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BIBLIOGRAPHY OF DOCUMENTS RELATED TO THE THEORY, OPERATION, PERFORMANCE AND APPLICATIONS OF COAXIAL PLASMA GUNS (REVISED EDITION)

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David W. Price

November 1990

**Final Report** 



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Weapons Laboratory Air Force Systems Command Kirtland Air Force Base, NM 87117-6008 This final report was prepared by the Weapons Laboratory, Kirtland Air Force Base, New Mexico, under Job Order 57970598. The Laboratory Project Officer-in-Charge was Dr David W. Price (AWX).

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This report has been reviewed and is approved for publication.

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#### INTRODUCTION

This bibliography is provided for use in the analysis and operation of coaxial plasma guns. Plasmas in these guns are formed by inserting gases into the gun muzzle and applying high voltage across the gun electrodes. The gas is ionized by the induced electric field, causing a radial current J formation. This radial current J produces an azimuthal magnetic field  $\mathbf{B}_{\theta}$ . The J  $\times$  B force drives the current with an axial velocity  $\mathbf{v}_z$ . This axial current can then be used in a variety of ways, many of which are summarized in the references reported here.

Because the focus of this bibliography is on coaxial plasma guns, references to other plasma guns are limited. Some references are provided, however, if the source reports parameters applicable to the coaxial gun. Papers on the dense plasma focus (DPF) are also cited, not for the focus physics, but because the DPF is generated with a coaxial gun and affected by the coaxial gun plasma generation. Compact toroids are also mentioned for similar reasons. Although such articles are not usually directed toward coaxial plasma guns, they do contain relevant information.

## BIBLIOGRAPHIC INFORMATION AND RELATED COMMENTS

This bibliography contains many references which apply to the theory, operation and performance of coaxial plasma guns. There is no intent to ignore any relevant source. However, the references cited here are only

provide a partial listing. They are limited, by necessity, with the following restrictions:

- Abstracts are not generally referenced. Only abstracts having pertinent detailed information or extended abstracts (over two pages in length) are cited.
- 2. Foreign references, unless translated into English, are not cited. This is no reflection on non-English language published research, but on the linguistic limitations of the compiler. When available, both the translation and the original reference are cited.
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The maximum available bibliographic information is reported for the interested reader. The sole exception to this policy of maximum reporting is in the listing of the authors. Some references report only initials, not the full names. That practice is followed here to limit the length of the citations.

Some referenced authors do not use languages with a Roman alphabet (e.g., the Cyrillic of the Russian Language or the ideograph structure of the Japanese language) and spelling of authors' names can be inconsistent. The rule in this bibliography is to follow the source document spelling.

This is the second version of the bibliography on this topic. (The first bibliography was produced by the compiler in September 1988.)

This bibliography incorporates the recently published work by scientists from the Soviet Union, Eastern bloc nations and other nations of the Third World. It also reflects an increased recent interest in the dense plasma focus.

Although I have gone to some effort to verify the citations in this bibliography, the possibility for mistakes in a work of this length is very real. While I have tried to list as many relevant documents as I can find, I realize that I may have omitted pertinent documents from this listing. If the users of this document find errors or have addenda to the listing, I would appreciate their feedback. Comments will be used to correct later versions of this bibliography.

### ACKNOWLEDGMENT

I am indebted to the efforts of the Weapons Laboratory Technical Library (WL/SUL) for their efforts in obtaining the materials cited in this bibliography. Were it not for their consistent and persistent work, it is doubtful this bibliography could have been prepared.

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