

SECRET

QUARTERLY REPORT

Contract

25X1

PAR 217

26 Feb 65

SUBJECT: Optimization of Lasers

TASK/PROBLEM

1. Explore the production of 0.53 micron (blue-green) laser radiation by harmonic doubling in KDP and ADP crystals.

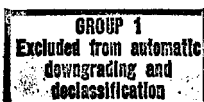
DISCUSSION

2. Early in this quarter continued empirical effort was directed toward reducing the lattice work structure in the second harmonic beam pattern. Having already shown that the structure is not a random phenomenon (FY-65 No. 2 Quarterly Report, 30 November 1964), attempts were made to determine if this structure was an inherent characteristic of the 1.06 micron fundamental beam or if it was generated by the K.D.P. crystal.

3. In the initial experiments, a 200mm lens was placed in the beam path between the KDP crystal and the film plane. Three lens positions were then chosen such that a cross section through the beam ahead of the crystal, in the crystal, and beyond the crystal would be in focus. The resulting exposures indicated that the structure was not dependent on focus. The only variations were those due to slight changes in magnification. Consistent with these results, it is considered that the crystal might be acting as a resonant cavity, producing interference fringes due to the slightly divergent laser beam. The reason for the lattice work structure rather than a circular or slightly elliptical interference pattern, however, is not completely understood.

4. At the request of the customer, a literature search was initiated to provide possible basis for theoretical comparison of the harmonic doubling technique with other laser techniques for producing visible coherent radiation. The search is being made by the contractor's "Technical Information

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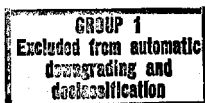
Service" group (library). A number of articles from technical journals were supplied by them near the end of the second period of the quarter.

5. During the second period of the quarter, the contractor's project monitoring group prepared the attached "Restatement of Goals" for this project which was also included in the monthly report of 22 January 65. Laboratory work on this project was stopped at the end of the thirteenth period, by the departmental supervision of the group to whom this project is assigned, to await the restatement of project goals.

6. No work has been done on either the beam structure study or on study of the available literature in the second and third periods of the quarter.

PLANNED ACTIVITY

7. During the next quarter, we will:
- a. Continue the study of the laser beam structure.
 - b. Study the available literature for a possible comparison of the harmonic doubling system with other visible light laser systems.



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