NUCLEAR DIVISION

C002-DS090269-F1
ENGINEERING DESIGN SHEET SPECIFICATION

PERFORMANCE/DESIGN AND
PRODUCT CONFIRMATION REQUIREMENTS.

FOR
LOWER THRUST STRUCTURE

FORMING A PART OF
CEI NUMBER 090290A

PRELIMINARY PROPOSAL ISSUE
DATED 12-15-69
FOR REVIEW ONLY. DO NOT IMPLEMENT.

MASTER

AEROJET-GENERAL CORPORATION

SACRAMENTO, CALIFORNIA

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CODE IDENT. NO. 05824

Data Item Identification
No. C002-DS090269-F1

Design Sheet
Component Specification No. DS-90269

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PERFORMANCE/DESIGN AND QUALIFICATION REQUIREMENTS

for

LOWER THRUST STRUCTURE

Replace page(s) with the latest revised page(s) noted below. Revised paragraph(s) are identified with the latest revision letter (or number) in the margin.

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1. SCOPE

1.1 Scope. - This specification establishes the performance, design, test and qualification requirements for equipment identified as the lower thrust structure. It is a part of the subsystem described as the thrust structure subsystem and is listed as a design critical component in detail specification EC-90152.

2. APPLICABLE DOCUMENTS

2.1 Aerojet-General Corporation Documents. - The following documents, of the latest issue, form a part of this specification to the extent specified herein. In the event of conflict between documents referenced herein and other detailed content of Sections 3, 4, 5, and 10, the detailed requirements of Sections 3, 4, 5, and 10 shall be considered a superseding requirement.

SPECIFICATIONS

EC-90152	Thrust Structure Subsystem
CP-90290	Engine, NERVA, 75K, Full Flow

DRAWINGS

1136390	75K NERVA Flight Engine-Full Flow Concept
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(Copies of above documents required by suppliers in connection with specific procurement functions should be obtained from the procuring activity)

3. REQUIREMENTS

3.1 Performance.- Except as otherwise specified herein, performance requirements for this equipment shall be in accordance with EC-90152 of which this equipment is a part. The lower thrust structure shall be capable of performing as specified herein within the environmental conditions specified in 3.1.2.4.

3.1.1 Functional Characteristics.- The Lower Thrust Structure shall be capable of transmitting engine thrust and/or inertia loads from the pressure vessel closure interface to the external shield (shield spacer) interface.

3.1.2 Operability.-

3.1.2.1 Reliability.- The probability that the component shall successfully fulfill its operating requirements shall be a minimum of 0.999998.

3.1.2.2 Maintainability.-

3.1.2.2.1 Maintenance and Repair Cycles.- As specified in EC-90152.

3.1.2.2.2 Service and Access.- Access shall be provided to permit the following:

(a) Remote and manual repair and replacement of all valves and control drums actuators.

(b) Manual replacement of valve actuators.

3.1.2.3 Useful Life.- As specified in EC-90152.

3.1.2.4 Environmental.- The Lower Thrust Structure shall be subjected to the natural environments specified in CP-90290 in addition to the following induced environments.

- (a) Nuclear Radiation - See Table I.
- (b) Vibration, acceleration and shock - See Table II.
- (c) Acoustics - See Table II.

3.1.2.5 Transportability.- The lower thrust structure shall be capable of conforming to the transportability requirements of EC-90152.

3.1.2.6 Human Performance.- Not applicable.

3.1.2.7 Safety.- As specified in EC-90152

3.2 CEI Definition.- Not applicable

3.3 Design and Construction.- Except as otherwise specified herein, design and construction of this equipment shall be in accordance with EC-90152 of which this equipment is a part.

3.3.1 General Design.-

3.3.1.1 Configuration.- The lower thrust structure external configuration shall conform to the envelope requirements of drawing 1136390.

3.3.1.2 Structural Criteria.- As specified in EC-90152

3.3.1.3 Physical Properties.- The weight of the lower thrust structure when combined with the weights of the middle and upper thrust structure components and shield spacer shall not exceed the weight specified for the Thrust Structure Subsystem in EC-90152.

3.3.2 Selection of Specifications and Standards.- As specified in CP-90290.

- 3.3.3 Materials, Parts, and Processes.- As specified in CP-90290.
- 3.3.4 Standard and Commercial Parts.- As specified in CP-90290.
- 3.3.5 Mositure and Fungus Resistance.- As specified in CP-90290.
- 3.3.6 Corrosion and Metal Parts.- As specified in CP-90290.
- 3.3.7 Interchangeability and Replaceability.- As specified in CP-90290.
- 3.3.8 Workmanship.- As specified in CP-90290.
- 3.3.9 Electromagnetic Interference.- Not applicable.
- 3.3.10 Identification and Marking.- As specified in CP-90290.

3.3.11 Storage.- The lower thrust structure shall be capable of performing as specified herein subsequent to storage while protected from the ground environmental conditions specified in 3.1.2.4 for a period not exceeding the ground storage life specified in 3.1.2.3.

TABLE I
INDUCED NUCLEAR RADIATION

<u>Description</u>	<u>Sta</u>	<u>R</u>	<u>Flight*</u>		<u>Ground Engine</u>	
			<u>Gamma Kerma Rate Rads/Hr</u>	<u>Fast Neutron Flux n/cm²-sec</u>	<u>Gamma Kerma Rate Rads/Hr</u>	<u>Fast Neutron Flux n/cm²-sec</u>
LTS Near Shield Interface	94.8	42.0	1.4×10^7	4.2×10^{11}	1.5×10^7	4.6×10^{11}
LTS/PV Intervace	114.0	27.3	6.3×10^6	3.4×10^{11}	7.7×10^6	3.8×10^{11}

*No external shield, unperturbed

TABLE II
INDUCED DYNAMICS ENVIRONMENT

<u>Mode</u>	<u>Acceleration, g's</u>		<u>Vibration, g's</u>		<u>Shock</u>	<u>Acoustic</u>
	<u>Axial</u>	<u>Lateral</u>	<u>Axial</u> <u>3 - 35 Hz</u>	<u>Lateral</u> <u>0.1 - 15 Hz</u>		
(a) Launch	5.2	<u>+ 1.0</u>	<u>+ 4.5</u>	<u>+ 3.0</u>		As specified in CP-90290
(b) Operation						

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