PART 5 - STRUCTURAL HEALTH MONITORING

WING CENTER SECTION - SHEAR FITTINGS AT THE FRONT SPAR

1. Purpose

A. Use this comparative vacuum monitoring (CVM) procedure to help find cracks in the 111A2401-1 and -2 shear fittings at the front spar of the wing center section. See Figure 1 for the inspection areas.

B. This procedure can find cracks that are 0.75 inch (19.1 mm) long or longer.

C. The shear fittings are 7050-T7451 aluminum alloy.

D. Service Bulletin Reference:

(1) 737-57-1309

2. Equipment

A. General

(1) Comparative vacuum monitoring (CVM) is a structural health monitoring (SHM) system. The CVM system measures the different pressures between sensor galleries that have a vacuum or are at atmospheric pressure to find cracks in parts. See Figure 2 for some examples of CVM equipment.

(2) Use the equipment specified in this inspection procedure to do this procedure.

B. Instrument

(1) PM200; Structural Monitoring Systems (SMS)

C. Functional Test Socket

(1) PM200-9 or SP1131; Structural Monitoring Systems (SMS)

D. Comparative Vacuum Monitoring kit

(1) 737NG-FSSF-1KCVM CVM Installation Kit; Structural Monitoring Systems (SMS)

E. Software

(1) PM200 Management Software version 0.0.3276 or newer

F. Special Tools

(1) Consumables kit. See set up file: Part 5, 57-10-01 List of Necessary Materials

3. Prepare for the Inspection

A. See Set Up File Part 5, 57-10-01, for the List of Necessary Materials.

B. See Set Up Files Part 5, 57-10-01, CVM installation instructions for the instructions that follow:

(1) Prepare the surface of the 111A2401-1 and -2 shear fittings for inspection.

(2) Install the CVM sensors onto the shear fittings.

(3) Install the CVM leads.

(4) Install four sensor lead sockets (SLS) on the (SLS) bracket.

4. Instrument Calibration and Functional Test

A. A functional test of the PM200 CVM system must be done before you can do a CVM inspection. A functional test socket is used to make sure the instrument operates correctly. To do a functional test, follow these steps:

(1) Make sure that the PM200 instrument lead is correctly attached to the pneumatics socket at the top of the PM200 instrument.

(2) Energize the PM200 instrument.

(a) If the instrument lead is not connected, the PM200 instrument will give a warning to connect the instrument lead.

(3) Make an operator name selection and add the Personal Identification Number (PIN), if necessary.

(4) Connect the instrument lead to the functional test socket and push the “Up” key to start the functional test. The functional test will take approximately 15 minutes to complete.

(5) When the functional test is done, make sure that the functional test was satisfactorily completed.

(a) If the PM200 instrument does not satisfactorily complete the functional test, do a check of all the connections and do the functional test again. You cannot do the CVM inspection until the PM200 instrument satisfactorily completes the functional test.

(b) If the functional test is unsatisfactory again, refer to the PM200 instrument operation manual or work with the sensor manufacturer (Anodyne Electronics Manufacturing (AEM) Corporation), the instrument manufacturer (Structural Monitoring Systems (SMS)), or Boeing Service Engineering for help.

(6) Disconnect the instrument lead from the functional test socket and install dust covers on the two connectors. If the instrument satisfactorily completed the functional test, it is now prepared to do inspections with the CVM sensors.

NOTE: It is only necessary to do a functional test one time after the PM200 instrument is energized. It is not necessary to do a functional test for each of the four sensor lead socket (SLS) connections related to this inspection.

5. Inspection Procedure

A. Connect the sensor lead socket (SLS) for the shear fitting to the PM200 instrument lead.

(1) Make sure that the PM200 instrument lead is correctly attached to the pneumatics socket at the top of the PM200 instrument.

(2) Energize the PM200 instrument.

(a) If the instrument lead is not connected, the PM200 instrument will give a warning to connect the instrument lead.

B. Push Start to begin the functional test.

C. After the PM200 instrument satisfactorily completes a functional test it will give an “ALL TESTS PASSED” screen display. If a different screen display occurs, refer to the PM200 instrument operation manual for help.

D. After the PM200 instrument gives the “ALL TESTS PASSED” screen display, select Details and record the C Cont, 1 Cont, 2 Cont, 1 DCVM, and 2 DCVM values.

NOTE: Each SLS is calibrated and given a vacuum constant during the PM200 instrument start-up sequence. The PM200 instrument does a check of the calibration vacuum constants. If you get a “Not Calibrated Warning” on the instrument display, the PM200 instrument must not be used to do the CVM inspections and must be returned to SMS for calibration.

E. Do Paragraph 5.A. thru Paragraph 5.D. again to test all four SLS connectors.

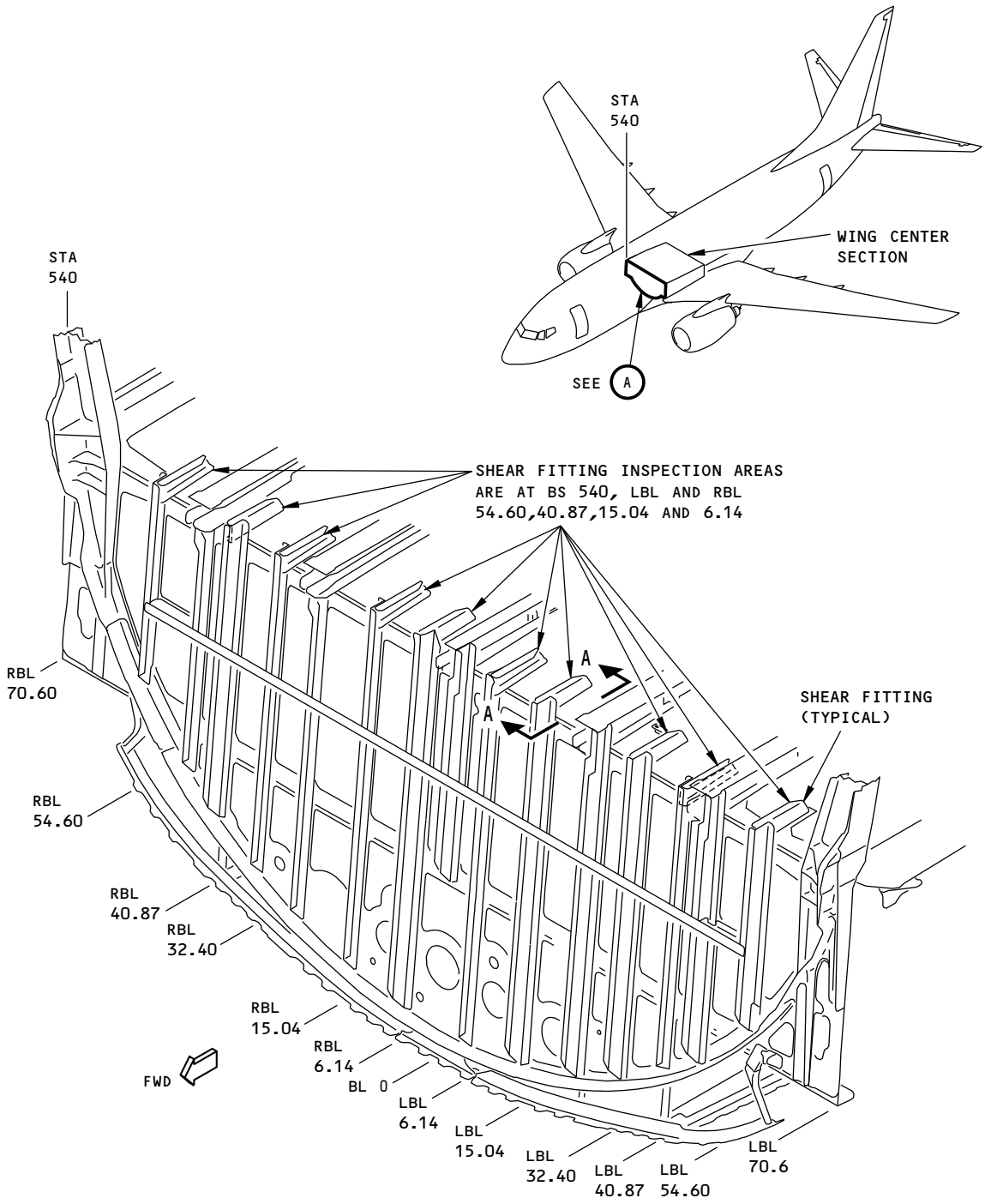
6. Inspection Results

A. If “LIMIT1 EXCEEDED” or “LIMIT2 EXCEEDED” occurs on the PM200 instrument screen display, it is a sign that there is a crack. You can do one of the procedures that follow to make sure that there is a crack:

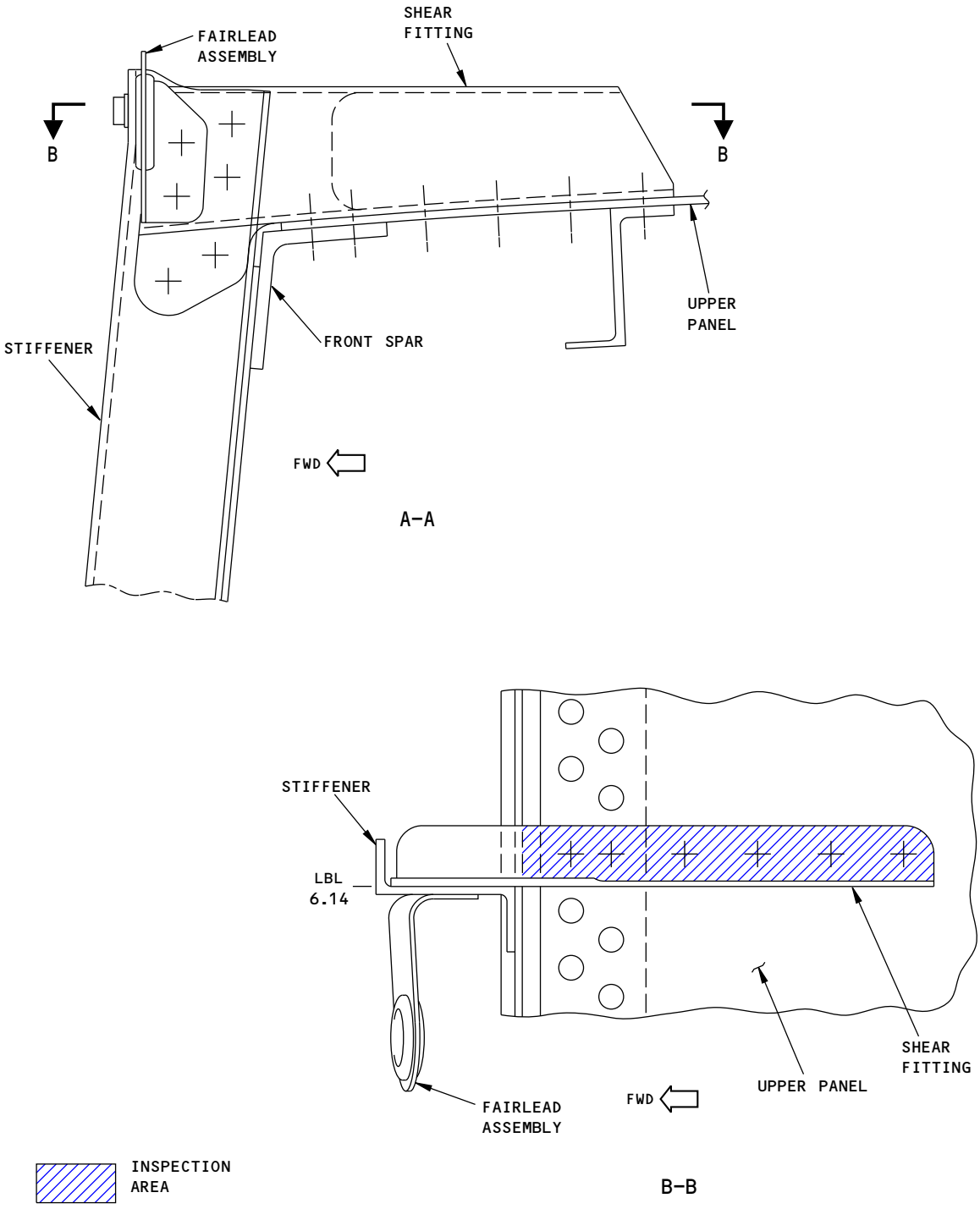
(1) Do a visual inspection of the shear fittings that are connected to the SLS connector. If necessary, remove the sealant used for the fuel vapor barrier and the CVM sensors to do this visual inspection.

(2) Do a high frequency eddy current (HFEC) inspection of the shear fitting as specified in Part 6, 51-00-27.

(3) Remove sealant from the shear fitting inspection area and the CVM sensors and do a HFEC inspection of the shear fitting as specified in Part 6, 51-00-00, Procedure 23.



Inspection Areas
Figure 1 (Sheet 1 of 2)



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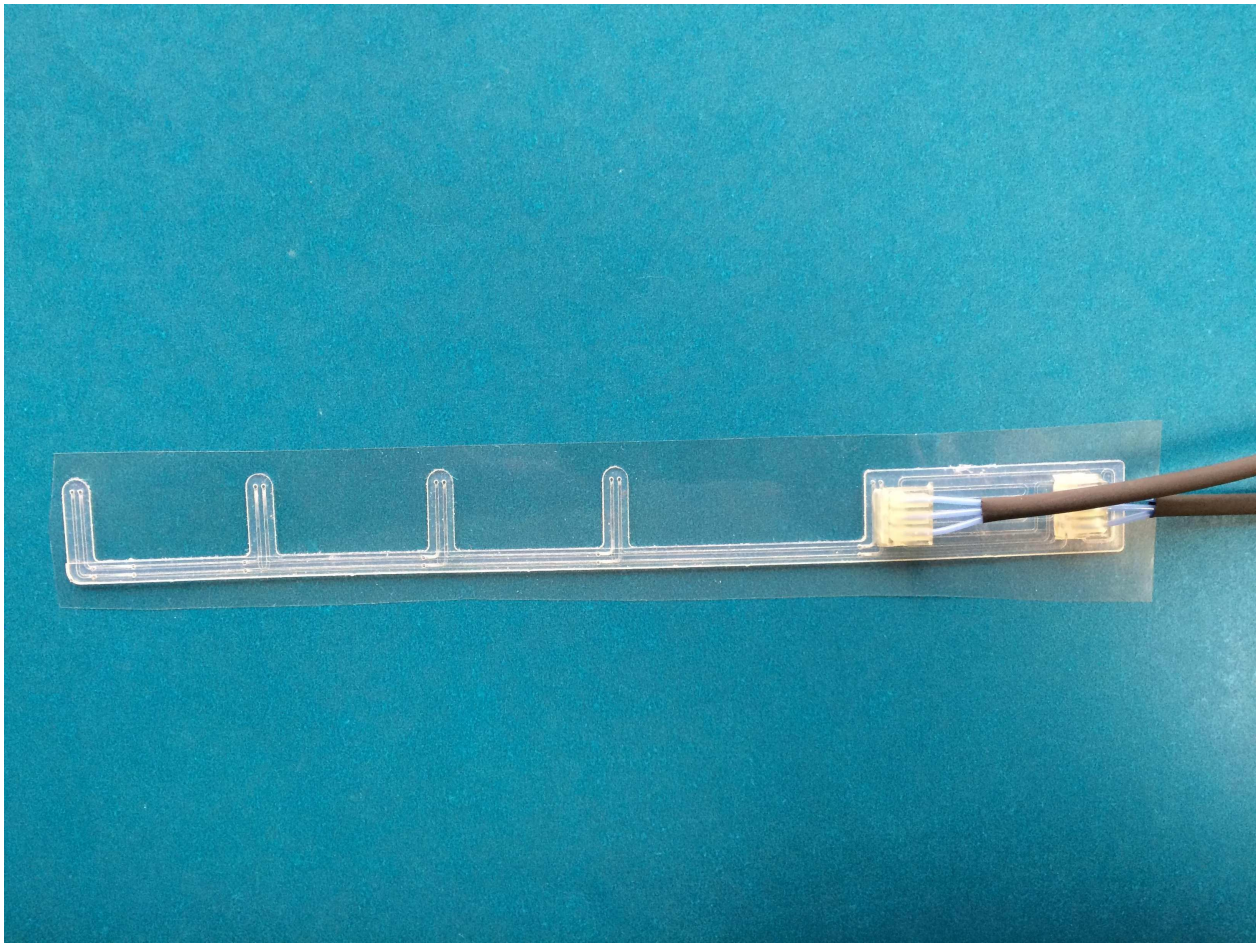
Inspection Areas
Figure 1 (Sheet 2 of 2)



FLUORINATED ETHYLENE PROPYLENE (FEP) SENSOR 191-01-004 IS SHOWN;
FLUORINATED ETHYLENE PROPYLENE (FEP) SENSORS 191-01-001 AND
191-01-007 ARE ALMOST THE SAME

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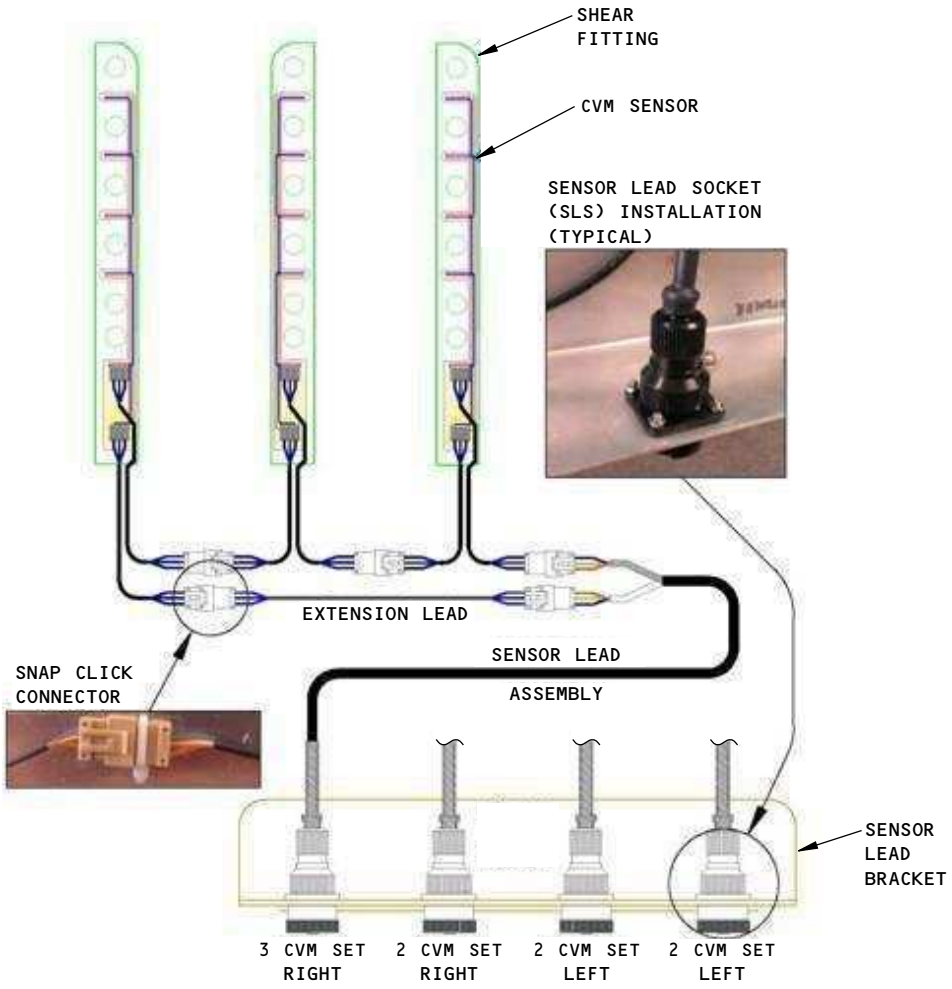
Comparative Vacuum Monitoring (CVM) Equipment
Figure 2 (Sheet 1 of 3)



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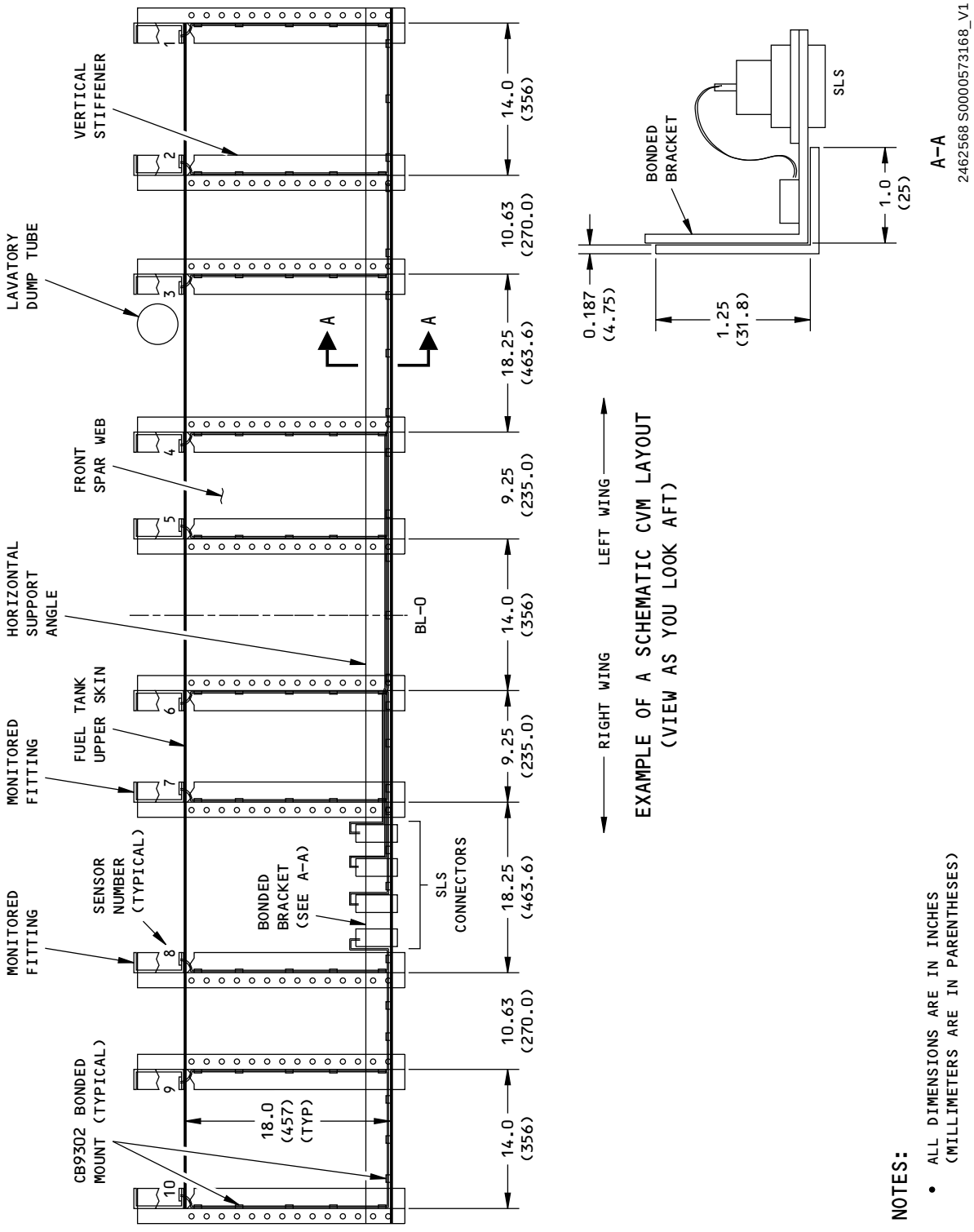
Comparative Vacuum Monitoring (CVM) Equipment
Figure 2 (Sheet 2 of 3)



Comparative Vacuum Monitoring (CVM) Equipment
Figure 2 (Sheet 3 of 3)