INSTALLATION OF ELECTRICAL COMPONENTS TO THE GMA PALLET

P0678 REV A

22 September, 2000

GPB SCIENCE MISSION PROCEDURE

PREPARED

G. Asher, GMA RE

Date

APPROVED

R. Stephenson GMA Engineer

Date

APPROVED

G. Asher, GMA Manager

Date

APPROVED

D. Ross, Quality Assurance

Date

APPROVED

B. Muhlfelder, Hardware Manager

Date
# TABLE OF CONTENTS

1. **SCOPE** .........................................................................................................................3  
   1.1 Acronyms ..................................................................................................................3  

2. **REFERENCES** .............................................................................................................3  
   2.1 Plans and Procedures ..............................................................................................3  
   2.2 Drawings ..................................................................................................................3  
   2.3 Specifications ..........................................................................................................3  

3. **GENERAL REQUIREMENTS** ..................................................................................3  
   3.1 Environmental Requirements ..................................................................................3  
   3.2 Personnel ..................................................................................................................4  
   3.3 Safety ........................................................................................................................4  
   3.3 Quality Assurance ....................................................................................................4  
   3.5 Red-line Authority ....................................................................................................4  

4. **REQUIRED EQUIPMENT** ..........................................................................................5  
   4.1 Tools and Materials ..................................................................................................5  

5. **INSTALLATION OF ELECTRICAL COMPONENTS TO THE GMA Pallet** . . .5  
   5.1 Install the harness ....................................................................................................5  
   5.2 Bonding heaters .......................................................................................................6  
   5.3 Installation of the thermostats to the bracket .........................................................6  
   5.4 Wire routing and soldering .......................................................................................7  
   5.5 Assemble temperature sensor kits and install on the GMA pallet .........................9  
   5.6 Test wire harness .....................................................................................................10  
   5.7 QA Final Inspection ..................................................................................................10  

6. **PROCEDURE COMPLETION** ....................................................................................11  

7. **DATA BASE ENTRY** ......................................................................................................11
1 SCOPE

This procedure installs the GMA wiring harness onto the GMA pallet, installs the heaters, temperature sensors, and thermostats on the pallet and connects them to the wiring harness.

1.1 Acronyms

The following acronyms may be used in this document

☐ QA Quality Assurance

2 REFERENCES

2.1 Plans and Procedures

Engineering Memo No. TCS 334
5835028A  GP-B General Procedure for Epoxy Bonding

2.2 Drawings

GMA Harness 26202 Rev A
Gas Management Assembly 25110 Rev C
Thermal cutoff assembly 25754 Rev-
Temperature sensor kit, silicone diode 25498 Rev A
Temperature sensor, silicon diode 23534

2.3 Specifications

LAC 3200
NHB5300.4 (2A-3)

3 GENERAL REQUIREMENTS

| ONR representative, and QA to be notified 24 hours prior to beginning this procedure |
| QA Notified:_________________  ONR Notified:___________________ |

3.1 Environmental Requirements

3.1.1 Cleanliness

A normal lab environment is appropriate for this assembly

3.1.2 Magnetic Contamination

N/A

3.1.3 Electrostatic Discharge Control

N/A
3.2 Personnel

3.2.1 The Integration and Test Director (ITD)

The IDT shall be R. Stephenson or an alternate that he shall designate. The ITD has overall responsibility for the implementation of this procedure and shall sign off the completed procedure and relevant sections within it. The GMA Manager shall also sign off the completed As-Built procedure.

3.2.2 Integration Engineers and other personnel

All engineers and technicians participating in this procedure shall work under the direction of the ITD who shall determine personnel that are qualified to participate in this procedure. Participants in this procedure are to be R. Stephenson and Lockheed technician.

3.3 Safety

N/A

3.3 Quality Assurance

The test shall be conducted on a formal basis to approved and released procedures. The QA program office shall be notified of the start of this procedure. A Quality Assurance Representative, designated by D. Ross shall be present during the procedure (if deemed necessary) and shall review any discrepancies noted and approve their disposition. Upon completion of this procedure, the QA Manager, D. Ross or her designate, shall certify their concurrence that the effort was performed and accomplished in accordance with the prescribed instructions by signing and dating in the designated place(s) in this document. Discrepancies will be recorded in a D-log or as a DR per Quality Plan P0108. If a re-test of any or all of the hardware is necessary, the Payload Technical Manager will determine the appropriate changes in the procedure, with the QA Manager’s approval.

3.5 Red-line Authority

Authority to red-line (make minor changes during execution) this procedure is given solely to the ITD or his designate, or the GMA Manager, and shall be approved by QA. Additionally, approval by the Payload Technical Manager shall be required, if in the judgment of the ITD or QA Representative, experiment functionality may be affected.
4 REQUIRED EQUIPMENT

4.1 Tools and Materials

The following tools and Materials will be available:

<table>
<thead>
<tr>
<th>Qty.</th>
<th>Description</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Digital Multimeter</td>
<td>Fluke 75 or similar</td>
</tr>
<tr>
<td>1</td>
<td>GMA Pallet Harness</td>
<td>26202A</td>
</tr>
<tr>
<td>3</td>
<td>Heater</td>
<td>133-7314</td>
</tr>
<tr>
<td>8</td>
<td>Thermostat</td>
<td>1617538-042</td>
</tr>
<tr>
<td>1</td>
<td>Thermostat Bracket</td>
<td>25753-101</td>
</tr>
<tr>
<td>8</td>
<td>Screw SHCS</td>
<td>NAS1351N3LB8S</td>
</tr>
<tr>
<td>6</td>
<td>Silicon Diode</td>
<td>23534</td>
</tr>
<tr>
<td>6</td>
<td>Connector / splice 22awg</td>
<td>CTS-S-22/22</td>
</tr>
<tr>
<td>4</td>
<td>Connector / splice 20awg</td>
<td>CTS-S-20/20</td>
</tr>
<tr>
<td>A/R</td>
<td>Epoxy, TRA-BOND</td>
<td>2115</td>
</tr>
<tr>
<td>4</td>
<td>Mount, silicon diode</td>
<td>25724-102</td>
</tr>
<tr>
<td>4</td>
<td>Screw lock kit</td>
<td>205817-8</td>
</tr>
<tr>
<td>1</td>
<td>Bracket, Electronic connector</td>
<td>25120-102</td>
</tr>
<tr>
<td>12</td>
<td>washer</td>
<td>NAS620C10</td>
</tr>
<tr>
<td>A/R</td>
<td>Adhesive</td>
<td>LAC 24-4693</td>
</tr>
<tr>
<td>A/R</td>
<td>Aluminum foil</td>
<td>LAC 24-4451</td>
</tr>
<tr>
<td>A/R</td>
<td>Epoxy</td>
<td>EPIBOND 9515-A</td>
</tr>
</tbody>
</table>

5 INSTALLATION OF ELECTRICAL COMPONENTS TO THE GMA PALLET

5.1 Install the harness

Install harness to the GMA pallet per engineering instruction

5.1.1 Install bracket 25120-102
Install connector bracket 25120-102 the GMA pallet using 4 ea. NAS1351N3LB8S screws, and 8 ea. NAS620C10 washers per 25110 sheet2. Torque bolts to 18 in lb. per LAC 3600

5.1.2 Install connectors to the connector bracket
Install J1 thru J4 into bracket 25120-102 using 205817-8 screw lock kit.

5.1.3 Mate connectors to valves and pressure transducers.
Install 14 ea. Connectors to the pressure transducers and 32 ea. To the solenoid valves, tighten jackscrews per best shop practice.
5.2 Bonding heaters

5.2.1 Verifying adhesive expiration date
Verify that adhesive on heater tapes has not expired.
If adhesive is out of date, spray it with MEK. This will soften the adhesive. Then remove with plastic or teflon scraper. Finally, clean up any remaining adhesive with MEK on a wiper or clean cloth. This work will be performed by a Lockheed technician.

5.2.2 Heater bonding.
Test continuity of heater strip leads with digital multimeter and record here:

<table>
<thead>
<tr>
<th>H1:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>H2:</td>
<td></td>
</tr>
</tbody>
</table>

Bond heater per 25110 and LMMS engineering memo TCS 334 with existing adhesive or F/N 50 on Dwg. 25110 Rev C. Take care to place heaters in the correct orientation as shown on Dwg. 25110. Heater edge should be flush with top edge of mounting plate. This work will be performed by a Lockheed technician.
Record adhesive data
Lot#____________
Exp date ______________

5.2.3 Inspection of bond.
Inspect the bonded heater. There should be no air bubbles larger than 5% of the total surface area of the heater and the total of all air bubbles should not exceed 10% of the total area of the heater.
Test continuity of heater strip leads with digital multimeter and record here:

<table>
<thead>
<tr>
<th>H1:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>H2:</td>
<td></td>
</tr>
</tbody>
</table>

Inspector’s signature: ________________________________

5.2.4 Bonding of Aluminum foil
Bond aluminum foil, F/N 51 on Dwg. 25110, to base plate over heater tapes per Lockheed engineering memo TCS 334. Take care to place the edge of the foil flush with the bottom edge of the mounting plate. The other edge of the foil should be folded over the top edge of the mounting plate between 1/8” and 3/16” an then trimmed so as to not interfere with screws, etc. This work will be performed by Lockheed technician.
Inspect the bonding of the foil.
Test continuity of heater strip leads with digital multimeter and record here:

<table>
<thead>
<tr>
<th>H1:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>H2:</td>
<td></td>
</tr>
</tbody>
</table>

Inspector’s signature: ________________________________
5.3 Installation of the thermostats to the bracket

5.3.1 Continuity checks
Test the electrical continuity between the two leads of the thermostats and record here:

Tester’s signature: _______________________________

5.3.2 Bond thermostats to the bracket
Bond thermostats per Dwg. 25754 and LMMS engineering memo TCS 334 using F/N 4, epoxy 1210-A/9615-10.

Record epoxy data
Lot# __________
Exp date __________
Shore hardness after 24 hour cure: _________________

Test the electrical continuity between the two leads of the thermostat and record here:

Tester’s signature: _______________________________

5.3.3 Solder thermostat jumper wires
Solder interconnect wires using 20 awg wire per NHB5300.4 (2A-3) and figure 1 of this procedure. Wires used to interface to the harness and the heaters shall have sufficient length to interface to there respective components. A length of two feet will be sufficient.

5.3.4 Inspect solder
Inspect solder per NHB5300.4 (2A-3)
Inspector’s signature: _______________________________

5.3.5 Bolt bracket to pallet
Install thermostat assembly 25754 the GMA pallet per 25110 using 4x F/N 30 screws and 4x washers F/N 35. Torque screws to 16- 18 in lb. Per LAC3600

5.4 Wire routing and soldering

5.4.1 Solder heater interconnect wires
Rout heater interconnect wires per best shop practice to their respective heaters per figure 1 of this procedure. Solder per NHB5300.4 (3A-2) the 22-awg wire to the solder tabs located on the heaters, including the wires from the thermostat assembly.
5.4.2 Inspect solder
Inspect the solder joints per NHB 5300.4(3A-2)

Inspector’s signature: ________________________________

5.4.3 Crimp pins
Crimp pins to connectors P13, P14, P15, and P16 per LMMS specification LAC 3200

5.4.4 Inspect crimp
Inspect crimps per LAC 3200
Inspector’s signature: ________________________________

5.4.5 Insert pins and tie down
Insert pins into connectors J13, J14, J15, and J16.

Install wire tie downs per best shop practice.

5.4.6 Engineering verification.

Engineering to verify the placement of wire tie downs.

Inspector’s signature: ________________________________
5.5  Assemble temperature sensor kits and install on the GMA pallet.

5.5.1  Continuity check
Check the continuity of the silicon diodes from the positive to the negative leads and record here:

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Tester’s signature: ____________________________________
5.5.2 Bond sensors
Bond sensors to the sensor mount per LMMS procedure 5833028 and drawing 25498.

5.5.3 Mount temperature sensor kits
Mount the temperature sensor kit to the pallet in four locations per 25110.
Check the continuity of the silicon diodes from the positive to the negative leads and record here:

<p>| |</p>
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
</table>

Tester’s signature: _______________________________

5.5.4 Bond sensors to cylinders
Bond one sensor to the each cylinder located on the reverse side of the pallet. The location is to be specified by engineering.
Check the continuity of the silicon diodes from the positive to the negative leads and record here:

<p>| |</p>
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
</table>

Tester’s signature: _______________________________

5.5.5 Trim wires and crimp pins
Route the 36 awg wires from the temperature sensors to their respective connectors, wire routing for the sensors located on the opposite side of the pallet shall be through the plumbing hole in the pallet. Crimp the pins to the write per LAC3200.

5.5.6 Inspect crimps
Inspect the 10 crimps per LAC 3200

Inspector’s signature: _______________________________

5.5.7 Insert wires to connectors and tie down
Install tie downs per best shop practice and insert the pins into the connectors.

5.5.8 Engineering verification
Engineering to verify the placement of the tie downs and routing of wires

5.6 Test wire harness
Test the completed wire harness per note 9, DWG 26202

Inspector’s signature: _______________________________

5.7 QA Final Inspection
QA INSPECT ASSEMBLY COMPLETE
6 PROCEDURE COMPLETION

The results obtained in the performance of this procedure are acceptable:

Integration Engineer____________________________   Date _____________

The information obtained under this assembly and test procedure is as represented and the documentation is complete and correct:

QA Representative _______________________________   Date _____________

GMA REE _______________________________   Date _____________

QA Program Manager ____________________________   Date _____________

Copy discrepancies to D-Log and open Discrepancy Reports when required.

7 DATA BASE ENTRY
The following data shall be entered into the GP-B Data Base:

a) Name, number and revision of this procedure
b) An electronic copy of this document
c) A copy of the “as-built” procedure with data and pictures, when completed.