Last update: 18/03/04

Production guide for F-modules:

Clean room dresses, including coats, trousers, shoes,caps and especially gloves MUST BE USED FOR ALL STEPS during production!

Assumption: Straws are prepared, i.e. tongues are cutted and soldered, wire locators are placed in the straw, and endblock is glued to straw at the straw-end with tongue. The feedthrough boards are already pretinned.

A) Connect panel A to support tool

Comment:
This step uses the adjusted template to flatten each panel and to fix it to the support bar such that this flatness and the panel position relative to the dowel pin holes is maintained throughout all following steps.
THE VACUUM OF THE SUPPORT THEREFORE MUST NOT BE INTERRUPTED DURING THE ENTIRE MODULE CONSTRUCTION.

1.Clean panel and template thoroughly by wiping using ethanol.
2. Place panel by means of dowel pins on template. TAKE CARE TO THE ORIENTATION OF THE PANEL: The longhole of the panel has to be positioned on the lower half of the template.
3. The mid of the panel must be fixed to nominal position by temporary position bars. These are removed once the panel is fixed to the support bar.
   Fix position bars at the centre of the panel by means of scotch to position panel at centre.
4. Place panel on template. DO NOT USE SPACERS UNDERNEATH SUPPORT TOOL FEET!
5. Switch pump connected to support tool.
6. Lower cylinders of support tool to the panel carefully and fix them again. The cylinders should fall freely and be sucked on by the vacuum before they are fixed.
7. Remove dowel pins.
8. Raise panel and support tool by applying pressure to cylinders.
9. Remove support tool including panel from template.
10.Remove position bars from template.

B) Gluing straws to panel A

1. Fix both feed-through board and middle PCB:
   - Clean template, feed-through board thorougly by wiping using ethanol .
   - Fix feed-through boards and middle PCBs including small plastic distance holders and spacer by pins.
   - Take care to place feedthrough-board with normal hole on upper half and

feedthrough-board with long hole on lower half of the template.

2. Place prepared long straws on upper and short straws on lower half of template.
   - Take care that both endblocks touch the PCB along the straw axis and that their tongues are are not rotated with respect to the PCB flat surface.

3. Solder straw tube tongues to ground pads on feedthrough board. Use standard solder iron and solder tin, melting point 186°C.

4. Distribute glue on panel A
   - Prepare 130g of Araldite 103 (93g of Araldite 103 + 37g of HY991)
   - Prepare 15g of Araldite 103 including 50% of bubbles (10.7g Araldite 103 + 4.3g HY991 + 50% by volume of bubbles).
   - Distribute glue without bubbles on panels by means of a roller.
   - Distribute glue with bubbles on feedthrough boards and middle PCB,
   - Wait for 90minutes.

Remark: T*o minimize the time needed for steps B3 and B4 it is possible to solder straw tube tongues to the ground pads of the feedthrough board during the 90minute break needed to cure the glue. But is has to be guaranteed that the soldering is finished is within that time. This should be possible if two persons are working in parallel.*

5.Glue panel A to straws
   - Place spacers on template to keep support in correct distance to template.
     The nominal distance between panel and straws is readjusted to 50µm.
     ===> The spacers have to be correspondingly readjusted.
   - Apply pressure to cylinders of support tool, to adjust support tool in upper position.
   - Place support tool including panel A on template.
   - Adjust panel with respect to feedthrough boards and template by means of dowel pins.
   - Remove dowel pins.
   - Lower panel to straws by releasing pressure from cylinders of support tool.
   - Recheck correct positioning of panel with respect to feedthrough board and template by means of dowel pin.
   - Visually inspect the distance between panel surface and straws from all sides. If a sizeable gap is visible, an adjustment of the height of the corresponding cylinder may be advisable. This should in principle not happen but may be a consequence of bad handling or adjustment.

6.Wait 12 hours (minimum).

7.Remove panel from template.

C) Gluing straws to panel C

Same as B), but place long straws on lower half and short straws on upper half.

D) Wiring of panel A

1. Adjust wiring tool with to upper half of panel. Use *California thin wire, 25µm Tungsten, Au plated 6%.*

Use two weights of 70g each on both sides of the panel. for wiring.

2. Connect sucking device to vacuum pump.

3. Wiring of straws.

For all soldering use solder tin free of colophnonium. Recommended is:
Fluitin L-Sn60pb DIN 1707 F-SW32 PIN8516 Sn60 806659

- Suck wire through both straws (upper and lower half).
- Connect weights on both sides of the panel.
- Solder wire to upper and lower feedthrough board.
- Solder wire on middle PCB.
- Cut wire at the end of solder pad of feedthrough boards.

Repeat for all straws!

- Cut all 64 wires at both solder pads of middle PCB.
- REMOVE REMAINING PIECES OF WIRE CAREFULLY!

4. Measure wire tension.

5. Apply HV (1500V) to all wires and measure dark current. Log dark current for all wires in list.

6. Exchange wires with dark current > 5nA or wire tension below 58g or above 80g.

7. Repeat steps 4.-6. for all exchanged wires.

E) Wiring of panel B

Same as D)

E) Finishing of panel A

Steps E) and F) shall be done at the same time.

1. Clean gas blocks and gas strips according to cleaning instuctions.
2. Prepare 7ml of Araldite 103 (5ml Araldite 103 + 2ml HY991) without bubbles.
3. Prepare 7ml of Araldite 103 including 50% of bubbles
   (5ml Araldite103 + 7ml HY991+3.5ml bubbles).
4. Glue sec. gas blocks at gas block of upper and lower half. Use Araldite103+HY991 with bubbles.
5. Glue side strips at middle PCB. Use Araldite103+HY991 without bubbles.
6. Glue Al-spacer at upper and lower half. Use Araldite103+HY991 with bubbles.
7. Fill rest of glue without bubbles in dispenser.
8. Seal end of straw tubes by applying drop of glue. Use pink tip (diameter 0.0588mm) syringe. Adjust pressure to 4bar and time to 4 divisions.
9. Wait twelve hours.
10. Glue sec. gas foil to at middle PCB.

F) Finishing of panel B

Same as E), but without step E6.

G) Gluing panel A to panel B

H) Gluing side walls to module.

I) Connecting gas pipes.