



SERVICE BULLETIN

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REVISION TRANSMITTAL SHEET

This sheet transmits Revision 2 to Service Bulletin 6647-32-13 dated Apr 01/15

REASON FOR REVISION

1. With the distribution of Service Bulletin 6647-32-14 (Amendment 9) and Service Bulletin 6647-32-15 (Amendment 10) the configuration limitations on Amendment 8 assemblies has changed.
2. Amended to include Airbus accepted statements.
3. Include references to Service Bulletin 6647-32-14, Service Bulletin 6647-32-15. & Airbus EDES 001LG/14
4. Material price information updated.
5. Wire specified in the consumables list is being phased out by manufacturer.
6. Update contact details.
7. Other typographic corrections.



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FURTHER INFORMATION

Units previously complied with this Service Bulletin are not affected by this revision.

The revision line in the left margin identifies the changes.

NOTE: The Service Bulletin is distributed as a complete document.

REVISION SEQUENCE

Original: Oct 01/06

Revision 1: Mar 01/15 (Not distributed. Internal Revision Only)

Revision 2: Apr 01/15



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SERVICE BULLETIN No. 6647-32-13

LANDING GEAR - EXTENSION AND RETRACTION - CONTROL AND INTERFACE

LANDING GEAR CONTROL AND INTERFACE UNIT - AMENDMENT 8

INTRODUCTION OF A NEW MICROPROCESSOR BOARD, OUTPUT BOARD, POWER SUPPLY AND FILTER ASSEMBLY and POWER SUPPLY MODULE

1. Planning Information

A. Effectivity

AIRBUS A318, A319, A320 and A321 aircraft, all models.

Landing Gear Control and Interface Units (LGCIUs) PNR. 664700500A4X, all serial numbers up to and including 5432. CMM ATA Ref. No. 32-31-39 (Latest Revision).

B. Concurrent Requirements

Not Applicable.

C. Reasons

- (1) An integrated circuit on the current Microprocessor Printed Circuit Board (PCB) is old and difficult to procure. This Service Bulletin introduces a new Microprocessor PCB which includes a more recent integrated circuit.
- (2) A tranzorb on the Output PCB has become obsolete and has a long lead time. This Service Bulletin introduces a new Output PCB which includes an easily available tranzorb.



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- (3) A tranzorb used on the filter circuit external to the Power Supply Module has become obsolete and has a long lead time. This Service Bulletin introduces a new tranzorb to the Filter Circuit.
- (4) The analogue voltage regulator integrated circuit used in the Power Supply Module is old and difficult to procure. This Service Bulletin introduces a New Power Supply Module redesigned voltage regulator circuit which includes a more recent integrated circuit.
- (5) Amendment 8 provides a solution for the issue of component supply. Operators should not complete this Service Bulletin or return LGCIUs to Ultra Electronics Controls solely for this modification to be installed. However, this Service Bulletin must be completed if any applicable assemblies are to be installed, refer Paragraph M, Page 4.

D. Description

- (1) On the Microprocessor PCB the integrated circuit (IC1) currently installed is an Ultra Electronics Controls PNR: 2865107500 device. Amendment 8 replaces this item with an Ultra Electronics Controls PNR: 2865107608 device. The new integrated circuit operates slightly differently with the NOVAL RAM chip (IC4). These differences have been met by introducing two resistor networks (RP5 & RP6), and two capacitors (C65 & C66).
- (2) On the Output PCB there are five tranzorbs (TA1 through TA5) currently installed which are Ultra Electronics Controls PNR: 2826314205 items. Amendment 8 replaces these items with an Ultra Electronics Controls PNR: 282318608 devices.
- (3) The Power Supply Module (PNR: 002PM010000) is attached to the Power Supply and Filter Assembly (PNR: 001LG010570). The Power Supply Module contains a power supply PCB. A dual voltage regulator (IC3) (PNR: 2865714307) currently installed on the power supply PCB. Amendment 8 replaces this dual voltage regulator and associated circuitry with a simplified design involving two single regulators; voltage regulator (IC07) (PNR:2865768108) and an adjustable voltage reference device (IC08) (PNR: 286768008). Minor changes are made to the PCB circuit to attach the new components.



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- (4) There are currently ten tranzorbs (T1 through T10) attached to the Filter Panel and the Rear Support Assembly used in the filter circuit which are Ultra Electronics Controls PNR: 2826314205 items. Amendment 8 replaces these items with an Ultra Electronics Controls PNR: 2826318608 devices. Minor changes are also made to the Filter Panel supporting structure and the PCB Rear Support Assembly.

E. Compliance

This amendment is fitted to new production LGCIUs starting from serial number 5433.

Compliance with this Service Bulletin is optional or on an attrition basis for LGCIUs that are serial number up to and including 5432.

F. Approval

The modification procedures described in this Service Bulletin are reviewed and technically accepted by Airbus Design Office to apply to the Airbus fleet affected.

This Service Bulletin does not contain any change information that revises the equipment definition covered by Airbus approved modifications.

G. Manpower

The time estimates given in the Service Bulletin are based on the direct labour to do the work. The estimates do not include the time to prepare, plan or inspect the work. Also procurement of parts, drying time for sealants or other materials and general administration work for the task are not included. The estimated time necessary to embody this Service Bulletin is as follows:

1. Disassembly and Assembly: 8 Man Hours.
2. Pre Environmental Stress Screening Test: 1 Man Hour.
3. Environmental Stress Screening: 11.5 Man Hours.
4. Final Test: 1 Man Hour.

H. Weight and Balance

None.



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I. Electrical Load Data

Not changed.

J. Software Accomplishment Summary

Not Applicable.

K. References

Ultra Electronics Controls LGCIU CMM ATA Ref. No. 32-31-39 (Latest Revision).
Service Bulletin 6647-32-14 Amendment 9 (Latest Revision)
Service Bulletin 6647-32-15 Amendment 10 (Latest Revision)
Airbus Equipment Definition Evolution Sheet, EDES 001LG/14, Issue 3, Introducing Amendment 8.

L. Other Publications Affected

Not Applicable.

M. Interchangeability or Intermixability of Parts

Accomplishment of this Service Bulletin does not affect intermixability or interchangeability of the LGCIU. However this amendment will install the following items:

- Microprocessor PCB PNR: 001LG010800
- Output PCB PNR: 001LG010810
- Filter and Power Supply Assembly PNR: 001LG010830
- Power Supply Module PNR: 002PM020000

IF EITHER THE FILTER AND POWER SUPPLY ASSEMBLY PNR: 001LG010830 OR THE POWER SUPPLY ASSEMBLY PNR: 002PM020000 ARE INSTALLED IN A UNIT THEN ALL THE ITEMS IN THE ABOVE LIST MUST BE INSTALLED AND THE LGCIU IDENTIFIED AS AMENDMENT 8.

Refer to SB 6647-32-14 for the use of Microprocessor PNR:001LG010800 and SB 6647-32-15 for the use of Output Board PNR 001LG010810 in pre-Amendment 8 LGCIUs.



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2. Material Information

A. Material – Price and Availability

Price: The necessary material is detailed in Paragraph 2.C.

Availability: Contact Ultra Electronics Controls for availability.

B. Industry Support Information

Units returned to Ultra Electronics Controls can have this Service Bulletin carried out on request from Operators, or on LGCIUs returned for investigation or repair. Normal conditions and warranty terms for repair items will apply.



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C. Material Necessary for Each Component (Unit)

The following parts from Ultra Electronics Controls are necessary to accomplish this Service Bulletin.

(1) Material to be Purchased.

<u>New PNR</u>	<u>Key Word</u>	<u>Old PNR</u>	<u>Qty</u>	<u>Unit Price</u>	<u>Inst/Disp</u>
001LG01K800	AMENDMENT KIT Contains:	N/A	1	\$15,179 (World List Price 2015)	N/A
001LG010800	Microprocessor PCB	001LG010600	1	Part of Amendment Kit	New Part
001LG010810	Output PCB	001LG010350	1	Part of Amendment Kit	New Part
001LG010830	Filter and Power Supply Assembly	001LG010570	1	Part of Amendment Kit	New Part
002PM020000	Power Supply Module	002PM010000	1	Part of Amendment Kit	New Part
001LG010820	Rear Support Assembly	001LG010140	1	Part of Amendment Kit	New Part
2826318608	Tranzorb	2826314205	4	Part of Amendment Kit	New Part

(2) Material Supplied by the Operator (Consumables)

(a) Standard Material

Refer to the related sections of the CMM – Tools and Materials.



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(b) Specific Material

Conformal Coating – Concoat Ltd, Humiseal 1B73.
Thinners – Concoat Ltd, Humiseal No. 73.
Adhesive Sealant – RTV 162, GE Silicone.
Braiding Lace 21 DR Vinyl Coated – Gudebrod FYR Lace 21 DR.
Wire Insulated 19/.203, Black, Raychem 55A0111-20-0

D. Material Necessary for Each Spare

Not Applicable.

E. Re-identified Parts

Not Applicable.

F. Tooling – Price and Availability

Not Applicable.

3. Accomplishment Instructions

A. General

CAUTION: YOU MUST WORK ON THE LGCIU ONLY UNDER CLEAN ROOM CONDITIONS. ALL WORK MUST BE CARRIED OUT AT AN APPROVED METAL OXIDE SEMICONDUCTOR WORK STATION, IN ACCORDANCE WITH STANDARD ANTISTATIC PROCESURES TO PREVENT DAMAGE BY STATIC DISCHARGE

CAUTION: DISASSEMBLY OF THE LGCIU INVOLVES UNSOLDERING OF COMPONENTS WHICH CAN CAUSE DAMAGE IF PERFORMED INCORRECTLY. ALL INDIVIDUALS PERFORMING REPAIR TASKS MUST HAVE THE APPROPRIATE SKILLS AND COMPLETED THE IPC SPECIALIST COURSE J-STD-001(REQUIREMENTS FOR SOLDERED ELECTRICAL AND ELECTRONIC ASSEMBLIES) TO SATISFY SKILL REQUIREMENTS.



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NOTE: THE WORK STANDARDS USED FOR PREPERATION, SOLDERING INSPECTION AND REPAIRS OF ELECTRONIC EQUIPMENT WILL BE DONE TO THE INDUSTRY STANDARDS AS INSTRUCTED IN IPC-A-610E, ACCEPTABILITY OF ELECTRONIC ASSEMBLIES.

A description of the procedures is described in the LGCIU CMM, ATA Ref. 32-31-39 (Latest Revision), with supplementary information within this Service Bulletin. In the procedures which follow, use Illustrated Parts List (IPL) Fig., as detailed at the start of each procedure. The item numbers in parentheses are the same as those in the IPL Fig.

This procedure involves much unsoldering of unit wiring. Make sure that the wiring is identified and tagged in order to help with re-fitment of unit wiring. In addition make sure that wiring routing is noted and this routing is followed when wiring is refitted.

B. Disassembly

- (1) Refer to the LGCIU CMM, DISASSEMBLY page 301. (IPL Fig.2)
- (2) Remove OBRM and all PCBs (30, 35, 40, 45, 50 and 55). Use the instructions in the CMM DISASSEMBLY page 301.
- (3) Place the Microprocessor PCB (55) and Output PCB (45) aside as they will not be refitted.
- (4) Remove the left-hand side cover (Looking at the FRONT of unit). Use the instructions in the CMM DISASSEMBLY, page 301.
- (5) Remove the right-hand side cover (Looking at the FRONT of unit). Use the instructions in the CMM DISASSEMBLY, page 301.
- (6) Find the two bonding leads fitted to the Rear Panel (270). Remove M3 nut (285) and washer (295) and keep. Remove bonding leads from M3 screw (280).
- (7) Remove the three countersunk head M3 screws (150) securing the Power Supply Module (145) to the Power Supply and Filter Panel Assembly (135). Note: The top two countersunk screws (150) are secured by nut (155), lock washer (160) and plain washer (165).



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- (8) Carefully support the Power Supply Module (145) and tag and identify all wiring soldered to the Power Supply Module. Unsolder all wiring attached to the Power Supply Module. (Note: The red multi-core wire is connected to the Power Supply Module terminal +28V and the black multi-core wire is connected to terminal 0V are from the Filter Panel Assembly. The remaining black single core wires are from the unit wiring loom).
- (9) Remove the Power Supply Module (145) from the Filter and Power Supply Assembly (135). Place the Power Supply Module aside as it will not be refitted.
- (10) Refer to Figure 1 below. Find Tranzorbs T7, T8, T9 and T10 (320) attached to the back face of the Rear Support Panel (235). Tag and identify location of all grey single core wiring soldered to the Tranzorbs and the single black multicore wire soldered the "T7B" terminal. Also make a note of the routing followed by each wire. Unsolder the grey single core wiring attached to the Tranzorbs and the black multicore wire attached to the "T7B" terminal. Also unsolder the black multicore bonding wire link between the "B" terminals and keep. (Note: The grey wires are a part of the unit wiring loom and the black multicore wire soldered to the "T7B" terminal is the earth bonding wire to the bonding tag on the structure of the Filter Panel Assembly, see paragraph 3. B. (17) below.
- (11) Remove the two countersunk head M3 screws (140) securing the Power Supply and Filter Assembly (135) to the Rear Support Assembly (235) and keep. Remove the Rear Support from the unit. Place the rear support aside as it will not be refitted.
- (12) Find ARINC connector Shell 1C. Remove wires from sockets 1 (Red), 2 (Black), 9 (Blue), 10 (Red) and 11 (Blue).

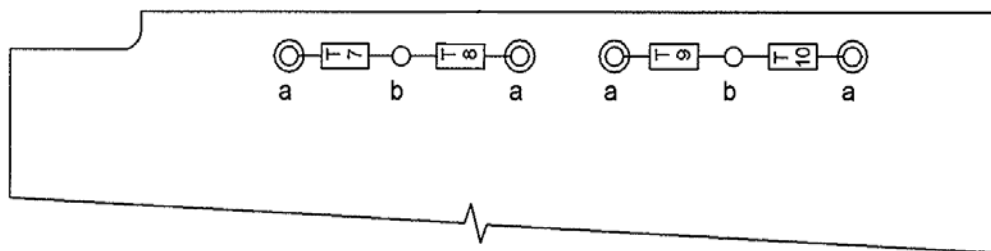


Figure 1 – Part View of Back Face of Rear Support (PNR: 001-LG-01-0820)



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- (13) Find Tranzorbs T3, T4, T5 and T6 (205) attached to the structure Filter Assembly (135). Tag and identify location of all grey single core wiring soldered to the Tranzorbs. Also make a note of the routing followed by each wire. (Note: The grey single core wires are part of the unit wiring loom. The black multicore wire soldered to the middle terminals is an earth bonding wire to the bonding tag on the structure of the Filter Panel Assembly) Unsolder the grey single core wiring attached to the Tranzorbs.
- (14) Find Filter F6 (180) and Filter F7 (185). Tag and identify location of wiring from the unit wiring loom soldered to the filters. Also make a note of the route followed by each wire. Unsolder the red multicore wire attached to Filter F6 and the black multicore wire attached to Filter F7.
- (15) Find Capacitor C1 (195). Tag and identify the black multicore wire from the unit wire loom soldered to the capacitor. Also make a note of the routing followed by the wire. Unsolder the black wire attached to the Capacitor C1.
- (16) Find Filter F2 (200). Tag and identify the two black wires from the unit wire loom soldered to the filter. Also make a note of the routing followed by each wire. Unsolder the two black wires attached to the Filter F2.
- (17) Find the four black wires secured to the Bonding Tag (197) on the structure of the Filter Assembly (135). Find the bonding wire which is the earth wire link to the "T7B" terminal for the Tranzorbs attached to the back face of the Rear Support Assembly (235). (Note: This wire is secured to the upper most bonding tag and is routed through a wiring hole in the assembly bracket.) Remove the heatshrink sleeve and unsolder the wire from the bonding tag. Remove wire from Filter Assembly and keep.
- (18) Untie all the Filter Panel assembly wiring from the unit wiring loom, taking note of the wiring routing and securing positions, sufficiently to allow the Filter Panel assembly to be removed from the unit. Remove the Filter Panel Assembly from the unit. Place the Filter Panel Assembly aside as it will not be refitted.



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C. Re-assembly (IPL Fig.1)

- (1) Take new Rear Support Assembly (PNR: 001LG010820). Refer to Figure 1 above and the black multicore bonding wire link removed in Paragraph 3. B. (10) as a template. Using a 80 mm (3.15 inch.) length of black wire detailed in Paragraph 2. C. (2) (b), solder a bonding wire link between "B" terminals. Take the four new Tranzorb (PNR: 2826318608) and solder Tranzorbs in positions T7, T8, T9 and T10 to tags on back face of the Rear Support Panel. Bond the Tranzorb body to the Rear Support using adhesive sealant detailed in Paragraph 2. C. (2) (b). (Note: The adhesive is a damping mechanism between the Tranzorb body and panel. The Tranzorbs T7, T8, T9 and T10 are to be conformally coated using items detailed in Paragraph 2. C. (2) (b) above. Allow the adhesive sealant and conformal coating to dry in accordance with manufacturers instructions.
- (2) Refer to the LGCIU CMM Figure 12B and Table 1 LGCIU Connections.
- (3) Take new Filter and Power Supply Assembly (PNR: 001LG010830). Find and identify the following wiring fitted to the new Filter Panel:
 - a. Red wire (F2 to Power Supply Module (+V in)).
 - b. Black wire (F1 to Power Supply Module (0V)).
 - c. Two black bonding wires (Ring terminations).
 - d. Two screened red and blue wires and black bonding wire all ready terminated with contacts for ARINC Shell 1C connector.
- (4) Support the Filter Panel assembly and put into position with the LGCIU.
- (5) Take the two screened red and blue wires and black bonding wire all ready terminated with contacts and insert into the ARINC Shell 1C connector (240):
 - a. Black bonding wire (Bond rear panel) – Socket 6.
 - b. Red wire (Filter F5) – Socket 1.
 - c. Blue wire (Filter F4) – Socket 9.
 - d. Red wire (Filter F6) – Socket 10.
 - e. Blue wire (Filter F7) – Socket 11.



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- (6) Using the black multicore bonding wire unsoldered and removed from the Filter Panel Assembly at Paragraph 3. B. (17) as a template. Using a 235 mm (9.25 inch.) length of black wire detailed in Paragraph 2. C. (2) (b) above. Fit the wire, routing wire in the same way from the Bonding Tag (197) on the structure of the Filter Panel Assembly through the access holes ready for resoldering to "T7B" terminal on the Tranzorbs attached to the back face of the Rear Support Assembly (235). Fit heatshrink sleeve over wire, and solder wire to the Filter Assembly bonding tag. Make good the heatshrink.
- (7) Take the two black wires unsoldered at Paragraph 3. B. (16), routing wire in the same way to Filter F2 (200) (Filter 2 to SK8 159 & 160). Resolder wires to Filter F2.
- (8) Take the black multicore wire unsoldered at Paragraph 3. B. (15), routing wire in the same way to the Capacitor C1 (195) (C1 to 0V2 Terminal Stud). Resolder wire to Capacitor C1.
- (9) Take the red wire unsoldered at Paragraph 3. B. (14), routing wire in the same way to Filter F6 (180) (Filter F6 to 28V Terminal Stud). Resolder wire to Filter F6.
- (10) Take the black wire unsoldered at Paragraph 3. B. (14), routing wire in the same way to Filter F7 (185) (Filter F7 to 0V1 Terminal Stud). Resolder wire to Filter F7.
- (11) Take the grey single core wires unsoldered at Paragraph 3. B. (13), routing the wire in the same way to Tranzorbs T3, T4, T5 and T6 (205). Resolder wires to Tranzorbs.

T3a to SK1AA/1A & SK4/86
T4a to SK1AA/1B & SK4/88
T5a to SK1AA/1C & SK4/84
T6a to SK1AA/1D & SK4/82
- (12) Take the new Rear Support (PN: 001LG010820) complete with new Tranzorbs assembled in Paragraph 3. C. (1). Place and support the Rear Support Panel into position with the Filter Panel Assembly.
- (13) Take the black multicore bonding wire from the Filter Panel Assembly earth tag fitted and soldered in Paragraph 3. C. (6). Refer to Figure 1 above. Solder black multicore wire to "T7B" terminal.
- (14) Secure the Filter and Power Supply Assembly (135) to the Rear Support Assembly (235) with the two countersunk head M3 screws (140) kept at Paragraph 3. B. (11)



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- (15) Take the grey single core wires unsoldered at Paragraph 3. B. (10), routing wire in the same way to Tranzorbs T7, T8, T9 and T10 (320). Resolder wires to Tranzorbs.
- T7a to SK1AA/1J & SK4/80
T8a to SK1AA/1K & SK4/72
T9a to SK1AA/1G & SK4/58
T10a to SK1AA/1H & SK4/68
- (16) Secure and make good wiring looms as previously noted with braiding lace.
- (17) Take two black bonding wires (Ring terminations) fitted to Filter Panel Assembly, identified at Paragraph 3. C. (3). Fit the ring terminations bonding wires to M3 screw (280) fitted to the Rear Panel (270) and secure with M3 nut (285) and washer (295) kept at Paragraph 3. B. (6).
- (18) Take new Power Supply Module (PNR: 002PM020000). Place and support the Power Supply Module into position with the Filter and Power Supply Assembly (135). Refer to Figure 2 below. Take the wires unsoldered at Paragraph 3. B. (8) and resolder wires to the new Power Supply Module.

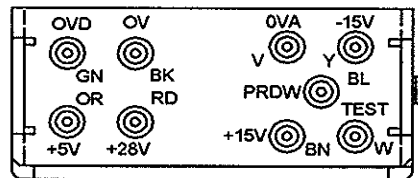


Figure 2 – Terminals Power Supply Module

+28V(Red) Terminal to F2 (Filter Panel)
0V(Black) Terminal to F1 (Filter Panel)

+5V (Orange) Terminal to SK8/1
+5V (Orange) Terminal to SK8/2
+5V (Orange) Terminal to SK8/3
+5V (Orange) Terminal to SK8/5

+15V (Brown) Terminal to SK5/94
+15V (Brown) Terminal to SK5/96



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+15V (Yellow) Terminal to SK5/93
+15V (Yellow) Terminal to SK5/95
0VD (Green) Terminal to 0V/1 Plane
0VD (Green) Terminal to 0V/1 Plane
0VD (Green) Terminal to 0V/1 Plane

0VA (Violet) Terminal to 0V/1 Plane
0VA (Violet) Terminal to 0V/1 Plane
0VA (Violet) Terminal to 0V/1 Plane

PRDW (Blue) Terminal to SK5/70

- (19) Secure new Power Supply Module (PNR: 002PM020000) to the Power Supply and Filter Assembly (135), using the three countersunk head M3 screws (150), two nuts (155), two lock washers (160) and two plain washers (165) kept at Paragraph 3. B. (7). Note: The top two countersunk screws (150) are secured by nut (155), lock washer (160) and plain washer (165).
- (20) Refit the right-hand side cover (Looking at the FRONT of unit) and secure the Ground Block (130). Use the instructions in the CMM ASSEMBLY, page 701.
- (21) Refit the left-hand side cover (Looking at the FRONT of unit). Use the instructions in the CMM ASSEMBLY page 701.
- (22) Complete the reassembly of the LGCIU, as instructed in the CMM, ASSEMBLY page 701, fitting new Microprocessor PCB (55) (PN: 001LG010800) and new Output PCB (45) (PN: 001LG010810).

D. Re-identification

Endorse unit amendment label (CMM, Fig 1, Item 25) to Amendment 8.

E. Test

- (1) Refer to the LGCIU CMM, TESTING AND FAULT ISOLATION page 101.
- (2) Do the full return to service test on the LGCIU in accordance with the CMM, TESTING AND FAULT ISOLATION section page 101.
- (3) Due to the replacement of multiple sub-assemblies perform the Environmental Stress Screening (ESS) detailed in Appendix 1.



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- (4) Before commencing the ESS, ensure there are no fault codes in the Non-Volatile Memory. In the event of a reported failure, the unit shall be investigated and repaired. At the end any LGCIU repair, repeat the testing and ESS sequence from Paragraph 3, E. (2) to ensure no fault codes are recorded.
- (5) Do another full return to service test on the LGCIU in accordance with the CMM, TESTING AND FAULT ISOLATION section page 101.

E. Removed Items

Return the following removed items to the Further Information address at the end of the Service Bulletin:

- Microprocessor PCB PNR: 001LG010600
- Output PCB PNR: 001LG010350
- Filter and Power Supply Assembly PNR: 001LG010570
- Power Supply Assembly PNR: 002PM010000

4. Notification

After accomplishment of this Service Bulletin, the Operator must tell the Ultra Electronics Controls this data:

- Service Bulletin number.
- Serial number(s) of the LGCIU(s) amended.
- Date of amendment(s).

Send this data to:

Customer Support Manager,
Ultra Electronics Controls,
417 Bridport Road, Greenford, Middlesex,
UB6 8UE,
United Kingdom



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5. Further information

If you need more information about this Service Bulletin, or to obtain price/delivery data, contact the Customer Services Manager at:

Ultra Electronics Controls
417 Bridport Road, Greenford, Middlesex
UB6 8UE
United Kingdom

Telephone: +44 (0) 20 8813 4444 Fax: +44 (0) 20 8813 4351
Email: support@ultra-controls.com



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1. Appendix 1 – Environmental Stress Screening

A. Introduction

Refer to this Appendix 1, Figure, the LGCIU (whilst powered/not powered) shall be subject to an Environmental Stress Screening (ESS) of combined temperature cycling and vibration over 4 cycles with a total screening time of approximately 11.5 hours. The environmental test facilities will need to be set-up using the information provided below.

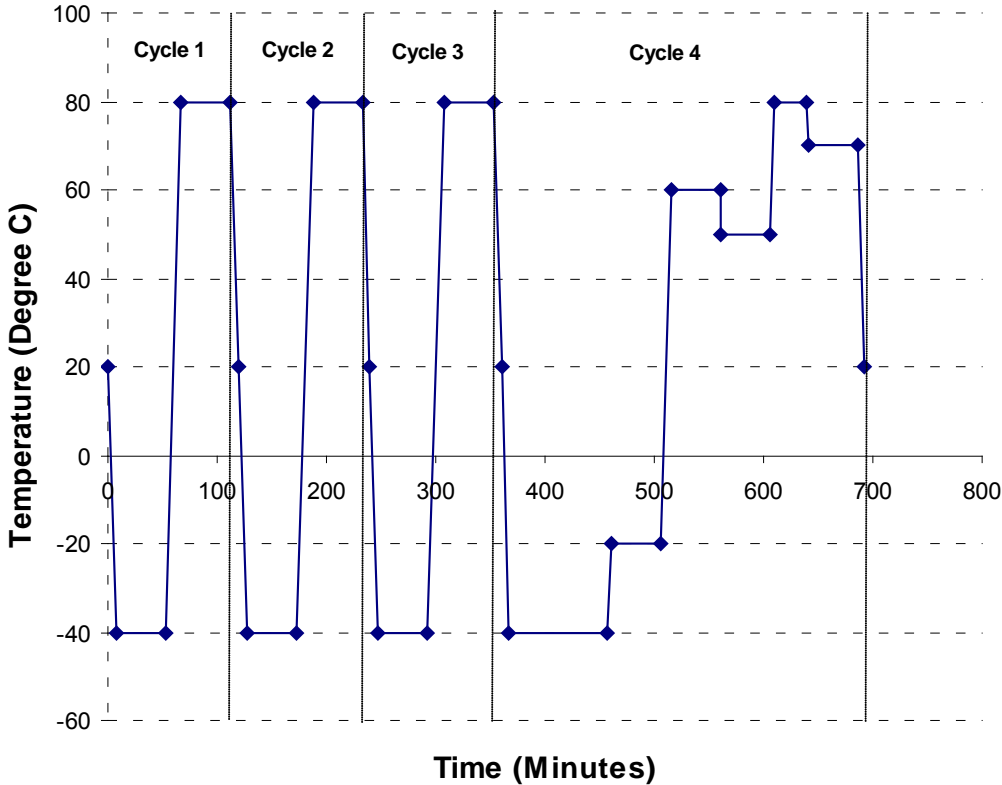


Figure 1 – ESS Test Profile



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B. Temperature Cycle

The LGCIU shall be subject to the following temperature cycle:

- (1) Installation of unit at normal ambient temperature of 15°C to 35°C.

Cycle 1

- (2) Ramp down to -40°C. (Rate 8°C ± 2°C Minute)
- (3) Dwell cold at -40°C for 45mins.
- (4) Ramp up to +80°C. (Rate 8°C ± 2°C Minute)
- (5) Dwell hot at +80°C for 45mins (Apply Vibration 15 minutes into dwell).

Cycle 2

- (6) Ramp down to -40°C. (Rate 8°C ± 2°C Minute)
- (7) Dwell cold at -40°C for 45mins.
- (8) Ramp up to +80°C. (Rate 8°C ± 2°C Minute)
- (9) Dwell hot at +80°C for 45mins (Apply Vibration 15 minutes into dwell).

Cycle 3

- (10) Ramp down to -40°C. (Rate 8°C ± 2°C Minute)
- (11) Dwell cold at -40°C for 45mins.
- (12) Ramp up to +80°C. (Rate 8°C ± 2°C Minute)
- (13) Dwell hot at +80°C for 45mins.

Cycle 4

- (14) Ramp down to -40°C. (Rate 8°C ± 2°C Minute)
- (15) Dwell cold at -40°C for 90mins (Apply Vibration 15 minutes into dwell).
- (16) Ramp up to -20°C. (Rate 8°C ± 2°C Minute)
- (17) Dwell cold at -20°C for 45mins. (Start continuous powered testing 30 minutes into dwell)
- (18) Ramp up to +60°C. (Rate 8°C ± 2°C Minute)
- (19) Dwell hot at +60°C for 45mins.
- (20) Ramp down to +50°C. (Rate 8°C ± 2°C Minute)
- (21) Dwell hot at +50°C for 45mins (Apply Vibration 15 minutes into dwell).
- (22) Ramp up to +80°C. (Rate 8°C ± 2°C Minute)
- (23) Dwell hot at +80°C for 30mins.
- (24) Ramp down to +70°C. (Rate 8°C ± 2°C Minute)
- (25) Dwell hot at +70°C for 45mins.
- (26) Ramp down to +20°C. (Rate 8°C ± 2°C Minute)



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C. Vibration Profile

The LGCIU (whilst powered/not powered) will be subjected to random vibration for 5mins on 4 occasions within the thermal cycles. The vibration will be applied during the thermal cycles as follows:

- (1) Cycle 1: +80°C dwell - 15 minutes into dwell.
- (2) Cycle 2: +80°C dwell - 15 minutes into dwell.
- (3) Cycle 4: -40°C dwell - 15 minutes into dwell.
- (4) Cycle 4: +50°C dwell - 15 minutes into dwell.

The random vibration profile provides an overall random “g” rms of 2.5 using the following:

18-80 Hz	3dB/Octave
81-350Hz	0.007g ² /Hz
351-2Khz	-3dB/Octave

D. Equipment Mounting

The LGCIU is to be mounted and secured on the vibration table in its normal installed position.

E. Unit Powered Testing

Before testing ensure that the Non-Volatile Memory (NVM) is erased. The unit will not be powered during the temperature cycling between -40°C and +80°C in cycles 1 to 3 as these temperatures are outside the normal operating limits for the unit.

Powered testing shall start 30 minutes into the -20°C dwell of the 4th cycle and will continue to the end of the test. (Note: Although the 4th cycle has a peak of +80°C which is outside the normal operating limits for the unit, the short duration at this temperature is to ensure the unit is satisfactory at its peak operating temperature of +70°C) The performance test shall comprise continuous Take Off/Landing sequences or if Automatic Test Equipment is being used continuous tests shall be carried out.

F. Test Results

Where the ESS sequence has been completed and there are no fault codes logged in the NVM, the unit will have successfully completed the ESS. In the event of a reported failure occurring during the ESS, the NVM should be downloaded and the unit shall be investigated and repaired. At the end any LGCIU repair, repeat the ESS of the unit to ensure no fault codes are recorded.