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Development of a Supplemental Inspection Document for the Fairchild SA226 and SA227 Aircraft, Part 1

September 1999

Technical Report

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16. Abstract

This report is the first phase of a three-phase program sponsored by the Federal Aviation Administration to develop a supplemental inspection document for Fairchild SA226 and SA227 aircraft. In this report, the mission profiles for the aircraft are established. The principal structural elements are defined, and the operating stresses are established.

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FAIRCHILD
AIRCRAFT

REPORT NO. R1517

TITLE: **DEVELOPMENT OF A SUPPLEMENTAL INSPECTION DOCUMENT FOR SA226/SA227 AIRCRAFT PART I**

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1. INTRODUCTION

The Fairchild SA226 and SA227 series of aircraft have been in production since 1970. During that time the aircraft has undergone extensive development to increase its economic usefulness. The maximum takeoff weight has grown from 12,500 pounds to 16,500 pounds. The high-time aircraft in the fleet have exceeded 30,000 hours in flight.

To extend the useful life of these aircraft and to assure the continued airworthiness of the airframe, an examination of the structural characteristics of the airframe has been undertaken using damage tolerant techniques that were not available when the aircraft was first designed.

This study examines the way the aircraft are currently being used by examining data gathered from several large fleet operators. From this data, typical flight profiles have been developed from which load exceedance curves for the aircraft are constructed. The load exceedance curves are then used to develop stress spectra at critical locations in the aircraft. The stresses used in the stress spectra have been obtained by a combination of structural analyses and flight strain surveys.

2. FLEET COMPOSITION

The SA226/SA227 series of aircraft are being operated in three types of service; scheduled commuter operation, executive transport, and cargo operation. The latter has become more important in recent years. Operators of aircraft in each of these categories were surveyed to generate an understanding of the operational roll of the aircraft.

2.1 OPERATOR SURVEY

Table 2-1 lists the operators and number of aircraft that participated in this report survey. Additional information on operations was based on the schedules published in the Official Airline Guide (Internet) and teleconferences with specific operators. Data for SA226 aircraft were also taken from reference 8.

TABLE 2-1 FLEET INVENTORY AIRCRAFT OPERATION

	Operator	No. of Aircraft	Category
	Horizon	16	Commuter
	Skywest	16	Commuter
	Merlin Express	31	Cargo
	Military Support Aircraft (MSA)	7	Executive
Total	**4**	**70**	**3**

2.2 DATA REVIEWED

The following information was provided by most of the operators.

1. Number of Aircraft
2. Number of Flights
3. Avg. Flight Distance
4. Avg. Flight Speed
5. Avg. Operating Altitude
6. Avg. Block Time
7. Avg. Flight Time
8. Landings per Hour
9. Avg. Aircraft Takeoff Weight
10. Avg. Aircraft Cruise Weight
11. Avg. Aircraft Landing Weight

12. Avg. Payload
13. Avg. Takeoff Weight
14. Avg. Flight Fuel Weight
15. Avg. Block Fuel Weight
16. Avg. Landing Fuel Weight

2.3 SUMMARY OF OPERATOR'S DATA - COMMUTER SERVICE

The Horizon and Skywest Airlines flight operations data (Appendix A-1) for typical commuter service were reviewed in depth and the following summary of combined information was extracted. This data covers a total of 535 flights.

Fuel Data	Weight (lbs.)
Total Segment Takeoff Fuel	875,100
Total Segment Landing Fuel	590,274
Total Segment Block Fuel	284,826
Total Segment Flight Fuel	732,687
Avg. Segment Takeoff Fuel	1,636
Avg. Segment Landing Fuel	1,103
Avg. Block Fuel	532
Avg. Flight Fuel	1,370

Time and Speed Data

Avg. Block Time	1.139 hr. (68 min)
Avg. Flight Time	0.968 hr. (58 min)
Avg. Flight Distance	228 n.m.
Avg. Flight Speed	234 kts

Miscellaneous Data

Avg. Payload = 1,791 lb.
Avg. Landings Per Hr. = 1.03
Avg. Cruise Altitude = 16,778 FT.
Avg. Operating Empty Wt. = 9,525 lb.
Avg. Zero Fuel Wt. = 11,594 lb.

Flight Frequencies at Cruise Altitude

Cruise Alt. Ft.	No. of Flights	% of Flights
8000	0	0.0
9000	20	3.7
10000	0	0.0
11000	0	0.0
12000	0	0.0
13000	56	10.5
14000	12	2.2
15000	13	2.4
16000	145	27.1
17000	106	19.8
18000	59	11.0
19000	60	11.2
20000	0	0.0
21000	33	6.2
22000	31	5.8
16766 (Avg.)	535	100

2.4 SUMMARY OF OPERATOR'S DATA - CARGO SERVICE

The Merlin Express Airlines flight operations data (Appendix A-2) for typical cargo service were reviewed in depth and the following summary of information was extracted. This data parameter covers 248 flight segments.

Fuel Data	Weight (lbs.)
Total Segment Takeoff Fuel	509,500
Total Segment Landing Fuel	275,045
Total Segment Block Fuel	234,455
Total Segment Flight Fuel	395,273
Avg. Segment Takeoff Fuel	2,054
Avg. Segment Landing Fuel	1,109
Avg. Block Fuel	945
Avg. Flight Fuel	1,594

Time, Distance, and Speed Data

Avg. Block Time	1.50 hr. (90 min)
Avg. Flight Time	1.32 hr. (79 min)
Avg. Flight Distance	304 nm
Avg. Flight Speed	227 kts

Miscellaneous Data

Avg. Payload = 2,062 lb.
Avg. Landings Per Hr. = 0.76
Avg. Cruise Altitude = 19,827 ft.
Avg. Operating Empty Wt. = 9,206 lb.
Avg. Zero Fuel Wt. = 11,268 lb.

Flight Frequencies at Cruise Altitude

Cruise Alt. Ft.	No. of Flights	% Of Flights
8000	7	2.82
9000	0	0
10000	0	0
11000	0	0
12000	0	0
13000	0	0
14000	0	0
15000	0	0
16000	40	16.13
17000	0	0
18000	0	0
19000	0	0
20000	0	0
21000	201	81.05
19827 (Avg.)	248	100.00

2.5 SUMMARY OF OPERATOR'S DATA - EXECUTIVE SERVICE

The Military Support Aircraft (MSA) program flight operations data (Appendix A-3) for typical executive service were reviewed in depth and the following summary of information was extracted. This data parameter covers 88 flights.

Fuel Data	Weight (lbs.)
Total Segment Takeoff Fuel	606,350
Total Segment Landing Fuel	342,552
Total Segment Block Fuel	263,798
Total Segment Flight Fuel	474,451
Avg. Segment Takeoff Fuel	3,191
Avg. Segment Landing Fuel	1,803
Avg. Block Fuel	1,388
Avg. Flight Fuel	2,497

Time, Distance, and Speed Data

Avg. Block Time	N/A
Avg. Flight Time	1.98 hr. (119 min)
Avg. Flight Distance	487nm
Avg. Flight Speed	244 kts

Miscellaneous Data

Avg. Payload = 663 lb.
Avg. Landings Per Hr. = 0.50
Avg. Cruise Altitude = 17,463 ft.
Avg. Operating Empty Wt. = 1,0831 lb.
Avg. Zero Fuel Wt. = 11,594 lb.

Flight Frequencies at Cruise Altitude

Cruise Alt. Ft.	No. of Flights	% of Flights
3000	5	2.6
3500	1	0.5
4000	7	3.7
7500	1	0.5
8000	2	1.1
9000	5	2.6
10000	4	2.1
11000	3	1.6
12000	3	1.6
13000	3	1.6
14000	5	2.6
15000	5	2.6
16000	15	7.9
18000	1	0.5
19000	10	5.3
20000	61	32.1
21000	56	29.5
22000	3	1.6
17463 (Avg.)	190	100

Figure 2-1 shows histograms of the three operation categories illustrating the number of flights vs. landings per hour.

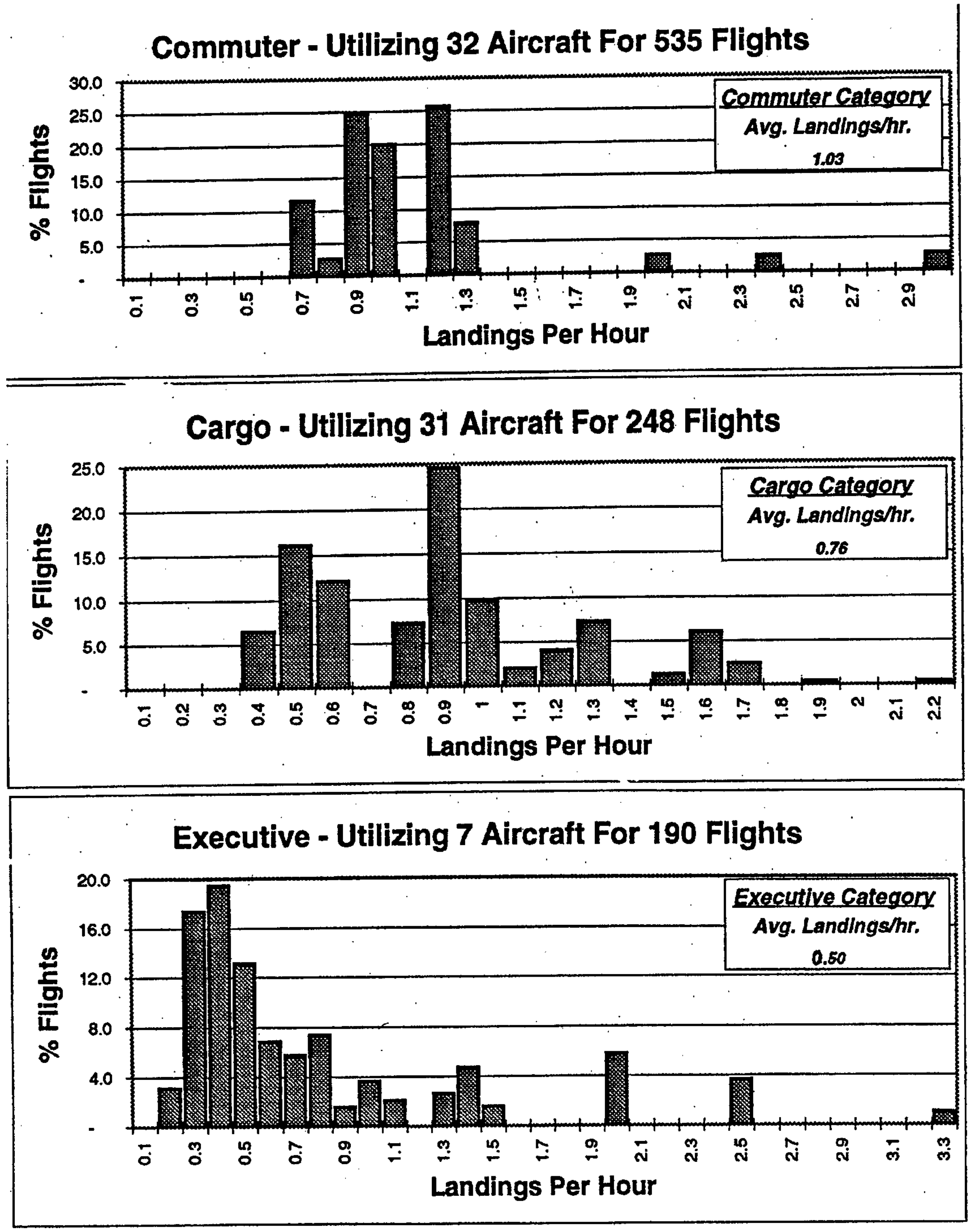


FIGURE 2-1 LANDING FREQUENCY COMPARISON

3. AIRCRAFT USAGE

3.1 SERVICE EXPERIENCE

A summary of structural service bulletins issued for Metro 226s and 227s is shown in Table 3-1 and Table 3-2. Table 3-3 is a summary of the significant structurally related service difficulty reports [19]. These reports cover the time period 1985 through 1997.

TABLE 3-1 SA226 SERVICE BULLETIN SUMMARY

SA226 S.B. No.	Service Bulletin Name & Reason	Effectivity	Issue Date
32-033	Inspect Main Landing Gear Struts Detection of possible fatigue cracks in the area of the drag brace boss.	T 201-275, 277-291 T(B) 276, 292-417 AT 001-074 TC 201-419	(R) 3-2-87
32-065	Ozone Industries, Inc.,P/N 5453005-1, -3 0r -5 Yoke (Ref. MLG Assy. P/N OAS5453 All Dash Numbers Up To And Including -19) And P/N 5451005-1 Yoke (Ref. NLG Assy. P/N OAS5451: All Dash Numbers Up To And Including -17) Ultrasonic Inspection. To prevent possible failure of the aluminum housing (yoke) on the MLG or NLG yoke, initiated by stress corrosion cracking (SCC) and corrosion fatigue.	All AT, TC, T and T (B) aircraft w/ OZONE Industries Inc. MLG & NLG yokes with mentioned P/Ns.	(R) 9-28-95
52-018	Main Cargo Door Improvement To increase cargo door life by strengthening high stress areas. (Install new straps, doublers, frames, bayonets, and bayonet bushings to cargo door and enlarge forward and aft fuselage frame bayonet receiving holes, to accomodate new bayonets.)	AT 001-419 TC 201-419	12/9/96
53-001	Frame Splices-Inspect And Change As Required Due to the possibility the affected parts may have been installed in an improper heat treat state, parts should be inspected and changed as required, per this service bulletin.	T 201-210	(R) 1-22-76
53-003	Reinforced Floorboard In Nose Baggage Compartment To prevent improper baggage loading from deflecting nose baggage compartment flooring. Deflection of the flooring could cause interference w/ the nose gear uplock hook. (Install floorboard supports and protective strips to strengthen the center section of the nose baggage compartment.)	T 201-278 AT 001-060 TC 201-238	9/16/77
53-007	Inspection/Beef-Up Of Cargo Door Area Belt Frames To inspect belt frames at cargo latch receptacles for cracks in belt frames and strengthen frames if required. (Inspection of the cargo door lower latch receptacle frames for possible crack(s). installation of doublers to strengthen frames should cracks be detected and replacement of present aluminum receptacles w/ steel.)	AT 001-074 TC 201-419	(R) 2-17-92

Table 3-1 SA226 SERVICE BULLETIN SUMMARY (Continued)

SA226 S.B. No.	Service Bulletin Name & Reason	Effectivity	Issue Date
53-008	Stiffening Of Cargo Door Opening And Cargo Floor To minimize the change in deflection across the cargo door opening under varying compartment baggage loads. (Add additional inner skin and straps above cargo door. Install cargo floor intercostals along RH side of fuselage opposite cargo door opening.)	AT 001-419 TC 201-419	11/12/81
53-011	Cabin Entrance Door Sill Beef Up Strengthen structure to eliminate potential cracking in door sill. (Remove existing sill angle supports. Add straps and doublers.)	AT 001-074 TC 201, 406, 419	(R) 2-10-93
54-004	Add Stiffeners To Main Gear Keelson Webs To reduce amount of repair incurred following hard landings. (Add stiffeners to main gear keelson webs at nacelle station 120.00 (inboard & outboard) in both nacelles. Remove & replace bleed air plumbing bleed air plumbing support bracket on left hand outboard keelson.)	T 201-275, 277-291 AT 001-069 TC 201-261	12/5/78
55-003	Vertical Stabilizer-Skin Reinforcement To improve the service life of the vertical stabilizer skins. (Provides for the removal of two intercostal braces, to be replaced by stiffeners in the vertical stabilizer in the area just behind the horizontal trim actuator and for the installation of two exterior skin doubler (one per side) in the area just fwd of the horizontal stabilizer pivot trunnion.)	TC 201-212 T 200-251 AT 001-033	9/3/75
55-003	Vertical Stabilizer-Skin Reinforcement (Supp 1) (Same as above)	(Same as above)	10/23/75
55-004	Stabilizer Vertical To improve fatigue life of vertical stabilizer skins adjacent to horizontal stabilizer intersection. (Install new vertical stabilizer stiffener. Replace elevator quadrant access door .)	T 201-291, Except 276 T(B) 276, 292-419 AT 001-419 TC 201-419	(R) 7-26-82
55-005	Outboard Elevator Hinge Beef-Up Eliminate spar cracking at outboard elevator hinge and provide additional stiffness for outboard elevator hinge. (Install reinforcing channel, radius block, improved gusset and new clip under stablizer skin.)	T 201-275, 277-291 T(B) 276, 292-417 AT 001-074 TC 201-419	(R) 1-17-91

Table 3-1 SA226 SERVICE BULLETIN SUMMARY (Continued)

SA226 S.B. No.	Service Bulletin Name & Reason	Effectivity	Issue Date
55-008	Modification Of Elevator Balance Intercostal To reinforce the elevator in the elevator balance weight area. (Replace existing structure and modify elevator balance intercostal area w/ internal and external gussets.)	T 201-275, 277-291 T(B) 276, 292-417 AT 001-074 TC 201-419	4/12/88
55-009	Vertical Stabilizer Skin Improvement To reduce skin vibrations that may cause fatigue cracks. (To substantially reduce the probability of developing cracks in the dorsal fin aft of the pitch trim actuator by adding clips to both ends of the 27-4100-177 channel as seen in Figure 2. And also reduce the probability of developing skin cracks along the interspar ribs at W/L. 138 & 148 by adding clamp-up washers under the rivet heads as seen in Figure 4.)	T 201-275, 277-291 T(B) 276, 292-417 AT 001-074 TC 201-419	11/16/88
57-003	X-Ray Inspection Of Lower Front Spar Cap To provide a means of inspecting the lower front spar cap between W.S. 9.29 and 99.0, left and right side for the detection of cracks.	T 201-291, Except 276 T(B) 276, 292-417	(R) 1-12-83
57-004	X-Ray Inspection Of Lower Front Spar Cap To provide a means of inspecting the lower front spar cap between W.S. 9.29 and 99.0, left and right side for the detection of cracks.	AT 001-999	(R) 1-12-83
57-005	X-Ray Inspection Of Lower Front Spar Cap To provide a means of inspecting the lower front spar cap between W.S. 9.29 and 99.0, left and right side for the detection of cracks.	201-999	(R) 1-12-83
57-006	Modification To Provide Access For X-Ray Inspection To provide access to the lower cap of the wing spar at selected wing sta. to accomplish the X-ray Insp. required by S.B. 57-003.	T 201-999	(R) 12-2-75
57-007	Modification To Provide Access For X-Ray Inspection To provide access to the lower cap of the wing spar at selected wing sta. to accomplish the X-ray Insp. required by S.B. 57-004.	AT 001-999	(R) 12-2-75
57-008	Modification To Provide Access For X-Ray Inspection To provide access to the lower cap of the wing spar at selected wing sta. to accomplish the X-ray Insp. required by S.B. 57-005.	TC 201-999	(R) 12-2-75

Table 3-1 SA226 SERVICE BULLETIN SUMMARY (Continued)

SA226 S.B. No.	Service Bulletin Name & Reason	Effectivity	Issue Date
57-009	Trailing Edge Stiffening To prevent cracking of wing skins aft of the rear spar in the area forward of the ailerons. (This bulletin provides for the installation of doublers between the skins and the hinge fittings and ribs forward of the aileron. Twenty doublers are required for a/c with continuos skins and four doublers per a/c are required for airplanes with spliced skins.)	Spliced Skins: TC 201-206 T 201-234 AT 001-009 Continuous Skins: TC 207-208 T 235-248 AT 010-019	(R) 12-2-75
57-012	Trailing Edge Stiffening To improve service life of trailing edge skins between the rear wing and the ailerons. (Part " A" provides for the installation of reinforcement doublers at either side of existing doublers between trailing edge ribs and skins between W.S. 187 and 248. Part "B" provides for the installation of an improved doubler on effected a/c at stations where no doubler presently exists.)	Spliced Skins: TC 209-999 T 249-999 AT 020-999 Continuous Skins: TC 207-208 T 235-248 AT 010-019	12/4/75
57-013	Wing Lower Trail'g Edge Insp. Repair and /or Stiffening To improve the service life of the trailing edge skins at wing stations 116, 132, 148, and 161. (Part I - Inspection of the trailing edge skins at W.S. 116, 132, 148, & 161. Part II - Repair cracked skins as required. Part III - Installation of stiffening clip 27-31000-481 at W.S. 116, 132, 148, & 161.)	T 201-264, 269 AT 001-050 TC 201-222E	(R) 8-26-76
57-015	X-Ray Inspection Of Lower Spar To inspect for possible manufacturing defects in wing station 99 area. (This bulletin sets forth the method and requirements for a one time inspection of W.S. 99 lower spar cap area. This inspection requires defueling the aircraft and removal of two access panels.)	T 201-214, 216-220 AT 002-004, 006-007 TC 201, 202, 202E	12/6/78
57-016	Wing Trailing Edge Ribs/Center Flap Hinge Insp. To provide continued airworthiness by (1) inspecting the center flap hinge wing trailing edge ribs for cracks; (2) replacing cracked ribs; (3) installing reinforcement doublers. (Part A - Inspection of wing trailing edge ribs at flap actuator attach brackets for	TC 201-379 T 201-275, 277-291 T(B) 275, 292-378 AT 001-069	(R) 12-9-81

Table 3-1 SA226 SERVICE BULLETIN SUMMARY (Continued)

SA226 S.B. No.	Service Bulletin Name & Reason	Effectivity	Issue Date
	cracks. Part B - Installation of reinforcements doublers at either side wing trailing edge ribs at W.S. 98.385 & 100.635. Part C - Replacement of cracked wing trailing edge ribs.)		
57-018	Mod/Repair Of Upper Wing Skin To prevent crack in right and left upper wing skin at aft corner of battery box access panel opening. (Visually inspect right and left upper wing skin. If wing skin is cracked, remove skin from affected area and install stainless steel repair plate.)	T 201-275, 277-291 T(B) 276, 292-417 AT 001-074 TC 201-419	(R) 10-25-93

TABLE 3-2 SA227 SERVICE BULLETIN SUMMARY

SA227 SB #	Service Bulletin Name & Reason	Effectivity	Issue Date
32-022	MLG Struts Inspection To detect fatigue cracks in the area of the drag brace boss of the 5453001-1 and 5453001-3 MLG strut housing and to determine if the housings are to be reworked or rejected.	TT 421-541 AT 423-631 AC 406, 415, 416, 420 - 663, 667, 671, 673, 674	(R) 3-2-87
32-039	All SA227 AC, AT, BC, TT aircraft w/ OZONE Industries Inc. MLG yoke (Ref. MLG Assy. P/N OAS5453 all dash numbers up to and including -19) and NLG Yoke (Ref. NLG Assy. P/N OAS5451 all dash numbers up to and including -17) installed. To prevent possible failure of the aluminum housing (yoke) on the MLG or NLG yoke, initiated by stress corrosion cracking (SCC) and corrosion fatigue.	All AC, AT, BC, and TT aircraft w/ OZONE Industries Inc. MLG & NLG yokes with mentioned P/Ns.	(R) 9-28-95
52-009	Main Cargo Door Improvement To increase cargo door life by strengthening high stress areas. (Install new straps, doublers, frames, bayonets, and bayonet bushings to cargo door and enlarge forward and aft fuselage frame bayonet receiving holes, to accomodate new bayonets.) * = Except for aircraft that have 27-24050-133, -167, or -185 cargo door installed.	AT 423-469* AC 406, 415, 416, 420-478, except 457, 470* BC 420-458, except 457 & 470*	12/9/96
53-003	Inspection/Beef-Up Cargo Door Area Belt Frames To inspect lower left belt frames at gargo latch receptacles for crack(s) in the belt frame. (Provides for inspection of cargo door lower receptacle frames for possible crack(s). It also provides for the installation of doublers to strengthen frames should crack(s) be detected.)	AT 423-469 AC 406, 415, 416, 420-478, except 457, 470.	(R) 2-13-86
53-004	Cabin Entrance Door Sill Beef-Up Strengthen structure to eliminate potential cracking in door sill. (Remove existing sill angle supports. Add straps and doublers to increase structural strength and eliminate cracking.)	TT 421-541 AT 423-695 AC 406, 415, 416, 420 - 789 BC 420-789	1/18/93
55-001	Stabilizer - Vertical To improve fatigue life of vertical stabilizer skins adjacent to horizontal stabilizer intersection. (Install New vertical stabilizer stiffener and replace elevator quadrant door.)	TT 421-479 AT 423-480 AC 420-481	(R) 7-26-82

Table 3-2 SA227 SERVICE BULLETIN SUMMARY (Continued)

SA227 SB #	Service Bulletin Name & Reason	Effectivity	Issue Date
55-002	Outboard Elevator Hinge Beef-Up Eliminate spar cracking at outboard elevator hinge and provide additional stiffness for outboard elevator hinge. (Install reinforcing channel, radius block, improved gusset and new clip under stabilizer skin.)	TT 421-527 AT 423-524 AC 406, 415, 416, 420 - 509, 511-530	(R) 10-13-88
55-003	Inspect/Replace Fasteners In Horizontal Stab. To inspect all NAS1202 fasteners for security and condition in the Horizontal Stabilizer FWD Spar bewteen sta. 3.13 & 12.00.	TT 421-555 AT 423-577 AC 415, 416, 420-565	(R) 4-9-84
55-004	Modification Of Elevator Balance Intercostal To reinforce the elevator in the elevator balance weight area. (Replace existing structure and modify elevator balance intercostal area w/ internal and external gussets for strengthening.)	TT 421-489 AT 423-502 AC 406, 415, 416, 420 - 500	4/12/88
55-005	Vertical Stabilizer Beef-Up To reduce skin vibrations that may cause fatigue cracks. (To substanially reduce the probability of developing cracks in the dorsal fin aft of the pitch trim actuator.)	TT 421-541 AT 423-631 AC 406, 415, 416, 420 - 683	11/16/88
55-006	Horizontal Stabilizer Fitting Fasteners Strengthen stabilizer aft spar attach fitting hardware to improve durability. Allow easier access to inspect for potential crack in splice plate. (Modify horizontal stabilizer aft spar attach fitting installation by replacing twenty HI-LOK fasteners, & eight additional fasteners for increasing structural strength.)	TT 421-541 AT 423-695 AC 406, 415, 416, 420 - 783, and 785 BC 420-783, 785	(R)1-20-93
57-002	Inspect/Add Doubler At Lower Wing Skin To improve the fatigue life of the lower skin panel adjacent to the intersection door at W.S. 187.00. (Strengthen area by installing skin doubler.)	AT 423-554 AC 415, 416, 420-554	(R) 1-23-84
57-004	Inspect, Modify/Repair Lower Wing Skin W.S. 113 Improve fatigue life of lower wing stringers, both left and right wings, adjacent to aft inspection door at W.S. 113.00. (Installation of straps and reinforcing plate to eliminate possibly of cracks.)	AT 423-631, 695 AC 406, 415, 416, 420 - 789 BC 420-789	6/22/93

Table 3-2 SA227 SERVICE BULLETIN SUMMARY (Continued)

SA227 SB #	Service Bulletin Name & Reason	Effectivity	Issue Date
57-005	<u>Modification/Repair Of Upper Wing Skin</u> To prevent or repair crack in right and left upper wing skin at aft corner of battery box access panel opening. (Structurally strengthen area by installing stainless steel repair plate.)	TT 421-541 AT 423-631, 695 AC 406, 415, 416, 420 - 789 BC 420-789	(R) 7-1-93

TABLE 3-3 FAA SERVICE DIFFICULTY REPORTS METRO 226/227

COMPONENT	DIFFICULTY DESCRIPTION
Aileron	Corrosion was found in inboard aileron hinge attachment area.
Cargo Door	Door hinge cracks were found.
Elevator	Corrosion was found in elevator torque tube.
Keelson	Cracks were found in keelson beam, angle, and web.
Landing Gear	Cracks were found in gear upper strut at drag brace/boss attachment.
Nacelle	Cracks were found in upper wing skin to nacelle angles attachment.
Windows	Cracks were found in passenger windows and cockpit windows. Cockpit windows failed during flight.
Wing Extension	Cracks were found in upper wing extension around the attachment screw holes. Elongated bolt holes found.

3.2 FLIGHT PROFILE DEFINITION

Flight Profile Definition SA227 Aircraft

After reviewing the flight length, cruise altitude, and takeoff weight of surveyed data, three sets of profiles were developed representing flights typical of the three types of operation.
Table 3-5 shows the mission profile parameters and Figure 3-1 illustrates the flight profiles.

Surveyed flight lengths were categorized into three groups, (1) 40 minutes or less, (2) between 41 and 99 minutes, and (3) 100 minutes or longer. Within each flight group, the average cruise altitude, and takeoff weight were tabulated. Figure 3-2 through Figure 3-4 show the flight occurrence distributions vs. flight duration, cruise altitude, and takeoff weight.

TABLE 3-4 METRO III AIRCRAFT CHARACTERISTICS

Maximum weight, lb	14,500
Wing span, ft	57
Wing area, ft^2	309
Type propulsion Power per engine, hp	Twin-Engine Turboprop 1,000 shp, dry 1,100 shp, wet
V_C at sea level, knots Design Cruising Speed	248
V_D at sea level, knots Design Dive Speed	311
n_m at V_C Maneuver Limit Load Factor	3.08
$-n_m$ at V_C Maneuver Limit Load Factor	-1.21
n_g at V_C 7 Gust Limit Load Factor	3.08
$-n_g$ at V_C Gust Limit Load Factor	-1.21

TABLE 3-5 METRO III MISSION PROFILE SELECTION

Flight Profile Group	Flight Length (Minutes)	Cruise Altitude (Feet)	Takeoff Gross Wt. (Lb)	Landing Weight (Pounds)	Climb Speed (Kts)	Descent Speed (Kts)	Cruise Speed (Kts)
Group 1	30	12,000	12,800	12,500	160 (IAS)	220 (IAS)	250
Group 2	60	16,000	13,300	13,000	160 (IAS)	220 (IAS)	250
Group 3	120	20,000	13,800	12,700	160 (IAS)	220 (IAS)	250

Flight Profile Definition SA226 Aircraft

The typical flight profile for the SA226 aircraft is taken from reference 8. Table 3-6 provides the characteristics of the aircraft and table 3-7 shows the typical mission profile selected. This profile was developed in 1979 from operator surveys for use in the full-scale fatigue test. This spectrum represents the more severe usage that the aircraft received in the early life. Adjustments were made in the spectrum at that time to account for the longer high-altitude flights typical of executive transport missions Most of these aircraft have been converted to cargo operation which tends to have a less severe spectrum because of longer stage lengths.

TABLE 3-6 METRO II AIRCRAFT CHARACTERISTICS

Maximum weight, lb	13,100
Wing span, ft	46
Wing area, ft^2	277
Type propulsion Power per engine, hp	Twin-Engine Turboprop 840 shp, dry 960 shp, wet
V_C at sea level, knots Design Cruising Speed	248
V_D at sea level, knots Design Dive Speed	311
n_m at V_C Maneuver Limit Load Factor	3.14
$-n_m$ at V_C Maneuver Limit Load Factor	-1.26
n_g at V_C Gust Limit Load Factor	3.14
$-n_g$ at V_C Gust Limit Load Factor	-1.26

TABLE 3-7 METRO II MISSION PROFILE SELECTION

Flight Profile Group	Flight Length (Minutes)	Cruise Altitude (Feet)	Takeoff Gross Wt. (Lb)	Landing Weight (Pounds)	Climb Speed (Kts)	Descent Speed (Kts)	Cruise Speed (Kts)
Combined Profile	30	20,000	13,800	13,000	160 (IAS)	220 (IAS)	250

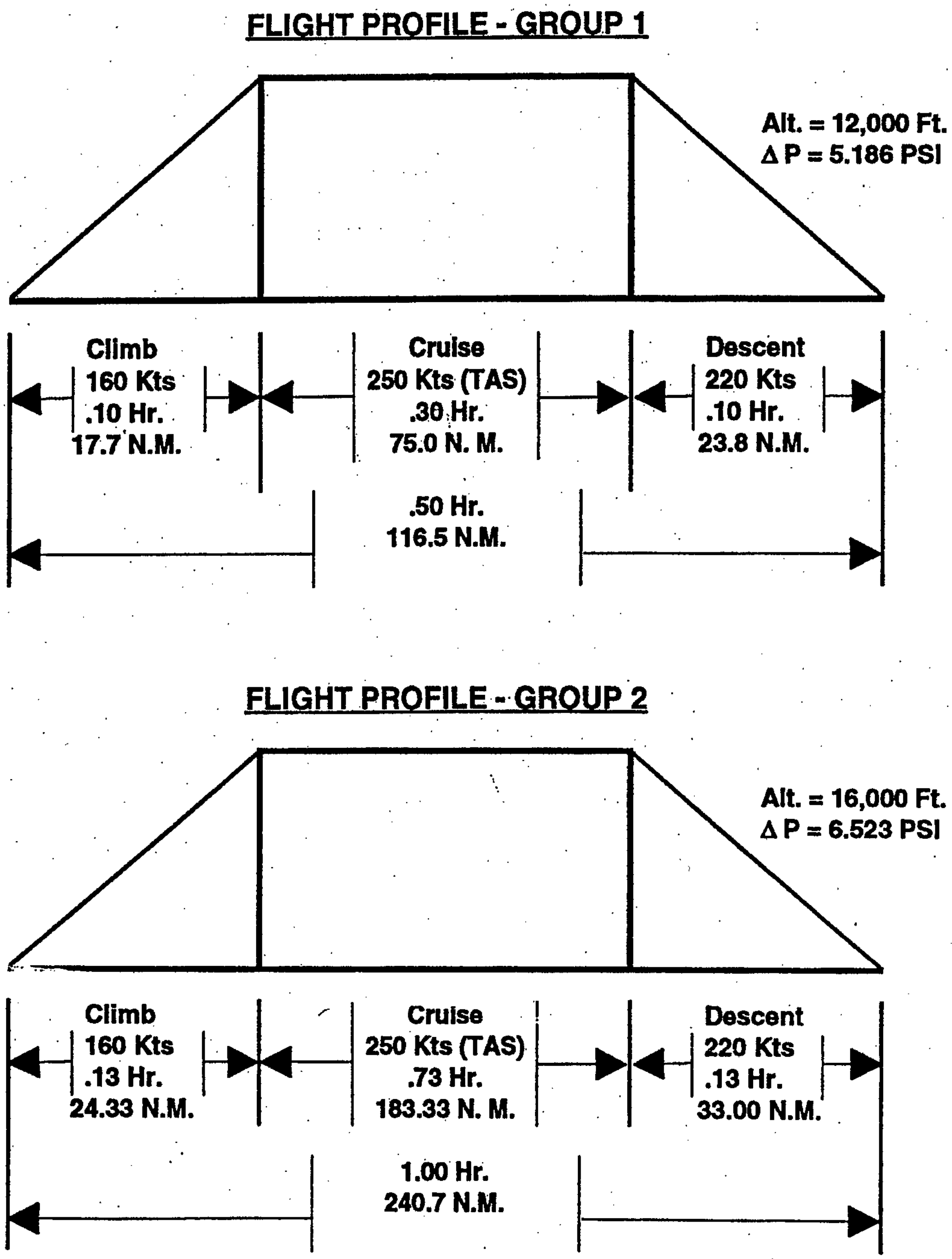


FIGURE 3-1 FLIGHT PROFILE ILLUSTRATION

FLIGHT PROFILE - GROUP 3

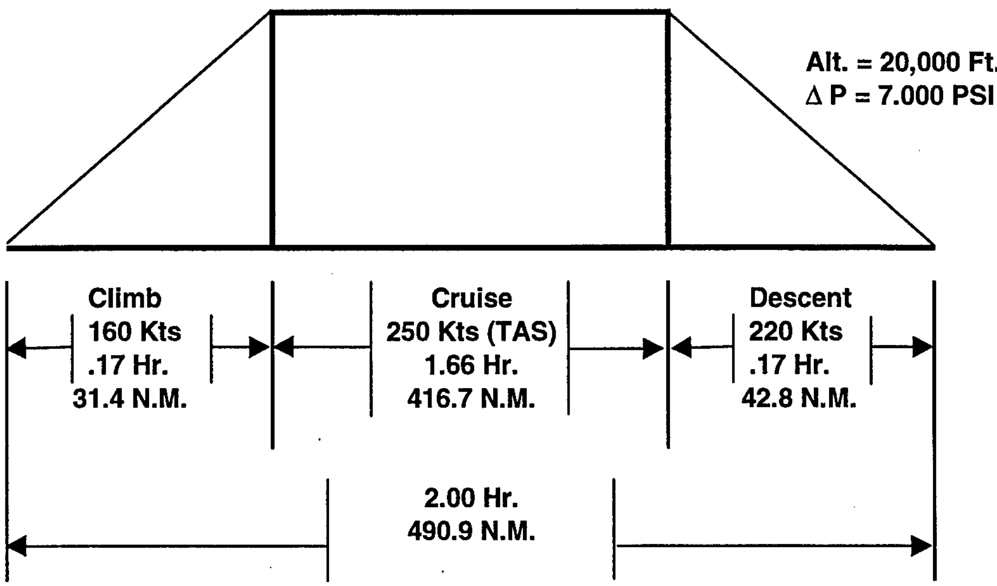


Figure 3-1 FLIGHT PROFILE ILLUSTRATION (Continued)

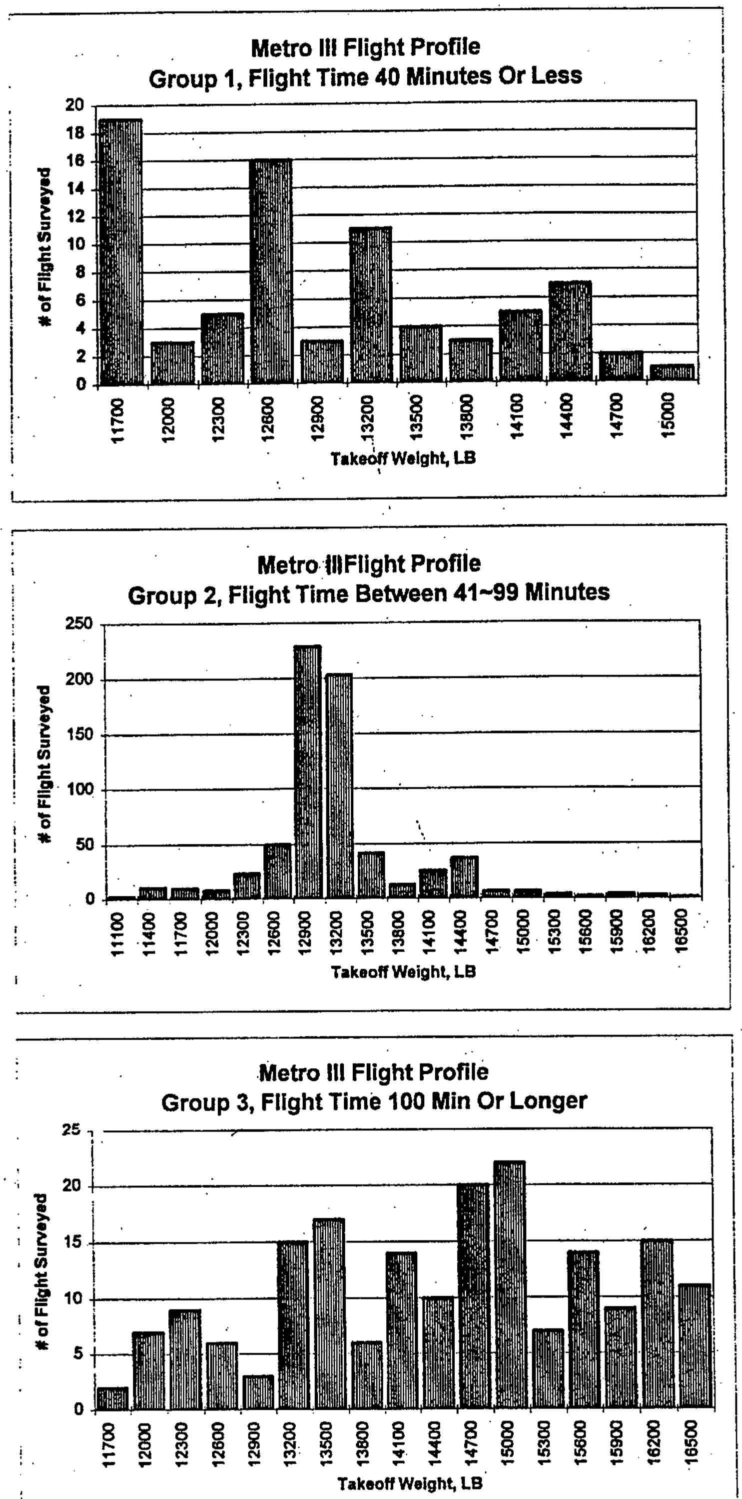


FIGURE 3-2 FLIGHT PROFILE - FLIGHT LENGTH

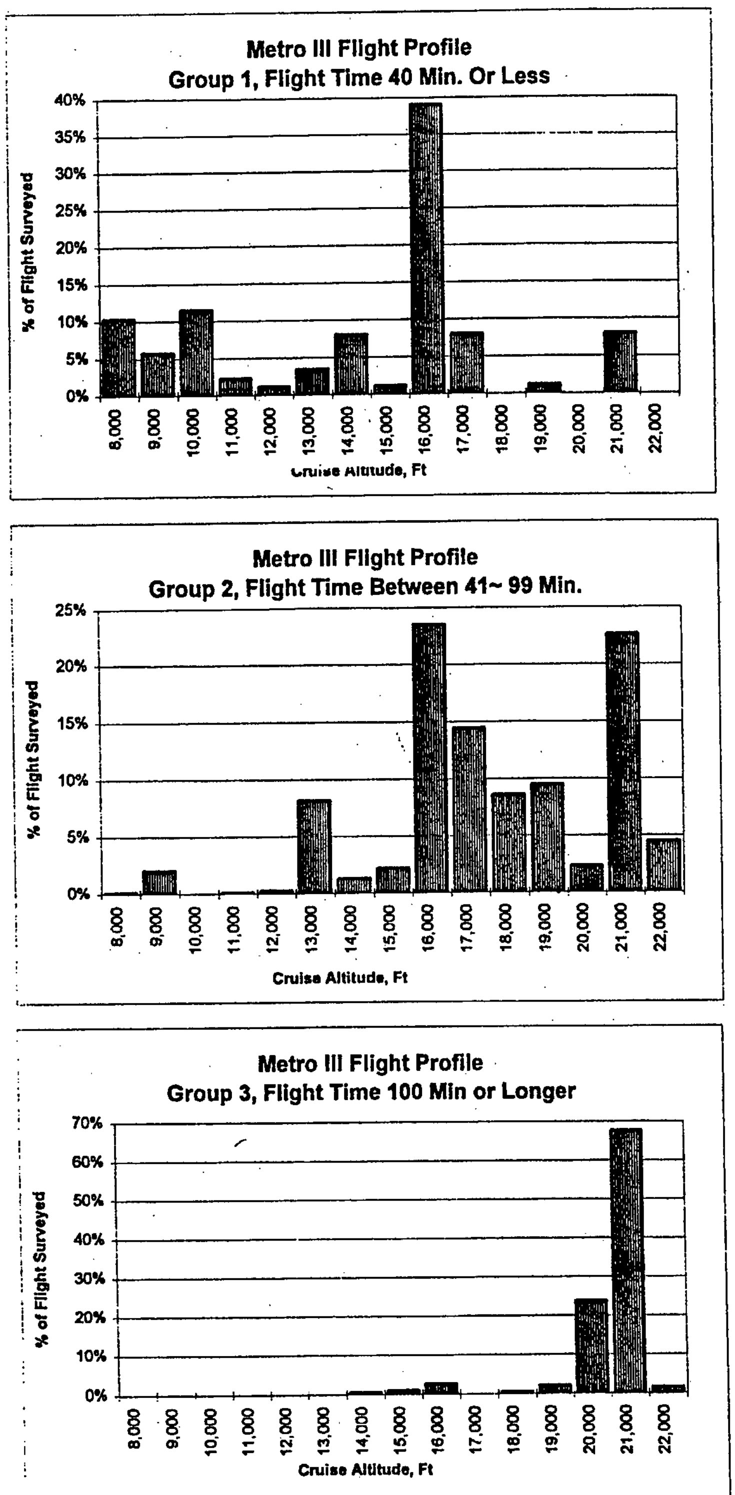
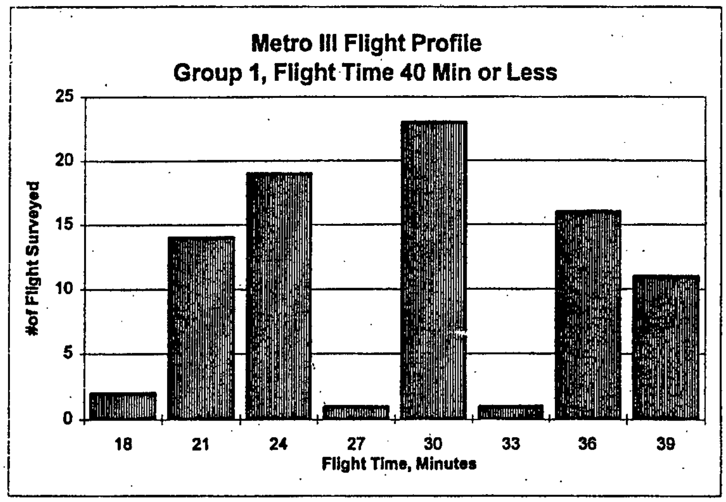
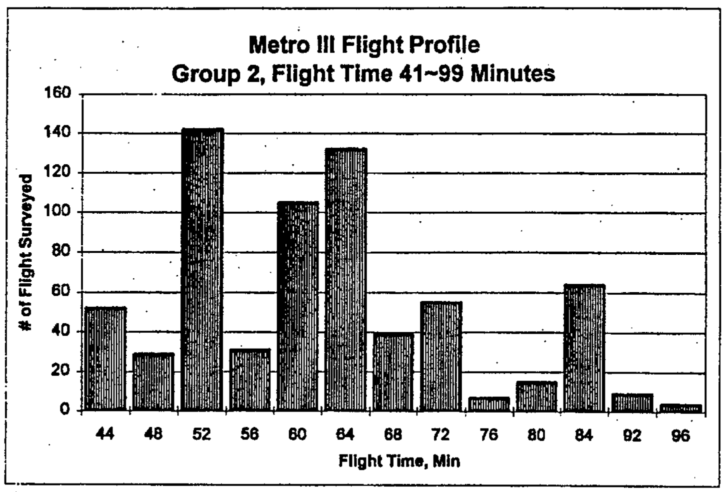


FIGURE 3-3 FLIGHT PROFILE - CRUISE ALTITUDE





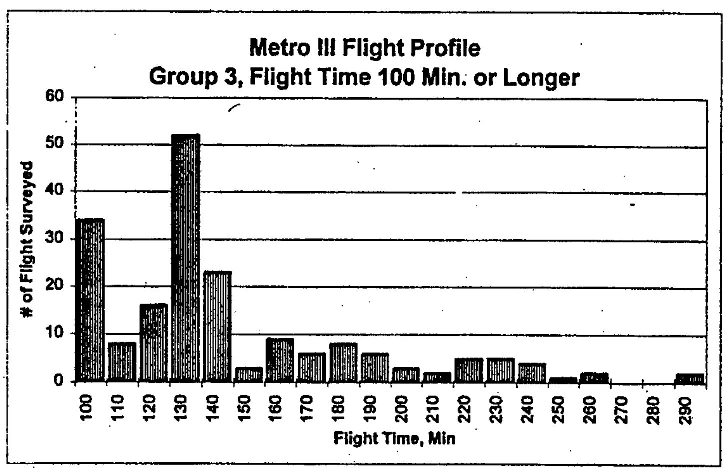


FIGURE 3-4 FLIGHT PROFILE - TAKEOFF WEIGHT

4. LOAD SPECTRUM SA226 AND SA227

The load spectrum that was used for the SA226 fatigue test was a modification of the spectrum presented in reference 2. The gust and maneuver portions of the load spectrum were used without change; but the flight length, altitude, and weights were adjusted to reflect the operational usage of the aircraft—the altitude adjustment effecting the loads on the pressure vessel only. For the current study it appears that this spectrum would not be appropriate for use in analyzing the SA227 aircraft because the SA227 aircraft have operational profiles quite different from the aircraft used to define the reference 2 spectrums, particularly the altitudes at which the aircraft are being flown. A detailed analysis of the reference 2 spectrum is presented in reference 3. Here it is seen that the pressurized general usage load spectrum is almost entirely derived from data collected on two similar aircraft operated for a total of 1640 hours. The average altitude for the two aircraft is less than 11,000 feet. As this altitude is quite a bit less than the altitudes reported by SA227 operators, a revised load spectrum has been derived for the current study using the gust spectrum presented in references 7 and 6. Using gust velocities instead of gust loads allows one to construct a gust load spectrum based on the actual mission profile flown by SA227 operators.

For the SA227, the operational data gathered for commuter, cargo, and executive operation defined seven typical flights in terms of range, speed, altitude, payload, and fuel. For each flight, the aircraft was assumed to climb at 2000 feet per minute and 160 knots to the cruising altitude. The aircraft was assumed to descend at the end of the flight at close to the red line speed and at 2000 feet per minute. The cruise portion of the flight was at constant speed and altitude to cover the remaining time of flight. This flight profile closely matches the way the aircraft are actually operated.

For each altitude, speed, and wing loading, a gust load spectrum was constructed using the atmospheric gust spectrum given in reference 7. The gusts encountered in climb and decent were accounted for by breaking these flight segments into several steps and calculating the appropriate gust frequency for each step.

To construct this spectrum the expansion of the RAS 69023 spectrum given in reference 6 was used as a starting point. Each curve of exceedances per nautical mile was fit with a polynomial to develop an analytic expression for gust exceedance at each altitude. The equations for gust load as a function of gust velocity given in FAR 23 were then used to define gust velocities for a given flight condition to generate a specified gust load. Using a quadratic or cubic interpolation depending on altitude, the exceedances per nautical mile were then extracted from the analytic expressions for gust load as a function of altitude.

Given the aircraft usage data from chapter three, and the fight profile chosen there, the flight was broken up into three segments; clime, cruise, and decent. Load exceedances were summed for each of these segments to develop a gust exceedance curve for the entire mission.

To validate this method a comparison was made using this method and the results for the load exceedance curve for pressurized aircraft given in Figure 2-18 and D-17 of reference 2. These figures are dominated by airplanes 3 and 3^1. the physical and operational characteristics of these aircraft are given in table A-8 and page B-7 of reference 2. For this particular aircraft the current method gives essentially the same exceedance curve as presented in reference 2.

4.1 FLIGHT LENGTH SPECTRUM

The landing frequency for the three types of operation is summarized in Table 4-1.

TABLE 4-1 MISSION PROFILE LANDING FREQUENCY

Mission Profiles	Landing / Hour
Commuter - Group 1, (30 minutes)	2.0
Cargo - Group 2, (60 minutes)	1.0
Executive - Group 3, (120 minutes)	0.5

4.2 CABIN PRESSURE SPECTRUM

TABLE 4-2 FLIGHT PROFILE CABIN PRESSURE CHANGES

Mission Profile	Altitude (ft)	Pressure (psi)	Δ P for Flight Spectrum
Commuter (Short)	12,000	9.0	5.2
Cargo (Mid)	16,000	7.6	6.5
Executive (Long)	20,000	6.5	7.0

4.3 GUST AND MANEUVER

The SA227 vertical gust load factor exceedance curve is presented in the Figure 4-1 through Figure 4-4. Table 4-3 and Table 4-4 list the maneuver and gust loads of exceedances per 35,000 flight hours.

TABLE 4-3 SA227 MANUVER AND GUST LOADS PER CYCLE (35,000 HR)

An/An_{LLF}	Group 1	Group 2	Group 3
0.9	12	12	9
0.8	30	28	20
0.7	86	81	52
0.6	278	265	168
0.5	847	814	462
0.4	3,410	3,298	1,862
0.3	16,255	15,727	8,131
0.2	106,522	104,362	47,740
0.1	1,056,305	1,088,623	429,013
-0.1	945,544	974,203	312,311
-0.2	83,349	80,423	23,323
-0.3	11,215	10,520	2,820
-0.4	2,130	1,976	513
-0.5	524	480	122
-0.6	150	133	33
-0.7	45	39	9
-0.8	14	11	3
-0.9	4	3	1

An – Vertical acceleration of the airplane center of gravity (c.g.)

An_{LLF} – An at the limit load factor.

TABLE 4-4 SA226 MANEUVER AND GUST LOADS PER CYCLE (35,000 HR)

An/An_{LLF}	Combined Profiles
0.9	18
0.8	37
0.7	98
0.6	305
0.5	1,162
0.4	5,124
0.3	34,094
0.2	240,975
0.1	1,472,625
0	
-0.1	1,374,450
-0.2	209,737
-0.3	27,398
-0.4	4,274
-0.5	903
-0.6	196
-0.7	51
-0.8	18
-0.9	9

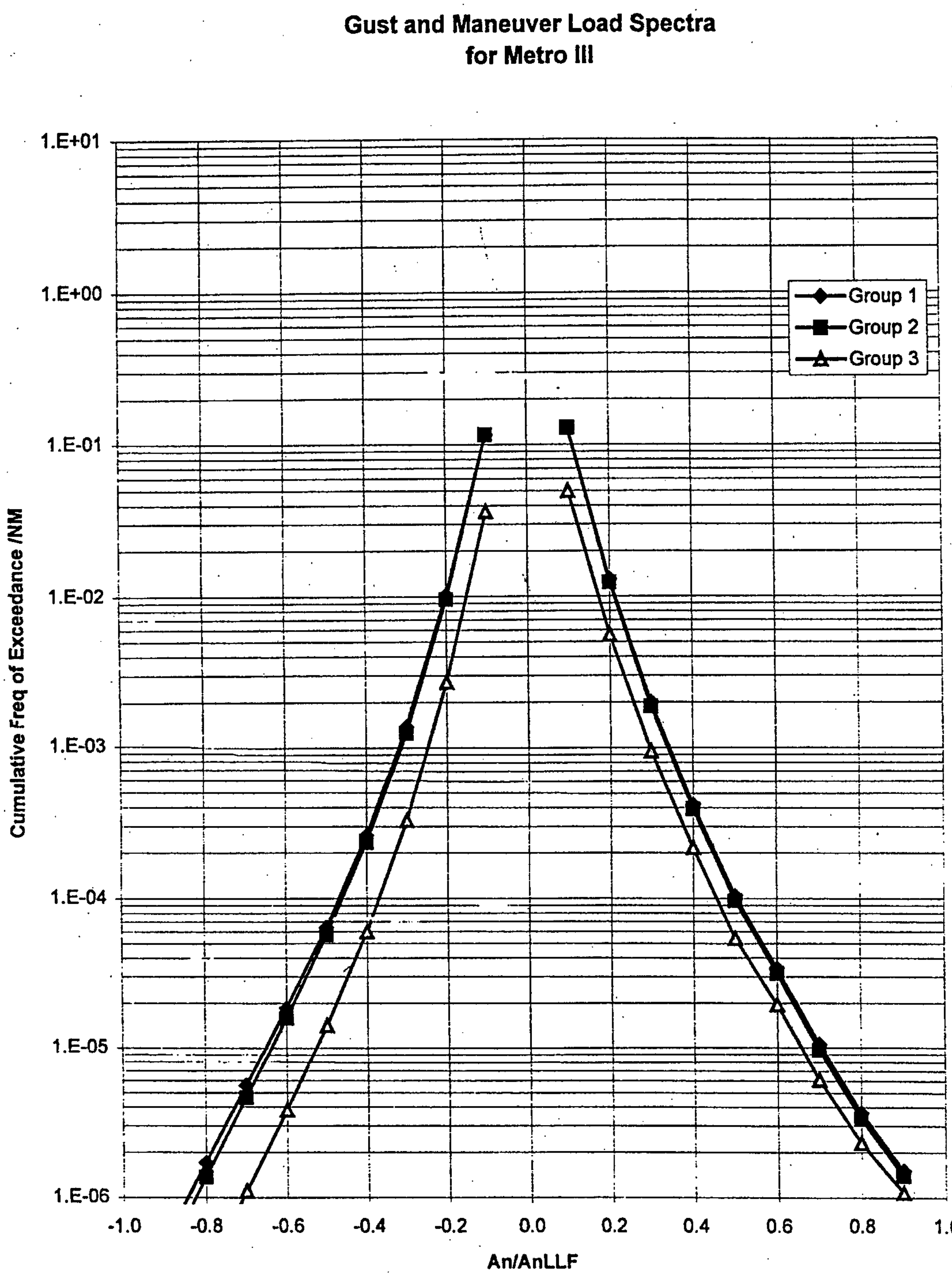


FIGURE 4-1 SA227 MANEUVER AND GUST SPECTRUM

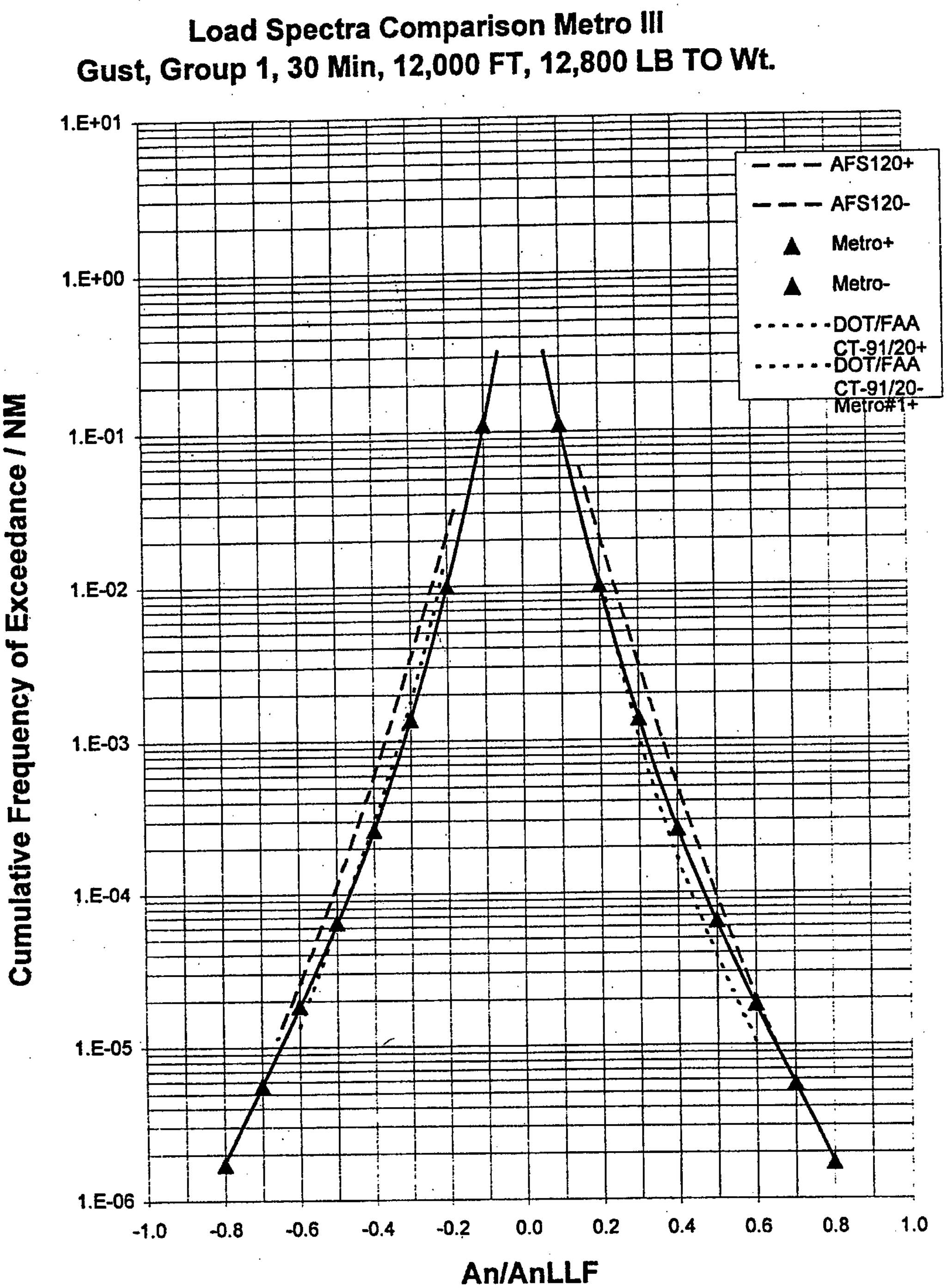


FIGURE 4-2 GROUP 1 FLIGHT PROFILE VERTICAL GUST LOADS EXCEEDANCE COMPARISON

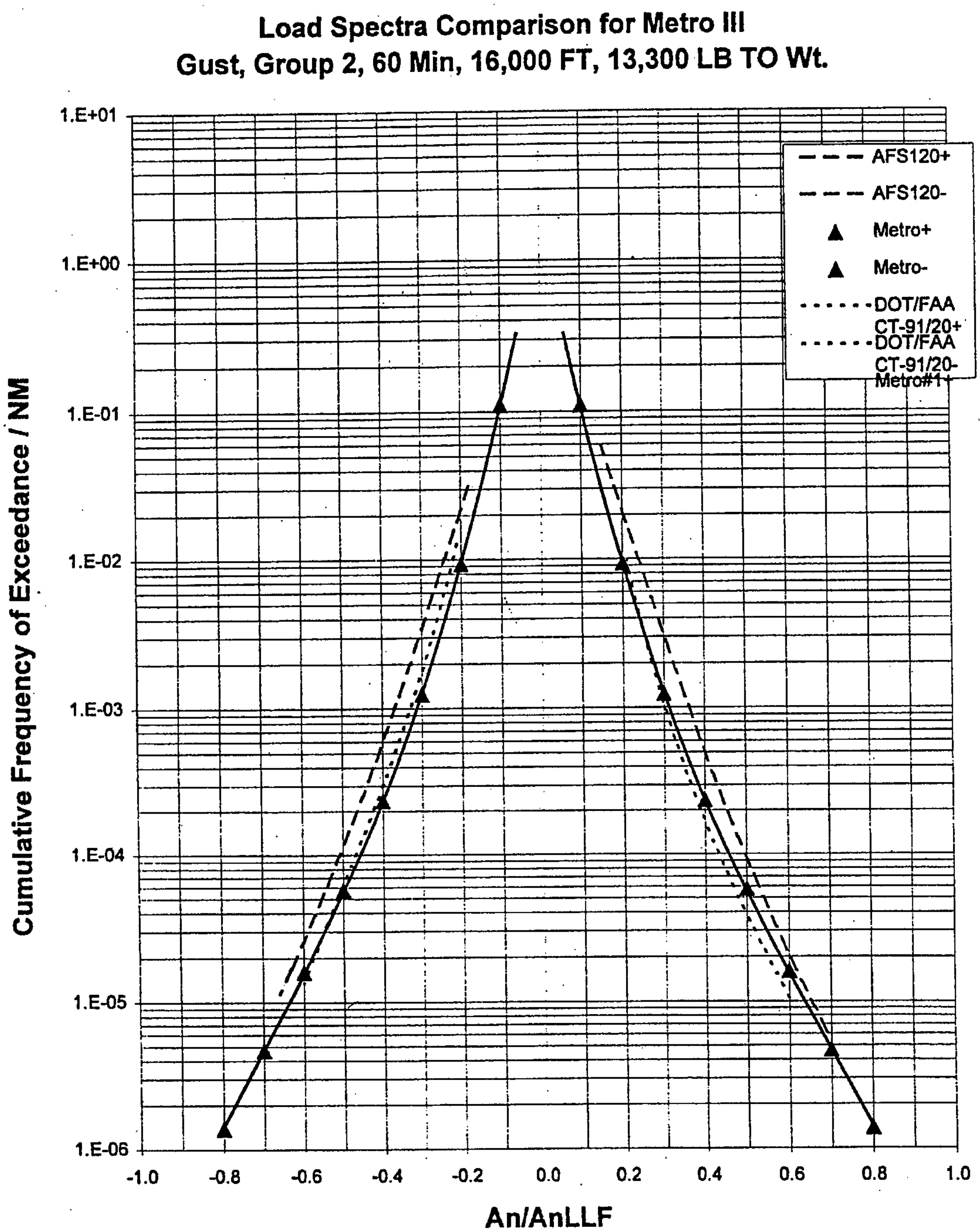


FIGURE 4-3 GROUP 2 FLIGHT PROFILE
VERTICAL GUST LOADS EXCEEDANCE COMPARISON

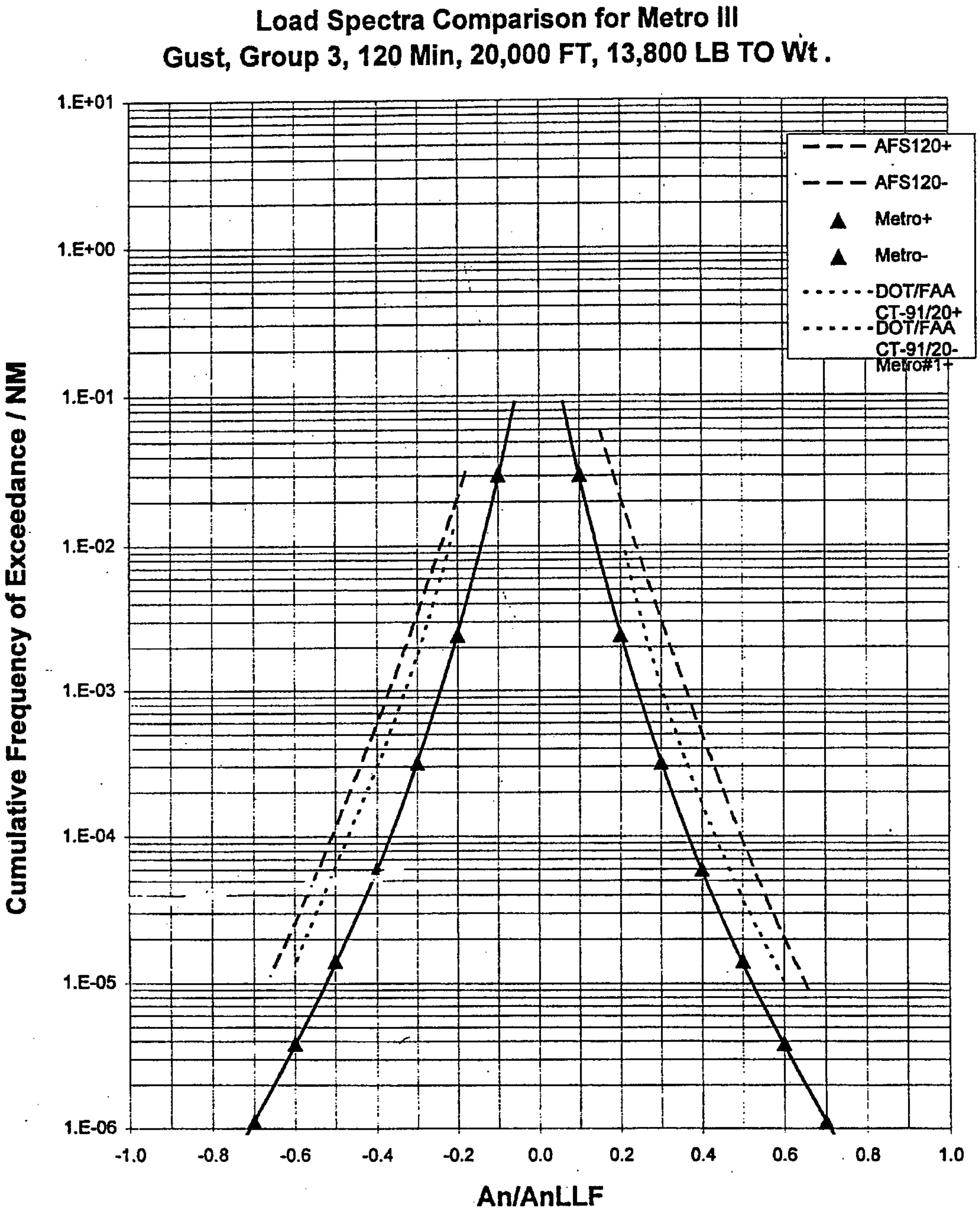


FIGURE 4-4 GROUP 3 FLIGHT PROFILE VERTICAL GUST LOADS EXCEEDANCE COMPARISON

4.4 TAXI LOAD SPECTRUM

The taxi spectrum in Reference 2 was used to define the once-per-flight taxi bump. In most cases, this will result in the minimum G-A-G stress.

TABLE 4-5 TAXI LOAD SPECTRUM

Gs	Cumulative	ΔCycles
1.00	500,000	--
1.30	2,000	1900
1.40	100	90
1.46	10	10

Of the landings, 95% will be followed by a 1.3-g taxi bump, 4.5% by a 1.4- g taxi bump, and 0.5% by a 1.46-g taxi bump. In addition, 40% of the taxi bumps will be assumed to occur with full fuel (1900 pounds per side). The remainder will be with 400 pounds of fuel per side. The high fuel load conditions are included to cover executive operations. This is excessive for commuter operation but could be used to substantiate a higher landing frequency per hour for commuter operations if that becomes necessary.

4.5 LANDING SPECTRUM

The landing spectrum used was be the executive twin spectrum from Reference 2. This spectrum is probably more severe than necessary for commuter airline operation but will more than adequately cover cargo and executive operations.

TABLE 4-6 LANDING SPECTRUM

Sink Speed fps	Cumulative	Test Cumulative	Cycles	Cumulative Per Landing
0	10,000	-10,000	2,750	1.00
1	4,500	7,250	4,400	0.725
2	1,200	2,850	2,200	0.285
3	100	650	590	0.065
4	20	60	48	0.006
5	5	12	12	0.0012

5. FLIGHT STRAIN SURVEY

5.1 STRAIN SURVEY

A model SA227 DC aircraft serial number AC-557 was instrumented to measure strains at selected locations on the aircraft during typical flight maneuvers. A total of five flights were made to collect the data preceded by a calibration of the aircraft strain gages by the application of known loads to the aircraft. The location of the strain gages is shown on Figure 5-1.

Strain gages were located at three locations on the wing main and rear spar, on the horizontal tail main spar and rear spar near the root, and on the main and rear spar of the vertical tail. In addition strain gages were located at potentially high stress locations on the pressure vessel and nacelle. The strain gages were loaded with known loads to verify the gages were functioning properly. The data were recorded on the hard disk of a PC on the aircraft by a virtual instrument developed using LabView for Windows software. The analog to digital boards on the aircraft are capable of recording voltages equivalent to about 40-psi stress. For this reason some of the plots discussed are somewhat ragged looking when displaying very low stress levels.

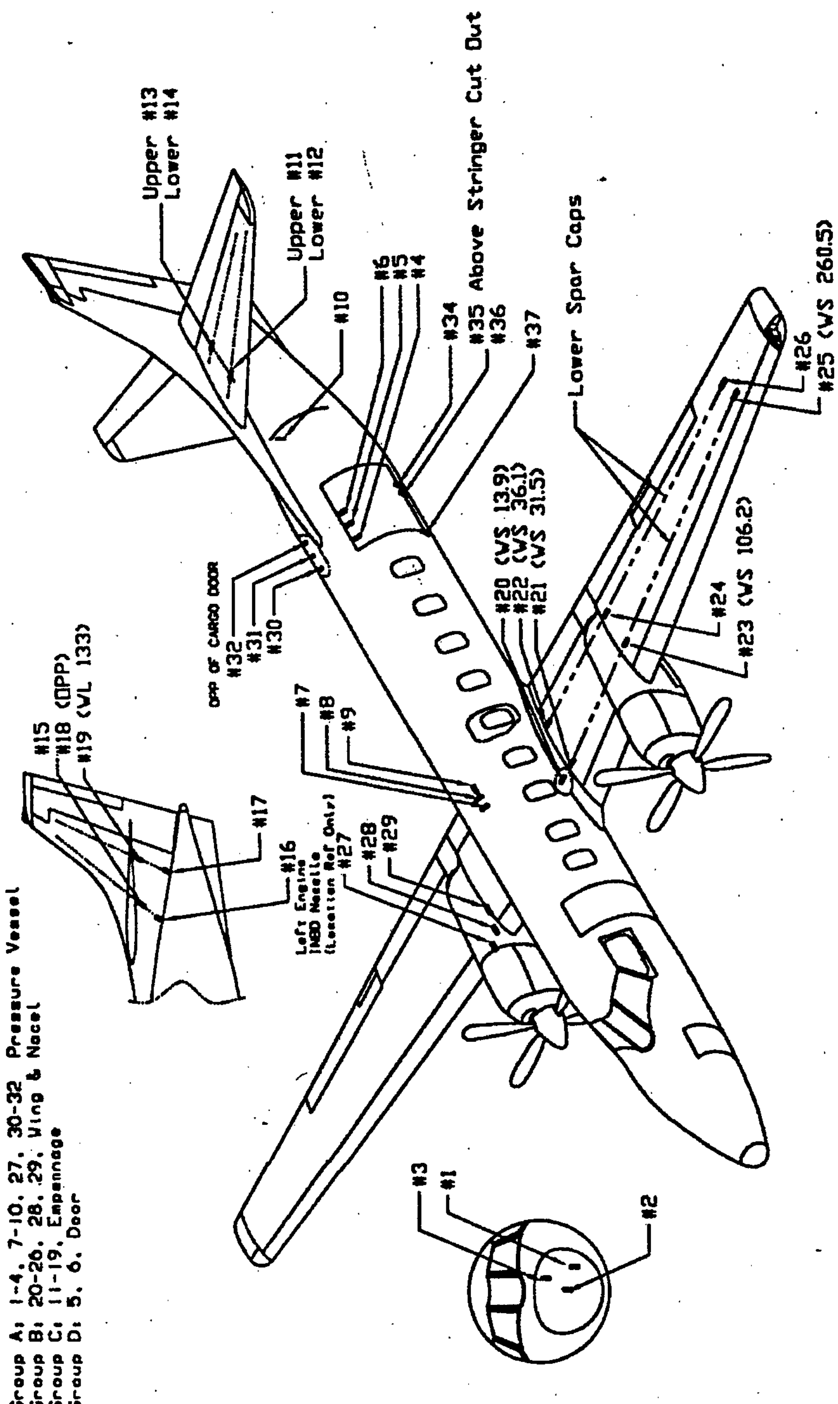


FIGURE 5-1 STRAIN GAGE LOCATIONS

5.2 FUSELAGE STRAIN GAGES PRESSURE LOADS ONLY

To verify the correct operation of the gages mounted on the fuselage and to measure the strains due to pure pressure loading, the aircraft was pressurized to 3.5 psi and then 7.0 psi while on the ground. Figure D-1 in Appendix D of reference 20 is a plot of the measured strains converted to stresses for gages 7, 8, and 9 which were mounted on the fuselage crown between the wing spar attachment frames. The maximum stress measured was about 5,375 psi at gage 8. This gage was mounted midway between fuselage frames. Gage 7 mounted close to a frame measured about 4,550 psi at 7.0 psi pressure. These stresses are somewhat below the PR/T stresses assumed in the analysis. For the configuration of this aircraft PR/T=(7.0x33)/0.040=5,775 psi. In this analysis the stiffening effect of the frames is neglected. Also the presence of plug mounted escape hatches causes local frame bending that tends to reduce the hoop stress. Gage 9 which is mounted in the axial direction measured a strain corresponding to only 3,247 psi. Because the skin on the lower half of the fuselage and around the window belt is heavier than at the top, the average stress would be expected to be somewhat less than the PR/2T stress of 2,887 psi, but because the centroid of the fuselage cross section is below the centerline, there is some bending effect that would tend to increase the axial stress. To gain more confidence in the accuracy of the strain gages, three additional gages were mounted on the fuselage at the location where it was felt extraneous influences on the hoop and axial stress would be at a minimum. This was at fuselage stations (FS) 425 and 429 on the right side, one bay forward of the cargo door. Here the structure is the most uniform and devoid of local reinforcements. The local skin thickness is 0.032". At 7.0 psi, gage 30 at F.S. 425 indicated a stress of 6,156 psi, gage 31 in the middle of the bay at FS 429 indicated a stress of 6,467 psi, and gage 32 mounted in the middle of the bay in the axial direction indicated a stress of 3,462 psi. Here the stresses in the hoop direction were higher than at the overwing location of gages 7, 8, and 9 due to the thinner skin but the hoop direction stresses were still about 90% of the expected stresses. The axial stress as measured by gage 32 was now about 94% of PR/2T.

These readings show the significant effect of the material in the frames and stringers in lowering the nominal hoop stress and help explain the absence of any significant fuselage structural deterioration in even the highest-time aircraft. These additional fuselage gages were meant as a check on the gages mounted above the wing and were read only on the ground.

The other location in the fuselage that would be considered to be highly loaded is the forward pressure bulkhead. The stresses for critical locations on the forward pressure bulkhead are shown on Figure D-2. Here the maximum stress was about 7500 psi. Again this stress was lower than the calculated stress shown in the stress analysis because of the conservative assumptions made in the analysis.

To examine the stresses on this structure, three strain gages were mounted on what was judged to be the most highly loaded portion after examining the stress analysis and the actual structure.

Strain gage 1 was mounted on the vertical member on the forward side of the pressure bulkhead midway between the upper and lower fuselage skins. This member is the longest of the vertical members on the forward side of the pressure bulkhead and does not have significant fixity at its ends. At 7.0 psi this gage measured a stress of 7680 psi. The analytic bending moment for gage 1 is found in reference 5 on page 12.201 to be 8700 in-lb. When the section properties are corrected for fully effective skin, the section becomes 0.332 in^3 giving a stress of 26,190 psi. Adding the axial stress makes the resultant stress 13,300 psi at 7.0 psi. This analysis is conservative because it does not consider the diaphragm action of the web which is considerable in the central region of the bulkhead. The actual stress is less than 60% of the stress used in the design and analysis. Gage 2 was mounted on the centerline of the pressure bulkhead and located midway between the lower reinforcements for the nose gear attachment and the upper reinforcements for the windshield posts. The measured stress at this location was 2910 psi at 7.0 psi cabin pressure. This was substantially below the analytic stress used in the structural analysis due to the conservative neglect of the influence of the windshield structure on the analysis.

Gage 3 was mounted on the vertical member attaching the windshield post to the pressure bulkhead. Because of the complexity of this structure and the necessity for the windshield posts to withstand bird strikes, the analysis was very conservative. The measured stress at 7.0 psi in this gage was only 7680 psi. The vertical members on the pressure bulkhead are the most highly loaded members identified in the forward pressure bulkhead and have a maximum operating stress of less than 7,700 psi (Figure D-2 in reference 20).

5.3 CARGO DOOR

Gages 4, 5, and 6 located along the top edge of the cargo door were installed to measure the effectiveness of the cargo door hinge in transferring load across the door opening into the door skin. These gages read at 7.0 psi showed stresses of 4075, 6710, and 7718 psi respectively where the nominal stress was 7 x 33/0.032 = 7,219 psi. The differences are due mainly to some of the load being picked up by the cargo door surround frame and a portion of the corner of the door which was not supported by the hinge. These gages were not connected to the flight instrumentation and were only recorded on the ground.

Four additional gages were mounted in the fuselage cargo door surround structure to measure stresses at the latches due to pressurization. The location of these gages is shown in Figure 5-2 through Figure 5-4. The stresses measured by these gages are shown in Appendix D of reference 20.

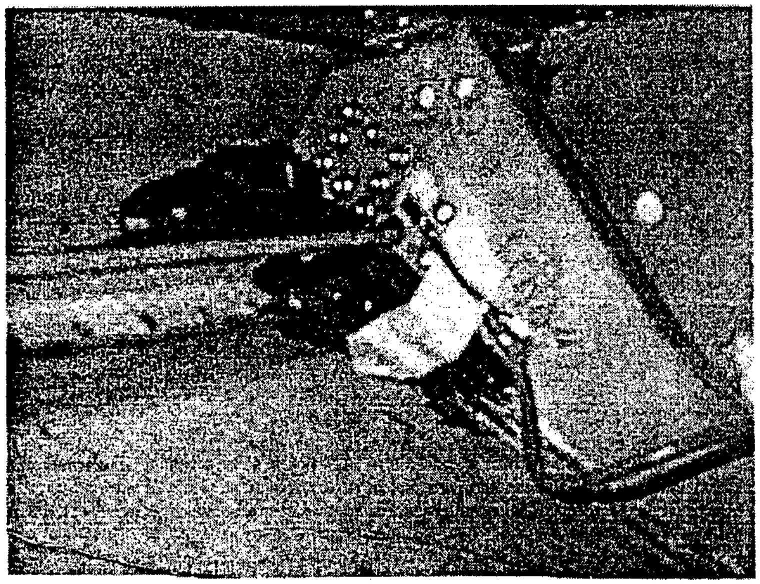


FIGURE 5-2 STRAIN GAGE 34

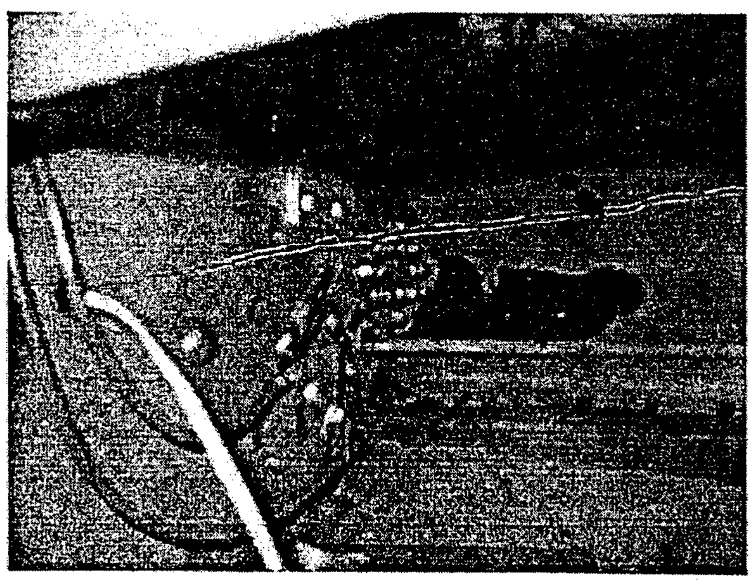


FIGURE 5-3 STRAIN GAGE 35, 36

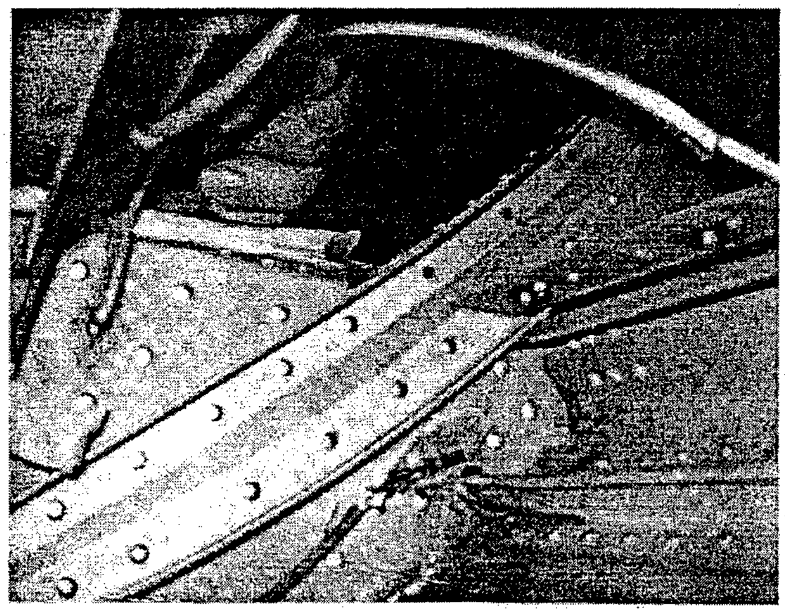


FIGURE 5-4 STRAIN GAGE 37

The stress measured at gage 34 was in reasonable agreement with the calculated stress. The stress at gages 35 and 36 was unexpected and did not match the stresses which caused fatigue cracks at this location during the full-scale fatigue test. After the crack was discovered during the fatigue test, the frames at this location were increased in thickness from 0.040 to 0.071 inch the local lightening holes were removed, and the tooling holes were plugged. The new configuration is the one being used in the current test. These changes are not expected to change the sign of the local stresses. The compressive stresses now measured locally may be due to variations in the local engagement of the latches that would vary from aircraft to aircraft. For this reason any analysis must assume the maximum calculated stress in these frames.

5.4 STABILIZER TRIM ACTUATOR LOADS

Gage 10 was mounted on the frame supporting the horizontal stabilizer trim fitting. The stress measured by this gage was intended to verify the calculations for the stress in this frame and also to measure the trim actuator loads which are difficult to calculate accurately due to the complex aerodynamics at the intersection of the vertical and horizontal stabilizers and the fuselage. When a net force of 201 pounds was applied to the stabilizer above the actuator attach bolt, a stress of 828 psi tension was measured in the frame. The resulting frame moment calculated using NACA TN1310 methods was 462 in-lb, only 10% greater than measured, thus the gage strain is in good agreement with the analysis.

5.5 GROUND RUNS

After the pressure tests were completed and the functioning of the strain gages was verified, a series of tests were performed to measure the effect of prop wash on the tail during engine runup. Data were collected at the rate of 800 samples per second for those strain gages mounted on the tail of the aircraft. A plot of the stress measured by gages 15 and 18 mounted on the vertical fin below the pivot fitting is shown in Figure D-3 of reference 20. The stress measured is somewhat asymmetric due to the prop wash striking the tail at different locations on each side due to the counter-rotating propellers. The maximum stresses were on the order of 2200 psi. The frequency of the stresses was about 5.2 Hertz. This is close to the 5.4-Hertz natural frequency of the horizontal stabilizer rock mode measured in previous ground vibration tests [6].

The stresses measured by gages 16 and 17 mounted at the intersection of the vertical stabilizer and the fuselage, several inches below gages 15 and 18, are shown on Figure D-4. These gages were excited at the same stabilizer rock frequency with a maximum stress amplitude of 1700 psi.

Gages 11 and 12 on the horizontal stabilizer front spar and gages 13 and 14 on the horizontal stabilizer rear spar are also excited by the prop wash during engine runup but to a lesser extent than the gages on the vertical stabilizer. The plots of their stresses are given in Figure D-5 and Figure D-6. The maximum stresses measured were less than 1000 psi.

The airborne portion of the strain survey was flown at forward and aft center of gravity locations. Each flight consisted of a one-g level flight segment, a 60 degree banked turn, and a zero-g pushover maneuver and repeated several times and then a landing.

5.6 HORIZONTAL TAIL STRAIN GAGES

Figure D-7 is a plot of the horizontal tail stress in level flight for forward and aft center of gravity (c.g.) during flights 4 and 5. The measured values are presented in Appendix D of reference 20.

These two c.g. positions represent the practical extremes of the c.g. travel. An examination of the stresses for the forward and aft c.g. conditions shows that at the forward c.g. the stresses are small. The aft position stresses indicate an up tail load which is to be expected. From this table one may now construct a relationship between weight, c.g., and level flight tail stresses.

5.7 WING LOADS

Flights 4 and 5 were flown at a relatively light fuel forward c.g. and full fuel load aft c.g. The data collected were used to determine the influence of fuel load on wing stresses. A complete tabulation of the measured stresses is given in Appendix D of reference 20.

6. PRINCIPAL STRUCTURAL ELEMENTS

The procedure applied to select and prioritize principal structure elements is based on reference 4, "An Engineering Procedure to Select and Prioritize Component Evaluation Under USAF Structural Integrity Requirement." Components were evaluated and ranked to determine the durability and damage tolerance. The excerpts of the report to show the basis for determining such ranking are listed below:

The Nine Categories for Durability and Damage Tolerance Ranking

	Category	Ranking Minimum	Ranking Maximum
1	1-g Operational Stress Level	1	20
2	Limit Strength and Residual Strength	1	15
3	Fail Safe Aspects of the Structure	1	15
4	Load Load Distribution Characteristics	1	10
5	Susceptibility to Sustained Stress Corrosion Cracking	0	5
6	Susceptibility to Corrosion	1	10
7	Stress Riser Due to Geometry (K_t)	1	8
8	Susceptibility to Accidental Damage	1	5
9	Inspectability	1	12
	Total	8	100

Category Ranking Guidelines 1:
1-g Operational Stress Condition (Reference Note)

a	Wing structure; wing-engine and wing-fuselage attach structure
b	Fuselage structure and horizontal stabilizer structure
c	System or components such as hydraulic systems that operate near limit load for each load excursion
d	Vertical tail structure; control surfaces, elevators, flaps, etc., and their attachments
e	Indirect structural elements and structure not directly responsive to the normal operational flight spectra

Category Ranking Guidelines 2:
Limit Strength and Residual Strength (Reference Note)

	Primary Structure	Adjacent Material and Secondary Structure
a	Low Margin of Safety	Low margin of safety with relatively less significant material
b	Low Margin of Safety	High margin of safety with relatively less significant material
c	High Margin of Safety	Low margin of safety with relatively less significant material
d	Low Margin of Safety	Low margin of safety with relatively significant material
e	Low Margin of Safety	High margin of safety with relatively significant material
f	High Margin of Safety	High margin of safety with relatively significant material
g	High Margin of Safety	Low margin of safety with relatively significant material
h	High Margin of Safety	Low margin of safety with relatively significant material

Category Ranking Guidelines 3:
Fail-Safe Aspect of the Structure (Reference Note)

a	Damage can only be detected by a scheduled inspection. An in-flight failure would result in the loss of the aircraft without warning and/or emergency procedures.
b	Damage can only be detected by a scheduled inspection. An in-flight failure would allow the crew to implement immediate emergency landing procedures.
c	Damage can be readily detected by a scheduled inspection. Pre-catastrophic damage would be in-flight evident to crew thus enabling a safe scheduled landing.
d	Damage would be evident without a scheduled inspection. Pre- or post-flight inspections would indicated incipient damage. Adequate residual strength is available to complete a flight prior to catastrophic failure.
e	Damage is obvious to ground crew or flight crew, and inspections are readily performed. Multiple flight capability is available prior to catastrophic failure.

Category Ranking Guideline 4:
Load Load Distribution Characteristics (Reference Note)

a	Major load path confluence
b	Splices and load paths with complex discontinuities
c	Load path with moderate discontinuities

Category Ranking Guidelines 5:
Susceptibility to Sustained Stress Corrosion Cracking (Susceptibility to Sustained Stress CorrosionC) (Reference Note)

a	Low resistance to Susceptibility to Sustained Stress CorrosionC. Item subject to process or assembly built-in stress or residual tension stress.
b	Low resistance to Susceptibility to Sustained Stress CorrosionC. No significant induced tension stress.
c	Intermediate resistance to Susceptibility to Sustained Stress CorrosionC. Item subject to process or assembly built-in stress or residual tension stress.
d	Intermediate resistance to Susceptibility to Sustained Stress CorrosionC. No Significant induced tension stress.
e	High resistance to Susceptibility to Sustained Stress CorrosionC. Item subject to process or assembly built-in stress or residual tension stress.
f	High resistance to Susceptibility to Sustained Stress CorrosionC. No significant induced tension stress.

Category Ranking Guidelines 6:
Susceptibility to Corrosion (Reference Note)

a_e	Single load path element; or corrosion problem area based on experience.
b_e	Elements exposed to exhaust gases, excess temperature, heavy salt exposure, sump tank water, or anaerobic degradation.
c_e	Elements exposed to climatic conditions.
d_e	Elements contained in closed dry areas, and not exposed to contaminants.
a_p	Bare metal.
b_p	Alodine, cadmium plate, or epoxy primer only.
c_p	Chromic anodizing, or alclad without chem-mill.
d_p	Chromic anodizing plus polyurethane fuel coating.
e_p	Sulfuric acid anodizing.

Category Ranking Guidelines 7:
Stress Risers Due To Geometry K_t (Reference Note)

a	High Tension K_T in descending order
b	Additional tension and biaxial tension K_t
c	Mild stress concentrations
d	Nonappreciable K_t

Category Ranking Guidelines 8:
Susceptibility to Accidental Damage (Reference Note)

a	High probability of damage occurring. Generally without timely detection or maintenance.
b	Low probability of damage occurring without timely detection or maintenance.
c	High probability of damage occurring, but area is frequently maintained or inspected with good visibility.
d	Low probability of damage occurring. Area is frequently maintained and inspected with good visibility.
e	Negligible probability of accidental damage.

Category Ranking Guidelines 9:
Inspectability. (Reference Note)

a	Special detail inspection: An intensive check of a specific location.
b	Detail inspection: An intensive visual check of a specified detail, assembly, or installation.
c	Internal surveillance: A visual check that will detect obvious unsatisfactory conditions and discrepancies in internal structure.
d	External surveillance: A visual check that will detect obvious unsatisfactory conditions and discrepancies in externally visible structure.
e	Walk-around check: A visual check conducted from ground level to detect obvious discrepancies.

6.1 SELECT AND PRIORITIZE COMPONENT

Date: Nov. 6, 1996 Analyst: W. Dwyer

ITEM W1 - SA226 main spar lower cap at wing station 99.0

Selection Justification: This is a high-stress location in the SA226 wing main spar. At this location the titanium straps end just outboard of the nacelle kealsons. The leading edge box ends at this location to allow for the nacelle and wheel well.

Function: This is the primary load-carrying member in the wing at this wing station.

Environment: The spar at this location is in the wet area of the fuel tank.
T= -40 to +130°F. Spar is exposed to fuel contaminants.

Material: 2014-T6 plate. Part No. 27-33000-011. Chromic acid alodined, and polyurethane coated.

Accessibility: Covered by nacelle skin. One can see the center ridge of the cap when nacelle skin is opened.

PRIORITIZATION			
Category*	Comments	Ref. Note*	Rank*
1. Operating Stress	The local 1-g stress is about 8.8 ksi	a	16
2. Limit Strength	This is a three-element spar cap. Any two elements can carry limit load, margin of safety about 0.8. Crack arrest at complete failure of one element.	e	6
3. Fail Safe	Damage can only be detected by scheduled inspection; failure would not be evident to the crew.	c	12
4. Load Distribution	Parallel elements would pick up load with no major change in load path.	c	1
5. Susceptibility to Sustained Stress Corrosion	This is a low-resistance alloy. Not considered to have significant residual stresses.	b	4
6. Corrosion	Item is in the fuel tank area. Alodined and polyurethane coated.	b_e, d_p	6
7. K_t	Loaded fasteners due to ending of titanium straps	b	6
8. Accidental Damage	Low probability of damage. Away from propellers and baggage and service vehicles. Wheel well protects from tires.	d	2
9. Inspect	Difficult to inspect. Look for crack on exposed center ridge of spar cap.	a	11
	Total Score		64

*From section 6, the nine categories for durability and damage tolerance ranking.

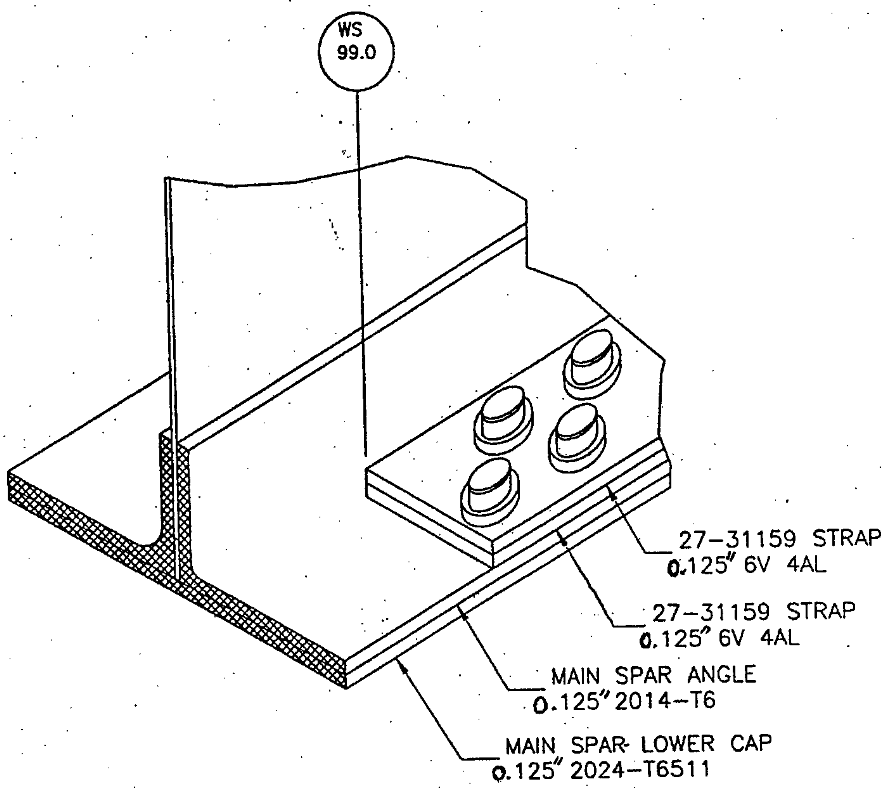


FIGURE 6-1 W1 - SA226 MAIN SPAR LOWER CAP AT WING STATION 99.0

Date: Nov. 6, 1996 Analyst: W. Dwyer

ITEM W2 - SA226 main spar lower cap at wing station 9.0

Selection Justification: This is a locally high-stress location in the SA226 wing main spar. At this location the top spar cap is lowered to clear the cabin floor resulting in local bending loads and locally high shear in the web at this location.

Function: This is the primary load-carrying member in the wing at this wing station.

Environment: The spar at this location is in the dry area of the wing. T= -40 to +130°F. Could be exposed to moisture.

Material: 2014-T6 plate. Part No. 27-33000-011. Chromic acid alodined, and polyurethane coated.

Accessibility: One can see the center ridge of the cap. Difficult to inspect for partial failure of element.

PRIORITIZATION			
Category*	Comments	Ref. Note*	Rank*
1. Operating Stress	The local 1-g stress is about 6.5 ksi.	a	15
2. Limit Strength	This is a three-element spar cap. Any two elements can carry limit load, margin of safety about 0.8. Crack arrest at complete failure of one element.	e	6
3. Fail Safe	Damage can only be detected by scheduled inspection; failure would not be evident to the crew.	c	12
4. Load Distribution	Parallel elements would pick up load with no major change in load path.	c	1
5. Susceptibility to Sustained Stress Corrosion	This is a low-resistance alloy and is not considered to have significant residual stresses.	b	4
6. Corrosion	Dry area of wing box alodined, and polyurethane coated.	d_e, d_p	4
7. K_t	Minor local bending.	c	3
8. Accidental Damage	Low probability of damage. Away from propellers and baggage and service vehicles.	d	2
9. Inspect	Difficult to inspect. Look for crack on exposed center ridge of spar cap.	a	11
	Total Score		58

*From section 6, the nine categories for durability and damage tolerance ranking.

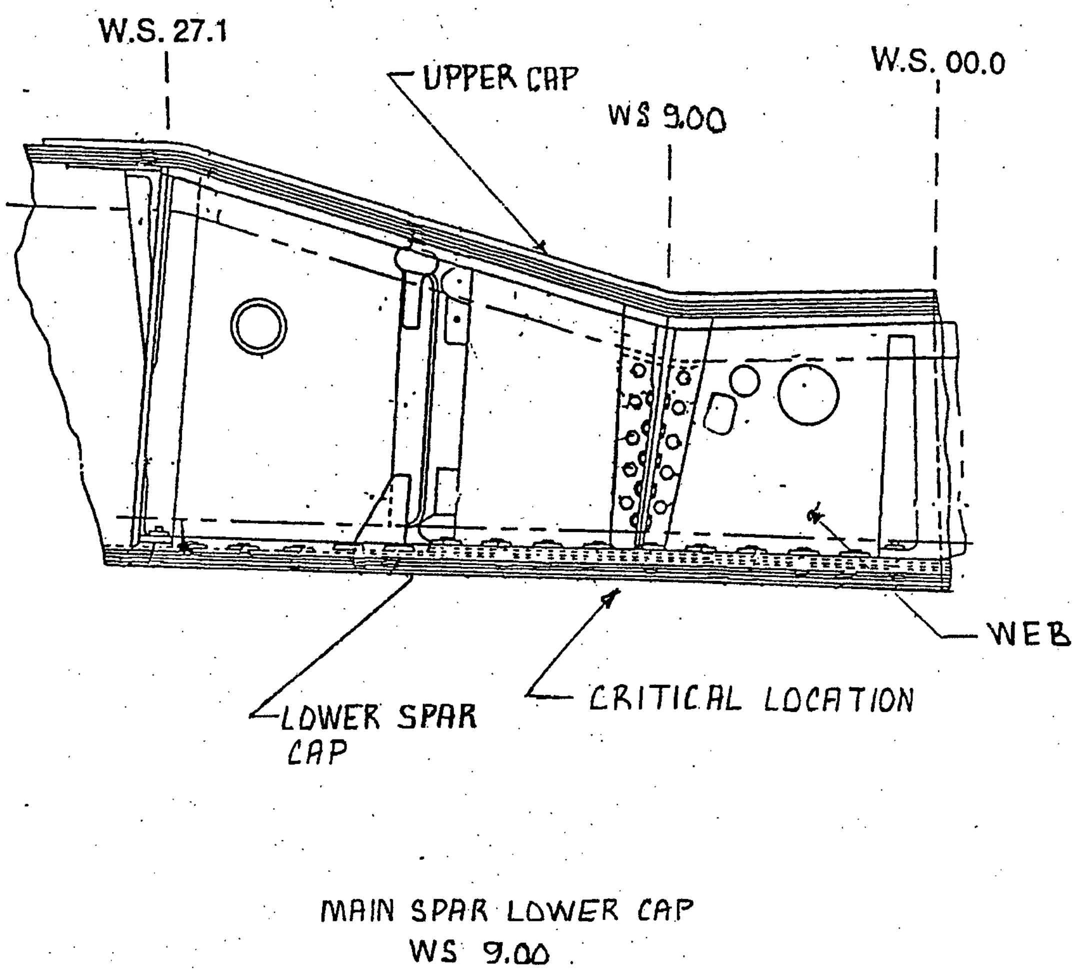


FIGURE 6-2 W2 - SA226 MAIN SPAR LOWER CAP AT WING STATION 9.0

Date: Nov. 6, 1996 Analyst: W. Dwyer

ITEM W3 - SA226 rear spar lower cap at wing station 27.0

Selection Justification: This is a locally high-stress location in the SA226 wing rear spar. At this location the pressure plates and their supporting steel angles end. This causes this location to have the highest stress on the rear spar.

Function: This is the primary load-carrying member in the wing at this wing station. Member is highly loaded on landing.

Environment: The spar at this location is in the wet area of the wing. T= -40 to +130°F. Could be exposed to moisture and other fuel contaminants.

Material: 2014-T6511 extrusion. Part No. 27-33001-103. Chromic acid alodined, and polyurethane coated.

Accessibility: Covered by the wing lower skin. Difficult to inspect for partial failure of element.

PRIORITIZATION			
Category*	Comments	Ref. Note*	Rank*
1. Operating Stress	The local 1-g stress is about 5.6 ksi	a	14
2. Limit Strength	This is a two-element spar cap. Any element can carry limit load, margin of safety about 0.8. Crack arrest at complete failure of one element.	e	6
3. Fail Safe	Damage can only be detected by scheduled inspection, failure would not be evident to the crew.	c	12
4. Load Distribution	Parallel elements would pick up load with no major change in load path.	c	1
5. Susceptibility to Sustained Stress Corrosion	This is a low-resistance alloy and is not considered to have significant residual stresses.	b	4
6. Corrosion	Wet area of wing box alodined, and polyurethane coated. Fuel contaminants may be present.	b_e, d_p	6
7. K_t	Loaded fasteners due to ending of steel angles.	c	3
8. Accidental Damage	Low probability of damage. Away from propellers and baggage and service vehicles.	d	2
9. Inspect	Difficult to inspect. Modification may be needed.	a	12
	Total Score		60

*From section 6, the nine categories for durability and damage tolerance ranking.

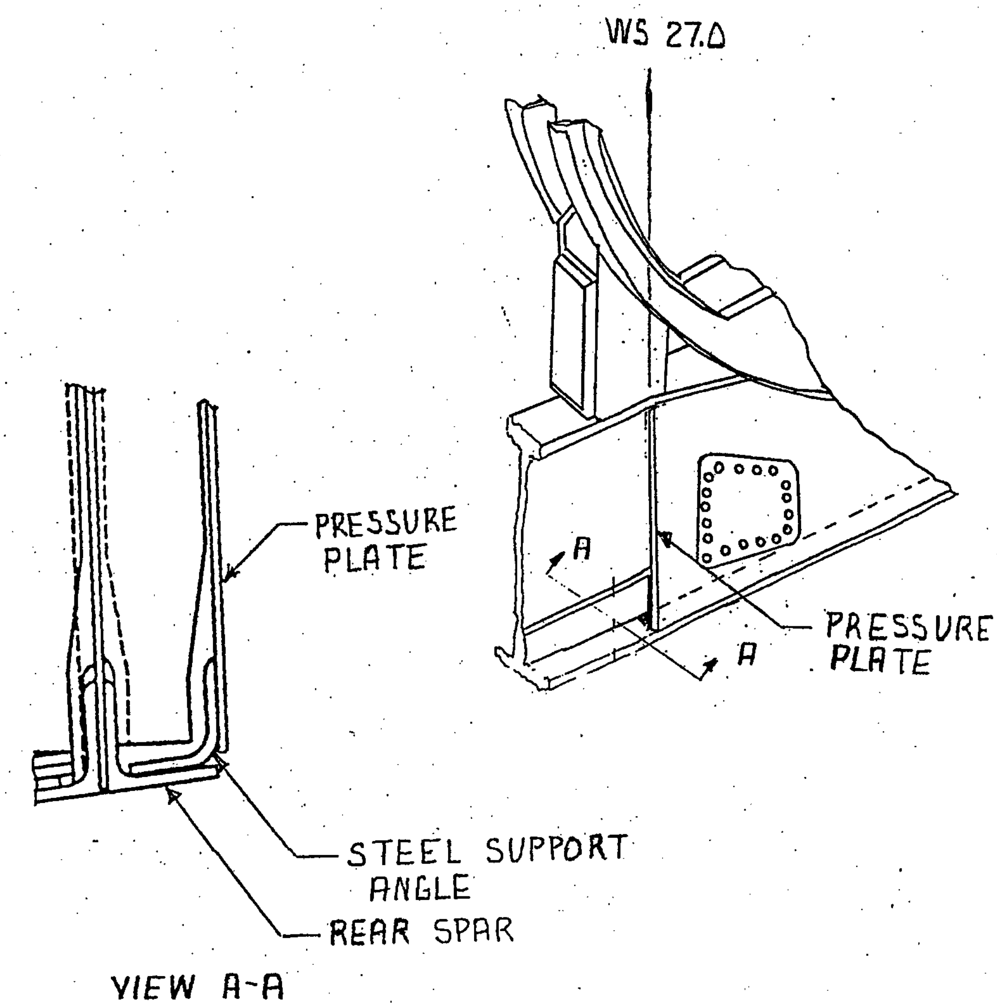


FIGURE 6-3 W3 - SA226 REAR SPAR LOWER CAP AT WING STATION 27.0

Date: Nov. 11, 1996 Analyst: W. Dwyer

ITEM W4 W4 - SA227 main spar lower cap at wing station 99.0

Selection Justification: This is locally a high-stress location in the SA226 wing main spar. For the 227 models the load transfer between elements has been improved by ending the straps further outboard. The cutout in the wing box is just inboard of this location. The transfer of wing load around this cutout causes this location to have the highest stress on the main spar.

Function: This is the primary load-carrying member in the wing. Member is most highly loaded by gust loads.

Environment: The spar at this location is in the wet area of the wing. T= -40 to +130°F. Could be exposed to moisture and other fuel contaminants.

Material: 2014-T6511 extrusion. Part No. 27-33000-011. Chromic acid alodined, and polyurethane coated.

Accessibility: Covered by the wing lower skin. Difficult to inspect for partial failure of element.

PRIORITIZATION			
Category*	Comments	Ref. Note*	Rank*
1. Operating Stress	The local 1-g stress is about 8.6ksi	a	17
2. Limit Strength	This is a three-element spar cap. Any element can carry limit load margin of safety about 0.5. Crack arrest at complete failure of one element.	e	6
3. Fail Safe	Damage can only be detected by scheduled inspection; failure would not be evident to the crew.	c	12
4. Load Distribution	Parallel elements would pick up load with no major change in load path.	c	1
5. Susceptibility to Sustained Stress Corrosion	This is a low-resistance alloy. Not consider to have significant residual stresses.	b	4
6. Corrosion	Wet area of wing box alodined, and polyurethane coated. Fuel contaminants may be present.	b_e, d_p	6
7. K_t	Continuous structure with only fastener holes.	c	3
8. Accidental Damage	Low probability of damage. Away from propellers and baggage and service vehicles.	d	2
9. Inspect	Difficult to inspect.	a	12
	Total Score		63

*From section 6, the nine categories for durability and damage tolerance ranking.

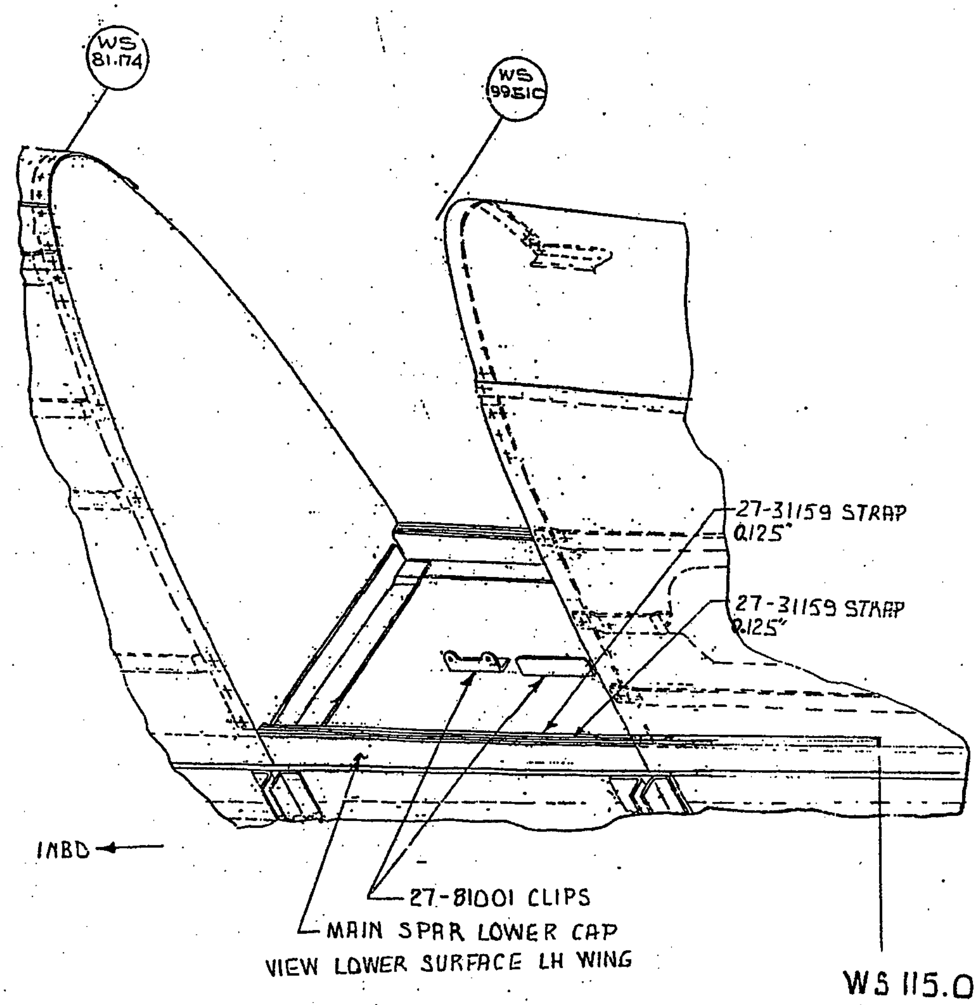


FIGURE 6-4 W4 - SA227 MAIN SPAR LOWER CAP AT WING STATION 99.0

Date: Nov. 12, 1996 Analyst: W. Dwyer

ITEM W5 - SA227 skin splice at wing station 99.51 lower surface

Selection Justification: This is a high stress location in the wing lower skin panel. The 0.063″ skin inboard of this location is spliced to the 0.063″ skin outboard. The leading edge box ends at this location to allow for the nacelle and wheel well, so additional shear load acts on this joint. Stress analysis on p. 8.27 in reference 16.

Function: This is a primary load-carrying member forming the lower portion of the wing torque box.

Environment: The skin at this location is in the wet area of the fuel tank. T= -40 to +130 F. Could be exposed to fuel contaminants.

Material: Outboard 2024-T3 sheet, Part No. 27-31321. Inboard 2024-T3 sheet, Part No. 27-31324. Both chromic acid alodined, and polyurethane coated.

Accessibility: Covered by nacelle skin.

PRIORITIZATION			
Category*	Comments	Ref. Note*	Rank*
1. Operating Stress	The local 1-g stress is about 7.7 ksi.	a	16
2. Limit Strength	This is a butt splice with two rows of fasteners. Crack arrest at complete failure of joint. Margin of safety less than 0.5.	e	6
3. Fail Safe	Damage would be detected by fuel leaking from the wing.	d	10
4. Load Distribution	Load is almost all tension. Parallel elements would pick up tension load. Low shear loads would be carried by spars.	c	4
5. Susceptibility to Sustained Stress Corrosion	This is a high-resistance alloy. No significant residual.	b	1
6. Corrosion	Item is in the fuel tank area. Alodined and polyurethane coated.	b_e, d_p	6
7. K_t	Double row of loaded fasteners.	b	6
8. Accidental Damage	Low probability of damage. Away from propellers and baggage and service vehicles. Wheel well protects from tires.	d	2
9. Inspect	Difficult to inspect directly. Look for fuel leaks.	d	4
	Total Score		55

*From section 6, the nine categories for durability and damage tolerance ranking.

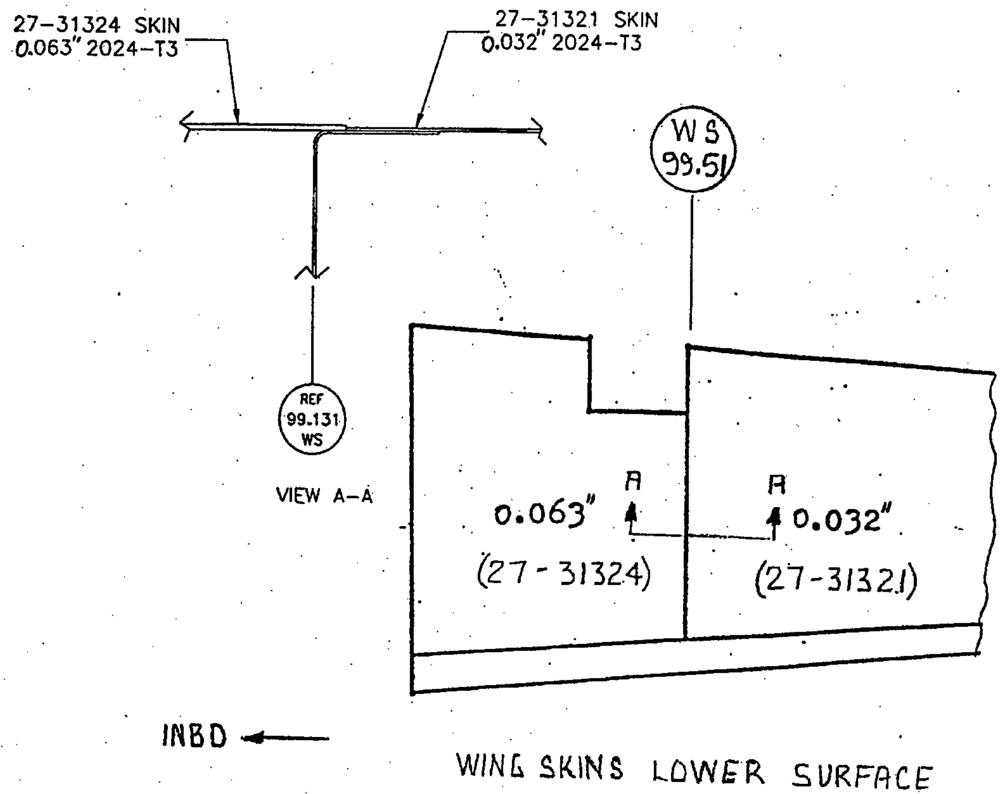


FIGURE 6-5 W5 - SA227 SKIN SPLICE AT WING STATION 99.51 LOWER SURFACE

Date: Nov. 13, 1996 Analyst: W. Dwyer

ITEM W6 - SA227 wing extension fitting main spar lower surface

Selection Justification: The lower spar cap fitting is the main load-carrying member at the attachment of the tip extension to the main wing box. The fitting is made of 4130 steel heat treated to 150 ksi. There are three fittings at this location. The one on the tip extension (27-31334) is sandwiched between two fittings on the main spar (27-31332). The joint is completed by a 160-ksi bolt loaded in double shear. The analysis starts on p 10.25 in reference 16.

Function: This is a primary load-carrying member in the wing at this wing station.

Environment: The skin at this location is in the dry area of the wing.
T= -40 to +130°F.

Material: 4130 steel heat treated to F4 condition. Parts are cadmium plated and epoxy primed.

Accessibility: Lower wing skin splice panel is removable for inspection.

PRIORITIZATION			
Category*	Comments	Ref. Note*	Rank*
1. Operating Stress	The local 1-g stress is about 4.1 ksi	a	11
2. Limit Stress	This is a shear splice. The failure of this fitting would transfer load to the covering skin panel which is designed to carry limit load with the fitting failed.	f	5
3. Fail Safe	Damage would be apparent by the relative movement of the wing tip.	d	10
4. Load Distribution	Failure of this fitting would change the load path with the load then being carried by the skin panel.	b	6
5. Susceptibility to Sustained Stress Corrosion	This is a high-resistance alloy. No significant induced stress.	f	0
6. Corrosion	Item is in the dry area of the wing protected from the elements by the wing skins.	d_e, b_p	2
7. K_t	Shear joint.	d	2
8. Accidental Damage	Low probability of damage. Away from propellers and baggage and service vehicles. Damage would be obvious.	d	2
9. Inspect	Difficult to inspect directly. Remove skin panel.	c	6
	Total Score		44

*From section 6, the nine categories for durability and damage tolerance ranking.

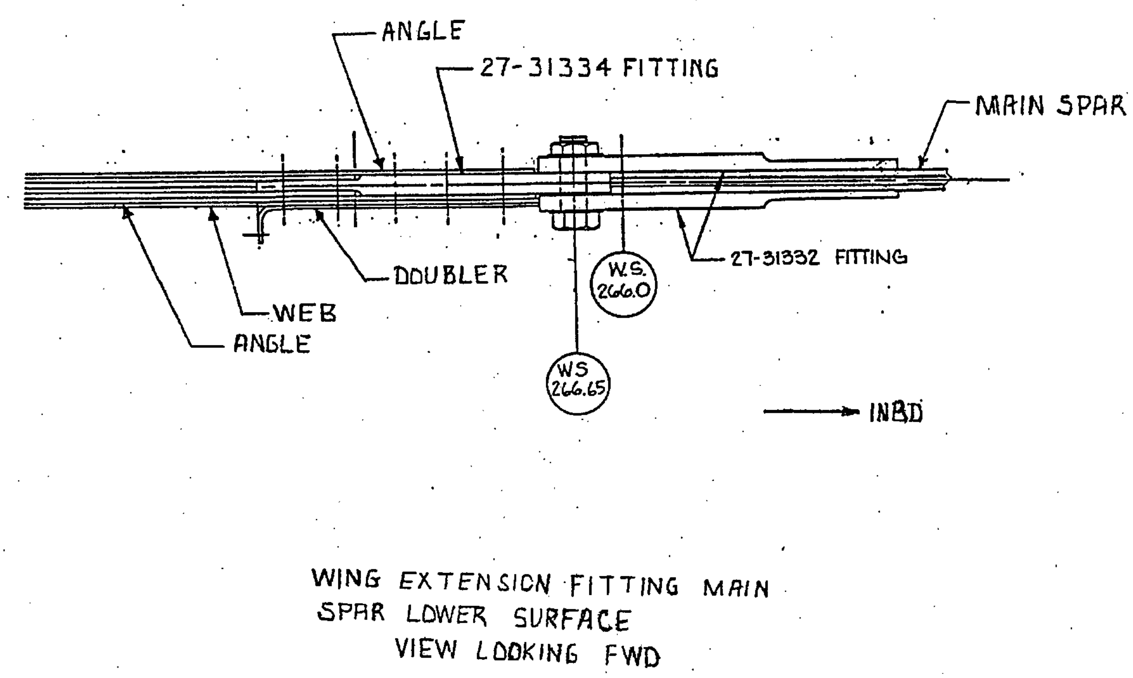


FIGURE 6-6 W6 - SA227 WING EXTENSION FITTING MAIN SPAR LOWER SURFACE

Date: Nov. 27, 1996 Analyst: W. Dwyer

ITEM W7 - SA227 lower wing skin on forward side of landing gear trunnion (27-31058) at WS 113, prior to aircraft serial number 847

Selection Justification: The landing gear side support stiffeners in early aircraft ended abruptly at this point. The cross section area of this angle at its end is about 0.18 square inch. This creates a stress concentration in the 0.040″ skin that can cause a skin crack. This feature was redesigned at serial number 847 and up.

Function: The skin at this location forms the bottom of the fuel tank.

Environment: The skin at this location is in the wet area of the wing. T= -40 to +130°F.

Material: The skin is 0.040″ thick clad 2024-T3 and chemically milled. The angle is made from 2024-T3 extrusion for later aircraft but was 2024-T3 sheet prior to serial number 847.

Accessibility: Cracks would be visible from the outside of the aircraft and would cause a fuel leak.

PRIORITIZATION			
Category*	Comments	Ref. Note*	Rank*
1. Operating Stress	The local 1-g stress is about 8 ksi	a	16
2. Limit Strength	The skin panel contains adjacent stringers that are more than adequate to carry the load that would be transferred from the adjacent skin.	h	1
3. Fail Safe	Damage would be apparent by fuel leaking from the wing.	e	1
4. Load Distribution	Cracks can be induced by the stress concentration caused by the abrupt termination of the angle.	a	8
5. Susceptibility to Sustained Stress Corrosion	This is a high-resistance alloy. No significant induced stress.	f	0
6. 6. Corrosion	Item is in the wet area of the wing subjected to fuel contaminants. Parts are anodized and polyurethane coated.	b_{e},	3
7. K_t	Abrupt stringer runout.	b	6
8. Accidental Damage	Low probability of damage. Away from propellers and baggage and service vehicles. Damage would be obvious.	d	2
9. Inspect	Walk around inspection will spot fuel leak.	e	2
	Total Score		39

*From section 6, the nine categories for durability and damage tolerance ranking.

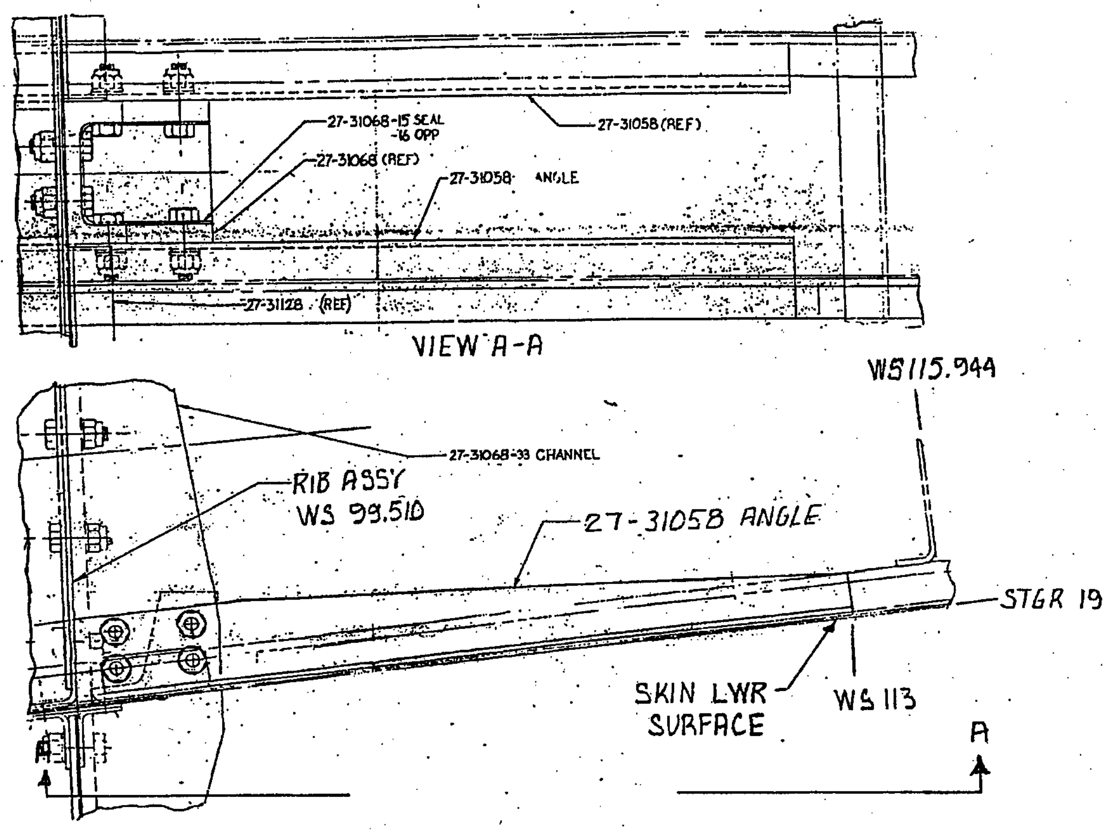


FIGURE 6-7 W7 - SA227 LOWER WING SKIN ON FORWARD SIDE OF LANDING GEAR TRUNNION

Date: Dec. 5, 1996 Analyst: W. Dwyer

ITEM W8 - SA227 and SA226 chordwise skin splice at wing station 173.944 lower surface

Selection Justification: This is a joint in the wing lower skin panel between 0.032″ skin inboard and 0.025″ skin outboard. Stress analysis is shown on p. 8.24 in reference 16.

Function: This is a butt splice with a single splice plate on the inside of the skin. The splice is loaded by wing bending and torsion.

Environment: The skin at this location is in the wet area of the fuel tank. T= -40 to +130°F. Could be exposed to fuel contaminants.

Material: Outboard 2024-T3 sheet, Part No. 27-31322. Inboard 2024-T3 sheet, Part No. 27-31324. Both chem-milled, chromic acid alodined, and polyurethane coated.

Accessibility: Clearly visible from outside the aircraft.

PRIORITIZATION			
Category*	Comments	Ref. Note*	Rank*
1. Operating Stress	The local 1-g stress is about 4.8 ksi.	a	12
2. Limit Strength	This is a butt splice with two rows of fasteners. Crack arrest at complete failure of joint.	h	1
3. Fail Safe	Damage would be detected by fuel leaking from the wing.	d	7
4. Load Distribution	Load is almost all tension. Parallel elements would pick up tension load. Low-shear loads would be carried by spars.	c	4
5. Susceptibility to Sustained Stress Corrosion	This is a high-resistance alloy. No significant residual.	b	1
6. Corrosion	Item is in the fuel tank area. Alodined and polyurethane coated.	b_e, d_p	6
7. K_t	Double row of loaded fasteners.	b	6
8. Accidental Damage	Low probability of damage. Away from propellers and baggage and service vehicles. Wheel well protects from tires.	d	2
9. Inspect	Easy to inspect directly. Look for fuel leaks.	e	2
	Total Score		41

*From section 6, the nine categories for durability and damage tolerance ranking.

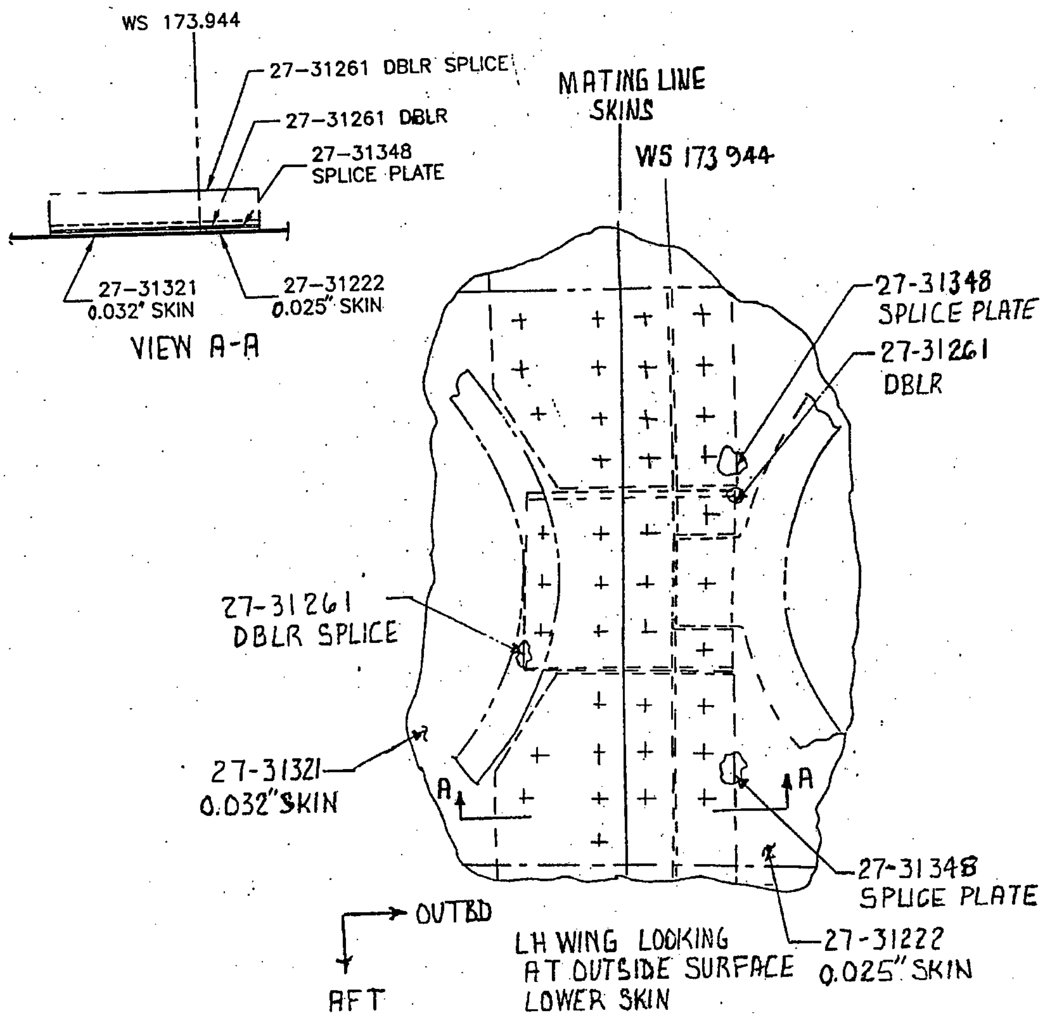


FIGURE 6-8 W8 - CHORDWISE SKIN SPLICE AT W.S. 173.944 LOWER SURFACE

Date: Dec 5, 1996 Analyst: W. Dwyer

ITEM W9 - SA227 and SA226 skin splice at wing station 27.103 lower surface outboard of the rib

Selection Justification: This is a joint in the wing lower skin panel. At this location the 0.064″ skin outboard of this location is spliced to the center section 0.050″ skin with a chordwise steel doubler strap. Landing loads are redistributed from the skin to the wing rib at this location as the wing torque box ends here. The stress analysis is on p. 8.28 in reference 16.

Function: This is a primary load-carrying member in the wing at this wing station forming the lower portion of the wing torque box.

Environment: The skin at this location is in the wet area of the fuel tank. T= -40 to +130°F. It could be exposed to fuel contaminants.

Material: Outboard 2024-T3 sheet chem-milled, chromic acid alodined, and polyurethane coated (Part No. 27-31324). The chordwise strap is part no. 27-31000-659.

Accessibility: Probable failure location is covered by the chordwise strap.

PRIORITIZATION			
Category*	Comments	Ref. Note*	Rank*
1. Operating Stress	The local 1-g stress is about 7.1 ksi.	a	16
2. Limit Strength	This is a lap splice with 2 rows of fasteners. Crack arrest at complete failure of joint.	h	1
3. Fail Safe	Damage would be detected by fuel leaking from the wing.	d	9
4. Load Distribution	Load is almost all tension in flight. Large shear loads on landing parallel elements would pick up tension load. Shear loads would be carried by spars.	c	4
5. Susceptibility to Sustained Stress Corrosion	This is a high-resistance alloy. No significant residual.	b	1
6. Corrosion	Item is in the fuel tank area, alodined, and polyurethane coated.	b_e, d_p	6
7. K_t	Double row of loaded fasteners.	b	6
8. Accidental Damage	Low probability of damage. Away from propellers and baggage and service vehicles.	d	1
9. Inspect	Difficult to inspect directly. Look for fuel leaks	a	11
	Total Score		55

*From section 6, the nine categories for durability and damage tolerance ranking.

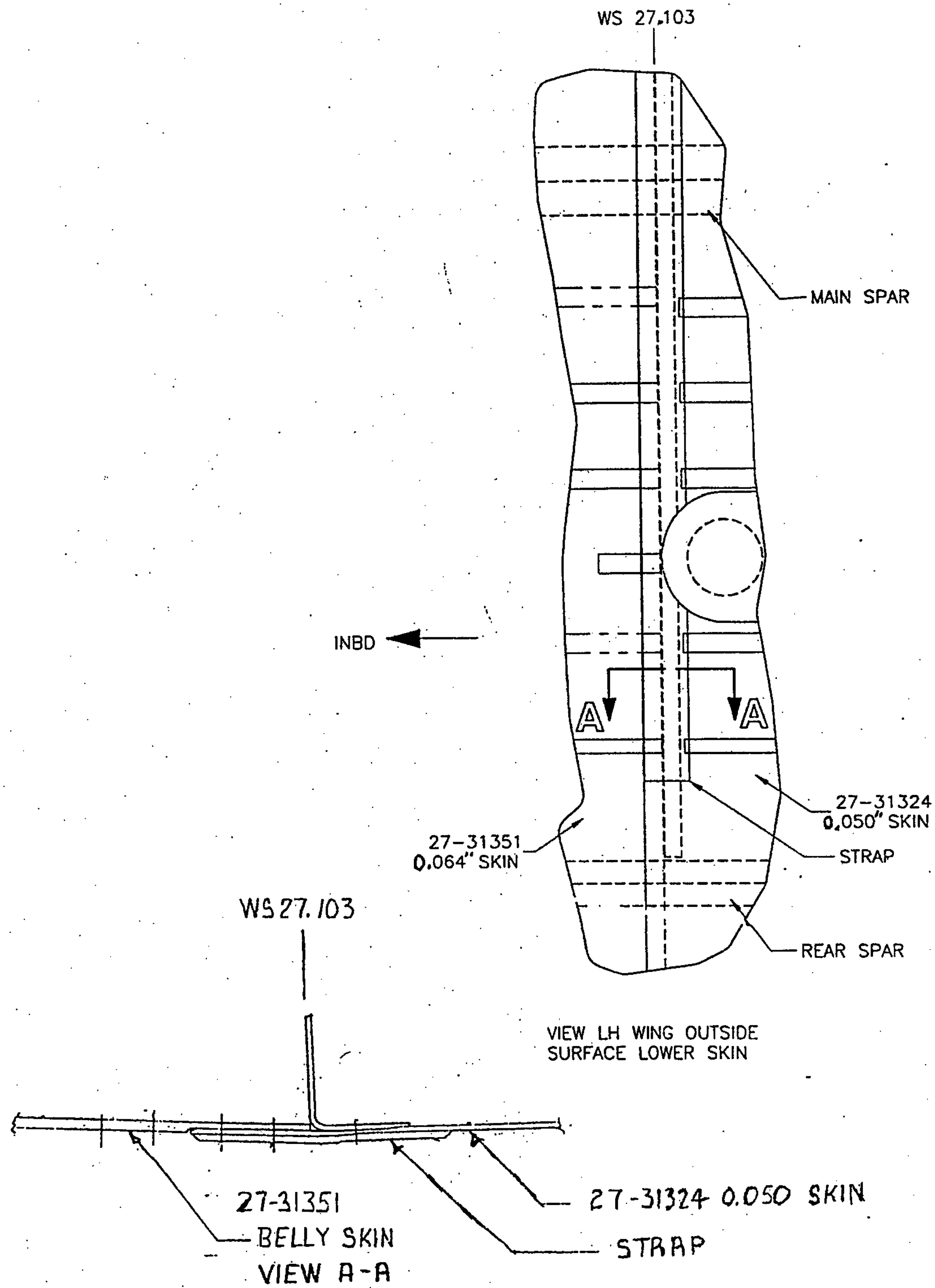


FIGURE 6-9 W9 - SKIN SPLICE AT W.S. 27.103 LOWER SURFACE OUTBOARD OF THE RIB

Date: Dec. 6, 1996 Analyst: W. Dwyer

ITEM W10 - SA227 and SA226 skin splice at wing station 27.103 lower surface inboard of splice. From TC245, T285, AT061, to CC/DC aircraft

Selection Justification: This is a joint in the wing lower skin panel. At this location the 0.064″ skin outboard of this location is spliced to the center section 0.050″ skin with a chordwise steel doubler strap. The stress analysis is on p. 8.28 in reference 16. There is a rather sharp change in thickness just inboard of this location.

Function: This is a primary load-carrying member in the wing at this wing station forming a stiffened panel carrying a portion of the wing bending loads.

Environment: The skin at this location is in the dry area of the wing center section. T= -40 to +130°F. It could be exposed to fuel contaminants.

Material: Inboard 2024-T3 sheet chem-milled to 0.050″, chromic acid alodined, and zinc chromate coated (Part Number 27-31225-05). The chordwise strap is Part Number 27-31000-659.

Accessibility: Probable failure location is covered by the chordwise strap.

PRIORITIZATION			
Category*	Comments	Ref. Note*	Rank*
1. Operating Stress	The local 1-g stress is about 9.0 ksi.	a	17
2. Limit Strength	This is a lap splice with two rows of fasteners. Crack arrest at complete failure of joint. possible failure at thickness change.	h	1
3. Fail Safe	Damage would be detected only by a close inspection.	b	13
4. Load Distribution	Load is almost all tension. Parallel elements would pick up tension load. Low-shear loads would be carried by spars.	c	4
5. Susceptibility to Sustained Stress Corrosion	This is a high-resistance alloy. No significant residual.	b	1
6. Corrosion	Item is in the dry area. Alodined and zinc chromate coated.	c_e, c_p	6
7. K_t	Stress riser at thickness change.	b	6
8. Accidental Damage	Low probability of damage. Away from propellers and baggage and service vehicles.	d	2
9. Inspect	Difficult to inspect directly. Look for fuel leaks.	a	11
	Total Score		61

*From section 6, the nine categories for durability and damage tolerance ranking.

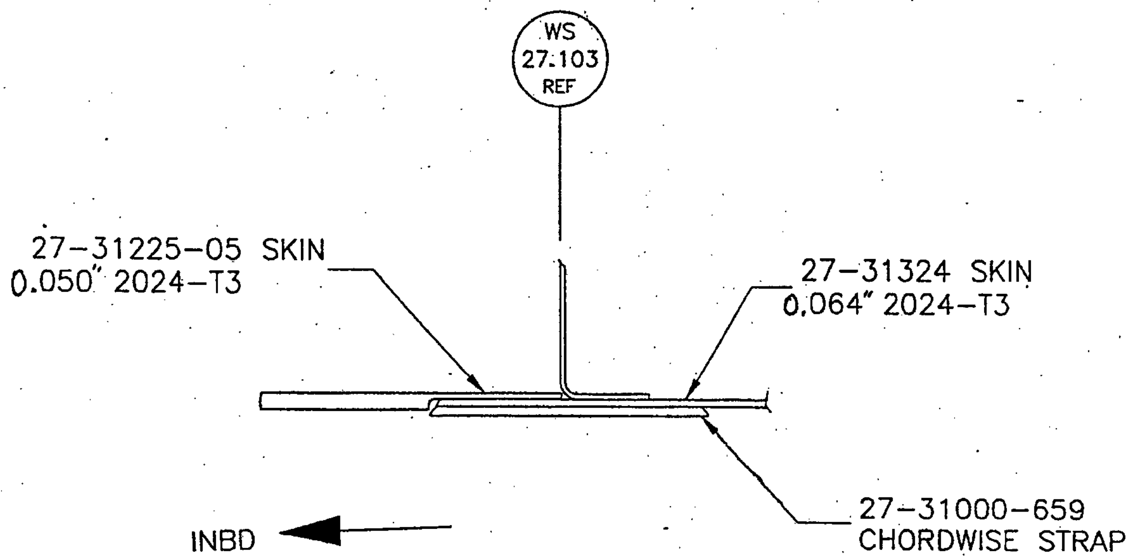


FIGURE 6-10 W10 - SKIN SPLICE AT W.S. 27.103 LOWER SURFACE INBOARD OF SPLICE

Date: Dec. 6, 1996 Analyst: W. Dwyer

ITEM W11 - SA226 wing lower center section skin at landing light cutout

Selection Justification: This is a relatively high-stress location in the wing center section skin between the landing lights and the rear spar. The high stress is caused by the local disruption of the load path by the landing light cutout (27-31225-5).

Function: This is a primary load-carrying member in the wing at this wing station forming a stiffened panel carrying a portion of the wing bending loads.

Environment: The skin at this location is in the dry area of the wing center section. T= -40 to +130°F.

Material: Inboard 2024-T3 sheet chem-milled to 0.050″ thick at the landing light cutout, chromic acid alodined, and zinc chromate coated.

Accessibility: Probable failure location is directly observable.

PRIORITIZATION			
Category*	Comments	Ref. Note*	Rank*
1. Operating Stress	The local 1-g stress is about 12 ksi.	a	19
2. Limit Strength	This is a stress concentration caused by landing light cutouts. Load will transfer to the rear spar nearby.	e	6
3. Fail Safe	Damage would be detected by visual inspection.	c	11
4. Load Distribution	Load is almost all tension. Parallel elements would pick up tension load. Low shear loads would be carried by spars.	c	4
5. Susceptibility to Sustained Stress Corrosion	This is a high-resistance alloy. No significant residual.	b	1
6. Corrosion	Item is in the dry area. Alodined and zinc chromate coated.	c_e, b_p	7
7. K_t	Stress riser at thickness change.	a	6
8. Accidental Damage	Low probability of damage. Away from propellers and baggage and service vehicles.	d	2
9. Inspect	Easy to inspect directly.	a	3
	Total Score		59

*From section 6, the nine categories for durability and damage tolerance ranking.

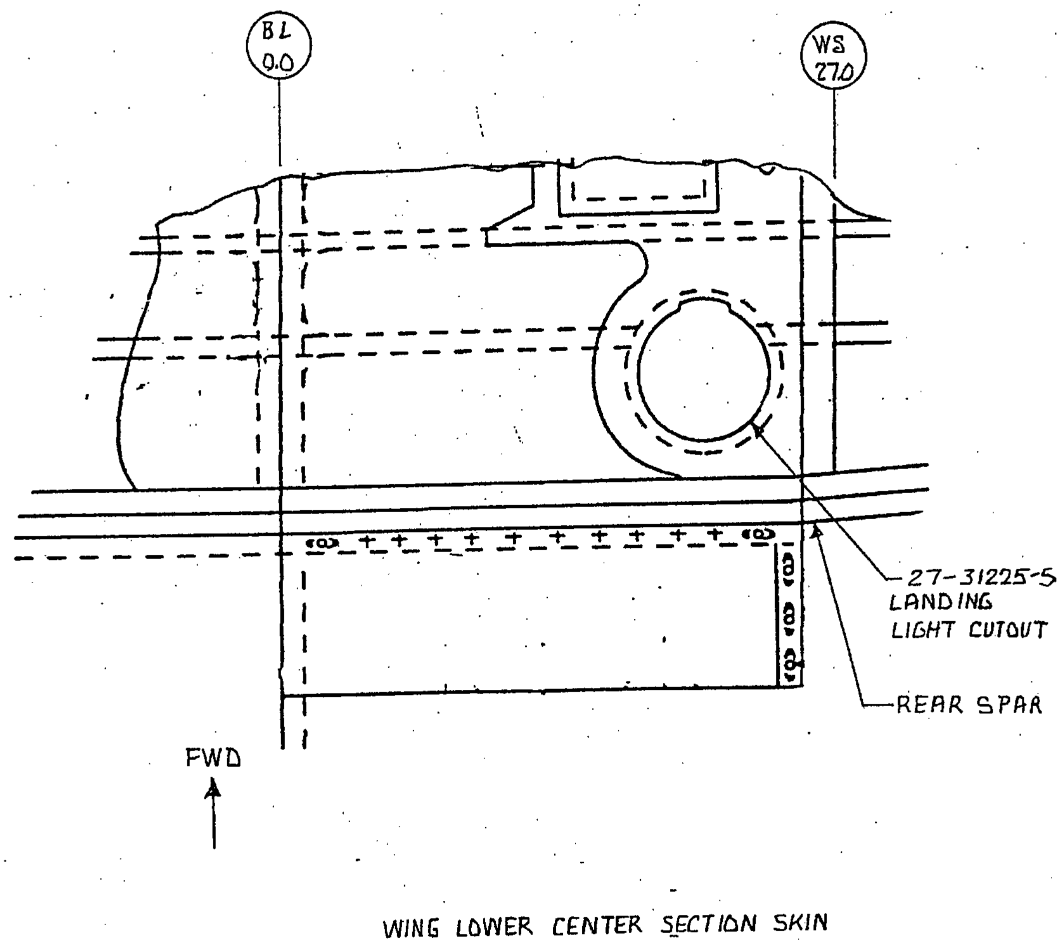


FIGURE 6-11 W11 - SA226 WING LOWER CENTER SECTION SKIN AT LANDING LIGHT CUTOUT

Date: Jan 8,1997 Analyst: W. Dwyer

ITEM W12 - SA227 tip extension fitting rear spar lower surface (27-31335)

Selection Justification: The lower rear spar cap fitting is a main torsional load-carrying member at the attachment of the tip extension to the main wing box. The fitting is made of 4130 steel heat treated to 150 ksi. There are two fittings at this location. The one on the tip extension (27-31337) is attached in single shear to a similar fittings on the main spar (27-31335). The joint is completed by a 160-ksi bolt loaded in shear. The analysis starts on page 10.25 in reference 16.

Function: This is a primary load-carrying member at this wing station. If this fitting fails the torsional load strength and stiffness of the wing tip extension would be substantially reduced.

Environment: The skin at this location is in the dry area of the wing.
T= -40 to +130°F.

Material: 4130 steel heat treated to F4 condition. Parts are cadmium plated and epoxy primed.

Accessibility: Lower wing skin splice panel is removable for inspection.

PRIORITIZATION			
Category*	Comments	Ref. Note*	Rank*
1. Operating Stress	The local 1-g stress is about 14.8 ksi in steel.	a	13
2. Limit Strength	This is a shear splice. The failure of this fitting would transfer load to the covering skin panel which is designed to carry limit load with the fitting failed.	f	5
3. Fail Safe	Damage would be apparent by the relative movement of the wing tip.	d	10
4. Load Distribution	Failure of this fitting would change the load path with the load then being carried by the skin panel.	b	6
5. Susceptibility to Sustained Stress Corrosion	This is a high-resistance alloy. No significant induced stress.	f	0
6. Corrosion	Item is in the dry area of the wing protected from the elements by the wing skins.	d_e, b_p	2
7. K_t	Shear joint.	d	2
8. Accidental Damage	Low probability of damage. Away from propellers and baggage and service vehicles. Damage would be obvious.	d	2
9. Inspect	Difficult to inspect directly. Remove skin panel.	c	6
	Total Score		46

*From section 6, the nine categories for durability and damage tolerance ranking.

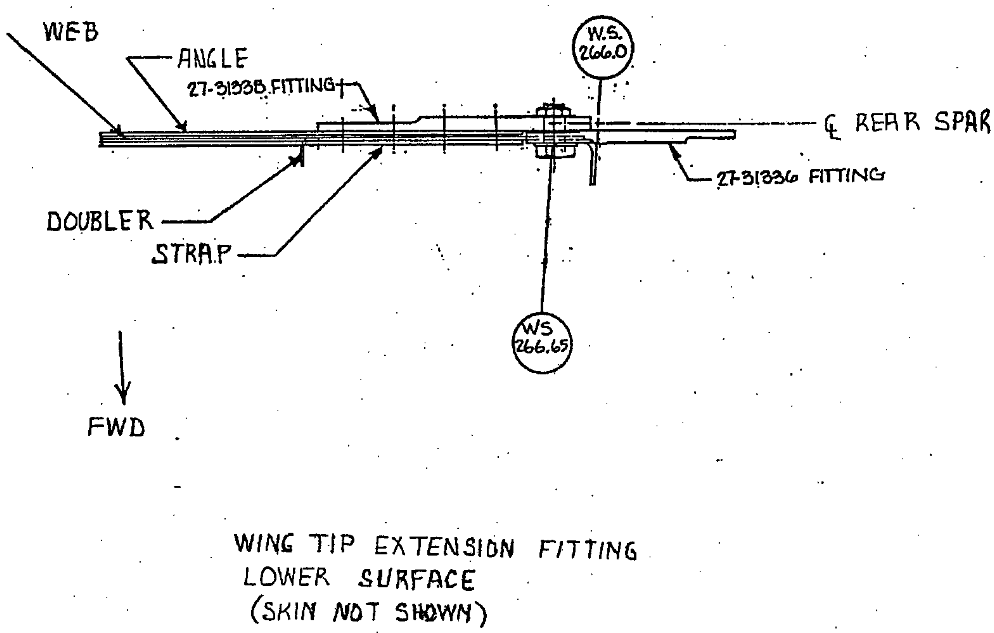


FIGURE 6-12 W12 - SA227 TIP EXTENSION FITTING REAR SPAR LOWER SURFACE (27-31335)

Date: Jan 8,1997 Analyst: W. Dwyer

ITEM W13 - SA227 tip extension at end of outboard fitting rear spar lower surface (W.S 270.12)

Selection Justification: The lower rear spar cap fitting is a main torsional load-carrying member at the attachment of the tip extension to the main wing box. At this location the steel fitting ends, loading the aluminum lower rear spar cap assembly with the load transferred from the fitting.

Function: This is a primary load-carrying member at this wing station. If this spar fails the torsional load strength and stiffness of the wing tip extension would be substantially reduced.

Environment: The skin at this location is in the dry area of the wing. T= -40 to +130°F.

Material: 2024-T3 aluminum sheet and extrusion. Sheet parts are clad extrusions and anodized; all are epoxy primed.

Accessibility: Lower wing skin splice panel is removable for inspection.

PRIORITIZATION			
Category*	Comments	Ref. Note*	Rank*
1. Operating Stress	The local 1-g stress is about 6.8 ksi in aluminum.	a	15
2. Limit Strength	This is at a shear splice. The failure of this material would transfer load to the covering skin panel which is designed to carry limit load with the fitting failed.	f	5
3. Fail Safe	Damage may not be apparent without close inspection.	b	13
4. Load Distribution	Failure at this location would not change the load.	c	4
5. Susceptibility to Sustained Stress Corrosion	This is a high-resistance alloy. No significant induced stress.	f	0
6. Corrosion	Item is in the dry area of the wing protected from the elements by the wing skins.	d_e, b_p	2
7. K_t	Shear joint.	d	2
8. Accidental Damage	Low probability of damage. Away from propellers and baggage and service vehicles. Damage would be obvious.	d	2
9. Inspect	Difficult to inspect directly. Remove skin panel.	c	6
	Total Score		49

*From section 6, the nine categories for durability and damage tolerance ranking.

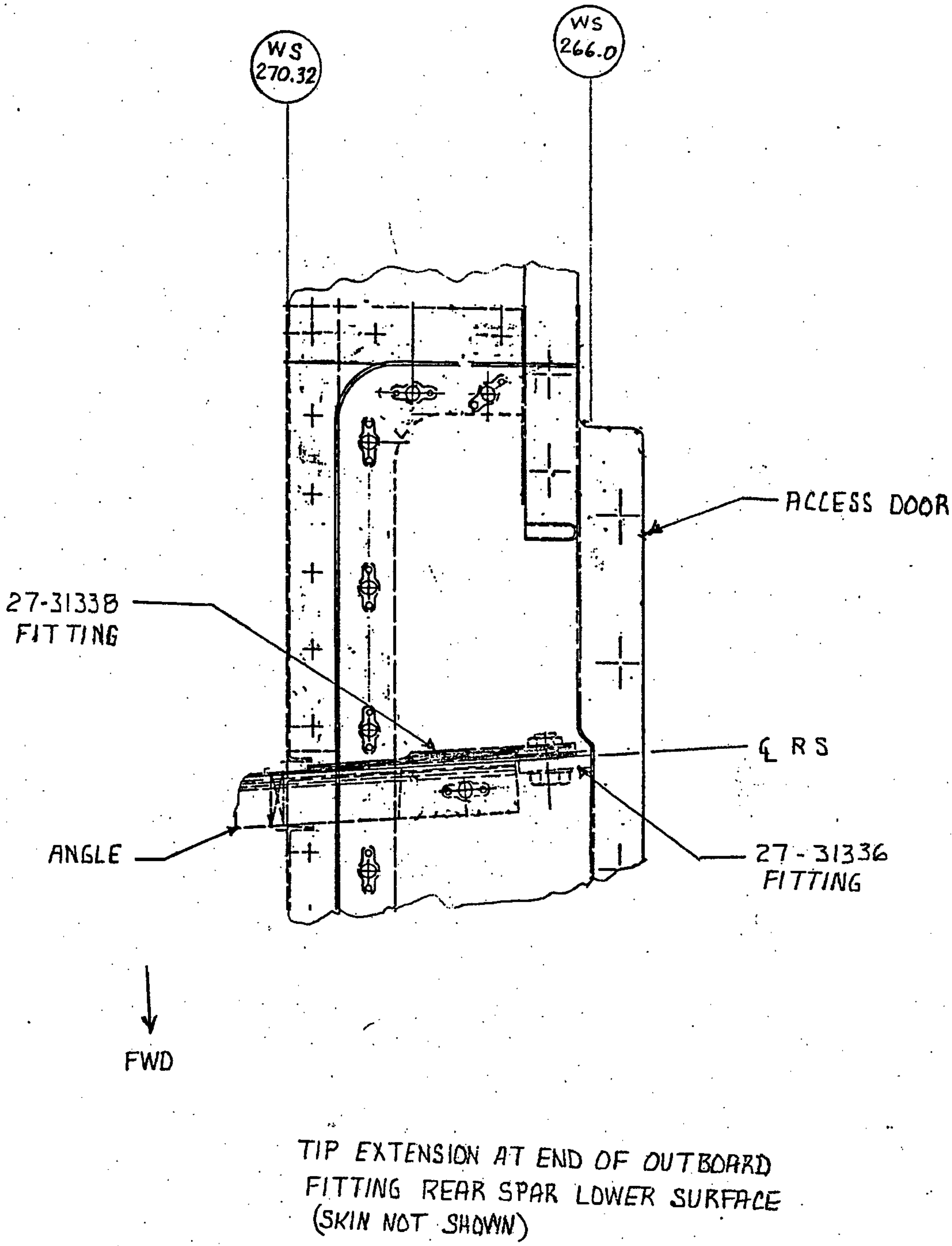


FIGURE 6-13 W13 - SA227 TIP EXTENSION AT END OF OUTBOARD FITTING (REAR SPAR)

Date: Jan 8,1997 Analyst: W. Dwyer

ITEM W14 - SA227 tip extension at end of outboard fitting main spar lower surface (W.S 271.02)

Selection Justification: The lower main spar cap fitting is the principle load-carrying member at the attachment of the tip extension to the main wing box. At this location, the steel fitting ends, and the aluminum lower main spar cap assembly carries the loads transferred from the steel fitting.

Function: This is a primary load-carrying member at this wing station. If this spar fails the bending strength and stiffness of the wing tip extension would be substantially reduced.

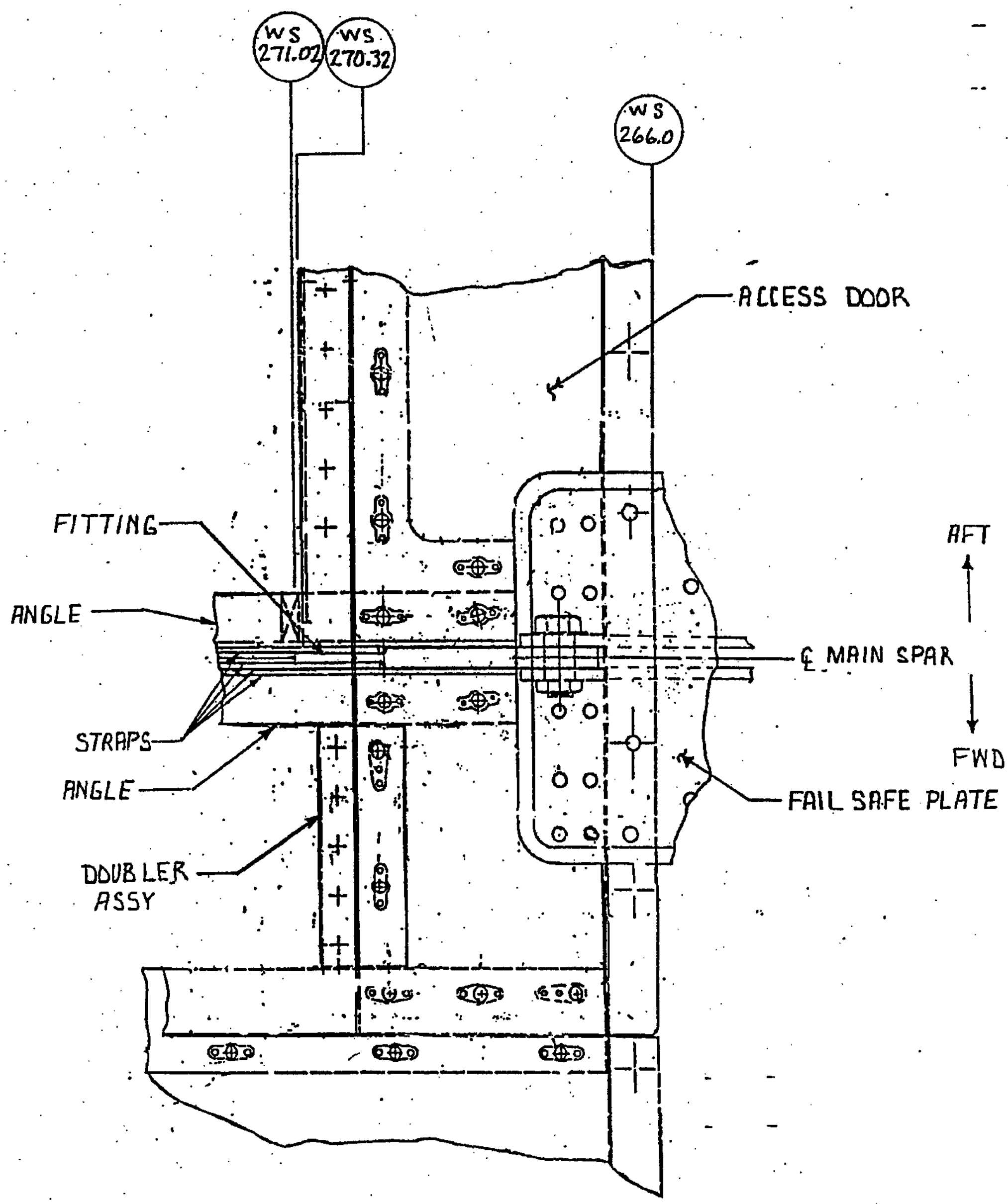
Environment: The skin at this location is in the dry area of the wing. T= -40 to +130°F.

Material: 2024-T3 aluminum sheet and extrusion. Sheet parts are clad extrusions and anodized; all are zinc chromate or epoxy primed.

Accessibility: Lower wing skin splice panel is removable for inspection.

PRIORITIZATION			
Category	Comments	Ref. Note*	Rank*
1. Operating Stress	The local 1-g stress is about 7.9 ksi in aluminum.	a	16
2. Limit Strength	This is at a double shear splice. The failure of this material would transfer load to the covering skin panel which is designed to carry limit load with the fitting failed.	f	5
3. Fail Safe	Damage may not be apparent without close inspection.	b	13
4. Load Distribution	Failure at this location would not change the load.	c	4
5. Susceptibility to Sustained Stress Corrosion	This is a high-resistance alloy. No significant induced stress.	f	0
6. Corrosion	Item is in the dry area of the wing protected from the elements by the wing skins.	d_e, b_p	2
7. K_t	Shear joint.	d	2
8. Accidental Damage	Low probability of damage. Away from propellers and baggage and service vehicles. Damage would be obvious.	d	2
9. Inspect	Difficult to inspect directly. Remove skin panel.	c	6
	Total Score		50

*From section 6, the nine categories for durability and damage tolerance ranking.



WING TIP EXTENSION AT END OF
OUTBOARD FITTING MAIN SPAR
LOOKING UP LOWER SURFACE
(SKIN NOT SHOWN)

FIGURE 6-14 W14 - SA227 TIP EXTENSION AT END OF OUTBOARD FITTING (MAIN SPAR)

Date: Nov. 14, 1996 Analyst: W. Dwyer

ITEM F1 - SA226 T stringer, top centerline near F.S. 330

Selection Justification: This T stringer serves as a splicing element for the fuselage hoop loads due to pressurization. The stringer is made from 2014-T6 extrusion and is loaded in the transverse direction. The fuselage skin is attached to the stringer with a single row of double dimpled rivets on each side of the T.

Function: This is a primary pressure-carrying member in the fuselage.

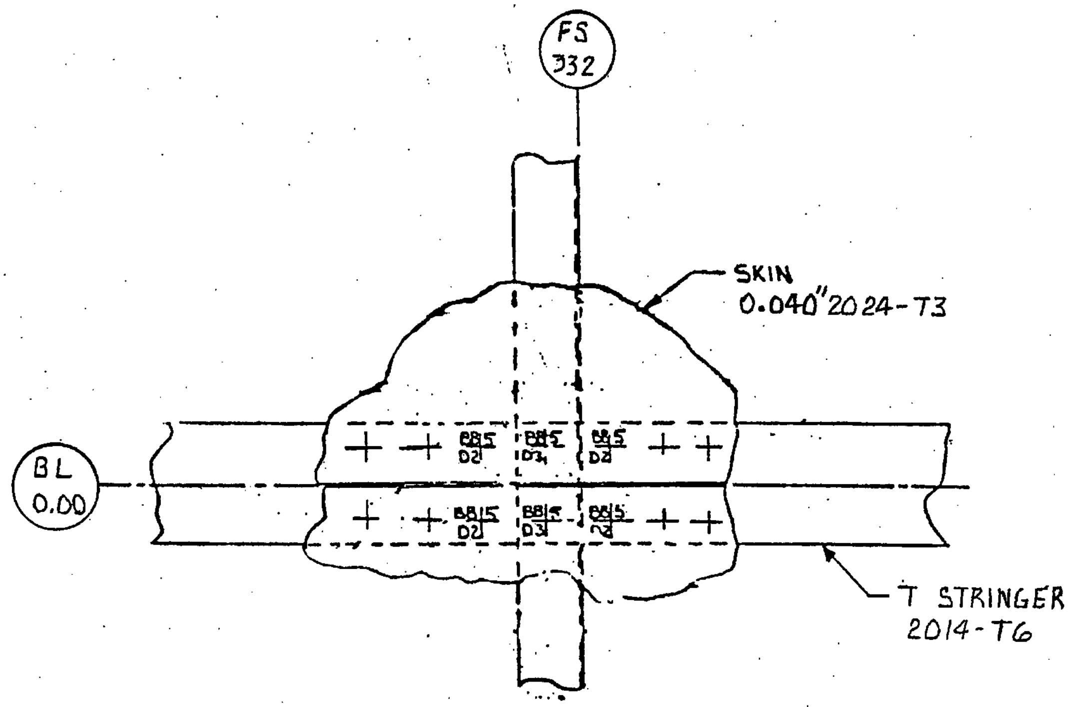
Environment: The skin at this location is in the protected area of the fuselage but could be subject to moisture over time if the sealant were to deteriorate. T= -40 to +130°F.

Material: 2014-T6 extrusion 0.050 inch thick. Pioneer number PA11269.

Accessibility: Interior furnishings would have to be removed to inspect this feature.

PRIORITIZATION			
Category*	Comments	Ref. Note*	Rank*
1. Operating Stress	The local PR/T stress is about 4.6 ksi plus fuselage bending.	b	9
2. Limit Strength	High margins but also high-fatigue loads every cycle.	f	5
3. Fail Safe	Damage may become apparent by the failure to maintain pressurization.	c	12
4. Load Distribution	Single shear joint.	b	6
5. Susceptibility to Sustained Stress Corrosion	This is a low-resistance alloy. Significant induced stress due to dimpling operation.	f	5
6. Corrosion	Single load path element. Early aircraft were protected with zinc chromate primer.	a_e, b_p	9
7. K_t	Loaded fastener holes.	b	6
8. Accidental Damage	Low probability of damage. Away from propellers and baggage and service vehicles. Damage would be obvious.	d	2
9. Inspect	Difficult to inspect directly. Remove interior paneling and dye check.	c	11
	Total Score		65

*From section 6, the nine categories for durability and damage tolerance ranking.



T STRINGER TOP CENTERLINE
NEAR FS 330

FIGURE 6-15 F1 - SA226 T STRINGER, TOP CENTERLINE NEAR F.S. 330

Date: Nov. 15, 1996 Analyst: W. Dwyer

ITEM	F2 - SA226 and SA227 wing fuselage forward attachment fittings
Selection Justification:	This fitting is the main attachment point for the main spar to the fuselage. This fitting is loaded in compression under normal flight loads. At landing impact the fitting is loaded in tension due to the vertical and drag loads on the main landing gear. At maximum landing impact the shear bolts attaching the fitting to the fuselage frame have low margins.
Function:	This is a primary attachment of the main spar to the fuselage.
Environment:	The fitting at this location is in the protected area of the fuselage protected from the environment by the wing root fairing. This seal however is not watertight. T= -40 to +130°F.
Material:	2014-T6 forging, also may be made from bar stock.
Accessibility:	The wing root fairing would have to be removed to inspect the outside of the fitting at the wing. If it were necessary to inspect the shear bolts in the fuselage frames, interior paneling would have to be removed.

	PRIORITIZATION		
Category*	Comments	Ref. Note*	Rank*
1. Operating Stress	Normal operating stress is compressive	a	5
2. Limit Strength	Low margins in shear. Additional load path through opposite side of the fitting and through fuselage to spar web fasteners.	d	8
3. Fail Safe	Multiple fasteners share the load in this joint.	b	13
4. Load Distribution	Single shear joint.	b	6
5. Susceptibility to Sustained Stress Corrosion	This is a low-resistance alloy. Significant induced stress may be present due to fit up operation on assembly.	f	5
6. Corrosion	Early aircraft were protected with zinc chromate primer.	c_e, b_p	7
7. K_t	Loaded fastener holes.	b	6
8. Accidental Damage	Low probability of damage. Away from propellers and baggage and service vehicles. Damage would be obvious.	d	2
9. Inspect	Difficult to inspect directly. Remove exterior and interior paneling and dye check.	c	11
	Total Score		63

*From section 6, the nine categories for durability and damage tolerance ranking.

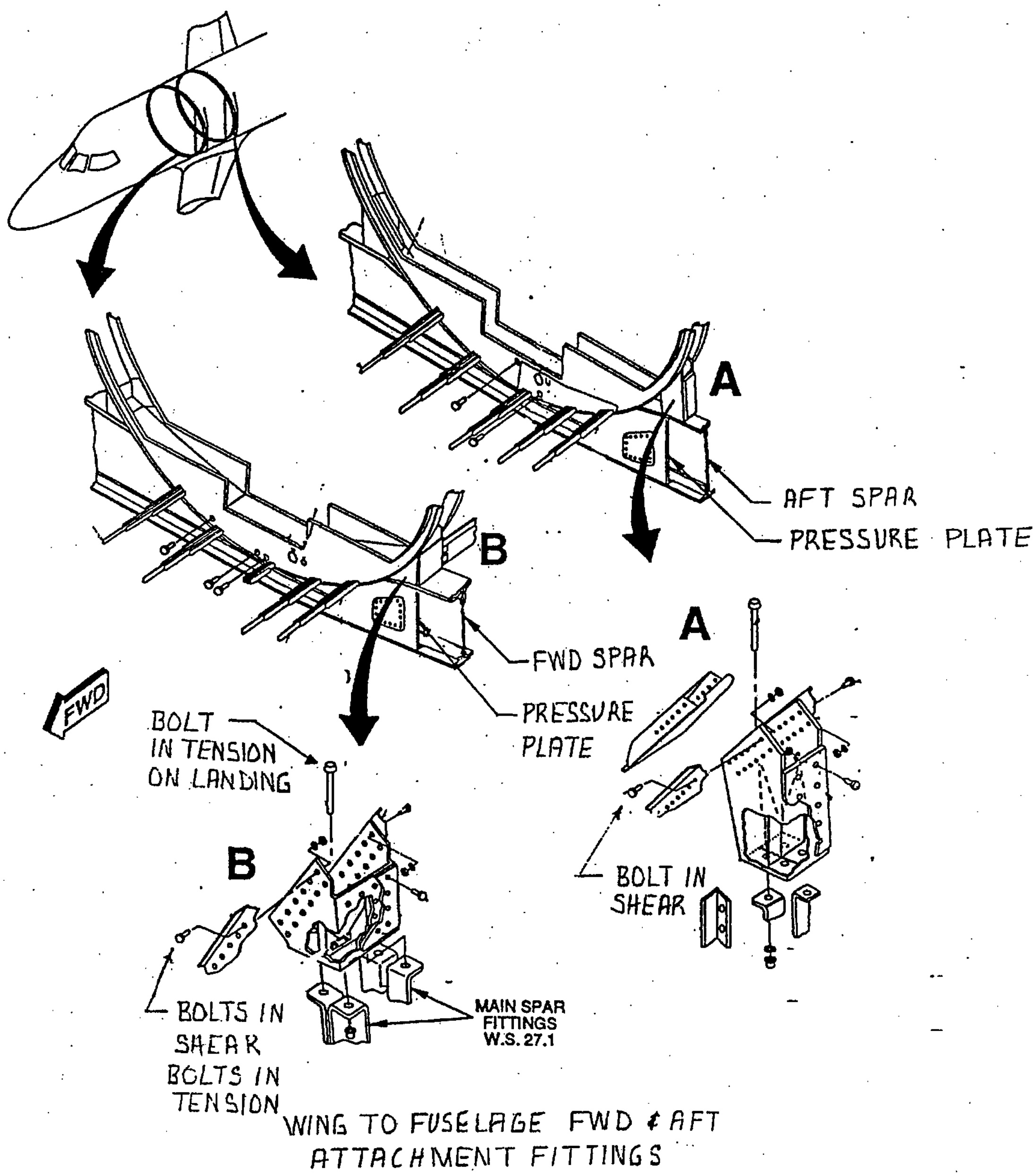


FIGURE 6-16 F2 AND F3 - SA226 AND SA227 WING FUSELAGE FORWARD ATTACHMENT FITTINGS

Date: Nov. 18, 1996 Analyst: W. Dwyer

ITEM F3 - SA226 and SA227 wing fuselage aft attachment fittings

Selection Justification: This fitting is the main attachment point for the rear spar to the fuselage. This fitting is loaded in compression under normal flight loads. At landing impact the fitting is loaded in compression due to the vertical and drag loads on the main landing gear. At maximum landing impact the shear bolts attaching the fitting to the fuselage frame have low margins.

Function: This is a primary attachment of the rear spar to the fuselage.

Environment: The fitting at this location is in the protected area of the fuselage that is protected from the environment by the wing root fairing. This seal however is not watertight. T= -40 to +130°F.

Material: 2014-T6 forging, also may be made from a hog out. Later aircraft have fittings made from 7075-T73.

Accessibility: The wing root faring would have to be removed to inspect this feature. If it were necessary to inspect the shear bolts the fuselage interior paneling would have to be removed.

PRIORITIZATION			
Category*	Comments	Ref. Note*	Rank*
1. Operating Stress	Normal operating stress is compressive.	a	5
2. Limit Strength	Low margins. Additional load path through adjacent fitting and through fuselage to spar web fasteners.	d	8
3. Fail Safe	Multiple fasteners share the load in this joint.	b	13
4. Load Distribution	Single shear joint.	b	6
5. Susceptibility to Sustained Stress Corrosion	This is a low-resistance alloy. Significant induced stress may be present due to fit up operation on assembly.	f	5
6. Corrosion	Early aircraft were protected with zinc chromate primer.	c_e, b_p	7
7. K_t	Loaded fastener holes.	b	6
8. Accidental Damage	Low probability of damage. Away from propellers and baggage and service vehicles. Damage would be obvious.	d	2
9. Inspect	Difficult to inspect directly. Remove exterior and interior paneling and dye check.	c	11
	Total Score		63

*From section 6, the nine categories for durability and damage tolerance ranking.

Date: Nov. 19, 1996 Analyst: W. Dwyer

ITEM F4 - SA226 and SA227 fuselage frame at forward cargo door latch (27-22112), F.S. 454.5 and 455.7 and aft latch at F.S. 473.4 and 474.6

Selection Justification: This frame supports the cargo door lower latches. Two identical frames are in the aircraft, one at each of the cargo door bottom latch receptacles. The frames are highly loaded with a stress of as high as 40 ksi at the stress concentration created by a tooling hole and a stringer notch. This detail was changed at s/n 457, 470, 479, and higher and also with Service Bulletins 226-53-007 or 227-53-003 installed.

Function: This member supports one side of the cargo door lower latches.

Environment: The fitting at this location is in the protected area of the fuselage. However, this area is not watertight and is often exposed to rain during cargo loading. Operating temperature = -40 to +130°F.

Material: 2024-T6 clad sheet 0.040 inch thick and primed with zinc chromate.

Accessibility: The cargo area floor boards would have to be removed to inspect this feature. A mirror and flashlight should then be adequate for inspection.

PRIORITIZATION			
Category*	Comments	Ref. Note*	Rank*
1. Operating Stress	Normal operating stress is tension over 40 ksi.	b	16
2. Limit Strength	Low margins. Additional load path through adjacent fitting.	d	8
3. Fail Safe	Adjacent frame shares the load in this joint.	b	13
4. Load Distribution	Abrupt change in area below the latch fitting.	a	9
5. Susceptibility to Sustained Stress Corrosion	This is an intermediate resistance alloy. No appreciable residual stresses should be present.	d	2
6. Corrosion	Early aircraft were protected with zinc chromate primer.	c_e, c_p	5
7. K_t	High stress concentration at stringer cutout.	a	8
8. Accidental Damage	Moderate probability of damage from and baggage and service vehicles. Damage would not be obvious.	a	5
9. Inspect	Remove interior flooring, and it is then visible with flashlight and mirror.	b	8
	Total Score		74

*From section 6, the nine categories for durability and damage tolerance ranking.

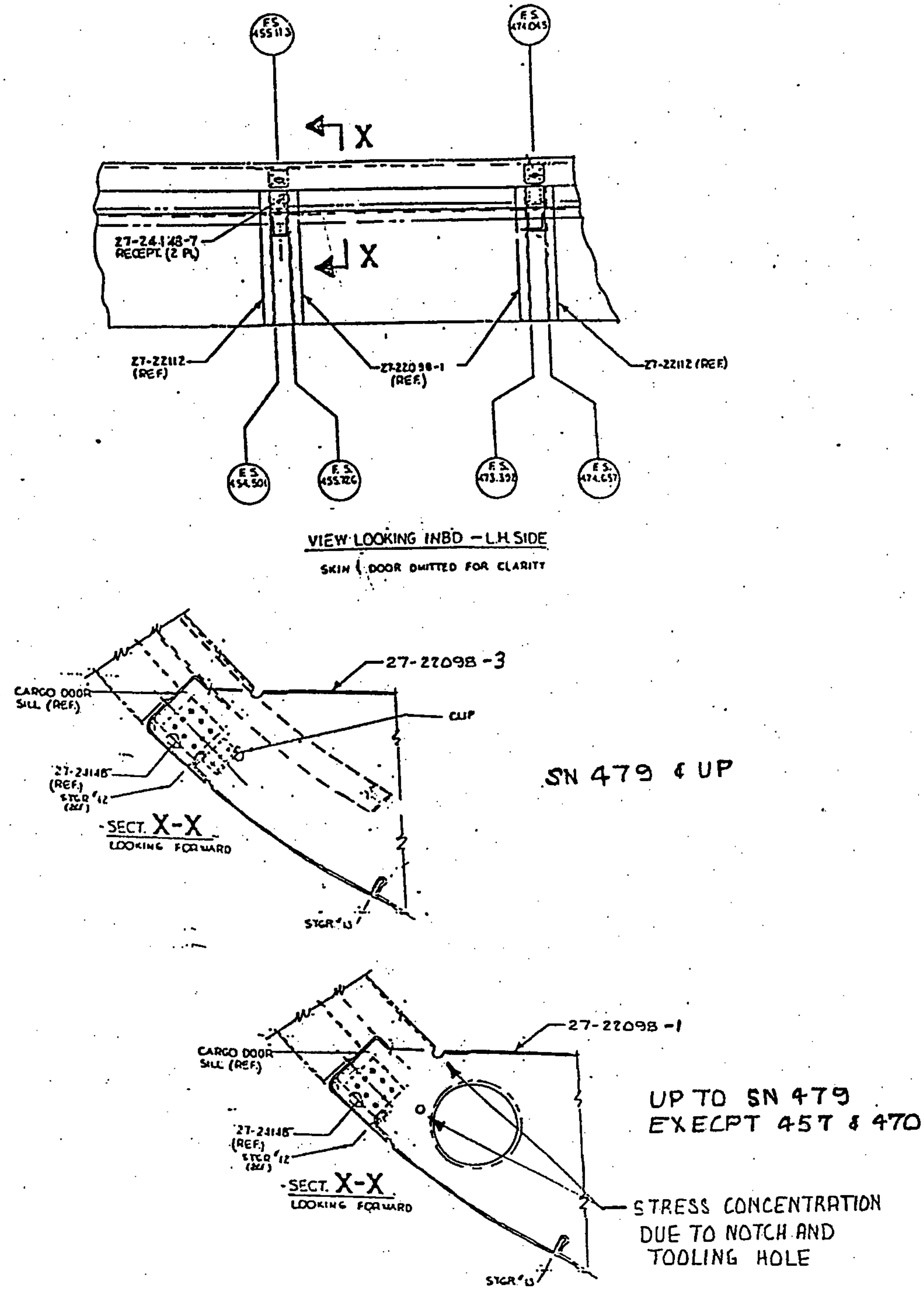


FIGURE 6-17 F4 - SA226 AND SA227 FUSELAGE FRAME AT FORWARD CARGO DOOR LATCH

Date: Nov. 19, 1996 Analyst: W. Dwyer

ITEM F5 - SA226 and SA227 fuselage frame at cargo door latch (27-22098) at F.S. 455.7 and 473.4

Selection Justification: This frame is a full depth frame that supports the cargo door lower latches and the cargo floor. Two identical frames are in the aircraft, one at each of the cargo door bottom latch receptacles. The frames are highly loaded with a gross area stress of as high as 40 ksi at the stress concentration created by a tooling hole and a stringer notch. This detail was changed at s/n 457, 470, 479, and up and also with Service Bulletins 226-53-007 and 227-53-003.

Function: This member supports one side of the cargo door lower latches.

Environment: The fitting at this location is in the protected area of the fuselage However this area is not watertight and is often exposed to rain during cargo loading. Operating temperature = -40 to +130°F.

Material: 2024-T6 clad sheet 0.040 inch thick and primed with zinc chromate.

Accessibility: The cargo area floor boards would have to be removed to inspect this feature. A mirror and flashlight should then be adequate for inspection.

PRIORITIZATION			
Category*	Comments	Ref. Note*	Rank*
1. Operating Stress	Normal operating stress is tension over 40 ksi.	b	16
2. Limit Strength	Low margins. Additional load path through adjacent fitting.	d	8
3. Fail Safe	Adjacent frame shares the load in this joint.	b	13
4. Load Distribution	Abrupt change in area below the latch fitting.	a	9
5. Susceptibility to Sustained Stress Corrosion	This is an intermediate resistance alloy. No appreciable residual stresses should be present.	d	2
6. Corrosion	Early aircraft were protected with zinc chromate primer.	c_e, c_p	5
7. K_t	High stress concentration at stringer cutout.	a	8
8. Accidental Damage	Moderate probability of damage from baggage and service vehicles. Damage would not be obvious.	a	5
9. Inspect	Remove interior flooring, and it is then visible with flashlight and mirror.	b	8
	Total Score		74

*From section 6, the nine categories for durability and damage tolerance ranking.

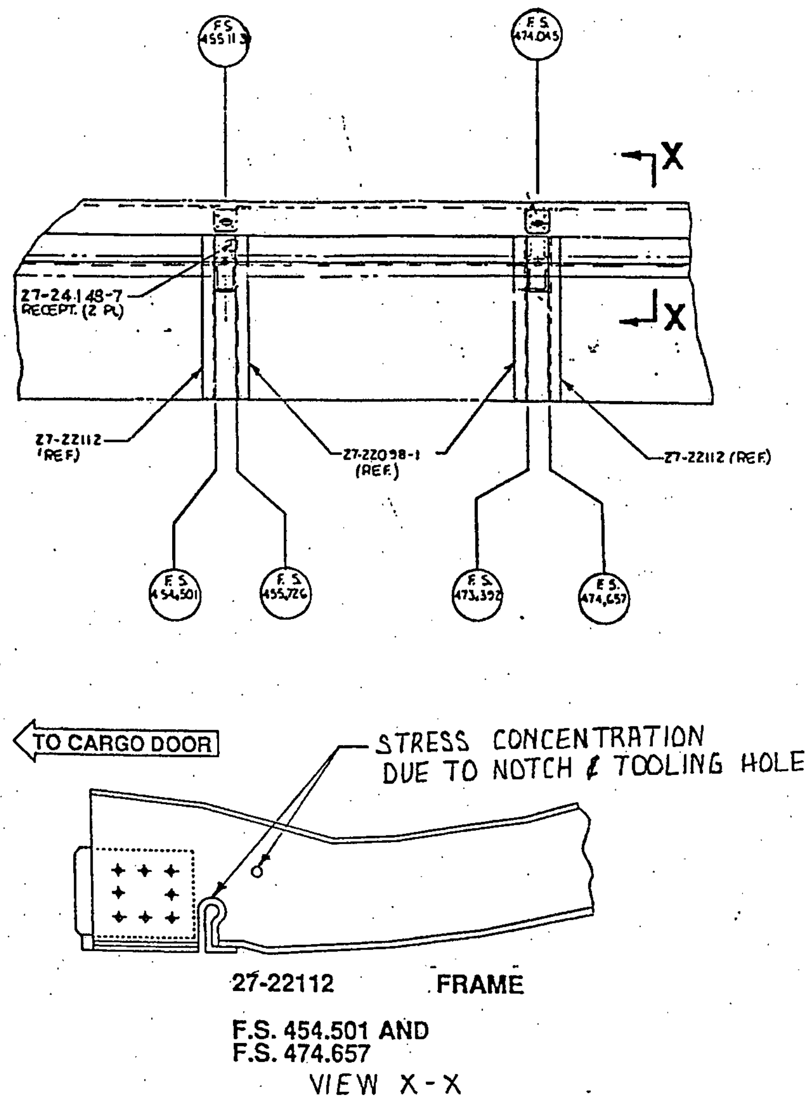


FIGURE 6-18 F5 – SA226 AND SA227 FUSELAGE FRAME AT CARGO DOOR LATCH

Date: Nov. 20, 1996 Analyst: W. Dwyer

ITEM F6 - SA226 and SA227 fuselage frame at cargo door sides (27-22085)

Selection Justification: This frame forms the forward side of the cargo door opening. If the door is not completely effective in carrying the hoop tension loads through the latches, this frame will be loaded in bending. A stress concentration exists where the side of the frame intersects the bottom portion of the door at the floor level where a notch is created by a bend relief and a stringer cutout. This detail was changed at s/n 457, 470, 479, and higher and also with Service Bulletins 226-53-007 and 227-53-003.

Function: This member forms one side of the cargo door opening and transfers hoop loads around the opening.

Environment: The frame is exposed to the weather during cargo loading and unloading. Operating temperature = -40 to +130°F.

Material: 2024-T6 clad 0.063 inch thick with zinc chromate or polished on the visible surface.

Accessibility: The cargo area floor boards would have to be removed to inspect this feature. A mirror and flashlight should then be adequate for inspection.

PRIORITIZATION			
Category*	Comments	Ref. Note*	Rank*
1. Operating Stress	Normal operating stress is tension over 20 ksi.	B	16
2. Limit Strength	Low margins. Additional load path through adjacent structure but with significant change in load path.	B	12
3. Fail Safe	Adjacent skin and frames shares the load in this location. Failure may not be apparent without scheduled inspection.	B	13
4. Load Distribution	Abrupt change in area below the floor level.	A	9
5. Susceptibility to Sustained Stress Corrosion	This is an intermediate resistance alloy. No appreciable residual stresses should be present.	D	2
6. Corrosion	Early aircraft were protected with zinc chromate primer.	C_e, C_p	5
7. K_t	High stress concentration at stringer cutout.	A	8
8. Accidental Damage	Probability of damage from baggage and service vehicles. Damage would be obvious above but not below the floor level without some disassembly.	A	5
9. Inspect	Remove interior flooring, and it is then visible with flashlight and mirror.	B	8
	Total Score		78

*From section 6, the nine categories for durability and damage tolerance ranking.

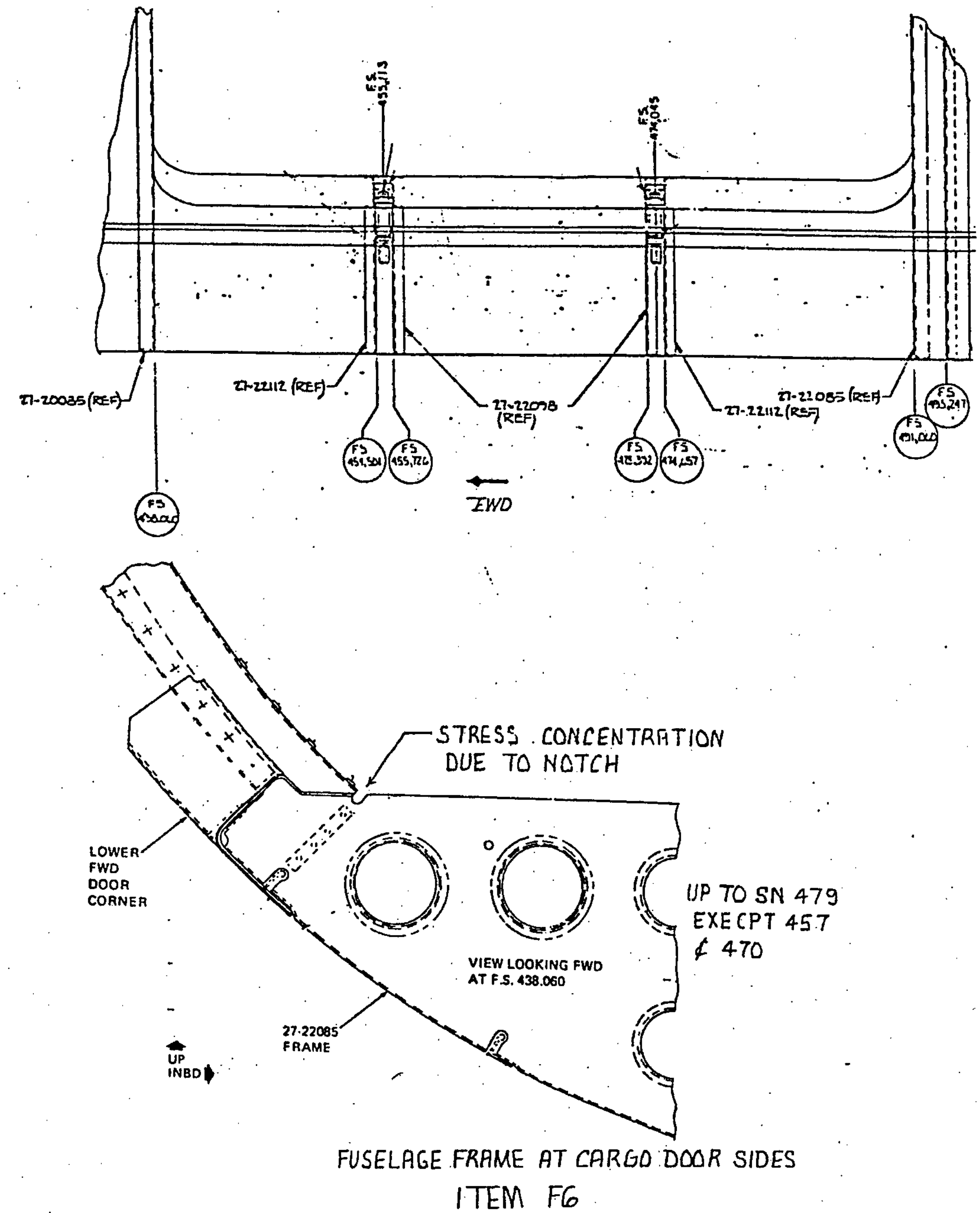


FIGURE 6-19 F6 - SA226 AND SA227 FUSELAGE FRAME AT CARGO DOOR SIDES

Date: Nov. 20, 1996 Analyst: W. Dwyer

ITEM F7 - SA226 and SA227 cargo door hinge (MS20001-P8)

Selection Justification: This piano hinge along the top of the cargo door is the main load path for the hoop loads in the cargo door to be transferred to the fuselage shell.

Function: This member connects the top of the cargo door to the fuselage, transferring hoop loads between them.

Environment: The hinge is exposed to the atmosphere.
Operating temperature = -40 to +130°F.

Material: 2024-T3511 extrusion anodized 0.064 inch thick, nominal.

Accessibility: The typical failures one could expect would be cracking along the individual hinge elements which would be readily seen, or failure of the skin at the rivet attachments.

PRIORITIZATION			
Category*	Comments	Ref. Note*	Rank*
1. Operating Stress	Normal operating stress is tension over 7 ksi.	b	16
2. Limit Strength	Additional load path through adjacent hinge elements but with increasing eccentricity in the load path.	h	1
3. Fail Safe	Failure may not be apparent without scheduled inspection.	c	11
4. Load Distribution	Local bending and shear of the hinge segments	b	6
5. Susceptibility to Sustained Stress Corrosion	This is an intermediate resistance alloy. No appreciable residual stresses should be present. Loads in the T (width) L (length) direction.	d	2
6. Corrosion	Anodized.	c_e, c_p	5
7. K_t	Moderately high-stress concentration due to the leaf geometry.	b	6
8. Accidental Damage	Probability of damage from baggage and service vehicles and wind gusts. Damage would be obvious on inspection.	c	3
9. Inspect	Visual inspection with good light should detect damaged structure.	d	4
	Total Score		54

*From section 6, the nine categories for durability and damage tolerance ranking.

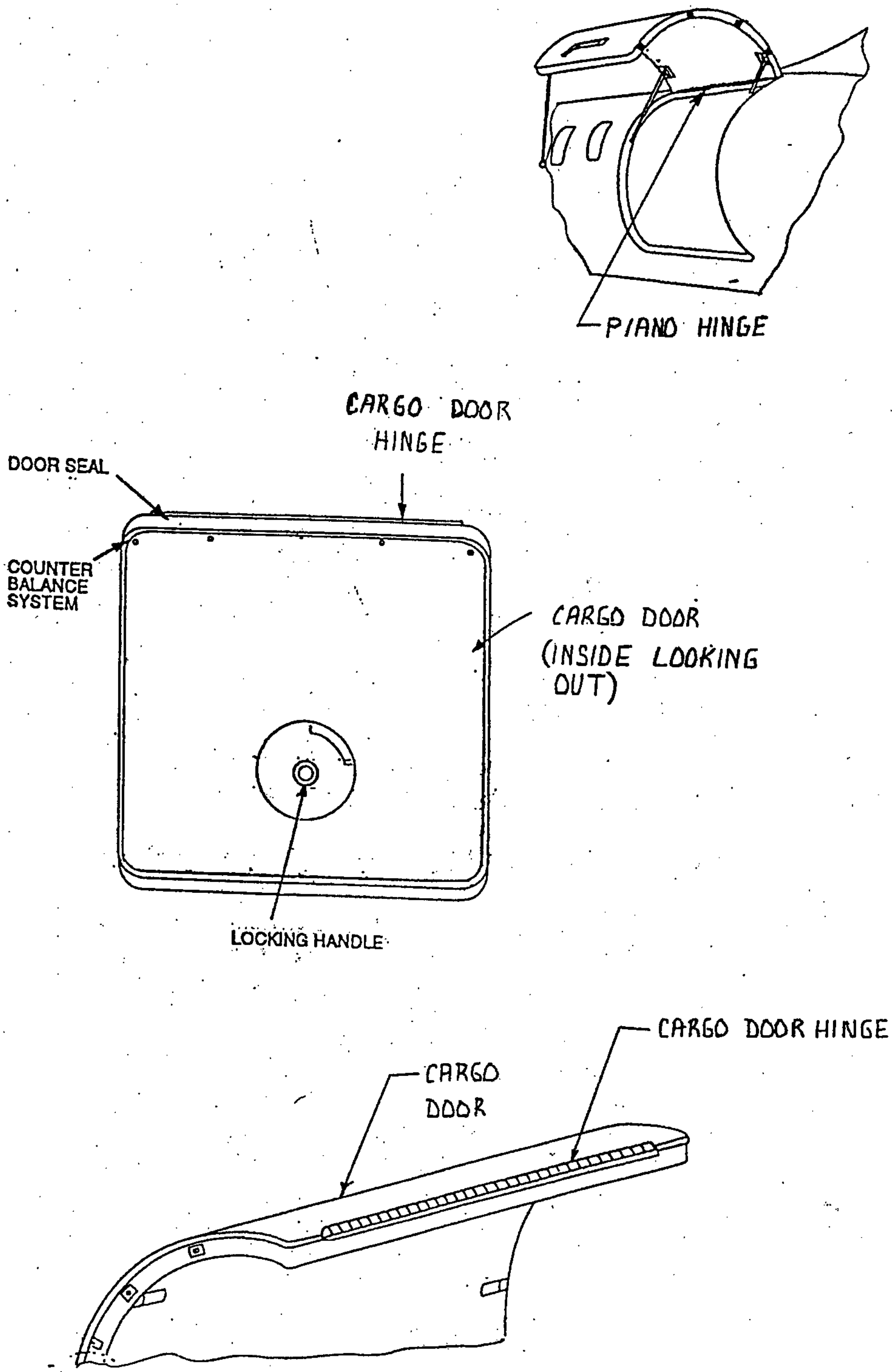


FIGURE 6-20 F7 - SA226 AND SA227 CARGO DOOR HINGE

Date: December 3, 1996 Analyst: W. Dwyer

ITEM F8 - SA226 and SA227 corners of passenger window cutouts

Selection Justification: The corners of the fuselage window cutouts developed cracks during the full-scale fatigue test. If these cracks are not repaired, they would eventually lead to a loss of cabin air pressure and possible rapid crack growth.

Function: The corners of the cutouts are loaded by cabin air pressure that is not completely carried through the window itself.

Environment: The material at the corners of the windows is exposed to the atmosphere. Most are painted with polyurethane.

Material: 2024-T3511 clad aluminum sheet 0.040 inch thick.

Accessibility: The typical failures one could expect would be cracking along the diagonal from the corners of the window opening starting at a rivet hole. This is readily inspectable with either a surface eddy-current probe or by dye penetrant with removed paint.

PRIORITIZATION			
Category*	Comments	Ref. Note*	Rank*
1. Operating Stress	Normal operating stress is tension, over 10 ksi.	b	14
2. Limit Strength	Additional load path through the adjacent frames and skin.	h	1
3. Fail Safe	Failure may be apparent without scheduled inspection.	c	9
4. Load Distribution	Complex load path due to window stiffness unknowns and adjacent frames.	b	6
5. Susceptibility to Sustained Stress Corrosion	This is a high-resistance alloy. No appreciable residual stresses should be present. Loads in the T (width) L (length) direction.	F	0
6. Corrosion	Clad, alodined, and painted.	b, c_p	3
7. K_t	Moderately high stress concentration due to window cutout.	b	6
8. Accidental Damage	Probability of damage from ice at forward window surround structure.	c	3
9. Inspect	Visual inspection with good light should detect damaged structure.	d	3
	Total Score		45

*From section 6, the nine categories for durability and damage tolerance ranking.

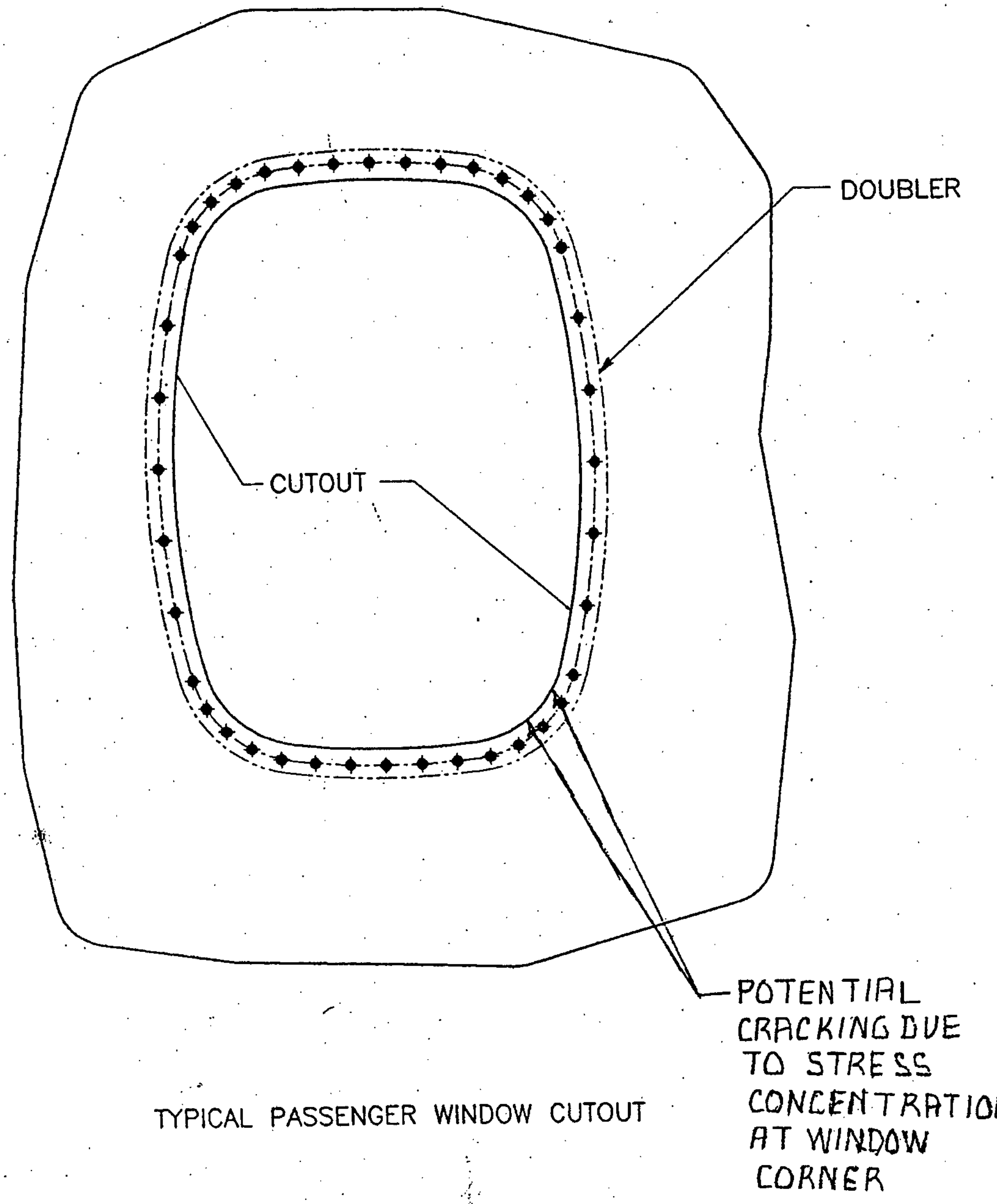


FIGURE 6-21 F8 - SA226 AND SA227 CORNERS OF PASSENGER WINDOW CUTOUTS

Date: Dec. 4, 1996 Analyst: W. Dwyer

ITEM F9 - SA226 T stringer, bottom centerline aft of F.S. 362

Selection Justification: This T stringer serves as a splicing element for the fuselage hoop loads due to pressurization. The stringer is made from 2014-T6 extrusion and is loaded in the transverse direction. The fuselage skin is attached to the stringer with a single row of double dimpled rivets on each flange of the T.

Function: This is a primary pressure carrying member in the fuselage.

Environment: The skin at this location is in the protected area of the fuselage but subject to sump water that can collect in the bottom of the fuselage if the drains are not properly maintained. T= -40 to +130°F.

Material: 2014-T6 extrusion 0.050 inch thick. Pioneer number PA11269.

Accessibility: Interior floor panels would have to be removed to inspect this feature.

PRIORITIZATION			
Category*	Comments	Ref. Note*	Rank*
1. Operating Stress	The local PR/T stress is about 4.6 ksi plus fuselage bending; working stress in compressive.	b	9
2. Limit Strength	High margins but also high alternating loads every cycle.	f	4
3. Fail Safe	Damage may become apparent by the failure to maintain pressurization. Could complete another flight.	c	10
4. Load Distribution	Single shear joint.	b	6
5. Susceptibility to Sustained Stress Corrosion	This is a low-resistance alloy. Significant induced stress due to dimpling operation.	f	5
6. Corrosion	Single load path element, early aircraft were protected with zinc chromate primer. Moisture can collect in belly area.	a_e, b_p	9
7. K_t	Loaded fastener holes.	b	6
8. Accidental Damage	Low probability of damage. Away from propellers and baggage and service vehicles. Damage would be obvious.	d	2
9. Inspect	Difficult to inspect directly. Remove interior paneling and dye check.	c	11
	Total Score		62

*From section 6, the nine categories for durability and damage tolerance ranking.

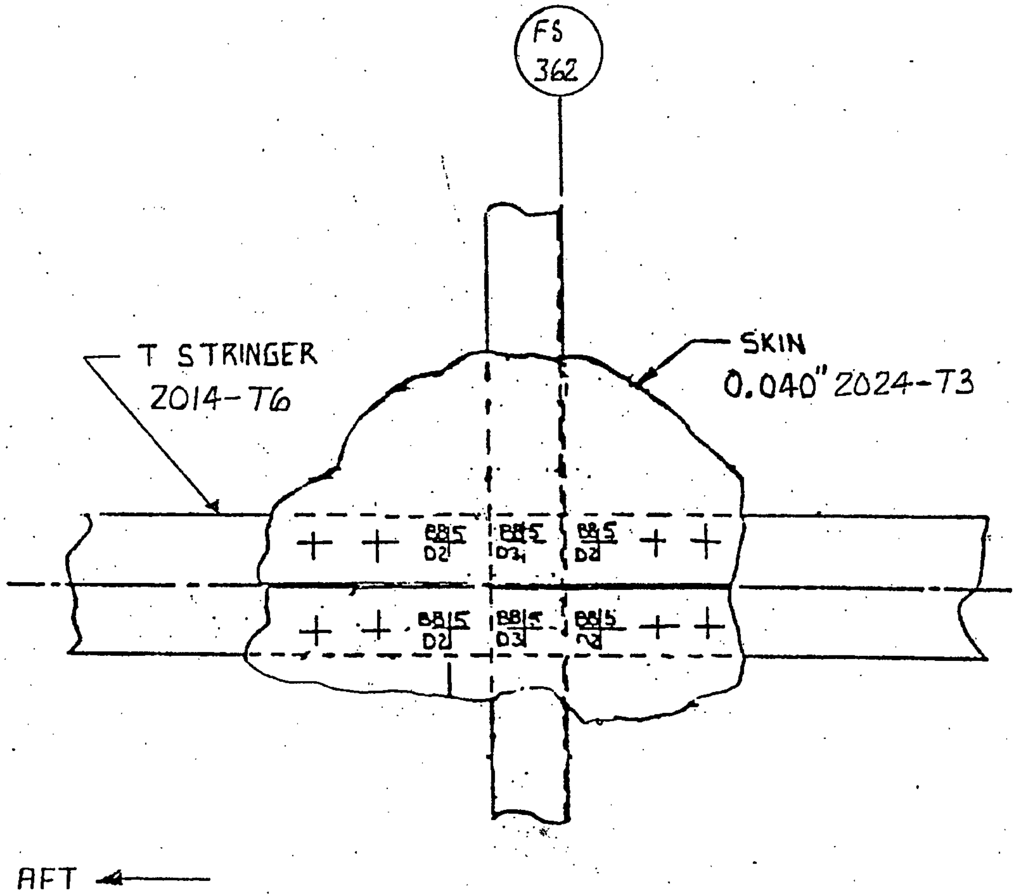


FIGURE 6-22 F9 - SA226 T STRINGER, BOTTOM CENTERLINE AFT OF F.S. 362

Date: December 4, 1996 Analyst: W. Dwyer

ITEM F10 F10 - SA226 and SA227 cargo door opening corners

Selection Justification: The corners of the cargo door cutout developed cracks during the full-scale fatigue test. If these cracks are not repaired, they would eventually lead to a loss of cabin air pressure and possible rapid crack growth.

Function: The corners of the cargo door opening are loaded by cabin air pressure loads that are not completely carried through the door itself.

Environment: The material at the corners of the doors is exposed to the atmosphere. Most are painted with polyurethane.

Material: 2024-T3 clad aluminum sheet 0.040 inch thick.

Accessibility: The typical failures one could expect would be cracking along the diagonal from the corners of the door opening starting at a rivet hole. This is readily inspectable with either a surface eddy-current probe or by removing paint.

PRIORITIZATION			
Category*	Comments	Ref. Note*	Rank*
1. Operating Stress	Normal operating stress is tension over 7.7 ksi.	b	14
2. Limit Strength	Additional load path through the adjacent frames and skin.	h	1
3. Fail Safe	Failure may be apparent without scheduled inspection.	c	11
4. Load Distribution	Complex load path due to door stiffness unknowns and adjacent frames.	b	6
5. Susceptibility to Sustained Stress Corrosion	This is a high-resistance alloy. No appreciable residual stresses should be present. Loads in the T (width) L (length) direction.	f	0
6. Corrosion	Clad, alodined, and painted.	b_e, c_p	3
7. K_t	Moderately high stress concentration due to window cutout.	b	6
8. Accidental Damage	Probability of damage from service vehicles and cargo.	c	3
9. Inspect	Visual inspection with good light should detect damaged structure.	d	3
	Total Score		47

*From section 6, the nine categories for durability and damage tolerance ranking.

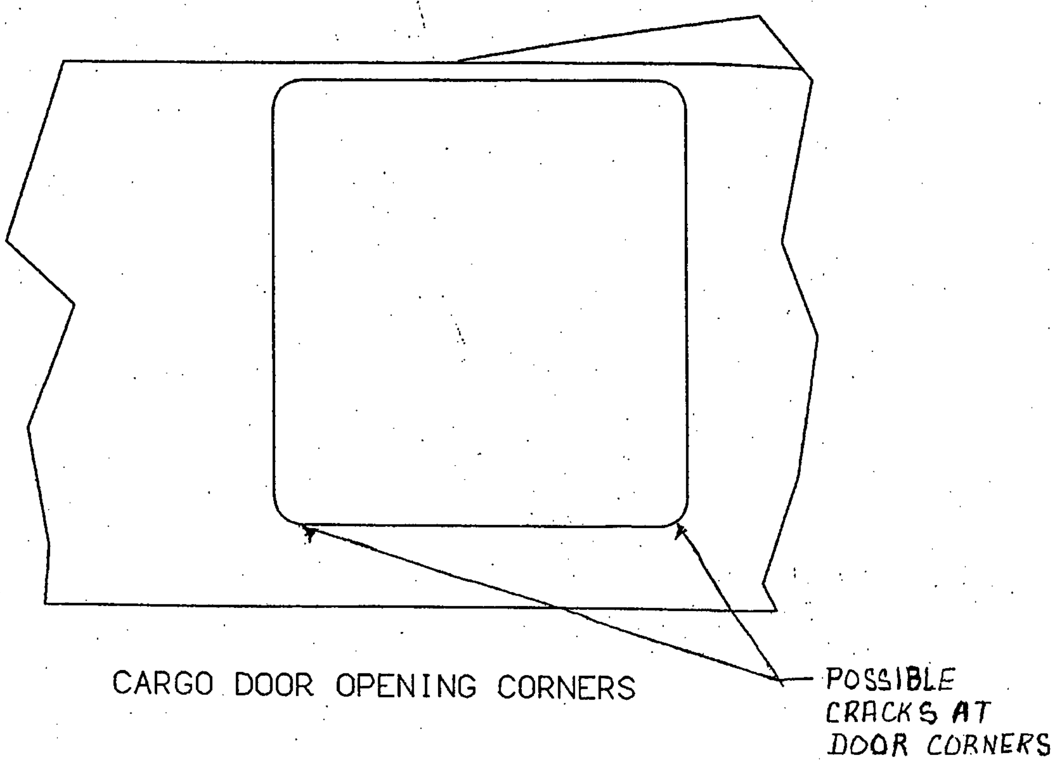


FIGURE 6-23 F10 - SA226 AND SA227 CARGO DOOR OPENING CORNERS

Date: December 11, 1996 Analyst: W. Dwyer

ITEM F11 - SA226 and SA227 forward pressure bulkhead (27-21028)

Selection Justification:. Failure of this member could cause cabin air pressure loss and possibly loss of rudder control or nose gear collapse on landing.

Function: . The forward pressure bulkhead is also the structural member carrying the vertical component of the nose landing gear strut and is the mounting point for the rudder controls.

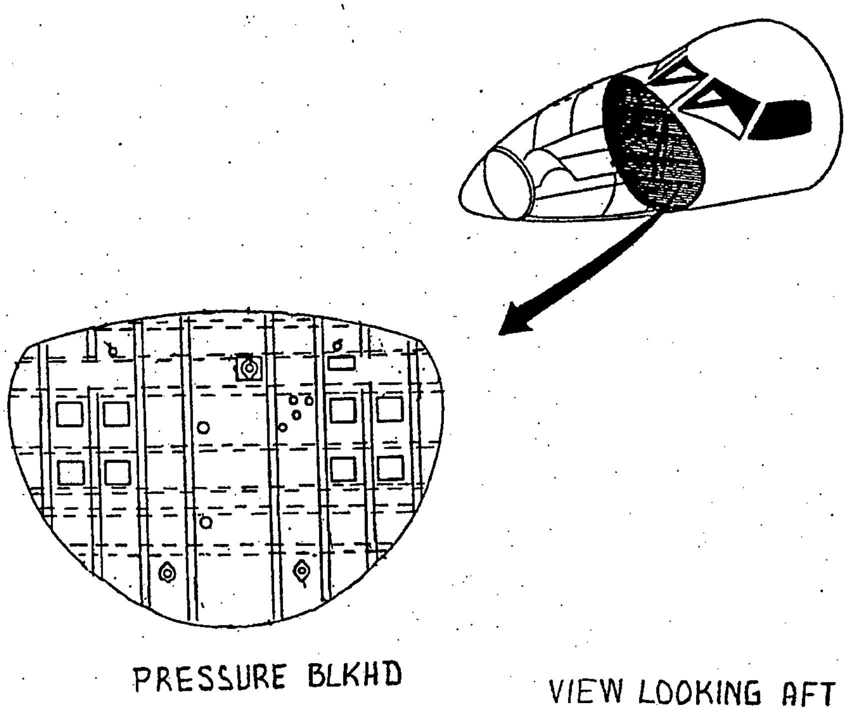
Environment: The pressure bulkhead is protected from the weather by the fuselage outer skin.

Material: 2024-T3 clad aluminum sheet 0.032 inch thick.

Accessibility: Most of the pressure bulkhead is hidden from direct view by the instrument panel on the back side and by mechanical equipment on the front side.

PRIORITIZATION			
Category*	Comments	Ref. Note*	Rank*
1. Operating Stress	Normal operating stress is tension of about 8.0 ksi.	b	14
2. Limit Strength	Additional load path through the adjacent frames and skin.	h	1
3. Fail Safe	Failure may not be apparent without scheduled inspection.	b	14
4. Load Distribution	Complex load path due to stiffness unknowns and adjacent frames.	b	6
5. Susceptibility to Sustained Stress Corrosion	This is a high-resistance alloy. No appreciable residual stresses should be present.	f	0
6. Corrosion	Clad, alodined, and primed.	b_e, c_p	3
7. K_t	Moderate stress concentration due to electrical cutouts and hydraulic pass throughs.	b	6
8. Accidental Damage	Low probability of damage from service vehicles and cargo.	d	2
9. Inspect	Visual inspection requires removing sealant to detect damaged structure.	a	11
	Total Score		57

*From section 6, the nine categories for durability and damage tolerance ranking.



Nose Section, Bulkhead - F.S.69.31

FIGURE 6-24 F11 - SA226 AND SA227 FORWARD PRESSURE BULKHEAD

Date: December 12, 1996 Analyst: W. Dwyer

ITEM	F12 - SA226 and SA227 passenger door opening corners
Justification:	The corners of the passenger door are in a complex stress field and may eventually develop cracks. If these cracks are not repaired, they would lead to a loss of cabin air pressure and possible rapid crack growth.
Function:	The corners of the passenger door are loaded by cabin air pressure loads that are not completely carried through the door itself.
Environment:	The material at the corners of the door is exposed to the atmosphere. Most are painted with polyurethane.
Material:	2024-T3 clad aluminum sheet 0.040 inch thick.
Accessibility:	The typical failures one could expect would be cracking along the diagonal from the corners of the door opening starting at a rivet hole. This is readily inspectable with either a surface eddy- current probe or by removing paint.

PRIORITIZATION			
Category*	Comments	Ref. Note*	Rank*
1. Operating Stress	Normal operating stress is tension of about 8.0 ksi.	b	14
2. Limit Strength	Additional load path through the adjacent frames and skin.	h	1
3. Fail Safe	Failure may be apparent without scheduled inspection.	c	4
4. Load Distribution	Complex load path due to door stiffness unknowns and adjacent frames.	b	6
5. Susceptibility to Sustained Stress Corrosion	This is a high-resistance alloy. No appreciable residual stresses should be present. Loads in the T (width) L (length) direction.	f	0
6. Corrosion	Clad, alodined, and painted.	b, c_p	3
7. K_t	Moderately high stress concentration due to cockpit window cutout.	b	6
8. Accidental Damage	Probability of damage from service vehicles and cargo.	d	2
9. Inspect	Visual inspection with good light should detect damaged structure.	d	3
	Total Score		39

*From section 6, the nine categories for durability and damage tolerance ranking.

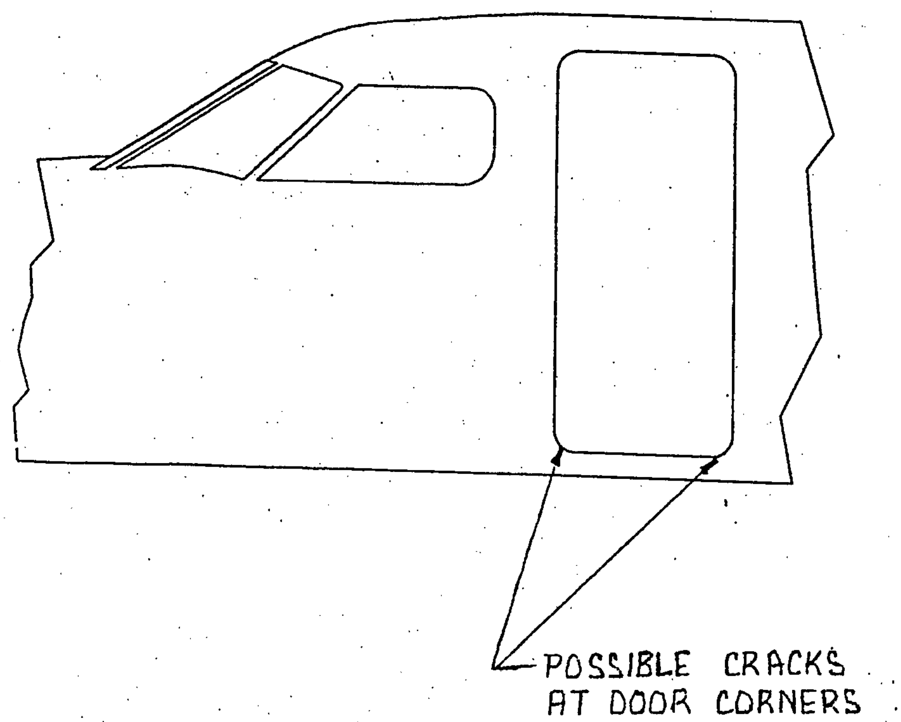


FIGURE 6-25 F12 - SA226 AND SA227 PASSENGER DOOR OPENING CORNERS

Date: December 12, 1996 Analyst: W. Dwyer

ITEM F13 - SA226 and SA227 control column roller bearing

Selection Justification: The service life of the control column roller bearings is controlled by the preload applied to the bearing stud. This preload depends on the stud nut being properly torqued. Loss of nut torque will substantially reduce the life of the stud. Failure of the stud would substantially reduce pitch control of the airplane.

Function: The control column pivots about the control column bearing. Pitch control is degraded if the bearing fails.

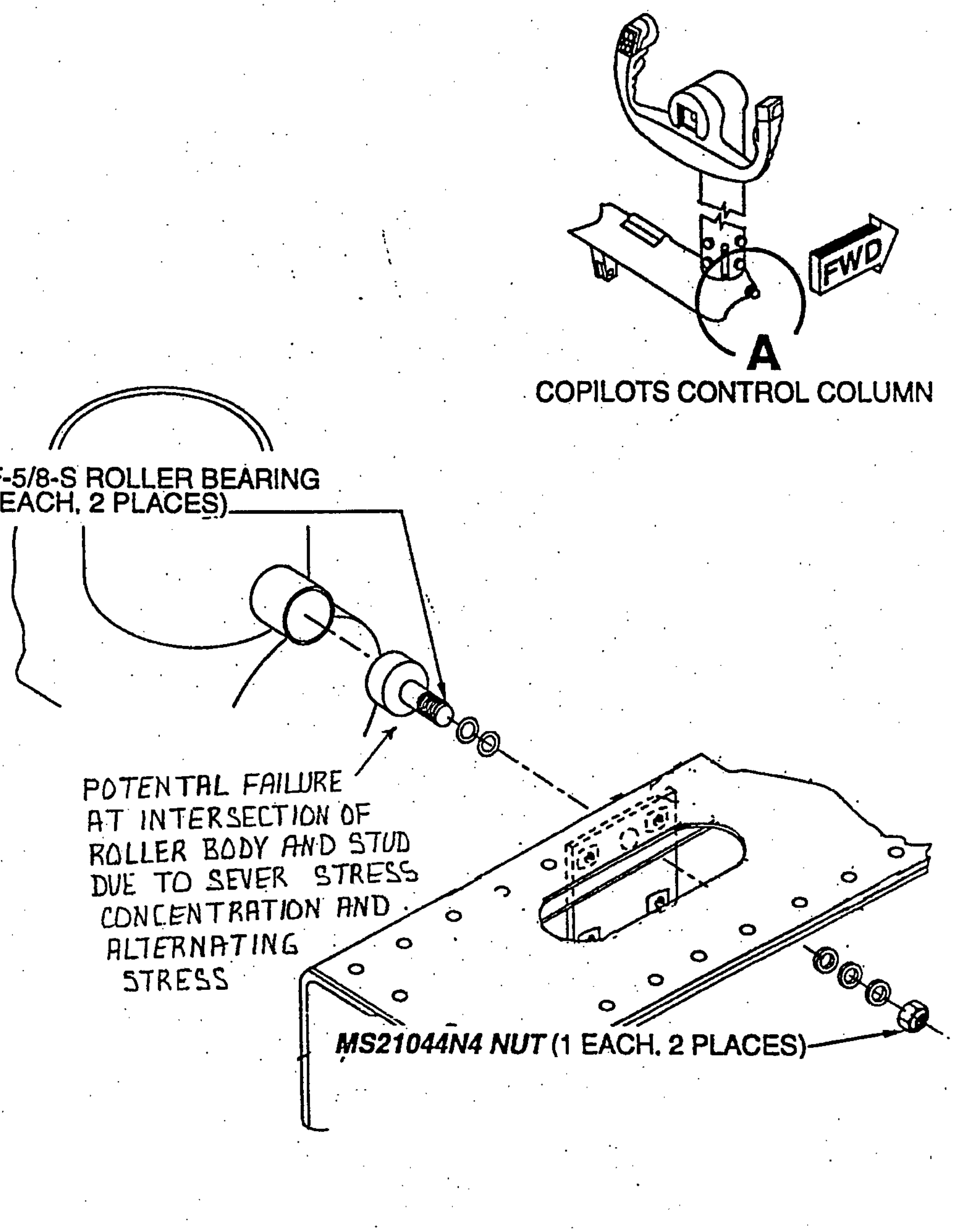
Environment: The bearings are in the controlled environment of the aircraft interior exposed to atmospheric temperatures when the aircraft is parked.

Material: 4118 steel carbonzed to Rc 58.

Accessibility: The cockpit floor boards must be removed to gain access to the roller bearing studs.

PRIORITIZATION			
Category*	Comments	Ref. Note*	Rank*
1. Operating Stress	Normal operating stress is tension of about 50 ksi.	c	15
2. Limit Strength	No additional load path available.	c	11
3. Fail Safe	Failure will be apparent without scheduled inspection.	b	14
4. Load Distribution	Simple load path.	a	9
5. Susceptibility to Sustained Stress Corrosion	This is a high-resistance alloy. No appreciable residual stresses should be present. Loads in the T (width) L (length) direction.	f	0
6. Corrosion	Black oxide finish.	d_e,d_p	4
7. K_t	Moderately high stress concentration due to shoulder on stud.	b	6
8. Accidental Damage	Low probability of damage from service vehicles and cargo.	e	1
9. Inspect	Inspection for torque on nut.	b	8
	Total Score		68

*From section 6, the nine categories for durability and damage tolerance ranking.



DETAIL A
(PILOTS SIDE TYPICAL)

FIGURE 6-26 F13 - SA226 AND SA227 CONTROL COLUMN ROLLER BEARING

Date: Nov. 27, 1996 Analyst: W. Dwyer

ITEM H1 - SA226 and SA227 horizontal stabilizer station 3.135 rib strap at rear spar (27-43077-1)

Selection Justification: This location is loaded in stabilizer bending due to the poor stiffness continuity across the rear spar and the sweep of the spar. The termination of the torque box at this location results in chordwise loads along the rib cap. This design detail was changed at s/n 784, 786, and up.

Function: This member contributes to the torsional stiffness of the horizontal stabilizer by providing a load path for differential bending loads to reach the spar caps.

Environment: The strap at this location is buried under the skin for the most part but exposed to the atmosphere along its edge. T= -40 to +130°F.

Material: The strap is made from 0.125″ thick clad 2024-T3.

Accessibility: Cracks along the edge of the strap can be detected by a careful examination with a mirror. Partial cracks emanating from a fastener hole would be difficult to see without disassembly.

PRIORITIZATION			
Category*	Comments	Ref. Note*	Rank*
1. Operating Stress	The local 1-g stress is about 10 ksi	b	5
2. Limit Strength	This strap failed during the fatigue test and the horizontal carried limit load successfully afterward.	e	6
3. Fail Safe	Damage would be apparent only at a scheduled inspection.	c	11
4. Load Distribution	Complex loads induced by flight loads.	b	6
5. Susceptibility to Sustained Stress Corrosion	This is a high-resistance alloy and is not considered to have significant induced stress.	f	0
6. Corrosion	This part is protected by zinc chromate or epoxy primers over the clad surface. Partially exposed to the atmosphere.	c_e, c_p	5
7. K_t	Loaded fastener holes.	b	5
8. Accidental Damage	Low probability of damage. Away from propellers and baggage and service vehicles.	d	2
9. Inspect	Scheduled inspection needed; complete failure should be obvious.	d	3
	Total Score		43

*From section 6, the nine categories for durability and damage tolerance ranking.

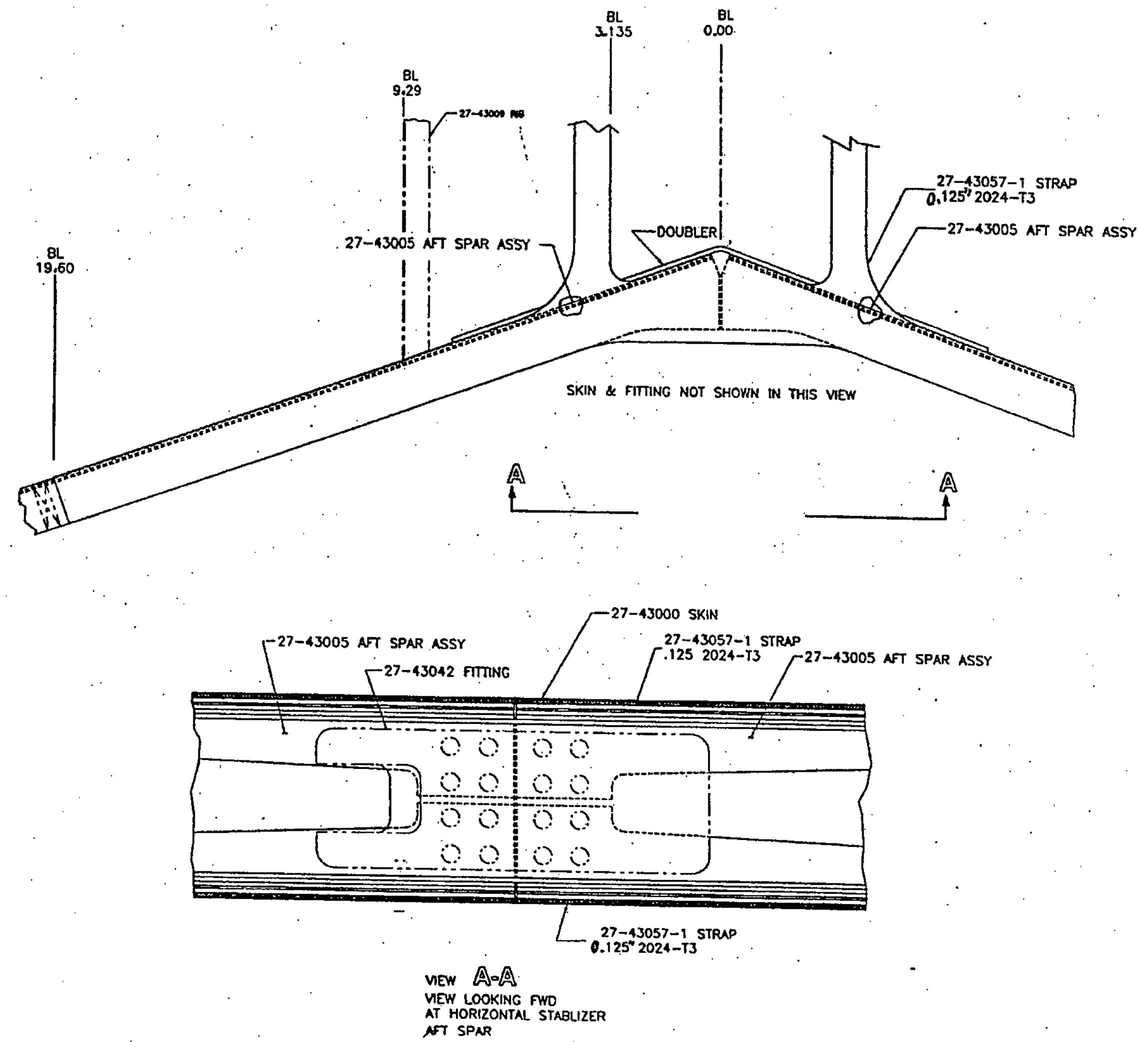


FIGURE 6-27 H1 - SA226 AND SA227 HORIZONTAL STABILIZER RIB STRAP AT REAR SPAR

Date: Dec. 3, 1996 Analyst: W. Dwyer

ITEM H2 - SA226 and SA227 horizontal stabilizer pitch trim actuator fittings (27-43062)

Selection Justification: This fitting provides the attachment point of the front spar of the horizontal stabilizer to the pitch trim actuators. Failure of this fitting and its twin could result in loss of the aircraft due to loss of pitch control.

Function: This member is the attachment point of the pitch trim actuators to the horizontal stabilizer.

Environment: The fittings are located under the dorsal fin fairing and protected from the weather but the area is not watertight.

Material: The fitting is machined from 2024-T4 aluminum.

Accessibility: Inspection of this fitting can be done at the same time as the pitch trim actuator fitting inspections by removing the dorsal fin fairing.

PRIORITIZATION			
Category*	Comments	Ref. Note*	Rank*
1. Operating Stress	The local 1-g stress is low + or - depending on trim.	a	5
2. Limit Strength	This fitting is loaded very lightly and has an identical fitting next to it.	h	1
3. Fail Safe	Damage would be apparent only at a scheduled inspection.	c	11
4. Load Distribution	Major load path at lug.	a	8
5. Susceptibility to Sustained Stress Corrosion	This is a high-resistance alloy and is not considered to have significant induced stress.	f	0
6. Corrosion	This part is protected by zinc chromate or epoxy primer over the surface. Partially exposed to the atmosphere.	c_e, b_p	7
7. K_t	Loaded fastener holes with bushings.	b	5
8. Accidental Damage	Low probability of damage. Away from propellers and baggage and service vehicles.	d	1
9. Inspect	Scheduled inspection needed; complete failure should be obvious.	c	5
	Total Score		43

*From section 6, the nine categories for durability and damage tolerance ranking.

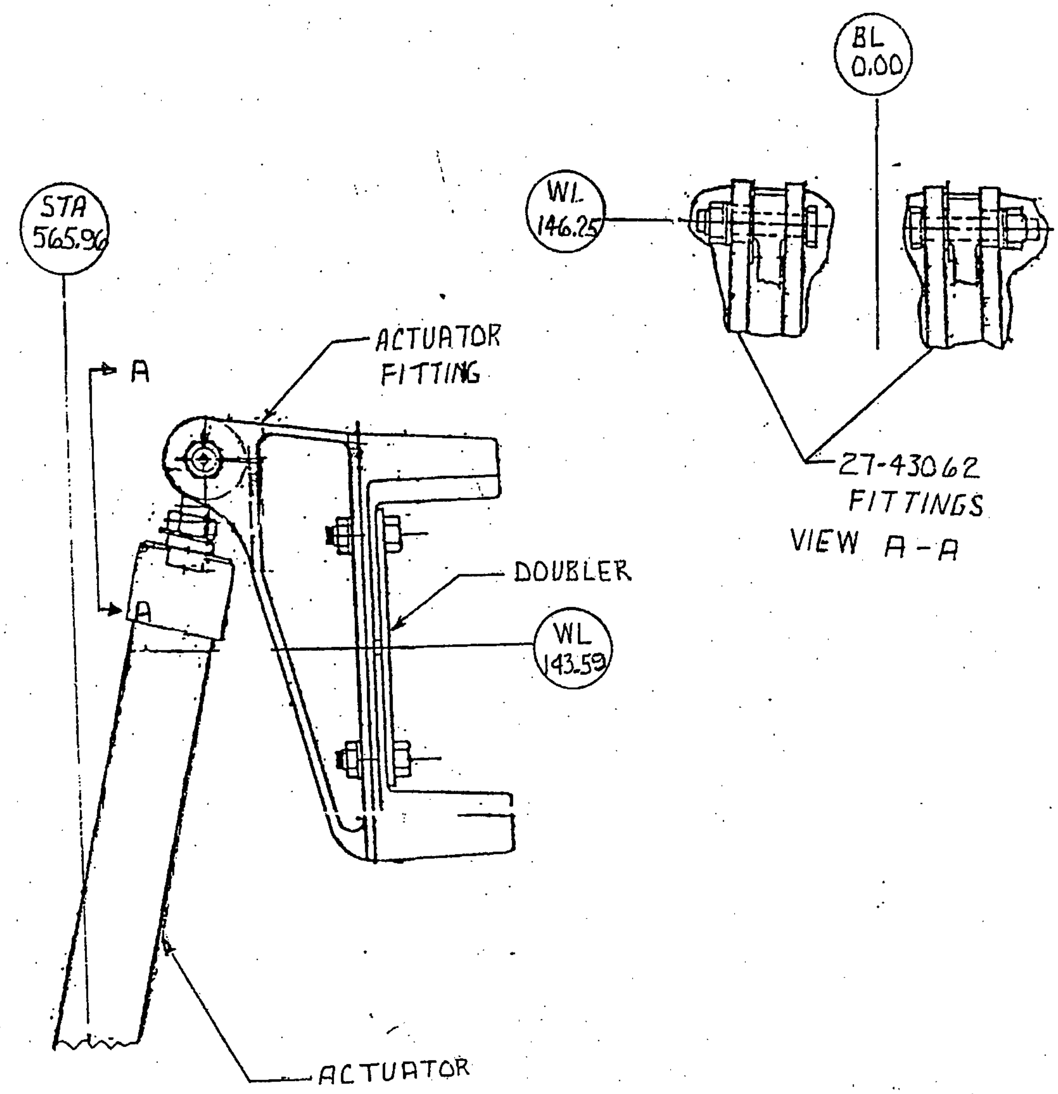


FIGURE 6-28 H2 – SA226 AND SA227 HORIZONTAL STABILIZER PITCH TRIM ACTUATOR FITTINGS

Date: Nov. 21, 1996 Analyst: W. Dwyer

ITEM N1 - SA226 and SA227 nacelle upper longeron at the firewall (27-35003)

Selection wJustification: This tension loaded member is the principal load path for the reaction of the engine and propeller inertia in all conditions.

Function: This member at W.S. 99 and its mate at W.S. 81 support the engine and propeller and provide a load path for the reaction of the engine loads at the main spar.

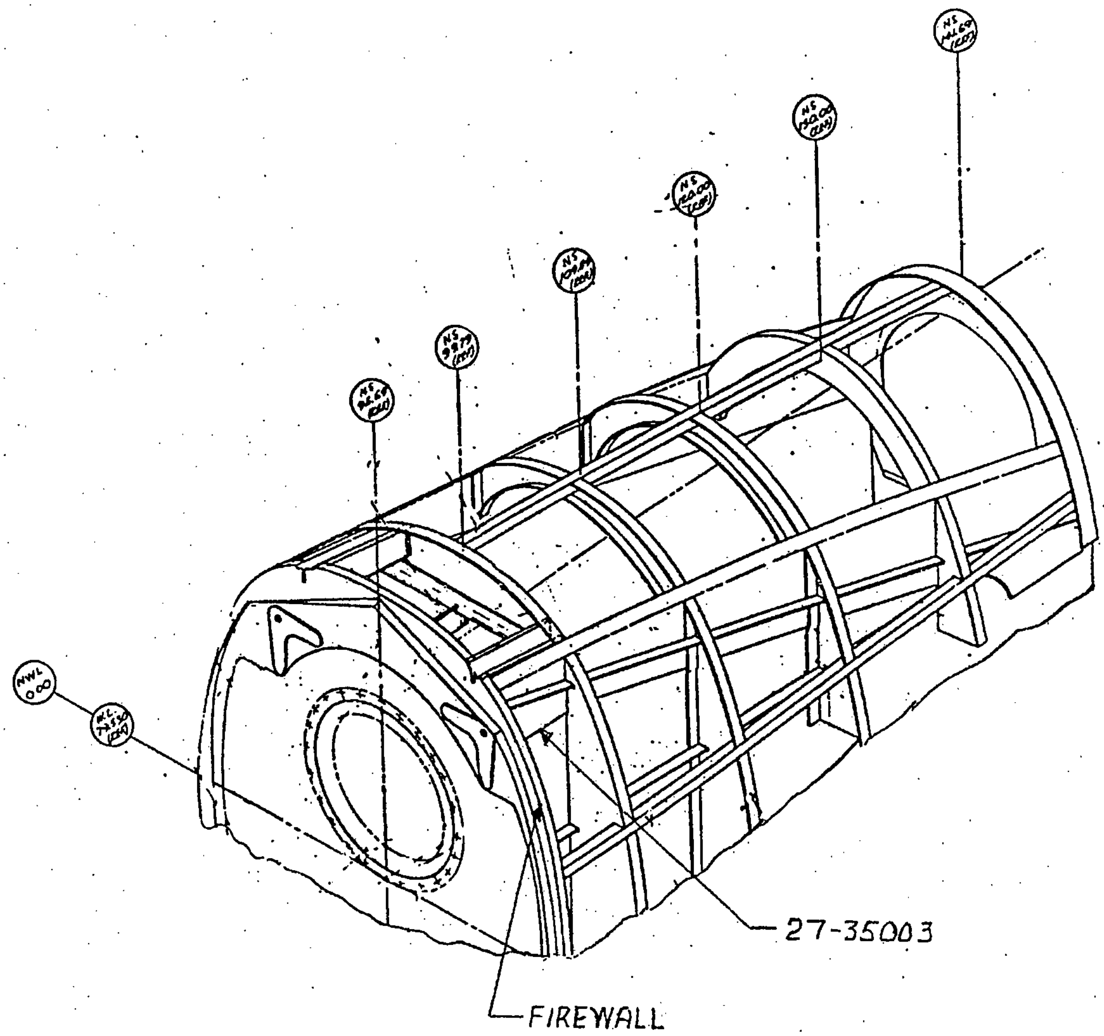
Environment: The longeron is exposed to operating temperatures from -40 to +200°F. In the event of a fire in the engine compartment higher temperatures could be expected.

Material: 2024-T42 sheet 0.090 inch thick, nominal.

Accessibility: To access this area it would be necessary to peel back the nacelle skin or install an inspection panel.

PRIORITIZATION			
Category*	Comments	Ref. Note*	Rank*
1. Operating Stress	Normal operating stress is tension about 2 ksi.	a	5
2. Limit Strength	High margins but adjacent structure is relatively less significant in area and load-carrying capacity.	f	5
3. Fail Safe	Failure may not be apparent without scheduled inspection.	b	13
4. Load Distribution	Single shear of engine mount loads into the longeron.	b	5
5. Susceptibility to Sustained Stress Corrosion	This is a high-resistance alloy as loaded in the LT direction. No appreciable residual stresses should be present.	f	0
6. Corrosion	Clad and primed with zinc chromate.	a_e, c_p	8
7. K_t	Fastener holes loaded in shear.	b	5
8. Accidental Damage	Area is high on the nacelle covered and protected by nacelle skin. Not easily inspected.	b	4
9. Inspect	Area can only be inspected with some disassembly.	a	11
	Total Score		56

*From section 6, the nine categories for durability and damage tolerance ranking.



NACELLE UPPER LONGERON
AT FIREWALL

FIGURE 6-29 N1 - SA226 AND SA227 NACELLE UPPER LONGERON AT THE FIREWALL

Date: Nov. 26, 1996 Analyst: W. Dwyer

ITEM N2 - SA226 and SA227 nacelle upper longeron (27-35003) at the attachment to the wing rib attach angles (27-31135) at the main spar.

Selection Justification: This tension-loaded member is the principal load path for the reaction of the engine and propeller inertia on landing and gust conditions.

Function: This member at W.S. 99 and its mate at W.S. 80 support the engine and propeller and provide a load path for the reaction of the engine loads at the main spar.

Environment: The longeron operating temperature is -40 to +200°F. In the event of a fire in the engine compartment higher temperatures could be expected.

Material: 2024-T3511 sheet 0.090 inch thick, nominal.

Accessibility: To access this area it would be necessary to peel back the nacelle skin.

PRIORITIZATION			
Category*	Comments	Ref. Note*	Rank*
1. Operating Stress	At this point the member is critical in bearing.	a	5
2. Limit Strength	High margins and adjacent structure is relatively less significant in area and load-carrying capacity.	c	11
3. Fail Safe	Failure may not be apparent without scheduled inspection.	b	13
4. Load Distribution	Double shear of longeron loads into rib cap.	b	3
5. Susceptibility to Sustained Stress Corrosion	This is a high-resistance alloy as loaded in the LT direction. No appreciable residual stresses should be present.	f	0
6. Corrosion	Clad and primed with zinc chromate.	a_e, c_p	8
7. K_t	Fastener holes loaded in shear.	b	5
8. Accidental Damage	Area is high on the wing and covered and protected by nacelle skin. Not easily inspected.	b	4
9. Inspect	Area can only be inspected with some disassembly.	a	11
	Total Score		60

*From section 6, the nine categories for durability and damage tolerance ranking.

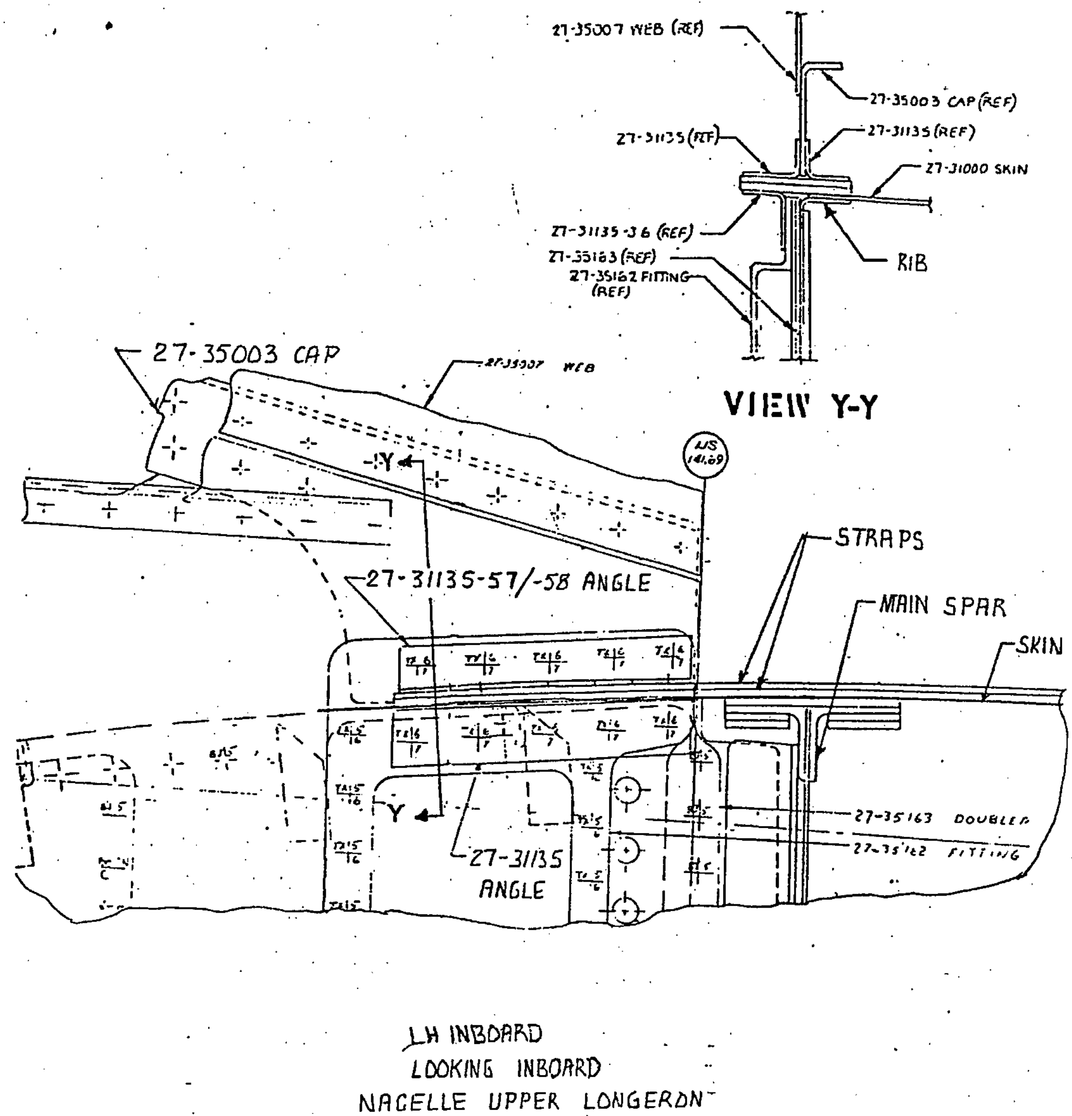


FIGURE 6-30 N2 AND N3 – SA226 AND SA227 NACELLE UPPER LONGERON AT THE ATTACHMENT TO THE WING RIB

Date: Nov. 26, 1996 Analyst: W. Dwyer

ITEM N3 - SA226 and SA227 nacelle upper longeron to the wing rib attach angles (27-31135 -57/-58) at the wing rib

Selection Justification: This tension loaded member is the principal load path for the reaction of the engine and propeller inertia on landing and gust conditions.

Function: This member at W.S. 99 and its mate at W.S. 80 support the engine and propeller and provide a load path for the reaction of the engine loads at the main spar.

Environment: The attach angle operating temperature is -40 to +200°F. In the event of a fire in the engine compartment, higher temperatures could be expected.

Material: 2024-T4 sheet 0.063 inch thick, nominal.

Accessibility: To access this area it would be necessary to peel back the nacelle skin.

PRIORITIZATION			
Category*	Comments	Ref. Note*	Rank*
1. Operating Stress	At this point the member is critical in bending.	a	5
2. Limit Strength	High margins and adjacent structure are relatively less significant in area and load-carrying capacity.	c	11
3. Fail Safe	Failure may not be apparent without scheduled inspection.	b	13
4. Load Distribution	Angle clip loaded in bending.	b	6
5. Susceptibility to Sustained Stress Corrosion	This is a high-resistance alloy as loaded in the L (length) T (width) direction. No appreciable residual stresses should be present.	f	0
6. Corrosion	Clad and primed with zinc chromate.	a_e, c_p	8
7. K_t	Fastener holes loaded in tension.	b	5
8. Accidental Damage	Area is high on the wing and covered and protected by nacelle skin. Not easily inspected.	b	4
9. Inspect	Area can only be inspected with some disassembly.	a	11
	Total Score		63

*From section 6, the nine categories for durability and damage tolerance ranking.

Date: December 24, 1996 Analyst: W. Dwyer

ITEM V1 - SA226 and SA227 Vertical fin main spar cap strips at the bottom of the pivot fitting

Selection Justification: Failure of the main spar of the vertical stabilizer would result in loss of lateral control of the aircraft.

Function:. The vertical stabilizer main spar carries the vertical tail bending loads and the bending loads induced from unsymmetric loading of the horizontal stabilizer.

Environment: The main spar of the vertical is protected from the direct effects of the weather but is not in a moisture proof environment.

Material: 2024-T42, 0.063 inch thick.

Accessibility: Mostly covered by the external skin. Some access through removable panels.

PRIORITIZATION			
Category*	Comments	Ref. Note*	Rank*
1. Operating Stress	Normal operating stress is near 0 ksi.	d	5
2. Limit Strength	Additional load path available through redundant structure.	h	3
3. Fail Safe	Failure would not be apparent without scheduled inspection.	b	14
4. Load Distribution	Simple load path.	c	3
5. Susceptibility to Sustained Stress Corrosion	This is a high-resistance alloy. No appreciable residual stresses should be present. Loads in the L (length) T (width) direction.	f	0
6. Corrosion	Zinc chromate finish in early aircraft. Epoxy polyemide in latter.	c_e, b_p	7
7. K_t	Moderate due to fastener holes.	b	6
8. Accidental Damage	Low probability of damage from service vehicles and cargo.	D	2
9. Inspect	Inspection requires opening panels.	b	8
	Total Score		48

*From section 6, the nine categories for durability and damage tolerance ranking.

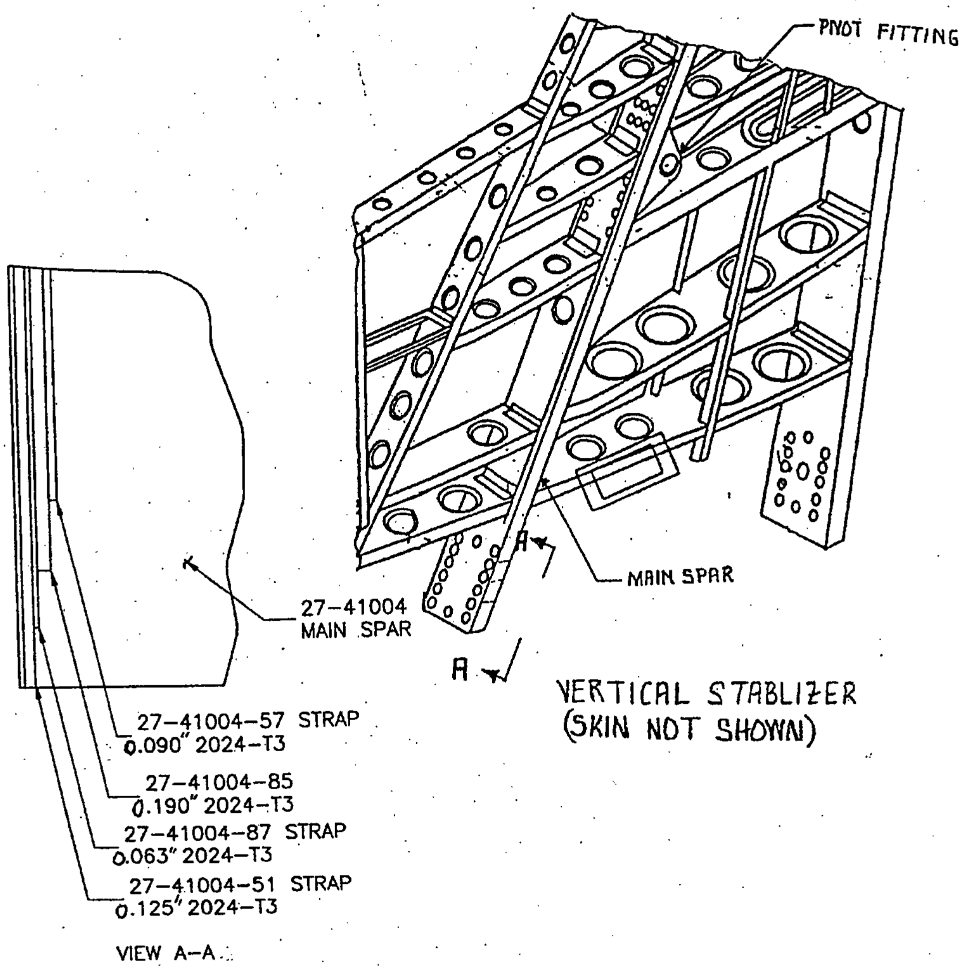


FIGURE 6-31 V1 – SA226 AND SA227 VERTICAL FIN MAIN SPAR CAP STRIPS

December 13, 1996 Analyst: W. Dwyer

ITEM EM1 - SA227 engine mount (27-62114) at firewall

Selection Justification: The attachment of the engine mount at the firewall is subject to local bending because of the different diameters of the mounting bolt head and the tubing at the attach point. This causes high stresses in the 0.190-inch-thick -63 flange (older 27-62078 engine mount for -3 engines had 0.25-inch-thick flange).

Function: This member is the main load path between the engine mount truss and the nacelle.

Environment: The material is in the engine compartment and exposed to radiant heat from the engine. These parts are primed with Alumagrip or Imron primers.

Material: 4130-N steel.

Accessibility: The typical failures one could expect would be cracking in the tube along the circumference of the forward edge of the weld bead. These areas can be checked using a bright light and mirror.

PRIORITIZATION			
Category*	Comments	Ref. Note*	Rank*
1. Operating Stress	Normal operating stress is tension, 20.0 ksi.	a	15
2. Limit Strength	Additional load path through the adjacent members.	b	13
3. Fail Safe	Failure may be apparent without scheduled inspection.	c	11
4. Load Distribution	Major load path with primary fitting.	a	8
5. Susceptibility to Sustained Stress Corrosion	This is a high-resistance alloy. No appreciable residual stresses should be present.	f	0
6. Corrosion	Clad, alodined, and painted.	b_e, b_p	7
7. K_t	Transverse loading of the weld bead.	b	6
8. Accidental Damage	Low. Inside cowling.	b	2
9. Inspect	Visual inspection with good light should detect damaged structure.	d	3
	Total Score		65

*From section 6, the nine categories for durability and damage tolerance ranking.

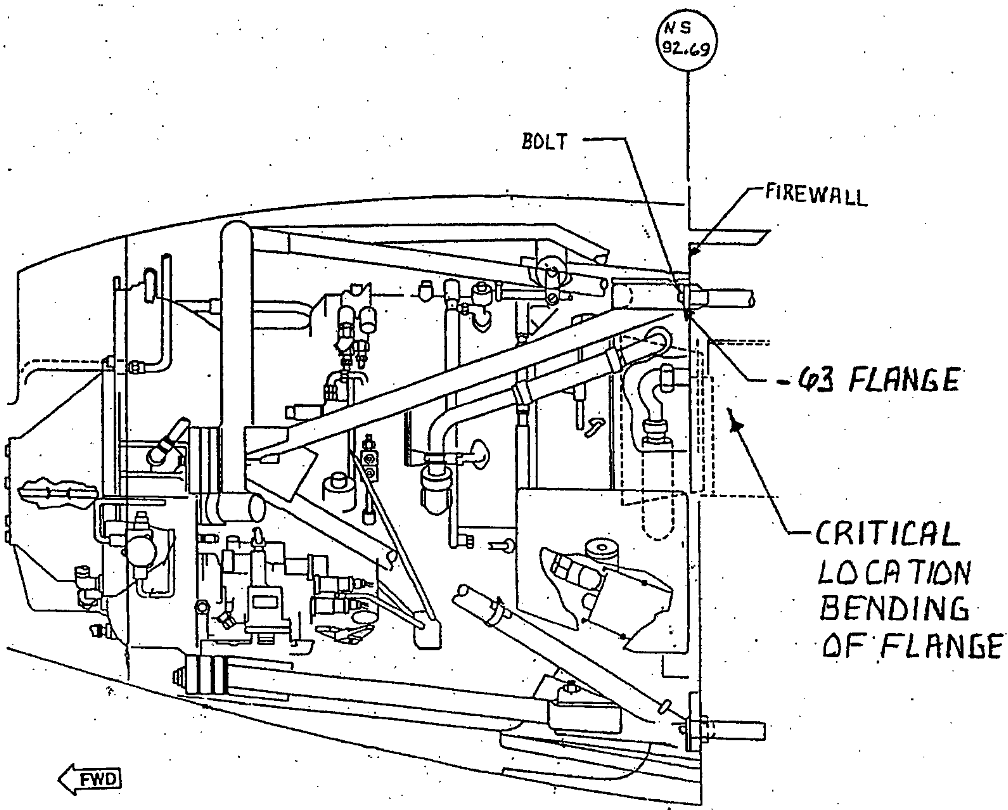


FIGURE 6-32 EM1 - SA227 ENGINE MOUNT AT FIREWALL

February 2, 1996 Analyst: W. Dwyer

ITEM LG2 landing gear cylinder, all Ozone manufactured gear (OAS P/N 5453001-1,-3) applicable to SA226 and SA227 aircraft with a landing weight of 14,000 lbs or less

Selection Justification: This aluminum forging forms the upper end of the landing gear struts. Cracks have occurred in service due to spring back loads. Failure of this forging could cause the wheels to fall off the aircraft or more likely could cause the aircraft to swerve out of control on landing.

Function: This forging attaches the landing gear piston to the airframe.

Environment: The forging is exposed to moisture and runway debris. It is vulnerable to damage from ground equipment and mechanical abuse. T= -40 to +130°F.

Material: 2014-T6 forging, approximately 3.0 inches thick.

Accessibility: Easily accessible to visual inspection.

PRIORITIZATION			
Category*	Comments	Ref. Note*	Rank*
1. Operating Stress	The local stress is about 20 ksi. Service loads are high at the critical location.	b	13
2. Limit Strength	Low margins, single load path.	a	15
3. Fail Safe	Part is not fail safe but easy to inspect.	e	2
4. Load Distribution	Major load path with stress concentration around drag brace attachment.	a	8
5. Susceptibility to Sustained Stress Corrosion	This is a low-resistance alloy.	b	4
6. Corrosion	Single load path structure protected by anodizing the part.	a_e, e_p	4
7. K_t	Reentrant corner in thick section of forging.	c	2
8. Accidental Damage	Moderate probability of damage occurring, frequently inspected area.	d	2
9. Inspect	Requires no special inspection techniques.	e	2
	Total Score		52

*From section 6, the nine categories for durability and damage tolerance ranking.

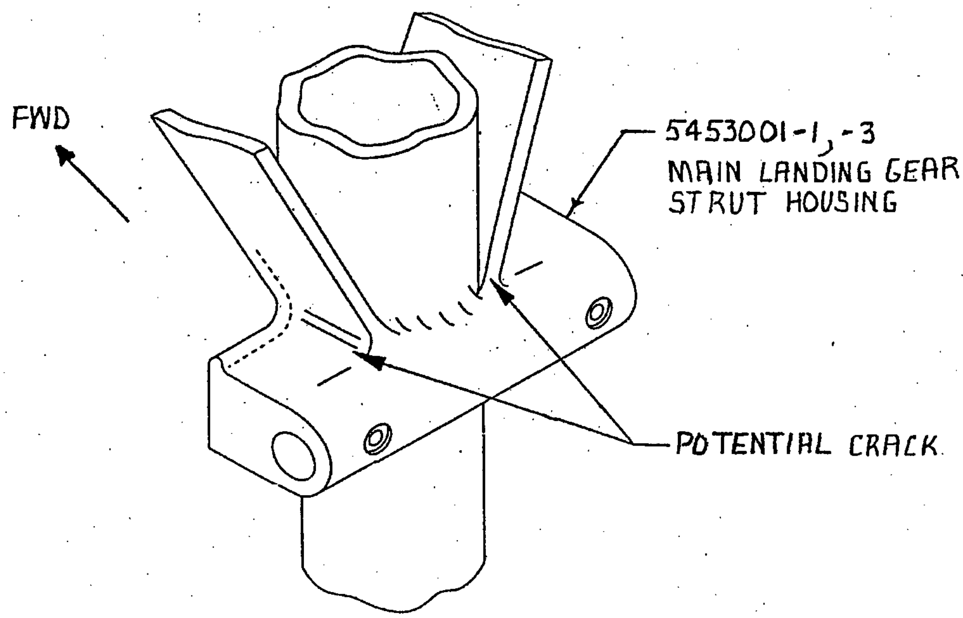


FIGURE 6-33 LG2 - MAIN LANDING GEAR STRUT

TABLE 6-1 PSE LISTING BY RANKING

	Ranking	Crack Growth Ranking	PSE LISTING (Sorted by Ranking)
F6	78	41	SA226/SA227 fuselage frame at cargo door sides (27-22085)
F4	74	37	Fuselage frame at forward cargo door latch , F.S. 454.5 & 455.7 and aft latch F.S. 473.4 & 474.6
F5	73	37	SA226/SA227 fuselage frame at cargo door latch (27-22098) at F.S. 455.7 & 473.4
F13	68	40	SA226/SA227 control column roller bearing
EM1	65	39	SA227 engine mount (27-62114) at firewall
F1	65	24	SA226 T stringer, top centerline near F.S. 330
W1	64	34	SA226 main spar lower cap at W.S. 99.0
W4	63	35	SA227 main spar lower cap at W.S. 99.0
N3	63	29	Nacelle upper longeron to the wing rib attach angles (27-31135 –57/-58) at the wing rib
F2	63	26	SA226/SA227 wing fuselage forward attachment fittings
F3	63	26	SA226/SA227 wing fuselage aft attachment fittings
F9	62	23	SA226 T stringer, bottom centerline aft of F.S. 362
W10	61	31	Skin splice at W.S. 27.103 lower surface inboard of splice
W3	60	32	SA226 rear spar lower cap at W.S. 27.0
N2	60	29	Nacelle upper longeron at the attachment to the wing rib attach angles at the main spar
W11	59	36	SA226 wing lower center section skin at landing light cutout
W2	58	33	SA226 main spar lower cap at W.S. 9.0
F11	57	29	SA226/SA227 forward pressure bulkhead (27-21028)
N1	56	23	SA226/SA227 nacelle upper longeron at the firewall (27-35003)
W5	55	32	SA227 skin splice at W.S. 99.51 lower surface
W9	55	26	Skin splice at W.S. 27.103 lower surface outboard of the rib
F7	54	28	SA226/SA227 cargo door hinge (MS20001-P8)
LG2	52	30	Landing gear cylinder, all Ozone manufactured lightweight gear
W14	50	34	SA227 tip extension at end of outboard fitting main spar lower surface (W.S. 271.02)
W13	49	33	SA227 tip extension at end of outboard fitting rear spar lower surface (W.S. 270.12)
V1	48	22	Vertical fin main spar at the bottom of the pivot fitting
F10	47	26	SA226/SA227 cargo door opening corners
W12	46	28	SA227 tip extension fitting rear spar lower surface (27-31335)
F8	45	24	SA226/SA227 corners of passenger window cutouts
W6	44	26	SA227 wing extension fitting main spar lower surface
H1	43	22	SA226/SA227 horizontal stabilizer station 3.135 rib strap at rear spar (27-43077-1)
H2	43	17	SA226/SA227 horizontal stabilizer pitch trim actuator fittings (27-43062)
W8	41	20	Chordwise skin splice at W.S. 173.944 lower surface
F12	39	19	SA226/SA227 passenger door opening corners
W7	39	18	SA227 lower wing skin on forward side of landing gear trunion (27-31058) at W.S. 113

TABLE 6-2 PSE LISTING BY GROUPS

	Ranking	Crack Growth Ranking	PSE LISTING (Sorted by Groups)
EM1	65	39	SA227 engine mount (27-62114) at firewall
F1	65	24	SA226 T stringer, top centerline near F.S. 330
F10	47	26	SA226/SA227 cargo door opening corners
F11	57	29	SA226/SA227 forward pressure bulkhead (27-21028)
F12	39	19	SA226/SA227 passenger door opening corners
F13	68	40	SA226/SA227 control column roller bearing
F2	63	26	SA226/SA227 wing fuselage forward attachment fittings
F3	63	26	SA226/SA227 wing fuselage aft attachment fittings
F4	74	37	Fuselage frame at forward cargo door latch , F.S. 454.5 & 455.7 and aft latch F.S. 473.4 & 474.6
F5	73	37	SA226/SA227 fuselage frame at cargo door latch (27-22098) at F.S. 455.7 & 473.4
F6	78	41	SA226/SA227 fuselage frame at cargo door sides (27-22085)
F7	54	28	SA226/SA227 cargo door hinge (MS20001-P8)
F8	45	24	SA226/SA227 corners of passenger window cutouts
F9	62	23	SA226 T stringer, bottom centerline aft of F.S. 362
H1	43	22	SA226/SA227 horizontal stabilizer station 3.135 rib strap at rear spar (27-43077-1)
H2	43	17	SA226/SA227 horizontal stabilizer pitch trim actuator fittings (27-43062)
LG2	52	30	Landing gear cylinder, all Ozone manufactured lightweight gear
N1	56	23	SA226/SA227 nacelle upper longeron at the firewall (27-35003)
N2	60	29	Nacelle upper longeron at the attachment to the wing rib attach angles at the main spar
N3	63	29	Nacelle upper longeron to the wing rib attach angles (27-31135 -57/-58) at the wing rib
V1	48	22	Vertical fin main spar at the bottom of the pivot fitting
W1	64	34	SA226 Main spar lower cap at W.S. 99.0
W10	61	31	Skin splice at W.S. 27.103 lower surface inboard of splice
W11	59	36	SA226 wing lower center section skin at landing light cutout
W12	46	28	SA227 tip extension fitting rear spar lower surface (27-31335)
W13	49	33	SA227 tip extension at end of outboard fitting rear spar lower surface (W.S 270.12)
W14	50	34	SA227 tip extension at end of outboard fitting main spar lower surface (W.S 271.02)
W2	58	33	SA226 main spar lower cap at W.S. 9.0
W3	60	32	SA226 rear spar lower cap at W.S. 27.0
W4	63	35	SA227 main spar lower cap at W.S. 99.0
W5	55	32	SA227 skin splice at W.S. 99.51 lower surface
W6	44	26	SA227 wing extension fitting main spar lower surface
W7	39	18	SA227 lower wing skin on forward side of landing gear trunion (27-31058) at W.S. 113
W8	41	20	Chordwise skin splice at W.S. 173.944 lower surface
W9	55	26	Skin splice at W.S. 27.103 lower surface outboard of the rib

6.2 FINITE ELEMENT MODEL

The main landing gear yoke finite element model shown in Figure 6-34 was developed to analyze the stress distribution around the hole in the body due to thermal stress shown in figure 6-35. With small changes this model is also capable of analyzing the stress distribution with cracks emanating from the hole.

The wing finite element model shown in Figure 6-36 was used to analyze the SA227 wing. The distributions were checked during the SA227 wing static test and shown to be within about 1% of the measured stress for the more heavily loaded portions of the wing. These analysis results can be used to determine stresses at locations other than the strain gage locations.

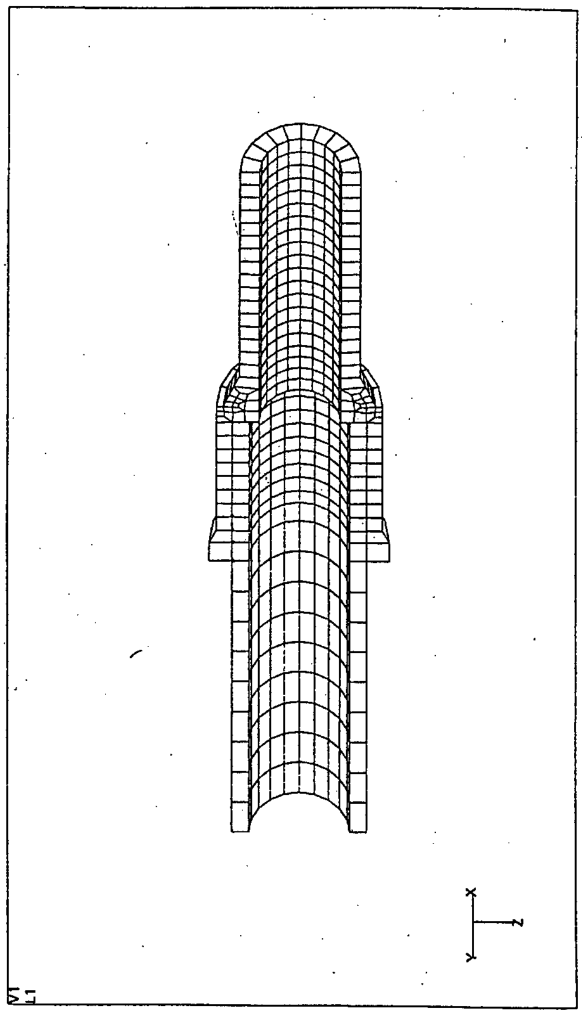


FIGURE 6-34 METRO III MAIN LANDING GEAR FINITE ELEMENT MODEL

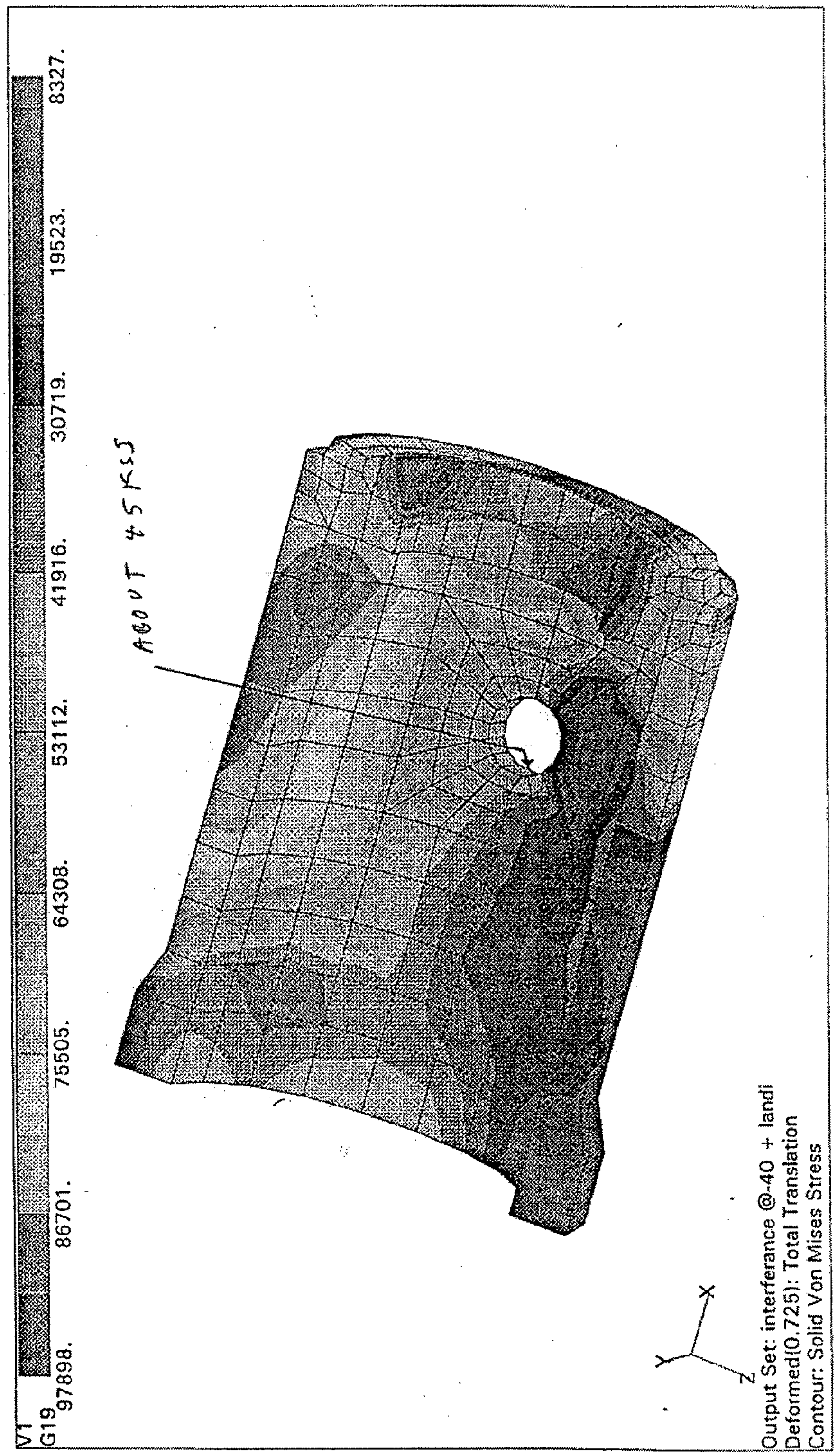


FIGURE 6-35 MAIN LANDING GEAR FINITE ELEMENT MODEL

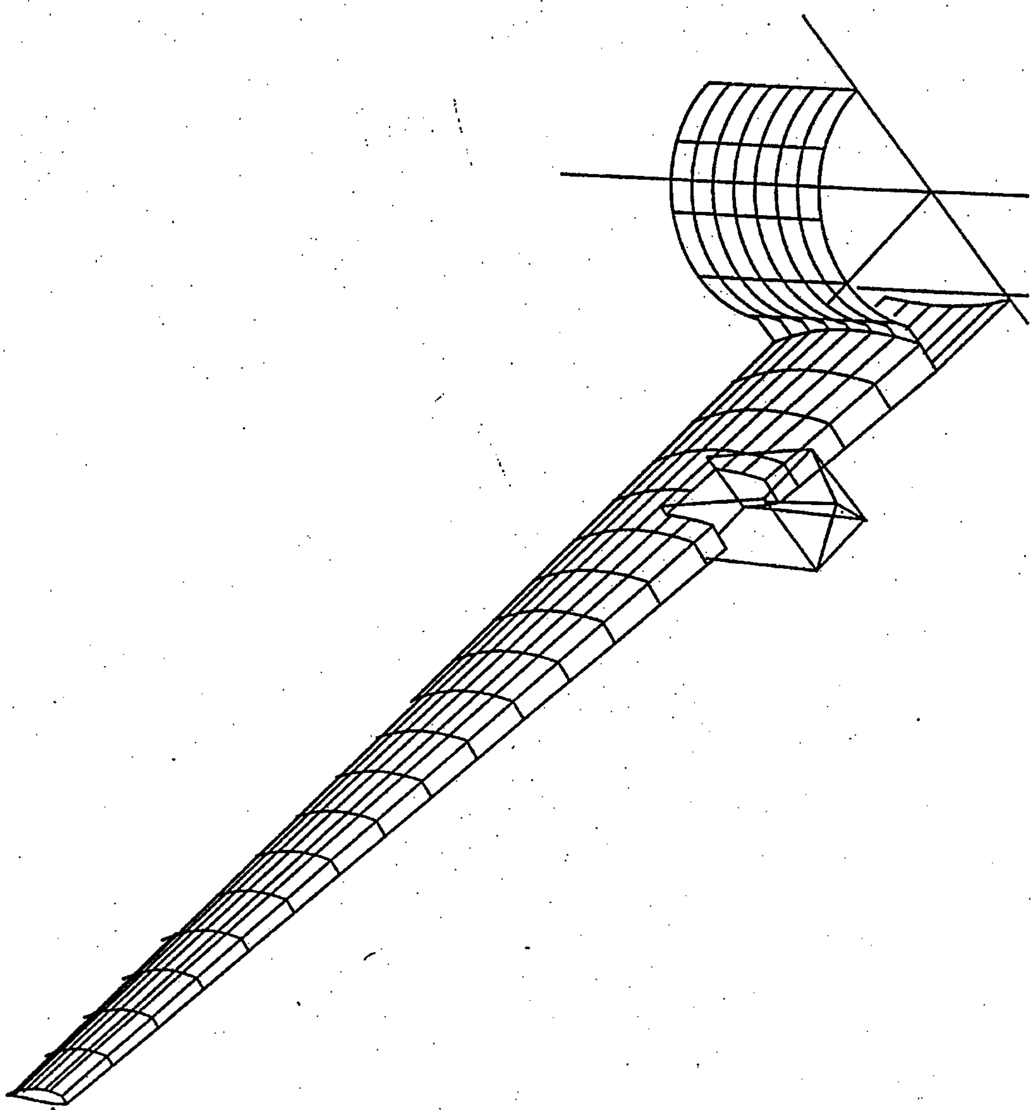


FIGURE 6-36 WING FINITE ELEMENT MODEL

6.3 FATIGUE TEST RESULT

A complete airframe flight by flight fatigue test was performed on a SA226 airframe in 1979. This test simulated 105,000 hours of flight with a loading spectrum derived from reference 9 including both executive and commuter operations. This test led to a series of improvements to the airframe to enhance the durability of the aircraft. As a result of these improvements, there is a variety of structural configurations present in the operational fleet. These different configurations have come about due to changes made at the factory and changes introduced by service bulletins. Significant results from the fatigue test include the following:

Cargo door latch frames:
Fuselage frames at the cargo door have been strengthened by removing lightning holes and increasing frame thickness from 0.040 to 0.071 inch at the latches.

Cargo door opening boundary frames:
The frames have been locally reinforced to allow the door alignment pins to carry the full cargo door load if the latches fail. Stress concentrations at the door sill side frame location have been removed by adding local reinforcements.

Cargo door:
The door has been redesigned to prevent failure of the door if the bottom latches should fail.

Wing centerline rib:
The rib was strengthened to prevent fatigue failure due to loading from wing bending.

Window corners:
Slow growing cracks appeared at the corners of the passenger cabin windows starting at about 72,000 hours of testing. No changes have been made to this area because the cracks are slow growing, appearing at the end of the second projected life of the aircraft, and have not appeared in service.

7. STRESS SPECTRUM FOR CRITICAL STRUCTURAL ELEMENTS

The list of critical structural elements contains elements that are amenable to inspection for incipient failure through crack growth analysis and also items that are not. In the latter category are items like the control column pivot bearing and the engine mount at the firewall. These items are difficult to inspect without complex disassembly and would have short critical crack lengths. These items are candidates for redesign to remove the cause of the element being critical instead of relying on inspections to find cracks. Improved designs are available for both of these elements.

Another class of principal structural elements are those that are subjected to very low stress levels in normal operation. These elements may be damaged in service and must be inspected but they are not subject to cyclic load induced cracking or crack growth.

The elements that are susceptible to fatigue induced crack growth and should be investigated for crack growth characteristics are those with relatively high 1-g stresses or alternating stresses, those with low residual strength, and those with poor fail-safe characteristics. The list of principal structural elements was resorted based on the Ranking of the elements for these three criteria combined and shown in Table 7-1.

The stress spectrum for the critical structural elements was derived by adjusting the stresses measured at the strain gage locations from the loading condition of the strain survey flight condition for the loading condition of the typical flights.

To adjust the wing stresses at the critical locations, the computer program used in the original aircraft certification for symmetric net wing loads was rerun for the actual aircraft gross weights and fuel loads required for the typical flight conditions and for the flight strain survey condition. The net wing moments for these conditions for the wings of the SA226 and SA227 models are presented in Appendix D of reference 20. These analytically derived bending moments were then used to adjust the measured stresses for different loading conditions and different positions on the aircraft. Wing stresses for the SA226 models were obtained by adjusting previously measured stresses recorded in reference 15 for changes in location and loading condition in a similar way. The detailed stress spectrum for elements that are candidates for crack growth analysis are presented in Appendix D of reference 20.

TABLE 7-1 PSE LISTING BY CRACK GROWTH

	Ranking	Crack Growth Ranking	PSE LISTING (Sorted By Crack Growth Ranking)
F6	78	41	SA226/SA227 Fuselage frame at cargo door sides (27-22085)
F13	68	40	SA226/SA227 Control column roller bearing
EM1	65	39	SA227 engine mount (27-62114) at firewall
F4	74	37	Fuselage frame at forward cargo door latch , F.S. 454.5 & 455.7 and aft latch F.S. 473.4 & 474.6
F5	73	37	SA226/SA227 fuselage frame at cargo door latch (27-22098) at F.S. 455.7 & 473.4
W11	59	36	SA226 wing lower center section skin at landing light cutout
W4	63	35	SA227 Main spar lower cap at W.S. 99.0
W1	64	34	SA226 Main spar lower cap at W.S. 99.0
W14	50	34	SA227 tip extension At end of outboard fitting main spar lower surface (W.S 271.02)
W13	49	33	SA227 tip extension At end of outboard fitting rear spar lower surface (W.S 270.12)
W2	58	33	SA226 Main spar lower cap at W.S. 9.0
W3	60	32	SA226 Rear spar lower cap at W.S. 27.0
W5	55	32	SA227 Skin splice at W.S. 99.51 lower surface
W10	61	31	Skin splice at W.S. 27.103 lower surface inboard of splice
LG2	52	30	Landing gear cylinder, all Ozone manufactured lightweight gear
F11	57	29	SA226/SA227 Forward pressure bulkhead (27-21028)
N2	60	29	Nacelle upper longeron at the attachment to the wing rib attach angles at the main spar
N3	63	29	Nacelle upper longeron to the wing rib attach angles (27-31135 -57/-58) at the wing rib
F7	54	28	SA226/SA227 cargo door hinge (MS20001-P8)
W12	46	28	SA227 tip extension fitting rear spar lower surface (27-31335)
W6	44	26	SA227 wing extension fitting main spar lower surface
F10	47	26	SA226/SA227 cargo door opening corners
F2	63	26	SA226/SA227 wing fuselage forward attachment fittings
F3	63	26	SA226/SA227 wing fuselage aft attachment fittings
W9	55	26	Skin splice at W.S. 27.103 lower surface outboard of the rib
F1	65	24	SA226 T stringer, top centerline near F.S. 330
F8	45	24	SA226/SA227 corners of passenger window cutouts
F9	62	23	SA226 T stringer, bottom centerline aft of F.S. 362
N1	56	23	SA226/SA227 Nacelle upper longeron at the firewall (27-35003)
H1	43	22	SA226/SA227 horizontal stabilizer station 3.135 rib strap at rear spar (27-43077-1)
V1	48	22	Vertical fin main spar at the bottom of the pivot fitting
W8	41	20	Chordwise skin splice at W.S. 173.944 lower surface
F12	39	19	SA226/SA227 Passenger door opening corners
W7	39	18	SA227 lower wing skin on forward side of landing gear trunion (27-31058) at W.S. 113
H2	43	17	SA226/SA227 horizontal stabilizer pitch trim actuator fittings (27-43062)

8. REFERENCES

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APPENDIX A—OPERATOR SURVEY DATA

APPENDIX A-1 COMMUTERS OPERATOR SURVEY DATA

Commuter Flight Activity Example Per Flight Database

Typical examples from the Skywest and Horizon Airline flight schedules.

Operator	ORIGIN	DEST	FLT #	Flts/Per Example	Avg Flt. Dist. (nm)	Avg. Flt. Speed (kts)	Avg. Oper. Alt.	Avg. Block Time (Min.)	Avg. Flt. Time (Min)
32 Aircraft Summary:				535	228	234	16778	68	58
HZA	ALW	PDT	A332	7	83.33	250	16000	26	20
HZA	BIL	HLN	A335	7	229.17	250	16000	61	55
HZA	BIL	HLN	A539	6	208.33	250	14000	56	50
HZA	BTM	BIL	A384	6	229.17	250	17000	61	55
HZA	BTM	GEG	A335	7	104.17	250	16000	31	25
HZA	GEG	GTF	A376	7	312.50	250	19000	81	75
HZA	GEG	GTF	A428	7	333.33	250	19000	86	80
HZA	GEG	HLN	A384	7	291.67	250	17000	76	70
HZA	GEG	MSO	A334	7	208.33	250	17000	56	50
HZA	GEG	MSO	A418	7	208.33	250	16000	56	50
HZA	GTF	HLN	A376	1	125.00	250	19000	36	30
HZA	HLN	BTM	A335	7	83.33	250	16000	26	20
HZA	HLN	BTM	A384	7	125.00	250	17000	36	30
HZA	HLN	BTM	A539	6	104.17	250	14000	31	25
HZA	MSO	GEG	A421	7	208.33	250	16000	56	50
HZA	OTH	PDX	A302	6	208.33	250	17000	56	50
HZA	OTH	PDX	A304	7	208.33	250	15000	56	50
HZA	PDT	PDX	A332	7	250.00	250	16000	66	60
HZA	PDT	PDX	A445	7	229.17	250	16000	61	55
HZA	PDX	LMT	A511	6	291.67	250	19000	76	70
HZA	PDX	OTH	A393	6	208.33	250	15000	56	50
HZA	PDX	OTH	A411	7	208.33	250	17000	56	50
HZA	PDX	PDT	A440	7	229.17	250	17000	61	55
HZA	SEA	ALW	A332	7	250.00	250	19000	66	60
SWI	BFL	LAX	5800	7	140.25	187	13000	57	45
SWI	BFL	LAX	5804	7	140.25	187	13000	57	45
SWI	BFL	LAX	5806	7	140.25	187	13000	57	45
SWI	BFL	SMF	5801	7	313.83	269	18000	82	70
SWI	FAT	ONT	5831	7	253.50	234	19000	77	65
SWI	FAT	ONT	5833	6	253.50	234	19000	77	65
SWI	FAT	ONT	5835	7	253.50	234	19000	77	65
SWI	FAT	ONT	5837	6	253.50	234	19000	77	65
SWI	FAT	ONT	5839	6	253.50	234	19000	77	65
SWI	LAX	BFL	5801	7	163.50	218	16000	57	45
SWI	LAX	BFL	5805	7	163.50	218	16000	57	45
SWI	LAX	BFL	5814	7	163.50	218	16000	57	45
SWI	LAX	SAN	5761	7	160.00	192	9000	62	50

APPENDIX A-1 COMMUTERS OPERATOR SURVEY DATA

Commuter Flight Activity Example Per Flight Database (Continued)

Typical examples from the Skywest and Horizon Airline flight schedules.

Oper-ator	ORIGIN	DEST	FLT #	Flts/Per Example	Avg Flt. Dist. (nm)	Avg. Flt. Speed (kts)	Avg. Oper. Alt.	Avg. Block Time (Min.)	Avg. Flt. Time (Min)
32 Aircraft Summary:				535	228	234	16778	68	58
SWI	LAX	SAN	5775	7	160.00	192	9000	62	50
SWI	LAX	SMX	5887	7	192.50	231	16000	62	50
SWI	LAX	SMX	5891	7	192.50	231	16000	62	50
SWI	LAX	SMX	5893	7	192.50	231	16000	62	50
SWI	LAX	SMX	5895	7	192.50	231	16000	62	50
SWI	LAX	SMX	5897	7	192.50	231	16000	62	50
SWI	ONT	FAT	5830	5	277.33	256	22000	77	65
SWI	ONT	FAT	5832	7	277.33	256	22000	77	65
SWI	ONT	FAT	5834	7	277.33	256	22000	77	65
SWI	ONT	FAT	5836	6	277.33	256	22000	77	65
SWI	ONT	FAT	5838	6	277.33	256	22000	77	65
SWI	PSP	ONT	5830	5	97.50	195	10000	42	30
SWI	PSP	ONT	5833	1	97.50	195	10000	42	30
SWI	SAN	SBA	5603	6	245.00	245	16000	72	60
SWI	SAN	SBA	5605	7	245.00	245	16000	72	60
SWI	SAN	SBA	5607	7	245.00	245	16000	72	60
SWI	SAN	SBA	5609	7	245.00	245	16000	72	60
SWI	SAN	SBA	5611	6	245.00	245	16000	72	60
SWI	SBA	SAN	5600	6	226.00	226	21000	72	60
SWI	SBA	SAN	5602	7	226.00	226	21000	72	60
SWI	SBA	SAN	5604	7	226.00	226	21000	72	60
SWI	SBA	SAN	5606	7	226.00	226	21000	72	60
SWI	SBA	SAN	5608	6	226.00	226	21000	72	60
SWI	SBA	SMF	5601	5	365.50	258	18000	97	85
SWI	SBA	SMF	5603	7	365.50	258	18000	97	85
SWI	SBA	SMF	5605	7	365.50	258	18000	97	85
SWI	SBA	SMF	5607	6	365.50	258	18000	97	85
SWI	SBA	SMF	5609	6	365.50	258	18000	97	85
SWI	SBP	SMF	5816	7	211.25	195	18000	77	65
SWI	SBP	SMF	5820	7	211.25	195	18000	77	65
SWI	SBP	SMF	5821	7	211.25	195	18000	77	65
SWI	SMF	BFL	5804	7	277.33	256	17000	77	65
SWI	SMF	SBA	5602	5	361.25	255	17000	97	85
SWI	SMF	SBA	5604	7	361.25	255	17000	97	85
SWI	SMF	SBA	5606	7	361.25	255	17000	97	85
SWI	SMF	SBA	5608	6	361.25	255	17000	97	85
SWI	SMF	SBA	5610	6	361.25	255	17000	97	85

APPENDIX A-1 COMMUTERS OPERATOR SURVEY DATA

Commuter Flight Activity Example Per Flight Database (Continued)

Typical examples from the Skywest and Horizon Airline flight schedules.

Oper-ator	ORIGIN	DEST	FLT #	Flts/Per Example	Avg Flt. Dist. (nm)	Avg. Flt. Speed (kts)	Avg. Oper. Alt.	Avg. Block Time (Min.)	Avg. Flt. Time (Min)
32 Aircraft Summary:				**535**	**228**	**234**	**16778**	**68**	**58**
SWI	SMF	SBP	5819	7	215.58	199	17000	77	65
SWI	SMF	SBP	5822	7	215.58	199	17000	77	65
SWI	SMF	SBP	5824	7	215.58	199	17000	77	65
SWI	SMX	LAX	5888	7	165.00	198	13000	62	50
SWI	SMX	LAX	5892	7	165.00	198	13000	62	50
SWI	SMX	LAX	5894	7	165.00	198	13000	62	50
SWI	SMX	LAX	5896	7	165.00	198	13000	62	50
SWI	SMX	LAX	5898	7	165.00	198	13000	62	50
Total/Avg.				535	228.34	234.01	16777.57	68.35	58.10

APPENDIX A-1 COMMUTERS OPERATOR SURVEY DATA

Commuter Flight Activity Example Per Flight Database

Typical examples from the Skywest and Horizon Airline flight schedules.

Oper-ator	ORIGIN	DEST	FLT #	Flts/Per Example	Avg. Ldgs Per Hr.	Avg. A/C Takeoff Wt.	Avg. A/C Cruising Wt.	Avg. A/C Landing Wt.
32 Aircraft Summary:				535	1.03	12952	12686	12420
HZA	ALW	PDT	A332	7	3.00	12593	12518	12443
HZA	BIL	HLN	A335	7	1.09	11763	11463	11163
HZA	BIL	HLN	A539	6	1.20	11459	11384	11309
HZA	BTM	BIL	A384	6	1.09	13310	13010	12710
HZA	BTM	GEG	A335	7	2.40	11763	11463	11163
HZA	GEG	GTF	A376	7	0.80	12802	12452	12102
HZA	GEG	GTF	A428	7	0.75	14424	14099	13774
HZA	GEG	HLN	A384	7	0.86	13310	13010	12710
HZA	GEG	MSO	A334	7	1.20	12784	12584	12384
HZA	GEG	MSO	A418	7	1.20	13426	13226	13026
HZA	GTF	HLN	A376	1	2.00	12802	12452	12102
HZA	HLN	BTM	A335	7	3.00	11763	11463	11163
HZA	HLN	BTM	A384	7	2.00	13310	13010	12710
HZA	HLN	BTM	A539	6	2.40	11459	11384	11309
HZA	MSO	GEG	A421	7	1.20	14041	13841	13641
HZA	OTH	PDX	A302	6	1.20	12894	12619	12344
HZA	OTH	PDX	A304	7	1.20	12314	12089	11864
HZA	PDT	PDX	A332	7	1.00	14320	14045	13770
HZA	PDT	PDX	A445	7	1.09	13117	12892	12667
HZA	PDX	LMT	A511	6	0.86	13348	13073	12798
HZA	PDX	OTH	A393	6	1.20	13238	12913	12588
HZA	PDX	OTH	A411	7	1.20	13631	13406	13181
HZA	PDX	PDT	A440	7	1.09	13321	13071	12821
HZA	SEA	ALW	A332	7	1.00	12440	12190	11940
SWI	BFL	LAX	5800	7	1.33	12821	12617.5	12414
SWI	BFL	LAX	5804	7	1.33	12821	12617.5	12414
SWI	BFL	LAX	5806	7	1.33	12821	12617.5	12414
SWI	BFL	SMF	5801	7	0.86	13265	12961.5	12658
SWI	FAT	ONT	5831	7	0.92	13088	12781.5	12475
SWI	FAT	ONT	5833	6	0.92	13088	12781.5	12475
SWI	FAT	ONT	5835	7	0.92	13088	12781.5	12475
SWI	FAT	ONT	5837	6	0.92	13088	12781.5	12475
SWI	FAT	ONT	5839	6	0.92	13088	12781.5	12475
SWI	LAX	BFL	5801	7	1.33	12821	12627.5	12434
SWI	LAX	BFL	5805	7	1.33	12821	12627.5	12434
SWI	LAX	BFL	5814	7	1.33	12821	12627.5	12434
SWI	LAX	SAN	5761	7	1.20	12779	12564.5	12350

Commuter Flight Activity Example Per Flight Database (Continued)

Typical examples from the Skywest and Horizon Airline flight schedules.

Oper-ator	ORIGIN	DEST	FLT #	Flts/Per Example	Avg. Ldgs Per Hr.	Avg. A/C Takeoff Wt.	Avg. A/C Cruising Wt.	Avg. A/C Landing Wt.
	32 Aircraft Summary:			535	1.03	12952	12686	12420
SWI	LAX	SAN	5775	7	1.20	12779	12564.5	12350
SWI	LAX	SMX	5887	7	1.20	12838	12624.5	12411
SWI	LAX	SMX	5891	7	1.20	12838	12624.5	12411
SWI	LAX	SMX	5893	7	1.20	12838	12624.5	12411
SWI	LAX	SMX	5895	7	1.20	12838	12624.5	12411
SWI	LAX	SMX	5897	7	1.20	12838	12624.5	12411
SWI	ONT	FAT	5830	5	0.92	12988	12727	12466
SWI	ONT	FAT	5832	7	0.92	12988	12727	12466
SWI	ONT	FAT	5834	7	0.92	12988	12727	12466
SWI	ONT	FAT	5836	6	0.92	12988	12727	12466
SWI	ONT	FAT	5838	6	0.92	12988	12727	12466
SWI	PSP	ONT	5830	5	2.00	12671	12545	12419
SWI	PSP	ONT	5833	1	2.00	12671	12545	12419
SWI	SAN	SBA	5603	6	1.00	12729	12477	12225
SWI	SAN	SBA	5605	7	1.00	12729	12477	12225
SWI	SAN	SBA	5607	7	1.00	12729	12477	12225
SWI	SAN	SBA	5609	7	1.00	12729	12477	12225
SWI	SAN	SBA	5611	6	1.00	12729	12477	12225
SWI	SBA	SAN	5600	6	1.00	12829	12545	12261
SWI	SBA	SAN	5602	7	1.00	12829	12545	12261
SWI	SBA	SAN	5604	7	1.00	12829	12545	12261
SWI	SBA	SAN	5606	7	1.00	12829	12545	12261
SWI	SBA	SAN	5608	6	1.00	12829	12545	12261
SWI	SBA	SMF	5601	5	0.71	13083	12711.5	12340
SWI	SBA	SMF	5603	7	0.71	13083	12711.5	12340
SWI	SBA	SMF	5605	7	0.71	13083	12711.5	12340
SWI	SBA	SMF	5607	6	0.71	13083	12711.5	12340
SWI	SBA	SMF	5609	6	0.71	13083	12711.5	12340
SWI	SBP	SMF	5816	7	0.92	13098	12789	12480
SWI	SBP	SMF	5820	7	0.92	13098	12789	12480
SWI	SBP	SMF	5821	7	0.92	13098	12789	12480
SWI	SMF	BFL	5804	7	0.92	13365	13035	12705
SWI	SMF	SBA	5602	5	0.71	13183	12804	12425
SWI	SMF	SBA	5604	7	0.71	13183	12804	12425
SWI	SMF	SBA	5606	7	0.71	13183	12804	12425
SWI	SMF	SBA	5608	6	0.71	13183	12804	12425
SWI	SMF	SBA	5610	6	0.71	13183	12804	12425

APPENDIX A-1 COMMUTERS OPERATOR SURVEY DATA

Commuter Flight Activity Example Per Flight Database (Continued)

Typical examples from the Skywest and Horizon Airline flight schedules.

Oper-ator	ORIGIN	DEST	FLT #	Flts/Per Example	Avg. Ldgs Per Hr.	Avg. A/C Takeoff Wt.	Avg. A/C Cruising Wt.	Avg. A/C Landing Wt.
32 Aircraft Summary:				**535**	**1.03**	**12952**	**12686**	**12420**
SWI	SMF	SBP	5819	7	0.92	13255	12956.5	12658
SWI	SMF	SBP	5822	7	0.92	13255	12956.5	12658
SWI	SMF	SBP	5824	7	0.92	13255	12956.5	12658
SWI	SMX	LAX	5888	7	1.20	12938	12698	12458
SWI	SMX	LAX	5892	7	1.20	12938	12698	12458
SWI	SMX	LAX	5894	7	1.20	12938	12698	12458
SWI	SMX	LAX	5896	7	1.20	12938	12698	12458
SWI	SMX	LAX	5898	7	1.20	12938	12698	12458
Total/Avg.				535	1.03	12952.16	12686.0	12420

APPENDIX A-1 COMMUTERS OPERATOR SURVEY DATA

Commuter Flight Activity Example Per Flight Database

Typical examples from the Skywest and Horizon Airline flight schedules.

Oper-ator	ORIGIN	DEST	FLT #	Flts/Per Example	Avg. Pay-load (lbs)	Avg. Takeoff Fuel Wt. (lbs)	Avg. Flt. Fuel Wt.(lbs)	Avg. Block Fuel (lbs)
32 Aircraft Summary:				535	1791	1636	1370	532
HZA	ALW	PDT	A332	7	2263	950	875	150.0
HZA	BIL	HLN	A335	7	990	1500	1200	600.0
HZA	BIL	HLN	A539	6	418	1500	1425	150.0
HZA	BTM	BIL	A384	6	1530	1750	1450	600.0
HZA	BTM	GEG	A335	7	990	1500	1200	600.0
HZA	GEG	GTF	A376	7	1761	1500	1150	700.0
HZA	GEG	GTF	A428	7	2753	1950	1625	650.0
HZA	GEG	HLN	A384	7	1530	1750	1450	600.0
HZA	GEG	MSO	A334	7	1626	2050	1850	400.0
HZA	GEG	MSO	A418	7	2756	1450	1250	400.0
HZA	GTF	HLN	A376	1	1761	1500	1150	700.0
HZA	HLN	BTM	A335	7	990	1500	1200	600.0
HZA	HLN	BTM	A384	7	1530	1750	1450	600.0
HZA	HLN	BTM	A539	6	418	1500	1425	150.0
HZA	MSO	GEG	A421	7	3066	1550	1350	400.0
HZA	OTH	PDX	A302	6	1727	1750	1475	550.0
HZA	OTH	PDX	A304	7	2137	1400	1175	450.0
HZA	PDT	PDX	A332	7	3040	1500	1225	550.0
HZA	PDT	PDX	A445	7	2404	1500	1275	450.0
HZA	PDX	LMT	A511	6	2546	1450	1175	550.0
HZA	PDX	OTH	A393	6	2899	1550	1225	650.0
HZA	PDX	OTH	A411	7	2472	2000	1775	450.0
HZA	PDX	PDT	A440	7	1410	2000	1750	500.0
HZA	SEA	ALW	A332	7	1560	1500	1250	500.0
SWI	BFL	LAX	5800	7	1761	1500	1296.5	407.0
SWI	BFL	LAX	5804	7	1761	1500	1296.5	407.0
SWI	BFL	LAX	5806	7	1761	1500	1296.5	407.0
SWI	BFL	SMF	5801	7	2005	1700	1396.5	607.0
SWI	FAT	ONT	5831	7	1778	1750	1443.5	613.0
SWI	FAT	ONT	5833	6	1778	1750	1443.5	613.0
SWI	FAT	ONT	5835	7	1778	1750	1443.5	613.0
SWI	FAT	ONT	5837	6	1778	1750	1443.5	613.0
SWI	FAT	ONT	5839	6	1778	1750	1443.5	613.0
SWI	LAX	BFL	5801	7	1761	1500	1306.5	387.0
SWI	LAX	BFL	5805	7	1761	1500	1306.5	387.0
SWI	LAX	BFL	5814	7	1761	1500	1306.5	387.0
SWI	LAX	SAN	5761	7	1719	1500	1285.5	429.0

Commuter Flight Activity Example Per Flight Database (Continued)

Typical examples from the Skywest and Horizon Airline flight schedules.

Operator	ORIGIN	DEST	FLT #	Flts/Per Example	Avg. Payload (lbs)	Avg. Takeoff Fuel Wt. (lbs)	Avg. Flt. Fuel Wt.(lbs)	Avg. Block Fuel (lbs)
32 Aircraft Summary:				535	1791	1636	1370	532
SWI	LAX	SAN	5775	7	1719	1500	1285.5	429.0
SWI	LAX	SMX	5887	7	1778	1500	1286.5	427.0
SWI	LAX	SMX	5891	7	1778	1500	1286.5	427.0
SWI	LAX	SMX	5893	7	1778	1500	1286.5	427.0
SWI	LAX	SMX	5895	7	1778	1500	1286.5	427.0
SWI	LAX	SMX	5897	7	1778	1500	1286.5	427.0
SWI	ONT	FAT	5830	5	1778	1650	1389	522.0
SWI	ONT	FAT	5832	7	1778	1650	1389	522.0
SWI	ONT	FAT	5834	7	1778	1650	1389	522.0
SWI	ONT	FAT	5836	6	1778	1650	1389	522.0
SWI	ONT	FAT	5838	6	1778	1650	1389	522.0
SWI	PSP	ONT	5830	5	1761	1350	1224	252.0
SWI	PSP	ONT	5833	1	1761	1350	1224	252.0
SWI	SAN	SBA	5603	6	1569	1600	1348	504.0
SWI	SAN	SBA	5605	7	1569	1600	1348	504.0
SWI	SAN	SBA	5607	7	1569	1600	1348	504.0
SWI	SAN	SBA	5609	7	1569	1600	1348	504.0
SWI	SAN	SBA	5611	6	1569	1600	1348	504.0
SWI	SBA	SAN	5600	6	1569	1700	1416	568.0
SWI	SBA	SAN	5602	7	1569	1700	1416	568.0
SWI	SBA	SAN	5604	7	1569	1700	1416	568.0
SWI	SBA	SAN	5606	7	1569	1700	1416	568.0
SWI	SBA	SAN	5608	6	1569	1700	1416	568.0
SWI	SBA	SMF	5601	5	1723	1800	1428.5	743.0
SWI	SBA	SMF	5603	7	1723	1800	1428.5	743.0
SWI	SBA	SMF	5605	7	1723	1800	1428.5	743.0
SWI	SBA	SMF	5607	6	1723	1800	1428.5	743.0
SWI	SBA	SMF	5609	6	1723	1800	1428.5	743.0
SWI	SBP	SMF	5816	7	1838	1700	1391	618.0
SWI	SBP	SMF	5820	7	1838	1700	1391	618.0
SWI	SBP	SMF	5821	7	1838	1700	1391	618.0
SWI	SMF	BFL	5804	7	2005	1800	1470	660.0
SWI	SMF	SBA	5602	5	1723	1900	1521	758.0
SWI	SMF	SBA	5604	7	1723	1900	1521	758.0
SWI	SMF	SBA	5606	7	1723	1900	1521	758.0
SWI	SMF	SBA	5608	6	1723	1900	1521	758.0
SWI	SMF	SBA	5610	6	1723	1900	1521	758.0

Commuter Flight Activity Example Per Flight Database (Continued)

Typical examples from the Skywest and Horizon Airline flight schedules.

Oper-ator	ORIGIN	DEST	FLT #	Flts/Per Example	Avg. Pay-load (lbs)	Avg. Takeoff Fuel Wt. (lbs)	Avg. Flt. Fuel Wt.(lbs)	Avg. Block Fuel (lbs)
32 Aircraft Summary:				**535**	**1791**	**1636**	**1370**	**532**
SWI	SMF	SBP	5819	7	2095	1600	1301.5	597.0
SWI	SMF	SBP	5822	7	2095	1600	1301.5	597.0
SWI	SMF	SBP	5824	7	2095	1600	1301.5	597.0
SWI	SMX	LAX	5888	7	1778	1600	1360	480.0
SWI	SMX	LAX	5892	7	1778	1600	1360	480.0
SWI	SMX	LAX	5894	7	1778	1600	1360	480.0
SWI	SMX	LAX	5896	7	1778	1600	1360	480.0
SWI	SMX	LAX	5898	7	1778	1600	1360	480.0
Total/Avg.				535	1790.74	1635.70	1369.51	532.4

APPENDIX A-1 COMMUTERS OPERATOR SURVEY DATA

Commuter Flight Activity Example Per Flight Database

Typical examples from the Skywest and Horizon Airline flight schedules.

Oper-ator	ORIGIN	DEST	FLT #	Flts/Per Example	Avg. Ldging Fuel Wt. (lbs)
	32 Aircraft Summary:			535	1103
HZA	ALW	PDT	A332	7	800
HZA	BIL	HLN	A335	7	900
HZA	BIL	HLN	A539	6	1350
HZA	BTM	BIL	A384	6	1150
HZA	BTM	GEG	A335	7	900
HZA	GEG	GTF	A376	7	800
HZA	GEG	GTF	A428	7	1300
HZA	GEG	HLN	A384	7	1150
HZA	GEG	MSO	A334	7	1650
HZA	GEG	MSO	A418	7	1050
HZA	GTF	HLN	A376	1	800
HZA	HLN	BTM	A335	7	900
HZA	HLN	BTM	A384	7	1150
HZA	HLN	BTM	A539	6	1350
HZA	MSO	GEG	A421	7	1150
HZA	OTH	PDX	A302	6	1200
HZA	OTH	PDX	A304	7	950
HZA	PDT	PDX	A332	7	950
HZA	PDT	PDX	A445	7	1050
HZA	PDX	LMT	A511	6	900
HZA	PDX	OTH	A393	6	900
HZA	PDX	OTH	A411	7	1550
HZA	PDX	PDT	A440	7	1500
HZA	SEA	ALW	A332	7	1000
SWI	BFL	LAX	5800	7	1093
SWI	BFL	LAX	5804	7	1093
SWI	BFL	LAX	5806	7	1093
SWI	BFL	SMF	5801	7	1093
SWI	FAT	ONT	5831	7	1137
SWI	FAT	ONT	5833	6	1137
SWI	FAT	ONT	5835	7	1137
SWI	FAT	ONT	5837	6	1137
SWI	FAT	ONT	5839	6	1137
SWI	LAX	BFL	5801	7	1113
SWI	LAX	BFL	5805	7	1113
SWI	LAX	BFL	5814	7	1113
SWI	LAX	SAN	5761	7	1071

APPENDIX A-1 COMMUTERS OPERATOR SURVEY DATA

Commuter Flight Activity Example Per Flight Database (Continued)

Typical examples from the Skywest and Horizon Airline flight schedules.

Oper-ator	ORIGIN	DEST	FLT #	Flts/Per Example	Avg. Ldging Fuel Wt. (lbs)
	32 Aircraft Summary:			**535**	**1103**
SWI	LAX	SAN	5775	7	1071
SWI	LAX	SMX	5887	7	1073
SWI	LAX	SMX	5891	7	1073
SWI	LAX	SMX	5893	7	1073
SWI	LAX	SMX	5895	7	1073
SWI	LAX	SMX	5897	7	1073
SWI	ONT	FAT	5830	5	1128
SWI	ONT	FAT	5832	7	1128
SWI	ONT	FAT	5834	7	1128
SWI	ONT	FAT	5836	6	1128
SWI	ONT	FAT	5838	6	1128
SWI	PSP	ONT	5830	5	1098
SWI	PSP	ONT	5833	1	1098
SWI	SAN	SBA	5603	6	1096
SWI	SAN	SBA	5605	7	1096
SWI	SAN	SBA	5607	7	1096
SWI	SAN	SBA	5609	7	1096
SWI	SAN	SBA	5611	6	1096
SWI	SBA	SAN	5600	6	1132
SWI	SBA	SAN	5602	7	1132
SWI	SBA	SAN	5604	7	1132
SWI	SBA	SAN	5606	7	1132
SWI	SBA	SAN	5608	6	1132
SWI	SBA	SMF	5601	5	1057
SWI	SBA	SMF	5603	7	1057
SWI	SBA	SMF	5605	7	1057
SWI	SBA	SMF	5607	6	1057
SWI	SBA	SMF	5609	6	1057
SWI	SBP	SMF	5816	7	1082
SWI	SBP	SMF	5820	7	1082
SWI	SBP	SMF	5821	7	1082
SWI	SMF	BFL	5804	7	1140
SWI	SMF	SBA	5602	5	1142
SWI	SMF	SBA	5604	7	1142
SWI	SMF	SBA	5606	7	1142
SWI	SMF	SBA	5608	6	1142
SWI	SMF	SBA	5610	6	1142

Commuter Flight Activity Example Per Flight Database (Continued)

Typical examples from the Skywest and Horizon Airline flight schedules.

Oper-ator	ORIGIN	DEST	FLT #	Flts/Per Example	Avg. Ldging Fuel Wt. (lbs)
			32 Aircraft Summary:	535	1103
SWI	SMF	SBP	5819	7	1003
SWI	SMF	SBP	5822	7	1003
SWI	SMF	SBP	5824	7	1003
SWI	SMX	LAX	5888	7	1120
SWI	SMX	LAX	5892	7	1120
SWI	SMX	LAX	5894	7	1120
SWI	SMX	LAX	5896	7	1120
SWI	SMX	LAX	5898	7	1120
			Total/Avg.	535	1103.32

APPENDIX A-2 CARGO OPERATOR SURVEY DATA

Commuter Flight Activity Example Per Flight Database

Typical examples from Merlin Express' Airline flight schedule.

Oper-ator	Unit	Flight #	Flts/Per Example	Avg Seg. Distance	Avg. Flt. Speed (kts)	Avg. Oper. Alt.	Avg. Block Time (Min.)	Avg. Flt. Time (Min)
31 A/C Summary:			248	304	227	19827	90	79
MER	AIR	9821	6	117.00	185.2	8000	45.4	37.9
MER	AIR	9822	7	117.00	191.8	21000	45.1	36.6
MER	CIF	632	1	242.00	217.0	21000	77.5	66.9
MER	CIF	1931	4	240.00	224.0	21000	75.1	64.3
MER	CIF	1971	7	268.00	237.5	21000	85.5	67.7
MER	CIF	1972	3	268.00	227.8	21000	83.4	70.6
MER	CIF	6402	1	112.00	212.0	8000	39.7	31.7
MER	CIF	6691	13	242.00	208.6	21000	80.4	69.6
MER	CIF	6692	11	242.00	217.0	21000	77.5	66.9
MER	CIF	6694	4	242.00	217.0	21000	77.5	66.9
MER	CIF	6801	10	474.00	227.3	21000	138.6	125.1
MER	CIF	6802	7	474.00	246.7	21000	125.4	115.3
MER	CIF	6901	10	172.00	212.3	16000	61.5	48.6
MER	CIF	6902	10	172.00	220.0	16000	56.6	46.9
MER	CIF	6903	10	302.00	251.7	21000	85.1	72
MER	CIF	6904	8	152.10	207.7	16000	52.25	43.94
MER	FED	7010	9	312.00	252.1	21000	86.14	74.27
MER	FED	7024	11	506.00	231.1	21000	140	131.4
MER	FED	7025	9	395.00	233.0	21000	108.3	101.7
MER	FED	8010	11	392.00	232.2	21000	114.8	101.3
MER	FED	8024	12	506.00	237.9	21000	136.6	127.6
MER	FED	8025	9	395.00	235.8	21000	110.1	100.5
MER	UPS	627	2	202.00	204.0	21000	69	59.4
MER	UPS	1820	5	203.00	226.0	21000	63.7	53.9
MER	UPS	1870	7	225.00	229.6	21000	67.1	58.8
MER	UPS	1879	6	225.00	217.4	21000	70.8	62.1
MER	UPS	1911	3	176.00	234.7	16000	55.5	45
MER	UPS	1912	8	271.00	222.7	21000	82.2	73
MER	UPS	1941	9	240.00	238.8	21000	70.6	60.3
MER	UPS	1942	10	240.00	219.2	21000	75	65.7
MER	UPS	1972	6	137.00	228.3	16000	48	36
MER	UPS	7009	7	543.00	232.9	21000	149.1	139.9
MER	UPS	8009	9	543.00	241.7	21000	147.2	134.8
MER	UPS	9936	3	138.67	241.9	16000	43.1	34.4
Total/Avg.			248	304.11	226.66	19826.61	89.94	79.44

APPENDIX A-2 CARGO OPERATOR SURVEY DATA

Commuter Flight Activity Example Per Flight Database (Continued)

Typical examples from Merlin Express' Airline flight schedule.

Oper-ator	Unit	Flight #	Flts/Per Example	Avg. Ldgs Per Hr.	Avg. A/C Takeoff Wt.	Avg. A/C Cruising Wt.	Avg. A/C Landing Wt.	Avg. Pay-load (lbs)
31 A/C Summary:			**248**	**0.76**	**13322**	**12861**	**12377**	**2062**
MER	AIR	9821	6	1.58	11972	11722	11472	1023.2
MER	AIR	9822	7	1.64	13746	13496	13246	2733.6
MER	CIF	632	1	0.90	13626	13276	12926	3104
MER	CIF	1931	4	0.93	14218	13818	13418	3123
MER	CIF	1971	7	0.89	14041	13641	13241	3117
MER	CIF	1972	3	0.85	14020	13587	13154	2996
MER	CIF	6402	1	1.89	11985	11685	11385	410
MER	CIF	6691	13	0.86	13854	13449	13045	2607
MER	CIF	6692	11	0.90	13763	13363	12963	3198
MER	CIF	6694	4	0.90	12938	12551	12163	2008
MER	CIF	6801	10	0.48	13026	12361	11696	1249
MER	CIF	6802	7	0.52	12249	11520	10792	376
MER	CIF	6901	10	1.23	12364	12065	11765	1371
MER	CIF	6902	10	1.28	12517	12227	11937	2038
MER	CIF	6903	10	0.83	13138	12693	12248	2276
MER	CIF	6904	8	1.37	12298	11986	11673	1222
MER	FED	7010	9	0.81	12760	12227	11694	908
MER	FED	7024	11	0.46	13534	12832	12129	1257
MER	FED	7025	9	0.59	11892	11297	10703	706
MER	FED	8010	11	0.59	14414	13859	13305	3169
MER	FED	8024	12	0.47	14966	14268	13570	2860
MER	FED	8025	9	0.60	13660	13068	12476	1679
MER	UPS	627	2	1.01	13497	13097	12697	1720
MER	UPS	1820	5	1.11	13294	12894	12494	2229
MER	UPS	1870	7	1.02	13636	13243	12850	2885
MER	UPS	1879	6	0.97	12863	12463	12063	1901
MER	UPS	1911	3	1.33	12544	12311	12077	1701
MER	UPS	1912	8	0.82	13600	13131	12663	2646
MER	UPS	1941	9	1.00	12875	12475	12075	1946
MER	UPS	1942	10	0.91	13225	12825	12425	2352
MER	UPS	1972	6	1.67	13860	13535	13210	2867
MER	UPS	7009	7	0.43	13146	12425	11703	1041
MER	UPS	8009	9	0.45	14306	13595	12884	2660
MER	UPS	9936	3	1.74	12902	12652	12402	1951
		Total/Avg.	248	0.76	13321.93	12860.60	12376.54	2061.93

APPENDIX A-2 CARGO OPERATOR SURVEY DATA

Commuter Flight Activity Example Per Flight Database (Continued)

Typical examples from Merlin Express' Airline flight schedule.

Operator	Unit	Flight #	Flts/Per Example	Avg. Takeoff Fuel Wt. (lbs)	* Avg. Flt. Fuel Wt.(lbs)	Avg. Block Fuel (lbs)	Avg. Ldging Fuel Wt. (lbs)
31 A/C Summary:			**248**	**2054**	**1594**	**945**	**1109**
MER	AIR	9821	6	1583.3	1333	500	1083
MER	AIR	9822	7	1828.6	1579	500	1329
MER	CIF	632	1	1500	1150	700	800
MER	CIF	1931	4	1950	1550	800	1150
MER	CIF	1971	7	1629	1229	800	829
MER	CIF	1972	3	1733	1300	867	867
MER	CIF	6402	1	2300	2000	600	1700
MER	CIF	6691	13	2162	1757	809	1352
MER	CIF	6692	11	1527	1127	800	727
MER	CIF	6694	4	1725	1338	775	950
MER	CIF	6801	10	2480	1815	1330	1150
MER	CIF	6802	7	2614	1886	1457	1157
MER	CIF	6901	10	1845	1545	599	1246
MER	CIF	6902	10	1250	960	580	670
MER	CIF	6903	10	1830	1385	890	940
MER	CIF	6904	8	2088	1775	625	1463
MER	FED	7010	9	2583	2050	1066	1518
MER	FED	7024	11	2516	1814	1405	1111
MER	FED	7025	9	2178	1583	1189	989
MER	FED	8010	11	1952	1398	1109	843
MER	FED	8024	12	2354	1656	1396	958
MER	FED	8025	9	2950	2358	1183	1767
MER	UPS	627	2	2300	1900	800	1500
MER	UPS	1820	5	1920	1520	800	1120
MER	UPS	1870	7	1786	1393	786	1000
MER	UPS	1879	6	1833	1433	800	1033
MER	UPS	1911	3	1833	1600	467	1367
MER	UPS	1912	8	1950	1481	938	1013
MER	UPS	1941	9	1989	1589	800	1189
MER	UPS	1942	10	1950	1550	800	1150
MER	UPS	1972	6	1767	1442	650	1117
MER	UPS	7009	7	2707	1986	1443	1264
MER	UPS	8009	9	2222	1511	1422	800
MER	UPS	9936	3	1867	1617	500	1367
Total/Avg.			248	2054.44	1594.30	945.38	1109.05

APPENDIX A-3 EXECUTIVE - MSA OPERATOR SURVEY DATA

Executive Flight Activity Example Per Flight Database

Typical examples from Military Support Aircraft (MSA) flight schedule.

Operator	Unit	Sortie Date	Flts/Per Example	Avg Seg. Distance	Avg. Seg. Speed (kts)	Avg. Oper. Alt.	Avg. Block Time (Min.)	Avg. Flt. Time (Min)
		7 A/C Summary:	190	487	244	17463	N/A	119
MSA	802M	12/3/96	1	331.5	255	20000		78
MSA	802M	12/3/96	1	338	260	21000		78
MSA	802M	12/3/96	1	265	265	19000		60
MSA	802M	12/3/96	1	270	270	16000		60
MSA	802M	12/4/96	1	397.5	265	20000		90
MSA	802M	12/4/96	1	265	265	21000		60
MSA	802M	12/6/96	1	331.5	255	21000		78
MSA	802M	12/6/96	1	390	260	20000		90
MSA	802M	12/8/96	1	561	255	20000		132
MSA	802M	12/8/96	1	390	260	20000		90
MSA	802M	12/8/96	1	816	272	20000		180
MSA	802M	12/9/96	1	600	250	21000		144
MSA	802M	12/9/96	1	676	260	21000		156
MSA	802M	12/9/96	1	598	260	20000		138
MSA	802M	12/9/96	1	636	265	21000		144
MSA	802M	12/10/96	1	536.8	244	21000		132
MSA	802M	12/10/96	1	648	270	16000		144
MSA	802M	12/12/96	1	583	265	22000		132
MSA	802M	12/12/96	1	534	267	21000		120
MSA	802M	12/12/96	1	192.5	275	15000		42
MSA	802M	12/13/96	1	506	253	21000		120
MSA	802M	12/13/96	1	359.8	257	20000		84
MSA	802M	12/13/96	1	604.9	263	20000		138
MSA	802M	12/13/96	1	609.5	265	20000		138
MSA	802M	12/13/96	1	493.2	274	21000		108
MSA	802M	12/31/96	1	120	240	7500		30
MSA	802M	1/3/97	1	932.4	252	20000		222
MSA	802M	1/5/97	1	715.5	265	21000		162
MSA	802M	1/7/97	1	266	266	21000		60
MSA	802M	1/7/97	1	453.9	267	21000		102
MSA	802M	1/7/97	1	109.2	273	8000		24
MSA	802M	1/7/97	1	855.6	276	16000		186
MSA	802M	1/8/97	1	234	260	16000		54
MSA	802M	1/8/97	1	220	275	21000		48
MSA	802M	1/8/97	1	412.5	275	20000		90
MSA	802M	1/8/97	1	330	275	21000		72
MSA	802M	1/10/97	1	648	270	21000		144

APPENDIX A-3 EXECUTIVE - MSA OPERATOR SURVEY DATA

Executive Flight Activity Example Per Flight Database (Continued)

Typical examples from Military Support Aircraft (MSA) flight schedule.

Oper-ator	Unit	Sortie Date	Flts/Per Example	Avg Seg. Distance	Avg. Seg. Speed (kts)	Avg. Oper. Alt.	Avg. Block Time (Min.)	Avg. Flt. Time (Min)
	7 A/C Summary:		190	487	244	17463	N/A	119
MSA	802M	1/10/97	1	621	270	20000		138
MSA	802M	1/12/97	1	632.5	275	21000		138
MSA	802M	1/12/97	1	550	275	16000		120
MSA	802M	1/12/97	1	276	276	16000		60
MSA	802M	1/13/97	1	605	275	21000		132
MSA	802M	1/13/97	1	702	270	20000		156
MSA	802M	1/14/97	1	486	270	21000		108
MSA	802M	1/14/97	1	360	180	3000		120
MSA	802M	1/14/97	1	412.5	275	20000		90
MSA	802M	1/15/97	1	286	260	12000		66
MSA	802M	1/15/97	1	286	260	11000		66
MSA	802M	1/17/97	1	129.5	259	10000		30
MSA	802M	1/17/97	1	228.6	254	21000		54
MSA	802M	1/17/97	1	182	260	19000		42
MSA	802M	1/17/97	1	370.5	285	16000		78
MSA	802M	1/19/97	1	275	275	21000		60
MSA	802M	1/19/97	1	217.6	272	16000		48
MSA	802M	1/19/97	1	356.2	274	12000		78
MSA	802M	1/19/97	1	107.6	269	9000		24
MSA	802M	1/20/97	1	108	270	14000		24
MSA	802M	1/20/97	1	683.1	253	21000		162
MSA	802M	1/20/97	1	815.3	263	20000		186
MSA	802M	1/21/97	1	725	259	21000		168
MSA	802M	1/21/97	1	107	268	9000		24
MSA	802M	1/22/97	1	104	260	11000		24
MSA	802M	1/22/97	1	188	268	16000		42
MSA	802M	1/22/97	1	187	267	15000		42
MSA	802M	1/22/97	1	108	269	10000		24
MSA	802M	1/23/97	1	187	267	14000		42
MSA	802M	1/23/97	1	739	264	20000		168
MSA	802M	1/23/97	1	538	269	21000		120
MSA	802M	1/24/97	1	936	260	20000		216
MSA	802M	1/24/97	1	720	257	20000		168
MSA	802M	1/24/97	1	156	260	13000		36
MSA	802M	1/25/97	1	586.5	255	20000		138
MSA	802M	2/3/97	1	130	260	10000		30
MSA	802M	2/3/97	1	686	245	20000		168

APPENDIX A-3 EXECUTIVE - MSA OPERATOR SURVEY DATA

Executive Flight Activity Example Per Flight Database (Continued)

Typical examples from Military Support Aircraft (MSA) flight schedule.

Operator	Unit	Sortie Date	Flts/Per Example	Avg Seg. Distance	Avg. Seg. Speed (kts)	Avg. Oper. Alt.	Avg. Block Time (Min.)	Avg. Flt. Time (Min)
	7 A/C Summary:		190	487	244	17463	N/A	119
MSA	802M	2/3/97	1	504	265	21000		114
MSA	802M	2/6/97	1	572	260	20000		132
MSA	802M	2/6/97	1	612	255	21000		144
MSA	802M	2/6/97	1	154	256	9000		36
MSA	811M	12/5/96	1	560	280	15000		120
MSA	811M	12/5/96	1	999	270	20000		222
MSA	811M	12/5/96	1	864	270	20000		192
MSA	811M	12/5/96	1	260	260	14000		60
MSA	811M	12/6/96	1	1053	270	21000		234
MSA	811M	12/8/96	1	486	180	4000		162
MSA	811M	12/9/96	1	675	270	20000		150
MSA	811M	12/9/96	1	729	270	20000		162
MSA	811M	12/9/96	1	1120	280	19000		240
MSA	811M	12/14/96	1	1344	280	20000		288
MSA	811M	12/14/96	1	594	270	21000		132
MSA	811M	12/14/96	1	621	270	21000		138
MSA	811M	12/15/96	1	324	270	20000		72
MSA	811M	12/15/96	1	324	270	21000		72
MSA	811M	12/18/96	1	351	270	20000		78
MSA	811M	12/18/96	1	324	270	21000		72
MSA	811M	12/19/96	1	476	280	16000		102
MSA	811M	12/20/96	1	540	270	21000		120
MSA	811M	12/20/96	1	675	270	21000		150
MSA	811M	12/20/96	1	1204	280	20000		258
MSA	811M	12/27/96	1	144	180	4000		48
MSA	811M	12/27/96	1	126	180	4000		42
MSA	811M	12/27/96	1	588	210	4000		168
MSA	863M	12/5/96	1	100	200	4000		30
MSA	863M	12/5/96	1	100	200	3000		30
MSA	863M	12/6/96	1	72	180	3000		24
MSA	863M	12/6/96	1	440	200	3000		132
MSA	863M	12/6/96	1	154	220	3000		42
MSA	90-0531	5/3/96	1	414	180	19000		138
MSA	90-0531	5/3/96	1	285	190	19000		90
MSA	90-0531	5/5/96	1	450	180	20000		150
MSA	90-0531	5/6/96	1	400	200	14000		120

APPENDIX A-3 EXECUTIVE - MSA OPERATOR SURVEY DATA

Executive Flight Activity Example Per Flight Database (Continued)

Typical examples from Military Support Aircraft (MSA) flight schedule.

Operator	Unit	Sortie Date	Flts/Per Example	Avg Seg. Distance	Avg. Seg. Speed (kts)	Avg. Oper. Alt.	Avg. Block Time (Min.)	Avg. Flt. Time (Min)
	7 A/C Summary:		190	487	244	17463	N/A	119
MSA	90-0531	5/7/96	1	486	180	21000		162
MSA	90-0531	5/7/96	1	558	180	21000		186
MSA	90-0531	5/7/96	1	60	200	12000		18
MSA	90-0531	5/10/96	1	702	180	20000		234
MSA	90-0531	5/10/96	1	594	180	20000		198
MSA	90-0531	5/10/96	1	63	210	11000		18
MSA	90-0531	5/18/96	1	171	190	20000		54
MSA	90-0531	5/18/96	1	171	190	19000		54
MSA	90-0531	5/18/96	1	147	210	14000		42
MSA	90-0531	5/18/96	1	105	210	13000		30
MSA	90-0531	5/19/96	1	216	180	20000		72
MSA	90-0531	5/19/96	1	228	190	21000		72
MSA	90-0531	5/19/96	1	120	200	16000		36
MSA	90-0531	5/19/96	1	100	200	13000		30
MSA	90-0531	5/21/96	1	133	190	16000		42
MSA	90-0531	5/21/96	1	95	190	15000		30
MSA	90-0531	5/23/96	1	504	180	21000		168
MSA	90-0531	5/23/96	1	304	190	16000		96
MSA	90-0531	6/5/96	1	270	180	20000		90
MSA	90-0531	6/5/96	1	306	180	21000		102
MSA	90-0531	6/6/96	1	234	180	21000		78
MSA	90-0531	6/6/96	1	152	190	19000		48
MSA	90-0531	6/6/96	1	304	190	19000		96
MSA	90-0531	6/6/96	1	176	220	8000		48
MSA	90-0531	6/10/96	1	576	180	20000		192
MSA	90-0531	6/10/96	1	570	190	19000		180
MSA	90-0531	6/14/96	1	648	180	22000		216
MSA	90-0531	6/14/96	1	570	190	19000		180
MSA	90-0531	6/16/96	1	360	180	20000		120
MSA	90-0531	6/16/96	1	594	180	20000		198
MSA	90-0531	6/16/96	1	396	180	20000		132
MSA	90-0531	6/17/96	1	468	180	21000		156
MSA	90-0531	6/17/96	1	684	180	21000		228
MSA	90-0531	6/28/96	1	666	180	22000		222
MSA	90-0531	6/28/96	1	270	180	20000		90
MSA	90-0531	6/28/96	1	342	180	20000		114
MSA	90-0531	6/30/96	1	396	180	21000		132

Executive Flight Activity Example Per Flight Database (Continued)

Typical examples from Military Support Aircraft (MSA) flight schedule.

Operator	Unit	Sortie Date	Flts/Per Example	Avg Seg. Distance	Avg. Seg. Speed (kts)	Avg. Oper. Alt.	Avg. Block Time (Min.)	Avg. Flt. Time (Min)
7 A/C Summary:			190	487	244	17463	N/A	119
MSA	90-0531	6/30/96	1	486	180	21000		162
MSA	90-0531	6/30/96	1	288	180	21000		96
MSA	BTV	1/10/97	1	1176	280	16000		252
MSA	BTV	1/10/97	1	702	270	21000		156
MSA	BTV	1/13/97	1	1026	270	18000		228
MSA	BTV	1/14/97	1	918	270	21000		204
MSA	BTV	1/17/97	1	1015	290	20000		210
MSA	BTV	1/17/97	1	812	290	21000		168
MSA	BTV	1/20/97	1	432	270	21000		96
MSA	BTV	1/20/97	1	462	220	20000		126
MSA	BTV	1/21/97	1	297	270	20000		66
MSA	BTV	1/21/97	1	639	278	15000		138
MSA	BTV	1/21/97	1	378	270	16000		84
MSA	BTV	1/23/97	1	945	270	20000		210
MSA	BTV	1/23/97	1	810	270	21000		180
MSA	BTV	1/31/97	1	867	271	20000		192
MSA	BTV	1/31/97	1	771	257	21000		180
MSA	MGM	1/15/97	1	370	185	4000		120
MSA	MGM	1/31/97	1	779	190	3500		246
MSA	S. Falls	1/6/97	1	504	210	4000		144
MSA	S. Falls	1/7/97	1	357.5	275	20000		78
MSA	S. Falls	1/7/97	1	1100	275	21000		240
MSA	S. Falls	1/7/97	1	1320	275	20000		288
MSA	S. Falls	1/9/97	1	1072.5	275	21000		234
MSA	S. Falls	1/11/97	1	1182.5	275	20000		258
MSA	S. Falls	1/12/97	1	467.5	275	20000		102
MSA	S. Falls	1/12/97	1	495	275	20000		108
MSA	S. Falls	1/17/97	1	495	275	20000		108
MSA	S. Falls	1/17/97	1	825	275	20000		180
MSA	S. Falls	1/17/97	1	1100	275	21000		240
MSA	S. Falls	1/23/97	1	120	240	9000		30
MSA	S. Falls	1/23/97	1	522.5	275	21000		114
MSA	S. Falls	1/23/97	1	605	275	20000		132
MSA	S. Falls	1/24/97	1	120	240	9000		30
MSA	S. Falls	1/24/97	1	495	275	21000		108
MSA	S. Falls	1/24/97	1	550	275	20000		120
MSA	S. Falls	1/24/97	1	120	240	10000		30

Executive Flight Activity Example Per Flight Database (Continued)

Typical examples from Military Support Aircraft (MSA) flight schedule.

Operator	Unit	Sortie Date	Flts/Per Example	Avg Seg. Distance	Avg. Seg. Speed (kts)	Avg. Oper. Alt.	Avg. Block Time (Min.)	Avg. Flt. Time (Min)
		7 A/C Summary:	190	487	244	17463	N/A	119
MSA	S. Falls	1/28/97	1	1100	275	21000		240
MSA	S. Falls	1/29/97	1	412.5	275	20000		90
MSA	S. Falls	1/30/97	1	632.5	275	20000		138
MSA	S. Falls	1/30/97	1	660	275	20000		144
MSA	S. Falls	1/31/97	1	825	275	20000		180
MSA	S. Falls	1/31/97	1	825	275	20000		180
		Total/Avg.	190	486.70	243.99	17463.16	0	118.83

APPENDIX A-3 EXECUTIVE - MSA OPERATOR SURVEY DATA

Executive Flight Activity Example Per Flight Database

Typical examples from Military Support Aircraft (MSA) flight schedule.

Oper-ator	Unit	Sortie Date	Flts/Per Example	Avg. Ldgs Per Hr.	Avg. A/C Takeoff Wt.	Avg. A/C Cruising Wt.	Avg. A/C Landing Wt.
	7 A/C Summary:		**190**	**0.50**	**14685**	**13990**	**13296**
MSA	802M	12/3/96	1	0.77	15980	15480	14980
MSA	802M	12/3/96	1	0.77	15200	14750	14300
MSA	802M	12/3/96	1	1.00	13400	13150	12900
MSA	802M	12/3/96	1	1.00	12600	12250	11900
MSA	802M	12/4/96	1	0.67	15400	14800	14200
MSA	802M	12/4/96	1	1.00	12400	12050	11700
MSA	802M	12/6/96	1	0.77	14300	13900	13500
MSA	802M	12/6/96	1	0.67	13600	13150	12700
MSA	802M	12/8/96	1	0.45	13560	12861	12162
MSA	802M	12/8/96	1	0.67	16260	15760	15260
MSA	802M	12/8/96	1	0.33	14010	13010	12010
MSA	802M	12/9/96	1	0.42	15760	15010	14260
MSA	802M	12/9/96	1	0.38	15060	14360	13660
MSA	802M	12/9/96	1	0.43	15500	14850	14200
MSA	802M	12/9/96	1	0.42	13400	12700	12000
MSA	802M	12/10/96	1	0.45	15100	14450	13800
MSA	802M	12/10/96	1	0.42	16200	15200	14200
MSA	802M	12/12/96	1	0.45	14600	13850	13100
MSA	802M	12/12/96	1	0.50	16200	15600	15000
MSA	802M	12/12/96	1	1.43	14800	14600	14400
MSA	802M	12/13/96	1	0.50	14500	13850	13200
MSA	802M	12/13/96	1	0.71	16000	15550	15100
MSA	802M	12/13/96	1	0.43	13400	12600	11800
MSA	802M	12/13/96	1	0.43	15200	14300	13400
MSA	802M	12/13/96	1	0.56	12600	12000	11400
MSA	802M	12/31/96	1	2.00	14100	13850	13600
MSA	802M	1/3/97	1	0.27	15460	14210	12960
MSA	802M	1/5/97	1	0.37	15160	14210	13260
MSA	802M	1/7/97	1	1.00	15400	14950	14500
MSA	802M	1/7/97	1	0.59	14900	14500	14100
MSA	802M	1/7/97	1	2.50	14600	14400	14200
MSA	802M	1/7/97	1	0.32	15000	14250	13500
MSA	802M	1/8/97	1	1.11	12500	12150	11800
MSA	802M	1/8/97	1	1.25	13600	13250	12900
MSA	802M	1/8/97	1	0.67	14100	13550	13000
MSA	802M	1/8/97	1	0.83	14900	14500	14100
MSA	802M	1/10/97	1	0.42	14800	14000	13200

Executive Flight Activity Example Per Flight Database (Continued)

Typical examples from Military Support Aircraft (MSA) flight schedule.

Operator	Unit	Sortie Date	Flts/Per Example	Avg. Ldgs Per Hr.	Avg. A/C Takeoff Wt.	Avg. A/C Cruising Wt.	Avg. A/C Landing Wt.
	7 A/C Summary:		190	0.50	14685	13990	13296
MSA	802M	1/10/97	1	0.43	15700	14750	13800
MSA	802M	1/12/97	1	0.43	14900	14050	13200
MSA	802M	1/12/97	1	0.50	12400	11600	10800
MSA	802M	1/12/97	1	1.00	14000	13650	13300
MSA	802M	1/13/97	1	0.45	14800	14000	13200
MSA	802M	1/13/97	1	0.38	14950	14050	13150
MSA	802M	1/14/97	1	0.56	14870	14220	13570
MSA	802M	1/14/97	1	0.50	13300	12600	11900
MSA	802M	1/14/97	1	0.67	13200	12650	12100
MSA	802M	1/15/97	1	0.91	15000	14600	14200
MSA	802M	1/15/97	1	0.91	14200	13750	13300
MSA	802M	1/17/97	1	2.00	14900	14750	14600
MSA	802M	1/17/97	1	1.11	15000	14650	14300
MSA	802M	1/17/97	1	1.43	14800	14500	14200
MSA	802M	1/17/97	1	0.77	13000	12400	11800
MSA	802M	1/19/97	1	1.00	14700	14300	13900
MSA	802M	1/19/97	1	1.25	15100	14750	14400
MSA	802M	1/19/97	1	0.77	13800	13200	12600
MSA	802M	1/19/97	1	2.50	12200	12000	11800
MSA	802M	1/20/97	1	2.50	14400	14150	13900
MSA	802M	1/20/97	1	0.37	15800	14800	13800
MSA	802M	1/20/97	1	0.32	14000	13000	12000
MSA	802M	1/21/97	1	0.36	15600	14500	13400
MSA	802M	1/21/97	1	2.50	12800	12450	12100
MSA	802M	1/22/97	1	2.50	14200	14000	13800
MSA	802M	1/22/97	1	1.43	16220	15870	15520
MSA	802M	1/22/97	1	1.43	15420	15120	14820
MSA	802M	1/22/97	1	2.50	12200	12050	11900
MSA	802M	1/23/97	1	1.43	14700	14400	14100
MSA	802M	1/23/97	1	0.36	15500	14450	13400
MSA	802M	1/23/97	1	0.50	13400	12800	12200
MSA	802M	1/24/97	1	0.28	13800	12550	11300
MSA	802M	1/24/97	1	0.36	15600	14850	14100
MSA	802M	1/24/97	1	1.67	13300	13050	12800
MSA	802M	1/25/97	1	0.43	14600	13800	13000
MSA	802M	2/3/97	1	2.00	14400	14150	13900
MSA	802M	2/3/97	1	0.36	16500	15550	14600

APPENDIX A-3 EXECUTIVE - MSA OPERATOR SURVEY DATA

Executive Flight Activity Example Per Flight Database (Continued)

Typical examples from Military Support Aircraft (MSA) flight schedule.

Operator	Unit	Sortie Date	Flts/Per Example	Avg. Ldgs Per Hr.	Avg. A/C Takeoff Wt.	Avg. A/C Cruising Wt.	Avg. A/C Landing Wt.
	7 A/C Summary:		190	0.50	14685	13990	13296
MSA	802M	2/3/97	1	0.53	13300	12750	12200
MSA	802M	2/6/97	1	0.45	13400	12600	11800
MSA	802M	2/6/97	1	0.42	15600	14700	13800
MSA	802M	2/6/97	1	1.67	12500	12250	12000
MSA	811M	12/5/96	1	0.50	14900	14250	13600
MSA	811M	12/5/96	1	0.27	16300	15050	13800
MSA	811M	12/5/96	1	0.31	16300	15350	14400
MSA	811M	12/5/96	1	1.00	12200	11850	11500
MSA	811M	12/6/96	1	0.26	14900	13650	12400
MSA	811M	12/8/96	1	0.37	14900	13950	13000
MSA	811M	12/9/96	1	0.40	16500	15600	14700
MSA	811M	12/9/96	1	0.37	16500	15550	14600
MSA	811M	12/9/96	1	0.25	14900	13650	12400
MSA	811M	12/14/96	1	0.21	14900	13350	11800
MSA	811M	12/14/96	1	0.45	16500	15700	14900
MSA	811M	12/14/96	1	0.43	16500	15650	14800
MSA	811M	12/15/96	1	0.83	14600	14250	13900
MSA	811M	12/15/96	1	0.83	13000	12650	12300
MSA	811M	12/18/96	1	0.77	13900	13550	13200
MSA	811M	12/18/96	1	0.83	13600	13250	12900
MSA	811M	12/19/96	1	0.59	14900	14200	13500
MSA	811M	12/20/96	1	0.50	16100	15400	14700
MSA	811M	12/20/96	1	0.40	16100	15250	14400
MSA	811M	12/20/96	1	0.23	14900	13850	12800
MSA	811M	12/27/96	1	1.25	14900	14600	14300
MSA	811M	12/27/96	1	1.43	14200	13950	13700
MSA	811M	12/27/96	1	0.36	13600	12600	11600
MSA	863M	12/5/96	1	2.00	16000	15800	15600
MSA	863M	12/5/96	1	2.00	14000	13850	13700
MSA	863M	12/6/96	1	2.50	14000	13850	13700
MSA	863M	12/6/96	1	0.45	15000	14650	14300
MSA	863M	12/6/96	1	1.43	15500	15300	15100
MSA	90-0531	5/3/96	1	0.43	15600	14900	14200
MSA	90-0531	5/3/96	1	0.67	14100	13550	13000
MSA	90-0531	5/5/96	1	0.40	15600	14800	14000
MSA	90-0531	5/6/96	1	0.50	13500	12850	12200

Executive Flight Activity Example Per Flight Database (Continued)

Typical examples from Military Support Aircraft (MSA) flight schedule.

Operator	Unit	Sortie Date	Flts/Per Example	Avg. Ldgs Per Hr.	Avg. A/C Takeoff Wt.	Avg. A/C Cruising Wt.	Avg. A/C Landing Wt.
	7 A/C Summary:		190	0.50	14685	13990	13296
MSA	90-0531	5/7/96	1	0.37	16200	15300	14400
MSA	90-0531	5/7/96	1	0.32	16200	15200	14200
MSA	90-0531	5/7/96	1	3.33	13900	13750	13600
MSA	90-0531	5/10/96	1	0.26	16200	15000	13800
MSA	90-0531	5/10/96	1	0.30	16200	15100	14000
MSA	90-0531	5/10/96	1	3.33	11400	11250	11100
MSA	90-0531	5/18/96	1	1.11	15500	15150	14800
MSA	90-0531	5/18/96	1	1.11	14800	14450	14100
MSA	90-0531	5/18/96	1	1.43	13800	13500	13200
MSA	90-0531	5/18/96	1	2.00	11700	11400	11100
MSA	90-0531	5/19/96	1	0.83	16000	15500	15000
MSA	90-0531	5/19/96	1	0.83	15100	14650	14200
MSA	90-0531	5/19/96	1	1.67	14100	13850	13600
MSA	90-0531	5/19/96	1	2.00	11600	11350	11100
MSA	90-0531	5/21/96	1	1.43	12300	12050	11800
MSA	90-0531	5/21/96	1	2.00	14500	14250	14000
MSA	90-0531	5/23/96	1	0.36	16200	15400	14600
MSA	90-0531	5/23/96	1	0.63	16200	15700	15200
MSA	90-0531	6/5/96	1	0.67	13300	12800	12300
MSA	90-0531	6/5/96	1	0.59	12300	11800	11300
MSA	90-0531	6/6/96	1	0.77	13700	13250	12800
MSA	90-0531	6/6/96	1	1.25	13000	12700	12400
MSA	90-0531	6/6/96	1	0.63	13500	12950	12400
MSA	90-0531	6/6/96	1	1.25	12000	11650	11300
MSA	90-0531	6/10/96	1	0.31	13500	12450	11400
MSA	90-0531	6/10/96	1	0.33	16100	15100	14100
MSA	90-0531	6/14/96	1	0.28	16200	15100	14000
MSA	90-0531	6/14/96	1	0.33	14700	13700	12700
MSA	90-0531	6/16/96	1	0.50	16200	15550	14900
MSA	90-0531	6/16/96	1	0.30	16400	15250	14100
MSA	90-0531	6/16/96	1	0.45	16400	15650	14900
MSA	90-0531	6/17/96	1	0.38	14700	13900	13100
MSA	90-0531	6/17/96	1	0.26	14700	13500	12300
MSA	90-0531	6/28/96	1	0.27	15000	13850	12700
MSA	90-0531	6/28/96	1	0.67	15000	14000	13000
MSA	90-0531	6/28/96	1	0.53	15000	14250	13500
MSA	90-0531	6/30/96	1	0.45	16500	15750	15000

APPENDIX A-3 EXECUTIVE - MSA OPERATOR SURVEY DATA

Executive Flight Activity Example Per Flight Database (Continued)

Typical examples from Military Support Aircraft (MSA) flight schedule.

Oper-ator	Unit	Sortie Date	Flts/Per Example	Avg. Ldgs Per Hr.	Avg. A/C Takeoff Wt.	Avg. A/C Cruising Wt.	Avg. A/C Landing Wt.
	7 A/C Summary:		190	0.50	14685	13990	13296
MSA	90-0531	6/30/96	1	0.37	16500	15600	14700
MSA	90-0531	6/30/96	1	0.63	16500	15950	15400
MSA	BTV	1/10/97	1	0.24	15250	13550	11850
MSA	BTV	1/10/97	1	0.38	16200	15200	14200
MSA	BTV	1/13/97	1	0.26	15800	14400	13000
MSA	BTV	1/14/97	1	0.29	15600	14500	13400
MSA	BTV	1/17/97	1	0.29	15000	13800	12600
MSA	BTV	1/17/97	1	0.36	15000	13900	12800
MSA	BTV	1/20/97	1	0.63	15500	14900	14300
MSA	BTV	1/20/97	1	0.48	14000	13050	12100
MSA	BTV	1/21/97	1	0.91	12500	11850	11200
MSA	BTV	1/21/97	1	0.43	16000	15100	14200
MSA	BTV	1/21/97	1	0.71	13000	12500	12000
MSA	BTV	1/23/97	1	0.29	14800	13600	12400
MSA	BTV	1/23/97	1	0.33	14500	13475	12450
MSA	BTV	1/31/97	1	0.31	15000	13925	12850
MSA	BTV	1/31/97	1	0.33	15100	14100	13100
MSA	MGM	1/15/97	1	0.50	14000	13450	12900
MSA	MGM	1/31/97	1	0.24	16500	15050	13600
MSA	S. Falls	1/6/97	1	0.42	13600	12650	11700
MSA	S. Falls	1/7/97	1	0.77	15100	14550	14000
MSA	S. Falls	1/7/97	1	0.25	16500	15100	13700
MSA	S. Falls	1/7/97	1	0.21	14800	13200	11600
MSA	S. Falls	1/9/97	1	0.26	15200	13900	12600
MSA	S. Falls	1/11/97	1	0.23	15200	13700	12200
MSA	S. Falls	1/12/97	1	0.59	14800	14150	13500
MSA	S. Falls	1/12/97	1	0.56	13500	12800	12100
MSA	S. Falls	1/17/97	1	0.56	14800	14100	13400
MSA	S. Falls	1/17/97	1	0.33	16000	14900	13800
MSA	S. Falls	1/17/97	1	0.25	14800	13450	12100
MSA	S. Falls	1/23/97	1	2.00	13800	13500	13200
MSA	S. Falls	1/23/97	1	0.53	15200	14400	13600
MSA	S. Falls	1/23/97	1	0.45	14800	13950	13100
MSA	S. Falls	1/24/97	1	2.00	14800	14500	14200
MSA	S. Falls	1/24/97	1	0.56	14700	13950	13200
MSA	S. Falls	1/24/97	1	0.50	15700	14900	14100
MSA	S. Falls	1/24/97	1	2.00	12200	11950	11700

APPENDIX A-3 EXECUTIVE - MSA OPERATOR SURVEY DATA

Executive Flight Activity Example Per Flight Database (Continued)

Typical examples from Military Support Aircraft (MSA) flight schedule.

Oper-ator	Unit	Sortie Date	Flts/Per Example	Avg. Ldgs Per Hr.	Avg. A/C Takeoff Wt.	Avg. A/C Cruising Wt.	Avg. A/C Landing Wt.
		7 A/C Summary:	**190**	**0.50**	**14685**	**13990**	**13296**
MSA	S. Falls	1/28/97	1	0.25	14800	13400	12000
MSA	S. Falls	1/29/97	1	0.67	16000	15450	14900
MSA	S. Falls	1/30/97	1	0.43	14800	13850	12900
MSA	S. Falls	1/30/97	1	0.42	16500	15550	14600
MSA	S. Falls	1/31/97	1	0.33	14800	13700	12600
MSA	S. Falls	1/31/97	1	0.33	14800	13700	12600
		Total/Avg.	190	0.50	14684.53	13990.32	13296.12

APPENDIX A-3 EXECUTIVE - MSA OPERATOR SURVEY DATA

Executive Flight Activity Example Per Flight Database

Typical examples from Military Support Aircraft (MSA) flight schedule.

Oper-ator	Unit	Sortie Date	Flts/Per Example	Avg. Pay-load (lbs)	Avg. Takeoff Fuel Wt. (lbs)	* Avg. Flt. Fuel Wt.(lbs)	Avg. Block Fuel (lbs)
	7 A/C Summary:		190	663	3191	2497	1388
MSA	802M	12/3/96	1	2380	3200	2700	1000
MSA	802M	12/3/96	1	2380	2500	2050	900
MSA	802M	12/3/96	1	0	3000	2750	500
MSA	802M	12/3/96	1	0	2200	1850	700
MSA	802M	12/4/96	1	1600	3200	2600	1200
MSA	802M	12/4/96	1	0	2000	1650	700
MSA	802M	12/6/96	1	1600	2200	1800	800
MSA	802M	12/6/96	1	0	3200	2750	900
MSA	802M	12/8/96	1	400	2600	1901	1398
MSA	802M	12/8/96	1	1200	4200	3700	1000
MSA	802M	12/8/96	1	400	3200	2200	2000
MSA	802M	12/9/96	1	2600	2600	1850	1500
MSA	802M	12/9/96	1	1600	3000	2300	1400
MSA	802M	12/9/96	1	800	4300	3650	1300
MSA	802M	12/9/96	1	0	2900	2200	1400
MSA	802M	12/10/96	1	1700	3000	2350	1300
MSA	802M	12/10/96	1	1700	4000	3000	2000
MSA	802M	12/12/96	1	0	4200	3450	1500
MSA	802M	12/12/96	1	1600	4200	3600	1200
MSA	802M	12/12/96	1	1400	2800	2600	400
MSA	802M	12/13/96	1	1800	2300	1650	1300
MSA	802M	12/13/96	1	2400	3200	2750	900
MSA	802M	12/13/96	1	0	3000	2200	1600
MSA	802M	12/13/96	1	800	4000	3100	1800
MSA	802M	12/13/96	1	0	2200	1600	1200
MSA	802M	12/31/96	1	0	3700	3450	500
MSA	802M	1/3/97	1	1600	3200	1950	2500
MSA	802M	1/5/97	1	1600	3100	2150	1900
MSA	802M	1/7/97	1	2000	3000	2550	900
MSA	802M	1/7/97	1	2400	2100	1700	800
MSA	802M	1/7/97	1	800	3400	3200	400
MSA	802M	1/7/97	1	400	4200	3450	1500
MSA	802M	1/8/97	1	0	2000	1650	700
MSA	802M	1/8/97	1	0	3200	2850	700
MSA	802M	1/8/97	1	1300	2400	1850	1100
MSA	802M	1/8/97	1	1500	3000	2600	800
MSA	802M	1/10/97	1	1400	3000	2200	1600

Executive Flight Activity Example Per Flight Database (Continued)

Typical examples from Military Support Aircraft (MSA) flight schedule.

Operator	Unit	Sortie Date	Flts/Per Example	Avg. Payload (lbs)	Avg. Takeoff Fuel Wt. (lbs)	* Avg. Flt. Fuel Wt.(lbs)	Avg. Block Fuel (lbs)
	7 A/C Summary:		190	663	3191	2497	1388
MSA	802M	1/10/97	1	1800	3500	2550	1900
MSA	802M	1/12/97	1	200	4300	3450	1700
MSA	802M	1/12/97	1	2000	3600	2800	1600
MSA	802M	1/12/97	1	1600	2000	1650	700
MSA	802M	1/13/97	1	850	3200	2400	1600
MSA	802M	1/13/97	1	1050	3500	2600	1800
MSA	802M	1/14/97	1	170	4300	3650	1300
MSA	802M	1/14/97	1	0	2900	2200	1400
MSA	802M	1/14/97	1	170	2500	1950	1100
MSA	802M	1/15/97	1	170	4300	3900	800
MSA	802M	1/15/97	1	170	3500	3050	900
MSA	802M	1/17/97	1	200	4300	4150	300
MSA	802M	1/17/97	1	600	4000	3650	700
MSA	802M	1/17/97	1	1200	3200	2900	600
MSA	802M	1/17/97	1	0	2600	2000	1200
MSA	802M	1/19/97	1	0	4300	3900	800
MSA	802M	1/19/97	1	1200	3500	3150	700
MSA	802M	1/19/97	1	600	2800	2200	1200
MSA	802M	1/19/97	1	200	1600	1400	400
MSA	802M	1/20/97	1	0	4000	3750	500
MSA	802M	1/20/97	1	2000	3400	2400	2000
MSA	802M	1/20/97	1	0	3600	2600	2000
MSA	802M	1/21/97	1	1400	3800	2700	2200
MSA	802M	1/21/97	1	0	2400	2050	700
MSA	802M	1/22/97	1	0	3800	3600	400
MSA	802M	1/22/97	1	2520	3300	2950	700
MSA	802M	1/22/97	1	2520	2500	2200	600
MSA	802M	1/22/97	1	0	1800	1650	300
MSA	802M	1/23/97	1	0	4300	4000	600
MSA	802M	1/23/97	1	1400	3700	2650	2100
MSA	802M	1/23/97	1	0	3000	2400	1200
MSA	802M	1/24/97	1	0	3400	2150	2500
MSA	802M	1/24/97	1	1800	3400	2650	1500
MSA	802M	1/24/97	1	0	2900	2650	500
MSA	802M	1/25/97	1	0	4200	3400	1600
MSA	802M	2/3/97	1	800	3200	2950	500
MSA	802M	2/3/97	1	2200	3900	2950	1900

APPENDIX A-3 EXECUTIVE - MSA OPERATOR SURVEY DATA

Executive Flight Activity Example Per Flight Database (Continued)

Typical examples from Military Support Aircraft (MSA) flight schedule.

Operator	Unit	Sortie Date	Flts/Per Example	Avg. Payload (lbs)	Avg. Takeoff Fuel Wt. (lbs)	* Avg. Flt. Fuel Wt.(lbs)	Avg. Block Fuel (lbs)
7 A/C Summary:			190	663	3191	2497	1388
MSA	802M	2/3/97	1	0	2900	2350	1100
MSA	802M	2/6/97	1	0	3000	2200	1600
MSA	802M	2/6/97	1	2000	3200	2300	1800
MSA	802M	2/6/97	1	800	1300	1050	500
MSA	811M	12/5/96	1	0	4100	3450	1300
MSA	811M	12/5/96	1	2100	3500	2250	2500
MSA	811M	12/5/96	1	2100	3500	2550	1900
MSA	811M	12/5/96	1	0	1500	1150	700
MSA	811M	12/6/96	1	0	4100	2850	2500
MSA	811M	12/8/96	1	0	4100	3150	1900
MSA	811M	12/9/96	1	2600	3200	2300	1800
MSA	811M	12/9/96	1	2600	3200	2250	1900
MSA	811M	12/9/96	1	0	4100	2850	2500
MSA	811M	12/14/96	1	0	4100	2550	3100
MSA	811M	12/14/96	1	2600	3200	2400	1600
MSA	811M	12/14/96	1	2600	3200	2350	1700
MSA	811M	12/15/96	1	700	3100	2750	700
MSA	811M	12/15/96	1	0	2300	1950	700
MSA	811M	12/18/96	1	0	3100	2750	700
MSA	811M	12/18/96	1	700	2300	1950	700
MSA	811M	12/19/96	1	0	4100	3400	1400
MSA	811M	12/20/96	1	2700	2600	1900	1400
MSA	811M	12/20/96	1	2700	2600	1750	1700
MSA	811M	12/20/96	1	0	4100	3050	2100
MSA	811M	12/27/96	1	0	4100	3800	600
MSA	811M	12/27/96	1	0	3400	3150	500
MSA	811M	12/27/96	1	0	2800	1800	2000
MSA	863M	12/5/96	1	2000	3000	2800	400
MSA	863M	12/5/96	1	2000	1500	1350	300
MSA	863M	12/6/96	1	2000	1800	1650	300
MSA	863M	12/6/96	1	2000	2000	1650	700
MSA	863M	12/6/96	1	2000	3000	2800	400
MSA	90-0531	5/3/96	1		2400	1700	1400
MSA	90-0531	5/3/96	1		3500	2950	1100
MSA	90-0531	5/5/96	1		2500	1700	1600
MSA	90-0531	5/6/96	1		3000	2350	1300

Executive Flight Activity Example Per Flight Database (Continued)

Typical examples from Military Support Aircraft (MSA) flight schedule.

Operator	Unit	Sortie Date	Flts/Per Example	Avg. Payload (lbs)	Avg. Takeoff Fuel Wt. (lbs)	* Avg. Flt. Fuel Wt.(lbs)	Avg. Block Fuel (lbs)
	7 A/C Summary:		190	663	3191	2497	1388
MSA	90-0531	5/7/96	1		3000	2100	1800
MSA	90-0531	5/7/96	1		3000	2000	2000
MSA	90-0531	5/7/96	1		3300	3150	300
MSA	90-0531	5/10/96	1		3000	1800	2400
MSA	90-0531	5/10/96	1		3000	1900	2200
MSA	90-0531	5/10/96	1		800	650	300
MSA	90-0531	5/18/96	1		2600	2250	700
MSA	90-0531	5/18/96	1		1900	1550	700
MSA	90-0531	5/18/96	1		3200	2900	600
MSA	90-0531	5/18/96	1		1200	900	600
MSA	90-0531	5/19/96	1		3000	2500	1000
MSA	90-0531	5/19/96	1		2000	1550	900
MSA	90-0531	5/19/96	1		3500	3250	500
MSA	90-0531	5/19/96	1		1100	850	500
MSA	90-0531	5/21/96	1		900	650	500
MSA	90-0531	5/21/96	1		3500	3250	500
MSA	90-0531	5/23/96	1		2500	1700	1600
MSA	90-0531	5/23/96	1		3000	2500	1000
MSA	90-0531	6/5/96	1		3000	2500	1000
MSA	90-0531	6/5/96	1		2000	1500	1000
MSA	90-0531	6/6/96	1		1900	1450	900
MSA	90-0531	6/6/96	1		2500	2200	600
MSA	90-0531	6/6/96	1		1700	1150	1100
MSA	90-0531	6/6/96	1		1500	1150	700
MSA	90-0531	6/10/96	1		3000	1950	2100
MSA	90-0531	6/10/96	1		2500	1500	2000
MSA	90-0531	6/14/96	1		2700	1600	2200
MSA	90-0531	6/14/96	1		4200	3200	2000
MSA	90-0531	6/16/96	1		2600	1950	1300
MSA	90-0531	6/16/96	1		2800	1650	2300
MSA	90-0531	6/16/96	1		2800	2050	1500
MSA	90-0531	6/17/96	1		4200	3400	1600
MSA	90-0531	6/17/96	1		4200	3000	2400
MSA	90-0531	6/28/96	1		4200	3050	2300
MSA	90-0531	6/28/96	1		4200	3200	2000
MSA	90-0531	6/28/96	1		4200	3450	1500
MSA	90-0531	6/30/96	1		2700	1950	1500

APPENDIX A-3 EXECUTIVE - MSA OPERATOR SURVEY DATA

Executive Flight Activity Example Per Flight Database (Continued)

Typical examples from Military Support Aircraft (MSA) flight schedule.

Operator	Unit	Sortie Date	Flts/Per Example	Avg. Payload (lbs)	Avg. Takeoff Fuel Wt. (lbs)	* Avg. Flt. Fuel Wt.(lbs)	Avg. Block Fuel (lbs)
	7 A/C Summary:		190	663	3191	2497	1388
MSA	90-0531	6/30/96	1		2700	1800	1800
MSA	90-0531	6/30/96	1		2700	2150	1100
MSA	BTV	1/10/97	1	150	4200	2500	3400
MSA	BTV	1/10/97	1	300	4100	3100	2000
MSA	BTV	1/13/97	1	200	4200	2800	2800
MSA	BTV	1/14/97	1	200	4000	2900	2200
MSA	BTV	1/17/97	1	400	4200	3000	2400
MSA	BTV	1/17/97	1	400	4200	3100	2200
MSA	BTV	1/20/97	1	400	4200	3600	1200
MSA	BTV	1/20/97	1	0	3500	2550	1900
MSA	BTV	1/21/97	1	1000	2500	1850	1300
MSA	BTV	1/21/97	1	800	4200	3300	1800
MSA	BTV	1/21/97	1	1200	2400	1900	1000
MSA	BTV	1/23/97	1	180	4200	3000	2400
MSA	BTV	1/23/97	1	0	4000	2975	2050
MSA	BTV	1/31/97	1	750	4150	3075	2150
MSA	BTV	1/31/97	1	800	4200	3200	2000
MSA	MGM	1/15/97	1	2000	2000	1450	1100
MSA	MGM	1/31/97	1	2000	4200	2750	2900
MSA	S. Falls	1/6/97	1	200	3100	2150	1900
MSA	S. Falls	1/7/97	1	200	4100	3550	1100
MSA	S. Falls	1/7/97	1	1900	4000	2600	2800
MSA	S. Falls	1/7/97	1	0	4200	2600	3200
MSA	S. Falls	1/9/97	1	400	4200	2900	2600
MSA	S. Falls	1/11/97	1	400	4200	2700	3000
MSA	S. Falls	1/12/97	1	0	4200	3550	1300
MSA	S. Falls	1/12/97	1	0	2900	2200	1400
MSA	S. Falls	1/17/97	1	0	4200	3500	1400
MSA	S. Falls	1/17/97	1	2100	3200	2100	2200
MSA	S. Falls	1/17/97	1	0	4200	2850	2700
MSA	S. Falls	1/23/97	1	0	3200	2900	600
MSA	S. Falls	1/23/97	1	1900	2600	1800	1600
MSA	S. Falls	1/23/97	1	0	4200	3350	1700
MSA	S. Falls	1/24/97	1	0	4200	3900	600
MSA	S. Falls	1/24/97	1	500	3600	2850	1500
MSA	S. Falls	1/24/97	1	1900	3200	2400	1600
MSA	S. Falls	1/24/97	1	0	1600	1350	500

APPENDIX A-3 EXECUTIVE - MSA OPERATOR SURVEY DATA

Executive Flight Activity Example Per Flight Database (Continued)

Typical examples from Military Support Aircraft (MSA) flight schedule.

Operator	Unit	Sortie Date	Flts/Per Example	Avg. Payload (lbs)	Avg. Takeoff Fuel Wt. (lbs)	* Avg. Flt. Fuel Wt.(lbs)	Avg. Block Fuel (lbs)
		7 A/C Summary:	**190**	**663**	**3191**	**2497**	**1388**
MSA	S. Falls	1/28/97	1	0	4200	2800	2800
MSA	S. Falls	1/29/97	1	2600	2600	2050	1100
MSA	S. Falls	1/30/97	1	0	4200	3250	1900
MSA	S. Falls	1/30/97	1	2700	3200	2250	1900
MSA	S. Falls	1/31/97	1	0	4200	3100	2200
MSA	S. Falls	1/31/97	1	0	4200	3100	2200
		Total/Avg.	190	662.95	3191.32	2497.11	1388.41

APPENDIX A-3 EXECUTIVE - MSA OPERATOR SURVEY DATA

Executive Flight Activity Example Per Flight Database

Typical examples from Military Support Aircraft (MSA) flight schedule.

Oper-ator	Unit	Sortie Date	Flts/Per Example	Avg. Ldging Fuel Wt. (lbs)
		7 A/C Summary:	190	1803
MSA	802M	12/3/96	1	2200
MSA	802M	12/3/96	1	1600
MSA	802M	12/3/96	1	2500
MSA	802M	12/3/96	1	1500
MSA	802M	12/4/96	1	2000
MSA	802M	12/4/96	1	1300
MSA	802M	12/6/96	1	1400
MSA	802M	12/6/96	1	2300
MSA	802M	12/8/96	1	1202
MSA	802M	12/8/96	1	3200
MSA	802M	12/8/96	1	1200
MSA	802M	12/9/96	1	1100
MSA	802M	12/9/96	1	1600
MSA	802M	12/9/96	1	3000
MSA	802M	12/9/96	1	1500
MSA	802M	12/10/96	1	1700
MSA	802M	12/10/96	1	2000
MSA	802M	12/12/96	1	2700
MSA	802M	12/12/96	1	3000
MSA	802M	12/12/96	1	2400
MSA	802M	12/13/96	1	1000
MSA	802M	12/13/96	1	2300
MSA	802M	12/13/96	1	1400
MSA	802M	12/13/96	1	2200
MSA	802M	12/13/96	1	1000
MSA	802M	12/31/96	1	3200
MSA	802M	1/3/97	1	700
MSA	802M	1/5/97	1	1200
MSA	802M	1/7/97	1	2100
MSA	802M	1/7/97	1	1300
MSA	802M	1/7/97	1	3000
MSA	802M	1/7/97	1	2700
MSA	802M	1/8/97	1	1300
MSA	802M	1/8/97	1	2500
MSA	802M	1/8/97	1	1300
MSA	802M	1/8/97	1	2200
MSA	802M	1/10/97	1	1400

Executive Flight Activity Example Per Flight Database (Continued)

Typical examples from Military Support Aircraft (MSA) flight schedule.

Oper-ator	Unit	Sortie Date	Flts/Per Example	Avg. Ldging Fuel Wt. (lbs)
		7 A/C Summary:	190	1803
MSA	802M	1/10/97	1	1600
MSA	802M	1/12/97	1	2600
MSA	802M	1/12/97	1	2000
MSA	802M	1/12/97	1	1300
MSA	802M	1/13/97	1	1600
MSA	802M	1/13/97	1	1700
MSA	802M	1/14/97	1	3000
MSA	802M	1/14/97	1	1500
MSA	802M	1/14/97	1	1400
MSA	802M	1/15/97	1	3500
MSA	802M	1/15/97	1	2600
MSA	802M	1/17/97	1	4000
MSA	802M	1/17/97	1	3300
MSA	802M	1/17/97	1	2600
MSA	802M	1/17/97	1	1400
MSA	802M	1/19/97	1	3500
MSA	802M	1/19/97	1	2800
MSA	802M	1/19/97	1	1600
MSA	802M	1/19/97	1	1200
MSA	802M	1/20/97	1	3500
MSA	802M	1/20/97	1	1400
MSA	802M	1/20/97	1	1600
MSA	802M	1/21/97	1	1600
MSA	802M	1/21/97	1	1700
MSA	802M	1/22/97	1	3400
MSA	802M	1/22/97	1	2600
MSA	802M	1/22/97	1	1900
MSA	802M	1/22/97	1	1500
MSA	802M	1/23/97	1	3700
MSA	802M	1/23/97	1	1600
MSA	802M	1/23/97	1	1800
MSA	802M	1/24/97	1	900
MSA	802M	1/24/97	1	1900
MSA	802M	1/24/97	1	2400
MSA	802M	1/25/97	1	2600
MSA	802M	2/3/97	1	2700
MSA	802M	2/3/97	1	2000

Executive Flight Activity Example Per Flight Database (Continued)

Typical examples from Military Support Aircraft (MSA) flight schedule.

Oper-ator	Unit	Sortie Date	Flts/Per Example	Avg. Ldging Fuel Wt. (lbs)
		7 A/C Summary:	190	1803
MSA	802M	2/3/97	1	1800
MSA	802M	2/6/97	1	1400
MSA	802M	2/6/97	1	1400
MSA	802M	2/6/97	1	800
MSA	811M	12/5/96	1	2800
MSA	811M	12/5/96	1	1000
MSA	811M	12/5/96	1	1600
MSA	811M	12/5/96	1	800
MSA	811M	12/6/96	1	1600
MSA	811M	12/8/96	1	2200
MSA	811M	12/9/96	1	1400
MSA	811M	12/9/96	1	1300
MSA	811M	12/9/96	1	1600
MSA	811M	12/14/96	1	1000
MSA	811M	12/14/96	1	1600
MSA	811M	12/14/96	1	1500
MSA	811M	12/15/96	1	2400
MSA	811M	12/15/96	1	1600
MSA	811M	12/18/96	1	2400
MSA	811M	12/18/96	1	1600
MSA	811M	12/19/96	1	2700
MSA	811M	12/20/96	1	1200
MSA	811M	12/20/96	1	900
MSA	811M	12/20/96	1	2000
MSA	811M	12/27/96	1	3500
MSA	811M	12/27/96	1	2900
MSA	811M	12/27/96	1	800
MSA	863M	12/5/96	1	2600
MSA	863M	12/5/96	1	1200
MSA	863M	12/6/96	1	1500
MSA	863M	12/6/96	1	1300
MSA	863M	12/6/96	1	2600
MSA	90-0531	5/3/96	1	1000
MSA	90-0531	5/3/96	1	2400
MSA	90-0531	5/5/96	1	900
MSA	90-0531	5/6/96	1	1700

APPENDIX A-3 EXECUTIVE - MSA OPERATOR SURVEY DATA

Executive Flight Activity Example Per Flight Database (Continued)

Typical examples from Military Support Aircraft (MSA) flight schedule.

Oper-ator	Unit	Sortie Date	Flts/Per Example	Avg. Ldging Fuel Wt. (lbs)
		7 A/C Summary:	**190**	**1803**
MSA	90-0531	5/7/96	1	1200
MSA	90-0531	5/7/96	1	1000
MSA	90-0531	5/7/96	1	3000
MSA	90-0531	5/10/96	1	600
MSA	90-0531	5/10/96	1	800
MSA	90-0531	5/10/96	1	500
MSA	90-0531	5/18/96	1	1900
MSA	90-0531	5/18/96	1	1200
MSA	90-0531	5/18/96	1	2600
MSA	90-0531	5/18/96	1	600
MSA	90-0531	5/19/96	1	2000
MSA	90-0531	5/19/96	1	1100
MSA	90-0531	5/19/96	1	3000
MSA	90-0531	5/19/96	1	600
MSA	90-0531	5/21/96	1	400
MSA	90-0531	5/21/96	1	3000
MSA	90-0531	5/23/96	1	900
MSA	90-0531	5/23/96	1	2000
MSA	90-0531	6/5/96	1	2000
MSA	90-0531	6/5/96	1	1000
MSA	90-0531	6/6/96	1	1000
MSA	90-0531	6/6/96	1	1900
MSA	90-0531	6/6/96	1	600
MSA	90-0531	6/6/96	1	800
MSA	90-0531	6/10/96	1	900
MSA	90-0531	6/10/96	1	500
MSA	90-0531	6/14/96	1	500
MSA	90-0531	6/14/96	1	2200
MSA	90-0531	6/16/96	1	1300
MSA	90-0531	6/16/96	1	500
MSA	90-0531	6/16/96	1	1300
MSA	90-0531	6/17/96	1	2600
MSA	90-0531	6/17/96	1	1800
MSA	90-0531	6/28/96	1	1900
MSA	90-0531	6/28/96	1	2200
MSA	90-0531	6/28/96	1	2700
MSA	90-0531	6/30/96	1	1200

APPENDIX A-3 EXECUTIVE - MSA OPERATOR SURVEY DATA

Executive Flight Activity Example Per Flight Database (Continued)

Typical examples from Military Support Aircraft (MSA) flight schedule.

Operator	Unit	Sortie Date	Flts/Per Example	Avg. Ldging Fuel Wt. (lbs)
	7 A/C Summary:		190	1803
MSA	90-0531	6/30/96	1	900
MSA	90-0531	6/30/96	1	1600
MSA	BTV	1/10/97	1	800
MSA	BTV	1/10/97	1	2100
MSA	BTV	1/13/97	1	1400
MSA	BTV	1/14/97	1	1800
MSA	BTV	1/17/97	1	1800
MSA	BTV	1/17/97	1	2000
MSA	BTV	1/20/97	1	3000
MSA	BTV	1/20/97	1	1600
MSA	BTV	1/21/97	1	1200
MSA	BTV	1/21/97	1	2400
MSA	BTV	1/21/97	1	1400
MSA	BTV	1/23/97	1	1800
MSA	BTV	1/23/97	1	1950
MSA	BTV	1/31/97	1	2000
MSA	BTV	1/31/97	1	2200
MSA	MGM	1/15/97	1	900
MSA	MGM	1/31/97	1	1300
MSA	S. Falls	1/6/97	1	1200
MSA	S. Falls	1/7/97	1	3000
MSA	S. Falls	1/7/97	1	1200
MSA	S. Falls	1/7/97	1	1000
MSA	S. Falls	1/9/97	1	1600
MSA	S. Falls	1/11/97	1	1200
MSA	S. Falls	1/12/97	1	2900
MSA	S. Falls	1/12/97	1	1500
MSA	S. Falls	1/17/97	1	2800
MSA	S. Falls	1/17/97	1	1000
MSA	S. Falls	1/17/97	1	1500
MSA	S. Falls	1/23/97	1	2600
MSA	S. Falls	1/23/97	1	1000
MSA	S. Falls	1/23/97	1	2500
MSA	S. Falls	1/24/97	1	3600
MSA	S. Falls	1/24/97	1	2100
MSA	S. Falls	1/24/97	1	1600
MSA	S. Falls	1/24/97	1	1100

APPENDIX A-3 EXECUTIVE - MSA OPERATOR SURVEY DATA

Executive Flight Activity Example Per Flight Database (Continued)

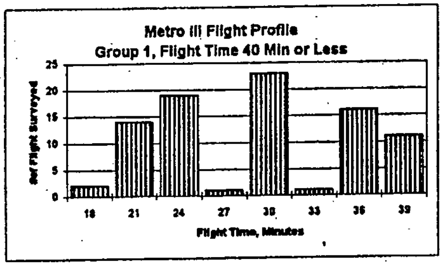
Typical examples from Military Support Aircraft (MSA) flight schedule.

Operator	Unit	Sortie Date	Flts/Per Example	Avg. Ldging Fuel Wt. (lbs)
		7 A/C Summary:	**190**	**1803**
MSA	S. Falls	1/28/97	1	1400
MSA	S. Falls	1/29/97	1	1500
MSA	S. Falls	1/30/97	1	2300
MSA	S. Falls	1/30/97	1	1300
MSA	S. Falls	1/31/97	1	2000
MSA	S. Falls	1/31/97	1	2000
		Total/Avg.	190	1802.91

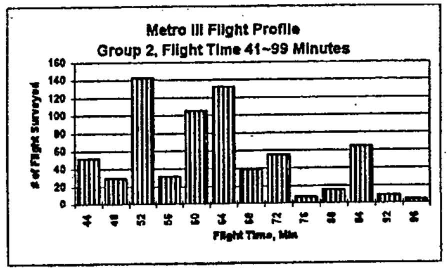
APPENDIX B—MISSION PROFILE

APPENDIX B-1 FLIGHT DURATION - FLIGHT PROFILE SELECTION

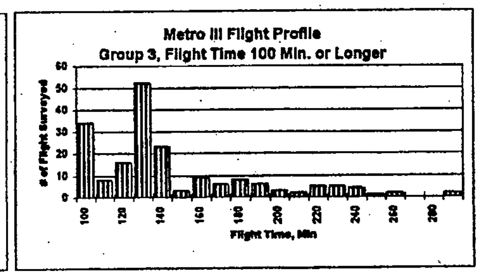
MISSION PROFILE SELECTION
FLIGHT LENGTH COMPARISON



Time (+1 std dev)	36
Time, Average	29
Time (-1 std dev)	23



Time (+1 std dev)	74
Time, Average	62
Time (-1 std dev)	50



Time (+1 std dev)	186
Time, Average	144
Time (-1 std dev)	103

Metro III Flight Time Surveys, STD DEV CAL

Group 1, 40 minutes or less

Sum of Freq	
ro(Time)	Total
18	2
21	14
24	19
27	1
30	23
33	1
36	16
39	11
Grand Total	87

Freq	o(Time)	Time	X	X^2
1	30	30	30	900
1	24	24	24	576
1	33	32	32	1,005
1	39	38	38	1,436
1	39	38	38	1,438
1	39	38	38	1,436
1	39	38	38	1,438
1	39	38	38	1,436
1	39	38	38	1,436
1	24	24	24	576
1	30	30	30	900
1	30	30	30	900
1	24	24	24	576
1	36	36	36	1,296
5	30	30	150	4,500
1	30	30	30	900
1	30	30	30	900
1	30	30	30	900
1	24	24	24	576
1	30	30	30	900
1	18	18	18	324
1	24	24	24	576
1	18	18	18	324
1	30	30	30	900
1	30	30	30	900
1	36	36	36	1,296
6	24	25	150	3,750
1	24	24	24	576
1	30	30	30	900
7	21	20	140	2,800
7	24	25	175	4,375
7	21	20	140	2,800
1	36	36	36	1,296
1	36	36	36	1,296
1	36	36	36	1,296
1	36	36	36	1,296
1	36	36	36	1,296

Group 2, 41~99 minuts

Sum of Freq	
ro(Time)	Total
44	52
48	29
52	142
56	31
60	105
64	132
68	39
72	55
76	7
80	15
84	64
92	9
96	4
Grand Total	684

Freq	o(Time)	Time	X	X^2
1	48	48	48	2.30E+03
7	52	50	350	1.75E+04
7	52	50	350	1.75E+04
1	68	66	66	4.36E+03
1	68	66	66	4.36E+03
1	80	78	78	6.08E+03
7	44	45	315	1.42E+04
7	44	45	315	1.42E+04
7	44	45	315	1.42E+04
7	52	50	350	1.75E+04
7	52	50	350	1.75E+04
7	52	50	350	1.75E+04
7	52	50	350	1.75E+04
7	52	50	350	1.75E+04
1	44	42	42	1.76E+03
1	44	42	42	1.76E+03
6	52	50	300	1.50E+04
1	60	60	60	3.60E+03
1	44	42	42	1.76E+03
1	44	42	42	1.76E+03
7	52	50	350	1.75E+04
6	52	50	300	1.50E+04
1	44	42	42	1.76E+03
1	44	42	42	1.76E+03
7	44	45	315	1.42E+04
7	44	45	315	1.42E+04
7	44	45	315	1.42E+04
1	44	45	45	2.03E+03
1	44	45	45	2.03E+03
1	44	45	45	2.03E+03
7	52	50	350	1.75E+04
7	52	50	350	1.75E+04
7	52	50	350	1.75E+04
7	52	50	350	1.75E+04
7	52	50	350	1.75E+04
6	60	60	360	2.16E+04
7	60	60	420	2.52E+04

Group 3, 100 minutes or longer

Sum of Freq	
ro(Time)	Total
100	34
110	8
120	16
130	52
140	23
150	3
160	9
170	6
180	8
190	6
200	3
210	2
220	5
230	5
240	4
250	1
260	2
290	2
Grand Total	189

ro(Time)	Total
100	34
110	8
120	16
130	52
140	23
150	3
160	9

Freq	o(Time)	Time	X	X^2
1	120	120	120	1.44E+04
1	120	120	120	1.44E+04
1	140	138	138	1.90E+04
1	100	102	102	1.04E+04
1	140	144	144	2.07E+04
1	190	186	186	3.46E+04
1	120	120	120	1.44E+04
1	250	252	252	6.35E+04
1	230	228	228	5.20E+04
1	240	240	240	5.76E+04
1	140	138	138	1.90E+04
1	180	180	180	3.24E+04
1	180	180	180	3.24E+04
1	100	102	102	1.04E+04
1	130	132	132	1.74E+04
1	180	180	180	3.24E+04
1	140	138	138	1.90E+04
1	140	138	138	1.90E+04
1	140	138	138	1.90E+04
1	220	222	222	4.93E+04
1	140	138	138	1.90E+04
1	160	156	156	2.43E+04
1	190	186	186	3.46E+04
1	140	138	138	1.90E+04
1	220	222	222	4.93E+04
1	190	192	192	3.69E+04
1	150	150	150	2.25E+04
1	160	162	162	2.62E+04
1	290	288	288	8.29E+04
1	260	258	258	6.66E+04
1	150	150	150	2.25E+04
1	230	234	234	5.48E+04
1	200	198	198	3.92E+04
1	190	192	192	3.69E+04
1	120	120	120	1.44E+04
1	200	198	198	3.92E+04
1	130	132	132	1.74E+04

Metro III Flight Time Surveys, STD DEV CAL

Group 1, 40 minutes or less

Freq	o(Time)	Time	X	X^2
1	36	36	36	1,296
1	36	36	36	1,296
1	39	39	39	1,521
1	39	39	39	1,521
1	39	39	39	1,521
1	27	28	28	762
1	39	38	38	1,429
1	39	38	38	1,429
7	30	30	210	6,300
1	30	30	30	900
1	38	37	37	1,340
1	36	37	37	1,340
1	38	37	37	1,340
1	36	37	37	1,340
1	36	37	37	1,340
1	35	37	37	1,340
1	36	37	37	1,340
87 x			2,535	77,376

Avg Time	29
STD DEV	6
STD DEV	1
	6
HIGH	36
AVG	29
LOW	23
Avg Time	29
STD DEV	6
STD DEV	1
	6

Group 2, 41~99 minute

Freq	o(Time)	Time	X	X^2
7	60	60	420	2.52E+04
7	60	60	420	2.52E+04
6	60	60	360	2.16E+04
7	60	60	420	2.52E+04
7	56	55	385	2.12E+04
7	52	50	350	1.75E+04
7	52	50	350	1.75E+04
7	56	55	385	2.12E+04
1	60	60	60	3.60E+03
1	56	54	54	2.92E+03
1	60	60	60	3.60E+03
1	80	78	78	6.08E+03
1	48	48	48	2.30E+03
1	96	96	96	9.22E+03
1	84	84	84	7.06E+03
1	48	49	49	2.36E+03
1	48	49	49	2.36E+03
1	48	49	49	2.36E+03
1	48	49	49	2.36E+03
1	48	49	49	2.36E+03
1	48	49	49	2.36E+03
1	48	49	49	2.36E+03
1	48	49	49	2.36E+03
1	48	49	49	2.36E+03
1	48	49	49	2.36E+03
1	48	47	47	2.20E+03
1	48	47	47	2.20E+03
1	48	47	47	2.20E+03
1	48	47	47	2.20E+03
1	48	47	47	2.20E+03
1	48	47	47	2.20E+03
1	48	47	47	2.20E+03
1	48	47	47	2.20E+03
1	48	47	47	2.20E+03
1	48	47	47	2.20E+03
1	48	47	47	2.20E+03
1	48	47	47	2.20E+03
1	48	47	47	2.20E+03
1	48	47	47	2.20E+03
1	48	47	47	2.20E+03
7	64	85	455	2.96E+04
7	64	65	455	2.96E+04
7	64	65	455	2.96E+04
6	52	50	300	1.50E+04
7	52	50	350	1.75E+04
6	56	55	330	1.82E+04
7	72	70	490	3.43E+04
7	52	50	350	1.75E+04
7	56	55	385	2.12E+04
5	84	85	425	3.61E+04
7	84	85	595	5.06E+04
7	84	85	595	5.06E+04
6	84	85	510	4.34E+04
6	84	85	510	4.34E+04
7	64	65	455	2.96E+04
7	64	65	455	2.96E+04
7	64	65	455	2.96E+04
7	64	65	455	2.96E+04
5	84	85	425	3.61E+04
7	84	85	595	5.06E+04
7	84	85	595	5.06E+04
6	84	85	510	4.34E+04
6	84	85	510	4.34E+04

Group 3, 100 minutes or longer

		Freq	o(Time)	Time	X	X^2
170	6	1	110	114	114	1.30E+04
180	8	1	290	288	288	8.29E+04
190	6	1	260	258	258	6.66E+04
200	3	1	110	108	108	1.17E+04
210	2	1	110	108	108	1.17E+04
220	5	1	180	180	180	3.24E+04
230	5	1	130	132	132	1.74E+04
240	4	1	120	120	120	1.44E+04
250	1	1	140	138	138	1.90E+04
260	2	1	140	144	144	2.07E+04
270	0	1	180	180	180	3.24E+04
280	0	1	180	180	180	3.24E+04
290	2	1	210	210	210	4.41E+04
Grand Total	189	1	130	126	126	1.59E+04
		1	210	210	210	4.41E+04
		1	190	192	192	3.69E+04
		1	170	168	168	2.82E+04
		1	220	216	216	4.67E+04
		1	170	168	168	2.82E+04
		1	170	168	168	2.82E+04
		1	130	132	132	1.74E+04
		1	100	102	102	1.04E+04
		1	100	102	102	1.04E+04
		1	100	104	104	1.09E+04
		1	100	102	102	1.03E+04
		1	100	102	102	1.03E+04
		1	100	102	102	1.03E+04
		1	100	102	102	1.03E+04
		1	100	102	102	1.03E+04
		1	100	102	102	1.03E+04
		1	100	102	102	1.03E+04
		1	100	102	102	1.03E+04
		1	100	102	102	1.03E+04
		1	100	101	101	1.03E+04
		1	100	101	101	1.03E+04
		1	100	101	101	1.03E+04
		1	100	101	101	1.03E+04
		1	100	101	101	1.03E+04
		1	100	101	101	1.03E+04
		1	100	101	101	1.03E+04
		1	100	101	101	1.03E+04
		1	100	101	101	1.03E+04
		1	100	101	101	1.03E+04
		1	100	101	101	1.03E+04
		1	100	101	101	1.01E+04
		1	100	101	101	1.01E+04
		1	100	101	101	1.01E+04
		1	100	101	101	1.01E+04
		1	100	101	101	1.01E+04
		1	100	101	101	1.01E+04
		1	100	101	101	1.01E+04
		1	100	101	101	1.01E+04
		1	100	101	101	1.01E+04
		1	140	144	144	2.07E+04
		1	160	156	156	2.43E+04
		1	140	144	144	2.07E+04
		1	130	132	132	1.74E+04
		1	120	120	120	1.44E+04
		1	120	120	120	1.44E+04
		1	110	108	108	1.17E+04
		1	160	162	162	2.62E+04
		1	140	144	144	2.07E+04
		1	140	138	138	1.90E+04

APPENDIX B-1 FLIGHT DURATION - FLIGHT PROFILE SELECTION (Continued)

Metro III Flight Time Surveys, STD DEV CAL

Group 1, 40 minutes or less

Freq	o(Time)	Time	X	X^2

Group 2, 41~99 minute

Freq	o(Time)	Time	X	X^2
7	72	70	490	3.43E+04
1	44	42	42	1.76E+03
7	64	65	455	2.96E+04
6	64	65	390	2.54E+04
7	64	65	455	2.96E+04
6	64	65	390	2.54E+04
6	64	65	390	2.54E+04
7	60	60	420	2.52E+04
7	76	75	525	3.94E+04
7	80	80	560	4.48E+04
6	72	70	420	2.94E+04
1	60	60	60	3.60E+03
1	92	90	90	8.10E+03
1	56	54	64	2.92E+03
1	48	48	48	2.30E+03
1	96	96	96	9.22E+03
1	80	78	78	6.08E+03
1	92	90	90	8.10E+03
1	92	90	90	8.10E+03
1	92	90	90	8.10E+03
1	84	84	84	7.06E+03
1	92	90	90	8.10E+03
1	92	90	90	8.10E+03
1	72	72	72	5.18E+03
1	80	78	78	6.08E+03
1	56	54	54	2.92E+03
1	72	72	72	5.18E+03
1	92	90	90	8.10E+03
1	92	90	90	8.10E+03
1	80	78	78	6.08E+03
1	92	90	90	8.10E+03
1	68	66	66	4.36E+03
6	60	60	360	2.16E+04
7	60	60	420	2.52E+04
7	60	60	420	2.52E+04
7	60	60	420	2.52E+04
6	60	60	360	2.16E+04
1	80	78	78	6.08E+03
1	60	60	60	3.60E+03
1	80	78	78	6.08E+03
1	60	60	60	3.60E+03
1	48	48	48	2.30E+03
1	72	72	72	5.18E+03
1	56	54	54	2.92E+03
1	60	60	60	3.60E+03
1	72	72	72	5.18E+03
1	72	72	72	5.18E+03
1	72	72	72	5.18E+03
1	80	78	78	6.08E+03
1	96	96	96	9.22E+03
1	96	96	96	9.22E+03
1	60	59	59	3.53E+03
1	60	59	59	3.53E+03
1	68	67	67	4.48E+03
1	52	54	54	2.91E+03
1	52	54	54	2.91E+03
1	52	54	54	2.91E+03
1	52	54	54	2.91E+03
1	52	54	54	2.91E+03
1	60	59	59	3.46E+03
1	60	59	59	3.46E+03
1	60	59	59	3.46E+03
1	60	59	59	3.46E+03

Group 3, 100 minutes or longer

Freq	o(Time)	Time	X	X^2
1	130	132	132	1.74E+04
1	110	108	108	1.17E+04
1	160	162	162	2.62E+04
1	230	234	234	5.48E+04
1	130	132	132	1.74E+04
1	140	138	138	1.90E+04
1	120	120	120	1.44E+04
1	150	150	150	2.25E+04
1	160	162	162	2.62E+04
1	190	186	186	3.46E+04
1	170	168	168	2.82E+04
1	160	156	156	2.43E+04
1	230	228	228	5.20E+04
1	130	132	132	1.74E+04
1	160	162	162	2.62E+04
1	240	240	240	5.76E+04
1	230	234	234	5.48E+04
1	240	240	240	5.76E+04
1	110	114	114	1.30E+04
1	110	108	108	1.17E+04
1	240	240	240	5.76E+04
1	160	156	156	2.43E+04
1	200	204	204	4.16E+04
1	170	168	168	2.82E+04
1	180	180	180	3.24E+04
1	180	180	180	3.24E+04
1	170	168	168	2.82E+04
1	120	120	120	1.44E+04
1	110	114	114	1.30E+04
1	140	144	144	2.07E+04
1	130	125	125	1.57E+04
1	130	125	125	1.57E+04
1	130	125	125	1.57E+04
1	130	125	125	1.57E+04
1	130	125	125	1.57E+04
1	130	125	125	1.57E+04
1	130	125	125	1.57E+04
1	130	125	125	1.57E+04
1	130	125	125	1.57E+04
1	130	125	125	1.57E+04
1	120	115	115	1.33E+04
1	120	115	115	1.33E+04
1	120	115	115	1.33E+04
1	120	115	115	1.33E+04
1	120	115	115	1.33E+04
1	120	115	115	1.33E+04
1	120	115	115	1.33E+04
1	140	140	140	1.96E+04
1	140	140	140	1.96E+04
1	140	140	140	1.96E+04
1	140	140	140	1.96E+04
1	140	140	140	1.96E+04
1	140	140	140	1.96E+04
1	140	140	140	1.96E+04
1	130	131	131	1.73E+04
1	130	131	131	1.73E+04
1	130	131	131	1.73E+04
1	130	131	131	1.73E+04
1	130	131	131	1.73E+04
1	130	131	131	1.73E+04
1	130	131	131	1.73E+04
1	130	131	131	1.73E+04
1	130	131	131	1.73E+04

APPENDIX B-1 FLIGHT DURATION - FLIGHT PROFILE SELECTION (Continued)

Metro III Flight Time Surveys, STD DEV CAL

Group 1, 40 minutes or less

Freq	o(Time)	Time	X	X^2

Group 2, 41~99 minute

Freq	o(Time)	Time	X	X^2
1	60	59	59	3.46E+03
1	60	59	59	3.46E+03
1	60	59	59	3.46E+03
1	64	62	62	3.86E+03
1	64	62	62	3.86E+03
1	64	62	62	3.86E+03
1	64	62	62	3.86E+03
1	64	62	62	3.86E+03
1	64	62	62	3.86E+03
1	72	73	73	5.33E+03
1	72	73	73	5.33E+03
1	72	73	73	5.33E+03
1	72	73	73	5.33E+03
1	72	73	73	5.33E+03
1	72	73	73	5.33E+03
1	72	73	73	5.33E+03
1	72	73	73	5.33E+03
1	64	64	64	4.13E+03
1	64	64	64	4.13E+03
1	64	64	64	4.13E+03
1	64	64	64	4.13E+03
1	60	60	60	3.64E+03
1	60	60	60	3.64E+03
1	60	60	60	3.64E+03
1	60	60	60	3.64E+03
1	60	60	60	3.64E+03
1	60	60	60	3.64E+03
1	60	60	60	3.64E+03
1	60	60	60	3.64E+03
1	60	60	60	3.64E+03
1	64	66	66	4.32E+03
1	64	66	66	4.32E+03
1	64	66	66	4.32E+03
1	64	66	66	4.32E+03
1	64	66	66	4.32E+03
1	64	66	66	4.32E+03
1	64	66	66	4.32E+03
1	64	66	66	4.32E+03
1	64	66	66	4.32E+03
1	64	66	66	4.32E+03
1	68	68	68	4.58E+03
1	68	68	68	4.58E+03
1	68	68	68	4.58E+03
1	68	68	68	4.58E+03
1	68	68	68	4.58E+03
1	68	68	68	4.58E+03
1	68	68	68	4.58E+03
1	72	71	71	4.98E+03
1	72	71	71	4.98E+03
1	72	71	71	4.98E+03
1	68	70	70	4.84E+03
1	68	70	70	4.84E+03
1	68	70	70	4.84E+03
1	68	70	70	4.84E+03
1	68	70	70	4.84E+03
1	68	70	70	4.84E+03
1	68	70	70	4.84E+03
1	68	70	70	4.84E+03
1	68	70	70	4.84E+03
1	68	70	70	4.84E+03
1	68	70	70	4.84E+03
1	68	70	70	4.84E+03
1	68	70	70	4.84E+03

Group 3, 100 minutes or longer

Freq	o(Time)	Time	X	X^2
1	130	131	131	1.73E+04
1	130	131	131	1.73E+04
1	130	135	135	1.82E+04
1	130	135	135	1.82E+04
1	130	135	135	1.82E+04
1	130	135	135	1.82E+04
1	130	135	135	1.82E+04
1	130	135	135	1.82E+04
1	130	135	135	1.82E+04
1	130	135	135	1.82E+04
1	130	135	135	1.82E+04
1	130	128	128	1.63E+04
1	130	128	128	1.63E+04
1	130	128	128	1.63E+04
1	130	128	128	1.63E+04
1	130	128	128	1.63E+04
1	130	128	128	1.63E+04
1	130	128	128	1.63E+04
1	130	128	128	1.63E+04
1	130	128	128	1.63E+04
1	130	128	128	1.63E+04
1	130	128	128	1.63E+04
1	130	128	128	1.63E+04
1	130	132	132	1.74E+04
1	220	216	216	4.67E+04
1	220	222	222	4.93E+04
189 x			27239.7	4248779

Avg Time	144
STD DEV	41
STD DEV	1
	41
HIGH	186
AVG	144
LOW	103

APPENDIX B-1 FLIGHT DURATION - FLIGHT PROFILE SELECTION (Continued)

Metro III Flight Time Surveys, STD DEV CAL

Group 1, 40 minutes or less

Freq	o(Time)	Time	X	X^2

Group 2, 41~99 minuts

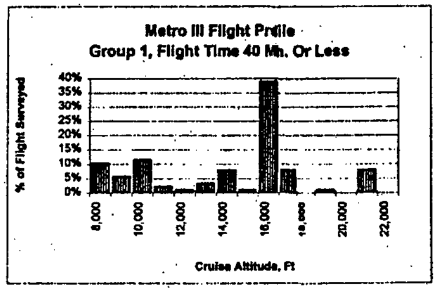
Freq	o(Time)	Time	X	X^2
1	68	67	67	4.48E+03
1	68	67	67	4.48E+03
1	68	67	67	4.48E+03
1	68	67	67	4.48E+03
1	68	67	67	4.48E+03
1	68	67	67	4.48E+03
1	68	67	67	4.48E+03
1	68	67	67	4.48E+03
1	68	67	67	4.48E+03
1	68	67	67	4.48E+03
1	68	67	67	4.48E+03
1	68	67	67	4.48E+03
1	68	67	67	4.48E+03
1	68	67	67	4.48E+03
1	68	67	67	4.48E+03
1	72	72	72	5.18E+03
1	72	72	72	5.18E+03
1	72	72	72	5.18E+03
1	72	72	72	5.18E+03
1	72	72	72	5.18E+03
1	72	72	72	5.18E+03
1	72	72	72	5.18E+03
1	72	72	72	5.18E+03
1	72	72	72	5.18E+03
1	72	72	72	5.18E+03
1	72	71	71	4.97E+03
1	72	71	71	4.97E+03
1	72	71	71	4.97E+03
1	72	71	71	4.97E+03
1	72	71	71	4.97E+03
1	72	71	71	4.97E+03
1	72	71	71	4.97E+03
1	72	71	71	4.97E+03
5	64	65	325	2.11E+04
7	64	65	455	2.96E+04
7	64	65	455	2.96E+04
6	64	65	390	2.54E+04
6	64	65	390	2.54E+04
684	x	x	42280.8	2715592

Avg Time	62
STD DEV	12
STD DEV	1
	12
HIGH	74
AVG	62
LOW	50

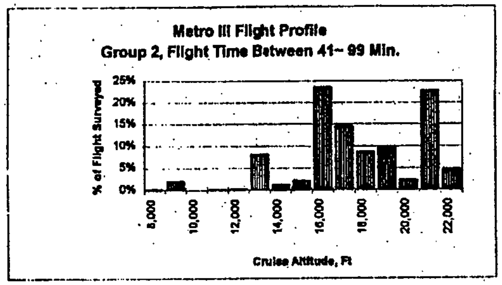
Group 3, 100 minutes or longer

Freq	o(Time)	Time	X	X^2

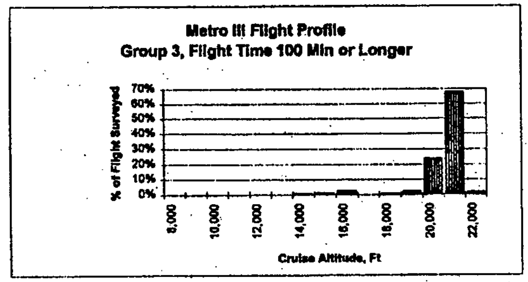
MISSION PROFILE SELECTION
FLIGHT ALTITUDE COMPARISON



Alt (+1 std dev)	17,900
Alt Average	14,155
Alt (-1 std dev)	10,410



Alt (+1 std dev)	20,523
Alt Average	17,633
Alt (-1 std dev)	14,743



Alt (+1 std dev)	21,683
Alt Average	20,487
Alt (-1 std dev)	19,290

Metro III Altitude Survey

Group 1, 40 minutes or less

Freq	Alt	X	X^2
1	7,500	7,500	5.63E+07
1	8,000	8,000	6.40E+07
1	8,000	8,000	6.40E+07
1	8,000	8,000	6.40E+07
1	8,000	8,000	6.40E+07
1	8,000	8,000	6.40E+07
1	8,000	8,000	6.40E+07
1	8,000	8,000	6.40E+07
1	8,000	8,000	6.40E+07
1	9,000	9,000	8.10E+07
1	9,000	9,000	8.10E+07
1	9,000	9,000	8.10E+07
1	9,000	9,000	8.10E+07
1	9,000	9,000	8.10E+07
5	10,000	50,000	5.00E+08
1	10,000	10,000	1.00E+08
1	10,000	10,000	1.00E+08
1	10,000	10,000	1.00E+08
1	10,000	10,000	1.00E+08
1	10,000	10,000	1.00E+08
1	11,000	11,000	1.21E+08
1	11,000	11,000	1.21E+08
1	12,000	12,000	1.44E+08
1	13,000	13,000	1.69E+08
1	13,000	13,000	1.69E+08
1	13,000	13,000	1.69E+08
6	14,000	84,000	1.18E+09
1	14,000	14,000	1.96E+08
1	15,000	15,000	2.25E+08
7	16,000	112,000	1.79E+09
7	16,000	112,000	1.79E+09
7	16,000	112,000	1.79E+09
1	16,000	16,000	2.56E+08
1	16,000	16,000	2.56E+08
1	16,000	16,000	2.56E+08
1	16,000	16,000	2.56E+08
1	16,000	16,000	2.56E+08

Group 2, 41~99 minuts

Freq	Alt	X	X^2
1	8,000	8,000	6.40E+07
7	9,000	63,000	5.67E+08
7	9,000	63,000	5.67E+08
1	11,000	11,000	1.21E+08
1	12,000	12,000	1.44E+08
1	12,000	12,000	1.44E+08
7	13,000	91,000	1.18E+09
7	13,000	91,000	1.18E+09
7	13,000	91,000	1.18E+09
7	13,000	91,000	1.18E+09
7	13,000	91,000	1.18E+09
7	13,000	91,000	1.18E+09
7	13,000	91,000	1.18E+09
7	13,000	91,000	1.18E+09
1	14,000	14,000	1.96E+08
1	14,000	14,000	1.96E+08
6	14,000	84,000	1.18E+09
1	14,000	14,000	1.96E+08
1	15,000	15,000	2.25E+08
1	15,000	15,000	2.25E+08
7	15,000	105,000	1.58E+09
6	15,000	90,000	1.35E+09
1	16,000	16,000	2.56E+08
1	16,000	16,000	2.56E+08
7	16,000	112,000	1.79E+09
7	16,000	112,000	1.79E+09
7	16,000	112,000	1.79E+09
1	16,000	16,000	2.56E+08
1	16,000	16,000	2.56E+08
1	16,000	16,000	2.56E+08
7	16,000	112,000	1.79E+09
7	16,000	112,000	1.79E+09
7	16,000	112,000	1.79E+09
7	16,000	112,000	1.79E+09
7	16,000	112,000	1.79E+09
6	16,000	96,000	1.54E+09
7	16,000	112,000	1.79E+09

Group 3, 100 minutes or longer

Freq	Alt	X	X^2
1	14,000	14,000	1.96E+08
1	15,000	15,000	2.25E+08
1	15,000	15,000	2.25E+08
1	16,000	16,000	2.56E+08
1	16,000	16,000	2.56E+08
1	16,000	16,000	2.56E+08
1	16,000	16,000	2.56E+08
1	16,000	16,000	2.56E+08
1	18,000	18,000	3.24E+08
1	19,000	19,000	3.61E+08
1	19,000	19,000	3.61E+08
1	19,000	19,000	3.61E+08
1	19,000	19,000	3.61E+08
1	20,000	20,000	4.00E+08
1	20,000	20,000	4.00E+08
1	20,000	20,000	4.00E+08
1	20,000	20,000	4.00E+08
1	20,000	20,000	4.00E+08
1	20,000	20,000	4.00E+08
1	20,000	20,000	4.00E+08
1	20,000	20,000	4.00E+08
1	20,000	20,000	4.00E+08
1	20,000	20,000	4.00E+08
1	20,000	20,000	4.00E+08
1	20,000	20,000	4.00E+08
1	20,000	20,000	4.00E+08
1	20,000	20,000	4.00E+08
1	20,000	20,000	4.00E+08
1	20,000	20,000	4.00E+08
1	20,000	20,000	4.00E+08
1	20,000	20,000	4.00E+08
1	20,000	20,000	4.00E+08
1	20,000	20,000	4.00E+08
1	20,000	20,000	4.00E+08
1	20,000	20,000	4.00E+08
1	20,000	20,000	4.00E+08
1	20,000	20,000	4.00E+08

Metro III Altitude Survey

Group 1, 40 minutes or less

Freq	Alt	X	X^2
1	16,000	16,000	2.56E+08
1	16,000	16,000	2.56E+08
1	16,000	16,000	2.56E+08
1	16,000	16,000	2.56E+08
1	16,000	16,000	2.56E+08
1	16,000	16,000	2.56E+08
1	16,000	16,000	2.56E+08
1	16,000	16,000	2.56E+08
7	17,000	119,000	2.02E+09
1	19,000	19,000	3.61E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
87		1231500	1.86E+10

AVG ALT	14,155
STD DEV	3,745
	1.00
STD DEV	3,745
HIGH	17,900
AVG	14,155
LOW	10,410

Group 2, 41-99 minuts

Freq	Alt	X	X^2
7	16,000	112,000	1.79E+09
7	16,000	112,000	1.79E+09
6	16,000	96,000	1.54E+09
7	16,000	112,000	1.79E+09
7	16,000	112,000	1.79E+09
7	16,000	112,000	1.79E+09
7	16,000	112,000	1.79E+09
7	16,000	112,000	1.79E+09
1	16,000	16,000	2.56E+08
1	16,000	16,000	2.56E+08
1	16,000	16,000	2.56E+08
1	16,000	16,000	2.56E+08
1	16,000	16,000	2.56E+08
1	16,000	16,000	2.56E+08
1	16,000	16,000	2.56E+08
1	16,000	16,000	2.56E+08
1	16,000	16,000	2.56E+08
1	16,000	16,000	2.56E+08
1	16,000	16,000	2.56E+08
1	16,000	16,000	2.56E+08
1	16,000	16,000	2.56E+08
1	16,000	16,000	2.56E+08
1	16,000	16,000	2.56E+08
1	16,000	16,000	2.56E+08
1	16,000	16,000	2.56E+08
1	16,000	16,000	2.56E+08
1	16,000	16,000	2.56E+08
1	16,000	16,000	2.56E+08
1	16,000	16,000	2.56E+08
1	16,000	16,000	2.56E+08
1	16,000	16,000	2.56E+08
1	16,000	16,000	2.56E+08
1	16,000	16,000	2.56E+08
1	16,000	16,000	2.56E+08
1	16,000	16,000	2.56E+08
1	16,000	16,000	2.56E+08
1	16,000	16,000	2.56E+08
1	16,000	16,000	2.56E+08
1	16,000	16,000	2.56E+08
1	16,000	16,000	2.56E+08
7	17,000	119,000	2.02E+09
7	17,000	119,000	2.02E+09
7	17,000	119,000	2.02E+09
6	17,000	102,000	1.73E+09
7	17,000	119,000	2.02E+09
6	17,000	102,000	1.73E+09
7	17,000	119,000	2.02E+09
7	17,000	119,000	2.02E+09
7	17,000	119,000	2.02E+09
5	17,000	85,000	1.45E+09
7	17,000	119,000	2.02E+09
7	17,000	119,000	2.02E+09
6	17,000	102,000	1.73E+09
6	17,000	102,000	1.73E+09
7	17,000	119,000	2.02E+09
7	18,000	126,000	2.27E+09
7	18,000	126,000	2.27E+09
7	18,000	126,000	2.27E+09
5	18,000	90,000	1.62E+09
7	18,000	126,000	2.27E+09
7	18,000	126,000	2.27E+09

Group 3, 100 minutes or longer

Freq	Alt	X	X^2
1	20,000	20,000	4.00E+08
1	20,000	20,000	4.00E+08
1	20,000	20,000	4.00E+08
1	20,000	20,000	4.00E+08
1	20,000	20,000	4.00E+08
1	20,000	20,000	4.00E+08
1	20,000	20,000	4.00E+08
1	20,000	20,000	4.00E+08
1	20,000	20,000	4.00E+08
1	20,000	20,000	4.00E+08
1	20,000	20,000	4.00E+08
1	20,000	20,000	4.00E+08
1	20,000	20,000	4.00E+08
1	20,000	20,000	4.00E+08
1	20,000	20,000	4.00E+08
1	20,000	20,000	4.00E+08
1	20,000	20,000	4.00E+08
1	20,000	20,000	4.00E+08
1	20,000	20,000	4.00E+08
1	20,000	20,000	4.00E+08
1	20,000	20,000	4.00E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08

APPENDIX B-2 CRUISE ALTITUDE - FLIGHT PROFILE SELECTION (Continued)

Metro III Altitude Survey

Group 1, 40 minutes or less				Group 2, 41-99 minuts				Group 3, 100 minutes or longer			
Freq	Alt	X	X^2	Freq	Alt	X	X^2	Freq	Alt	X	X^2
				6	18,000	108,000	1.94E+09	1	21,000	21,000	4.41E+08
				6	18,000	108,000	1.94E+09	1	21,000	21,000	4.41E+08
				7	18,000	126,000	2.27E+09	1	21,000	21,000	4.41E+08
				1	19,000	19,000	3.61E+08	1	21,000	21,000	4.41E+08
				7	19,000	133,000	2.53E+09	1	21,000	21,000	4.41E+08
				6	19,000	114,000	2.17E+09	1	21,000	21,000	4.41E+08
				7	19,000	133,000	2.53E+09	1	21,000	21,000	4.41E+08
				6	19,000	114,000	2.17E+09	1	21,000	21,000	4.41E+08
				6	19,000	114,000	2.17E+09	1	21,000	21,000	4.41E+08
				7	19,000	133,000	2.53E+09	1	21,000	21,000	4.41E+08
				7	19,000	133,000	2.53E+09	1	21,000	21,000	4.41E+08
				7	19,000	133,000	2.53E+09	1	21,000	21,000	4.41E+08
				6	19,000	114,000	2.17E+09	1	21,000	21,000	4.41E+08
				1	19,000	19,000	3.61E+08	1	21,000	21,000	4.41E+08
				1	19,000	19,000	3.61E+08	1	21,000	21,000	4.41E+08
				1	19,000	19,000	3.61E+08	1	21,000	21,000	4.41E+08
				1	19,000	19,000	3.61E+08	1	21,000	21,000	4.41E+08
				1	19,000	19,000	3.61E+08	1	21,000	21,000	4.41E+08
				1	20,000	20,000	4.00E+08	1	21,000	21,000	4.41E+08
				1	20,000	20,000	4.00E+08	1	21,000	21,000	4.41E+08
				1	20,000	20,000	4.00E+08	1	21,000	21,000	4.41E+08
				1	20,000	20,000	4.00E+08	1	21,000	21,000	4.41E+08
				1	20,000	20,000	4.00E+08	1	21,000	21,000	4.41E+08
				1	20,000	20,000	4.00E+08	1	21,000	21,000	4.41E+08
				1	20,000	20,000	4.00E+08	1	21,000	21,000	4.41E+08
				1	20,000	20,000	4.00E+08	1	21,000	21,000	4.41E+08
				1	20,000	20,000	4.00E+08	1	21,000	21,000	4.41E+08
				1	20,000	20,000	4.00E+08	1	21,000	21,000	4.41E+08
				1	20,000	20,000	4.00E+08	1	21,000	21,000	4.41E+08
				1	20,000	20,000	4.00E+08	1	21,000	21,000	4.41E+08
				1	20,000	20,000	4.00E+08	1	21,000	21,000	4.41E+08
				1	20,000	20,000	4.00E+08	1	21,000	21,000	4.41E+08
				1	20,000	20,000	4.00E+08	1	21,000	21,000	4.41E+08
				1	20,000	20,000	4.00E+08	1	21,000	21,000	4.41E+08
				6	21,000	126,000	2.65E+09	1	21,000	21,000	4.41E+08
				7	21,000	147,000	3.09E+09	1	21,000	21,000	4.41E+08
				7	21,000	147,000	3.09E+09	1	21,000	21,000	4.41E+08
				7	21,000	147,000	3.09E+09	1	21,000	21,000	4.41E+08
				6	21,000	126,000	2.65E+09	1	21,000	21,000	4.41E+08
				1	21,000	21,000	4.41E+08	1	21,000	21,000	4.41E+08
				1	21,000	21,000	4.41E+08	1	21,000	21,000	4.41E+08
				1	21,000	21,000	4.41E+08	1	21,000	21,000	4.41E+08
				1	21,000	21,000	4.41E+08	1	21,000	21,000	4.41E+08
				1	21,000	21,000	4.41E+08	1	21,000	21,000	4.41E+08
				1	21,000	21,000	4.41E+08	1	21,000	21,000	4.41E+08
				1	21,000	21,000	4.41E+08	1	21,000	21,000	4.41E+08
				1	21,000	21,000	4.41E+08	1	21,000	21,000	4.41E+08
				1	21,000	21,000	4.41E+08	1	21,000	21,000	4.41E+08
				1	21,000	21,000	4.41E+08	1	21,000	21,000	4.41E+08
				1	21,000	21,000	4.41E+08	1	21,000	21,000	4.41E+08
				1	21,000	21,000	4.41E+08	1	21,000	21,000	4.41E+08
				1	21,000	21,000	4.41E+08	1	21,000	21,000	4.41E+08
				1	21,000	21,000	4.41E+08	1	21,000	21,000	4.41E+08
				1	21,000	21,000	4.41E+08	1	21,000	21,000	4.41E+08
				1	21,000	21,000	4.41E+08	1	21,000	21,000	4.41E+08
				1	21,000	21,000	4.41E+08	1	21,000	21,000	4.41E+08
				1	21,000	21,000	4.41E+08	1	21,000	21,000	4.41E+08
				1	21,000	21,000	4.41E+08	1	21,000	21,000	4.41E+08
				1	21,000	21,000	4.41E+08	1	21,000	21,000	4.41E+08
				1	21,000	21,000	4.41E+08	1	21,000	21,000	4.41E+08
				1	21,000	21,000	4.41E+08	1	21,000	21,000	4.41E+08

APPENDIX B-2 CRUISE ALTITUDE - FLIGHT PROFILE SELECTION (Continued)

Metro III Altitude Survey

Group 1, 40 minutes or less

Freq	Alt	X	X^2

Group 2, 41–99 minuts

Freq	Alt	X	X^2
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08

Group 3, 100 minutes or longer

Freq	Alt	X	X^2
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	22,000	22,000	4.84E+08
1	22,000	22,000	4.84E+08
1	22,000	22,000	4.84E+08
189		3872000	7.96E+10

AVG ALT	20,487
STD DEV	1,197
STD DEV	1.00
	1,197
HIGH	21,683
AVG	20,487
LOW	19,280

APPENDIX B-2 CRUISE ALTITUDE - FLIGHT PROFILE SELECTION (Continued)

Metro III Altitude Survey

Group 1, 40 minutes or less

Freq	Alt	X	X^2

Group 2, 41~99 minuts

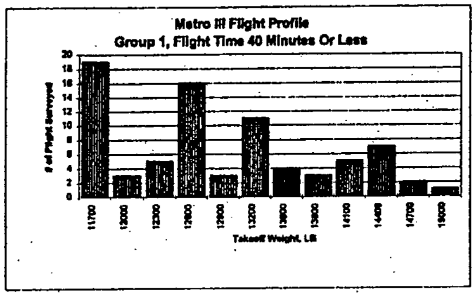
Freq	Alt	X	X^2
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
1	21,000	21,000	4.41E+08
5	22,000	110,000	2.42E+09
7	22,000	154,000	3.39E+09
7	22,000	154,000	3.39E+09
6	22,000	132,000	2.90E+09
6	22,000	132,000	2.90E+09
684		12,061,000	2.18E+11
	AVG ALT	17,633	
	STD DEV	2,890	
	STD DEV	1.00	
		2,890	
	HIGH	20,523	
	AVG	17,633	
	LOW	14,743	

Group 3, 100 minutes or longer

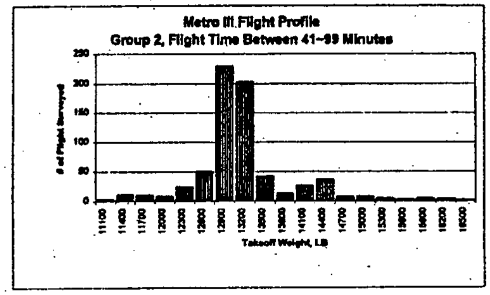
Freq	Alt	X	X^2

APPENDIX B-3 TAKEOFF WEIGHT - FLIGHT PROFILE SELECTION

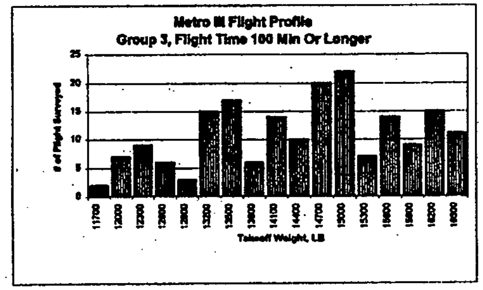
MISSION PROFILE SELECTION
TAKEOFF WEIGHT COMPARISON



Wt. (+1 std dev)	13,765
Wt. Average	12,753
Wt. (-1 std dev)	11,741



Wt. (+1 std dev)	13,901
Wt. Average	13,274
Wt. (-1 std dev)	12,647



Wt. (+1 std dev)	14,918
Wt. Average	13,828
Wt. (-1 std dev)	12,737

Metro III Weight Surveys

Sum of Freq round takeoff	Total
11400	8
11700	19
12000	3
12300	5
12600	16
12900	3
13200	11
13500	4
13800	3
14100	5
14400	7
14700	2
15000	1
Grand Total	87

Group 1, 40 minutes or less

Freq	Ro(Wt)	Wt.	Freq*Wt	Freq*Wt^2
1	14,100	14,100	14,100	1.99E+08
1	14,700	14,600	14,600	2.13E+08
1	12,000	11,985	11,985	1.44E+08
1	11,700	11,564	11,564	1.34E+08
1	11,700	11,679	11,679	1.36E+08
1	12,000	11,883	11,883	1.41E+08
1	12,300	12,192	12,192	1.49E+08
1	12,600	12,713	12,713	1.62E+08
1	11,700	11,803	11,803	1.39E+08
1	12,300	12,200	12,200	1.49E+08
1	13,800	13,800	13,800	1.90E+08
1	14,700	14,800	14,800	2.19E+08
1	12,900	12,800	12,800	1.64E+08
1	12,600	12,500	12,500	1.56E+08
5	12,600	12,671	63,355	8.03E+08
1	12,600	12,871	12,871	1.61E+08
1	15,000	14,900	14,900	2.22E+08
1	12,300	12,200	12,200	1.49E+08
1	12,300	12,200	12,200	1.49E+08
1	14,400	14,400	14,400	2.07E+08
1	11,400	11,400	11,400	1.30E+08
1	14,100	14,200	14,200	2.02E+08
1	13,800	13,900	13,900	1.93E+08
1	11,700	11,700	11,700	1.37E+08
1	11,700	11,600	11,600	1.35E+08
1	13,200	13,300	13,300	1.77E+08
6	11,400	11,459	68,754	7.88E+08
1	14,400	14,400	14,400	2.07E+08
1	14,400	14,500	14,500	2.10E+08
7	12,600	12,593	88,151	1.11E+09
7	11,700	11,763	82,341	9.69E+08
7	11,700	11,763	82,341	9.69E+08
1	14,100	14,100	14,100	1.99E+08
1	13,200	13,173	13,173	1.74E+08
1	14,100	14,201	14,201	2.02E+08
1	13,200	13,229	13,229	1.75E+08
1	14,400	14,469	14,469	2.09E+08
1	13,500	13,603	13,603	1.85E+08
1	14,400	14,483	14,483	2.10E+08
1	11,400	11,332	11,332	1.28E+08
1	12,900	12,849	12,849	1.65E+08
1	12,300	12,258	12,258	1.50E+08
1	12,600	12,614	12,614	1.59E+08

Sum of Freq Round(alt)	Total
11100	3
11400	11
11700	10
12000	8
12300	24
12600	50
12900	229
13200	203
13500	42
13800	13
14100	26
14400	37
14700	7
15000	7
15300	4
15600	2
15900	4
16200	3
16500	1
Grand Total	684

Group 2, 41~99 minuts

Freq	Ro(Wt)	Wt.	Freq*Wt	Freq*Wt^2
1	12000	12000	12,000	1.44E+08
7	12900	12779	89,453	1.14E+09
7	12900	12779	89,453	1.14E+09
1	14100	14200	14,200	2.02E+08
1	15000	15000	15,000	2.25E+08
1	13800	13800	13,800	1.90E+08
7	12900	12821	89,747	1.15E+09
7	12900	12821	89,747	1.15E+09
7	12900	12821	89,747	1.15E+09
7	12900	12938	90,566	1.17E+09
7	12900	12938	90,566	1.17E+09
7	12900	12938	90,566	1.17E+09
7	12900	12938	90,566	1.17E+09
7	12900	12938	90,566	1.17E+09
1	13800	13800	13,800	1.90E+08
1	14700	14700	14,700	2.16E+08
6	11400	11459	68,754	7.88E+08
1	12300	12200	12,200	1.49E+08
1	14700	14800	14,800	2.19E+08
1	15300	15420	15,420	2.38E+08
7	12300	12314	86,198	1.06E+09
6	13200	13238	79,428	1.05E+09
1	12300	12300	12,300	1.51E+08
1	16200	16220	16,220	2.63E+08
7	12900	12821	89,747	1.15E+09
7	12900	12821	89,747	1.15E+09
7	12900	12821	89,747	1.15E+09
1	12300	12414	12,414	1.54E+08
1	12600	12478	12,478	1.56E+08
1	12600	12740	12,740	1.62E+08
7	12900	12838	89,866	1.15E+09
7	12900	12838	89,866	1.15E+09
7	12900	12838	89,866	1.15E+09
7	12900	12838	89,866	1.15E+09
7	12900	12838	89,866	1.15E+09
6	12600	12729	76,374	9.72E+08
7	12600	12729	89,103	1.13E+09
7	12600	12729	89,103	1.13E+09
7	12600	12729	89,103	1.13E+09
6	12600	12729	76,374	9.72E+08
7	14400	14320	100,240	1.44E+09
7	11700	11763	82,341	9.69E+08
7	13500	13426	93,982	1.26E+09

Sum of Freq Round(alt)	Total
11400	1
11700	2
12000	7
12300	9
12600	6
12900	3
13200	15
13500	17
13800	6
14100	14
14400	10
14700	20
15000	22
15300	7
15600	14
15900	9
16200	15
16500	11
Grand Total	188

Group 3, 100 minutes or longer

Freq	Ro(Wt)	Wt.	Freq*Wt	Freq*Wt^2
1	15000	14900	15,000	2.25E+08
1	15900	16000	15,900	2.53E+08
1	15000	14900	15,000	2.25E+08
1	16200	16200	16,200	2.62E+08
1	15000	15000	15,000	2.25E+08
1	12300	12400	12,300	1.51E+08
1	15300	15250	15,300	2.34E+08
1	15900	15800	15,900	2.53E+08
1	15000	14900	15,000	2.25E+08
1	15600	15600	15,600	2.43E+08
1	16200	16100	16,200	2.62E+08
1	14700	14700	14,700	2.16E+08
1	14700	14800	14,700	2.16E+08
1	13500	13560	13,500	1.82E+08
1	14100	14010	14,100	1.99E+08
1	15600	15500	15,600	2.43E+08
1	13500	13400	13,500	1.82E+08
1	15300	15200	15,300	2.34E+08
1	15600	15480	15,600	2.43E+08
1	15600	15700	15,600	2.43E+08
1	15000	14950	15,000	2.25E+08
1	14100	14000	14,100	1.99E+08
1	14700	14600	14,700	2.16E+08
1	16200	16300	16,200	2.62E+08
1	16200	16300	16,200	2.62E+08
1	16500	16500	16,500	2.72E+08
1	16500	16500	16,500	2.72E+08
1	15000	14900	15,000	2.25E+08
1	15000	14900	15,000	2.25E+08
1	15600	15600	15,600	2.43E+08
1	16200	16200	16,200	2.62E+08
1	16200	16200	16,200	2.62E+08
1	13500	13500	13,500	1.82E+08
1	16200	16200	16,200	2.62E+08
1	16500	16400	16,500	2.72E+08
1	16500	16400	16,500	2.72E+08
1	15000	15000	15,000	2.25E+08
1	14700	14800	14,700	2.16E+08
1	15300	15200	15,300	2.34E+08
1	13500	13500	13,500	1.82E+08
1	14700	14800	14,700	2.16E+08
1	15900	16000	15,900	2.53E+08
1	14700	14800	14,700	2.16E+08

APPENDIX B-3 TAKEOFF WEIGHT - FLIGHT PROFILE SELECTION (Continued)

Metro III Weight Surveys

Group 1, 40 minutes or less

Freq	Ro(Wt)	Wt.	Freq*Wt	Freq*Wt^2
1	12,000	11,850	11,850	1.40E+08
1	14,100	14,243	14,243	2.03E+08
7	13,200	13,310	93,170	1.24E+09
1	12,900	12,802	12,802	1.64E+08
1	13,200	13,160	13,160	1.73E+08
1	13,500	13,638	13,638	1.86E+08
1	13,800	13,657	13,657	1.87E+08
1	13,500	13,635	13,635	1.86E+08
1	13,500	13,548	13,548	1.84E+08
1	14,400	14,251	14,251	2.03E+08
1	14,400	14,336	14,336	2.06E+08
87			1109533	1.42E+10
		AVG WT	12,753	
		STD DEV	1,012	
		STD DEV	1.00	
			1,012	
		HIGH	13,765	
		AVG	12,753	
		LOW	11,741	

Group 2, 41~99 minute

Freq	Ro(Wt)	Wt.	Freq*Wt	Freq*Wt^2
7	14100	14041	98,287	1.38E+09
7	13200	13117	91,819	1.20E+09
1	12600	12600	12,600	1.59E+08
1	12600	12500	12,500	1.56E+08
1	14100	14000	14,000	1.96E+08
1	12900	13000	13,000	1.69E+08
1	15000	15100	15,100	2.28E+08
1	16200	16200	16,200	2.62E+08
1	12900	13000	13,000	1.69E+08
1	11100	10971	10,971	1.20E+08
1	11700	11658	11,658	1.36E+08
1	11700	11650	11,650	1.36E+08
1	12000	12075	12,075	1.46E+08
1	12300	12162	12,162	1.48E+08
1	13500	13564	13,564	1.84E+08
1	12300	12410	12,410	1.54E+08
1	13200	13068	13,068	1.71E+08
1	13500	13505	13,505	1.82E+08
1	12600	12583	12,583	1.58E+08
1	12900	12937	12,937	1.67E+08
1	11100	11046	11,046	1.22E+08
1	12000	11869	11,869	1.41E+08
1	11400	11415	11,415	1.30E+08
1	11100	11214	11,214	1.26E+08
1	12900	13015	13,015	1.69E+08
1	13200	13228	13,228	1.75E+08
1	12600	12518	12,518	1.57E+08
1	14400	14320	14,320	2.05E+08
1	13500	13612	13,612	1.85E+08
1	12900	12994	12,994	1.69E+08
1	11400	11463	11,463	1.31E+08
1	11400	11425	11,425	1.31E+08
1	12000	12049	12,049	1.45E+08
1	14100	14017	14,017	1.96E+08
7	13200	13255	92,785	1.23E+09
7	13200	13255	92,785	1.23E+09
7	13200	13255	92,785	1.23E+09
6	12900	12894	77,364	9.98E+08
7	12900	12784	89,488	1.14E+09
6	13200	13310	79,860	1.06E+09
7	13200	13310	93,170	1.24E+09
7	13500	13631	95,417	1.30E+09
7	13200	13321	93,247	1.24E+09
5	13200	13183	65,915	8.69E+08
7	13200	13183	92,281	1.22E+09
7	13200	13183	92,281	1.22E+09
6	13200	13183	79,098	1.04E+09
6	13200	13183	79,098	1.04E+09
7	13500	13365	93,555	1.25E+09
7	13200	13098	91,686	1.20E+09
7	13200	13098	91,686	1.20E+09
7	13200	13098	91,686	1.20E+09
5	13200	13083	65,415	8.56E+08
7	13200	13083	91,581	1.20E+09
7	13200	13083	91,581	1.20E+09
6	13200	13083	78,498	1.03E+09
6	13200	13083	78,498	1.03E+09
7	13200	13265	92,855	1.23E+09
1	14700	14800	14,800	2.19E+08
7	13200	13088	91,616	1.20E+09
6	13200	13088	78,528	1.03E+09
7	13200	13088	91,616	1.20E+09
6	13200	13088	78,528	1.03E+09
6	13200	13088	78,528	1.03E+09
7	12300	12440	87,080	1.06E+09
7	12900	12802	89,614	1.15E+09
7	14400	14424	100,968	1.46E+09
6	13200	13348	80,088	1.07E+09
1	13500	13400	13,400	1.80E+08
1	14100	14100	14,100	1.99E+08

Group 3, 100 minutes or longer

Freq	Ro(Wt)	Wt.	Freq*Wt	Freq*Wt^2
1	15600	15700	15,600	2.43E+08
1	14700	14800	14,700	2.16E+08
1	16500	16500	16,500	2.72E+08
1	14700	14800	14,700	2.16E+08
1	14700	14800	14,700	2.16E+08
1	15000	15000	15,000	2.25E+08
1	14100	14000	14,100	1.99E+08
1	14700	14800	14,700	2.16E+08
1	15000	15000	15,000	2.25E+08
1	15600	15500	15,600	2.43E+08
1	13800	13800	13,800	1.90E+08
1	15600	15600	15,600	2.43E+08
1	16500	16500	16,500	2.72E+08
1	13500	13400	13,500	1.82E+08
1	15000	14900	15,000	2.25E+08
1	12300	12300	12,300	1.51E+08
1	12300	12216	12,300	1.51E+08
1	11700	11585	11,700	1.37E+08
1	12000	12072	12,000	1.44E+08
1	12000	12043	12,000	1.44E+08
1	12000	12085	12,000	1.44E+08
1	12000	11893	12,000	1.44E+08
1	12300	12263	12,300	1.51E+08
1	11700	11670	11,700	1.37E+08
1	12000	11979	12,000	1.44E+08
1	11400	11434	11,400	1.30E+08
1	14400	14288	14,400	2.07E+08
1	12900	13037	12,900	1.86E+08
1	15900	15801	15,900	2.53E+08
1	14100	14227	14,100	1.99E+08
1	14700	14563	14,700	2.16E+08
1	14400	14268	14,400	2.07E+08
1	14400	14541	14,400	2.07E+08
1	15600	15699	15,600	2.43E+08
1	14400	14500	14,400	2.07E+08
1	13500	13445	13,500	1.82E+08
1	14100	14184	14,100	1.99E+08
1	13500	13471	13,500	1.82E+08
1	14100	14090	14,100	1.99E+08
1	14100	14014	14,100	1.99E+08
1	13800	13721	13,800	1.90E+08
1	13200	13074	13,200	1.74E+08
1	13500	13458	13,500	1.82E+08
1	13200	13067	13,200	1.74E+08
1	13800	13839	13,800	1.90E+08
1	14100	14203	14,100	1.99E+08
1	15900	15780	15,900	2.53E+08
1	15000	15060	15,000	2.25E+08
1	13500	13400	13,500	1.82E+08
1	15000	15100	15,000	2.25E+08
1	16200	16200	16,200	2.62E+08
1	14400	14500	14,400	2.07E+08
1	12600	12600	12,600	1.59E+08
1	15300	15160	15,300	2.34E+08
1	14700	14800	14,700	2.16E+08
1	15000	14900	15,000	2.25E+08
1	14700	14800	14,700	2.16E+08
1	15000	14870	15,000	2.25E+08
1	15900	15800	15,900	2.53E+08
1	15000	14900	15,000	2.25E+08
1	16500	16500	16,500	2.72E+08
1	16500	16500	16,500	2.72E+08
1	16200	16100	16,200	2.62E+08
1	16200	16100	16,200	2.62E+08
1	16200	16200	16,200	2.62E+08
1	16200	16200	16,200	2.62E+08
1	16200	16200	16,200	2.62E+08
1	14700	14700	14,700	2.16E+08
1	14700	14700	14,700	2.16E+08
1	16500	16500	16,500	2.72E+08

APPENDIX B-3 TAKEOFF WEIGHT - FLIGHT PROFILE SELECTION (Continued)

Metro III Weight Surveys

Group 1, 40 minutes or less

Freq	Ro(Wt)	Wt.	Freq*Wt	Freq*Wt^2

Group 2, 41–99 minute

Freq	Ro(Wt)	Wt.	Freq*Wt	Freq*Wt^2
1	14700	14800	14,800	2.19E+08
1	12900	13000	13,000	1.69E+08
1	13500	13500	13,500	1.82E+08
1	15900	15980	15,980	2.55E+08
1	15300	15400	15,400	2.37E+08
1	13500	13600	13,600	1.85E+08
1	16200	16260	16,260	2.64E+08
1	15900	16000	16,000	2.56E+08
1	14100	14100	14,100	1.99E+08
1	13200	13200	13,200	1.74E+08
1	14700	14600	14,600	2.13E+08
1	13800	13900	13,900	1.93E+08
1	15600	15500	15,500	2.40E+08
1	15900	16000	16,000	2.56E+08
1	13200	13300	13,300	1.77E+08
1	15000	15000	15,000	2.25E+08
1	15000	15100	15,100	2.28E+08
1	15900	16000	16,000	2.56E+08
1	12500	12500	12,500	1.56E+08
6	12900	12829	76,974	9.87E+08
7	12900	12829	89,803	1.15E+09
7	12900	12829	89,803	1.15E+09
7	12900	12829	89,803	1.15E+09
6	12900	12829	76,974	9.87E+08
1	15300	15200	15,200	2.31E+08
1	12300	12400	12,400	1.54E+08
1	14400	14300	14,300	2.04E+08
1	15300	15400	15,400	2.37E+08
1	13500	13600	13,600	1.85E+08
1	15000	14900	14,900	2.22E+08
1	15000	15000	15,000	2.25E+08
1	14700	14700	14,700	2.16E+08
1	12900	13000	13,000	1.69E+08
1	13500	13600	13,600	1.85E+08
1	15000	15100	15,100	2.28E+08
1	13800	13700	13,700	1.88E+08
1	16500	16500	16,500	2.72E+08
1	15600	15500	15,500	2.40E+08
1	13500	13543	13,543	1.83E+08
1	13500	13450	13,450	1.81E+08
1	13500	13626	13,626	1.86E+08
1	13500	13368	13,368	1.79E+08
1	14100	14071	14,071	1.98E+08
1	14100	14247	14,247	2.03E+08
1	12900	12968	12,968	1.68E+08
1	11700	11817	11,817	1.40E+08
1	12900	12754	12,754	1.63E+08
1	13800	13891	13,891	1.93E+08
1	13800	13942	13,942	1.94E+08
1	14400	14500	14,500	2.10E+08
1	14400	14320	14,320	2.05E+08
1	14100	14115	14,115	1.99E+08
1	12000	11931	11,931	1.42E+08
1	11400	11535	11,535	1.33E+08
1	12600	12747	12,747	1.62E+08
1	13500	13425	13,425	1.80E+08
1	13200	13170	13,170	1.73E+08
1	12300	12272	12,272	1.51E+08
1	14100	14029	14,029	1.97E+08
1	12000	12073	12,073	1.46E+08
1	14400	14436	14,436	2.08E+08
1	12300	12179	12,179	1.48E+08
1	14400	14427	14,427	2.08E+08
1	14400	14409	14,409	2.08E+08
1	14100	14221	14,221	2.02E+08
1	14100	14060	14,060	1.98E+08
1	12900	12996	12,996	1.69E+08
1	14100	14142	14,142	2.00E+08
1	13800	13791	13,791	1.90E+08
1	14400	14460	14,460	2.09E+08

Group 3, 100 minutes or longer

Freq	Ro(Wt)	Wt.	Freq*Wt	Freq*Wt^2
1	16500	16500	16,500	2.72E+08
1	16500	16500	16,500	2.72E+08
1	15300	15200	15,300	2.34E+08
1	14700	14800	14,700	2.16E+08
1	15300	15200	15,300	2.34E+08
1	14700	14700	14,700	2.16E+08
1	14700	14800	14,700	2.16E+08
1	16200	16200	16,200	2.62E+08
1	15600	15600	15,600	2.43E+08
1	15000	15000	15,000	2.25E+08
1	14400	14500	14,400	2.07E+08
1	15000	15100	15,000	2.25E+08
1	15600	15600	15,600	2.43E+08
1	13500	13400	13,500	1.82E+08
1	13200	13300	13,200	1.74E+08
1	15600	15600	15,600	2.43E+08
1	12600	12730	12,600	1.59E+08
1	12600	12736	12,600	1.59E+08
1	12600	12592	12,600	1.59E+08
1	13200	13269	13,200	1.74E+08
1	12900	12844	12,900	1.66E+08
1	12600	12495	12,600	1.59E+08
1	13200	13305	13,200	1.74E+08
1	13500	13437	13,500	1.82E+08
1	13500	13535	13,500	1.82E+08
1	13200	13320	13,200	1.74E+08
1	12000	11961	12,000	1.44E+08
1	12300	12360	12,300	1.51E+08
1	12300	12284	12,300	1.51E+08
1	12600	12484	12,600	1.59E+08
1	12300	12163	12,300	1.51E+08
1	12000	12057	12,000	1.44E+08
1	12300	12432	12,300	1.51E+08
1	12300	12416	12,300	1.51E+08
1	13200	13191	13,200	1.74E+08
1	13200	13075	13,200	1.74E+08
1	13200	13108	13,200	1.74E+08
1	13200	13275	13,200	1.74E+08
1	13500	13439	13,500	1.82E+08
1	13500	13518	13,500	1.82E+08
1	13200	13326	13,200	1.74E+08
1	13200	13318	13,200	1.74E+08
1	13200	13150	13,200	1.74E+08
1	13200	13261	13,200	1.74E+08
1	14100	14156	14,100	1.99E+08
1	13500	13593	13,500	1.82E+08
1	13500	13568	13,500	1.82E+08
1	14100	14022	14,100	1.99E+08
1	13800	13705	13,800	1.90E+08
1	12900	12988	12,900	1.66E+08
1	13800	13790	13,800	1.90E+08
1	13200	13155	13,200	1.74E+08
1	13800	13884	13,800	1.90E+08
1	13500	13358	13,500	1.82E+08
1	14400	14299	14,400	2.07E+08
1	14100	14086	14,100	1.99E+08
1	15900	15997	15,900	2.53E+08
1	14400	14534	14,400	2.07E+08
1	14700	14577	14,700	2.16E+08
1	15000	14966	15,000	2.25E+08
1	15600	15670	15,600	2.43E+08
1	15900	15880	15,900	2.53E+08
1	14400	14271	14,400	2.07E+08
1	14100	14124	14,100	1.99E+08
1	14100	14202	14,100	1.99E+08
1	15900	15999	15,900	2.53E+08
1	15000	14975	15,000	2.25E+08
1	15000	14875	15,000	2.25E+08
1	14100	14146	14,100	1.99E+08
1	15300	15315	15,300	2.34E+08

APPENDIX B-3 TAKEOFF WEIGHT - FLIGHT PROFILE SELECTION (Continued)

Metro III Weight Surveys

Group 1, 40 minutes or less

Freq	Ro(Wt)	Wt.	Freq*Wt	Freq*Wt^2

Group 2, 41~99 minuts

Freq	Ro(Wt)	Wt.	Freq*Wt	Freq*Wt^2
1	14400	14480	14,480	2.10E+08
1	12000	11851	11,851	1.40E+08
1	12000	11999	11,999	1.44E+08
1	13800	13770	13,770	1.90E+08
1	12900	12950	12,950	1.68E+08
1	12600	12621	12,621	1.59E+08
1	13200	13289	13,289	1.77E+08
1	13200	13068	13,068	1.71E+08
1	13200	13072	13,072	1.71E+08
1	13200	13252	13,252	1.76E+08
1	12600	12675	12,675	1.61E+08
1	13200	13342	13,342	1.78E+08
1	12900	12912	12,912	1.67E+08
1	13800	13657	13,657	1.87E+08
1	13800	13817	13,817	1.91E+08
1	13200	13169	13,169	1.73E+08
1	13500	13360	13,360	1.78E+08
1	12300	12328	12,328	1.52E+08
1	12900	12927	12,927	1.67E+08
1	14100	14067	14,067	1.98E+08
1	13200	13204	13,204	1.74E+08
1	13200	13204	13,204	1.74E+08
1	14400	14479	14,479	2.10E+08
1	14400	14478	14,478	2.10E+08
1	14400	14350	14,350	2.06E+08
1	14400	14428	14,428	2.08E+08
1	14100	14144	14,144	2.00E+08
1	14400	14443	14,443	2.09E+08
1	13200	13186	13,186	1.74E+08
1	14400	14432	14,432	2.08E+08
1	12900	12861	12,861	1.65E+08
1	13500	13473	13,473	1.82E+08
1	13500	13361	13,361	1.79E+08
1	13500	13547	13,547	1.84E+08
1	14400	14464	14,464	2.09E+08
1	13800	13870	13,870	1.92E+08
1	14100	13992	13,992	1.96E+08
1	14400	14411	14,411	2.08E+08
1	13500	13536	13,536	1.83E+08
1	14400	14410	14,410	2.08E+08
1	14400	14297	14,297	2.04E+08
1	14100	14225	14,225	2.02E+08
1	13800	13656	13,656	1.86E+08
1	13500	13501	13,501	1.82E+08
1	13800	13802	13,802	1.90E+08
1	14100	14001	14,001	1.96E+08
1	13200	13074	13,074	1.71E+08
1	13500	13437	13,437	1.81E+08
1	12900	12826	12,826	1.65E+08
1	14700	14597	14,597	2.13E+08
1	14400	14447	14,447	2.09E+08
1	14400	14470	14,470	2.09E+08
1	13200	13147	13,147	1.73E+08
1	14100	14087	14,087	1.98E+08
1	12900	12944	12,944	1.68E+08
1	13200	13239	13,239	1.75E+08
1	12900	12848	12,848	1.65E+08
1	12600	12721	12,721	1.62E+08
1	11400	11358	11,358	1.29E+08
1	12600	12603	12,603	1.59E+08
1	12300	12327	12,327	1.52E+08
1	14400	14253	14,253	2.03E+08
1	12600	12486	12,486	1.56E+08
1	14100	14222	14,222	2.02E+08
1	13200	13098	13,098	1.72E+08
1	14400	14500	14,500	2.10E+08
1	13200	13318	13,318	1.77E+08
1	13200	13219	13,219	1.75E+08
1	12600	12484	12,484	1.56E+08
1	12600	12580	12,580	1.58E+08

Group 3, 100 minutes or longer

Freq	Ro(Wt)	Wt.	Freq*Wt	Freq*Wt^2
1	15600	15559	15,600	2.43E+08
1	14400	14493	14,400	2.07E+08
1	14700	14600	14,700	2.18E+08
1	16200	16200	16,200	2.62E+08
1	15000	15000	15,000	2.25E+08
54			746700	1.04E+10
		AVG WT	13,828	
		STD DEV	1,091	
		STD DEV	1.00	
			1,091	
		HIGH	14,918	
		AVG	13,828	
		LOW	12,737	

APPENDIX B-3 TAKEOFF WEIGHT - FLIGHT PROFILE SELECTION (Continued)

Metro III Weight Surveys

Group 1, 40 minutes or less

Freq	Ro(Wt)	Wt.	Freq*Wt	Freq*Wt^2

Group 2, 41-99 minuts

Freq	Ro(Wt)	Wt.	Freq*Wt	Freq*Wt^2
1	12600	12623	12,623	1.59E+08
1	12900	12978	12,978	1.68E+08
1	12900	12808	12,808	1.64E+08
1	13200	13126	13,126	1.72E+08
1	12600	12504	12,504	1.56E+08
1	13500	13518	13,518	1.83E+08
5	12900	12988	64,940	8.43E+08
7	12900	12988	90,916	1.18E+09
7	12900	12988	90,916	1.18E+09
6	12900	12988	77,928	1.01E+09
6	12900	12988	77,928	1.01E+09
80			1061938	1.41E+10

AVG WT	13,274
STD DEV	627
STD DEV	1.00
	627
HIGH	13,901
AVG	13,274
LOW	12,647

Group 3, 100 minutes or longer

Freq	Ro(Wt)	Wt.	Freq*Wt	Freq*Wt^2