

Summary:

During the integration of the EFW instruments onto the RBSP Observatories (SC) there was some confusion about the orientation of the booms. This memo records the serial numbers of booms in each location, their respective EFW telemetry channel, and other relevant nomenclature used in various Project documents. This memo also includes schematic diagrams of the boom and TM channel locations relative to the Sun Sensors and to the Observatory (XYZ) and Science (UVW) coordinate systems.

FM1 and FM2 Boom Locations on S/C A and S/C B

Science Coordinates	S/C Coordinates	S/C Panel Number	Spacecraft ICD Boom Numbers	TM Channel	FM1/ S/C-A S/N	FM2 / S/C-B S/N
+V	+X+Y	2	3	4	4	5
+U	+X-Y	4	1	2	2	8
-U	-X+Y	0	2	1	1	7
-V	-X-Y	6	4	3	3	9
+W	+Z	9	6	6	4	3
-W	-Z	8	5	5	5	6

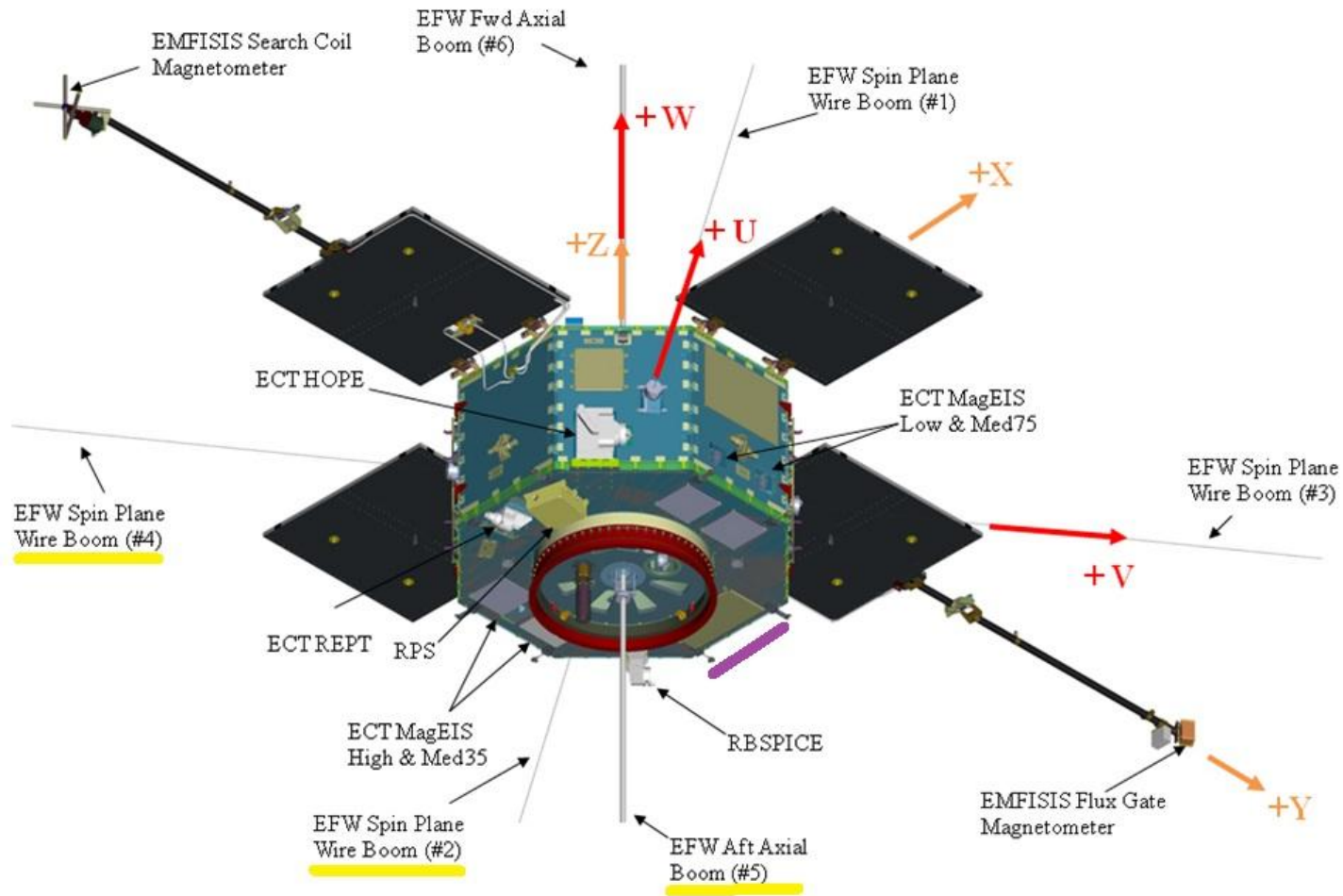
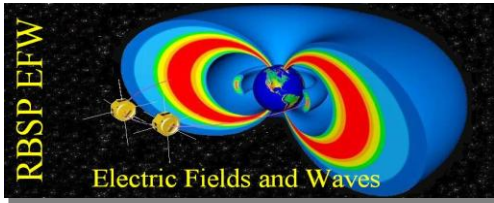


Figure 1: Boom locations shown on diagram. Note TM channels and boom serial numbers are not shown.

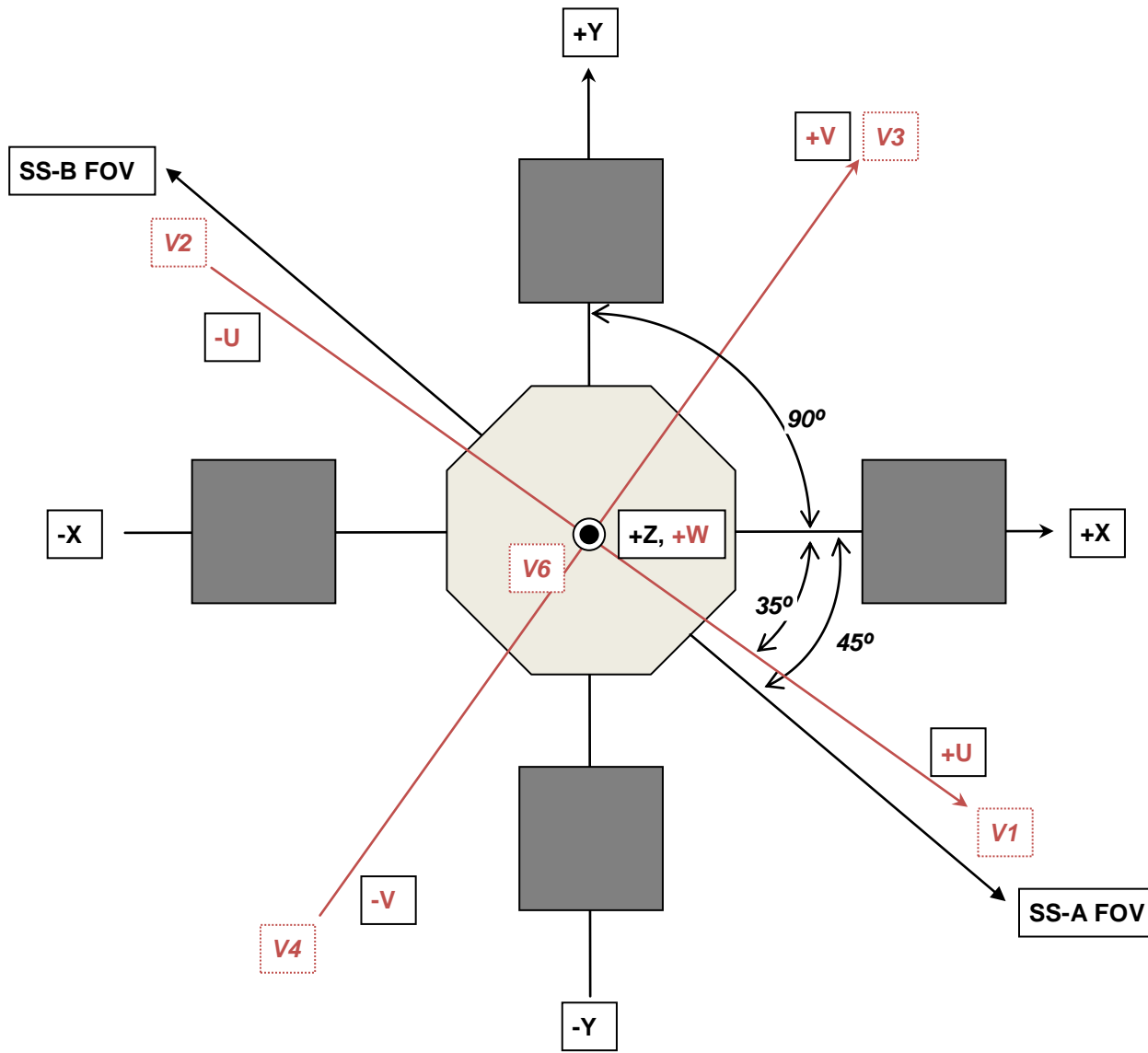
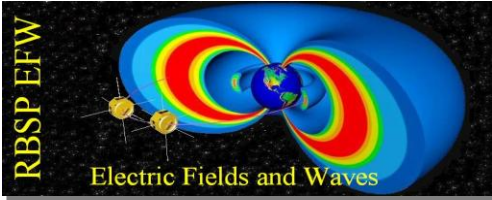


Figure 2: Schematic view of EFW booms, SC (XYZ) and Science (UVW) coordinate systems.

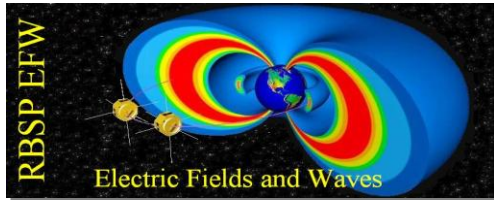
EFW TM Channel labels (Vn) noted for spin plane sensors.

Field-of-View (FOV) of both Sun Sensors (SS-A and SS-B) included as well.

Solar array panels are shown in grey, SC body in tan.

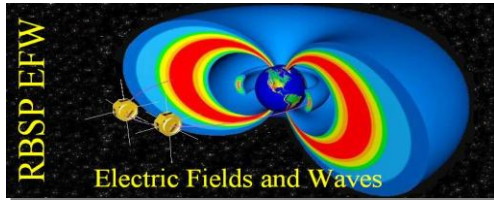
View is from above top (forward, Sun-facing) deck, parallel to SC Z-axis.

-Z/-W/V5 boom on aft (rear, anti-Sunward) deck is not shown in this view.



Notes:

1. The differential (E) channels from the EFW instrument are identified as $E_{mn} = V_m - V_n$, so that $E_{12} = V_1 - V_2$, up to some positive scaling factor dependent upon the conversion between ADC units and volts. Given this definition for the channels (verified in EFW SciCal and Observatory-level LIT/CIT), the locations of the EFW booms and the definitions of the Science (UVW) coordinate systems, one has the following polarity relationships between the EFW E channels and the relevant Science Coordinate System values (up to positive offsets and scaling factors):
 - a. $E_u = -E_{12}$
 - b. $E_v = -E_{34}$
 - c. $E_w = +E_{56}$
2. Note that the nominal deployed orientations of the EFW booms and the Science (UVW) coordinate systems are aligned by design, and that the EMFISIS MAG and MSC sensor axis are nominally aligned with those axes as well.



Revision History:

- Rev A, Michael Ludlam, UCB SSL, July 2011.
 - Initial revision, incorporating as-integrated serial numbers and position of integration information.
- Rev B, John Bonnell, UCB SSL, 8 Nov 2011.
 - Added SC Panel number IDs to table.
- Rev C, John Bonnell, UCB SSL, 20 July 2012.
 - Added additional diagram, showing booms, coordinate systems and Sun Sensor FOVs from top deck looking down along SC Z axis.