GlueX FDC Work Plans – 2010

February 4, 2010– v1.0
(File: fdc_work10.tex)

In order to better understand where we are in completing this list of goals, the following key is being used:

✓	– Work completed.	(3)
X	– Work partially completed or in progress.	(14)
	– Work not begun.	(103)

• Wire Frames

- [X] 1). Find manufacturer who can make single piece STB and HVTB boards.
- [X] 2). Complete final STB design.
- [X] 3). Complete final HVTB design.
- [X] 4). Complete final filler board design.
- [ ] 5). Complete final wire frame circuit board drawings.
- [ ] 6). Procure production circuit boards for the FDC system.
- [ ] 7). Complete initial QA test plan on all circuit boards.
- [ ] 8). Procure all G10 pieces for the production FDC frames.
- [ ] 9). Submit G10 pieces to the machine shop for work.
- [✓] 10). Procure all Rohacell foam pieces for the production FDC wire frames.
- [X] 11). Complete R&D work on wire frame core region near bolt holes.

- [x] 12). Make final decisions about FDC wire frame laminate design.
- [ ] 13). Finalize circuit board alignment schemes during lamination.
- [x] 14). Complete contract with IUCF for Phase 3 wire winding.
- [ ] 15). Finalize plans for wire frame PCB Phase 1 component stuffing.
- [ ] 16). Finalize plans for wire frame PCB Phase 2 component stuffing.
- [ ] 17). Complete wire frame Phase 1 PCB component stuffing.
- [ ] 18). Complete wire frame post-Phase 1 PCB electrical QA procedures.
- [x] 19). Finalize FDC production wire frame construction manual.
- [ ] 20). Construct FDC production composite wire frames.
- [ ] 21). Imprint label on each wire frame for logging purposes.
- [ ] 22). Design combs compatible with IUCF wire winding table.
- [ ] 23). Procure combs for IUCF wire winding table.
- [ ] 24). Finalize design of wire frame strongbacks for wire winding.
- [ ] 25). Procure strongbacks for wire winding.
- [ ] 26). Finalize plans for weight system to push wires into contact with wire plane.
- [ ] 27). Finalize wire frame post-winding cleaning system and test.
- [ ] 28). Visit IUCF and work to upgrade and test winding facility with prototype wire frame P2.
- [ ] 29). Make final decisions and changes to Wire Winding facility before the start of production winding.

- [ ] 30). Give wire frame PCB design to IUCF for review before procurement.
- [ ] 31). Complete production wire frame winding.
- [ ] 32). Work with IUCF to review position and tension data for each plane.
- [ ] 33). Design wire frame transport/storage boxes.
- [ ] 34). Procure wire frame transport/storage boxes.
- [ ] 35). Complete wire frame Phase 2 PCB component stuffing.
- [ ] 36). Complete wire frame post-Phase 2 PCB electrical QA procedures.
- [ ] 37). Design and fabricate protective cover for the wire frames.
- [ ] 38). Make final decisions on wire deadening size for each FDC package.
- [ ] 39). Complete final wire electroplating tests on prototype plane P2.
- [ ] 40). Electroplate FDC wire plane central wire region.

• Cathode Frames

- [X] 41). Complete final design of cathode circuit boards.
- [X] 42). Complete R&D work on cathode frame core region near bolt holes.
- [X] 43). Make final decisions about FDC cathode frame laminate design.
- [ ] 44). Finalize gas hole design (number of holes and position) in cathode frame.
- [ ] 45). Procure all G10 pieces for the production cathode frames.
- [ ] 46). Submit G10 pieces to the machine shop for work.

- [x] 47). Procure all Rohacell foam pieces for the production FDC cathode frames.
- [X] 48). Finalize FDC production cathode frame construction manual.
- [x] 49). Procure raw board material for FDC cathodes.
- [ ] 50). Procure FDC cathode boards.
- [ ] 51). Finalize cathode board handling and storage procedures.
- [ ] 52). Complete initial inspection and electrical QA of all cathode boards.
- [ ] 53). Complete edge cutting of cathode boards.
- [ ] 54). Finalize design for all cathode plane grounding connections.
- [ ] 55). Finalize scheme for attaching rigid-flex assemblies to cathode boards.
- [X] 56). Complete final design of rigid-flex assemblies.
- [ ] 57). Construction production FDC cathode planes.
- [ ] 58). Imprint label on each cathode frame for logging purposes.
- [ ] 59). Complete assembly of cathode sandwiches.
- [ ] 60). Procure cathode plane rigid-flex assemblies.
- [ ] 61). Complete component stuffing of rigid-flex assemblies.
- [ ] 62). Complete initial electrical QA of all rigid-flex assemblies.
- [ ] 63). Solder rigid-flex assemblies to cathodes.
- [ ] 64). Complete final electrical QA of all rigid-flex assemblies.

- [ ] 65). Measure surface flatness of constructed cathodes.
- [ ] 66). Design environmentally controlled storage system for completed cathodes.
- [ ] 67). Procure cathode frame storage system.

General

- [ ] 68). Procure second granite table for construction.
- [ ] 69). Organize new construction space for FDC work.
- [ ] 70). Develop cable support system outside the solenoid magnet.
- [ ] 71). Develop cable support system inside the solenoid magnet.
- [ ] 72). Design mechanical prototype for cable support assemblies.
- [ ] 73). Build mechanical prototype and develop/finalize layouts.
- [ ] 74). Finalize gas inlet/outlet ports on spacer ring and on-chamber gas distribution system.
- [ ] 75). Finalize design of spacer frames.
- [ ] 76). Procure FDC spacer frames.
- [ ] 77). Develop rail and mounting attachments with minimal material.
- [ ] 78). Complete full set of final FDC assembly drawings.
- [ ] 79). Procure, construct, and test FDC signal cables.
- [ ] 80). Procure, construct, and test FDC HV cables.
- [ ] 81). Procure, construct, and test FDC LV cables.

- [ ] 82). Consider how to protect the FDC packages from target failure.
- [ ] 83). Finalize scheme for upstream insertion/removal of FDC system.
- [ ] 84). Finalize scheme for downstream insertion/removal of FDC system.
- [ ] 85). Prepare preliminary FDC system commissioning/calibration plan.
- [ ] 86). Develop HV system control interface.
- [ ] 87). Develop LV system control interface.

• Assembly

- [ ] 88). Finalize design of the compression ring for FDC package assembly.
- [X] 89). Finalize FDC package construction manual.
- [ ] 90). Develop FDC system inter-alignment system.
- [ ] 91). Finalize local package HV distribution scheme.
- [ ] 92). Finalize the design of the FDC exoskeleton.
- [ ] 93). Design the dry-air system for the chambers.
- [ ] 94). Finalize the cable strain-relief plans.
- [X] 95). Finalize plans for chamber sighting and fiducialization.

• Electronics

- [ ] 96). Test pulser system for the FADCs and strip-to-strip calibration.
- [ ] 97). Develop the pulser calibration scheme for the preamp boards.
- [ ] 98). Finalize the design of the electronics cooling system.

• Gas

- [ ] 99). Study prototype chamber performance with various gas mixtures.
- [ ] 100). Decide on the gas flow rate.
- [ ] 101). Finalize the design of the gas handling system and controls.
- [ ] 102). Decide on the final chamber gas mixture.
- [ ] 103). Study aging issues with the gas mixture finalists.
- [ ] 104). Design local package FDC gas distribution system.

• Full-Scale Prototype

- [ ] 105). Quantify ASIC dynamic range for cathodes and anodes.
- [ ] 106). Calibrate time-to-distance relation of cosmic ray chambers.
- [ ] 107). Set up hodoscope scintillators to be in the test setup trigger.
- [ ] 108). Study alcohol content in the cosmic ray chambers to optimize chamber resolution and signal-to-noise ratio.
- [ ] 109). Scale up the number of chambers in the cosmic ray chamber readout in order to allow for studies of resolution vs. angle in FDC prototype chamber.

- [ ] 110). Complete software for charged particle tracking – both hit-based and time-based.
- [ ] 111). Measure resolution of FDC prototype vs. track incidence angle.
- [ ] 112). Study the anode signal from cross talk when pulsing the cathode preamp boards.
- [ ] 113). Study the cathode signal from cross talk when pulsing the cathode preamp boards.
- [ ] 114). Understand zig-zag pattern in reconstruction wire positions.
- [ ] 115). Carry out full test plan for full-scale prototype.

• Monte Carlo

- [ ] 116). What is the maximum material thickness that can be employed in the inactive area to reduce photon conversions?
- [ ] 117). What is the required number of FDC packages?
- [ ] 118). What is the required number of chamber layers per package?
- [ ] 119). What are the optimal z-locations of the different chamber packages?
- [ ] 120). What is the size of the beam hole for cathodes and wire deadening vs. z?
