Ladder installation Procedure **February 2, 2000**

Bert Gonzalez is qualified to install ladders. Brenna Flaugher and Joe Howell are qualified to help him. Bert plus one other person (second set of eyes/hands) are required for laldder installation. Gloves, face masks, and ESD heel strap (as well as the usual clean room garb of hair net, coat and booties) must be worn during this process. Mike Roman and Cristian Gingu are qualified to run CMM programs only when Brenna Flaugher, Joe Howell or Bert Gonzalez are present and the programs have been properly authenticated and tested.

General Rules for when no one is in attendance: The CMM must be left in the "home" position (back right hand corner). The servos will be off. The barrel will be covered by the dark/dry box lid and curtain.

Ladders must pass a final electrical tests on DAQ4 and be placed in the lower section of the ladder storage box in Lab C (marked "Ladders ready for installation")

If problems occur, or it is necessary to deviate from the procedure, the following people should be contacted: Brenna Flaugher Joe Howell

Position and ID of each ladder will be recorded in SVX barrel log book, along with the date of installation and testing.

Procedure

0) Record room temp and humidity and verify that cooling to bulkheads and portcards are off.

1) Remove dark box lid and curtain

2) remove dark box frame on left hand side

3) establish coordinate system

4) adjust vertical stops on CMM for ladder installation

5) apply grease to ledges for all ledges in layer

6) rotate bulkhead to appropriate position - ladders are installed at the 12 o'clock location. Leave angular clamp loose during installation.

7) install and align arms

8) push long arm through barrel (to left side of CMM) for ladder loading

9) install cable carrier on arm, tape down

10) pick up ladder

11) feed cable through bulkhead

12) lower ladder onto trays

13) align pins with notches in trays

14) engage ladder restraint pins with o-rings

15) tape left cable to arm

16) move ladder slowly through bulkhead - adjust skew and height to avoid wirebonds

17) adjust ladder horizontally into position behind ribs

18) lower ladder onto ledges by retracting arms

19) insert kapton shims

20) install x-side screw (with washers)

21) install z-side screw (with o-ring)

22) install x and z-side bar nuts and tighten to squeeze out grease

23) wait 1 minute for grease to flow

24) loosen bar nuts at both ends (for alignment)

25) adjust bulkhead position to correct location and tighten lock screw

26) check vertical stop location on CMM - camera should not be able to touch ladders.

27) adjust ladder position: center in x (split difference in guard rings on

28) center two detectors) goal is centered to ≤ 20 microns.

29) tighten z-screw 1/4 turn past engaged

30) measure ladder fiducials on left most detector

31) measure and adjust x-end of ladder until fiducials at both ends are at the same y position to ≤ 5 microns.

32) tighten x-screw to 6 inch-oz

33) measure and record alignment fiducial locations

34) rotate to next ladder position

35) install next ladder (steps 6-32)

After 6 lower (or upper) ladders are installed

1) rotate bulkhead to upright position

2) measure and record bulkhead fiducials and pin (cylinder) fiducials. If any of the fiducials differ from the initial positions by more than 5 microns remeasure and if still off call Brenna Flaugher or Joe Howell before proceeding.

3) measure radial positions:

a) adjust vertical stops (both magnetic and the hard stop)

b) for ladder in 9 o'clock position measure and record y location of inner edge of silicon, at least two points in x on each sensor.

c) repeat for each ladder

d) readjust vertical stops to prohibit camera from reaching the ladders.

4) close out on bulkhead fiducials (record points) If any of the fiducials differ from the initial positions by more than 5 microns remeasure and if still off call Brenna Flaugher or Joe Howell before proceeding.

5) place camera in home position (back right hand corner)

6) install dark box frame and curtain