

HESSI IDPU to Spectrometer Signal Harness Shielding Instructions

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1. Background

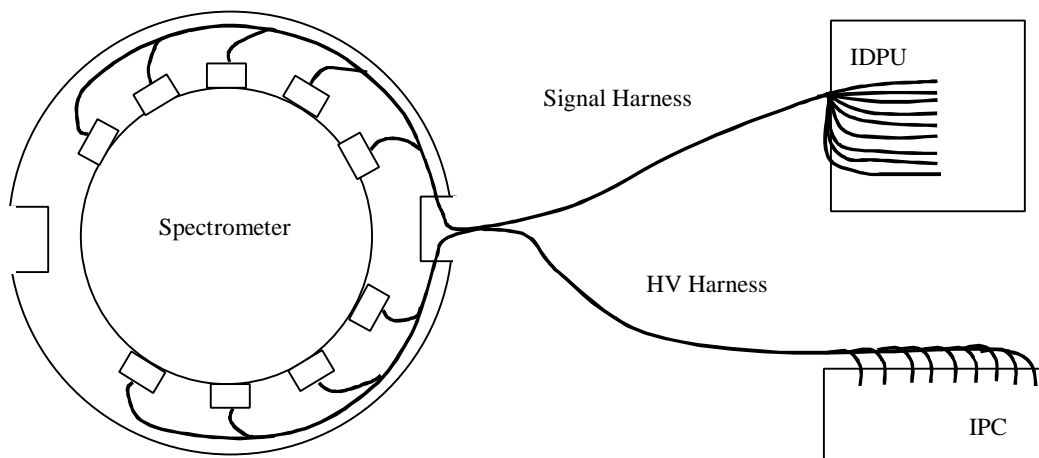
The spectrometer to IDPU harness carries low level signals and requires significant shielding from pickup of signals radiated by boxes and other harnesses on the spacecraft. This plan calls out the baseline shielding for the harness. Should we find that the shielding is insufficient, additional shielding may be required.

2. Overview

The individual CSA to DIB harnesses shall be wrapped with aluminum tape, grounded to signal ground at both ends via a drain wire. The outside of each harness shall then be wrapped in kapton to avoid shorting the aluminum tape to structure or the other CSA to DIB harnesses. Next a second aluminum tape wrap shall be applied in common over all the CSA to DIB harnesses from the IDPU down as far as the Spectrometer. This shield shall be terminated by a drain wire to the IDPU chassis via a convenient IDPU chassis screw.

The HV cables shall be included in this shield from the filter box to where the HV harnesses separate from the signal harness at the spacecraft struts. From that point on the HV harnesses shall be wrapped in a single common aluminum tape shield. This shield shall be terminated via a drain wire to the IPC chassis (not the HV power supply chassis). The shield shall end just before the HV cables reach the high voltage supplies.

The external chassis ground shield shall not be insulated, and so may contact the spacecraft. However, the chassis ground shield must not come in contact with the Spectrometer, the inner signal ground shield, or the high voltage power supply chassis.



3. Signal Ground Drain Wire

The signal ground drain wire shall be a bare #26 wire running the full length of each CSA to DIB harness. It shall be terminated on CSA n -P1 pin E at the CSA, and at IDPU-P1 n pin 10 at the IDPU (where n in the connector number represents the harness number, 1 to 9; for example harness 1 connects CSA1-P1 to IDPU-P11).

The DIB boards in the IDPU shall be modified to connect pin 10 to signal ground. The CSAs shall be modified to connect pin E to the CSA chassis ground.

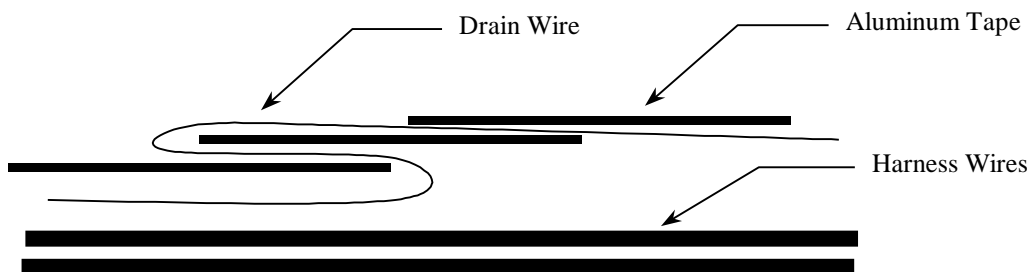
The drain wire will need to be longer than the harness since it will be weaved in and out of the shield tape, so connect it just to the CSA end with extra length at first.

4. Signal Ground Shield

Once the signal ground drain wire is attached at the CSA end of the signal harnesses, the harness can be wrapped with aluminum tape. The tape shall start at CSA n -P1, under the connector shell if possible. After an inch or two it should also include the coax signals from CSA n -P2, CSA n -P3, Filt n -P1, and the HV cable from Filt n -P3.

The tape shall be overlapped by 50% as shown in the figure below.

The shield shall be connected to the drain wire by weaving the drain wire in and out of the shield so that it is captured between one wrap of the shield and the next as shown below:



The drain wires shall weave through the tape approximately every 18" to ensure good ground contact, starting near the CSA connector. If a break in the tape is required, one part of the tape shall overlap the other, and the drain wire should weave into both sides of the break.

The HV cable shall leave the harness where the harness reaches the spacecraft strut.

The tape shall end about 1 inch from the IDPU-P1*n* connector. The drain wire shall then connect to IDPU-P1*n* pin 10.

The tape shield must be applied with the harness in the configuration it will be on the spacecraft, since it will not be very flexible once the tape is applied. This means it should either be applied on the harness mock-up, or else on the actual spacecraft.

5. Kapton Tape Insulation

Next the harness shall be wrapped in kapton tape to insulate the aluminum tape. The kapton tape shall cover the end of the tape at the IDPU end, but can stop an inch or two before the CSA end, just before the coaxes break out of the shield.

6. Chassis Ground Shield

After the signal ground and insulation layers, a final aluminum tape layer shall be applied. This layer shall cover all 9 signal harnesses from the IDPU to the Spectrometer.

This shield shall start at the junction of the 9 signal harnesses at the IDPU and end at the bottom of the strut just before the Spectrometer

A drain wire shall be used similar to the one used for the signal harness. It shall terminate after a short loop to the screw that holds the clamp that holds signal harness to the IDPU just before it fans out to the 9 connectors. It shall run the length of the outer shield to the spectrometer.

Similarly the HV harness shall have a single common chassis ground shield. The shield shall run from the junction of the 9 HV cables at the IPC to the bottom of the strut just before the spectrometer (just before they enter the signal harness).

The HV harness shall also have a drain wire attached in the same way to the IPC chassis that the signal harness chassis shield drain attaches to the IDPU chassis. Be careful to avoid contacting the HV harness; use an external kapton layer if required.