

# NASA TECH BRIEF

## *Lewis Research Center*



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### Design Criteria Monograph on Solid Rocket Motor Igniters

A design criteria monograph has been published which is a summary and a systematic ordering of the large and loosely organized body of existing successful design techniques and practices for solid rocket motor igniters.

This monograph was written to organize and present, for effective use in design, the significant experience and knowledge accumulated by NASA in development and operational programs. It reviews and assesses current design practices and, from them, establishes firm guidance for achieving greater consistency in design, increased reliability in the end product, and greater efficiency in the design effort.

Ignition system designers, in general, have been able to comply satisfactorily with the requirements imposed on igniters. However, a primary problem exists in the inability to meet requirements at low development costs with an optimum and reliable design. The cause is largely a lack of theoretically sound bases for establishing fundamental design methods. It has been necessary to rely on empirically derived relationships that do not effectively coordinate all pertinent variables and are not suitable for design optimization. This monograph has been written to assist the designer in correcting these deficiencies and to provide a concise but comprehensive guide to the practices and procedures that will produce successful igniter designs.

The monograph comprises two major sections: "State of the Art" and "Design Criteria and Recommended Practices". References complement the text.

The State of the Art section reviews and discusses the total design problem and identifies the design elements that are involved in successful design. The Design Criteria state clearly and briefly each rule, guide, limitation, or standard that must be imposed on each essential design element to assure successful design; the

Recommended Practices set forth the best available procedures for satisfying the Design Criteria.

Both major sections are divided into five subject categories: general (design requirements and ignition theory), initiation system (types of initiation, low-voltage electroexplosive devices, high-voltage electroexplosive devices, through-bulkhead initiators, initiator output charges, and safety features), energy release system (basic requirements, pyrogens, pelleted pyrotechnics, hypergolic, minor types, igniter location, and restart systems), hardware (initiation system and energy release system), and design proof testing (initiators, energy release system, hardware, and complete igniters).

This thorough review of design criteria and practices relating to igniters should be of interest to manufacturers of emergency-release systems, explosive metal forming, and ignition systems.

#### Notes:

1. The following documentation may be obtained from:  
National Technical Information Service  
Springfield, Virginia 22151  
Single document price \$3.00  
(or microfiche \$0.95)

Reference: NASA SP-8051 (N71-30346), Solid Rocket Motor Igniters

2. Technical questions may be directed to:  
Technology Utilization Officer  
Lewis Research Center  
21000 Brookpark Road  
Cleveland, Ohio 44135  
Reference: B72-10715

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