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## INSTRUMENT MANGEMENT MEMORANDUM

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**TO:** ATLAS LASER TRANSMITTER SUBSYSTEM  
**FROM:** GLENN JACKSON, ATLAS INSTRUMENT MANAGER  
**SUBJECT:** DEFINITION OF TECHNOLOGY READINESS LEVEL (TRL) 6 FOR LASER TRANSMITTER  
**DATE:** 1/26/2010

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### Purpose:

This memorandum defines the Preliminary Design maturity level for the Laser Transmitter subsystem. This is an application of the widely accepted TRL-6 definition as it pertains specifically to the ATLAS Laser Transmitter subsystem. This practical definition will be utilized in planning development, testing, funding scheduling, and staffing to achieve TRL-6 before the Instrument Preliminary Design Review (iPDR).

### Terminology:

*Technology:* The hardware, software, firmware, processing, and combination there of utilized to achieve the mission's requirements.

*Technology Readiness Level:* Provides a scale against which to measure the maturity of a technology. TRLs range from 1, Basic Technology Research, to 9, Systems Test, Launch and Operations. Typically, a TRL of 6 (i.e., technology demonstrated in a relevant environment) is required for a technology to be integrated into a System Engineer process. (ref. NPR-7123.1A)

*Subsystem Prototype:* A subsystem prototype is an integrated assembly operating at the performance level to achieve all the requirements for the eventual flight subsystem as predicted by the corresponding mature engineering analysis or analytic modeling.

### TRL-6 Definition for Laser Transmitter:

At TRL 6, the Laser Transmitter Subsystem prototype will go well beyond ad hoc or discrete component level breadboarding, and will be tested in a relevant environment simulating space operation. This environment shall be approximated in ground test through vibration testing, emi/emc testing, and thermal vacuum testing the subsystem prototype. Radiation testing will be done at a component level. Component level testing for radiation should be sufficient to find any potential problems and it would be extremely difficult to test the subsystem as a whole.

The ATLAS laser transmitter subsystem, as defined by the instrument requirements document, includes electronics and the opto-mechanical package. However the

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drive electronics (and heat pipes where required) are not considered a TRL risk so they do not need to be included in the environmental testing at this stage. Where the electronics are not at  $\geq$  TRL 6, or where it is an integral part of the opto-mechanical prototype, it will be included in the subsystem environmental testing.

The operation of the subsystem prototype will be through test equipment simulating the higher levels of the instrument and observatory. The lifetime requirement will be demonstrated through a combination of relevant testing and analysis.

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