DATA ITEM DESCRIPTION

Form Approved
OMB No. 0704-0188

1. TITLE	2. IDENTIFICATION NUMBER
INTERNAL LOADS AND STATIC STRENGTH ANALYSIS REPORT	DI-GDRQ-80198A

3. DESCRIPTION/PURPOSE

3.1 This report presents the derivation of internal loads, resulting stresses and strength computations that analytically substantiate the structural ability of aircraft and aircraft-carried stores to react to critical external loading conditions. This analysis is used to monitor the structural adequacy of the design for meeting contract requirements, to evaluate any engineering change proposals, to serve as a basis for modifications, structural repair, establishing damage limits, and to evaluate any possible incidents or accidents during operation.

4. APPROVAL DATE (YYMMDD)	5. OFFICE OF PRIMARY RESPONSIBILITY (OPR)	6a. DTIC APPLICABLE	6b. GIDEP APPLICABLE
950731	F-ASC/ENFS	X	

7. APPLICATION/INTERRELATIONSHIP

7.1 This Data Item Description (DID) contains the format and content preparation instructions for the data product generated by the specific and discrete task requirement as delineated in the contract.

7.2 This DID is applicable to the analyses of aircraft, missiles, aircraft-carried stores, and follow-on modification programs.

7.3 This DID supersedes DI-GDRQ-80198.

(Continued on Page 2)

8. APPROVAL LIMITATION	9a. APPLICABLE FORMS	9b. AMSC NUMBER
		F7163

10. PREPARATION INSTRUCTIONS

10.1 Format. The Internal Loads and Static Strength Analysis Report shall use the format stated below:

a. Table of contents.

b. Revision status sheet.

c. References.

d. Table of minimum margins of safety that includes part names, load conditions, stress types, and analysis page numbers.

e. External loads.

f. Internal loads

g. Detailed stress analyses.

10.2 Content. The report describes the results of the internal loads and static strength analyses.

10.2.1 The report shall present detailed analyses of major components and abbreviated analyses of all secondary components of the airframe to demonstrate load paths of adequate strength.

(Continued on Page 2)

11. DISTRIBUTION STATEMENT

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

Block 7, APPLICATION/INTERRELATIONSHIP (Continued)

7.4 The address for Defense Technical Information Center (DTIC) submittals is:

Administrator
Defense Technical Information Center
ATTN: DTIC-FDAC
Bldg 5, Cameron Station
Alexandria VA 22304-6145.

Block 10, PREPARATION INSTRUCTIONS (Continued)

10.2.2 Aircraft structures. The report shall present analyses of the structural components of the aircraft including the following:

a. Wing, including all attachments and actuating structures, moveable control surfaces, wing-mounted speed reduction devices and auxiliary lift devices, engine mounts, and nacelles.

b. Fuselage, including canopy, fuselage-attached engine mounts, fuselage-mounted speed reduction devices, tie-down structure for seats, litter, cargo, and equipment racks, and all actuating structure and attachments.

c. Empennage, including fixed horizontal and vertical surfaces, moveable surfaces, their attachments, and actuating support structures.

d. Control system, either manual or powered, including cables, rods, bellcranks, automatic parts, devices, and actuators.

e. Landing and takeoff gear, including actuators and attachments, catapult and arresting gears, beaching gear and auxiliary floats.

f. Miscellaneous structure, including seats, equipment racks, hoisting gear, pylons, armament attachments, fuselage and wing external fuel tanks, their fittings and attachment, as well as fittings, attachments and actuators not elsewhere analyzed.

g. Rotor systems both main and tail.

h. Aerial refueling system.

i. Cargo handling and aerial delivery system.

10.2.3 Missiles and aircraft-carried stores. The report shall present analyses of the following major structural components:

a. Body structure, including pressure vessels and those serving as primary structures, engine mount structure, control surfaces and control systems support structure, wing support structure and its actuating structure.

b. Wing, either fixed or deployable, and attachments.

c. Control surfaces, including fixed, deployable, and moveable.

d. Control systems actuators, mechanisms, and attachment.

e. Suspension structure, including lugs and captive-carry interface hardware.

f. Miscellaneous structure, including welded joints, mounted equipment and attachments, fittings, mechanisms, and actuators not elsewhere analyzed.

10.2.4 Aircraft internal and external modifications. The report shall document revisions to previous airframe stress analyses and shall present strength analysis of new and modified installations and affected structures.

10.2.5 External loads. The report shall provide curves or tables showing maximum external loadings of shears, bending moments, torsion and, where appropriate, temperatures and time and temperature gradients.

10.2.6 Internal loads. The internal loads section may be separately prepared or combined with the detailed stress analysis described in 10.4.3, below. Internal loads will be tabulated for all members, but repetitive structures may be substantiated by analysis of the common structural member having the maximum loading. The computation of internal loads on all structural members shall be shown to be complete for critical, external loading conditions and show the steps considered in their development. Internal loads are identified as limit or design ultimate loads. When internal loads computations are accomplished by computer programs, rather than classical, hand–solution methods, pertinent data considered integral to the report shall be included as follows:

a. An example of computer input and output with definitions.

b. Sufficient geometric views or computer–generated plots showing the computer model or finite element model.

c. Coordinate system origins and orientations of applicable local and global systems.

d. Node point locations and numbering.

e. Section property derivations.

f. Applicable material properties.

g. Element locations, numbering and types, with selection justification described.

h. Boundary constraints, with described justifications.

i. Applied loads.

j. Outputs of element forces, restraint forces and, where necessary, relative deflections.

10.2.7 Detailed stress analysis.

a. The report shall describe all structural components analyzed, stating the type of construction, arrangement, materials, coordinate locations of load carrying members. The report shall provide adequate sketches to minimize the necessity of referring to drawings. All sketches shall include pertinent dimensions and shall be labeled by name and part number. Free–body sketches shall be provided to indicate applied loads, reactions, and boundary forces and constraints.

b. The report shall describe the critical load cases and types of applied stresses.

c. The report shall include calculations of stresses based on design ultimate loads. Where limit loads are more critical for material yield strength allowables, such calculations shall be shown. Allowable loads and stress calculations shall be shown or references listed. The analyses shall state the equations used and define the parameters within those equations prior to numerical solution. The report shall state fitting factors, casting factors; and form factors used in the analyses. The report shall list all margins of safety to adequately account for tensile, compressive, shear and torsional stresses, joint attachment strengths, beam column effects, crippling, panel buckling, and thermal stress effects. Substantiation of unconventional methods of analysis shall be included in the report by referencing the derivation source of unusual formulas.

d. The report shall include specific page numbers, tables, and figures of reference material used in the analyses.

10.3 Analysis–static test correlation. Whenever prior, design development test measurements are available, the report shall include the correlation of those results with the report's analytically–determined values.