SMEX FAST
I&T MAGNETIC CLEANLINESS REQUIREMENTS
FAST-SPEC-023

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SMEX/FAST I&T MAGNETIC CLEANLINESS REQUIREMENTS

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SCOPE

This document describes the requirements necessary to maintain the magnetic cleanliness of the FAST spacecraft during integration and test (I&T). Actual step-by-step procedures will be described as part of the general FAST I&T procedures.

INTRODUCTION

Since the FAST spacecraft will be measuring faint variations in the magnetic field around the earth, it is very sensitive to any magnetic fields generated internally. The designers have taken great care to minimize magnetic materials and current loops which generate magnetic fields. In order to maintain the spacecraft magnetic cleanliness, some extra precautions must be taken during I&T of FAST.

The primary concern during I&T is magnetically charging any of the material on the spacecraft (such as the battery) with a tool or fixture that is magnetized. Generally, ambient fields will not be a problem except when the source is close (a foot or two) to the spacecraft (such as the vibration table or spin balance motor). DC magnetic fields are much more of a problem than AC fields.

REQUIREMENTS

All externally applied fields shall not exceed 3 Gauss at a one foot distance from the spacecraft. This level is low enough to prevent magnetization of any materials on the spacecraft. Ambient fields in most areas where the spacecraft will be are well below this level. The only potential problem areas which must be tested are the vibration table, the spin table, and the thermal vacuum chamber.

The magnetic field of all fixtures used to support or move the spacecraft shall be measured. The field shall not exceed 3 Gauss.

The maximum magnetic field on the surface of any tool in the clean tent area shall not exceed 3 Gauss. Tools shall be screened anytime they are brought into the clean tent. Any tools exceeding the specification shall be degaussed and retested. Since tools come in direct contact with the spacecraft, a surface field greater than 3 Gauss could easily magnetically charge something on the spacecraft. This specification does not necessarily require tools made of a non-magnetic material.

Keys and watches shall not be brought into the clean tent. In addition, jewelry, belt buckles, and other personal metal objects shall be screened. These items can have a substantial magnetic field.

Analog current meters shall be kept at least five feet away from the spacecraft. A Simpson 260 meter has a field of several hundred Gauss on the meter face. Check the particular meter and make sure its field does not exceed 3 Gauss at the spacecraft.

No DC powered soldering irons shall be used near the spacecraft. The DC magnetic fields from these irons are substantial. If necessary, an AC iron is acceptable, as long as it is powered off away from the spacecraft. If a strong AC field is interrupted suddenly, it will leave some residual magnetism; moving the iron away allows the field to drop off.

And, of course, no magnets shall be brought anywhere close to the spacecraft or anything that gets near the spacecraft. If a tool or fixture is exposed to a magnet, it must be tested and probably degaussed prior to it being used with the spacecraft again. Little magnets hide in many places around the center--door frames, cabinets, tool boxes, etc. Be alert!

SUMMARY

In most cases, the above requirements should be relatively easy to implement. The best protection for the spacecraft is an awareness of its sensitivity to magnetic fields, and the common sense of anyone who works near it.