Section 4
LASER SYSTEM REPORT

4.A GDL Facility Report

During the first half of the second quarter of FY90, GDL operations concentrated on three main programs: shine-through, x-ray laser, and Bessel-beam propagation. There were also many shots devoted to identification and suppression of a prepulse. The second half of the quarter was devoted to an oscillator reconstruction in which the GDL oscillator was totally rebuilt, with attention given to vibrational and electrical isolation for the purpose of ensuring proper phase stabilization. This work also included changing the frequency of the rf-driven mode-locker and Q-switch from 66 MHz to 50 MHz. Ultimately these upgrades plus the installation of a regenerative amplifier seeded by a cw laser will provide pairs of accurately timed pulses enabling us to perform pulse-shaping experiments.

A summary of the quarter's GDL operation follows:

Beamline Test, Calibration, Tuning and Laser Alignment Shots	407
Target Shots	
Shine-through	56
X-Ray Laser	41
Bessel Beam	46
TOTAL	550

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4.B OMEGA Facility Report

During the second quarter of FY90, the OMEGA laser facility resources were allocated to three main programs. First, beam-uniformity improvements for target irradiation went through system integration and testing cycles, followed by target-interaction studies. Then, two other campaigns were supported, each utilizing single OMEGA beamlines. Large-signal-gain measurements were made on a multisegmented amplifier (MSA), and stimulated rotational Raman scattering (SRRS) threshold measurements in the ultraviolet (351 nm) were also acquired.

As reported last quarter, the SSD uniformity-enhancement system was upgraded from 3-GHz to 8-GHz modulation frequency. A new style of microwave resonant cavity was completed and installed in the OMEGA driver line. Streak-camera measurements of amplitude modulation in the laser were well correlated with the theoretical modeling, and target shots were taken to quantify the effects of the faster smoothing times. A more detailed description of the SSD improvements will appear in a future LLE Review article.

An MSA prototype amplifier was assembled in a class-100 cleanroom within the OMEGA laser bay. The goal of this campaign was to characterize the amplifier performance, specifically the large-signal gain. OMEGA infrared output pulses at the 120- to 130-J level, 800 ps, were used as input for one of the four MSA beam paths. The MSA was synchronized to OMEGA, with the output of beam 6-4 double-passing the amplifier. OMEGA calorimetry, interferometry, and other diagnostics were deployed to characterize the MSA performance over the full range of operational parameters. During these tests a laboratory single-beam energy record of 949 J was set. Further details will be published in a future LLE Review article.

After the MSA tests were completed, beam 6-2 was converted to UV for SRRS experiments. As SRRS is a function of the product of intensity and interaction length, a long-path high-intensity beam setup was constructed to ensure conditions for threshold would be easily achieved. In fact, many shots were taken both above and below threshold for accurate characterization.

OMEGA was used for these measurements because it is the only facility that has SSD beam smoothing, and SRRS dependence on bandwidth and dispersion was a parameter space that to date has never been explored empirically. Data collection on this experiment will be completed early next quarter.

A shot summary for the quarter follows:

Driver Line		59
Software Test		50
Laser		94
Target		63
MSA		82
SRRS		25
	TOTAL	373

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