LLE INSTRUCTION 9850A

SUBJECT: INTEGRATION OF COMPUTER-BASED DIAGNOSTICS INTO THE OMEGA FACILITY

1. Purpose: To formalize laboratory procedures for control of OMEGA diagnostics and for addressing the exchange of information with the OMEGA Facility.

2. Definitions:

a. Potential uses of computers within the OMEGA Facility include
   (1) Command and control of the facility elements
   (2) Acquisition of system diagnostic data
   (3) Acquisition of target experiment data
   (4) Maintenance of the control hardware and software
   (5) Management of operations
   (6) Analysis of shot and non-shot data acquired in the facility
   (7) Personal and non-operations–oriented communication or research

b. Functions related to instruments that acquire data for system or target diagnostic purposes include
   (1) Start-up, calibration, and shut-down
   (2) Setup for a particular shot
   (3) Sequencing on the shot cycle (ready, arm, acquire/abort, log data)
   (4) Retrieval of data for archiving
   (5) Monitoring and troubleshooting

c. The following status classifications apply to diagnostic instruments and other system elements:
   (1) Not On-Line – not connected to the OMEGA LAN.
   (2) Temporary – connected to the OMEGA LAN for a short-term use not critical to the basic operation of the OMEGA System.
   (3) Developmental – not a fully integrated part of the OMEGA System, operated primarily by dedicated investigators.
   (4) Operational – an integrated part of the OMEGA System operated by the Watchstanders on duty.

(5) Guest Operational – Laboratory-to-laboratory agreements may establish situations in which a non-LLE Investigator accepts responsibility for setup and proper performance of an instrument that is otherwise fully integrated with OMEGA and OMEGA Operations.

3. Procedures:

a. Efficient, reliable, and safe OMEGA System operations are dependent upon the correct operation of the system computers, software, and the Ethernet infrastructure. Accordingly, the following procedures are established:

(1) All aspects of instrument operation that affect personnel safety or the integrity and safety of the OMEGA laser, target chamber, or other instruments will be under the control of OMEGA Operations. (This applies to all of the element classes defined above.)

(2) All on-line computers that are physically within the OMEGA Facility will be connected only to the OMEGA LAN or to a LAN physically contained completely within the OMEGA facility.

(3) To facilitate configuration management and minimize the potential for unauthorized use, the OMEGA Ethernet will be isolated from other LAN's in the building and the Internet.

(4) All computers connected to the OMEGA LAN will be installed and maintained in accordance with LLEINST 9800.

(5) Connections to LLE computers that are external to the OMEGA LAN will be allowed in limited cases. These "hole in the firewall" arrangements must be reviewed and approved by the LLE Computing System Administrator, the OMEGA System Engineer, and the OMEGA Facility Manager. In general, they will be approved only when paragraph 3.a.1 is not compromised and only if no other arrangement will meet the operational need addressed by the proposed connection.

(6) An LLE employee will be designated as the contact point for each Temporary or Developmental computer connected to the OMEGA Ethernet. That person will act as a liaison for other/non-LLE persons associated with the computer and will keep the LFM, the SD on duty, and the appropriate subsystem operator on duty apprised of the computer's status and significant changes. See also CIDS Part 2, LLEINST 9800.

(7) Setup and sequencing of Operational computer-based instruments that are part of the plan for a shot day will be carried out from within the OMEGA Facility and by the operational structure defined in LLEINST 3000 (LFORM). In particular

(a) The computer/instrument will not be controlled from outside the OMEGA LAN.

(b) All setups, readiness checks, arming, etc., diagnosis, and troubleshooting will be coordinated with and communicated to the SD on duty and the appropriate subsystem operator on duty.

(8) The primary responsibility for setup and sequencing of Guest Operational or Developmental instruments shall lie with the investigator. Any assistance required from OMEGA Operations for such instrumentation and other details of the respective responsibilities shall be negotiated on a case-by-case basis and appropriately documented (for instance, in a laboratory-to-laboratory agreement/procedure). In no event shall paragraph 3.a.1 be compromised.

(9) In general, data critical to the assessment of OMEGA operations and target experiments is to be stored in the OMEGA Experimental Database in "raw" form. The database provides necessary methods for subsequent access to the data. Reduced data may also be stored when appropriate. The use of computers that are on-line in the OMEGA Facility for final reduction of temporary or developmental diagnostic data is discouraged.

(10) The use of computers that are on-line in the OMEGA Facility for personal and non-operations–oriented communication or research is highly discouraged.

4. Implementation:

a. The OMEGA LAN, the OMEGA software system, and the OMEGA Hardware Timing System provide standard interfaces that can be used to meet the functional and policy requirements addressed by this document.

(1) Setup, Sequencing, and Monitoring – The OMEGA Intercommunication Protocol (OIP), formerly known as the Broadcast System, provides subscribers with shot preparation and sequencing messages over the OMEGA LAN. In general, these are sufficient to allow the subscriber to set up for the shot. The messages may also be sufficient for the subscribing application to function correctly through the shot cycle. (Since these messages are software generated and relayed over a network, they should not be used to time events that have precision or repeatability requirements less than about one second.) OIP can also be used in conjunction with features of the executive software system to provide the appropriate OMEGA subsystem operator with status-monitoring feedback. The LLE Software Development Group (SDG) will provide software for Sun/Solaris applications and guidance and support for personal computers to implement the subscriber side of this interface. The SDG will configure the executive/server side of the interface as required on a case-by-case basis.

(2) Precision Triggers – The OMEGA Hardware Timing System can provide precision triggers to applications that need timing performance in excess of that provided by OIP. LLE Engineering will facilitate these connections.

(3) Additional Setup Data – To the extent that an application requires configuration data that is not adequately defined by the OMEGA Shot Types, files may be transferred into the OMEGA system and accessed by the subject computer. (See paragraph 3.a.8)

(4) Data Logging – The application may write data to a specific location in the OMEGA file structure or directly into the OMEGA Experimental Database. In the former case, the OMEGA software system provides a facility that will

quickly move the data file to an archive location in the database. Data stored in this manner is automatically accessible to computers external to the OMEGA LAN. Non-LLE users can be provided with web-based access to the OMEGA database. These implementations will be facilitated by the SDG on a case-by-case basis. Access will, in general, be restricted to experiments carried out by the user's institution.

(5) Monitoring and Troubleshooting – Monitoring beyond that provided by the OIP/Executive configuration and detailed troubleshooting will be performed by the appropriate persons working within the OMEGA Facility.

5. Responsibilities:

a. User Investigators

(1) Direct initial requests for access to experimental data or LLE operation of non-LLE diagnostics to the User Coordinator (also assigned as the NLUF Manager) ONLY. Raw experimental data will be made accessible to personnel from the institution carrying out the experiment or who are specifically listed as either the Principal Investigator or Co–Principal Investigator.

(2) Provide written procedures for the operation of non-LLE diagnostics to LLE for review and approval. Non-LLE diagnostics will not be operated by LLE in the absence of on-site assistance from the investigator's organization until a procedure has been written, accepted, and approved by LLE.

(3) Computer penetrations of the OMEGA LAN firewall must be approved by the LLE Computing System Administrator, the OMEGA System Engineer, and the OMEGA Facility Manager. Such approvals will be made only in rare instances.

b. LLE Computing System Administrator

(1) Approve any exceptions to the penetration of the OMEGA LAN firewall.

(2) Maintain a record of all firewall penetrations.

c. LLE System Engineer

(1) Approve any exceptions to the penetration of the OMEGA LAN firewall.

(2) Review and approve procedures for operation and control of non-LLE diagnostics.

d. OMEGA Facility Manager

(1) Approve any exceptions to the penetration of the OMEGA LAN firewall.

e. User Coodinator

(1) Field user requests for experimental data access and either LLE operation or remote operation of non-LLE diagnostics and arrange for the appropriate response/action by the responsible LLE representative.

5. Approval:

Robert L. McCrory
Director