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FINAL REPORT
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Final Report on Task 55

Peter R. Forman

During this last year I responded to requests from my section leader and performed those tasks in which he wished me to be involved.

The most successful venture was the interferometry measurements of the plasma jet formed when the electron beam of the ITS(dahrt) was incident of the metal target. W (Monty) Woods is a post-doc, new to the group, and was assigned to design and install interferometers to make density determinations of the plasma jet. The time frame for getting the instrumentation designed, assembled and tested was very short. My acquaintance with personnel within the group and a knowledge of optic, fiber optics, etc. was very useful in the design of a quadrature interferometer and in borrowing the necessary equipment to get the system on line rapidly. Data were take and the system has been installed on a more permanent basis with new components replacing those which were borrowed for the initial runs. Monty has taken over completely in the taking and reduction of data.

The least successful was the fiber optic approach to the measurement of pressure within a shock front by measuring the Raman shift of laser light within a diamond probe which is subjected to the high pressures associated with the shock wave. This was a continuation of the work start in the previous fiscal year. After two attempts at delivering the laser light through a multi mode optical fiber the work was stopped while I made numerical estimates of the anticipated signal. Those results confirmed that no signal should be expected and that direct illumination of the diamond sensor element should and did provide adequate signal. The fiber approach should be rethought. The convenience of delivering the laser light through a fiber to the experimental test region should not be thrown away without considering other approaches.

Another project which had mixed results was the work with P-23 on the Russian, Infra-red imaging camera. This camera was purchased with P-22 money jointly with P-23. The physical possession of the camera was in P-23 and it had a sorry history of never really getting worked on due to repeated relocation of the instrument within that group. I studied the Russian reports about the camera and worked with a technician in P-23 to try and determine the fastest time response that the camera was capable of achieving. A couple of internal memos resulted from that work but interest in the instrument vanished when commercial solid state cameras were purchased. They are clearly superior as there linearity can be established or at least compensated for in the reduction of the data.

The hope was that multiple images could be obtained from the Russian plasma IR camera. It became apparent that this would not be the case as the energy deposited from the plasma discharge in acquiring the first image would vastly exceed the Infrared energy incident from any subsequent scenes of interest.

On numerous occasions I participated in discussions with small groups and individuals on fiber optic problems which were confronting the P-22 group. In particular I often consulted with John Stokes on the development of the Faraday Fiber-optic measurements

of current. The original measurements of the Verdet constant which we reported last fiscal year were confirmed by measurements at NIST in Boulder Colorado. This has led to the acceptance of the 5% reduction in the current measurements which had previously been proposed. Another project in which I had peripheral association was the Infra-red measurements of the temperature of a shocked surface. David Holtkamp had primary responsibility for these experiments but I often was involved in discussions of the equipment to be used and answered questions from Pat Rodriguez when Holtkamp was not available.

No effort was expended on the mode locked laser. It was anticipated that part of my time would be involved when the task order was initiated, however, other things took precedence.