



Emission from powerful new NRC laser reflected from mirror at far right ionizes the air (streak at upper left) as laser generates billions of watts of power in less than a millionth of a second.

POWERFUL NEW LASER

A new laser capable of generating billions of watts of power in pulses lasting less than one ten-millionth of a second has been developed at the National Research Council of Canada.

The powerful instrument was designed by two scientists, Drs. A.J. Alcock and M.C. Richardson, in the laboratories of NRC's Division of Physics in Ottawa. They developed the laser during research into the production and analysis of plasmas using high-energy lasers.

The device is an addition to a family of TEA (transversely-excited atmospheric pressure) lasers first invented by Canadian scientists at the Defence Research Establishment Valcartier (DREV), Valcartier, Quebec. Much interest in these lasers has been shown by physicists and engineers the world over since DREV reported their findings two years ago. The TEA carbon-dioxide lasers are characterized by their low cost, high efficiency and relative safety of radiation produced.

ADVANTAGES OF TEA LASERS

Scientists have pointed out the attractions of TEA lasers, particularly for industrial uses such as drilling, welding, cutting and machining, due to the high power which they generate. The laser developed at NRC can give gigawatt (billions of watts) powers in pulses lasting only 50 nanoseconds (50 billionths of a second). It is believed to be the first laser capable of generating such power in such pulse times.

The NRC work constitutes a distinct improvement over existing TEA laser designs. On a low

budget, Dr. Richardson, assisted by Kurt Leopold and Peter Burryn, managed to have a working model of their relatively large TEA laser ready in just under four months of intensive laboratory work.

Still another advantage of the new laser is that it is built in modular form, and is easily amenable to commercial development. The laser is made up of a number of box-like modules, all identical and each one a complete unit.

MARKETING

Commercial development and marketing of the new laser will shortly be undertaken by an Ottawa firm which has been licensed by the Canadian Patents and Development Ltd., a subsidiary of NRC, under the original TEA laser patents.

The firm, Lumonics Research Limited, was the first Canadian manufacturer to concentrate exclusively on the design and production of lasers. A second firm, Gen-Tec (1969) Inc. of Quebec city, is developing another type of TEA laser. TEA lasers are powerful enough to instantly vaporize all known materials, and there is mounting interest among plasma physicists in the possibility of using these lasers to produce plasma fireballs with temperatures comparable to those on the sun. Large research programs in several countries are currently directed at studying the production of these extremely high-temperature plasmas for controlled thermo-nuclear fusion.

The NRC physicists presented a paper of the new laser at the seventh International Quantum Electronics Conference in Montreal last month.