

## Section 4

# LASER SYSTEM REPORT

### 4.A GDL Facility Report

GDL continued operation this quarter as a target interaction facility. A number of shots were devoted to interaction experiments. Damage-testing shots for the materials group have resulted in the successful tests of liquid-crystal waveplates, which will improve polarization control over existing liquid-crystal polarizers. The ALPHA (25th beam for OMEGA) beam has been successfully aligned, tuned, and activated.

A summary of GDL operations for this quarter follows:

Pointing/Alignment Shots	65
Beamline Test and Activation	65
Damage Testing	7
ALPHA Test Shots	36
ALPHA/OMEGA Synchronized Shots	2
Target Shots	149
TOTAL	<hr/> 324

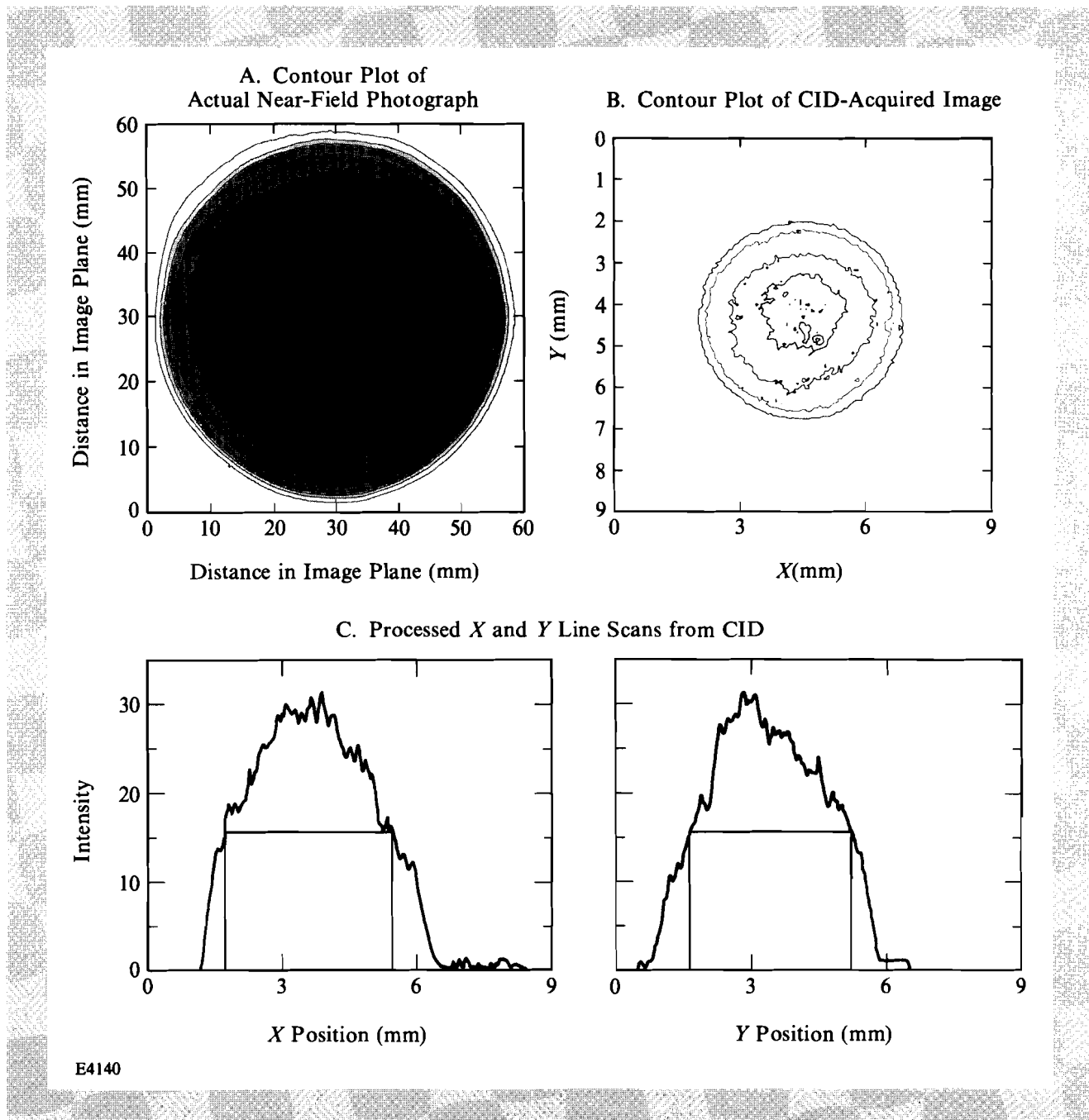
### 4.B OMEGA Facility Report

During the first quarter of FY87, OMEGA activities included continuation of the laser system modifications begun during the previous quarter. The main objective of the modifications was the improvement of beam quality and diagnostics.

The driver-line reconfiguration is concluded. The driver seed beam to the OMEGA beamline splitters has near-perfect circularity, a controllable beam profile, and less than a one-tenth wave of total aberration in the beam.

A new beam diagnostic, which consists of a charge-injection-device (CID) camera coupled to an image-processing computer, has provided shot-to-shot capability for on-shot centering ( $\pm 1\%$ ) and beam profile diagnostics to the driver line. A typical reduction of the camera data is shown in Fig. 29.24.

Fig. 29.24  
CID beam profile diagnostic.



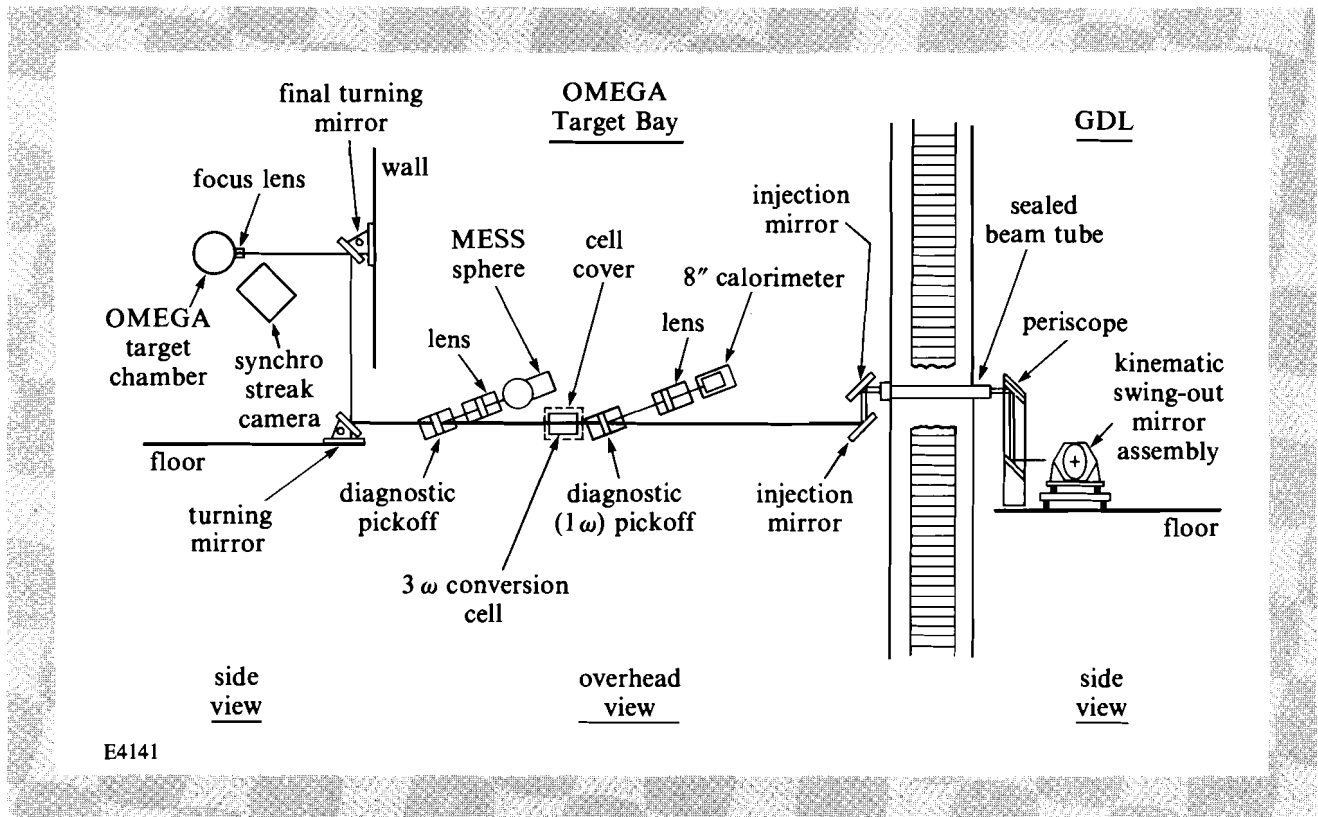
The multi-wavelength energy-sensing system (MESS) has been improved with new, high-reflectivity covers and calibrated with an accuracy approaching 2%. Such accuracy is required to obtain the beam balance and uniformity specification of the high-density target experiments.

Linear-polarizer/wave-plate combinations at the inputs to the beamline amplifiers have been replaced with liquid-crystal circular-polarizer/wave-plate combinations, providing high-contrast circular-polarized light into each amplifier stage. Tests of the device at the input of the 90-mm amplifiers show no damage to the liquid-crystal polarizers, and optimum polarization, even at high energies, for third-harmonic conversion.

As part of the effort to improve laser illumination uniformity, initial measurements were taken on beamline 6-2, the "perfect beam," which has been fitted with the finest optical components available and is completely covered by a turbulence-prevention corridor. A possible source of microthermals has been eliminated by removing the heat lamps that have been used to control the temperature of the frequency conversion crystals; instead, control is achieved by sensing the cell temperature and adjusting the phase-matching angle of the cell for optimum second- and third-harmonic conversion.

The ALPHA beam, previously called the 25th beam, has been successfully fired onto a target in the OMEGA target chamber. The ALPHA beam is transported through the laboratory from the output of

Fig 29.25  
ALPHA beam layout.



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the GDL/active mirror laser to the OMEGA target bay, as shown in Fig. 29.25. It will be used as a short-pulse, third-harmonic, x-ray backlighting source, synchronized with the OMEGA laser.

Target shots were taken for diagnostic activation and timing and in support of the National Laser Users Facility program.

A summary of OMEGA operations this quarter follows:

Driver Test and Alignment Shots	118
Beamline Tests	162
Target Shots	54
<b>TOTAL</b>	<b>334</b>

#### ACKNOWLEDGMENT

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