DESIGN CONCEPT FOR GLAST TRAY PROTECTION DURING ASSEMBLY AND STORAGE

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SCIPP

Introduction:

We will attempt to design a protective cover (covers) for the GLAST trays which optomizes safety and ease of handling during all assembly steps. These steps include; tray panel assembly, HDI mounting and wire bonding, detector placement and wire bonding, detector survey, and tower assembly.

Primary Issues:

1. After full assembly there are only two available safe contact area with the tray. These areas are the closeout sides perpendicular to the electronics.
2. All the assembly steps require precision mechanical alignment which requires access to the tray corner posts both from the top and bottom and from the side.
3. Wire bonding requires no protrusions above the Kapton plane higher than 0.060 in.
4. Work holder weight limits on the wire bonder limit the tray cover pieces (not including the top cover which will be removed during bonding) to 3.5 lbs.
5. Electrical testing and burning in of trays requires access for cables to reach the Nanonics connectors on both HDI's

Design Concept:

Since the tray is assembled and testing in a linear fashion, the protective covers should be designed to be attached to the tray sequentially. Ideally we would only place a protective cover on once, after one area of the tray is finished, and then never have to take it off. This requires careful attention to interfacing with the various apparatus, jigs, fixtures, and tools used for testing and assembly.

For the prototype tower, tray assembly will happen in the following fashion:

1.	Build up tray panels with Kapton	SLAC
2.	Glue assembled, wire bonded and tested HDI to Kapton	SCIPP
3.	Wire bond front-end chips to Kapton	SCIPP
4.	Bend HDI down and screw to closeout	SCIPP
5.	Align and glue detector ladders	SCIPP or SLAC
6.	Wire bond ladders to Kapton	SCIPP
7.	Electrical testing and burning in	SCIPP

8. Survey detector positioning	SLAC
9. Tower assembly	SLAC

Tray assembly steps with addition of *protective covers:*

1. Build up tray panels with Kapton	SLAC
2. Attach rails with handles to the two free sides of the tray	*SLAC*
3. Glue assembled, wire bonded and tested HDI to Kapton	SCIPP
4. Wire bond front-end chips to Kapton	SCIPP
5. Bend HDI down and screw to closeout	SCIPP
6. Attach HDI cover end-caps	*SCIPP*
7. Align and glue detector ladders	SCIPP or SLAC
8. Attach cover top and bottom after ladder placement	*SCIPP or SLAC*
9. Remove top or bottom to perform wire bonding	*SCIPP*
10. Wire bond ladders to Kapton	SCIPP
11. Electrical testing and burning in	SCIPP
12. Survey detector positioning	SLAC
13. Tower assembly	SLAC

Tray assembly steps with *protective covers* and *jigs or fixtures.*

1. Build up tray panels with Kapton	SLAC
2. Attach rails with handles to the two free sides of the tray	*SLAC*
3. Put tray on survey stage	*SLAC*
4. Attach HDI alignment and gluing jig	*SCIPP*
5. Glue assembled, wire bonded and tested HDI to Kapton	SCIPP
6. Put tray in bonder work holder	*SCIPP*
7. Wire bond front-end chips to Kapton	SCIPP
8. Bend HDI down and screw to closeout	SCIPP
9. Attach HDI cover end-caps	*SCIPP*
10. Register SSD placement fixture	*SCIPP or SLAC*
11. Align and glue detector ladders	SCIPP or SLAC
12. Attach cover top and bottom after ladder placement	*SCIPP or SLAC*
13. Remove top or bottom to perform wire bonding	*SCIPP*
14. Put tray in bonder work holder	*SCIPP*
15. Wire bond ladders to Kapton	SCIPP
16. Plug in Kapton cables	*SCIPP*
17. Electrical testing and burning in	SCIPP
18. Put tray on survey stage	*SLAC*
19. Survey detector positioning	SLAC
20. Tower assembly	SLAC

THE PIECES

Rails:

1. Made of 60-61 Al.
2. Go on non-electronics sides.
3. Don't cover corner posts. Actually, are held back from the corner posts enough (0.1 in.) to make room for the HDI alignment jig clamps.
4. Protrude 0.060 in. beyond Kapton plane on both top and bottom. This gives us the option of setting the tray down with no bottom cover.
5. Have three small tapped holes on the top and bottom for attaching the cover sheets.
6. Are cut away (2 in.) near corner posts to not protrude above the tray at all.
7. Have small handles (Aluminum tabs) ~ 0.5 in. x 3 in. for carrying the tray and/or flipping it over.
8. Have 3 tapped holes (4-40) to attach to the wire bonder.

HDI end-caps:

1. Made of transparent material, or Al
2. Can cover corner posts
3. Screw into boss
4. Don't cover Nanonics connectors on each side of boss.
5. Have a small lip on the side opposite the boss to protect the chip-Kapton bonds.
6. Have 3 small screw holes for the cover sheet to attach to. This is mostly to hold the end cap in place since it has nothing holding it on the side opposite the boss.

Cover Sheets:

1. Made of composite perforated Al sheet and Mylar. Or perforated acrylic with Mylar. Depends on strength vs. weight requirements.
2. Steps up around the edges to provide more clearance above detectors and bonds.
3. Have cut-outs to access four the 4 corner posts and two Nanonics connectors (wide enough for Kapton cable
4. Have clearance holes for screws to attach to 2 rails and 2 HDI end-caps.
5. Have 2 pins for alignment and safety. These should slip into holes in the two rails.

Summary:

There are three different pieces that make up the tray protection, Rails, HDI End-caps, and cover sheets. Each tray needs 2 of each of these pieces. For 18 trays we will then need 36 of each piece, or a total of 108 pieces.

Since this cover scheme does not completely enclose the tray we might want some other way to seal the completed trays for transport and storage. This could be something as simple as a large zip-lock bag.