https://ntrs.nasa.gov/search.jsp?R=19890015890 2020-03-20T01:47:20+00:00Z

LMSC-HEC TR F226066

CONJUGATING BINARY SYSTEMS FOR SPACECRAFT THERMAL CONTROL – FINAL REPORT

Appendix C
Aeroassist Flight Experiment Carrier Vehicle Preliminary Stress Analysis

January 1989

Contract NAS8-36199

Prepared for

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
MARSHALL SPACE FLIGHT CENTER, AL 35812

By

J.E. Ingram
T.O. Murray

Lockheed
Missiles & Space Company, Inc.
Huntsville Engineering Center

(NASA-CR-183609) CONJUGATING BINARY SYSTEMS FOR SPACECRAFT THERMAL CONTROL. APPENDIX C: AEROASSIST FLIGHT EXPERIMENT CARRIER VEHICLE PRELIMINARY STRESS ANALYSIS Final Report (Lockheed Missiles and Space Co.) 426 p

N89-25261

Unclas
G3/18 0204313

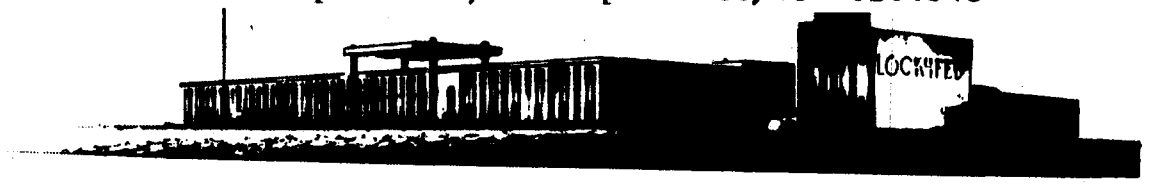


TABLE OF CONTENTS

SECTION	TITLE	PAGE NO.
	MARGIN OF SAFETY SUMMARY	ii
1.0	INTRODUCTION	1.0
2.0	STRUCTURAL DESCRIPTION	2.0
3.0	MECHANICAL PROPERTIES	3.0
4.0	NASTRAN MODEL	4.0
4.1	Model Description	4.1
4.2	Load Conditions	4.2
5.0	STRESS ANALYSIS	
5.1	Aerobrake Attach Fitting	5.1.1
5.2	Solid Rocket Motor (SRM) Attach Brackets	5.2.1
5.3	Thruster Support Beam	5.3.1
5.4	Trunnion Back-up Structure	5.4.1
5.5	Upper and Lower (Isogrid) Panels	5.5.1
5.6	Center Cylinder Top and Bottom Rings	5.6.1
5.7	Isogrid Panel Splices	5.7.1
APPENDIX A - CARRIER VEHICLE NASTRAN MODEL BULK DATA ECHO		A.1
APPENDIX B - ISOGRD PROGRAM LISTING		B.1

MARGIN OF SAFETY SUMMARY

STRUCTURAL COMPONENT	MARGIN OF SAFETY	FAILURE MODE	PAGE NO.
AEROBRAKE ATTACH FITTINGS			
CV FITTING	.88 (U) HIGH (Y)	BENDING	5.1.7
CV FITTING - LUG	.93 (U)	OBLIQUE LOADING	5.1.10
CV FITTING ATTACH BOLTS	.24 (U)	TENSION - SHEAR	5.1.12
CV FITTING - FLANGES	.41 (Y) .09 (U)	BENDING	5.1.13
ATTACH PIN	.05 (U) .52 (Y)	BENDING	5.1.18
ATTACH FASTENERS - AEROBRAKE SIDE	1.17 (U)	TENSION - SHEAR	5.1.22
SRM ATTACH BRACKETS			
UPPER BRACKET - FLANGES	.48 (U) 1.69 (Y)	CRIPPLING	5.2.8
LOWER BRACKET - TOP PLATE	.05 (U) .36 (Y)	BENDING	5.2.10
CYLINDER PANELS AT SRM BKTS			
BAY 1	.29(U)	SHEAR-BUCKLING	5.2.21
BAY 3	.00(U)	SHEAR-BUCKLING	5.2.22
BAY 5	.02(U)	SHEAR BUCKLING	5.2.20
THRUSTER SUPPORT BEAMS	HIGH	BENDING - CRIPPLING	5.3.6
TRUNNION FITTING BACK UP STRUCTURE			
SUPPORT BEAM CHANNELS	-.42 (U) -.25 (Y)	BENDING	5.4.7

MARGIN OF SAFETY SUMMARY (CONT'D)

STRUCTURAL COMPONENT	MARGIN OF SAFETY	FAILURE MODE	PAGE NO.
UPPER AND LOWER ISOGRID PANELS	(SEE SUMMARY TABLE FOR ISOGRID BARS IN SECTION5.5)		
CYLINDER RINGS			
TOP RING ANGLE	.48 (U)	BENDING	5.6.7
BOTTOM RING ANGLE	.15 (U)	BENDING	5.6.9
ISOGRID PANEL SPLICES	(SEE SUMMARY TABLE IN SECTION 5.7)		

AFE CARRIER VEHICLE
STRESS ANALYSIS

1.0 INTRODUCTION

This report presents the assessment of the static strength of the Aeroassist Flight Experiment (AFE) Carrier Vehicle structure. The Carrier Vehicle is the structural component which provides the mounting platform for the experiments, on-board computers, batteries and other "black boxes". In addition, the Solid Rocket Motor (SRM), the Thrusters, and the Aerobrake are all attached directly to the Carrier Vehicle.

The basic approach used in this analysis was to develop a NASTRAN Finite Element Model as a parallel effort to the preliminary design, and to use the internal loads from this model to perform the stress analysis. The loads on the Carrier Vehicle stem from several sources, principally, g forces on the components mounted to the Carrier Vehicle while the AFE is still supported in the Shuttle Payload Bay. The greatest load factors are due to Liftoff and Landing Abort conditions, during which the AFE is supported at the SRM. Because the design loads are given in terms of accelerations at the AFE CG, and because no aerodynamic loads are present on the aerobrake (during these conditions), it has been convenient to use a method of analysis in NASTRAN known as Inertial Relief. This method involves either specifying a set of CG accelerations or applying forces at the CG and representing the Carrier Vehicle and all of its mounted devices with the proper stiffness and mass properties. The masses will produce forces at their attach points in proportion to the accelerations of the total system. This procedure obviously depends upon an accurate representation of the mass properties of the entire AFE. A major advantage to this technique is that once the mass properties have been satisfactorily modeled, they remain the same for each load condition. New loads may be run on the model by simply applying forces to the CG rather than deriving a new set of forces for all of the separate components.

The regular landing condition is also an inertial relief solution because it, like liftoff and landing abort, has no aerodynamic loading. However it differs from the previous conditions in that the supports

which react the forces due to acceleration are at the Trunnion points rather than at the SRM Support Ring.

The mass properties of the total AFE model were developed by using structural mass for the Carrier Vehicle elements; i.e., NASTRAN will use the element section properties and the density specified on the MAT (material data) card to calculate the total mass and inertia of the structure. The non-Carrier Vehicle masses (mounted components, SRM, Aerobrake) were represented in the model as concentrated masses located at the component CG. The NASTRAN bulk data for the AFE model is included as Appendix A for reference.

In conducting the strength evaluation of the Carrier Vehicle using the output from the NASTRAN model, it became necessary to develop a post processing computer program to read the output isogrid bar forces and calculate margins of safety. The summary of isogrid margins of safety printed by this program are included in section 5.5 of this report. The listing of this FORTRAN program "ISOGRD" is also given as Appendix B.

2.0 STRUCTURAL DESCRIPTION

The Carrier Vehicle is currently designed as an all aluminum (2219-T87) bolted structure. The upper and lower panels are isogrid construction featuring a simple rectangular cross-section .07" x .50" for each individual isogrid bar. While the Carrier Vehicle is basically hexagonal in planform, and the panels in each bay are shaped the same, most of the panels have some feature that makes it unique. Each unique panel is given in Figures 2.5 through 2.12 which follow. The center cylinder, the avionics panels and the radial beams are all solid sections.

The panels and cylinder are attached using tee and angle sections as splicing members. These sections are shown along with the radial Beam details in Figures 2.13 and 2.14.

Figures 2.15 through 2.18 show the several fittings that provide the load path from the SRM to the Carrier Vehicle and from the Aerobrake to the Carrier Vehicle. These parts with the exception of the connecting pins/bolts are also 2219-T87 aluminum.

2.0 STRUCTURAL DESCRIPTION (CONT'D)

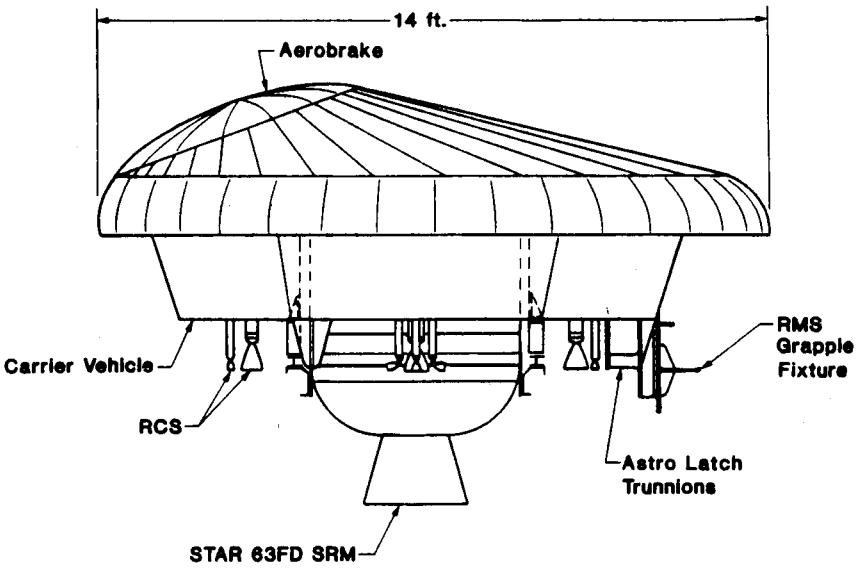
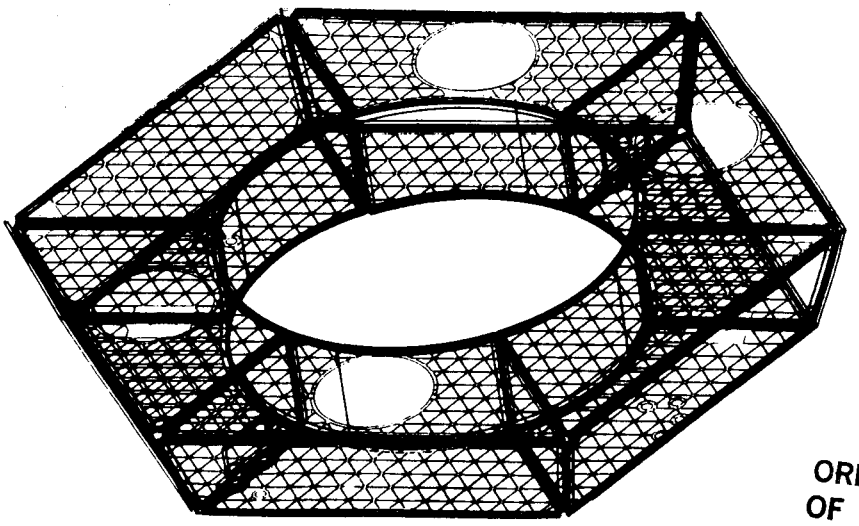


FIGURE 2.1 AEROASSIST FLIGHT EXPERIMENT REFERENCE CONFIGURATION



ORIGINAL PAGE IS OF POOR QUALITY

FIGURE 2.2 AFE CARRIER VEHICLE STRUCTURE

Prepared by:	Date	LOCKHEED MISSILES & SPACE COMPANY, INC.	Page (Temp. / Perm.)
INGRAM	6-7-88		2.2
Checked by:	Date	Title	Model
		AFE CARRIER VEHICLE STRESS ANALYSIS	AFE
Approved by:	Date		Report No.

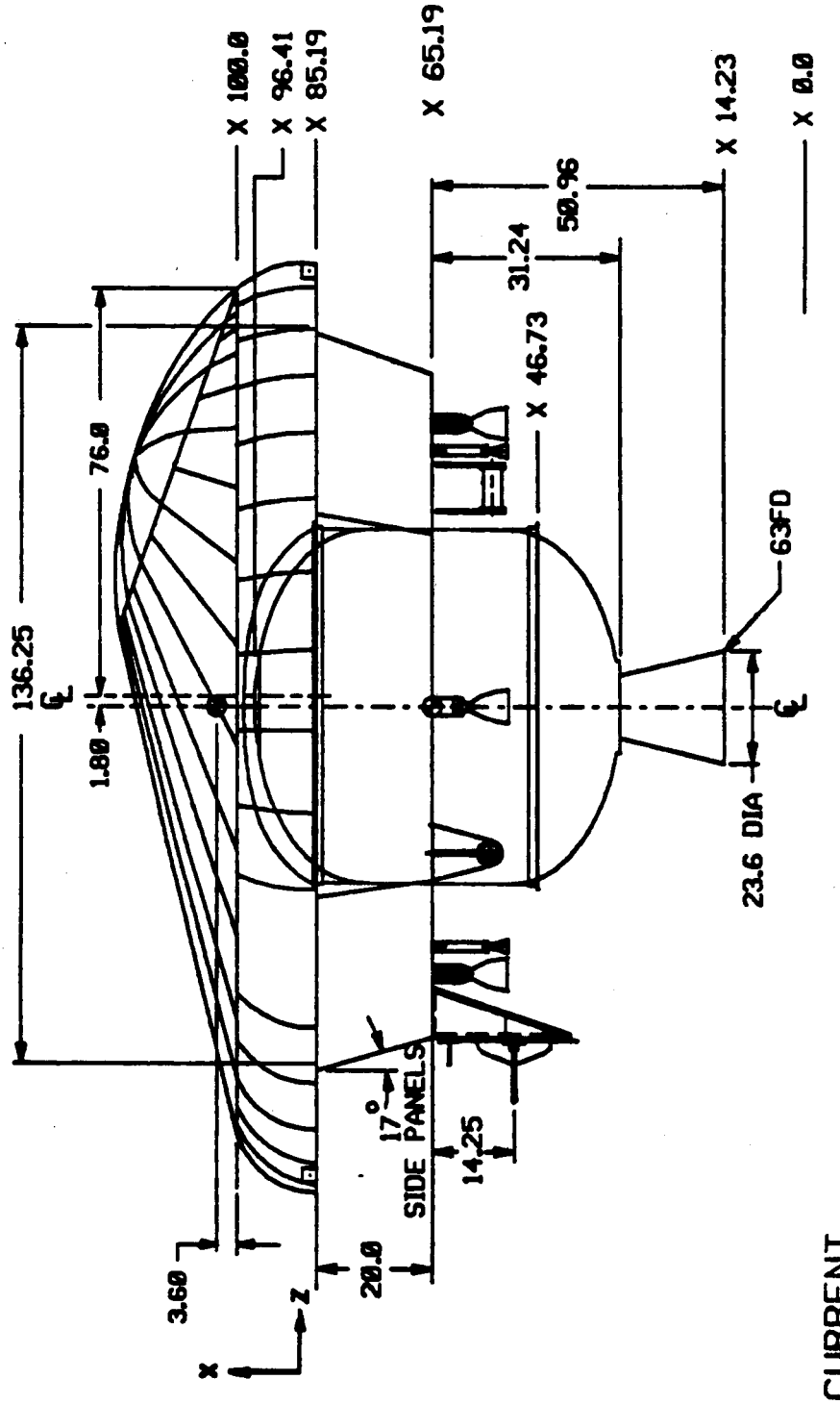
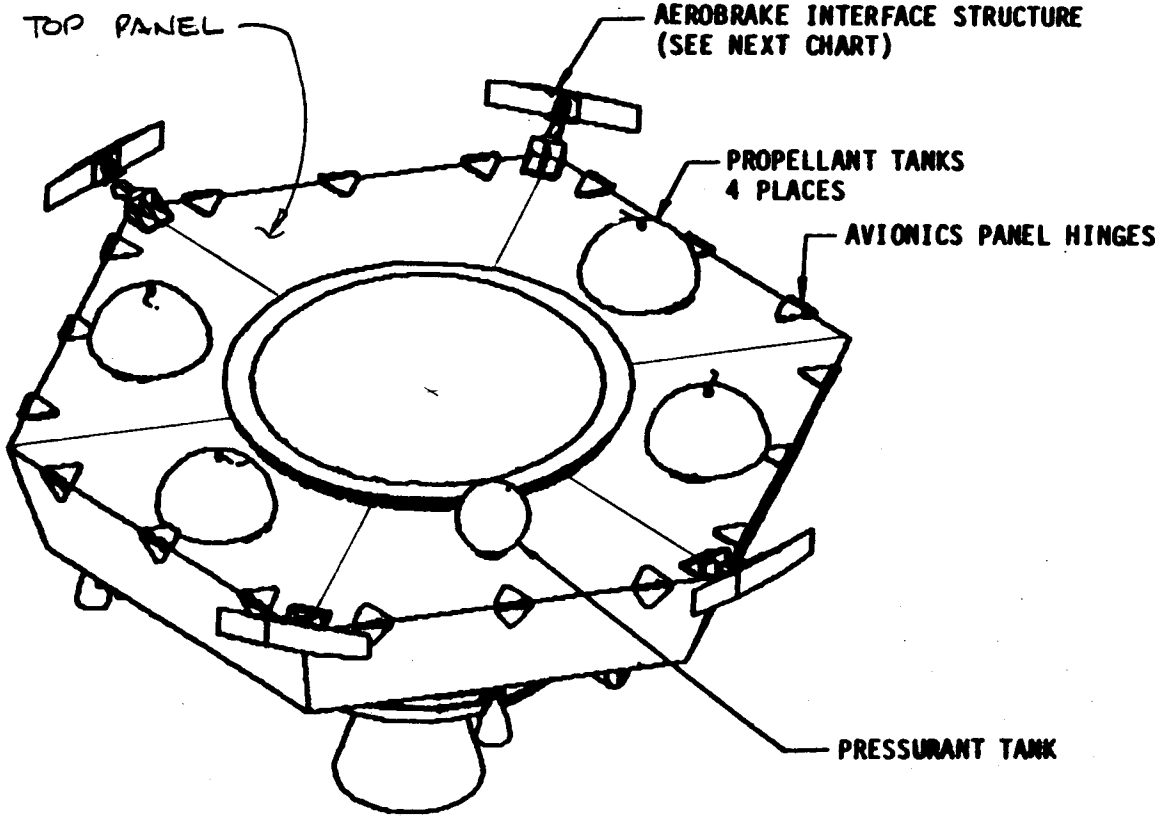


FIG 2.3 AFE COMPLETE - SIDE VIEW

FORM LMSC 362 B-3

FORM LMSC 362 B-3

FIG 2.4 AFE CARRIER VEHICLE (AERO BRAKE OMITTED) SHOWING AEROBRAKE ATTACH MENT HARDWARE



Prepared by: INGRAM Date: 6-7-88
Checked by: Date:
Approved by: Date:

LOCKHEED MISSILES & SPACE COMPANY, INC.

Title: AFE CARRIER VEHICLE STRESS ANALYSIS

Model: AFE
Report No.

Page: 2.3
Temp
Perm

2.0 STRUCTURAL DESCRIPTION (CONT'D)

ORIGINAL PAGE IS
OF POOR QUALITY

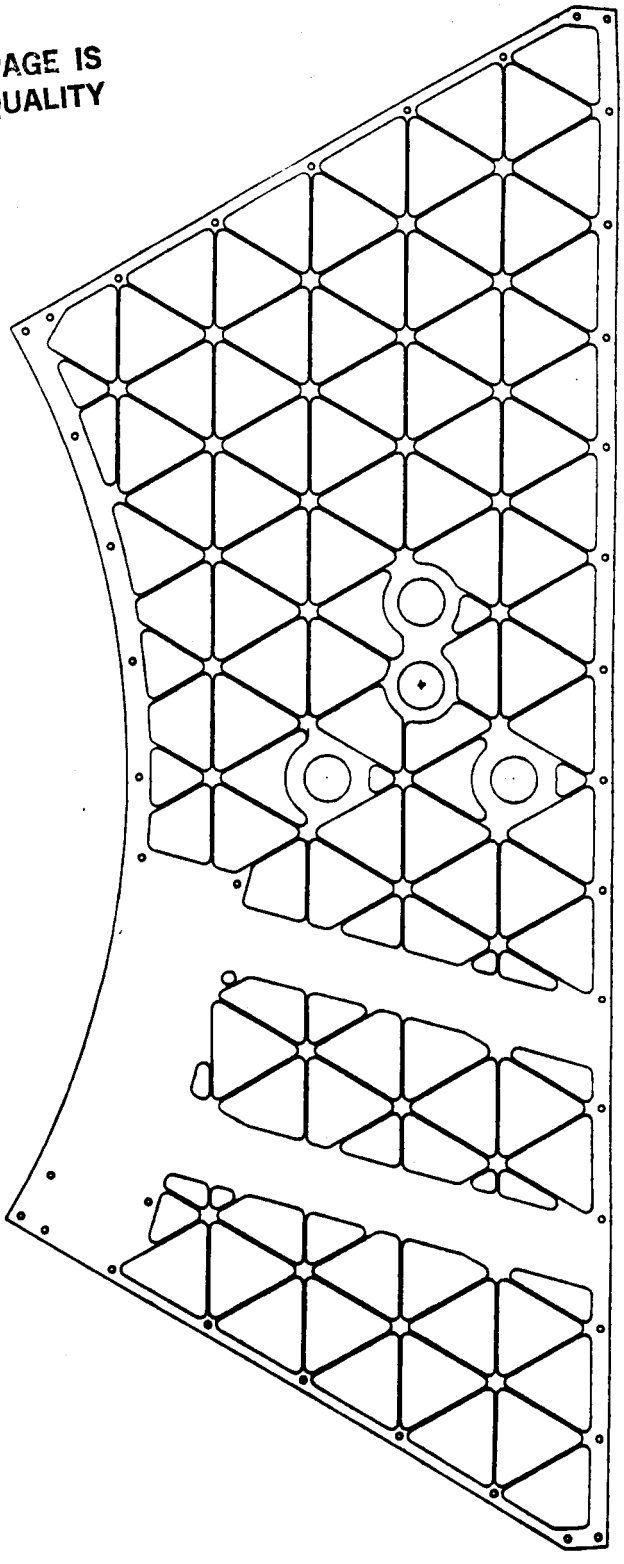


FIG. 2.5 AFE CV LOWER PANEL - BAY 1

2.0 STRUCTURAL DESCRIPTION (CONT'D)

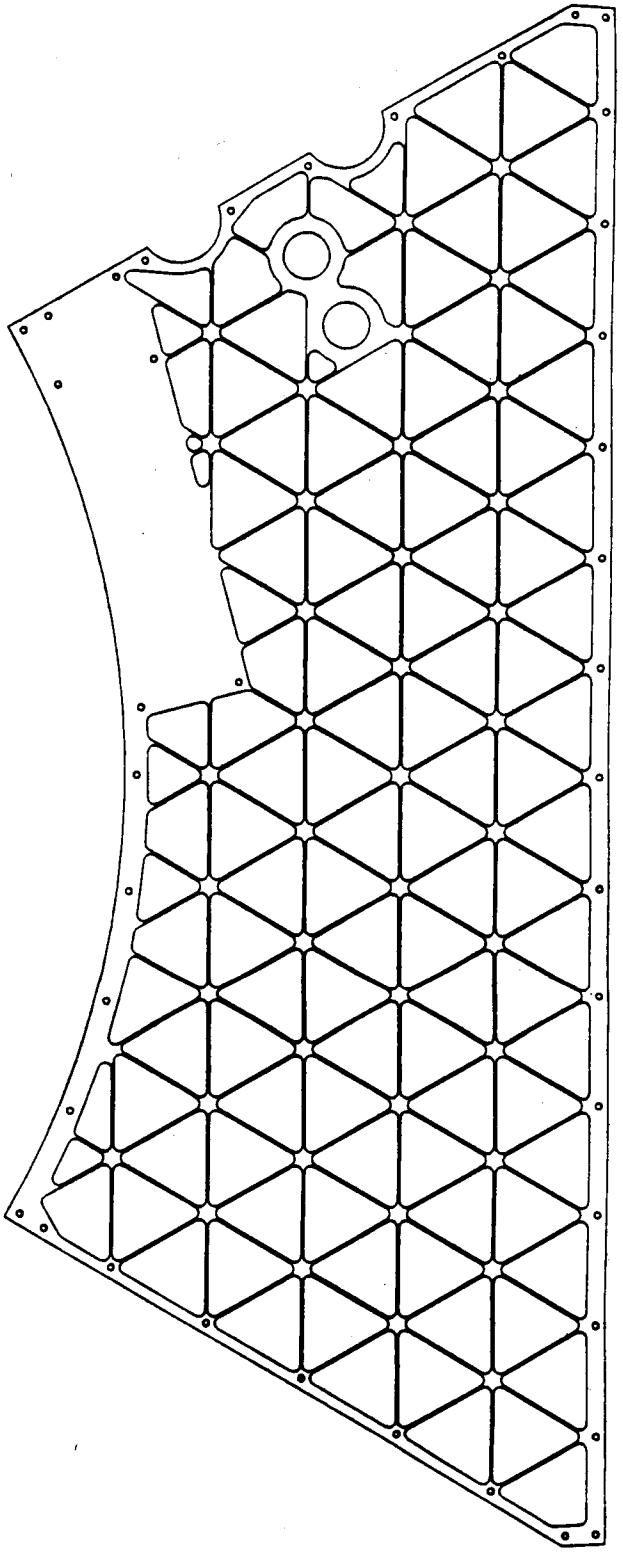


FIG. 2.6 AFE CV LOWER PANEL - BAY 2

2.0 STRUCTURAL DESCRIPTION (CONT'D)

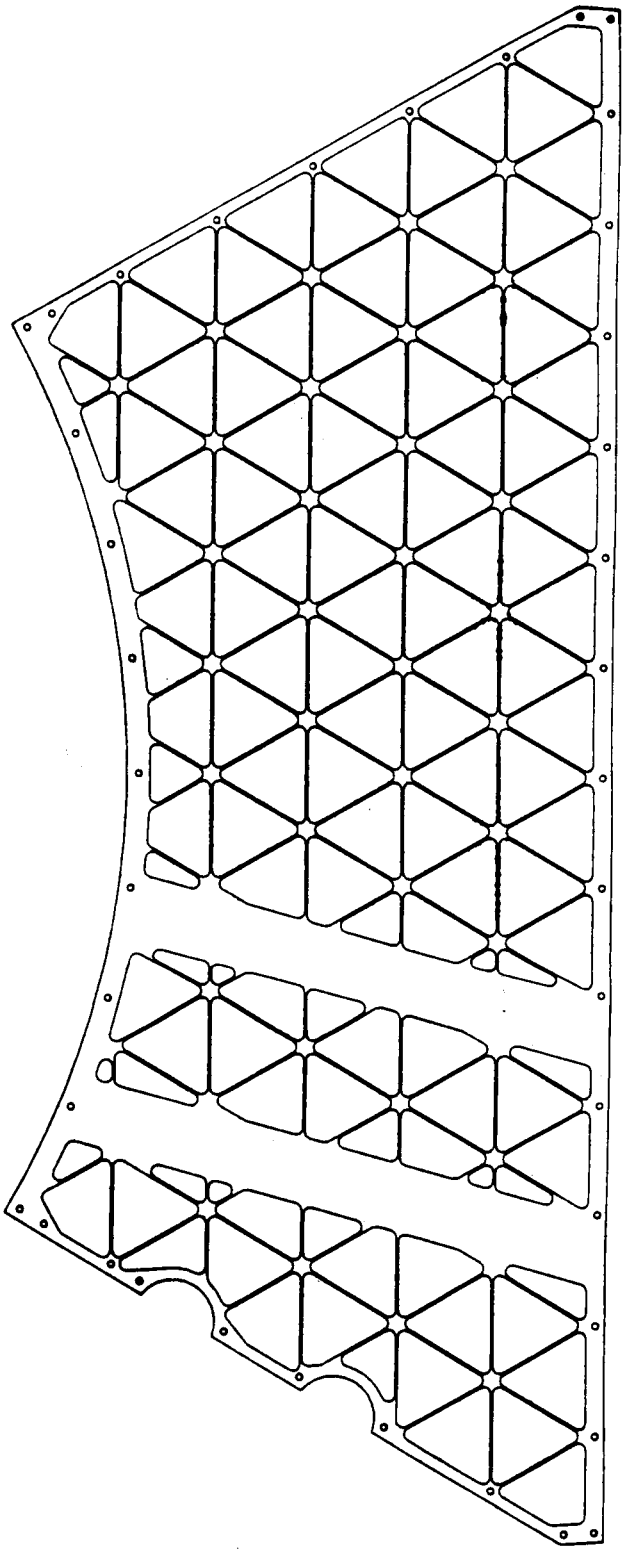


FIG 2.7 AFE CV LOWER PANEL - BAY 3

2.0 STRUCTURAL DESCRIPTION (CONT'D)

ORIGINAL PAGE IS
OF POOR QUALITY

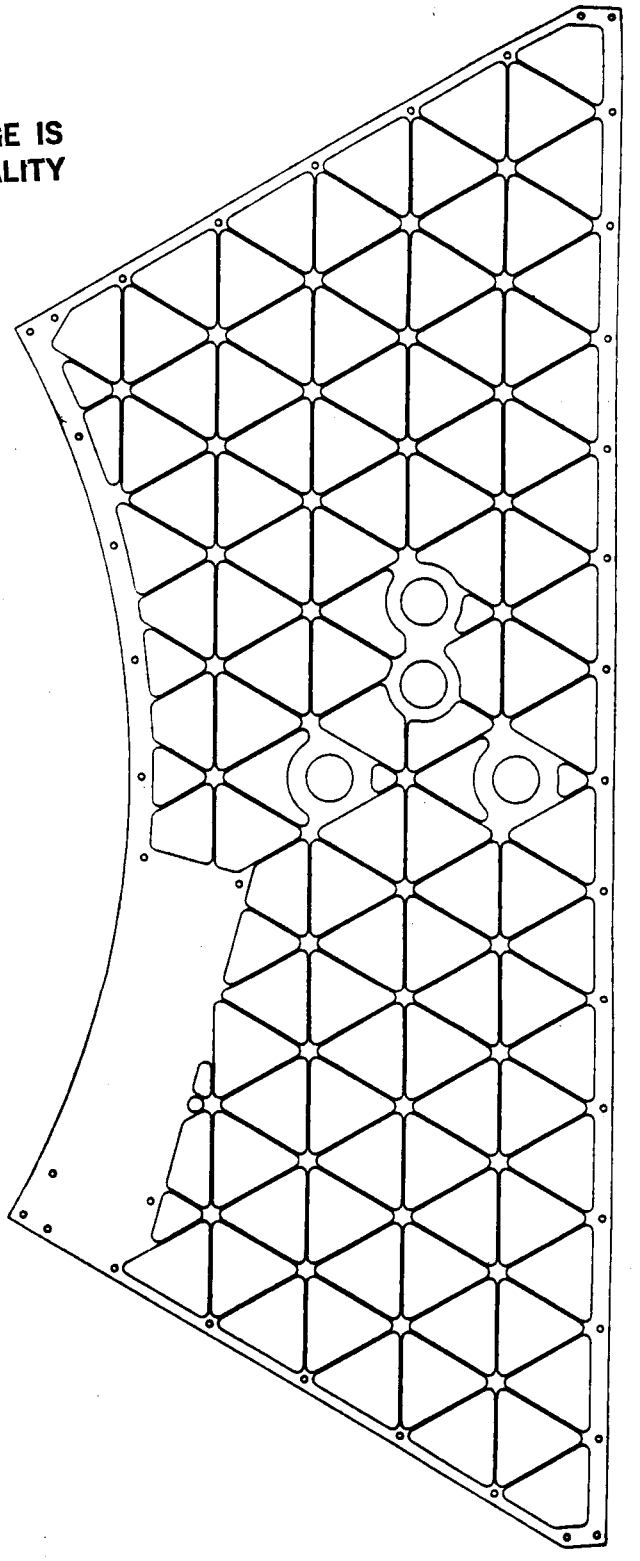


FIG 2.8 ACE CV LOWER PANEL - BAY 4

2.0 STRUCTURAL DESCRIPTION (CONT'D)

ORIGINAL PAGE IS
OF POOR QUALITY

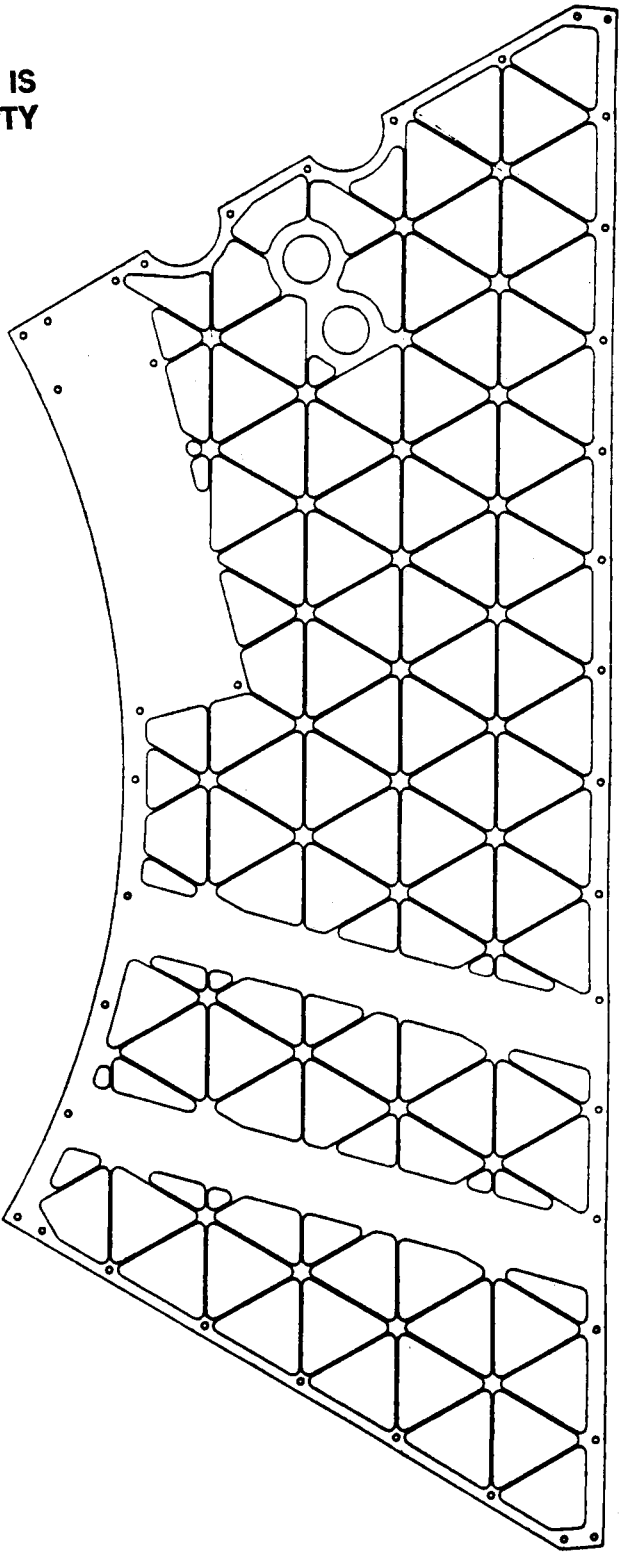


FIG. 2.9 AFE CV LOWER PANEL - BAY 5

2.0 STRUCTURAL DESCRIPTION (CONT'D)

ORIGINAL PAGE IS
OF POOR QUALITY

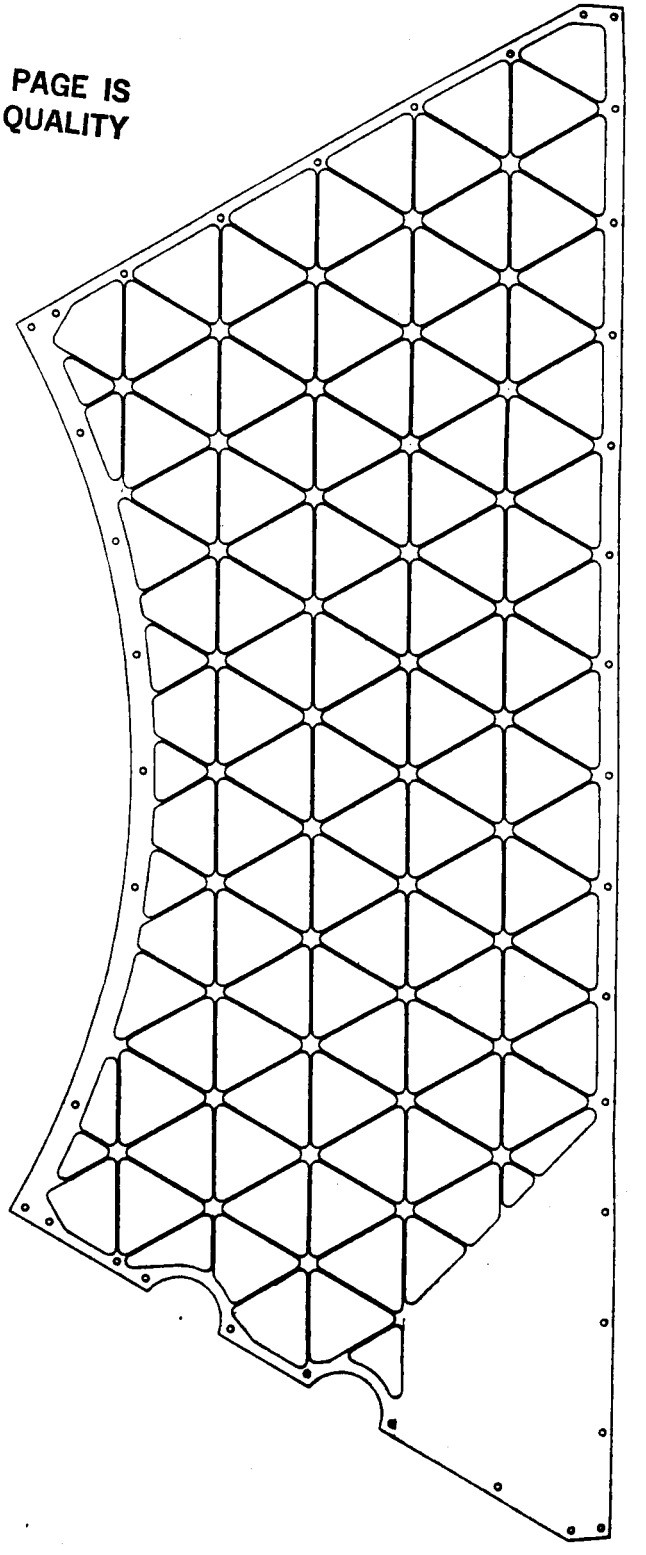


FIG. 2.10 AFE CV LOWER PANEL - BAY 6

2.0 STRUCTURAL DESCRIPTION (CONT'D)

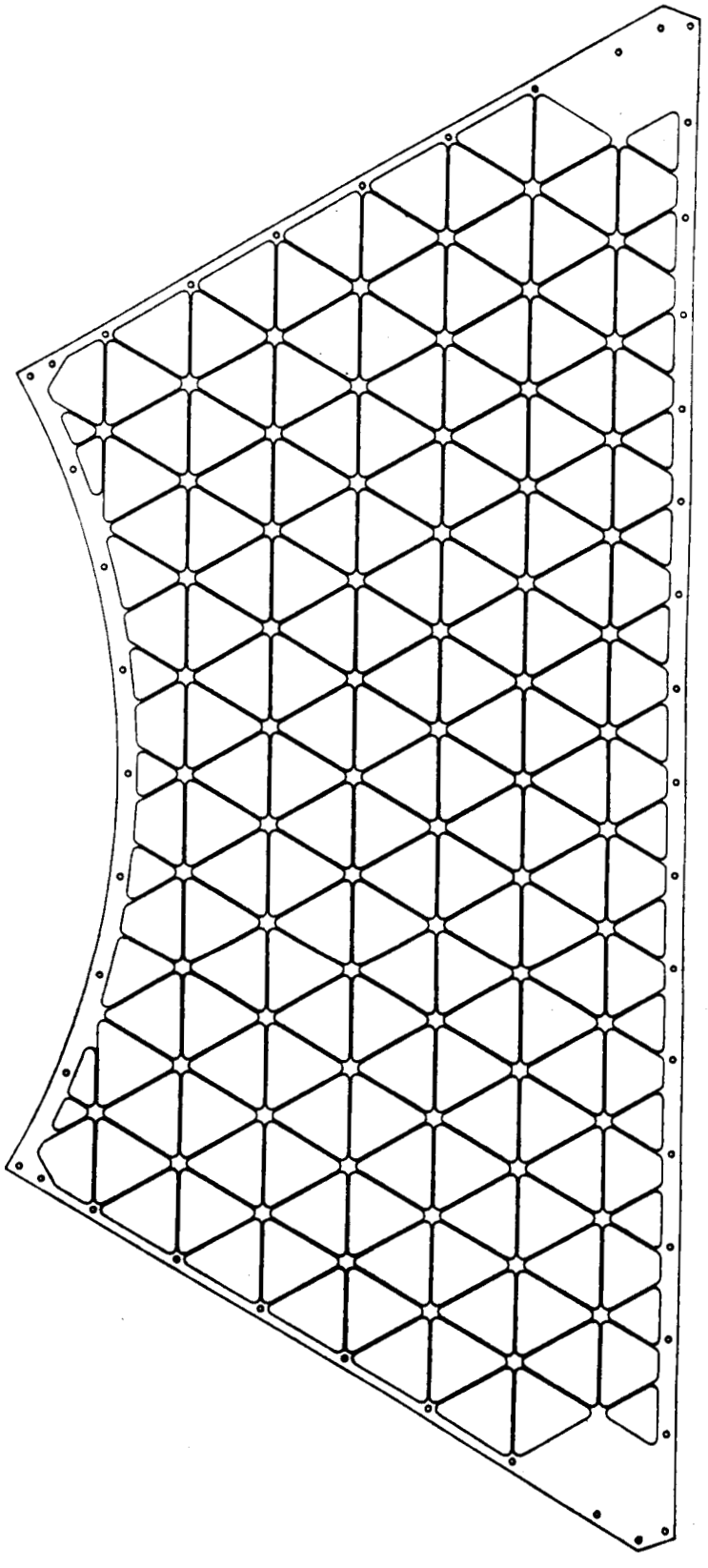


FIG. 2.11 AFE CV UPPER PANEL - BAYS 1 & 4

2.0 STRUCTURAL DESCRIPTION (CONT'D)

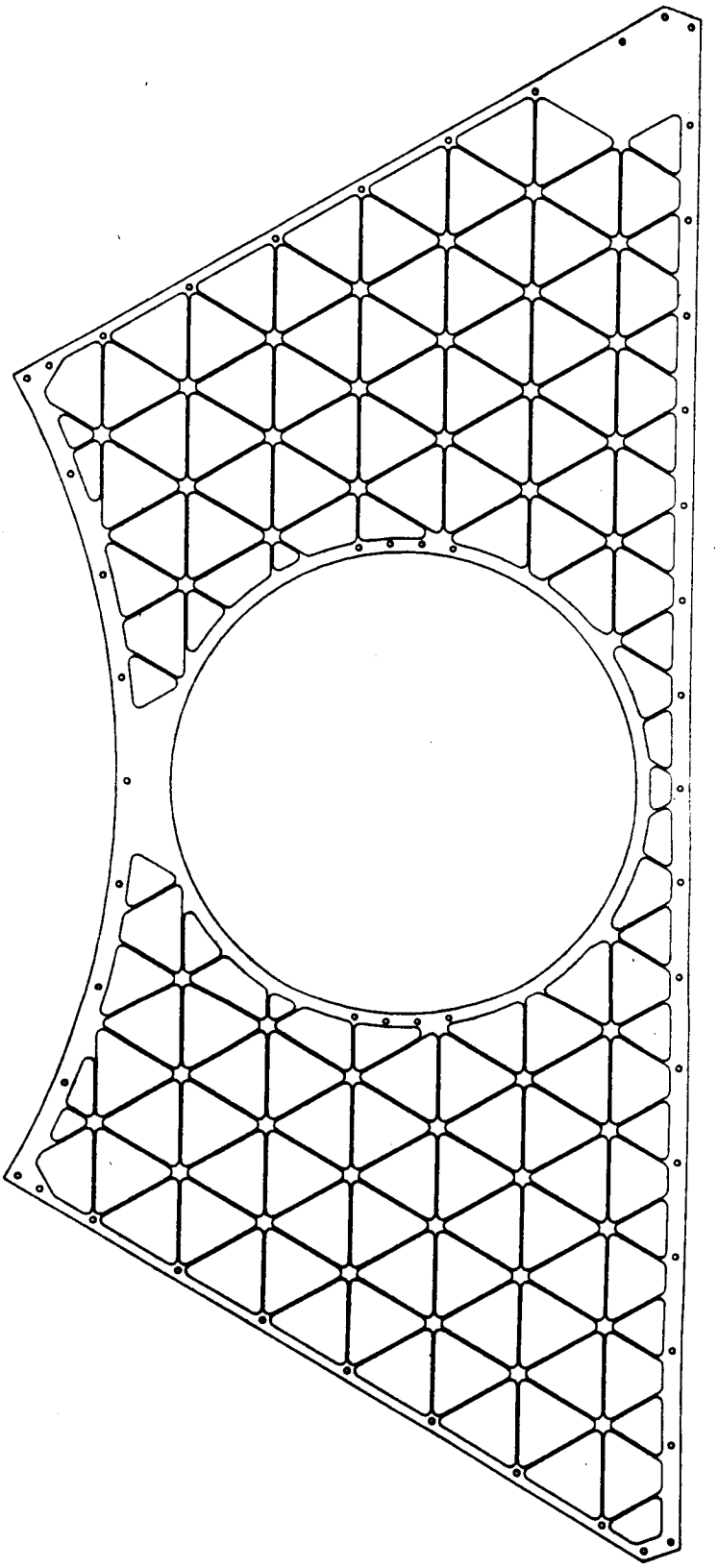


FIG. 2.12 AFE CV UPPER PANEL - BAYS 2, 3, 5 & 6

2.0 STRUCTURAL DESCRIPTION (CONT'D)

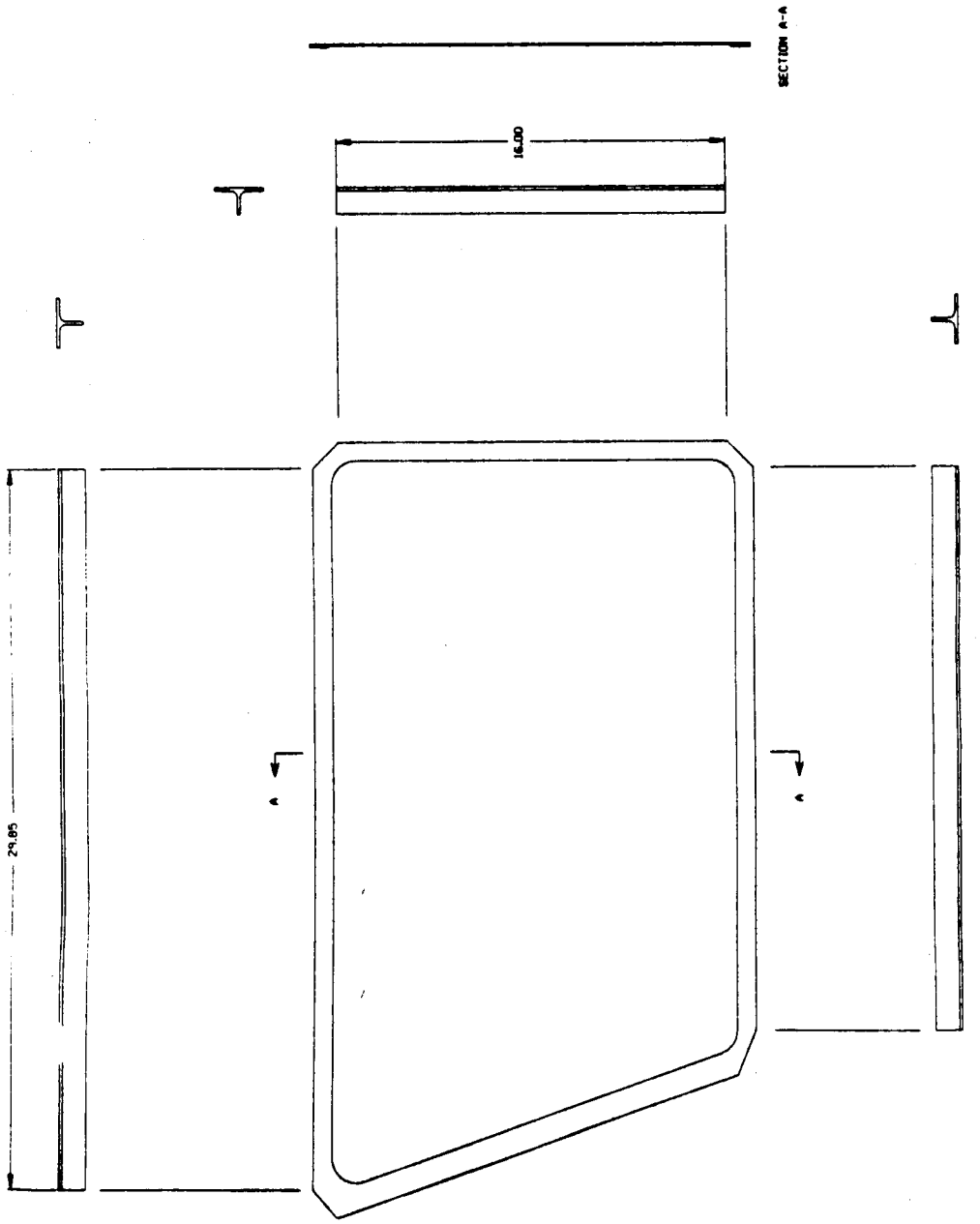


FIG. 2.13 AFE CV RADIAL BEAM AT NON THRUSTER LOCATIONS

2.0 STRUCTURAL DESCRIPTION (CONT'D)

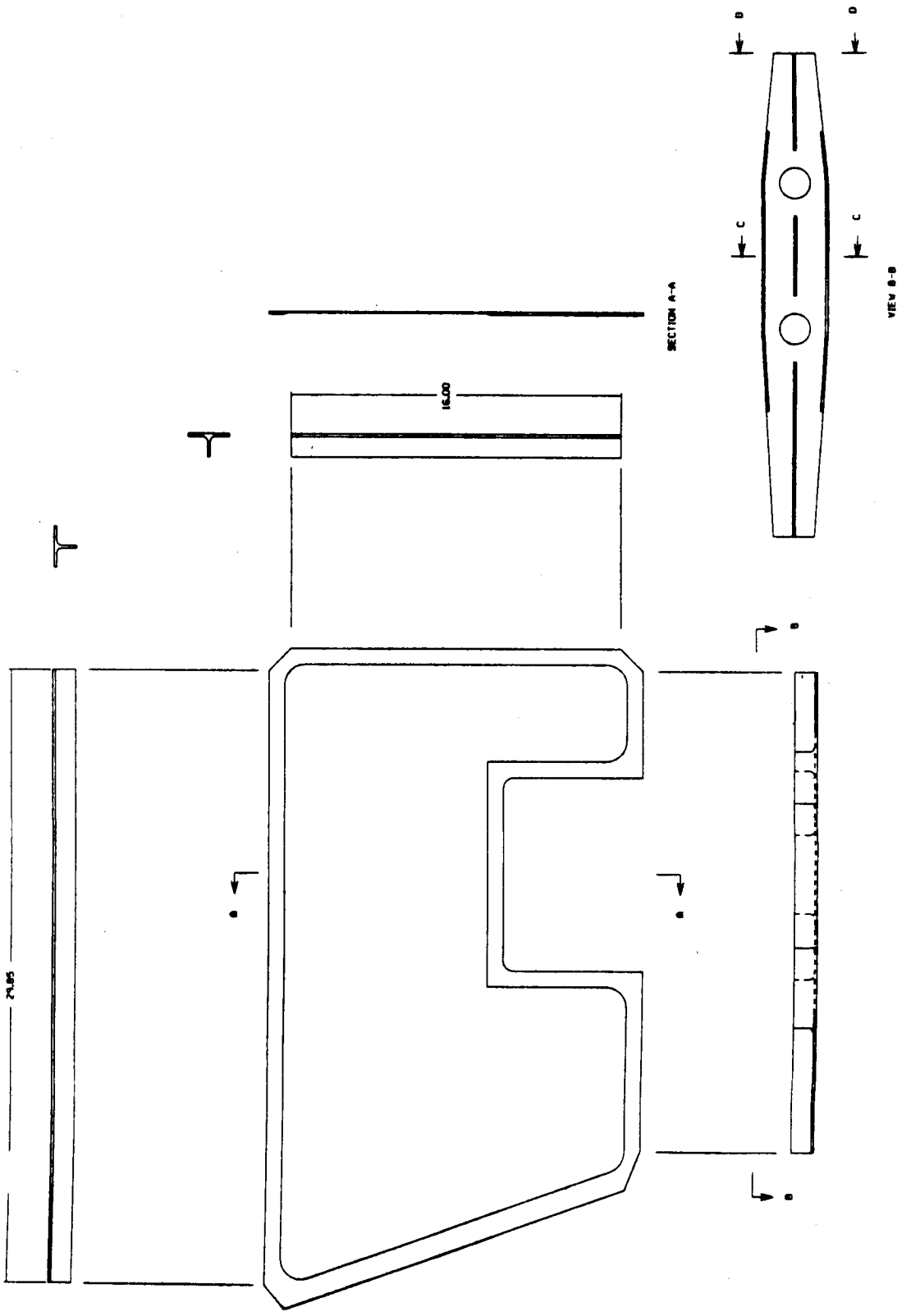


FIG. 2.14 AFE CV RADIAL BEAM 8' THRUSTER FITTING

2.0 STRUCTURAL DESCRIPTION (CONT'D)

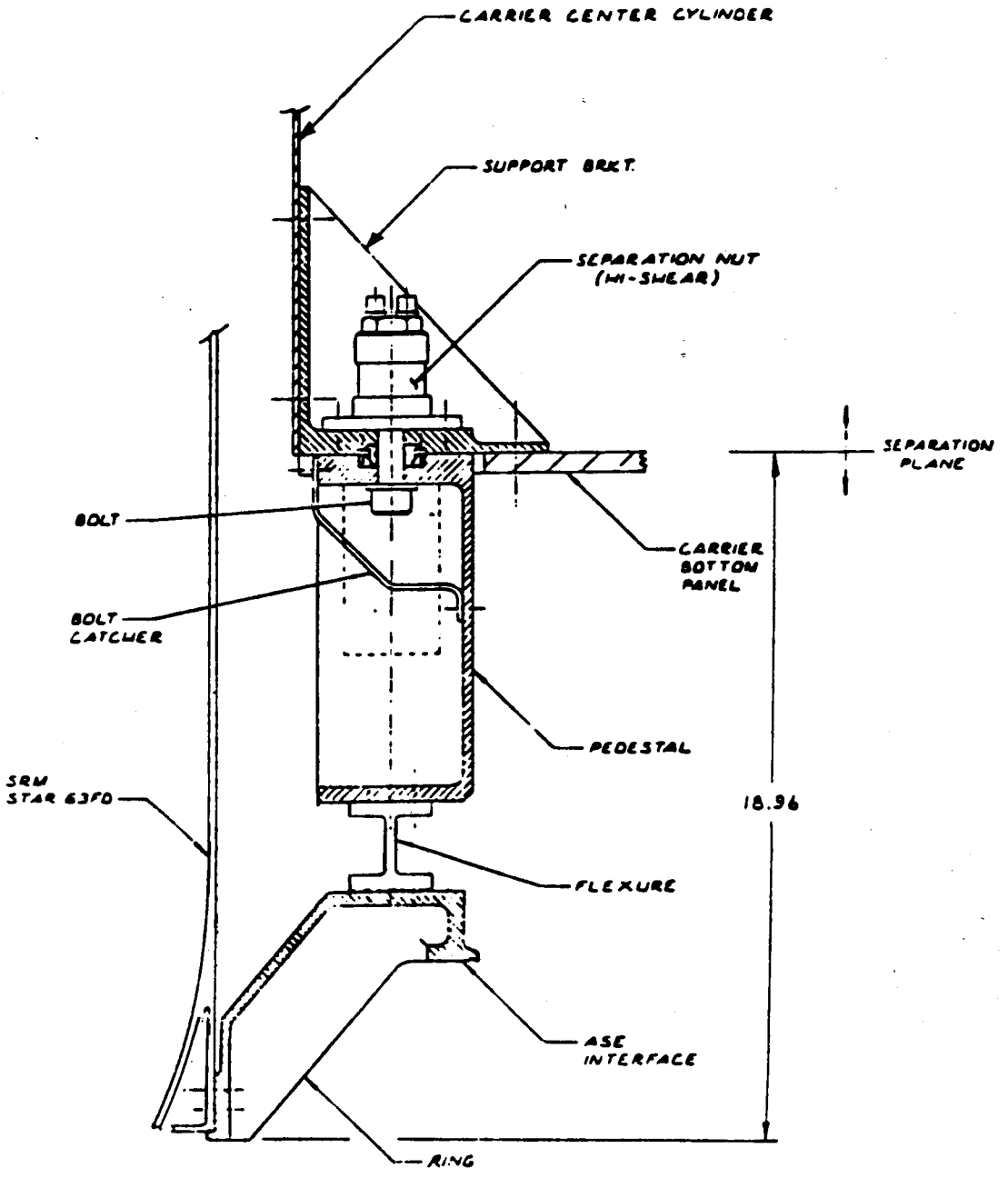


FIG 2.15 SRM SUPPORT BRACKET / JETTISON SYSTEM - SIDE VIEW (TYPICAL 3 PLACES)

2.0 STRUCTURAL DESCRIPTION (CONT'D)

ORIGINAL PAGE IS
OF POOR QUALITY

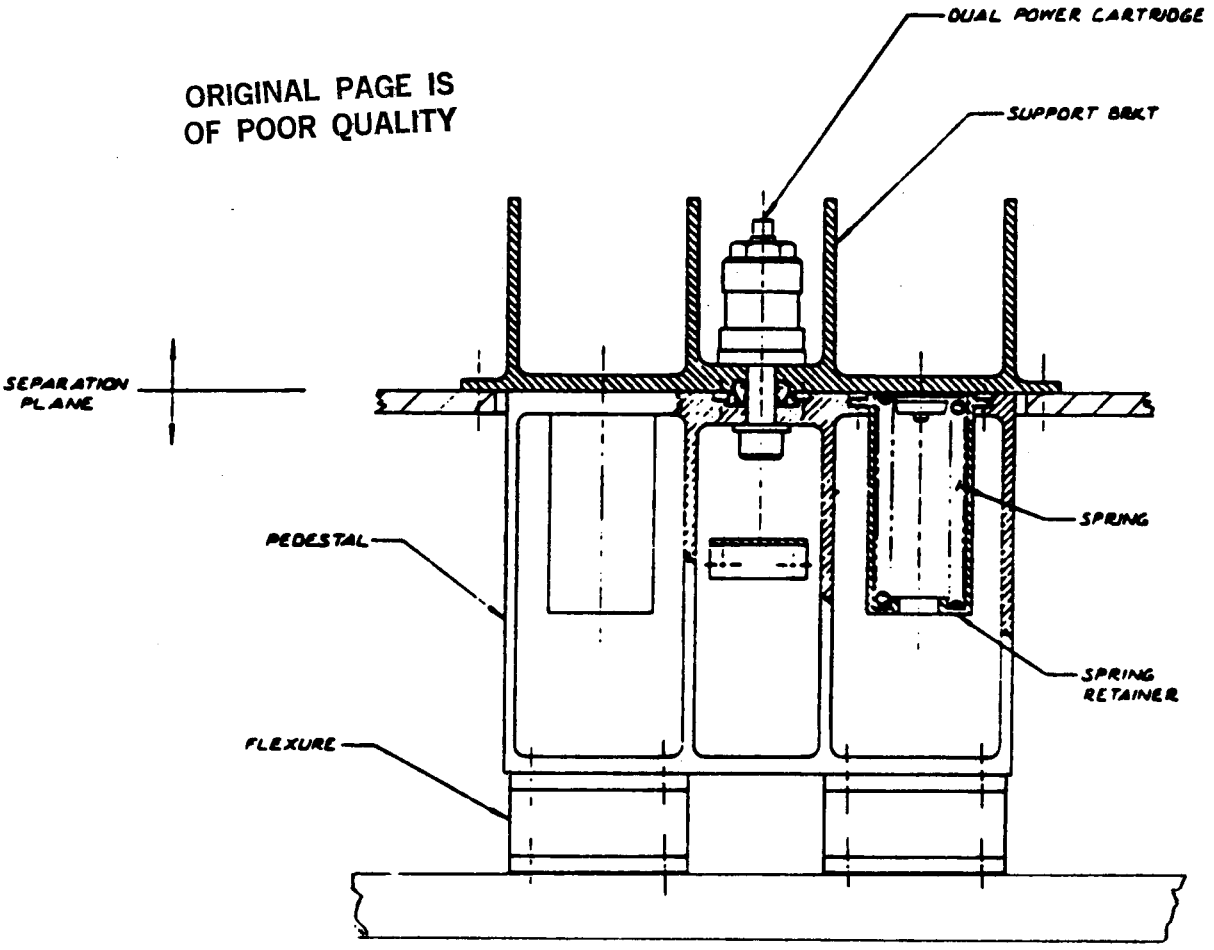


FIG. 2.16 SRM SUPPORT BRACKET / JETTISON SYSTEM - FRONT VIEW (TYPICAL 3 PLACES)

2.0 STRUCTURAL DESCRIPTION (CONT'D)

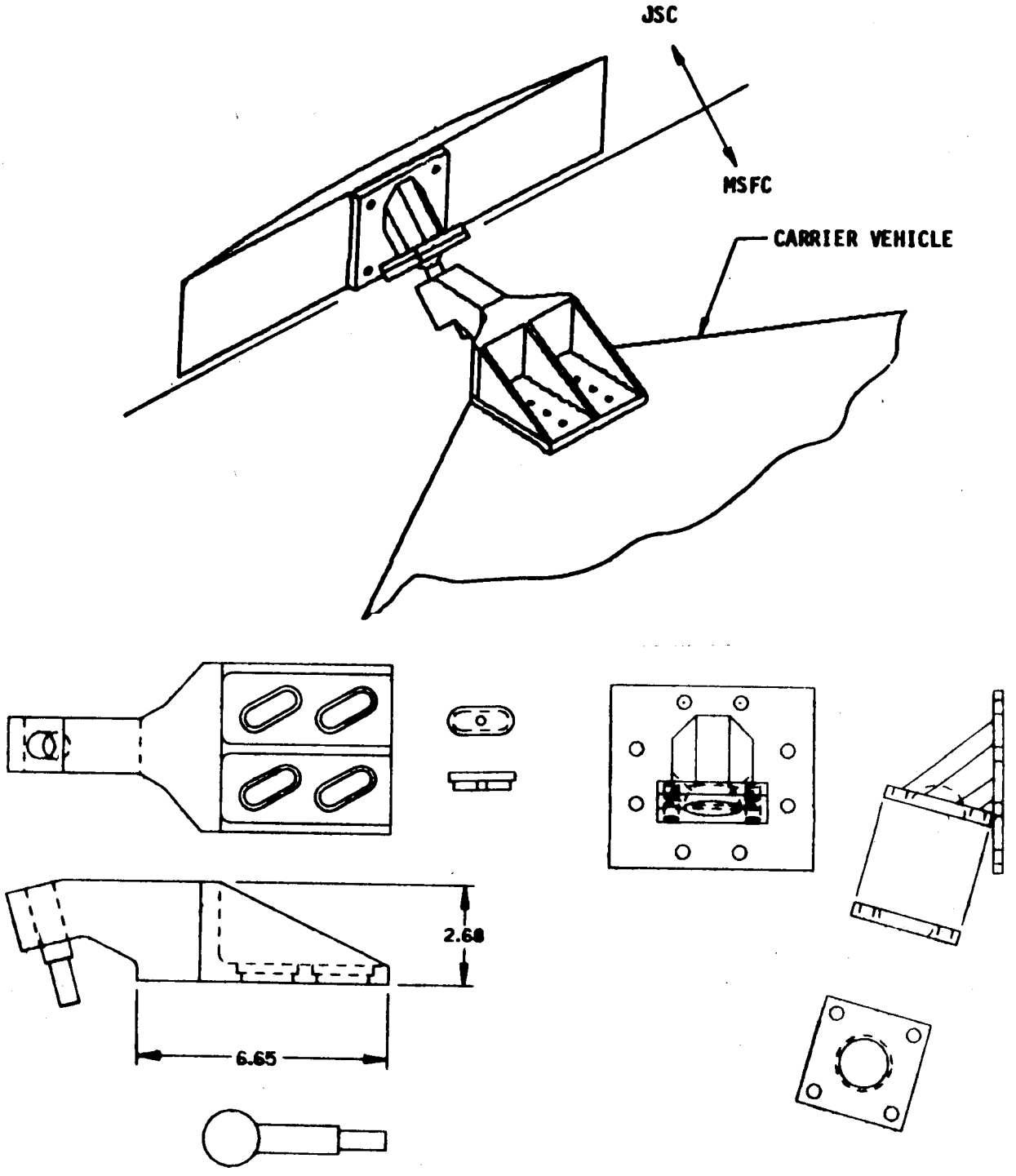


FIG. 2.17 AEROBRAKE ATTACH FITTING DETAILS

2.0 STRUCTURAL DESCRIPTION (CONT'D)

ORIGINAL PAGE IS
OF POOR QUALITY

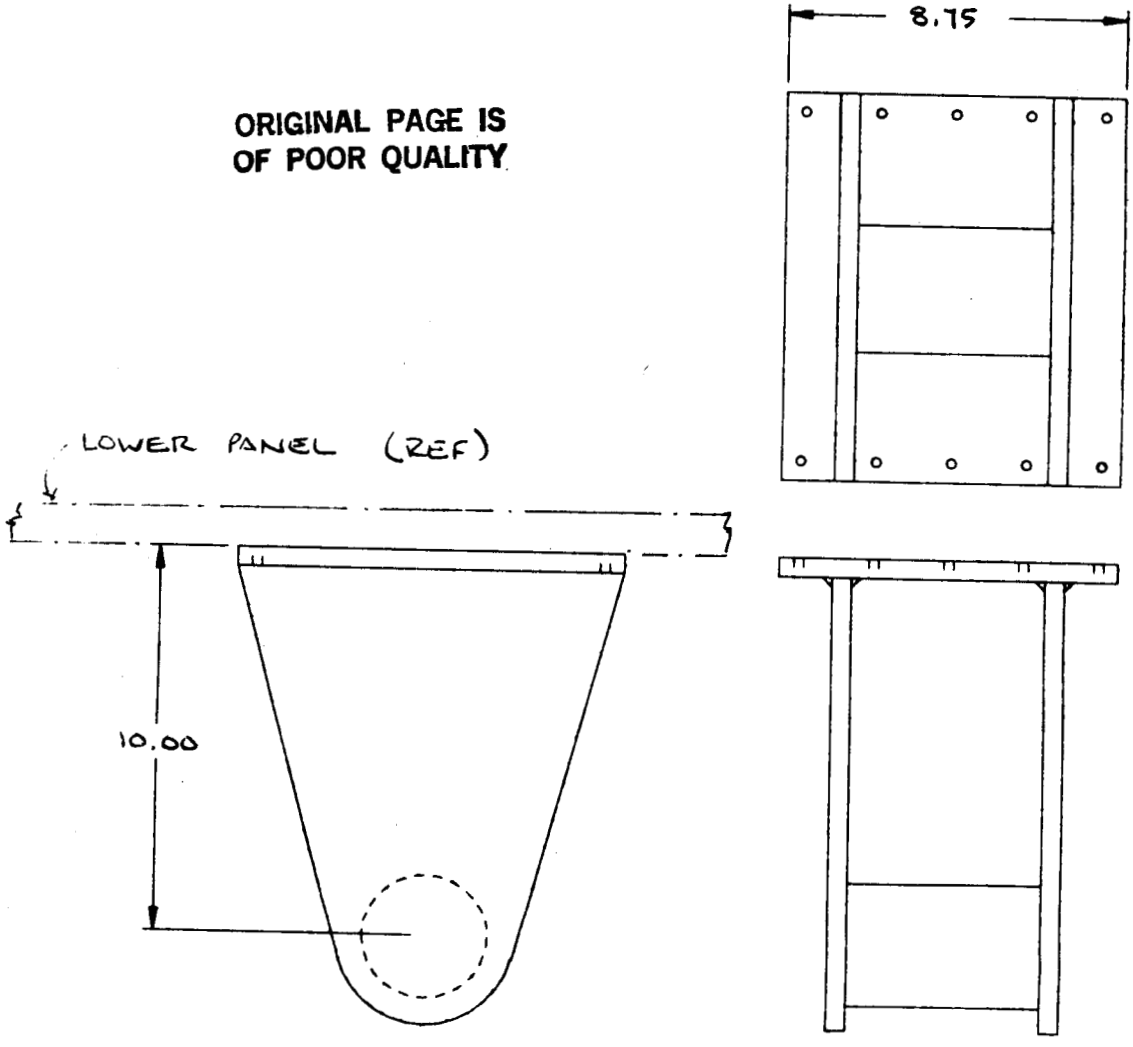


FIG. 2.18 NORMAL LANDING TRUNNION FITTINGS (TYPICAL 3 PLACES)

FORM LMSC 362 B-3

3.0 MECHANICAL PROPERTIES

TABLE 3.1 *Design Mechanical Properties of 2219 Aluminum Alloy Sheet and Plate*

Specification	QQ-A-250/30																													
Form	Sheet and plate																													
Temper	T62[c]		T81		T851												T87													
Thickness, in.	0.020-2.000		0.020-0.249		0.250-1.000		1.001-2.000		2.001-3.000		3.001-4.000		4.001-5.000		5.001-6.000		0.020-0.039		0.040-0.249		0.250-1.000		1.001-2.000		2.001-3.000		3.001-4.000		4.001-5.000	
Basis	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
Mechanical properties:																														
F_{tu}, ksi:																														
L	54	55	62	63	62	63	62	63	...	...	...	...	...	...	...	...	63	64	63	64	63	64	63	64	...	...	...	...	...	...
LT	54	55	62	63	62	63	62	63	62	63	60	61	59	60	57	58	64	65	64	65	64	65	64	65	64	65	62	63	61	62
F_{ty}, ksi:																														
L	36	37	47	48	47	48	47	48	...	...	...	...	...	...	...	...	51	52	52	53	51	52	51	52	...	...	...	...	...	...
LT	36	37	46	47	46	47	46	47	45	46	44	45	43	44	42	43	52	53	52	53	51	52	51	52	51	52	50	51	49	50
F_{cy}, ksi:																														
L	38	39	48	49	48	49	47	48	...	...	...	...	...	...	...	...	52	53	52	53	51	52	51	52	...	...	...	...	...	...
LT	38	39	49	50	49	50	49	50	...	...	...	...	...	...	...	...	55	56	55	56	54	55	54	55	...	...	...	...	...	...
F_{su}, ksi	32	32	36	36	36	36	36	37	...	...	...	...	...	...	...	...	37	38	37	38	37	37	38	38	...	...	...	...	...	...
F_{bru}[a], ksi:																														
(e/D=1.5)	84	86	95	97	95	97	95	97	...	...	...	...	...	...	...	...	99	101	99	101	99	101	99	101	...	...	...	...	...	...
(e/D=2.0)	109	111	121	123	121	123	120	122									126	128	126	128	126	128	126	128	...	...	...	...	...	...
F_{bry}[a], ksi:																														
(e/D=1.5)	63	65	77	78	77	78	77	78	...	...	...	...	...	...	...	...	84	86	84	86	83	84	83	84	...	...	...	...	...	...
(e/D=2.0)	79	82	93	95	93	95	93	95	...	...	...	...	...	...	...	...	97	99	97	99	95	97	95	97	...	...	...	...	...	...
e, percent (S Basis):																														
L	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
LT	b	...	b	...	8	...	7	...	6	...	5	...	5	...	4	...	5	...	6	...	7	...	6	...	6	...	4	...	3	...
E, 10^3 ksi	10.5																													
E_c, 10^3 ksi	10.8																													
G, 10^3 ksi	4.0																													
μ	0.33																													
Physical properties:																														
ω, lb/in.^{3}	0.102																													
C, Btu/(lb)(F)	See Figure 3.2.6.0																													
K, Btu/(hr)(ft^2)(F)/ft	See Figure 3.2.6.0																													
α, 10^{-6} in./in./F	See Figure 3.2.6.0																													

[a]See Table 3.1.2.1.1. Bearing values are "dry pin" values per Section 1.4.7.1.

[b]T62 and T81: 0.020-0.039 in., 6 percent; 0.040-0.249 in., 7 percent; T62: 0.250-1.000 in., 8 percent; 1.00-2.000 in., 7 percent.

[c]These allowables apply when samples of material supplied in the O or F temper are heat treated to demonstrate response to heat treatment. Properties obtained by the user however, may be lower than those listed if the material has been formed or otherwise cold or hot worked, particularly in the annealed temper, prior to solution heat treatment.

ORIGINAL PAGE IS
OF POOR QUALITY

Prepared by: INGRAM Date: 6-7-68
Checked by: Date:
Approved by: Date:

LOCKHEED MISSILES & SPACE COMPANY, INC.

Title: AFE CARRIER VEHICLE STRESS ANALYSIS

Model: AFE
Report No.:

Page: 3.1

ORIGINAL PAGE IS
OF POOR QUALITY

3.0 MECHANICAL PROPERTIES (CONT'D)

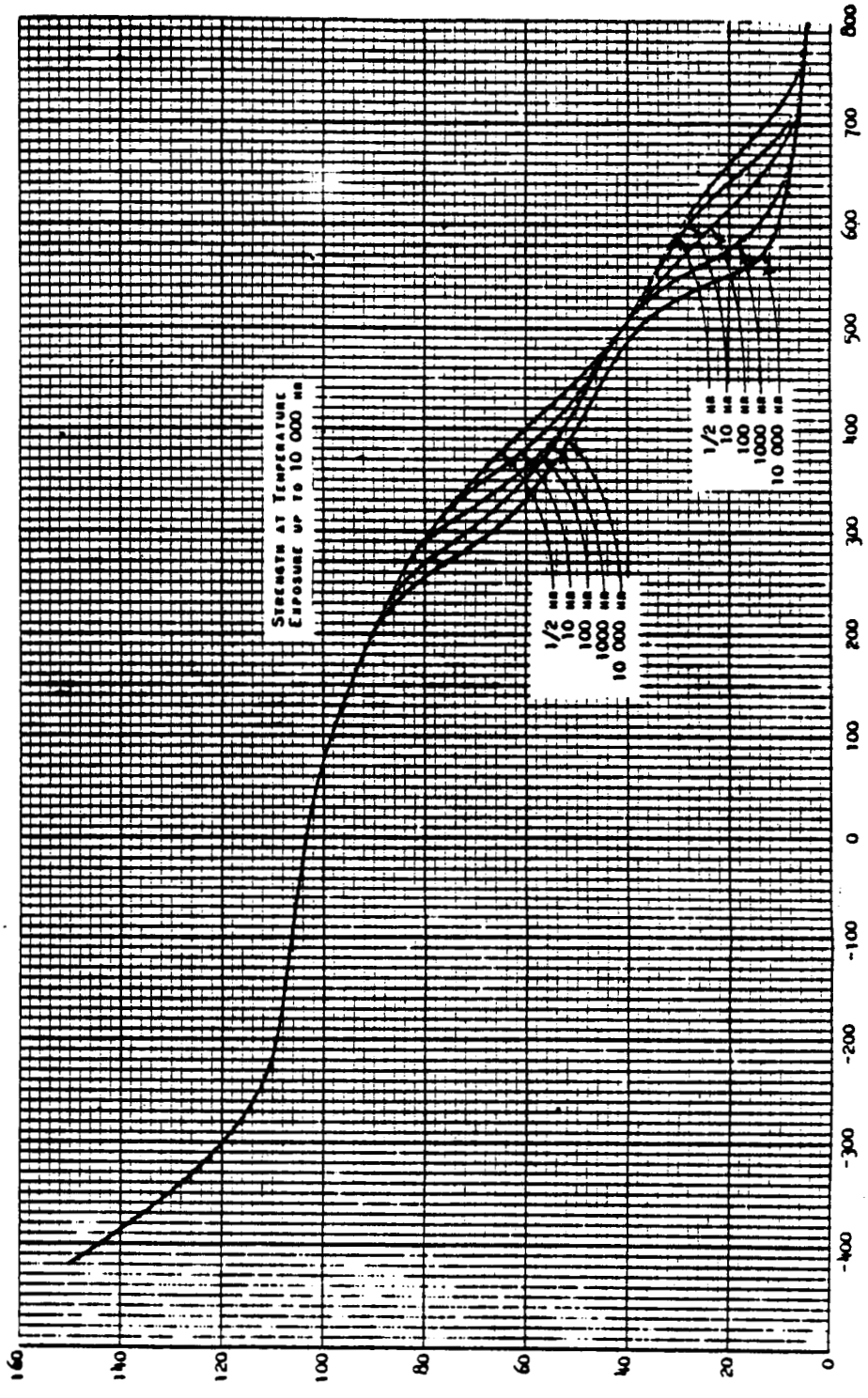


FIGURE 3.1 *Effect of temperature on the ultimate tensile strength (F_{tu}) of 2219-T87 aluminum alloy bare and clad sheet and plate.*

ORIGINAL PAGE IS
OF POOR QUALITY

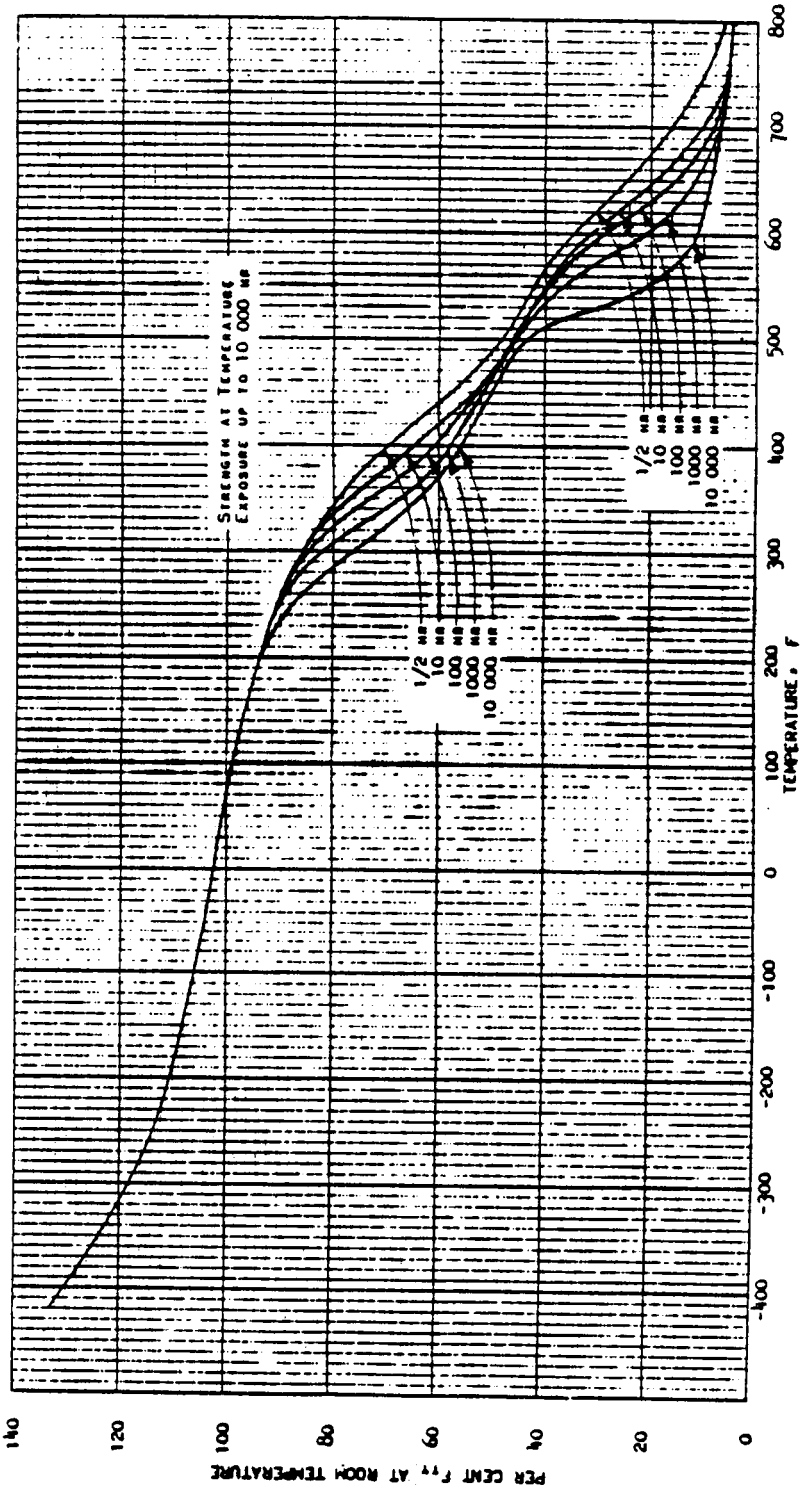


FIGURE 3.2 *Effect of temperature on the tensile yield strength (F_{ty}) of 2219-T87 aluminum alloy bare and clad sheet and plate.*

3.0 MECHANICAL PROPERTIES

3.0 MECHANICAL PROPERTIES

ORIGINAL PAGE IS
OF POOR QUALITY

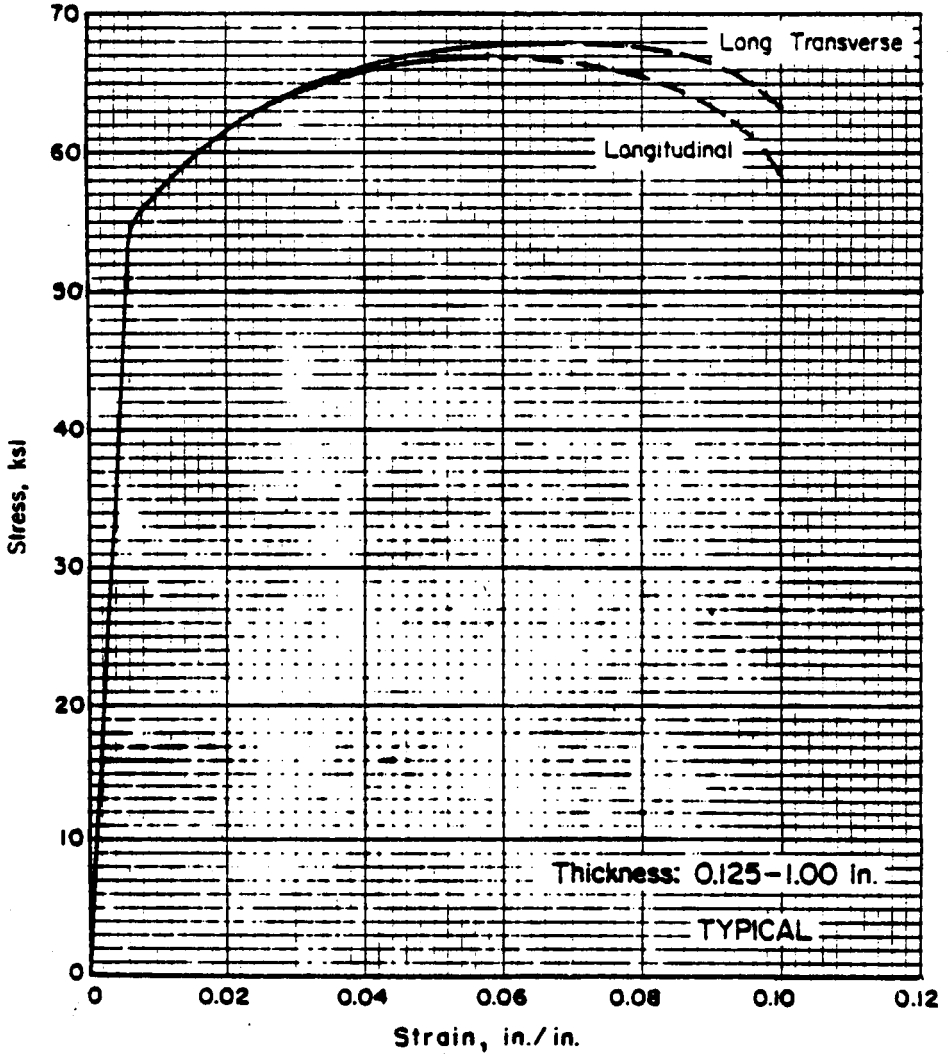


FIGURE 3.3 *Typical tensile stress-strain curves (full range) for 2219-T87 aluminum alloy sheet and plate at room temperature.*

4.1 MODEL DESCRIPTION

The NASTRAN model of the Carrier Vehicle is a full 360 degree model of all six bays of the vehicle. This was done in spite of the cyclic symmetry of the structure in order to simplify the location of the (mounted component) masses and to allow for the eventual inclusion of those structural components that are not symmetric. This model presently includes nearly 2500 nodes and 7500 elements.

During the beginning of the model development, not only the upper and lower panels, but all panels except the cylinder were considered as isogrid construction. For this reason the majority of the panels are modeled using a triangular pattern for the grid points. At the present time the avionics panels and the radial beams are solid sections and are consequently represented by triangular plate (CTRIA) elements. The upper panel is still an open isogrid construction and is made up of bar elements to simulate each individual isogrid bar. The lower panel is isogrid construction like the upper panel but with the addition of a .016" thick aluminum panel. This construction is represented by both individual isogrid CBAR elements and CTRIA elements for the thin sheet. The center cylinder is a solid .125" aluminum sheet and is modeled with CQUAD plate elements. The panel splice tee and angle sections and the upper and lower ring angle sections are simulated in the model with CBAR elements.

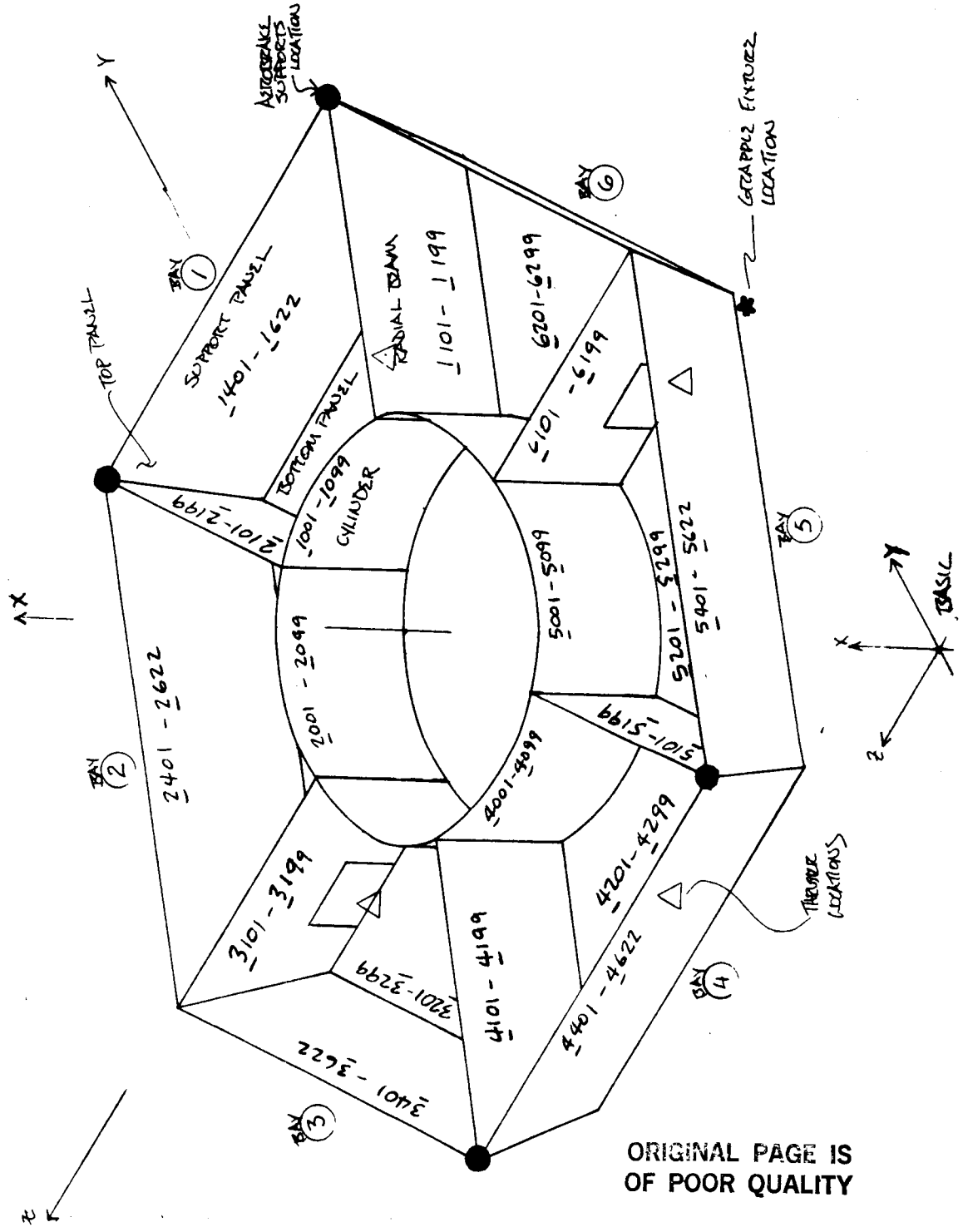
The SRM is represented in the model by a concentrated mass and inertia (CONM2) located at the point in AFE coordinates specified by the mass properties group. It is connected through rigid (CRIGD) elements to set of plate elements which simulate the mounting ring. The Carrier Vehicle is attached to this ring through a system of brackets, separation bolts and flexures modeled by plate and bar elements. These SRM Support Brackets are located at three equally spaced points around the Support Ring. Sketches of these Brackets are included in the Structural Description section of this report and the NASTRAN details representing the same structure are given in the model plots which follow.

The Aerobrake is presently modeled in a similar method to the SRM. The values from the mass properties table are assigned to a gridpoint at the correct location, and this point is then attached to the Carrier Vehicle at four points. The Aerobrake attach fittings are modeled in enough detail that the fitting flange stresses, attach bolt loads, and connecting pin loads may be obtained from the output.

There are basically two structural configurations modeled at the present time. The liftoff/landing abort model includes the mass and connecting structure associated with the attached SRM. The loads from the Carrier Vehicle & Aerobrake are reacted back into the SRM structure for these conditions as the system is still supported in the payload bay at the support ring. The second model arrangement represents the regular landing configuration in which the AFE has jettisoned the SRM, has been recovered by the Shuttle, and is supported (in the payload bay again) on the three Trunnion fittings. For this configuration the SRM mass and connecting elements have been deleted and the CG node (loading point) has been consequently relocated.

4.1 MODEL DESCRIPTION (CONT'D)

- GENERAL LAYOUT AND NUMBERING SCHEME



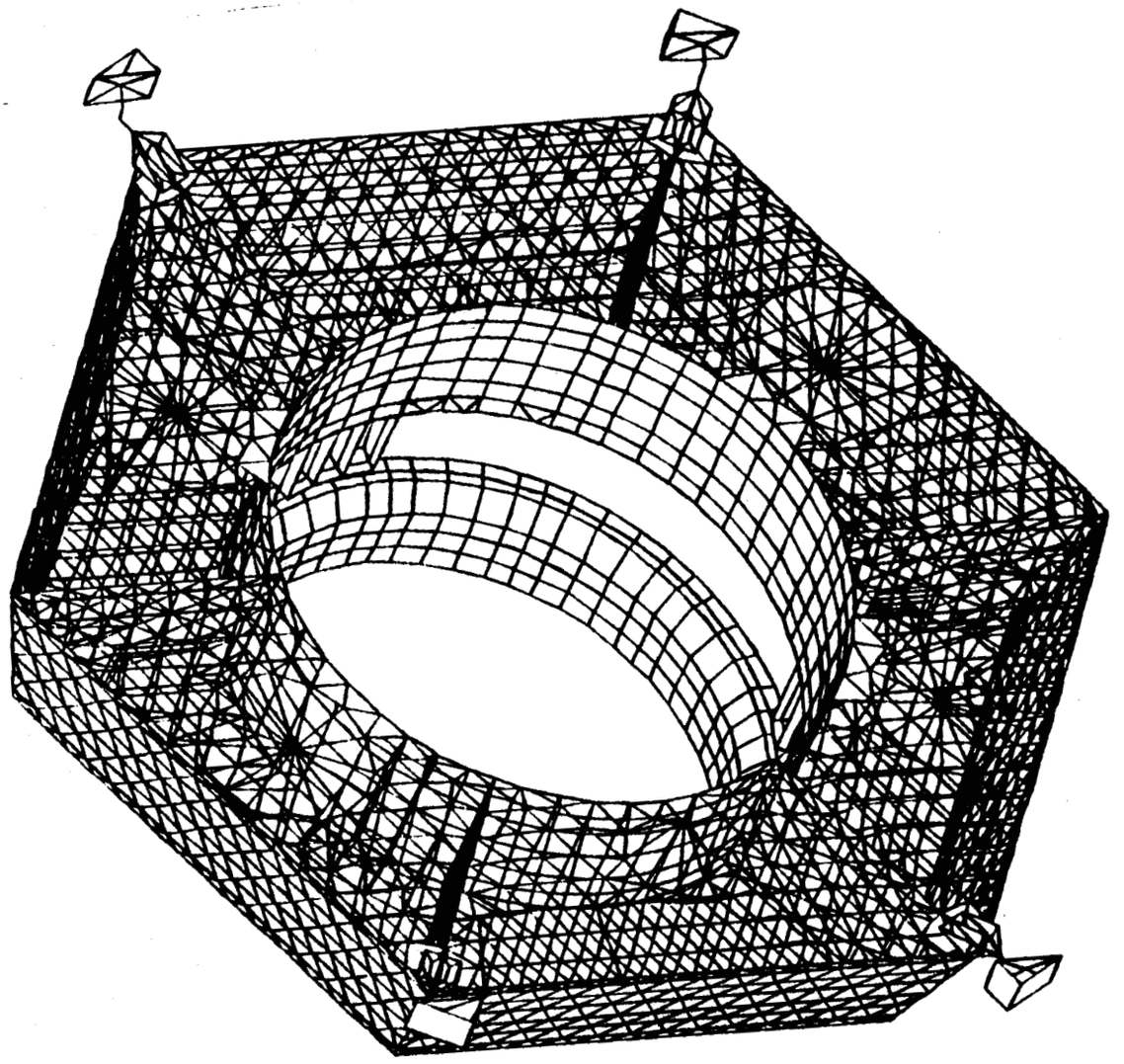
ORIGINAL PAGE IS OF POOR QUALITY

FORM LMSC 362 B-3

Prepared by: INGRAM	Date 10-11-88	LOCKHEED MISSILES & SPACE COMPANY, INC.	Page 4.1.4 Temp Perm.
Checked by:	Date	Title AFE CARRIER VEHICLE STRESS ANALYSIS	Model
Approved by:	Date		Report No.

4.1 MODEL DESCRIPTION (CONT'D)

ORIGINAL PAGE IS
OF POOR QUALITY

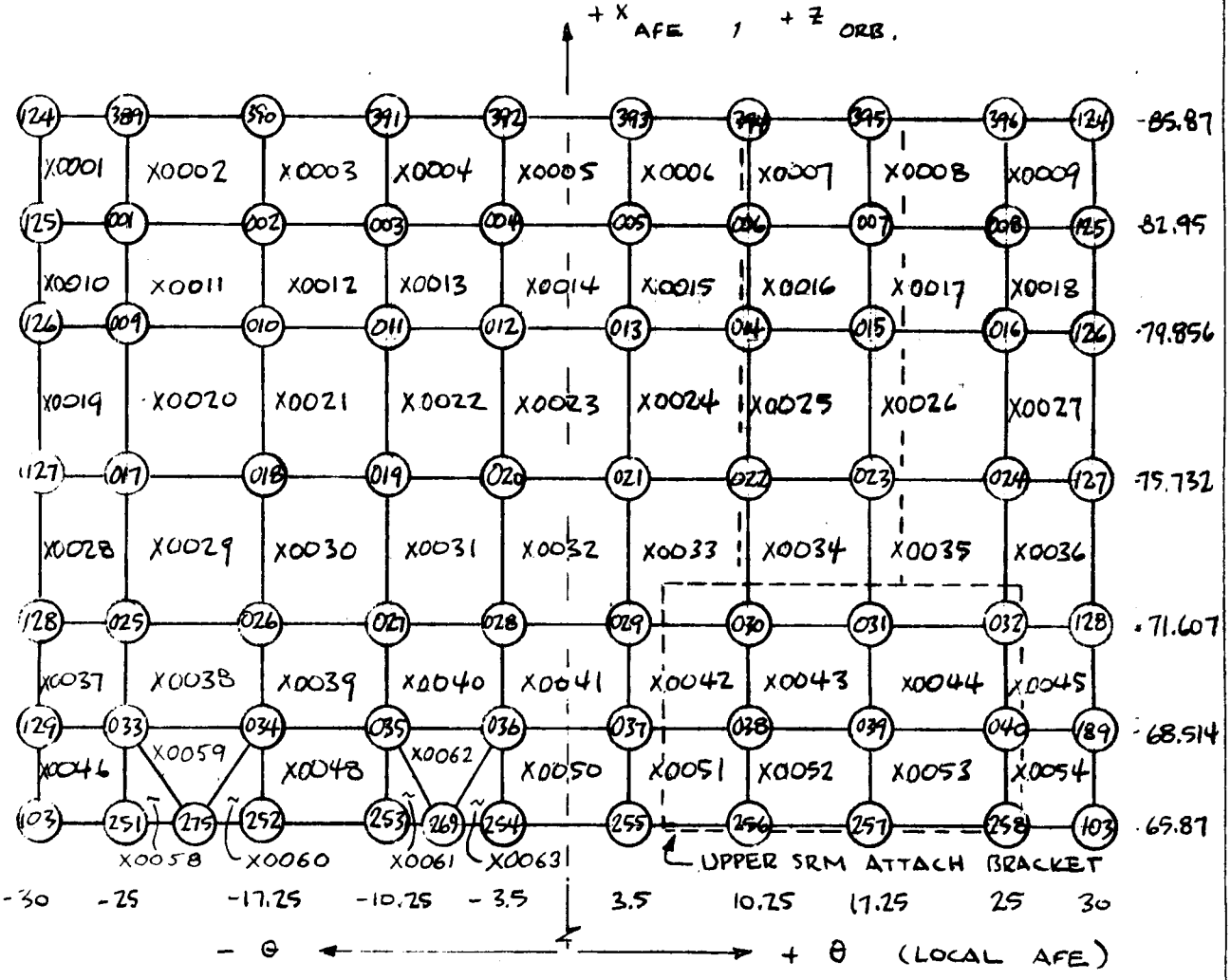


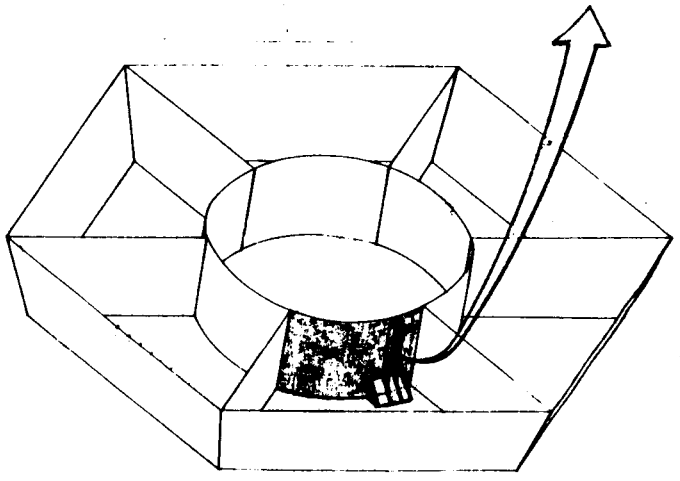
PLOT OF TOTAL CARRIER VEHICLE MODEL SHOWING SRM SUPPORT RING / BRACKETS AND AEROBRAKE ATTACH FITTINGS

FORM LMSC 362 B-3

4.1 MOVEL DESCRIPTION (CONT'D)

AFE CARRIER VEHICLE 60° CYLINDER SEGMENT (PANEL 0)



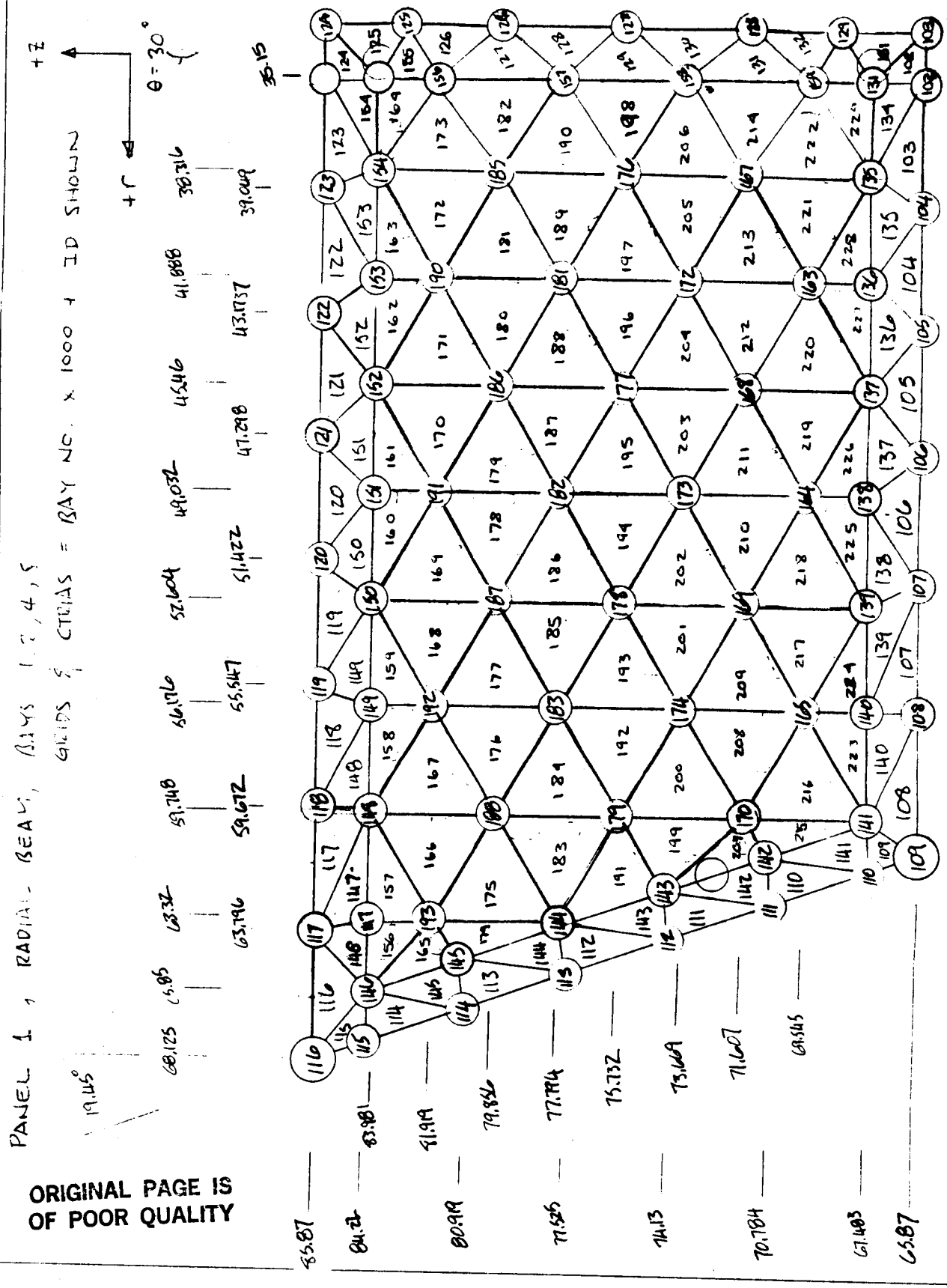


ORIGINAL PAGE IS
OF POOR QUALITY

FORM LMSC 362 8-3

Prepared by:	Date	LOCKHEED MISSILES & SPACE COMPANY, INC.	Page Temp. Perm.
INGRAM	10/9/88		4.1.6
Checked by:	Date	Title	Model
		AFE CARRIER VEHICLE STRESS ANALYSIS	
Approved by:	Date		Report No.

4.1 MODEL DESCRIPTION (CONT'D)



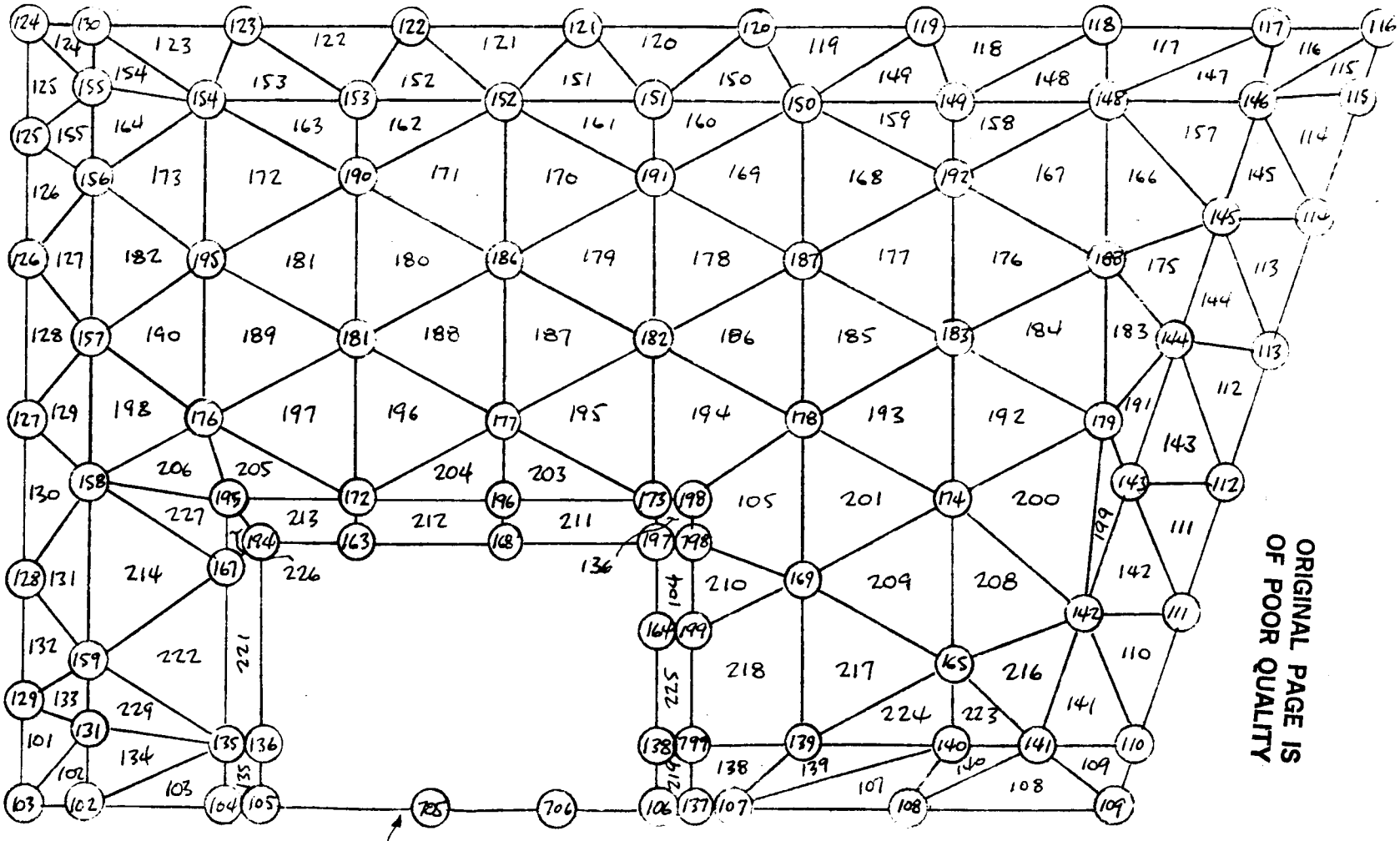
ORIGINAL PAGE IS OF POOR QUALITY

FORM LMSC 362 8-3

FORM LMSC 362 B-3

4.1 MODEL DESCRIPTION (CONT'D)

PANEL 1, WITH CUTOUT FOR THRUSTER ASSEMBLY - BAYS 3, 6



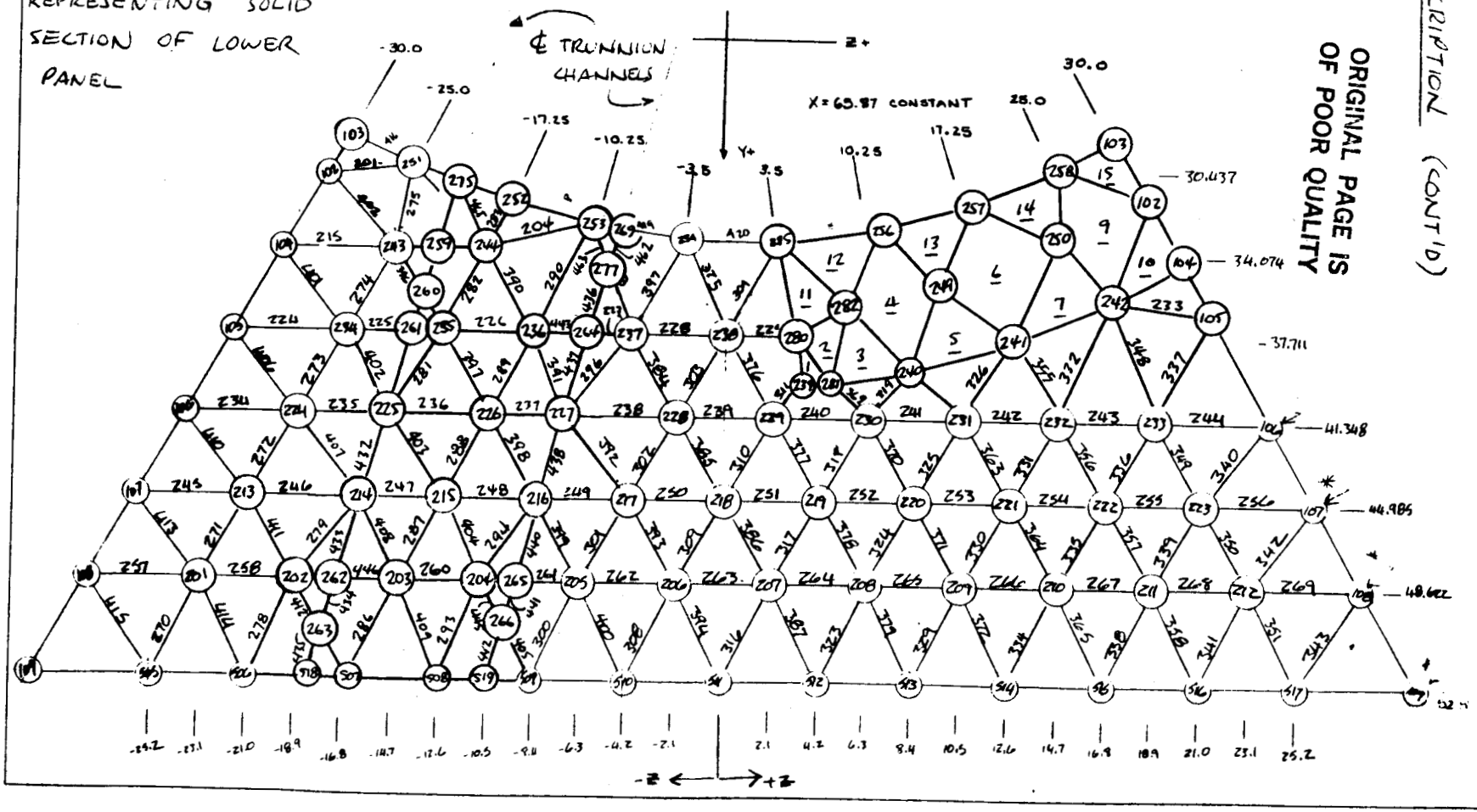
ORIGINAL PAGE IS OF POOR QUALITY

Prepared by: INGRAM
Checked by
Approved by:
Date 10/4/82
Date
Date
LOCKHEED MISSILES & SPACE COMPANY, INC.
Title AFE CARRIER VEHICLE STRESS ANALYSIS
Page 4.1.7
Model
Report No.
Temp
Perm

PANEL 2 - LOWER PANEL - BAYS 1 3,5
- TRUNNION SUPPORT AND SRM ATTACH BRACKET LOCATIONS

GRID # = (BAY NO) x 1000 + LAYOUT NO.
BAR # = (BAY NO) x 10,000 + (PANEL NO) x1000 + LAYOUT NO.

ELEMENTS 1 THRU 15 ARE PLATE ELEMENTS REPRESENTING SOLID SECTION OF LOWER PANEL

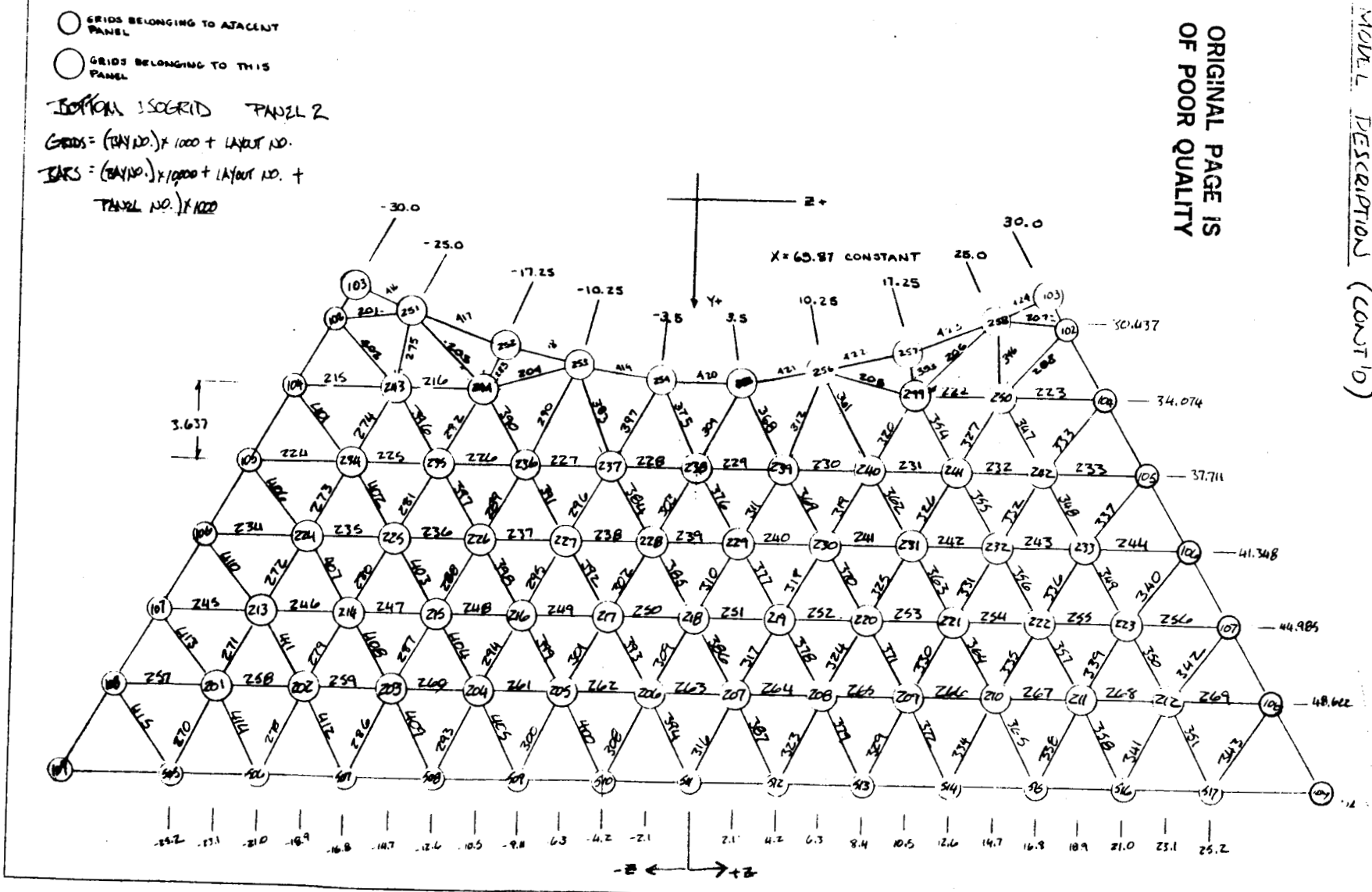


ORIGINAL PAGE IS OF POOR QUALITY

4.1 MODEL DESCRIPTION (CONT'D)

FORM LMSC 362 B-3

PANEL 2 - BAYS 2, 4, 6 - NO TRUNNION OR SRM SUPPORT STRUCTURE



ORIGINAL PAGE IS OF POOR QUALITY

4.1 MODEL DESCRIPTION (CONT'D)

Prepared by	INGRAM	Date	10 7 82
Checked by		Date	
Approved by		Date	

LOCKHEED MISSILES & SPACE COMPANY, INC.

Title: NFE CARRIER VEHICLE STRESS ANALYSIS

Page 4.1.9

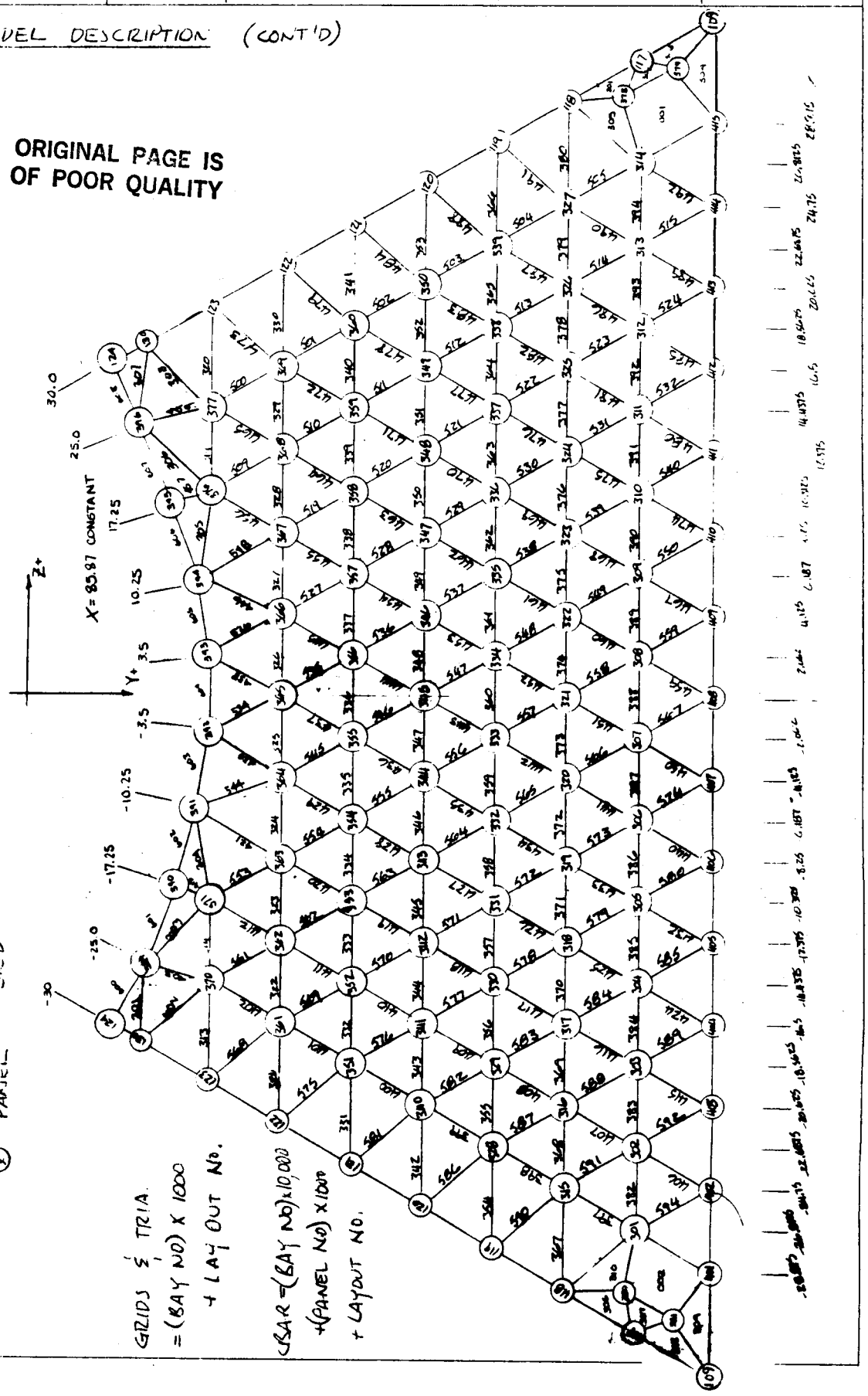
Model

Report No.

Prepared by	Date	LOCKHEED MISSILES & SPACE COMPANY, INC.	Page	Perm
INGRAM	10-9-80		4.1.10	
Checked by	Date	Title	Model	
		APE CARRIER VEHICLE		
Approved by	Date	STRESS ANALYSIS	Report No.	

4.1 MODEL DESCRIPTION (CONT'D)

ORIGINAL PAGE IS OF POOR QUALITY

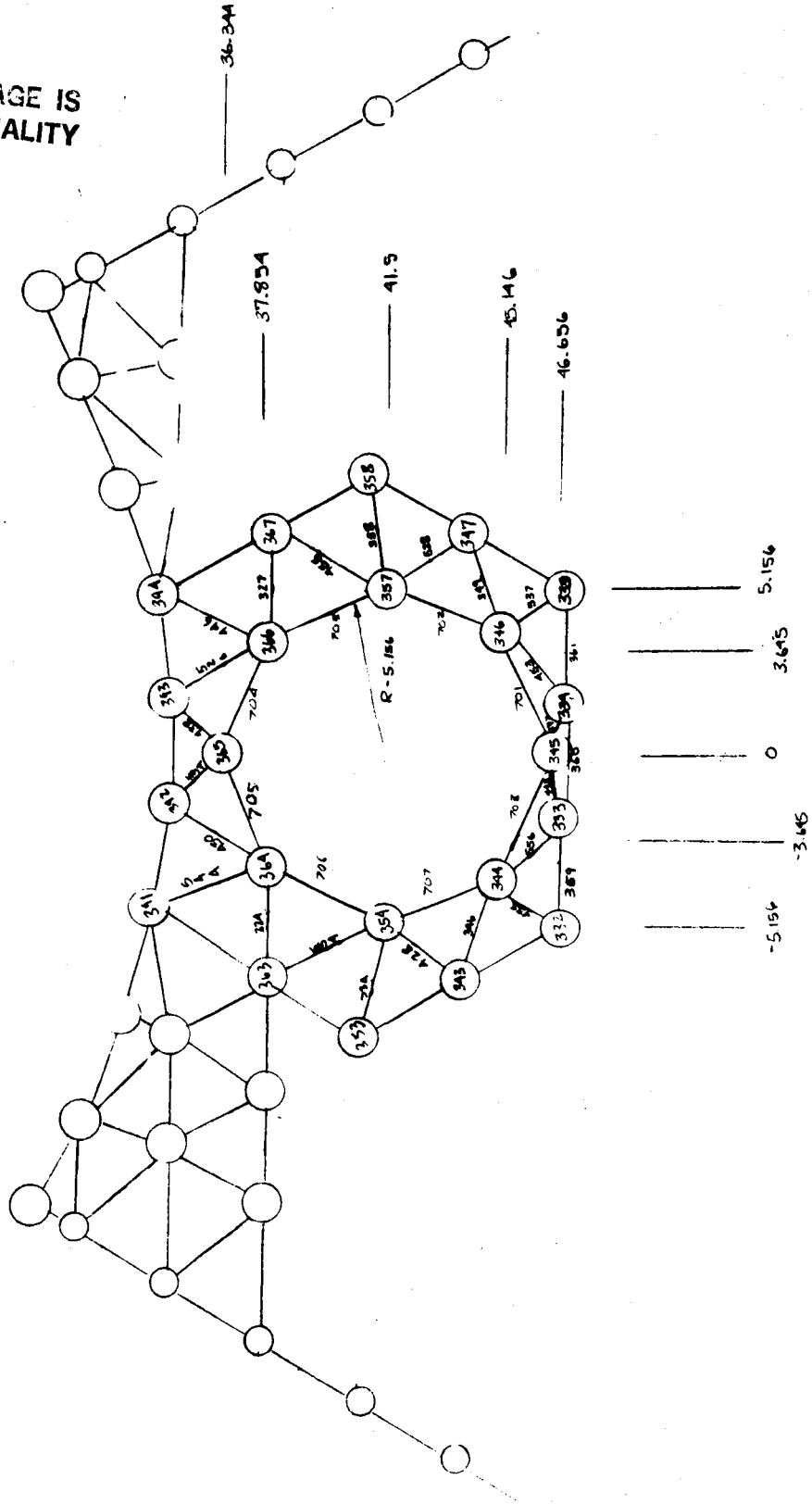


FORM LMSC 362 B-3

Prepared by	Date	LOCKHEED MISSILES & SPACE COMPANY, INC.	Page (Temp / Perm.)
INGRAM	10-9-88		4.1.12
Checked by:	Date	Title	Model
		AFE CARRIER VEHICLE	
Approved by:	Date	STRESS ANALYSIS	Report No.

4.1 MODEL DESCRIPTION (CONT'D)

ORIGINAL PAGE IS
OF POOR QUALITY



PANEL 3 - UPPER PANEL, BAY 4

FORM LMSC 362 B-3

FORM LMSC 362 B-3

Prepared by: INGRAM Date 10-9-86
Checked by: Date
Approved by: Date

LOCKHEED MISSILES & SPACE COMPANY, INC.

Title: ATE CARRIER VEHICLE STRESS ANALYSIS

Page 4.1.1.3 Temp Perm
Model
Report No.

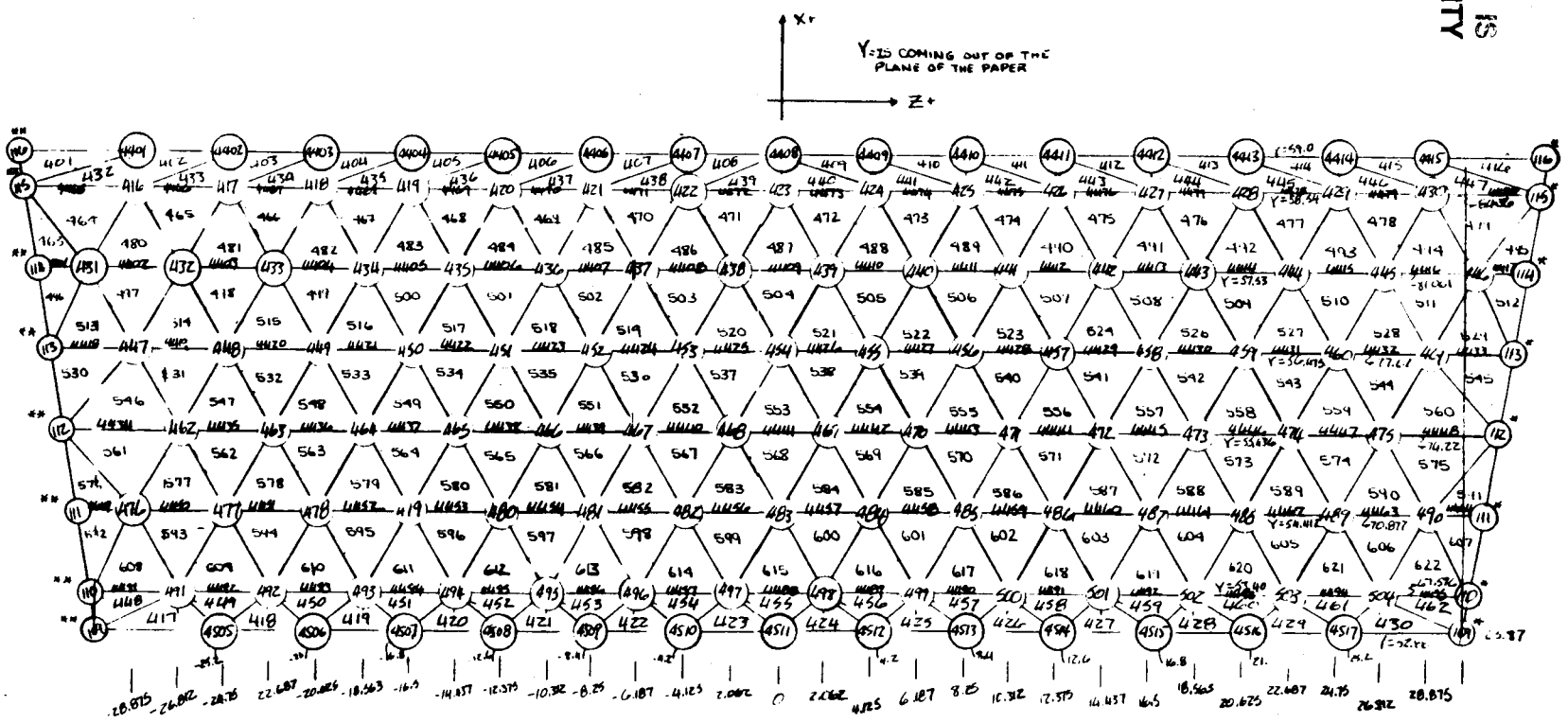
4.1 MODEL DESCRIPTION (CONT'D)

ORIGINAL PAGE IS OF POOR QUALITY

PANEL 4 ~ AVIONICS PANEL - ALL 6 BAYS

GRID NO. & TRIA NO. = (BAY NO) x 1,000 + LAYOUT NO.

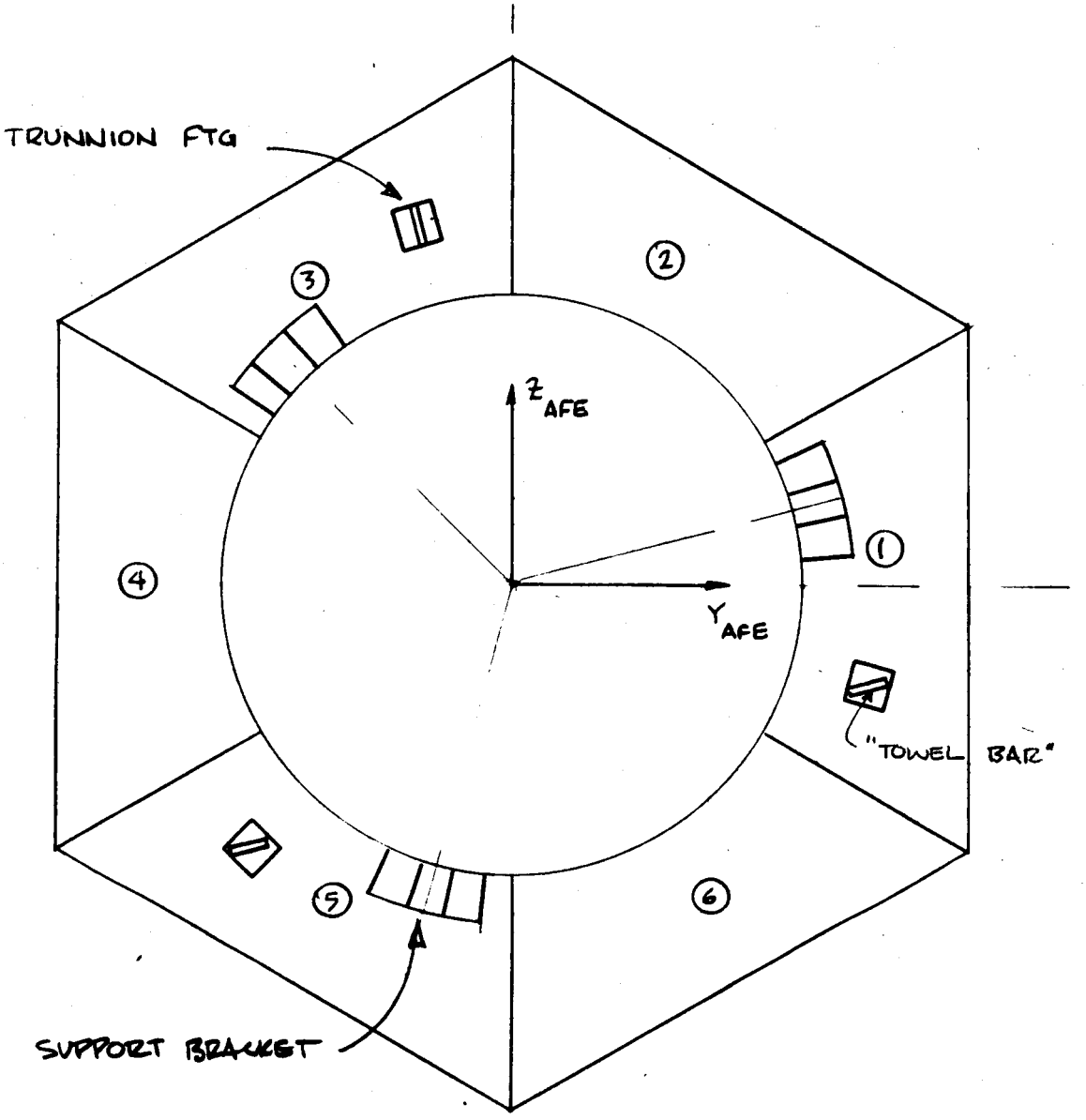
BAR NO. = (BAY NO.) x 10,000 + (PANEL NO) x 1,000 + LAYOUT NO.



* GRID NO. = (BAY NO) x 10,000 + 1,000 + LAYOUT NO

** GRID NO. = (BAY NO) x 10,000 + LAYOUT NO.

4.1 MODEL DESCRIPTION (CONT'D)



(x) ⇒ BAY NO.

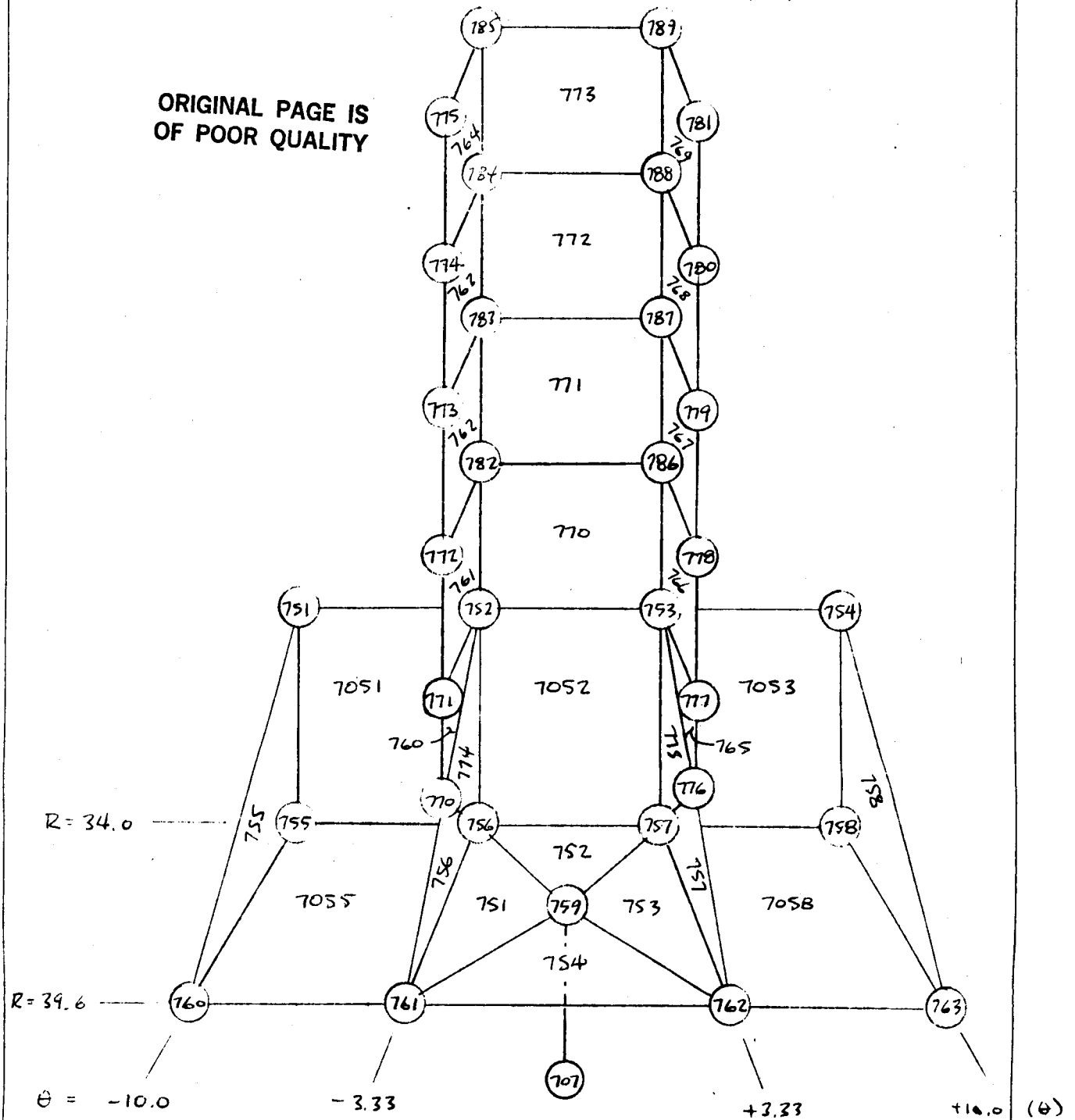
CARRIER VEHICLE PLAN VIEW SHOWING LOCATION AND ORIENTION OF SRM SUPPORT BRACKETS AND TRUNNION FITTINGS.

Prepared by	Date	LOCKHEED MISSILES & SPACE COMPANY, INC.	Page	Temp	Perm
INGRAM	10-10 88		4.1.15		
Checked by	Date	Title	Model		
		AFE CARRIER VEHICLE			
Approved by:	Date	STRESS ANALYSIS	Report No.		

4.1 MODEL DESCRIPTION (CONT'D)

- SRM UPPER BRACKET (TYPICAL BAYS 1, 3, 5)

ORIGINAL PAGE IS OF POOR QUALITY

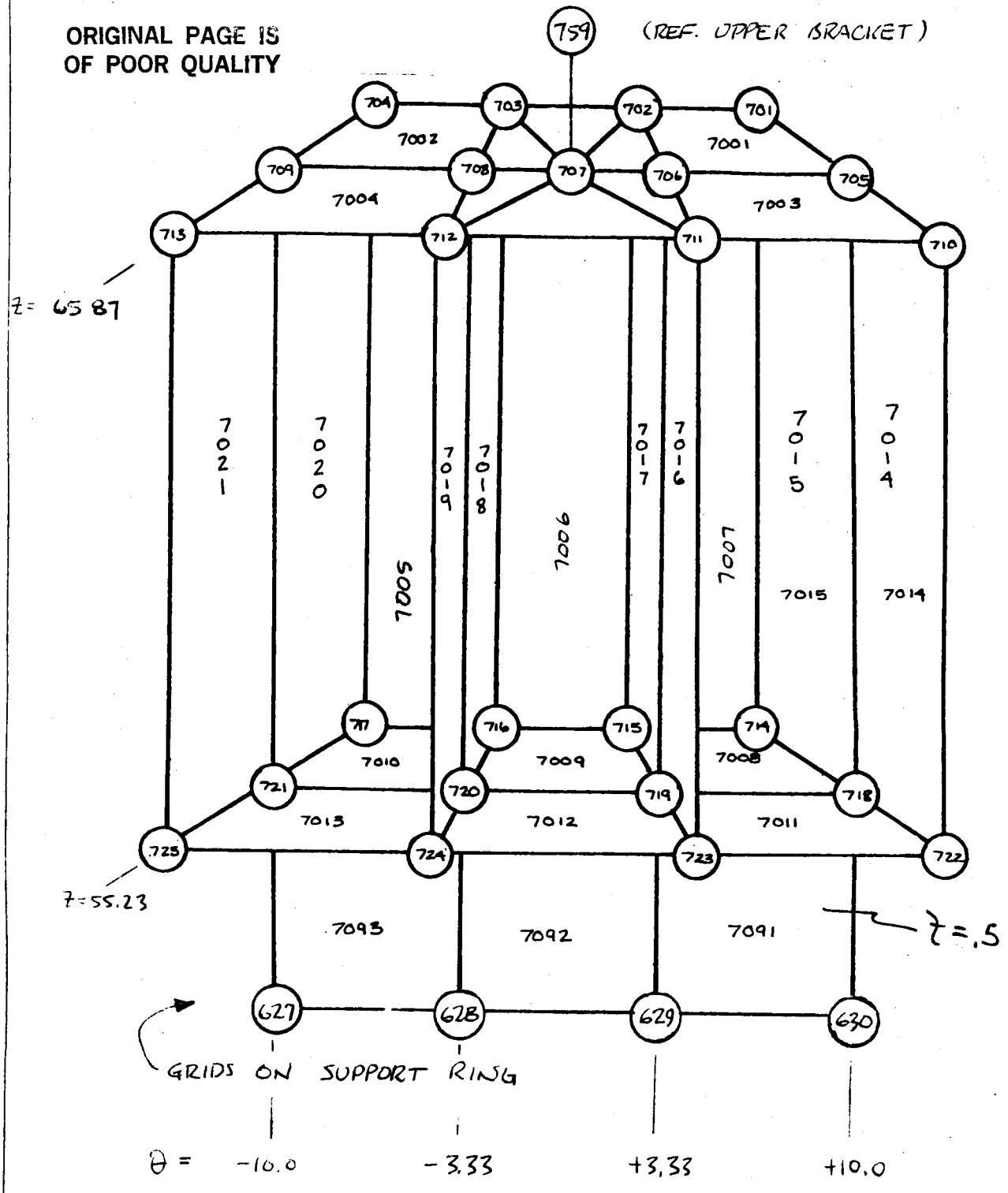


FORM LMSC 362 B-3

4.1 MODEL DESCRIPTION (CONT'D)

- SRM LOWER BRACKET (PEDESTAL) - TYPICAL BAYS 1, 3, 5

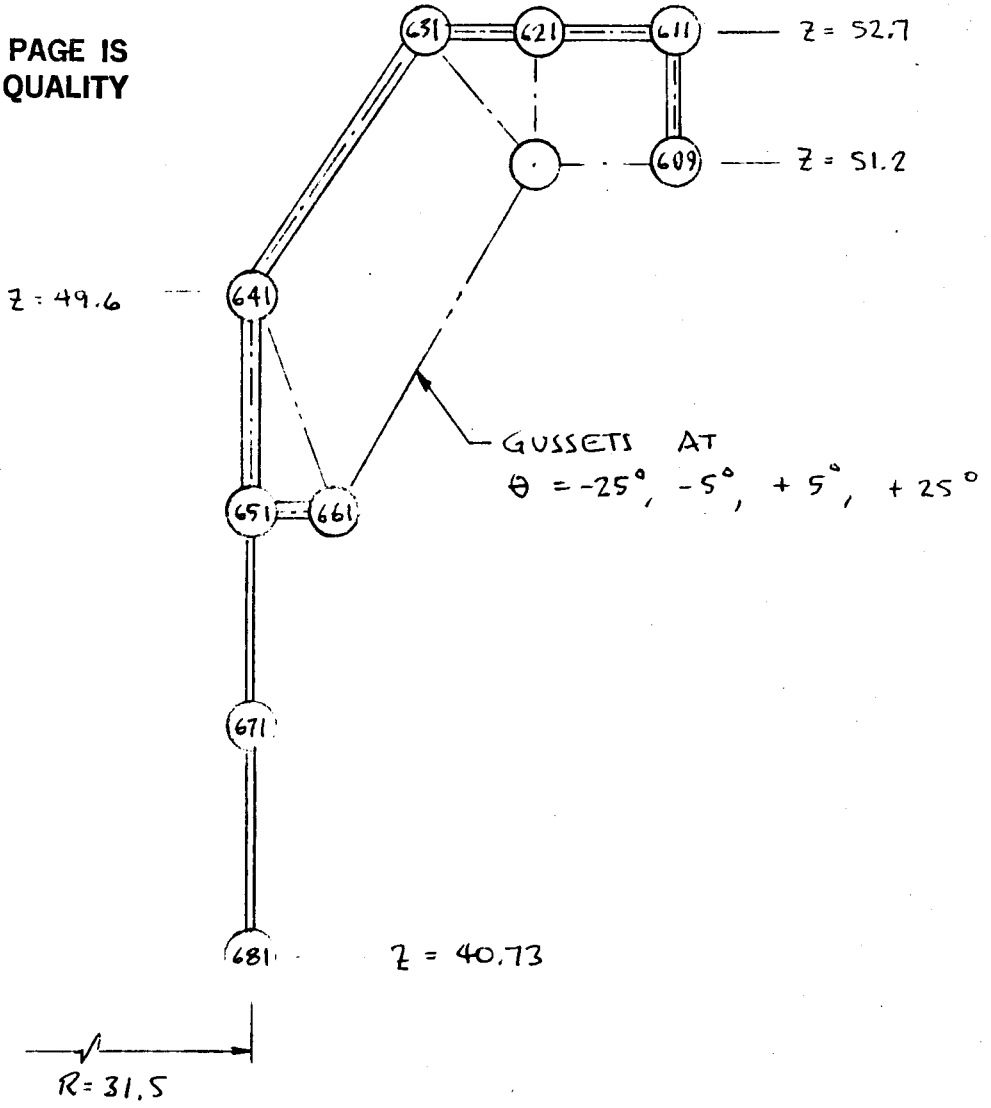
ORIGINAL PAGE IS
OF POOR QUALITY



4.1 MODEL DESCRIPTION (CONT'D)

SRM SUPPORT RING CROSSECTION (@ $\theta = -30°$)

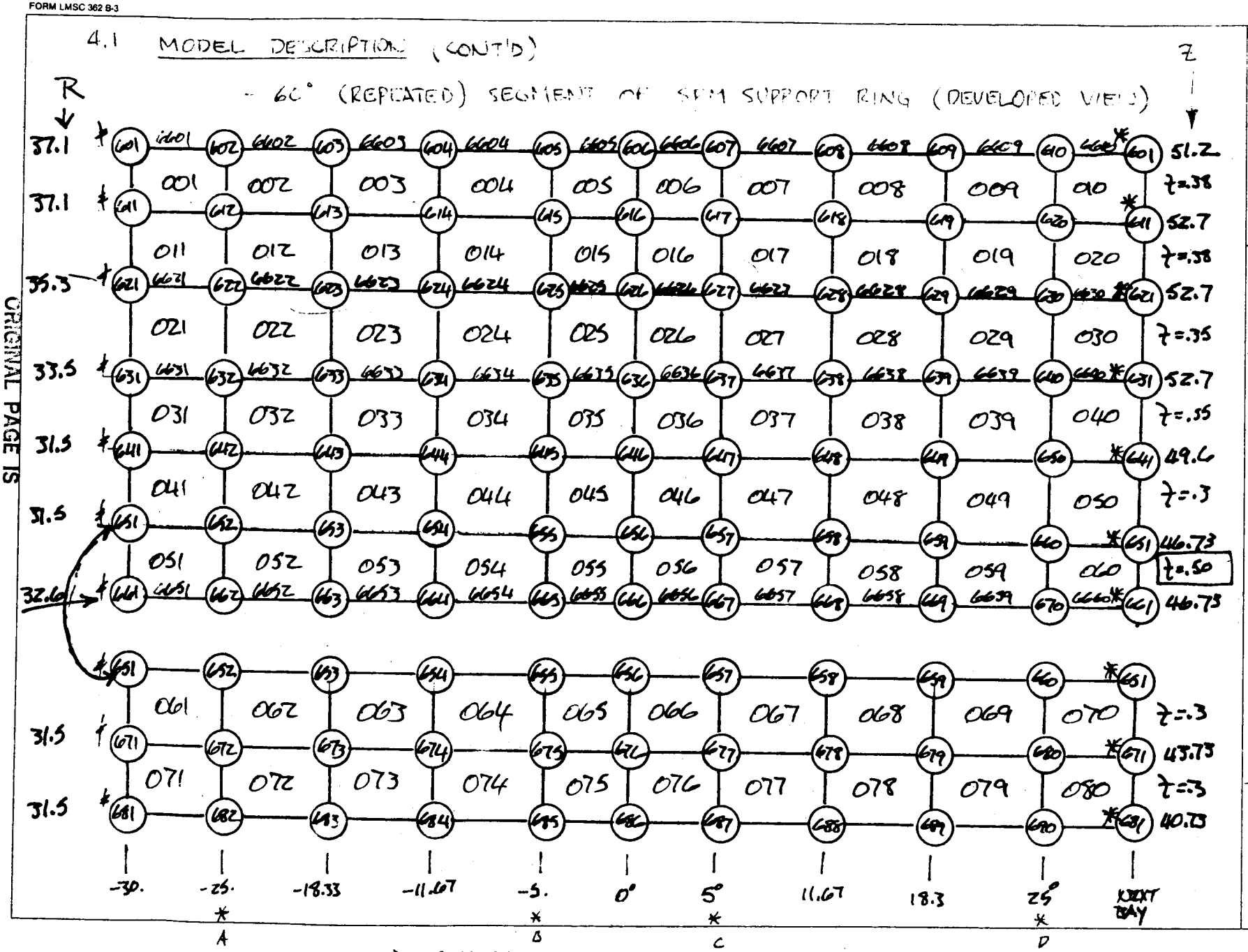
ORIGINAL PAGE IS
OF POOR QUALITY



FORM LMSC 362 B-3

4.1 MODEL DESCRIPTION (CONT'D)

- 60° (REPEATED) SEGMENT OF SPM SUPPORT RING (DEVELOPED VIEW)



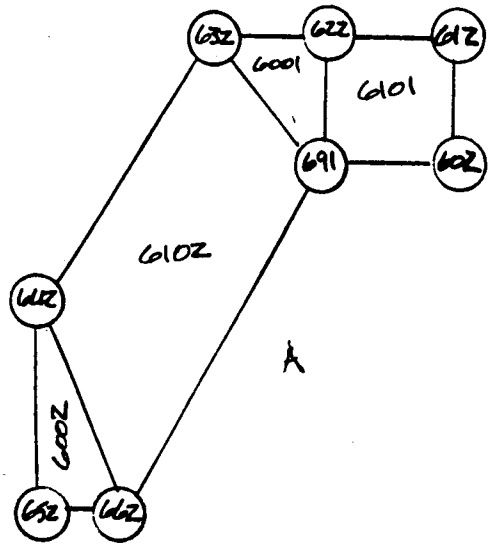
* ⇒ GUSSET LOCATIONS

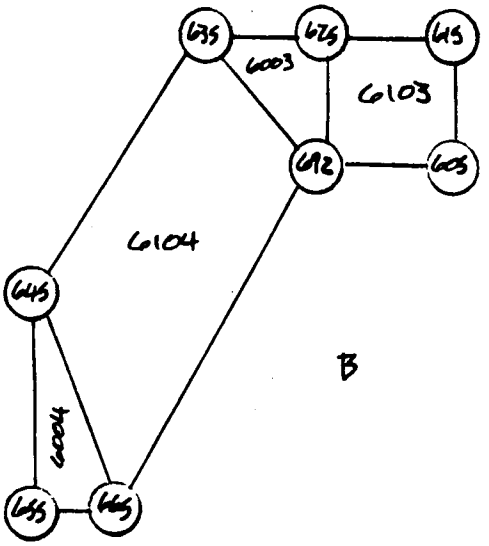
ORIGINAL PAGE IS OF POOR QUALITY

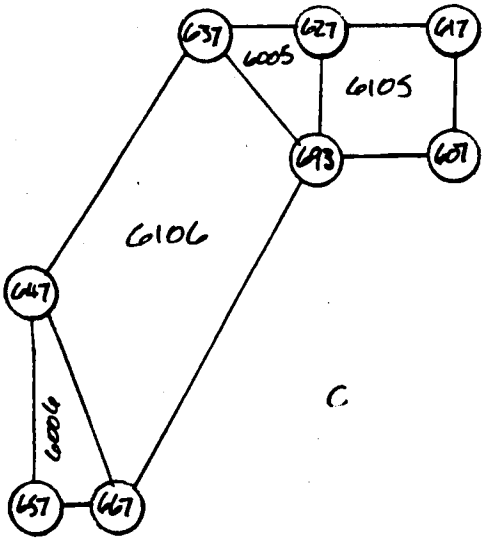
Prepared by: INGRAM	Date: 10 11 86	LOCKHEED MISSILES & SPACE COMPANY, INC.	Page 4.1.18
Checked by	Date	Title: AFE CARRIER VEHICLE STRESS ANALYSIS	Model
Approved by:	Date		Report No.

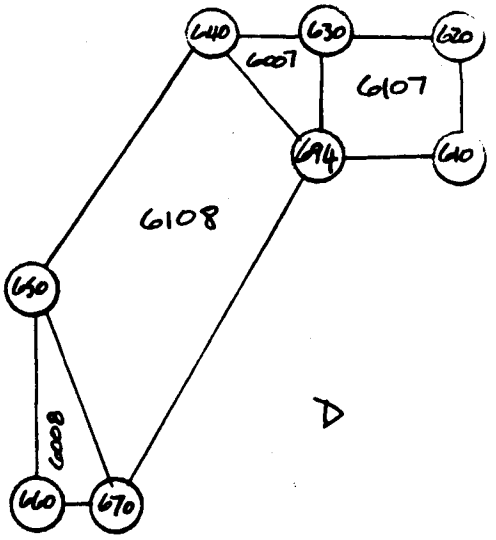
4.1 MODEL DESCRIPTION (CONT'D)

- SUPPORT RING GUSSETS



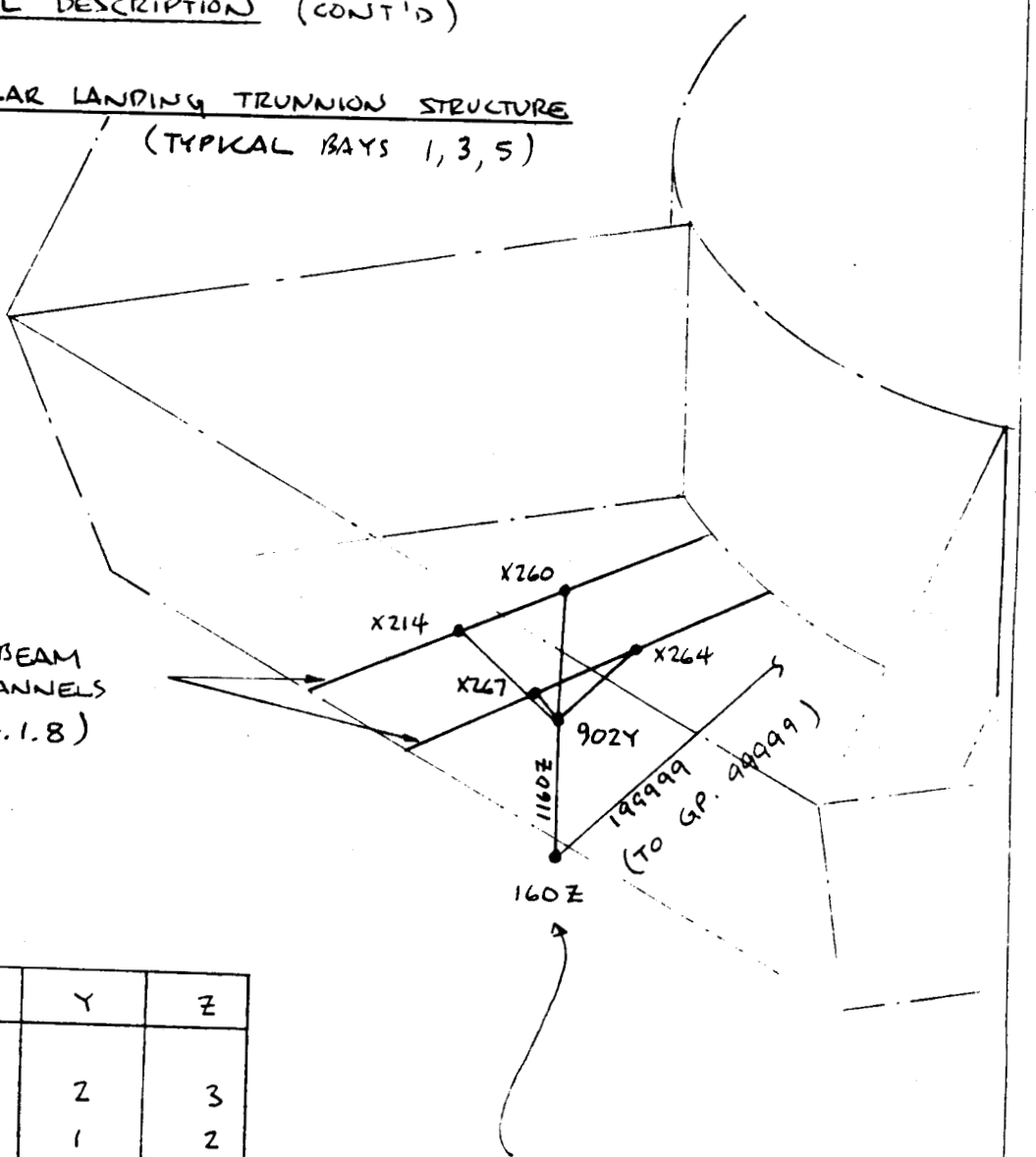






4.1 MODEL DESCRIPTION (CONT'D)

- REGULAR LANDING TRUNNION STRUCTURE (TYPICAL BAYS 1, 3, 5)



BAY	X	Y	Z
1	1	2	3
3	3	1	2
5	5	0	1

CRIGD 19999 TRANSFERS LOADS TO 160Z IN VERTICAL AND TRANSLATIONAL DIRECTIONS (NORMAL TO AXIS OF "TOWEL BAR"). SEE PAGE PG. 4.1.14 FOR ORIENTATION OF "TOWEL BAR" IN EACH BAY.

ORIGINAL PAGE IS OF POOR QUALITY

4.2 LOAD CONDITIONS

There are presently five load conditions which have been run on these models. Three (Liftoff, Landing Abort, and Regular Landing) are high-g cases which produce internal loads in the Carrier Vehicle from the accelerations of the mounted components and mass of the structure. These three conditions were selected from the ten conditions given in Table 4.2.1 - AFE PRELIMINARY DESIGN LOAD FACTORS (presented below) as the critical cases which envelope all others. The other two conditions are the application of the Thruster forces when the AFE is in flight. One of these is with the SRM still attached and one with the SRM already jettisoned. The assumption made with each of these two conditions is that all Thrusters are acting at once and that the Thrusters are the only forces active during that instant. The purpose in applying these Thruster conditions was to evaluate the local structure in the near vicinity of each of the Thruster groups. The Thruster forces are of such low magnitude that no significant stresses result in the Carrier Vehicle other than at the local backup structure.

TABLE 4.2.1 AFE PRELIMINARY DESIGN LOAD FACTORS

Flight Condition	Load Factor, g			Angular Acceleration, rad/sec^2		
	Nx	Ny	Nz	$\ddot{\theta}x$	$\ddot{\theta}y$	$\ddot{\theta}z$
Lift-Off	-0.4 -4.0	±1.4	±2.5	±10.0	±20.0	±10.0
Ascent	-1.10 -3.17	±0.4	±0.25 -0.80	±0.2	±0.25	±0.25
Descent	+1.01 -0.15	±2.5	+2.5 -1.0	±1.28	+0.02 -0.11	±0.25
*SRM Burn	TBD	TBD	TBD	TBD	TBD	TBD
*Aeropass	TBD	TBD	TBD	TBD	TBD	TBD
Landing Normal (9.6 fps)	±2.5	±1.5	+6.2 -1.7	±10.0	±15.1	±10.0
Landing Abort (6.0 fps)	±1.6	±1.3	+3.9 -1.1	±8.3	±9.4	±6.3
Emergency Landing (Ultimate Load)	+4.5 -1.5	±1.50	+4.5 -2.0			
On-Orbit PRCS	+.017 -.009	±.009	+.039 -.029	±.019	+.023 -.015	±.013
OMS Operation	-.273	±.0048	-.089	±.0104	±.0051	±.0045

Notes: * For subsequent stress analysis of internal loads, the signs of the table should be reversed.

4.2 LOAD CONDITIONS (CONT'D)

The method of solution as discussed previously, involves using an inertial relief solution in NASTRAN that depends on an accurate representation in the model of the vehicle mass and inertia properties. The structural mass for the Carrier Vehicle panels, splice section bars and cylinder were calculated from an input density and the crossectional areas specified on the property cards. The non-structural mass for the mounted equipment, the SRM, and the aerobrake were assigned via CONM2 cards at the location given in the mass properties table. The NASTRAN program calculates and provides a summary of the total model mass and moment of inertia when the program executes. As can be seen in the following table, the agreement between the model and the original mass property estimates is very close.

TABLE 4.2.2 MASS PROPERTIES SUMMARY TABLE

AFE WITH SRM

	WT DOCUMENT	NASTRAN MODEL	% DIFFERENCE
MASS (lb)	12540.4	12534.3	0.05
INERTIAS (slug-ft^2)			
Ixx	2525.6	2540.6	-0.59
Iyy	1911.6	1921.3	-0.51
Izz	1798.1	1826.2	-1.56

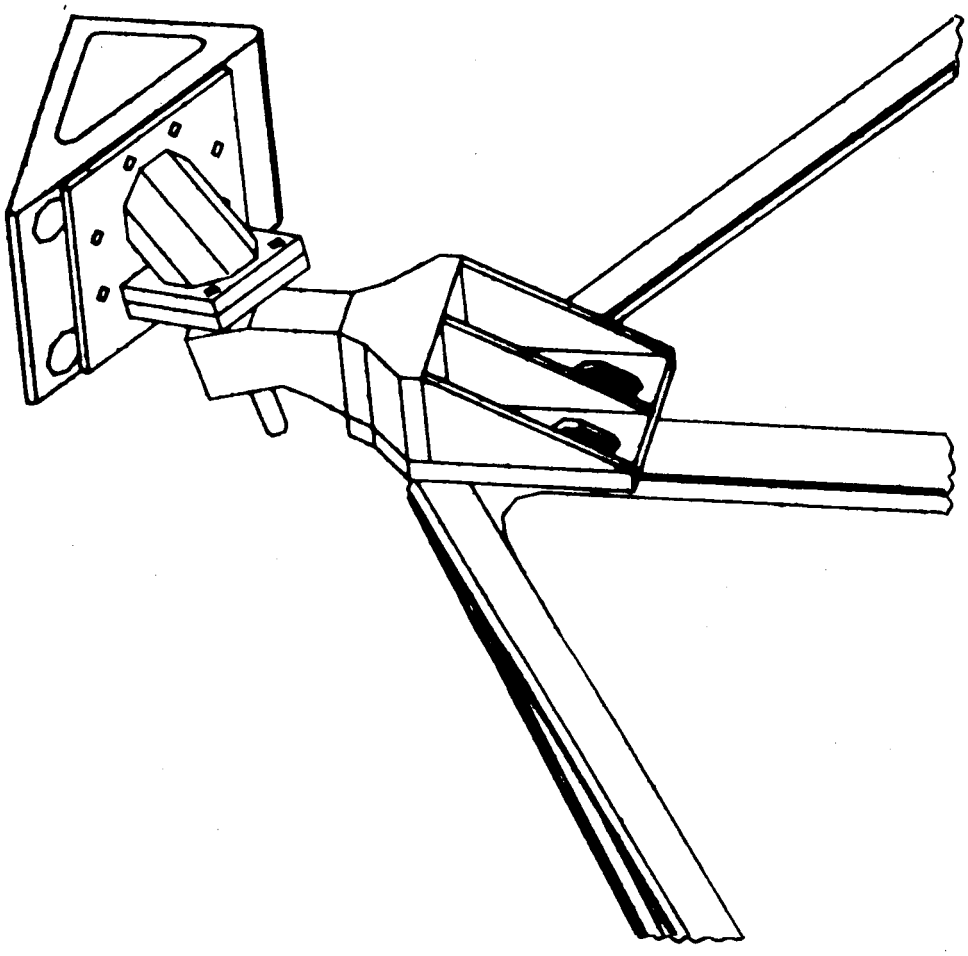
AFE W/O SRM

	WT DOCUMENT	NASTRAN MODEL	% DIFFERENCE
MASS (lb)	3567.4	3585.2	-0.50
INERTIAS (slug-ft^2)			
Ixx	1726.4	1742.9	-0.96
Iyy	1106.2	1105.5	0.06
Izz	980.8	1010.7	-3.05

Prepared by: INGRAM	Date 3-4-88	LOCKHEED MISSILES & SPACE COMPANY, INC.	Page 5.1.1 Temp Perm
Checked by	Date	Title AFE CARRIER VEHICLE STRESS ANALYSIS	Model AFE
Approved by	Date		Report No

5.1 AEROBRAKE ATTACH FITTING ANALYSIS

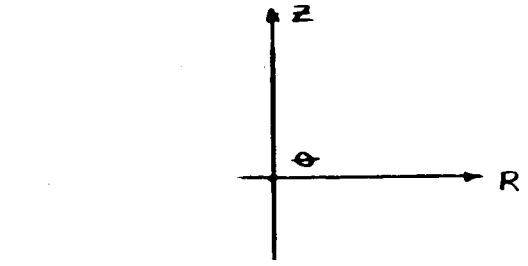
ORIGINAL PAGE IS
OF POOR QUALITY



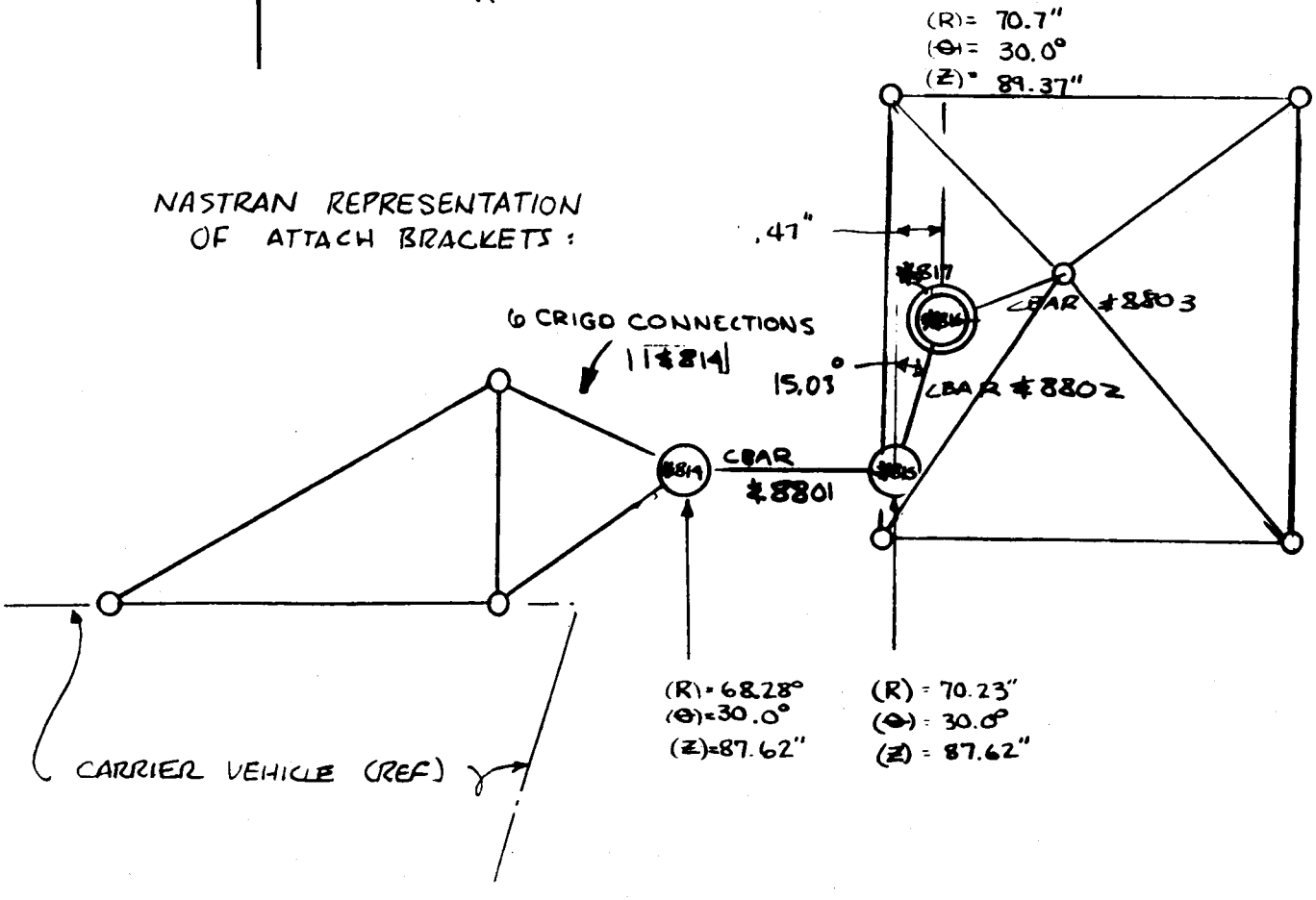
FORM LMSC 362 B-3

5.1 AEROBRAKE ATTACH FITTING ANALYSIS

– NASTRAN ELEMENTS REPRESENTING ATTACH FITTINGS



NASTRAN REPRESENTATION OF ATTACH BRACKETS:



Prepared by: INGRAM Date: 3-4-88
Checked by: Date:
Approved by: Date:

LOCKHEED MISSILES & SPACE COMPANY, INC.

Title: AFE CARRIER VEHICLE STRESS ANALYSIS

Model: AFE
Report No.

Page: 5.1.2

5.1 AEROBRAKE ATTACH FITTING ANALYSIS (CONT'D)

AEROBRAICE ATTACH BRACKET BAR X8801 FORCES ~ LIFT-OFF CONDITION

BRACKET LOCATION	CBAR ELEM	END	M_1	M_2	V_1	V_2	P	T
• BAY 1/6	18801	a	9,435.9	-3,208.8	3,671.7	-1,326.0	-316.3	-2,319.8
		b	2,276.0	-623.0				
BAY 1/2	28801	a	-8,306.4	-6,536.5	-4,826.4	-2,701.3	-1,926.9	-4,724.7
		b	1,105.1	-1,268.9				
• BAY 3/4	48801	a	-9,754.8	6,080.6	-5,107.8	2,513.1	-1,486.8	4,394.0
		b	205.4	1,180.1				
BAY 4/5	58801	a	7,237.8	5,056.4	3,744.4	2,090.1	1,041.8	3,651.9
		b	-63.7	980.8				

$\Sigma =$ -2,518.0 LB (VERT)

• => MOST HIGHLY LOADED (CRITICAL) BRACKETS.

5.1 AEROBRAKE ATTACH FITTING STRESS ANALYSIS (CONT'D)

AEROBRAKE ATTACH BRACKET BAR x8801 FORCES ~ LANDING ABORT CONDITION

BRACKET LOCATION	CBAR ELEM	END	M_1	M_2	V_1	V_2	P	T
BAY 1/6	18801	a	-4,651.3	4,315.8	-3,221.7	1,783.6	-1795.8	3,119.6
		b	1,631.0	837.8				
BAY 1/2	28801	a	2,278.5	1,781.4	1,205.9	736.4	366.0	1,286.0
		b	-73.0	345.4				
BAY 3/4	48801	a	3,672.4	-587.7	1,145.5	-242.8	-514.9	-425.3
		b	1,438.6	-114.2				
BAY 4/5	58801	a	-4043.6	-4,459.1	-3,082.5	-1842.7	-1,951.5	-3223.9
		b	1,967.3	-865.8				

Σ = -3952.8 LB (VERT)

5.1 AEROBRAKE ATTACH FITTING ANALYSIS (CONT'D)

AEROBRAKE ATTACH BRACKET BAR X8801 FORCES ~ NORMAL LANDING CONDITION

BRACKET LOCATION	CBAR ELEM	END	M_1	M_2	V_1	V_2	P	T
BAY 1/6	18801	a	-7,919.9	5,190.4	-4,677.7	2,145.1	-1,940.6	3,751.5
		b	1,201.6	1,007.6				
BAY 1/2	28801	a	611.7	3,425.4	1,286.9	1,415.9	1,430.9	2,473.8
		b	-1,897.8	664.4				
BAY 3/4	48801	a	5,266.6	-1,561.6	2,060.0	-645.2	-161.4	-1,129.9
		b	1,249.5	-303.5				
BAY 4/5	58801	a	-9,083.5	-5,407.8	-5,194.6	-2,234.7	-1,992.0	-3,909.9
		b	1,046.0	-1,050.1				

$\Sigma =$ -6,525.4 LB (VERT)

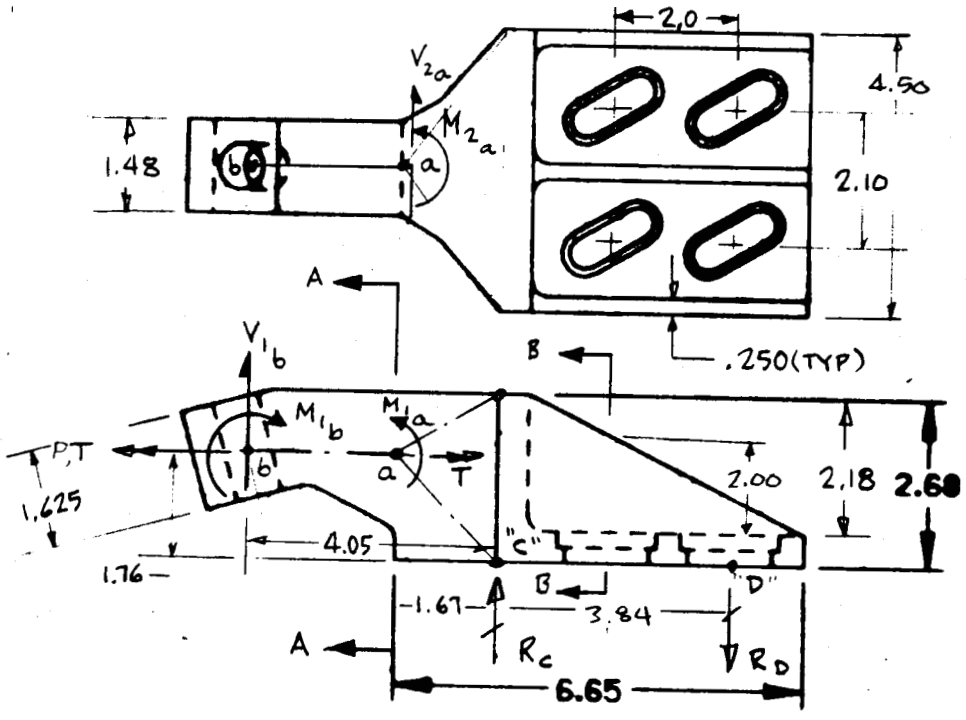
JEI 3-4-88

AFE CARRIER VEHICLE STRESS ANALYSIS

LOCKHEED CORP

5.1.5 AFE CV

5.1 AEROBRAKE ATTACH FITTING ~ CV SIDE



P_a = -1486.8 lb

$V_{1a} = V_{1b}$ = -5,107.8 lb

M_{1a} = -9,754.8 in-lb

M_{2a} = 6080.6 in-lb

$V_{2a} = V_{2b}$ = 2,513.1 lb

T_a = 4394.0 in-lb

CRITICAL LOADS FOR END "a"
REF AFE NASTRAN MODEL
LIFT-OFF LOADS FOR
BAY 3/4 FTG (CBAR 48801)

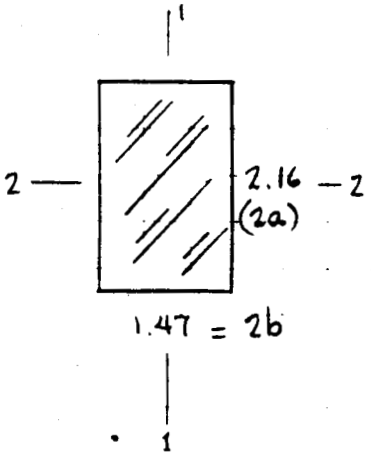
P_b = -316.3 lb
V_{1b} = 3671.7 lb
V_{2b} = -1326.0 lb
M_{1b} = 2276.0 in-lb
M_{2b} = -623.0 in-lb
T_b = -2319.8 in-lb

CRITICAL LOADS FOR END "b"
REF. AFE NASTRAN MODEL
LIFT-OFF LOADS FOR
BAY 1/6 FTG (CBAR 18801)

ORIGINAL PAGE IS
OF POOR QUALITY

5.1 AEROBRAKE ATTACH FITTING ~ CV SIDE (CONT'D)

BENDING STRESSES AT SECTION A-A:



MIN DIMENSIONS:

$$I_1 = \frac{2.16(1.47)^3}{12} = .572 \text{ IN}^4$$

$$I_2 = \frac{1.47(2.16)^3}{12} = 1.235 \text{ IN}^4$$

$$A = 1.47(2.16) = 3.175 \text{ IN}^4$$

$$k = ab^3\left[\frac{16}{3} - 3.36\frac{b}{a}\left(1 - \frac{b^4}{12a^4}\right)\right]$$

$$k = 1.324$$

$$f_b = \frac{P}{A} + \frac{M_1 C_2}{I_1} + \frac{M_2 C_1}{I_2}$$

$$f_b = \frac{-1486.8}{3.175} + \frac{(-9,754.8)(1.08)}{1.235} + \frac{(6080.6)(-.735)}{.572}$$

$$f_b = -16,812 \text{ psi}$$

$$MS_{y\ BEND.} = \frac{51.0^{*}}{(1.25)(16.8)} - 1 = \underline{+ \text{HIGH}}$$

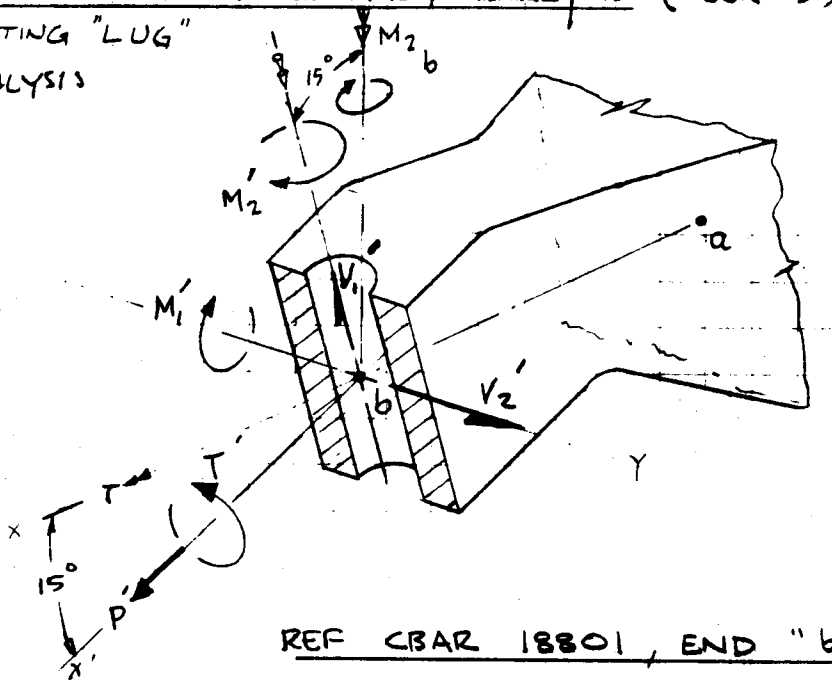
$$MS_{u\ BEND.} = \frac{63.0^{*\nabla}}{(2.0)(16.8)} - 1 = \underline{+.88}$$

∇ - USED F_{tu} FOR ULTIMATE MARGIN ASSUMING LOADS CAN REVERSE.

* ASSUMES MAT'L TO BE 2219-T87 AL.

5.1 AEROBRAKE ATTACH FITTING ANALYSIS (CONT'D)

- FITTING "LUG" ANALYSIS



REF CBAR 18801, END "b":

$M_1' = M_{1b} = 2276.0$ in-lb

$M_2' = M_{2b} \cos 15° - T \sin 15° \cong 0$ in-lb ✓

$T' = T \cos 15° + M_{2b} \sin 15° = -2402.0$ in-lb

$V_2' = V_{2b} = -1326.0$ lb

$V_1' = V_{1b} \cos 15° + P \sin 15° = 3464.7$ lb

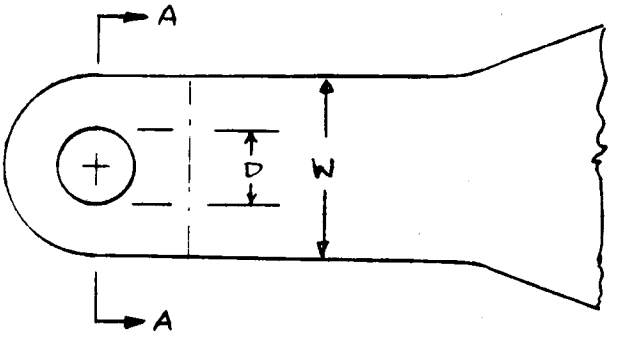
$P' = P \cos 15° - V_1 \sin 15° = -1,255.8$ lb

ANALYZE BENDING + AXIAL STRESSES AS EQUIVALENT AXIAL STRESS:

⇨ REF. SM NO 1e:

LUG PARAMETERS:

W = 1.47" (MIN)
D = .75" (MAX)
t = 1.615" (MIN)

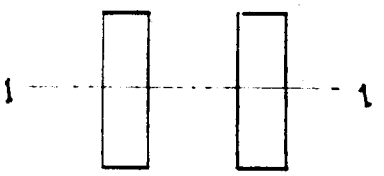


5.1 AEROBRAICE ATTACH FITTING ANALYSIS (CONT'D)

$\frac{W}{D} = 1.96 \Rightarrow k_{t_u} \simeq .835$ (REF FIG. 5a)

$\bar{P}_{tu} = K_t \cdot A_t \cdot F_{tu} = 61.2$ K

SECT A-A:



$I_1' = \frac{(1.47-.75)(1.615)^3}{12}$

$I_1' = .253$

$A_t = (1.47-.75)(1.615) = 1.163 in^2$

$f_b = \frac{M_1' c_2'}{I_1'}$

$f_b = \frac{2276\ (.8075)}{.253}$

$f_b = 7264.3$ psi

$\bar{P}_t = 7264.3(A_t) = 8448.4$ Lb

$\Rightarrow R_a = \frac{8448.4\ (2.0)}{61,200} = .276$

TRANSVERSE LOADING:

$\frac{a}{D} = \frac{W}{2D} = .98 \Rightarrow \frac{A_{av}}{A_{br}} = .565$ (REF FIG. 6c)

PIN-BEARING SECTION PROPERTIES:

$I_{BRG\ AREA} = \frac{.75(1.615)^3}{12} = .263\ in^4$

$A_{br} = .75(1.615) = 1.211\ in^2$

$f_{tr} = \frac{V_2'}{A_{br}} + \frac{T' c}{I_{br}}$

$f_{tr} = \frac{1326.0}{1.211} + \frac{(2402)(.8075)}{.263}$

$f_{tr} = 8469.9$ psi

$K_{tr_y} = K_{tr_u} = .690$

$P_{tr} = K_{tru} \cdot A_{br} \cdot f_{tu}$

$P_{tr} = .69\ (1.211)(63.0) = 52.64$ K

$\bar{P}_{tr} = 8469.9\ (1.615)(.75) = 10,259$ K

$R_{tr} = \frac{\bar{P}_{tr}\ (2.0)}{P_{tr}}$

$\Rightarrow R_{tr} = \frac{(10.26)(2.0)}{(52.64)} = .390$

5.1 AEROBRAKE ATTACH FITTING ANALYSIS (CONT'D)

- "LUG" ANALYSIS (CONT'D)

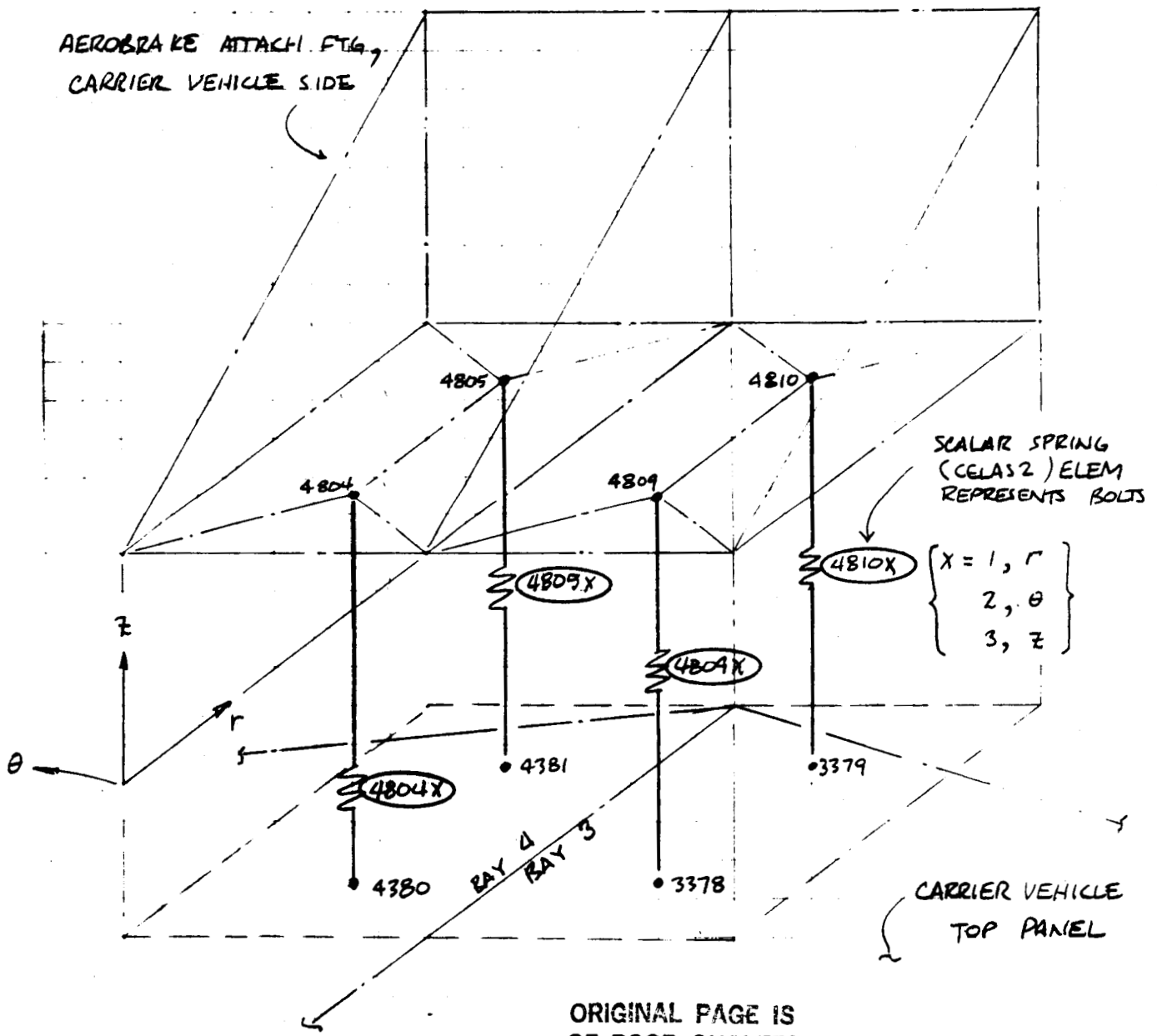
AXIAL, TRANSVERSE LOADING INTERACTION EQUATION[1]:

$$MS_u = \frac{1}{(Ra^{1.6} + R_{tr}^{1.6})^{.625}} - 1 = \underline{+.93}$$

OBLIQUE LOADING

AEROBRAKE / CARRIER VEHICLE ATTACH BOLTS

NASTRAN MODEL DETAIL OF ATTACH FTG TO CARRIER VEHICLE CONNECTION:



ORIGINAL PAGE IS OF POOR QUALITY

5.1 AEROBRAKE ATTACH FITTING ANALYSIS (CONT'D)

- FITTING / CARRIER VEHICLE ATTACH BOLTS

SUMMARY OF CELAS2 SPRING FORCES FOR LIFTOFF CONDITION *

(LIMIT FORCES IN Lb).

CELAS2 ELEM.	X =	F_r (1)	F_θ (2)	F_z (3)
4804X		1,755.2	1,851.0	7,482.4
4805X		1.926.2	-2,816.0	-5,962.8
4809X		-2,172.0	1,646.3	6,529.3
4810X		-2,977.9	-3,341.4	-13,166.9 ⇦
Σ =		-1,468.5	-2,660.1	-5,114.0

CRITICAL FASTENER IS 4810X

TOTAL SHEAR, $V = \left[(2977.9)^2 + (3341.4)^2\right]^{1/2} = 4475.8$ Lb

"TENSION" ** $= F_z = 13,166.9$ Lb

ASSUMING FASTENER SELECTED IS 1/2" DIA 180 KSI - TENSION (108 KSI - SHEAR) MS 21250 TENSION BOLT OR EQUIV:

$$P_{tu} = 180\left(\frac{\pi}{4}D^2\right) = 35.343 \text{ KIP}$$

$$P_{su} = 108\left(\frac{\pi D^2}{4}\right) = 21.206 \text{ KIP}$$

$$R_t = \frac{2.0(13,167)}{35.343} = .745$$

$$R_s = \frac{2.0(4,476)}{21.206} = .422$$

** ASSUMING LOADS CAN BE REVERSIBLE.

* DETERMINED TO BE MOST CRITICAL CONDITION FOR THIS STRUCTURE

5.1 AEROBRAKE ATTACH FITTING ANALYSIS (CONT'D)

- FITTING / CARRIER VEHICLE ATTACH BOLT ANALYSIS (CONT'D)

BOLT TENSION, SHEAR INTERACTION:

(REF NASA STRUCTURES MANUAL, TABLE A.3.4.0-1)

$$k^3 R_s^3 + k^2 R_t^2 = 1$$

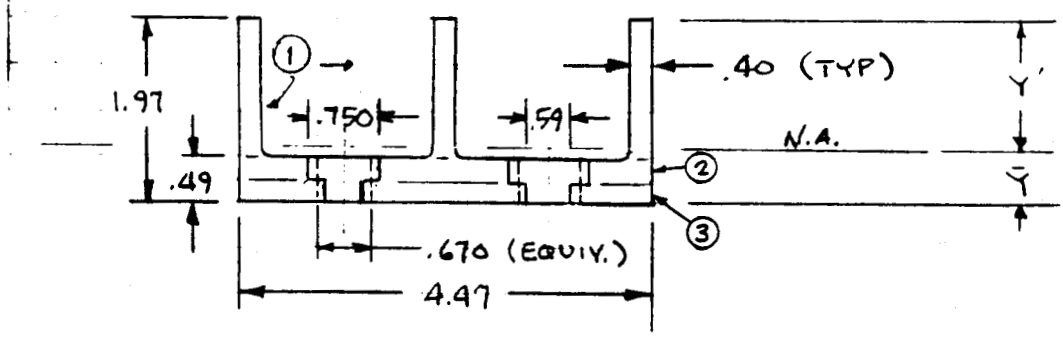
$$k^3(.422)^3 + k^2(.745)^2 = 1$$

BY TRIAL, $K = 1.24$

$$MS_{\text{TENS-SHEAR}} = k - 1 = +.24$$

BENDING ANALYSIS OF ATTACH FTG, (CV SIDE)

REF SECTION B-B, PG 5.1.6:



ELEM	A	Y	AY	AY^2	I_o
①	1.7760	1.2300	2.1845	2.6869	.3242
②	.7277	.3675	.2674	.0983	.0036
③	.8061	.1225	.0987	.0121	.0040
Σ	3.3098		2.5506	2.7973	.3318

$$\bar{Y} = \frac{\Sigma AY}{\Sigma A} = \frac{2.5506}{3.3098} = .7706 \text{ IN}$$

$$I_c = \Sigma Ay^2 + \Sigma I_o - (\Sigma A)(\bar{Y})^2 = 1.1636 \text{ IN}^4$$

ORIGINAL PAGE IS OF POOR QUALITY

5.1 AEROBRAKE ATTACH FITTING ANALYSIS (CONT'D)

BENDING ANALYSIS OF CV FITTING (CONT'D)

$$f_b = \frac{M_Y'}{I} = \frac{(7486.4 + 6529.3)(2.0)(1.97-.771)}{1.164}$$

$$f_b = 28,874 \text{ psi}$$

$$MS_{Y\ BEND.} = \frac{51.0}{1.25\,(28.9)} - 1 = \underline{+.41}$$

$$MS_{U\ BEND} = \frac{63.0}{2.0\,(28.9)} - 1 = \underline{+.09}$$

ALLOWABLE CRIPPLING STRESS OF UP-STANDING FLANGE (ONE EDGE FREE)
(REF NASA STRUCTURES MANUAL, SECT 4.21)

$$F_{cc} = \frac{C_e \sqrt{F_{cy} \cdot E_c}}{(b/t)^{.75}}$$

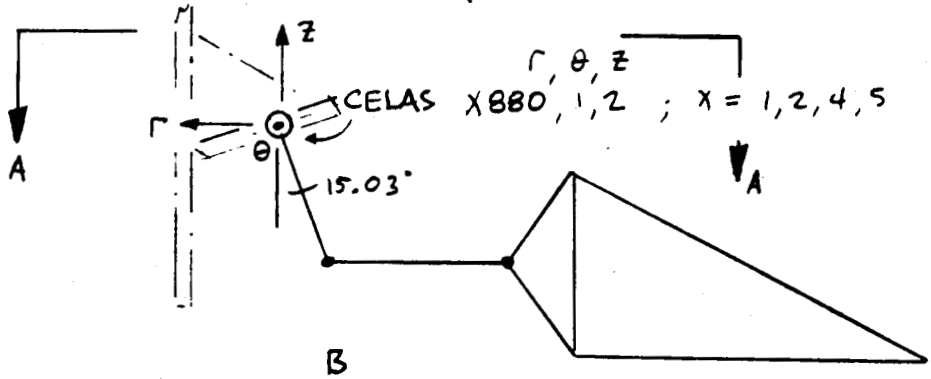
$$F_{cc} = \frac{.275\,(51E3 \cdot 10.8E6)^{1/2}}{\left(\frac{1.97-.567}{.40}\right)^{.75}}$$

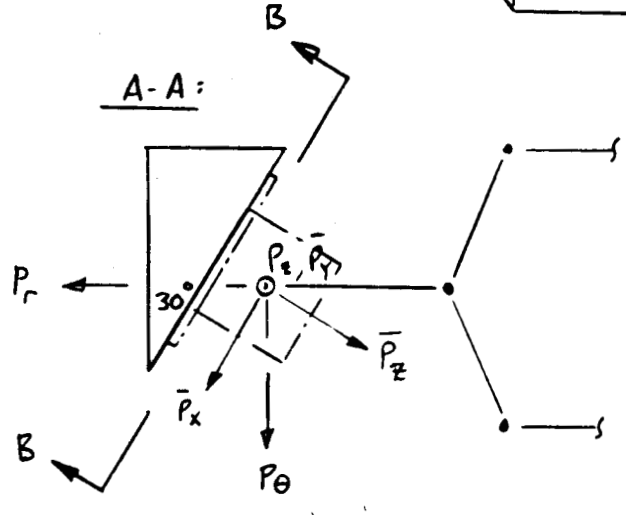
$F_{cc} = 79.6$ KSI $\Rightarrow$ CRIPPLING O.K.

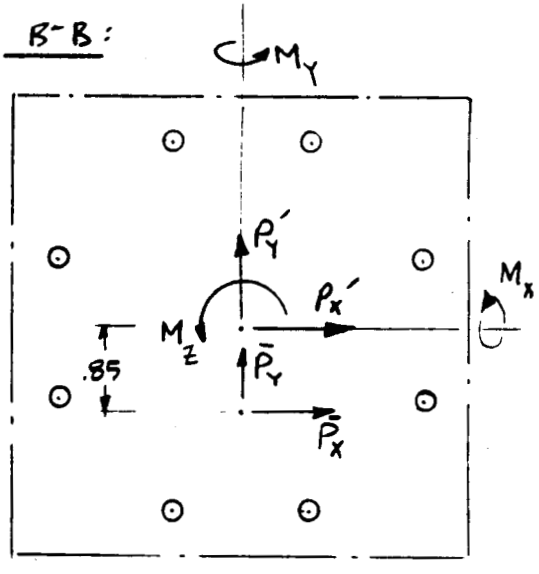
ORIGINAL PAGE IS
OF POOR QUALITY

5.1 ATTACH FITTING ANALYSIS - AEROBRAKE SIDE

SUMMARY OF BALL & SOCKET TRANSLATIONAL FORCES







$$\bar{P}_x = P_\theta \cos 30^\circ + P_r \sin 30^\circ$$

$$\bar{P}_z = P_\theta \sin 30^\circ - P_r \cos 30^\circ$$

$$\bar{P}_Y = P_z$$

I. LIFTOFF:

$$M_z = \bar{P}_x (.85)$$

BAY	P_r	P_θ	P_z	$\bar{P}_x$	$\bar{P}_Y$	$\bar{P}_z$	M
1/c	313.3	-1,325.3	-3,672.6	-991.1	-3672.6	-934.0	-842.4
1/2	1,927.2	-2,699.1	4,822.8	-1373.9	4822.8	-3018.6	-1167.8
3/4	1,489.7	2,509.8	5,105.1	2918.4	5105.1	-35.2	2480.6
4/5	-1,042.1	2085.2	-3744.2	1284.8	-3744.2	1945.1	1092.1

TOM 3-10-88 S.1.15

AFE CARRIER VEHICLE AFE
STRESS ANALYSIS

II LANDING ABOART

BAY	P_r	P_θ	P_z	$\bar{P}_x$	$\bar{P}_y$	$\bar{P}_z$	M
1/6	1797.2	1782.2	3218.9	2442.0	3218.9	-665.3	2075.7
1/2	-365.8	734.0	-1207.3	452.8	-1207.3	683.8	384.9
3/4	513.4	-243.1	-1148.2	46.2	-1148.2	-566.2	39.3
4/5	1951.2	-1842.0	3078.4	-619.6	3078.4	-2610.8	-526.7

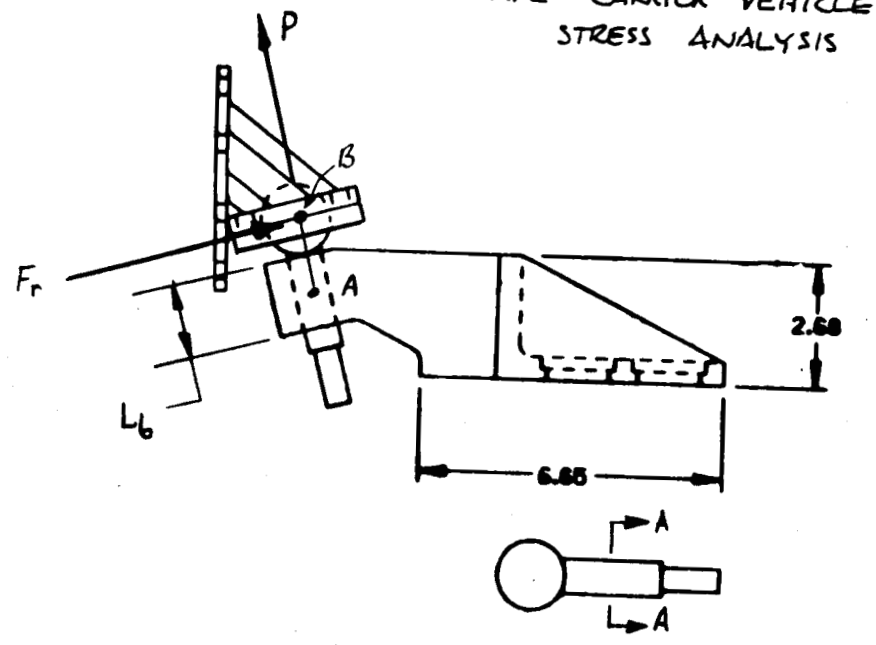
III REGULAR LANDING

BAY	P_r	P_θ	P_z	$\bar{P}_x$	$\bar{P}_y$	$\bar{P}_z$	M
1/6	1942.7	2143.1	4672.8	2827.3	4672.8	-610.9	2403.2 ⇦
1/2	-1430.4	1412.5	-1289.6	508.1	-1289.6	1945.0	431.9
3/4	159.3	-645.9	-2064.2	-479.7	-2064.2	-460.9	-407.7
4/5	1991.6	-2233.9	5188.3	-938.8	5188.3	-2841.7	-798.0

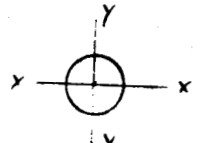
TOM 3-10-88

5.1.16
AFE

AFE CARRIER VEHICLE STRESS ANALYSIS

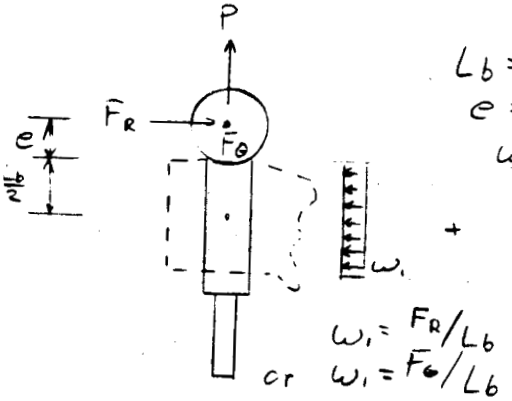


Section A-A



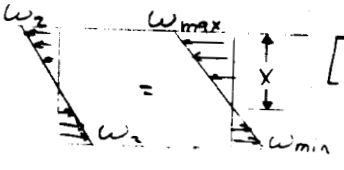
$I_{xx} = I_{yy} = 1/4\ \pi (.375)^4 = 1.55\ E\text{-}2$ in⁴

$A = \pi r^2 = \pi (.375)^2 = 4.42E\text{-}1$ in²



L_b = length of bearing = 1.60"

$e = 0.85$"



$\left[\frac{1}{2}\left(\frac{1.60}{2}\right)\omega_2\left(\frac{1.60}{3}\right)\right] 2 = F_R(1.65)$

$0.4267\ \omega_2 = M$

$\omega_2 = 2.34\ M$

$\omega_1 = F_R/L_b$
or $\omega_1 = F_\theta/L_b$

where $M = F_R(1.65)$
or $M = F_\theta(1.65)$

element X8RC2, X = 1, 2, 4, 5, ball at end B

$\omega_{max} = \omega_1 + \omega_2$

$\omega_{min} = \omega_2 - \omega_1$

ORIGINAL PAGE IS
OF POOR QUALITY

AFE CARRIER VEHICLE STRESS ANALYSIS AFE

5.1 AEROBRAKE ATTACH FITTING ANALYSIS (CONT'D)

$$\frac{X}{L_b - X} = \frac{\omega_{max}}{\omega_{min}}$$

ORIGINAL PAGE IS OF POOR QUALITY

$$X\omega_{min} = (L_b - X)\omega_{max}$$

$$X(\omega_{min} + \omega_{max}) = L_b\omega_{max}$$

$$X = \frac{L_b\omega_{max}}{\omega_{max} + \omega_{min}} = \text{constant} = \frac{1.60(8193)}{(8193+5910)} = 0.93 \text{ in}$$

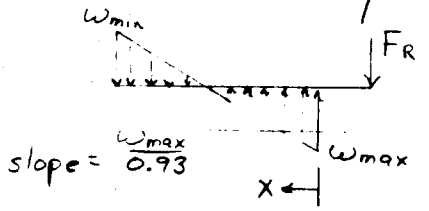
$F_{RESULTANT}$	Load Case		
Bay ↓	I	II	III
1/6	1826	1997	2244
1/2	2768 *	736	1759
3/4	2513	830	945
4/5	2087	2138	2308

* highest F

If X is measured as shown, $0 \le X \le 0.93$ in

shear eq'n $V = -F_R + \frac{1}{2}\left[\omega_{max} + \left(\omega_{max} - X\left(\frac{\omega_{max}}{0.93}\right)\right)\right]X$

$$= -F_R + \omega_{max}X - \frac{X^2\omega_{max}}{1.86}$$



M_{max}, $(V = 0)$: $0 = -2768 + 12416X - \frac{X^2(12416X)}{1.86}$

$$6675X^2 - 12416X + 2768 = 0$$

$X = 1.60$

$X = 0.259$ ← use

$M_{max} = 2768 \text{ lb}(0.85 + 0.259) = 3.07$ k-in

$$f_b = \frac{P}{A} + \frac{Mc}{I}$$

AFT CARRIER VEHICLE
STRESS ANALYSIS

5.1 AEROBRAKE ATTACH FITTING ANALYSIS (CONT'D)
- ATTACH PIN ANALYSIS (CONT'D)

$$f_b = \frac{5159}{0.442} + \frac{3.07E3(3/8)}{1.55E-2} = 85.9 \text{ ksi}$$

Assuming A286 steel pin 180 ksi = F_{tu}

$$MS_u = \frac{180}{2.0(85.9)} - 1 = +0.05$$

$$MS_y = \frac{163}{1.25(85.9)} - 1 = +0.52$$

FORM LMSC 362 B 3

Originated by T.O.M. Date 3-8-88 | Checked by Date | Approved by Date

LOCKHEED MISSILES & SPACE COMPANY, INC.

Title AFE CARRIER VEHICLE STRESS ANALYSIS

Model AFE | Report No.

Page 5.1.19

5.1 AEROBRAKE ATTACH FITTING ANALYSIS (CONT'D)

- SUMMARY OF RESULTANT PIN BEARING LOADS

ORIGINAL PAGE IS OF POOR QUALITY

I LIFTOFF

Bay	P	F_R	F_θ	F_R W_1	F_R W_2	F_R W_{max}	F_R W_{min}	F_θ W_1	F_θ W_2	F_θ W_{max}	F_θ W_{min}	Resultant W_{max}	Resultant W_{min}
1/6	3465.1	1256.1	1325.6	785.1	4849.8	5635	4065	828.5	5118.1	5947	4290	8193	5910
1/2	5158.7	609.9	2699.8	381.2	2354.8	2736	1974	1687.4	10,424	12111	8737	12416	8957
3/4	5317.4	113.4	2510.9	70.9	432.8	509	367	1569.3	9695	11264	8126	11275	8134
4/5	3886.4	35.2	2086.8	22.0	135.9	158	114	1304.3	8057	9361	6753	9362	6754

II LANDING ABORT

Bay	P	F_R	F_θ	F_R W_1	F_R W_2	F_R W_{max}	F_R W_{min}	F_θ W_1	F_θ W_2	F_θ W_{max}	F_θ W_{min}	Resultant W_{max}	Resultant W_{min}
1/6	3575.7	900.1	1782.7	562.6	3475.3	4037.9	2913	1114.2	6883.0	7997	5769	8959	6463
1/2	1260.4	40.3	734.8	25.2	155.6	180.8	130.4	459.3	2837.1	3296	2378	3301	2382
3/4	974.8	793.9	243.0	496.2	3065.2	3561	2569	151.9	938.2	1090	786	3724	2687
4/5	3480.5	1085.7	1842.2	678.6	4191.9	4870.5	3513	1151.4	7112.7	8264	5961	9592	6919

III REGULAR LANDING

Bay	P	F_R	F_θ	F_R W_1	F_R W_2	F_R W_{max}	F_R W_{min}	F_θ W_1	F_θ W_2	F_θ W_{max}	F_θ W_{min}	Resultant W_{max}	Resultant W_{min}
1/6	5018.1	663.1	2143.7	414	2560	2974	2146	1340	8277	9617	6937	10,066	7261
1/2	1615.7	1047.3	1413.6	655	4044	4699	3389	884	5458	6342	4574	7893	5693
3/4	1950.7	689.6	645.7	431	2663	3094	2232	404	2493	2897	2089	4239	3057
4/5	5529.3	577.3	2134.2	361	2229	2590	1868	1396	8626	10022	7230	10,351	7467

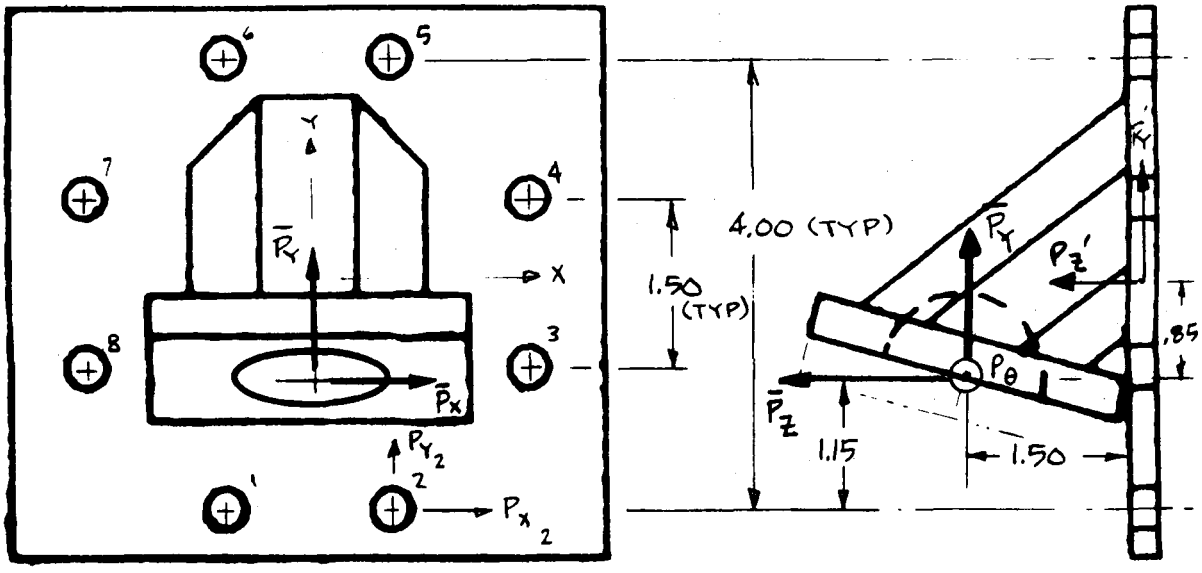
AFE CARRIER VEHICLE AFE

STRESS ANALYSIS

5.1 AEROBRAKE ATTACH FITTING ANALYSIS (CONT'D)

- AEROBRAKE SIDE ; ATTACH FASTENER ANALYSIS

ORIGINAL PAGE IS OF POOR QUALITY



FITTING ATTACH BOLT SHEAR FORCES:

BOLT	x	Y	x^2	Y^2	P_{cx}	P_{ex}	P_x	P_{cY}	P_{eY}	P_Y	RESULTANT P
1	-.75	-2.0	.5625	4.0	353.4	+294.6	648.0	584.1	-110.5	473.6	802.6
2	.75	-2.0	.5625	4.0		+294.6	648.0		+110.5	694.6	949.9
3	2.0	-.75	4.0	.5625		+110.5	463.9		+294.6	878.7	993.6 ⇦
4	2.0	.75	4.0	.5625		-110.5	242.9		+294.6	878.7	911.7
5	.75	2.0	.5625	4.0		-294.6	58.8		+110.5	694.6	697.1
6	-.75	2.0	.5625	4.0		-294.6	58.8		-110.5	473.6	477.2
7	-2.0	.75	4.0	.5625		-110.5	242.9		-294.6	289.5	377.9
8	-2.0	-.75	4.0	.5625	353.4	+110.5	463.9	584.1	-294.6	289.5	546.8
Σ			18.25	18.25			2827.2			4672.8	

REF BAY 1/6, REGULAR LANDING: $P_X' = 2827.3$ Lb, $P_Y' = 4672.8$ Lb, $M = 2403.2$ in.lb } FORCES AT BOLT PATTERN CG.

LARGEST SHEAR FORCE ON FAST'R # 3 = 993.6 Lb (LIM)

5.1 AEROBRAKE ATTACH FITTING ANALYSIS (CONT'D)
– AEROBRAKE ; ATTACH FASTENER ANALYSIS

TENSION LOADS :

ORIGINAL PAGE IS
OF POOR QUALITY

$$P_t = \frac{\bar{P}_z}{8} + \frac{M_x(Y)}{\Sigma x^2 + \Sigma y^2} + \frac{M_y(x)}{\Sigma x^2 + \Sigma y^2}$$

	LIFTOFF			LANDING ABORT			REGULAR LANDING		
BAY	$\bar{P}_z$	M_x	M_y	$\bar{P}_z$	M_x	M_y	$\bar{P}_z$	M_x	M_y
1/6	-934.0	-5508.9	-1486.7	-665.3	4828.4	3663.0	-610.9	7009.2	4241.0
1/2	-3018.6	7234.2	-2060.9	683.8	-1811.0	679.2	1945.0	-1934.4	762.2
3/4	-35.2	7657.7	4377.6	-566.2	-1722.3	69.3	-460.9	-3096.3	-719.6
4/5	1945.1	-5616.3	1927.2	-2610.8	4617.6	-929.4	-284.1	7782.5	-1408.2

$M_x = \bar{P}_Y (1.50)$ $\quad M_y = \bar{P}_x (1.50)$

$$P_t = \frac{\bar{P}_z}{8} + \frac{M_x(Y)}{36.5} + \frac{M_y(x)}{36.5}$$

LIFT OFF, BAY 1/2:

$$P_t = \frac{-3018.6}{8} + \frac{7234.2(-2)}{36.5} + \frac{(-2060.9)(.75)}{36.5} = -816.1 \text{ lb}$$

ASSUMING LOADS CAN BE REVERSIBLE, P_t = 816.1 lb (LIM-TENS)

CONSERVATIVELY ASSUME MAX SHEAR CALCULATED EARLIER AND MAX TENSION FORCES ACT ON SAME FASTENER.

5.1 AEROBRAKE ATTACH FITTING ANALYSIS (CONT'D)
ATTACH FASTENERS - AEROBRAKE SIDE (CONT'D)

ASSUME $\frac{1}{4}$" DIA 95 KSI SHEAR, 160 KSI TENSION FASTR

$$P_{tu} = (160)\left(\frac{\pi D^2}{4}\right) = 7.854 \text{ KIP}$$

$$P_{su} = (95)\left(\frac{\pi D^2}{4}\right) = 4.663 \text{ KIP}$$

$$R_t = \frac{2.0(816.1)}{7854} = .2078$$

$$R_s = \frac{2.0(993.6)}{4663} = 0.4262$$

SHEAR-TENSION INTERACTION:

$$k^3 R_s^3 + k^2 R_t^2 = 1$$

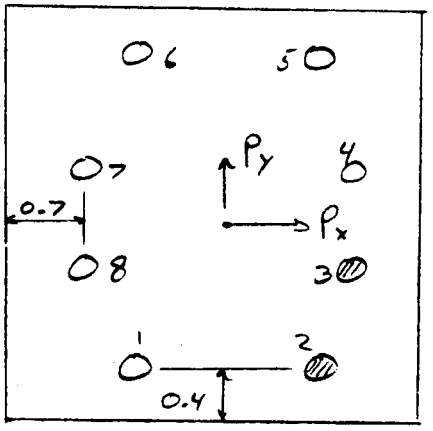
$$k^3(.0774) + k^2(.0432) = 1$$

$$\Rightarrow k = 2.17$$

$$MS_{\text{TENS.-SHEAR}} = K - 1 = \underline{+ 1.17}$$

AFE CARRIER VEHICLE STRESS ANALYSIS

S.1 AEROBRAKE ATTACH FITTING ANALYSIS (CONT'D)



$t = 0.25$

ORIGINAL PAGE IS OF POOR QUALITY

TEAROUT STRESS

largest P_x (per hole) = 464 lb for holes 3, 4, 7, 8

" P_y (" ") = 695 lb " " 1, 2, 5, 6

$F_{su} = 37$ ksi for plate $A_s = 2t\left(e - \frac{d}{2}\right)$

Y-direction

$e/D = 0.4/0.375 = 1.07$ (used $e = 1.5$ in table)

$$f_s = P/A_s = \frac{695\ lb}{2(.25)(0.4 - .1875)} = 6.54\ ksi$$

$$MS_u = \frac{37}{2.0(6.54)} - 1 = +1.8$$

X-direction

$e/D = 0.7/.375 = 1.87$ (used $e/D = 1.5$)

$$f_s = P/A_s = \frac{464}{2(.25)(0.7 - .1875)} = 1.81\ ksi$$

$$MS_u = \frac{37}{2.0(1.81)} - 1 = +9.2$$

TOM 3/10/88

5.1.24

AFE CARRIER VEHICLE
STRESS ANALYSIS

AF1

BEARING STRESS

max $P_{resultant}$ = 994 lb @ hole 3

$$f_b = P/A_b = \frac{994}{(.375)(.25)} = 10.6 \text{ ksi}$$

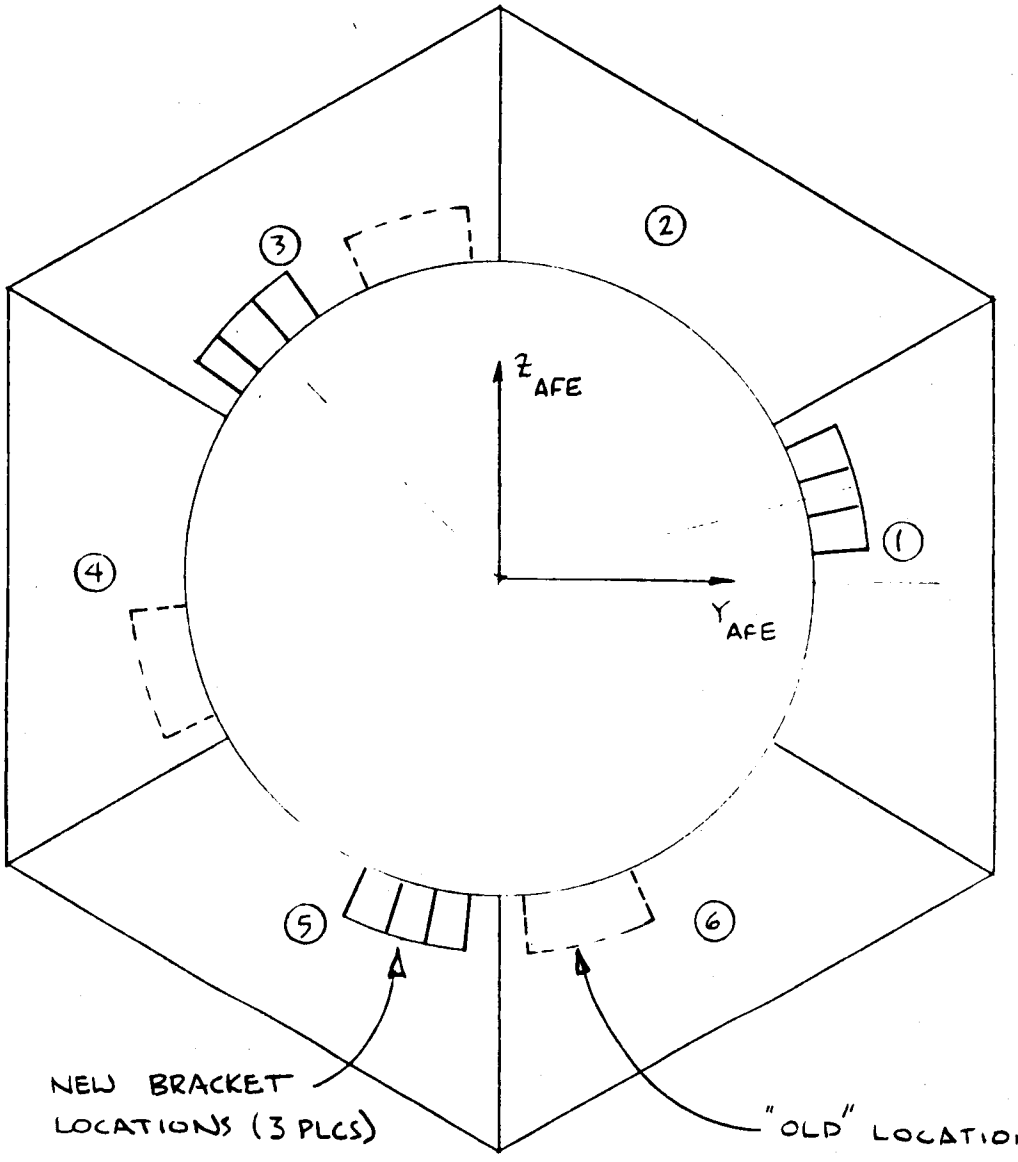
F_{bru} = 99 ksi
F_{bry} = 83 ksi
} $e/D = 1.5$

$$MS_u = \frac{99}{2.0(10.6)} - 1 = +3.7$$

$$MS_y = \frac{83}{1.25(10.6)} - 1 = +5.3$$

Prepared by: INGRAM	Date 4-26-88	LOCKHEED MISSILES & SPACE COMPANY, INC.	Page 5.2.1 Temp Perm
Checked by:	Date	Title: AFE CARRIER VEHICLE - SRM SUPPORT STRUCTURE	Model: AFE
Approved by:	Date		Report No.

5.2 SOLID ROCKET MOTOR (SRM) ATTACH BRACKETS

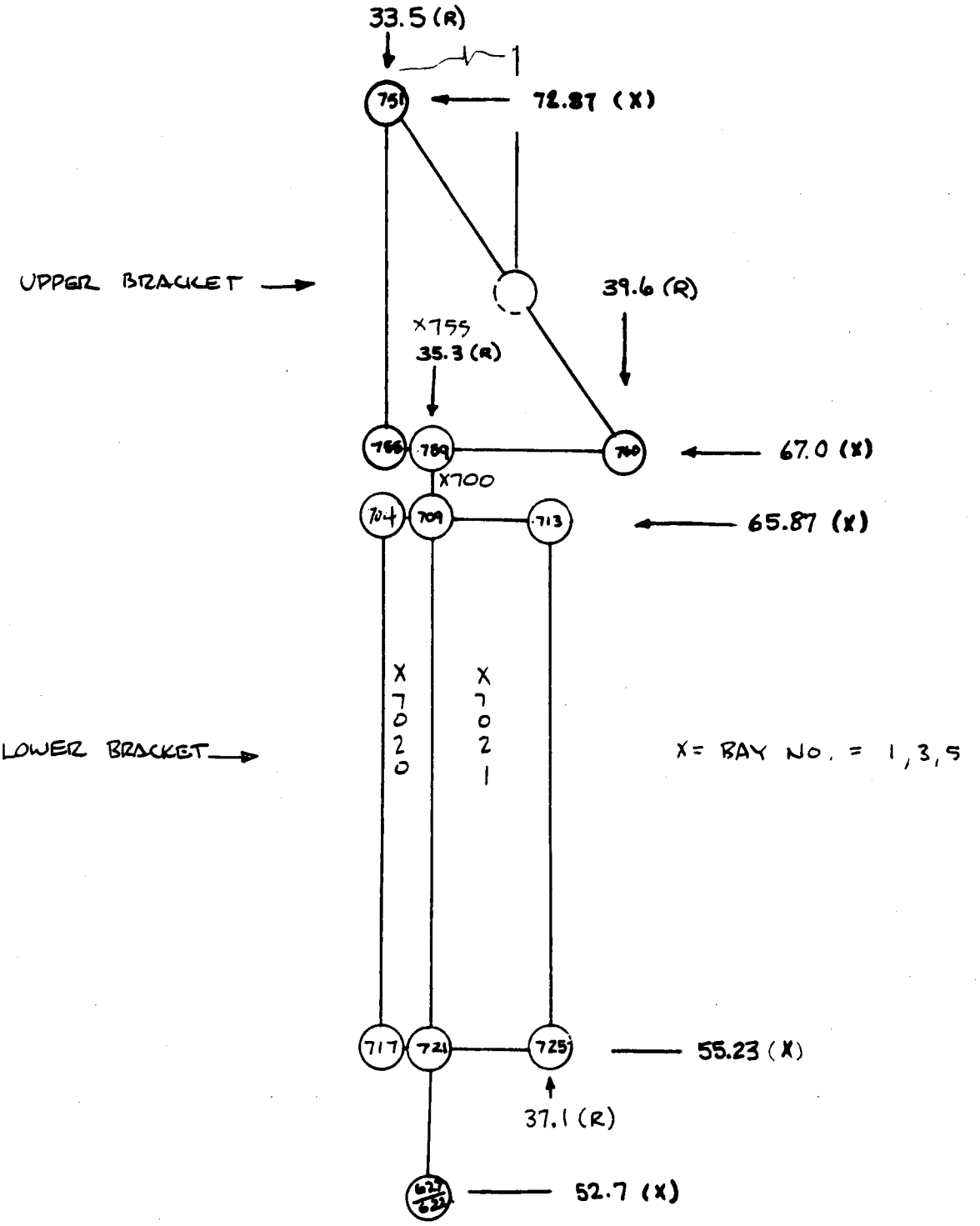


- PLAN VIEW OF CARRIER VEHICLE SHOWING NEW LOCATION OF SRM SUPPORT BRACKETS

FORM LMSC 362 8 3

Prepared by:	Date	LOCKHEED MISSILES & SPACE COMPANY, INC.	Page 5.2.2
INGRAM	4-26-88		
Checked by	Date	Title	Model AFE
		AFE CARRIER VEHICLE - SRM SUPPORT STRUCTURE	
Approved by:	Date		Report No

5.2 SRM ATTACH BRACKETS (CONT'D)

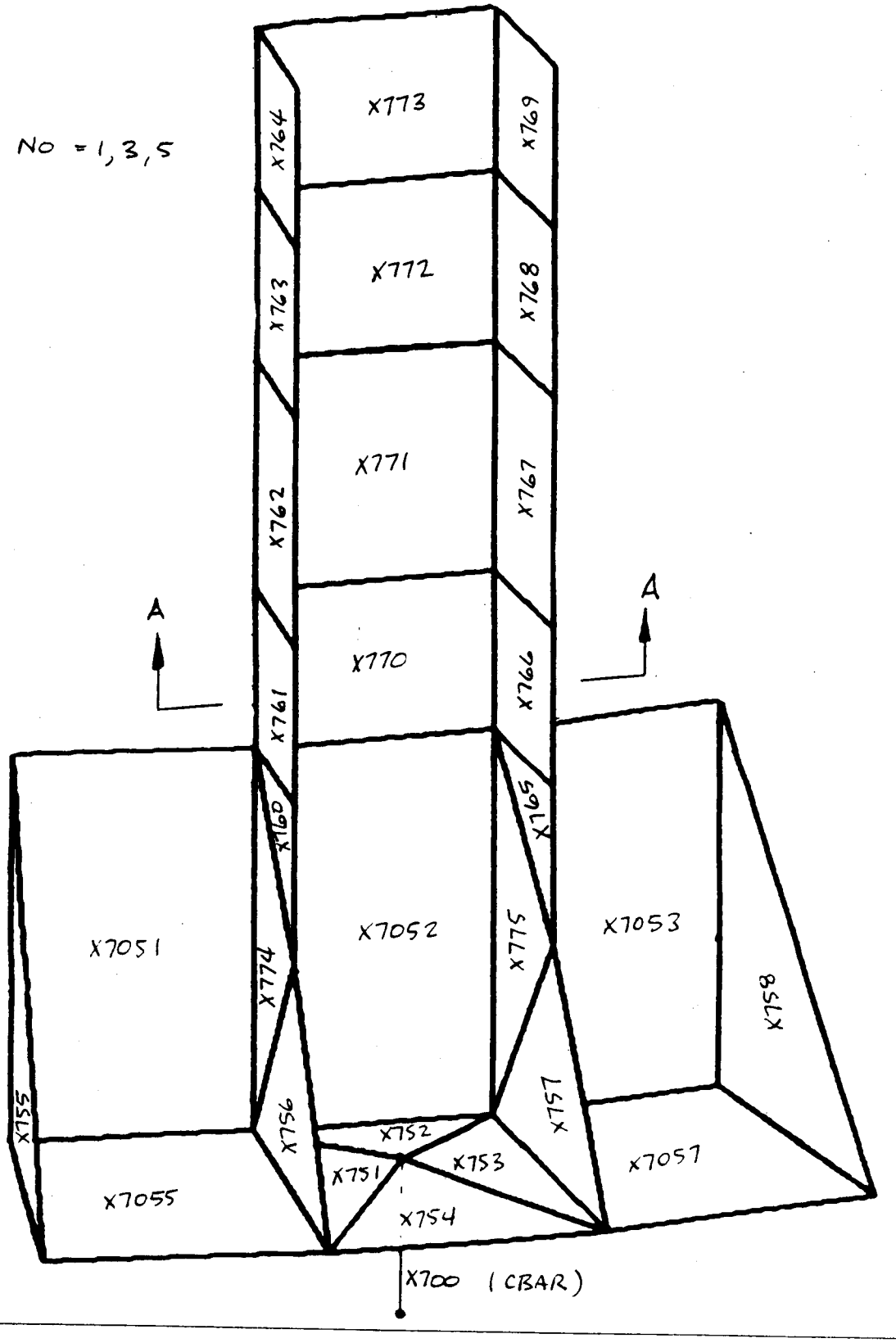


SRM SUPPORT BRACKETS NASTRAN DETAILS
- SIDE VIEW

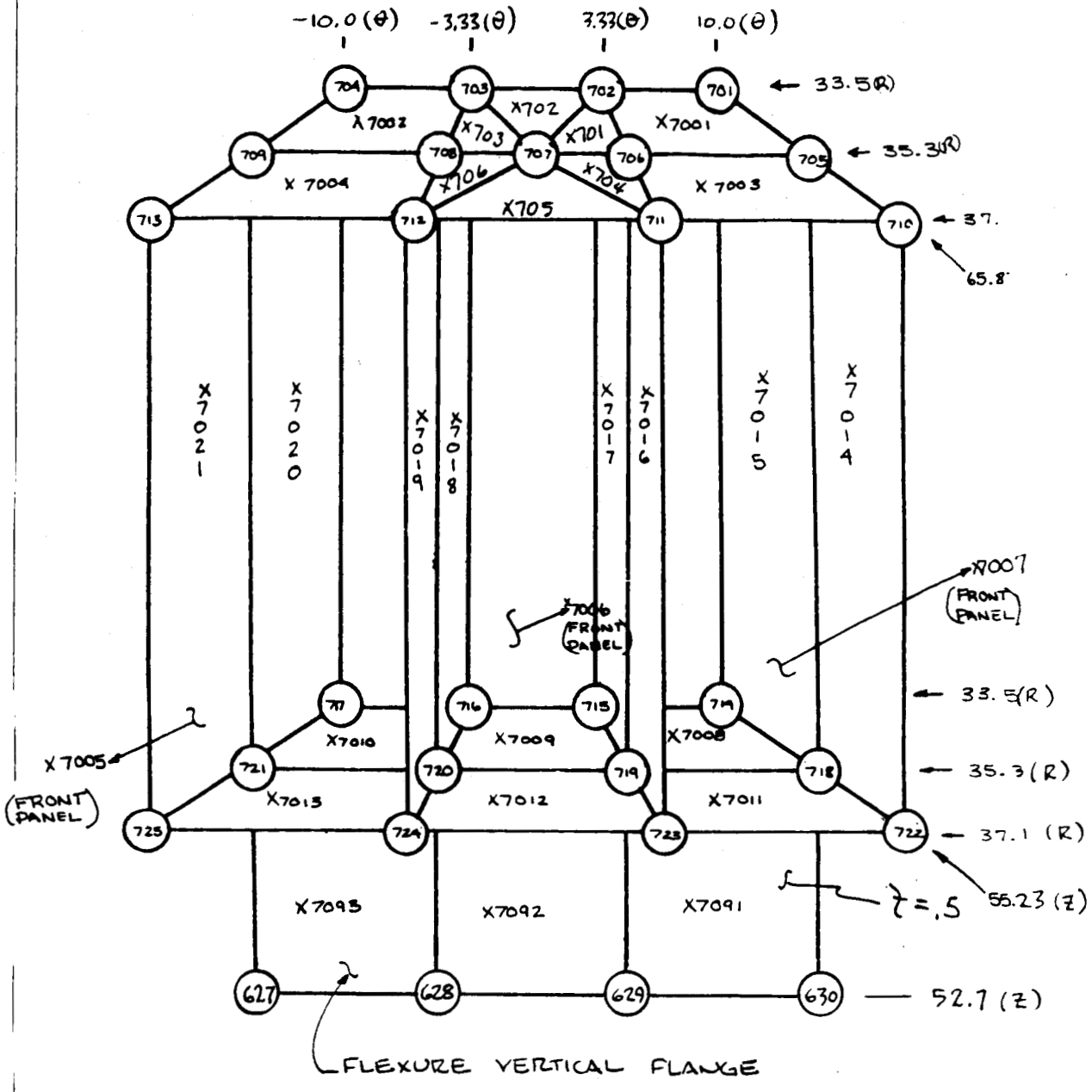
FORM LMSC 362 B 3

5.2 SRM ATTACH BRACKETS (CONT'D)
- UPPER BRACKET NASTRAN DETAILS

X = BAY NO = 1, 3, 5



5.2 SRM ATTACH BRACKETS (CONT'D)



X = BAY NO. = 1, 3, 5

SRM LOWER SUPPORT BRACKET NASTRAN DETAILS
- FRONT VIEW

5.2 SRM ATTACH BRACKETS (CONT'D)

a. LIFTOFF

Bay No.	Element	Shear (lb)	Bending (in-lb)	Axial (lb)
1	1700	-11,647	7,988	-5,894
3	3700	4,802	-2,702	-15,239 *
5	5700	7,731	-4,582	12,286

Σ = 8,847

b. LANDING ABORT

Bay No.	Element	Shear (lb)	Bending (in-lb)	Axial (lb)
1	1700	5,129	-3,513	-2,689
3	3700	-580	302	937
5	5700	-3,951	2,327	-11,962

Σ = 13,714

c. THRUSTER LOADS WITH SRM ATTACHED

Bay No.	Element	Shear (lb)	Bending (in-lb)	Axial (lb)
1	1700	28	-19	-0.7
3	3700	30	-18	-1.0
5	5700	36	-22	2.4

UPPER/LOWER BRACKET ATTACH BOLT LOADS

* worst combination

5.2 SRM ATTACH BRACKETS (CONT'D)

- UPPER BRACKET ELEMENT STRESSES

ELEMENT (2)		LIMIT STRESS (1) (KSI) BAY 1 (X=1)	BAY 2 (X=2)	BAY 3 (X=3)
			(3)	
X751		-34.530	-64.086	60.634
X752		20.919	-83.170	60.475
X753		21.885	-63.998	-32.096
X754		-29.059	-9.364	-4.739
X755		-1.655	6.943	-4.663
X756	CTRIA	-7.107	5.350	4.968
X757		-6.324	-5.505	4.295
X758		1.661	7.710	-5.314
X760		-11.339	-4.085	7.418
X765		-7.607	-2.715	3.124
X774		-2.360	-9.121	6.039
X775		-3.357	-10.586	6.370
X7051		4.646	4.565	-4.504
X7052		6.252	-11.046	7.862
X7053		-1.315	-5.161	2.576
X7055		6.432	-7.476	5.675
X7057		-5.355	-7.173	-5.860
X761		-5.471	-3.194	4.742
X762		-6.877	-3.173	6.457
X763		-3.732	-2.940	4.083
X764	CQUAD	-1.897	-2.229	2.337
X766		-4.025	-3.594	3.793
X767		-2.191	1.262	-1.680
X768		1.499	.534	.860
X769		.718	-.439	.601
X770		17.203	-12.558	-12.732
X771		5.077	-5.223	-1.792
X772		2.608	-4.482	2.469
X773		2.099	-3.617	3.049

(1) MAX PRINCIPAL STRESS

(2) REF. PG. 5.2.3

(3) THESE STRESSES ARE NOT CONSIDERED REALISTIC AS THEY ARE LOCAL EFFECT OF MOMENT TRANSFERRED FROM BAR X700. WILL BE REFINED.

FORM LMSC 362 8-3

5.2 SRM ATTACH BRACKETS (CONT'D)

LOWER BRACKET ELEMENT STRESSES (LIFTOFF CONDITION)

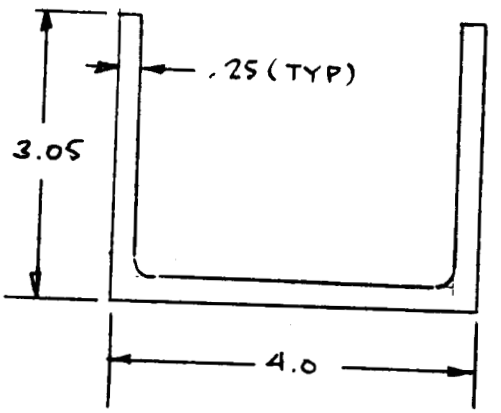
ELEMENT [4]	LIMIT STRESS [1] (KSI)	
	BAY 1 (X=1)	BAY 5 (X=5)
X701	-21.359	24.273
X702	-23.478	29.895
X703	15.758	-14.043
X704	-20.195	22.040
X705	19.042	-20.184
X706	15.886	-14.317
X7001	13.663	-13.520
X7002	11.851	-10.809
X7003	12.539	-11.447
X7004	-13.469	11.968
X7005	6.127	4.908
X7006	-8.367	7.863
X7007	-8.720	8.410
X7008	-9.550	9.053
X7009	-10.322	9.054
X7010	-7.598	7.967
X7011	13.158	-14.085
X7012	-9.865	-12.322
X7013	-12.662	8.663
X7014	-6.602	6.463
X7015	-9.737	8.939
X7016	-3.813	5.984
X7017	-5.708	8.791
X7018	10.423	3.807
X7019	-17.530	3.970
X7020	7.480	-6.053
X7021	3.763	-3.061
X7091	-16.606	29.709
X7092	10.809	-10.397
X7093	25.227	-9.131

[1] MAX PRINCIPAL STRESS

[4] REF. FIG. 5

5.2 SRM ATTACH BRACKETS (CONT'D)

- UPPER BRACKET STRESS ANALYSIS



SECT A-A

ALLOWABLE FLANGE CRIPPLING STRESS:
(REF NACA TN 3782 FOR METHOD)

$$b_w = 4 - 2\left(\frac{.25}{2}\right) = 3.75$$

$$b_f = 3.05 - \frac{.25}{2} = 2.925$$

$$\frac{b_f}{b_w} = \frac{2.925}{3.750} = .78$$

$\Rightarrow K_w = 1.45$ (REF PG. 5.2.9)

$$F_c = \frac{k_w \pi^2 E}{12(1-\nu^2)} \cdot \frac{t_w^2}{b_w^2} = \frac{(1.45)(\pi^2)(10.8\times10^6)(.25)^2}{12(1-.33^2)(3.75)^2}$$

$F_c = 64.2$ KSI $> F_{cy} = 51.0$ KSI $\therefore$ USE F_{cy}

$f_c = 17.2$ KSI (REF TABLE , ELEMENT 1770)

$$MS_{\text{COMPRESSION-YIELD}} = \frac{51.0}{1.1(17.2)} - 1 = \underline{+1.69\ (Y)}$$

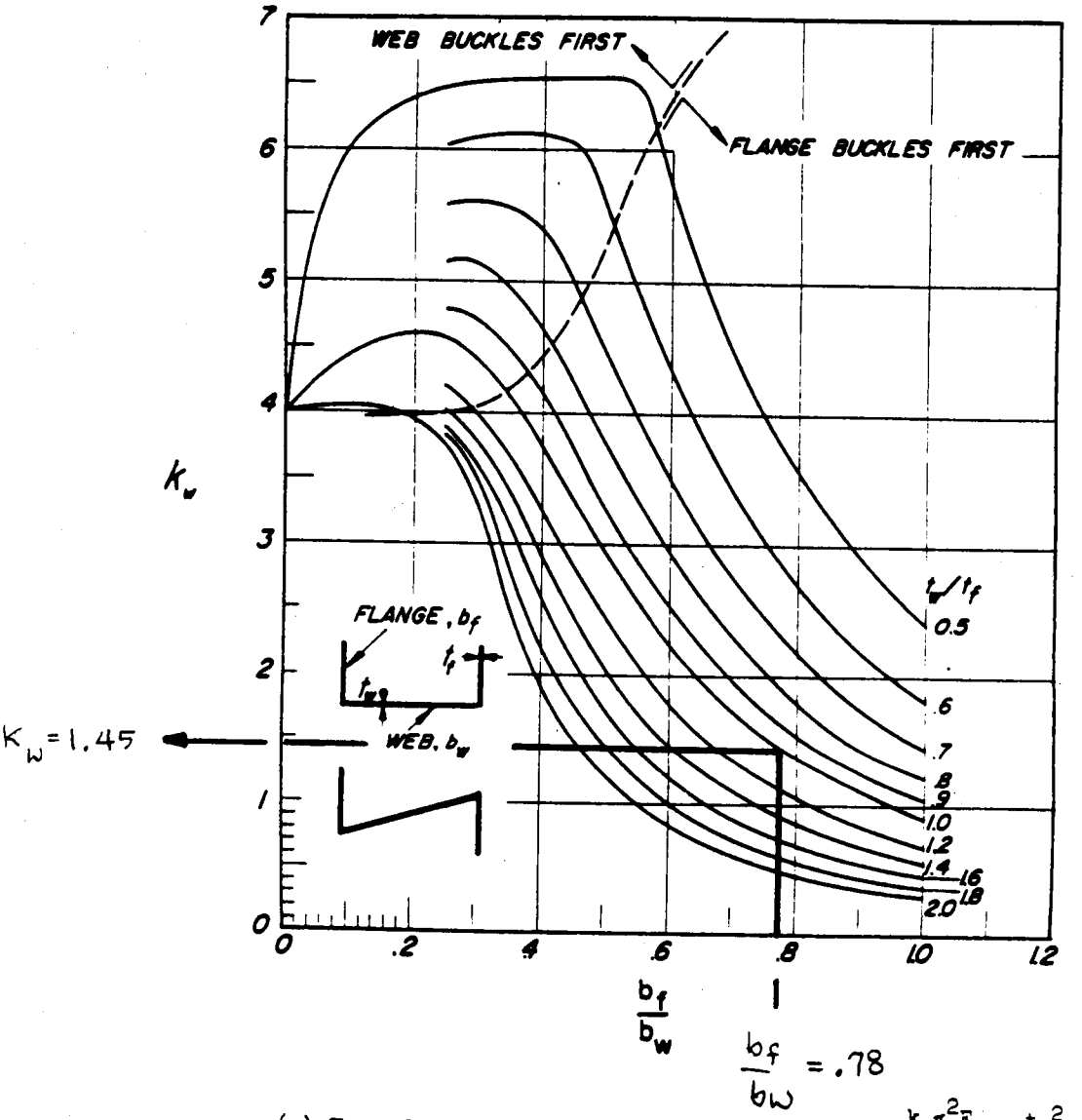
$$MS_{\text{CRIPPLING-ULT}} = \frac{51.0}{2.0(17.2)} - 1 = \underline{+.48\ (U)}$$

5.2 SRM ATTACH BRACKETS (CONT'D)

- UPPER BRACKET STRESS ANALYSIS (CONT'D)

NACA TN 3782, FIG. 5:

NACA TN 3782



(a) Channel- and Z-section stiffeners. $\sigma_{cr} = \frac{k_w \pi^2 E}{12(1-\nu_e^2)} \frac{t_w^2}{b_w^2}$.

FORM LMSC 362 B-3

5.2 SRM SUPPORT BRACKET STRESS ANALYSIS

THE STRESSES SUMMARIZED IN THE PREVIOUS TABLES REPRESENT THE MAX PRINCIPAL STRESS THAT RESULTS FROM THE COMBINATION OF AXIAL, BENDING AND SHEAR LOADS ON THE ELEMENT.

THE MOST CRITICAL (HIGHLY STRESSED ELEMENT IS CTRIA2 NO. 5702 WHICH IS AT THE TOP END OF THE LOWER BRACKET, ADJACENT TO THE ATTACH BOLT. THIS STRESS RESULTS PRIMARILY FROM BENDING; THEREFORE A SIMPLE COMPARISON TO F_{ty}, F_{tu} WILL BE THE FAILURE CRITERIA.

$$f_b = 29.895 \text{ KSI (LIMIT)}$$

$$MS_{YIELD} = \frac{51.0}{(1.25)(29.895)} - 1 = \underline{\underline{+.36}}$$

$$MS_{ULT} = \frac{63.0}{(2.0)(29.895)} - 1 = \underline{\underline{+.05}}$$

5.2 SRM ATTACH BRACKETS (CONT'D) - EFFECT ON CENTER CYLINDER

CYLINDER PANEL ELEMENT STRESSES (LIFTOFF)

Element	Limit Stress (ksi) Bay 3
X 01	3.01
X 02	4.62
X 03	5.49
X 04	6.90
X 05	8.73
X 06	6.34
X 07	5.02
X 08	7.92
X 09	-7.57
X 10	2.44
X 11	-3.26
X 12	-3.04
X 13	3.44
X 14	-4.06
X 15	-5.65
X 16	-7.80
X 17	-9.07
X 18	-7.72
X 19	2.29
X 20	-2.55
X 21	2.53
X 22	5.21
X 23	-7.05
X 24	-8.24
X 25	-9.96
X 26	-11.24
X 27	-10.44
X 28	2.23
X 29	2.77
X 30	3.17

X=300

ORIGINAL PAGE IS
OF POOR QUALITY

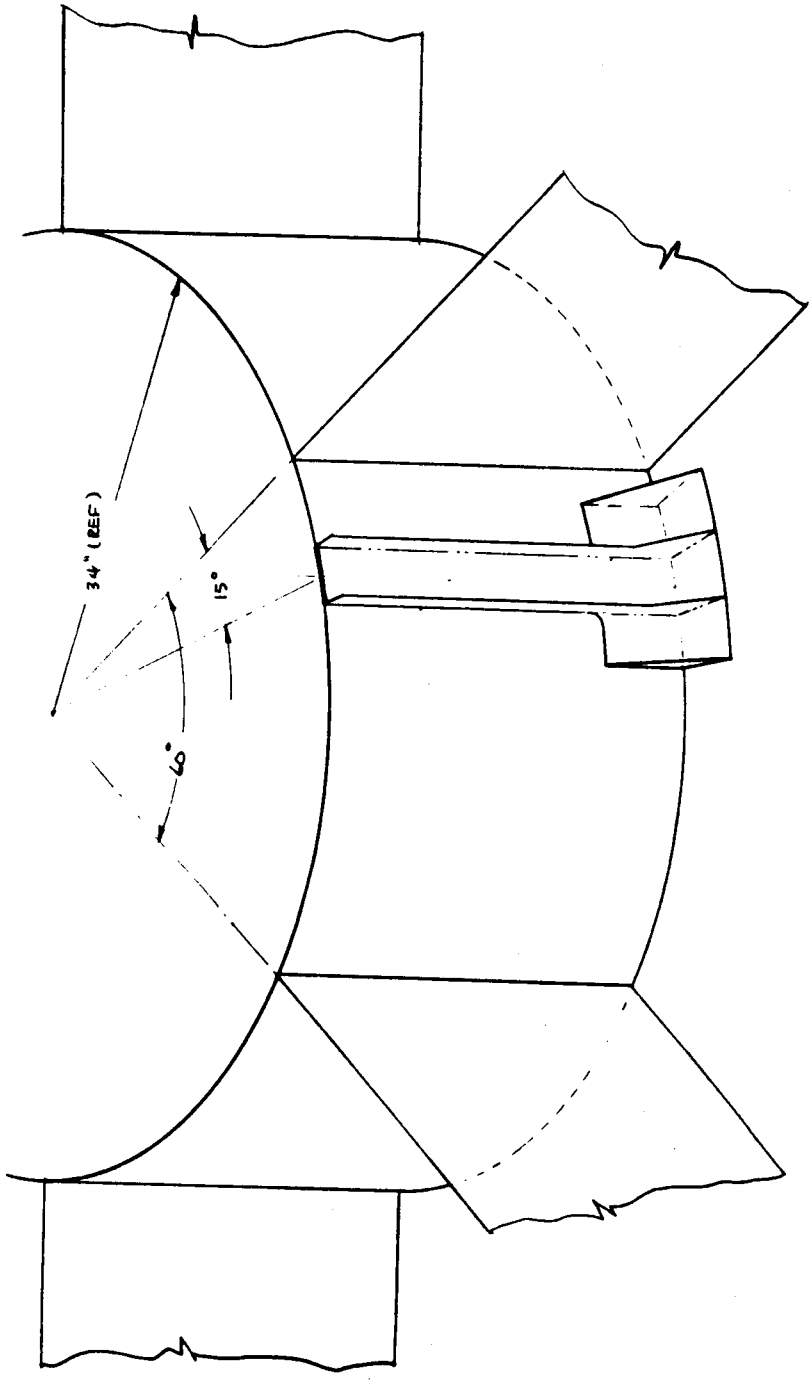
5.2 SRM ATTACH BRACKETS (CONT'D)

CYLINDER PANEL ELEMENT STRESSES (LIFTOFF) (CONT'D)

Element	Limit Stress (ksi) Bay 3
X31	6.25
X32	4.73
X33	-14.07
X34	-19.14
X35	-19.88
X36	-13.91
X37	2.22
X38	-2.59
X39	3.82
X40	5.77
X41	-8.50
X42	-10.17
X43	-9.22
X44	-9.57
X45	-8.52
X46	2.85
X48	-2.35
X50	2.65
X51	-7.43
X52	-10.99
X53	-8.15
X54	-4.43
X58	3.62
X59	-2.93
X60	-4.66
X61	-3.29
X62	-2.54
X63	3.84

5.2 SRM ATTACH BRACKET

- MODIFIED UPPER BRACKET (FULL HEIGHT)

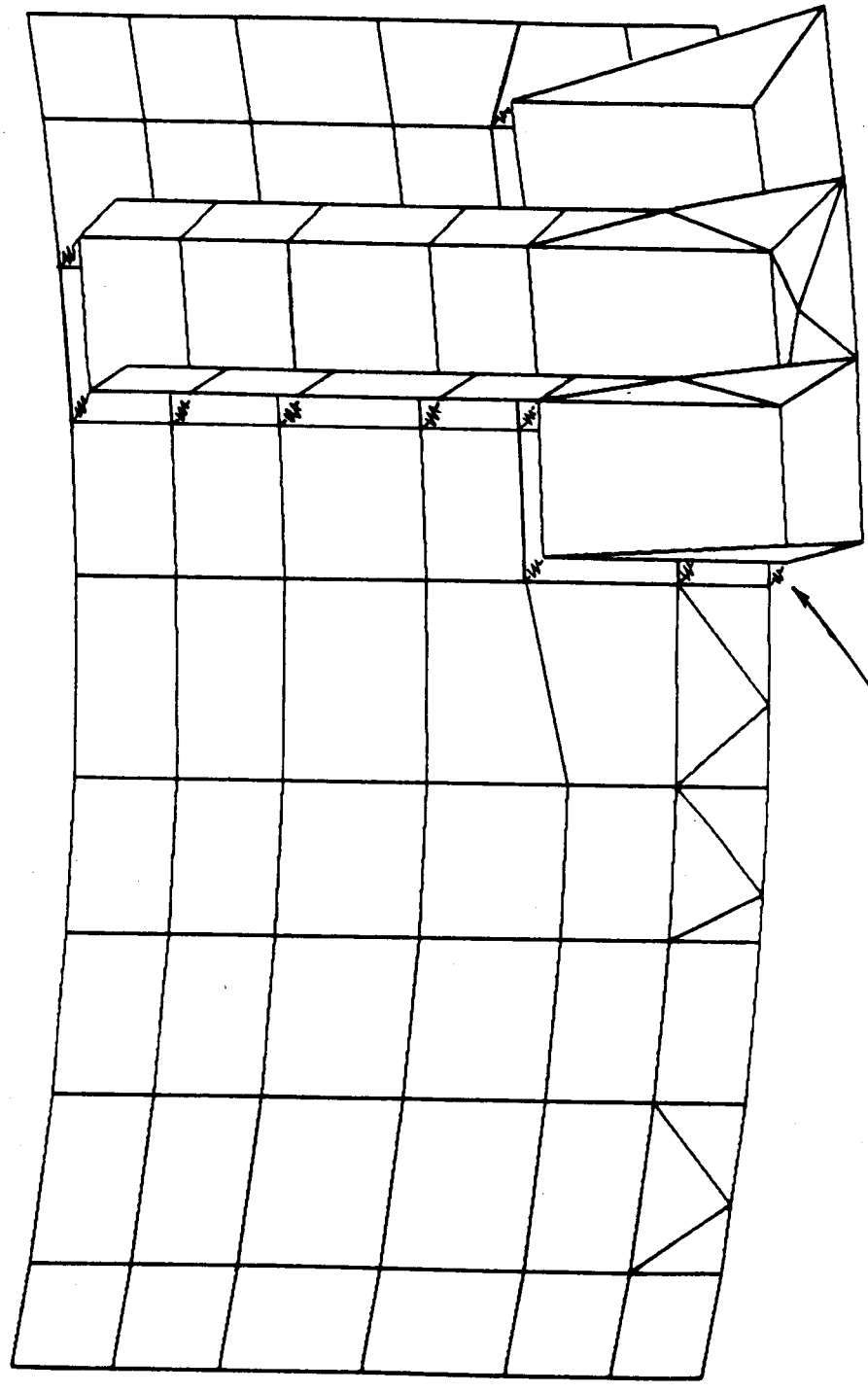


NUMBER OF BRACKETS = 3, SPACED AT 120° INTERVALS.

Prepared by: INGRAM	Date 6-28-88	LOCKHEED MISSILES & SPACE COMPANY, INC.	Page 5.2.14 Temp Perm.
Checked by:	Date	Title AFE CARRIER VEHICLE STRESS ANALYSIS	Model AFE CV
Approved by:	Date		Report No.

5.2 SRM ATTACH BRACKET

- NASTRAN MODEL PLOT OF BRACKET / CYLINDER SEGMENT



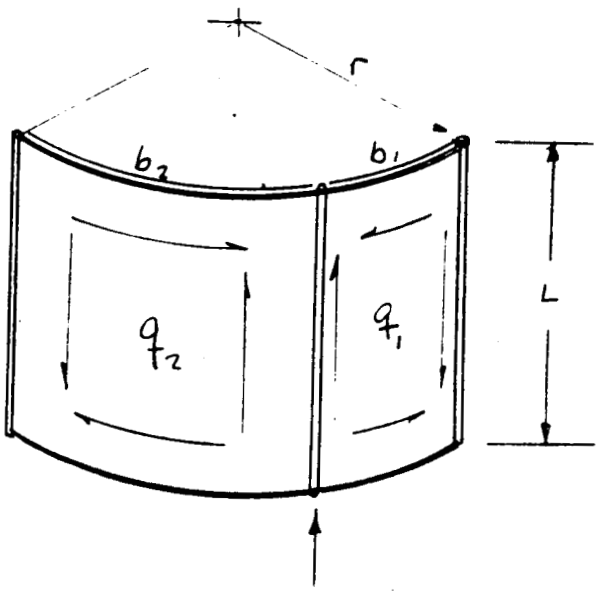
FORM LMSC 362 B-3

5.2 SRM SUPPORT BRACKET (CONT'D)

CURVED PANEL (CYLINDER SEGMENT) BUCKLING ALLOWABLE

MATERIAL: 2219-T87
.125" THK

$b_1 = 8.90"$
$b_2 = 26.70"$
$L = 20.0"$



REF. NACA TN 3783, FIG 49: (INCLUDED ON PG.) FOR ANALYSIS METHOD.

PANEL 1: ("LONG" PANEL)

$$Z_b = \frac{b^2}{rt}(1-\nu^2)^{1/2} = \frac{(8.9)^2}{(34)(.125)}(1-.33^2)^{1/2}$$

$$Z_b = 17.6$$

$$\frac{a}{b} = \frac{L}{b} = \frac{20}{8.9} = 2.25$$

$$\Rightarrow K_s = 20$$

$$\uparrow_{cr_1} = \frac{K_s \pi^2 E}{12(1-\nu^2)}\left(\frac{t}{b}\right)^2 = \frac{(20)\pi^2(10.5\times10^6)}{12(1-.33^2)}\left(\frac{.125}{8.9}\right)^2$$

$$\Rightarrow \uparrow_{cr_1} = 38{,}234 \text{ psi}$$

ORIGINAL PAGE IS OF POOR QUALITY

5.2 SRM SUPPORT BRACKET (CONT'D)

- CURVED PANEL (CYLINDER SEGMENT) BUCKLING ALLOWABLES

PANEL 2: ($b_2 > L$ $\Rightarrow$ "WIDE" PANEL)

$$Z_b = \frac{b^2}{rt}(1-\nu^2)^{1/2} = \frac{(26.7)^2}{(34)(.125)}(1-.33^2)^{1/2}$$

$$Z_b = 158.3$$

$$\frac{a}{b} = \frac{b_2}{L} = \frac{26.7}{20.} = 1.34$$

$$\Rightarrow K_s = 41.0$$

$$\tau_{cr_2} = \frac{K_s \pi^2 E}{12(1-\nu^2)}\left(\frac{t}{b}\right)^2 = \frac{41(\pi^2)(10.5\times10^6)}{12(1-.33^2)}\left(\frac{.125}{26.7}\right)^2$$

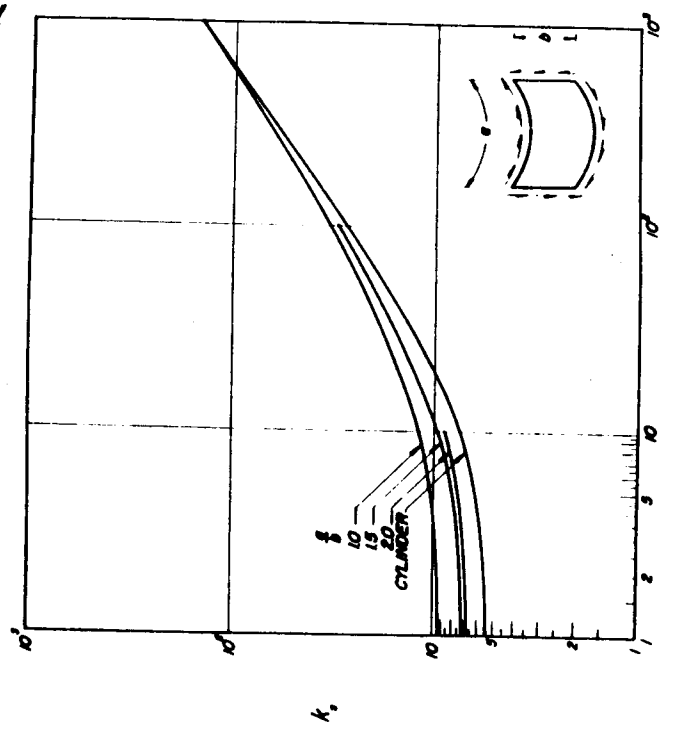
$$\Rightarrow \tau_{cr_2} = 8{,}709 \text{ psi}$$

5.2 SRM SUPPORT BRACKETS (CONT'D)

- CURVED PANEL (CYLINDER) BUCKLING ALLOWABLES

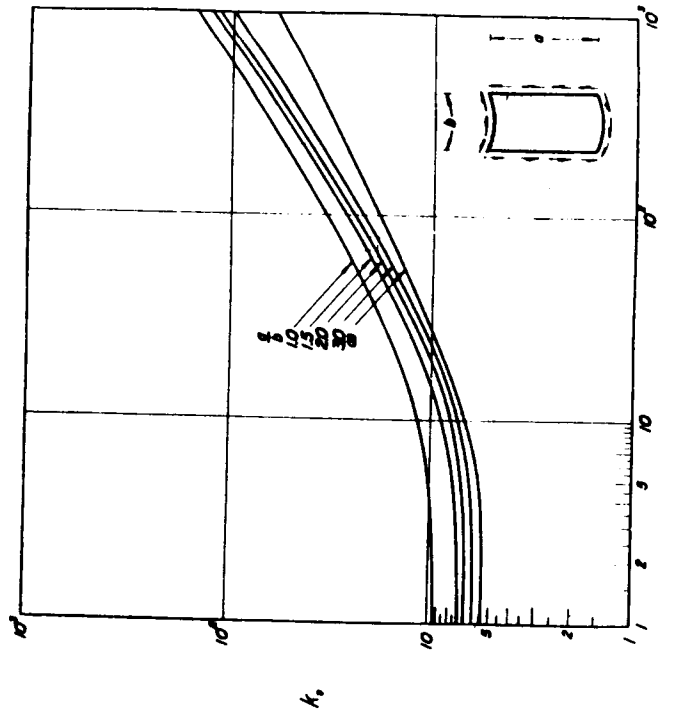
ORIGINAL PAGE IS OF POOR QUALITY

SHEAR BUCKLING CURVES FROM NACA 3783, FIG. 49:



(c) Wide, simply supported plates.

Figure 49.- Continued.



(a) Long simply supported plates.

Figure 49.- Shear buckling coefficients for various curved plates.

$$\tau_{cr} = \frac{k_s \pi^2 E}{12\left(1 - \nu_e^2\right)}\left(\frac{t}{b}\right)^2 ; \quad Z_b = \frac{b^2}{rt}\left(1 - \nu_e^2\right)^{1/2}$$

5.2 SRM ATTACH ANALYSIS (CONT'D)

- CYLINDER PRINCIPAL SHEAR STRESSES

BAY: 1 LOAD CONDITION: LANDING ABORT

$\uparrow_{MAX}$ IN NASTRAN ELEMENTS FOR 60° SEGMENT OF CYLINDER:

749	898	727	803	1328	1936	1348	655	912
436	238	259	379	605	1061	1138	524	1102
266	185	335	359	686	269	1119	1343	1416
311	187	198	567	952	1162	2217	3147	2366
263	295	440	654	1359	871	902	1144	2380
674	819	1142	1240	1318	539	625	1364	2783

1217 1627 1925 1752 1918 958

UPR PANEL

LWR PANEL

RADIAL BEAM INTERSECT

RADIAL BEAM INTERSECT

PANEL SHEAR BUCKLING MARGINS:

(CONSERVATIVELY ASSUME MAX SHEAR EXISTS THROUGHOUT PANEL:

PANEL 1: $\uparrow_{MAX} = 3,147$ psi (LIMIT)

$$MS_{SHEAR-BUCKLING} = \frac{38.2}{(2.0)(3.15)} - 1 = \text{HIGH}$$

PANEL 2: $\uparrow_{MAX} = 1925$ psi

$$MS_{SHEAR-BUCKLING} = \frac{8.7}{2(1.93)} - 1 = +1.25$$

5.2 SRM ATTACH ANALYSIS (CONT'D)

- CYLINDER PRINCIPAL SHEAR STRESSES

BAY: 3 LOAD CONDITION: LANDING ABORT

↑MAX IN NASTRAN ELEMENTS FOR 60° SEGMENT OF CYLINDER:

474	507	559	592	558	774	869	395	334
330	356	353	244	294	537	628	354	263
310	260	308	236	388	696	528	381	324
291	245	276	305	201	1140	1637	1291	550
239	240	288	380	204	313	296	291	516
192	253 / 236 / 418	355	252 / 521	420	598	282	649	838

496

UPR PANEL

LWR PANEL

BY COMPARISON TO BAY 1, ALL SHEAR-BUCKLING MARGINS ARE HIGH.

RADIAL BEAM INTERSECT

RADIAL BEAM INTERSECT

5.2 SRM ATTACH ANALYSIS (CONT'D)

- CYLINDER PRINCIPAL SHEAR STRESSES

BAY: 5 LOAD CONDITION: LANDING ABORT

τ_{MAX} IN NASTRAN ELEMENTS FOR 60° SEGMENT OF CYLINDER:

2031	2135	2831	2242	1747	4245	2905	2451	2887
1742	1879	2002	2530	2070	4003	3686	2447	2850
1633	1688	1627	2183	4001	4193	3730	3010	3715
1606	1570	1551	2126	4272	* 6702	6501	3798	4039
1647	1498	1447	1900	3450	2678	2458	1256	2405
1465	1406 / 1368 / 1671	1293	1350 / 2825 / 1491	3140	2014	2272	955	2273

UPR PANEL

LWR PANEL

* THE 6,702 psi SHEAR STRESS SEEMS TO BE A LOCAL RESULT DUE TO ITS LOCATION AT THE CORNER OF THE FITTING. THEREFORE IT WILL NOT BE USED FOR BUCKLING CALCULATIONS.

RADIAL BEAM INTERSECT

RADIAL BEAM INTERSECT

PANEL 1: τ_{MAX} = 4039 psi

$$MS_{\text{SHEAR BUCKLING}} = \frac{38.2}{(2.0)(4.04)} - 1 = \underline{+4.73}$$

PANEL 2: τ_{MAX} = 4,272 psi

$$MS_{\text{SHEAR-BUCKLING}} = \frac{8.7}{(2.0)(4.27)} - 1 = \underline{+.02}$$

FORM LMSC-302 B-3

Prepared by: INGRAM	Date 6-29-88	LOCKHEED MISSILES & SPACE COMPANY, INC.	Page 5.2.21 Temp Perm
Checked by	Date	Title AFE CARRIER VEHICLE STRESS ANALYSIS	Model AFE CV
Approved by	Date		Report No.

5.2 SRM ATTACH ANALYSIS (CONT'D)

- CYLINDER PRINCIPAL SHEAR STRESSES

ORIGINAL PAGE IS OF POOR QUALITY

BAY: 1 LOAD CONDITION: LIFTOFF

τ_{MAX} IN NASTRAN ELEMENTS FOR 60° SEGMENT OF CYLINDER:

1200	1434	1746	1997	1098	1677	915	1275	1307
1347	1533	1781	2210	1572	2325	2429	1385	1544
1427	1481	1534	1807	3031	3358	2631	1891	1965
1528	1444	1548	1654	3085	5111*	4445	1592	2902
1547	1600	1484	1419	2245	1593	1609	1787	2855
1545	1727 / 2455	1774	1070 / 3155	1895 / 3341 / 4311	1212	1455	2106	4.32

1652 2279

UPR PANEL

LWR PANEL

RADIAL BEAM INTERSECT

RADIAL BEAM INTERSECT

PANEL 1: $\tau_{max} = 4445$ psi

$$MS_{SHEAR\text{-}BUCKLING} = \frac{38.2}{2.0(4.45)} - 1 = +3.29$$

PANEL 2: $\tau_{max} = 5111$ psi

$$MS_{SHEAR\text{-}BUCKLING} = \frac{8.7}{2.0(3.36)} - 1 = +.29$$

* LOCAL EFFECT FROM FITTING — NOT REPRESENTATIVE OF OVERALL PANEL STRESS.

FORM LMSC 382 B 3

ORIGINAL PAGE IS
OF POOR QUALITY

Prepared by: INGRAM	Date 6-29-88	LOCKHEED MISSILES & SPACE COMPANY, INC.	Page 5.2.22 Temp Perm
Checked by:	Date	Title: AFE CARRIER VEHICLE STRESS ANALYSIS	Model: AFE CV
Approved by:	Date		Report No.

5. SRM ATTACH ANALYSIS (CONT'D)
- CYLINDER PRINCIPAL SHEAR STRESSES

BAY: 3 LOAD CONDITION: LIFTOFF

τ_{MAX} IN NASTRAN ELEMENTS FOR 60° SEGMENT OF CYLINDER:

2999	3387	353.2	2476	2242	4338	3360	2594	3232
2179	2095	2048	2348	1867	3140	2576	2465	3304
1898	1901	2126	2061	3177	2640	2777	3194	4069
1775	1780	1747	2210	3961	* 4938	5349	4983	4651
1911	1630	1474	2346	4312	2904	2450	1381	2429
1703	1418 / 1295	1402	2273 / 2527	3531	2145	2022	2048	3075

UPR PANEL

LWR PANEL

1757 1965

RADIAL BEAM INTERSECT

RADIAL BEAM INTERSECT

PANEL 1: $\tau_{max} = 5349$ psi

$$MS = \frac{38.2}{2.0(5.35)} - 1 = \underline{+2.57}$$

PANEL 2: $\tau_{max} = 4938$ psi

$$MS = \frac{8.7}{2.0(4.34)} - 1 = \underline{+.00}$$

* LOCAL EFFECT FROM FITTING - NOT REPRESENTATIVE OF OVERALL PANEL STRESS.

5.2 SRM ATTACH ANALYSIS (CONT'D)

- CYLINDER PRINCIPAL SHEAR STRESSES

BAY: 5 LOAD CONDITION: LIFTOFF

τ_{MAX} IN NASTRAN ELEMENTS FOR 60° SEGMENT OF CYLINDER:

2114	2118	2661	2536	2401	3806	2269	2383	2631
1935	2031	2171	2729	1867	3503	3168	2476	2550
1864	1873	1834	2248	3759	3872	3163	2805	2978
1906	1738	1837	2254	4087	5821 *	4620	1834	2872
1902	1854	1699	2075	3213	2579	2081	1113	2537
2086	2076 / 3404	2279	1409 * / 4408	3350	1882	1883	855	2761

UPR PANEL

LWR PANEL

2301 3044

ORIGINAL PAGE IS OF POOR QUALITY

PANEL 1: $\tau_{max} = 4620$ psi

$$M.S. = \frac{38.2}{2.0(4.62)} - 1 = \underline{3.1}$$

PANEL 2: $\tau_{max} = 4408$ psi

$$M.S. = \frac{8.7}{2.0(4.09)} - 1 = \underline{+.06}$$

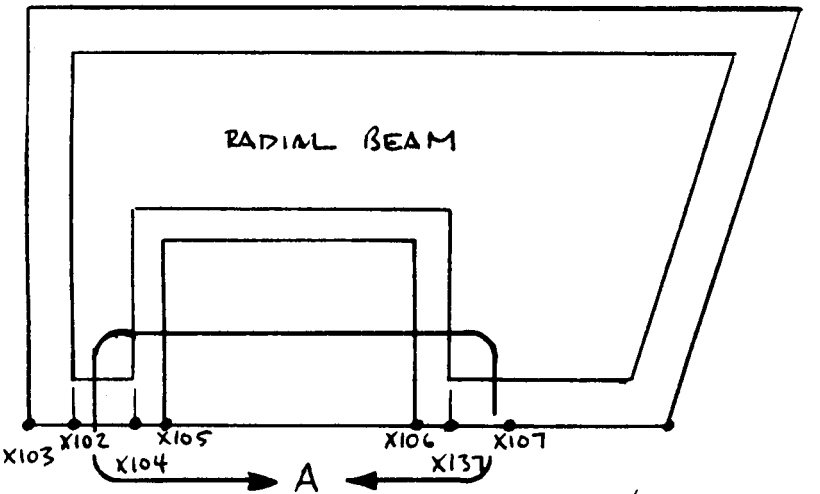
RADIAL BEAM INTERSECT

RADIAL BEAM INTERSECT

* LOCAL EFFECTS FROM ADJACENT FITTINGS - NOT REPRESENTATIVE OF OVERALL PANEL STRESS.

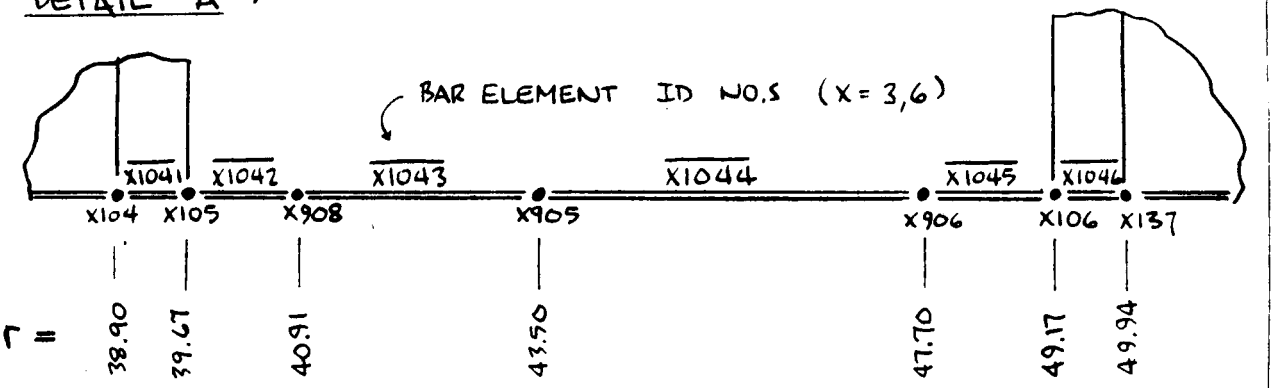
Prepared by: E. INGRAM	Date 3-28-88	LOCKHEED MISSILES & SPACE COMPANY, INC.	Page 5.3.1 (Temp / Perm)
Checked by	Date	Title: THRUSTER BEAM ANALYSIS	Model: AFE-CV
Approved by	Date		Report No.

5.3 THRUSTER SUPPORT BEAM ANALYSIS

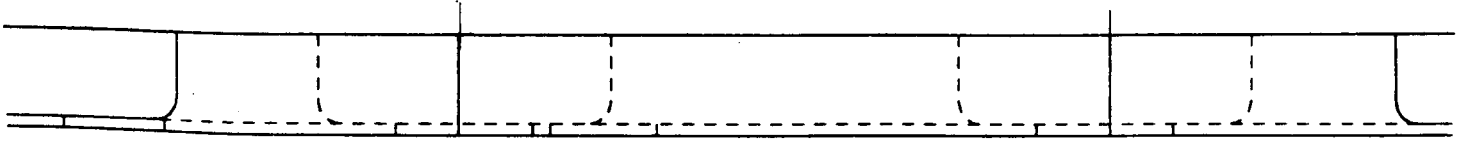


GRID POINT NO.S , X => BAY NO. (FOR REFERENCE)
(NASTRAN) X = 3,6

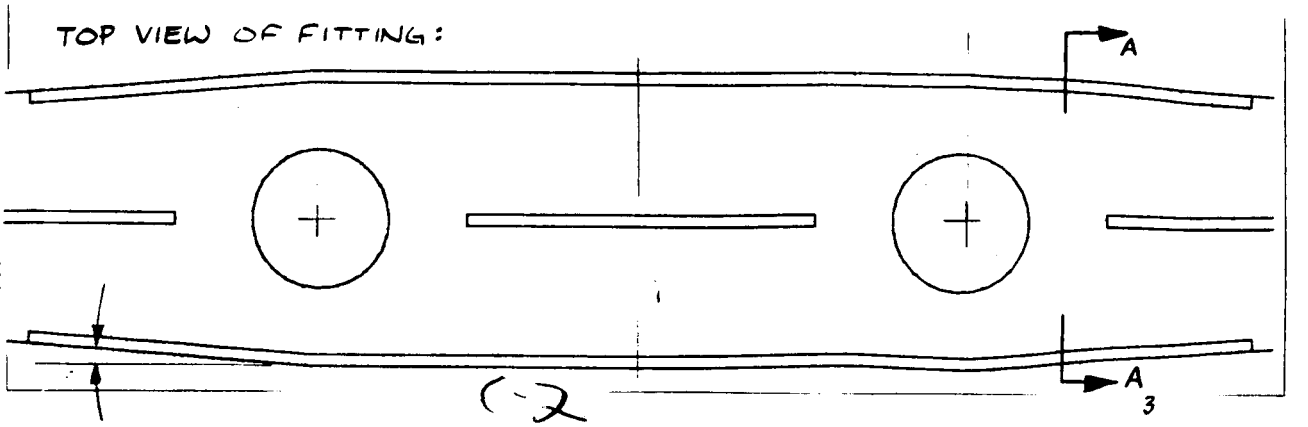
DETAIL "A" :



SIDE VIEW OF THRUSTER FITTING:



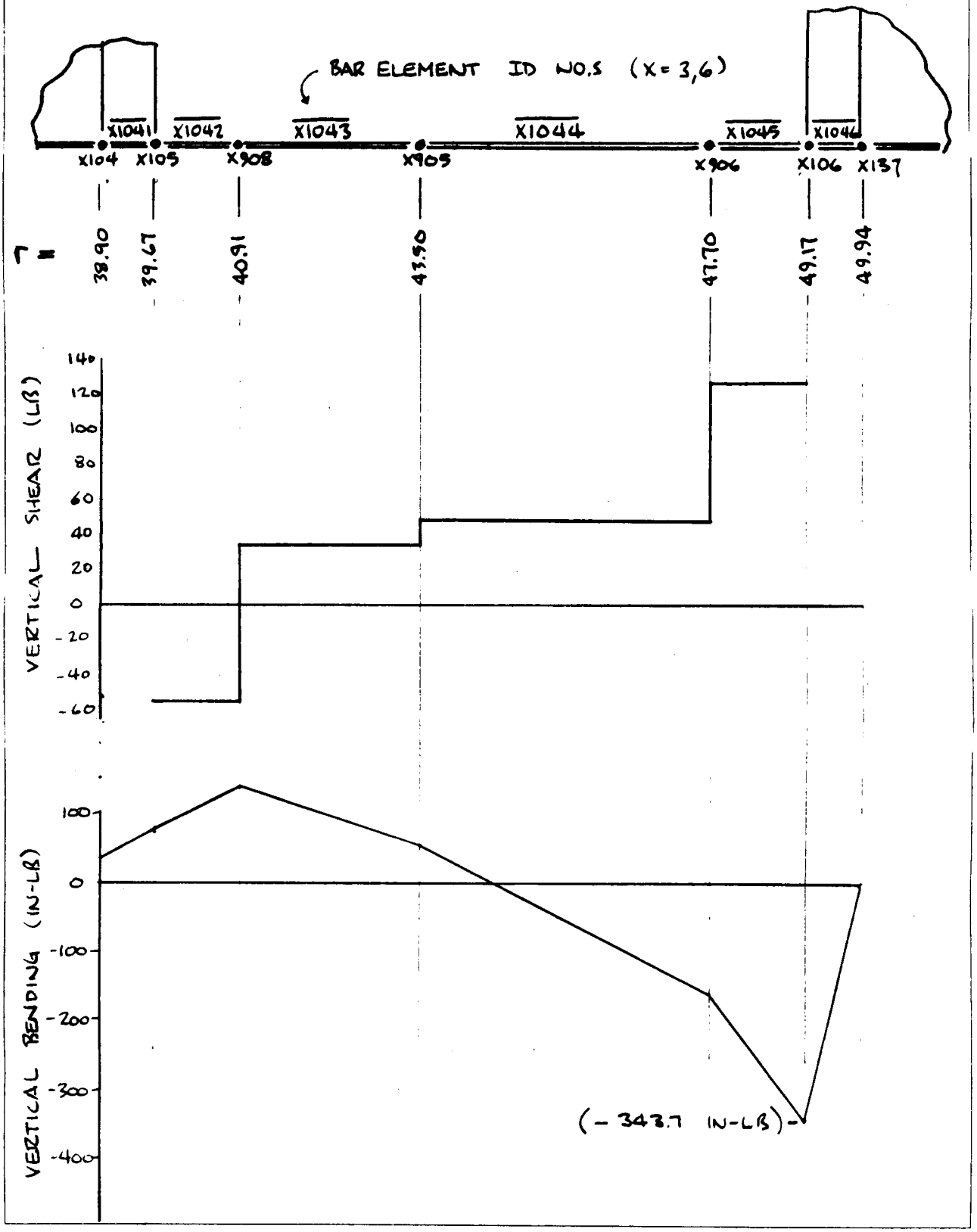
TOP VIEW OF FITTING:



FORM LMSC 362 8 3

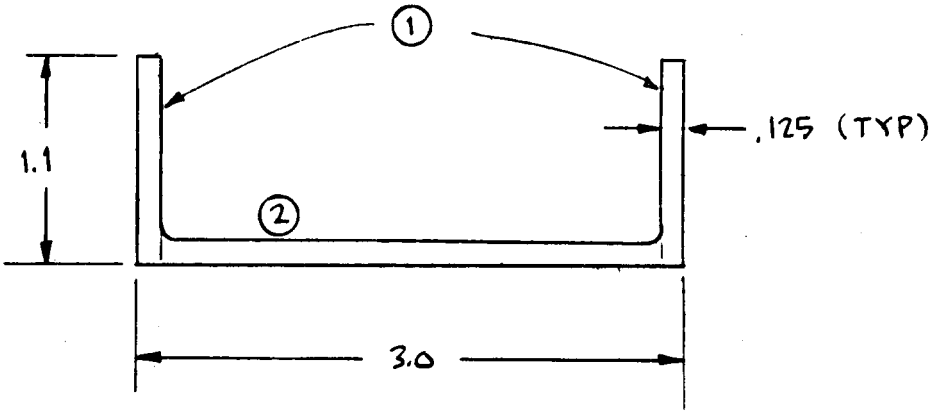
Prepared by: E. INGRAM	Date 3-28-88	LOCKHEED MISSILES & SPACE COMPANY, INC.	Page 5.3.2 (Temp / Perm)
Checked by:	Date	Title: THRUSTER BEAM ANALYSIS	Model: AFE-CV
Approved by:	Date		Report No.

5.3 THRUSTER SUPPORT BEAM (CONT'D)



S.3 THRUSTER SUPPORT BEAM (CONT'D)

SECTION A-A (P.1)



ELEM	A	Y	AY	AY^2	I_o
(1)	.2750	.550	.1513	.0832	.0277
(2)	.3281	.0625	.0205	.0013	.0004
	.6031		.1718	.0845	.0281

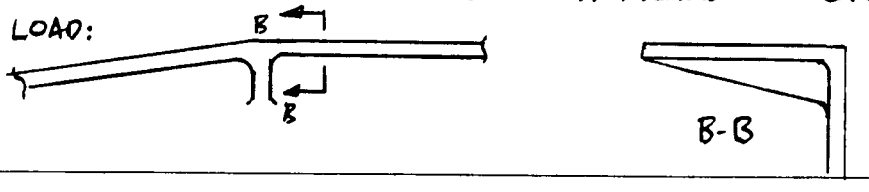
$$\bar{Y} = \frac{.1718}{.6031} = .2849 \text{ IN}$$

$$I_c = .0845 + .0281 - .6031(.2849)^2 = .0637 \text{ IN}^4$$

BENDING STRESS:

$$f_b = \frac{My}{I} = \frac{-343.7\,(1.10 - .2849)}{.0637} = -4398 \text{ psi}$$

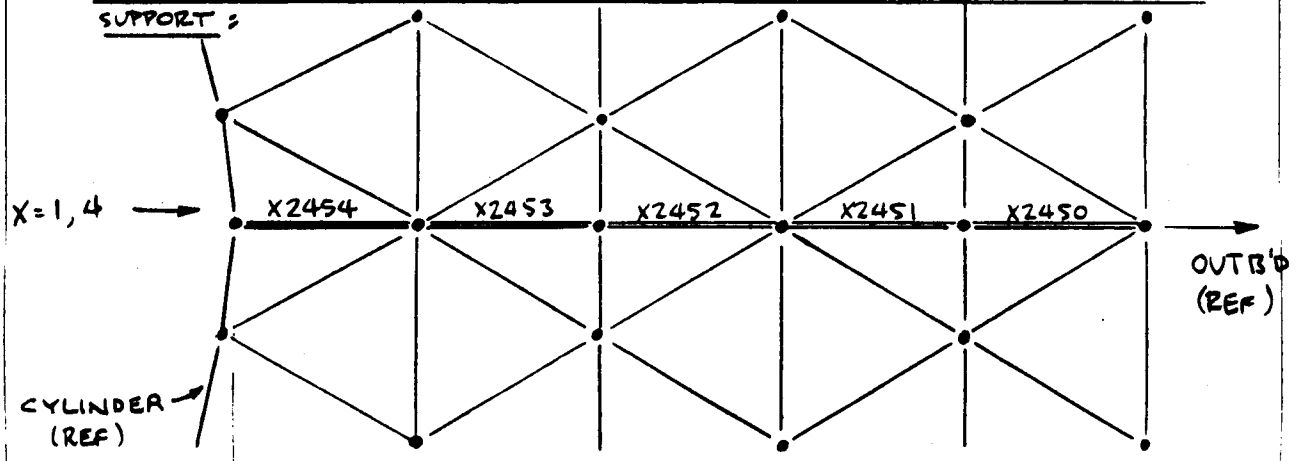
ALTHOUGH THIS STRESS LEVEL IS QUITE LOW AND OBVIOUSLY BELOW THE (ALLOWABLE) CRIPPLING STRESS, THERE IS A SLIGHT BEND (APPROX. 4.5°) THAT WILL INTRODUCE A "KICK" LOAD ON THIS FLANGE. IN EFFECT, IT MAKES THE FLANGE BEHAVE AS IF IT WERE ALREADY CRIPPLED. A SMALL SUPPORT AS SHOWN BELOW WOULD PROVIDE A MEANS TO REACT THE KICK LOAD:



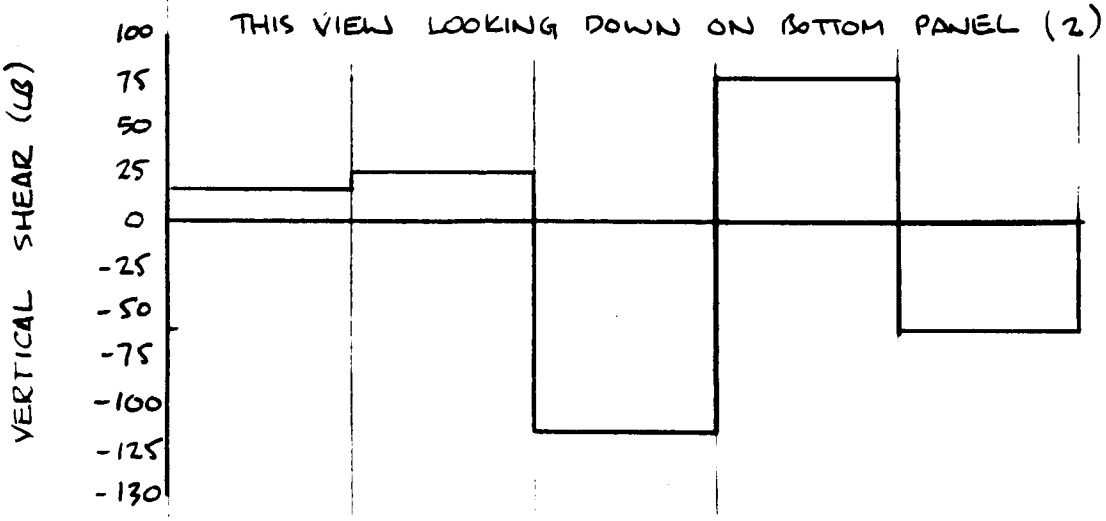
Prepared by: E. INGRAM	Date 3-28-88	LOCKHEED MISSILES & SPACE COMPANY, INC.	Page 5.3.5 Temp Perm.
Checked by:	Date	Title THRUSTER BEAM ANALYSIS	Model AFE CV
Approved by:	Date		Report No.

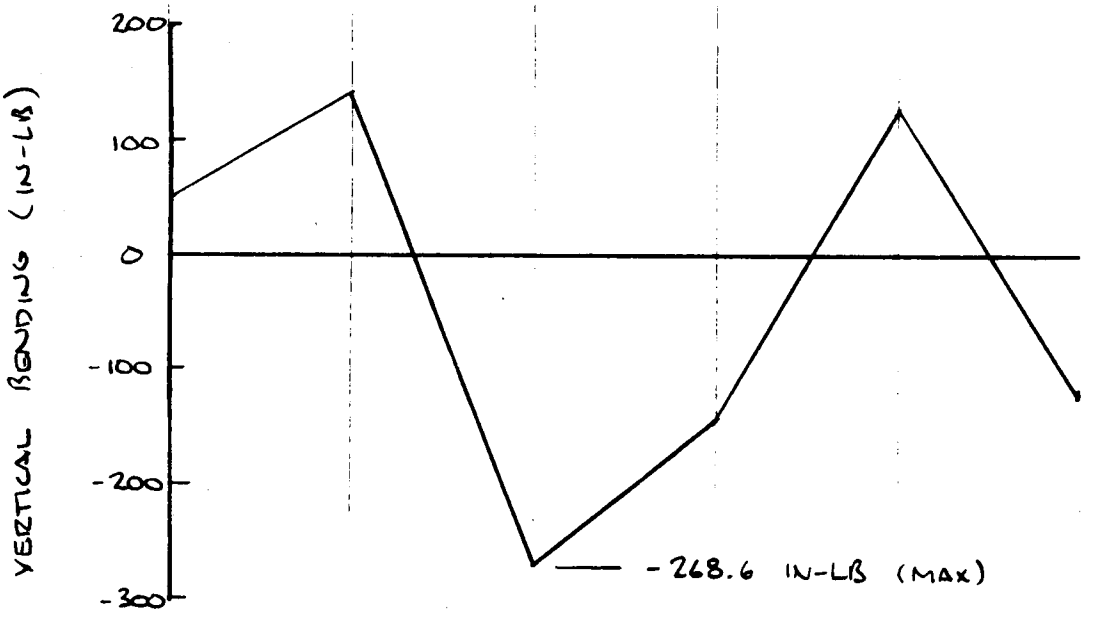
5.3 THRUSTER BEAM AT MID PANEL (BAYS 1 AND 4)

- MODIFICATION TO NASTRAN MODEL TO INCLUDE MID-BAY THRUST SUPPORT:



THIS VIEW LOOKING DOWN ON BOTTOM PANEL (2)

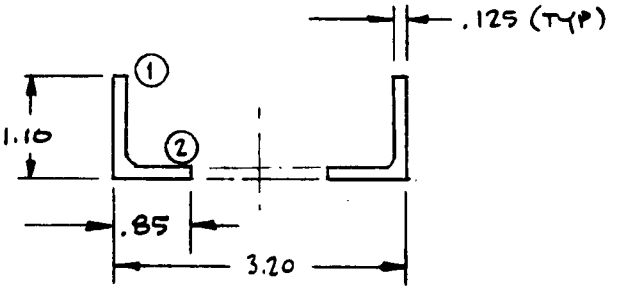




FORM LMSC 362 B-3

5.3 THRUSTER BEAM AT MID PANEL (BAYS 1 AND 4) (CONT'D)

MID PANEL BEAM CROSS SECTION:



ELEM	A	Y	AY	AY^2	I_o
1	.275	.550	.1513	.0832	.0277
2	.1813	.0625	.0113	.0007	.0002
Σ	.4563		.1626	.0839	.0279

$$\bar{Y} = \frac{.1626}{.4563} = .3563 \text{ IN}$$

$$I_c = .0839 + .0279 - .4563(.3563)^2 = .0539 \text{ IN}^4$$

BENDING STRESS: (AXIAL COMPRESSION LOADS WERE < 10 LB)

$$f_b = \frac{My}{I} = \frac{-268.6\,(1.1 - .3563)}{.0539} = -3706 \text{ psi}$$

IN ABSENCE OF CRIPPLING ALLOWABLE DATA FOR 2219-T87 ALUM., USE 2024-T3 DATA CONTAINED IN LOCKHEED STRESS MEMO NO 110

$$@\ \frac{b}{t} = \frac{(1.1 - .125)}{.125} = 7.8, \Rightarrow F_{cc} = 37.5 \text{ KSI (ONE EDGE FREE)}$$

$$MS_{\text{CRIPPLING}} = \frac{37.5}{3.7\,(2.0)} - 1 = \underline{+\text{HIGH}}$$

Prepared by: T.O. Murray	Date 6/3/88	LOCKHEED MISSILES & SPACE COMPANY, INC.	Page 5.4.1 Temp Perm
Checked by:	Date	Title AFE CV Bottom Panel Isogrid Layout	Model AFE CV
Approved by:	Date		Report No.

5.4 TRUNNION FTG BACK-UP STRUCTURE ANALYSIS

- NASTRAN MODEL DETAILS OF LOWER PANELS SHOWING 3 TRUNNION LOCATIONS

ORIGINAL PAGE IS
OF POOR QUALITY

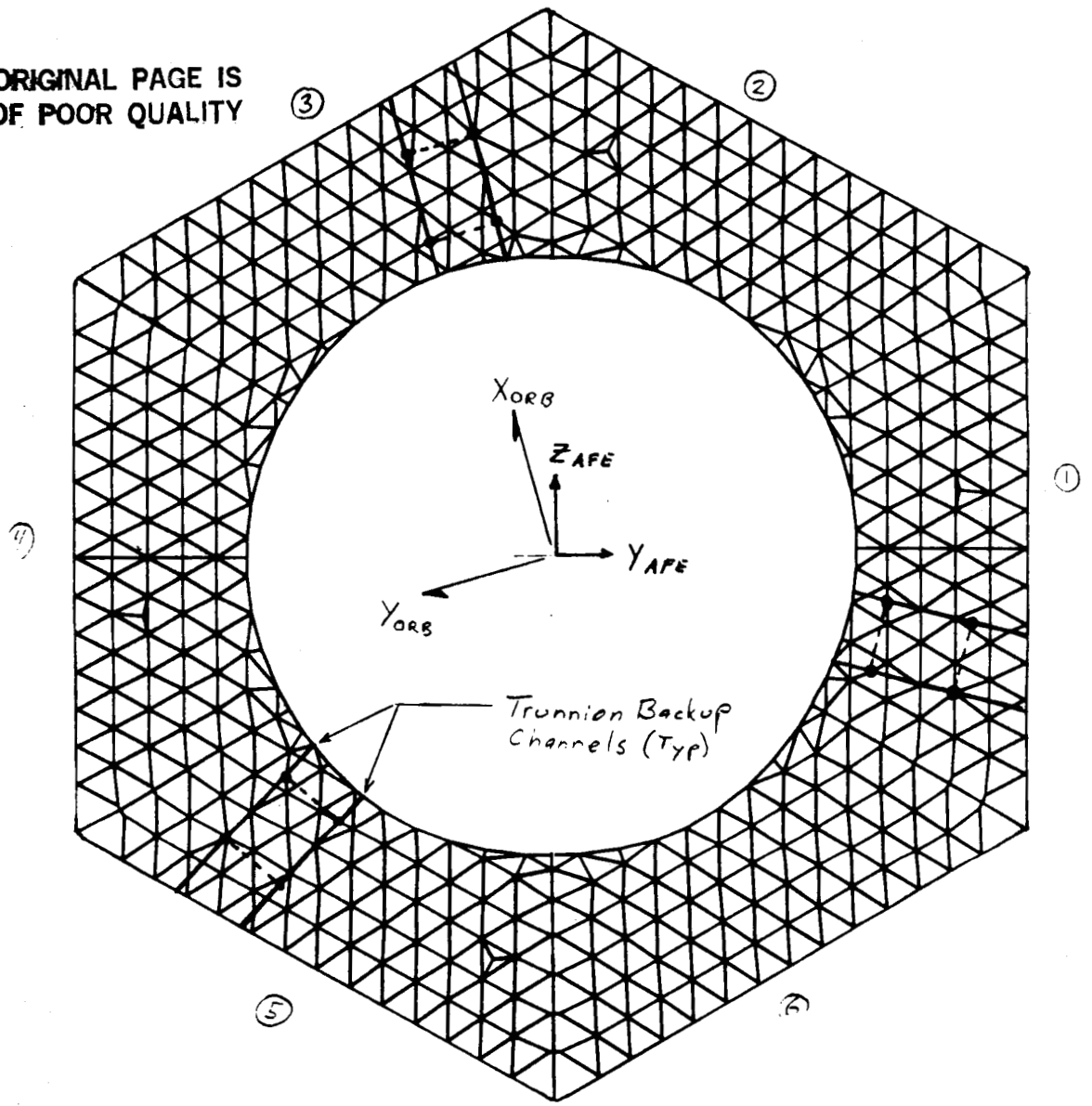


Figure 1

5.4 TRUNNION FTG BACK UP STRUCTURE ANALYSIS

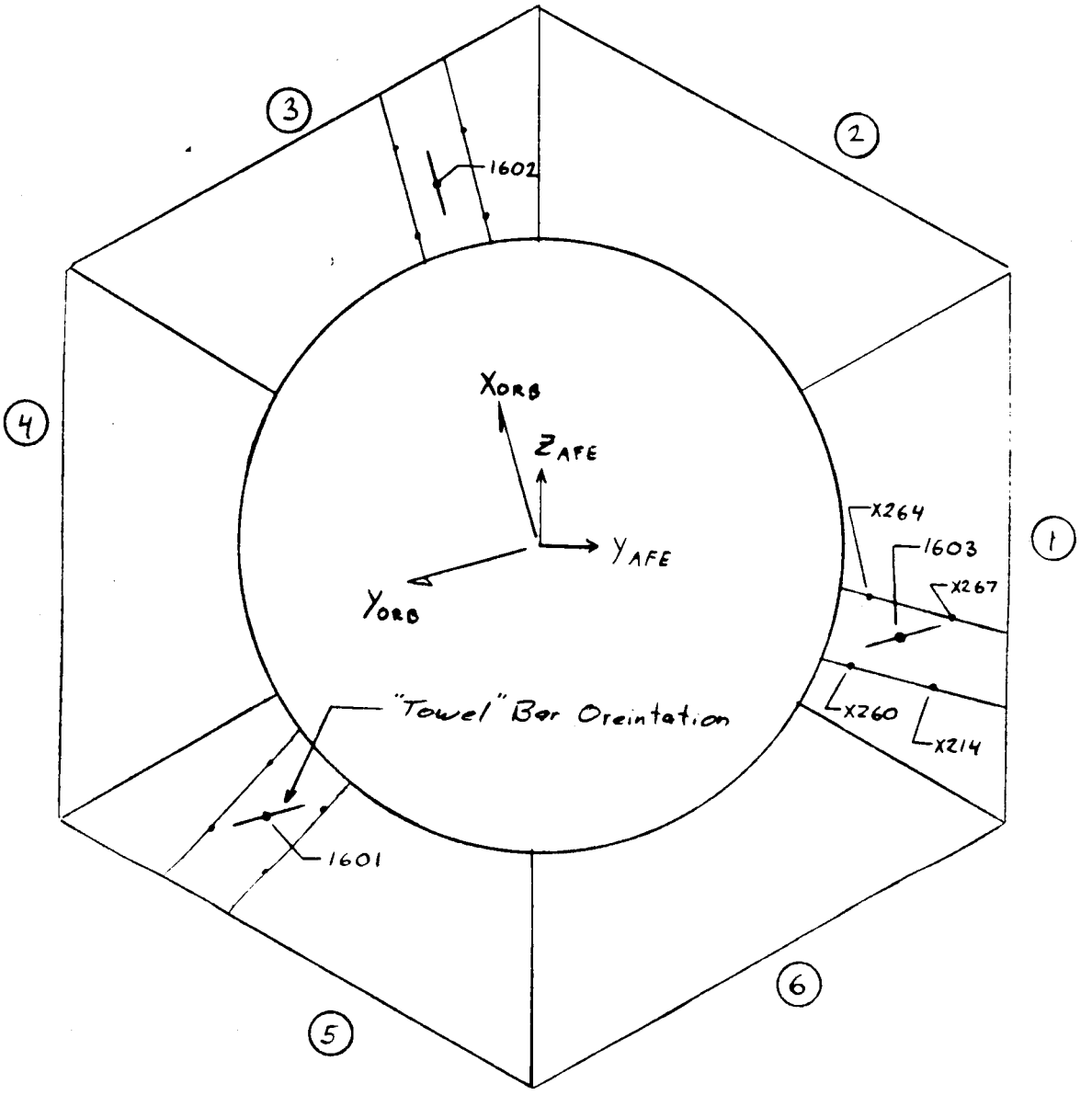


Figure 2.

5.4 TRUNNION FTG BACK UP STRUCTURE ANALYSIS

ORIGINAL PAGE IS
OF POOR QUALITY

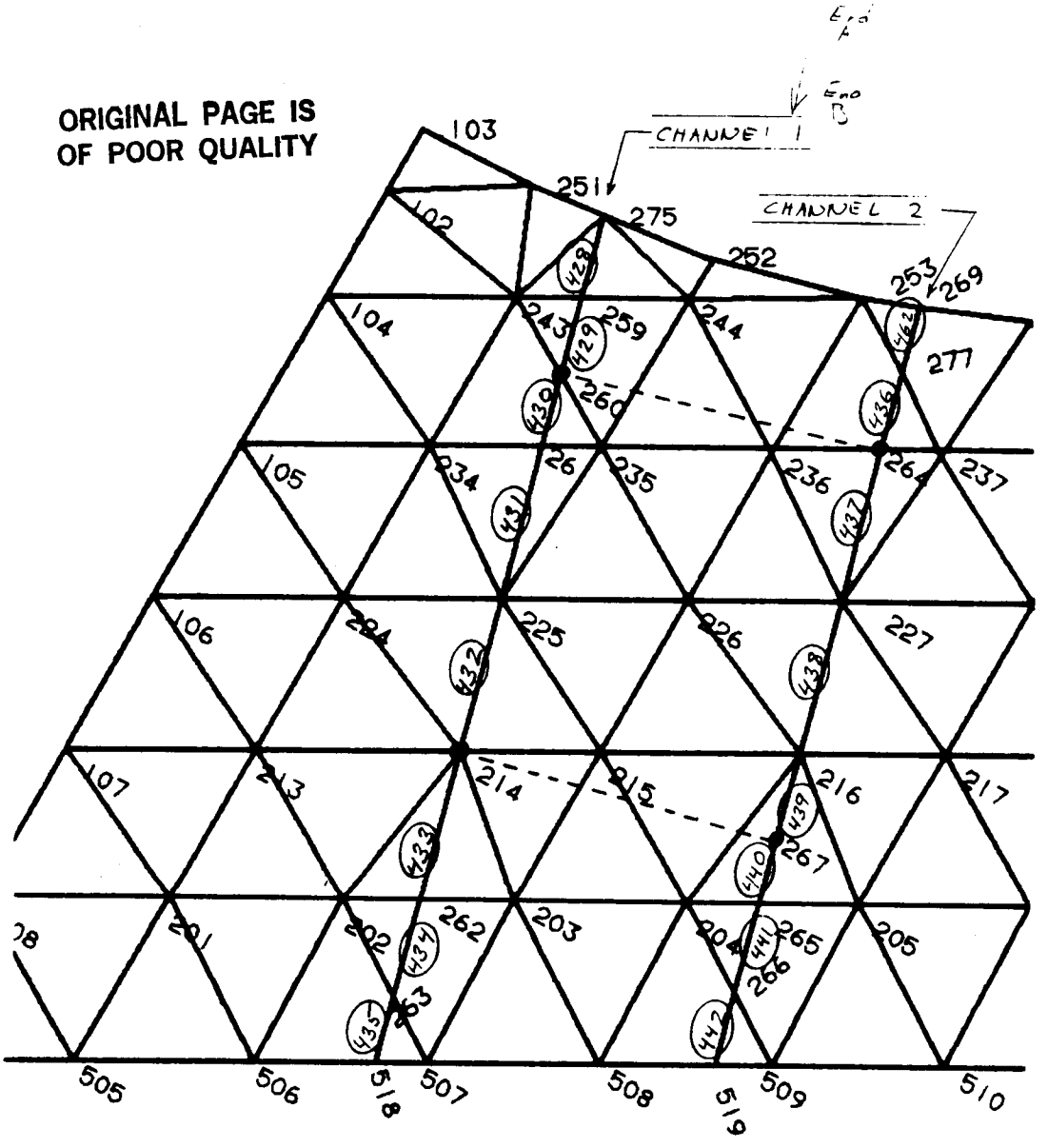
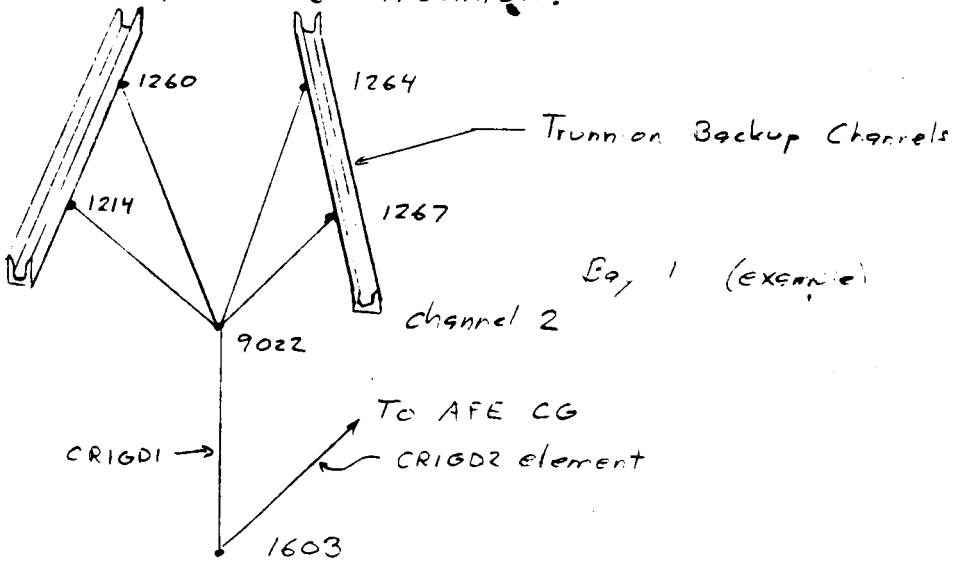


Figure 3. Enlarged Bottom Isogrid Panel Showing Trunnion Backup Structure

Node numbering: Bay No × 1,000 + number shown
Element " : Bay No × 10,000 + 2,000 + number shown

5.4 TRUNNION FTG BACK-UP STRUCTURE ANALYSIS

Figure 1 shows the trunnion backup structure on the AFE CV bottom isogrids. An outline of the trunnion footing is also shown. Figure 2 shows the orientation of the trunnion "towel" bars and the grid point ID's for the bars. Force components along the "towel" bar's axes were released for each trunnion. Bar elements were used to spread the regular landing trunnion forces to four nodes on the two "channel" bars for each trunnion.



ORIGINAL PAGE IS
OF POOR QUALITY

FORM LMSC 362 B-3

Prepared by: T O Murray Date: 6/3/88
Checked by: Date:
Approved by Date:

LOCKHEED MISSILES & SPACE COMPANY, INC.
Title: AFE CARRIER VEHICLE STRESS ANALYSIS
Model: AFE CV
Report No.
Page: 5.4.5 Temp Perm

5.4 TRUNNION FTG BACK UP STRUCTURE ANALYSIS

Table 1.

Vertical Bending Moments (M2) in Channel Elements

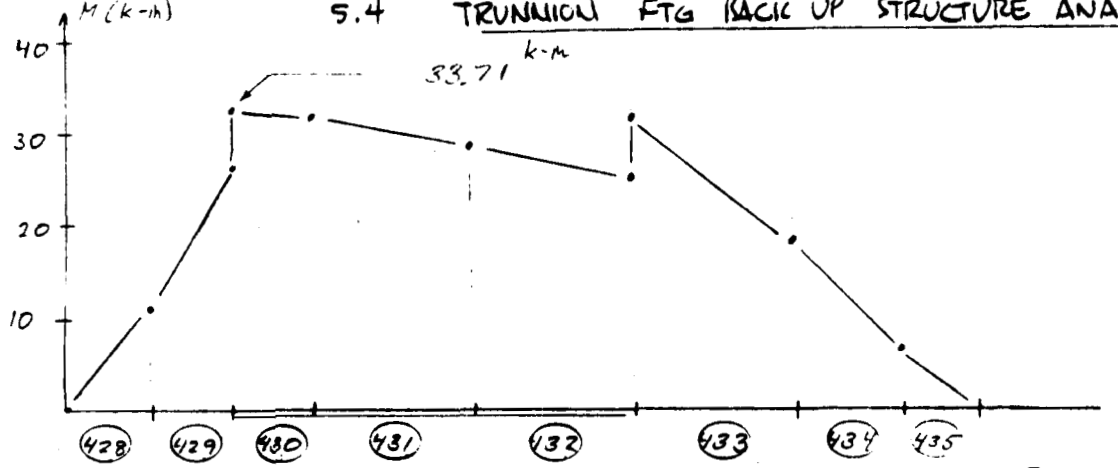
	Element No.	Bay 1 Moment (k-in) End A	Bay 1 Moment (k-in) End B	Bay 3 Moment (k-in) End A	Bay 3 Moment (k-in) End B	Bay 5 Moment (k-in) End A	Bay 5 Moment (k-in) End B
Channel 1	X 428	0.07	-3.12	-0.14	8.56	0.22	-12.37
	X 429	-3.18	-6.92	8.54	18.78	-12.36	-27.17
	X 430	-10.34	-8.61	21.56	22.24	-33.71	-32.13
	X 431	-8.55	-4.05	22.22	24.10	-32.06	-28.18
	X 432	-4.18	0.20	24.09	26.10	-28.26	-24.59
	X 433	-1.24	-0.59	30.34	15.73	-32.09	-16.95
	X 434	-0.59	-0.20	15.73	6.08	-16.95	-6.57
	X 435	-0.18	0.03	6.04	-0.23	-6.49	0.09
Channel 2	X 467	0.07	-7.83	0.06	-2.09	-0.06	-2.52
	X 436	-7.89	-18.72	-1.97	-4.72	-2.79	-6.53
	X 437	-24.66	-21.42	3.81	-5.73	-10.68	-6.76
	X 438	-21.43	-18.36	5.69	-7.71	-6.80	-2.75
	X 439	-18.34	-16.52	-7.76	-9.09	-2.74	-0.49
	X 440	-23.31	-17.20	-9.99	-7.34	-2.34	-1.75
	X 441	-17.20	-7.24	7.33	-3.07	-1.76	-0.81
	X 442	-7.16	0.32	3.04	0.11	-0.80	-0.11

X = 12, 32, 52 (Bays 1, 3, 5)

ORIGINAL PAGE IS
OF POOR QUALITY

Prepared by: T.O Murray	Date 6/3/88	LOCKHEED MISSILES & SPACE COMPANY, INC.	Page Temp Perm 5.4.6
Checked by:	Date	Title AFE CARRIER VEHICLE STRESS ANALYSIS	Model AFE CV
Approved by:	Date		Report No.

5.4 TRUNNION FTG BACK UP STRUCTURE ANALYSIS



Bay 5, Vertical Bending Moment Diagram
Channel 1

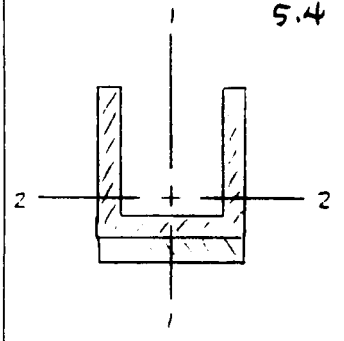
The vertical bending moments are multiple factors above the lateral moments. Because the channel section properties are similar for both principle directions, element no. 430 will be considered critical. The related forces for this element are as follows:

$M_2 = 33.71$ k-in (shown)
$M_1 = 5.15$ k-in } from NASTRAN
$P = 3.84$ k } output

ORIGINAL PAGE IS
OF POOR QUALITY

Prepared by: T.O. Murray	Date 6/3/88	LOCKHEED MISSILES & SPACE COMPANY, INC.	Page 5.4.7 Temp Perm.
Checked by:	Date	Title AFE CARRIER VEHICLE STRESS ANALYSIS	Model AFE CV
Approved by:	Date		Report No.

5.4 TRUNNION PTG BACK UP STRUCTURE ANALYSIS



Section properties:

$A = 2.375\ in^2$

$I_2 = 1.157\ in^4$

$I_1 = 1.175\ in^4$

$C_2 = 1.0$

$C_1 = 1.665$

$$f_{Total} = \frac{P}{A} + \frac{M_1 C_2}{I_1} + \frac{M_2 C_1}{I_2}$$

Max loads (from page 5.4.6)

$M_2 = 33.71$ k-in

$M_1 = 5.15$ k-in

$P = 3.84$ k

$$f_{Total} = \frac{3.84\ k}{2.375\ in^2} + \frac{5.15(1.0)}{1.175} + \frac{33.71(1.665)}{1.157}$$

$$= 54.51\ ksi$$

$$MS_{yield} = \frac{51.0}{1.25(54.51)} - 1 = \underline{\underline{-0.25}}$$

$$MS_{ult} = \frac{63.0}{2.0(54.51)} - 1 = \underline{\underline{-0.42}}$$

The vertical bending moment is lower from the previous analysis but the section is still inadequate.

ORIGINAL PAGE IS
OF POOR QUALITY

FORM LMSC 362 B 3

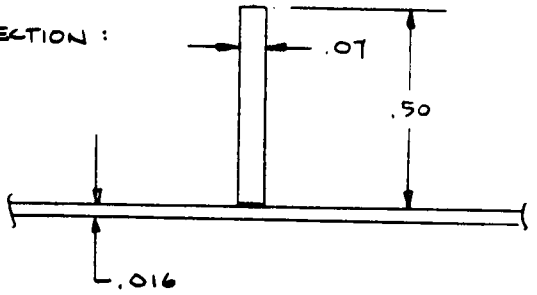
5.5 UPPER AND LOWER ISOGRID PANELS

Each isogrid bar in the upper and lower panels is represented by a CBAR element and thus is able to produce individual bar forces (axial, shear, moment and torque) for subsequent stress analysis. During the course of evaluating several hundred isogrid bars per panel for twelve panels and five load conditions and repeating the process for each design/model update, the need for a way to post process the NASTRAN output for the analysis of the isogrid bars has become apparent.

A FORTRAN program has been written and is now in use which reads the NASTRAN ouput and searches for the isogrid bars, identifying them by their property ID. The program then distinguishes between upper and lower panel elements and uses pre-determined allowables to calculate and print the isogrid bar margins of safety. The following pages include the calculation of the allowables that are currently being used in this program. The upper panel allowables are based simply on the bar critical (instability) axial and bending loads. The buckling load for these bar elements is based upon an end fixity factor of 2.0 as recommended by the McDonnel-Douglas Isogrid Design Handbook. The lower panel isogrid allowables are based on using the buckling load of the thin triangular panel (determined by NACA 3781) and treating the bar in the same way as an integral stiffener. The output from this " ISOGRD" program is included in this section following the calculation of allowables.

5.5 UPPER AND LOWER PANEL SKIN BUCKLING ALLOWABLES

ISOGRID CROSS-SECTION :



ORIGINAL PAGE IS
OF POOR QUALITY

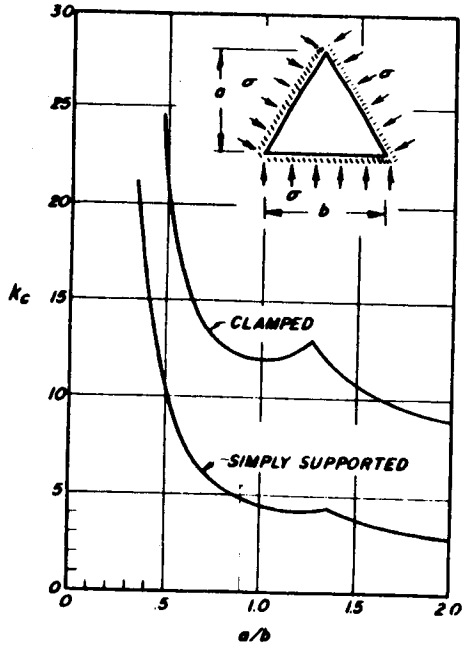
I. BUCKLING OF TRIANGULAR PLATE (REF. NACA TN 3781)

$$\sigma_{cr} = \frac{k\pi^2 E}{12(1-\nu^2)}\left(\frac{t}{b}\right)^2$$

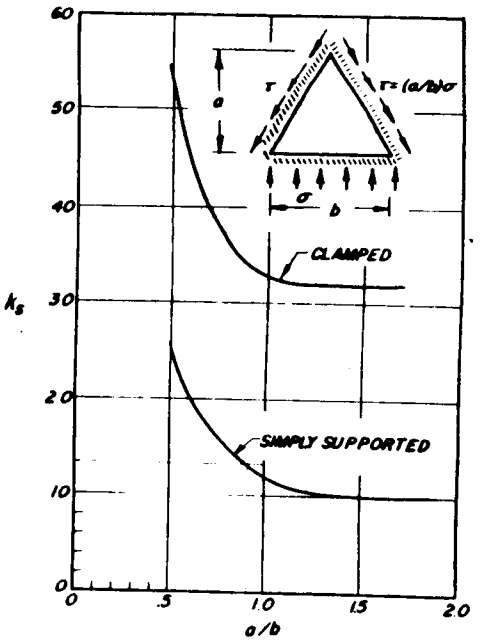
@ $\frac{a}{b} = .866$ (EQUIL. TRIANGLE), $K_c = 5.0$, $K_s = 13$

UNIFORM COMPRESSION → $\sigma_{cr} = \frac{(5.)(\pi^2)(10.3\times10^6)}{12(1-.33^2)}\left(\frac{.016}{4.2}\right)^2 = 689.8$ psi

COMPRESSION BALANCED BY EDGE SHEAR → $\sigma_{cr} = \frac{(13.5)(\pi^2)(10.3\times10^6)}{12(1-.33^2)}\left(\frac{.016}{4.2}\right)^2 = 1,862.5$ psi



(a) Uniform compression.



(b) Shear

Figure 34.- Buckling coefficients for isosceles triangular plates.

5.5 UPPER AND LOWER PANEL BUCKLING ALLOWABLES (CONT'D)

CRIPPLING ALLOWABLE OF UPSTANDING LEG OF ISOGRID. FIRST ANALYZE ASSUMING THE (BUCKLED) SKIN PROVIDES LATERAL TRANSLATIONAL SUPPORT BUT NOT ROTATIONAL. IE, SIMPLE SUPPORTS.

REF SM NO 80 C. (Δ): (USE 2024-T81 PROPERTIES BY SIMILARITY)

Δ, TABLE II →
$k_s = 1.095$
$n = 25$
$F_{.7} = 55.0$ KSI

$$\frac{b}{t} = \frac{.50}{.07} = 7.143$$

Δ, FIG 5 → $B_{cc} = 1.02$ (ONE EDGE FREE)

$$B = k_s B_{cc} = 1.095\,(1.02) = 1.1169$$

FIG 1 → $F/F_{.7} = .78$

$$F_{cr} = .78\,(55.) = 42.9 \text{ KSI}$$

TOTAL →
$$F_{c_T} = \frac{F_{c_{SKIN}}(A_{SKIN}) + F_{c_{STIFF.}}(A_{STIFF})}{A_{TOT}}$$

$$F_{c_T} = \frac{.690\,(4.2)(.016) + 42.9\,(.50)(.07)}{(4.2)(.016) + (.50)(.07)}$$

$$F_{c_T} = 15.15 \text{ KSI}$$

THIS IS THE ALLOWABLE STRESS TO BE USED WHEN THE THIN SKIN IS INCLUDED IN THE NASTRAN STIFFNESS MATRIX. IT ACCOUNTS FOR THE FACT THAT THE SKIN WILL BUCKLE EARLY.

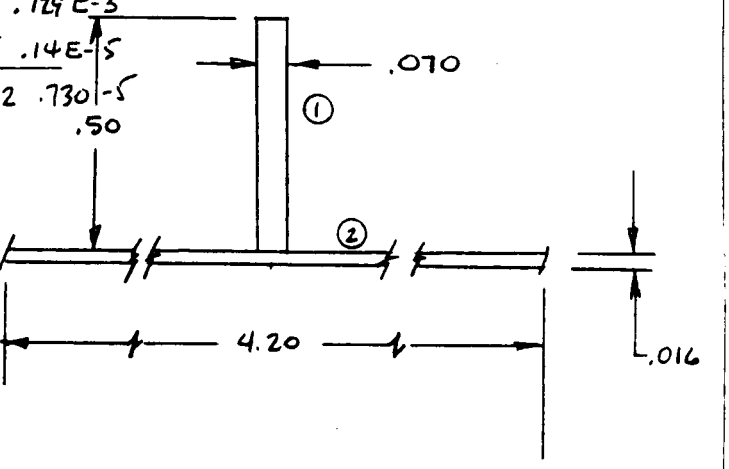
STIFFENER (CBAR) AXIAL FORCE:

⇒ $P_a = 15{,}150\,(.07)(.50) = 530$ LB

5.5 UPPER AND LOWER ISOGRID PANELS (CONT'D)

PURE BENDING ALLOWABLE OF ISOGRID CROSSECTION

i	A	Y	AY	AY^2	I_o
①	.035	.266	.931E-2	.247E-2	.729E-3
②	.067	.008	.536E-3	.430E-5	.14E-5
Σ	.102		.985E-2	.2474E-2	.730E-5



$$\bar{Y} = \frac{\Sigma AY}{\Sigma A} = .0966$$

$$I_c = \Sigma AY^2 + \Sigma I_o - \Sigma A(\bar{Y})^2$$

$$I_c = 1.530 \times 10^{-3}$$

APPLY UNIT MOMENT

$$f_{b_u} = \frac{M(Y')}{I} = \frac{-1(.50+.016-.0966)}{1.530 \times 10^{-3}} = -274.1 \text{ psi}$$

$$f_{b_l} = \frac{M(\bar{Y})}{I} = \frac{-1(-.0966)}{1.53 \times 10^{-3}} = 63.1 \text{ psi}$$

DETERMINE MAGNITUDE OF BENDING MOMENT WHEN f_{b_u} IS EQUAL TO CRIPPLING STRESS OF VERTICAL FLANGE.

$$\Rightarrow M_a = 1\left(\frac{42{,}900}{274.1}\right) = 156.6 \text{ IN-LB}$$

COMPRESSION / BENDING INTERACTION (REF SM NO 70 a, TABLE I)

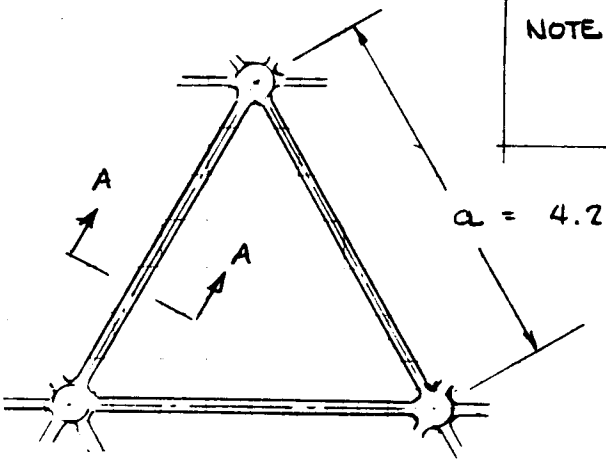
$$\Rightarrow R_b^{1.75} + R_c = 1 \quad ; \quad R_b = \frac{m}{M_a} \quad , \quad R_c = \frac{P}{P_a}$$

FORM LMSC 362 B.3

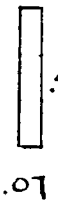
5.5 UPPER AND LOWER ISOGRID PANELS (CONT'D)

ISOGRID LOCAL "BAR" ALLOWABLES ~ UPPER PANEL (NO SKIN)

NOTE: PER MSFC-HDBK-505A
STABILITY ⇒ MEAN DIMENSIONS
TENSION ⇒ MIN. DIMENSIONS



I. COMPRESSION ALLOWABLE ~ ELASTIC COLUMN BUCKLING

A-A: 

$$I_{MIN} = \frac{bh^3}{12} = 14.3 \times 10^{-6} \text{ IN}^4$$

$$P_{COL} = C\pi^2\frac{EI}{a^2} = \frac{2.0^{*}\pi^2(10.3\times10^{6})(14.3\times10^{-6})}{(4.2)^2}$$

$$P_{COL} = 164.8 \text{ lb}$$

$$F_{COL} = \frac{164.8}{(.07)(.5)} = 4.709 \text{ KSI (ULT)(ELASTIC)} \checkmark$$

$$\Rightarrow P_{LIMIT_c} = \frac{164.8}{2.0} = 82.4 \text{ Lb} \quad \text{(SAFETY FACTOR = 2.0)}$$

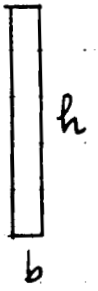
II. TENSION ~ GROSS AREA STRESS = F_{tu}

$$P = \frac{F_{tu}\cdot A}{S.F._u} = \frac{63{,}000\,(.06)(.490)}{2.0}$$

$$\Rightarrow P_{LIMIT_T} = 926.1 \text{ Lb}$$

* C = 2.0 FROM M°DAC ISOGRID DESIGN HDBK, P. 4.8.007

5.5 UPPER AND LOWER ISOGRID PANELS (CONT'D)



ORIGINAL PAGE IS
OF POOR QUALITY

BASELINE ISOGRID BAR .07 x .50 $\Rightarrow$ A = .035

$\therefore$ MAINTAINING CURRENT WEIGHT $\Rightarrow$ A = .035

$b * h = .035$: $b = .035/h$

b	h	$\frac{bh^3}{12}$	$\frac{(I/c)}{(I/c)_{REF}}$	I/I_{REF}
.25	.140	57.2×10^{-6}	8.0	4.0
.30	.1167	39.7×10^{-6}	4.63	2.776
.35	.100	29.2×10^{-6}	2.917	2.042
.40	.0875	22.3×10^{-6}	1.949	1.559
.45	.0778	17.7×10^{-6}	1.375	1.238
.50	.070	14.3×10^{-6}	1.0	1.0

BENDING ALLOWABLE:

$$F_{tu} = \frac{M_{ALL}\, c}{I} \qquad b = .07 \text{ , } h = .5 \text{ , } F_{tu} = 42{,}000$$

$$M_{ALL} = \frac{(42{,}000)(.07)(.5)^3}{12\,(.25)}$$

$\Rightarrow$ M_{ALL} = 122.5 IN-LB , BENDING ALLOWABLE WHEN OPEN ISOGRID

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: LIFTOFF LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
12201	-186.227	0.351	0.638	0.004	1.85
12202	43.806	0.083	4.304	0.027	HIGH
12204	-237.117	0.447	1.421	0.009	1.23
12205	-112.410	0.212	11.410	0.073	3.50
12206	139.326	0.263	7.696	0.049	2.73
12207	-106.389	0.201	18.790	0.120	3.44
12208	255.124	0.481	13.094	0.084	1.02
12215	-179.888	0.339	1.376	0.009	1.94
12216	-145.008	0.274	8.517	0.054	2.57
12222	-196.040	0.370	12.843	0.082	1.61
12223	-184.749	0.349	12.239	0.078	1.78
12224	-155.406	0.293	1.053	0.007	2.41
12225	-147.437	0.278	3.128	0.020	2.58
12226	-147.944	0.279	3.906	0.025	2.56
12227	-161.521	0.305	25.036	0.160	1.90
12228	-109.483	0.207	46.267	0.295	2.08
12229	-181.843	0.343	62.788	0.401	0.83
12230	-97.140	0.183	12.827	0.082	4.11
12231	-245.893	0.464	35.410	0.226	0.86
12232	-63.041	0.119	14.464	0.092	6.44
12233	-107.853	0.203	58.942	0.376	1.60
12234	-135.203	0.255	0.906	0.006	2.92
12235	-122.584	0.231	1.528	0.010	3.32
12236	-102.987	0.194	2.622	0.017	4.13
12237	-81.435	0.154	4.734	0.030	5.42
12238	-36.524	0.069	16.368	0.105	HIGH
12239	100.078	0.189	34.974	0.223	2.83
12240	-109.155	0.206	81.377	0.520	0.91
12241	-143.500	0.271	112.984	0.721	0.20
12242	-111.017	0.209	64.849	0.414	1.36
12243	-110.412	0.208	5.149	0.033	3.74
12244	-137.128	0.259	23.689	0.151	2.38
12245	-112.118	0.212	3.027	0.019	3.70
12246	-94.511	0.178	0.637	0.004	4.61
12247	-80.870	0.153	1.597	0.010	5.54
12248	-57.526	0.109	2.496	0.016	8.15
12249	10.429	0.020	5.378	0.034	HIGH
12250	65.761	0.124	31.886	0.204	4.38
12251	-177.935	0.336	415.199	2.651	-0.83
12252	-20.709	0.039	1.100	0.007	HIGH
12253	-132.138	0.249	389.611	2.488	-0.81
12254	-111.760	0.211	32.305	0.206	2.65
12255	-113.329	0.214	23.009	0.147	3.02
12256	-108.470	0.205	19.093	0.122	3.35
12257	-96.874	0.183	6.475	0.041	4.36

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: LIFTOFF LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
12317	79.706	0.150	285.579	1.824	-0.67
12318	-27.126	0.051	135.020	0.862	0.22
12319	7.257	0.014	127.760	0.816	0.40
12320	14.857	0.028	25.982	0.166	HIGH
12323	187.680	0.354	215.572	1.377	-0.52
12324	27.542	0.052	1.666	0.011	HIGH
12325	57.901	0.109	353.147	2.255	-0.77
12326	25.430	0.048	121.433	0.775	0.45
12327	348.508	0.658	9.305	0.059	0.50
12329	142.805	0.269	180.179	1.151	-0.35
12330	136.331	0.257	139.784	0.893	-0.07
12331	116.363	0.220	91.220	0.583	0.64
12332	116.482	0.220	36.959	0.236	2.34
12333	354.111	0.668	39.436	0.252	0.32
12334	169.370	0.320	122.747	0.784	0.03
12335	164.720	0.311	49.451	0.316	1.25
12336	166.413	0.314	29.617	0.189	1.72
12337	207.356	0.391	14.589	0.093	1.46
12338	170.297	0.321	46.464	0.297	1.27
12339	169.404	0.320	20.181	0.129	1.88
12340	177.079	0.334	13.780	0.088	1.87
12341	148.481	0.280	11.427	0.073	2.44
12342	153.072	0.289	6.657	0.043	2.42
12343	105.507	0.199	3.756	0.024	3.99
12346	146.272	0.276	8.453	0.054	2.55
12347	-50.097	0.095	7.063	0.045	9.11
12348	-127.203	0.240	20.268	0.129	2.73
12349	-91.005	0.172	16.422	0.105	4.23
12350	-85.885	0.162	10.935	0.070	4.83
12351	-81.362	0.154	11.197	0.072	5.12
12353	-300.437	0.567	14.706	0.094	0.72
12354	-273.710	0.516	7.669	0.049	0.92
12355	-134.596	0.254	75.651	0.483	0.87
12356	-135.124	0.255	65.250	0.417	1.12
12357	-133.112	0.251	29.348	0.187	2.28
12358	-131.528	0.248	31.974	0.204	2.22
12361	-389.208	0.734	7.757	0.050	0.35
12362	-116.802	0.220	111.976	0.715	0.29
12363	-148.865	0.281	132.403	0.845	-0.03
12364	-168.697	0.318	83.575	0.534	0.53
12365	-170.804	0.322	70.264	0.449	0.76
12368	-7.091	0.013	25.228	0.161	HIGH
12369	-80.534	0.152	78.656	0.502	1.21
12370	-45.930	0.087	134.007	0.856	0.18
12371	-202.886	0.383	215.900	1.379	-0.53

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: LIFTOFF LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
12456	-294.291	0.555	47.924	0.306	0.47
12463	-191.193	0.361	19.376	0.124	1.59
12464	-143.780	0.271	4.003	0.026	2.66
12465	29.752	0.056	10.354	0.066	HIGH
13301	-203.656	0.384	3.565	0.023	1.59
13302	185.701	0.350	2.097	0.013	1.85
13303	279.736	0.528	1.137	0.007	0.89
13304	-329.179	0.621	1.445	0.009	0.61
13305	663.768	1.252	2.451	0.016	-0.20
13306	-418.977	0.791	2.398	0.015	0.26
13307	440.735	0.832	2.779	0.018	0.20
13308	-363.627	0.686	2.315	0.015	0.46
13313	-118.611	0.224	2.654	0.017	3.45
13314	-215.380	0.406	1.111	0.007	1.46
13319	523.292	0.987	1.891	0.012	0.01
13320	391.701	0.739	7.461	0.048	0.34
13321	-135.010	0.255	1.628	0.010	2.92
13322	-169.524	0.320	1.258	0.008	2.12
13323	-135.078	0.255	1.273	0.008	2.92
13324	-94.929	0.179	1.694	0.011	4.57
13325	-22.797	0.043	1.145	0.007	HIGH
13326	121.455	0.229	2.010	0.013	3.35
13327	234.842	0.443	2.023	0.013	1.25
13328	336.494	0.635	1.844	0.012	0.57
13329	496.990	0.938	2.952	0.019	0.07
13330	491.469	0.927	8.583	0.055	0.07
13331	-92.015	0.174	1.130	0.007	4.75
13332	-78.832	0.149	1.075	0.007	5.72
13333	-84.883	0.160	0.723	0.005	5.24
13334	-47.489	0.090	1.302	0.008	HIGH
13335	-20.177	0.038	1.208	0.008	HIGH
13336	31.786	0.060	1.285	0.008	HIGH
13337	98.920	0.187	1.200	0.008	4.35
13338	167.935	0.317	1.649	0.011	2.15
13339	292.784	0.552	1.626	0.010	0.81
13340	351.174	0.663	3.939	0.025	0.51
13341	415.231	0.783	6.645	0.042	0.27
13342	-67.466	0.127	0.802	0.005	6.85
13343	-35.824	0.068	0.516	0.003	HIGH
13344	-46.860	0.088	0.362	0.002	HIGH
13345	-33.690	0.064	0.729	0.005	HIGH
13346	-11.536	0.022	0.847	0.005	HIGH
13347	9.794	0.018	0.855	0.005	HIGH
13348	38.099	0.072	0.626	0.004	HIGH
13349	94.126	0.178	1.289	0.008	4.62

5.5.11

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: LIFTOFF LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
13398	-226.217	0.427	2.807	0.018	1.34
13399	-205.329	0.387	0.742	0.005	1.58
13400	-171.041	0.323	0.759	0.005	2.10
13401	-119.077	0.225	0.630	0.004	3.45
13402	-22.317	0.042	0.805	0.005	HIGH
13403	179.505	0.339	3.362	0.021	1.94
13406	-161.247	0.304	4.170	0.027	2.27
13407	-182.840	0.345	1.421	0.009	1.90
13408	-201.661	0.380	0.917	0.006	1.63
13409	-199.421	0.376	1.183	0.008	1.66
13410	-188.603	0.356	1.207	0.008	1.81
13411	-182.746	0.345	0.925	0.006	1.90
13412	-180.508	0.341	4.414	0.028	1.92
13413	52.459	0.099	8.301	0.053	8.54
13415	-173.839	0.328	0.900	0.006	2.05
13416	-194.562	0.367	1.285	0.008	1.72
13417	-205.301	0.387	1.460	0.009	1.58
13418	-212.897	0.402	1.485	0.009	1.49
13419	-226.176	0.427	1.388	0.009	1.34
13420	-263.553	0.497	1.600	0.010	1.01
13421	-262.709	0.496	7.185	0.046	1.00
13424	-179.124	0.338	1.439	0.009	1.96
13425	-206.904	0.390	1.644	0.010	1.56
13426	-217.823	0.411	1.657	0.011	1.43
13427	-231.783	0.437	1.677	0.011	1.28
13428	-254.017	0.479	1.235	0.008	1.09
13429	-281.291	0.531	2.058	0.013	0.88
13430	-333.689	0.630	2.294	0.015	0.59
13432	-193.187	0.365	1.812	0.012	1.74
13433	-224.924	0.424	1.829	0.012	1.35
13434	-236.260	0.446	1.845	0.012	1.24
13435	-251.778	0.475	1.631	0.010	1.10
13436	-273.213	0.515	0.926	0.006	0.94
13437	-325.029	0.613	2.636	0.017	0.63
13438	-353.112	0.666	5.437	0.035	0.49
13440	-213.964	0.404	2.031	0.013	1.47
13441	-248.949	0.470	1.967	0.013	1.13
13442	-259.676	0.490	1.905	0.012	1.04
13443	-274.962	0.519	1.486	0.009	0.93
13444	-303.274	0.572	0.610	0.004	0.75
13445	-370.346	0.699	0.769	0.005	0.43
13446	-404.902	0.764	8.427	0.054	0.30
13450	-240.531	0.454	2.171	0.014	1.20
13451	-278.098	0.525	2.104	0.013	0.90
13452	-290.264	0.548	1.953	0.012	0.82

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: LIFTOFF LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
13509	473.428	0.893	5.458	0.035	0.12
13510	382.514	0.722	0.931	0.006	0.39
13511	324.353	0.612	0.944	0.006	0.63
13512	298.584	0.563	0.930	0.006	0.77
13513	282.460	0.533	0.562	0.004	0.88
13514	261.637	0.494	1.912	0.012	1.02
13515	211.808	0.400	6.382	0.041	1.48
13518	621.341	1.172	4.906	0.031	-0.15
13519	576.851	1.088	1.399	0.009	-0.08
13520	452.534	0.854	0.455	0.003	0.17
13521	378.830	0.715	0.426	0.003	0.40
13522	332.548	0.627	0.270	0.002	0.59
13523	296.895	0.560	0.244	0.002	0.79
13524	239.677	0.452	1.329	0.008	1.21
13526	654.657	1.235	10.323	0.066	-0.20
13527	578.132	1.091	0.584	0.004	-0.08
13528	509.421	0.961	0.479	0.003	0.04
13529	432.690	0.816	0.313	0.002	0.22
13530	377.106	0.712	0.580	0.004	0.41
13531	339.083	0.640	0.716	0.005	0.56
13532	277.670	0.524	0.770	0.005	0.91
13534	581.479	1.097	6.948	0.044	-0.09
13535	550.541	1.039	5.170	0.033	-0.04
13536	483.668	0.913	0.737	0.005	0.10
13537	434.600	0.820	0.881	0.006	0.22
13538	402.880	0.760	1.013	0.006	0.32
13539	367.316	0.693	1.330	0.008	0.44
13540	310.622	0.586	1.583	0.010	0.71
13544	518.710	0.979	9.703	0.062	0.01
13545	487.384	0.920	2.999	0.019	0.09
13546	435.583	0.822	1.660	0.011	0.22
13547	407.376	0.769	1.020	0.007	0.30
13548	383.083	0.723	1.348	0.009	0.38
13549	363.409	0.686	1.672	0.011	0.46
13550	317.399	0.599	2.479	0.016	0.67
13553	416.844	0.786	3.988	0.025	0.27
13554	410.834	0.775	3.638	0.023	0.29
13555	383.614	0.724	1.898	0.012	0.38
13556	362.383	0.684	0.692	0.004	0.46
13557	347.137	0.655	1.405	0.009	0.53
13558	335.079	0.632	1.815	0.012	0.58
13559	296.793	0.560	2.307	0.015	0.78
13561	391.241	0.738	2.839	0.018	0.35
13562	384.883	0.726	2.688	0.017	0.38
13563	347.655	0.656	2.098	0.013	0.52

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: LIFTOFF LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
22227	117.258	0.221	4.696	0.030	3.48
22228	103.028	0.194	7.859	0.050	4.01
22229	98.053	0.185	16.683	0.107	3.88
22230	114.115	0.215	20.108	0.128	3.12
22231	136.258	0.257	73.560	0.470	0.91
22232	179.492	0.339	103.706	0.662	0.21
22233	124.902	0.236	143.096	0.914	-0.08
22234	102.652	0.194	9.925	0.063	3.96
22235	92.007	0.174	7.125	0.046	4.62
22236	90.498	0.171	2.760	0.018	4.83
22237	80.031	0.151	5.900	0.038	5.48
22238	73.618	0.139	11.001	0.070	5.73
22239	68.504	0.129	19.732	0.126	5.41
22240	75.145	0.142	21.742	0.139	4.77
22241	92.651	0.175	25.929	0.166	3.59
22242	126.518	0.239	295.922	1.890	-0.70
22243	11.549	0.022	2.247	0.014	HIGH
22244	96.429	0.182	411.377	2.627	-0.82
22245	81.115	0.153	6.884	0.044	5.36
22246	12.132	0.023	1.952	0.012	HIGH
22247	69.624	0.131	4.976	0.032	6.48
22248	53.367	0.101	3.655	0.023	8.80
22249	45.434	0.086	7.145	0.046	HIGH
22250	38.290	0.072	14.189	0.091	HIGH
22251	37.284	0.070	19.770	0.126	9.30
22252	38.791	0.073	22.442	0.143	8.38
22253	38.346	0.072	63.028	0.402	2.63
22254	19.833	0.037	192.534	1.229	-0.32
22255	14.366	0.027	186.178	1.189	-0.28
22256	-1.102	0.002	18.815	0.120	HIGH
22257	39.323	0.074	2.911	0.019	HIGH
22258	19.366	0.037	2.063	0.013	HIGH
22259	37.272	0.070	0.557	0.004	HIGH
22260	9.303	0.018	2.080	0.013	HIGH
22261	15.606	0.029	1.964	0.013	HIGH
22262	5.427	0.010	3.892	0.025	HIGH
22263	7.194	0.014	9.192	0.059	HIGH
22264	2.785	0.005	10.296	0.066	HIGH
22265	-2.385	0.004	10.378	0.066	HIGH
22266	-12.233	0.023	52.478	0.335	4.86
22267	-17.630	0.033	88.198	0.563	1.50
22268	-21.325	0.040	48.875	0.312	4.86
22269	-41.071	0.077	15.252	0.097	9.59
22270	33.928	0.064	3.497	0.022	HIGH
22271	56.471	0.107	3.220	0.021	8.29

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: LIFTOFF LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
22334	-2.755	0.005	148.937	0.951	0.09
22335	1.914	0.004	352.086	2.248	-0.76
22336	-1.972	0.004	0.331	0.002	HIGH
22337	73.014	0.138	324.489	2.072	-0.73
22338	-21.407	0.040	101.385	0.647	0.97
22339	-18.695	0.035	127.992	0.817	0.36
22340	52.729	0.099	37.672	0.241	4.49
22341	-43.720	0.082	11.372	0.073	9.79
22342	-28.244	0.053	7.574	0.048	HIGH
22343	-49.564	0.094	4.360	0.028	9.48
22346	1.183	0.002	65.280	0.417	3.58
22347	46.704	0.088	156.156	0.997	-0.08
22348	56.507	0.107	45.422	0.290	3.52
22349	26.244	0.050	156.171	0.997	-0.04
22350	38.846	0.073	2.839	0.018	HIGH
22351	54.179	0.102	10.866	0.069	7.96
22353	70.900	0.134	126.904	0.810	0.21
22354	105.083	0.198	46.047	0.294	2.17
22355	56.741	0.107	158.809	1.014	-0.12
22356	6.652	0.013	0.338	0.002	HIGH
22357	42.098	0.079	167.997	1.073	-0.17
22358	46.157	0.087	58.259	0.372	2.78
22361	80.301	0.152	79.531	0.508	1.19
22362	55.590	0.105	54.155	0.346	2.83
22363	21.603	0.041	78.310	0.500	1.96
22364	39.409	0.074	71.959	0.460	2.02
22365	45.390	0.086	137.248	0.876	0.14
22368	53.893	0.102	41.559	0.265	4.00
22369	41.065	0.077	24.842	0.159	7.52
22370	23.458	0.044	57.866	0.370	3.56
22371	23.554	0.044	59.947	0.383	3.33
22372	33.986	0.064	122.564	0.783	0.40
22375	8.657	0.016	18.357	0.117	HIGH
22376	12.390	0.023	17.599	0.112	HIGH
22377	5.685	0.011	27.714	0.177	HIGH
22378	3.998	0.008	30.288	0.193	HIGH
22379	9.486	0.018	68.629	0.438	2.94
22383	-35.986	0.068	6.779	0.043	HIGH
22384	-27.150	0.051	7.113	0.045	HIGH
22385	-22.138	0.042	9.367	0.060	HIGH
22386	-21.253	0.040	10.352	0.066	HIGH
22387	-16.527	0.031	30.084	0.192	HIGH
22390	-61.665	0.116	1.710	0.011	7.57
22391	-60.745	0.115	1.643	0.010	7.70
22392	-54.481	0.103	1.540	0.010	8.70

5.5.19

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: LIFTOFF LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
23334	98.313	0.185	27.795	0.177	3.27
23338	104.272	0.197	32.315	0.206	2.85
23339	41.936	0.079	11.294	0.072	HIGH
23340	58.154	0.110	6.927	0.044	7.77
23341	42.782	0.081	15.319	0.098	9.22
23342	2.203	0.004	7.706	0.049	HIGH
23343	6.022	0.011	6.202	0.040	HIGH
23344	30.459	0.057	12.849	0.082	HIGH
23345	78.487	0.148	30.446	0.194	3.88
23350	27.052	0.051	34.981	0.223	7.09
23351	38.532	0.073	13.581	0.087	HIGH
23352	45.932	0.087	9.822	0.063	9.58
23353	30.639	0.058	11.433	0.073	HIGH
23354	-26.281	0.050	7.325	0.047	HIGH
23355	-9.593	0.018	7.139	0.046	HIGH
23356	11.372	0.021	5.476	0.035	HIGH
23357	18.976	0.036	27.902	0.178	HIGH
23363	29.237	0.055	28.512	0.182	8.44
23364	29.142	0.055	4.957	0.032	HIGH
23365	37.370	0.071	8.881	0.057	HIGH
23366	23.913	0.045	7.986	0.051	HIGH
23367	-44.856	0.085	15.213	0.097	8.85
23368	-6.971	0.013	7.645	0.049	HIGH
23369	13.500	0.025	2.870	0.018	HIGH
23370	25.598	0.048	7.284	0.047	HIGH
23371	1.335	0.003	28.788	0.184	HIGH
23376	55.037	0.104	25.745	0.164	5.84
23377	25.748	0.049	6.955	0.044	HIGH
23378	27.455	0.052	4.516	0.029	HIGH
23379	37.485	0.071	5.226	0.033	HIGH
23380	26.305	0.050	4.883	0.031	HIGH
23382	9.777	0.018	14.353	0.092	HIGH
23383	18.259	0.034	1.300	0.008	HIGH
23384	28.402	0.054	1.071	0.007	HIGH
23385	24.992	0.047	2.410	0.015	HIGH
23386	61.435	0.116	19.112	0.122	6.09
23390	51.588	0.097	16.332	0.104	7.59
23391	37.417	0.071	2.201	0.014	HIGH
23392	28.547	0.054	1.988	0.013	HIGH
23393	33.530	0.063	2.019	0.013	HIGH
23394	45.707	0.086	1.532	0.010	HIGH
23395	42.277	0.080	1.352	0.009	HIGH
23397	224.891	0.424	26.990	0.172	1.13
23398	157.696	0.298	1.954	0.012	2.36
23399	113.087	0.213	2.785	0.018	3.67

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: LIFTOFF LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
23482	73.867	0.139	10.930	0.070	5.72
23483	65.750	0.124	8.222	0.053	6.70
23484	74.828	0.141	19.696	0.126	4.96
23485	71.547	0.135	8.726	0.056	6.07
23486	74.599	0.141	7.037	0.045	5.89
23487	64.701	0.122	6.925	0.044	6.92
23488	71.621	0.135	13.934	0.089	5.68
23489	68.584	0.129	3.766	0.024	6.64
23490	65.225	0.123	3.734	0.024	7.03
23491	70.354	0.133	8.215	0.052	6.22
23492	59.735	0.113	1.944	0.012	7.84
23493	69.152	0.130	5.203	0.033	6.52
23494	63.561	0.120	4.068	0.026	7.22
23499	5.595	0.011	6.761	0.043	HIGH
23500	-9.395	0.018	3.902	0.025	HIGH
23501	-26.048	0.049	4.469	0.029	HIGH
23502	-39.227	0.074	3.753	0.024	HIGH
23503	-50.291	0.095	1.922	0.012	9.49
23504	-62.350	0.118	1.535	0.010	7.48
23505	-76.409	0.144	1.690	0.011	5.92
23506	-90.413	0.171	1.570	0.010	4.85
23509	18.606	0.035	9.573	0.061	HIGH
23510	-21.459	0.040	8.863	0.057	HIGH
23511	-37.785	0.071	8.923	0.057	HIGH
23512	-45.328	0.086	6.440	0.041	HIGH
23513	-53.691	0.101	3.272	0.021	8.76
23514	-63.840	0.120	4.565	0.029	7.16
23515	-67.384	0.127	4.644	0.030	6.74
23518	-144.574	0.273	6.238	0.040	2.62
23519	-72.093	0.136	15.749	0.101	5.49
23520	-47.449	0.090	11.553	0.074	9.00
23521	-59.055	0.111	10.764	0.069	7.29
23522	-59.135	0.112	7.789	0.050	7.56
23523	-60.988	0.115	9.018	0.058	7.21
23524	-57.504	0.108	9.303	0.059	7.65
23530	-103.386	0.195	16.747	0.107	3.65
23531	-74.418	0.140	11.681	0.075	5.62
23532	-58.201	0.110	15.345	0.098	6.88
23539	-82.042	0.155	29.501	0.188	3.79
23540	-50.624	0.096	28.102	0.179	5.90
23550	-5.041	0.010	54.137	0.346	5.05
23553	-59.872	0.113	19.671	0.126	6.17
23554	-121.595	0.229	33.549	0.214	2.37
23559	69.932	0.132	64.163	0.410	1.93
23561	-96.032	0.181	14.782	0.094	4.07

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: LIFTOFF LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
32232	-289.500	0.546	4.673	0.030	0.82
32233	-235.456	0.444	154.903	0.989	-0.30
32234	-237.726	0.449	5.029	0.032	1.22
32235	-184.686	0.348	5.059	0.032	1.85
32236	-183.016	0.345	1.835	0.012	1.89
32237	-168.621	0.318	2.416	0.015	2.14
32238	-136.708	0.258	16.599	0.106	2.60
32239	-77.798	0.147	11.792	0.075	5.34
32240	-19.337	0.036	14.315	0.091	HIGH
32241	-93.972	0.177	17.822	0.114	4.01
32242	-134.801	0.254	21.232	0.136	2.51
32243	-204.319	0.386	36.544	0.233	1.16
32244	-182.370	0.344	41.800	0.267	1.26
32245	-131.158	0.247	13.858	0.088	2.82
32246	-139.403	0.263	0.329	0.002	2.80
32247	-147.040	0.277	1.161	0.007	2.60
32248	-146.619	0.277	0.660	0.004	2.61
32249	-112.401	0.212	8.743	0.056	3.58
32250	-75.874	0.143	8.368	0.053	5.71
32251	-40.208	0.076	4.665	0.030	HIGH
32252	-51.260	0.097	10.255	0.065	8.51
32253	-71.346	0.135	13.613	0.087	5.73
32254	-88.479	0.167	28.647	0.183	3.58
32255	-153.525	0.290	7.320	0.047	2.40
32256	-163.664	0.309	18.277	0.117	2.01
32257	-125.201	0.236	7.903	0.050	3.14
32258	-110.882	0.209	6.890	0.044	3.69
32259	-69.186	0.131	9.846	0.063	6.22
32260	-108.913	0.205	2.888	0.018	3.84
32261	-82.606	0.156	8.809	0.056	5.16
32262	-63.597	0.120	3.186	0.020	7.26
32263	-44.412	0.084	2.494	0.016	HIGH
32264	-37.507	0.071	2.941	0.019	HIGH
32265	-49.526	0.093	5.131	0.033	9.42
32266	-57.379	0.108	7.708	0.049	7.82
32267	-86.566	0.163	12.013	0.077	4.73
32268	-106.839	0.202	9.208	0.059	3.79
32269	-115.916	0.219	8.932	0.057	3.44
32270	35.922	0.068	14.831	0.095	HIGH
32271	16.781	0.032	4.105	0.026	HIGH
32272	14.900	0.028	3.509	0.022	HIGH
32273	-20.770	0.039	1.807	0.012	HIGH
32274	-68.036	0.128	2.380	0.015	6.75
32275	195.921	0.370	5.380	0.034	1.69
32278	21.298	0.040	25.328	0.162	HIGH

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: LIFTOFF LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
32339	127.215	0.240	18.055	0.115	2.80
32340	157.056	0.296	25.013	0.160	1.97
32341	128.789	0.243	4.346	0.028	3.08
32342	147.739	0.279	13.252	0.085	2.42
32343	99.280	0.187	10.378	0.066	4.10
32346	133.696	0.252	20.290	0.130	2.57
32347	-119.733	0.226	22.331	0.143	2.86
32348	-99.591	0.188	159.666	1.020	-0.18
32349	-76.260	0.144	36.710	0.234	3.49
32350	-89.776	0.169	24.964	0.159	3.77
32351	-69.068	0.130	2.979	0.019	6.62
32353	-769.803	1.452	15.779	0.101	-0.32
32354	-593.736	1.120	13.482	0.086	-0.12
32355	-234.282	0.442	55.821	0.356	0.65
32356	-164.154	0.310	25.216	0.161	1.85
32357	-104.705	0.198	21.413	0.137	3.38
32358	-80.099	0.151	18.263	0.117	4.73
32361	-592.970	1.119	8.214	0.052	-0.11
32362	-198.390	0.374	58.171	0.371	0.81
32363	-157.711	0.298	32.027	0.205	1.78
32364	-140.494	0.265	7.399	0.047	2.71
32365	-107.137	0.202	28.155	0.180	2.97
32368	-44.941	0.085	43.512	0.278	4.23
32369	-193.085	0.364	52.891	0.338	0.95
32370	-119.573	0.226	29.665	0.189	2.57
32371	-99.685	0.188	14.175	0.091	3.93
32372	-88.163	0.166	32.655	0.209	3.33
32375	73.128	0.138	32.774	0.209	3.93
32376	9.007	0.017	25.997	0.166	HIGH
32377	-49.989	0.094	22.508	0.144	6.82
32378	-39.358	0.074	16.738	0.107	9.61
32379	-24.226	0.046	18.218	0.116	HIGH
32383	172.285	0.325	12.172	0.078	1.97
32384	115.910	0.219	10.851	0.069	3.38
32385	56.993	0.108	13.647	0.087	7.23
32386	21.244	0.040	13.509	0.086	HIGH
32387	15.838	0.030	14.009	0.089	HIGH
32390	183.604	0.346	5.379	0.034	1.86
32391	154.926	0.292	1.388	0.009	2.42
32392	110.242	0.208	9.925	0.063	3.63
32393	78.950	0.149	7.552	0.048	5.50
32394	60.439	0.114	7.505	0.048	7.41
32396	322.943	0.609	6.286	0.040	0.63
32397	173.476	0.327	1.489	0.010	2.05
32398	147.878	0.279	1.397	0.009	2.58

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: LIFTOFF LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
33328	313.709	0.592	6.959	0.044	0.68
33329	524.581	0.990	6.379	0.041	0.01
33330	526.481	0.993	15.917	0.102	-0.01
33331	248.793	0.469	13.178	0.084	1.07
33332	234.861	0.443	5.529	0.035	1.24
33333	230.496	0.435	8.919	0.057	1.26
33334	290.253	0.548	22.785	0.145	0.72
33338	425.779	0.803	20.191	0.129	0.20
33339	454.750	0.858	10.029	0.064	0.15
33340	430.524	0.812	6.348	0.041	0.23
33341	487.740	0.920	15.054	0.096	0.07
33342	212.554	0.401	9.339	0.060	1.45
33343	189.502	0.358	7.573	0.048	1.76
33344	179.272	0.338	11.220	0.072	1.87
33345	195.738	0.369	27.220	0.174	1.40
33350	422.898	0.798	28.374	0.181	0.18
33351	330.104	0.623	12.735	0.081	0.57
33352	333.361	0.629	8.910	0.057	0.57
33353	409.085	0.772	9.323	0.060	0.28
33354	172.508	0.325	5.657	0.036	2.04
33355	148.748	0.281	6.553	0.042	2.51
33356	132.570	0.250	5.084	0.032	2.96
33357	109.487	0.207	22.777	0.145	3.15
33363	212.146	0.400	26.024	0.166	1.25
33364	259.068	0.489	6.550	0.042	1.03
33365	266.026	0.502	8.727	0.056	0.97
33366	306.895	0.579	8.412	0.054	0.71
33367	135.084	0.255	3.340	0.021	2.91
33368	114.118	0.215	3.647	0.023	3.61
33369	102.658	0.194	2.638	0.017	4.14
33370	89.297	0.168	6.871	0.044	4.79
33371	59.903	0.113	20.456	0.131	6.07
33376	50.882	0.096	23.565	0.150	6.56
33377	196.869	0.371	9.370	0.060	1.64
33378	226.200	0.427	1.976	0.013	1.34
33379	227.013	0.428	10.478	0.067	1.29
33380	184.391	0.348	27.595	0.176	1.53
33381	102.370	0.193	3.051	0.019	4.15
33382	79.480	0.150	1.076	0.007	5.66
33383	69.048	0.130	0.979	0.006	6.67
33384	64.048	0.121	1.195	0.008	7.26
33385	51.751	0.098	2.429	0.016	9.17
33386	77.583	0.146	12.262	0.078	5.33
33390	129.761	0.245	12.431	0.079	2.90
33391	88.295	0.167	4.070	0.026	4.94

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: LIFTOFF LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
33475	-279.633	0.528	13.520	0.086	0.85
33476	-424.468	0.801	12.581	0.080	0.23
33477	-470.860	0.888	11.661	0.074	0.11
33478	-473.762	0.894	7.419	0.047	0.11
33479	-438.216	0.827	24.444	0.156	0.16
33480	-294.248	0.555	13.914	0.089	0.76
33481	-404.282	0.763	13.743	0.088	0.29
33482	-433.101	0.817	11.847	0.076	0.21
33483	-439.677	0.830	5.978	0.038	0.20
33484	-427.764	0.807	23.419	0.150	0.19
33485	-342.825	0.647	15.728	0.100	0.50
33486	-403.630	0.762	14.861	0.095	0.29
33487	-404.067	0.762	3.516	0.022	0.31
33488	-371.990	0.702	15.911	0.102	0.39
33489	-293.712	0.554	23.615	0.151	0.69
33490	-366.130	0.691	11.127	0.071	0.43
33491	-273.316	0.516	1.484	0.009	0.94
33492	-337.562	0.637	65.038	0.415	0.17
33499	-178.215	0.336	5.754	0.037	1.95
33500	84.564	0.160	2.716	0.017	5.24
33501	171.921	0.324	3.413	0.022	2.07
33502	221.001	0.417	2.316	0.015	1.39
33503	254.026	0.479	2.183	0.014	1.08
33504	314.278	0.593	6.759	0.043	0.67
33505	433.206	0.817	36.436	0.233	0.12
33509	495.706	0.935	7.841	0.050	0.06
33510	340.577	0.643	6.536	0.042	0.55
33511	364.615	0.688	6.024	0.038	0.45
33512	361.353	0.682	5.263	0.034	0.46
33513	354.448	0.669	3.767	0.024	0.49
33514	353.660	0.667	7.246	0.046	0.49
33515	280.246	0.529	19.490	0.124	0.80
33518	231.400	0.437	9.010	0.058	1.26
33519	193.734	0.366	9.999	0.064	1.68
33520	383.263	0.723	9.181	0.059	0.37
33521	475.757	0.898	8.444	0.054	0.11
33522	429.132	0.810	7.729	0.049	0.23
33523	399.940	0.755	3.265	0.021	0.32
33524	338.608	0.639	3.600	0.023	0.56
33530	619.519	1.169	13.541	0.086	-0.15
33531	474.449	0.895	11.185	0.071	0.10
33532	367.511	0.693	4.581	0.029	0.44
33539	406.981	0.768	23.049	0.147	0.25
33540	346.212	0.653	11.145	0.071	0.51
33550	262.864	0.496	40.775	0.260	0.69

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: LIFTOFF LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
42225	-148.459	0.280	3.167	0.020	2.56
42226	-134.649	0.254	30.078	0.192	2.23
42227	-106.128	0.200	9.672	0.062	3.81
42228	-72.017	0.136	22.286	0.142	4.92
42229	-116.373	0.220	26.681	0.170	2.78
42230	-95.263	0.180	35.953	0.230	2.91
42231	-92.061	0.174	39.623	0.253	2.79
42232	-112.472	0.212	39.247	0.251	2.32
42233	-130.980	0.247	43.746	0.279	1.82
42234	-124.469	0.235	19.699	0.126	2.83
42235	-94.135	0.178	9.962	0.064	4.39
42236	-80.915	0.153	9.616	0.061	5.24
42237	-52.373	0.099	8.820	0.056	8.49
42238	-33.482	0.063	10.369	0.066	HIGH
42239	-49.042	0.093	55.176	0.352	2.94
42240	-111.295	0.210	131.083	0.837	0.06
42241	-123.773	0.234	150.751	0.963	-0.14
42242	-124.889	0.236	105.939	0.676	0.35
42243	-136.586	0.258	25.502	0.163	2.34
42244	-144.349	0.272	44.120	0.282	1.62
42245	-118.723	0.224	11.441	0.073	3.27
42246	-33.365	0.063	16.764	0.107	HIGH
42247	-74.224	0.140	9.010	0.058	5.81
42248	-35.495	0.067	5.857	0.037	HIGH
42249	9.563	0.018	13.232	0.084	HIGH
42250	58.937	0.111	26.289	0.168	5.44
42251	-176.636	0.333	446.057	2.848	-0.85
42252	-21.614	0.041	1.138	0.007	HIGH
42253	-172.451	0.325	407.280	2.601	-0.82
42254	-141.179	0.266	28.924	0.185	2.14
42255	-133.339	0.252	30.157	0.193	2.25
42256	-135.191	0.255	28.536	0.182	2.27
42257	-81.165	0.153	11.702	0.075	5.10
42258	-49.043	0.093	6.744	0.043	9.35
42259	-82.646	0.156	6.229	0.040	5.27
42260	-34.370	0.065	3.282	0.021	HIGH
42261	-15.234	0.029	4.511	0.029	HIGH
42262	10.929	0.021	63.547	0.406	3.41
42263	121.191	0.229	18.965	0.121	2.94
42264	-54.334	0.103	228.107	1.457	-0.51
42265	-103.816	0.196	197.566	1.262	-0.41
42266	-106.721	0.201	70.767	0.452	1.22
42267	-98.257	0.185	16.288	0.104	3.89
42268	-96.037	0.181	16.016	0.102	4.01
42269	-98.210	0.185	11.183	0.071	4.12

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: LIFTOFF LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
42332	70.612	0.133	32.646	0.208	4.06
42333	94.465	0.178	36.346	0.232	2.91
42334	80.839	0.153	124.518	0.795	0.22
42335	71.266	0.134	59.755	0.382	2.13
42336	63.574	0.120	50.250	0.321	2.89
42337	74.244	0.140	45.026	0.288	2.95
42338	52.069	0.098	42.102	0.269	4.03
42339	48.561	0.092	33.245	0.212	5.33
42340	50.827	0.096	23.517	0.150	6.57
42341	21.664	0.041	12.886	0.082	HIGH
42342	21.071	0.040	12.277	0.078	HIGH
42343	-10.465	0.020	9.491	0.061	HIGH
42346	17.580	0.033	36.287	0.232	8.04
42347	-14.023	0.026	24.290	0.155	HIGH
42348	15.955	0.030	24.561	0.157	HIGH
42349	23.650	0.045	21.168	0.135	HIGH
42350	23.740	0.045	14.156	0.090	HIGH
42351	23.543	0.044	15.847	0.101	HIGH
42353	-28.400	0.054	92.567	0.591	1.21
42354	-33.466	0.063	34.078	0.218	6.55
42355	-10.482	0.020	73.428	0.469	2.50
42356	1.274	0.002	74.303	0.474	2.65
42357	-6.079	0.011	35.193	0.225	HIGH
42358	-6.305	0.012	38.085	0.243	9.40
42361	-6.217	0.012	73.619	0.470	2.59
42362	-11.284	0.021	55.269	0.353	4.47
42363	-10.455	0.020	136.126	0.869	0.25
42364	-41.033	0.077	89.459	0.571	1.21
42365	-47.503	0.090	78.615	0.502	1.57
42368	45.838	0.086	50.149	0.320	3.49
42369	24.006	0.045	47.857	0.306	4.85
42370	37.024	0.070	128.154	0.818	0.29
42371	-100.605	0.190	234.735	1.499	-0.55
42372	-93.984	0.177	170.963	1.092	-0.26
42375	72.139	0.136	20.864	0.133	5.04
42376	-9.719	0.018	33.863	0.216	HIGH
42377	-44.701	0.084	127.475	0.814	0.28
42378	-26.101	0.049	1.294	0.008	HIGH
42379	-80.647	0.152	184.856	1.180	-0.33
42383	64.788	0.122	11.255	0.072	6.56
42384	41.551	0.078	8.004	0.051	HIGH
42385	57.572	0.109	16.656	0.106	6.79
42386	-82.286	0.155	68.832	0.440	1.55
42387	-80.492	0.152	82.205	0.525	1.10
42390	76.432	0.144	10.279	0.066	5.55

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: LIFTOFF LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
43330	-234.651	0.443	4.935	0.032	1.25
43331	410.763	0.775	16.146	0.103	0.26
43332	370.368	0.699	11.309	0.072	0.41
43333	294.764	0.556	6.761	0.043	0.78
43334	79.239	0.150	76.382	0.488	1.30
43338	57.335	0.108	56.927	0.364	2.59
43339	-93.817	0.177	4.373	0.028	4.59
43340	-132.426	0.250	3.738	0.024	2.98
43341	-178.794	0.337	4.283	0.027	1.95
43342	331.859	0.626	11.587	0.074	0.57
43343	292.903	0.553	12.977	0.083	0.77
43344	313.365	0.591	8.844	0.056	0.67
43345	312.799	0.590	25.828	0.165	0.58
43346	-286.719	0.541	29.825	0.190	0.68
43349	330.496	0.624	25.878	0.165	0.50
43350	-126.990	0.240	17.574	0.112	2.83
43351	-122.200	0.231	5.032	0.032	3.29
43352	-96.242	0.182	3.093	0.020	4.48
43353	-134.657	0.254	3.546	0.023	2.92
43354	230.871	0.436	9.060	0.058	1.26
43355	219.747	0.415	10.546	0.067	1.36
43356	248.368	0.469	8.112	0.052	1.11
43357	250.591	0.473	6.218	0.040	1.10
43358	171.042	0.323	22.970	0.147	1.80
43359	164.482	0.310	26.911	0.172	1.81
43360	19.985	0.038	20.576	0.131	HIGH
43361	-103.283	0.195	8.016	0.051	3.99
43362	-38.076	0.072	13.347	0.085	HIGH
43363	-97.862	0.185	10.781	0.069	4.16
43364	-88.393	0.167	3.604	0.023	4.95
43365	-59.551	0.112	2.008	0.013	7.86
43366	-75.861	0.143	1.666	0.011	5.97
43367	119.518	0.226	28.197	0.180	2.63
43368	171.438	0.323	9.746	0.062	2.02
43369	188.564	0.356	4.154	0.027	1.80
43370	182.896	0.345	2.875	0.018	1.89
43371	136.828	0.258	7.351	0.047	2.80
43372	120.468	0.227	11.396	0.073	3.21
43373	74.305	0.140	10.289	0.066	5.72
43374	-6.182	0.012	9.038	0.058	HIGH
43375	-26.405	0.050	7.099	0.045	HIGH
43376	-30.034	0.057	6.978	0.045	HIGH
43377	-57.407	0.108	4.444	0.028	8.07
43378	-53.371	0.101	1.552	0.010	8.90
43379	-38.629	0.073	2.874	0.018	HIGH

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: LIFTOFF LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
43435	379.067	0.715	99.052	0.633	-0.14
43438	1056.510	1.993	103.716	0.662	-0.60
43440	356.181	0.672	29.835	0.191	0.38
43441	421.253	0.795	14.830	0.095	0.23
43442	467.653	0.882	32.590	0.208	0.06
43443	520.725	0.983	66.179	0.423	-0.17
43446	690.682	1.303	157.294	1.004	-0.57
43450	362.813	0.685	31.339	0.200	0.34
43451	437.037	0.825	17.562	0.112	0.18
43452	517.550	0.977	39.797	0.254	-0.06
43453	318.061	0.600	51.461	0.329	0.35
43455	778.825	1.469	46.730	0.298	-0.37
43456	793.430	1.497	20.700	0.132	-0.34
43457	229.402	0.433	28.275	0.181	1.07
43459	355.788	0.671	23.883	0.153	0.41
43460	425.497	0.803	20.421	0.130	0.20
43461	453.053	0.855	20.541	0.131	0.13
43462	319.435	0.603	24.803	0.158	0.56
43463	517.954	0.977	27.441	0.175	-0.02
43464	674.771	1.273	26.144	0.167	-0.24
43465	704.736	1.330	7.870	0.050	-0.25
43467	339.958	0.641	10.245	0.065	0.54
43468	393.198	0.742	13.410	0.086	0.32
43469	388.046	0.732	13.285	0.085	0.34
43470	447.971	0.845	12.252	0.078	0.17
43471	443.665	0.837	12.817	0.082	0.18
43472	482.482	0.910	9.010	0.058	0.09
43473	392.554	0.741	4.389	0.028	0.35
43474	316.813	0.598	8.557	0.055	0.66
43475	362.031	0.683	8.269	0.053	0.45
43476	389.744	0.735	5.874	0.038	0.35
43477	380.786	0.718	6.793	0.043	0.38
43478	355.408	0.671	6.794	0.043	0.48
43479	346.307	0.653	3.890	0.025	0.53
43480	291.750	0.550	8.403	0.054	0.80
43481	336.672	0.635	5.893	0.038	0.57
43482	333.127	0.629	2.245	0.014	0.59
43483	304.887	0.575	3.208	0.020	0.74
43484	296.455	0.559	3.004	0.019	0.78
43485	260.654	0.492	8.155	0.052	1.01
43486	285.187	0.538	3.677	0.023	0.85
43487	270.987	0.511	2.808	0.018	0.95
43488	250.594	0.473	1.484	0.009	1.11
43489	218.201	0.412	3.931	0.025	1.42
43490	239.940	0.453	7.022	0.045	1.19

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: LIFTOFF LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
43561	-876.974	1.655	25.117	0.160	-0.41
43562	-771.430	1.456	18.597	0.119	-0.32
43563	-565.046	1.066	31.140	0.199	-0.11
43564	-340.850	0.643	33.655	0.215	0.41
43565	-470.698	0.888	24.380	0.156	0.08
43566	-424.525	0.801	12.635	0.081	0.23
43567	-349.680	0.660	23.056	0.147	0.44
43568	-437.014	0.825	18.364	0.117	0.18
43569	-595.914	1.124	15.918	0.102	-0.12
43570	-520.403	0.982	19.709	0.126	-0.01
43571	-519.483	0.980	22.066	0.141	-0.01
43572	-440.008	0.830	23.393	0.149	0.15
43573	-423.431	0.799	11.820	0.075	0.23
43574	-358.446	0.676	27.738	0.177	0.38
43575	-402.179	0.759	23.013	0.147	0.26
43576	-443.168	0.836	8.030	0.051	0.19
43577	-463.183	0.874	16.340	0.104	0.12
43578	-465.041	0.877	16.408	0.105	0.12
43579	-418.834	0.790	13.793	0.088	0.24
43580	-355.468	0.671	23.574	0.151	0.41
43581	-355.007	0.670	19.551	0.125	0.44
43582	-387.344	0.731	8.202	0.052	0.36
43583	-415.474	0.784	10.121	0.065	0.26
43584	-409.473	0.773	10.386	0.066	0.28
43585	-341.894	0.645	14.284	0.091	0.51
43586	-301.354	0.569	11.758	0.075	0.73
43587	-346.960	0.655	2.309	0.015	0.53
43588	-363.642	0.686	6.161	0.039	0.45
43589	-313.619	0.592	6.230	0.040	0.68
43590	-223.848	0.422	2.471	0.016	1.36
43591	-313.178	0.591	11.168	0.071	0.66
43592	-256.825	0.485	8.749	0.056	1.04
43594	-289.103	0.545	44.106	0.282	0.53
52201	241.893	0.456	11.062	0.071	1.15
52202	-150.660	0.284	8.375	0.053	2.45
52204	315.258	0.595	3.209	0.020	0.68
52205	197.031	0.372	12.899	0.082	1.60
52206	-165.417	0.312	10.191	0.065	2.12
52207	220.444	0.416	24.656	0.157	1.20
52208	-197.251	0.372	16.377	0.105	1.55
52215	231.495	0.437	28.099	0.179	1.06
52216	171.699	0.324	0.710	0.005	2.09
52222	331.271	0.625	18.674	0.119	0.54
52223	335.607	0.633	17.452	0.111	0.53
52224	184.954	0.349	39.165	0.250	1.29

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: LIFTOFF LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
52270	130.380	0.246	4.439	0.028	3.03
52271	102.590	0.194	1.195	0.008	4.16
52272	99.317	0.187	2.213	0.014	4.32
52273	106.939	0.202	1.495	0.010	3.95
52274	101.780	0.192	1.586	0.010	4.20
52275	-126.772	0.239	7.440	0.048	3.10
52278	87.995	0.166	6.590	0.042	4.88
52279	158.050	0.298	2.205	0.014	2.35
52280	4.244	0.008	0.080	0.001	HIGH
52281	205.144	0.387	1.274	0.008	1.58
52282	206.645	0.390	3.668	0.023	1.56
52283	167.739	0.316	7.388	0.047	2.11
52286	171.536	0.324	3.077	0.020	2.08
52287	159.158	0.300	0.692	0.004	2.33
52288	159.733	0.301	0.616	0.004	2.32
52289	182.550	0.344	0.841	0.005	1.90
52290	235.488	0.444	1.057	0.007	1.25
52293	126.699	0.239	9.093	0.058	3.07
52294	167.164	0.315	0.524	0.003	2.17
52295	16.133	0.030	0.067	0.000	HIGH
52296	229.413	0.433	5.175	0.033	1.30
52297	346.492	0.654	6.926	0.044	0.52
52300	93.851	0.177	7.549	0.048	4.49
52301	161.069	0.304	5.549	0.035	2.26
52302	171.657	0.324	6.951	0.044	2.05
52303	227.691	0.430	16.514	0.105	1.23
52304	234.969	0.443	22.464	0.143	1.10
52308	153.934	0.290	17.500	0.112	2.20
52309	120.297	0.227	18.269	0.117	3.00
52310	160.663	0.303	31.330	0.200	1.75
52311	221.032	0.417	39.544	0.253	0.97
52312	392.881	0.741	22.087	0.141	0.29
52316	91.745	0.173	29.976	0.191	3.38
52317	74.358	0.140	30.419	0.194	4.07
52318	32.725	0.062	120.896	0.772	0.43
52319	284.263	0.536	22.828	0.146	0.75
52320	51.528	0.097	5.938	0.038	8.95
52323	55.553	0.105	57.539	0.367	2.59
52324	63.457	0.120	38.052	0.243	3.91
52325	84.597	0.160	73.373	0.469	1.35
52326	28.232	0.053	137.040	0.875	0.18
52327	-341.536	0.644	15.120	0.097	0.51
52329	12.799	0.024	94.570	0.604	1.28
52330	12.931	0.024	77.394	0.494	2.17
52331	-2.592	0.005	138.402	0.884	0.23

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: LIFTOFF LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
52391	-117.233	0.221	1.976	0.013	3.51
52392	-188.854	0.356	11.941	0.076	1.72
52393	-61.665	0.116	9.610	0.061	7.07
52394	-80.983	0.153	26.039	0.166	4.10
52396	-232.691	0.439	10.231	0.065	1.23
52397	-209.488	0.395	1.599	0.010	1.53
52398	-192.934	0.364	1.774	0.011	1.74
52399	-57.523	0.109	4.305	0.027	8.06
52400	-172.031	0.325	13.877	0.089	1.95
52401	-269.403	0.508	20.427	0.130	0.86
52402	-257.838	0.486	9.755	0.062	1.02
52403	-257.273	0.485	1.365	0.009	1.06
52404	-254.348	0.480	1.255	0.008	1.08
52405	-79.173	0.149	28.649	0.183	3.99
52406	-263.177	0.497	35.314	0.226	0.75
52407	-247.341	0.467	9.909	0.063	1.11
52408	-264.730	0.499	1.920	0.012	1.00
52409	-277.666	0.524	6.168	0.039	0.90
52410	-259.492	0.490	31.109	0.199	0.82
52411	-261.836	0.494	4.447	0.028	1.02
52412	-238.397	0.450	4.779	0.031	1.21
52413	-231.732	0.437	15.431	0.099	1.20
52414	-263.009	0.496	7.566	0.048	1.00
52415	-153.572	0.290	7.002	0.045	2.40
52425	354.349	0.669	10.948	0.070	0.47
52426	-226.476	0.427	2.641	0.017	1.34
52427	222.557	0.420	4.471	0.029	1.37
52443	190.129	0.359	4.648	0.030	1.77
52444	72.960	0.138	2.318	0.015	6.23
52445	-251.862	0.475	2.895	0.018	1.10
52446	59.625	0.112	3.611	0.023	7.78
52447	-120.655	0.228	10.742	0.069	3.22
52463	161.758	0.305	6.671	0.043	2.23
52464	231.369	0.437	7.058	0.045	1.27
52465	-88.796	0.168	12.664	0.081	4.56
53301	-185.790	0.351	2.476	0.016	1.85
53302	151.504	0.286	2.344	0.015	2.49
53303	185.773	0.351	4.463	0.028	1.84
53304	-290.477	0.548	2.232	0.014	0.82
53305	-410.710	0.775	3.210	0.021	0.29
53306	19.926	0.038	5.504	0.035	HIGH
53307	-527.384	0.995	8.320	0.053	0.00
53308	92.099	0.174	4.642	0.030	4.69
53313	-154.839	0.292	3.182	0.020	2.41
53314	-251.089	0.474	2.275	0.015	1.11

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: LIFTOFF LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
53383	-71.984	0.136	2.231	0.014	6.33
53384	-71.055	0.134	0.915	0.006	6.45
53385	-16.427	0.031	1.840	0.012	HIGH
53386	-61.331	0.116	8.157	0.052	7.24
53390	-47.188	0.089	1.710	0.011	HIGH
53391	-45.593	0.086	0.433	0.003	HIGH
53392	-75.576	0.143	0.308	0.002	6.01
53393	-98.842	0.186	0.162	0.001	4.36
53394	-127.031	0.240	0.194	0.001	3.17
53395	-151.146	0.285	3.332	0.021	2.49
53397	-356.012	0.672	22.196	0.142	0.42
53398	-272.302	0.514	4.453	0.028	0.94
53399	-216.572	0.409	1.490	0.010	1.45
53400	-172.543	0.326	1.102	0.007	2.07
53401	-105.222	0.199	0.110	0.001	4.04
53402	1.986	0.004	0.747	0.005	HIGH
53403	202.721	0.382	3.067	0.020	1.61
53406	-268.863	0.507	8.395	0.054	0.95
53407	-294.135	0.555	3.264	0.021	0.80
53408	-288.408	0.544	2.815	0.018	0.83
53409	-278.742	0.526	2.738	0.017	0.90
53410	-252.081	0.476	2.345	0.015	1.10
53411	-161.410	0.305	0.846	0.005	2.28
53412	-150.566	0.284	1.679	0.011	2.52
53413	-44.890	0.085	10.359	0.066	9.72
53415	-301.527	0.569	1.112	0.007	0.76
53416	-340.600	0.643	2.785	0.018	0.55
53417	-358.472	0.676	4.420	0.028	0.47
53418	-381.359	0.720	4.566	0.029	0.39
53419	-280.761	0.530	2.630	0.017	0.88
53420	-101.834	0.192	0.111	0.001	4.20
53421	-65.176	0.123	3.262	0.021	7.06
53424	-348.202	0.657	2.489	0.016	0.52
53425	-438.625	0.828	6.828	0.044	0.20
53426	-566.993	1.070	7.559	0.048	-0.07
53432	-372.553	0.703	7.247	0.046	0.41
53433	-433.132	0.817	12.251	0.078	0.21
53440	-316.924	0.598	26.900	0.172	0.55
53450	-154.823	0.292	81.144	0.518	0.64
53455	-234.695	0.443	5.376	0.034	1.24
53456	-301.862	0.570	0.769	0.005	0.76
53457	-610.291	1.151	14.648	0.094	-0.14
53463	-32.820	0.062	1.967	0.013	HIGH
53464	-87.224	0.165	1.349	0.009	5.07
53465	126.265	0.238	4.081	0.026	3.17

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: LIFTOFF LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
53522	-89.168	0.168	1.758	0.011	4.93
53523	-51.873	0.098	2.503	0.016	9.14
53524	-25.133	0.047	2.868	0.018	HIGH
53530	-109.989	0.208	1.473	0.009	3.81
53531	-75.304	0.142	3.600	0.023	5.97
53532	-43.643	0.082	3.849	0.025	HIGH
53539	-45.400	0.086	4.626	0.030	HIGH
53540	-38.421	0.072	5.552	0.035	HIGH
53550	6.610	0.012	12.352	0.079	HIGH
53553	208.302	0.393	7.023	0.045	1.52
53554	238.793	0.451	1.498	0.010	1.22
53559	-7.667	0.014	27.585	0.176	HIGH
53561	368.648	0.696	4.812	0.031	0.43
53562	370.669	0.699	3.828	0.024	0.43
53563	476.657	0.899	3.268	0.021	0.11
53568	294.656	0.556	4.797	0.031	0.79
53569	377.285	0.712	4.671	0.030	0.40
53570	468.214	0.883	2.491	0.016	0.13
53571	568.437	1.073	5.661	0.036	-0.07
53574	62.554	0.118	7.176	0.046	7.16
53575	348.988	0.658	8.165	0.052	0.51
53576	382.039	0.721	3.657	0.023	0.38
53577	408.944	0.772	3.012	0.019	0.29
53578	386.172	0.729	5.614	0.036	0.37
53579	257.900	0.487	6.351	0.041	1.04
53580	136.051	0.257	8.790	0.056	2.80
53581	349.902	0.660	7.344	0.047	0.50
53582	356.187	0.672	1.787	0.011	0.49
53583	366.073	0.691	4.426	0.028	0.44
53584	348.453	0.657	7.140	0.046	0.51
53585	253.839	0.479	7.965	0.051	1.06
53586	316.276	0.597	4.347	0.028	0.67
53587	332.419	0.627	0.805	0.005	0.59
53588	338.385	0.638	6.641	0.042	0.56
53589	299.439	0.565	7.374	0.047	0.76
53590	245.456	0.463	2.944	0.019	1.15
53591	295.733	0.558	6.521	0.042	0.78
53592	270.819	0.511	9.826	0.063	0.93
53594	318.944	0.602	27.895	0.178	0.54
62201	-135.842	0.256	17.630	0.113	2.59
62202	67.780	0.128	3.930	0.025	6.72
62203	7.448	0.014	1.840	0.012	HIGH
62204	-87.941	0.166	5.056	0.032	4.94
62205	-128.001	0.242	2.155	0.014	3.13
62206	42.730	0.081	2.836	0.018	HIGH

5.5-49

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: LIFTOFF LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
62263	-6.964	0.013	0.152	0.001	HIGH
62264	-11.192	0.021	1.747	0.011	HIGH
62265	-19.687	0.037	1.751	0.011	HIGH
62266	-31.614	0.060	2.720	0.017	HIGH
62267	-46.246	0.087	1.897	0.012	HIGH
62268	-49.101	0.093	1.290	0.008	9.77
62269	-77.768	0.147	6.487	0.041	5.64
62270	-53.299	0.101	7.636	0.049	8.47
62271	-50.508	0.095	72.843	0.465	1.80
62272	-1.640	0.003	10.171	0.065	HIGH
62273	-23.363	0.044	3.556	0.023	HIGH
62274	-12.469	0.024	6.265	0.040	HIGH
62275	-2.213	0.004	5.953	0.038	HIGH
62278	-14.200	0.027	32.817	0.210	9.91
62279	4.491	0.008	49.172	0.314	6.13
62280	-48.845	0.092	3.641	0.023	9.69
62281	-7.035	0.013	3.879	0.025	HIGH
62282	-39.579	0.075	5.633	0.036	HIGH
62283	-23.898	0.045	6.102	0.039	HIGH
62286	-20.358	0.038	22.252	0.142	HIGH
62287	-52.336	0.099	15.649	0.100	7.58
62288	-21.616	0.041	4.780	0.031	HIGH
62289	-17.162	0.032	4.267	0.027	HIGH
62290	-33.348	0.063	12.613	0.081	HIGH
62293	-31.810	0.060	6.631	0.042	HIGH
62294	-16.602	0.031	6.860	0.044	HIGH
62295	-10.032	0.019	2.732	0.017	HIGH
62296	-11.923	0.022	4.542	0.029	HIGH
62297	-24.971	0.047	7.857	0.050	HIGH
62300	-7.179	0.014	3.170	0.020	HIGH
62301	-3.329	0.006	2.843	0.018	HIGH
62302	5.778	0.011	4.271	0.027	HIGH
62303	0.462	0.001	4.412	0.028	HIGH
62304	1.622	0.003	6.295	0.040	HIGH
62308	-5.816	0.011	0.776	0.005	HIGH
62309	21.917	0.041	0.604	0.004	HIGH
62310	18.031	0.034	1.817	0.012	HIGH
62311	22.665	0.043	4.100	0.026	HIGH
62312	33.522	0.063	4.200	0.027	HIGH
62316	19.392	0.037	1.873	0.012	HIGH
62317	24.832	0.047	1.215	0.008	HIGH
62318	32.841	0.062	1.564	0.010	HIGH
62319	43.634	0.082	2.672	0.017	HIGH
62320	55.429	0.105	1.921	0.012	8.52
62323	25.334	0.048	2.409	0.015	HIGH

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: LIFTOFF LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
62379	-32.894	0.062	4.447	0.028	HIGH
62383	-11.034	0.021	5.744	0.037	HIGH
62384	-25.483	0.048	1.458	0.009	HIGH
62385	-29.717	0.056	3.849	0.025	HIGH
62386	-27.203	0.051	0.657	0.004	HIGH
62387	-27.434	0.052	3.828	0.024	HIGH
62390	1.784	0.003	0.196	0.001	HIGH
62391	-8.672	0.016	1.966	0.013	HIGH
62392	-10.179	0.019	1.788	0.011	HIGH
62393	-0.700	0.001	2.740	0.017	HIGH
62394	-26.525	0.050	4.537	0.029	HIGH
62396	5.770	0.011	2.788	0.018	HIGH
62397	-14.664	0.028	4.865	0.031	HIGH
62398	-9.510	0.018	5.034	0.032	HIGH
62399	-2.446	0.005	2.894	0.018	HIGH
62400	0.620	0.001	3.722	0.024	HIGH
62401	1.188	0.002	1.766	0.011	HIGH
62402	-74.811	0.141	4.648	0.030	5.98
62403	-31.853	0.060	10.875	0.069	HIGH
62404	-0.575	0.001	9.634	0.062	HIGH
62405	13.716	0.026	8.328	0.053	HIGH
62406	-106.962	0.202	2.075	0.013	3.94
62407	-52.215	0.099	17.914	0.114	7.26
62408	-9.457	0.018	29.480	0.188	HIGH
62409	27.062	0.051	9.357	0.060	HIGH
62410	-48.454	0.091	22.569	0.144	6.99
62411	-43.480	0.082	45.258	0.289	4.10
62412	-13.727	0.026	36.728	0.235	8.53
62413	-2.151	0.004	110.038	0.703	0.84
62414	42.215	0.080	40.218	0.257	4.80
62415	2.801	0.005	37.550	0.240	HIGH
63301	-320.131	0.604	2.738	0.017	0.65
63302	-130.470	0.246	4.199	0.027	3.03
63303	-46.829	0.088	3.503	0.022	HIGH
63304	-142.994	0.270	1.850	0.012	2.70
63305	-201.966	0.381	1.427	0.009	1.62
63306	94.291	0.178	0.801	0.005	4.62
63307	-149.964	0.283	5.866	0.037	2.49
63308	70.635	0.133	3.324	0.021	6.44
63313	-192.862	0.364	5.233	0.033	1.73
63314	-227.488	0.429	1.246	0.008	1.33
63319	-163.723	0.309	2.407	0.015	2.23
63320	-71.569	0.135	1.303	0.008	6.39
63321	-163.735	0.309	6.247	0.040	2.20
63322	-193.116	0.364	1.791	0.011	1.74

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: LIFTOFF LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
63386	-61.353	0.116	3.562	0.023	7.54
63390	-31.502	0.059	1.769	0.011	HIGH
63391	-2.055	0.004	0.654	0.004	HIGH
63392	-18.069	0.034	1.069	0.007	HIGH
63393	18.779	0.035	4.556	0.029	HIGH
63394	57.515	0.109	18.532	0.118	6.55
63396	131.513	0.248	1.646	0.011	3.02
63397	105.758	0.200	0.211	0.001	4.01
63398	88.402	0.167	0.516	0.003	4.99
63399	75.070	0.142	1.118	0.007	6.05
63400	62.201	0.117	1.331	0.008	7.50
63401	41.672	0.079	1.237	0.008	HIGH
63402	13.106	0.025	0.961	0.006	HIGH
63403	10.630	0.020	3.964	0.025	HIGH
63406	80.794	0.152	1.427	0.009	5.55
63407	72.682	0.137	0.416	0.003	6.29
63408	60.315	0.114	0.822	0.005	7.78
63409	51.594	0.097	2.061	0.013	9.22
63410	44.140	0.083	2.844	0.018	HIGH
63411	4.177	0.008	2.829	0.018	HIGH
63412	-104.234	0.197	2.820	0.018	4.06
63413	-254.115	0.479	3.688	0.024	1.08
63415	62.301	0.118	1.353	0.009	7.49
63416	61.283	0.116	1.317	0.008	7.63
63417	55.565	0.105	2.187	0.014	8.49
63418	54.445	0.103	3.287	0.021	8.63
63419	37.190	0.070	3.592	0.023	HIGH
63420	54.956	0.104	5.441	0.035	8.39
63421	59.445	0.112	2.377	0.015	7.86
63424	68.403	0.129	2.329	0.015	6.71
63425	77.741	0.147	2.748	0.018	5.78
63426	109.650	0.207	4.982	0.032	3.78
63432	75.328	0.142	4.755	0.030	5.93
63433	97.330	0.184	7.103	0.045	4.32
63440	54.657	0.103	10.842	0.069	7.89
63450	-8.627	0.016	14.700	0.094	HIGH
63455	84.783	0.160	0.783	0.005	5.25
63456	84.037	0.159	0.889	0.006	5.30
63457	-107.693	0.203	5.689	0.036	3.85
63463	261.839	0.494	0.949	0.006	1.02
63464	192.426	0.363	0.652	0.004	1.75
63465	185.319	0.350	0.788	0.005	1.86
63467	42.993	0.081	3.758	0.024	HIGH
63470	361.485	0.682	2.378	0.015	0.46
63471	278.960	0.526	0.406	0.003	0.90

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: LIFTOFF LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
63539	-276.519	0.522	4.827	0.031	0.91
63540	-236.421	0.446	4.844	0.031	1.23
63550	-158.427	0.299	8.001	0.051	2.29
63553	-238.792	0.451	4.876	0.031	1.21
63554	-139.273	0.263	14.010	0.089	2.60
63559	-69.421	0.131	33.087	0.211	4.08
63561	-99.061	0.187	5.905	0.038	4.26
63562	-198.709	0.375	6.025	0.038	1.64
63563	-156.560	0.295	6.936	0.044	2.34
63568	-149.702	0.282	7.156	0.046	2.48
63569	-125.627	0.237	3.629	0.023	3.19
63570	-165.253	0.312	6.440	0.041	2.17
63571	-182.072	0.344	6.745	0.043	1.88
63574	-8.520	0.016	2.471	0.016	HIGH
63575	-132.716	0.250	8.614	0.055	2.90
63576	-104.157	0.197	2.399	0.015	4.07
63577	-111.264	0.210	4.479	0.029	3.72
63578	-112.003	0.211	4.456	0.028	3.69
63579	-79.718	0.150	3.323	0.021	5.60
63580	-44.653	0.084	3.838	0.025	HIGH
63581	-109.992	0.208	7.263	0.046	3.71
63582	-80.638	0.152	2.519	0.016	5.54
63583	-89.000	0.168	3.570	0.023	4.91
63584	-94.370	0.178	3.643	0.023	4.57
63585	-85.518	0.161	2.747	0.018	5.17
63586	-92.073	0.174	5.724	0.037	4.66
63587	-70.171	0.132	2.189	0.014	6.52
63588	-82.174	0.155	2.525	0.016	5.42
63589	-83.869	0.158	2.629	0.017	5.29
63590	-81.860	0.154	4.826	0.031	5.38
63591	-68.092	0.128	2.047	0.013	6.75
63592	-75.617	0.143	2.150	0.014	5.98
63593	-79.433	0.150	4.610	0.029	5.58
63594	-68.701	0.130	3.100	0.020	6.65
63595	-95.591	0.180	5.420	0.035	4.46

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: LANDING ABORT LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
12201	30.388	0.057	0.737	0.005	HIGH
12202	71.874	0.136	0.745	0.005	6.37
12204	17.557	0.033	2.708	0.017	HIGH
12205	33.513	0.063	4.210	0.027	HIGH
12206	-11.890	0.022	2.346	0.015	HIGH
12207	-65.290	0.123	5.652	0.036	6.93
12208	-73.222	0.138	8.563	0.055	5.93
12215	13.724	0.026	2.292	0.015	HIGH
12216	23.527	0.044	1.512	0.010	HIGH
12222	-81.977	0.155	6.681	0.043	5.30
12223	-71.089	0.134	8.322	0.053	6.14
12224	19.293	0.036	6.847	0.044	HIGH
12225	17.222	0.032	1.858	0.012	HIGH
12226	19.051	0.036	1.091	0.007	HIGH
12227	34.297	0.065	14.278	0.091	HIGH
12228	47.633	0.090	19.922	0.127	7.55
12229	4.167	0.008	27.161	0.173	HIGH
12230	44.896	0.085	5.596	0.036	HIGH
12231	3.146	0.006	9.286	0.059	HIGH
12232	-100.062	0.189	3.820	0.024	4.25
12233	-73.914	0.139	48.400	0.309	2.74
12234	14.384	0.027	4.899	0.031	HIGH
12235	14.493	0.027	2.171	0.014	HIGH
12236	23.572	0.044	0.327	0.002	HIGH
12237	23.821	0.045	0.301	0.002	HIGH
12238	42.778	0.081	8.273	0.053	HIGH
12239	134.474	0.254	12.656	0.081	2.76
12240	-0.776	0.001	59.191	0.378	4.44
12241	-18.197	0.034	67.327	0.430	2.81
12242	-38.475	0.073	39.910	0.255	5.10
12243	-69.552	0.131	2.567	0.016	6.58
12244	-65.761	0.124	15.038	0.096	6.11
12245	6.919	0.013	1.721	0.011	HIGH
12246	7.739	0.015	1.332	0.009	HIGH
12247	17.846	0.034	0.501	0.003	HIGH
12248	19.268	0.036	0.199	0.001	HIGH
12249	44.451	0.084	5.741	0.037	HIGH
12250	86.835	0.164	27.195	0.174	3.75
12251	-23.665	0.045	278.145	1.776	-0.64
12252	-7.508	0.014	0.704	0.004	HIGH
12253	-77.426	0.146	239.851	1.532	-0.56
12254	-56.462	0.107	17.453	0.111	6.81
12255	-57.982	0.109	11.597	0.074	7.34
12256	-59.553	0.112	10.698	0.068	7.23
12257	2.924	0.006	0.776	0.005	HIGH

PRECEDING PAGE BLANK NOT FILMED

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED. LANDING ABORT LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
12317	-37.677	0.071	173.917	1.111	-0.21
12318	-79.115	0.149	82.517	0.527	1.10
12319	-61.484	0.116	76.101	0.486	1.51
12320	-183.525	0.346	4.287	0.027	1.87
12323	-14.356	0.027	138.285	0.883	0.20
12324	-5.607	0.011	1.015	0.006	HIGH
12325	-78.752	0.149	223.144	1.425	-0.50
12326	-58.238	0.110	72.669	0.464	1.70
12327	-34.228	0.065	1.647	0.011	HIGH
12329	-27.734	0.052	101.531	0.648	0.92
12330	-20.515	0.039	85.807	0.548	1.58
12331	-41.060	0.077	55.591	0.355	3.15
12332	-10.028	0.019	24.020	0.153	HIGH
12333	-48.675	0.092	25.731	0.164	6.45
12334	-18.676	0.035	68.513	0.438	2.70
12335	-16.613	0.031	31.863	0.203	9.75
12336	-14.973	0.028	17.674	0.113	HIGH
12337	-19.917	0.038	8.002	0.051	HIGH
12338	-11.886	0.022	24.621	0.157	HIGH
12339	-8.835	0.017	13.887	0.089	HIGH
12340	-8.630	0.016	9.625	0.061	HIGH
12341	-10.788	0.020	5.216	0.033	HIGH
12342	-4.222	0.008	5.582	0.036	HIGH
12343	-9.896	0.019	3.472	0.022	HIGH
12346	14.905	0.028	4.117	0.026	HIGH
12347	-4.987	0.009	5.043	0.032	HIGH
12348	27.483	0.052	19.311	0.123	HIGH
12349	21.604	0.041	10.018	0.064	HIGH
12350	20.883	0.039	6.652	0.042	HIGH
12351	27.994	0.053	6.752	0.043	HIGH
12353	-191.524	0.361	6.490	0.041	1.74
12354	-94.574	0.178	2.303	0.015	4.58
12355	-20.082	0.038	57.824	0.369	3.70
12356	11.062	0.021	41.922	0.268	7.30
12357	12.783	0.024	16.547	0.106	HIGH
12358	18.111	0.034	18.132	0.116	HIGH
12361	-41.459	0.078	1.998	0.013	HIGH
12362	15.205	0.029	89.270	0.570	1.48
12363	34.872	0.066	84.274	0.538	1.48
12364	14.123	0.027	53.847	0.344	4.52
12365	18.357	0.035	41.730	0.266	6.49
12368	122.604	0.231	13.560	0.087	3.08
12369	36.647	0.069	54.002	0.345	3.46
12370	53.594	0.101	89.443	0.571	1.10
12371	10.861	0.020	131.417	0.839	0.32

5.5.61

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: LANDING ABORT LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
12456	-86.493	0.163	34.146	0.218	3.30
12463	141.767	0.267	9.288	0.059	2.64
12464	-49.851	0.094	0.519	0.003	9.63
12465	68.112	0.129	2.241	0.014	6.75
13301	125.774	0.237	3.360	0.021	3.19
13302	-109.437	0.206	0.477	0.003	3.84
13303	-152.148	0.287	0.321	0.002	2.48
13304	209.452	0.395	1.493	0.010	1.53
13305	-83.159	0.157	1.564	0.010	5.36
13306	119.785	0.226	1.660	0.011	3.42
13307	-29.269	0.055	1.921	0.012	HIGH
13308	84.469	0.159	1.752	0.011	5.26
13313	110.020	0.208	6.332	0.040	3.73
13314	156.244	0.295	1.102	0.007	2.39
13319	-38.936	0.073	1.236	0.008	HIGH
13320	-20.864	0.039	0.752	0.005	HIGH
13321	134.766	0.254	7.077	0.045	2.87
13322	153.180	0.289	2.353	0.015	2.45
13323	122.912	0.232	1.153	0.007	3.31
13324	96.387	0.182	0.939	0.006	4.49
13325	54.071	0.102	1.517	0.010	8.77
13326	-14.790	0.028	2.053	0.013	HIGH
13327	-49.355	0.093	0.874	0.006	9.73
13328	-58.413	0.110	0.985	0.006	8.06
13329	-45.452	0.086	0.747	0.005	HIGH
13330	-29.146	0.055	2.050	0.013	HIGH
13331	108.918	0.206	5.558	0.035	3.80
13332	100.585	0.190	3.356	0.021	4.24
13333	100.820	0.190	0.993	0.006	4.25
13334	72.727	0.137	0.976	0.006	6.28
13335	48.051	0.091	0.746	0.005	HIGH
13336	10.652	0.020	1.198	0.008	HIGH
13337	-27.015	0.051	0.701	0.004	HIGH
13338	-42.223	0.080	1.026	0.007	HIGH
13339	-43.162	0.081	1.005	0.006	HIGH
13340	-22.873	0.043	0.614	0.004	HIGH
13341	-19.387	0.037	1.872	0.012	HIGH
13342	75.346	0.142	2.790	0.018	5.99
13343	62.926	0.119	3.208	0.020	7.34
13344	71.368	0.135	1.032	0.007	6.42
13345	61.843	0.117	0.720	0.005	7.56
13346	41.428	0.078	0.684	0.004	HIGH
13347	18.392	0.035	0.514	0.003	HIGH
13348	-6.270	0.012	0.524	0.003	HIGH
13349	-29.135	0.055	0.701	0.004	HIGH

5.5.63

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: LANDING ABORT LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
13398	133.458	0.252	2.098	0.013	2.96
13399	95.596	0.180	0.363	0.002	4.54
13400	73.336	0.138	1.036	0.007	6.22
13401	45.849	0.087	1.422	0.009	HIGH
13402	-6.525	0.012	0.881	0.006	HIGH
13403	-120.835	0.228	3.781	0.024	3.36
13406	151.421	0.286	4.670	0.030	2.47
13407	150.218	0.283	1.659	0.011	2.52
13408	132.510	0.250	0.336	0.002	3.00
13409	117.919	0.222	0.911	0.006	3.49
13410	109.706	0.207	0.917	0.006	3.83
13411	109.654	0.207	0.875	0.006	3.83
13412	117.951	0.223	2.405	0.015	3.48
13413	6.536	0.012	5.170	0.033	HIGH
13415	148.639	0.280	0.887	0.006	2.56
13416	153.459	0.290	0.460	0.003	2.45
13417	145.974	0.275	0.510	0.003	2.63
13418	144.928	0.273	0.523	0.003	2.66
13419	154.617	0.292	0.530	0.003	2.43
13420	182.770	0.345	0.490	0.003	1.90
13421	187.427	0.354	0.654	0.004	1.83
13424	142.204	0.268	0.612	0.004	2.73
13425	158.074	0.298	0.227	0.001	2.35
13426	160.121	0.302	0.219	0.001	2.31
13427	169.841	0.320	0.104	0.001	2.12
13428	190.380	0.359	0.196	0.001	1.78
13429	215.120	0.406	0.548	0.004	1.46
13430	243.734	0.460	2.842	0.018	1.17
13432	143.781	0.271	0.062	0.000	2.69
13433	163.779	0.309	0.146	0.001	2.24
13434	171.539	0.324	0.384	0.002	2.09
13435	187.354	0.353	0.489	0.003	1.83
13436	210.512	0.397	0.568	0.004	1.52
13437	247.946	0.468	4.029	0.026	1.13
13438	266.234	0.502	2.213	0.014	0.99
13440	144.890	0.273	0.350	0.002	2.66
13441	165.620	0.312	0.511	0.003	2.20
13442	175.913	0.332	0.661	0.004	2.01
13443	192.883	0.364	0.687	0.004	1.75
13444	217.651	0.411	0.936	0.006	1.43
13445	255.377	0.482	1.424	0.009	1.07
13446	275.604	0.520	2.485	0.016	0.92
13450	140.910	0.266	0.480	0.003	2.76
13451	160.746	0.303	0.753	0.005	2.30
13452	171.606	0.324	0.742	0.005	2.09

5.5.65

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: LANDING ABORT LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
13509	8.251	0.016	2.095	0.013	HIGH
13510	-16.667	0.031	0.510	0.003	HIGH
13511	-36.753	0.069	0.270	0.002	HIGH
13512	-53.235	0.100	0.345	0.002	8.95
13513	-62.078	0.117	0.415	0.003	7.54
13514	-58.798	0.111	0.840	0.005	8.01
13515	-56.114	0.106	1.591	0.010	8.42
13518	-37.931	0.072	0.782	0.005	HIGH
13519	-47.121	0.089	0.577	0.004	HIGH
13520	-46.071	0.087	0.554	0.004	HIGH
13521	-51.918	0.098	0.627	0.004	9.20
13522	-57.663	0.109	0.739	0.005	8.18
13523	-59.655	0.113	0.949	0.006	7.87
13524	-54.947	0.104	1.727	0.011	8.61
13526	-117.290	0.221	3.631	0.023	3.49
13527	-89.934	0.170	0.557	0.004	4.89
13528	-74.717	0.141	0.883	0.006	6.09
13529	-65.651	0.124	0.950	0.006	7.06
13530	-64.658	0.122	1.060	0.007	7.19
13531	-65.605	0.124	1.262	0.008	7.06
13532	-57.716	0.109	1.433	0.009	8.16
13534	-162.361	0.306	1.185	0.008	2.26
13535	-149.200	0.282	4.324	0.028	2.53
13536	-111.607	0.211	1.020	0.007	3.75
13537	-90.078	0.170	1.214	0.008	4.88
13538	-85.965	0.162	1.287	0.008	5.16
13539	-79.135	0.149	1.524	0.010	5.68
13540	-66.278	0.125	1.933	0.012	6.97
13544	-198.392	0.374	2.068	0.013	1.67
13545	-185.416	0.350	1.400	0.009	1.86
13546	-148.001	0.279	0.928	0.006	2.58
13547	-123.310	0.233	1.198	0.008	3.29
13548	-108.255	0.204	1.377	0.009	3.89
13549	-97.352	0.184	1.570	0.010	4.43
13550	-79.857	0.151	2.289	0.015	5.61
13553	-202.860	0.383	1.222	0.008	1.61
13554	-197.148	0.372	0.699	0.004	1.69
13555	-172.422	0.325	0.696	0.004	2.07
13556	-149.376	0.282	0.913	0.006	2.55
13557	-132.438	0.250	1.333	0.009	3.00
13558	-121.654	0.230	1.469	0.009	3.35
13559	-101.700	0.192	1.873	0.012	4.20
13561	-230.149	0.434	0.432	0.003	1.30
13562	-217.237	0.410	0.503	0.003	1.44
13563	-189.132	0.357	0.491	0.003	1.80

5.5.67

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: LANDING ABORT LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
22227	-67.073	0.127	3.310	0.021	6.83
22228	-59.448	0.112	5.325	0.034	7.71
22229	-57.333	0.108	9.791	0.063	7.62
22230	-57.029	0.108	11.700	0.075	7.45
22231	-47.953	0.090	45.478	0.290	3.87
22232	-25.355	0.048	63.603	0.406	2.93
22233	-13.898	0.026	102.225	0.653	1.00
22234	-99.683	0.188	5.157	0.033	4.25
22235	-71.712	0.135	4.467	0.029	6.28
22236	-61.388	0.116	2.465	0.016	7.58
22237	-49.379	0.093	2.874	0.018	9.63
22238	-44.901	0.085	6.454	0.041	HIGH
22239	-41.582	0.078	11.397	0.073	HIGH
22240	-39.600	0.075	12.503	0.080	HIGH
22241	-40.996	0.077	17.588	0.112	9.09
22242	-52.325	0.099	176.701	1.128	-0.25
22243	-7.901	0.015	1.514	0.010	HIGH
22244	-26.631	0.050	281.486	1.797	-0.65
22245	-87.041	0.164	3.432	0.022	5.04
22246	-49.765	0.094	2.072	0.013	9.59
22247	-50.718	0.096	2.693	0.017	9.36
22248	-39.409	0.074	1.248	0.008	HIGH
22249	-33.436	0.063	3.663	0.023	HIGH
22250	-30.914	0.058	8.374	0.053	HIGH
22251	-24.761	0.047	10.715	0.068	HIGH
22252	-20.128	0.038	12.184	0.078	HIGH
22253	-13.535	0.026	40.129	0.256	7.49
22254	-5.278	0.010	108.881	0.695	0.85
22255	-78.037	0.147	167.883	1.072	-0.22
22256	-57.532	0.109	30.822	0.197	5.00
22257	-66.253	0.125	4.005	0.026	6.90
22258	-36.880	0.070	0.899	0.006	HIGH
22259	-68.084	0.128	1.661	0.011	6.76
22260	-19.003	0.036	1.624	0.010	HIGH
22261	-23.359	0.044	1.411	0.009	HIGH
22262	-21.453	0.040	1.605	0.010	HIGH
22263	-16.201	0.031	4.941	0.032	HIGH
22264	-13.479	0.025	4.952	0.032	HIGH
22265	-12.052	0.023	5.058	0.032	HIGH
22266	-17.649	0.033	33.106	0.211	9.08
22267	-37.158	0.070	54.789	0.350	3.36
22268	-31.500	0.059	42.121	0.269	5.25
22269	-37.995	0.072	9.882	0.063	HIGH
22270	27.623	0.052	2.562	0.016	HIGH
22271	-1.328	0.003	1.919	0.012	HIGH

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: LANDING ABORT LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
22334	87.292	0.165	75.519	0.482	1.25
22335	107.980	0.204	191.194	1.221	-0.38
22336	16.148	0.030	0.160	0.001	HIGH
22337	114.510	0.216	223.498	1.427	-0.52
22338	62.282	0.118	56.911	0.363	2.48
22339	56.039	0.106	115.717	0.739	0.44
22340	104.545	0.197	9.588	0.061	3.88
22341	40.176	0.076	18.853	0.120	8.96
22342	49.543	0.093	22.930	0.146	6.80
22343	20.913	0.039	13.470	0.086	HIGH
22346	5.513	0.010	32.783	0.209	HIGH
22347	-47.396	0.089	109.308	0.698	0.61
22348	-7.351	0.014	37.219	0.238	9.55
22349	-20.164	0.038	80.020	0.511	1.88
22350	-31.810	0.060	40.899	0.261	5.43
22351	-22.899	0.043	11.105	0.071	HIGH
22353	-21.446	0.040	64.388	0.411	2.97
22354	-75.415	0.142	20.197	0.129	4.88
22355	-94.373	0.178	93.707	0.598	0.71
22356	-10.194	0.019	0.167	0.001	HIGH
22357	-36.622	0.069	94.895	0.606	1.06
22358	-41.557	0.078	43.990	0.281	4.35
22361	-69.263	0.131	40.717	0.260	3.44
22362	-76.099	0.144	34.153	0.218	3.69
22363	-64.648	0.122	48.600	0.310	2.98
22364	-72.355	0.137	40.112	0.256	3.37
22365	-51.241	0.097	68.039	0.434	2.04
22368	-75.226	0.142	20.814	0.133	4.84
22369	-74.300	0.140	14.706	0.094	5.41
22370	-72.675	0.137	34.773	0.222	3.79
22371	-78.968	0.149	35.734	0.228	3.46
22372	-71.866	0.136	66.250	0.423	1.80
22375	-65.444	0.123	7.774	0.050	6.77
22376	-66.529	0.126	7.375	0.047	6.68
22377	-68.315	0.129	18.126	0.116	5.58
22378	-72.739	0.137	19.538	0.125	5.12
22379	-72.913	0.138	36.188	0.231	3.66
22383	-43.829	0.083	1.682	0.011	HIGH
22384	-50.105	0.095	2.109	0.013	9.52
22385	-53.271	0.101	8.111	0.052	8.42
22386	-59.270	0.112	8.590	0.055	7.47
22387	-60.826	0.115	14.011	0.089	6.73
22390	-24.562	0.046	2.186	0.014	HIGH
22391	-28.832	0.054	1.036	0.007	HIGH
22392	-33.154	0.063	3.492	0.022	HIGH

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: LANDING ABORT LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
23334	-2.768	0.005	5.432	0.035	HIGH
23338	-68.614	0.129	7.740	0.049	6.43
23339	-68.486	0.129	2.065	0.013	6.71
23340	-82.791	0.156	0.781	0.005	5.40
23341	-82.140	0.155	2.252	0.014	5.43
23342	40.584	0.077	0.949	0.006	HIGH
23343	41.490	0.078	1.071	0.007	HIGH
23344	30.025	0.057	0.937	0.006	HIGH
23345	-6.708	0.013	3.590	0.023	HIGH
23350	-55.474	0.105	7.892	0.050	8.09
23351	-58.919	0.111	2.993	0.019	7.92
23352	-64.436	0.122	1.448	0.009	7.21
23353	-65.741	0.124	1.312	0.008	7.05
23354	45.456	0.086	0.779	0.005	HIGH
23355	39.921	0.075	1.181	0.008	HIGH
23356	31.169	0.059	1.318	0.008	HIGH
23357	19.919	0.038	3.123	0.020	HIGH
23363	-27.472	0.052	6.979	0.045	HIGH
23364	-38.321	0.072	1.020	0.007	HIGH
23365	-45.362	0.086	1.217	0.008	HIGH
23366	-49.636	0.094	1.274	0.008	9.65
23367	43.458	0.082	4.867	0.031	HIGH
23368	33.919	0.064	1.072	0.007	HIGH
23369	29.217	0.055	1.690	0.011	HIGH
23370	25.985	0.049	1.877	0.012	HIGH
23371	34.573	0.065	4.736	0.030	HIGH
23376	1.492	0.003	7.409	0.047	HIGH
23377	-12.377	0.023	1.457	0.009	HIGH
23378	-21.940	0.041	0.911	0.006	HIGH
23379	-28.166	0.053	0.894	0.006	HIGH
23380	-32.847	0.062	0.997	0.006	HIGH
23382	50.012	0.094	4.445	0.028	9.38
23383	31.411	0.059	0.703	0.004	HIGH
23384	26.656	0.050	1.520	0.010	HIGH
23385	28.801	0.054	1.999	0.013	HIGH
23386	13.639	0.026	3.417	0.022	HIGH
23390	20.177	0.038	5.224	0.033	HIGH
23391	8.191	0.015	0.521	0.003	HIGH
23392	-0.870	0.002	0.514	0.003	HIGH
23393	-6.317	0.012	0.277	0.002	HIGH
23394	-10.183	0.019	0 189	0.001	HIGH
23395	-10.965	0.021	0.186	0.001	HIGH
23397	-141.330	0.267	8.211	0.052	2.67
23398	-112.495	0.212	1.518	0.010	3.70
23399	-90.139	0.170	0.388	0.002	4.88

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: LANDING ABORT LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
23482	12.522	0.024	2.268	0.014	HIGH
23483	19.718	0.037	2.110	0.013	HIGH
23484	13.783	0.026	3.661	0.023	HIGH
23485	3.029	0.006	4.141	0.026	HIGH
23486	9.343	0.018	1.704	0.011	HIGH
23487	15.738	0.030	1.685	0.011	HIGH
23488	14.075	0.027	1.622	0.010	HIGH
23489	8.042	0.015	2.005	0.013	HIGH
23490	12.832	0.024	1.164	0.007	HIGH
23491	13.095	0.025	1.129	0.007	HIGH
23492	12.897	0.024	0.436	0.003	HIGH
23493	12.675	0.024	2.195	0.014	HIGH
23494	16.638	0.031	1.454	0.009	HIGH
23499	-13.649	0.026	5.812	0.037	HIGH
23500	-23.876	0.045	1.087	0.007	HIGH
23501	-17.312	0.033	1.143	0.007	HIGH
23502	-16.752	0.032	0.961	0.006	HIGH
23503	-15.083	0.028	0.467	0.003	HIGH
23504	-11.771	0.022	0.078	0.001	HIGH
23505	-8.832	0.017	0.246	0.002	HIGH
23506	-9.729	0.018	0.256	0.002	HIGH
23509	-85.579	0.161	4.062	0.026	5.13
23510	-43.450	0.082	2.299	0.015	HIGH
23511	-29.018	0.055	2.222	0.014	HIGH
23512	-23.327	0.044	1.726	0.011	HIGH
23513	-16.119	0.030	0.702	0.004	HIGH
23514	-9.716	0.018	1.070	0.007	HIGH
23515	-4.769	0.009	1.105	0.007	HIGH
23518	-75.735	0.143	0.661	0.004	5.99
23519	-35.576	0.067	3.595	0.023	HIGH
23520	-37.089	0.070	2.697	0.017	HIGH
23521	-33.483	0.063	2.559	0.016	HIGH
23522	-22.479	0.042	2.178	0.014	HIGH
23523	-12.748	0.024	2.488	0.016	HIGH
23524	-6.585	0.012	2.584	0.016	HIGH
23530	-28.557	0.054	4.080	0.026	HIGH
23531	-14.553	0.027	3.578	0.023	HIGH
23532	-5.671	0.011	4.524	0.029	HIGH
23539	-11.893	0.022	8.244	0.053	HIGH
23540	0.438	0.001	8.776	0.056	HIGH
23550	19.317	0.036	17.727	0.113	HIGH
23553	-50.332	0.095	7.133	0.046	9.05
23554	-26.656	0.050	7.267	0.046	HIGH
23559	35.162	0.066	19.236	0.123	9.89
23561	-30.995	0.058	3.707	0.024	HIGH

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: LANDING ABORT LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
32232	-26.991	0.051	1.672	0.011	HIGH
32233	-38.831	0.073	11 242	0.072	HIGH
32234	-50.765	0.096	23.116	0.148	6.64
32235	-10.417	0.020	9.999	0.064	HIGH
32236	-9.696	0.018	0.801	0.005	HIGH
32237	-1.071	0.002	0.589	0.004	HIGH
32238	10.908	0.021	0.751	0.005	HIGH
32239	1.893	0.004	0.449	0.003	HIGH
32240	-0.738	0.001	0.287	0.002	HIGH
32241	-2.607	0.005	0.720	0.005	HIGH
32242	-14.746	0.028	0.734	0.005	HIGH
32243	-27.261	0.051	3.501	0.022	HIGH
32244	-21.507	0.041	10.827	0.069	HIGH
32245	-3.520	0.007	11.616	0.074	HIGH
32246	1.226	0.002	8.063	0.051	HIGH
32247	-4.122	0.008	1.314	0.008	HIGH
32248	-0.665	0.001	0.552	0.004	HIGH
32249	10.054	0.019	2.407	0.015	HIGH
32250	0.697	0.001	0.838	0.005	HIGH
32251	-1.655	0.003	0.615	0.004	HIGH
32252	-3.616	0.007	0.694	0.004	HIGH
32253	-7.138	0.013	0.744	0.005	HIGH
32254	-8.094	0.015	1.896	0.012	HIGH
32255	-22.946	0.043	1.794	0.011	HIGH
32256	-28.983	0.055	1.604	0.010	HIGH
32257	-4.820	0.009	5.704	0.036	HIGH
32258	7.848	0.015	3.887	0.025	HIGH
32259	1.152	0.002	5.829	0.037	HIGH
32260	4.956	0.009	3.213	0.021	HIGH
32261	9.315	0.018	9.983	0.064	HIGH
32262	3.671	0.007	1.373	0.009	HIGH
32263	0.936	0.002	0.926	0.006	HIGH
32264	-1.026	0.002	0.365	0.002	HIGH
32265	-5.070	0.010	0.718	0.005	HIGH
32266	-6.423	0.012	0.595	0.004	HIGH
32267	-12.808	0.024	0.739	0.005	HIGH
32268	-14.435	0.027	0.675	0.004	HIGH
32269	-23.928	0.045	0.648	0.004	HIGH
32270	29.533	0.056	6.315	0.040	HIGH
32271	19.530	0.037	2.081	0.013	HIGH
32272	16.427	0.031	2.889	0.018	HIGH
32273	16.654	0.031	2.506	0.016	HIGH
32274	36.682	0.069	3.207	0.020	HIGH
32275	-2.694	0.005	0.200	0.001	HIGH
32278	30.920	0.058	0.979	0.006	HIGH

5.5.77

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: LANDING ABORT LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
32339	39.010	0.074	0.668	0.004	HIGH
32340	47.643	0.090	5.151	0.033	9.82
32341	15.249	0.029	0.402	0.003	HIGH
32342	25.693	0.048	0.395	0.003	HIGH
32343	2.572	0.005	0.587	0.004	HIGH
32346	22.430	0.042	4.947	0.032	HIGH
32347	-3.229	0.006	2.902	0.019	HIGH
32348	-19.693	0.037	4.745	0.030	HIGH
32349	-12.102	0.023	0.958	0.006	HIGH
32350	-8.572	0.016	2.748	0.018	HIGH
32351	1.062	0.002	0.227	0.001	HIGH
32353	-13.131	0.025	1.828	0.012	HIGH
32354	-25.214	0.048	1.622	0.010	HIGH
32355	-47.923	0.090	2.184	0.014	9.99
32356	-35.276	0.067	2.363	0.015	HIGH
32357	-22.350	0.042	1.031	0.007	HIGH
32358	-20.452	0.039	0.895	0.006	HIGH
32361	-43.417	0.082	1.093	0.007	HIGH
32362	-55.512	0.105	1.230	0.008	8.53
32363	-43.404	0.082	1.256	0.008	HIGH
32364	-42.289	0.080	1.234	0.008	HIGH
32365	-35.279	0.067	0.817	0.005	HIGH
32368	-50.077	0.094	0.527	0.003	9.58
32369	-52.588	0.099	0.485	0.003	9.07
32370	-50.683	0.096	1.138	0.007	9.44
32371	-47.049	0.089	1.190	0.008	HIGH
32372	-45.024	0.085	2.339	0.015	HIGH
32375	-65.241	0.123	0.151	0.001	7.12
32376	-58.733	0.111	0.313	0.002	8.02
32377	-56.007	0.106	1.151	0.007	8.45
32378	-53.913	0.102	1.210	0.008	8.81
32379	-49.130	0.093	3.607	0.023	9.63
32383	-83.943	0.158	0.077	0.000	5.31
32384	-73.538	0.139	0.450	0.003	6.21
32385	-64.396	0.122	0.712	0.005	7.22
32386	-61.907	0.117	1.638	0.010	7.54
32387	-59.347	0.112	1.556	0.010	7.91
32390	-60.077	0.113	0.357	0.002	7.82
32391	-60.965	0.115	0.397	0.003	7.69
32392	-76.107	0.144	0.843	0.005	5.96
32393	-66.560	0.126	2.878	0.018	6.90
32394	-63.102	0.119	3.246	0.021	7.32
32396	-44.470	0.084	0.719	0.005	HIGH
32397	-74.342	0.140	0.223	0.001	6.13
32398	-82.514	0.156	0.562	0.004	5.42

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: LANDING ABORT LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
33328	-56.313	0.106	3.887	0.025	8.28
33329	-62.015	0.117	2.145	0.014	7.51
33330	-28.320	0.053	4.913	0.031	HIGH
33331	71.907	0.136	1.968	0.013	6.35
33332	52.079	0.098	1.453	0.009	9.15
33333	65.565	0.124	0.482	0.003	7.08
33334	-15.983	0.030	2.912	0.019	HIGH
33338	-44.364	0.084	15.154	0.097	8.95
33339	-67.548	0.127	4.730	0.030	6.71
33340	-32.488	0.061	2.068	0.013	HIGH
33341	-26.919	0.051	4.920	0.031	HIGH
33342	63.820	0.120	2.056	0.013	7.27
33343	36.516	0.069	2.190	0.014	HIGH
33344	34.448	0.065	1.451	0.009	HIGH
33345	31.891	0.060	3.238	0.021	HIGH
33350	-70.937	0.134	15.260	0.097	5.63
33351	-30.238	0.057	5.702	0.036	HIGH
33352	-11.706	0.022	3.022	0.019	HIGH
33353	-9.787	0.018	3.253	0.021	HIGH
33354	54.654	0.103	2.035	0.013	8.65
33355	30.041	0.057	2.433	0.016	HIGH
33356	27.054	0.051	2.509	0.016	HIGH
33357	11.658	0.022	5.168	0.033	HIGH
33363	-20.506	0.039	11.935	0.076	HIGH
33364	-15.963	0.030	1.924	0.012	HIGH
33365	6.596	0.012	2.199	0.014	HIGH
33366	34.501	0.065	2.428	0.016	HIGH
33367	41.856	0.079	2.145	0.014	HIGH
33368	23.670	0.045	2.086	0.013	HIGH
33369	21.141	0.040	2.116	0.014	HIGH
33370	17.687	0.033	2.507	0.016	HIGH
33371	-15.999	0.030	9.021	0.058	HIGH
33376	12.574	0.024	10.845	0.069	HIGH
33377	-24.075	0.045	2.600	0.017	HIGH
33378	-11.525	0.022	2.462	0.016	HIGH
33379	17.338	0.033	2.568	0.016	HIGH
33380	74.557	0.141	7.736	0.049	5.86
33381	21.246	0.040	1.915	0.012	HIGH
33382	14.403	0.027	1.296	0.008	HIGH
33383	9.169	0.017	0.995	0.006	HIGH
33384	4.915	0.009	0.841	0.005	HIGH
33385	2.605	0.005	2.210	0.014	HIGH
33386	5.485	0.010	8.291	0.053	HIGH
33390	-20.969	0.040	7.217	0.046	HIGH
33391	-13.940	0.026	0.767	0.005	HIGH

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: LANDING ABORT LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
33475	90.186	0.170	4.078	0.026	4.82
33476	126.682	0.239	5.393	0.034	3.14
33477	122.234	0.231	5.393	0.034	3.28
33478	103.842	0.196	3.149	0.020	4.08
33479	85.979	0.162	7.901	0.050	4.97
33480	104.392	0.197	10.886	0.070	3.85
33481	133.794	0.252	3.969	0.025	2.94
33482	121.368	0.229	4.245	0.027	3.33
33483	98.980	0.187	4.087	0.026	4.31
33484	86.033	0.162	7.091	0.045	5.00
33485	132.234	0.249	7.119	0.045	2.94
33486	133.647	0.252	4.705	0.030	2.93
33487	104.989	0.198	4.798	0.031	3.99
33488	71.672	0.135	4.438	0.028	6.29
33489	127.940	0.241	9.666	0.062	3.02
33490	132.609	0.250	7.728	0.049	2.92
33491	73.700	0.139	4.439	0.028	6.09
33492	232.133	0.438	23.774	0.152	1.11
33499	70.626	0.133	4.814	0.031	6.38
33500	-10.534	0.020	1.779	0.011	HIGH
33501	-60.006	0.113	1.920	0.012	7.80
33502	-90.798	0.171	1.534	0.010	4.83
33503	-119.428	0.225	0.585	0.004	3.44
33504	-173.087	0.327	2.721	0.017	2.05
33505	-259.489	0.490	15.704	0.100	0.97
33509	-72.085	0.136	3.871	0.025	6.27
33510	-76.634	0.145	3.827	0.024	5.84
33511	-111.373	0.210	3.776	0.024	3.73
33512	-129.669	0.245	2.511	0.016	3.08
33513	-151.974	0.287	1.534	0.010	2.48
33514	-180.545	0.341	1.414	0.009	1.93
33515	-178.145	0.336	6.420	0.041	1.94
33518	-122.194	0.231	1.066	0.007	3.33
33519	-73.944	0.140	6.616	0.042	5.97
33520	-110.288	0.208	4.672	0.030	3.76
33521	-150.704	0.284	4.334	0.028	2.49
33522	-155.097	0.293	3.070	0.020	2.41
33523	-167.430	0.316	3.656	0.023	2.15
33524	-167.606	0.316	5.551	0.035	2.13
33530	-205.028	0.387	6.822	0.044	1.56
33531	-168.473	0.318	5.812	0.037	2.12
33532	-140.680	0.265	8.052	0.051	2.69
33539	-142.595	0.269	11.906	0.076	2.57
33540	-115.162	0.217	13.954	0.089	3.31
33550	-58.061	0.110	26.589	0.170	5.47

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: LANDING ABORT LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
42225	40.207	0.076	3.352	0.021	HIGH
42226	44.609	0.084	2.049	0.013	HIGH
42227	55.966	0.106	1.985	0.013	8.43
42228	72.794	0.137	15.999	0.102	5.42
42229	-27.617	0.052	17.353	0.111	HIGH
42230	-14.438	0.027	22.716	0.145	HIGH
42231	-9.083	0.017	24.513	0.157	HIGH
42232	-6.919	0.013	23.941	0.153	HIGH
42233	0.880	0.002	22.413	0.143	HIGH
42234	40.444	0.076	2.095	0.013	HIGH
42235	26.853	0.051	0.514	0.003	HIGH
42236	33.339	0.063	0.782	0.005	HIGH
42237	43.316	0.082	2.593	0.017	HIGH
42238	53.539	0.101	3.505	0.022	8.77
42239	34.562	0.065	33.104	0.211	6.63
42240	-27.764	0.052	80.848	0.516	1.73
42241	-27.529	0.052	93.094	0.594	1.20
42242	-22.559	0.043	65.241	0.417	2.87
42243	-11.021	0.021	14.835	0.095	HIGH
42244	-2.825	0.005	22.304	0.142	HIGH
42245	25.645	0.048	2.915	0.019	HIGH
42246	15.392	0.029	4.021	0.026	HIGH
42247	21.417	0.040	1.966	0.013	HIGH
42248	32.184	0.061	0.539	0.003	HIGH
42249	54.687	0.103	4.085	0.026	8.54
42250	94.532	0.178	11.474	0.073	4.30
42251	-54.199	0.102	282.033	1.801	-0.66
42252	-9.121	0.017	0.723	0.005	HIGH
42253	-70.414	0.133	253.887	1.621	-0.59
42254	-34.648	0.065	18.653	0.119	HIGH
42255	-15.523	0.029	17.913	0.114	HIGH
42256	-4.570	0.009	17.068	0.109	HIGH
42257	4.152	0.008	0.976	0.006	HIGH
42258	6.021	0.011	1.633	0.010	HIGH
42259	16.273	0.031	1.339	0.009	HIGH
42260	3.702	0.007	0.642	0.004	HIGH
42261	15.393	0.029	0.921	0.006	HIGH
42262	30.772	0.058	22.161	0.142	HIGH
42263	117.481	0.222	23.620	0.151	2.87
42264	-31.925	0.060	146.875	0.938	0.05
42265	-38.579	0.073	125.188	0.799	0.34
42266	-34.450	0.065	43.873	0.280	4.78
42267	-24.673	0.047	10.711	0.068	HIGH
42268	-17.179	0.032	10.600	0.068	HIGH
42269	-13.286	0.025	8.117	0.052	HIGH

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: LANDING ABORT LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
42332	-47.432	0.089	20.817	0.133	7.42
42333	-56.343	0.106	22.591	0.144	6.14
42334	3.567	0.007	79.946	0.511	2.17
42335	-7.233	0.014	34.281	0.219	HIGH
42336	-26.087	0.049	29.461	0.188	8.71
42337	-34.539	0.065	26.050	0.166	8.22
42338	6.915	0.013	30.194	0.193	HIGH
42339	-1.469	0.003	17.293	0.110	HIGH
42340	-11.445	0.022	13.935	0.089	HIGH
42341	14.876	0.028	6.962	0.044	HIGH
42342	12.333	0.023	7.239	0.046	HIGH
42343	18.409	0.035	6.737	0.043	HIGH
42346	7.171	0.014	23.909	0.153	HIGH
42347	21.126	0.040	15.571	0.099	HIGH
42348	9.829	0.019	15.813	0.101	HIGH
42349	1.255	0.002	13.839	0.088	HIGH
42350	-8.715	0.016	8.196	0.052	HIGH
42351	-10.289	0.019	7.942	0.051	HIGH
42353	-6.921	0.013	61.358	0.392	3.83
42354	28.318	0.053	21.464	0.137	HIGH
42355	26.148	0.049	46.364	0.296	4.95
42356	14.550	0.027	46.985	0.300	5.71
42357	-4.447	0.008	22.056	0.141	HIGH
42358	-11.301	0.021	23.620	0.151	HIGH
42361	45.444	0.086	42.654	0.272	4.31
42362	39.096	0.074	34.907	0.223	5.85
42363	33.876	0.064	85.573	0.546	1.43
42364	-1.587	0.003	56.450	0.360	4.86
42365	-10.817	0.020	51.318	0.328	5.16
42368	70.842	0.134	29.792	0.190	4.31
42369	57.597	0.109	28.785	0.184	5.24
42370	57.409	0.108	79.177	0.506	1.43
42371	-13.054	0.025	148.497	0.948	0.07
42372	-16.064	0.030	108.360	0.692	0.80
42375	85.587	0.161	13.780	0.088	4.69
42376	28.420	0.054	20.575	0.131	HIGH
42377	40.305	0.076	76.709	0.490	1.76
42378	-3.489	0.007	0.817	0.005	HIGH
42379	-6.329	0.012	115.245	0.736	0.68
42383	56.168	0.106	9.052	0.058	7.87
42384	43.462	0.082	4.446	0.028	HIGH
42385	62.444	0.118	6.453	0.041	7 22
42386	-13.974	0.026	41.401	0.264	7.07
42387	-8.087	0.015	49.164	0.314	5.81
42390	44.659	0.084	2.453	0.016	HIGH

C-3

7.5.87

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: LANDING ABORT LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
43330	79.919	0.151	8.654	0.055	5.37
43331	-197.629	0.373	4.781	0.031	1.67
43332	-159.926	0.302	3.299	0.021	2.30
43333	-120.647	0.228	1.061	0.007	3.39
43334	-17.268	0.033	7.127	0.046	HIGH
43338	-18.585	0.035	15.124	0.097	HIGH
43339	42.967	0.081	2.698	0.017	HIGH
43340	47.018	0.089	5.350	0.034	9.94
43341	63.622	0.120	8.358	0.053	6.94
43342	-177.085	0.334	3.556	0.023	1.98
43343	-138.799	0.262	4.196	0.027	2.79
43344	-144.219	0.272	3.473	0.022	2.66
43345	-141.067	0.266	3.576	0.023	2.74
43346	165.370	0.312	15.760	0.101	2.03
43349	-154.269	0.291	6.595	0.042	2.39
43350	71.764	0.135	4.593	0.029	6.27
43351	55.508	0.105	3.926	0.025	8.41
43352	32.078	0.061	5.963	0.038	HIGH
43353	42.310	0.080	5.287	0.034	HIGH
43354	-169.766	0.320	3.443	0.022	2.11
43355	-124.229	0.234	3.392	0.022	3.24
43356	-123.685	0.233	3.521	0.022	3.26
43357	-116.386	0.220	3.519	0.022	3.53
43358	-74.719	0.141	4.892	0.031	5.98
43359	-80.229	0.151	9.789	0.063	5.28
43360	-2.344	0.004	11.660	0.074	HIGH
43361	80.641	0.152	5.410	0.035	5.45
43362	34.671	0.065	3.233	0.021	HIGH
43363	54.652	0.103	2.525	0.016	8.63
43364	37.120	0.070	3.592	0.023	HIGH
43365	9.501	0.018	4.740	0.030	HIGH
43366	-4.451	0.008	4.002	0.026	HIGH
43367	-155.960	0.294	11.665	0.074	2.28
43368	-119.634	0.226	2.204	0.014	3.42
43369	-99.974	0.189	2.414	0.015	4.28
43370	-81.054	0.153	2.473	0.016	5.51
43371	-51.035	0.096	2.029	0.013	9.33
43372	-42.963	0.081	4.605	0.029	HIGH
43373	-19.091	0.036	6.392	0.041	HIGH
43374	27.428	0.052	6.305	0.040	HIGH
43375	34.405	0.065	2.483	0.016	HIGH
43376	30.355	0.057	1.047	0.007	HIGH
43377	35.655	0.067	1.511	0.010	HIGH
43378	20.582	0.039	1.730	0.011	HIGH
43379	-6.082	0.011	4.210	0.027	HIGH

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: LANDING ABORT LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
43435	-198.005	0.374	54.511	0.348	0.88
43438	-521.147	0.983	48.406	0.309	-0.10
43440	-204.050	0.385	18.855	0.120	1.44
43441	-238.579	0.450	12.560	0.080	1.16
43442	-262.380	0.495	16.469	0.105	0.94
43443	-288.878	0.545	38.817	0.248	0.58
43446	-342.621	0.646	39.435	0.252	0.36
43450	-210.156	0.397	22.798	0.146	1.32
43451	-251.370	0.474	10.516	0.067	1.07
43452	-297.675	0.562	21.428	0.137	0.69
43453	-190.809	0.360	33.035	0.211	1.35
43455	-402.151	0.759	10.577	0.068	0.30
43456	-399.179	0.753	13.299	0.085	0.30
43457	-174.662	0.330	17.928	0.114	1.84
43459	-203.984	0.385	22.562	0.144	1.39
43460	-241.119	0.455	7.760	0.050	1.17
43461	-251.961	0.475	13.638	0.087	1.04
43462	-171.042	0.323	16.868	0.108	1.92
43463	-266.497	0.503	7.680	0.049	0.97
43464	-329.701	0.622	6.849	0.044	0.60
43465	-327.780	0.618	7.241	0.046	0.60
43467	-190.793	0.360	17.922	0.114	1.61
43468	-217.551	0.410	7.321	0.047	1.41
43469	-208.443	0.393	9.327	0.060	1.50
43470	-228.335	0.431	8.642	0.055	1.29
43471	-212.189	0.400	4.984	0.032	1.48
43472	-216.230	0.408	5.671	0.036	1.43
43473	-165.822	0.313	6.595	0.042	2.16
43474	-172.195	0.325	11.733	0.075	1.98
43475	-194.395	0.367	5.922	0.038	1.70
43476	-199.684	0.377	5.896	0.038	1.63
43477	-182.255	0.344	5.482	0.035	1.88
43478	-158.960	0.300	3.391	0.022	2.32
43479	-152.259	0.287	10.268	0.066	2.38
43480	-155.499	0.293	6.190	0.040	2.37
43481	-175.936	0.332	3.766	0.024	2.00
43482	-160.940	0.304	3.650	0.023	2.28
43483	-133.465	0.252	2.192	0.014	2.96
43484	-125.051	0.236	10.649	0.068	3.08
43485	-139.957	0.264	2.326	0.015	2.78
43486	-146.226	0.276	2.328	0.015	2.62
43487	-119.688	0.226	0.414	0.003	3.43
43488	-94.721	0.179	7.460	0.048	4.45
43489	-120.232	0.227	3.645	0.023	3.38
43490	-126.892	0.239	5.868	0.037	3.12

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: LANDING ABORT LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
43561	438.486	0.827	6.379	0.041	0.20
43562	404.006	0.762	6.405	0.041	0.31
43563	303.036	0.572	5.797	0.037	0.74
43564	188.135	0.355	23.497	0.150	1.56
43565	265.069	0.500	17.130	0.109	0.92
43566	241.426	0.456	8.162	0.052	1.17
43567	199.743	0.377	21.998	0.140	1.44
43568	270.859	0.511	5.070	0.032	0.95
43569	327.670	0.618	4.622	0.030	0.61
43570	288.647	0.545	2.922	0.019	0.83
43571	285.546	0.539	9.711	0.062	0.83
43572	244.148	0.461	10.769	0.069	1.13
43573	236.200	0.446	7.239	0.046	1.22
43574	201.586	0.380	20.462	0.131	1.45
43575	248.861	0.470	7.155	0.046	1.11
43576	257.154	0.485	2.598	0.017	1.06
43577	262.595	0.495	5.194	0.033	1.01
43578	255.384	0.482	5.532	0.035	1.06
43579	225.570	0.426	5.563	0.036	1.33
43580	192.061	0.362	16.154	0.103	1.62
43581	227.788	0.430	6.303	0.040	1.31
43582	232.445	0.439	2.314	0.015	1.28
43583	231.967	0.438	3.120	0.020	1.28
43584	213.206	0.402	3.188	0.020	1.48
43585	174.005	0.328	11.254	0.072	1.96
43586	208.531	0.393	3.445	0.022	1.53
43587	203.652	0.384	1.565	0.010	1.60
43588	184.163	0.347	1.617	0.010	1.88
43589	149.667	0.282	6.566	0.042	2.49
43590	147.761	0.279	2.607	0.017	2.58
43591	143.917	0.272	1.195	0.008	2.68
43592	109.041	0.206	4.374	0.028	3.82
43594	75.368	0.142	9.804	0.063	5.66
52201	-201.306	0.380	8.031	0.051	1.60
52202	100.894	0.190	2.648	0.017	4.23
52204	-238.005	0.449	2.893	0.018	1.22
52205	-129.014	0.243	8.413	0.054	3.01
52206	108.993	0.206	8.128	0.052	3.73
52207	-151.773	0.286	20.307	0.130	2.18
52208	88.367	0.167	13.100	0.084	4.56
52215	-209.984	0.396	19.189	0.123	1.37
52216	-157.670	0.297	10.018	0.064	2.27
52222	-227.716	0.430	16.260	0.104	1.23
52223	-208.378	0.393	18.930	0.121	1.39
52224	-182.570	0.344	23.798	0.152	1.62

5.5.93

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: LANDING ABORT LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
52270	-33.323	0.063	2.098	0.013	HIGH
52271	-32.295	0.061	0.250	0.002	HIGH
52272	-45.697	0.086	1.770	0.011	HIGH
52273	-60.720	0.115	1.557	0.010	7.70
52274	-63.846	0.120	0.900	0.006	7.29
52275	119.603	0.226	2.976	0.019	3.41
52278	-22.996	0.043	5.863	0.037	HIGH
52279	-87.945	0.166	0.298	0.002	5.03
52280	0.367	0.001	0.229	0.001	HIGH
52281	-142.767	0.269	1.049	0.007	2.71
52282	-148.742	0.281	2.404	0.015	2.55
52283	-126.263	0.238	4.709	0.030	3.16
52286	-106.559	0.201	6.912	0.044	3.87
52287	-101.043	0.191	0.718	0.005	4.24
52288	-106.574	0.201	0.588	0.004	3.97
52289	-127.847	0.241	0.831	0.005	3.14
52290	-169.305	0.319	0.629	0.004	2.13
52293	-78.551	0.148	13.881	0.089	5.15
52294	-108.110	0.204	0.991	0.006	3.90
52295	-11.863	0.022	0.301	0.002	HIGH
52296	-156.386	0.295	5.021	0.032	2.36
52297	-249.086	0.470	6.132	0.039	1.11
52300	-42.560	0.080	11.762	0.075	9.98
52301	-92.818	0.175	5.052	0.032	4.63
52302	-111.292	0.210	6.782	0.043	3.67
52303	-181.584	0.343	14.236	0.091	1.80
52304	-202.937	0.383	19.488	0.124	1.45
52308	-63.901	0.121	16.301	0.104	6.16
52309	-57.656	0.109	16.835	0.108	6.75
52310	-104.102	0.196	28.898	0.185	3.03
52311	-213.297	0.402	36.630	0.234	1.08
52312	-384.763	0.726	23.189	0.148	0.31
52316	-9.383	0.018	30.971	0.198	HIGH
52317	12.547	0.024	22.724	0.145	HIGH
52318	74.393	0.140	119.176	0.761	0.32
52319	-325.900	0.615	1.501	0.010	0.63
52320	-123.080	0.232	18.799	0.120	2.90
52323	23.323	0.044	46.477	0.297	5.12
52324	20.409	0.039	25.183	0.161	HIGH
52325	-3.552	0.007	41.478	0.265	8.57
52326	44.114	0.083	120.402	0.769	0.40
52327	198.721	0.375	10.002	0.064	1.61
52329	67.318	0.127	26.380	0.168	4.84
52330	80.633	0.152	12.526	0.080	5.09
52331	101.831	0.192	96.986	0.619	0.60

5.5.95

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: LANDING ABORT LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
52391	66.348	0.125	1.088	0.007	6.98
52392	94.446	0.178	12.260	0.078	4.27
52393	-10.366	0.020	9.248	0.059	HIGH
52394	2.533	0.005	25.460	0.163	HIGH
52396	179.200	0.338	4.249	0.027	1.94
52397	129.906	0.245	1.141	0.007	3.08
52398	111.368	0.210	0.949	0.006	3.76
52399	12.250	0.023	4.625	0.030	HIGH
52400	73.807	0.139	14.708	0.094	5.44
52401	184.525	0.348	8.958	0.057	1.82
52402	169.210	0.319	5.853	0.037	2.10
52403	154.554	0.292	1.058	0.007	2.43
52404	150.461	0.284	0.974	0.006	2.52
52405	36.017	0.068	40.501	0.259	5.18
52406	165.225	0.312	18.233	0.116	1.99
52407	136.818	0.258	5.574	0.036	2.83
52408	162.233	0.306	2.324	0.015	2.26
52409	166.460	0.314	10.122	0.065	2.10
52410	154.610	0.292	15.747	0.101	2.23
52411	140.631	0.265	1.529	0.010	2.76
52412	112.069	0.211	2.413	0.015	3.71
52413	136.777	0.258	4.529	0.029	2.84
52414	140.311	0.265	3.633	0.023	2.76
52415	87.717	0.166	5.396	0.034	4.94
52425	-269.609	0.509	7.558	0.048	0.95
52426	144.601	0.273	1.311	0.008	2.66
52427	-180.219	0.340	1.973	0.013	1.94
52443	-149.550	0.282	2.987	0.019	2.53
52444	-63.666	0.120	3.469	0.022	7.24
52445	147.014	0.277	3.911	0.025	2.58
52446	-58.844	0.111	6.956	0.044	7.67
52447	70.423	0.133	24.507	0.156	4.82
52463	-139.419	0.263	3.962	0.025	2.78
52464	-193.125	0.364	3.192	0.020	1.74
52465	50.569	0.095	8.924	0.057	8.80
53301	164.837	0.311	2.514	0.016	2.21
53302	-194.241	0.366	7.456	0.048	1.69
53303	-197.733	0.373	11.533	0.074	1.61
53304	249.429	0.471	6.327	0.040	1.11
53305	339.622	0.641	4.653	0.030	0.56
53306	-38.176	0.072	9.715	0.062	HIGH
53307	430.809	0.813	7.034	0.045	0.22
53308	-104.792	0.198	9.360	0.060	3.88
53313	186.655	0.352	3.679	0.023	1.83
53314	229.221	0.432	4.944	0.032	1.30

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: LANDING ABORT LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
53383	85.856	0.162	0.527	0.003	5.17
53384	68.735	0.130	1.354	0.009	6.70
53385	32.111	0.061	1.865	0.012	HIGH
53386	65.155	0.123	18.224	0.116	5.84
53390	62.046	0.117	13.012	0.083	6.70
53391	43.086	0.081	1.574	0.010	HIGH
53392	65.673	0.124	1.410	0.009	7.05
53393	82.399	0.155	1.402	0.009	5.42
53394	105.943	0.200	0.973	0.006	4.00
53395	132.917	0.251	2.488	0.016	2.98
53397	135.190	0.255	12.120	0.077	2.75
53398	104.237	0.197	1.337	0.009	4.08
53399	87.781	0.166	2.269	0.014	5.02
53400	68.613	0.129	3.292	0.021	6.66
53401	24.682	0.047	3.538	0.023	HIGH
53402	-53.091	0.100	3.132	0.020	8.88
53403	-224.967	0.424	10.116	0.065	1.31
53406	93.053	0.176	8.089	0.052	4.52
53407	125.167	0.236	5.274	0.034	3.19
53408	136.171	0.257	3.219	0.021	2.88
53409	144.622	0.273	6.325	0.040	2.62
53410	139.302	0.263	6.842	0.044	2.75
53411	84.407	0.159	6.862	0.044	5.12
53412	86.002	0.162	6.632	0.042	5.02
53413	-21.662	0.041	33.948	0.217	8.11
53415	134.231	0.253	7.190	0.046	2.88
53416	174.012	0.328	7.116	0.045	2.00
53417	198.285	0.374	8.682	0.055	1.63
53418	236.117	0.446	8.843	0.056	1.21
53419	193.041	0.364	9.072	0.058	1.69
53420	57.070	0.108	9.966	0.064	7.64
53421	0.335	0.001	4.173	0.027	HIGH
53424	192.364	0.363	12.392	0.079	1.67
53425	253.336	0.478	10.382	0.066	1.05
53426	354.465	0.669	13.988	0.089	0.46
53432	206.429	0.389	23.228	0.148	1.35
53433	236.092	0.445	29.965	0.191	1.00
53440	185.067	0.349	49.571	0.317	1.07
53450	129.978	0.245	69.975	0.447	1.04
53455	112.468	0.212	28.398	0.181	2.81
53456	211.001	0.398	12.980	0.083	1.43
53457	469.936	0.887	8.867	0.057	0.12
53463	-58.164	0.110	12.884	0.082	7.17
53464	1.046	0.002	10.649	0.068	HIGH
53465	-159.030	0.300	13.762	0.088	2.18

5.5.90

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: LANDING ABORT LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
53522	97.455	0.184	6.423	0.041	4.33
53523	69.650	0.131	5.253	0.034	6.46
53524	45.815	0.086	5.408	0.035	HIGH
53530	138.953	0.262	12.867	0.082	2.64
53531	101.988	0.192	7.688	0.049	4.06
53532	72.591	0.137	9.222	0.059	5.94
53539	76.611	0.145	23.516	0.150	4.53
53540	75.494	0.142	18.708	0.119	5.00
53550	60.433	0.114	39.000	0.249	3.95
53553	-233.525	0.441	19.816	0.127	1.14
53554	-274.686	0.518	22.769	0.145	0.81
53559	72.650	0.137	49.364	0.315	2.71
53561	-379.406	0.716	12.792	0.082	0.37
53562	-365.682	0.690	8.434	0.054	0.44
53563	-434.947	0.821	11.717	0.075	0.20
53568	-292.404	0.552	9.334	0.060	0.79
53569	-348.858	0.658	8.635	0.055	0.50
53570	-403.794	0.762	10.729	0.069	0.30
53571	-446.438	0.842	11.890	0.076	0.17
53574	-71.388	0.135	30.401	0.194	4.22
53575	-301.766	0.569	13.348	0.085	0.72
53576	-324.390	0.612	4.127	0.026	0.63
53577	-329.729	0.622	9.646	0.062	0.59
53578	-291.843	0.551	10.221	0.065	0.79
53579	-190.677	0.360	12.445	0.079	1.69
53580	-129.992	0.245	24.128	0.154	2.53
53581	-287.193	0.542	12.156	0.078	0.81
53582	-284.798	0.537	6.254	0.040	0.85
53583	-276.336	0.521	9.002	0.057	0.89
53584	-252.094	0.476	9.611	0.061	1.07
53585	-191.098	0.361	13.208	0.084	1.68
53586	-248.921	0.470	7.364	0.047	1.11
53587	-245.559	0.463	5.058	0.032	1.15
53588	-234.546	0.443	5.207	0.033	1.25
53589	-197.755	0.373	5.323	0.034	1.66
53590	-171.178	0.323	2.169	0.014	2.09
53591	-191.530	0.361	1.780	0.011	1.76
53592	-162.688	0.307	4.420	0.028	2.24
53594	-126.822	0.239	12.465	0.080	2.98
62201	-28.423	0.054	26.670	0.170	9.12
62202	-9.605	0.018	3.184	0.020	HIGH
62203	21.978	0.041	3.755	0.024	HIGH
62204	-25.780	0.049	5.902	0.038	HIGH
62205	24.598	0.046	1.520	0.010	HIGH
62206	37.823	0.071	2.503	0.016	HIGH

5.5.0

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: LANDING ABORT LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
62263	-30.569	0.058	0.493	0.003	HIGH
62264	-27.276	0.051	2.653	0.017	HIGH
62265	-28.665	0.054	3.213	0.021	HIGH
62266	-17.465	0.033	4.111	0.026	HIGH
62267	-7.661	0.014	1.293	0.008	HIGH
62268	-7.450	0.014	1.291	0.008	HIGH
62269	1.212	0.002	1.516	0.010	HIGH
62270	61.678	0.116	1.460	0.009	7.57
62271	31.714	0.060	27.266	0.174	8.37
62272	43.007	0.081	9.285	0.059	HIGH
62273	34.165	0.064	4.440	0.028	HIGH
62274	44.165	0.083	4.977	0.032	HIGH
62275	66.532	0.126	7.570	0.048	6.66
62278	46.055	0.087	4.077	0.026	HIGH
62279	49.556	0.094	21.218	0.135	7.08
62280	54.067	0.102	5.972	0.038	8.50
62281	41.430	0.078	5.720	0.037	HIGH
62282	5.972	0.011	3.355	0.021	HIGH
62283	1.260	0.002	1.520	0.010	HIGH
62286	56.162	0.106	6.483	0.041	8.11
62287	57.864	0.109	4.231	0.027	8.01
62288	51.503	0.097	4.191	0.027	9.11
62289	29.692	0.056	4.182	0.027	HIGH
62290	4.864	0.009	11.552	0.074	HIGH
62293	64.530	0.122	3.119	0.020	7.14
62294	60.796	0.115	1.734	0.011	7.69
62295	49.022	0.092	2.157	0.014	9.75
62296	34.422	0.065	2.132	0.014	HIGH
62297	21.466	0.041	6.795	0.043	HIGH
62300	63.420	0.120	4.015	0.026	7.24
62301	57.648	0.109	1.383	0.009	8.17
62302	51.881	0.098	1.223	0.008	9.19
62303	40.790	0.077	1.293	0.008	HIGH
62304	36.296	0.068	6.445	0.041	HIGH
62308	58.758	0.111	5.603	0.036	7.79
62309	59.148	0.112	0.792	0.005	7.95
62310	51.632	0.097	3.765	0.024	9.11
62311	49.009	0.092	0.447	0.003	9.81
62312	44.909	0.085	5.037	0.032	HIGH
62316	57.780	0.109	8.483	0.054	7.69
62317	53.456	0.101	3.873	0.025	8.77
62318	52.899	0.100	3.770	0.024	8.87
62319	50.235	0.095	3.842	0.025	9.38
62320	47.353	0.089	4.229	0.027	9.97
62323	51.859	0.098	9.001	0.057	8.56

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: LANDING ABORT LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
62379	-16.664	0.031	20.885	0.133	HIGH
62383	-5.954	0.011	5.088	0.032	HIGH
62384	-20.915	0.039	1.021	0.007	HIGH
62385	-29.081	0.055	3.847	0.025	HIGH
62386	-31.673	0.060	0.765	0.005	HIGH
62387	-41.796	0.079	12.606	0.080	9.99
62390	1.458	0.003	3.386	0.022	HIGH
62391	-20.393	0.038	0.472	0.003	HIGH
62392	-35.160	0.066	0.609	0.004	HIGH
62393	-41.045	0.077	1.046	0.007	HIGH
62394	-51.894	0.098	8.692	0.056	8.59
62396	9.675	0.018	4.621	0.030	HIGH
62397	-16.782	0.032	3.887	0.025	HIGH
62398	-38.599	0.073	0.819	0.005	HIGH
62399	-50.411	0.095	1.709	0.011	9.47
62400	-53.508	0.101	6.224	0.040	8.57
62401	-38.880	0.073	13.966	0.089	HIGH
62402	-37.412	0.071	11.422	0.073	HIGH
62403	-49.848	0.094	3.087	0.020	9.52
62404	-56.078	0.106	2.497	0.016	8.39
62405	-56.183	0.106	5.317	0.034	8.20
62406	-76.021	0.143	30.977	0.198	3.95
62407	-61.504	0.116	14.065	0.090	6.65
62408	-69.669	0.131	6.254	0.040	6.41
62409	-42.414	0.080	2.129	0.014	HIGH
62410	-73.891	0.139	38.197	0.244	3.46
62411	-27.696	0.052	16.844	0.108	HIGH
62412	-87.327	0.165	3.643	0.023	5.02
62413	-37.556	0.071	38.918	0.249	5.32
62414	-54.852	0.103	6.463	0.041	8.32
62415	-21.999	0.042	7.373	0.047	HIGH
63301	273.223	0.516	1.532	0.010	0.94
63302	45.500	0.086	10.151	0.065	9.62
63303	-43.027	0.081	11.720	0.075	9.88
63304	160.425	0.303	4.906	0.031	2.28
63305	63.782	0.120	4.133	0.026	7.19
63306	-34.902	0.066	10.039	0.064	HIGH
63307	72.073	0.136	3.440	0.022	6.29
63308	-23.881	0.045	6.949	0.044	HIGH
63313	178.360	0.337	7.979	0.051	1.92
63314	213.246	0.402	2.525	0.016	1.48
63319	74.218	0.140	5.848	0.037	5.98
63320	49.522	0.093	4.113	0.026	9.51
63321	162.047	0.306	12.552	0.080	2.15
63322	195.507	0.369	3.222	0.021	1.70

5.5.105

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: LANDING ABORT LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
63386	64.523	0.122	12.270	0.078	6.50
63390	41.313	0.078	14.915	0.095	9.61
63391	14.056	0.027	2.178	0.014	HIGH
63392	15.838	0.030	0.969	0.006	HIGH
63393	14.585	0.028	1.113	0.007	HIGH
63394	18.873	0.036	10.190	0.065	HIGH
63396	-106.793	0.201	0.999	0.006	3.96
63397	-83.048	0.157	0.537	0.003	5.38
63398	-67.210	0.127	0.453	0.003	6.88
63399	-54.565	0.103	1.983	0.013	8.67
63400	-44.513	0.084	3.190	0.020	HIGH
63401	-40.419	0.076	3.585	0.023	HIGH
63402	-49.331	0.093	3.016	0.019	9.63
63403	-105.633	0.199	13.782	0.088	3.68
63406	-58.057	0.110	2.586	0.017	8.07
63407	-47.046	0.089	2.607	0.017	HIGH
63408	-35.599	0.067	1.976	0.013	HIGH
63409	-25.253	0.048	5.375	0.034	HIGH
63410	-18.306	0.035	7.288	0.047	HIGH
63411	-5.638	0.011	7.391	0.047	HIGH
63412	58.219	0.110	7.422	0.047	7.72
63413	109.889	0.207	30.580	0.195	2.78
63415	-30.324	0.057	5.550	0.035	HIGH
63416	-25.603	0.048	5.413	0.035	HIGH
63417	-18.637	0.035	6.390	0.041	HIGH
63418	-8.079	0.015	8.631	0.055	HIGH
63419	2.183	0.004	9.273	0.059	HIGH
63420	-29.888	0.056	13.055	0.083	HIGH
63421	-46.636	0.088	2.997	0.019	HIGH
63424	-21.623	0.041	9.410	0.060	HIGH
63425	-22.083	0.042	7.543	0.048	HIGH
63426	-27.389	0.052	12.935	0.083	HIGH
63432	-20.582	0.039	17.895	0.114	HIGH
63433	-39.499	0.075	22.629	0.145	8.23
63440	3.609	0.007	34.092	0.218	HIGH
63450	57.962	0.109	47.355	0.302	3.30
63455	-97.347	0.184	28.576	0.182	3.26
63456	-19.508	0.037	17.159	0.110	HIGH
63457	16.562	0.031	27.934	0.178	HIGH
63463	-129.791	0.245	13.635	0.087	2.86
63464	-85.013	0.160	11.569	0.074	4.85
63465	-81.309	0.153	12.526	0.080	5.04
63467	-51.028	0.096	19.041	0.122	7.24
63470	-134.703	0.254	13.843	0.088	2.72
63471	-111.563	0.210	13.382	0.085	3.46

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: LANDING ABORT LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
63539	71.206	0.134	25.742	0.164	4.66
63540	76.833	0.145	19.208	0.123	4.87
63550	91.630	0.173	40.426	0.258	2.75
63553	52.377	0.099	19.579	0.125	6.99
63554	-10.760	0.020	31.586	0.202	HIGH
63559	94.974	0.179	61.665	0.394	1.67
63561	-46.772	0.088	14.923	0.095	8.56
63562	16.500	0.031	12.641	0.081	HIGH
63563	-13.614	0.026	14.959	0.096	HIGH
63568	38.641	0.073	12.851	0.082	HIGH
63569	0.718	0.001	9.983	0.064	HIGH
63570	13.287	0.025	14.442	0.092	HIGH
63571	23.461	0.044	15.070	0.096	HIGH
63574	-24.029	0.045	18.171	0.116	HIGH
63575	28.990	0.055	19.401	0.124	HIGH
63576	5.633	0.011	5.184	0.033	HIGH
63577	12.489	0.024	11.178	0.071	HIGH
63578	22.939	0.043	11.202	0.072	HIGH
63579	17.511	0.033	10.693	0.068	HIGH
63580	-7.407	0.014	16.002	0.102	HIGH
63581	22.328	0.042	17.539	0.112	HIGH
63582	9.103	0.017	6.699	0.043	HIGH
63583	19.368	0.037	9.406	0.060	HIGH
63584	26.244	0.050	9.719	0.062	HIGH
63585	25.899	0.049	9.597	0.061	HIGH
63586	24.359	0.046	12.069	0.077	HIGH
63587	16.812	0.032	6.018	0.038	HIGH
63588	28.183	0.053	6.061	0.039	HIGH
63589	32.952	0.062	5.798	0.037	HIGH
63590	31.121	0.059	6.686	0.043	HIGH
63591	27.077	0.051	4.043	0.026	HIGH
63592	37.042	0.070	4.074	0.026	HIGH
63593	41.552	0.078	3.905	0.025	HIGH
63594	37.819	0.071	3.055	0.020	HIGH
63595	69.816	0.132	4.340	0.028	6.48

5.5.109

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: REGULAR LANDING LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
12201	-79.466	0.150	5.348	0.034	5.55
12202	9.569	0.018	30.210	0.193	HIGH
12204	-158.730	0.299	25.226	0.161	1.94
12205	-41.753	0.079	0.508	0.003	HIGH
12206	-67.909	0.128	2.692	0.017	6.76
12207	-104.757	0.198	2.063	0.013	4.05
12208	-27.089	0.051	1.711	0.011	HIGH
12215	-63.797	0.120	27.364	0.175	4.97
12216	-55.411	0.105	101.813	0.650	0.74
12222	-88.081	0.166	1.211	0.008	5.01
12223	-117.706	0.222	1.762	0.011	3.49
12224	-34.517	0.065	18.634	0.119	HIGH
12225	-31.717	0.060	62.881	0.402	2.81
12226	24.468	0.046	31.687	0.202	8.33
12227	-360.519	0.680	53.098	0.339	0.20
12228	-218.272	0.412	49.749	0.318	0.83
12229	-146.891	0.277	58.162	0.371	1.20
12230	-86.155	0.163	9.510	0.061	4.88
12231	-86.495	0.163	5.070	0.032	5.04
12232	-138.840	0.262	2.555	0.016	2.81
12233	-148.578	0.280	11.081	0.071	2.45
12234	-25.379	0.048	8.398	0.054	HIGH
12235	-13.397	0.025	28.884	0.184	HIGH
12236	68.844	0.130	21.952	0.140	5.17
12237	94.714	0.179	28.005	0.179	3.39
12238	-189.908	0.358	62.253	0.398	0.79
12239	10.186	0.019	46.357	0.296	6.25
12240	-139.697	0.264	97.254	0.621	0.43
12241	-128.240	0.242	103.874	0.663	0.37
12242	-136.139	0.257	58.403	0.373	1.30
12243	-147.247	0.278	11.771	0.075	2.46
12244	-153.864	0.290	9.849	0.063	2.35
12245	-34.156	0.064	0.827	0.005	HIGH
12246	-29.002	0.055	5.664	0.036	HIGH
12247	79.708	0.150	48.958	0.313	2.56
12248	97.451	0.184	43.030	0.275	2.47
12249	-118.182	0.223	43.467	0.278	2.04
12250	-26.023	0.049	12.904	0.082	HIGH
12251	-204.867	0.387	448.069	2.861	-0.85
12252	-25.585	0.048	1.120	0.007	HIGH
12253	-217.664	0.411	377.742	2.412	-0.80
12254	-159.866	0.302	34.674	0.221	1.68
12255	-142.270	0.268	25.822	0.165	2.21
12256	-141.518	0.267	14.411	0.092	2.54
12257	-39.800	0.075	1.870	0.012	HIGH

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: REGULAR LANDING LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
12317	-45.146	0.085	273.903	1.749	-0.64
12318	-116.897	0.221	126.846	0.810	0.10
12319	-128.024	0.242	115.798	0.739	0.20
12320	-117.105	0.221	5.394	0.034	3.47
12323	61.107	0.115	206.007	1.315	-0.42
12324	0.797	0.002	1.561	0.010	HIGH
12325	-101.851	0.192	359.926	2.298	-0.78
12326	-93.171	0.176	138.798	0.886	0.01
12327	-34.965	0.066	1.016	0.006	HIGH
12329	13.780	0.026	152.160	0.972	0.02
12330	18.655	0.035	135.661	0.866	0.23
12331	-38.300	0.072	87.499	0.559	1.31
12332	-26.705	0.050	50.161	0.320	4.35
12333	7.437	0.014	6.073	0.039	HIGH
12334	30.768	0.058	99.130	0.633	0.97
12335	19.944	0.038	52.265	0.334	4.43
12336	2.707	0.005	23.431	0.150	HIGH
12337	10.612	0.020	20.217	0.129	HIGH
12338	29.903	0.056	31.174	0.199	7.64
12339	22.801	0.043	19.875	0.127	HIGH
12340	22.249	0.042	8.551	0.055	HIGH
12341	15.108	0.029	5.369	0.034	HIGH
12342	24.716	0.047	5.890	0.038	HIGH
12343	2.295	0.004	2.370	0.015	HIGH
12346	5.210	0.010	1.676	0.011	HIGH
12347	18.895	0.036	2.138	0.014	HIGH
12348	20.340	0.038	23.029	0.147	HIGH
12349	24.858	0.047	18.021	0.115	HIGH
12350	21.913	0.041	7.502	0.048	HIGH
12351	32.569	0.061	7.570	0.048	HIGH
12353	-22.882	0.043	1.702	0.011	HIGH
12354	32.829	0.062	0.747	0.005	HIGH
12355	7.398	0.014	106.076	0.677	0.92
12356	18.460	0.035	54.640	0.349	4.18
12357	1.298	0.002	22.592	0.144	HIGH
12358	-0.533	0.001	23.281	0.149	HIGH
12361	65.024	0.123	1.356	0.009	7.13
12362	39.285	0.074	154.404	0.986	-0.05
12363	46.536	0.088	128.818	0.823	0.25
12364	-10.552	0.020	80.218	0.512	2.03
12365	-15.635	0.029	56.471	0.361	4.07
12368	193.292	0.365	4.301	0.027	1.73
12369	101.248	0.191	94.555	0.604	0.65
12370	90.122	0.170	145.009	0.926	-0.04
12371	-43.493	0.082	200.375	1.280	-0.38

S.S. 1/2

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: REGULAR LANDING LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
12456	-287.035	0.542	55.787	0.356	0.42
12463	-27.399	0.052	95.649	0.611	1.11
12464	-36.982	0.070	41.093	0.262	5.02
12465	136.021	0.257	139.854	0.893	-0.07
13301	323.218	0.610	4.898	0.031	0.63
13302	-224.232	0.423	2.323	0.015	1.36
13303	-246.605	0.465	1.383	0.009	1.15
13304	467.699	0.882	1.849	0.012	0.13
13305	13.121	0.025	1.237	0.008	HIGH
13306	73.462	0.139	1.206	0.008	6.20
13307	25.016	0.047	1.156	0.007	HIGH
13308	19.294	0.036	1.847	0.012	HIGH
13313	299.211	0.565	10.626	0.068	0.74
13314	387.613	0.731	1.259	0.008	0.37
13319	51.072	0.096	0.361	0.002	9.37
13320	71.781	0.135	0.782	0.005	6.38
13321	375.217	0.708	12.233	0.078	0.39
13322	379.597	0.716	4.170	0.027	0.39
13323	257.820	0.486	1.595	0.010	1.05
13324	184.519	0.348	1.614	0.010	1.87
13325	110.939	0.209	1.413	0.009	3.77
13326	43.761	0.083	1.188	0.008	HIGH
13327	33.594	0.063	0.939	0.006	HIGH
13328	43.544	0.082	0.542	0.003	HIGH
13329	81.611	0.154	0.633	0.004	5.49
13330	101.603	0.192	1.822	0.012	4.21
13331	322.792	0.609	9.609	0.061	0.62
13332	285.426	0.539	5.839	0.037	0.85
13333	237.719	0.449	1.336	0.009	1.23
13334	145.058	0.274	1.313	0.008	2.65
13335	94.493	0.178	1.094	0.007	4.60
13336	55.743	0.105	0.936	0.006	8.50
13337	39.149	0.074	0.710	0.005	HIGH
13338	47.979	0.091	0.434	0.003	HIGH
13339	70.956	0.134	0.505	0.003	6.47
13340	101.801	0.192	0.555	0.004	4.20
13341	109.868	0.207	1.810	0.012	3.81
13342	261.573	0.494	4.785	0.031	1.02
13343	219.252	0.414	5.536	0.035	1.40
13344	200.638	0.379	1.927	0.012	1.64
13345	147.001	0.277	1.134	0.007	2.60
13346	90.872	0.171	1.088	0.007	4.83
13347	58.825	0.111	0.443	0.003	8.01
13348	44.397	0.084	0.277	0.002	HIGH
13349	43.676	0.082	0.308	0.002	HIGH

5.5.14

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: EQUILAR LANDING LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
13398	193.783	0.366	4.368	0.028	1.72
13399	153.966	0.291	0.458	0.003	2.44
13400	134.540	0.254	1.647	0.011	2.93
13401	107.354	0.203	2.333	0.015	3.92
13402	39.071	0.074	1.225	0.008	HIGH
13403	-153.073	0.289	4.654	0.030	2.44
13406	184.478	0.348	8.125	0.052	1.83
13407	215.750	0.407	2.261	0.014	1.45
13408	213.205	0.402	0.440	0.003	1.49
13409	216.844	0.409	1.268	0.008	1.44
13410	235.640	0.445	1.265	0.008	1.25
13411	283.382	0.535	1.113	0.007	0.87
13412	360.101	0.679	4.318	0.028	0.47
13413	234.735	0.443	6.663	0.043	1.24
13415	203.191	0.383	1.643	0.010	1.61
13416	234.215	0.442	0.202	0.001	1.26
13417	248.924	0.470	0.419	0.003	1.13
13418	277.719	0.524	0.490	0.003	0.91
13419	331.416	0.625	0.497	0.003	0.60
13420	423.921	0.800	1.462	0.009	0.25
13421	464.354	0.876	3.614	0.023	0.14
13424	213.571	0.403	1.578	0.010	1.48
13425	249.880	0.471	0.390	0.002	1.12
13426	273.365	0.516	0.281	0.002	0.94
13427	312.420	0.589	0.579	0.004	0.70
13428	368.601	0.695	0.953	0.006	0.44
13429	419.230	0.791	1.045	0.007	0.26
13430	467.307	0.882	7.458	0.048	0.13
13432	215.565	0.407	0.958	0.006	1.46
13433	250.617	0.473	0.900	0.006	1.11
13434	273.692	0.516	1.150	0.007	0.94
13435	306.207	0.578	1.271	0.008	0.73
13436	338.414	0.639	1.369	0.009	0.57
13437	377.325	0.712	3.663	0.023	0.40
13438	390.694	0.737	6.921	0.044	0.35
13440	200.294	0.378	1.134	0.007	1.64
13441	229.904	0.434	1.571	0.010	1.30
13442	246.240	0.465	1.684	0.011	1.15
13443	262.604	0.495	1.712	0.011	1.02
13444	277.289	0.523	1.179	0.008	0.91
13445	294.102	0.555	1.966	0.013	0.80
13446	305.750	0.577	4.136	0.026	0.73
13450	168.488	0.318	1.641	0.010	2.14
13451	191.424	0.361	2.054	0.013	1.76
13452	200.130	0.378	2.041	0.013	1.64

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: REGULAR LANDING LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
13509	62.363	0.118	0.680	0.004	7.49
13510	21.380	0.040	0.689	0.004	HIGH
13511	-9.150	0.017	0.859	0.005	HIGH
13512	-31.693	0.060	0.981	0.006	HIGH
13513	-50.623	0.096	1.050	0.007	9.45
13514	-63.585	0.120	1.251	0.008	7.32
13515	-85.589	0.161	1.558	0.010	5.18
13518	59.356	0.112	3.492	0.022	7.83
13519	37.433	0.071	0.932	0.006	HIGH
13520	14.741	0.028	1.323	0.008	HIGH
13521	-7.214	0.014	1.507	0.010	HIGH
13522	-26.832	0.051	1.622	0.010	HIGH
13523	-43.764	0.083	1.638	0.010	HIGH
13524	-57.780	0.109	1.681	0.011	8.14
13526	14.790	0.028	3.086	0.020	HIGH
13527	24.886	0.047	1.072	0.007	HIGH
13528	16.232	0.031	1.596	0.010	HIGH
13529	3.119	0.006	1.930	0.012	HIGH
13530	-13.085	0.025	2.134	0.014	HIGH
13531	-25.899	0.049	2.257	0.014	HIGH
13532	-29.381	0.055	2.406	0.015	HIGH
13534	-42.052	0.079	5.977	0.038	HIGH
13535	-26.425	0.050	2.997	0.019	HIGH
13536	-9.769	0.018	1.581	0.010	HIGH
13537	-8.933	0.017	2.198	0.014	HIGH
13538	-19.952	0.038	2.418	0.015	HIGH
13539	-23.475	0.044	2.778	0.018	HIGH
13540	-17.910	0.034	3.093	0.020	HIGH
13544	-120.774	0.228	4.442	0.028	3.35
13545	-103.053	0.194	0.946	0.006	4.14
13546	-64.186	0.121	1.165	0.007	7.24
13547	-49.606	0.094	2.129	0.014	9.62
13548	-46.668	0.088	2.546	0.016	HIGH
13549	-42.068	0.079	2.904	0.019	HIGH
13550	-27.354	0.052	4.041	0.026	HIGH
13553	-223.536	0.422	0.612	0.004	1.37
13554	-191.889	0.362	0.744	0.005	1.76
13555	-141.274	0.267	0.656	0.004	2.75
13556	-109.210	0.206	1.928	0.012	3.84
13557	-92.897	0.175	2.601	0.017	4.68
13558	-84.292	0.159	2.857	0.018	5.25
13559	-63.770	0.120	3.517	0.022	7.22
13561	-412.126	0.778	2.230	0.014	0.29
13562	-333.265	0.629	1.675	0.011	0.59
13563	-240.810	0.454	0.860	0.005	1.20

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: REGULAR LANDING LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
22227	30.130	0.057	3.019	0.019	HIGH
22228	29.908	0.056	6.911	0.044	HIGH
22229	30.347	0.057	13.928	0.089	HIGH
22230	51.813	0.098	16.708	0.107	7.50
22231	93.778	0.177	69.228	0.442	1.40
22232	174.053	0.328	97.758	0.624	0.30
22233	138.682	0.262	168.458	1.076	-0.28
22234	-44.187	0.083	3.556	0.023	HIGH
22235	-0.574	0.001	1.373	0.009	HIGH
22236	18.344	0.035	1.073	0.007	HIGH
22237	24.760	0.047	3.178	0.020	HIGH
22238	25.813	0.049	8.704	0.056	HIGH
22239	30.045	0.057	16.659	0.106	HIGH
22240	46.843	0.088	18.391	0.117	7.93
22241	73.431	0.139	26.969	0.172	4.42
22242	109.984	0.208	273.116	1.744	-0.65
22243	20.099	0.038	2.439	0.016	HIGH
22244	119.970	0.226	458.524	2.928	-0.85
22245	-40.722	0.077	2.167	0.014	HIGH
22246	-63.980	0.121	1.069	0.007	7.27
22247	23.870	0.045	1.267	0.008	HIGH
22248	19.670	0.037	1.449	0.009	HIGH
22249	16.453	0.031	4.903	0.031	HIGH
22250	18.873	0.036	12.337	0.079	HIGH
22251	36.617	0.069	16.171	0.103	HIGH
22252	55.253	0.104	18.449	0.118	6.82
22253	80.994	0.153	62.374	0.398	1.84
22254	90.402	0.171	168.238	1.074	-0.23
22255	-29.635	0.056	282.828	1.806	-0.65
22256	29.733	0.056	49.196	0.314	4.32
22257	-60.388	0.114	3.929	0.025	7.66
22258	-21.504	0.041	1.279	0.008	HIGH
22259	-46.627	0.088	1.663	0.011	HIGH
22260	9.426	0.018	1.650	0.011	HIGH
22261	-0.453	0.001	2.071	0.013	HIGH
22262	-6.202	0.012	2.384	0.015	HIGH
22263	27.570	0.052	7.501	0.048	HIGH
22264	31.161	0.059	7.605	0.049	HIGH
22265	38.071	0.072	7.837	0.050	HIGH
22266	31.981	0.060	52.065	0.332	3.86
22267	17.958	0.034	86.210	0.551	1.59
22268	30.321	0.057	70.855	0.452	2.26
22269	47.724	0.090	17.073	0.109	8.03
22270	113.741	0.215	2.981	0.019	3.64
22271	84.898	0.160	1.412	0.009	5.23

S.S.120

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: [redacted]LAR LANDING LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
22334	163.183	0.308	116.442	0.744	0.11
22335	180.407	0.340	290.120	1.853	-0.70
22336	29.655	0.056	0.273	0.002	HIGH
22337	194.857	0.368	366.767	2.342	-0.79
22338	114.480	0.216	87.209	0.557	0.74
22339	103.056	0.194	205.071	1.310	-0.44
22340	163.790	0.309	32.873	0.210	1.67
22341	91.786	0.173	35.224	0.225	3.05
22342	82.216	0.155	44.544	0.284	2.76
22343	61.187	0.115	26.328	0.168	5.27
22346	-52.113	0.098	48.477	0.310	3.41
22347	-56.884	0.107	171.590	1.096	-0.22
22348	-20.594	0.039	63.322	0.404	3.10
22349	-24.098	0.045	127.569	0.815	0.34
22350	-68.557	0.129	77.665	0.496	1.37
22351	-79.089	0.149	20.403	0.130	4.63
22353	34.997	0.066	105.544	0.674	0.76
22354	-17.069	0.032	34.359	0.219	8.75
22355	-99.768	0.188	141.977	0.907	-0.03
22356	-16.333	0.031	0.276	0.002	HIGH
22357	-82.112	0.155	144.110	0.920	-0.02
22358	-95.041	0.179	73.002	0.466	1.26
22361	-29.337	0.055	62.706	0.400	2.89
22362	-71.429	0.135	49.993	0.319	2.70
22363	-107.627	0.203	72.602	0.464	1.16
22364	-116.658	0.220	60.083	0.384	1.46
22365	-102.550	0.193	101.926	0.651	0.50
22368	-78.598	0.148	31.982	0.204	3.75
22369	-93.932	0.177	20.180	0.129	3.88
22370	-120.040	0.226	51.313	0.328	1.71
22371	-145.468	0.274	52.816	0.337	1.36
22372	-138.827	0.262	103.054	0.658	0.35
22375	-121.211	0.229	13.025	0.083	3.14
22376	-121.318	0.229	12.369	0.079	3.16
22377	-137.697	0.260	25.657	0.164	2.31
22378	-156.011	0.294	27.849	0.178	1.91
22379	-162.476	0.307	57.889	0.370	1.08
22383	-140.165	0.264	4.045	0.026	2.76
22384	-143.924	0.272	4.256	0.027	2.66
22385	-147.886	0.279	10.630	0.068	2.47
22386	-165.329	0.312	11.384	0.073	2.10
22387	-168.132	0.317	23.980	0.153	1.82
22390	-149.079	0.281	1.030	0.007	2.55
22391	-155.628	0.294	0.660	0.004	2.40
22392	-156.481	0.295	4.018	0.026	2.37

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: REGULAR LANDING LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
23334	-63.881	0.121	6.610	0.042	7.03
23338	-117.662	0.222	4.706	0.030	3.46
23339	-78.864	0.149	1.557	0.010	5.71
23340	-125.975	0.238	1.076	0.007	3.20
23341	-120.116	0.227	0.783	0.005	3.41
23342	-67.011	0.126	1.346	0.009	6.89
23343	-34.206	0.065	1.440	0.009	HIGH
23344	-47.376	0.089	1.211	0.008	HIGH
23345	-104.727	0.198	3.912	0.025	4.02
23350	-65.881	0.124	5.621	0.036	6.86
23351	-97.145	0.183	2.538	0.016	4.43
23352	-116.299	0.219	0.401	0.003	3.56
23353	-102.890	0.194	0.562	0.004	4.15
23354	-65.589	0.124	0.997	0.006	7.07
23355	-30.312	0.057	1.378	0.009	HIGH
23356	-30.444	0.057	1.498	0.010	HIGH
23357	-24.394	0.046	2.355	0.015	HIGH
23363	-62.503	0.118	6.076	0.039	7.24
23364	-78.278	0.148	0.829	0.005	5.77
23365	-97.843	0.185	0.582	0.004	4.42
23366	-85.214	0.161	0.981	0.006	5.21
23367	-59.232	0.112	3.727	0.024	7.83
23368	-33.879	0.064	0.479	0.003	HIGH
23369	-22.973	0.043	1.861	0.012	HIGH
23370	-10.759	0.020	2.125	0.014	HIGH
23371	46.650	0.088	2.986	0.019	HIGH
23376	-52.699	0.099	7.700	0.049	8.56
23377	-42.147	0.080	1.046	0.007	HIGH
23378	-60.160	0.114	0.669	0.004	7.80
23379	-81.912	0.155	0.653	0.004	5.47
23380	-70.992	0.134	1.481	0.009	6.45
23382	30.789	0.058	0.949	0.006	HIGH
23383	11.005	0.021	0.536	0.003	HIGH
23384	14.534	0.027	2.147	0.014	HIGH
23385	31.926	0.060	2.668	0.017	HIGH
23386	-2.011	0.004	2.056	0.013	HIGH
23390	2.577	0.005	5.756	0.037	HIGH
23391	-20.381	0.038	0.709	0.005	HIGH
23392	-29.339	0.055	0.516	0.003	HIGH
23393	-46.250	0.087	0.269	0.002	HIGH
23394	-68.698	0.130	0.383	0.002	6.71
23395	-61.721	0.116	1.501	0.010	7.57
23397	-174.934	0.330	3.187	0.020	2.02
23398	-157.423	0.297	1.215	0.008	2.36
23399	-139.144	0.263	0.535	0.003	2.81

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: REGULAR LANDING LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
23482	-77.657	0.147	2.127	0.014	5.80
23483	-57.855	0.109	2.075	0.013	8.12
23484	-71.421	0.135	1.157	0.007	6.41
23485	-92.123	0.174	5.201	0.033	4.67
23486	-86.148	0.163	1.613	0.010	5.14
23487	-64.151	0.121	1.851	0.012	7.23
23488	-74.868	0.141	1.893	0.012	6.06
23489	-83.521	0.158	2.993	0.019	5.31
23490	-72.768	0.137	1.697	0.011	6.26
23491	-80.100	0.151	2.526	0.016	5.58
23492	-69.073	0.130	0.921	0.006	6.67
23493	-83.671	0.158	3.886	0.025	5.27
23494	-73.879	0.139	4.251	0.027	6.08
23499	-48.420	0.091	2.148	0.014	9.88
23500	-24.358	0.046	0.981	0.006	HIGH
23501	14.735	0.028	0.881	0.006	HIGH
23502	38.193	0.072	0.619	0.004	HIGH
23503	55.166	0.104	0.271	0.002	8.61
23504	73.531	0.139	0.505	0.003	6.21
23505	94.398	0.178	0.691	0.004	4.61
23506	109.684	0.207	1.582	0.010	3.82
23509	-102.742	0.194	2.662	0.017	4.14
23510	-21.643	0.041	1.616	0.010	HIGH
23511	25.513	0.048	1.613	0.010	HIGH
23512	44.859	0.085	1.331	0.009	HIGH
23513	64.626	0.122	1.140	0.007	7.19
23514	86.579	0.163	1.556	0.010	5.11
23515	97.951	0.185	1.642	0.010	4.40
23518	-41.307	0.078	0.453	0.003	HIGH
23519	-3.420	0.006	2.228	0.014	HIGH
23520	14.177	0.027	1.960	0.013	HIGH
23521	45.580	0.086	1.940	0.012	HIGH
23522	61.600	0.116	1.907	0.012	7.57
23523	79.841	0.151	3.114	0.020	5.59
23524	85.466	0.161	3.245	0.021	5.16
23530	99.197	0.187	3.417	0.022	4.31
23531	89.049	0.168	4.394	0.028	4.88
23532	86.574	0.163	5.520	0.035	5.02
23539	90.645	0.171	8.289	0.053	4.65
23540	87.719	0.166	10.147	0.065	4.75
23550	82.756	0.156	20.692	0.132	4.40
23553	96.056	0.181	4.305	0.027	4.46
23554	81.731	0.154	8.240	0.053	5.25
23559	49.924	0.094	22.658	0.145	6.80
23561	161.040	0.304	2.450	0.016	2.28

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: REGULAR LANDING LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
32232	-24.074	0.045	0.753	0.005	HIGH
32233	-29.677	0.056	4.871	0.031	HIGH
32234	-18.718	0.035	19.544	0.125	HIGH
32235	144.043	0.272	89.344	0.571	0.55
32236	-21.364	0.040	54.074	0.345	4.11
32237	1.060	0.002	36.665	0.234	HIGH
32238	-91.852	0.173	30.149	0.193	3.36
32239	-62.138	0.117	6.725	0.043	7.24
32240	-38.160	0.072	8.307	0.053	HIGH
32241	-30.898	0.058	2.768	0.018	HIGH
32242	-29.454	0.056	0.302	0.002	HIGH
32243	-28.534	0.054	1.298	0.008	HIGH
32244	-32.599	0.062	9.371	0.060	HIGH
32245	110.143	0.208	10.990	0.070	3.60
32246	120.166	0.227	45.386	0.290	1.93
32247	-41.384	0.078	86.126	0.550	1.33
32248	-21.872	0.041	75.338	0.481	2.13
32249	-38.763	0.073	8.673	0.055	HIGH
32250	-47.181	0.089	7.365	0.047	9.66
32251	-38.835	0.073	4.473	0.029	HIGH
32252	-33.090	0.062	3.979	0.025	HIGH
32253	-32.518	0.061	0.828	0.005	HIGH
32254	-31.132	0.059	1.083	0.007	HIGH
32255	-25.410	0.048	1.477	0.009	HIGH
32256	-32.731	0.062	1.070	0.007	HIGH
32257	101.171	0.191	14.463	0.092	3.85
32258	101.914	0.192	17.267	0.110	3.69
32259	121.486	0.229	47.115	0.301	1.85
32260	3.045	0.006	28.446	0.182	HIGH
32261	-3.724	0.007	24.181	0.154	HIGH
32262	-15.026	0.028	2.544	0.016	HIGH
32263	-20.198	0.038	1.606	0.010	HIGH
32264	-19.924	0.038	1.908	0.012	HIGH
32265	-24.848	0.047	0.788	0.005	HIGH
32266	-24.615	0.046	0.488	0.003	HIGH
32267	-21.926	0.041	0.664	0.004	HIGH
32268	-26.230	0.049	0.570	0.004	HIGH
32269	-42.352	0.080	1.720	0.011	HIGH
32270	-1.488	0.003	20.426	0.130	HIGH
32271	-3.531	0.007	6.846	0.044	HIGH
32272	-21.611	0.041	18.171	0.116	HIGH
32273	-20.883	0.039	10.033	0.064	HIGH
32274	-14.350	0.027	16.290	0.104	HIGH
32275	180.654	0.341	48.133	0.307	1.14
32278	63.767	0.120	53.145	0.339	2.69

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: REGULAR LANDING LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
32339	-18.777	0.035	0.612	0.004	HIGH
32340	-17.906	0.034	4.385	0.028	HIGH
32341	-39.806	0.075	0.856	0.005	HIGH
32342	-27.712	0.052	0.303	0.002	HIGH
32343	-39.164	0.074	3.096	0.020	HIGH
32346	10.446	0.020	3.293	0.021	HIGH
32347	17.199	0.032	2.680	0.017	HIGH
32348	20.430	0.039	5.849	0.037	HIGH
32349	17.471	0.033	1.264	0.008	HIGH
32350	32.449	0.061	2.613	0.017	HIGH
32351	44.092	0.083	2.337	0.015	HIGH
32353	2.414	0.005	0.425	0.003	HIGH
32354	14.781	0.028	0.295	0.002	HIGH
32355	26.161	0.049	1.976	0.013	HIGH
32356	25.338	0.048	1.452	0.009	HIGH
32357	21.536	0.041	1.298	0.008	HIGH
32358	26.367	0.050	1.705	0.011	HIGH
32361	24.915	0.047	0.323	0.002	HIGH
32362	29.641	0.056	2.326	0.015	HIGH
32363	28.287	0.053	1.109	0.007	HIGH
32364	27.047	0.051	1.260	0.008	HIGH
32365	24.848	0.047	1.608	0.010	HIGH
32368	51.955	0.098	0.248	0.002	9.20
32369	36.702	0.069	5.520	0.035	HIGH
32370	29.599	0.056	0.472	0.003	HIGH
32371	29.221	0.055	1.347	0.009	HIGH
32372	29.706	0.056	4.249	0.027	HIGH
32375	94.435	0.178	14.227	0.091	4.18
32376	52.645	0.099	6.293	0.040	8.71
32377	29.004	0.055	1.263	0.008	HIGH
32378	23.579	0.044	1.756	0.011	HIGH
32379	29.258	0.055	7.859	0.050	HIGH
32383	92.482	0.174	41.444	0.265	2.67
32384	43.862	0.083	20.294	0.130	8.03
32385	16.705	0.032	6.027	0.038	HIGH
32386	8.836	0.017	5.057	0.032	HIGH
32387	8.951	0.017	5.049	0.032	HIGH
32390	32.414	0.061	30.889	0.197	7.37
32391	-40.047	0.076	34.050	0.217	5.91
32392	-23.855	0.045	32.036	0.205	8.33
32393	-10.191	0.019	8.496	0.054	HIGH
32394	-4.323	0.008	8.118	0.052	HIGH
32396	254.022	0.479	43.989	0.281	0.70
32397	-134.188	0.253	36.903	0.236	2.00
32398	-159.115	0.300	63.854	0.408	0.97

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: REGULAR LANDING LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
33328	-140.640	0.265	4.478	0.029	2.74
33329	-168.251	0.317	2.213	0.014	2.14
33330	-147.415	0.278	6.965	0.044	2.54
33331	-6.001	0.011	0.715	0.005	HIGH
33332	-22.721	0.043	1.386	0.009	HIGH
33333	24.297	0.046	1.805	0.012	HIGH
33334	-95.433	0.180	2.328	0.015	4.53
33338	-103.232	0.195	17.344	0.111	3.63
33339	-172.511	0.325	5.338	0.034	2.05
33340	-123.100	0.232	3.062	0.020	3.29
33341	-129.557	0.244	6.424	0.041	3.03
33342	-10.647	0.020	1.496	0.010	HIGH
33343	-44.482	0.084	1.597	0.010	HIGH
33344	-32.622	0.062	1.729	0.011	HIGH
33345	-17.139	0.032	3.145	0.020	HIGH
33350	-156.866	0.296	16.878	0.108	2.16
33351	-100.383	0.189	5.916	0.038	4.19
33352	-78.823	0.149	3.811	0.024	5.66
33353	-96.205	0.182	4.027	0.026	4.46
33354	-14.845	0.028	2.668	0.017	HIGH
33355	-49.156	0.093	1.940	0.012	9.73
33356	-39.662	0.075	2.492	0.016	HIGH
33357	-49.620	0.094	2.573	0.016	9.60
33363	-59.303	0.112	11.520	0.074	7.18
33364	-68.948	0.130	2.088	0.013	6.66
33365	-48.131	0.091	2.588	0.017	9.92
33366	-41.801	0.079	2.688	0.017	HIGH
33367	-25.995	0.049	3.249	0.021	HIGH
33368	-53.594	0.101	1.349	0.009	8.87
33369	-41.947	0.079	2.403	0.015	HIGH
33370	-36.253	0.068	2.947	0.019	HIGH
33371	-84.778	0.160	5.431	0.035	5.14
33376	21.834	0.041	7.941	0.051	HIGH
33377	-57.321	0.108	2.918	0.019	8.17
33378	-52.212	0.099	2.295	0.015	9.09
33379	-28.031	0.053	2.408	0.015	HIGH
33380	12.552	0.024	8.938	0.057	HIGH
33381	-52.896	0.100	3.396	0.022	8.90
33382	-62.505	0.118	0.836	0.005	7.47
33383	-52.507	0.099	0.664	0.004	9.09
33384	-45.100	0.085	1.306	0.008	HIGH
33385	-41.038	0.077	2.715	0.017	HIGH
33386	-33.163	0.063	7.532	0.048	HIGH
33390	-32.255	0.061	4.587	0.029	HIGH
33391	-14.733	0.028	0.936	0.006	HIGH

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: REGULAR LANDING LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
33475	169.053	0.319	2.740	0.017	2.13
33476	247.950	0.468	5.239	0.033	1.13
33477	257.753	0.486	5.264	0.034	1.05
33478	236.461	0.446	2.923	0.019	1.24
33479	207.794	0.392	9.730	0.062	1.50
33480	191.779	0.362	7.987	0.051	1.72
33481	242.498	0.458	3.558	0.023	1.18
33482	237.603	0.448	3.785	0.024	1.22
33483	217.074	0.410	3.645	0.023	1.43
33484	202.048	0.381	9.415	0.060	1.57
33485	225.031	0.425	5.546	0.035	1.34
33486	233.993	0.441	4.438	0.028	1.26
33487	210.127	0.396	4.545	0.029	1.51
33488	178.668	0.337	6.663	0.043	1.93
33489	205.952	0.389	7.600	0.049	1.54
33490	211.533	0.399	7.170	0.046	1.48
33491	153.909	0.290	6.444	0.041	2.40
33492	313.177	0.591	21.002	0.134	0.61
33499	110.838	0.209	5.609	0.036	3.72
33500	-24.988	0.047	1.717	0.011	HIGH
33501	-97.472	0.184	1.887	0.012	4.42
33502	-147.882	0.279	1.258	0.008	2.58
33503	-188.328	0.355	0.763	0.005	1.81
33504	-250.293	0.472	2.553	0.016	1.11
33505	-341.928	0.645	16.879	0.108	0.50
33509	-140.433	0.265	3.844	0.025	2.75
33510	-138.560	0.261	3.650	0.023	2.80
33511	-187.487	0.354	3.555	0.023	1.82
33512	-208.704	0.394	1.817	0.012	1.54
33513	-229.185	0.432	1.258	0.008	1.31
33514	-253.002	0.477	1.679	0.011	1.09
33515	-249.396	0.471	6.040	0.039	1.11
33518	-193.251	0.365	2.152	0.014	1.74
33519	-129.760	0.245	6.868	0.044	3.02
33520	-202.408	0.382	4.347	0.028	1.61
33521	-258.485	0.488	3.875	0.025	1.04
33522	-248.675	0.469	1.947	0.012	1.13
33523	-253.493	0.478	2.285	0.015	1.09
33524	-245.444	0.463	2.928	0.019	1.15
33530	-356.748	0.673	5.856	0.037	0.48
33531	-277.830	0.524	3.989	0.025	0.90
33532	-228.763	0.432	5.604	0.036	1.30
33539	-237.292	0.448	7.804	0.050	1.21
33540	-195.238	0.368	9.306	0.059	1.66
33550	-106.687	0.201	16.606	0.106	3.52

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: REGULAR LANDING LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
42225	-75.819	0.143	5.100	0.033	5.87
42226	-61.641	0.116	6.115	0.039	7.35
42227	-44.220	0.083	4.003	0.026	HIGH
42228	-27.223	0.051	22.281	0.142	HIGH
42229	-165.399	0.312	25.064	0.160	1.84
42230	-184.585	0.348	39.046	0.249	1.29
42231	-215.826	0.407	42.293	0.270	0.97
42232	-294.925	0.556	37.312	0.238	0.57
42233	-323.771	0.611	74.583	0.476	0.13
42234	-66.080	0.125	2.552	0.016	6.97
42235	-60.355	0.114	1.231	0.008	7.77
42236	-49.352	0.093	1.447	0.009	9.71
42237	-27.422	0.052	5.583	0.036	HIGH
42238	-14.346	0.027	7.275	0.046	HIGH
42239	-52.572	0.099	52.842	0.337	3.02
42240	-155.202	0.293	129.227	0.825	-0.01
42241	-188.104	0.355	150.348	0.960	-0.22
42242	-229.990	0.434	105.655	0.675	0.07
42243	-263.198	0.497	38.398	0.245	0.72
42244	-269.507	0.509	60.238	0.385	0.44
42245	-72.998	0.138	4.890	0.031	6.14
42246	-28.008	0.053	9.732	0.062	HIGH
42247	-54.190	0.102	12.092	0.077	7.81
42248	-23.505	0.044	2.732	0.017	HIGH
42249	14.779	0.028	11.419	0.073	HIGH
42250	62.149	0.117	23.913	0.153	5.47
42251	-204.397	0.386	446.489	2.851	-0.85
42252	-26.829	0.051	1.136	0.007	HIGH
42253	-244.666	0.462	407.363	2.601	-0.83
42254	-219.051	0.413	34.603	0.221	1.06
42255	-211.609	0.399	38.240	0.244	1.07
42256	-209.549	0.395	37.775	0.241	1.09
42257	-63.252	0.119	2.985	0.019	7.31
42258	-38.268	0.072	3.162	0.020	HIGH
42259	-63.808	0.120	2.956	0.019	7.24
42260	-30.535	0.058	4.034	0.026	HIGH
42261	-13.695	0.026	4.685	0.030	HIGH
42262	7.604	0.014	62.566	0.400	3.65
42263	117.824	0.222	21.766	0.139	2.94
42264	-78.377	0.148	226.938	1.449	-0.52
42265	-126.753	0.239	193.164	1.233	-0.41
42266	-143.994	0.272	70.525	0.450	0.93
42267	-142.181	0.268	19.780	0.126	2.39
42268	-137.476	0.259	19.639	0.125	2.50
42269	-139.741	0.264	16.680	0.107	2.53

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: REGULAR LANDING LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
42332	75.124	0.142	44.941	0.287	2.93
42333	103.167	0.195	48.964	0.313	2.07
42334	59.286	0.112	120.852	0.772	0.34
42335	54.954	0.104	58.297	0.372	2.56
42336	47.277	0.089	43.473	0.278	4.12
42337	55.168	0.104	72.642	0.464	1.74
42338	48.048	0.091	38.010	0.243	4.73
42339	40.473	0.076	28.258	0.180	6.92
42340	39.079	0.074	53.292	0.340	3.44
42341	30.125	0.057	3.814	0.024	HIGH
42342	30.576	0.058	20.389	0.130	HIGH
42343	17.501	0.033	2.358	0.015	HIGH
42346	106.860	0.202	26.926	0.172	3.04
42347	-44.954	0.085	17.190	0.110	8.46
42348	2.891	0.005	17.306	0.111	HIGH
42349	6.534	0.012	15.315	0.098	HIGH
42350	2.214	0.004	10.497	0.067	HIGH
42351	4.651	0.009	9.578	0.061	HIGH
42353	-68.218	0.129	91.921	0.587	0.91
42354	-137.006	0.259	32.683	0.209	2.10
42355	-47.591	0.090	65.944	0.421	2.23
42356	-14.075	0.027	66.987	0.428	2.96
42357	-20.764	0.039	34.599	0.221	8.06
42358	-22.072	0.042	37.100	0.237	7.19
42361	-98.889	0.187	62.042	0.396	1.60
42362	-64.282	0.121	49.601	0.317	2.92
42363	-22.774	0.043	130.693	0.835	0.30
42364	-47.509	0.090	83.830	0.535	1.35
42365	-45.730	0.086	73.005	0.466	1.86
42368	-33.499	0.063	45.463	0.290	4.62
42369	-12.007	0.023	44.480	0.284	6.51
42370	21.422	0.040	123.015	0.786	0.44
42371	-99.836	0.188	233.196	1.489	-0.54
42372	-77.459	0.146	167.193	1.068	-0.21
42375	21.950	0.041	18.561	0.119	HIGH
42376	-36.761	0.069	29.531	0.189	7.11
42377	-44.041	0.083	131.394	0.839	0.22
42378	-21.974	0.041	1.269	0.008	HIGH
42379	-52.642	0.099	175.816	1.123	-0.24
42383	31.527	0.059	9.921	0.063	HIGH
42384	21.570	0.041	5.119	0.033	HIGH
42385	59.857	0.113	14.762	0.094	6.75
42386	-58.679	0.111	69.501	0.444	1.84
42387	-52.141	0.098	77.849	0.497	1.55
42390	59.531	0.112	1.074	0.007	7.89

S.S. 13a

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: [redacted] LAR LANDING LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
43330	245.731	0.464	12.713	0.081	1.10
43331	-7.626	0.014	6.020	0.038	HIGH
43332	2.499	0.005	4.149	0.026	HIGH
43333	6.029	0.011	2.050	0.013	HIGH
43334	46.559	0.088	17.496	0.112	8.14
43338	56.216	0.106	8.690	0.055	7.90
43339	145.865	0.275	2.883	0.018	2.62
43340	185.792	0.351	7.334	0.047	1.81
43341	209.168	0.395	11.188	0.071	1.47
43342	-8.662	0.016	4.690	0.030	HIGH
43343	6.926	0.013	5.508	0.035	HIGH
43344	-2.563	0.005	4.625	0.030	HIGH
43345	-5.487	0.010	6.893	0.044	HIGH
43346	130.231	0.246	19.827	0.127	2.67
43349	-100.233	0.189	7.194	0.046	4.16
43350	149.943	0.283	2.985	0.019	2.52
43351	154.813	0.292	4.770	0.030	2.40
43352	153.210	0.289	7.705	0.049	2.40
43353	174.398	0.329	6.642	0.042	2.00
43354	-27.305	0.052	4.661	0.030	HIGH
43355	0.151	0.000	4.649	0.030	HIGH
43356	-1.206	0.002	4.638	0.030	HIGH
43357	-0.335	0.001	4.194	0.027	HIGH
43358	15.947	0.030	7.934	0.051	HIGH
43359	-25.254	0.048	13.436	0.086	HIGH
43360	16.366	0.031	15.215	0.097	HIGH
43361	69.880	0.132	5.002	0.032	6.45
43362	90.515	0.171	2.816	0.018	4.83
43363	125.513	0.237	3.233	0.021	3.20
43364	130.489	0.246	4.418	0.028	3.03
43365	124.374	0.235	5.913	0.038	3.20
43366	127.955	0.241	4.509	0.029	3.11
43367	-54.888	0.104	13.413	0.086	7.54
43368	-17.559	0.033	3.034	0.019	HIGH
43369	-2.503	0.005	3.085	0.020	HIGH
43370	7.054	0.013	3.094	0.020	HIGH
43371	18.698	0.035	2.117	0.014	HIGH
43372	11.097	0.021	6.187	0.040	HIGH
43373	18.161	0.034	8.034	0.051	HIGH
43374	46.168	0.087	7.957	0.051	9.81
43375	60.504	0.114	2.536	0.016	7.70
43376	78.388	0.148	1.433	0.009	5.75
43377	101.253	0.191	1.771	0.011	4.22
43378	109.859	0.207	2.060	0.013	3.81
43379	109.231	0.206	5.834	0.037	3.78

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: POLAR LANDING LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
43435	-51.172	0.097	70.095	0.448	1.93
43438	-266.263	0.502	55.636	0.355	0.50
43440	-107.029	0.202	22.658	0.145	3.24
43441	-123.984	0.234	13.978	0.089	3.02
43442	-130.972	0.247	22.173	0.142	2.57
43443	-141.041	0.266	50.676	0.324	1.47
43446	-187.962	0.355	35.691	0.228	1.33
43450	-120.649	0.228	26.627	0.170	2.67
43451	-145.198	0.274	10.481	0.067	2.54
43452	-172.991	0.326	28.671	0.183	1.65
43453	-64.615	0.122	42.797	0.273	3.44
43455	-298.628	0.563	5.429	0.035	0.77
43456	-291.602	0.550	12.399	0.079	0.78
43457	52.763	0.100	12.951	0.083	7.90
43459	-131.258	0.248	25.012	0.160	2.47
43460	-159.240	0.300	12.292	0.078	2.20
43461	-176.126	0.332	17.834	0.114	1.82
43462	-135.429	0.256	21.944	0.140	2.48
43463	-218.780	0.413	6.040	0.039	1.40
43464	-301.995	0.570	8.887	0.057	0.73
43465	-356.625	0.673	9.154	0.058	0.47
43467	-138.773	0.262	17.807	0.114	2.52
43468	-165.154	0.312	10.984	0.070	2.11
43469	-176.994	0.334	11.179	0.071	1.91
43470	-211.731	0.399	10.311	0.066	1.45
43471	-216.522	0.409	3.801	0.024	1.44
43472	-256.180	0.483	8.165	0.052	1.04
43473	-191.779	0.362	9.229	0.059	1.71
43474	-141.278	0.267	8.785	0.056	2.66
43475	-171.915	0.324	8.440	0.054	2.03
43476	-194.578	0.367	8.418	0.054	1.68
43477	-199.449	0.376	5.857	0.037	1.64
43478	-197.784	0.373	6.470	0.041	1.65
43479	-182.136	0.344	16.456	0.105	1.75
43480	-141.086	0.266	5.016	0.032	2.72
43481	-174.138	0.329	5.176	0.033	2.02
43482	-182.598	0.345	5.040	0.032	1.88
43483	-176.418	0.333	3.955	0.025	1.99
43484	-162.700	0.307	17.235	0.110	2.05
43485	-133.280	0.251	5.190	0.033	2.94
43486	-162.147	0.306	5.197	0.033	2.24
43487	-161.406	0.305	1.349	0.009	2.28
43488	-136.891	0.258	12.509	0.080	2.70
43489	-112.917	0.213	9.007	0.058	3.55
43490	-153.803	0.290	8.735	0.056	2.37

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: REGULAR LANDING LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
43561	196.485	0.371	10.560	0.067	1.63
43562	205.133	0.387	10.315	0.066	1.53
43563	160.080	0.302	10.268	0.066	2.22
43564	101.255	0.191	29.368	0.188	3.09
43565	160.858	0.304	21.356	0.136	1.99
43566	154.025	0.291	8.538	0.055	2.37
43567	129.982	0.245	23.582	0.151	2.55
43568	102.271	0.193	8.168	0.052	4.03
43569	139.214	0.263	7.404	0.047	2.74
43570	135.867	0.256	5.692	0.036	2.86
43571	138.934	0.262	13.252	0.085	2.63
43572	122.911	0.232	14.541	0.093	3.04
43573	130.666	0.247	9.800	0.063	2.93
43574	114.137	0.215	22.794	0.146	3.01
43575	107.663	0.203	9.525	0.061	3.75
43576	111.094	0.210	3.446	0.022	3.74
43577	120.707	0.228	7.742	0.049	3.29
43578	120.019	0.226	8.049	0.051	3.31
43579	108.619	0.205	8.066	0.052	3.75
43580	95.495	0.180	17.998	0.115	3.93
43581	107.035	0.202	7.863	0.050	3.82
43582	105.209	0.199	3.744	0.024	4.00
43583	106.751	0.201	4.955	0.032	3.91
43584	97.442	0.184	5.031	0.032	4.37
43585	78.953	0.149	12.080	0.077	5.24
43586	109.773	0.207	4.042	0.026	3.79
43587	98.385	0.186	2.672	0.017	4.36
43588	83.615	0.158	2.719	0.017	5.31
43589	68.551	0.129	6.583	0.042	6.50
43590	88.589	0.167	2.839	0.018	4.95
43591	67.442	0.127	1.737	0.011	6.84
43592	53.918	0.102	4.188	0.027	8.66
43594	64.870	0.122	10.806	0.069	6.59
52201	58.922	0.111	33.631	0.215	4.59
52202	-381.258	0.719	40.549	0.259	0.23
52204	26.929	0.051	25.484	0.163	9.81
52205	4.103	0.008	0.263	0.002	HIGH
52206	-29.974	0.057	1.130	0.007	HIGH
52207	61.082	0.115	2.903	0.019	7.61
52208	-43.988	0.083	2.778	0.018	HIGH
52215	33.326	0.063	46.489	0.297	4.49
52216	-17.753	0.033	87.178	0.557	1.55
52222	54.197	0.102	1.663	0.011	8.75
52223	78.945	0.149	7.521	0.048	5.50
52224	-64.160	0.121	77.942	0.498	1.40

5.5.144

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: POLAR LANDING LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
52270	64.164	0.121	18.857	0.120	5.86
52271	47.778	0.090	8.622	0.055	9.37
52272	61.070	0.115	12.871	0.082	6.82
52273	71.597	0.135	14.913	0.095	5.60
52274	109.555	0.207	21.584	0.138	3.20
52275	-304.642	0.575	51.568	0.329	0.39
52278	-11.924	0.022	76.943	0.491	2.22
52279	28.133	0.053	32.562	0.208	7.54
52280	46.499	0.088	17.807	0.114	8.09
52281	35.777	0.068	21.390	0.137	9.18
52282	-19.470	0.037	31.413	0.201	9.32
52283	-29.192	0.055	89.586	0.572	1.32
52286	-49.959	0.094	84.705	0.541	1.30
52287	-20.997	0.040	21.974	0.140	HIGH
52288	8.973	0.017	7.524	0.048	HIGH
52289	-0.485	0.001	18.848	0.120	HIGH
52290	26.024	0.049	47.260	0.302	4.81
52293	-19.779	0.037	19.856	0.127	HIGH
52294	6.238	0.012	10.472	0.067	HIGH
52295	12.089	0.023	4.285	0.027	HIGH
52296	20.756	0.039	32.327	0.206	8.77
52297	-14.078	0.027	52.478	0.335	4.74
52300	33.604	0.063	9.908	0.063	HIGH
52301	30.638	0.058	6.426	0.041	HIGH
52302	20.889	0.039	7.969	0.051	HIGH
52303	15.710	0.030	12.534	0.080	HIGH
52304	17.536	0.033	15.302	0.098	HIGH
52308	74.158	0.140	5.468	0.035	6.01
52309	44.987	0.085	4.764	0.030	HIGH
52310	43.959	0.083	4.344	0.028	HIGH
52311	30.996	0.058	14.801	0.095	HIGH
52312	12.119	0.023	0.649	0.004	HIGH
52316	74.493	0.141	2.509	0.016	6.08
52317	74.693	0.141	5.886	0.038	5.94
52318	92.791	0.175	18.624	0.119	4.02
52319	15.477	0.029	13.646	0.087	HIGH
52320	-7.323	0.014	7.958	0.051	HIGH
52323	79.430	0.150	16.274	0.104	4.92
52324	86.311	0.163	13.940	0.089	4.64
52325	85.328	0.161	54.247	0.346	2.15
52326	87.907	0.166	150.048	0.958	-0.09
52327	-51.992	0.098	4.631	0.030	8.98
52329	92.960	0.175	40.420	0.258	2.72
52330	100.026	0.189	51.305	0.328	2.02
52331	96.028	0.181	149.712	0.956	-0.10

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: REGULAR LANDING LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
52391	-100.888	0.190	60.632	0.387	1.63
52392	-57.709	0.109	38.948	0.249	4.09
52393	-45.674	0.086	7.620	0.049	9.96
52394	-59.129	0.112	4.392	0.028	7.81
52396	-519.021	0.979	53.898	0.344	-0.12
52397	10.246	0.019	31.141	0.199	HIGH
52398	15.153	0.029	29.720	0.190	HIGH
52399	-6.931	0.013	17.314	0.111	HIGH
52400	-55.108	0.104	8.401	0.054	8.09
52401	-353.358	0.667	67.402	0.430	0.12
52402	-260.638	0.492	89.996	0.575	0.15
52403	17.653	0.033	19.583	0.125	HIGH
52404	26.112	0.049	25.997	0.166	9.82
52405	-36.700	0.069	25.362	0.162	8.04
52406	-231.144	0.436	72.455	0.463	0.44
52407	-232.684	0.439	72.250	0.461	0.43
52408	-18.705	0.035	27.084	0.173	HIGH
52409	7.012	0.013	51.162	0.327	5.48
52410	-162.347	0.306	46.232	0.295	1.36
52411	-149.957	0.283	35.327	0.226	1.80
52412	-105.901	0.200	45.877	0.293	2.16
52413	-94.416	0.178	25.028	0.160	3.58
52414	-110.663	0.209	39.135	0.250	2.37
52415	-17.480	0.033	10.649	0.068	HIGH
52425	25.237	0.048	40.182	0.257	6.14
52426	39.225	0.074	30.880	0.197	6.56
52427	110.342	0.208	28.139	0.180	2.88
52443	121.933	0.230	123.796	0.791	0.12
52444	82.983	0.157	21.457	0.137	4.34
52445	33.612	0.063	31.613	0.202	7.05
52446	108.332	0.204	56.406	0.360	1.69
52447	-111.867	0.211	263.469	1.682	-0.63
52463	-299.198	0.565	292.359	1.867	-0.72
52464	331.954	0.626	24.719	0.158	0.50
52465	-99.055	0.187	26.421	0.169	3.32
53301	250.839	0.473	7.710	0.049	1.09
53302	-62.592	0.118	10.399	0.066	6.89
53303	-67.699	0.128	14.750	0.094	5.96
53304	208.938	0.394	4.529	0.029	1.52
53305	93.089	0.176	6.203	0.040	4.58
53306	-43.317	0.082	16.537	0.106	8.87
53307	124.643	0.235	5.492	0.035	3.20
53308	-75.895	0.143	12.369	0.079	5.45
53313	171.283	0.323	6.262	0.040	2.06
53314	228.972	0.432	9.184	0.059	1.28

S.S. 148

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: REGULAR LANDING LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
53383	93.181	0.176	0.957	0.006	4.68
53384	79.324	0.150	1.827	0.012	5.66
53385	68.223	0.129	2.153	0.014	6.74
53386	96.261	0.182	24.749	0.158	3.52
53390	67.029	0.126	25.983	0.166	4.90
53391	28.758	0.054	2.482	0.016	HIGH
53392	28.646	0.054	2.640	0.017	HIGH
53393	26.892	0.051	2.420	0.015	HIGH
53394	30.984	0.058	1.772	0.011	HIGH
53395	43.519	0.082	1.365	0.009	HIGH
53397	139.036	0.262	26.515	0.169	2.26
53398	94.522	0.178	1.954	0.012	4.59
53399	75.603	0.143	3.090	0.020	5.96
53400	67.843	0.128	5.131	0.033	6.66
53401	53.450	0.101	6.102	0.039	8.59
53402	23.910	0.045	5.840	0.037	HIGH
53403	-67.425	0.127	11.065	0.071	6.30
53406	63.987	0.121	16.139	0.103	6.17
53407	97.047	0.183	10.318	0.066	4.22
53408	98.934	0.187	4.112	0.026	4.31
53409	103.743	0.196	9.244	0.059	3.93
53410	109.698	0.207	11.528	0.074	3.60
53411	102.388	0.193	11.456	0.073	3.91
53412	153.063	0.289	12.125	0.077	2.33
53413	181.677	0.343	34.618	0.221	1.42
53415	76.753	0.145	14.019	0.090	5.27
53416	102.766	0.194	13.713	0.088	3.81
53417	110.441	0.208	11.371	0.073	3.58
53418	128.819	0.243	13.670	0.087	2.89
53419	107.251	0.202	14.272	0.091	3.60
53420	20.175	0.038	19.008	0.121	HIGH
53421	-36.694	0.069	7.880	0.050	HIGH
53424	91.250	0.172	21.062	0.134	3.95
53425	115.447	0.218	17.835	0.114	3.16
53426	150.884	0.285	21.315	0.136	2.17
53432	74.072	0.140	42.078	0.269	3.17
53433	70.274	0.133	42.490	0.271	3.26
53440	74.541	0.141	89.423	0.571	0.94
53450	121.235	0.229	90.945	0.581	0.63
53455	-125.509	0.237	46.358	0.296	1.81
53456	2.317	0.004	27.475	0.175	HIGH
53457	60.285	0.114	41.655	0.266	3.71
53463	-164.270	0.310	21.604	0.138	1.93
53464	-104.700	0.198	18.238	0.116	3.53
53465	-118.330	0.223	20.732	0.132	2.96

S.S.150

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: [redacted] LAR LANDING LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
53522	63.759	0.120	11.170	0.071	6.68
53523	61.177	0.115	13.181	0.084	6.78
53524	54.569	0.103	13.595	0.087	7.56
53530	108.827	0.205	23.195	0.148	3.15
53531	86.676	0.164	18.335	0.117	4.35
53532	76.822	0.145	21.832	0.139	4.66
53539	72.470	0.137	44.490	0.284	3.04
53540	86.567	0.163	43.383	0.277	2.72
53550	112.041	0.211	91.437	0.584	0.66
53553	28.677	0.054	23.863	0.152	9.96
53554	-68.007	0.128	43.251	0.276	3.28
53559	141.748	0.267	96.334	0.615	0.44
53561	-160.325	0.303	18.377	0.117	2.07
53562	-109.355	0.206	16.967	0.108	3.41
53563	-170.332	0.321	20.379	0.130	1.86
53568	-126.634	0.239	14.266	0.091	2.94
53569	-160.994	0.304	10.893	0.070	2.19
53570	-168.300	0.318	19.331	0.123	1.91
53571	-189.662	0.358	19.915	0.127	1.60
53574	-65.069	0.123	61.014	0.390	2.18
53575	-145.641	0.275	19.296	0.123	2.33
53576	-158.029	0.298	8.417	0.054	2.29
53577	-152.048	0.287	15.445	0.099	2.29
53578	-133.622	0.252	15.635	0.100	2.71
53579	-98.164	0.185	16.916	0.108	3.86
53580	-94.750	0.179	48.242	0.308	2.27
53581	-139.855	0.264	16.065	0.103	2.54
53582	-143.177	0.270	10.326	0.066	2.59
53583	-138.320	0.261	12.555	0.080	2.66
53584	-130.623	0.246	13.541	0.086	2.84
53585	-107.153	0.202	30.254	0.193	2.87
53586	-117.201	0.221	8.633	0.055	3.40
53587	-130.134	0.246	6.173	0.039	3.02
53588	-128.194	0.242	6.540	0.042	3.07
53589	-103.385	0.195	14.753	0.094	3.74
53590	-82.469	0.156	2.817	0.018	5.39
53591	-122.277	0.231	4.830	0.031	3.29
53592	-90.390	0.171	5.646	0.036	4.76
53594	-92.797	0.175	24.962	0.159	3.64
62201	-111.290	0.210	6.801	0.043	3.67
62202	84.390	0.159	2.032	0.013	5.26
62203	87.079	0.164	0.919	0.006	5.08
62204	-100.978	0.191	0.990	0.006	4.24
62205	-42.346	0.080	2.959	0.019	HIGH
62206	3.392	0.006	2.851	0.018	HIGH

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: REGULAR LANDING LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
62263	-16.498	0.031	0.757	0.005	HIGH
62264	-12.759	0.024	3.715	0.024	HIGH
62265	-23.830	0.045	4.558	0.029	HIGH
62266	-17.757	0.034	7.695	0.049	HIGH
62267	-14.098	0.027	1.874	0.012	HIGH
62268	-25.860	0.049	1.432	0.009	HIGH
62269	-27.404	0.052	1.404	0.009	HIGH
62270	31.852	0.060	10.598	0.068	HIGH
62271	-2.259	0.004	101.933	0.651	1.10
62272	24.456	0.046	16.890	0.108	HIGH
62273	11.143	0.021	2.306	0.015	HIGH
62274	25.538	0.048	8.151	0.052	HIGH
62275	92.975	0.175	5.246	0.033	4.62
62278	16.524	0.031	35.250	0.225	8.55
62279	7.939	0.015	67.805	0.433	3.06
62280	5.061	0.010	5.633	0.036	HIGH
62281	21.501	0.041	5.778	0.037	HIGH
62282	-30.233	0.057	5.234	0.033	HIGH
62283	11.996	0.023	1.592	0.010	HIGH
62286	4.197	0.008	28.670	0.183	HIGH
62287	2.389	0.005	20.813	0.133	HIGH
62288	5.753	0.011	3.804	0.024	HIGH
62289	-11.920	0.022	4.141	0.026	HIGH
62290	-49.979	0.094	3.854	0.025	9.44
62293	7.364	0.014	11.089	0.071	HIGH
62294	6.473	0.012	10.852	0.069	HIGH
62295	-7.097	0.013	3.256	0.021	HIGH
62296	-27.212	0.051	3.608	0.023	HIGH
62297	-58.368	0.110	3.376	0.022	7.98
62300	5.506	0.010	9.442	0.060	HIGH
62301	-4.468	0.008	7.296	0.047	HIGH
62302	-18.119	0.034	5.843	0.037	HIGH
62303	-29.851	0.056	5.469	0.035	HIGH
62304	-43.381	0.082	7.477	0.048	HIGH
62308	-5.235	0.010	14.027	0.090	HIGH
62309	-8.001	0.015	2.718	0.017	HIGH
62310	-16.569	0.031	5.897	0.038	HIGH
62311	-23.394	0.044	4.724	0.030	HIGH
62312	-20.617	0.039	6.067	0.039	HIGH
62316	-3.477	0.007	16.963	0.108	HIGH
62317	-10.184	0.019	4.881	0.031	HIGH
62318	-8.482	0.016	8.414	0.054	HIGH
62319	-4.970	0.009	8.623	0.055	HIGH
62320	-1.412	0.003	2.900	0.019	HIGH
62323	-3.353	0.006	18.005	0.115	HIGH

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: [illegible] LAR LANDING LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
62379	36.279	0.068	35.107	0.224	6.07
62383	73.097	0.138	1.540	0.010	6.23
62384	46.454	0.088	1.258	0.008	HIGH
62385	30.291	0.057	5.783	0.037	HIGH
62386	18.960	0.036	1.073	0.007	HIGH
62387	16.098	0.030	21.347	0.136	HIGH
62390	88.508	0.167	1.225	0.008	4.98
62391	58.123	0.110	1.624	0.010	8.09
62392	38.197	0.072	1.262	0.008	HIGH
62393	24.777	0.047	1.287	0.008	HIGH
62394	9.632	0.018	15.764	0.101	HIGH
62396	82.523	0.156	5.047	0.032	5.32
62397	50.723	0.096	4.735	0.030	9.21
62398	33.558	0.063	4.883	0.031	HIGH
62399	20.367	0.038	2.557	0.016	HIGH
62400	11.645	0.022	10.732	0.069	HIGH
62401	7.196	0.014	12.070	0.077	HIGH
62402	-10.114	0.019	6.539	0.042	HIGH
62403	7.129	0.013	13.955	0.089	HIGH
62404	11.028	0.021	12.160	0.078	HIGH
62405	12.130	0.023	3.442	0.022	HIGH
62406	-85.344	0.161	24.700	0.158	3.99
62407	-1.388	0.003	22.086	0.141	HIGH
62408	-13.965	0.026	36.875	0.235	8.44
62409	17.980	0.034	3.978	0.025	HIGH
62410	-61.840	0.117	50.156	0.320	2.95
62411	-9.733	0.018	61.216	0.391	3.73
62412	-23.989	0.045	35.363	0.226	7.39
62413	-13.629	0.026	149.886	0.957	0.05
62414	-1.270	0.002	43.985	0.281	8.03
62415	3.251	0.006	43.307	0.277	7.96
63301	45.710	0.086	5.083	0.032	HIGH
63302	29.307	0.055	12.883	0.082	HIGH
63303	25.712	0.049	17.606	0.112	HIGH
63304	-17.562	0.033	7.425	0.047	HIGH
63305	20.239	0.038	7.365	0.047	HIGH
63306	7.833	0.015	17.704	0.113	HIGH
63307	96.790	0.183	4.378	0.028	4.42
63308	71.372	0.135	12.355	0.079	5.83
63313	9.737	0.018	10.906	0.070	HIGH
63314	15.280	0.029	8.629	0.055	HIGH
63319	63.127	0.119	9.460	0.060	6.91
63320	33.152	0.063	6.704	0.043	HIGH
63321	-9.856	0.019	18.522	0.118	HIGH
63322	-0.037	0.000	7.421	0.047	HIGH

S.S.156

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: REGULAR LANDING LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
63386	24.481	0.046	22.077	0.141	HIGH
63390	43.306	0.082	24.799	0.158	7.23
63391	19.404	0.037	3.624	0.023	HIGH
63392	13.771	0.026	1.559	0.010	HIGH
63393	20.404	0.038	1.880	0.012	HIGH
63394	45.501	0.086	20.250	0.129	7.79
63396	-31.866	0.060	1.598	0.010	HIGH
63397	-25.666	0.048	1.731	0.011	HIGH
63398	-18.387	0.035	1.186	0.008	HIGH
63399	-10.319	0.019	2.491	0.016	HIGH
63400	-3.518	0.007	4.998	0.032	HIGH
63401	-2.999	0.006	6.134	0.039	HIGH
63402	-8.719	0.016	5.279	0.034	HIGH
63403	-8.979	0.017	13.196	0.084	HIGH
63406	-25.414	0.048	5.250	0.034	HIGH
63407	-22.889	0.043	5.306	0.034	HIGH
63408	-16.543	0.031	3.126	0.020	HIGH
63409	-9.543	0.018	8.804	0.056	HIGH
63410	-5.211	0.010	12.005	0.077	HIGH
63411	-17.477	0.033	12.060	0.077	HIGH
63412	-29.571	0.056	12.832	0.082	HIGH
63413	13.658	0.026	46.793	0.299	5.82
63415	-21.553	0.041	10.377	0.066	HIGH
63416	-22.966	0.043	10.124	0.065	HIGH
63417	-22.182	0.042	10.992	0.070	HIGH
63418	-20.304	0.038	14.518	0.093	HIGH
63419	-23.817	0.045	15.602	0.100	HIGH
63420	-66.122	0.125	20.910	0.134	5.48
63421	-176.429	0.333	5.930	0.038	1.97
63424	-17.179	0.032	17.547	0.112	HIGH
63425	-28.925	0.055	13.009	0.083	HIGH
63426	-40.143	0.076	22.098	0.141	8.24
63432	-5.549	0.010	32.386	0.207	HIGH
63433	-30.492	0.058	39.589	0.253	5.77
63440	38.110	0.072	62.292	0.398	2.69
63450	89.057	0.168	87.388	0.558	0.89
63455	-82.641	0.156	51.156	0.327	2.37
63456	50.717	0.096	30.648	0.196	5.52
63457	8.311	0.016	51.434	0.328	5.32
63463	-45.391	0.086	24.555	0.157	7.02
63464	5.219	0.010	20.772	0.133	HIGH
63465	13.438	0.025	21.843	0.139	HIGH
63467	-45.556	0.086	35.881	0.229	5.18
63470	-20.370	0.038	24.308	0.155	HIGH
63471	-7.212	0.014	23.483	0.150	HIGH

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: REGULAR LANDING LOADS

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
63539	-13.202	0.025	43.359	0.277	6.66
63540	9.367	0.018	35.967	0.230	9.65
63550	66.430	0.125	65.487	0.418	1.92
63553	62.482	0.118	29.778	0.190	4.79
63554	-66.143	0.125	49.096	0.314	2.90
63559	109.216	0.206	93.841	0.599	0.63
63561	21.038	0.040	21.885	0.140	HIGH
63562	9.198	0.017	19.380	0.124	HIGH
63563	-28.788	0.054	22.999	0.147	HIGH
63568	13.497	0.025	18.599	0.119	HIGH
63569	6.862	0.013	15.148	0.097	HIGH
63570	-5.484	0.010	23.019	0.147	HIGH
63571	-9.097	0.017	24.075	0.154	HIGH
63574	-36.046	0.068	34.522	0.220	6.20
63575	1.769	0.003	29.466	0.188	HIGH
63576	4.903	0.009	8.628	0.055	HIGH
63577	9.170	0.017	18.498	0.118	HIGH
63578	10.974	0.021	18.603	0.119	HIGH
63579	-0.320	0.001	18.344	0.117	HIGH
63580	-30.585	0.058	29.295	0.187	8.02
63581	4.912	0.009	27.469	0.175	HIGH
63582	15.027	0.028	11.653	0.074	HIGH
63583	21.972	0.041	15.888	0.101	HIGH
63584	22.696	0.043	16.461	0.105	HIGH
63585	10.572	0.020	17.503	0.112	HIGH
63586	14.356	0.027	18.318	0.117	HIGH
63587	23.634	0.045	10.670	0.068	HIGH
63588	29.936	0.056	10.709	0.068	HIGH
63589	28.816	0.054	9.375	0.060	HIGH
63590	21.946	0.041	8.352	0.053	HIGH
63591	27.555	0.052	6.731	0.043	HIGH
63592	30.276	0.057	6.735	0.043	HIGH
63593	23.773	0.045	2.453	0.016	HIGH
63594	24.414	0.046	3.793	0.024	HIGH
63595	21.617	0.041	1.598	0.010	HIGH

S.S.160

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: STER LOADS WITHOUT SRM

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
12201	-0.748	0.001	0.055	0.000	HIGH
12202	3.594	0.007	0.064	0.000	HIGH
12204	-2.391	0.005	0.055	0.000	HIGH
12205	0.598	0.001	0.021	0.000	HIGH
12206	-1.980	0.004	0.062	0.000	HIGH
12207	-2.542	0.005	0.212	0.001	HIGH
12208	-1.443	0.003	0.168	0.001	HIGH
12215	-0.780	0.001	0.116	0.001	HIGH
12216	-0.135	0.000	0.108	0.001	HIGH
12222	-2.105	0.004	0.175	0.001	HIGH
12223	-2.731	0.005	0.208	0.001	HIGH
12224	0.346	0.001	0.184	0.001	HIGH
12225	0.299	0.001	0.140	0.001	HIGH
12226	0.589	0.001	0.037	0.000	HIGH
12227	2.395	0.005	1.262	0.008	HIGH
12228	4.807	0.009	1.612	0.010	HIGH
12229	-5.572	0.011	2.508	0.016	HIGH
12230	-3.139	0.006	0.426	0.003	HIGH
12231	-3.054	0.006	0.278	0.002	HIGH
12232	-3.494	0.007	0.116	0.001	HIGH
12233	-3.671	0.007	0.987	0.006	HIGH
12234	0.694	0.001	0.092	0.001	HIGH
12235	0.725	0.001	0.163	0.001	HIGH
12236	2.168	0.004	0.009	0.000	HIGH
12237	2.953	0.006	0.040	0.000	HIGH
12238	6.882	0.013	0.878	0.006	HIGH
12239	20.172	0.038	0.996	0.006	HIGH
12240	-5.171	0.010	9.183	0.059	HIGH
12241	-5.338	0.010	10.258	0.066	HIGH
12242	-4.704	0.009	5.715	0.036	HIGH
12243	-4.730	0.009	1.207	0.008	HIGH
12244	-4.327	0.008	0.969	0.006	HIGH
12245	0.543	0.001	0.045	0.000	HIGH
12246	0.654	0.001	0.122	0.001	HIGH
12247	2.107	0.004	0.038	0.000	HIGH
12248	3.166	0.006	0.013	0.000	HIGH
12249	8.185	0.015	0.774	0.005	HIGH
12250	13.396	0.025	4.553	0.029	HIGH
12251	-7.530	0.014	44.326	0.283	7.06
12252	-1.350	0.003	0.112	0.001	HIGH
12253	-10.490	0.020	37.600	0.240	8.79
12254	-6.356	0.012	3.511	0.022	HIGH
12255	-4.703	0.009	2.618	0.017	HIGH
12256	-3.778	0.007	1.413	0.009	HIGH
12257	0.367	0.001	0.056	0.000	HIGH

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: STER LOADS WITHOUT SRM

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
12317	1.257	0.002	27.373	0.175	HIGH
12318	-7.031	0.013	12.661	0.081	HIGH
12319	-6.854	0.013	12.040	0.077	HIGH
12320	-4.997	0.009	0.248	0.002	HIGH
12323	6.315	0.012	19.768	0.126	HIGH
12324	0.552	0.001	0.157	0.001	HIGH
12325	-5.745	0.011	36.440	0.233	HIGH
12326	-6.335	0.012	14.355	0.092	HIGH
12327	-1.208	0.002	0.055	0.000	HIGH
12329	1.257	0.002	15.329	0.098	HIGH
12330	1.128	0.002	13.570	0.087	HIGH
12331	-2.952	0.006	8.733	0.056	HIGH
12332	-2.891	0.005	5.366	0.034	HIGH
12333	-1.264	0.002	0.574	0.004	HIGH
12334	1.526	0.003	9.995	0.064	HIGH
12335	0.629	0.001	5.228	0.033	HIGH
12336	-0.996	0.002	2.264	0.014	HIGH
12337	-1.373	0.003	2.243	0.014	HIGH
12338	1.631	0.003	3.146	0.020	HIGH
12339	0.827	0.002	1.963	0.013	HIGH
12340	-0.056	0.000	0.968	0.006	HIGH
12341	1.396	0.003	0.520	0.003	HIGH
12342	0.960	0.002	0.532	0.003	HIGH
12343	0.891	0.002	0.076	0.000	HIGH
12346	1.004	0.002	0.122	0.001	HIGH
12347	1.446	0.003	0.142	0.001	HIGH
12348	1.446	0.003	2.614	0.017	HIGH
12349	0.974	0.002	1.844	0.012	HIGH
12350	0.052	0.000	0.729	0.005	HIGH
12351	-0.339	0.001	0.770	0.005	HIGH
12353	0.236	0.000	0.117	0.001	HIGH
12354	3.240	0.006	0.109	0.001	HIGH
12355	1.437	0.003	10.767	0.069	HIGH
12356	1.458	0.003	5.470	0.035	HIGH
12357	-0.168	0.000	2.327	0.015	HIGH
12358	-0.846	0.002	2.266	0.014	HIGH
12361	5.152	0.010	0.122	0.001	HIGH
12362	4.027	0.008	16.096	0.103	HIGH
12363	3.359	0.006	12.985	0.083	HIGH
12364	-0.726	0.001	8.102	0.052	HIGH
12365	-1.501	0.003	5.572	0.036	HIGH
12368	10.393	0.020	0.368	0.002	HIGH
12369	7.051	0.013	8.859	0.057	HIGH
12370	7.230	0.014	15.075	0.096	HIGH
12371	-3.388	0.006	19.942	0.127	HIGH

5.5.03

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: STER LOADS WITHOUT SRM

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
12456	-17.707	0.033	4.864	0.031	HIGH
12463	4.845	0.009	0.200	0.001	HIGH
12464	-3.344	0.006	0.028	0.000	HIGH
12465	4.640	0.009	0.097	0.001	HIGH
13301	-1.165	0.002	0.026	0.000	HIGH
13302	2.083	0.004	0.012	0.000	HIGH
13303	2.191	0.004	0.027	0.000	HIGH
13304	-2.876	0.005	0.019	0.000	HIGH
13305	0.339	0.001	0.018	0.000	HIGH
13306	-1.130	0.002	0.014	0.000	HIGH
13307	-0.764	0.001	0.096	0.001	HIGH
13308	-0.525	0.001	0.046	0.000	HIGH
13313	-1.564	0.003	0.028	0.000	HIGH
13314	-2.024	0.004	0.016	0.000	HIGH
13319	-0.225	0.000	0.017	0.000	HIGH
13320	-0.436	0.001	0.065	0.000	HIGH
13321	-2.363	0.004	0.022	0.000	HIGH
13322	-2.319	0.004	0.014	0.000	HIGH
13323	-1.828	0.003	0.012	0.000	HIGH
13324	-1.339	0.003	0.010	0.000	HIGH
13325	-0.714	0.001	0.045	0.000	HIGH
13326	-0.055	0.000	0.040	0.000	HIGH
13327	0.049	0.000	0.006	0.000	HIGH
13328	0.064	0.000	0.008	0.000	HIGH
13329	-0.183	0.000	0.028	0.000	HIGH
13330	-0.255	0.000	0.040	0.000	HIGH
13331	-2.356	0.004	0.018	0.000	HIGH
13332	-1.929	0.004	0.018	0.000	HIGH
13333	-1.741	0.003	0.006	0.000	HIGH
13334	-1.155	0.002	0.007	0.000	HIGH
13335	-0.677	0.001	0.021	0.000	HIGH
13336	-0.255	0.000	0.034	0.000	HIGH
13337	-0.091	0.000	0.020	0.000	HIGH
13338	-0.060	0.000	0.011	0.000	HIGH
13339	-0.106	0.000	0.021	0.000	HIGH
13340	-0.272	0.001	0.036	0.000	HIGH
13341	0.071	0.000	0.033	0.000	HIGH
13342	-2.520	0.005	0.018	0.000	HIGH
13343	-1.844	0.003	0.020	0.000	HIGH
13344	-1.628	0.003	0.010	0.000	HIGH
13345	-1.180	0.002	0.003	0.000	HIGH
13346	-0.664	0.001	0.014	0.000	HIGH
13347	-0.296	0.001	0.026	0.000	HIGH
13348	-0.145	0.000	0.026	0.000	HIGH
13349	-0.080	0.000	0.009	0.000	HIGH

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: STER LOADS WITHOUT SRM

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
13398	-0.203	0.000	0.022	0.000	HIGH
13399	-0.803	0.002	0.002	0.000	HIGH
13400	-0.812	0.002	0.004	0.000	HIGH
13401	-0.559	0.001	0.005	0.000	HIGH
13402	0.071	0.000	0.008	0.000	HIGH
13403	1.637	0.003	0.039	0.000	HIGH
13406	1.164	0.002	0.060	0.000	HIGH
13407	0.198	0.000	0.043	0.000	HIGH
13408	-0.671	0.001	0.017	0.000	HIGH
13409	-1.143	0.002	0.008	0.000	HIGH
13410	-1.347	0.003	0.008	0.000	HIGH
13411	-1.524	0.003	0.009	0.000	HIGH
13412	-1.665	0.003	0.036	0.000	HIGH
13413	0.056	0.000	0.112	0.001	HIGH
13415	0.059	0.000	0.034	0.000	HIGH
13416	-0.617	0.001	0.030	0.000	HIGH
13417	-1.227	0.002	0.020	0.000	HIGH
13418	-1.704	0.003	0.013	0.000	HIGH
13419	-2.140	0.004	0.010	0.000	HIGH
13420	-2.713	0.005	0.008	0.000	HIGH
13421	-2.858	0.005	0.006	0.000	HIGH
13424	-0.936	0.002	0.028	0.000	HIGH
13425	-1.362	0.003	0.027	0.000	HIGH
13426	-1.823	0.003	0.021	0.000	HIGH
13427	-2.307	0.004	0.012	0.000	HIGH
13428	-2.809	0.005	0.006	0.000	HIGH
13429	-3.274	0.006	0.021	0.000	HIGH
13430	-3.680	0.007	0.029	0.000	HIGH
13432	-1.511	0.003	0.031	0.000	HIGH
13433	-1.916	0.004	0.029	0.000	HIGH
13434	-2.329	0.004	0.019	0.000	HIGH
13435	-2.736	0.005	0.006	0.000	HIGH
13436	-3.090	0.006	0.008	0.000	HIGH
13437	-3.499	0.007	0.101	0.001	HIGH
13438	-3.366	0.006	0.016	0.000	HIGH
13440	-1.893	0.004	0.039	0.000	HIGH
13441	-2.353	0.004	0.035	0.000	HIGH
13442	-2.642	0.005	0.013	0.000	HIGH
13443	-2.825	0.005	0.002	0.000	HIGH
13444	-2.963	0.006	0.024	0.000	HIGH
13445	-3.113	0.006	0.036	0.000	HIGH
13446	-3.064	0.006	0.003	0.000	HIGH
13450	-2.271	0.004	0.071	0.000	HIGH
13451	-2.617	0.005	0.033	0.000	HIGH
13452	-2.619	0.005	0.006	0.000	HIGH

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: STER LOADS WITHOUT SRM

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
13509	-0.402	0.001	0.032	0.000	HIGH
13510	-0.029	0.000	0.013	0.000	HIGH
13511	0.145	0.000	0.012	0.000	HIGH
13512	0.061	0.000	0.020	0.000	HIGH
13513	-0.327	0.001	0.029	0.000	HIGH
13514	-0.977	0.002	0.038	0.000	HIGH
13515	-1.610	0.003	0.052	0.000	HIGH
13518	0.335	0.001	0.055	0.000	HIGH
13519	0.533	0.001	0.033	0.000	HIGH
13520	0.590	0.001	0.011	0.000	HIGH
13521	0.567	0.001	0.024	0.000	HIGH
13522	0.302	0.001	0.042	0.000	HIGH
13523	-0.264	0.000	0.049	0.000	HIGH
13524	-0.875	0.002	0.053	0.000	HIGH
13526	1.153	0.002	0.060	0.000	HIGH
13527	1.131	0.002	0.053	0.000	HIGH
13528	1.111	0.002	0.025	0.000	HIGH
13529	1.118	0.002	0.017	0.000	HIGH
13530	1.064	0.002	0.044	0.000	HIGH
13531	0.775	0.001	0.070	0.000	HIGH
13532	0.308	0.001	0.076	0.000	HIGH
13534	1.822	0.003	0.014	0.000	HIGH
13535	1.723	0.003	0.116	0.001	HIGH
13536	1.572	0.003	0.033	0.000	HIGH
13537	1.544	0.003	0.013	0.000	HIGH
13538	1.696	0.003	0.032	0.000	HIGH
13539	1.746	0.003	0.079	0.001	HIGH
13540	1.534	0.003	0.131	0.001	HIGH
13544	2.600	0.005	0.060	0.000	HIGH
13545	2.431	0.005	0.059	0.000	HIGH
13546	2.022	0.004	0.046	0.000	HIGH
13547	1.884	0.004	0.023	0.000	HIGH
13548	1.924	0.004	0.015	0.000	HIGH
13549	2.125	0.004	0.058	0.000	HIGH
13550	2.197	0.004	0.169	0.001	HIGH
13553	3.077	0.006	0.051	0.000	HIGH
13554	2.919	0.006	0.027	0.000	HIGH
13555	2.456	0.005	0.031	0.000	HIGH
13556	2.104	0.004	0.029	0.000	HIGH
13557	1.921	0.004	0.016	0.000	HIGH
13558	1.920	0.004	0.024	0.000	HIGH
13559	1.866	0.004	0.104	0.001	HIGH
13561	3.624	0.007	0.022	0.000	HIGH
13562	3.406	0.006	0.016	0.000	HIGH
13563	2.836	0.005	0.024	0.000	HIGH

5.5.8.0

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: STER LOADS WITHOUT SRM

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
22227	0.941	0.002	0.344	0.002	HIGH
22228	0.428	0.001	0.778	0.005	HIGH
22229	-0.029	0.000	1.594	0.010	HIGH
22230	0.512	0.001	1.922	0.012	HIGH
22231	2.401	0.005	7.280	0.046	HIGH
22232	6.387	0.012	10.235	0.065	HIGH
22233	5.493	0.010	15.265	0.097	HIGH
22234	-0.858	0.002	0.568	0.004	HIGH
22235	1.010	0.002	0.155	0.001	HIGH
22236	1.468	0.003	0.087	0.001	HIGH
22237	1.291	0.002	0.380	0.002	HIGH
22238	0.885	0.002	0.967	0.006	HIGH
22239	0.716	0.001	1.849	0.012	HIGH
22240	1.122	0.002	2.038	0.013	HIGH
22241	1.965	0.004	2.696	0.017	HIGH
22242	2.945	0.006	28.828	0.184	HIGH
22243	0.305	0.001	0.230	0.001	HIGH
22244	3.186	0.006	42.721	0.273	8.18
22245	-0.281	0.001	0.190	0.001	HIGH
22246	-1.563	0.003	0.095	0.001	HIGH
22247	1.927	0.004	0.164	0.001	HIGH
22248	1.438	0.003	0.199	0.001	HIGH
22249	0.877	0.002	0.563	0.004	HIGH
22250	0.706	0.001	1.333	0.009	HIGH
22251	1.202	0.002	1.810	0.012	HIGH
22252	1.799	0.003	2.060	0.013	HIGH
22253	2.680	0.005	6.342	0.040	HIGH
22254	2.770	0.005	18.247	0.117	HIGH
22255	-5.230	0.010	22.022	0.141	HIGH
22256	-3.797	0.007	3.436	0.022	HIGH
22257	-0.629	0.001	0.164	0.001	HIGH
22258	0.128	0.000	0.023	0.000	HIGH
22259	-0.395	0.001	0.111	0.001	HIGH
22260	1.240	0.002	0.109	0.001	HIGH
22261	0.363	0.001	0.221	0.001	HIGH
22262	-0.022	0.000	0.243	0.002	HIGH
22263	1.012	0.002	0.814	0.005	HIGH
22264	0.976	0.002	0.887	0.006	HIGH
22265	0.968	0.002	0.900	0.006	HIGH
22266	0.056	0.000	5.236	0.033	HIGH
22267	-1.872	0.004	8.700	0.056	HIGH
22268	-1.755	0.003	5.649	0.036	HIGH
22269	-2.885	0.005	1.613	0.010	HIGH
22270	2.605	0.005	0.249	0.002	HIGH
22271	2.072	0.004	0.121	0.001	HIGH

5.5.17

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: STER LOADS WITHOUT SRM

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
22334	8.599	0.016	13.078	0.084	HIGH
22335	10.679	0.020	32.708	0.209	HIGH
22336	1.617	0.003	0.021	0.000	HIGH
22337	13.896	0.026	34.207	0.218	9.42
22338	5.626	0.011	9.061	0.058	HIGH
22339	5.496	0.010	13.347	0.085	HIGH
22340	12.201	0.023	2.702	0.017	HIGH
22341	2.853	0.005	1.177	0.008	HIGH
22342	4.180	0.008	1.603	0.010	HIGH
22343	0.791	0.001	0.517	0.003	HIGH
22346	-0.970	0.002	5.662	0.036	HIGH
22347	-3.336	0.006	16.510	0.105	HIGH
22348	0.560	0.001	5.139	0.033	HIGH
22349	-1.489	0.003	14.123	0.090	HIGH
22350	-2.188	0.004	2.996	0.019	HIGH
22351	-0.965	0.002	0.770	0.005	HIGH
22353	0.967	0.002	11.231	0.072	HIGH
22354	-2.809	0.005	3.783	0.024	HIGH
22355	-6.741	0.013	15.288	0.098	HIGH
22356	-0.884	0.002	0.030	0.000	HIGH
22357	-3.120	0.006	15.688	0.100	HIGH
22358	-3.203	0.006	6.235	0.040	HIGH
22361	-3.195	0.006	7.096	0.045	HIGH
22362	-4.959	0.009	5.387	0.034	HIGH
22363	-5.924	0.011	7.744	0.049	HIGH
22364	-5.992	0.011	6.784	0.043	HIGH
22365	-3.962	0.007	12.107	0.077	HIGH
22368	-5.400	0.010	3.554	0.023	HIGH
22369	-5.665	0.011	2.166	0.014	HIGH
22370	-6.486	0.012	5.664	0.036	HIGH
22371	-7.351	0.014	5.846	0.037	HIGH
22372	-6.343	0.012	11.130	0.071	HIGH
22375	-7.094	0.013	1.517	0.010	HIGH
22376	-6.619	0.012	1.450	0.009	HIGH
22377	-7.006	0.013	2.844	0.018	HIGH
22378	-7.587	0.014	3.084	0.020	HIGH
22379	-7.516	0.014	6.001	0.038	HIGH
22383	-7.692	0.015	0.547	0.003	HIGH
22384	-7.327	0.014	0.565	0.004	HIGH
22385	-7.147	0.013	1.157	0.007	HIGH
22386	-7.631	0.014	1.241	0.008	HIGH
22387	-7.537	0.014	2.288	0.015	HIGH
22390	-7.929	0.015	0.155	0.001	HIGH
22391	-7.560	0.014	0.152	0.001	HIGH
22392	-7.146	0.013	0.403	0.003	HIGH

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: STER LOADS WITHOUT SRM

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
23334	-0.019	0.000	0.277	0.002	HIGH
23338	-1.440	0.003	0.203	0.001	HIGH
23339	-3.801	0.007	0.069	0.000	HIGH
23340	-3.643	0.007	0.028	0.000	HIGH
23341	-4.232	0.008	0.011	0.000	HIGH
23342	1.624	0.003	0.088	0.001	HIGH
23343	1.441	0.003	0.056	0.000	HIGH
23344	1.621	0.003	0.146	0.001	HIGH
23345	1.406	0.003	0.327	0.002	HIGH
23350	-2.346	0.004	0.202	0.001	HIGH
23351	-2.419	0.005	0.080	0.001	HIGH
23352	-2.684	0.005	0.018	0.000	HIGH
23353	-3.528	0.007	0.020	0.000	HIGH
23354	0.265	0.001	0.065	0.000	HIGH
23355	0.827	0.002	0.040	0.000	HIGH
23356	1.382	0.003	0.125	0.001	HIGH
23357	0.969	0.002	0.181	0.001	HIGH
23363	-0.784	0.001	0.177	0.001	HIGH
23364	-1.656	0.003	0.027	0.000	HIGH
23365	-2.058	0.004	0.025	0.000	HIGH
23366	-2.821	0.005	0.024	0.000	HIGH
23367	-1.204	0.002	0.053	0.000	HIGH
23368	0.112	0.000	0.045	0.000	HIGH
23369	1.169	0.002	0.098	0.001	HIGH
23370	1.616	0.003	0.154	0.001	HIGH
23371	0.264	0.000	0.178	0.001	HIGH
23376	0.872	0.002	0.191	0.001	HIGH
23377	-0.694	0.001	0.035	0.000	HIGH
23378	-1.226	0.002	0.028	0.000	HIGH
23379	-1.536	0.003	0.022	0.000	HIGH
23380	-2.114	0.004	0.030	0.000	HIGH
23382	0.384	0.001	0.041	0.000	HIGH
23383	0.740	0.001	0.051	0.000	HIGH
23384	1.646	0.003	0.114	0.001	HIGH
23385	1.356	0.003	0.135	0.001	HIGH
23386	0.431	0.001	0.095	0.001	HIGH
23390	0.444	0.001	0.144	0.001	HIGH
23391	0.246	0.000	0.032	0.000	HIGH
23392	-0.359	0.001	0.022	0.000	HIGH
23393	-0.634	0.001	0.017	0.000	HIGH
23394	-0.918	0.002	0.017	0.000	HIGH
23395	-1.269	0.002	0.023	0.000	HIGH
23397	3.998	0.008	0.039	0.000	HIGH
23398	2.161	0.004	0.025	0.000	HIGH
23399	1.016	0.002	0.016	0.000	HIGH

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: STER LOADS WITHOUT SRM

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
23482	2.701	0.005	0.045	0.000	HIGH
23483	3.118	0.006	0.043	0.000	HIGH
23484	3.275	0.006	0.038	0.000	HIGH
23485	1.439	0.003	0.301	0.002	HIGH
23486	1.873	0.004	0.084	0.001	HIGH
23487	2.201	0.004	0.041	0.000	HIGH
23488	2.434	0.005	0.044	0.000	HIGH
23489	1.086	0.002	0,206	0.001	HIGH
23490	1.445	0.003	0.051	0.000	HIGH
23491	1.647	0.003	0.056	0.000	HIGH
23492	0.808	0.002	0.084	0.001	HIGH
23493	0.955	0.002	0.048	0.000	HIGH
23494	0.264	0.000	0.031	0.000	HIGH
23499	3.347	0.006	0.020	0.000	HIGH
23500	0.842	0.002	0.024	0.000	HIGH
23501	0.001	0.000	0.028	0.000	HIGH
23502	-0.385	0.001	0.021	0.000	HIGH
23503	-0.338	0.001	0.011	0.000	HIGH
23504	-0.170	0.000	0.027	0.000	HIGH
23505	0.028	0.000	0.028	0.000	HIGH
23506	0.228	0.000	0.023	0.000	HIGH
23509	-1.979	0.004	0.039	0.000	HIGH
23510	-1.411	0.003	0.045	0.000	HIGH
23511	-1.559	0.003	0.047	0.000	HIGH
23512	-1.286	0.002	0.037	0.000	HIGH
23513	-0.875	0.002	0.053	0.000	HIGH
23514	-0.555	0.001	0.060	0.000	HIGH
23515	-0.160	0.000	0.066	0.000	HIGH
23518	-4.335	0.008	0.091	0.001	HIGH
23519	-2.488	0.005	0.070	0.000	HIGH
23520	-2.905	0.005	0.053	0.000	HIGH
23521	-2.824	0.005	0.052	0.000	HIGH
23522	-1.945	0.004	0.049	0.000	HIGH
23523	-1.403	0.003	0.126	0.001	HIGH
23524	-0.951	0.002	0.133	0.001	HIGH
23530	-4.019	0.008	0.105	0.001	HIGH
23531	-2.449	0.005	0.182	0.001	HIGH
23532	-1.650	0.003	0.226	0.001	HIGH
23539	-2.472	0.005	0.205	0.001	HIGH
23540	-1.712	0.003	0.396	0.003	HIGH
23550	-0.845	0.002	0.745	0.005	HIGH
23553	-6.624	0.012	0.041	0.000	HIGH
23554	-3.367	0.006	0.249	0.002	HIGH
23559	0.264	0.000	0.456	0.003	HIGH
23561	-6.018	0.011	0.070	0.000	HIGH

4.5.5

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: STER LOADS WITHOUT SRM

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
32232	0.752	0.001	0.022	0.000	HIGH
32233	1.270	0.002	0.205	0.001	HIGH
32234	-10.770	0.020	1.872	0.012	HIGH
32235	-3.778	0.007	0.928	0.006	HIGH
32236	-4.127	0.008	0.027	0.000	HIGH
32237	-2.987	0.006	0.034	0.000	HIGH
32238	-1.241	0.002	0.031	0.000	HIGH
32239	-0.895	0.002	0.029	0.000	HIGH
32240	-0.608	0.001	0.023	0.000	HIGH
32241	-0.276	0.001	0.021	0.000	HIGH
32242	0.038	0.000	0.022	0.000	HIGH
32243	0.223	0.000	0.030	0.000	HIGH
32244	0.961	0.002	0.137	0.001	HIGH
32245	-1.684	0.003	0.595	0.004	HIGH
32246	-2.003	0.004	0.540	0.003	HIGH
32247	-2.727	0.005	0.077	0.000	HIGH
32248	-2.444	0.005	0.042	0.000	HIGH
32249	-1.145	0.002	0.070	0.000	HIGH
32250	-1.132	0.002	0.067	0.000	HIGH
32251	-0.803	0.002	0.034	0.000	HIGH
32252	-0.580	0.001	0.053	0.000	HIGH
32253	-0.306	0.001	0.053	0.000	HIGH
32254	0.114	0.000	0.045	0.000	HIGH
32255	0.183	0.000	0.019	0.000	HIGH
32256	0.384	0.001	0.111	0.001	HIGH
32257	-1.172	0.002	0.392	0.003	HIGH
32258	-0.177	0.000	0.069	0.000	HIGH
32259	-0.713	0.001	0.143	0.001	HIGH
32260	-1.196	0.002	0.213	0.001	HIGH
32261	-0.695	0.001	0.621	0.004	HIGH
32262	-0.819	0.002	0.121	0.001	HIGH
32263	-0.682	0.001	0.057	0.000	HIGH
32264	-0.492	0.001	0.035	0.000	HIGH
32265	-0.535	0.001	0.072	0.000	HIGH
32266	-0.223	0.000	0.054	0.000	HIGH
32267	-0.013	0.000	0.019	0.000	HIGH
32268	0.191	0.000	0.033	0.000	HIGH
32269	0.223	0.000	0.038	0.000	HIGH
32270	2.346	0.004	0.620	0.004	HIGH
32271	1.533	0.003	0.055	0.000	HIGH
32272	1.608	0.003	0.195	0.001	HIGH
32273	0.906	0.002	0.218	0.001	HIGH
32274	2.382	0.004	0.235	0.001	HIGH
32275	4.562	0.009	0.097	0.001	HIGH
32278	2.339	0.004	0.377	0.002	HIGH

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: STER LOADS WITHOUT SRM

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
32339	1.120	0.002	0.058	0.000	HIGH
32340	1.035	0.002	0.103	0.001	HIGH
32341	0.672	0.001	0.109	0.001	HIGH
32342	0.736	0.001	0.101	0.001	HIGH
32343	0.343	0.001	0.047	0.000	HIGH
32346	0.178	0.000	0.028	0.000	HIGH
32347	-0.244	0.000	0.021	0.000	HIGH
32348	-0.347	0.001	0.098	0.001	HIGH
32349	-0.493	0.001	0.017	0.000	HIGH
32350	-0.694	0.001	0.003	0.000	HIGH
32351	-0.659	0.001	0.008	0.000	HIGH
32353	0.331	0.001	0.004	0.000	HIGH
32354	-0.031	0.000	0.001	0.000	HIGH
32355	-0.517	0.001	0.032	0.000	HIGH
32356	-0.698	0.001	0.025	0.000	HIGH
32357	-0.830	0.002	0.035	0.000	HIGH
32358	-1.039	0.002	0.035	0.000	HIGH
32361	0.026	0.000	0.007	0.000	HIGH
32362	-0.285	0.001	0.032	0.000	HIGH
32363	-0.593	0.001	0.043	0.000	HIGH
32364	-1.005	0.002	0.079	0.001	HIGH
32365	-1.203	0.002	0.082	0.001	HIGH
32368	0.011	0.000	0.015	0.000	HIGH
32369	-0.191	0.000	0.021	0.000	HIGH
32370	-0.515	0.001	0.019	0.000	HIGH
32371	-0.779	0.001	0.116	0.001	HIGH
32372	-1.064	0.002	0.175	0.001	HIGH
32375	-0.171	0.000	0.018	0.000	HIGH
32376	-0.411	0.001	0.004	0.000	HIGH
32377	-0.688	0.001	0.017	0.000	HIGH
32378	-0.899	0.002	0.060	0.000	HIGH
32379	-0.815	0.002	0.405	0.003	HIGH
32383	-0.510	0.001	0.036	0.000	HIGH
32384	-0.763	0.001	0.018	0.000	HIGH
32385	-1.065	0.002	0.016	0.000	HIGH
32386	-1.380	0.003	0.025	0.000	HIGH
32387	-1.542	0.003	0.146	0.001	HIGH
32390	0.803	0.002	0.024	0.000	HIGH
32391	-0.529	0.001	0.022	0.000	HIGH
32392	-1.881	0.004	0.055	0.000	HIGH
32393	-1.818	0.003	0.127	0.001	HIGH
32394	-1.915	0.004	0.146	0.001	HIGH
32396	3.977	0.008	0.063	0.000	HIGH
32397	-2.267	0.004	0.016	0.000	HIGH
32398	-3.576	0.007	0.036	0.000	HIGH

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: STER LOADS WITHOUT SRM

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
33328	0.176	0.000	0.085	0.001	HIGH
33329	0.638	0.001	0.070	0.000	HIGH
33330	1.189	0.002	0.281	0.002	HIGH
33331	3.737	0.007	0.095	0.001	HIGH
33332	3.287	0.006	0.058	0.000	HIGH
33333	3.088	0.006	0.105	0.001	HIGH
33334	1.610	0.003	0.285	0.002	HIGH
33338	1.398	0.003	0.271	0.002	HIGH
33339	0.778	0.001	0.135	0.001	HIGH
33340	1.056	0.002	0.116	0.001	HIGH
33341	1.321	0.002	0.200	0.001	HIGH
33342	3.003	0.006	0.114	0.001	HIGH
33343	2.344	0.004	0.044	0.000	HIGH
33344	2.157	0.004	0.149	0.001	HIGH
33345	2.026	0.004	0.334	0.002	HIGH
33350	1.124	0.002	0.371	0.002	HIGH
33351	1.060	0.002	0.142	0.001	HIGH
33352	1.220	0.002	0.108	0.001	HIGH
33353	1.601	0.003	0.090	0.001	HIGH
33354	2.266	0.004	0.107	0.001	HIGH
33355	1.562	0.003	0.057	0.000	HIGH
33356	1.414	0.003	0.114	0.001	HIGH
33357	0.854	0.002	0.254	0.002	HIGH
33363	0.823	0.002	0.250	0.002	HIGH
33364	0.979	0.002	0.077	0.000	HIGH
33365	1.422	0.003	0.060	0.000	HIGH
33366	2.484	0.005	0.047	0.000	HIGH
33367	1.487	0.003	0.069	0.000	HIGH
33368	0.853	0.002	0.055	0.000	HIGH
33369	0.783	0.001	0.054	0.000	HIGH
33370	0.662	0.001	0.164	0.001	HIGH
33371	-0.311	0.001	0.187	0.001	HIGH
33376	0.157	0.000	0.129	0.001	HIGH
33377	0.335	0.001	0.116	0.001	HIGH
33378	0.804	0.002	0.026	0.000	HIGH
33379	1.522	0.003	0.030	0.000	HIGH
33380	3.157	0.006	0.059	0.000	HIGH
33381	0.474	0.001	0.032	0.000	HIGH
33382	0.135	0.000	0.028	0.000	HIGH
33383	0.055	0.000	0.030	0.000	HIGH
33384	0.018	0.000	0.051	0.000	HIGH
33385	-0.012	0.000	0.113	0.001	HIGH
33386	-0.337	0.001	0.243	0.002	HIGH
33390	-0.430	0.001	0.129	0.001	HIGH
33391	-0.411	0.001	0.059	0.000	HIGH

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: STER LOADS WITHOUT SRM

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
33475	0.278	0.001	0.067	0.000	HIGH
33476	0.118	0.000	0.109	0.001	HIGH
33477	-0.021	0.000	0.110	0.001	HIGH
33478	-0.165	0.000	0.129	0.001	HIGH
33479	-0.271	0.001	0.377	0.002	HIGH
33480	0.661	0.001	0.297	0.002	HIGH
33481	0.476	0.001	0.127	0.001	HIGH
33482	0.028	0.000	0.113	0.001	HIGH
33483	-0.396	0.001	0.093	0.001	HIGH
33484	-0.551	0.001	0.382	0.002	HIGH
33485	0.706	0.001	0.169	0.001	HIGH
33486	0.487	0.001	0.143	0.001	HIGH
33487	-0.209	0.000	0.104	0.001	HIGH
33488	-0.915	0.002	0.289	0.002	HIGH
33489	1.041	0.002	0.162	0.001	HIGH
33490	0.945	0.002	0.136	0.001	HIGH
33491	-0.330	0.001	0.188	0.001	HIGH
33492	3.427	0.006	0.143	0.001	HIGH
33499	0.877	0.002	0.081	0.001	HIGH
33500	0.280	0.001	0.027	0.000	HIGH
33501	-0.233	0.000	0.040	0.000	HIGH
33502	-0.490	0.001	0.030	0.000	HIGH
33503	-0.794	0.001	0.010	0.000	HIGH
33504	-1.713	0.003	0.026	0.000	HIGH
33505	-3.448	0.007	0.225	0.001	HIGH
33509	0.378	0.001	0.021	0.000	HIGH
33510	-0.093	0.000	0.012	0.000	HIGH
33511	-0.360	0.001	0.010	0.000	HIGH
33512	-0.509	0.001	0.003	0.000	HIGH
33513	-0.939	0.002	0.034	0.000	HIGH
33514	-1.643	0.003	0.086	0.001	HIGH
33515	-1.781	0.003	0.099	0.001	HIGH
33518	-1.724	0.003	0.054	0.000	HIGH
33519	-0.805	0.002	0.036	0.000	HIGH
33520	-0.340	0.001	0.052	0.000	HIGH
33521	-0.267	0.001	0.036	0.000	HIGH
33522	-0.411	0.001	0.045	0.000	HIGH
33523	-0.865	0.002	0.077	0.000	HIGH
33524	-1.110	0.002	0.087	0.001	HIGH
33530	0.044	0.000	0.074	0.000	HIGH
33531	-0.120	0.000	0.129	0.001	HIGH
33532	-0.292	0.001	0.147	0.001	HIGH
33539	0.675	0.001	0.199	0.001	HIGH
33540	0.569	0.001	0.244	0.002	HIGH
33550	1.609	0.003	0.602	0.004	HIGH

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: STER LOADS WITHOUT SRM

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
42225	-0.690	0.001	0.025	0.000	HIGH
42226	0.918	0.002	0.241	0.002	HIGH
42227	2.466	0.005	0.271	0.002	HIGH
42228	5.236	0.010	2.391	0.015	HIGH
42229	-6.774	0.013	2.690	0.017	HIGH
42230	-4.030	0.008	3.612	0.023	HIGH
42231	-2.887	0.005	3.941	0.025	HIGH
42232	-3.642	0.007	3.870	0.025	HIGH
42233	-4.597	0.009	4.082	0.026	HIGH
42234	1.427	0.003	0.179	0.001	HIGH
42235	0.819	0.002	0.154	0.001	HIGH
42236	1.649	0.003	0.241	0.002	HIGH
42237	3.708	0.007	0.369	0.002	HIGH
42238	5.254	0.010	0.516	0.003	HIGH
42239	2.710	0.005	5.299	0.034	HIGH
42240	-5.993	0.011	12.848	0.082	HIGH
42241	-5.706	0.011	14.931	0.095	HIGH
42242	-5.432	0.010	10.462	0.067	HIGH
42243	-5.176	0.010	2.479	0.016	HIGH
42244	-5.088	0.010	4.114	0.026	HIGH
42245	0.809	0.002	0.242	0.002	HIGH
42246	3.217	0.006	0.600	0.004	HIGH
42247	1.100	0.002	0.554	0.004	HIGH
42248	3.598	0.007	0.029	0.000	HIGH
42249	7.520	0.014	0.692	0.004	HIGH
42250	13.426	0.025	1.866	0.012	HIGH
42251	-9.597	0.018	44.634	0.285	6.73
42252	-1.482	0.003	0.115	0.001	HIGH
42253	-11.470	0.022	40.546	0.259	7.65
42254	-7.013	0.013	2.949	0.019	HIGH
42255	-5.289	0.010	2.966	0.019	HIGH
42256	-4.539	0.009	2.818	0.018	HIGH
42257	0.643	0.001	0.048	0.000	HIGH
42258	0.956	0.002	0.197	0.001	HIGH
42259	3.050	0.006	0.166	0.001	HIGH
42260	0.950	0.002	0.185	0.001	HIGH
42261	3.164	0.006	0.236	0.002	HIGH
42262	5.482	0.010	4.102	0.026	HIGH
42263	19.180	0.036	3.490	0.022	HIGH
42264	-3.659	0.007	23.035	0.147	HIGH
42265	-5.045	0.010	19.861	0.127	HIGH
42266	-4.779	0.009	6.962	0.044	HIGH
42267	-3.982	0.008	1.664	0.011	HIGH
42268	-3.387	0.006	1.643	0.010	HIGH
42269	-2.823	0.005	1.198	0.008	HIGH

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: STER LOADS WITHOUT SRM

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
42332	-3.532	0.007	3.365	0.021	HIGH
42333	-2.556	0.005	3.690	0.024	HIGH
42334	0.921	0.002	12.863	0.082	HIGH
42335	0.060	0.000	5.744	0.037	HIGH
42336	-1.638	0.003	4.930	0.031	HIGH
42337	-1.720	0.003	4.447	0.028	HIGH
42338	0.872	0.002	4.626	0.030	HIGH
42339	0.200	0.000	3.076	0.020	HIGH
42340	-0.536	0.001	2.197	0.014	HIGH
42341	1.030	0.002	1.155	0.007	HIGH
42342	0.415	0.001	1.179	0.008	HIGH
42343	0.362	0.001	0.234	0.001	HIGH
42346	-2.046	0.004	4.057	0.026	HIGH
42347	0.465	0.001	2.528	0.016	HIGH
42348	1.264	0.002	2.551	0.016	HIGH
42349	1.063	0.002	2.196	0.014	HIGH
42350	0.268	0.001	1.387	0.009	HIGH
42351	-0.283	0.001	1.474	0.009	HIGH
42353	-2.986	0.006	9.992	0.064	HIGH
42354	1.527	0.003	3.540	0.023	HIGH
42355	2.193	0.004	7.481	0.048	HIGH
42356	1.928	0.004	7.563	0.048	HIGH
42357	0.231	0.000	3.555	0.023	HIGH
42358	-0.293	0.001	3.825	0.024	HIGH
42361	5.443	0.010	7.350	0.047	HIGH
42362	4.151	0.008	5.768	0.037	HIGH
42363	3.838	0.007	13.670	0.087	HIGH
42364	-0.565	0.001	9.010	0.058	HIGH
42365	-1.307	0.002	8.094	0.052	HIGH
42368	11.041	0.021	4.785	0.031	HIGH
42369	8.094	0.015	4.638	0.030	HIGH
42370	7.822	0.015	13.026	0.083	HIGH
42371	-3.422	0.006	23.536	0.150	HIGH
42372	-3.555	0.007	17.423	0.111	HIGH
42375	13.376	0.025	1.749	0.011	HIGH
42376	4.847	0.009	3.277	0.021	HIGH
42377	5.176	0.010	11.857	0.076	HIGH
42378	-0.875	0.002	0.129	0.001	HIGH
42379	-2.575	0.005	18.638	0.119	HIGH
42383	10.027	0.019	0.839	0.005	HIGH
42384	8.185	0.015	0.540	0.003	HIGH
42385	10.748	0.020	1.281	0.008	HIGH
42386	-2.402	0.005	6.565	0.042	HIGH
42387	-2.019	0.004	7.454	0.048	HIGH
42390	8.987	0.017	0.232	0.001	HIGH

5 5 80 0

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: STER LOADS WITHOUT SRM

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
43330	-0.856	0.002	0.221	0.001	HIGH
43331	-2.577	0.005	0.240	0.002	HIGH
43332	-2.036	0.004	0.176	0.001	HIGH
43333	-1.699	0.003	0.218	0.001	HIGH
43334	-0.869	0.002	2.123	0.014	HIGH
43338	-0.182	0.000	2.121	0.014	HIGH
43339	-0.250	0.000	0.217	0.001	HIGH
43340	-0.569	0.001	0.191	0.001	HIGH
43341	-0.377	0.001	0.221	0.001	HIGH
43342	-2.758	0.005	0.202	0.001	HIGH
43343	-2.084	0.004	0.219	0.001	HIGH
43344	-2.063	0.004	0.142	0.001	HIGH
43345	-2.081	0.004	0.763	0.005	HIGH
43346	1.296	0.002	0.920	0.006	HIGH
43349	-0.892	0.002	0.929	0.006	HIGH
43350	0.361	0.001	0.753	0.005	HIGH
43351	0.060	0.000	0.160	0.001	HIGH
43352	-0.105	0.000	0.219	0.001	HIGH
43353	0.199	0.000	0.209	0.001	HIGH
43354	-3.487	0.007	0.186	0.001	HIGH
43355	-2.322	0.004	0.185	0.001	HIGH
43356	-2.001	0.004	0.143	0.001	HIGH
43357	-1.761	0.003	0.276	0.002	HIGH
43358	-1.260	0.002	0.755	0.005	HIGH
43359	-1.281	0.002	0.826	0.005	HIGH
43360	-0.070	0.000	0.289	0.002	HIGH
43361	1.382	0.003	0.845	0.005	HIGH
43362	0.351	0.001	0.747	0.005	HIGH
43363	0.372	0.001	0.256	0.002	HIGH
43364	0.348	0.001	0.159	0.001	HIGH
43365	0.499	0.001	0.164	0.001	HIGH
43366	1.187	0.002	0.169	0.001	HIGH
43367	-3.997	0.008	0.122	0.001	HIGH
43368	-2.659	0.005	0.125	0.001	HIGH
43369	-1.905	0.004	0.092	0.001	HIGH
43370	-1.349	0.003	0.071	0.000	HIGH
43371	-0.841	0.002	0.276	0.002	HIGH
43372	-0.655	0.001	0.343	0.002	HIGH
43373	-0.327	0.001	0.311	0.002	HIGH
43374	0.424	0.001	0.323	0.002	HIGH
43375	0.412	0.001	0.348	0.002	HIGH
43376	0.238	0.000	0.258	0.002	HIGH
43377	0.407	0.001	0.075	0.000	HIGH
43378	0.725	0.001	0.104	0.001	HIGH
43379	1.180	0.002	0.101	0.001	HIGH

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: STER LOADS WITHOUT SRM

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
43435	-2.388	0.005	2.011	0.013	HIGH
43438	-3.807	0.007	2.453	0.016	HIGH
43440	-2.476	0.005	0.695	0.004	HIGH
43441	-2.873	0.005	0.313	0.002	HIGH
43442	-3.185	0.006	0.583	0.004	HIGH
43443	-3.726	0.007	0.585	0.004	HIGH
43446	-1.975	0.004	3.890	0.025	HIGH
43450	-2.490	0.005	0.481	0.003	HIGH
43451	-3.006	0.006	0.501	0.003	HIGH
43452	-3.738	0.007	0.504	0.003	HIGH
43453	-2.898	0.005	0.471	0.003	HIGH
43455	-3.243	0.006	1.529	0.010	HIGH
43456	-2.471	0.005	0.878	0.006	HIGH
43457	-2.875	0.005	1.119	0.007	HIGH
43459	-2.194	0.004	0.452	0.003	HIGH
43460	-2.580	0.005	0.441	0.003	HIGH
43461	-2.592	0.005	0.432	0.003	HIGH
43462	-1.483	0.003	0.459	0.003	HIGH
43463	-2.055	0.004	0.790	0.005	HIGH
43464	-1.993	0.004	0.583	0.004	HIGH
43465	-1.210	0.002	0.488	0.003	HIGH
43467	-1.610	0.003	0.469	0.003	HIGH
43468	-1.763	0.003	0.449	0.003	HIGH
43469	-1.535	0.003	0.374	0.002	HIGH
43470	-1.539	0.003	0.531	0.003	HIGH
43471	-1.224	0.002	0.515	0.003	HIGH
43472	-0.892	0.002	0.229	0.001	HIGH
43473	-0.712	0.001	0.326	0.002	HIGH
43474	-0.702	0.001	0.745	0.005	HIGH
43475	-0.861	0.002	0.323	0.002	HIGH
43476	-1.012	0.002	0.316	0.002	HIGH
43477	-0.971	0.002	0.317	0.002	HIGH
43478	-0.791	0.001	0.267	0.002	HIGH
43479	-0.893	0.002	0.338	0.002	HIGH
43480	0.076	0.000	0.750	0.005	HIGH
43481	-0.276	0.001	0.216	0.001	HIGH
43482	-0.574	0.001	0.200	0.001	HIGH
43483	-0.707	0.001	0.199	0.001	HIGH
43484	-0.871	0.002	0.172	0.001	HIGH
43485	0.477	0.001	0.558	0.004	HIGH
43486	0.031	0.000	0.159	0.001	HIGH
43487	-0.403	0.001	0.098	0.001	HIGH
43488	-0.860	0.002	0.077	0.000	HIGH
43489	0.901	0.002	0.391	0.002	HIGH
43490	0.392	0.001	0.124	0.001	HIGH

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: STER LOADS WITHOUT SRM

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
43561	4.057	0.008	0.514	0.003	HIGH
43562	3.987	0.008	0.556	0.004	HIGH
43563	3.267	0.006	0.801	0.005	HIGH
43564	2.108	0.004	0.456	0.003	HIGH
43565	3.005	0.006	0.348	0.002	HIGH
43566	2.696	0.005	0.362	0.002	HIGH
43567	2.164	0.004	0.366	0.002	HIGH
43568	2.992	0.006	0.309	0.002	HIGH
43569	3.477	0.007	0.264	0.002	HIGH
43570	3.157	0.006	0.514	0.003	HIGH
43571	3.190	0.006	0.529	0.003	HIGH
43572	2.708	0.005	0.420	0.003	HIGH
43573	2.540	0.005	0.342	0.002	HIGH
43574	2.128	0.004	0.408	0.003	HIGH
43575	2.973	0.006	0.352	0.002	HIGH
43576	3.015	0.006	0.250	0.002	HIGH
43577	3.010	0.006	0.343	0.002	HIGH
43578	2.787	0.005	0.342	0.002	HIGH
43579	2.298	0.004	0.192	0.001	HIGH
43580	1.879	0.004	0.591	0.004	HIGH
43581	2.937	0.006	0.210	0.001	HIGH
43582	2.876	0.005	0.203	0.001	HIGH
43583	2.574	0.005	0.203	0.001	HIGH
43584	2.039	0.004	0.158	0.001	HIGH
43585	1.483	0.003	0.517	0.003	HIGH
43586	2.879	0.005	0.058	0.000	HIGH
43587	2.398	0.005	0.081	0.001	HIGH
43588	1.666	0.003	0.071	0.000	HIGH
43589	0.999	0.002	0.320	0.002	HIGH
43590	1.753	0.003	0.060	0.000	HIGH
43591	1.022	0.002	0.057	0.000	HIGH
43592	0.246	0.000	0.137	0.001	HIGH
43594	-1.819	0.003	0.168	0.001	HIGH
52201	-0.473	0.001	1.100	0.007	HIGH
52202	-5.248	0.010	0.497	0.003	HIGH
52204	0.973	0.002	0.115	0.001	HIGH
52205	2.114	0.004	0.033	0.000	HIGH
52206	-2.558	0.005	0.083	0.001	HIGH
52207	6.344	0.012	0.689	0.004	HIGH
52208	-4.433	0.008	0.295	0.002	HIGH
52215	0.017	0.000	2.959	0.019	HIGH
52216	-0.671	0.001	0.747	0.005	HIGH
52222	7.038	0.013	0.162	0.001	HIGH
52223	8.418	0.016	0.951	0.006	HIGH
52224	-0.683	0.001	3.993	0.025	HIGH

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: STER LOADS WITHOUT SRM

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
52270	2.304	0.004	0.166	0.001	HIGH
52271	1.772	0.003	0.084	0.001	HIGH
52272	1.618	0.003	0.246	0.002	HIGH
52273	1.640	0.003	0.188	0.001	HIGH
52274	1.168	0.002	0.149	0.001	HIGH
52275	-4.331	0.008	0.282	0.002	HIGH
52278	1.882	0.004	0.074	0.000	HIGH
52279	2.734	0.005	0.150	0.001	HIGH
52280	0.058	0.000	0.008	0.000	HIGH
52281	2.681	0.005	0.047	0.000	HIGH
52282	0.986	0.002	0.060	0.000	HIGH
52283	-1.067	0.002	0.424	0.003	HIGH
52286	3.578	0.007	0.260	0.002	HIGH
52287	3.018	0.006	0.012	0.000	HIGH
52288	2.497	0.005	0.012	0.000	HIGH
52289	2.405	0.005	0.014	0.000	HIGH
52290	2.878	0.005	0.093	0.001	HIGH
52293	2.757	0.005	0.350	0.002	HIGH
52294	3.753	0.007	0.055	0.000	HIGH
52295	0.113	0.000	0.008	0.000	HIGH
52296	5.325	0.010	0.022	0.000	HIGH
52297	5.818	0.011	0.061	0.000	HIGH
52300	4.964	0.009	0.395	0.003	HIGH
52301	5.005	0.009	0.019	0.000	HIGH
52302	5.917	0.011	0.053	0.000	HIGH
52303	5.333	0.010	0.050	0.000	HIGH
52304	5.680	0.011	0.073	0.000	HIGH
52308	7.952	0.015	0.259	0.002	HIGH
52309	6.553	0.012	0.120	0.001	HIGH
52310	6.683	0.013	0.188	0.001	HIGH
52311	5.139	0.010	0.156	0.001	HIGH
52312	2.747	0.005	0.071	0.000	HIGH
52316	7.967	0.015	0.417	0.003	HIGH
52317	8.662	0.016	0.412	0.003	HIGH
52318	9.948	0.019	0.856	0.005	HIGH
52319	1.733	0.003	1.339	0.009	HIGH
52320	-0.368	0.001	0.749	0.005	HIGH
52323	8.181	0.015	1.780	0.011	HIGH
52324	8.621	0.016	1.536	0.010	HIGH
52325	8.233	0.016	5.328	0.034	HIGH
52326	7.686	0.015	14.365	0.092	HIGH
52327	-6.552	0.012	0.551	0.004	HIGH
52329	7.949	0.015	4.015	0.026	HIGH
52330	8.824	0.017	4.976	0.032	HIGH
52331	8.720	0.016	14.527	0.093	HIGH

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: STER LOADS WITHOUT SRM

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
52391	-6.471	0.012	0.040	0.000	HIGH
52392	-8.809	0.017	0.092	0.001	HIGH
52393	-9.434	0.018	0.057	0.000	HIGH
52394	-7.953	0.015	0.139	0.001	HIGH
52396	-7.263	0.014	0.608	0.004	HIGH
52397	-6.457	0.012	0.047	0.000	HIGH
52398	-6.700	0.013	0.043	0.000	HIGH
52399	-6.416	0.012	0.080	0.001	HIGH
52400	-8.200	0.015	0.183	0.001	HIGH
52401	-6.238	0.012	1.806	0.012	HIGH
52402	-6.049	0.011	0.979	0.006	HIGH
52403	-6.621	0.012	0.078	0.000	HIGH
52404	-6.993	0.013	0.048	0.000	HIGH
52405	-3.914	0.007	1.108	0.007	HIGH
52406	-5.760	0.011	3.357	0.021	HIGH
52407	-5.864	0.011	0.962	0.006	HIGH
52408	-6.206	0.012	0.053	0.000	HIGH
52409	-6.839	0.013	0.291	0.002	HIGH
52410	-5.093	0.010	2.962	0.019	HIGH
52411	-5.286	0.010	0.381	0.002	HIGH
52412	-5.014	0.009	0.318	0.002	HIGH
52413	-3.919	0.007	1.301	0.008	HIGH
52414	-4.463	0.008	0.202	0.001	HIGH
52415	-2.013	0.004	0.297	0.002	HIGH
52425	0.095	0.000	0.341	0.002	HIGH
52426	-5.795	0.011	0.112	0.001	HIGH
52427	0.011	0.000	0.167	0.001	HIGH
52443	0.629	0.001	0.052	0.000	HIGH
52444	0.539	0.001	0.075	0.000	HIGH
52445	-6.864	0.013	0.099	0.001	HIGH
52446	0.078	0.000	0.205	0.001	HIGH
52447	-2.729	0.005	0.888	0.006	HIGH
52463	-7.146	0.013	0.203	0.001	HIGH
52464	4.105	0.008	0.440	0.003	HIGH
52465	-4.396	0.008	0.291	0.002	HIGH
53301	0.607	0.001	0.157	0.001	HIGH
53302	-3.032	0.006	0.065	0.000	HIGH
53303	-3.686	0.007	0.027	0.000	HIGH
53304	3.017	0.006	0.083	0.001	HIGH
53305	-4.151	0.008	0.080	0.001	HIGH
53306	3.918	0.007	0.031	0.000	HIGH
53307	-1.851	0.003	0.054	0.000	HIGH
53308	4.102	0.008	0.041	0.000	HIGH
53313	1.512	0.003	0.262	0.002	HIGH
53314	1.871	0.004	0.058	0.000	HIGH

5.5-40

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: STER LOADS WITHOUT SRM

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
53383	0.544	0.001	0.017	0.000	HIGH
53384	0.826	0.002	0.022	0.000	HIGH
53385	0.783	0.001	0.040	0.000	HIGH
53386	0.687	0.001	0.065	0.000	HIGH
53390	0.461	0.001	0.108	0.001	HIGH
53391	0.251	0.000	0.011	0.000	HIGH
53392	-0.381	0.001	0.009	0.000	HIGH
53393	-0.623	0.001	0.010	0.000	HIGH
53394	-0.852	0.002	0.008	0.000	HIGH
53395	-1.164	0.002	0.022	0.000	HIGH
53397	3.403	0.006	0.152	0.001	HIGH
53398	1.810	0.003	0.021	0.000	HIGH
53399	0.947	0.002	0.008	0.000	HIGH
53400	0.552	0.001	0.022	0.000	HIGH
53401	-0.034	0.000	0.034	0.000	HIGH
53402	-1.180	0.002	0.024	0.000	HIGH
53403	-3.658	0.007	0.143	0.001	HIGH
53406	2.195	0.004	0.059	0.000	HIGH
53407	2.269	0.004	0.046	0.000	HIGH
53408	1.634	0.003	0.014	0.000	HIGH
53409	1.313	0.002	0.002	0.000	HIGH
53410	1.224	0.002	0.017	0.000	HIGH
53411	0.765	0.001	0.030	0.000	HIGH
53412	0.503	0.001	0.078	0.000	HIGH
53413	-2.680	0.005	0.102	0.001	HIGH
53415	1.954	0.004	0.030	0.000	HIGH
53416	2.011	0.004	0.026	0.000	HIGH
53417	1.766	0.003	0.017	0.000	HIGH
53418	2.154	0.004	0.043	0.000	HIGH
53419	2.249	0.004	0.057	0.000	HIGH
53420	2.139	0.004	0.064	0.000	HIGH
53421	3.818	0.007	0.076	0.000	HIGH
53424	1.485	0.003	0.055	0.000	HIGH
53425	1.856	0.004	0.053	0.000	HIGH
53426	2.855	0.005	0.083	0.001	HIGH
53432	0.198	0.000	0.111	0.001	HIGH
53433	0.579	0.001	0.104	0.001	HIGH
53440	-1.366	0.003	0.213	0.001	HIGH
53450	-0.800	0.002	0.718	0.005	HIGH
53455	2.718	0.005	0.205	0.001	HIGH
53456	5.436	0.010	0.033	0.000	HIGH
53457	1.086	0.002	0.062	0.000	HIGH
53463	5.250	0.010	0.106	0.001	HIGH
53464	5.779	0.011	0.096	0.001	HIGH
53465	6.483	0.012	0.051	0.000	HIGH

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: STER LOADS WITHOUT SRM

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
53522	-1.650	0.003	0.038	0.000	HIGH
53523	-1.123	0.002	0.074	0.000	HIGH
53524	-0.711	0.001	0.077	0.000	HIGH
53530	-3.578	0.007	0.104	0.001	HIGH
53531	-2.098	0.004	0.098	0.001	HIGH
53532	-1.297	0.002	0.110	0.001	HIGH
53539	-2.183	0.004	0.163	0.001	HIGH
53540	-1.477	0.003	0.206	0.001	HIGH
53550	-0.645	0.001	0.415	0.003	HIGH
53553	-6.054	0.011	0.025	0.000	HIGH
53554	-3.166	0.006	0.209	0.001	HIGH
53559	0.422	0.001	0.278	0.002	HIGH
53561	-5.701	0.011	0.092	0.001	HIGH
53562	-5.744	0.011	0.094	0.001	HIGH
53563	-5.071	0.010	0.099	0.001	HIGH
53568	-3.726	0.007	0.219	0.001	HIGH
53569	-4.427	0.008	0.113	0.001	HIGH
53570	-4.880	0.009	0.139	0.001	HIGH
53571	-4.776	0.009	0.153	0.001	HIGH
53574	-0.742	0.001	0.126	0.001	HIGH
53575	-3.247	0.006	0.361	0.002	HIGH
53576	-3.494	0.007	0.101	0.001	HIGH
53577	-3.578	0.007	0.103	0.001	HIGH
53578	-3.184	0.006	0.102	0.001	HIGH
53579	-2.181	0.004	0.054	0.000	HIGH
53580	-1.805	0.003	0.137	0.001	HIGH
53581	-2.578	0.005	0.331	0.002	HIGH
53582	-2.677	0.005	0.062	0.000	HIGH
53583	-2.991	0.006	0.089	0.001	HIGH
53584	-3.230	0.006	0.085	0.001	HIGH
53585	-2.922	0.006	0.125	0.001	HIGH
53586	-1.657	0.003	0.212	0.001	HIGH
53587	-2.205	0.004	0.081	0.001	HIGH
53588	-2.832	0.005	0.083	0.001	HIGH
53589	-2.809	0.005	0.084	0.001	HIGH
53590	-1.188	0.002	0.102	0.001	HIGH
53591	-2.346	0.004	0.080	0.001	HIGH
53592	-2.268	0.004	0.073	0.000	HIGH
53594	-2.992	0.006	0.068	0.000	HIGH
62201	-7.041	0.013	0.689	0.004	HIGH
62202	4.816	0.009	0.172	0.001	HIGH
62203	4.218	0.008	0.101	0.001	HIGH
62204	-4.646	0.009	0.153	0.001	HIGH
62205	0.141	0.000	0.058	0.000	HIGH
62206	1.107	0.002	0.123	0.001	HIGH

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: STER LOADS WITHOUT SRM

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
62263	-0.833	0.002	0.040	0.000	HIGH
62264	-0.504	0.001	0.037	0.000	HIGH
62265	-0.577	0.001	0.050	0.000	HIGH
62266	-0.176	0.000	0.122	0.001	HIGH
62267	0.090	0.000	0.153	0.001	HIGH
62268	0.301	0.001	0.069	0.000	HIGH
62269	0.274	0.001	0.066	0.000	HIGH
62270	0.885	0.002	0.315	0.002	HIGH
62271	0.207	0.000	3.499	0.022	HIGH
62272	2.462	0.005	0.821	0.005	HIGH
62273	1.483	0.003	0.185	0.001	HIGH
62274	3.570	0.007	0.507	0.003	HIGH
62275	5.190	0.010	0.413	0.003	HIGH
62278	1.773	0.003	1.333	0.009	HIGH
62279	3.602	0.007	2.495	0.016	HIGH
62280	2.147	0.004	0.316	0.002	HIGH
62281	3.840	0.007	0.267	0.002	HIGH
62282	-0.010	0.000	0.241	0.002	HIGH
62283	0.681	0.001	0.191	0.001	HIGH
62286	2.744	0.005	0.967	0.006	HIGH
62287	2.023	0.004	0.645	0.004	HIGH
62288	3.124	0.006	0.172	0.001	HIGH
62289	1.946	0.004	0.164	0.001	HIGH
62290	-0.848	0.002	0.126	0.001	HIGH
62293	2.934	0.006	0.243	0.002	HIGH
62294	3.282	0.006	0.229	0.001	HIGH
62295	2.700	0.005	0.056	0.000	HIGH
62296	1.356	0.003	0.060	0.000	HIGH
62297	-0.713	0.001	0.048	0.000	HIGH
62300	3.169	0.006	0.109	0.001	HIGH
62301	2.880	0.005	0.084	0.001	HIGH
62302	2.382	0.004	0.036	0.000	HIGH
62303	1.199	0.002	0.015	0.000	HIGH
62304	0.368	0.001	0.066	0.000	HIGH
62308	2.315	0.004	0.090	0.001	HIGH
62309	3.102	0.006	0.082	0.001	HIGH
62310	2.209	0.004	0.055	0.000	HIGH
62311	1.524	0.003	0.096	0.001	HIGH
62312	1.171	0.002	0.099	0.001	HIGH
62316	2.643	0.005	0.166	0.001	HIGH
62317	2.322	0.004	0.148	0.001	HIGH
62318	2.076	0.004	0.111	0.001	HIGH
62319	1.816	0.003	0.182	0.001	HIGH
62320	1.538	0.003	0.170	0.001	HIGH
62323	2.190	0.004	0.273	0.002	HIGH

5.5.205

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: STER LOADS WITHOUT SRM

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
62379	-0.842	0.002	0.666	0.004	HIGH
62383	2.630	0.005	0.060	0.000	HIGH
62384	0.602	0.001	0.018	0.000	HIGH
62385	-0.568	0.001	0.025	0.000	HIGH
62386	-1.293	0.002	0.047	0.000	HIGH
62387	-1.846	0.003	0.247	0.002	HIGH
62390	3.119	0.006	0.103	0.001	HIGH
62391	0.790	0.001	0.061	0.000	HIGH
62392	-0.540	0.001	0.057	0.000	HIGH
62393	-1.024	0.002	0.061	0.000	HIGH
62394	-2.664	0.005	0.165	0.001	HIGH
62396	2.257	0.004	0.314	0.002	HIGH
62397	-0.369	0.001	0.158	0.001	HIGH
62398	-1.508	0.003	0.166	0.001	HIGH
62399	-2.063	0.004	0.129	0.001	HIGH
62400	-2.308	0.004	0.066	0.000	HIGH
62401	-2.017	0.004	0.724	0.005	HIGH
62402	-5.915	0.011	0.428	0.003	HIGH
62403	-4.156	0.008	0.500	0.003	HIGH
62404	-3.019	0.006	0.451	0.003	HIGH
62405	-2.571	0.005	0.132	0.001	HIGH
62406	-11.155	0.021	1.729	0.011	HIGH
62407	-5.396	0.010	0.793	0.005	HIGH
62408	-4.546	0.009	1.228	0.008	HIGH
62409	-1.758	0.003	0.332	0.002	HIGH
62410	-8.132	0.015	2.654	0.017	HIGH
62411	-3.749	0.007	2.170	0.014	HIGH
62412	-5.791	0.011	1.462	0.009	HIGH
62413	-2.903	0.005	4.897	0.031	HIGH
62414	-1.738	0.003	1.708	0.011	HIGH
62415	-2.029	0.004	1.560	0.010	HIGH
63301	3.059	0.006	0.040	0.000	HIGH
63302	-2.817	0.005	0.039	0.000	HIGH
63303	-2.060	0.004	0.036	0.000	HIGH
63304	3.679	0.007	0.006	0.000	HIGH
63305	-0.235	0.000	0.031	0.000	HIGH
63306	0.677	0.001	0.039	0.000	HIGH
63307	0.610	0.001	0.043	0.000	HIGH
63308	-0.361	0.001	0.047	0.000	HIGH
63313	2.830	0.005	0.016	0.000	HIGH
63314	3.167	0.006	0.014	0.000	HIGH
63319	0.325	0.001	0.045	0.000	HIGH
63320	0.756	0.001	0.034	0.000	HIGH
63321	3.527	0.007	0.027	0.000	HIGH
63322	3.131	0.006	0.024	0.000	HIGH

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: STER LOADS WITHOUT SRM

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
63386	-1.191	0.002	0.137	0.001	HIGH
63390	-0.831	0.002	0.152	0.001	HIGH
63391	-0.758	0.001	0.063	0.000	HIGH
63392	-0.484	0.001	0.027	0.000	HIGH
63393	-0.108	0.000	0.015	0.000	HIGH
63394	0.162	0.000	0.038	0.000	HIGH
63396	0.946	0.002	0.023	0.000	HIGH
63397	0.924	0.002	0.018	0.000	HIGH
63398	1.016	0.002	0.020	0.000	HIGH
63399	1.140	0.002	0.014	0.000	HIGH
63400	1.181	0.002	0.025	0.000	HIGH
63401	0.974	0.002	0.027	0.000	HIGH
63402	0.688	0.001	0.025	0.000	HIGH
63403	-0.513	0.001	0.107	0.001	HIGH
63406	0.703	0.001	0.044	0.000	HIGH
63407	0.961	0.002	0.031	0.000	HIGH
63408	1.211	0.002	0.029	0.000	HIGH
63409	1.544	0.003	0.041	0.000	HIGH
63410	1.797	0.003	0.048	0.000	HIGH
63411	1.953	0.004	0.048	0.000	HIGH
63412	2.909	0.005	0.072	0.000	HIGH
63413	2.031	0.004	0.202	0.001	HIGH
63415	0.788	0.001	0.068	0.000	HIGH
63416	1.130	0.002	0.065	0.000	HIGH
63417	1.573	0.003	0.050	0.000	HIGH
63418	2.175	0.004	0.056	0.000	HIGH
63419	2.189	0.004	0.060	0.000	HIGH
63420	1.961	0.004	0.057	0.000	HIGH
63421	3.406	0.006	0.068	0.000	HIGH
63424	0.857	0.002	0.109	0.001	HIGH
63425	1.399	0.003	0.087	0.001	HIGH
63426	2.426	0.005	0.105	0.001	HIGH
63432	0.650	0.001	0.207	0.001	HIGH
63433	1.340	0.003	0.191	0.001	HIGH
63440	-0.238	0.000	0.419	0.003	HIGH
63450	-1.231	0.002	0.462	0.003	HIGH
63455	0.147	0.000	0.185	0.001	HIGH
63456	1.788	0.003	0.069	0.000	HIGH
63457	1.340	0.003	0.091	0.001	HIGH
63463	0.302	0.001	0.094	0.001	HIGH
63464	0.844	0.002	0.091	0.001	HIGH
63465	0.449	0.001	0.083	0.001	HIGH
63467	0.356	0.001	0.318	0.002	HIGH
63470	0.227	0.000	0.127	0.001	HIGH
63471	0.300	0.001	0.118	0.001	HIGH

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: STER LOADS WITHOUT SRM

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
63539	0.629	0.001	0.239	0.002	HIGH
63540	0.492	0.001	0.279	0.002	HIGH
63550	1.608	0.003	0.740	0.005	HIGH
63553	-1.697	0.003	0.084	0.001	HIGH
63554	-0.256	0.000	0.170	0.001	HIGH
63559	0.536	0.001	1.182	0.008	HIGH
63561	-3.643	0.007	0.057	0.000	HIGH
63562	-2.652	0.005	0.085	0.001	HIGH
63563	-2.494	0.005	0.092	0.001	HIGH
63568	-2.858	0.005	0.038	0.000	HIGH
63569	-3.119	0.006	0.034	0.000	HIGH
63570	-2.959	0.006	0.089	0.001	HIGH
63571	-2.937	0.006	0.093	0.001	HIGH
63574	0.881	0.002	0.321	0.002	HIGH
63575	-2.354	0.004	0.042	0.000	HIGH
63576	-2.512	0.005	0.033	0.000	HIGH
63577	-2.254	0.004	0.058	0.000	HIGH
63578	-1.647	0.003	0.060	0.000	HIGH
63579	-0.616	0.001	0.050	0.000	HIGH
63580	0.277	0.001	0.250	0.002	HIGH
63581	-2.121	0.004	0.043	0.000	HIGH
63582	-1.993	0.004	0.036	0.000	HIGH
63583	-1.653	0.003	0.042	0.000	HIGH
63584	-1.204	0.002	0.047	0.000	HIGH
63585	-0.648	0.001	0.181	0.001	HIGH
63586	-1.827	0.003	0.043	0.000	HIGH
63587	-1.573	0.003	0.026	0.000	HIGH
63588	-1.317	0.002	0.029	0.000	HIGH
63589	-0.977	0.002	0.119	0.001	HIGH
63590	-1.521	0.003	0.048	0.000	HIGH
63591	-1.277	0.002	0.011	0.000	HIGH
63592	-1.027	0.002	0.052	0.000	HIGH
63593	-1.237	0.002	0.049	0.000	HIGH
63594	-1.036	0.002	0.033	0.000	HIGH
63595	-0.917	0.002	0.032	0.000	HIGH

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: THRUSTER LOADS - SRM ATTACHED

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
12201	-0.261	0.000	0.060	0.000	HIGH
12202	3.295	0.006	0.068	0.000	HIGH
12204	-1.903	0.004	0.059	0.000	HIGH
12205	0.583	0.001	0.040	0.000	HIGH
12206	-2.120	0.004	0.070	0.000	HIGH
12207	-2.777	0.005	0.226	0.001	HIGH
12208	-1.811	0.003	0.165	0.001	HIGH
12215	-0.264	0.000	0.122	0.001	HIGH
12216	0.227	0.000	0.107	0.001	HIGH
12222	-2.222	0.004	0.167	0.001	HIGH
12223	-2.910	0.005	0.205	0.001	HIGH
12224	0.781	0.001	0.194	0.001	HIGH
12225	0.687	0.001	0.146	0.001	HIGH
12226	0.947	0.002	0.037	0.000	HIGH
12227	2.809	0.005	1.242	0.008	HIGH
12228	5.128	0.010	1.584	0.010	HIGH
12229	-5.365	0.010	2.483	0.016	HIGH
12230	-3.042	0.006	0.421	0.003	HIGH
12231	-2.782	0.005	0.220	0.001	HIGH
12232	-3.899	0.007	0.137	0.001	HIGH
12233	-3.965	0.007	0.994	0.006	HIGH
12234	1.031	0.002	0.095	0.001	HIGH
12235	1.042	0.002	0.168	0.001	HIGH
12236	2.430	0.005	0.009	0.000	HIGH
12237	3.180	0.006	0.035	0.000	HIGH
12238	7.115	0.013	0.917	0.006	HIGH
12239	20.335	0.038	1.037	0.007	HIGH
12240	-5.067	0.010	9.220	0.059	HIGH
12241	-5.298	0.010	10.254	0.065	HIGH
12242	-4.774	0.009	5.717	0.037	HIGH
12243	-4.876	0.009	1.199	0.008	HIGH
12244	-4.423	0.008	0.963	0.006	HIGH
12245	0.749	0.001	0.047	0.000	HIGH
12246	0.868	0.002	0.125	0.001	HIGH
12247	2.293	0.004	0.040	0.000	HIGH
12248	3.324	0.006	0.010	0.000	HIGH
12249	8.327	0.016	0.785	0.005	HIGH
12250	13.465	0.025	4.687	0.030	HIGH
12251	-7.439	0.014	44.419	0.284	7.05
12252	-1.345	0.003	0.112	0.001	HIGH
12253	-10.509	0.020	37.596	0.240	8.79
12254	-6.399	0.012	3.505	0.022	HIGH
12255	-4.749	0.009	2.612	0.017	HIGH
12256	-3.816	0.007	1.410	0.009	HIGH
12257	0.470	0.001	0.058	0.000	HIGH

PRECEDING PAGE BLANK NOT FILMED

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: STER LOADS - SRM ATTACHED

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
12317	1.348	0.003	27.320	0.174	HIGH
12318	-6.889	0.013	12.666	0.081	HIGH
12319	-6.648	0.013	12.041	0.077	HIGH
12320	-5.177	0.010	0.201	0.001	HIGH
12323	6.375	0.012	19.859	0.127	HIGH
12324	0.568	0.001	0.157	0.001	HIGH
12325	-5.562	0.010	36.437	0.233	HIGH
12326	-6.041	0.011	14.342	0.092	HIGH
12327	-1.614	0.003	0.069	0.000	HIGH
12329	1.251	0.002	15.295	0.098	HIGH
12330	1.141	0.002	13.566	0.087	HIGH
12331	-2.915	0.005	8.729	0.056	HIGH
12332	-2.780	0.005	5.353	0.034	HIGH
12333	-1.640	0.003	0.568	0.004	HIGH
12334	1.495	0.003	9.978	0.064	HIGH
12335	0.583	0.001	5.228	0.033	HIGH
12336	-1.040	0.002	2.261	0.014	HIGH
12337	-1.480	0.003	2.241	0.014	HIGH
12338	1.575	0.003	3.137	0.020	HIGH
12339	0.761	0.001	1.964	0.013	HIGH
12340	-0.136	0.000	0.967	0.006	HIGH
12341	1.343	0.003	0.521	0.003	HIGH
12342	0.898	0.002	0.533	0.003	HIGH
12343	0.857	0.002	0.073	0.000	HIGH
12346	0.870	0.002	0.118	0.001	HIGH
12347	1.452	0.003	0.146	0.001	HIGH
12348	1.557	0.003	2.607	0.017	HIGH
12349	1.026	0.002	1.844	0.012	HIGH
12350	0.089	0.000	0.728	0.005	HIGH
12351	-0.310	0.001	0.769	0.005	HIGH
12353	0.144	0.000	0.069	0.000	HIGH
12354	3.221	0.006	0.117	0.001	HIGH
12355	1.421	0.003	10.788	0.069	HIGH
12356	1.519	0.003	5.470	0.035	HIGH
12357	-0.103	0.000	2.330	0.015	HIGH
12358	-0.788	0.001	2.261	0.014	HIGH
12361	5.379	0.010	0.144	0.001	HIGH
12362	3.989	0.008	16.124	0.103	HIGH
12363	3.430	0.006	12.985	0.083	HIGH
12364	-0.630	0.001	8.102	0.052	HIGH
12365	-1.419	0.003	5.565	0.036	HIGH
12368	10.266	0.019	0.368	0.002	HIGH
12369	6.985	0.013	8.875	0.057	HIGH
12370	7.227	0.014	15.074	0.096	HIGH
12371	-3.325	0.006	19.932	0.127	HIGH

5.5.2.5.1

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: STER LOADS - SRM ATTACHED

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
12456	-17.557	0.033	4.893	0.031	HIGH
12463	5.029	0.009	0.227	0.001	HIGH
12464	-2.872	0.005	0.030	0.000	HIGH
12465	4.470	0.008	0.100	0.001	HIGH
13301	-0.985	0.002	0.029	0.000	HIGH
13302	1.916	0.004	0.012	0.000	HIGH
13303	2.081	0.004	0.027	0.000	HIGH
13304	-2.671	0.005	0.022	0.000	HIGH
13305	0.230	0.000	0.019	0.000	HIGH
13306	-1.056	0.002	0.015	0.000	HIGH
13307	-0.861	0.002	0.099	0.001	HIGH
13308	-0.400	0.001	0.048	0.000	HIGH
13313	-1.391	0.003	0.031	0.000	HIGH
13314	-1.845	0.003	0.018	0.000	HIGH
13319	-0.317	0.001	0.017	0.000	HIGH
13320	-0.542	0.001	0.067	0.000	HIGH
13321	-2.154	0.004	0.024	0.000	HIGH
13322	-2.143	0.004	0.015	0.000	HIGH
13323	-1.732	0.003	0.014	0.000	HIGH
13324	-1.273	0.002	0.012	0.000	HIGH
13325	-0.681	0.001	0.043	0.000	HIGH
13326	-0.057	0.000	0.037	0.000	HIGH
13327	0.023	0.000	0.007	0.000	HIGH
13328	0.016	0.000	0.008	0.000	HIGH
13329	-0.282	0.001	0.029	0.000	HIGH
13330	-0.381	0.001	0.041	0.000	HIGH
13331	-2.202	0.004	0.019	0.000	HIGH
13332	-1.794	0.003	0.019	0.000	HIGH
13333	-1.647	0.003	0.007	0.000	HIGH
13334	-1.108	0.002	0.008	0.000	HIGH
13335	-0.647	0.001	0.020	0.000	HIGH
13336	-0.243	0.000	0.032	0.000	HIGH
13337	-0.094	0.000	0.019	0.000	HIGH
13338	-0.078	0.000	0.011	0.000	HIGH
13339	-0.157	0.000	0.022	0.000	HIGH
13340	-0.350	0.001	0.037	0.000	HIGH
13341	-0.015	0.000	0.034	0.000	HIGH
13342	-2.422	0.005	0.019	0.000	HIGH
13343	-1.756	0.003	0.021	0.000	HIGH
13344	-1.553	0.003	0.011	0.000	HIGH
13345	-1.132	0.002	0.002	0.000	HIGH
13346	-0.637	0.001	0.013	0.000	HIGH
13347	-0.280	0.001	0.025	0.000	HIGH
13348	-0.138	0.000	0.025	0.000	HIGH
13349	-0.085	0.000	0.009	0.000	HIGH

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: STER LOADS - SRM ATTACHED

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
13398	-0.124	0.000	0.023	0.000	HIGH
13399	-0.753	0.001	0.001	0.000	HIGH
13400	-0.765	0.001	0.004	0.000	HIGH
13401	-0.513	0.001	0.005	0.000	HIGH
13402	0.116	0.000	0.010	0.000	HIGH
13403	1.636	0.003	0.042	0.000	HIGH
13406	1.288	0.002	0.064	0.000	HIGH
13407	0.299	0.001	0.046	0.000	HIGH
13408	-0.594	0.001	0.019	0.000	HIGH
13409	-1.072	0.002	0.009	0.000	HIGH
13410	-1.263	0.002	0.008	0.000	HIGH
13411	-1.400	0.003	0.009	0.000	HIGH
13412	-1.481	0.003	0.044	0.000	HIGH
13413	0.203	0.000	0.124	0.001	HIGH
13415	0.152	0.000	0.037	0.000	HIGH
13416	-0.531	0.001	0.033	0.000	HIGH
13417	-1.148	0.002	0.022	0.000	HIGH
13418	-1.619	0.003	0.014	0.000	HIGH
13419	-2.027	0.004	0.010	0.000	HIGH
13420	-2.552	0.005	0.007	0.000	HIGH
13421	-2.677	0.005	0.016	0.000	HIGH
13424	-0.870	0.002	0.031	0.000	HIGH
13425	-1.290	0.002	0.030	0.000	HIGH
13426	-1.749	0.003	0.023	0.000	HIGH
13427	-2.222	0.004	0.013	0.000	HIGH
13428	-2.702	0.005	0.005	0.000	HIGH
13429	-3.149	0.006	0.016	0.000	HIGH
13430	-3.531	0.007	0.031	0.000	HIGH
13432	-1.460	0.003	0.034	0.000	HIGH
13433	-1.858	0.004	0.033	0.000	HIGH
13434	-2.271	0.004	0.021	0.000	HIGH
13435	-2.669	0.005	0.007	0.000	HIGH
13436	-3.012	0.006	0.005	0.000	HIGH
13437	-3.402	0.006	0.093	0.001	HIGH
13438	-3.260	0.006	0.015	0.000	HIGH
13440	-1.858	0.004	0.043	0.000	HIGH
13441	-2.319	0.004	0.039	0.000	HIGH
13442	-2.607	0.005	0.015	0.000	HIGH
13443	-2.783	0.005	0.002	0.000	HIGH
13444	-2.910	0.005	0.021	0.000	HIGH
13445	-3.046	0.006	0.032	0.000	HIGH
13446	-2.979	0.006	0.004	0.000	HIGH
13450	-2.266	0.004	0.077	0.000	HIGH
13451	-2.610	0.005	0.036	0.000	HIGH
13452	-2.602	0.005	0.007	0.000	HIGH

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: STER LOADS - SRM ATTACHED

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
13509	-0.490	0.001	0.033	0.000	HIGH
13510	-0.079	0.000	0.013	0.000	HIGH
13511	0.123	0.000	0.012	0.000	HIGH
13512	0.045	0.000	0.020	0.000	HIGH
13513	-0.354	0.001	0.029	0.000	HIGH
13514	-1.034	0.002	0.040	0.000	HIGH
13515	-1.695	0.003	0.055	0.000	HIGH
13518	0.254	0.000	0.060	0.000	HIGH
13519	0.466	0.001	0.032	0.000	HIGH
13520	0.555	0.001	0.010	0.000	HIGH
13521	0.551	0.001	0.024	0.000	HIGH
13522	0.285	0.001	0.043	0.000	HIGH
13523	-0.298	0.001	0.050	0.000	HIGH
13524	-0.929	0.002	0.055	0.000	HIGH
13526	1.084	0.002	0.060	0.000	HIGH
13527	1.083	0.002	0.052	0.000	HIGH
13528	1.079	0.002	0.024	0.000	HIGH
13529	1.104	0.002	0.017	0.000	HIGH
13530	1.060	0.002	0.044	0.000	HIGH
13531	0.766	0.001	0.072	0.000	HIGH
13532	0.291	0.001	0.077	0.000	HIGH
13534	1.759	0.003	0.015	0.000	HIGH
13535	1.685	0.003	0.108	0.001	HIGH
13536	1.549	0.003	0.032	0.000	HIGH
13537	1.533	0.003	0.013	0.000	HIGH
13538	1.699	0.003	0.032	0.000	HIGH
13539	1.758	0.003	0.080	0.001	HIGH
13540	1.549	0.003	0.133	0.001	HIGH
13544	2.541	0.005	0.069	0.000	HIGH
13545	2.387	0.005	0.056	0.000	HIGH
13546	1.997	0.004	0.044	0.000	HIGH
13547	1.870	0.004	0.023	0.000	HIGH
13548	1.920	0.004	0.014	0.000	HIGH
13549	2.137	0.004	0.058	0.000	HIGH
13550	2.223	0.004	0.172	0.001	HIGH
13553	3.004	0.006	0.054	0.000	HIGH
13554	2.861	0.005	0.026	0.000	HIGH
13555	2.416	0.005	0.030	0.000	HIGH
13556	2.075	0.004	0.029	0.000	HIGH
13557	1.899	0.004	0.016	0.000	HIGH
13558	1.907	0.004	0.023	0.000	HIGH
13559	1.865	0.004	0.104	0.001	HIGH
13561	3.439	0.006	0.023	0.000	HIGH
13562	3.281	0.006	0.019	0.000	HIGH
13563	2.759	0.005	0.023	0.000	HIGH

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: STER LOADS - SRM ATTACHED

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
22227	0.864	0.002	0.344	0.002	HIGH
22228	0.319	0.001	0.777	0.005	HIGH
22229	-0.205	0.000	1.590	0.010	HIGH
22230	0.271	0.001	1.917	0.012	HIGH
22231	2.111	0.004	7.267	0.046	HIGH
22232	6.115	0.012	10.219	0.065	HIGH
22233	5.294	0.010	15.324	0.098	HIGH
22234	-0.973	0.002	0.557	0.004	HIGH
22235	1.017	0.002	0.155	0.001	HIGH
22236	1.478	0.003	0.091	0.001	HIGH
22237	1.281	0.002	0.376	0.002	HIGH
22238	0.825	0.002	0.964	0.006	HIGH
22239	0.603	0.001	1.844	0.012	HIGH
22240	0.954	0.002	2.033	0.013	HIGH
22241	1.734	0.003	2.696	0.017	HIGH
22242	2.623	0.005	28.777	0.184	HIGH
22243	0.273	0.001	0.230	0.001	HIGH
22244	2.979	0.006	42.839	0.274	8.17
22245	-0.346	0.001	0.183	0.001	HIGH
22246	-1.653	0.003	0.098	0.001	HIGH
22247	2.005	0.004	0.163	0.001	HIGH
22248	1.476	0.003	0.195	0.001	HIGH
22249	0.865	0.002	0.560	0.004	HIGH
22250	0.641	0.001	1.331	0.008	HIGH
22251	1.121	0.002	1.804	0.012	HIGH
22252	1.692	0.003	2.053	0.013	HIGH
22253	2.575	0.005	6.341	0.040	HIGH
22254	2.722	0.005	18.183	0.116	HIGH
22255	-5.510	0.010	22.302	0.142	HIGH
22256	-3.957	0.007	3.527	0.023	HIGH
22257	-0.689	0.001	0.168	0.001	HIGH
22258	0.127	0.000	0.030	0.000	HIGH
22259	-0.433	0.001	0.116	0.001	HIGH
22260	1.310	0.002	0.115	0.001	HIGH
22261	0.369	0.001	0.221	0.001	HIGH
22262	-0.054	0.000	0.244	0.002	HIGH
22263	0.991	0.002	0.812	0.005	HIGH
22264	0.933	0.002	0.882	0.006	HIGH
22265	0.912	0.002	0.895	0.006	HIGH
22266	-0.012	0.000	5.235	0.033	HIGH
22267	-2.009	0.004	8.697	0.056	HIGH
22268	-1.844	0.003	5.712	0.036	HIGH
22269	-2.964	0.006	1.612	0.010	HIGH
22270	2.683	0.005	0.259	0.002	HIGH
22271	2.091	0.004	0.123	0.001	HIGH

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: STER LOADS - SRM ATTACHED

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
22334	8.969	0.017	13.012	0.083	HIGH
22335	11.124	0.021	32.546	0.208	HIGH
22336	1.689	0.003	0.020	0.000	HIGH
22337	14.161	0.027	34.295	0.219	9.33
22338	5.853	0.011	9.051	0.058	HIGH
22339	5.674	0.011	13.655	0.087	HIGH
22340	12.428	0.023	2.622	0.017	HIGH
22341	3.004	0.006	1.283	0.008	HIGH
22342	4.330	0.008	1.730	0.011	HIGH
22343	0.869	0.002	0.608	0.004	HIGH
22346	-0.758	0.001	5.652	0.036	HIGH
22347	-3.440	0.006	16.562	0.106	HIGH
22348	0.534	0.001	5.186	0.033	HIGH
22349	-1.505	0.003	14.030	0.090	HIGH
22350	-2.295	0.004	3.214	0.021	HIGH
22351	-1.073	0.002	0.830	0.005	HIGH
22353	1.008	0.002	11.213	0.072	HIGH
22354	-3.118	0.006	3.770	0.024	HIGH
22355	-7.042	0.013	15.258	0.097	HIGH
22356	-0.916	0.002	0.030	0.000	HIGH
22357	-3.218	0.006	15.638	0.100	HIGH
22358	-3.347	0.006	6.281	0.040	HIGH
22361	-3.581	0.007	7.074	0.045	HIGH
22362	-5.293	0.010	5.382	0.034	HIGH
22363	-6.167	0.012	7.735	0.049	HIGH
22364	-6.287	0.012	6.754	0.043	HIGH
22365	-4.184	0.008	12.023	0.077	HIGH
22368	-5.928	0.011	3.541	0.023	HIGH
22369	-6.095	0.012	2.166	0.014	HIGH
22370	-6.851	0.013	5.649	0.036	HIGH
22371	-7.716	0.015	5.829	0.037	HIGH
22372	-6.692	0.013	11.092	0.071	HIGH
22375	-7.661	0.014	1.508	0.010	HIGH
22376	-7.118	0.013	1.442	0.009	HIGH
22377	-7.449	0.014	2.838	0.018	HIGH
22378	-8.004	0.015	3.077	0.020	HIGH
22379	-7.915	0.015	5.986	0.038	HIGH
22383	-8.223	0.016	0.541	0.003	HIGH
22384	-7.835	0.015	0.559	0.004	HIGH
22385	-7.602	0.014	1.158	0.007	HIGH
22386	-8.068	0.015	1.242	0.008	HIGH
22387	-7.946	0.015	2.286	0.015	HIGH
22390	-8.436	0.016	0.154	0.001	HIGH
22391	-8.038	0.015	0.150	0.001	HIGH
22392	-7.574	0.014	0.408	0.003	HIGH

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: STER LOADS - SRM ATTACHED

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
23334	0.089	0.000	0.294	0.002	HIGH
23338	-1.561	0.003	0.223	0.001	HIGH
23339	-4.127	0.008	0.076	0.000	HIGH
23340	-3.953	0.007	0.031	0.000	HIGH
23341	-4.584	0.009	0.013	0.000	HIGH
23342	1.838	0.003	0.093	0.001	HIGH
23343	1.632	0.003	0.059	0.000	HIGH
23344	1.827	0.003	0.154	0.001	HIGH
23345	1.617	0.003	0.346	0.002	HIGH
23350	-2.561	0.005	0.221	0.001	HIGH
23351	-2.636	0.005	0.088	0.001	HIGH
23352	-2.914	0.005	0.019	0.000	HIGH
23353	-3.825	0.007	0.021	0.000	HIGH
23354	0.367	0.001	0.067	0.000	HIGH
23355	0.952	0.002	0.042	0.000	HIGH
23356	1.540	0.003	0.131	0.001	HIGH
23357	1.088	0.002	0.190	0.001	HIGH
23363	-0.870	0.002	0.191	0.001	HIGH
23364	-1.806	0.003	0.027	0.000	HIGH
23365	-2.231	0.004	0.025	0.000	HIGH
23366	-3.059	0.006	0.025	0.000	HIGH
23367	-1.222	0.002	0.054	0.000	HIGH
23368	0.172	0.000	0.047	0.000	HIGH
23369	1.293	0.002	0.104	0.001	HIGH
23370	1.759	0.003	0.162	0.001	HIGH
23371	0.280	0.001	0.188	0.001	HIGH
23376	0.929	0.002	0.201	0.001	HIGH
23377	-0.766	0.001	0.034	0.000	HIGH
23378	-1.333	0.003	0.027	0.000	HIGH
23379	-1.657	0.003	0.022	0.000	HIGH
23380	-2.286	0.004	0.029	0.000	HIGH
23382	0.421	0.001	0.041	0.000	HIGH
23383	0.804	0.002	0.054	0.000	HIGH
23384	1.766	0.003	0.121	0.001	HIGH
23385	1.443	0.003	0.143	0.001	HIGH
23386	0.474	0.001	0.099	0.001	HIGH
23390	0.473	0.001	0.151	0.001	HIGH
23391	0.261	0.000	0.031	0.000	HIGH
23392	-0.392	0.001	0.022	0.000	HIGH
23393	-0.681	0.001	0.017	0.000	HIGH
23394	-0.976	0.002	0.017	0.000	HIGH
23395	-1.355	0.003	0.023	0.000	HIGH
23397	4.354	0.008	0.046	0.000	HIGH
23398	2.386	0.005	0.026	0.000	HIGH
23399	1.157	0.002	0.017	0.000	HIGH

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: STER LOADS - SRM ATTACHED

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
23482	2.961	0.006	0.050	0.000	HIGH
23483	3.401	0.006	0.047	0.000	HIGH
23484	3.565	0.007	0.039	0.000	HIGH
23485	1.614	0.003	0.303	0.002	HIGH
23486	2.080	0.004	0.080	0.001	HIGH
23487	2.423	0.005	0.043	0.000	HIGH
23488	2.672	0.005	0.042	0.000	HIGH
23489	1.233	0.002	0.203	0.001	HIGH
23490	1.616	0.003	0.047	0.000	HIGH
23491	1.832	0.003	0.056	0.000	HIGH
23492	0.928	0.002	0.077	0.000	HIGH
23493	1.088	0.002	0.049	0.000	HIGH
23494	0.328	0.001	0.033	0.000	HIGH
23499	3.631	0.007	0.023	0.000	HIGH
23500	0.907	0.002	0.026	0.000	HIGH
23501	-0.012	0.000	0.030	0.000	HIGH
23502	-0.438	0.001	0.023	0.000	HIGH
23503	-0.395	0.001	0.011	0.000	HIGH
23504	-0.224	0.000	0.027	0.000	HIGH
23505	-0.022	0.000	0.028	0.000	HIGH
23506	0.180	0.000	0.022	0.000	HIGH
23509	-2.149	0.004	0.043	0.000	HIGH
23510	-1.535	0.003	0.049	0.000	HIGH
23511	-1.697	0.003	0.051	0.000	HIGH
23512	-1.409	0.003	0.040	0.000	HIGH
23513	-0.976	0.002	0.054	0.000	HIGH
23514	-0.642	0.001	0.061	0.000	HIGH
23515	-0.219	0.000	0.066	0.000	HIGH
23518	-4.725	0.009	0.097	0.001	HIGH
23519	-2.704	0.005	0.077	0.000	HIGH
23520	-3.150	0.006	0.058	0.000	HIGH
23521	-3.067	0.006	0.057	0.000	HIGH
23522	-2.123	0.004	0.048	0.000	HIGH
23523	-1.546	0.003	0.128	0.001	HIGH
23524	-1.060	0.002	0.134	0.001	HIGH
23530	-4.369	0.008	0.112	0.001	HIGH
23531	-2.670	0.005	0.184	0.001	HIGH
23532	-1.802	0.003	0.228	0.001	HIGH
23539	-2.680	0.005	0.215	0.001	HIGH
23540	-1.856	0.004	0.402	0.003	HIGH
23550	-0.905	0.002	0.758	0.005	HIGH
23553	-7.127	0.013	0.045	0.000	HIGH
23554	-3.638	0.007	0.264	0.002	HIGH
23559	0.304	0.001	0.474	0.003	HIGH
23561	-6.574	0.012	0.073	0.000	HIGH

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: STER LOADS - SRM ATTACHED

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
32232	0.171	0.000	0.008	0.000	HIGH
32233	0.723	0.001	0.229	0.001	HIGH
32234	-10.507	0.020	1.993	0.013	HIGH
32235	-3.528	0.007	0.977	0.006	HIGH
32236	-3.854	0.007	0.031	0.000	HIGH
32237	-2.751	0.005	0.037	0.000	HIGH
32238	-1.062	0.002	0.029	0.000	HIGH
32239	-0.747	0.001	0.030	0.000	HIGH
32240	-0.385	0.001	0.021	0.000	HIGH
32241	-0.182	0.000	0.027	0.000	HIGH
32242	-0.042	0.000	0.035	0.000	HIGH
32243	-0.052	0.000	0.038	0.000	HIGH
32244	0.720	0.001	0.151	0.001	HIGH
32245	-1.566	0.003	0.616	0.004	HIGH
32246	-1.816	0.003	0.587	0.004	HIGH
32247	-2.537	0.005	0.083	0.001	HIGH
32248	-2.275	0.004	0.043	0.000	HIGH
32249	-1.020	0.002	0.075	0.000	HIGH
32250	-1.037	0.002	0.070	0.000	HIGH
32251	-0.689	0.001	0.039	0.000	HIGH
32252	-0.483	0.001	0.057	0.000	HIGH
32253	-0.289	0.001	0.058	0.000	HIGH
32254	0.098	0.000	0.052	0.000	HIGH
32255	0.049	0.000	0.022	0.000	HIGH
32256	0.221	0.000	0.112	0.001	HIGH
32257	-1.139	0.002	0.443	0.003	HIGH
32258	-0.083	0.000	0.092	0.001	HIGH
32259	-0.613	0.001	0.174	0.001	HIGH
32260	-1.085	0.002	0.224	0.001	HIGH
32261	-0.616	0.001	0.657	0.004	HIGH
32262	-0.759	0.001	0.127	0.001	HIGH
32263	-0.620	0.001	0.061	0.000	HIGH
32264	-0.429	0.001	0.036	0.000	HIGH
32265	-0.503	0.001	0.078	0.000	HIGH
32266	-0.207	0.000	0.058	0.000	HIGH
32267	-0.038	0.000	0.022	0.000	HIGH
32268	0.150	0.000	0.037	0.000	HIGH
32269	0.166	0.000	0.042	0.000	HIGH
32270	2.531	0.005	0.681	0.004	HIGH
32271	1.670	0.003	0.076	0.000	HIGH
32272	1.706	0.003	0.213	0.001	HIGH
32273	1.043	0.002	0.230	0.001	HIGH
32274	2.600	0.005	0.249	0.002	HIGH
32275	4.426	0.008	0.088	0.001	HIGH
32278	2.522	0.005	0.409	0.003	HIGH

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: STER LOADS - SRM ATTACHED

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
32339	1.321	0.002	0.063	0.000	HIGH
32340	1.295	0.002	0.112	0.001	HIGH
32341	0.845	0.002	0.111	0.001	HIGH
32342	0.943	0.002	0.100	0.001	HIGH
32343	0.487	0.001	0.043	0.000	HIGH
32346	0.192	0.000	0.029	0.000	HIGH
32347	-0.397	0.001	0.028	0.000	HIGH
32348	-0.602	0.001	0.126	0.001	HIGH
32349	-0.678	0.001	0.024	0.000	HIGH
32350	-0.896	0.002	0.004	0.000	HIGH
32351	-0.827	0.002	0.013	0.000	HIGH
32353	-0.391	0.001	0.033	0.000	HIGH
32354	-0.547	0.001	0.016	0.000	HIGH
32355	-1.038	0.002	0.041	0.000	HIGH
32356	-1.022	0.002	0.030	0.000	HIGH
32357	-1.049	0.002	0.034	0.000	HIGH
32358	-1.239	0.002	0.034	0.000	HIGH
32361	-0.343	0.001	0.018	0.000	HIGH
32362	-0.717	0.001	0.032	0.000	HIGH
32363	-0.853	0.002	0.046	0.000	HIGH
32364	-1.231	0.002	0.083	0.001	HIGH
32365	-1.386	0.003	0.086	0.001	HIGH
32368	-0.157	0.000	0.022	0.000	HIGH
32369	-0.549	0.001	0.015	0.000	HIGH
32370	-0.747	0.001	0.021	0.000	HIGH
32371	-0.932	0.002	0.124	0.001	HIGH
32372	-1.197	0.002	0.179	0.001	HIGH
32375	-0.094	0.000	0.018	0.000	HIGH
32376	-0.439	0.001	0.009	0.000	HIGH
32377	-0.792	0.001	0.014	0.000	HIGH
32378	-0.987	0.002	0.067	0.000	HIGH
32379	-0.869	0.002	0.428	0.003	HIGH
32383	-0.737	0.001	0.039	0.000	HIGH
32384	-0.827	0.002	0.017	0.000	HIGH
32385	-1.098	0.002	0.015	0.000	HIGH
32386	-1.431	0.003	0.027	0.000	HIGH
32387	-1.595	0.003	0.157	0.001	HIGH
32390	0.623	0.001	0.034	0.000	HIGH
32391	-0.666	0.001	0.025	0.000	HIGH
32392	-1.949	0.004	0.057	0.000	HIGH
32393	-1.863	0.004	0.134	0.001	HIGH
32394	-1.964	0.004	0.154	0.001	HIGH
32396	3.642	0.007	0.071	0.000	HIGH
32397	-2.524	0.005	0.019	0.000	HIGH
32398	-3.785	0.007	0.038	0.000	HIGH

5.5.233

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: STER LOADS - SRM ATTACHED

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
33328	0.035	0.000	0.092	0.001	HIGH
33329	0.451	0.001	0.075	0.000	HIGH
33330	1.010	0.002	0.298	0.002	HIGH
33331	4.044	0.008	0.097	0.001	HIGH
33332	3.559	0.007	0.061	0.000	HIGH
33333	3.350	0.006	0.109	0.001	HIGH
33334	1.722	0.003	0.299	0.002	HIGH
33338	1.344	0.003	0.293	0.002	HIGH
33339	0.621	0.001	0.144	0.001	HIGH
33340	0.913	0.002	0.123	0.001	HIGH
33341	1.191	0.002	0.213	0.001	HIGH
33342	3.254	0.006	0.118	0.001	HIGH
33343	2.546	0.005	0.048	0.000	HIGH
33344	2.345	0.004	0.156	0.001	HIGH
33345	2.199	0.004	0.349	0.002	HIGH
33350	1.023	0.002	0.397	0.003	HIGH
33351	0.963	0.002	0.152	0.001	HIGH
33352	1.135	0.002	0.116	0.001	HIGH
33353	1.528	0.003	0.096	0.001	HIGH
33354	2.461	0.005	0.112	0.001	HIGH
33355	1.706	0.003	0.058	0.000	HIGH
33356	1.547	0.003	0.120	0.001	HIGH
33357	0.942	0.002	0.264	0.002	HIGH
33363	0.778	0.001	0.268	0.002	HIGH
33364	0.921	0.002	0.082	0.001	HIGH
33365	1.387	0.003	0.065	0.000	HIGH
33366	2.494	0.005	0.050	0.000	HIGH
33367	1.619	0.003	0.073	0.000	HIGH
33368	0.943	0.002	0.057	0.000	HIGH
33369	0.868	0.002	0.058	0.000	HIGH
33370	0.739	0.001	0.173	0.001	HIGH
33371	-0.314	0.001	0.198	0.001	HIGH
33376	0.158	0.000	0.137	0.001	HIGH
33377	0.290	0.001	0.123	0.001	HIGH
33378	0.772	0.001	0.028	0.000	HIGH
33379	1.527	0.003	0.032	0.000	HIGH
33380	3.243	0.006	0.064	0.000	HIGH
33381	0.527	0.001	0.033	0.000	HIGH
33382	0.167	0.000	0.029	0.000	HIGH
33383	0.078	0.000	0.031	0.000	HIGH
33384	0.040	0.000	0.054	0.000	HIGH
33385	0.005	0.000	0.120	0.001	HIGH
33386	-0.333	0.001	0.261	0.002	HIGH
33390	-0.455	0.001	0.136	0.001	HIGH
33391	-0.436	0.001	0.063	0.000	HIGH

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: STER LOADS - SRM ATTACHED

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
33475	0.368	0.001	0.070	0.000	HIGH
33476	0.254	0.000	0.117	0.001	HIGH
33477	0.129	0.000	0.118	0.001	HIGH
33478	-0.025	0.000	0.136	0.001	HIGH
33479	-0.166	0.000	0.400	0.003	HIGH
33480	0.779	0.001	0.311	0.002	HIGH
33481	0.616	0.001	0.134	0.001	HIGH
33482	0.155	0.000	0.121	0.001	HIGH
33483	-0.291	0.001	0.097	0.001	HIGH
33484	-0.472	0.001	0.406	0.003	HIGH
33485	0.841	0.002	0.178	0.001	HIGH
33486	0.621	0.001	0.152	0.001	HIGH
33487	-0.110	0.000	0.111	0.001	HIGH
33488	-0.865	0.002	0.307	0.002	HIGH
33489	1.180	0.002	0.173	0.001	HIGH
33490	1.081	0.002	0.143	0.001	HIGH
33491	-0.273	0.001	0.198	0.001	HIGH
33492	3.691	0.007	0.157	0.001	HIGH
33499	0.979	0.002	0.078	0.000	HIGH
33500	0.280	0.001	0.027	0.000	HIGH
33501	-0.279	0.001	0.041	0.000	HIGH
33502	-0.572	0.001	0.031	0.000	HIGH
33503	-0.908	0.002	0.010	0.000	HIGH
33504	-1.889	0.004	0.028	0.000	HIGH
33505	-3.729	0.007	0.235	0.001	HIGH
33509	0.265	0.001	0.020	0.000	HIGH
33510	-0.184	0.000	0.014	0.000	HIGH
33511	-0.464	0.001	0 012	0.000	HIGH
33512	-0.624	0.001	0.003	0.000	HIGH
33513	-1.077	0.002	0.035	0.000	HIGH
33514	-1.816	0.003	0.090	0.001	HIGH
33515	-1.960	0.004	0.107	0.001	HIGH
33518	-1.985	0.004	0.058	0.000	HIGH
33519	-0.943	0.002	0.042	0.000	HIGH
33520	-0.482	0.001	0.057	0.000	HIGH
33521	-0.412	0.001	0.040	0.000	HIGH
33522	-0.542	0.001	0.047	0.000	HIGH
33523	-1.009	0.002	0.080	0.001	HIGH
33524	-1.255	0.002	0.092	0.001	HIGH
33530	-0.132	0.000	0.080	0.001	HIGH
33531	-0.250	0.000	0.134	0.001	HIGH
33532	-0.401	0.001	0.154	0.001	HIGH
33539	0.606	0.001	0.210	0.001	HIGH
33540	0.520	0.001	0.255	0.002	HIGH
33550	1.660	0.003	0.630	0.004	HIGH

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: STER LOADS - SRM ATTACHED

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
42225	-0.660	0.001	0.042	0.000	HIGH
42226	0.917	0.002	0.283	0.002	HIGH
42227	2.430	0.005	0.271	0.002	HIGH
42228	5.167	0.010	2.390	0.015	HIGH
42229	-6.847	0.013	2.696	0.017	HIGH
42230	-4.184	0.008	3.610	0.023	HIGH
42231	-3.099	0.006	3.940	0.025	HIGH
42232	-3.888	0.007	3.871	0.025	HIGH
42233	-4.838	0.009	4.087	0.026	HIGH
42234	1.411	0.003	0.197	0.001	HIGH
42235	0.883	0.002	0.169	0.001	HIGH
42236	1.698	0.003	0.241	0.002	HIGH
42237	3.723	0.007	0.379	0.002	HIGH
42238	5.222	0.010	0.528	0.003	HIGH
42239	2.630	0.005	5.325	0.034	HIGH
42240	-6.044	0.011	12.877	0.082	HIGH
42241	-5.872	0.011	14.933	0.095	HIGH
42242	-5.594	0.011	10.465	0.067	HIGH
42243	-5.376	0.010	2.479	0.016	HIGH
42244	-5.288	0.010	4.120	0.026	HIGH
42245	0.834	0.002	0.257	0.002	HIGH
42246	3.185	0.006	0.636	0.004	HIGH
42247	1.200	0.002	0.568	0.004	HIGH
42248	3.646	0.007	0.025	0.000	HIGH
42249	7.527	0.014	0.727	0.005	HIGH
42250	13.348	0.025	1.911	0.012	HIGH
42251	-9.712	0.018	44.640	0.285	6.72
42252	-1.489	0.003	0.115	0.001	HIGH
42253	-11.512	0.022	40.547	0.259	7.64
42254	-7.131	0.013	2.946	0.019	HIGH
42255	-5.437	0.010	2.966	0.019	HIGH
42256	-4.689	0.009	2.818	0.018	HIGH
42257	0.671	0.001	0.057	0.000	HIGH
42258	0.989	0.002	0.211	0.001	HIGH
42259	3.076	0.006	0.169	0.001	HIGH
42260	1.002	0.002	0.195	0.001	HIGH
42261	3.186	0.006	0.248	0.002	HIGH
42262	5.475	0.010	4.283	0.027	HIGH
42263	19.059	0.036	3.380	0.022	HIGH
42264	-3.575	0.007	23.027	0.147	HIGH
42265	-5.135	0.010	19.861	0.127	HIGH
42266	-4.879	0.009	6.966	0.044	HIGH
42267	-4.071	0.008	1.662	0.011	HIGH
42268	-3.478	0.007	1.642	0.010	HIGH
42269	-2.902	0.005	1.197	0.008	HIGH

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: STER LOADS - SRM ATTACHED

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
42332	-3.105	0.006	3.365	0.021	HIGH
42333	-2.120	0.004	3.690	0.024	HIGH
42334	1.219	0.002	12.848	0.082	HIGH
42335	0.348	0.001	5.749	0.037	HIGH
42336	-1.320	0.002	4.929	0.031	HIGH
42337	-1.389	0.003	4.450	0.028	HIGH
42338	1.087	0.002	4.614	0.029	HIGH
42339	0.419	0.001	3.081	0.020	HIGH
42340	-0.306	0.001	2.194	0.014	HIGH
42341	1.167	0.002	1.157	0.007	HIGH
42342	0.547	0.001	1.180	0.008	HIGH
42343	0.418	0.001	0.224	0.001	HIGH
42346	-1.836	0.003	4.052	0.026	HIGH
42347	0.351	0.001	2.526	0.016	HIGH
42348	1.195	0.002	2.549	0.016	HIGH
42349	1.004	0.002	2.195	0.014	HIGH
42350	0.218	0.000	1.386	0.009	HIGH
42351	-0.339	0.001	1.474	0.009	HIGH
42353	-2.933	0.006	9.979	0.064	HIGH
42354	1.288	0.002	3.538	0.023	HIGH
42355	2.006	0.004	7.478	0.048	HIGH
42356	1.780	0.003	7.560	0.048	HIGH
42357	0.114	0.000	3.551	0.023	HIGH
42358	-0.406	0.001	3.821	0.024	HIGH
42361	5.125	0.010	7.345	0.047	HIGH
42362	3.893	0.007	5.760	0.037	HIGH
42363	3.578	0.007	13.670	0.087	HIGH
42364	-0.749	0.001	9.010	0.058	HIGH
42365	-1.499	0.003	8.084	0.052	HIGH
42368	10.601	0.020	4.783	0.031	HIGH
42369	7.756	0.015	4.636	0.030	HIGH
42370	7.600	0.014	13.017	0.083	HIGH
42371	-3.701	0.007	23.535	0.150	HIGH
42372	-3.819	0.007	17.407	0.111	HIGH
42375	12.895	0.024	1.737	0.011	HIGH
42376	4.458	0.008	3.267	0.021	HIGH
42377	4.735	0.009	11.899	0.076	HIGH
42378	-0.954	0.002	0.129	0.001	HIGH
42379	-2.841	0.005	18.634	0.119	HIGH
42383	9.585	0.018	0.821	0.005	HIGH
42384	7.767	0.015	0.529	0.003	HIGH
42385	10.377	0.020	1.319	0.008	HIGH
42386	-2.675	0.005	6.588	0.042	HIGH
42387	-2.265	0.004	7.497	0.048	HIGH
42390	8.562	0.016	0.231	0.001	HIGH

5.5.24

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: STER LOADS - SRM ATTACHED

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
43330	-1.104	0.002	0.234	0.001	HIGH
43331	-2.410	0.005	0.254	0.002	HIGH
43332	-1.906	0.004	0.187	0.001	HIGH
43333	-1.612	0.003	0.229	0.001	HIGH
43334	-0.886	0.002	2.252	0.014	HIGH
43338	-0.174	0.000	2.251	0.014	HIGH
43339	-0.354	0.001	0.229	0.001	HIGH
43340	-0.723	0.001	0.201	0.001	HIGH
43341	-0.573	0.001	0.236	0.002	HIGH
43342	-2.645	0.005	0.214	0.001	HIGH
43343	-1.989	0.004	0.232	0.001	HIGH
43344	-1.959	0.004	0.150	0.001	HIGH
43345	-1.981	0.004	0.807	0.005	HIGH
43346	1.125	0.002	0.965	0.006	HIGH
43349	-0.727	0.001	0.977	0.006	HIGH
43350	0.244	0.000	0.798	0.005	HIGH
43351	-0.064	0.000	0.169	0.001	HIGH
43352	-0.221	0.000	0.232	0.001	HIGH
43353	0.062	0.000	0.221	0.001	HIGH
43354	-3.471	0.007	0.196	0.001	HIGH
43355	-2.281	0.004	0.196	0.001	HIGH
43356	-1.934	0.004	0.151	0.001	HIGH
43357	-1.684	0.003	0.294	0.002	HIGH
43358	-1.221	0.002	0.797	0.005	HIGH
43359	-1.225	0.002	0.870	0.006	HIGH
43360	-0.073	0.000	0.302	0.002	HIGH
43361	1.320	0.002	0.891	0.006	HIGH
43362	0.296	0.001	0.790	0.005	HIGH
43363	0.277	0.001	0.272	0.002	HIGH
43364	0.262	0.000	0.167	0.001	HIGH
43365	0.441	0.001	0.175	0.001	HIGH
43366	1.156	0.002	0.179	0.001	HIGH
43367	-4.087	0.008	0.131	0.001	HIGH
43368	-2.677	0.005	0.133	0.001	HIGH
43369	-1.881	0.004	0.097	0.001	HIGH
43370	-1.306	0.002	0.076	0.000	HIGH
43371	-0.808	0.002	0.292	0.002	HIGH
43372	-0.624	0.001	0.361	0.002	HIGH
43373	-0.316	0.001	0.328	0.002	HIGH
43374	0.399	0.001	0.340	0.002	HIGH
43375	0.372	0.001	0.367	0.002	HIGH
43376	0.188	0.000	0.274	0.002	HIGH
43377	0.346	0.001	0.078	0.001	HIGH
43378	0.686	0.001	0.109	0.001	HIGH
43379	1.185	0.002	0.107	0.001	HIGH

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: STER LOADS - SRM ATTACHED

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
43435	-2.257	0.004	2.108	0.013	HIGH
43438	-3.271	0.006	2.602	0.017	HIGH
43440	-2.328	0.004	0.729	0.005	HIGH
43441	-2.693	0.005	0.330	0.002	HIGH
43442	-2.984	0.006	0.612	0.004	HIGH
43443	-3.509	0.007	0.614	0.004	HIGH
43446	-1.565	0.003	4.145	0.026	HIGH
43450	-2.323	0.004	0.500	0.003	HIGH
43451	-2.802	0.005	0.527	0.003	HIGH
43452	-3.497	0.007	0.529	0.003	HIGH
43453	-2.767	0.005	0.492	0.003	HIGH
43455	-2.799	0.005	1.624	0.010	HIGH
43456	-1.996	0.004	0.938	0.006	HIGH
43457	-2.771	0.005	1.202	0.008	HIGH
43459	-2.016	0.004	0.477	0.003	HIGH
43460	-2.365	0.004	0.465	0.003	HIGH
43461	-2.357	0.004	0.453	0.003	HIGH
43462	-1.303	0.002	0.487	0.003	HIGH
43463	-1.752	0.003	0.838	0.005	HIGH
43464	-1.577	0.003	0.620	0.004	HIGH
43465	-0.736	0.001	0.519	0.003	HIGH
43467	-1.425	0.003	0.493	0.003	HIGH
43468	-1.545	0.003	0.472	0.003	HIGH
43469	-1.311	0.002	0.396	0.003	HIGH
43470	-1.275	0.002	0.563	0.004	HIGH
43471	-0.953	0.002	0.547	0.003	HIGH
43472	-0.570	0.001	0.244	0.002	HIGH
43473	-0.416	0.001	0.343	0.002	HIGH
43474	-0.511	0.001	0.782	0.005	HIGH
43475	-0.643	0.001	0.337	0.002	HIGH
43476	-0.782	0.001	0.336	0.002	HIGH
43477	-0.749	0.001	0.337	0.002	HIGH
43478	-0.575	0.001	0.282	0.002	HIGH
43479	-0.675	0.001	0.358	0.002	HIGH
43480	0.268	0.001	0.784	0.005	HIGH
43481	-0.067	0.000	0.222	0.001	HIGH
43482	-0.386	0.001	0.211	0.001	HIGH
43483	-0.545	0.001	0.211	0.001	HIGH
43484	-0.718	0.001	0.184	0.001	HIGH
43485	0.653	0.001	0.580	0.004	HIGH
43486	0.204	0.000	0.162	0.001	HIGH
43487	-0.273	0.001	0.103	0.001	HIGH
43488	-0.769	0.001	0.081	0.001	HIGH
43489	1.055	0.002	0.402	0.003	HIGH
43490	0.537	0.001	0.129	0.001	HIGH

5.5-245

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: STER LOADS - SRM ATTACHED

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
43561	3.611	0.007	0.546	0.003	HIGH
43562	3.590	0.007	0.593	0.004	HIGH
43563	2.976	0.006	0.848	0.005	HIGH
43564	1.938	0.004	0.483	0.003	HIGH
43565	2.773	0.005	0.368	0.002	HIGH
43566	2.484	0.005	0.381	0.002	HIGH
43567	1.989	0.004	0.386	0.002	HIGH
43568	2.720	0.005	0.326	0.002	HIGH
43569	3.179	0.006	0.280	0.002	HIGH
43570	2.902	0.005	0.544	0.003	HIGH
43571	2.940	0.006	0.560	0.004	HIGH
43572	2.496	0.005	0.442	0.003	HIGH
43573	2.331	0.004	0.360	0.002	HIGH
43574	1.950	0.004	0.427	0.003	HIGH
43575	2.774	0.005	0.374	0.002	HIGH
43576	2.817	0.005	0.265	0.002	HIGH
43577	2.803	0.005	0.361	0.002	HIGH
43578	2.572	0.005	0.361	0.002	HIGH
43579	2.095	0.004	0.202	0.001	HIGH
43580	1.700	0.003	0.619	0.004	HIGH
43581	2.796	0.005	0.224	0.001	HIGH
43582	2.727	0.005	0.214	0.001	HIGH
43583	2.399	0.005	0.214	0.001	HIGH
43584	1.846	0.003	0.166	0.001	HIGH
43585	1.309	0.002	0.543	0.003	HIGH
43586	2.795	0.005	0.060	0.000	HIGH
43587	2.278	0.004	0.085	0.001	HIGH
43588	1.505	0.003	0.074	0.000	HIGH
43589	0.837	0.002	0.336	0.002	HIGH
43590	1.691	0.003	0.063	0.000	HIGH
43591	0.890	0.002	0.061	0.000	HIGH
43592	0.103	0.000	0.142	0.001	HIGH
43594	-2.036	0.004	0.182	0.001	HIGH
52201	0.109	0.000	1.101	0.007	HIGH
52202	-5.588	0.011	0.498	0.003	HIGH
52204	1.577	0.003	0.111	0.001	HIGH
52205	2.202	0.004	0.046	0.000	HIGH
52206	-2.552	0.005	0.091	0.001	HIGH
52207	5.875	0.011	0.717	0.005	HIGH
52208	-4.585	0.009	0.295	0.002	HIGH
52215	0.623	0.001	2.957	0.019	HIGH
52216	-0.229	0.000	0.741	0.005	HIGH
52222	6.771	0.013	0.167	0.001	HIGH
52223	8.064	0.015	0.969	0.006	HIGH
52224	-0.189	0.000	3.990	0.025	HIGH

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: STER LOADS - SRM ATTACHED

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
52270	2.460	0.005	0.166	0.001	HIGH
52271	1.905	0.004	0.084	0.001	HIGH
52272	1.765	0.003	0.246	0.002	HIGH
52273	1.822	0.003	0.187	0.001	HIGH
52274	1.370	0.003	0.149	0.001	HIGH
52275	-4.672	0.009	0.288	0.002	HIGH
52278	2.015	0.004	0.073	0.000	HIGH
52279	2.995	0.006	0.150	0.001	HIGH
52280	0.062	0.000	0.008	0.000	HIGH
52281	3.062	0.006	0.046	0.000	HIGH
52282	1.383	0.003	0.057	0.000	HIGH
52283	-0.738	0.001	0.397	0.003	HIGH
52286	3.850	0.007	0.266	0.002	HIGH
52287	3.277	0.006	0.013	0.000	HIGH
52288	2.771	0.005	0.013	0.000	HIGH
52289	2.741	0.005	0.014	0.000	HIGH
52290	3.344	0.006	0.087	0.001	HIGH
52293	2.948	0.006	0.354	0.002	HIGH
52294	4.025	0.008	0.057	0.000	HIGH
52295	0.136	0.000	0.008	0.000	HIGH
52296	5.735	0.011	0.021	0.000	HIGH
52297	6.477	0.012	0.056	0.000	HIGH
52300	5.102	0.010	0.401	0.003	HIGH
52301	5.272	0.010	0.021	0.000	HIGH
52302	6.193	0.012	0.053	0.000	HIGH
52303	5.668	0.011	0.050	0.000	HIGH
52304	6.038	0.011	0.076	0.000	HIGH
52308	8.206	0.015	0.259	0.002	HIGH
52309	6.751	0.013	0.122	0.001	HIGH
52310	6.940	0.013	0.190	0.001	HIGH
52311	5.308	0.010	0.184	0.001	HIGH
52312	3.024	0.006	0.071	0.000	HIGH
52316	8.137	0.015	0.419	0.003	HIGH
52317	8.884	0.017	0.414	0.003	HIGH
52318	10.319	0.019	0.855	0.005	HIGH
52319	1.536	0.003	1.341	0.009	HIGH
52320	-0.603	0.001	0.742	0.005	HIGH
52323	8.262	0.016	1.777	0.011	HIGH
52324	8.712	0.016	1.533	0.010	HIGH
52325	8.310	0.016	5.320	0.034	HIGH
52326	7.800	0.015	14.354	0.092	HIGH
52327	-6.689	0.013	0.559	0.004	HIGH
52329	7.977	0.015	4.011	0.026	HIGH
52330	8.834	0.017	4.955	0.032	HIGH
52331	8.711	0.016	14.499	0.093	HIGH

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: STER LOADS - SRM ATTACHED

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
52391	-6.699	0.013	0.043	0.000	HIGH
52392	-9.144	0.017	0.092	0.001	HIGH
52393	-9.546	0.018	0.055	0.000	HIGH
52394	-8.093	0.015	0.129	0.001	HIGH
52396	-7.809	0.015	0.608	0.004	HIGH
52397	-6.835	0.013	0.049	0.000	HIGH
52398	-7.025	0.013	0.045	0.000	HIGH
52399	-6.501	0.012	0.080	0.001	HIGH
52400	-8.490	0.016	0.178	0.001	HIGH
52401	-6.787	0.013	1.807	0.012	HIGH
52402	-6.538	0.012	0.979	0.006	HIGH
52403	-7.045	0.013	0.079	0.001	HIGH
52404	-7.404	0.014	0.049	0.000	HIGH
52405	-4.052	0.008	1.123	0.007	HIGH
52406	-6.220	0.012	3.356	0.021	HIGH
52407	-6.258	0.012	0.962	0.006	HIGH
52408	-6.641	0.013	0.053	0.000	HIGH
52409	-7.284	0.014	0.296	0.002	HIGH
52410	-5.500	0.010	2.960	0.019	HIGH
52411	-5.679	0.011	0.380	0.002	HIGH
52412	-5.356	0.010	0.318	0.002	HIGH
52413	-4.247	0.008	1.300	0.008	HIGH
52414	-4.817	0.009	0.202	0.001	HIGH
52415	-2.192	0.004	0.299	0.002	HIGH
52425	0.787	0.001	0.337	0.002	HIGH
52426	-6.220	0.012	0.111	0.001	HIGH
52427	0.467	0.001	0.169	0.001	HIGH
52443	0.991	0.002	0.050	0.000	HIGH
52444	0.674	0.001	0.077	0.000	HIGH
52445	-7.259	0.014	0.102	0.001	HIGH
52446	0.201	0.000	0.208	0.001	HIGH
52447	-2.920	0.006	0.909	0.006	HIGH
52463	-6.900	0.013	0.180	0.001	HIGH
52464	4.685	0.009	0.444	0.003	HIGH
52465	-4.601	0.009	0.291	0.002	HIGH
53301	0.757	0.001	0.160	0.001	HIGH
53302	-3.228	0.006	0.063	0.000	HIGH
53303	-3.874	0.007	0.035	0.000	HIGH
53304	3.247	0.006	0.082	0.001	HIGH
53305	-4.472	0.008	0.083	0.001	HIGH
53306	4.130	0.008	0.032	0.000	HIGH
53307	-2.109	0.004	0.050	0.000	HIGH
53308	4.346	0.008	0.039	0.000	HIGH
53313	1.665	0.003	0.274	0.002	HIGH
53314	2.046	0.004	0.059	0.000	HIGH

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: STER LOADS - SRM ATTACHED

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
53383	0.541	0.001	0.018	0.000	HIGH
53384	0.859	0.002	0.024	0.000	HIGH
53385	0.827	0.002	0.043	0.000	HIGH
53386	0.723	0.001	0.070	0.000	HIGH
53390	0.497	0.001	0.113	0.001	HIGH
53391	0.271	0.001	0.012	0.000	HIGH
53392	-0.394	0.001	0.009	0.000	HIGH
53393	-0.647	0.001	0.010	0.000	HIGH
53394	-0.880	0.002	0.008	0.000	HIGH
53395	-1.205	0.002	0.021	0.000	HIGH
53397	3.709	0.007	0.164	0.001	HIGH
53398	2.009	0.004	0.022	0.000	HIGH
53399	1.078	0.002	0.008	0.000	HIGH
53400	0.649	0.001	0.024	0.000	HIGH
53401	0.026	0.000	0.035	0.000	HIGH
53402	-1.160	0.002	0.025	0.000	HIGH
53403	-3.737	0.007	0.139	0.001	HIGH
53406	2.413	0.005	0.063	0.000	HIGH
53407	2.471	0.005	0.050	0.000	HIGH
53408	1.788	0.003	0.016	0.000	HIGH
53409	1.438	0.003	0.002	0.000	HIGH
53410	1.337	0.003	0.019	0.000	HIGH
53411	0.875	0.002	0.031	0.000	HIGH
53412	0.645	0.001	0.072	0.000	HIGH
53413	-2.663	0.005	0.078	0.000	HIGH
53415	2.125	0.004	0.032	0.000	HIGH
53416	2.168	0.004	0.029	0.000	HIGH
53417	1.896	0.004	0.019	0.000	HIGH
53418	2.293	0.004	0.046	0.000	HIGH
53419	2.391	0.005	0.061	0.000	HIGH
53420	2.286	0.004	0.068	0.000	HIGH
53421	4.094	0.008	0.076	0.000	HIGH
53424	1.584	0.003	0.059	0.000	HIGH
53425	1.965	0.004	0.057	0.000	HIGH
53426	3.005	0.006	0.089	0.001	HIGH
53432	0.191	0.000	0.119	0.001	HIGH
53433	0.589	0.001	0.113	0.001	HIGH
53440	-1.487	0.003	0.227	0.001	HIGH
53450	-0.877	0.002	0.778	0.005	HIGH
53455	2.795	0.005	0.214	0.001	HIGH
53456	5.653	0.011	0.035	0.000	HIGH
53457	0.991	0.002	0.061	0.000	HIGH
53463	5.501	0.010	0.112	0.001	HIGH
53464	6.048	0.011	0.101	0.001	HIGH
53465	6.833	0.013	0.052	0.000	HIGH

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: STER LOADS - SRM ATTACHED

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
53522	-1.769	0.003	0.039	0.000	HIGH
53523	-1.213	0.002	0.076	0.000	HIGH
53524	-0.777	0.001	0.079	0.001	HIGH
53530	-3.781	0.007	0.108	0.001	HIGH
53531	-2.220	0.004	0.100	0.001	HIGH
53532	-1.374	0.003	0.111	0.001	HIGH
53539	-2.292	0.004	0.169	0.001	HIGH
53540	-1.545	0.003	0.212	0.001	HIGH
53550	-0.655	0.001	0.430	0.003	HIGH
53553	-6.292	0.012	0.039	0.000	HIGH
53554	-3.240	0.006	0.224	0.001	HIGH
53559	0.464	0.001	0.289	0.002	HIGH
53561	-5.977	0.011	0.102	0.001	HIGH
53562	-5.982	0.011	0.100	0.001	HIGH
53563	-5.273	0.010	0.105	0.001	HIGH
53568	-3.896	0.007	0.229	0.001	HIGH
53569	-4.632	0.009	0.123	0.001	HIGH
53570	-5.089	0.010	0.147	0.001	HIGH
53571	-4.982	0.009	0.162	0.001	HIGH
53574	-0.774	0.001	0.134	0.001	HIGH
53575	-3.365	0.006	0.384	0.002	HIGH
53576	-3.644	0.007	0.109	0.001	HIGH
53577	-3.739	0.007	0.110	0.001	HIGH
53578	-3.335	0.006	0.109	0.001	HIGH
53579	-2.291	0.004	0.058	0.000	HIGH
53580	-1.901	0.004	0.147	0.001	HIGH
53581	-2.672	0.005	0.354	0.002	HIGH
53582	-2.798	0.005	0.067	0.000	HIGH
53583	-3.142	0.006	0.096	0.001	HIGH
53584	-3.408	0.006	0.091	0.001	HIGH
53585	-3.093	0.006	0.135	0.001	HIGH
53586	-1.723	0.003	0.229	0.001	HIGH
53587	-2.322	0.004	0.087	0.001	HIGH
53588	-2.996	0.006	0.089	0.001	HIGH
53589	-2.986	0.006	0.091	0.001	HIGH
53590	-1.258	0.002	0.112	0.001	HIGH
53591	-2.491	0.005	0.086	0.001	HIGH
53592	-2.426	0.005	0.078	0.000	HIGH
53594	-3.257	0.006	0.072	0.000	HIGH
62201	-7.258	0.014	0.691	0.004	HIGH
62202	4.492	0.008	0.181	0.001	HIGH
62203	3.797	0.007	0.107	0.001	HIGH
62204	-4.679	0.009	0.146	0.001	HIGH
62205	-0.415	0.001	0.063	0.000	HIGH
62206	1.577	0.003	0.133	0.001	HIGH

5.5.253

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: STER LOADS - SRM ATTACHED

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
62263	-0.834	0.002	0.040	0.000	HIGH
62264	-0.529	0.001	0.041	0.000	HIGH
62265	-0.651	0.001	0.053	0.000	HIGH
62266	-0.262	0.000	0.129	0.001	HIGH
62267	-0.033	0.000	0.161	0.001	HIGH
62268	0.198	0.000	0.073	0.000	HIGH
62269	0.163	0.000	0.069	0.000	HIGH
62270	0.863	0.002	0.331	0.002	HIGH
62271	0.092	0.000	3.696	0.024	HIGH
62272	2.514	0.005	0.842	0.005	HIGH
62273	1.450	0.003	0.191	0.001	HIGH
62274	3.501	0.007	0.511	0.003	HIGH
62275	4.974	0.009	0.393	0.003	HIGH
62278	1.861	0.004	1.403	0.009	HIGH
62279	3.783	0.007	2.608	0.017	HIGH
62280	2.056	0.004	0.329	0.002	HIGH
62281	3.764	0.007	0.276	0.002	HIGH
62282	-0.086	0.000	0.249	0.002	HIGH
62283	0.449	0.001	0.155	0.001	HIGH
62286	2.882	0.005	1.011	0.006	HIGH
62287	1.955	0.004	0.674	0.004	HIGH
62288	3.136	0.006	0.180	0.001	HIGH
62289	1.981	0.004	0.170	0.001	HIGH
62290	-0.760	0.001	0.117	0.001	HIGH
62293	3.055	0.006	0.254	0.002	HIGH
62294	3.420	0.006	0.239	0.002	HIGH
62295	2.870	0.005	0.061	0.000	HIGH
62296	1.569	0.003	0.065	0.000	HIGH
62297	-0.411	0.001	0.053	0.000	HIGH
62300	3.414	0.006	0.113	0.001	HIGH
62301	3.158	0.006	0.087	0.001	HIGH
62302	2.754	0.005	0.041	0.000	HIGH
62303	1.575	0.003	0.017	0.000	HIGH
62304	0.840	0.002	0.066	0.000	HIGH
62308	2.614	0.005	0.088	0.001	HIGH
62309	3.581	0.007	0.087	0.001	HIGH
62310	2.681	0.005	0.056	0.000	HIGH
62311	2.086	0.004	0.103	0.001	HIGH
62312	1.785	0.003	0.102	0.001	HIGH
62316	3.099	0.006	0.163	0.001	HIGH
62317	2.840	0.005	0.168	0.001	HIGH
62318	2.659	0.005	0.118	0.001	HIGH
62319	2.454	0.005	0.192	0.001	HIGH
62320	2.216	0.004	0.183	0.001	HIGH
62323	2.693	0.005	0.289	0.002	HIGH

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: STER LOADS - SRM ATTACHED

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
62379	-1.270	0.002	0.703	0.004	HIGH
62383	2.021	0.004	0.052	0.000	HIGH
62384	0.034	0.000	0.014	0.000	HIGH
62385	-1.086	0.002	0.042	0.000	HIGH
62386	-1.738	0.003	0.060	0.000	HIGH
62387	-2.331	0.004	0.264	0.002	HIGH
62390	2.573	0.005	0.114	0.001	HIGH
62391	0.293	0.001	0.063	0.000	HIGH
62392	-0.996	0.002	0.060	0.000	HIGH
62393	-1.386	0.003	0.063	0.000	HIGH
62394	-3.137	0.006	0.169	0.001	HIGH
62396	1.870	0.004	0.322	0.002	HIGH
62397	-0.772	0.001	0.165	0.001	HIGH
62398	-1.888	0.004	0.172	0.001	HIGH
62399	-2.411	0.005	0.133	0.001	HIGH
62400	-2.624	0.005	0.067	0.000	HIGH
62401	-2.217	0.004	0.745	0.005	HIGH
62402	-6.258	0.012	0.447	0.003	HIGH
62403	-4.483	0.008	0.524	0.003	HIGH
62404	-3.267	0.006	0.471	0.003	HIGH
62405	-2.800	0.005	0.141	0.001	HIGH
62406	-11.309	0.021	1.748	0.011	HIGH
62407	-5.841	0.011	0.825	0.005	HIGH
62408	-4.764	0.009	1.289	0.008	HIGH
62409	-1.822	0.003	0.354	0.002	HIGH
62410	-8.161	0.015	2.764	0.018	HIGH
62411	-3.951	0.007	2.283	0.015	HIGH
62412	-6.108	0.012	1.538	0.010	HIGH
62413	-2.953	0.006	5.187	0.033	HIGH
62414	-1.767	0.003	1.798	0.011	HIGH
62415	-2.076	0.004	1.656	0.011	HIGH
63301	3.186	0.006	0.035	0.000	HIGH
63302	-3.146	0.006	0.038	0.000	HIGH
63303	-2.397	0.005	0.035	0.000	HIGH
63304	3.993	0.008	0.013	0.000	HIGH
63305	-0.612	0.001	0.033	0.000	HIGH
63306	1.037	0.002	0.042	0.000	HIGH
63307	0.435	0.001	0.047	0.000	HIGH
63308	-0.019	0.000	0.050	0.000	HIGH
63313	3.048	0.006	0.020	0.000	HIGH
63314	3.393	0.006	0.020	0.000	HIGH
63319	0.045	0.000	0.048	0.000	HIGH
63320	0.516	0.001	0.036	0.000	HIGH
63321	3.835	0.007	0.032	0.000	HIGH
63322	3.430	0.006	0.030	0.000	HIGH

ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: STER LOADS - SRM ATTACHED

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
63386	-1.234	0.002	0.144	0.001	HIGH
63390	-0.913	0.002	0.163	0.001	HIGH
63391	-0.825	0.002	0.067	0.000	HIGH
63392	-0.579	0.001	0.029	0.000	HIGH
63393	-0.193	0.000	0.015	0.000	HIGH
63394	0.084	0.000	0.037	0.000	HIGH
63396	0.945	0.002	0.024	0.000	HIGH
63397	0.938	0.002	0.020	0.000	HIGH
63398	1.041	0.002	0.021	0.000	HIGH
63399	1.172	0.002	0.014	0.000	HIGH
63400	1.209	0.002	0.027	0.000	HIGH
63401	0.963	0.002	0.029	0.000	HIGH
63402	0.599	0.001	0.027	0.000	HIGH
63403	-0.803	0.002	0.099	0.001	HIGH
63406	0.728	0.001	0.047	0.000	HIGH
63407	1.013	0.002	0.034	0.000	HIGH
63408	1.279	0.002	0.031	0.000	HIGH
63409	1.634	0.003	0.043	0.000	HIGH
63410	1.897	0.004	0.052	0.000	HIGH
63411	2.028	0.004	0.052	0.000	HIGH
63412	2.997	0.006	0.066	0.000	HIGH
63413	1.859	0.004	0.191	0.001	HIGH
63415	0.863	0.002	0.073	0.000	HIGH
63416	1.236	0.002	0.070	0.000	HIGH
63417	1.713	0.003	0.053	0.000	HIGH
63418	2.374	0.004	0.060	0.000	HIGH
63419	2.393	0.005	0.065	0.000	HIGH
63420	2.145	0.004	0.064	0.000	HIGH
63421	3.740	0.007	0.076	0.000	HIGH
63424	0.976	0.002	0.117	0.001	HIGH
63425	1.579	0.003	0.094	0.001	HIGH
63426	2.723	0.005	0.112	0.001	HIGH
63432	0.769	0.001	0.221	0.001	HIGH
63433	1.520	0.003	0.203	0.001	HIGH
63440	-0.183	0.000	0.447	0.003	HIGH
63450	-1.268	0.002	0.488	0.003	HIGH
63455	0.433	0.001	0.199	0.001	HIGH
63456	2.303	0.004	0.075	0.000	HIGH
63457	1.455	0.003	0.100	0.001	HIGH
63463	0.823	0.002	0.101	0.001	HIGH
63464	1.389	0.003	0.097	0.001	HIGH
63465	1.024	0.002	0.089	0.001	HIGH
63467	0.418	0.001	0.347	0.002	HIGH
63470	0.750	0.001	0.136	0.001	HIGH
63471	0.801	0.002	0.126	0.001	HIGH

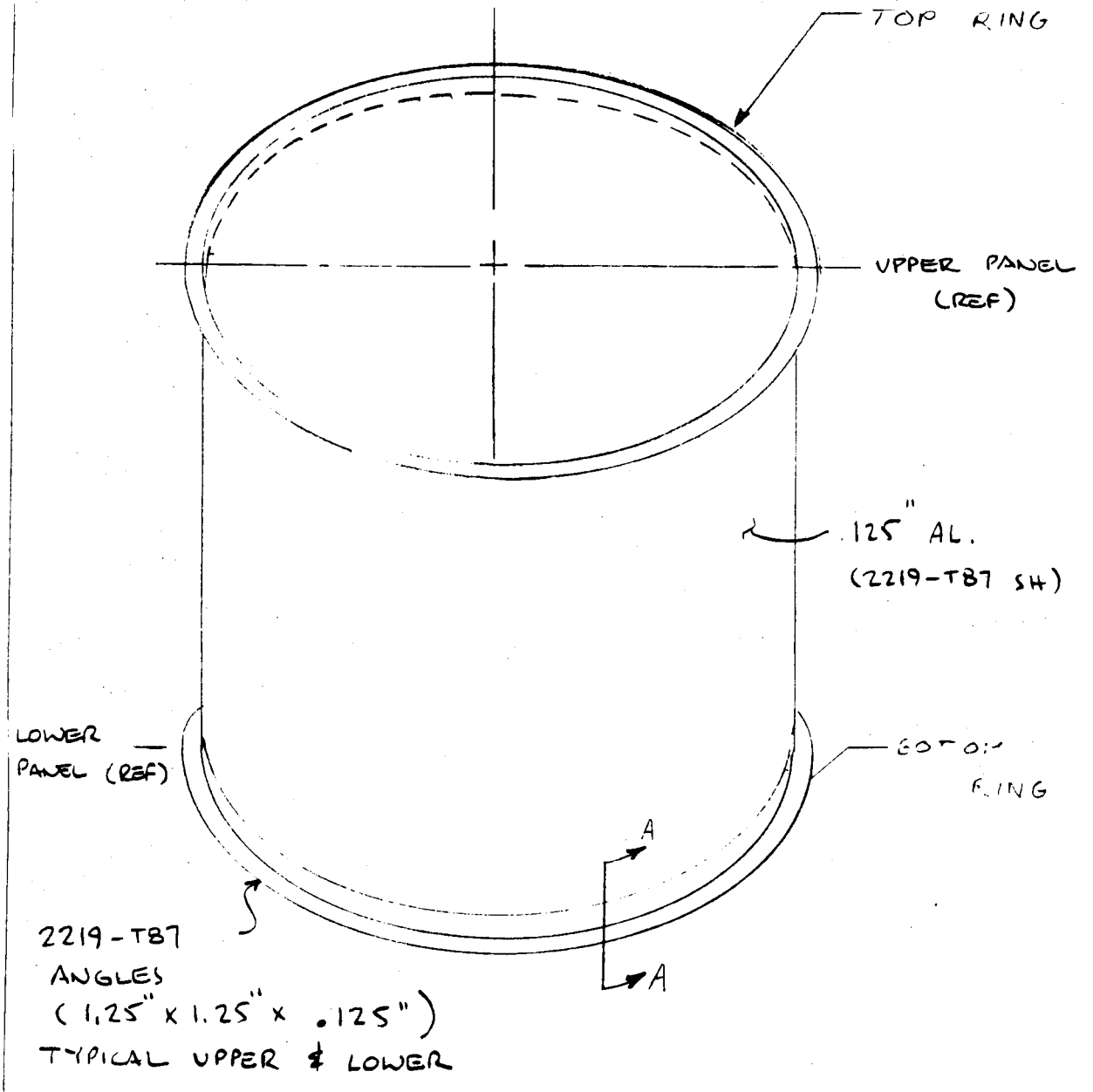
ISOGRID BAR FORCES AND MARGINS OF SAFETY
FROM AFE NASTRAN RUN TITLED: STER LOADS - SRM ATTACHED

BAR ID	AXIAL FORCE	AX. STRESS RATIO	BENDING MOMENT	BEND. STRESS RATIO	MARGIN OF SAFETY
63539	0.409	0.001	0.253	0.002	HIGH
63540	0.318	0.001	0.297	0.002	HIGH
63550	1.567	0.003	0.802	0.005	HIGH
63553	-2.202	0.004	0.082	0.001	HIGH
63554	-0.522	0.001	0.188	0.001	HIGH
63559	0.527	0.001	1.234	0.008	HIGH
63561	-4.174	0.008	0.059	0.000	HIGH
63562	-3.152	0.006	0.093	0.001	HIGH
63563	-2.945	0.006	0.101	0.001	HIGH
63568	-3.216	0.006	0.039	0.000	HIGH
63569	-3.527	0.007	0.035	0.000	HIGH
63570	-3.391	0.006	0.098	0.001	HIGH
63571	-3.364	0.006	0.102	0.001	HIGH
63574	0.897	0.002	0.343	0.002	HIGH
63575	-2.648	0.005	0.047	0.000	HIGH
63576	-2.827	0.005	0.037	0.000	HIGH
63577	-2.558	0.005	0.064	0.000	HIGH
63578	-1.891	0.004	0.066	0.000	HIGH
63579	-0.742	0.001	0.054	0.000	HIGH
63580	0.236	0.000	0.267	0.002	HIGH
63581	-2.369	0.004	0.048	0.000	HIGH
63582	-2.231	0.004	0.041	0.000	HIGH
63583	-1.869	0.004	0.046	0.000	HIGH
63584	-1.386	0.003	0.051	0.000	HIGH
63585	-0.769	0.001	0.194	0.001	HIGH
63586	-2.020	0.004	0.046	0.000	HIGH
63587	-1.749	0.003	0.029	0.000	HIGH
63588	-1.475	0.003	0.032	0.000	HIGH
63589	-1.107	0.002	0.127	0.001	HIGH
63590	-1.658	0.003	0.050	0.000	HIGH
63591	-1.398	0.003	0.013	0.000	HIGH
63592	-1.123	0.002	0.055	0.000	HIGH
63593	-1.318	0.002	0.050	0.000	HIGH
63594	-1.102	0.002	0.036	0.000	HIGH
63595	-0.937	0.002	0.032	0.000	HIGH

Prepared by: T. O. Hurley	Date 6/30/89	LOCKHEED MISSILES & SPACE COMPANY, INC.	Page 5.6.1 Temp Perm
Checked by:	Date	Title AFE CARRIER VEHICLE STRESS ANALYSIS	Model AFE-CV
Approved by:	Date		Report No.

5:6 CENTER CYLINDER RING ANALYSIS

- STRUCTURAL DESCRIPTION



ORIGINAL PAGE IS OF POOR QUALITY

5.6 CYLINDER RING ANALYSIS (CONT'D)

CRITICAL SECTION MOMENTS (i.-16)

TOP RING

LOAD CASE	BAY	PLANE 1	PLANE 2	REF. #
LIFTOFF	4/5	1120	0	1
LANDING ABORT	5/6	1020	-40	2
REGULAR LANDING	1/6	1280	80	3

BOTTOM RING

LOAD CASE	BAY	PLANE 1	PLANE 2	REF #
LIFT OFF	1	-750	-150	4
LANDING ABORT	5	500	-50	5
REGULAR LANDING	5	-1080	-1550	6

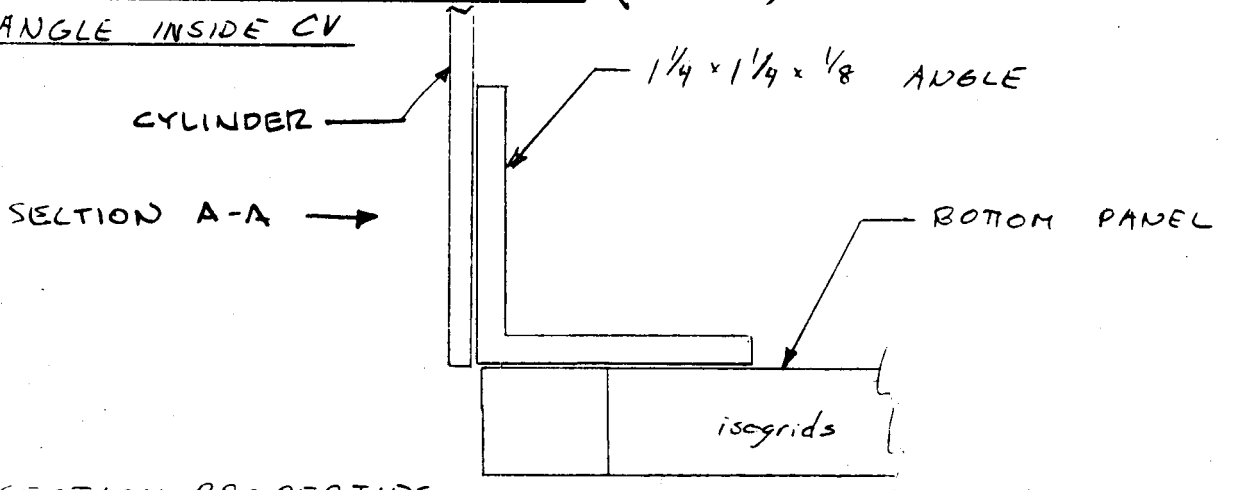
MARGINS OF SAFETY SUMMARY TABLE

COMBINED BENDING MOMENTS	M.S
• TOP RING	
LIFTOFF	1.1
LANDING ABORT	0.88
REGULAR LANDING	0.48
• BOTTOM RING	
LIFTOFF	1.4
LANDING ABORT	HIGH
REGULAR LANDING	0.15

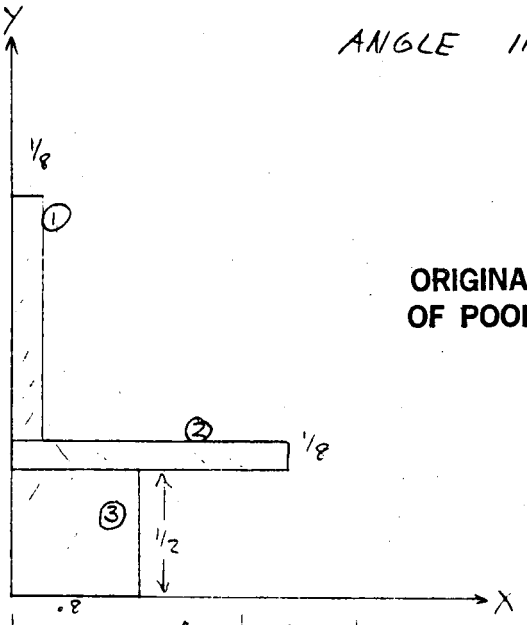
ORIGINAL PAGE IS
OF POOR QUALITY

5.6 CYLINDER RING ANALYSIS (CONT'D)

ANGLE INSIDE CV



SECTION PROPERTIES



ANGLE INSIDE CV

ORIGINAL PAGE IS
OF POOR QUALITY

	A	x	y	Ax	Ay	Ax²	Ay²	Iox	Ioy	Axy
1	.1406	.0625	1.1875	.0088	.1670	.0006	.1983	.0148	.0002	.0104
2	.1563	.6250	.5625	.0977	.0879	.0611	.0494	.0002	.0203	.0549
3	0.40	0.40	.25	.1600	.1000	.0640	.025	.0083	.0213	.0400
	.6969			.2665	.3549	.1257	.2727	.0233	.0418	.1053

$\bar{X} = \Sigma Ax / \Sigma A = .2665 / .6969 = 0.3824$

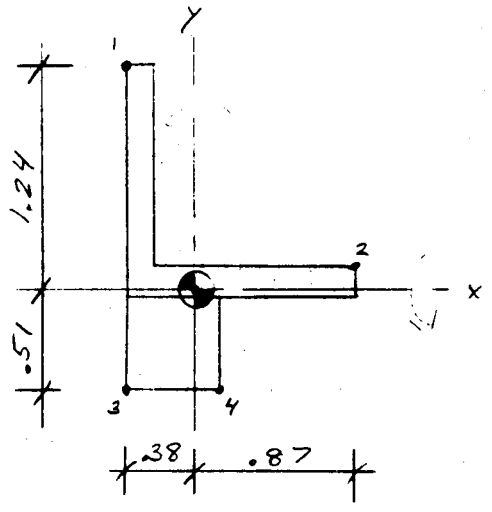
$\bar{y} = \Sigma Ay / \Sigma A = .3549 / .6969 = 0.5093$

SECTION PROPERTIES cont.

$$I_{x\,cg} = \Sigma I_{xo} + \Sigma(Ay^2) - \Sigma A(\bar{y})^2$$
$$= 0.0233 + 0.2727 - 0.6969(0.5093)^2 = 0.1152$$

$$I_{y\,cg} = \Sigma I_{yo} + \Sigma(Ax^2) - \Sigma A(\bar{x})^2$$
$$= 0.0418 + 0.1257 - 0.6969(0.3824)^2 = 0.0656$$

$$I_{xy\,cg} = \Sigma(Axy) - \Sigma A(\bar{x})(\bar{y})$$
$$= 0.1063 - 0.6969(.3824)(.5093)$$
$$= -0.0304$$



SECTION w/ CG LOCATION

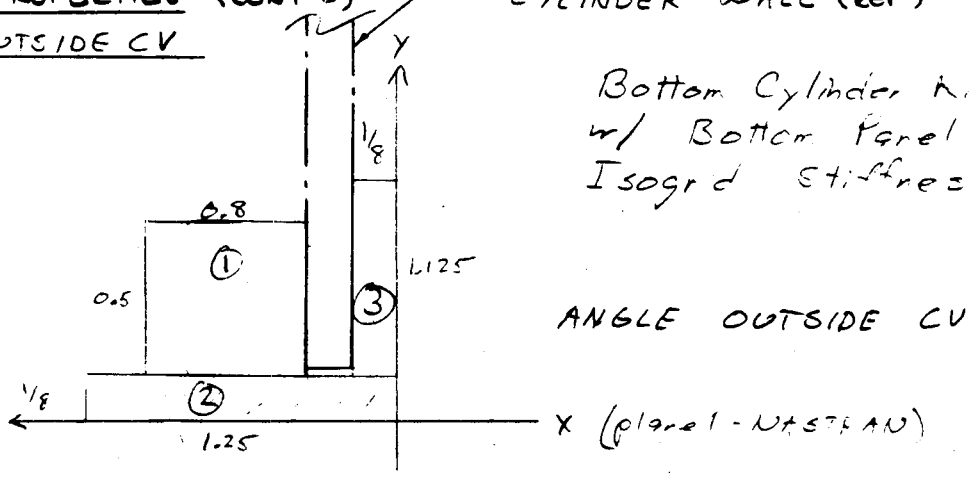
$I_{x\,cg} = 0.1152 \text{ in}^4$
$I_{y\,cg} = 0.0656 \text{ in}^4$
$I_{xy} = -0.0304 \text{ in}^4$

ORIGINAL PAGE IS
OF POOR QUALITY

Prepared by: T.O. Murray	Date 6/30/88	LOCKHEED MISSILES & SPACE COMPANY, INC.	Page 5.6.5 Temp Perm
Checked by:	Date	Title AFE CARRIER VEHICLE STRESS ANALYSIS	Model AFE-CV
Approved by:	Date		Report No.

SECTION PROPERTIES (CONT'D)

ANGLE OUTSIDE CV



Bottom Cylinder Ring w/ Bottom Panel Isogrid Stiffness

ANGLE OUTSIDE CV

SECTION PROPERTIES

	A	x	y	Ax	Ax²	Ay	Ay²
1	0.40	0.65	0.375	.26	.169	.15	.0563
2	0.1563	.625	0.0625	.0977	.0611	.0098	.0006
3	0.1406	.0625	.6875	.0088	.0005	.0967	.0665
	ΣA = 0.6969			.3665	.2306	.2580	.1234

	Iox	Ioy	Axy
1	.0083	.0213	.0975
2	.0002	.0203	.0061
3	.0148	.0002	.0060
	.0233	.0418	.1096

$\bar{x} = \Sigma Ax / \Sigma A = .3665 / .6969 = 0.5259$

$\bar{y} = \Sigma Ay / \Sigma A = .2580 / .6969 = 0.3702$

$I_{x\,cg} = \Sigma I_{ox} + \Sigma(Ay^2) - (\Sigma A)(\bar{y})^2 = 0.0512$

$I_{y\,cg} = \Sigma I_{oy} + \Sigma(Ax^2) - (\Sigma A)(\bar{x})^2 = .0797$

$I_{xy\,cg} = \Sigma(Axy) - \Sigma A(\bar{x})(\bar{y}) = -0.026$

(Top + Bottom Rings)

PRAM, 121, 2219, 0.6969, 7.97E-2, 5.12E-2, 0.01

(NASTRAN)

ORIGINAL PAGE IS
OF POOR QUALITY

FORM LMSC 362 8-3

5.6 CYLINDER RING ANALYSIS (CONT'D)

REF # 1 ~ TOP RING, LIFTOFF CONDITION

$$f_b = \frac{M_x c}{I_y} = \frac{1120 \text{ in-lb } (0.87 \text{ in})}{0.0656 \text{ in}^4} = 14.9 \text{ ksi}$$

$$MS = \frac{63}{2.0(14.9)} - 1 = \underline{\underline{1.11}}$$

REF # 2 ~ TOP RING, LANDING ABORT

$M_y = 1020$ in-lb

$M_x = -40$ in-lb

critical point = 2 tension stress

$x = -0.87$

$y = -0.24$ because of sign convention

$$f_b = \frac{M_x I_{xy} - M_y I_x}{I_x I_y - I_{xy}^2}(x) + \frac{M_y I_{xy} - M_x I_y}{I_x I_y - I_{xy}^2}(y)$$

$$= \frac{(40)(-.0304) - (1020)(.1152)}{(.1152)(.0656) - (.0304)^2}(-.87)$$

$$+ \frac{(1020)(-.0304) - (40)(.0656)}{(.1152)(.0656) - (.0304)^2}(-.24)$$

$$= 15.57 + 1.22 = 16.79 \text{ ksi}$$

$$MS = \frac{63}{2.0(16.8)} - 1 = \underline{\underline{0.88}}$$

ORIGINAL PAGE IS
OF POOR QUALITY

5.6 CYLINDER RING ANALYSIS (CONT'D)

REF # 3 ~ TOP RING, REGULAR LANDING

$M_y = 1280$ in-lb

$M_x = 80$ in-lb

critical pt = 2

$X = +0.87$

$Y = +0.24$

$$f_o = \frac{M_x I_{xy} - M_y I_x}{I_x I_y - (I_{xy})^2}(x) + \frac{M_y I_{xy} - M_x I_y}{I_x I_y - (I_{xy})^2}(y)$$

$$= \frac{80(-.0304) - (1280)(.1152)}{(.1152)(.0656) - (.0304)^2}(.87)$$

$$+ \frac{1280(-.0304) - (80)(.0656)}{(.1152)(.0656) - (.0304)^2}(.24)$$

$$= -19.66 \text{ ksi} - 1.60 \text{ ksi} = -21.3 \text{ ksi}$$

$$MS = \frac{63}{2.0(21.3)} - 1 = \underline{0.48}$$

ORIGINAL PAGE IS
OF POOR QUALITY

Prepared by: T.O. Murray	Date 7/7/88	LOCKHEED MISSILES & SPACE COMPANY, INC.	Page 5.6.8 Temp. Perm.
Checked by:	Date	Title AFE CARRIER VEHICLE STRESS ANALYSIS	Model AFE-CV
Approved by:	Date		Report No.

5.6 CYLINDER RING ANALYSIS (CONT'D)

REF #4 ~ BOTTOM RING, LIFTOFF CONDITION

$M_y = -750$ in-lb
$M_x = -150$ in-lb
critical point = 2 $M_y = 5 \times M_x$

$x = -0.87$
$y = -0.24$

$$f_b = \frac{M_x I_{xy} - M_y I_x}{I_x I_y - I_{xy}^2}(x) + \frac{M_y I_{xy} - M_x I_y}{I_x I_y - I_{xy}^2}(y)$$

$$f_b = \frac{(150)(-.0304) - (750)(.1152)}{(.1152)(.0656) - (.0304)^2}(-.87)$$

$$+ \frac{(750)(-.0304) - (150)(.0656)}{(.1152)(.0656) - (.0304)^2}(-.24)$$

$= 11.93 + 1.18 = 13.1$ ksi

$$MS = \frac{63}{2.0(13.1)} - 1 = \underline{1.40}$$

REF #5 ~ BOTTOM RING, LANDING ABORT

MS > 1.40 by comparison w/ REF # 4

ORIGINAL PAGE IS
OF POOR QUALITY

5.6 CYLINDER RING ANALYSIS (CONT'D)

REF #6 ~ BOTTOM RING, REGULAR LANDING

$M_y = -410$ and $M_y = -1080$
$M_x = -1800$ $M_x = -1550$

critical pt = 2

$X = -0.87$ in
$Y = -0.24$ in

$$f_b = \frac{M_x I_{xy} - M_y I_x}{I_x I_y - I_{xy}^2}(x) + \frac{M_y I_{xy} - M_x I_y}{I_x I_y - I_{xy}^2}(y)$$

$$= \frac{1550(-0.0304) - (1080)(.1152)}{(.1152)(.0656) - (.0304)^2}(-.87)$$

$$+ \frac{1080(-.0304) - (1550)(.0656)}{(.1152)(.0656) - (.0304)^2}(-.24)$$

$$= 22.50 + 4.87 = 27.4 \text{ ksi}$$

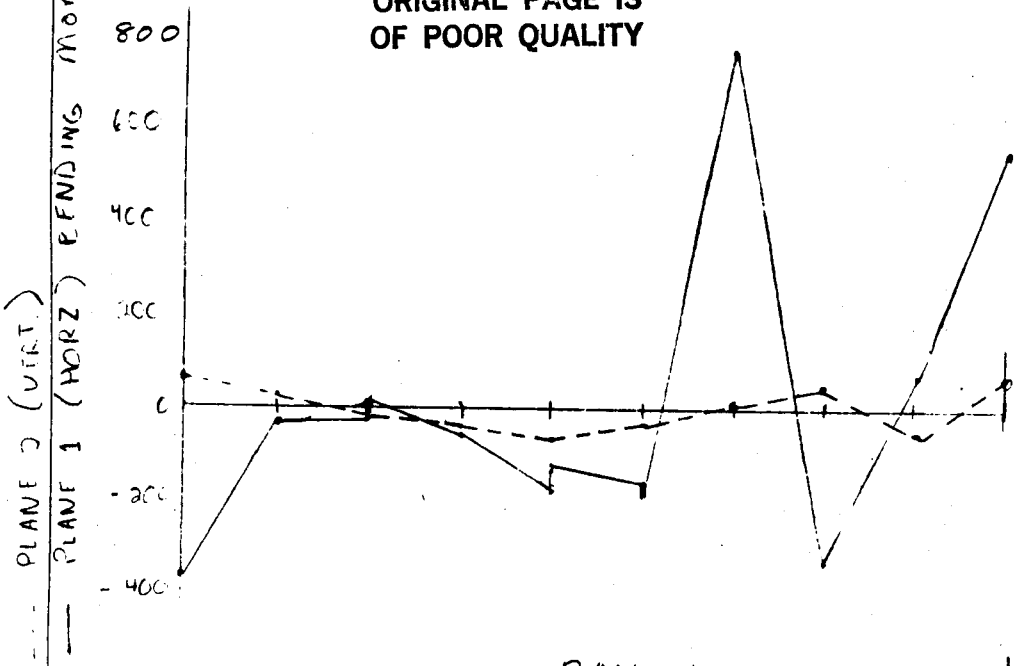
$$M.S. = \frac{63}{2.0(27.4)} - 1 = \underline{0.15}$$

ORIGINAL PAGE IS
OF POOR QUALITY

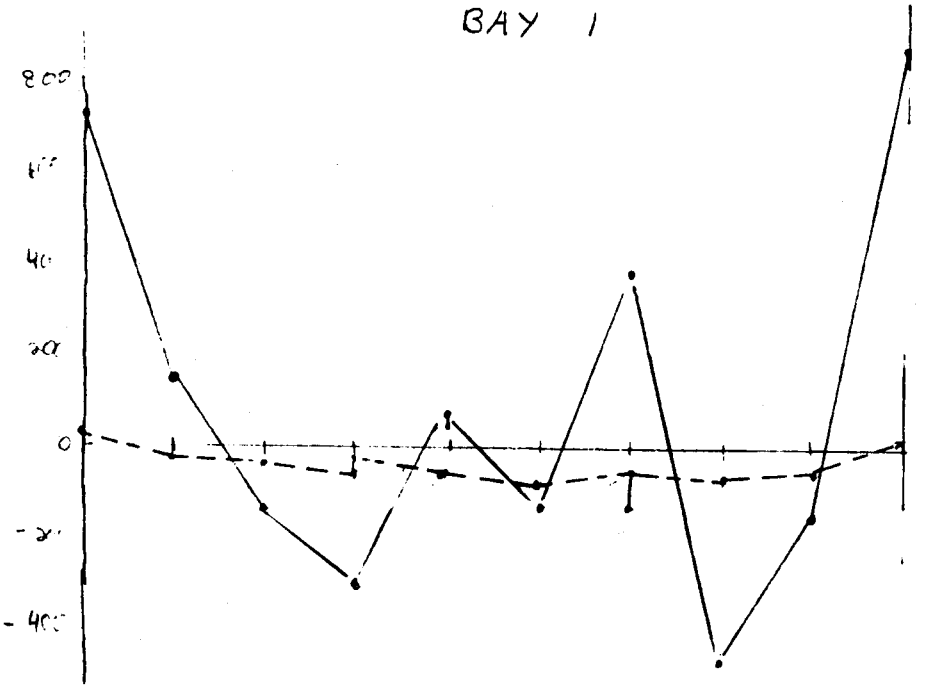
Prepared by: D.E. Kieflin	Date 7/6/88	LOCKHEED MISSILES & SPACE COMPANY, INC.	Page 5.6.10 Temp. Perm.
Checked by:	Date	Title AFE CARRIER VEHICLE STRESS ANALYSIS	Model AFE - CV
Approved by:	Date		Report No.

5.6 CYLINDER RING ANALYSIS (CONT'D)
LIFTOFF LOADS
TOP RING

ORIGINAL PAGE IS
OF POOR QUALITY



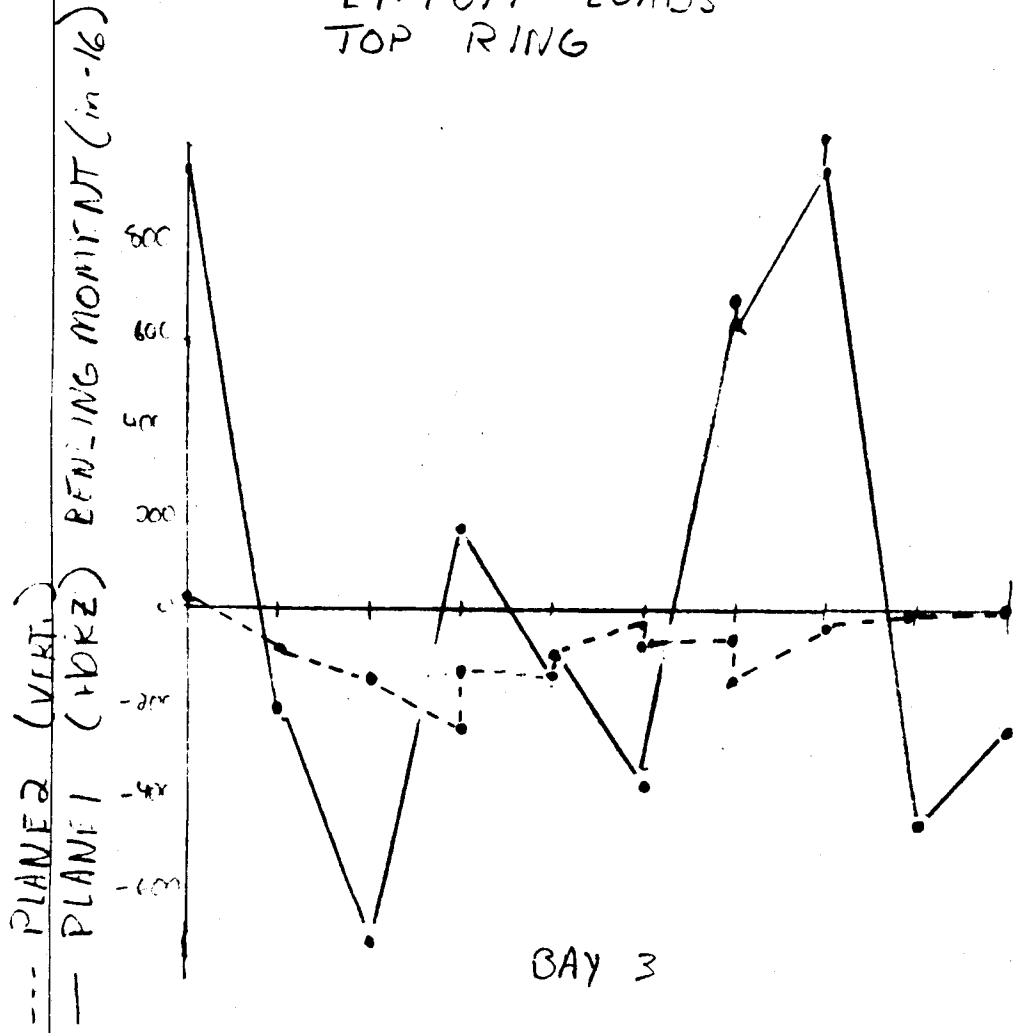
BAY 1



BAY 2

5.6 CYLINDER RING ANALYSIS (CONT'D)

LIFTOFF LOADS
TOP RING



ORIGINAL PAGE IS
OF POOR QUALITY

Prepared by: D.E. Kiefling	Date 7/6/88	LOCKHEED MISSILES & SPACE COMPANY, INC.	Page Temp. Perm. 5.6.12
Checked by:	Date	Title AFE CARRIER VEHICLE STRESS ANALYSIS	Model AFE-CV
Approved by:	Date		Report No.

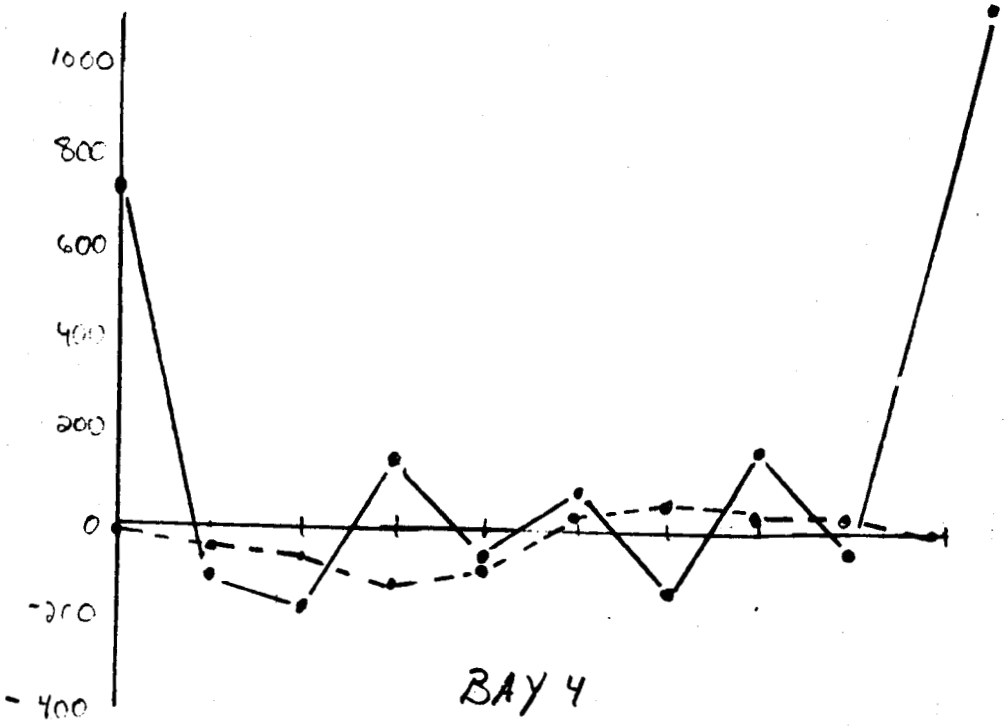
5.6 CYLINDER RING ANALYSIS (CONT'D)

LIFTOFF LOADS

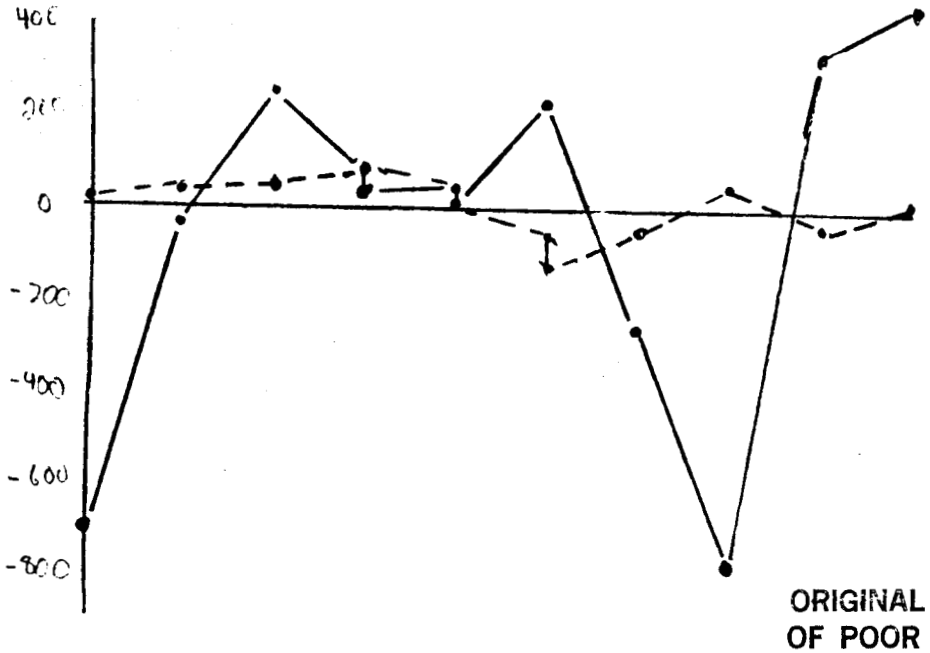
TOP RING

--- PLANE 2 (VERT.) BENDING MOMENT (111 - 16)

— PLANE 1 (HORZ.)



BAY 4



BAY 5

ORIGINAL PAGE IS
OF POOR QUALITY

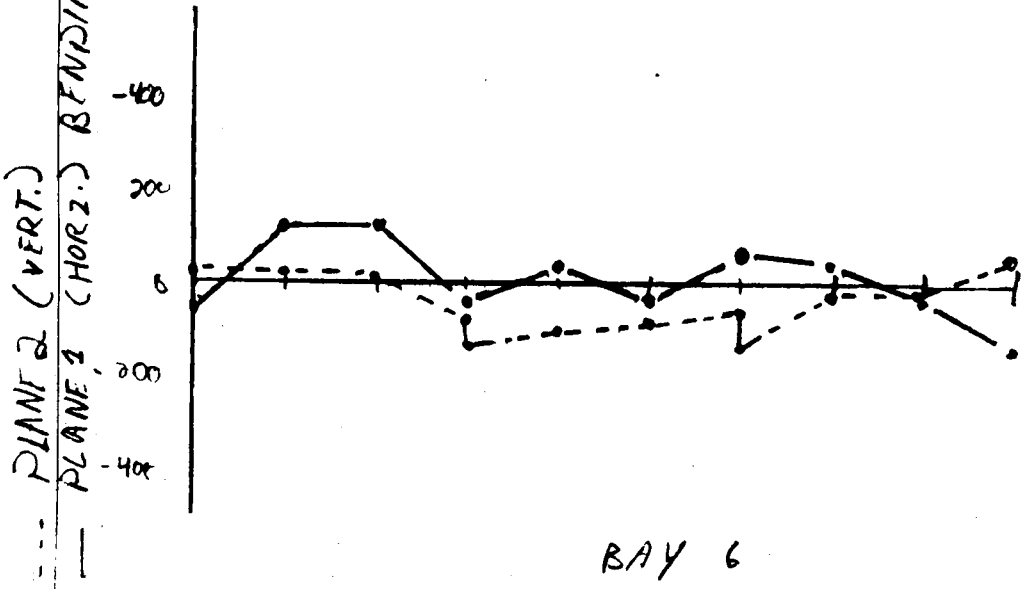
FORM LMSC 362 B-3

Prepared by: D.E. KIEFLING	Date 7/6/88	LOCKHEED MISSILES & SPACE COMPANY, INC.	Page 5.6.13 Temp. Perm.
Checked by:	Date	Title AFE CARRIER VEHICLE STRESS ANALYSIS	Model AFE-CV
Approved by:	Date		Report No.

5.6 CYLINDER RING ANALYSIS (CONT'D)

LIFTOFF LOADS

TOP RING

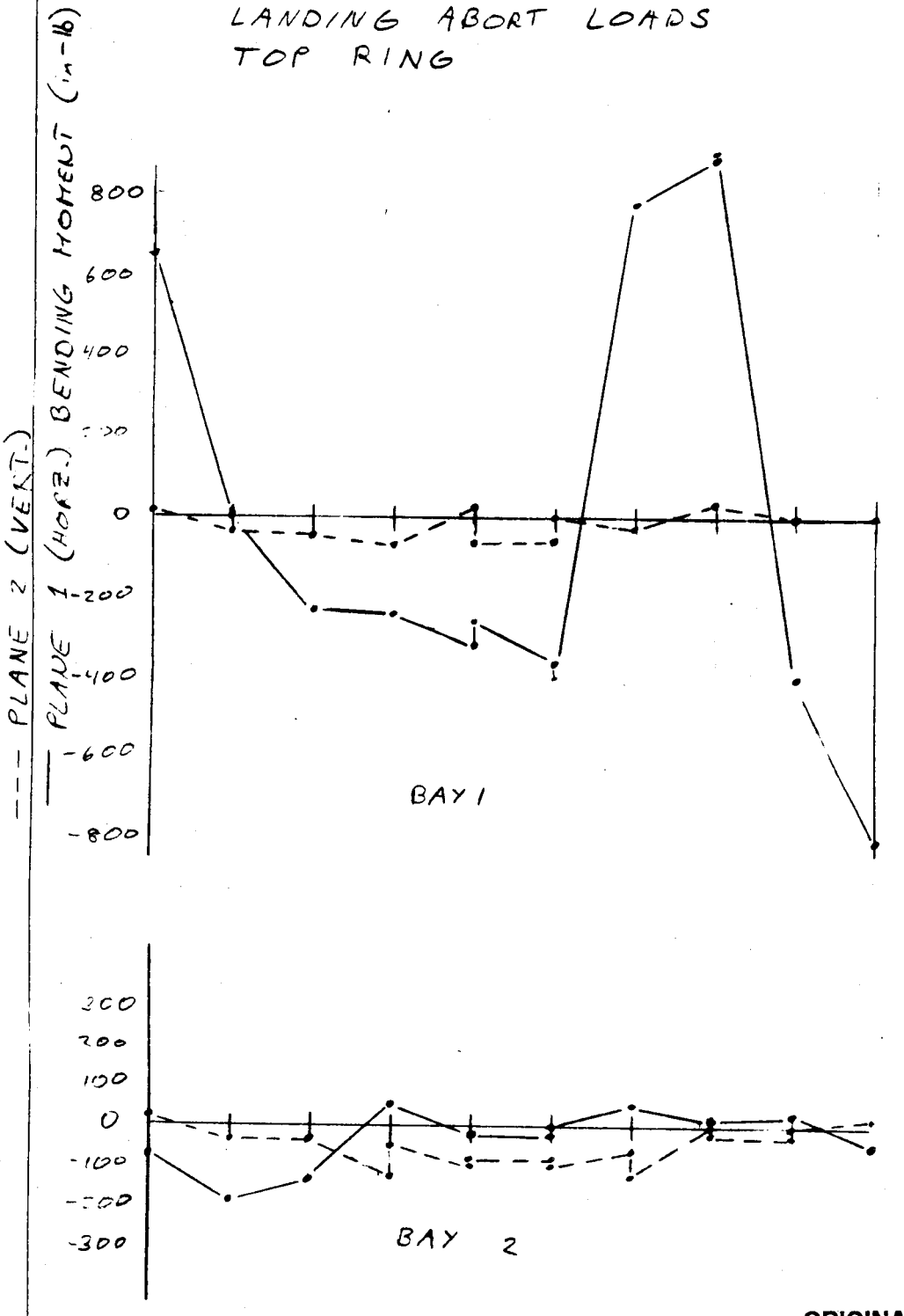


BAY 6

5.6 CYLINDER RING ANALYSIS (CONT'D)

LANDING ABORT LOADS

TOP RING



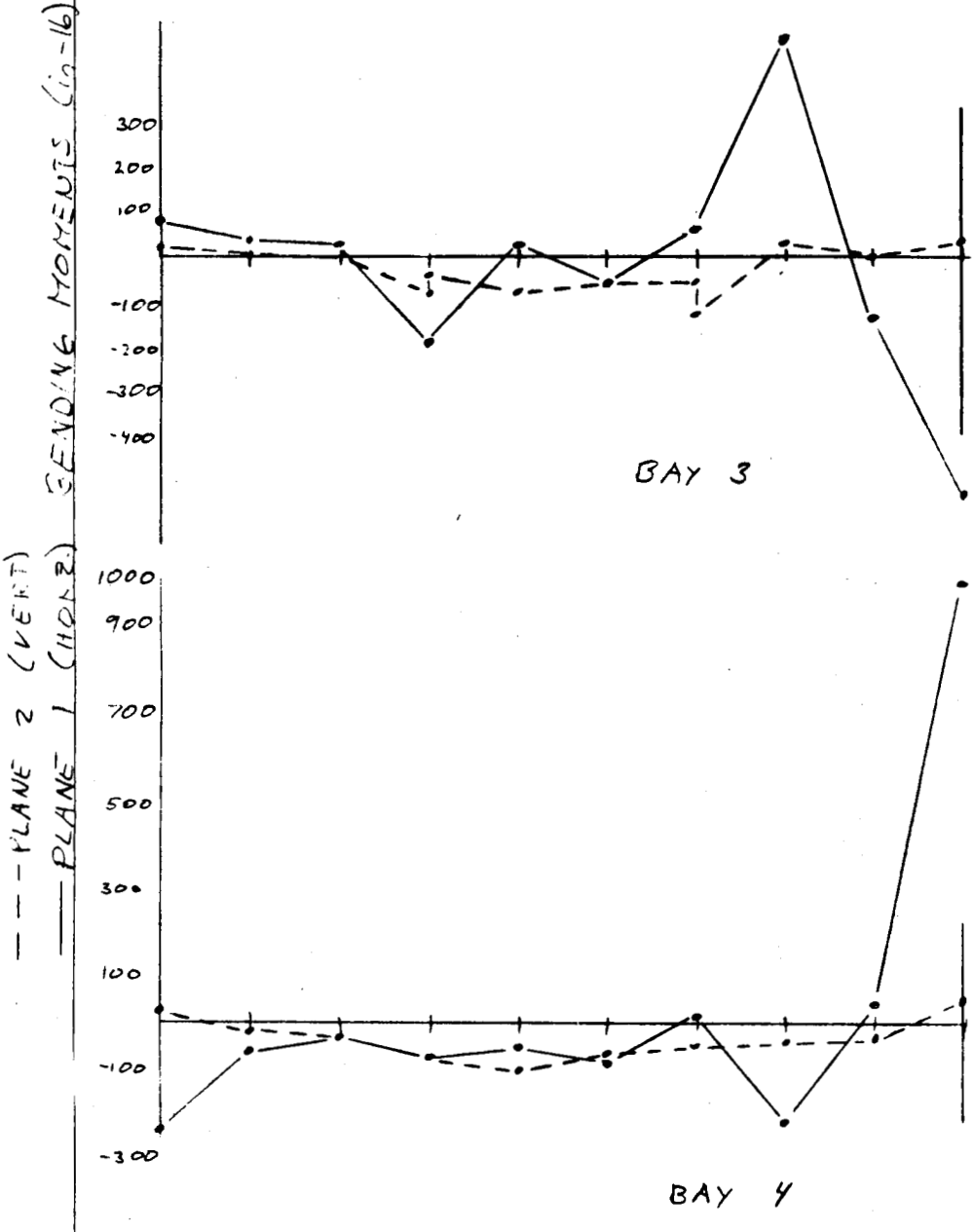
ORIGINAL PAGE IS
OF POOR QUALITY

Prepared by: T.O. MURRAY	Date 6/30/88	LOCKHEED MISSILES & SPACE COMPANY, INC.	Page 5.6.15 Temp Perm.
Checked by:	Date 7/6/88	Title AFE CARRIER VEHICLE	Model AFE-CV
Approved by:	Date	STRESS ANALYSIS	Report No.

5.6 CYLINDER RING ANALYSIS (CONT'D)

LANDING ABORT LOADS

TOP RING



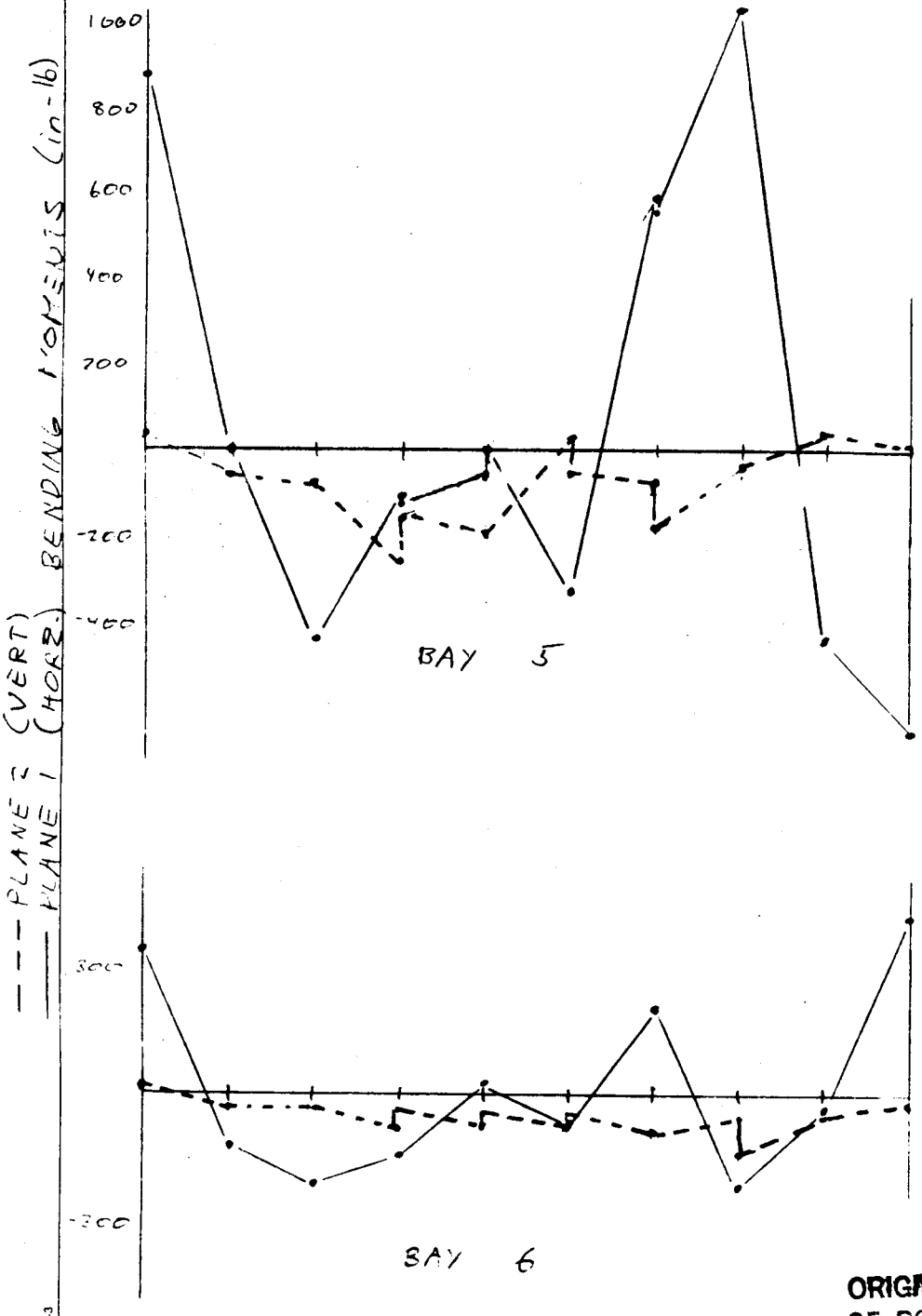
ORIGINAL PAGE IS
OF POOR QUALITY

Prepared by: T. O. Murray	Date 7/6/88	LOCKHEED MISSILES & SPACE COMPANY, INC.	Page 5.6.16 Temp Perm
Checked by:	Date	Title AFE CARRIER VEHICLE STRESS ANALYSIS	Model AFE-CV
Approved by:	Date		Report No.

5.6 CYLINDER RING ANALYSIS (CONT'D)

LANDING ABORT LOADS

TOP RING

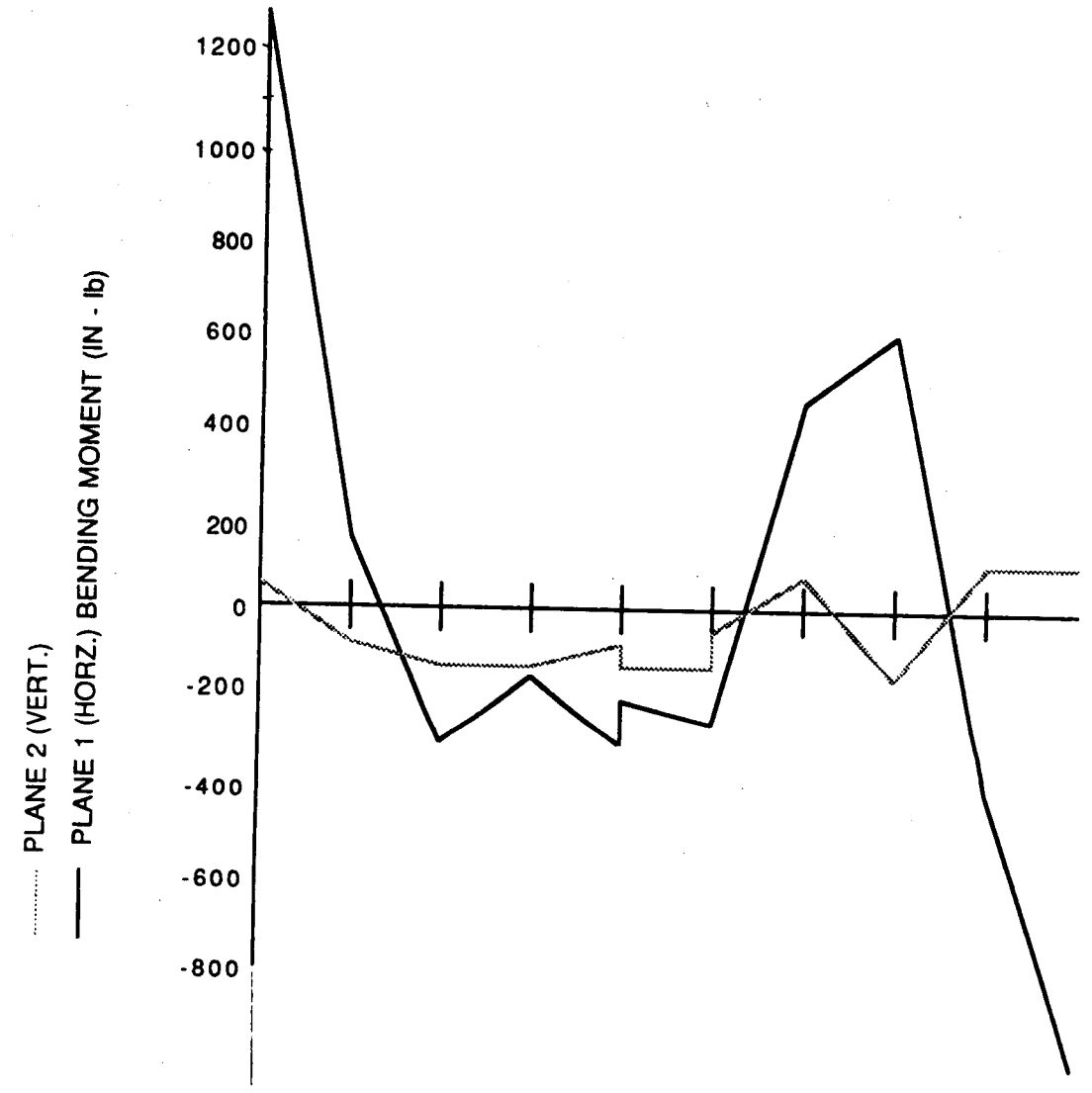


ORIGINAL PAGE IS
OF POOR QUALITY

5.6 CYLINDER RING ANALYSIS (CONT'D)

REGULAR LANDING LOADS

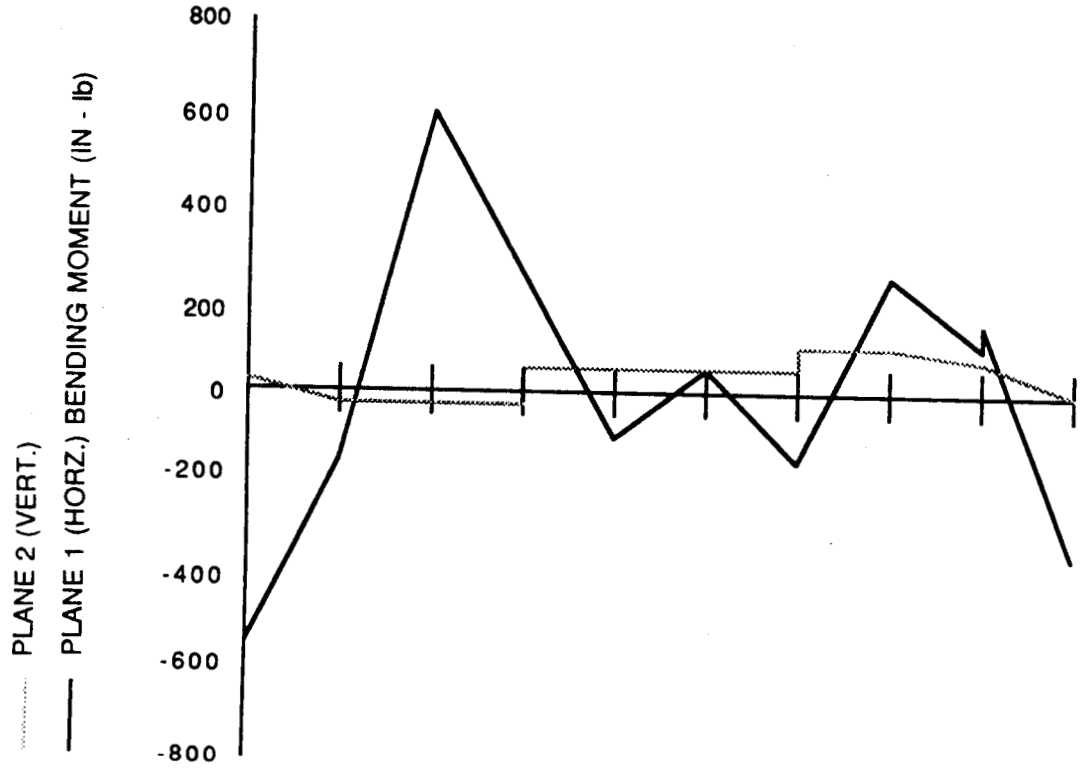
TOP RING



BAY 1

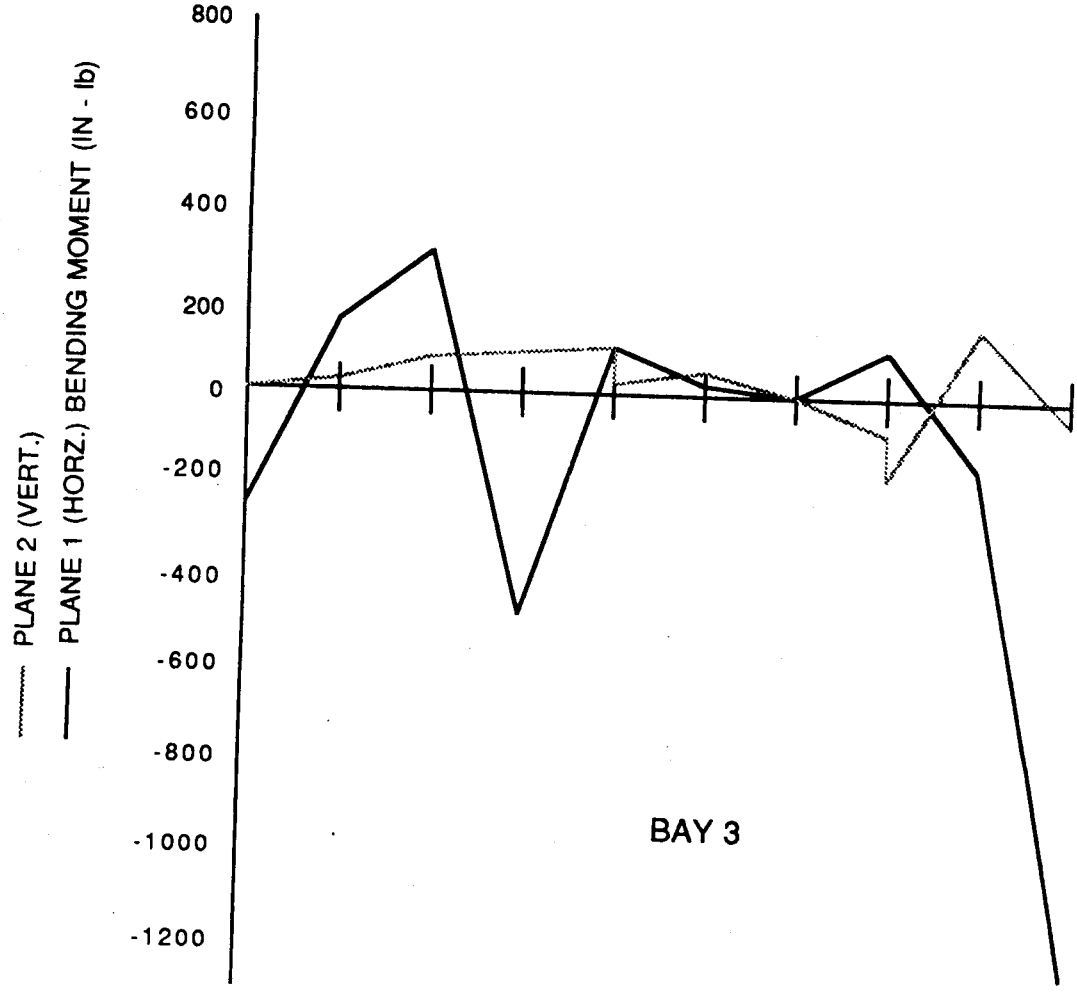
5.6 CYLINDER RING ANALYSIS (CONT'D)

REGULAR LANDING LOADS
TOP RING



BAY 2

5.6 CYLINDER RING ANALYSIS (CONT'D)
REGULAR LANDING LOADS
TOP RING

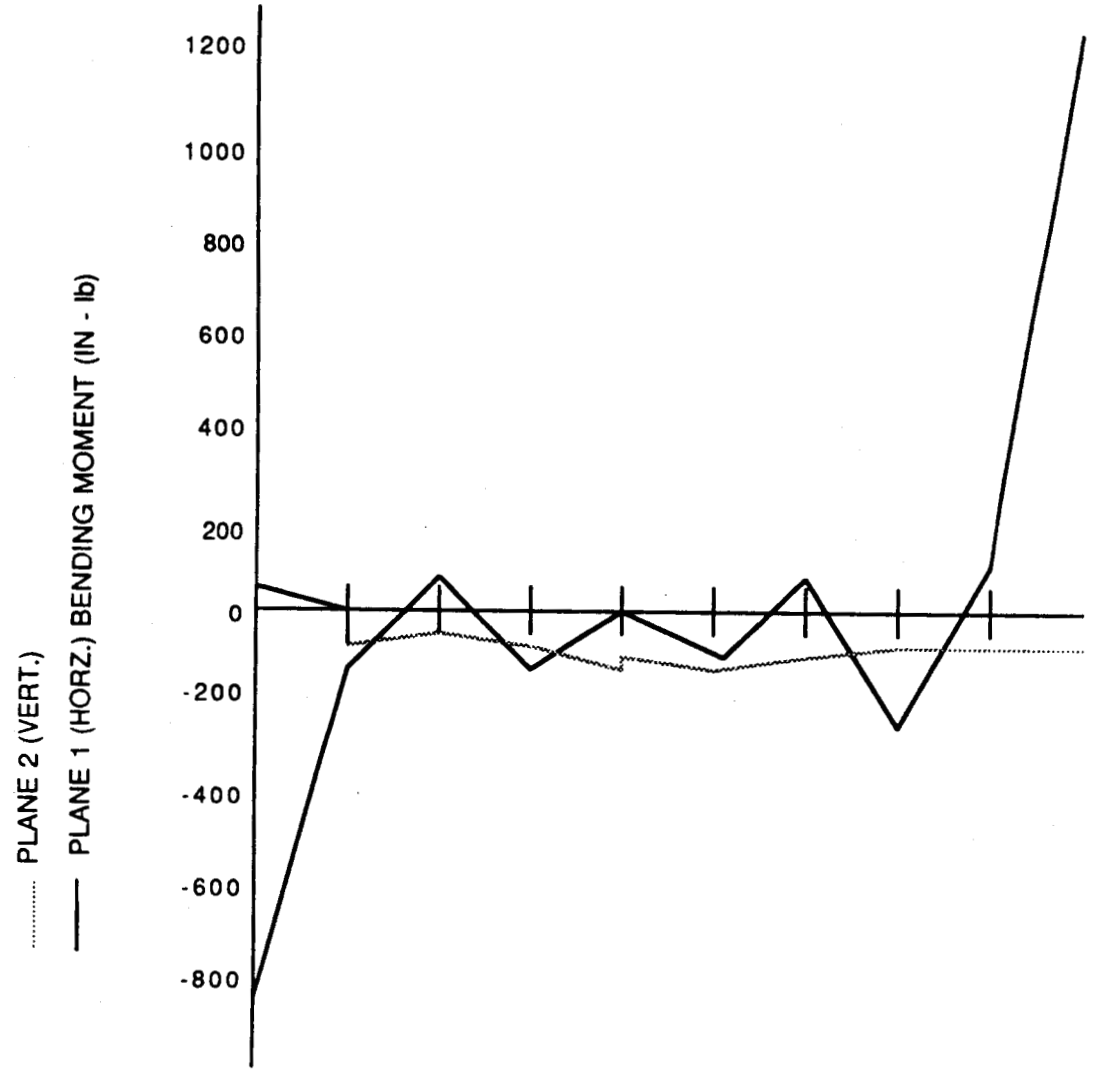


FORM LMSC 362 B 3

5.6 CYLINDER RING ANALYSIS (CONT'D)

REGULAR LANDING LOADS

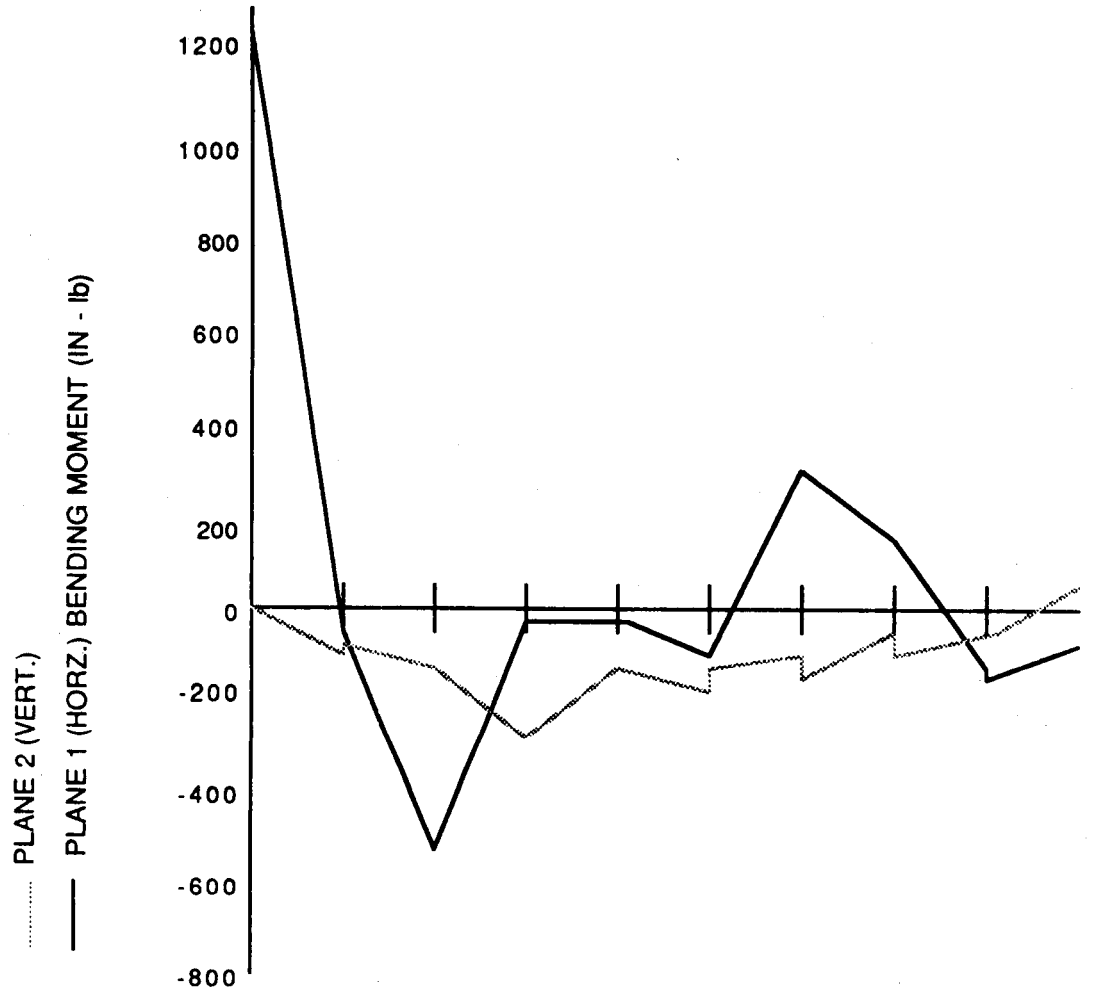
TOP RING



BAY 4

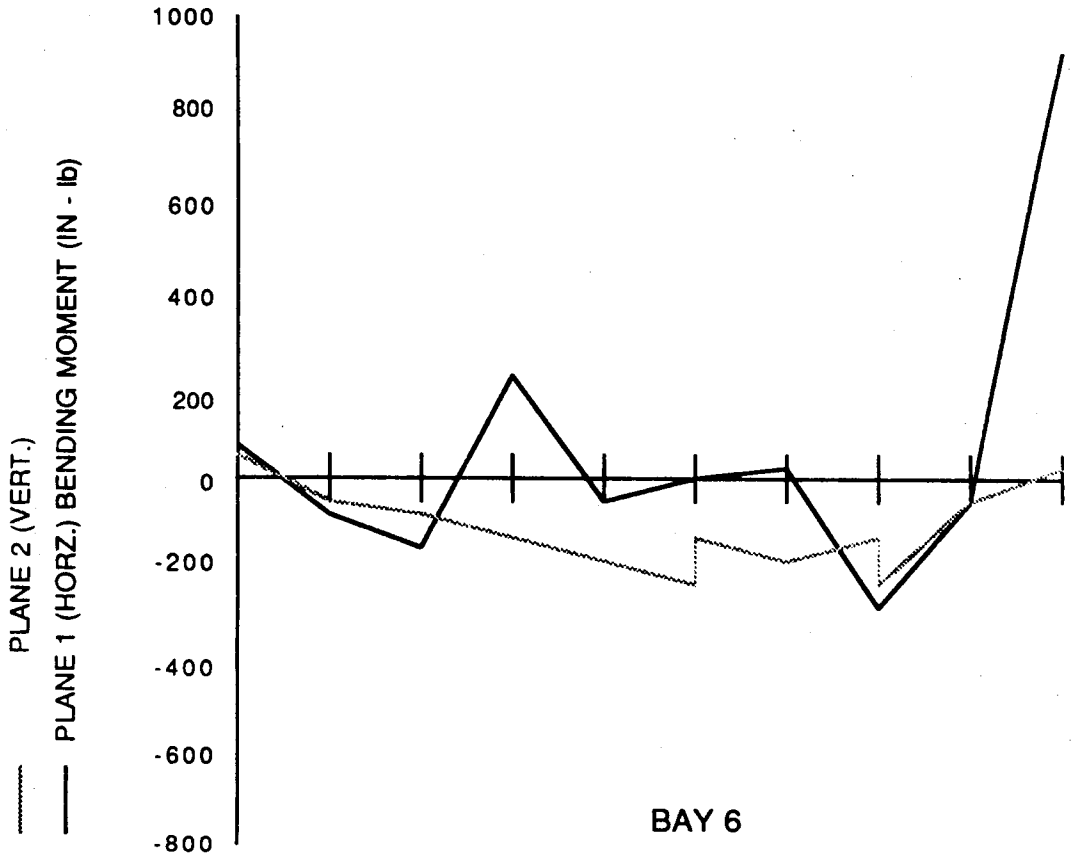
5.6 CYLINDER RING ANALYSIS (CONT'D)

REGULAR LANDING LOADS
TOP RING



BAY 5

5.6 CYLINDER RING ANALYSIS
REGULAR LANDING LOADS
TOP RING

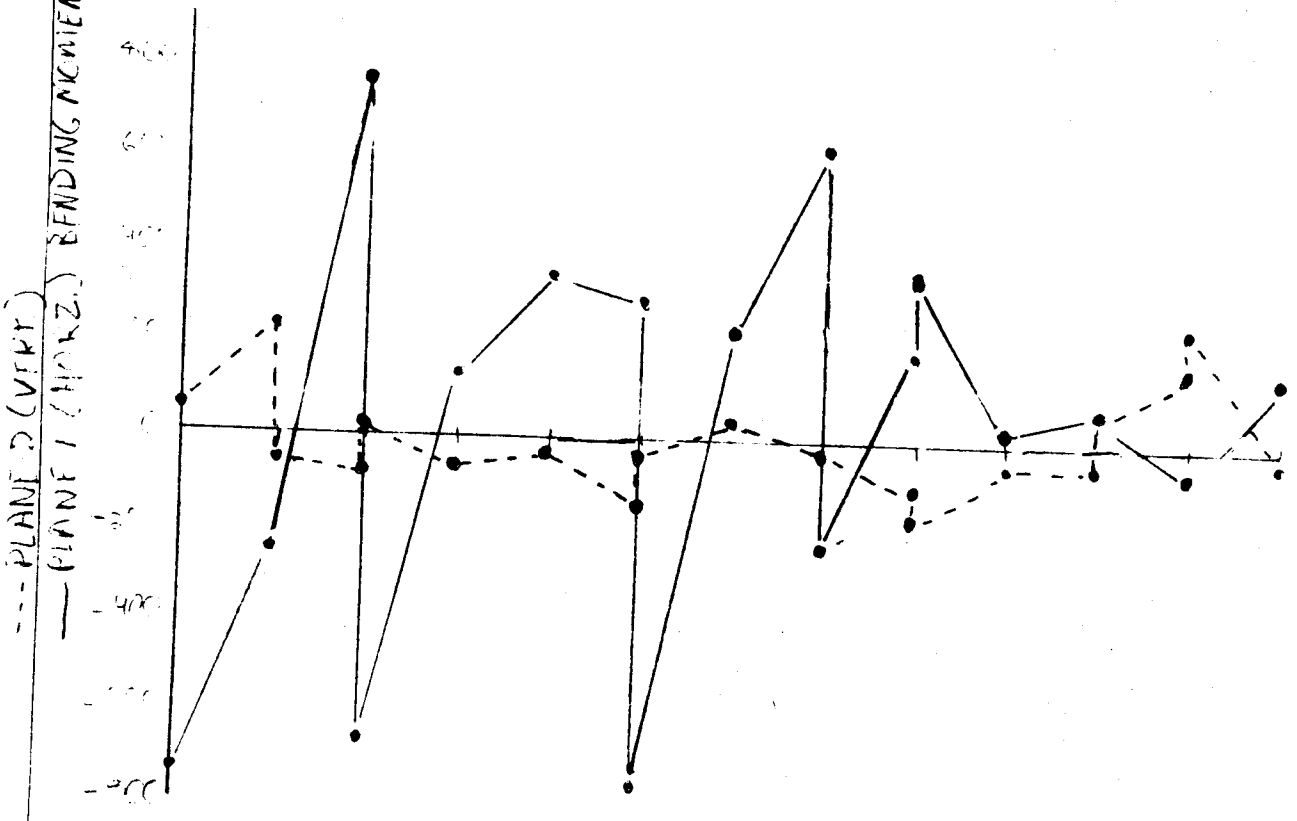


Prepared by:	Date	LOCKHEED MISSILES & SPACE COMPANY, INC.	Page 5.6.23 Temp Perm
Checked by:	Date	Title AFE CARRIER VEHICLE STRESS ANALYSIS	Model AFE-CV
Approved by:	Date		Report No.

5.6 CYLINDER RING ANALYSIS (CONT'D)

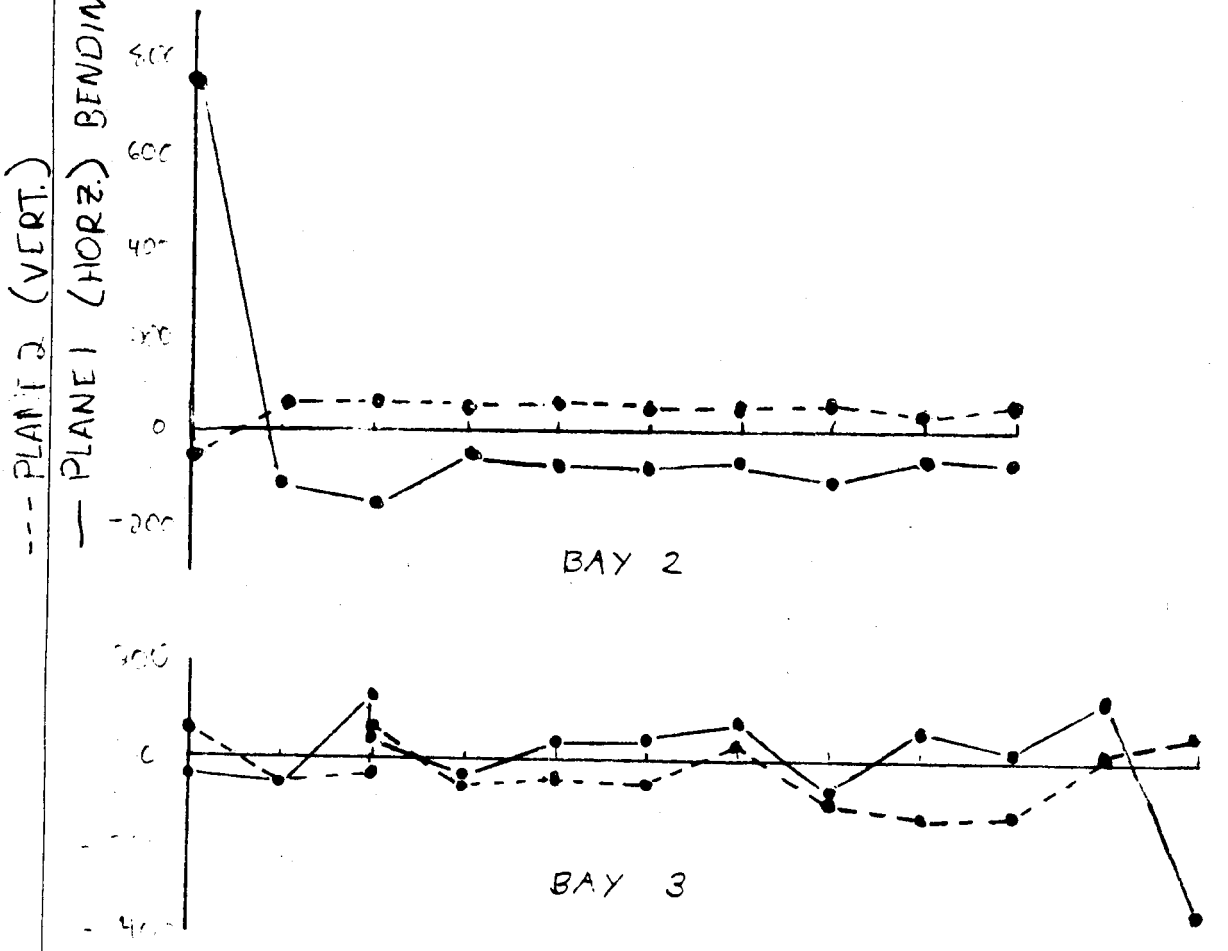
LIFTOFF LOADS

BOTTOM RING



ORIGINAL PAGE IS OF POOR QUALITY

5.6 CYLINDER RING ANALYSIS (CONT'D)
LIFTOFF LOADS
BOTTOM RING



ORIGINAL PAGE IS
OF POOR QUALITY

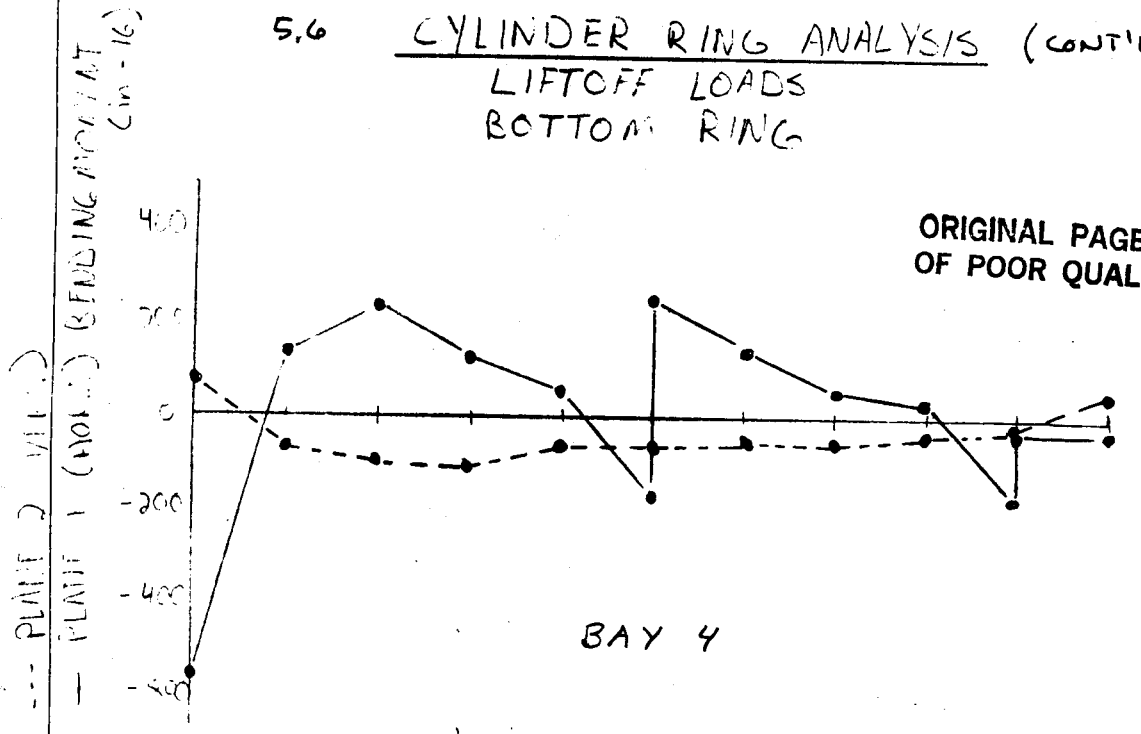
Prepared by: D.E. KIEFLING	Date 7/7/55	LOCKHEED MISSILES & SPACE COMPANY, INC.	Page 5.6.25 Temp Perm.
Checked by:	Date	Title AFE CARRIER VEHICLE STRESS ANALYSIS	Model AFE-CV
Approved by:	Date		Report No.

5.6 CYLINDER RING ANALYSIS (CONT'D)

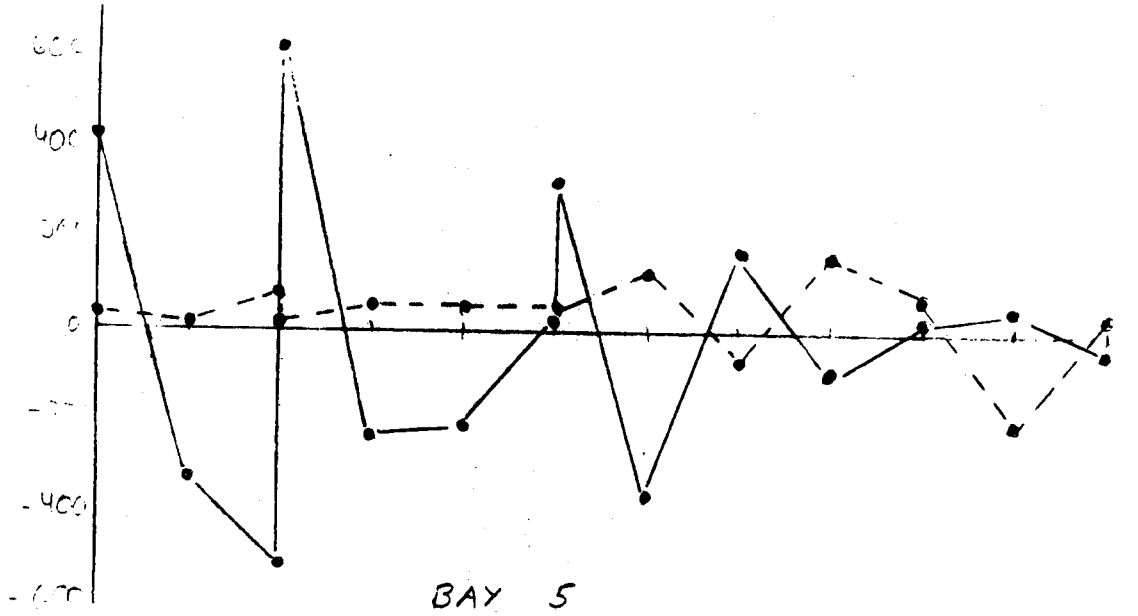
LIFTOFF LOADS

BOTTOM RING

ORIGINAL PAGE IS
OF POOR QUALITY



BAY 4



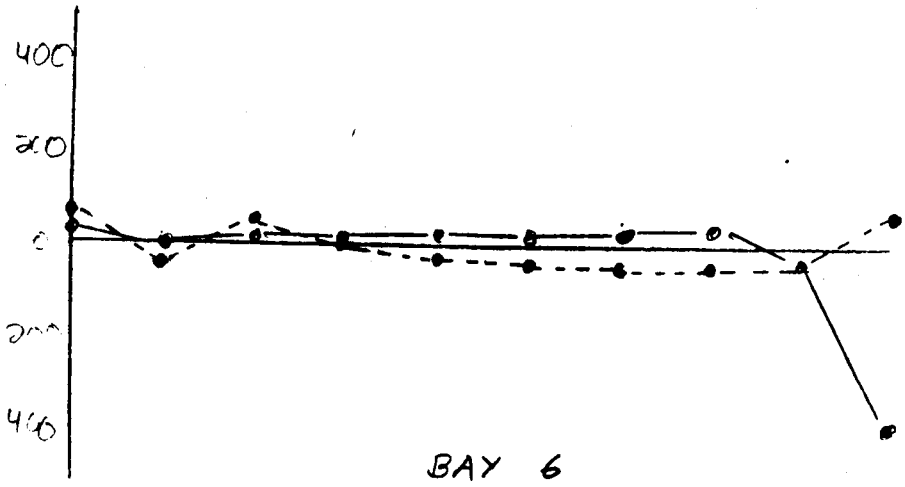
BAY 5

Prepared by: D.E. KIEFLING	Date 7/7/88	LOCKHEED MISSILES & SPACE COMPANY, INC.	Page 5.6.26 Temp. Perm.
Checked by:	Date	Title AFE CARRIER VEHICLE STRESS ANALYSIS	Model AFT-CV
Approved by:	Date		Report No.

5.6 CYLINDER RING ANALYSIS (CONT'D)

LIFTOFF LOADS

BOTTOM RING



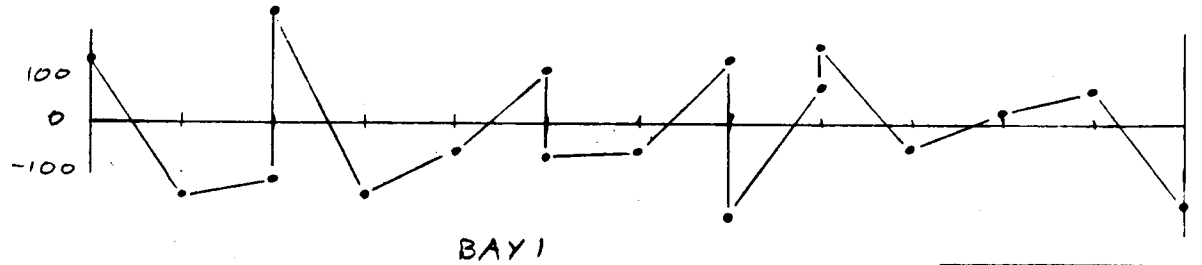
BAY 6

ORIGINAL PAGE IS
OF POOR QUALITY

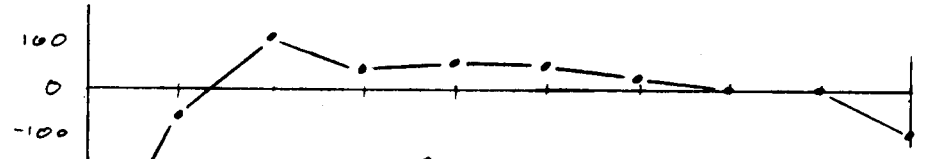
Prepared by: T.O. Murray	Date 6/29/88	LOCKHEED MISSILES & SPACE COMPANY, INC.	Page 5.6.27 Temp. Perm.
Checked by:	Date	Title AFE CARRIER VEHICLE STRESS ANALYSIS	Model AFE-CV
Approved by:	Date		Report No.

LANDING ABORT LOAD CASE, BOTTOM CYLINDER RING PLANE 1 MOMENTS VS. RING ELEMENTS

PLANE 1 BENDING MOMENTS (in-lb)

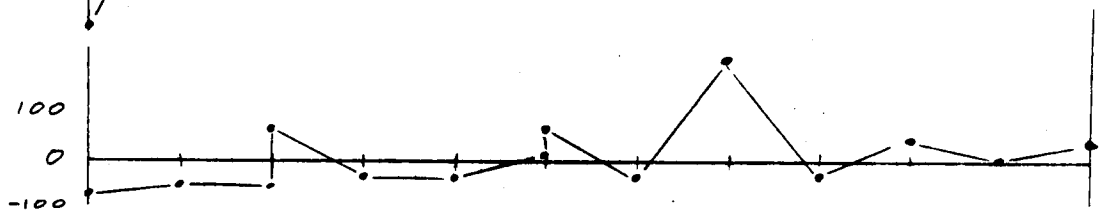


BAY 1

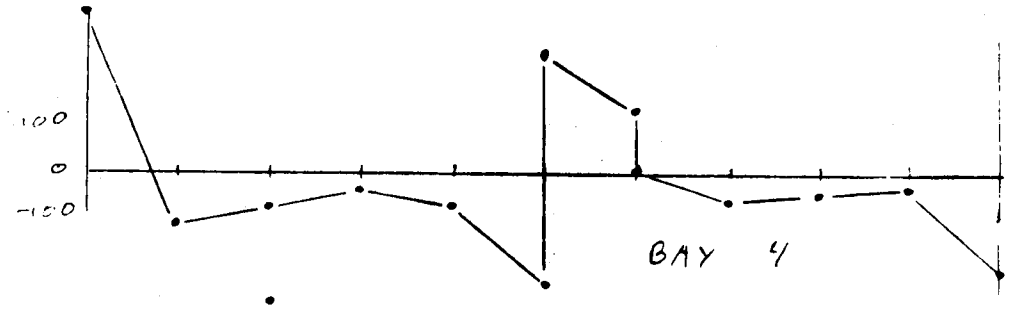


BAY 2

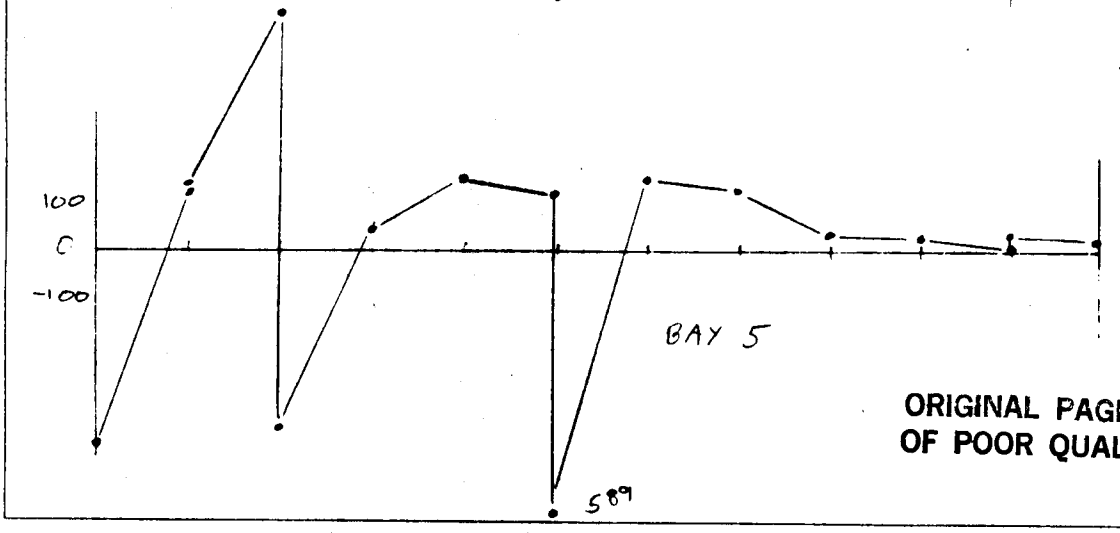
NOTE: HORIZONTAL AXIS REFERS TO NO. OF ELEMENTS PER BAY, NOT TO LENGTH SCALE



BAY 3



BAY 4



BAY 5

589

ORIGINAL PAGE IS OF POOR QUALITY

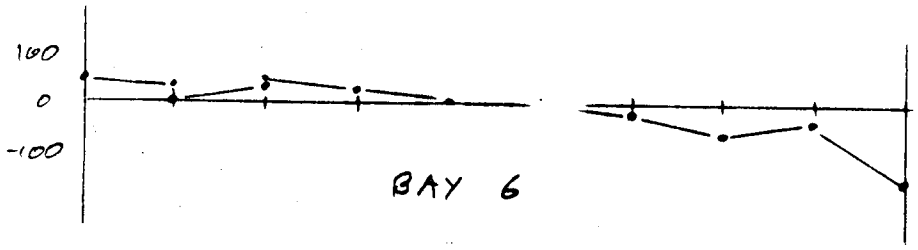
FORM LMSC 362 B-3

Prepared by: T. O Murray	Date 6/29/88	LOCKHEED MISSILES & SPACE COMPANY, INC.	Page 5.6.28 Temp Perm
Checked by	Date	Title AFE CARRIER VEHICLE STRESS ANALYSIS	Model AFE-CV
Approved by	Date		Report No

LANDING ABORT LOAD CASE, BOTTOM RING

PLANE 1 MOMENTS VS. RING ELEMENTS (CONT'D)

PLANE 1 MOMENTS (in.-lbs)



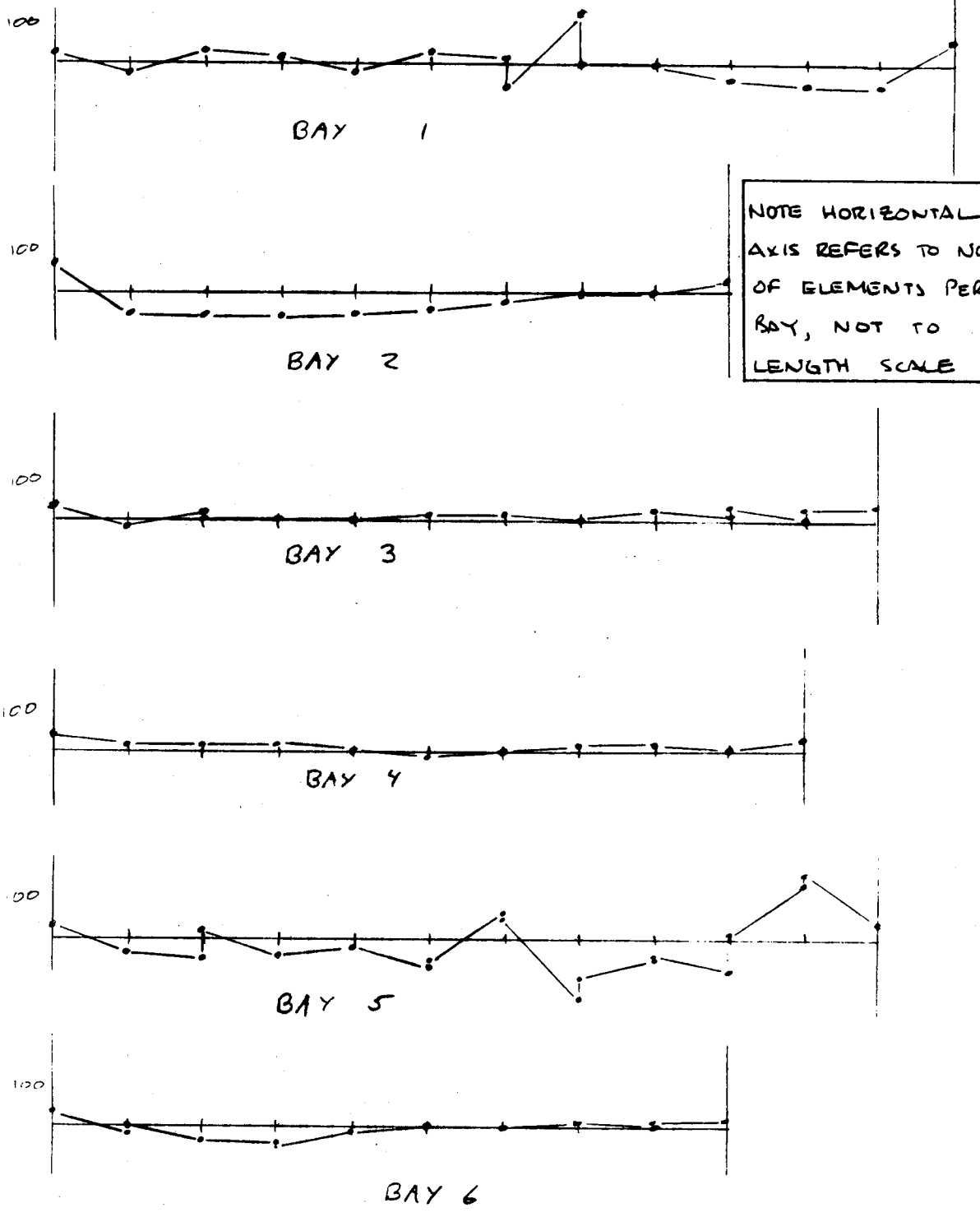
ORIGINAL PAGE IS
OF POOR QUALITY

FORM LMSC 362 8-3

Prepared by: T.O. Murray	Date 6/29/88	LOCKHEED MISSILES & SPACE COMPANY, INC.	Page 5.6.29 Temp Perm.
Checked by:	Date	Title AFE CARRIER VEHICLE STRESS ANALYSIS	Model AFE-CV
Approved by:	Date		Report No.

LANDING ABORT LOAD CASE, BOTTOM RING
PLANE 2 MOMENTS VS. RING ELEMENTS

PLANE 2 (VERTICLE) BENDING MOMENTS (in-lb)

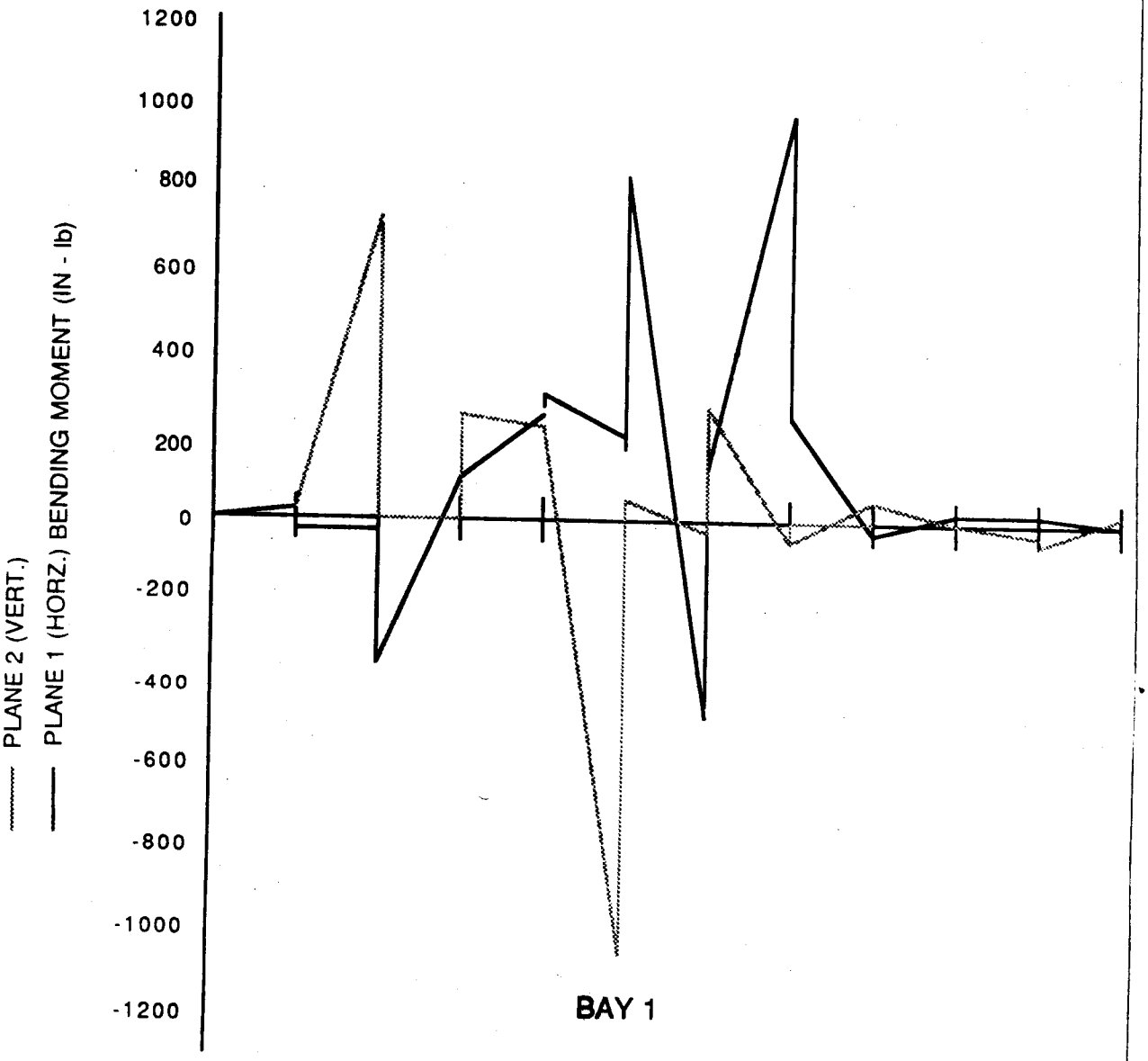


NOTE HORIZONTAL AXIS REFERS TO NO. OF ELEMENTS PER BAY, NOT TO LENGTH SCALE

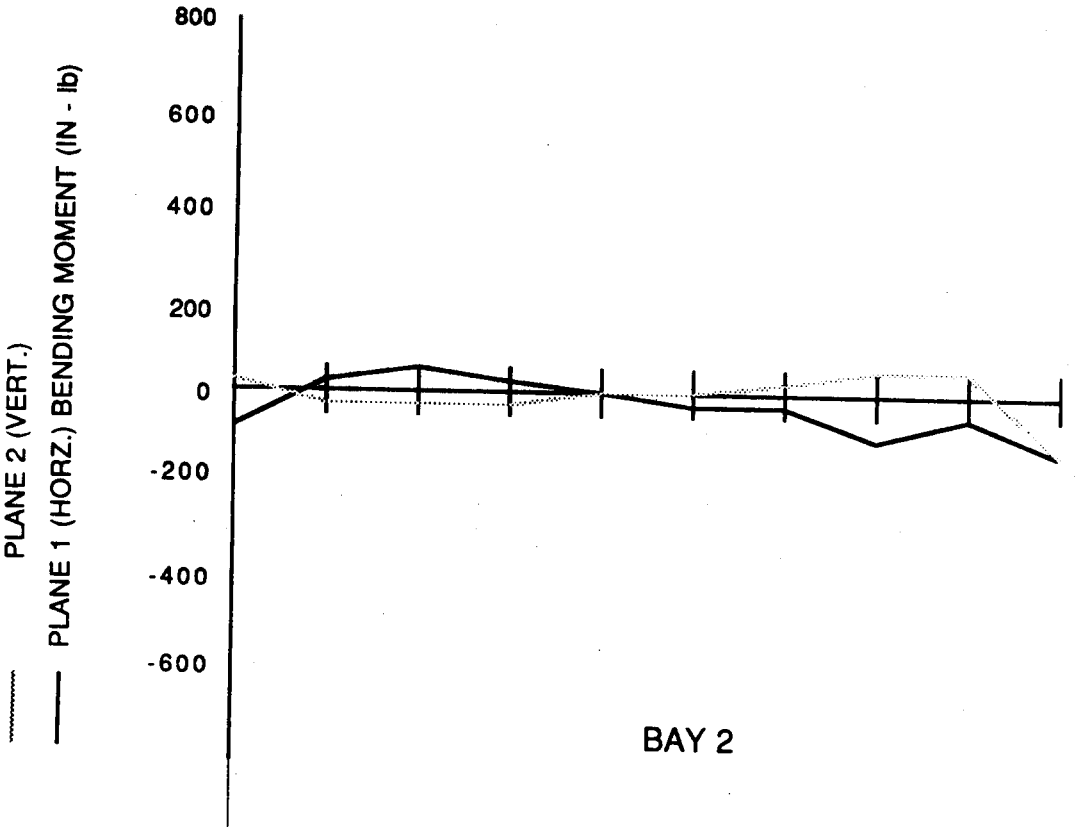
FORM LMSC 362 8 3

5.6 CYLINDER RING ANALYSIS (CONT'D)

REGULAR LANDING LOADS
BOTTOM RING



5.6 CYLINDER RING ANALYSIS (CONT'D)
REGULAR LANDING LOADS
BOTTOM RING

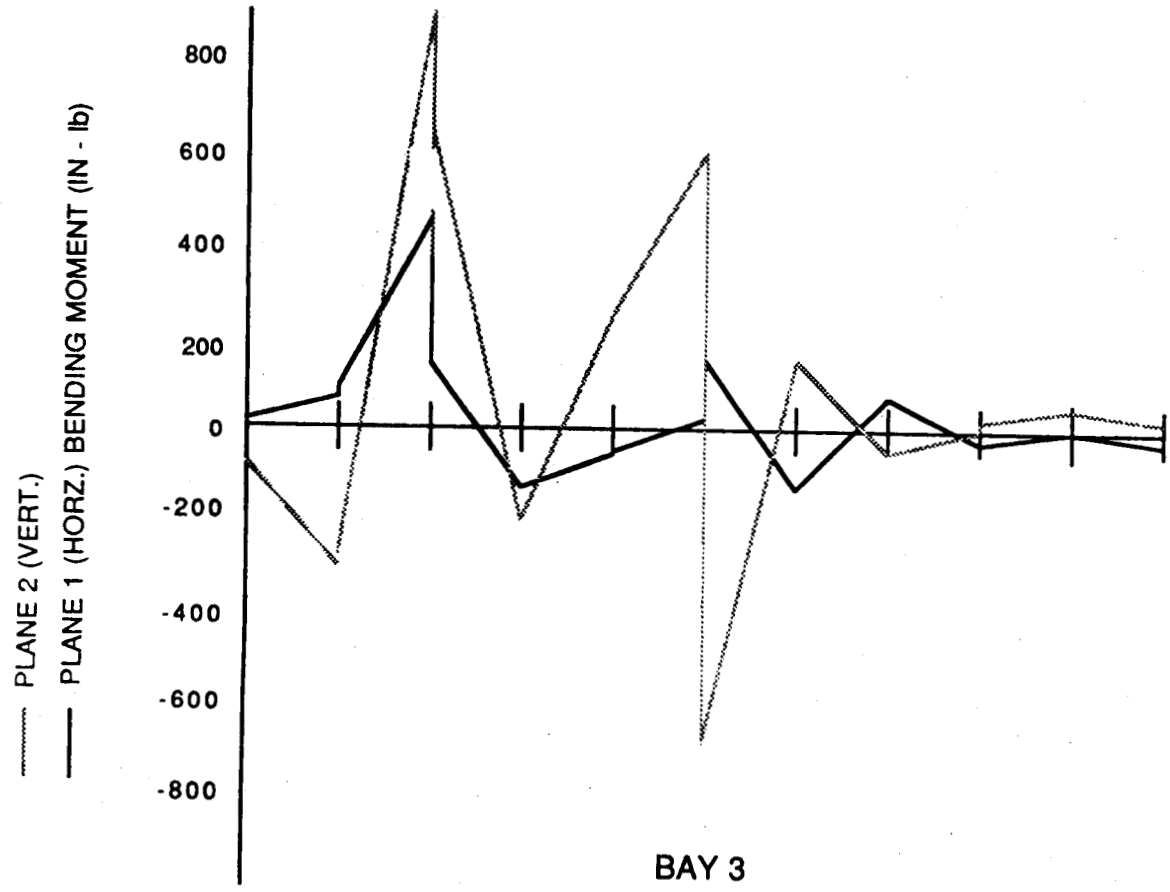


ORIGINAL PAGE IS
OF POOR QUALITY

5.6 CYLINDER RING ANALYSIS (CONT'D)

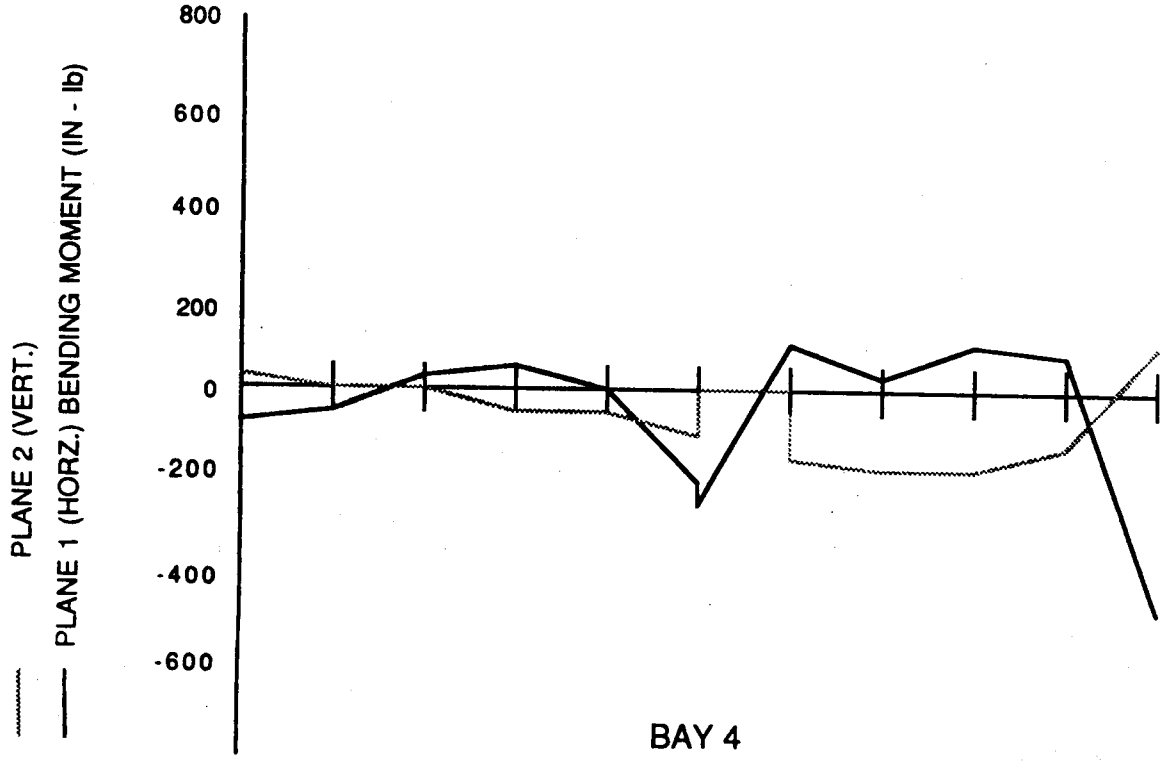
REGULAR LANDING LOADS

BOTTOM RING



ORIGINAL PAGE IS
OF POOR QUALITY

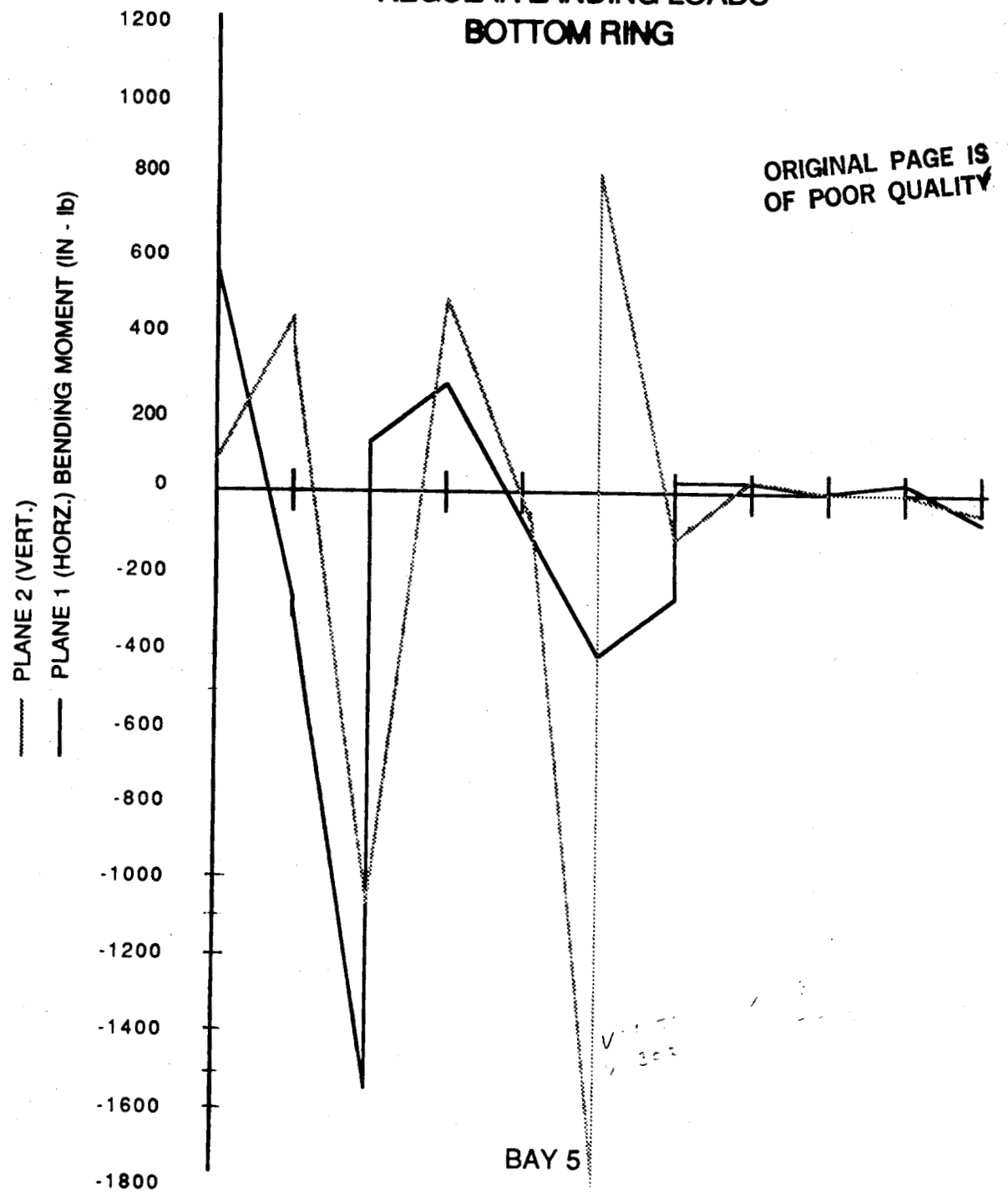
5.6 CYLINDER RING ANALYSIS (CONT'D)
REGULAR LANDING LOADS
BOTTOM RING



5.6 CYLINDER RING ANALYSIS (CONT'D)

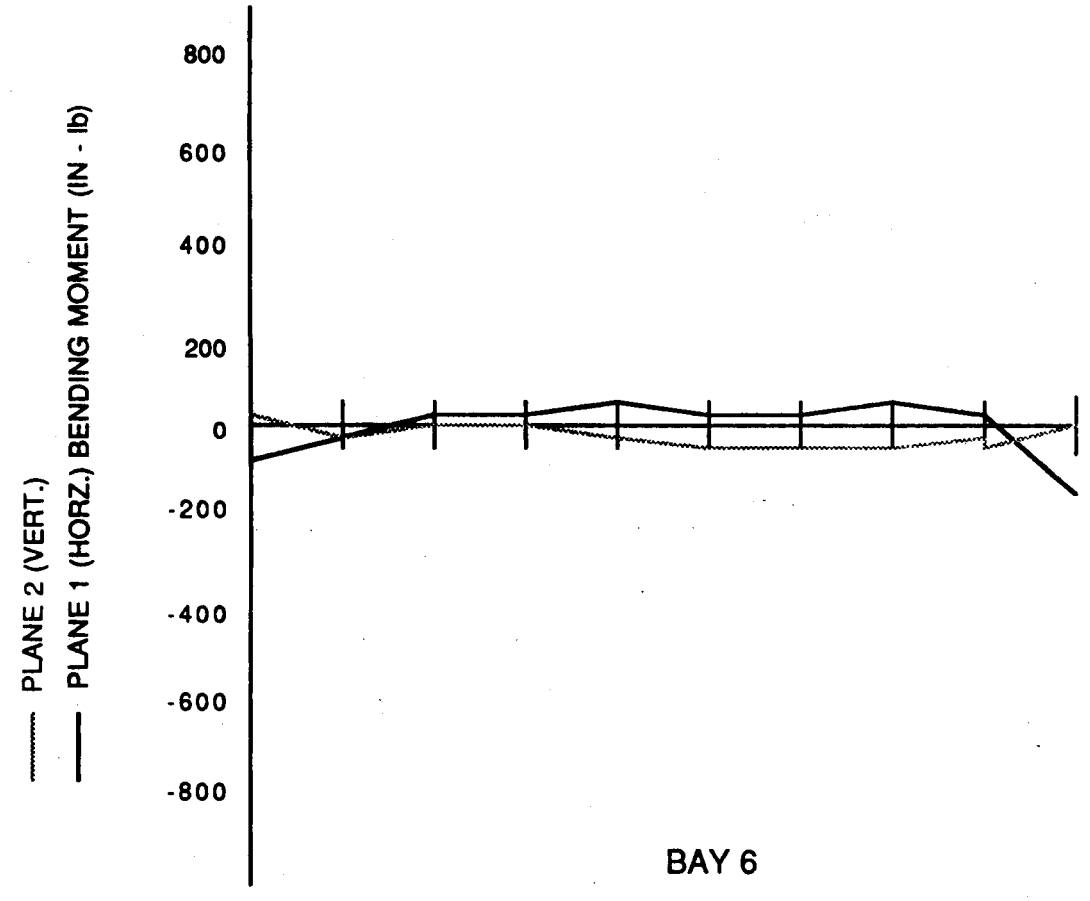
REGULAR LANDING LOADS

BOTTOM RING



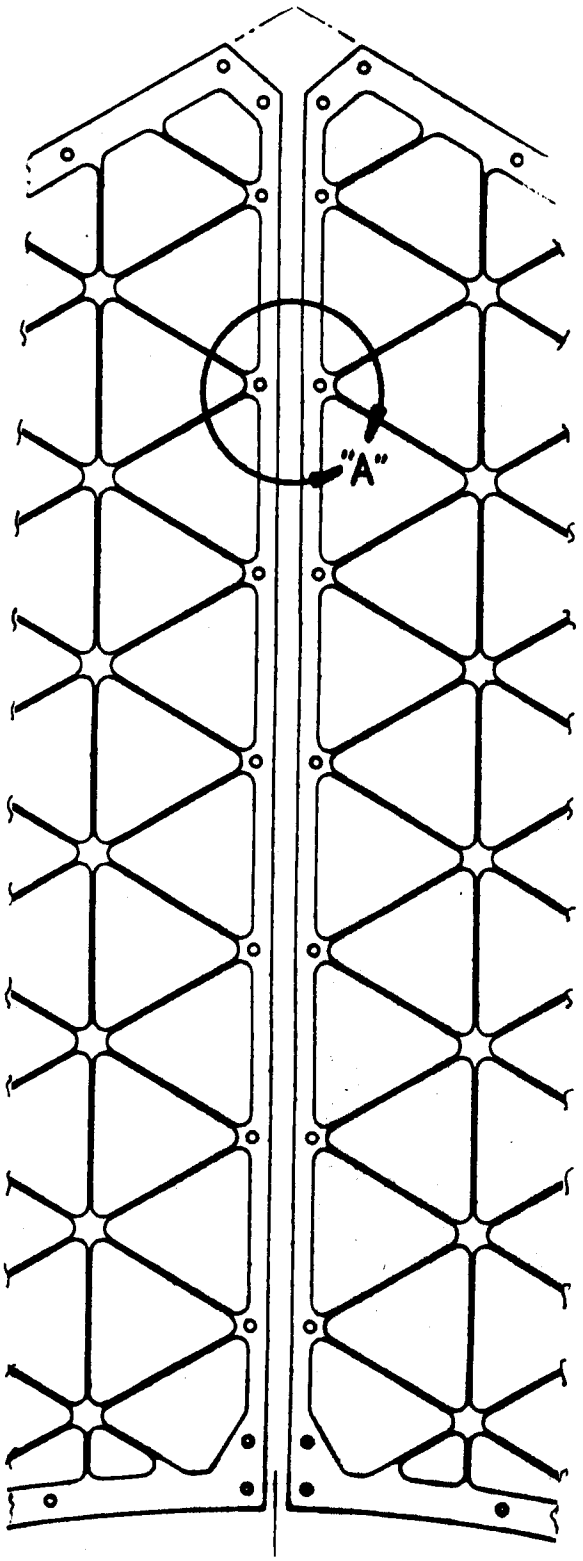
ORIGINAL PAGE IS
OF POOR QUALITY

5.6 CYLINDER RING ANALYSIS (CONT'D)
REGULAR LANDING LOADS
BOTTOM RING

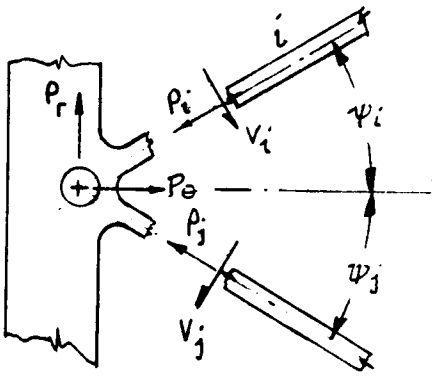


5.7 PANEL SPLICE ANALYSIS

TYPICAL PANEL SPLICE :



DETAIL "A" :



AT EACH NODE :

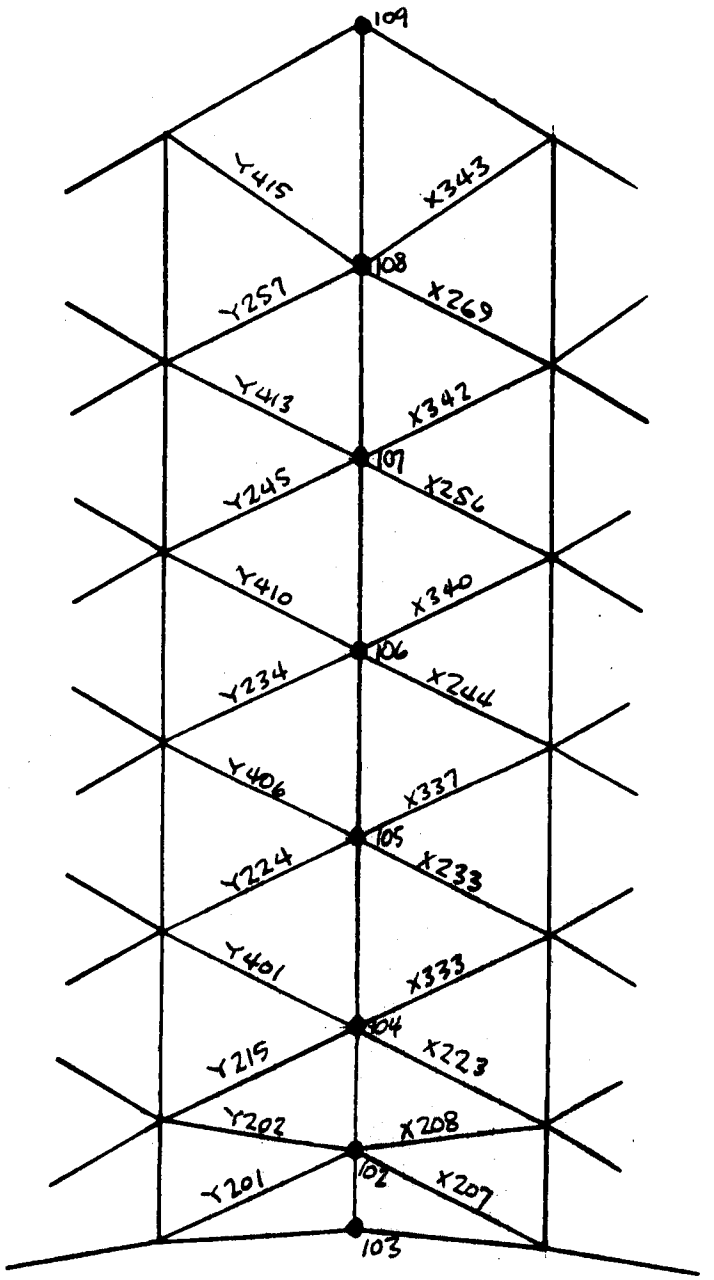
$$P_\theta = P_i \cos\psi_i - V_i \sin\psi_i + P_j \cos\psi_j + V_j \sin\psi_j$$

$$P_r = P_i \sin\psi_i + V_i \cos\psi_i - P_j \sin\psi_j + V_j \cos\psi_j$$

ORIGINAL PAGE IS OF POOR QUALITY

5.7 PANEL SPLICE ANALYSIS (CONT'D)

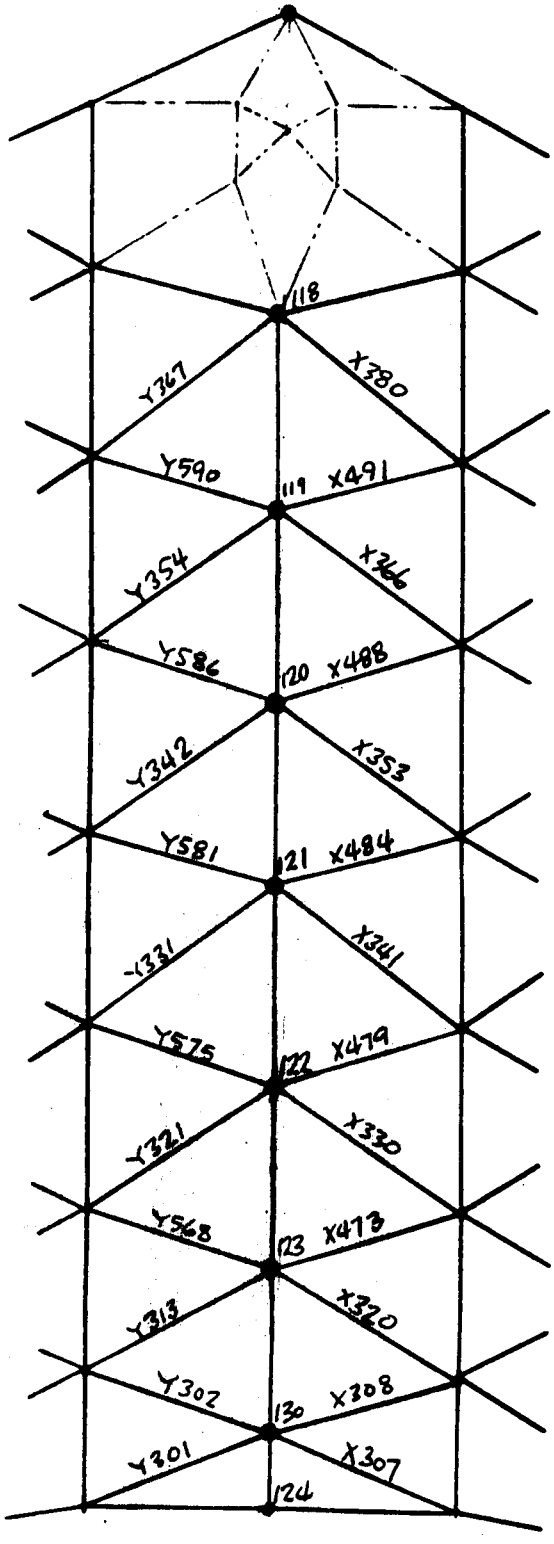
- NASTRAN MODEL DETAILS AT TYPICAL LOWER PANEL SPLICE



X, Y = LOWER PANEL BAY NOS.

5.7 PANEL SPLICE ANALYSIS (CONT'D)

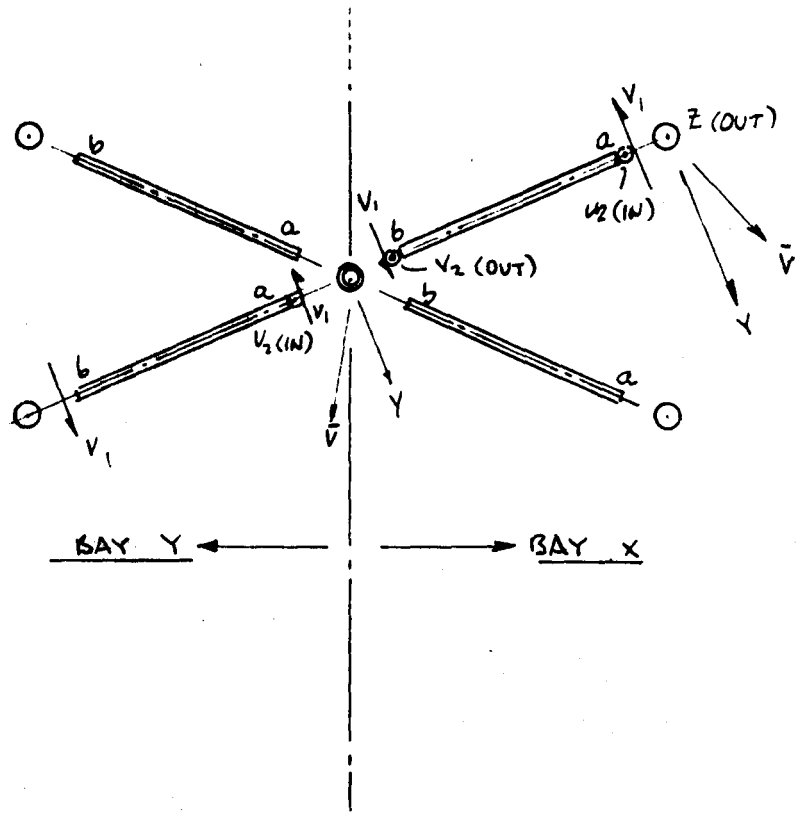
- NASTRAN MODEL DETAILS AT TYPICAL UPPER PANEL SPLICE



X, Y = UPPER PANEL BAY NOS.

5.7 PANEL SPLICE ANALYSIS (CONT'D)

- NASTRAN BAR FORCE SIGN CONVENTION
- POSITIVE BAR FORCES SHOWN FOR PANEL ISOGRID BARS



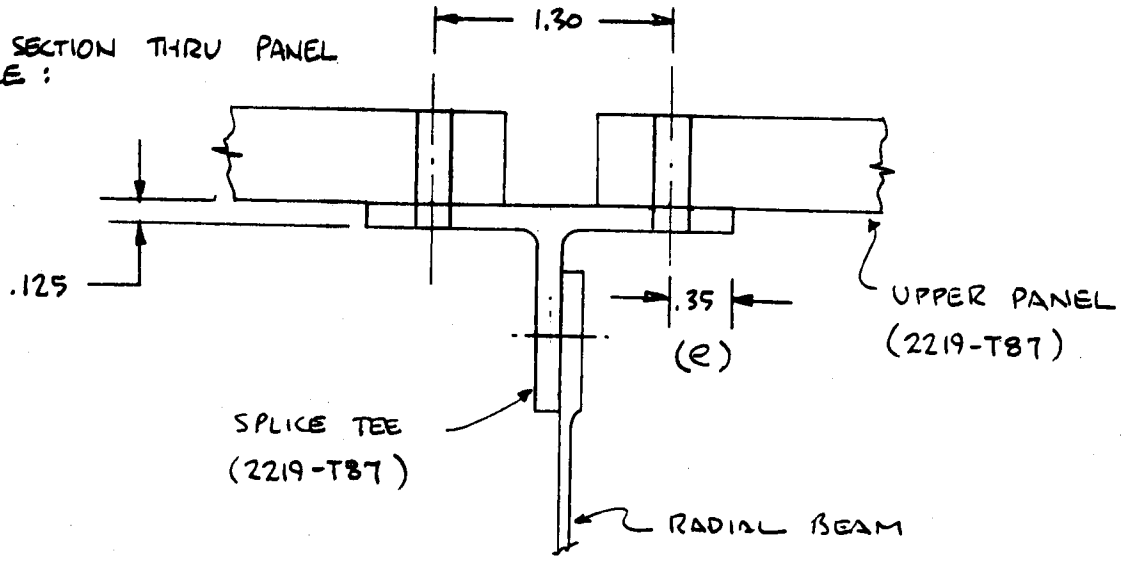
℄ SPLICE

ALL ISOGRID BAR ELEMENTS IN THE AFE CV NASTRAN MODEL ARE SPECIFIED AS SHOWN ABOVE, WHERE ENDS a AND b REFER TO THE ORDER OF THE GRIDPOINTS SPECIFYING THE CONNECTIVITY OF THE BAR. THE ORDER (a, b) AND A VECTOR, $\bar{V}$ DETERMINE THE DIRECTION OF POSITIVE BAR FORCES. (SEE FIG 1, PG. 1.3-15 OF COSMIC NASTRAN USERS' MANUAL)

5.7 PANEL SPLICE ANALYSIS (CONT'D)

- FASTENER ALLOWABLES

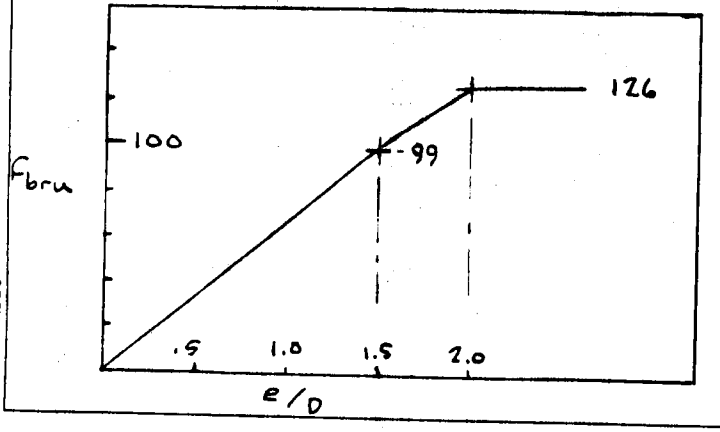
CROSS SECTION THRU PANEL SPLICE :



FASTNR BEARING, SHEAR & TENSION ALLOWABLES :

PIN DIA (IN)	e/D *	F_{bru} (KSI) *	⚠1 P_{bru} (K)	⚠2 P_{su} (K)	P_{tu} (K)
.188	1.86	118	2,773	2,637	2500
.250	1.40	92	2.875	4.663	4300
.312	1.12	74	2.886	7.263	6300

* REF MIL-HDBK-5C, TABLE 3.2.C.0(6):



⚠1 $P_{bru} = D \cdot t \cdot F_{bru}$

⚠2 $P_{su} = \frac{\pi D^2}{4} (F_{su})$ **

** ASSUME 95 KSI SHEAR BOLT

FORM LMSC 362 B-3

FORM LMSC 362 B-3

5.7 PANEL SPLICE ANALYSIS (CONT'D)

BAY 1 TO BAY 2 UPPER PANEL SPLICE FASTENER MARGINS OF SAFETY

LIFTOFF CONDITION

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	GRID POINT	BAR NUMBER	ANGLE "PSI"	SIDE SHEAR	VERT. SHEAR	AXIAL FORCE	THETA FORCE	RADIAL FORC	RES. SHEAR	TENSILE FORCE	SHEAR RATIO, Rs	TENSION RATIO, Rt	M.S.
2			0.017453	V1 - (LB)	V2 - (LB)	P - (LB)							
3	BAY 1 SIDE:												
4		13491	10	0.000	-0.003	-80.200							
5	119						-40.319	-29.359	49.879	0.140	0.021	0.000	318.848
6		13390	30	-0.012	0.143	21.700							
7													
8		13488	10	-0.015	0.718	-76.200							
9	120						-39.041	-44.912	59.509	0.807	0.026	0.000	243.286
10		13353	30	-0.015	0.068	41.100							
11													
12		13484	10	-0.020	0.022	89.000							
13	121						127.224	-9.788	127.403	88.423	0.055	0.041	22.221
14		13341	30	-0.017	0.423	52.700							
15													
16		13478	10	-0.020	0.188	-95.300							
17	122						-43.079	-60.989	75.134	0.887	0.032	0.000	171.698
18		13330	30	-0.015	0.518	59.000							
19													
20		13479	10	-0.021	0.032	-92.000							
21	123						-40.883	-53.088	67.707	0.847	0.029	0.000	200.699
22		13320	31	-0.019	0.016	65.500							
23													
24		13308	10	-0.030	0.097	-62.900							
25	139						28.488	-45.048	62.947	1.095	0.023	0.001	288.028
26		13307	22	0.007	0.998	83.400							
27													
28	BAY 2 SIDE:												
29													
30													
31		23590	10	0.038	0.218	-127.000							
32	119						-20.134	-109.002	110.848	-0.082	0.048	0.000	95.485
33		23364	30	0.033	-0.278	129.000							
34													
35		23588	10	0.092	-98.600	-175.000							
36	120						-110.795	-80.805	142.883	-95.884	0.061	0.045	20.231
37		23342	30	0.005	0.706	71.000							
38													
39		23581	10	0.078	-1.010	-201.000							
40	121						-112.330	-114.100	160.115	0.390	0.068	0.000	54.563
41		23331	30	0.006	1.400	100.000							
42													
43		23576	10	0.088	-0.531	-211.000							
44	122						-37.784	-177.944	181.911	-1.160	0.079	0.001	44.870
45		23321	30	0.045	-0.629	204.000							
46													
47		23568	10	0.093	0.405	-208.000							
48	123						-71.372	-134.464	152.232	0.620	0.065	0.000	58.931
49		23313	31	0.039	0.115	150.000							
50													
51		23302	10	-0.023	0.198	178.000							
52	139						319.498	-10.293	319.653	0.090	0.137	0.000	18.699
53		23301	22	-0.018	-0.108	158.000							

Prepared by: INGRAM	Date 6-29-88	LOCKHEED MISSILES & SPACE COMPANY, INC.	Page 5.7.6
Checked by:	Date	Title AFE CARRIER VEHICLE STRESS ANALYSIS	Model AFE CV
Approved by:	Date		Report No.

ORIGINAL PAGE IS
OF POOR QUALITY

FORM LMSC 362 B-3

5.7 PANEL SPLICE ANALYSIS (CONT'D)

BAY 2 TO BAY 3 UPPER PANEL SPLICE FASTENER MARGINS OF SAFETY

LIFTOFF CONDITION

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	GRID POINT	BAR NUMBER	ANGLE "PSI"	SIDE SHEAR	VERT. SHEAR	AXIAL FORCE	THETA FORCE	RADIAL FORC	RES. SHEAR	TENSILE FORCE	SHEAR RATIO, Rs	TENSION RATIO, Rt	M.S.
2			0.017453	V1 - (LB)	V2 - (LB)	P - (LB)							
3	BAY 2 SIDE:												
4		23491	10	-7.14E-03	8.99E-01	3.96E+01							
5	119						95.858	-9.132	96.290	0.805	0.029	0.000	206.862
6		23386	30	3.83E-03	-9.45E-02	3.41E+01							
7													
8		23485	10	-7.47E-03	1.41E+00	5.10E+01							
9	120												
10		23383	30	4.04E-03	1.51E-01	4.97E+01	89.237	-15.159	90.518	51.151	0.039	0.024	39.016
11													
12		23484	10	-8.85E-03	1.96E+00	8.02E+01							
13	121												
14		23841	90	4.65E-03	7.08E-01	7.10E+01	123.988	-22.883	126.029	69.996	0.054	0.033	27.686
15													
16		23478	10	-1.14E-02	1.37E+00	8.03E+01							
17	122												
18		23330	30	5.74E-03	1.40E+00	1.00E+02	156.098	-36.651	162.291	2.770	0.070	0.001	53.318
19													
20		23479	10	-1.62E-02	1.45E+00	1.09E+02							
21	123												
22		23320	31	-4.65E-03	2.10E+00	1.36E+02	220.498	-39.805	224.009	3.630	0.098	0.002	32.527
23													
24		23308	10	-3.41E-02	8.86E-01	8.72E+01							
25	130												
26		23307	28				83.832	24.002	87.200	0.988	0.037	0.000	136.877
27													
28	BAY 3 SIDE:												
29													
30													
31		33690	10	9.65E-03	-8.08E-01	3.47E+01							
32	119												
33		33354	30	-1.62E-03	1.90E-01	4.17E+01	87.088	-14.938	88.731	-0.418	0.029	0.000	196.424
34													
35		33686	10	1.31E-02	-1.09E+00	3.88E+01							
36	120												
37		33342	30	1.23E-03	8.69E-02	6.83E+01	90.436	-30.043	95.295	-0.974	0.041	0.000	119.835
38													
39		33681	10	2.02E-02	-1.59E+00	3.94E+01							
40	121												
41		33331	30	5.30E-03	-3.99E-01	1.06E+02	123.020	-51.421	133.895	-1.988	0.057	0.001	71.498
42													
43		33675	10	2.93E-02	-1.88E+00	4.39E+01							
44	122												
45		33321	30	5.71E-02	1.84E+00	-4.07E+01	9.298	36.097	37.276	-0.020	0.010	0.000	493.870
46													
47		33668	10	3.74E-02	-1.38E+00	5.44E+01							
48	123												
49		33313	31	2.58E-02	-2.12E+00	1.82E+02	208.301	-78.683	222.666	-3.500	0.096	0.002	32.931
50													
51		33302	10	4.56E-02	-1.05E+00	6.31E+01							
52	130												
53		33301	22	9.25E-03	-6.83E+00	3.22E+02	349.588	-105.933	365.206	-6.880	0.157	0.003	18.194

Prepared by: INGRAM Date 6-29-88
Checked by: Date
Approved by: Date

LOCKHEED MISSILES & SPACE COMPANY, INC.

Title: AFE CARRIER VEHICLE STRESS ANALYSIS

Model: AFE CV

Report No.

Page 5.7.7 Temp. Perm.

ORIGINAL PAGE IS
OF POOR QUALITY

FORM LMSC 382 B-3

5.7 PANEL SPLICE ANALYSIS (CONT'D)

BAY 3 TO BAY 4 UPPER PANEL SPLICE FASTENER MARGINS OF SAFETY

LIFTOFF CONDITION

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	GRID POINT	BAR NUMBER	ANGLE "Psi"	SIDE SHEAR	VERT. SHEAR	AXIAL FORCE	THETA FORCE	RADIAL FORCE	RES. SHEAR	TENSILE FORCE	SHEAR RATIO, Rs	TENSION RATIO, Rt	M.S.
2			0.017453	V1 - (LB)	V2 - (LB)	P - (LB)							
3	BAY 3 SIDE:												
4		33491	10	-3.58E-02	8.05E-01	-1.43E+01							
5	119						-13.189	-4.383	13.899	0.712	0.008	0.000	1792.886
6		33360	30	-9.04E-03	-9.29E-02	6.64E-01							
7													
8		33486	10	-2.74E-02	2.17E+00	-2.01E+01							
9	120						16.282	-31.431	35.398	2.554	0.015	0.001	450.263
10		33353	30	-2.39E-03	3.84E-01	4.40E+01							
11													
12		33484	10	-6.97E-04	-2.76E+00	-6.05E+01							
13	121						-54.140	-19.581	57.580	-59.140	0.025	0.028	34.998
14		33341	30	8.27E-03	1.30E+00	4.95E+00							
15													
16		33478	10	8.26E-03	1.58E+00	5.30E+01							
17	122						-3.618	55.082	55.186	3.230	0.024	0.002	251.849
18		33330	30	1.00E-02	1.77E+00	-6.84E+01							
19													
20		33473	10	-4.59E+00	8.73E-01	-7.98E+01							
21	123						43.090	38.550	57.817	2.712	0.025	0.001	242.877
22		33320	31	6.71E-03	1.84E+00	-4.07E+01							
23													
24		33308	10	3.70E-02	-4.07E-01	3.80E+00							
25	130						-99.945	38.891	99.833	2.343	0.042	0.001	112.896
26		33307	22	8.25E-02	2.84E+00	-1.01E+02							
27													
28	BAY 4 SIDE:												
29													
30													
31		43500	10	2.00E-02	5.81E-01	-7.08E+01							
32	119						10.648	-76.763	77.488	0.807	0.033	0.000	163.730
33		43354	30	1.76E-02	2.20E-01	9.74E+01							
34													
35		43500	10	9.03E+00	-1.43E+00	-1.17E+02							
36	120						16.566	-122.823	124.219	-1.406	0.053	0.001	80.201
37		43342	30	3.06E-02	2.44E-02	1.64E+02							
38													
39		43501	10	8.68E-02	-1.88E+00	-1.68E+02							
40	121						16.495	-175.498	176.272	-2.071	0.079	0.001	47.005
41		43331	30	4.39E-02	-8.91E-01	2.20E+02							
42													
43		43575	10	1.11E-01	-1.38E+00	-2.25E+02							
44	122						17.525	-231.734	232.398	0.030	0.100	0.000	30.777
45		43321	30	5.48E-02	1.41E+00	2.88E+02							
46													
47		43588	10	1.42E-01	9.46E-01	-2.88E+02							
48	123						-89.200	-202.236	213.748	-0.288	0.092	0.000	35.024
49		43313	31	7.68E-02	-8.14E-01	2.40E+02							
50													
51		43302	10	9.05E-02	1.23E+00	-2.71E+02							
52	130						1.885	-180.560	180.590	1.033	0.077	0.001	46.971
53		43301	22	7.70E-02	4.03E-01	2.03E+02							

ORIGINAL PAGE IS
OF POOR QUALITY

Prepared by: INGRAM Date 6-29-88
Checked by: Date
Approved by: Date

LOCKHEED MISSILES & SPACE COMPANY, INC.

Title: AFE CARRIER VEHICLE STRESS ANALYSIS

Page 5.7.8 Temp. Perm.
Model AFE CV
Report No.

FORM LMSC 362 B-3

5.7 PANEL SPLICE ANALYSIS (CONT'D)

BAY 1 TO BAY 2 LOWER PANEL SPLICE FASTENER MARGINS OF SAFETY

LIFTOFF CONDITION

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	GRID POINT	BAR NUMBER	ANGLE "PSI"	SIDE SHEAR	VERT. SHEAR	AXIAL FORCE	THETA FORCE	RADIAL FORCE	RES. SHEAR	TENSILE FORCE	SHEAR RATIO, Rs	TENSION RATIO, Rt	
2			0.017453	V1 - (LB)	V2 - (LB)	P - (LB)							M.S.
3	BAY 1 SIDE:												
4		12343	33	7.38E-03	8.74E-01	8.82E+01							
5	109						30.97	60.02	58.78	1.28	0.03	0.00	246.18
6		12289	28	2.97E-02	6.90E-01	-2.93E+01							
7													
8		12342	28	1.33E-02	4.32E-02	9.82E+01							
9	107						134.28	18.88	135.61	0.43	0.00	0.00	79.28
10		12290	28	9.83E-03	9.98E-01	6.32E+01							
11													
12		12340	28	1.77E-02	-9.88E-01	1.12E+02							
13	108						17.41	89.87	91.35	-1.28	0.04	0.00	127.58
14		12244	28	-3.67E-02	-3.05E-01	-9.26E+01							
15													
16		12237	28	2.09E-02	-1.88E+00	1.38E+02							
17	105						3.81	120.18	120.23	-2.85	0.05	0.00	83.81
18		12233	28	6.20E-02	-1.98E+00	-1.35E+02							
19													
20													
21	BAY 2 SIDE:												
22													
23		22416	33	8.78E-03	2.08E-01	-2.70E+01							
24	109						22.67	-38.73	43.11	-0.20	0.02	0.00	398.48
25		22257	28	2.01E-02	-4.88E-01	5.03E+01							
26													
27		22413	28	2.37E-02	6.37E-01	-9.17E+01							
28	107						21.84	-82.23	85.08	0.32	0.04	0.00	142.41
29		22245	28	3.18E-02	-3.13E-01	1.08E+02							
30													
31		22410	28	4.03E-02	8.28E-01	-1.19E+02							
32	108						8.28	-107.32	107.61	0.85	0.05	0.00	99.92
33		22234	28	4.87E-02	2.20E-02	1.28E+02							
34													
35		22408	28	4.95E-02	8.15E-01	-2.04E+02							
36	106						-45.84	-158.42	163.00	1.58	0.07	0.00	53.05
37		22224	28	3.57E-02	7.88E-01	1.53E+02							
38													
39		22401	28	8.29E-02	1.84E+00	-1.07E+02							
40	104						66.48	-128.15	142.60	2.72	0.09	0.00	64.98
41		22215	28	3.00E-02	1.08E+00	1.81E+02							
42													
43		22202	28	8.45E-02	9.78E-01	3.40E+01							
44	102						292.08	-112.82	313.02	3.41	0.13	0.00	19.32
45		22201	28	-3.67E-02	2.43E+00	2.91E+02							

ORIGINAL PAGE IS
OF POOR QUALITY

Prepared by: INGRAM Date 6-29-88

Checked by: Date

Approved by: Date

LOCKHEED MISSILES & SPACE COMPANY, INC.

Title: AFE CARRIER VEHICLE STRESS ANALYSIS

Page 5.7.9 Temp. Perm.

Model AFE CV

Report No.

FORM LMSC 362 B-3

5.7 PANEL SPLICE ANALYSIS (CONT'D)

BAY 2 TO BAY 3 LOWER PANEL SPLICE FASTENER MARGINS OF SAFETY

LIFTOFF CONDITION

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	GRID POINT	BAR NUMBER	ANGLE "PSI" 0.017453	SIDE SHEAR V1 - (LB)	VERT. SHEAR V2 - (LB)	AXIAL FORCE P - (LB)	THETA FORCE	RADIAL FORCE	RES. SHEAR	TENSILE FORCE	SHEAR RATIO, Rs	TENSION RATIO, Rt	M.S.
2													
3	BAY 2 SIDE:												
4		22343	33	1.03E-02	2.64E+00	-3.00E+01							
5	108						-2424.95	1154.11	2685.58	2.78	1.16	0.00	-0.18
6		22288	28	8.00E-03	1.41E-01	-2.87E+03							
7													
8		22342	28	8.86E-03	-2.16E+00	-2.20E+01							
9	107						-25.64	-0.82	28.53	-4.85	0.01	0.00	389.36
10		22256	28	-3.43E-02	-2.70E+00	-8.81E+00							
11													
12		22340	28	-2.68E-02	-1.92E+00	-5.41E+00							
13	106						-0.21	-4.87	4.87	-4.78	0.00	0.00	448.43
14		22244	28	-7.42E-03	-2.88E+00	5.17E+00							
15													
16		22337	28	-2.44E-03	-2.80E+00	4.88E+00							
17	105						15.60	-3.39	16.88	-3.38	0.01	0.00	598.51
18		22233	28	-4.73E-03	-7.88E-01	1.25E+01							
19													
20		22333	28	1.87E-03	8.42E-02	1.25E+01							
21	104						32.72	-6.00	33.09	0.36	0.01	0.00	697.45
22		22223	28	-1.85E-04	2.75E-01	2.39E+01							
23													
24		22206	28	4.28E-03	-7.68E-01	6.35E+01							
25	102						86.74	13.39	87.76	-3.41	0.04	0.00	132.82
26		22207	28	7.04E-03	-2.85E+00	3.30E+01							
27													
28	BAY 3 SIDE:												
29													
30		32416	33	-1.51E-02	8.26E+00	7.32E+00							
31	108						-48.88	29.83	56.87	7.80	0.02	0.00	194.98
32		32257	28	-4.82E-03	1.35E+00	-5.90E+01							
33													
34		32413	28	-8.55E-03	-3.11E+00	-1.28E+01							
35	107						-49.52	12.92	51.18	-0.42	0.02	0.00	305.91
36		32246	28	-5.23E-03	2.09E+00	-4.23E+01							
37													
38		32410	28	-1.03E-02	1.43E+00	2.10E+01							
39	106						2.82	17.15	17.35	2.10	0.01	0.00	654.68
40		32234	28	2.18E-02	8.70E-01	-1.81E+01							
41													
42		32408	28	-8.01E-03	-1.14E-01	3.59E+01							
43	105						58.23	3.98	58.37	-2.12	0.02	0.00	258.25
44		32224	28	-7.88E-02	-2.01E+00	2.87E+01							
45													
46		32401	28	-8.49E-04	-8.09E-01	2.79E+01							
47	104						45.03	2.49	45.10	-0.28	0.02	0.00	378.31
48		32215	28	-5.15E-03	3.31E-01	2.22E+01							
49													
50		32202	28	4.82E-03	9.79E-01	4.50E+01							
51	102						83.49	-1.27	83.50	3.74	0.04	0.00	141.86
52		32201	28	-3.28E-03	2.78E+00	4.79E+01							

ORIGINAL PAGE IS
OF POOR QUALITY

Prepared by: INGRAM Date 6-29-88
Checked by: Date
Approved by: Date

LOCKHEED MISSILES & SPACE COMPANY, INC.

Title: ACE CARRIER VEHICLE STRESS ANALYSIS

Model: ACE CV

Report No.

Page 5.7.10 Temp. Perm.

FORM LMSC 362 B-3

5.7 PANEL SPLICE ANALYSIS (CONT'D)

BAY 3 TO BAY 4 LOWER PANEL SPLICE FASTENER MARGINS OF SAFETY

LIFTOFF CONDITION

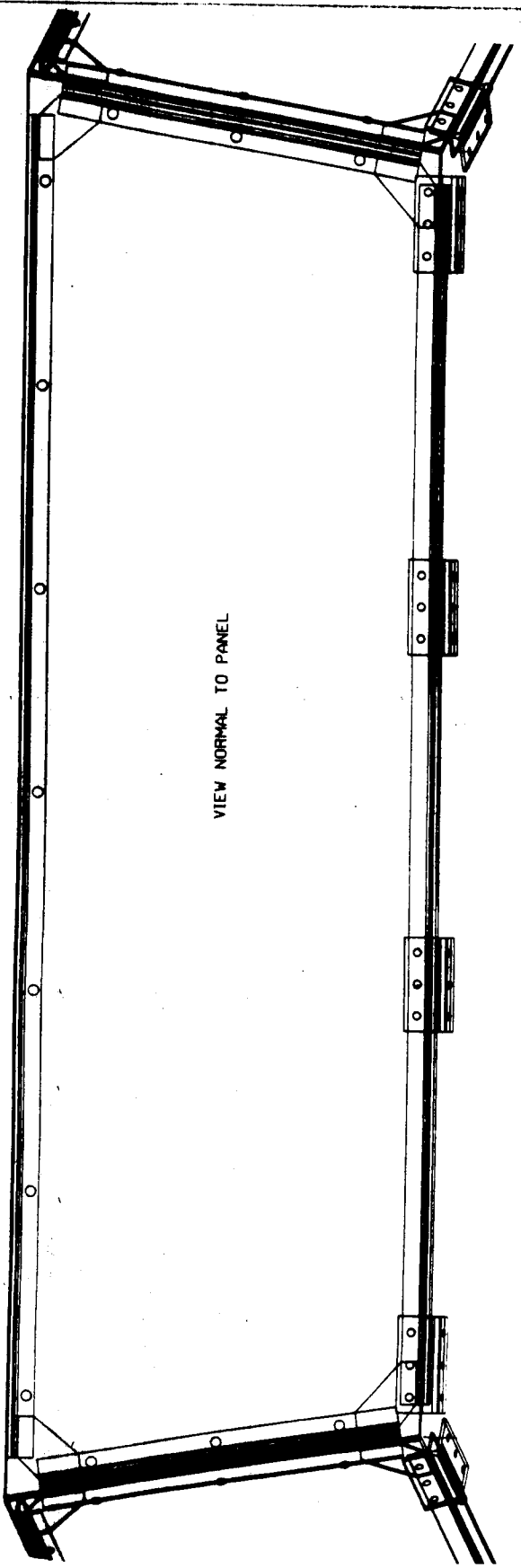
	A	B	C	D	E	F	G	H	I	J	K	L	M
1	GRID POINT	BAR NUMBER	ANGLE "PSI"	SIDE SHEAR	VERT. SHEAR	AXIAL FORCE	THETA FORCE	RADIAL FORC	RES. SHEAR	TENSILE FORCE	SHEAR RATIO, Rs	TENSION RATIO, Rt	M. S.
2			0.017453	V1 - (LB)	V2 - (LB)	P - (LB)							
3	BAY 3 SIDE:												
4		32343	33	-1.32E-04	1.61E+00	1.63E+01							
5	109						-13.02	21.91	25.48	2.70	0.01	0.00	587.98
6		32289	26	9.16E-03	1.09E+00	-2.87E+01							
7													
8		32342	26	6.30E-03	1.67E-02	1.40E+01							
9	107						-24.71	24.35	34.69	0.52	0.01	0.00	545.01
10		32256	26	1.62E-02	5.08E-01	-4.15E+01							
11													
12		32340	26	1.70E-02	1.46E+00	6.94E+00							
13	106						-48.50	28.76	58.91	3.70	0.02	0.00	238.04
14		32244	26	6.32E-03	2.24E+00	-6.09E+01							
15													
16		32337	26	1.42E-02	1.53E+00	2.58E+01							
17	105						-70.26	56.93	90.45	2.20	0.04	0.00	128.72
18		32233	26	2.18E-02	6.70E-01	-1.04E+02							
19													
20	BAY 4 SIDE												
21													
22		42415	33	-5.73E-03	-5.07E-01	-2.35E+02							
23	108						-254.26	-100.14	273.27	-1.87	0.12	0.00	23.92
24		42257	26	-2.92E-02	-1.36E+00	-6.36E+01							
25													
26		42413	26	-2.18E-02	-9.22E-01	8.62E+01							
27	107						-16.01	83.32	84.84	-0.97	0.04	0.00	142.76
28		42245	26	-4.54E-02	-4.53E-02	-1.04E+02							
29													
30		42410	26	1.06E-02	-6.35E-01	4.91E+01							
31	106						-69.13	76.74	103.29	-1.28	0.04	0.00	106.02
32		42234	26	-2.89E-02	-6.47E-01	-1.28E+02							
33													
34		42406	26	-2.35E-02	-7.93E-01	6.93E+00							
35	105						141.95	-63.19	155.39	-1.45	0.07	0.00	57.08
36		42224	26	-2.00E-02	-8.56E-01	1.51E+02							
37													
38		42401	26	-5.15E-02	-6.96E-01	-1.03E+02							
39	104						-303.77	57.81	309.23	-1.20	0.13	0.00	19.70
40		42215	26	-5.74E-03	-5.06E-01	-2.35E+02							
41													
42		42202	26	-7.77E-02	-1.88E+00	-1.52E+02							
43	102						-414.29	68.79	419.97	-7.36	0.18	0.00	12.07
44		42201	26	3.86E-02	-5.48E+00	-3.09E+02							

ORIGINAL PAGE IS OF POOR QUALITY

Prepared by: INGRAM	Date 6-29-88	LOCKHEED MISSILES & SPACE COMPANY, INC.	Page 5.7.11
Checked by:	Date	Title AFE CARRIER VEHICLE STRESS ANALYSIS	Model AFE CV
Approved by:	Date		Report No.

Prepared by: INGRAM	Date 7-20-88	LOCKHEED MISSILES & SPACE COMPANY, INC.	Page 5.8.1 Temp. Perm
Checked by:	Date	Title AFE CARRIER VEHICLE STRESS ANALYSIS	Model
Approved by:	Date		Report No.

5.8 AVIONICS PANEL ANALYSIS
- HINGE AND ATTACH BOLT LOCATIONS

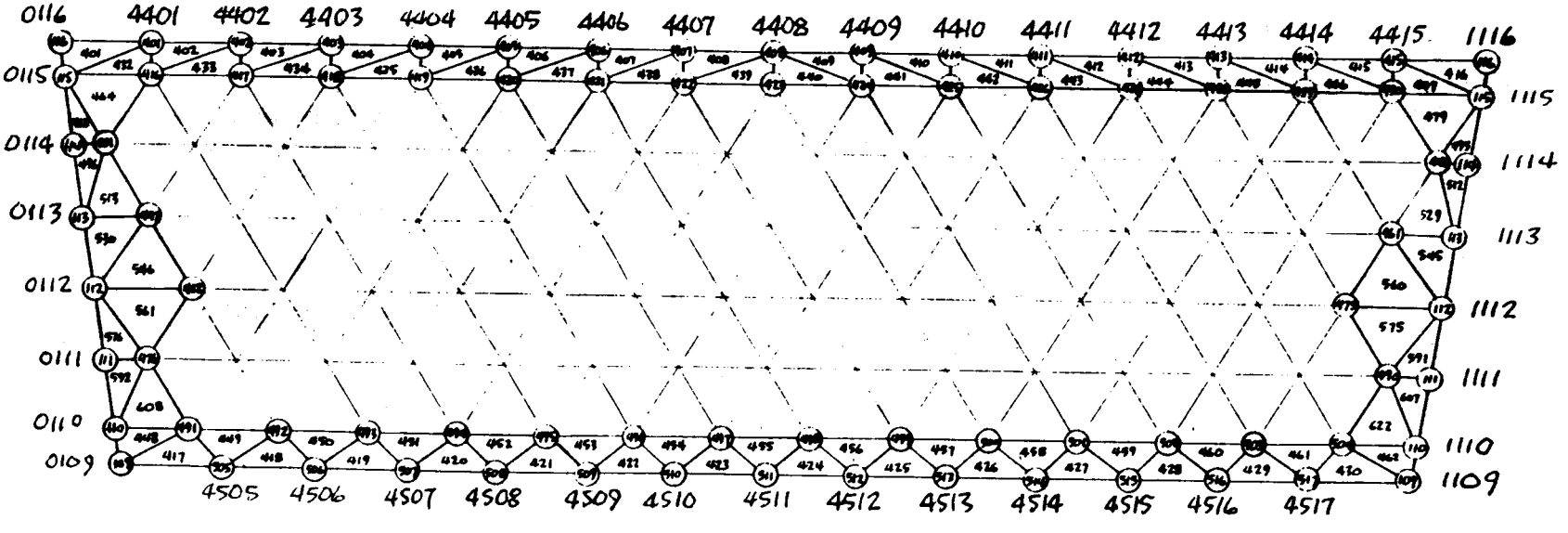


FORM LMSC 362 8-3

FORM LMSC 362 B-3

5.8 AVIONICS PANEL ANALYSIS (CONT'D)

PANEL PLATE (CTRIA2) ELEMENTS RESPECIFIED TO "FREE" NODES ~ NOT COMMON TO RADIAL BEAM, UPPER & LOWER PANELS EXCEPT THROUGH SPRING (CELAS2) ELEMENTS AT FASTENER LOCATIONS.



Prepared by: INGRAM Date 7-26-88
Checked by: Date
Approved by: Date

LOCKHEED MISSILES & SPACE COMPANY, INC.

Title: AFE CARRIER VEHICLE STRESS ANALYSIS

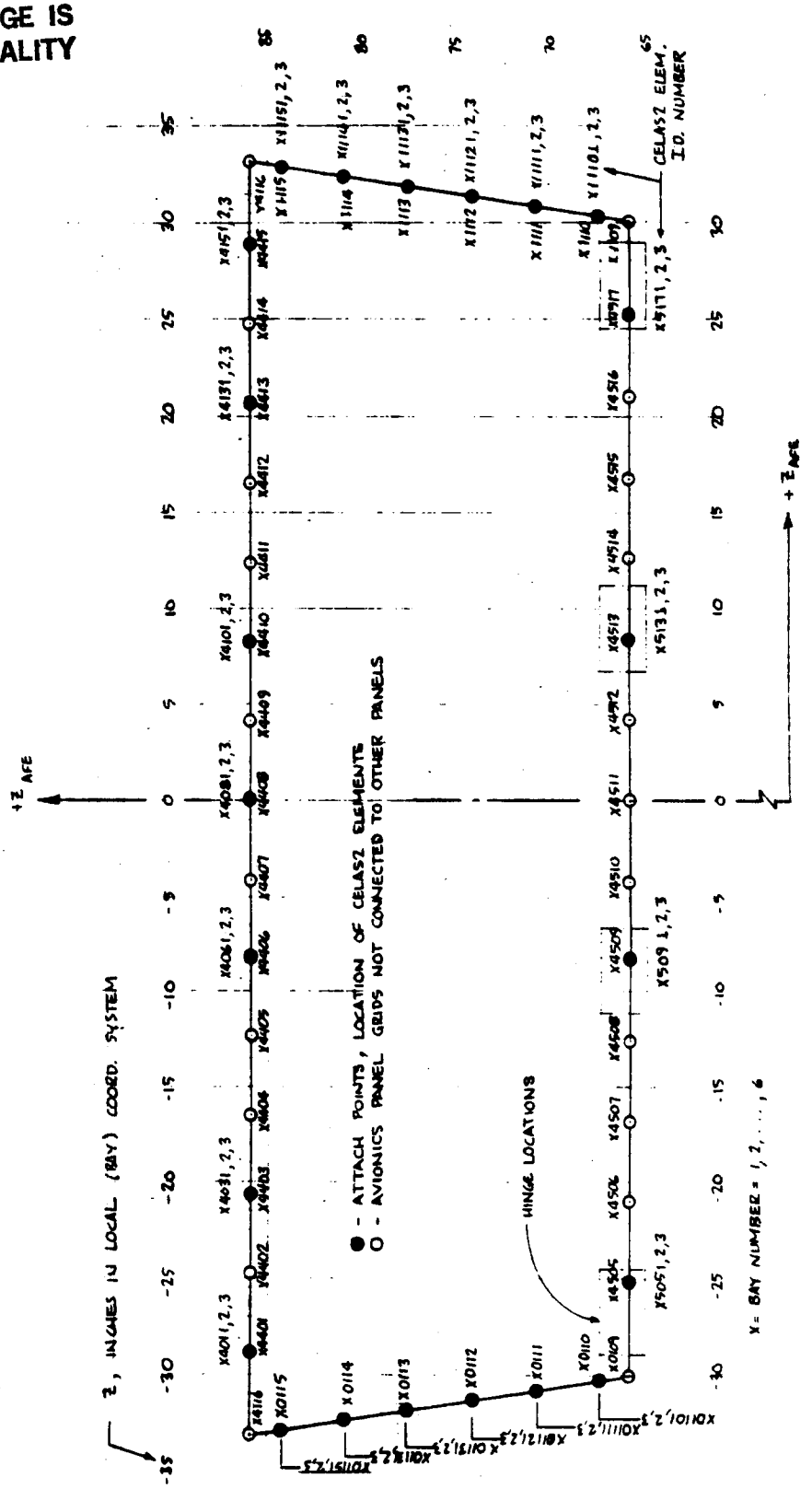
Model
Report No.
Page 5.8.2
Temp.
Perm.

Prepared by: INGRAM	Date 7-26-88	LOCKHEED MISSILES & SPACE COMPANY, INC.	Page 5.9.3 Temp. Perm.
Checked by:	Date	Title: AFE CARRIER VEHICLE STRESS ANALYSIS	Model
Approved by:	Date		Report No.

ORIGINAL PAGE IS
OF POOR QUALITY

5.8 AVIONICS PANEL ANALYSIS (CONT'D)

- REVISED NASTRAN MODEL SHOWING AVIONICS PANEL ATTACHMENTS



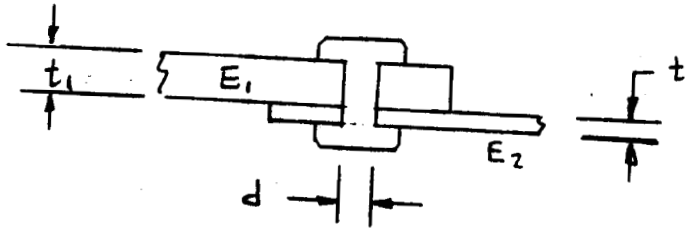
FORM LMSC 302 B-3

5.8 AVIONICS PANEL ANALYSIS

ATTACH BOLT STIFFNESS CALCULATIONS

FASTENER FLEXIBILITY $c = \frac{1}{k}$

FROM ⚠ : $$c = \left(\frac{t_1+t_2}{2d}\right)^a \cdot \frac{b}{n}\left(\frac{1}{t_1E_1} + \frac{1}{nt_2E_2} + \frac{1}{nt_1E_3} + \frac{1}{2nt_2E_2}\right)$$



$a = \frac{2}{3}$, $b = 3$ FOR BOLTED METALLIC JOINT (CURVE FIT PARAMS.)

$n = 1$ FOR SINGLE SHEAR

FOR $\frac{1}{4}$" STEEL BOLT IN ALUMINUM STRUCTURE:

$$c = \left(\frac{t_1 + .125}{2(.25)}\right)^{2/3} \cdot \frac{3}{1.10^6}\left(\frac{1}{t_1(10)} + \frac{1}{.125(10)} + \frac{1}{t_1(30)} + \frac{1}{2(.125)(30)}\right)$$

$$c = \left(\frac{t_1 + .125}{.50}\right)^{2/3} \cdot 3\times10^{-7}\left(\frac{1}{t_1} + \frac{1}{3t_1} + \frac{1}{.125} + \frac{1}{6(.125)}\right)$$

$$c = \left(\frac{t_1 + .125}{.50}\right)^{2/3} \cdot 3\times10^{-7}\left(\frac{4}{3t_1} + 9.333\right)$$

PANEL 4 THICKNESS, t_1	FLEXIBILITY, c	STIFFNESS k
.25	3.632×10^{-6}	2.753×10^{5}
.40	3.926×10^{-6}	2.547×10^{5}
.45	4.049×10^{-6}	2.470×10^{5}
.50	4.177×10^{-6}	2.394×10^{5}

⚠ REF: THE INFLUENCE OF FASTENER FLEXIBILITY ON THE PREDICTION OF LOAD TRANSFER AND FATIGUE LIFE FOR MULTI-ROW JOINTS - Dr. H. HUTH