

### Procédure



OBJET (*Subject*) :

Procedure of Bonding EM CDE

Réf : SEDI/Y08/265PB

Date :10/12/2002

Pages : 1/13

Annexes :

Auteur : E. Bougamont

Approbation (*approval*):

### RECIPIENTS (*To*)

For application:

For information:

### Revision

DA	04/02/03	Corrections before validation				
PB	10/12/02	Corrections made on the whole of the document	E B.	A. G.	J.L. R.	D. B.
Pa	04/12/02		E B.			
<b>Ind</b>	<b>Date</b>	<b>Modifications</b>	<b>Aimed Author</b>	<b>Aimed RAQ</b>	<b>Aimed Inspector</b>	<b>Aimed Approb.</b>

## SYNOPSIS

RECIPIENTS ( <i>To</i> )	1
<b>1 HEADINGS INTRODUCTORY S</b>	<b>3</b>
1.1 OBJECT	3
1.2 OBJECTIVES	3
1.3 APPLICABILITY	3
1.4 REFERENCE DOCUMENT	3
1.5 APPLICABLE DOCUMENTS	3
1.6 DEFINITION	3
1.6.1 <i>Abbreviation (Acronyms)</i>	3
1.6.2 <i>Terminology</i>	3
<b>2 MATERIAL NECESSARY</b>	<b>4</b>
2.1 MATERIAL SPECIFIC TO THE REALIZATION OF THE CDE	4
2.2 CONSUMABLE	4
2.3 VARIOUS TOOLS AND MATERIAL	4
<b>3 PREPARATION OF THE TOOLS OF BONDING</b>	<b>5</b>
3.1 PRESENTATION OF THE TOOLS	5
3.2 PREPARATION OF THE TOOLS	5
<b>4 ASSEMBLY OF CSI IN THE CLAMP</b>	<b>5</b>
<b>5 PREPARATION OF THE ADHESIVE</b>	<b>6</b>
5.1 MIX	6
5.2 DEGASIFICATION	6
5.3 SETTING IN SYRINGE	6
<b>6 INSTALLATION OF THE TOOLS:</b>	<b>7</b>
6.1 ASSEMBLY OF THE TOOLS	7
6.2 ASSEMBLY ON THE CRYSTAL	7
6.3 INSTALLATION OF THE SHEATH	7
<b>7 PREPARATION OF SURFACES</b>	<b>8</b>
7.1 CLEANING	8
7.2 DEPOSIT OF THE PRIMARY EDUCATION	8
<b>8 ASSEMBLY OF DPA ON THE CRYSTAL</b>	<b>9</b>
<b>9 INJECTION OF THE ADHESIVE</b>	<b>10</b>
<b>10 RELEASE FROM THE MOULD</b>	<b>10</b>
<b>11 CLEANING</b>	<b>10</b>
<b>12 DISASSEMBLING AND STORAGE</b>	<b>11</b>
<b>13 CHRONOGRAM OF THE OPERATIONS</b>	<b>12</b>
<b>14 COUNT OF THE ILLUSTRATIONS</b>	<b>13</b>

# 1 HEADINGS INTRODUCTORY S

## 1.1 Object

This document chronologically describes the various operations implemented for the bonding of photodiodes PDA on the crystals from CsI.

## 1.2 Objectives

It aims to ensure the follow-up and the reproducibility of these operations for the whole of the bondings to realize.

## 1.3 Applicability

This procedure applies to models CDE of test EM including/understanding:

- Prepared crystals [ DR6 ]
- PDA étuvées [ DR8 ]

## 1.4 Reference document

N°	Titrate	Reference
DR1	CAL EM Hook DetectorElement specification	LAT-ss-00239
DR2	Plan of the crystal	in the document LAT DS 00820-01
DR3	Product information Dow Corning Dc92-023	
DR4	Product in formation Dow Corning Dc93-500	
DR5	Specification of the PDA of the EM	SAp/Glast/E/07/236PB
DR6	Procedure of preparation of crystals EM	Sedi/Glast/Y/08/298
DR7	Procedure of forming of the sleeves	Sedi/Glast/Y/08/247
DR8	Procedure of preparation of the PDA of CDE EM	Sedi/Glast/Y/08/274

## 1.5 Applicable documents

N°	Titrate	Reference
DA1	Monitoring sheet CDE	SEDI/Glast/Q/158
DA2	Card-index anomaly	SEDI/Glast/Q/163
DA3	Procedure of handling of the CDE	To write
DA4	Note of decision-making in the manner of depositing the primary education	SEDI/Glast/N/191/B

## 1.6 Definition

### 1.6.1 Abbreviation (Acronyms)

DPD Dual Pine Diode  
**DPA Dual Pine Assembly**  
CDE Crystal Detector Element  
CsI Iodize Cesium  
Nm centi Newton measures

### 1.6.2 Terminology

The Side *More* (P) is the end of reference, on the side of the reference mark (>). *the Minus* side (M) is the second end.

On the file of plans of the tools of bonding, **the guide diode of reference** is called guide diode of obstinate and **the guide diode of adjustment** guide diode of tightening.

## 2 MATERIAL NECESSARY

### 2.1 Material specific to the realization of the CDE

- \* PDA in conformity with the specification réf: SAp/Glast/E/07/236PB
- \* Crystals of CsI in conformity with the specification réf: LAT-ds00820-01
- \* Tools of maintenance of the crystal: clamps
- \* Tools of positioning of the PDA
- \* Sleeve of protection of the crystals in VM2000 (réf: EM-Pr - # #)

List plans of the tools

	<b>Part</b>	<b>N°plan</b>
	Block of centering	9B 7270 DM 2005 022 ind
	Guide diode tightening	9B 7270 DM 2005 021 ind
	Guide obstinate diode	9B 7270 DM 2005 020 ind
	Block push rod	9B 7270 DM 2005 008 ind
	Threaded rod push rod	9B 7270 DM 2005 006 ind
	Bit long crystal	9B 7270 DM 2005 005 ind
	Bit runs crystal	9B 7270 DM 2005 004 ind

### 2.2 Consumable

- \* Primary education Dow Corning Cd. 92-023
- \* Stick Dow Corning Cd. 93-500
- \* Standard joint compound modelling clay used as stopper
- \* Silicone stopper
- \* Sheath out of silicone  $\Phi$ :0,9mm, 20 Shore
- \* Ethanol normapur and washing bottle
- \* Optical paper essuyor of KimWipes type
- \* Cotton Micro Absorbond 3 "
- \* Gloves not powdered latexes (size adjusted with the operator)
- \* Disposable pipettes
- \* Syringes out of polypropylene, disposable polyethylene pistons and a manual push rod
- \* Disposable needles ( $\Phi_{int}$ : 0.33mm)
- \* Hermetic Bécher
- \* Bottle of recovery of product (worn alcohol, worn primary education)
- \* Tools of laboratory various (screwdriver, Allen wrench, scissors...)

### 2.3 Various tools and material

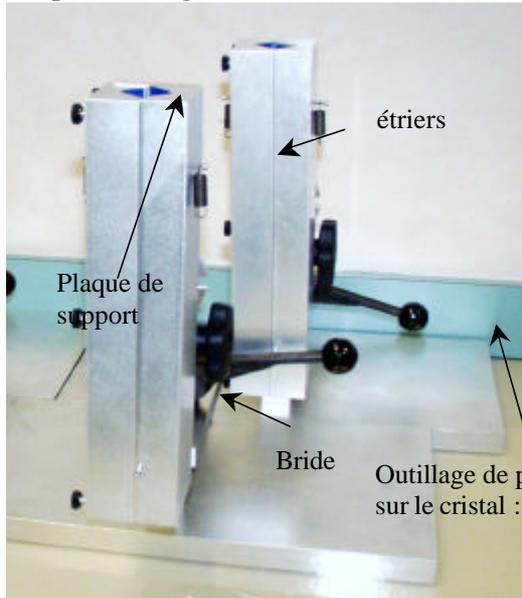
- \* System of pumping for the degasification of the adhesive
- \* Range hood
- \* Spatulas Stainless
- \* Capsules of weighing out of white polystyrene 100ml
- \* Standard batcher EB100
- \* Dynamometric screwdriver (15cNm)
- \* Balance precision of the type Ohaus Navigator, weighed 410g and precision of reading 0.01g
- \* Stop watch
- \* Thermometer and hygrogaph standard EBRO

*The list of the actions mentioned in paragraphs 3 to 12 respects a chronological order. They are held in clean room, controlled in temperature (22°C) and hygroscoy (HR<50%). These two parameters are controlled and raised with each operation.*

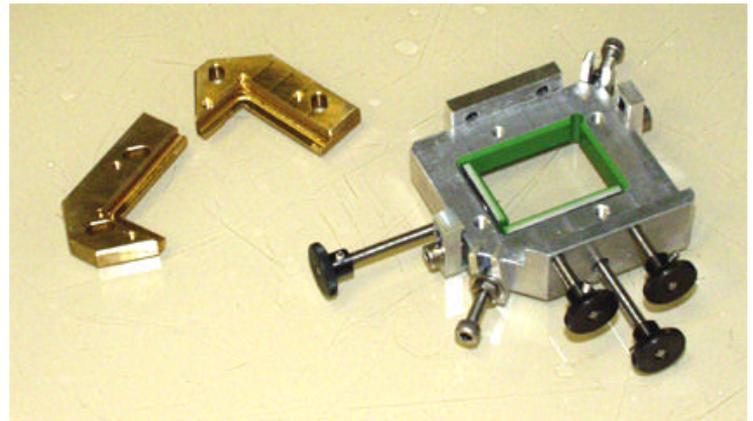
### 3 PREPARATION OF THE TOOLS OF BONDING

#### 3.1 Presentation of the tools

The tools of bonding consist of a clamp, in which the crystal is placed, and of a whole of tools for positioning of DPA.



Appareil 1: clamps in driving position



Outillage de positionnement de la DPD : guides diode

Appareil 2: tools of positioning of the PDA on the crystal

#### 3.2 Preparation of the tools

Before the first use, all the tools are cleaned with alcohol. Each whole of tools is appairé and associated a clamp carrying the same number.

Before each bonding, to make sure that the whole of the material is quite present, clean and in sufficient quantity.

In the hour preceding the deposit by primary education, the guides diode are again cleaned.

### 4 ASSEMBLY OF CSI IN THE CLAMP

With this stage, the crystals are frosted.

Each naked crystal is placed in sleeve a 29 cm length, carried out in VM2000 with identical of the wrapping

- To position the clamp with horizontal, thumb screw upwards,
- To place the crystal in its sleeve:
  - centered in the clamp, this one must overflow of 23 each side mm,
  - locate > face below on the left,

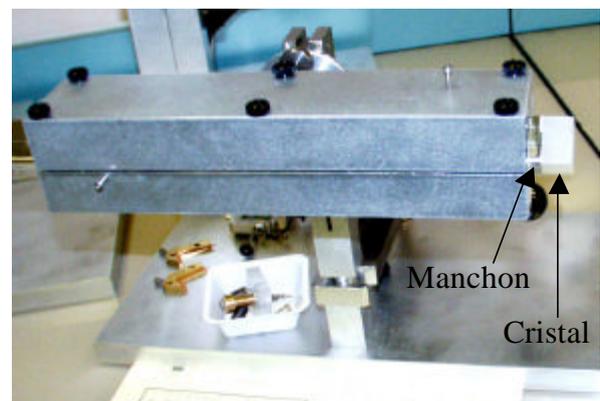


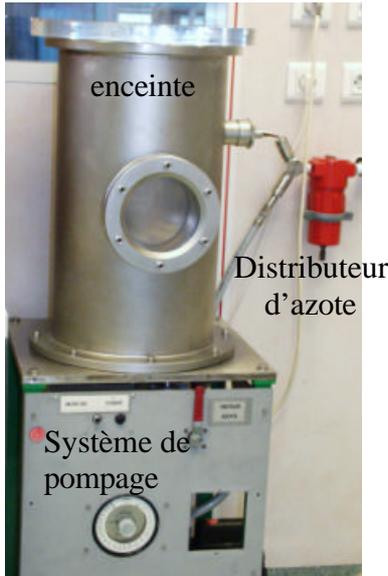
Figure 3 : cristal dans son étrier

- To close the clamp using the 6 screws thumb manual
- To note with the red marker the number of the clamp on the monitoring sheet CDE [ DA1 ], in the box tools envisaged for this purpose.

## 5 PREPARATION OF THE ADHESIVE

### 5.1 Mix

The report/ratio of mixture in weight given by Dow Corning is of 10 shares of the base for 1 share of the hardener



**Figure 5 : system of degasification of the clean room**

- to take a clean capsule (new)
- after having made the tare, to weigh 10 G basic (quantity sufficient for 8 bondings)
- to remake the tare and to weigh 1 G of hardener
- during 1 minute, to mix using the homogeneous spatula of way while bringing back the adhesive towards the center
- To note the date with the indelible felt on the capsule.



**Figure 4 : mix adhesive**

### 5.2 Degasification

The process of degasification aims to remove the air contained in the adhesive and visible in the form of bubbles. It A consists with:

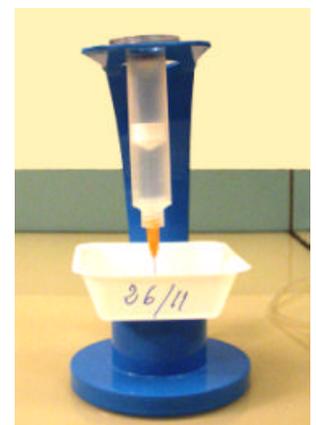
- To place the adhesive in its capsule in the vacuum bell-jar.
- To pump until a few mbar
- To make a nitrogen entry to Pa
- To start again until complete disappearance of the bubbles and to the maximum 5 times. The duration of a pumping is about 40 seconds (passage of the atmospheric pressure to a few millibars)

### 5.3 Setting in syringe

As of finished degasification, the adhesive is versed in a syringe equipped with its needle. For that, the syringe is tilted and the adhesive is slowly versed along its walls. The piston is installed using the manual push rod and the air is mainly expelled syringe.

In order to appreciably decrease its fluidity and thus the risks of escape during the injection, the adhesive thus rests in its positioned syringe switches to the bottom, during 1 hour.

This leaves time to carry out the following operations.



**Figure 6 : colle au repos dans la seringue**

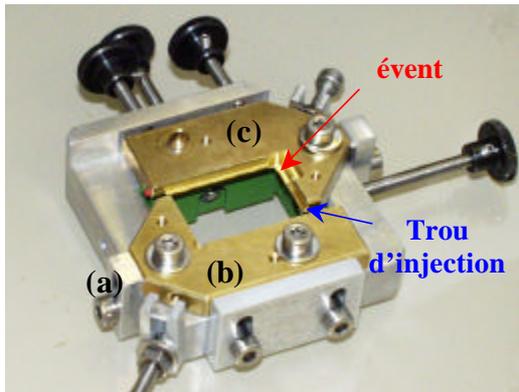


Figure 7 : outillage assemblé avant montage sur le cristal

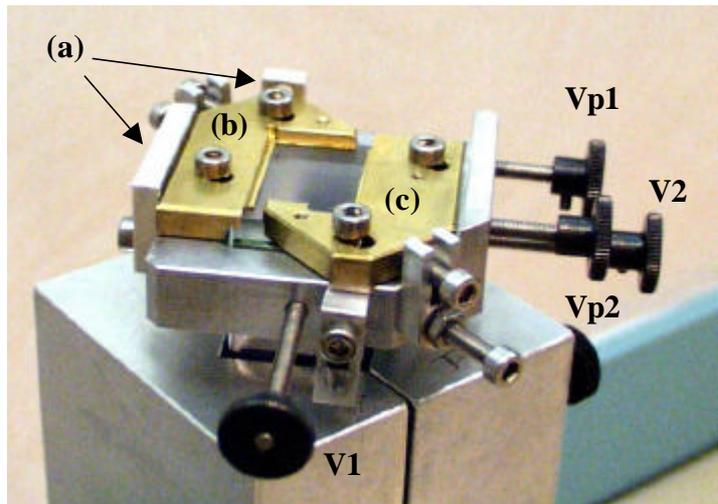


Figure 8 : outillage, 1<sup>ère</sup> phase du montage

## 6 INSTALLATION OF THE TOOLS:

The goal of this operation is to place the block of centering of the crystal in position. The clamp is in driving position, side to be stuck upwards. The first bonding is Plus side (reference, side >).

### 6.1 Assembly of the tools

These first stages are done on the table, not on the crystal.

- To tighten the holds of reference (A)
- To set up, screwed tight, the guide diode of reference (b)
- To position the guide diode of adjustment, screwed nontight (c).

### 6.2 Assembly on the crystal

- To place the unit on the end of the crystal to be stuck
- To adjust the guide diode (c) in position using the screws push rods Vp1, Vp2 and Vp3 and to screw it to tighten
- To fix the block of centering in position on the crystal using the screws V1 and V2
- To loosen the holds of reference and to dismount the guides diode.
- To check that the block of centering is quite interdependent of the crystal, to take again the adjustments at the beginning of paragraph 6 if necessary.

### 6.3 Installation of the sheath

To ensure the sealing on the crystal, the silicone sheath of hardness 20 Shore and 0,9 mms in diameter is placed on the guides diode using a spatula, in the throats envisaged for this purpose. The sheath is cut to length once installation. It exceeds on both sides guides diode of 2mm. An ultimate cleaning consists in wiping with a cotton Micro Absorbond soaked with alcohol the sheath thus installation. The sheath is replaced with each new use.



Figure 9 : guide diode équipé d'une gaine

## 7 PREPARATION OF SURFACES

The primary education being a harmful product, the following operations must be carried out under hood in order to protect the operator.

### 7.1 Cleaning

The process of cleaning is the same one for PDAs and CsI.

- To place under the hood:
  - PDAs windows to the top, on a plate insulating,
  - bars of CsI in their clamp.
- To pour a sufficient quantity of pure alcohol in a new capsule.
- To soak a cotton micro Absorbond and to pass it on surfaces to be cleaned
- To renew the operation as long as there remains dirtinesses on surfaces



Figure 10 : dépôt du primaire

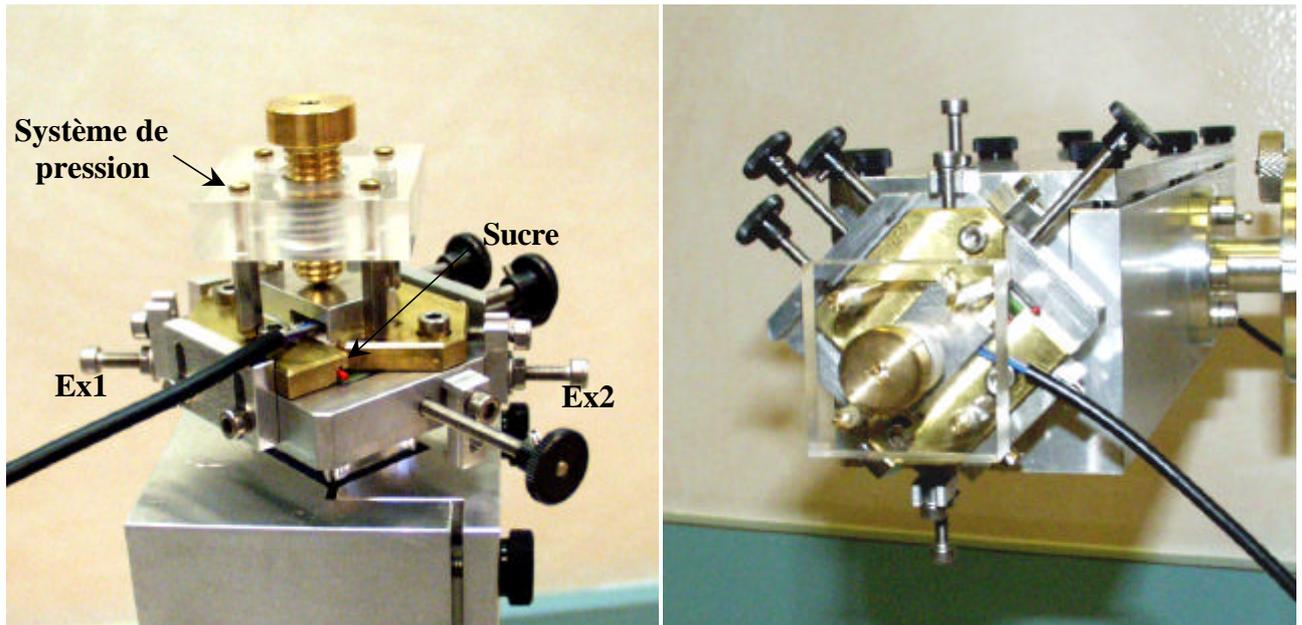
### 7.2 Deposit of the primary education

The primary education should not be to use directly since the bottle of origin. A quantity (typically 20 ml) is taken bottle of origin using a pipette and is placed in closing Bécher in a hermetic way. It is the primary education resulting from this Bécher which will be used. This operation of transfer is consigned in the monitoring sheet of the primary education. It must take place regularly, at least every 15 days and to the maximum after 5 openings of Bécher. The product not used is thrown in a container envisaged for this purpose. Bécher is replaced with each transfer.

The bottle of origin is arranged in a place safe from the light as well as Bécher after use.

The deposit of primary education is carried out 5 minutes after the cleaning of surfaces.

- To take with the pipette a small quantity of product of Bécher and deposited in a clean capsule
- to close again and arrange Bécher safe from the light
- To impregnate a cotton micro Absorbond
- To carry out the deposit while passing cotton on surface to be treated on several ways until this one is completely covered
- To change cotton for each new deposit
- To let dry the primary education during at least 40 minutes and to the maximum 2 hours
- To defer on the monitoring sheet CDE [ DA1 ] the hour of the deposit
- To throw exceeding it of product which will never be re-used, in the bottle envisaged for this purpose.



▪

## 8 ASSEMBLY OF DPA ON THE CRYSTAL

**Figure 11: Tools placed on the crystal**

- To check that the sheaths clean and are correctly positioned in the throats
- To tighten the holds of reference
- To set up, screwed tight, the guide diode of reference
- To check the absence of play enters the guide diode and the crystal  
*To take again the adjustments of paragraph 6 if it is not the case*
- To position the guide diode of adjustment, screwed nontight
- To place the diode, the pines of the diode must be side guides diode of reference
- To note its number on the monitoring sheet CDE [ DA1 ] corresponding: diode 1 is stuck side *Plus*, diode 2 *Minus* side.
- To adjust its position by bringing the guide diode of adjustment to its contact, the screws push rods Vp1, Vp2 and Vp3
- To screw tight the guide diode
- To insert the stopper (joined silicone) side opposed to the injection
- To check the positioning of the tools and the absence of play enters the guides diode and the PDA  
*To take again the adjustments at the beginning of paragraph 8 if it is not the case*
- To place the sugar and the system of pressure:
  - 4 posts on the guides diode
  - block plexiglass and screw in compression on the posts
- To bring the screw in compression in contact with sugar
- To tighten using a regulated dynamometric screwdriver with 15 Nm

## 9 INJECTION OF THE ADHESIVE

- To place the clamp at horizontal, end to be stuck vis-a-vis the operator.
- To connect the syringe to batcher EB100. The pressure is regulated with 5 bars. Before beginning the injection, emptying the syringe during 4 minutes in the capsule having been used for the preparation. This duration corresponds to the maximum time of injection for a bonding.
- To install the needle in the grout hole
- To begin the injection and to start the stop watch
- When the adhesive filled the hole with vent (see figure 7), to withdraw the needle and to stop the stop watch
- To stop the injection
- To give the clamp to horizontal slightly tilted ( $\cong 2^\circ$ ) so that the vent is in high point
- To stop the grout hole using joint compound
- To note the hour and the duration of the injection on the monitoring sheet CDE [ DA1 ] corresponding.

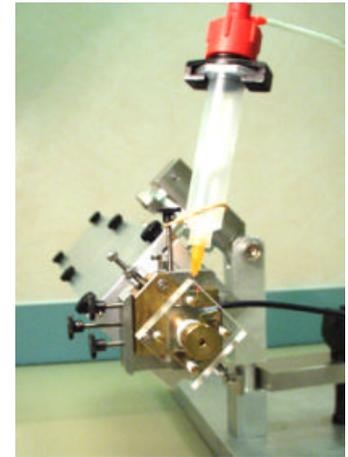


Figure 12 : injection

When the bondings are finished, to empty the remainder of the syringe in the capsule. After the 7 days of complete polymerization, a measurement of hardness will be made on this sample of adhesive.

## 10 RELEASE FROM THE MOULD

The release from the mould is carried out after 24 hours of polymerization.

- To dismantle the system of pressure + sugar.
- To loosen to escape holds from reference.
- To loosen the fastening screws of the guides diode (1/4 of turn)
- To tighten the screws of extraction Ex1 then Ex2 until exhaust of the guides diode of the PDA
- To withdraw the guides diode
- To check the absence of bubble and to carry out a visual monitoring dela position of the PDA compared to the crystal.

*In the event of nonconformity, to draw up a card of anomaly [ DA2 ].*

**If it is a question of the bonding of the first diode (side reference) of turning over the clamp to proceed to the bonding of the second diode.**

## 11 CLEANING

The surplus of adhesive is cleaned minimum 24 hours and maximum 48 hours after the release from the mould. Thus the adhesive being polymerized better, it is easier to withdraw of them the surplus by peeling using a paper essuyor humidified of pure ultra alcohol. To finick, if necessary, cleaning using a cotton micro dry Absorbond.

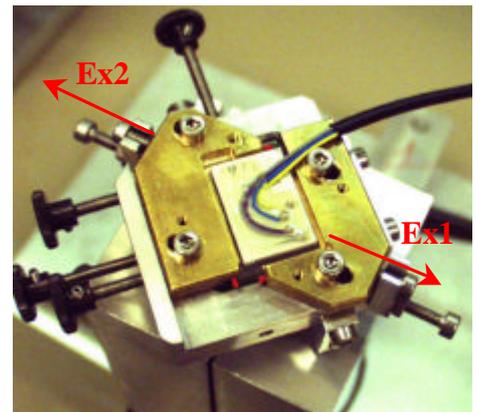


Figure 13 : 1<sup>ère</sup> phase du démouillage en vissant Ex1 et Ex2

## **12 DISASSEMBLING AND STORAGE**

After the last bonding, to put the clamp in horizontal position. To dismount the crystal of its clamp and to place it in Vé of handling storage. To place in a cupboard of the clean room safe from the light.

Polymerization is complete after 7 days.

## **13 CHRONOGRAM OF THE OPERATIONS**

*To write*

## 14 COUNT OF THE ILLUSTRATIONS

<i>Appear 3</i>	<i>clamps in driving position</i>	5
<i>Appear 4</i>	<i>tools of positioning of the PDA on the crystal</i>	5
<i>Figure 3</i>	<i>crystal in its clamp</i>	5
<i>Figure 4</i>	<i>mixture of the adhesive</i>	6
<i>Figure 5</i>	<i>system of degasification of the clean room</i>	6
<i>Figure 6</i>	<i>adhesive at rest in the syringe</i>	6
<i>Figure 7</i>	<i>tools assembled before assembly on the crystal</i>	7
<i>Figure 8</i>	<i>tools, 1st phase of the assembly</i>	7
<i>Figure 9</i>	<i>guide diode equipped with a sheath</i>	7
<i>Figure 10</i>	<i>deposit of the primary education</i>	8
<i>Figure 11</i>	<i>tools placed on the crystal</i>	9
<i>Figure 12</i>	<i>injection</i>	10
<i>Figure 13</i>	<i>1st phase of the release from the mould by screwing Ex1 and Ex2</i>	10