKE SURE THAT THE ENERGISING VOLTAGE REMAINS WITHIN THE LIMIT OF 6.000 ± 0.005v; RE-ADJUST THE VOLTAGE AS NECESSARY.

(b) If necessary, adjust the energising voltage to 6.000 ± 0.005v by means of the 6v adjustment potentiometer on the indicator unit; check that the winding switch is in the PRIMARY position and the channel switch is in the CHANNEL 1 position.

(c) Move the ram piston (3-150) to the fully retracted position (with the flanged nut (3-60) in contact with the face of the actuator body).

(d) Turn the winding switch to the SECONDARY position and read the LVDT output voltage on the indicator panel. Write the indicated voltage down under the heading 'CHANNEL 1 - Retracted' (for future reference).

(e) Turn the channel switch to the CHANNEL 2 position and repeat sub. para. (d). Write the indicated voltage down under the heading 'Channel 2 - Retracted'.

(f) Adjust the position of the stem of the LVDT to obtain a nominal output voltage of 2.870v (use Channel 1 voltage only). Tighten the lock nuts (3-10), hand tight only.

Note: Outward movement of the LVDT stem reduces the output voltage.

(g) Move the ram piston (3-150) to approximately the mid stroke position and then back to the retracted position; check that the voltages are within the limits of 2.816 to 2.930v.

(h) Move the ram piston (3-150) to the extended position and place a 19,05mm (0.750in.) slip gage against the actuator body, between the actuator body and the flanged nut (3-60); move the ram piston in the retract mode until the flanged nut just contacts the slip gage. Hold the ram piston in this position and check the LVDT output voltages (Channel 1 and Channel 2); both voltages must be within the limit of 1.438 to 1.552v.

(i) Remove the slip gage and move the ram piston (3-150) (by hand) to the fully extended position. Check the LVDT output voltages (Channel 1 and Channel 2), at this position; both voltages must be within the limit of 0.470 to 0.584v.

(j) If the LVDT output voltages (Channel 1 and Channel 2), are within the limits given in sub. paras. (9) (g), (h) and (i), torque tighten the two lock nuts (3-10) to 12 Nm (105 lbf. in.), against the fork end (3-20). Repeat the voltage check for the retracted position as given in sub. para. (9) (c) thru. (e), to make sure that the stem of the LVDT did not move when the lock nuts (3-10) were torque tightened.

(k) Disconnect the cable assembly from the connector on the actuator.

Note: If it is possible that the LVDT indicator unit EL4049 is to be used in the accomplishment of this Service Bulletin (on another actuator), within the next two hours it is advisable to keep it switched ON.

(10) Complete the Assembly of the Unit, Figure 1.

(a) Wirelock the two lock nuts (3-10) to each other, around the lug on the fork end (3-20) as shown in CMM 75-38-02, Assembly; use lockwire (1-40) (STD945-1).

(b) Apply Ardrox 3302 to the areas of the joint faces of the LVDT and the unit body, as given in CMM 75-38-02, Assembly.

(11) Re-identify the Actuator, Figure 1.

(a) Get the new identification plate (1-30) (215-4009) (supplied with the Mod. kit).

(b) Refer to the information marked on the first identification plate (1-30) and mark the new identification plate as follows (use 1,6mm (1/16in.), letter/ number stamps), with the identification plate held on a flat surface:

IAE No. - Mark: **5L0057**

TYPE No. - Mark: **1777 Mk2**

SERIAL No. - Mark as on the original plate.

INSP/TEST - Keep blank.

MOD No. - Mark as on the original plate.

(c) Where possible, fill in the stamped letters and numbers with black paint and wipe away the surplus.

(d) Destroy the first data plate.

(e) Install the identification plate on the actuator unit as given in CMM 75-38-02, Assembly; use the new label retaining strap (1-20) (215-410) (supplied with the Mod. kit).

(12) Install the Actuator and do the necessary leakage tests as instructed by IAE Service Bulletin V2500-ENG-75-041, Revision 1.

(13) A record of accomplishment is required.

(14) Place the removed LVDT, labelled as in sub. para (7), (e), in a clean polythene bag and, if possible, heat seal the bag. Pack the LVDT, together with the Supplier's Certificate (for the replacement LVDT), in the package material from which the replacement LVDT was removed.

(15) Return the LVDT package to:

Lucas Aerospace Ltd
Engine Control Systems
Shaftmoor Lane
Birmingham B28 8SW
England.
(For the attention of the Customer Support Manager, V2500).

B. Part 2 of this Service Bulletin is by unit replacement only:

(1) Remove the L.P.C. Bleed Master Actuator (Actuator), Unit as instructed by IAE Service Bulletin V2500-ENG-75-041, Revision 1.

Note: Removed Actuator units should be returned to:

Lucas Aerospace Ltd
Engine Control Systems
Shaftmoor Lane
Birmingham B28 8SW
England.
(For the attention of the Customer Support Manager, V2500).

(2) Install the replacement Actuator unit as instructed by IAE Service Bulletin V2500-ENG-75-041, Revision 1. The part number identification, 1777 Mk2, will show that this Service Bulletin has been incorporated.

(3) A record of accomplishment is required.

3. Material Information.

A. Modification Kit.

Modification kit D.TV.050 (comprises the parts given in Para. C.).

B. Parts to be Re-worked.

None.

C. New Production Parts.

The following new parts will be available as spares:

New Part No.	Qty.	Keyword	Old Part No.
1777-4000	1	LVDT	1666-4013
STD1031-4121	1	Ring, sealing	STD1031-4121
STD1031-4120	1	Ring, sealing	STD1031-4120
215-410	1	Strap, label retaining	215-410
215-4009	1	Plate, identification	215-4009

D. Redundant Parts.

IPL Fig./Item	New Part No.	Qty	Keyword	Old Part No.
3-70	-	1	LVDT	1666-4013
3-70A	1777-4000	1	LVDT	-

E. Identification of Units.

The type of equipment affected by this Service Bulletin (Modification), is:

Unit	Type No.
L.P.C. Bleed Master Actuator	1777 Mk1, pre D.TV.042(O) (Becomes 1777 Mk2).

Lucas Aerospace

SERVICE BULLETIN

1777-75-002 (SUPPLEMENT)

ENGINE COMPRESSOR CONTROL - LPC BLEED - MASTER ACTUATOR - INTRODUCTION OF LINEAR VARIABLE DIFFERENTIAL TRANSFORMER (LVDT), WITH IMPROVED WIRE TERMINATION.

(IAE SB V2500-ENG-75-041, Revision 1)
(LUCAS ENGINE SYSTEMS MOD. D.TV.050)

1. Modification Kit.

Modification kit D.TV.050 comprises the parts given in Para. 2.

2. New Production Parts.

Part No.	Qty per unit	Keyword	Gross World List Price (Dollars)	Availability on Receipt of Order
1777-4000	1	LVDT	$ 3921.20	90 days
STD1031-4121	1	Ring, sealing	$ 14.51	90 days
STD1031-4120	1	Ring, sealing	$ 13.71	90 days
215-410	1	Strap, label retaining	$ 4.25	90 days
215-4009	1	Plate, identification	$ 33.80	90 days

3. New Tooling.

None.

4. Spare Parts Supply.

Spares distribution and Customer Service is available from the following Lucas Aerospace Customer Support Centres:

REGION	ADDRESS	COMMUNICATION	
AMERICAS	LUCAS AEROSPACE CUSTOMER SUPPORT, AMERICAS ONE CIRCLE WEST STAMFORD CONNECTICUT 06902 USA	PHONE/AOG TELEX FAX SITA/ARINC	(1) 203 351 8400 4750339 (1) 203 351 8444 BDRLU7X

Continued....

SUPPLEMENT
1777-75-002

REGION	ADDRESS	COMMUNICATION	
EUROPE/MIDDLE-EAST/AFRICA	LUCAS AEROSPACE CUSTOMER SUPPORT, EUROPE BIRMINGHAM ROAD WEST BROMWICH WEST MIDLANDS B71 4JR ENGLAND	PHONE/AOG TELEX FAX SITA/ARINC	(44) 21 627 6767 334174 (44) 21 500 6405 BHXLW7X
ASIA/PACIFIC	LUCAS AEROSPACE CUSTOMER SUPPORT, ASIA/PACIFIC 35 - 37 LOYANG WAY SINGAPORE 1750	PHONE FAX SITA/ARINC AOG	(65) 545 9975 (65) 545 9965 SINLU7X (65) 545 6253

Lucas Aerospace

SERVICE BULLETIN

1666-75-004

ENGINE COMPRESSOR CONTROL - LPC BLEED - MASTER ACTUATOR - INTRODUCTION OF LINEAR VARIABLE DIFFERENTIAL TRANSFORMER (LVDT), WITH IMPROVED WIRE TERMINATION

(IAE SB V2500-ENG-75-0041)
(LUCAS ENGINE SYSTEMS MOD. D.TV.050)

1. Planning Information.

A. Effectivity.

(1) Airbus - A320.

V2500-A1100000. All 1666 Mk4 Units, pre D.TV.042(O) (pre SB 1666-75-003). Units which have had SB 1666-75-003 included, do not require this Service Bulletin.

(2) LPC Bleed Master Actuator Units.

This bulletin applies to new manufacture; the point of embodiment is unit serial number 1666586.

B. Reason.

(1) Condition.

The current standard of Linear Variable Differential Transformer (LVDT), (in the LPC Bleed Master Actuator Unit), is prone to chlorine corrosion failure of the winding wire at the soldered joints.

(2) Background.

The condition was identified during the investigation of units returned from service.

(3) Objective.

Incorporation of the changes introduced by this Service Bulletin (Modification), are designed to simplify and improve the wire termination process. The opportunity has also been taken to improve the method of sealing the winding area of the LVDT, against the ingress of fluids.

(4) Substantiation.

The changes introduced by this Service Bulletin (Modification), have been shown by testing, to improve the reliability of the LVDT.

C. Description.

(1) This Service Bulletin (Modification) introduces an LVDT with revised coil winding termination and additional sealing features as a product improvement.

(2) This Service Bulletin is in two parts. Part 1 is to accomplish this Service Bulletin at the Operator's facility (Contractor Working Party). Part 2 is to accomplish this Service Bulletin by unit replacement.

(3) For relationship with other Service Bulletins (Modifications), see Para. J(4).

D. 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.

E. Approval.

Service Bulletin No. 1666-75-004 (Mod. D.TV.050), (IAE SB V2500-ENG-75-0041), was technically approved by IAE on Jan. 8/94. The part number changes and/or part modifications described in this Service Bulletin have been shown to comply with the appropriate Federal Aviation Administration (FAA), Regulations and are FAA approved for those units listed in this Bulletin.

F. Manpower.

2.25 man hours are necessary to accomplish this Service Bulletin (Modification), at Engine Maintenance Level (Part 1). 1.73 man hours are necessary to accomplish this Service Bulletin (Modification), by unit replacement (Part 2).

G. Material - Price and Availability.

See the supplement to this Bulletin.

H. Tooling - Price and Availability.

(1) Additional tools:

None (Equipment required for Part 1 accomplishment will be available to Contractor's Working Party).

(2) Tools made redundant:

None.

I. Weight and Balance.

(1) Weight change ..... Nil

(2) Moment arm ..... No effect

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

J. References.

(1) Dowty & Smiths Industries Controls Limited, Component Maintenance Manual (CMM) 75-31-42.

(2) IAE Service Bulletin V2500-ENG-75-0041.

(3) Lucas Engine Control Systems Mod. D.TV.050.

(4) This Service Bulletin is subsequent to the Lucas Aerospace Service Bulletin 1666-75-003.

K. Other Publications Affected.

Nil.

2. Accomplishment Instructions.

This Service Bulletin can be accomplished by change of parts at engine maintenance level or by unit replacement. 2.A are the engine maintenance accomplishment instructions. 2.B are the unit replacement instructions.

A. The engine maintenance level accomplishment instructions (Part 1), of this Service Bulletin are as follows:

(1) Remove the LPC Bleed Master Actuator Unit (Actuator), as instructed by IAE Service Bulletin V2500-ENG-75-0041.

(2) Allow the fuel to drain from the actuator and, where possible, install the transport blanks called up in CMM 75-31-42.

(3) Refer to CMM 75-31-42 and Figure 1 of this Service Bulletin and release the label retaining strap (1-20); remove the label retaining strap (1-20) and the identification plate (1-30) from the actuator.

(4) Discard the label retaining strap (1-20) but keep the identification plate (1-30) until the Service Bulletin accomplishment (Part 1), is complete.

CAUTION: KEEP THE UNIT AND COMPONENTS CLEAN. COMPLETE THE WORK IN AN AREA WHICH IS CLEAR OF DIRT AND OTHER UNWANTED MATERIAL/CONTAMINATION.

(5) Check the local electrical supply voltage (120v or 240v). Refer to Figure 2 and set the voltage selector switch on the LVDT indicator unit EL4049, to equal the supply voltage. Connect the indicator unit to the mains supply and switch the on/off switch to the ON (down) position.

(6) Set the winding selector switch to the PRIMARY position and adjust the energising voltage to 6.000 ± 0.005v by means of the 6v adjustment potentiometer on the front panel of the indicator unit.

Note: Keep the indicator unit switched on while the change of LVDT is completed; this will permit the energising voltage to become stable.

(7) Remove the LVDT, Figure 1.

(a) Extend the actuator jack piston (3-170) by hand to approximately the mid-stroke position.

(b) Remove the lockwire and slacken the two locknuts (3-10) which secure the stem of the LVDT (3-70) to the fork end (3-20). Remove the outer locknut (3-10) completely.

(c) Remove the three machine bolts (3-80) which secure the LVDT flange to the actuator body. Withdraw the LVDT until the stem of the LVDT is clear of the fork end (3-20) and remove the second (inner), locknut (3-10) from the LVDT stem; remove the LVDT from the actuator body.

(d) Remove the toroidal sealing rings (3-90) and (3-100) from the LVDT; discard the sealing rings.

(e) Attach a label to the removed LVDT; the label must contain this data:

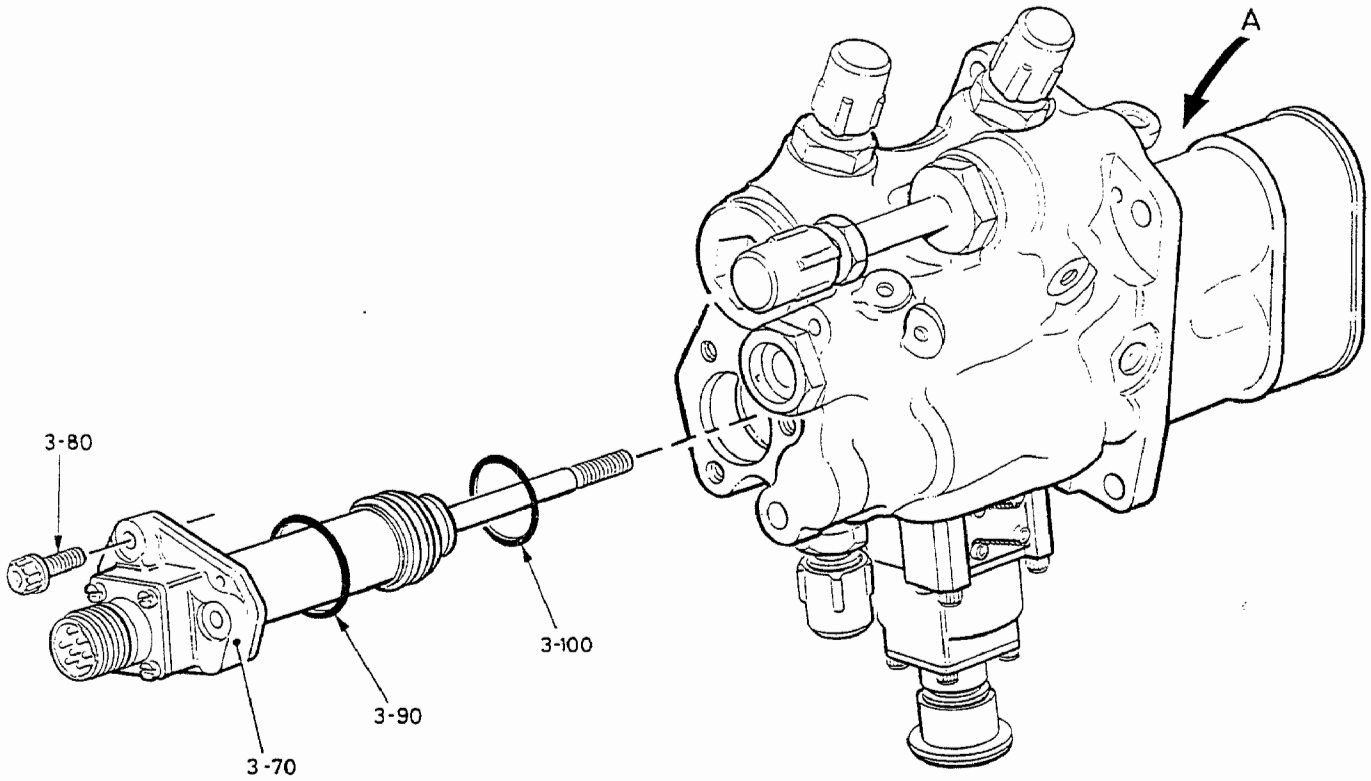
REMOVED FROM UNIT SERIAL No. 1666***

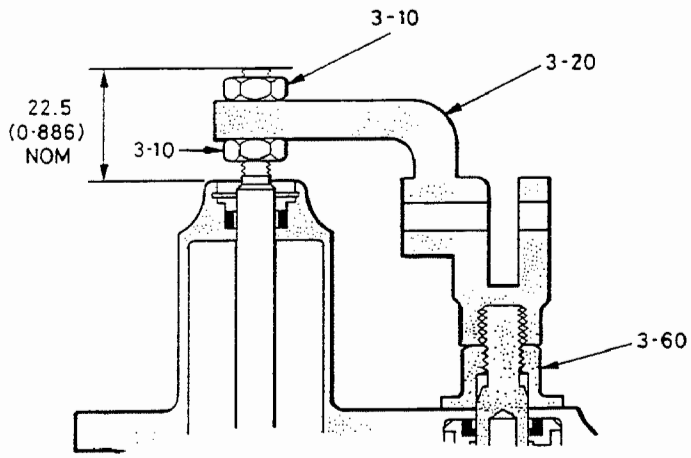
UNIT HOURS RUN:

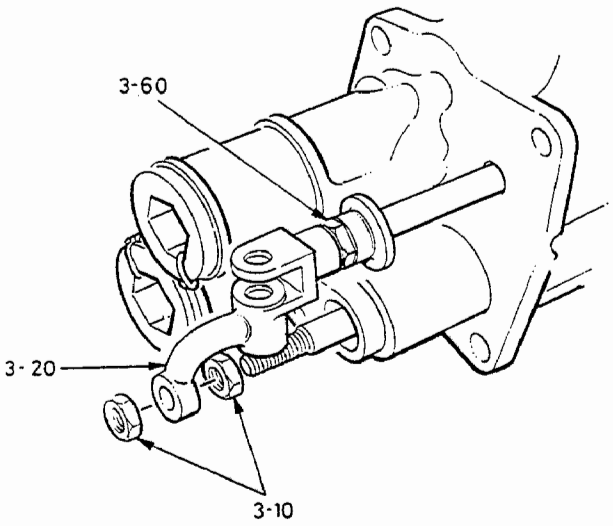
Note: 1666*** as shown on the data plate (1-30), which was removed at the start of these instructions. The unit hours run should be added if they are known or are available from the operator.

(8) Install the Replacement LVDT, Figure 1.

(a) Carefully remove the replacement LVDT (1777-4000) from the protective package. Make sure that the Supplier's Certificate is with the LVDT; make sure also that the Serial Number on the Certificate is the same as that on the flange of the LVDT.

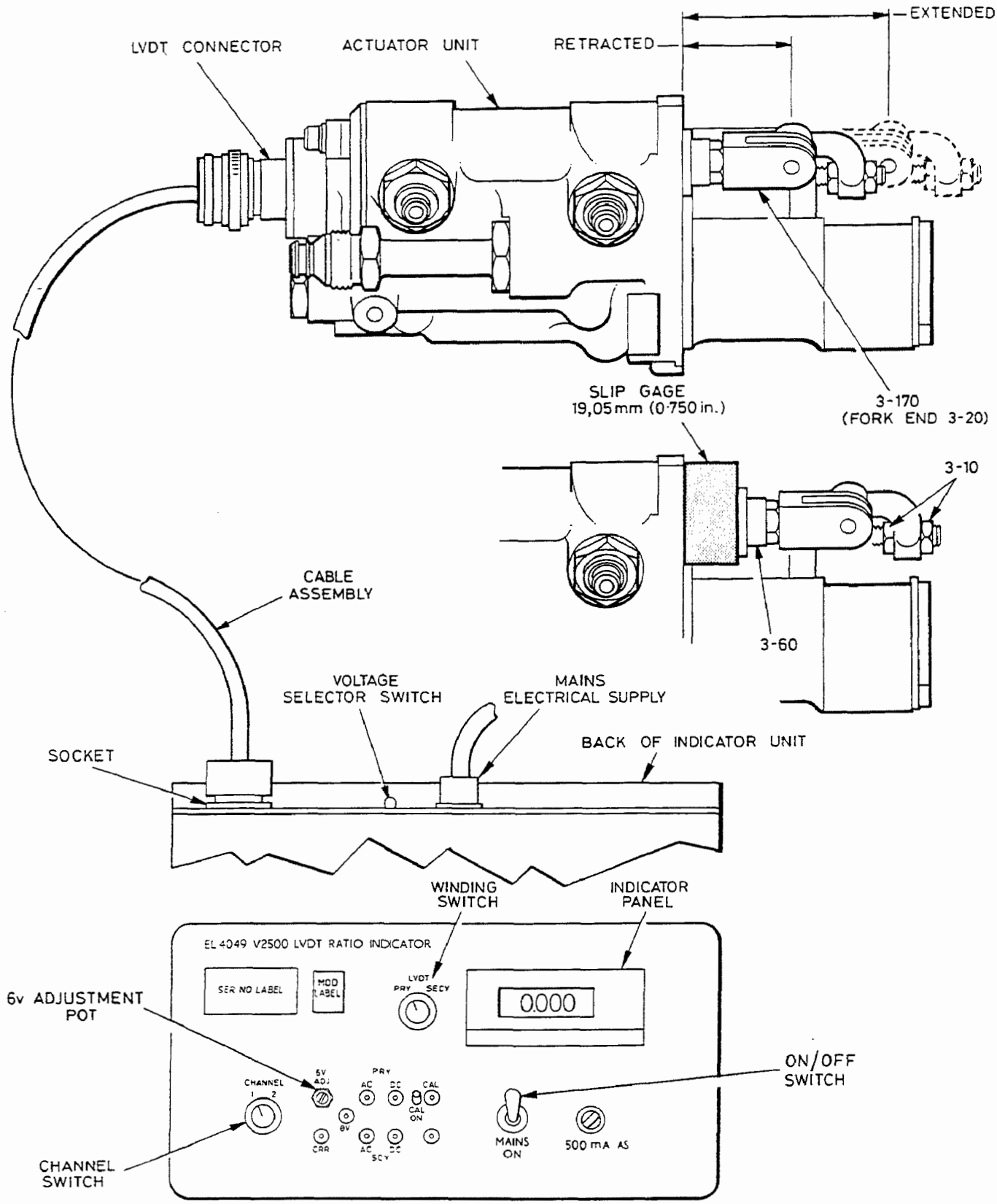






VIEW ON ARROW 'A'

Removal and Installation of the LVDT
Figure 1



LVDT Output Voltage Checks
Figure 2

CAUTION: KEEP THE SUPPLIER'S CERTIFICATE AVAILABLE THROUGHOUT THE REMAINDER OF THESE INSTRUCTIONS.

(b) Write on the Supplier's Certificate, the serial number of the actuator unit into which the LVDT is to be installed (1666*** - see the Note at sub. para. (7). (e)).

(c) Remove the LVDT (1777-4000) from the polythene bag and clean all the surfaces with a dry, lint-free cloth.

(d) Get the replacement toroidal sealing rings STD831-13, (3-90) and STD831-7, (3-100); remove the sealing rings from the protective packages and assemble them to the LVDT. Make sure the seals are not twisted in the grooves.

(e) Position the ram piston (3-170) to approximately the mid stroke position. Extend the stem of the LVDT (3-70) and install the LVDT to the actuator body. When the stem (of the LVDT), comes through the hole in the actuator body, assemble one locknut (3-10) to the stem before the stem goes through the hole in the fork end (3-20). Assemble the second lock nut (3-10) to the LVDT stem, but do not tighten the locknuts at this stage.

(f) Align the three holes in the flange of the LVDT with the three holes in the actuator body and assemble the three machine bolts (3-80).

(g) Check, when the machine bolts are tightened, that there is a minimum of 0,23 Nm (2 lbf.in.) inbuilt torque in each of the inserts. If the inbuilt torque is less than this figure, reject the unit for Repair. Torque tighten the machine bolts to 4,5 Nm (40 lbf.in.).

(h) Move the jack piston (by hand) to the fully retracted position (with the flanged nut (3-60) in contact with the face of the actuator body). By adjustment of the two lock nuts (3-10), set the stem of the LVDT to the dimension shown in Figure 1; use a vernier calliper or depth gage to measure the standout. Tighten the lock nuts (3-10), hand tight only.

(9) Check the LVDT Adjustment, Figure 2.

(a) Connect the cable assembly to the socket on the LVDT indicator unit (EL4049), and the LVDT connector on the Actuator unit.

CAUTION: THROUGHOUT THE PROCEDURE, MAKE SURE THAT THE ENERGISING VOLTAGE REMAINS WITHIN THE LIMIT OF 6.000 ± 0.005v; RE-ADJUST THE VOLTAGE AS NECESSARY.

(b) If necessary, adjust the energising voltage to 6.000 ± 0.005v by means of the 6v adjustment potentiometer on the indicator unit; check that the winding switch is in the PRIMARY position and the channel switch is in the CHANNEL 1 position.

(c) Move the ram piston (3-170) to the fully retracted position (with the flanged nut (3-60) in contact with the face of the actuator body).

(d) Turn the winding switch to the SECONDARY position and read the LVDT output voltage on the indicator panel. Write the indicated voltage down under the heading 'CHANNEL 1 - Retracted' (for future reference).

(e) Turn the channel switch to the CHANNEL 2 position and repeat sub. para. (d). Write the indicated voltage down under the heading 'Channel 2 - Retracted'.

(f) Adjust the position of the stem of the LVDT to obtain a nominal output voltage of 2.870v (use Channel 1 voltage only). Tighten the lock nuts (3-10), hand tight only.

Note: Outward movement of the LVDT stem reduces the output voltage.

(g) Move the ram piston (3-170) to approximately the mid stroke position and the back to the retracted position; check that the voltages are within the limits of 2.816 to 2.930v.

(h) Move the ram piston (3-170) to the extended position and place a 19,05mm (0.750in.) slip gage against the actuator body, between the actuator body and the flanged nut (3-60); move the ram piston in the retract mode until the flanged nut just contacts the slip gage. Hold the ram piston in this position and check the LVDT output voltages (Channel 1 and Channel 2); both voltages must be within the limit of 1.438 to 1.552v.

(i) Remove the slip gage and move the ram piston (3-170) (by hand) to the to the fully extended position. Check the LVDT output voltages (Channel 1 and Channel 2), at this position; both voltages must be within the limit of 0.470 to 0.584v.

(j) If the LVDT output voltages (Channel 1 and Channel 2), are within the limits given in sub. paras. (9) (g), (h) and (i), torque tighten the two lock nuts (3-10) to 12 Nm (105 lbf. in.), against the fork end (3-20). Repeat the voltage check for the retracted position as given in sub. para. (9) (c) thru. (e), to make sure that the stem of the LVDT did not move when the lock nuts (3-10) were torque tightened.

(k) Disconnect the cable assembly from the connector on the actuator.

Note: If it is possible that the LVDT indicator unit EL4049 is to be used in the accomplishment of this Service Bulletin (on another actuator), within the next two hours it is advisable to keep it switched ON.

(10) Complete the Assembly of the Unit, Figure 1.

(a) Wirelock the two lock nuts (3-10) to each other, around the lug on the fork end (3-20) as shown in CMM 75-31-42, Assembly; use lockwire (1-40) (STD945-1).

(b) Apply Ardrox 3302 to the areas of the joint faces of the LVDT and the unit body, as given in CMM 75-31-42, Assembly.

(11) Re-identify the Actuator, Figure 1.

(a) Get the new identification plate (1-30) (215-4009) (supplied with the Mod. kit).

(b) Refer to the information marked on the first identification plate (1-30) and mark the new identification plate as follows (use 1,6mm (1/16in.), letter/ number stamps), with the identification plate held on a flat surface:

IAE No.	-	Mark: **5L0059**
TYPE No.	-	Mark: **1666 Mk5**
SERIAL No.	-	Mark as on the original plate.
INSP/TEST	-	Keep blank.
MOD No.	-	Mark as on the original plate.

(c) Where possible, fill in the stamped letters and numbers with black paint and wipe away the surplus.

(d) Destroy the first data plate.

(e) Install the identification plate on the actuator unit as given in CMM 75-31-42, Assembly; use the new label retaining strap (1-20) (215-410) (supplied with the Mod. kit).

(12) Install the Actuator and do the necessary leakage tests as instructed by IAE Service Bulletin V2500-ENG-75-0041.

(13) A record of accomplishment is required.

(14) Place the removed LVDT, labelled as in sub. para (7), (e), in a clean polythene bag and, if possible, heat seal the bag. Pack the LVDT, together with the Supplier's Certificate (for the replacement LVDT), in the package material from which the replacement LVDT was removed.

(15) Return the LVDT package to:

Lucas Aerospace Ltd
Engine Control Systems
Shaftmoor Lane,
Birmingham B28 8SW
England.
(For the attention of the Customer Support Manager, V2500).

B. Part 2 of this Service Bulletin is by unit replacement only:

(1) Remove the L.P.C. Bleed Master Actuator (Actuator), Unit as instructed by IAE Service Bulletin V2500-ENG-75-0041.

Note: Removed Actuator units should be returned to:

Lucas Aerospace Ltd
Engine Control Systems
Shaftmoor Lane,
Birmingham B28 8SW
England.
(For the attention of the Customer Support Manager, V2500).

(2) Install the replacement Actuator unit as instructed by IAE Service Bulletin V2500-ENG-75-0041. The part number identification, 1666 Mk5, will show that this Service Bulletin has been incorporated.

(3) A record of accomplishment is required.

3. Material Information.

A. Modification Kit.

Modification kit D.TV.050 (comprises the parts given in Para. C.).

B. Parts to be Re-worked.

None.

C. New Production Parts.

The following new parts will be available as spares:

New Part No.	Qty.	Keyword	Old Part No.
1777-4000	1	LVDT	1666-4013
STD831-7	1	Ring, sealing	STD831-7
STD831-13	1	Ring, sealing	STD831-13
215-410	1	Strap, label retaining	215-410
215-4009	1	Plate, identification	215-426/215-4009

D. Redundant Parts.

IPL Fig./Item	New Part No.	Qty	Keyword	Old Part No.
3-70A	-	1	LVDT	1666-4013
3-70C	1777-4000	1	LVDT	-

E. Identification of Units.

The type of equipment affected by this Service Bulletin (Modification), is:

Unit	Type No.
L.P.C. Bleed Master Actuator	1666 Mk4, pre D.TV.042(O) (Becomes 1666 Mk5).

Lucas Aerospace

SERVICE BULLETIN

1666-75-004 (SUPPLEMENT)

ENGINE COMPRESSOR CONTROL - LPC BLEED - MASTER ACTUATOR - INTRODUCTION OF LINEAR VARIABLE DIFFERENTIAL TRANSFORMER (LVDT), WITH IMPROVED WIRE TERMINATION.

(IAE SB V2500-ENG-75-0041) (LUCAS ENGINE SYSTEMS MOD. D.TV.050)

1. Modification Kit.

   Modification kit D.TV.050 comprises the parts given in Para. 2.

2. New Production Parts.

Part No.	Qty per unit	Keyword	Gross World List Price (Dollars)	Availability on Receipt of Order
1777-4000	1	LVDT	$ 3921.20	90 days
STD831-7	1	Ring, sealing	$ 15.94	90 days
STD831-13	1	Ring, sealing	$ 15.94	90 days
215-410	1	Strap, label retaining	$ 4.25	90 days
215-4009	1	Plate, identification	$ 33.80	90 days

3. New Tooling.

   None.

4. Spare Parts Supply.

   Spares distribution and Customer Service is available from the following Lucas Aerospace Customer Support Centres:

REGION	ADDRESS	COMMUNICATION	
AMERICAS	LUCAS AEROSPACE CSC PO BOX 120039 STAMFORD CONNECTICUT 06912	PHONE/AOG TELEX FAX SITA/ARINC	(1) 203 351 8400 475 0339 (1) 203 351 8444 BDRLU7X

Continued....

REGION	ADDRESS	COMMUNICATION	
EUROPE/MIDDLE-EAST/AFRICA	LUCAS AEROSPACE CSC BIRMINGHAM ROAD WEST BROMWICH WEST MIDLANDS B71 4JR ENGLAND	PHONE/AOG TELEX FAX SITA/ARINC	(44) 21 627 6767 334174 (44) 21 500 6405 BHXLW7X
ASIA/PACIFIC	LUCAS AEROSPACE CSC 35/37 LOYANG WAY SINGAPORE 1750	PHONE FAX SITA/ARINC AOG	(65) 545 9975 (65) 545 9965 SINLU7X (65) 545 6253