GLAST Large Area Telescope

Tracker Subsystem
WBS 4.1.4
MRB for NCR 122
Bias Circuit Test Coupons

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MRB Agenda

- Present Documented Evidence/Facts of Failure or Non-Conformance
  - What, Where, Why, When, How
- Suspected Root Cause
- Impact to Inventory, WIP, Supplier PO, Already Built Product
- Corrective action to prevent recurrence
  - Test, Procedure Options, Recommendation
  - Impacts to other Subsystems
  - Affected Documentation (Dwg, ICD, Existing Analysis, Supplier EIDP - End Item Data Package)
  - Verification Plan to Validate Effective Corrective Action
- Effectiveness of Corrective action
  - Any Modification to Performance Capability
  - Impact on FMEA – Failure Mode & Effects Analysis, Reliability, Risk Assessment
- Recommended Final Dispositions
  - Rework, Repair, Return to Vendor, Reclassify, Scrap/Purge, Use-As-Is

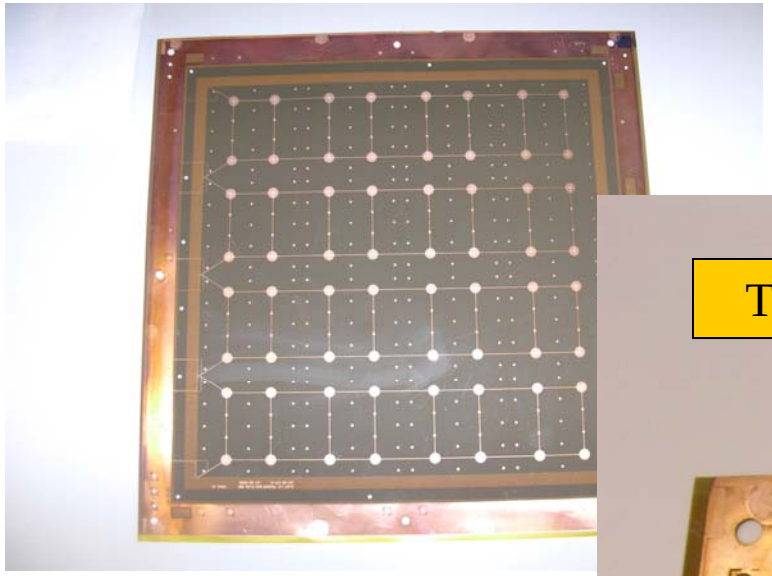
NCR 122

- **Documented Evidence/Facts of Failure or Non-Conformance**
  - **What – Test Coupons for 104 out of 267 Bias Circuits LAT-DS-00192-8 did not meet IPC 6013 Class 3 requirement**
  - **Where – Evaluation at GSFC**
  - **Why – Not all test coupon holes were plated through with gold. In the case where the test coupon is not plated with gold, the copper gets etched away in the next step.**
  - **When – 21 June 2004**
  - **How – Visual inspection**

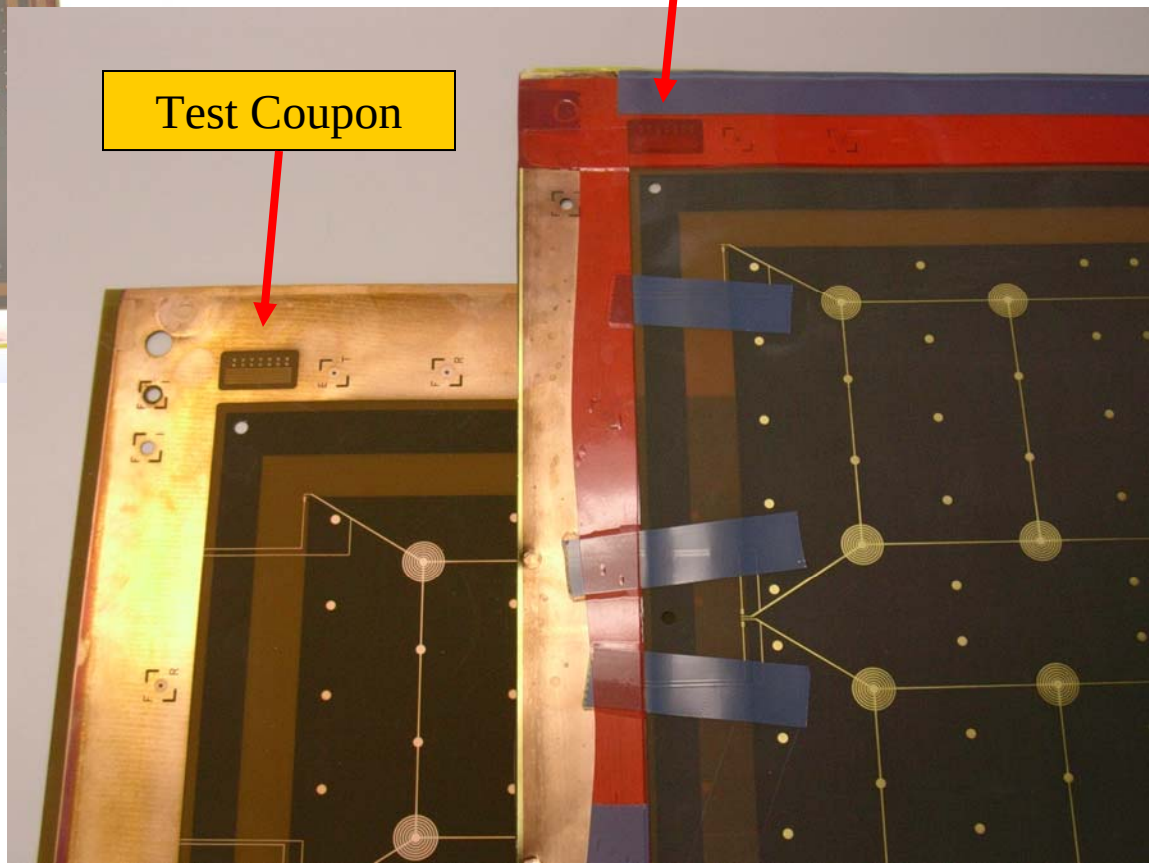
NCR 122 - Root Cause

- **Root Cause**
  - **Prior to gold plating, the edges of the Bias Circuit were masked with tape; in some cases, the tape covered all or parts of the test coupons**
  - **Why: Incomplete training of masking personnel at Parlex, due to their oversight.**

Cause of the Problem



Bias Circuit – approx 38cm x 38 cm



NCR 122 – Impact & Corrective Action

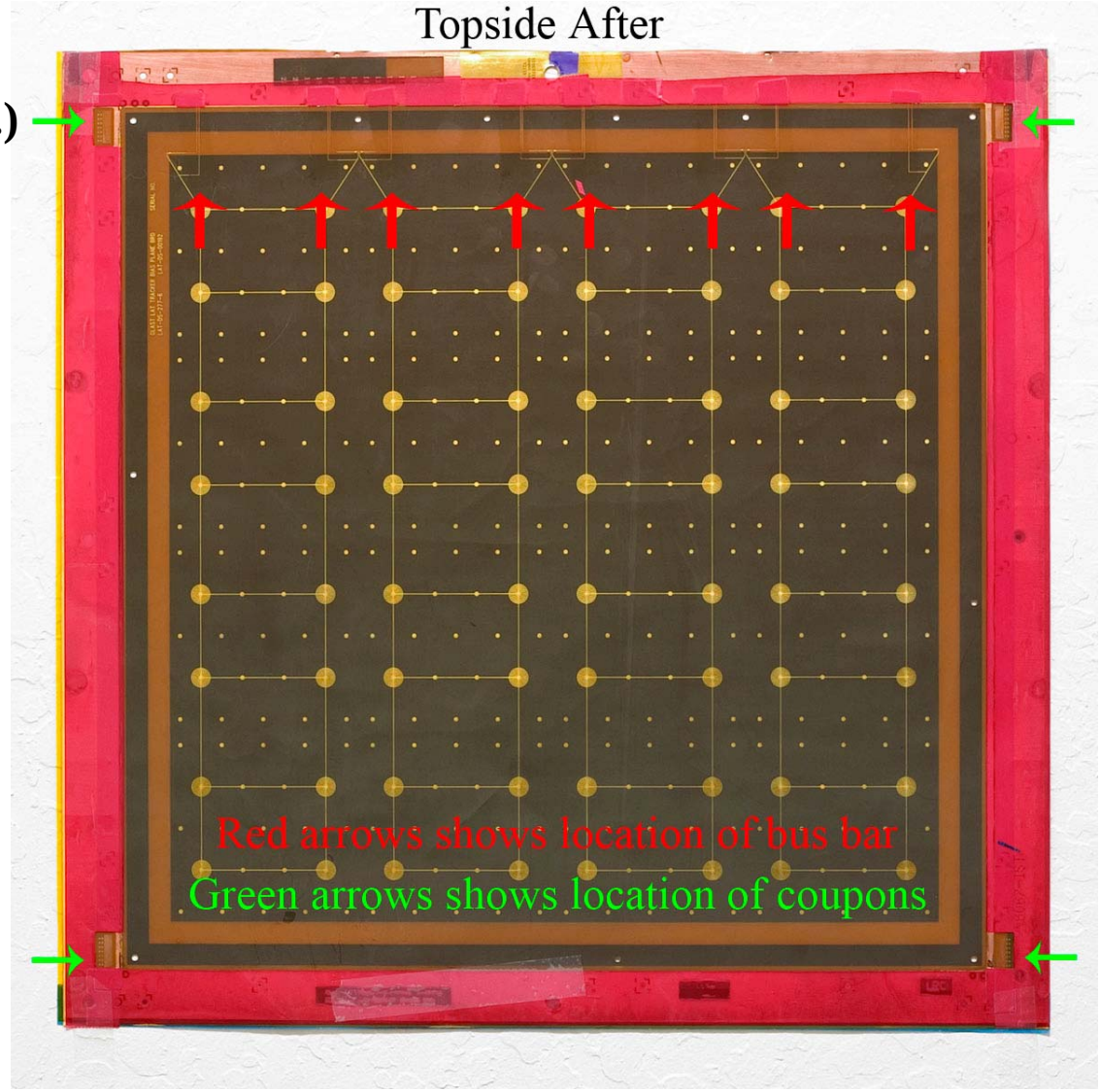
- **Impact to Inventory, WIP, Supplier PO, Already Built Product**
  - **104 out of 267 bias circuits already sent to Italy do not have acceptable test coupons**
  - **20 flight trays have had bias circuits bonded to them; it is still TBD as to whether any of these have the bias circuits in question**
  - **Extremely likely that all 267 of the bias circuits are usable, since:**
    1. **the design has 16X redundancy in plated-through holes**
    2. **every bias circuit was electrically checked and inspected**
    3. **The plating process was exactly the same for all 267 panels, except for the masking step which varied with the operator**
    4. **LAT QA Site Survey found satisfactory traceability and documentation (ref. slide #10)**
  - **If the 20 flight trays that have had bias circuits bonded to them can be used, there is no impact to the schedule for Tower A**

NCR 122 – Impact & Corrective Action

- **Corrective Action to prevent recurrence**
  - **Parlex generated a manufacturing process instruction MPI-PL-0005 Rev. A for masking operation.**
  - **Parlex has modified the masking operation to not cover the test coupons which caused the NCR (see photo #8)**
  - **Rationale for masking:**
    - **To add rigidity during plating and etching process**
    - **Tie-bar etching process**
    - **Control manufacturing cost (GOLD!)**
  - **Parlex added QA inspection point to verify proper masking**
  - **Modified traveler to add QC inspection point to ensure proper masking**
  - **LAT QA to perform visual inspection of coupons for presents of gold plating**

NCR 122 – Corrected Masking

Test Coupon (4 Plcs.)



NCR 122 – Supplier Site Survey

- Richard Gobin conducted LAT QA Site Survey (June 24, 2004)
- Verified MPI masking procedure
- Verified Revised Traveler
- Lot size is 25 Bias Circuits
- Received documented corrective action
- Received SPC of plating bath concentration for all lots
- Examined one sample of micro cross-section from failed test coupon SN4107). Proper plating verified (photo)
- Digital Photos taken of Electrical Test Fixtures, Plating Fixture, Masking, Inspection Stamp certifying electrical test acceptance (Ref. Back-up Slides)
- Witnessed current WIP

NCR 122 - Effectiveness // Final Disposition

- **Effectiveness of Corrective Action**
  - **No modification to performance capability**

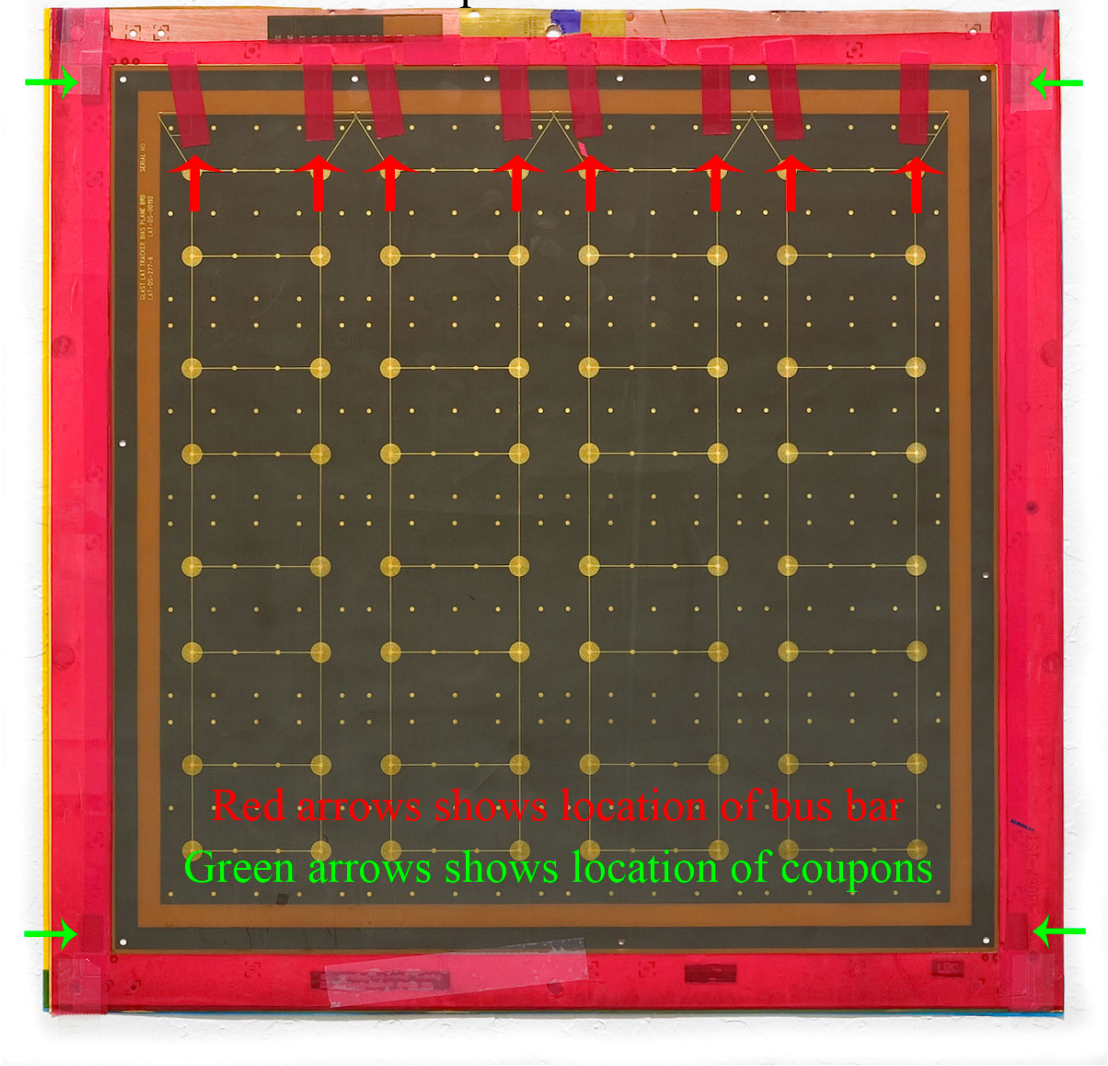
- **Recommended Final Disposition**
  - **Following recommendation provided by LAT EEE Parts Engineer:**
    - **Requested one Bias Circuit from each lot that had coupon test failure, to be provided to GSFC for cross section analysis.**
    - **Note: 74 Bias Circuits received at SLAC 6/24/04.**
      - **A sample of these coupons were inspected and had identical issues. These will follow the above recommendation and one Bias Circuit from each lot will be provided to GSFC for cross section analysis.**

Effectiveness // Risk

- **Effectiveness of Corrective Action**
  - **No modification to performance capability**
  - **No Risk to Flight Trays**
  - **No impact to Tracker delivery schedule**
  - **Minimal cost impact**

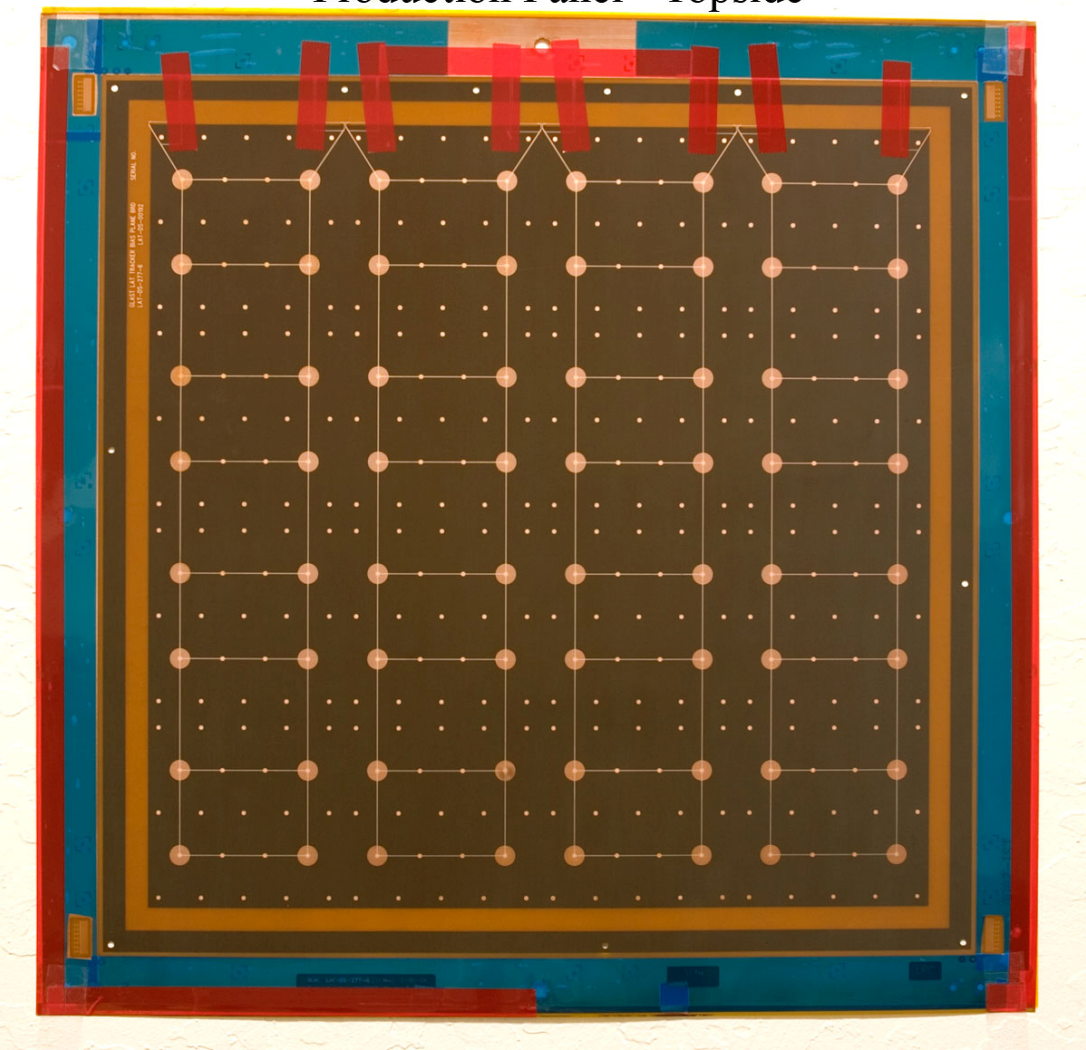
NCR 122, Back-up Photos

Topside Before



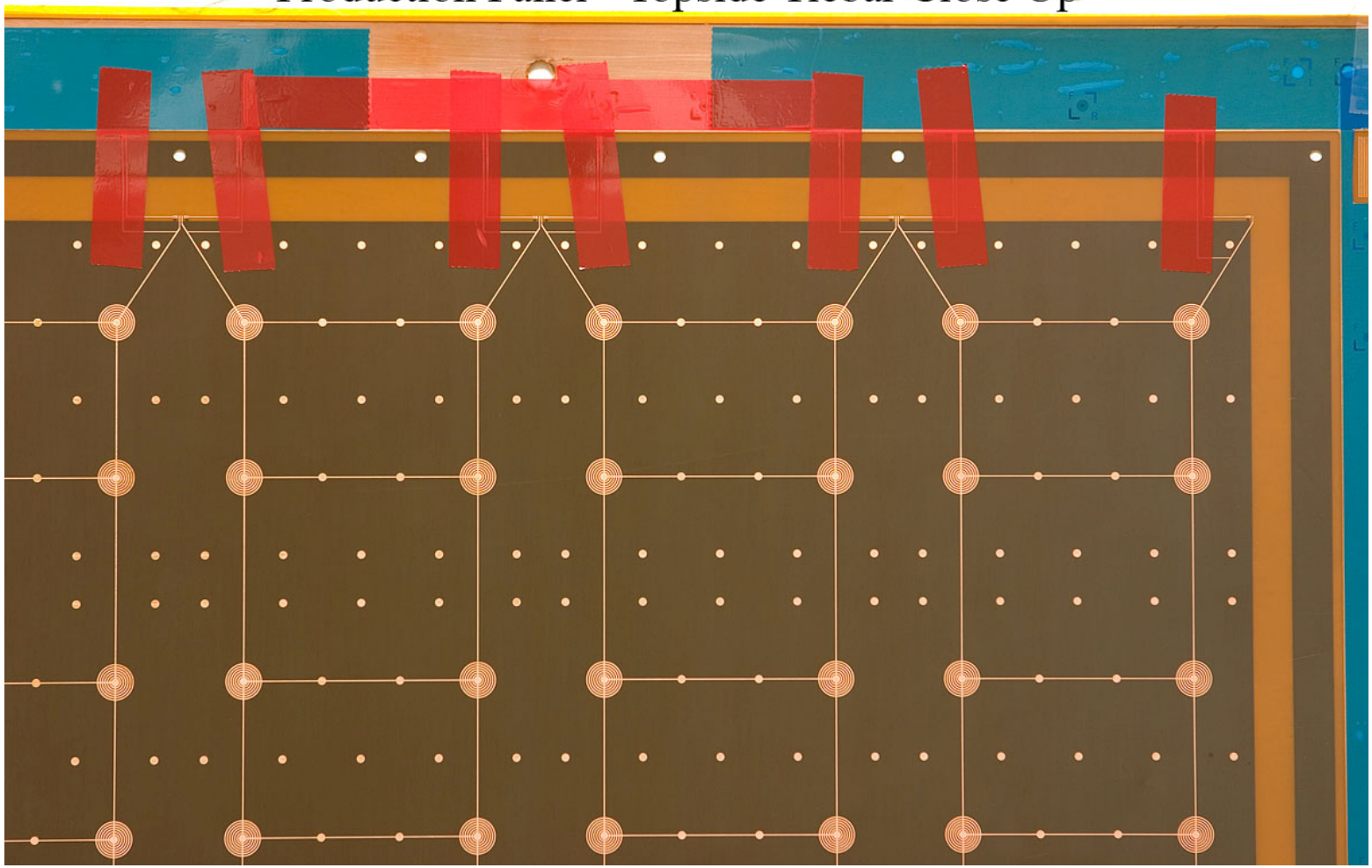
NCR 122, Back-up Photos

Production Panel - Topside



NCR 122, Back-up Photos

Production Panel - Topside Tiebar Close Up



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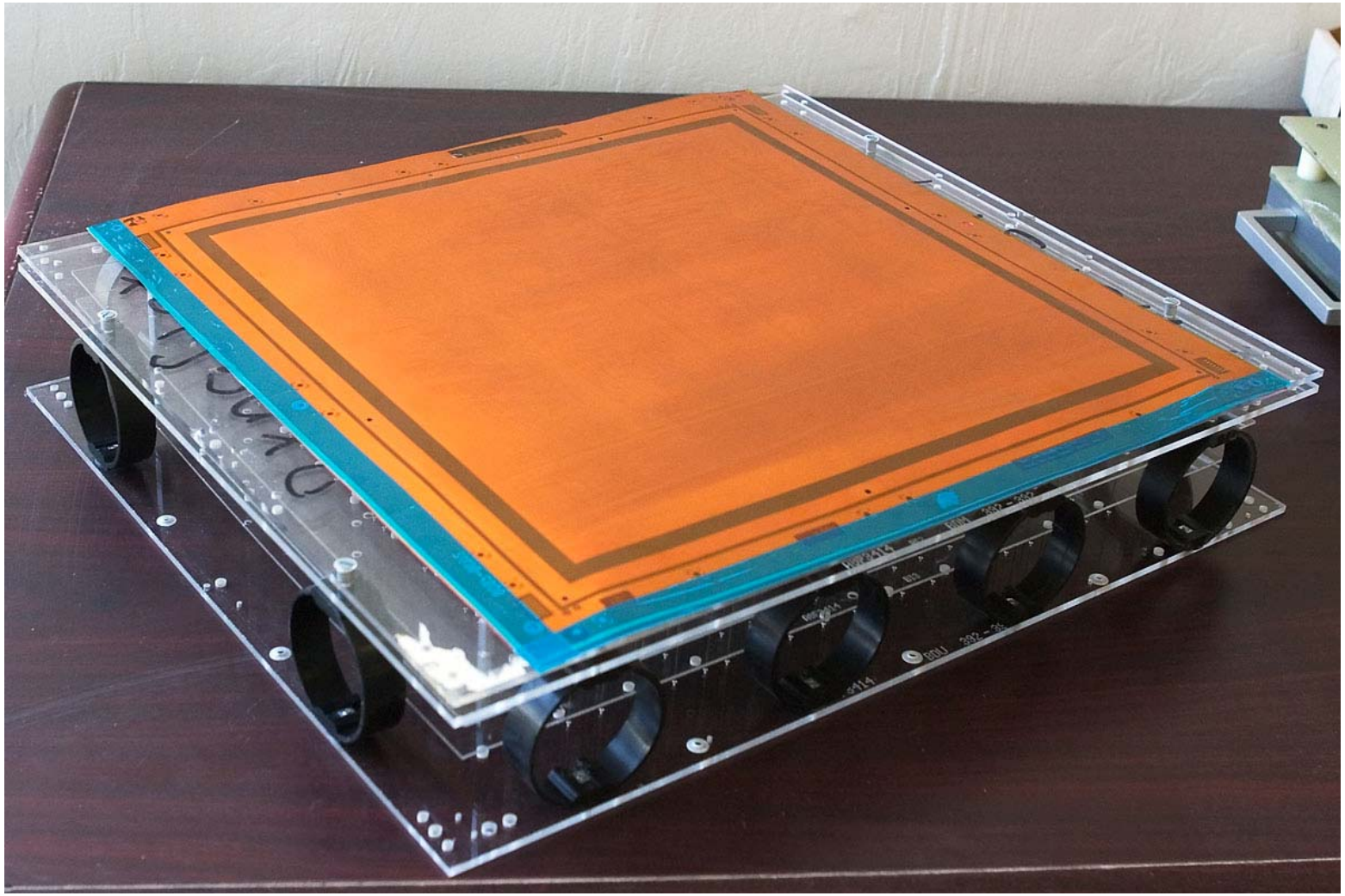

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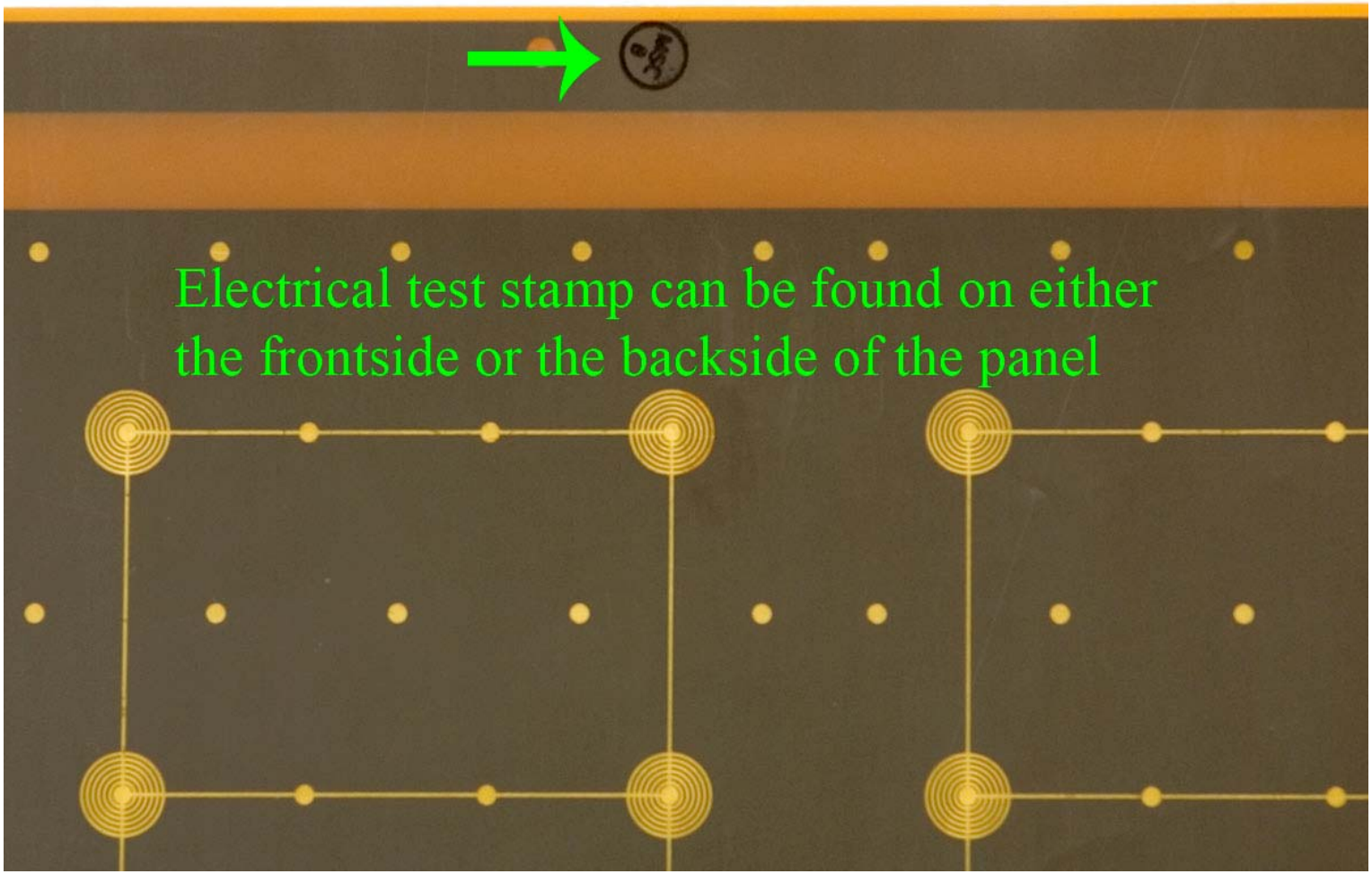

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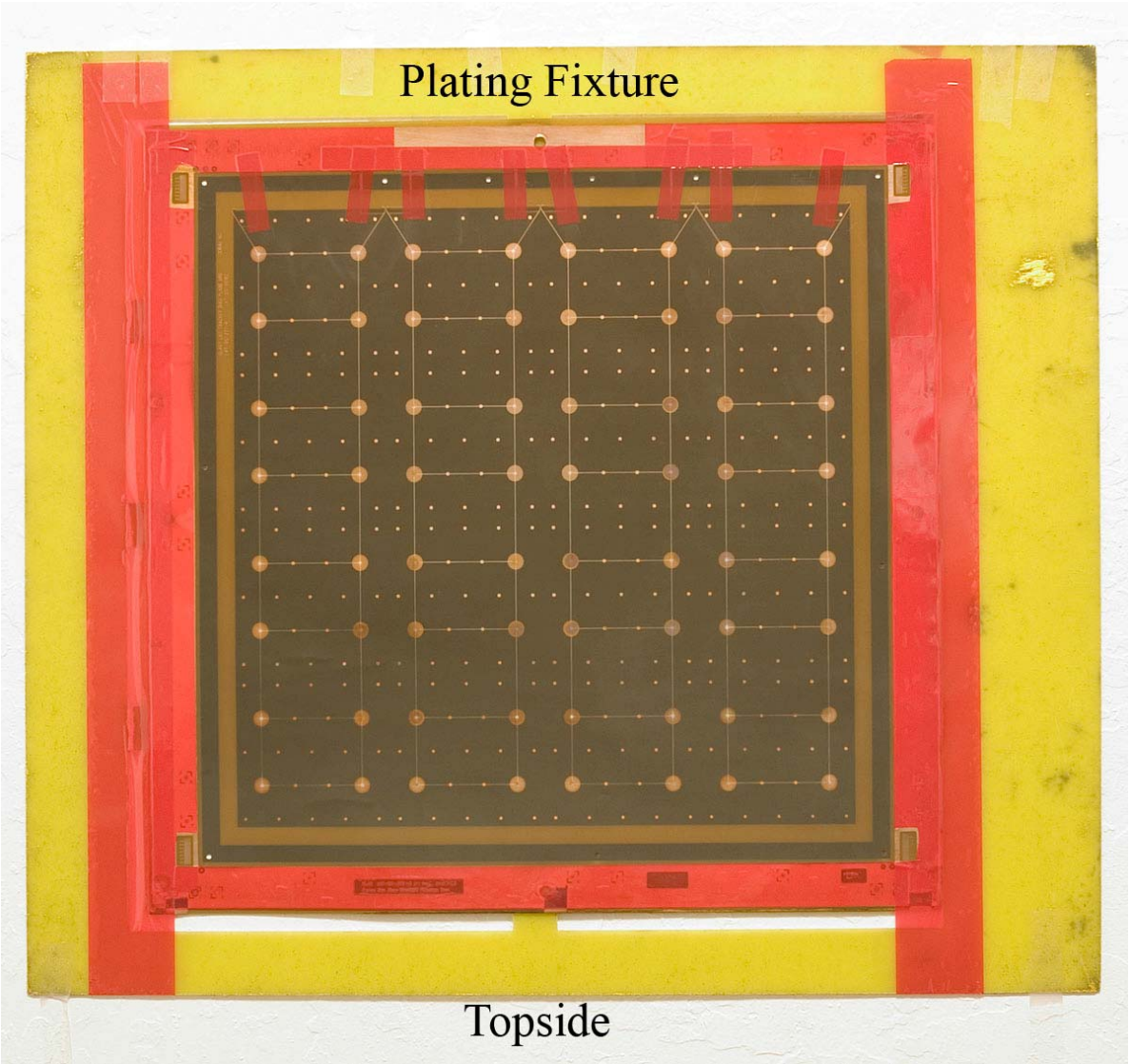

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