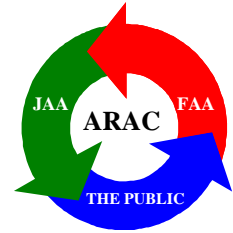


*Aviation Rulemaking
Advisory Committee*



*Evaluation Standards and
Proposed Regulatory Action
Advisory Group*

Task Group 8

1. Background

Task Group # 8 had two objectives;

- 1, Provide a common set of definitions to the other Task Groups so there was consistency in the data used by all groups, and
- 2, Define Proposed regulatory Action

2. Summary

2.1 Objective 1,

Technical support was provided to all TG's in the form of generic airplane definitions and missions for use in assessing potential safety enhancements. A spreadsheet was developed to provide a common source of data to be used by the task groups in order to ensure that the potential methods were evaluated using consistent data and assumptions. Data were included in the spreadsheet for six generic airplane types: small, medium and large transports, regional turbofans, regional turboprops and business jets. The data included summaries for each airplane type, such as fleet size, weights, fuel volumes and flight distributions. Mission profile data such as weight, altitude, Mach number, fuel remaining in each tank and body angle as a function of time was included for each generic airplane type. Temperature profiles ranging from cold to extremely hot were also included in the mission profiles. Performance trades and cost trades were also included to allow the consistent calculation of performance and cost impacts.

2.2 Objective 2,

A proposed change to FAR 25 has been drafted together with the body of a supporting Advisory Circular. The intent of the proposed regulatory action is to create a revised FAR 25.981 which will have two sections, the first addressing ignition source prevention in fuel systems, and the second part addressing controlling the flammability exposure within fuel tanks. The first part of the proposed FAR 25.981 will be addressed by the FAA directly and is outside the TOR for the FTHWG. The intent of the second part of the proposed FAR is to require that either the exposure of any tank to flammable fuel air mixtures be no greater than 7 % of fleet operational time, or that protective systems be provided for tanks that can not meet the flammability requirement. The requirement for flammability control is based on the fleet history as provided by TG1 coupled with the flammability exposure for the current fleet being provided by TG5. The other task groups have defined methods to satisfy the requirements of the proposed regulation and provided costs of implementation. Task Group 8 developed the proposed regulatory action and supporting AC/ACJ to allow the other groups to develop and cost different means to satisfy the proposed regulation. The cost benefits of each proposed means must be examined by the FTHWG to determine if a suitable means to satisfy the regulation exists and should such a regulation be proposed.

14th July, 1998

The supporting AC material is drafted to provide the methodology for assessing any given tank against the proposed rule, and will incorporate information on what alternatives are available to the applicant to satisfy the requirement. This section includes information on Foam, Inerting, Higher Flash Point Fuel etc.

3.1 Objective 1, Generic Standards

Technical support was provided to all TG's in the form of generic airplane definitions and A spreadsheet was developed to provide a common source of data to be used by the task groups in order to ensure that

included in the spreadsheet for six generic airplane types: small, medium and large transports, regional turbofans, regional turboprops and business jets. The data included volumes and flight

in each tank and body angle as a function of time was included for each generic airplane type. Temperature profiles ranging from cold to extremely hot were also included in the

consistent calculation of performance and cost impacts.

3.2 Objective 2, Proposed Regulatory Action

In order to enhance fuel system safety, the task group 8 recommended to the FTHWG that the following regulation be proposed to the FAA/JAA provided that the cost benefit studies show a net gain to the aviation system:

Create a revised paragraph FAR 25.981 to address fuel tank protection from airplane created threats that could prevent continued safe flight and landing. The proposed revision is as follows:

Section 25.981 Fuel Tank Ignition Prevention

The fuel system must be designed and arranged to prevent the ignition of fuel vapor within the tanks, or mitigate the effects of such an ignition by addressing:

(a) Ignition Sources

- (a)1. Place the current 25.981 requirement here*
- (a)2. Additional requirements in ignition source mitigation as defined by the FAA would be in section (a)2, (a)3, etc. as defined by the SFAR effort underway*

(b) Flammable Vapors

Limit the development of flammable conditions in the fuel tanks, based on the intended fuel types, to less than 7% of the expected fleet operational time, or Provide means to mitigate the effects of an ignition of fuel vapors within the fuel tanks such that any damage caused by an ignition will not prevent continued safe flight and landing.

3.2.1 Discussion on the intent of the proposed requirement

The proposed regulatory action provides a single regulation to address ignition prevention, thereby avoiding having several paragraphs which must be linked and interpreted in conjunction with each other. It provides the industry with a requirement that addresses all aspects of fuel tank ignition prevention/mitigation, which can be treated as a comprehensive requirement and addressed as one issue. The existing requirements set forth in sections 25.901, 25.954 and 25.981 are intended to preclude ignition sources from being present in airplane fuel tanks. As proposed, Paragraph (a) maintains these requirements, which have been, are, and shall continue to be, the essential primary elements in fuel tank safety. Paragraph (b) provides a requirement to address flammability mitigation as a new layer of protection to the fuel system. The intent of the combined regulation is to prevent an applicant relying solely on ignition prevention or on flammability reduction as the means to protect the fuel system from ignition events.

It is considered that there should be some ability on the part of the applicant to trade improvement in ignition prevention for relief in flammability reduction, but only in specific cases, for example, where the applicant had taken steps to significantly reduce potential ignition sources such as designing a tank with no pumps or a non electric gauging system.

The Concept of flammability exposure as a “Percentage of Expected Fleet Operational Time” is a measure of how much time will a given tank, in a fleet of a specific airplane type, be operating within the flammable range, as determined by the fuel properties and fuel temperature in that tank. This measure determines the likelihood of an ignition occurring in a tank that contains a flammable mixture. This is based on the hypothesis that ignition events occur very infrequently and randomly in any tank of a given airplane type and thus ignition is dependent on the flammability probability. The “less than 7% of the expected fleet operational time”, used in Section (b) is derived from examination of the current fleet exposure, as reported by Task Group 1, which indicates that wing tanks are statistically less likely to be involved in events than center wing tanks. Task Group 5, corroborated the fleet history by providing analysis to show there is a significant difference in fleet average exposure to flammable conditions between wing tanks (2% to 6%) and center wing tanks with nearby heat sources (approximately 30%). Using this data it was concluded that a 7% fleet average exposure would provide a significant improvement in safety without unduly penalizing current tanks without heat sources in, or nearby the tank. The combination of ignition source control, which is currently being upgraded through the SFAR activity, and flammability control will provide fuel systems whose exposure to a catastrophic event is much improved over today’s high standards.

Section (b) implicitly includes the option of using inerting of some form, or higher flash point fuel, to satisfy the 7% criterion, and for the use of foam, or explosion protection means, to satisfy the intent of mitigating the effects of an ignition in a tank where a designer chooses to use that option.

Task Group 8, Standards and Proposed Regulatory Action

14th July, 1998

3.3 Supporting AC/ACJ Material

The wording below represents the proposed body of an AC/ACJ to support the proposed new FAR 25.981(b). The AC/ACJ in support of the proposed FAR 25.981(a) is a separate AC/ACJ and must be developed by the FAA/JAA either in house, or through a new Harmonization Working Group.

It should be noted that the AC/ACJ material includes two methods of assessing fuel tank flammability. The second method was developed late in the task group's efforts and has not been as thoroughly developed as the first method. Additional testing of the method is required to validate it prior to adoption within the AC/ACJ.

AC/ACJ 25.981(b)

1 - Purpose

This ACJ sets forth an acceptable method of compliance with the requirements of FAR/JAR 25.981(b). The guidance provided within this AC is harmonized with the US Federal Aviation Administration (FAA) and Joint Aviation Authority (JAA) and is intended to provide a method of compliance that has been found acceptable. As with all ACJ material, it is not mandatory and does not constitute a regulation.

2 - Applicability

This ACJ applies to part 25 airplanes for which a new, amended, or supplemental type certificate is requested.

3 - Related Documents

FAR/JAR 25.901
FAR/JAR 25.954
FTHWG Report
TBD by FAA

4 - Background

The regulation is intended to provide requirements to reduce the probability of a fuel tank explosion to an extremely improbable level. The regulation is divided into two parts,

Part (a) dealing with ignition prevention and

Part (b) dealing with fuel flammability limitation and explosion related damage prevention.

Part (a) is the subject of a separate AC/ACJ.

Part (b) is addressed herein.

25.981(b) requires that either;

the probability of having a flammable fuel vapor/air mixture in a fuel tank is reduced to an acceptable level,

or

means are used to prevent airplane damage if an explosion is initiated in a tank that has a higher than acceptable fleet average flammability exposure.

This AC/ACJ provides an acceptable process for determining the fleet average flammability exposure of a design, and discusses options that may be used to achieve the

required level, and discusses explosion suppression means that may be used in lieu of reducing fleet average flammability exposure.

5 - Definitions

- **Flammability**; The ability for an fuel vapor/air mixture to be ignited when exposed to a sufficiently energetic source of energy (electrical, such as a spark; thermal, such as a hot surface; and mechanical, such as two metal parts rubbing together at high speed to produce sparks).

- **Flammability range**; The pressure (i.e. altitude) / temperature domain where the fuel vapor/ air mixture is flammable. The lower flammability limit (lfl), also known as the lower explosive limit (lel), defines the temperature/ altitude below which the fuel vapor/air mixture is too lean to burn. The upper flammability limit (ufl) defines the upper part of the domain, above which the fuel vapor/air mixture is too rich to burn. This domain is dependent of the type of fuel used.

Lower Flammability Limit; For the purpose of this AC, the lower flammability limit should be taken to be equal to the fuel flash point (FP) as determined by ASTM D-56 and corrected for altitude by -1°F per 800ft altitude increase from sea level.

Upper Flammability Limit; For the purpose of this AC, the upper flammability limit should be taken to be equal to the fuel flash point +70°F, and corrected for altitude by -1°F per 600 ft altitude increase from sea level.

Note; This simple approach to define lfl and ufl has been taken in lieu of any conclusive data on flammability versus ignition energy versus altitude, and the lack of any data on the probability of an ignition source of a given energy level being present in a fuel tank if an ignition source were to be present. (The FAA Document DOT/FAA/AR-98/26 provides further information on this subject.)

Fuel types; Different fuels are approved for use in turbine powered aircraft. The most widely used fuel types are JET-A/JET-A1, JET-B (JP-4). For an aircraft, the approved fuel types are listed in the Airplane Flight Manual (AFM). Each fuel type has its own properties, those directly related to flammability are flash point and distillation characteristics. Property differences can occur in a given fuel type as a results of variations in the source crude oil properties and the refining process used to produce the fuel.

Fuel tank; An aircraft volume containing fuel. Tanks contains both liquid fuel and, in the ullage space, a fuel vapor/air mixture, with some water vapor depending on the relative humidity in the tank.

Ullage, or Ullage Space; The volume within the tank not occupied by liquid fuel.

Operational time; The time from the start of preparing the aircraft for flight, (turning on the APU/Ground Power, Starting Environmental Control Systems etc.), through the actual flight and landing and the time to disembark any payload/passengers and crew.

6 - Design considerations to limit the probability of flammable conditions

Generally, the drivers in limiting the probability of a flammable mixture in the tank are the fuel type, fuel temperature and any design feature that increases the potential for fuel mists to be created. Current design practices which reduce the potential for fuel agitation should be continued. This prevents the flammability range from widening at the lean end because of the presence of fuel mist, which may be flammable at temperatures well below the flash point.

Design practices that reduce the overall risk are described within this paragraph of this ACJ. Airplane designs submitted for evaluation by the regulatory authorities will be evaluated against these practices.

The intent of the regulation is to limit the exposure to flammable fuel vapor/air mixtures to a small amount of the operational time for that aircraft type. Analysis has shown that this exposure needs to be less than 7% of operational time to provide an acceptably low risk of a fuel tank explosion. Practical design precautions should be used achieve this criterion. On any one aircraft type, the most effective methods may vary between different tanks, according to their exposure to the risk. For instance, tanks located in the wings with little or no heat input from aircraft systems have been analyzed and shown to meet the regulation, whereas tanks located within the fuselage contours will require more design attention. Such tanks may have less ability to reject heat to ambient air, both on the ground and in flight, and might be subject to heat sources from equipment located nearby in the fuselage such as the air conditioning packs that supply cool air to the cabin. For tanks that, because of installation location and/or other factors, do not readily meet the 7% flammability exposure criterion of 25.981(b), additional design considerations should be considered. The following are provide as examples, but are not the only design solutions that may be proposed;

a- Limiting heat transfer to the tank

The transfer of significant heat quantities into fuel tanks under normal operation conditions should be prevented to satisfy the requirement. Locating heat producing systems away from the tanks should be considered. If this is not a practical solution, controlling heat transfer to the fuel tank should be addressed. Possible technical solutions are the use of thermal blankets and/or providing ventilation to remove excess heat from the area near the tank.

b- Fuel tank ullage sweeping

A positive ventilation system may be used to “sweep” the ullage of flammable fuel vapor/air mixtures at a rate that keeps the ullage lean in spite of a higher than desirable fuel temperature. This ventilation system may be used as needed to satisfy the requirement of the regulation, but should address any negative effects such as sweeping unburned hydrocarbons into the atmosphere. Evidence that the ullage sweeping system does not leave pockets of flammable fuel vapor-air mixtures within the tank should be provided.

c- Fuel tank inerting

Fuel tank inerting is another way of reducing the flammability exposure within a given tank. The accepted level for tank inerting is to reduce the oxygen content of the tank ullage to less than 9%. The applicant may show that inerting is only needed for certain missions or parts of a mission to bring the tank fuel vapor/air mixture average exposure down to an acceptable level. Inerting may be achieved by supplying inert gas from on-board storage bottles, holding either gas or liquid inertant, on board inert gas generation systems (OBIGGS) or from a ground storage system if the tank is inerted only on the ground. Evidence that the inerting system does not leave pockets of high oxygen concentration within the tank should be provided. The effect of oxygen evolving from the fuel during pressure reduction conditions, such as during climb, should be addressed. The applicant should demonstrate that the added system does not decrease the overall safety of the aircraft.

d- Higher Flash Point Fuels

The applicant may consider using only high flash point fuels to reduce the flammability exposure to an acceptable level.

7 Acceptable means to mitigate of the effects of an explosion

An alternative means of satisfying 25.981(b) is to provide a means to protect a tank from structural and systems damage that could prevent continued safe flight and landing. This alternative recognizes that an applicant may choose to accept a high flammability exposure in a given tank and to provide additional protection to extinguish or suppress an explosion in a tank if an ignition occurs. The following are provided as examples, but are not the only design solutions that may be proposed;

a- Foam

The use of appropriate foams to fill the fuel tank and thereby control the pressure rise following an ignition of the fuel vapor/air mixture has been demonstrated by the USAF and other military forces to be effective, and is in use on several airplane types. The applicant may use such a foam installation to satisfy the requirement of 25.981(b). The foam type should be demonstrated to be effective in suppressing explosions to a level where structural and system damage is prevented.

The applicant should;

- Provide data on the foam, including material, pore size, and intended method for installing the foam in the tank.

- Address the potential for, and the effects of, degradation of the foam, from any environmental effects and long term aging, on both the airplane and engine fuel systems

- Address the effect of the foam installation on the airplane fuel system, as well as the APU and engine fuel systems, and

Develop maintenance procedures to ensure the foam is correctly installed both initially and when reinstalled, if removed for access to the tank.

Address the effects of the foam installation on fuel system performance, including engine feed, venting, fueling and defueling including the effect of the foam on electrostatic build up in the tank.

b- Explosion suppression

The use of a simple flame propagation suppression system has been approved by the FAA for use in fuel system surge tanks on some commercial transport aircraft. This technology has not been proven for use inside fuel tanks but may be pursued by an applicant. An explosion suppression system typically consists of one or more optical sensors which are capable of rapidly detecting a flame within their field of view, and then the system commands the release of extinguishing agent from one or more containers sufficiently quickly to extinguish the fire before a damaging over-pressure can develop. These systems may be considered for use in fuel tanks to satisfy 25.981(b).

The applicant should consider the following:

- 1, Do the sensors' field of view cover enough of the tank volume to effectively recognize an explosion developing anywhere in the tank?
- 2, Is the sensor field of view and sensitive affected by the presence of fuel in the field of view?
- 3, Will the release of extinguishing agent in the tank cause an over pressure, particularly if the agent is released below the fuel surface?.
- 4 Will failures of the systems cause over-pressure of the tank?

8- Acceptable Means of Determining the Flammability Exposure of a Given Tank.

In service experience indicates that a satisfactory level of safety can be achieved if the presence of flammable vapors is less than approximately 7% of operational time as determined by either of the methods set forth below.

Method I

The presence of flammable vapors should be determined independently for each tank. Within each tank, separate volumes where barriers or walls prevent mixing of the fuel /air mixtures, should be treated independently to determine the worst case exposure for that tank.

The analysis should take into account all fuel types for which certification is sought and listed in the AFM, and the expected usage of each fuel type.

To ensure that a consistent method and assumptions are used in this process, specific ground rules have been developed and must be followed by the applicant.

The amount of ground operation time to be included in determining Airplane Operational Time as defined in this ACJ, should use the following:

Pre-flight Time;

Small airplanes (maximum TOGW equivalent to a 130 passenger airplane or smaller,) = 45 min,

Medium airplanes (maximum TOGW equivalent to a 130 to 300 passenger airplane) = 1 hr,

Large (maximum TOGW equivalent to more than a 300 passenger airplane) = 1.5 hr, and Post Flight time;

30 minutes after completion of the landing roll landing for all airplanes.

For each tank in the airplane under consideration, the applicant should determine the exposure to flammable mixtures in the tank as a percentage of operational time for the expected fleet as follows;

The applicant should develop a computer model of the thermal environment of the tank so as to calculate the temperature of the fuel in the tank as a function of operational time as defined above, including normal airplane system usage, and the effects of any heating or cooling systems operating in or nearby the tank.

This model may be a detailed thermodynamic of all the heat flows into and out of the tank in question, or may be a simple model based on sufficient flight tests to allow accurate corrections for outside conditions and internal heat flow changes with flight conditions.

The applicant should define the flammability regions of the certified or proposed fuel types as a function of altitude and determine the statistical variation of the flammability range based on known or expected characteristics of the fuel as delivered to the airplane or airport. The attached figure is to be used for jet A type fuels, and similar data should be used in considering the use of higher flash point fuels

The thermal model should be used to calculate the total time the fuel in the tank is in the flammable region as a percentage of the total operational time of each flight, for a sufficient number of flights over various range flights, in various ambient temperatures and with a variety of fuel properties within the specifications of the expected fuel types, to assess the average fleet exposure to being in the flammability region.

The following factors are to be used in determining fleet exposure.

- 1, The fleet of airplanes is in use on a world wide basis, i.e. the effect of initial deliveries to a small number of users in a given part of the world should not be considered in this analysis but rather assume that the mature fleet will be used throughout the world.
- 2, The operational environment is world wide when considering both airport ambient and flight temperatures, as defined on the first figure below

3 The properties of certified fuels (as defined in the AFM) should be based on the distributions defined on second figure below,

In order to simplify the process, the airplane flight times may be reduced to three types, a short flight and medium flight and a long flight.

A random selection process is used to define a set of “flights” from which the fleet average exposure is determined.

The technique is described as follows:

Sets of values are created for each variable that define a given flight, such as fuel flash point, ground ambient temperature, cruise ambient temperature, range, fuel load and usage, etc. Each set will contain a large number of values (typically several thousands) such that the data in each set matches the distribution of the values expected in service. Each data set is then “shuffled” to generate a random order. By selecting the nth value of variables from each set a “random” flight is created. This is then used to compute the fuel temperature and time of flammability for a single flight. This process is repeated several thousand times and the individual flight flammability exposures are summed to develop a fleet average flammability exposure. Computing time can be reduced considerably by calculating a matrix of flight cases for a range of ambient and flight conditions and interpolating for each random flight case being considered.

An example of the process is attached as appendix 1.

To satisfy the requirement of the FAR/JAR, the fleet average exposure for each tank should be less than 7% of total operational time. If the 7% level cannot be achieved, the applicant should consider alternative means to reduce flammability, or to mitigate the effect of an ignition in the tank. These are discussed in Section 6 above.

Method II

This process may only be used on airplanes which have approved fuels with a flash point of 100°F or above.

In flight, the fuel temperature in a typical wing fuel tank responds to a step change in TAT (total air temperature) with an exponential decay response to eventually reach the new TAT, assuming the flight continues for a long enough time. (The most common analogy to this process is the decay of capacitor voltage during discharge across a fixed resistance). Analysis of such tanks on a variety of certified airplanes, using Jet A type fuels, has shown that tanks with a rapid enough response to changes in total air temperature will result in a satisfactory flammability exposure as required by 25.981(b), provided there is no large heat input on the ground to increase fuel temperatures in the tank prior to flight or significant heat input from airplane systems in flight.

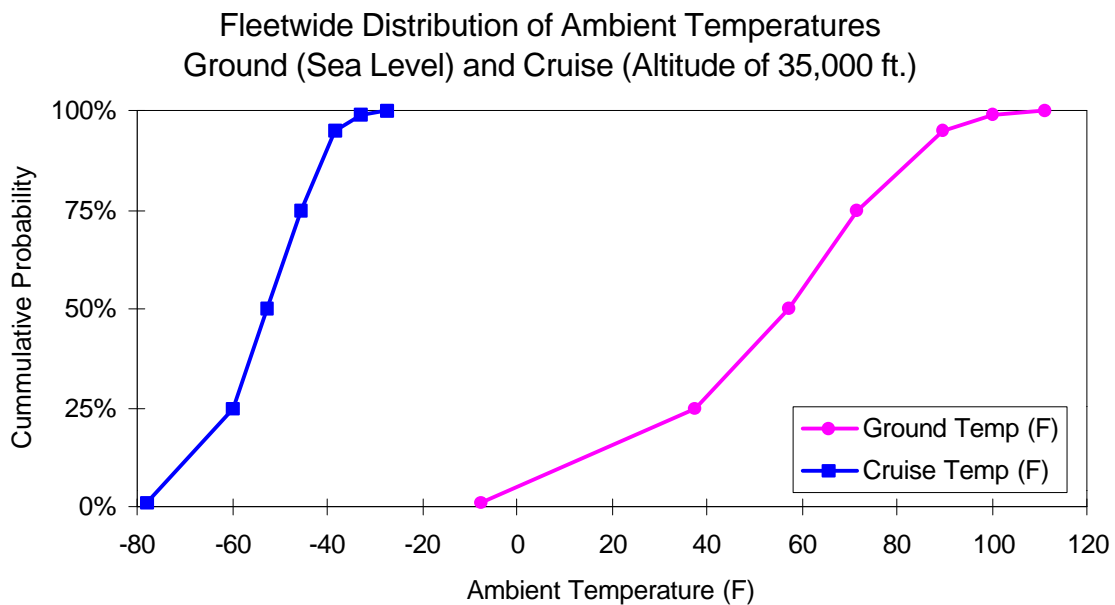
This method of demonstrating an acceptable flammability exposure is therefore to show by analysis or test the thermal response of each tank on the ground and in flight. The response of the fuel temperature to a change in TAT may be expressed as an exponential response as follows:

$$\Delta FT_t = \Delta TAT \times (1 - e^{-t/T})$$

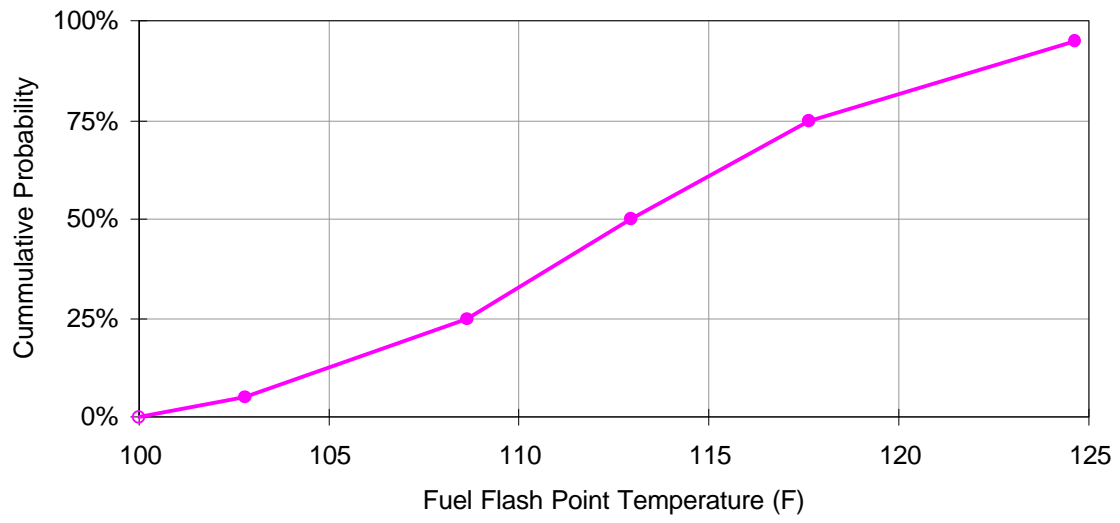
Where ΔFT_t is the change in fuel temperature at time t , and ΔTAT is a step change in TAT, and T is the time constant for the fuel temperature in the subject tank.

A tank will meet the intent of the flammability exposure requirement of 25.981(b) if the tank satisfies the following;

- 1, The response of the fuel temperature is such that the time constant T is less than 120 minutes with a full tank,
(*Note: at the time of submittal of this report the value of the time constant had not been finalized and needs to be verified*)
- 2, The time constant, T , decreases as fuel is used and is not subject to additional heat load at lower fuel quantities,
- 3, The fuel temperature does not increase on the ground from heat input from other airplane systems during normal operation, by more that 5°F per hour with any amount of fuel in the tank from unusable to full.



Fleetwide Distribution of Fuel Flash Point

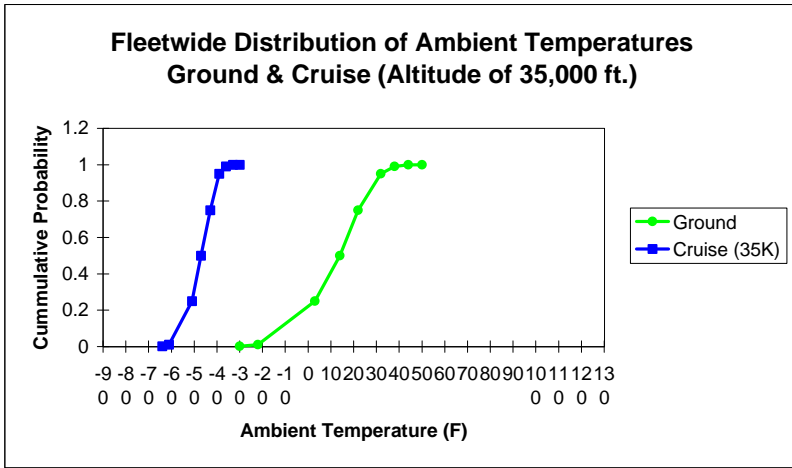


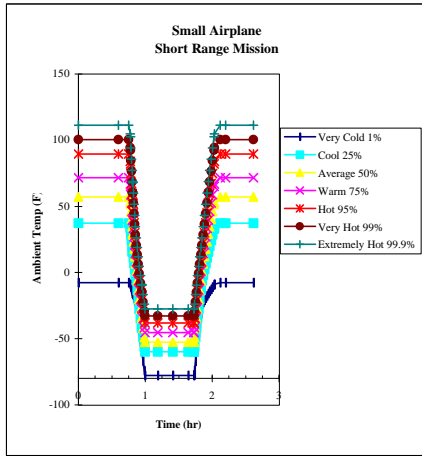
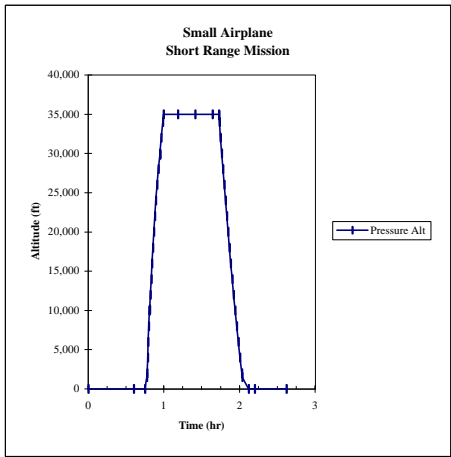
Jet A Fuel, Worldwide Distribution

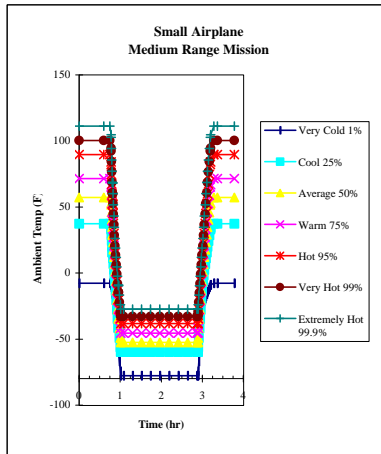
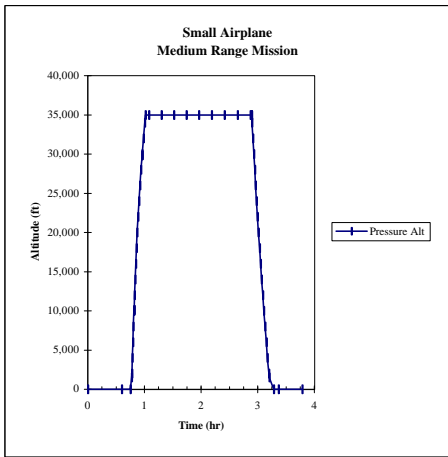
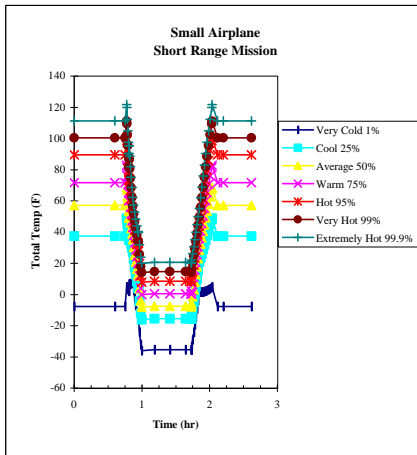
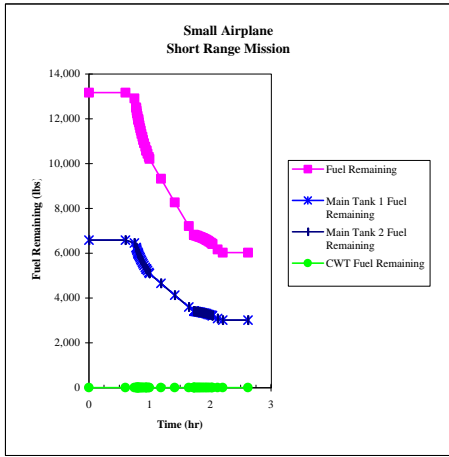
14th July, 1998

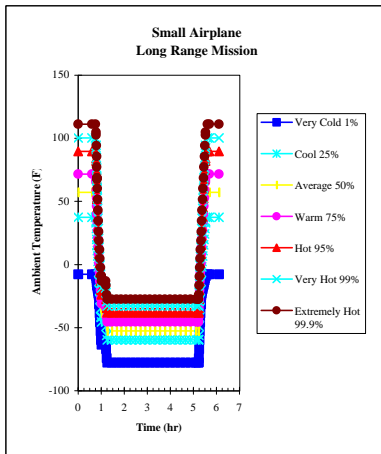
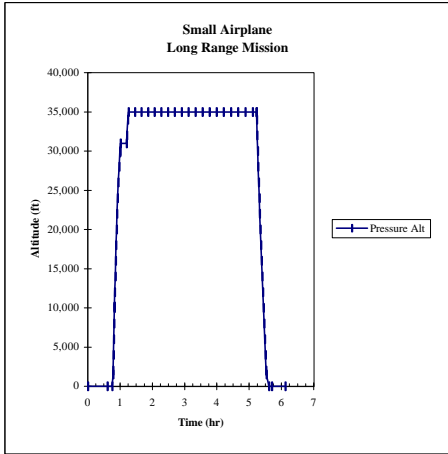
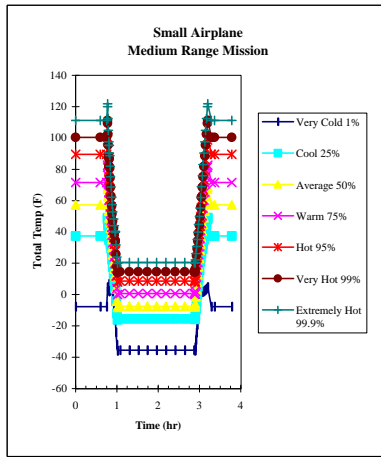
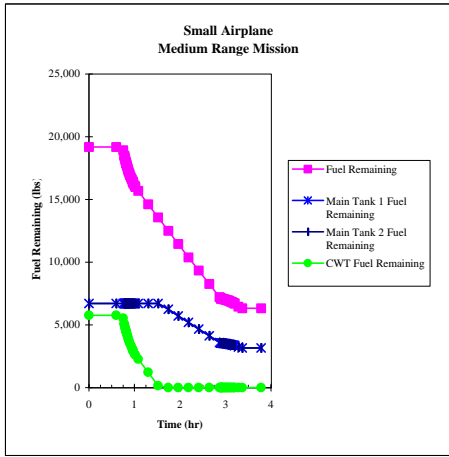
Attachment to Task Group 8 Report

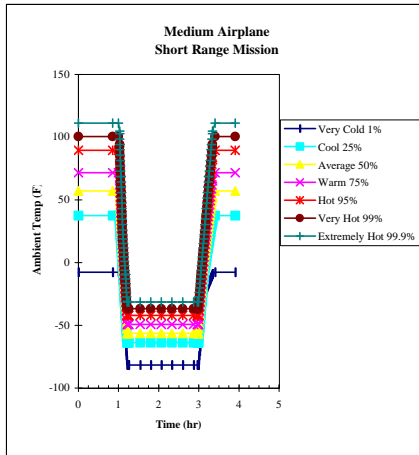
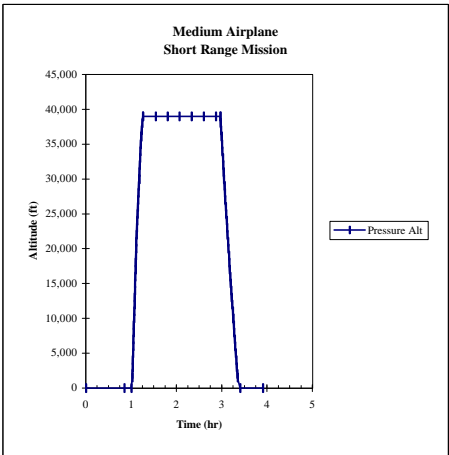
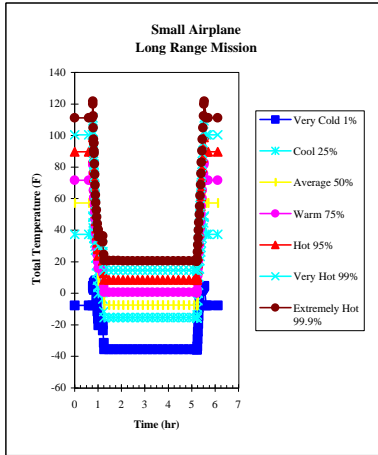
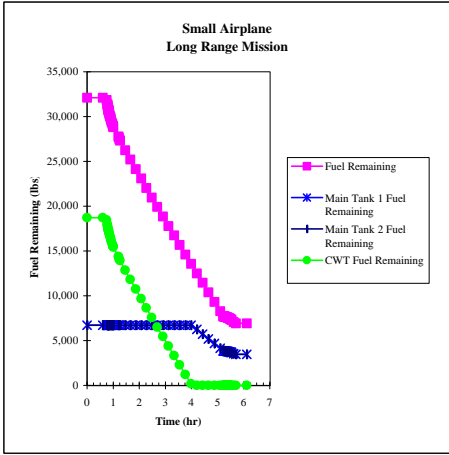
Common Airplane and Mission Data and Performance Trades and Cost Trades

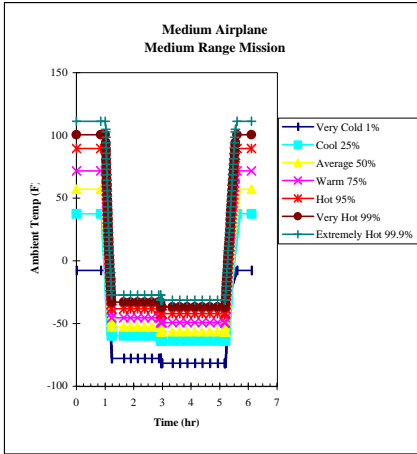
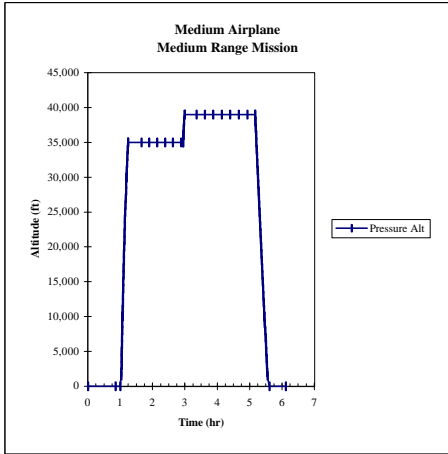
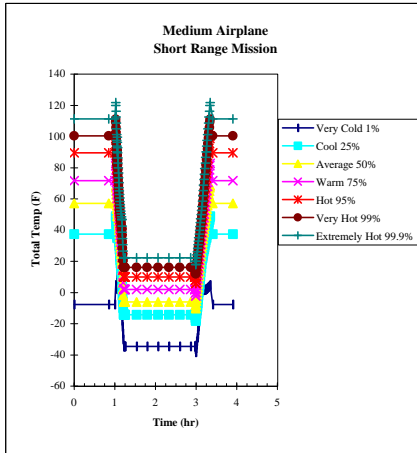
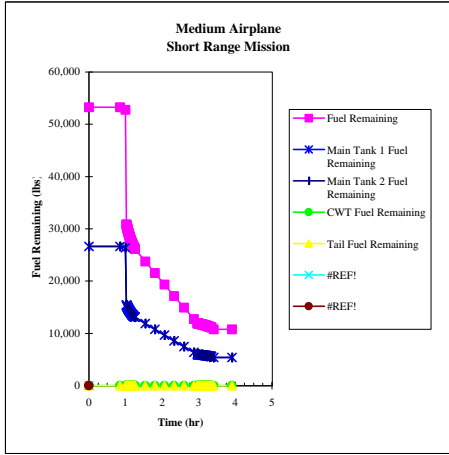


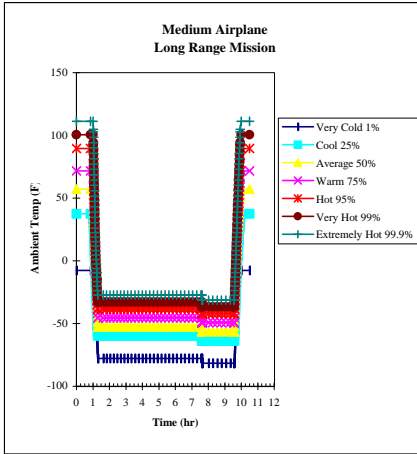
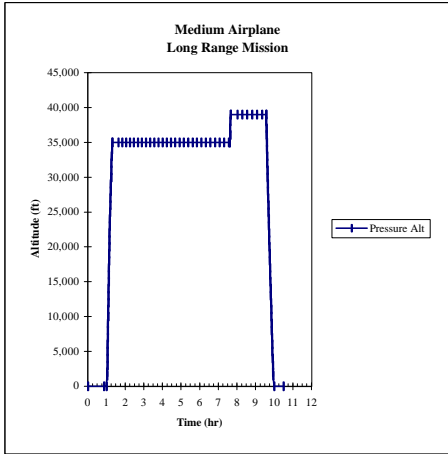
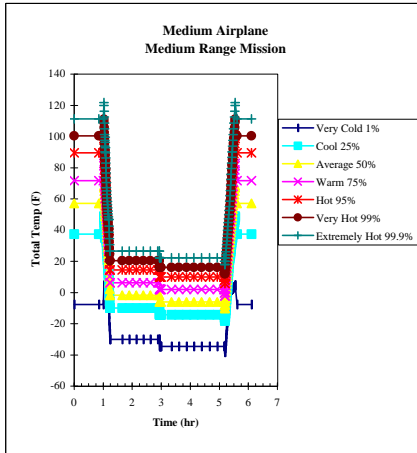
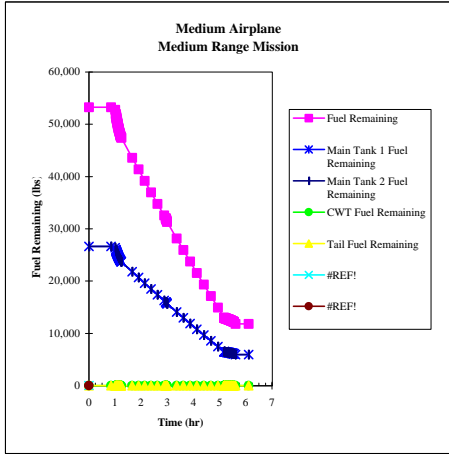


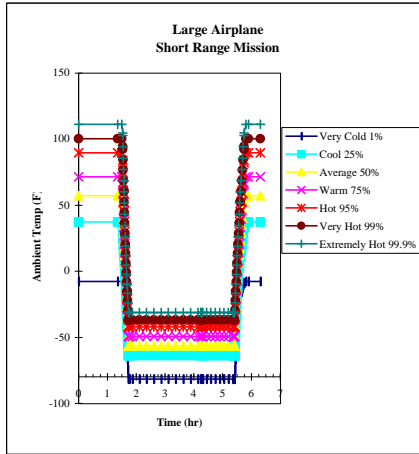
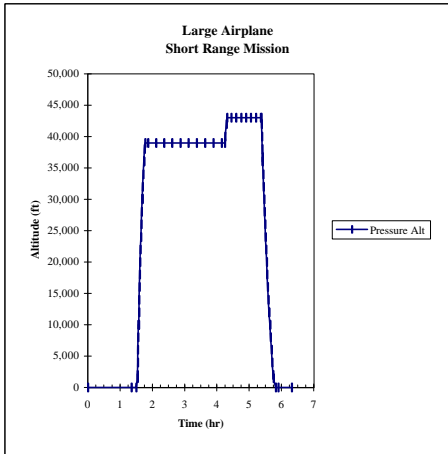
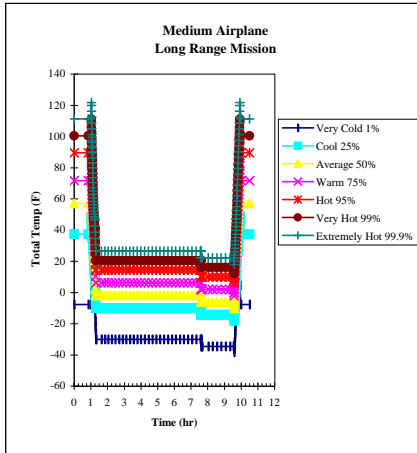
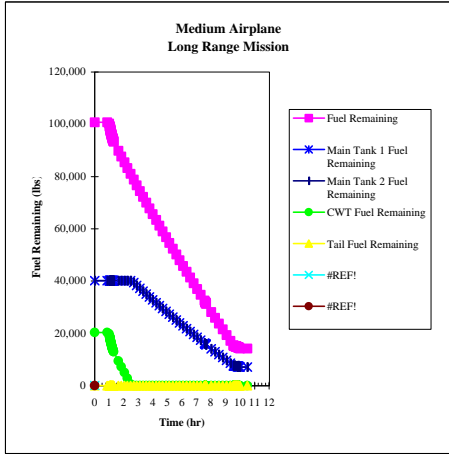


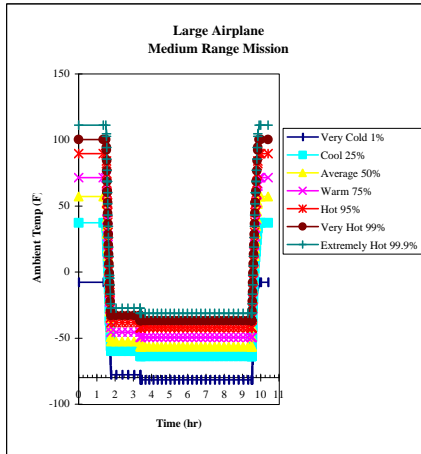
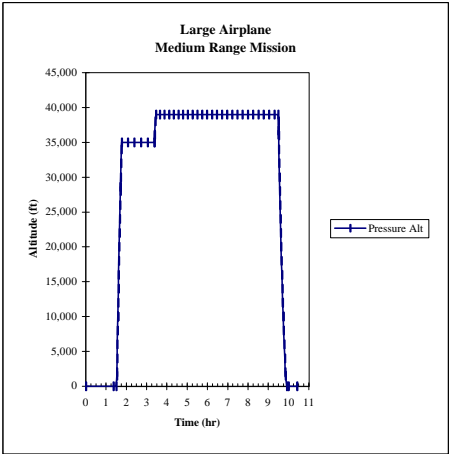
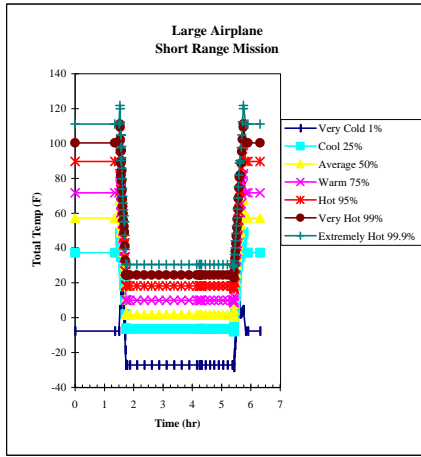
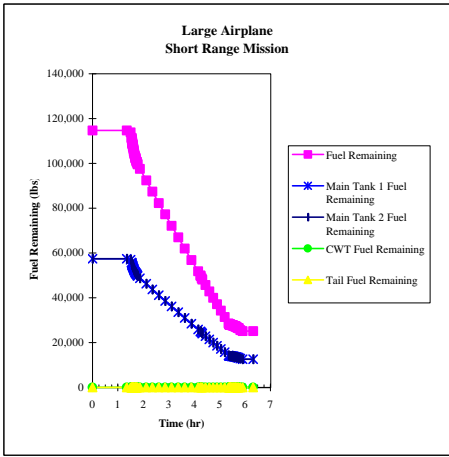


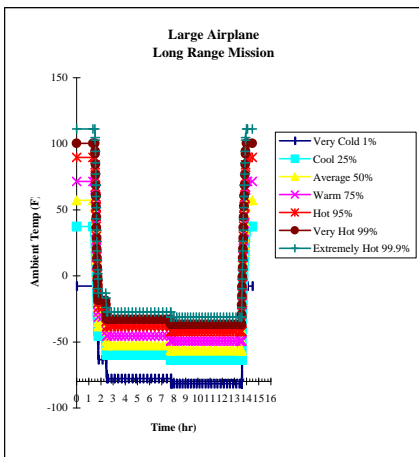
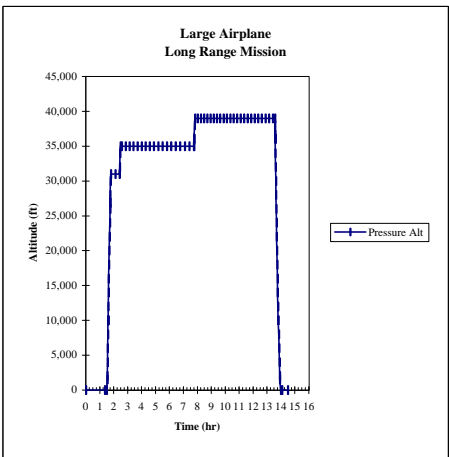
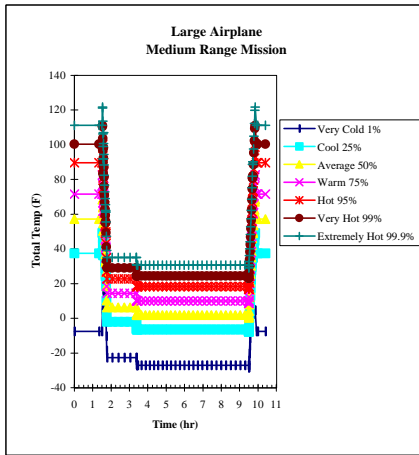
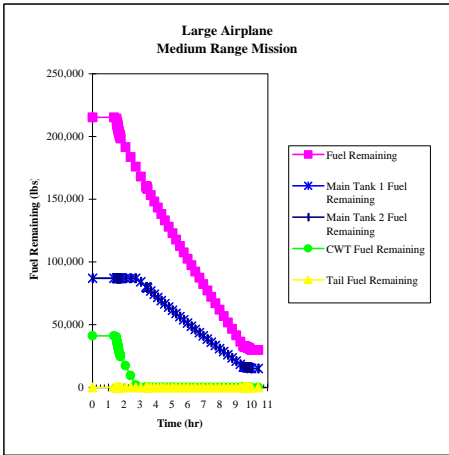


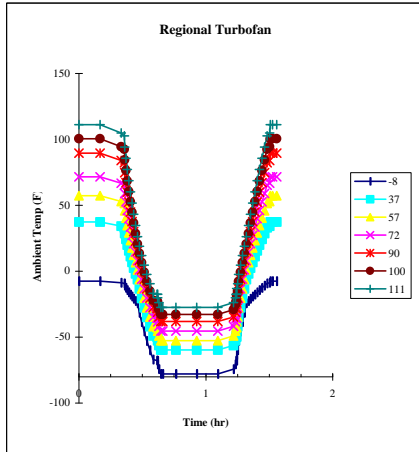
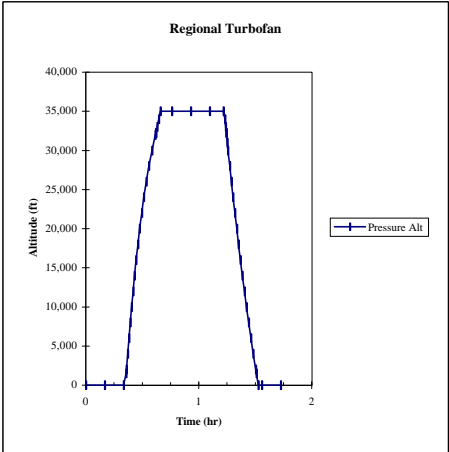
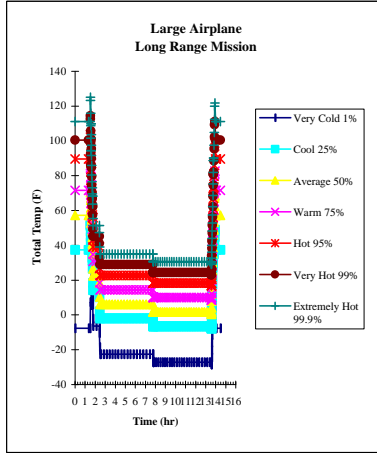
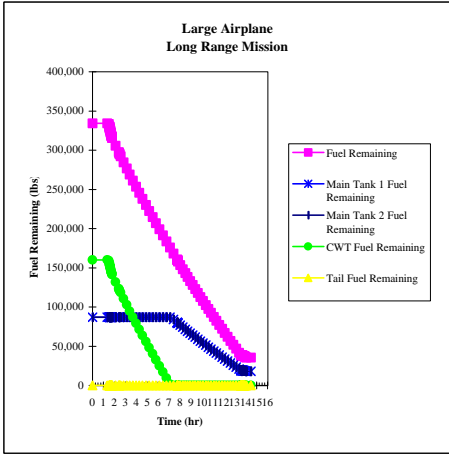


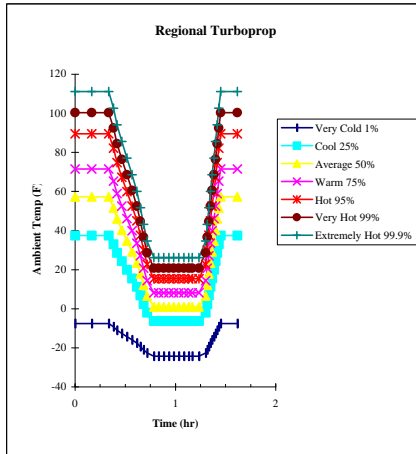
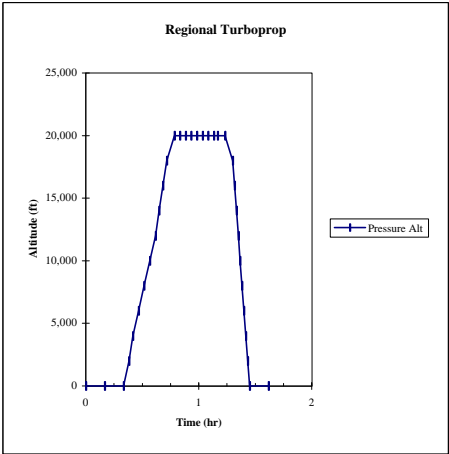
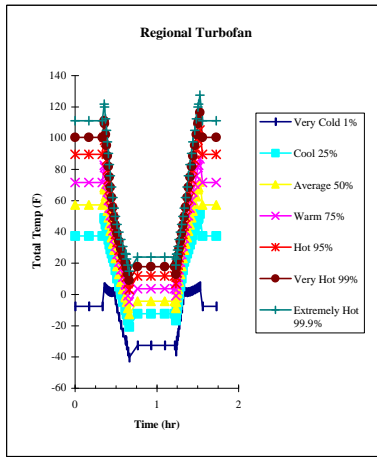
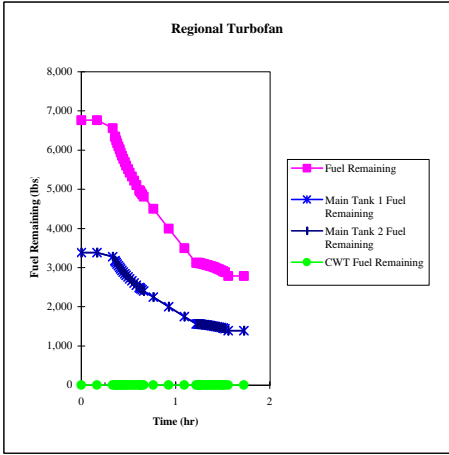


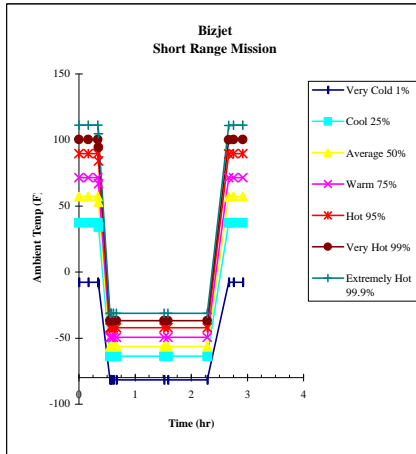
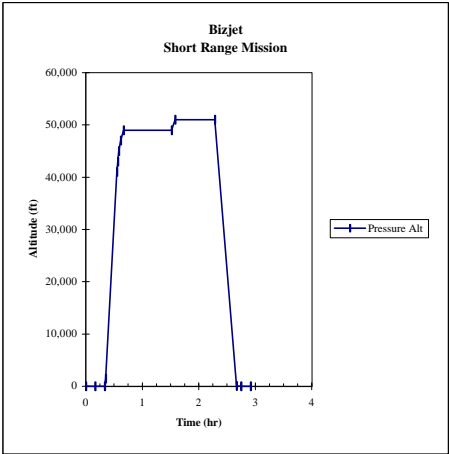
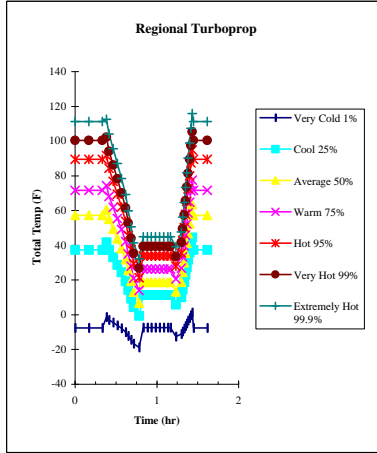
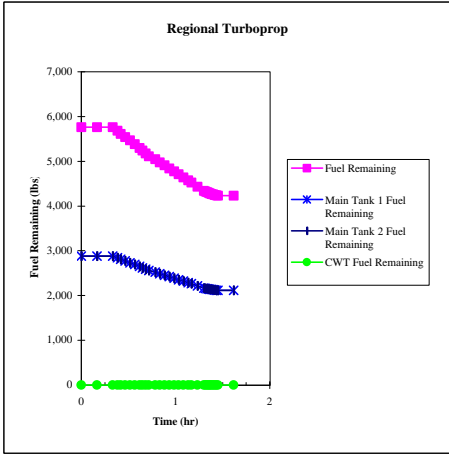


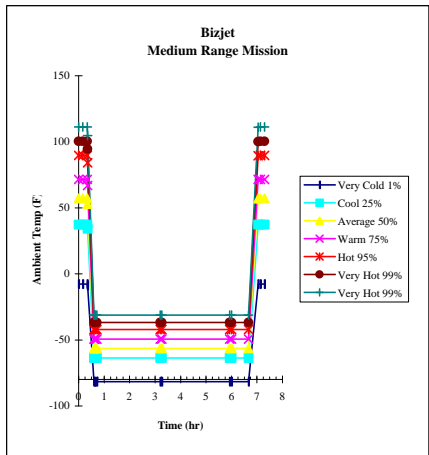
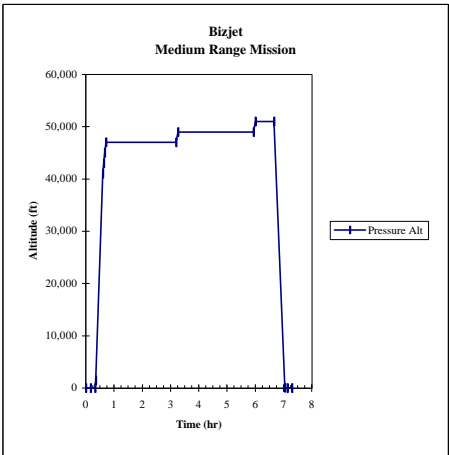
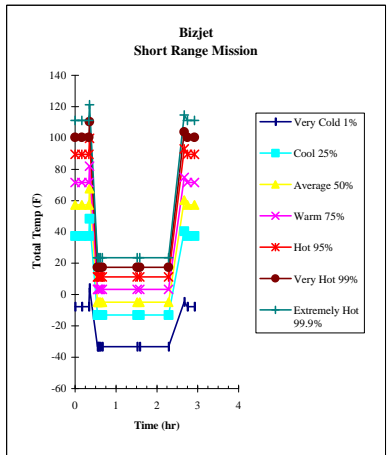
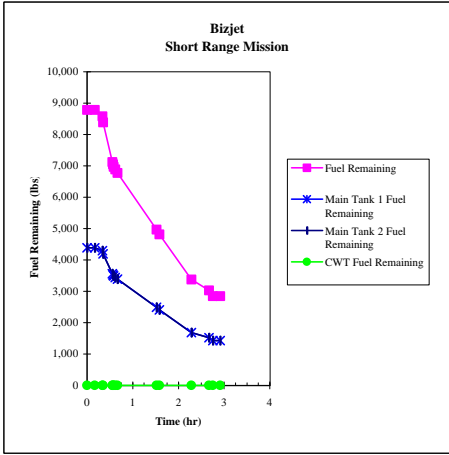


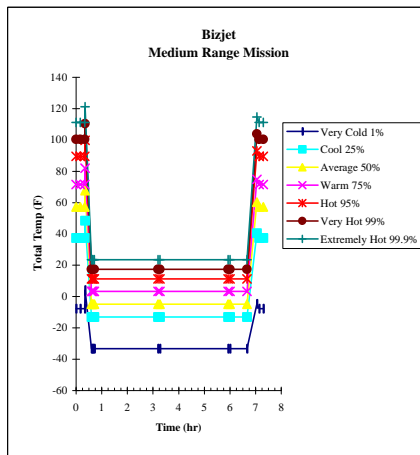
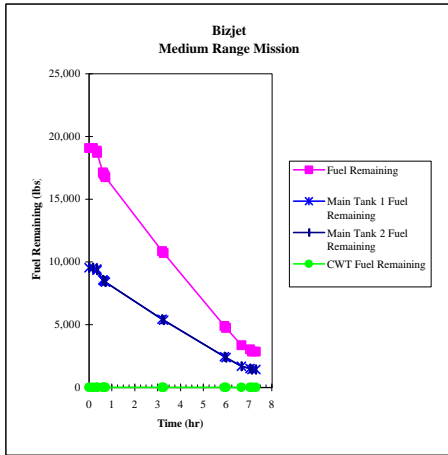












Standards-generic

Model	Large	Medium	Small	Regional T/fan	Regional T/prop	Bizjet
General						
Fleet size	2,000	1,400	8,600	1,000	2,000	8,600
MTOGW	800,000	330,000	160,000	78,000	40,000	23,000
MLW	600,000	270,000	130,000	69,000	38,000	20,000
Fuel Volume:						
Total	54,000	24,000	5,000	3200	1400	1200
Center	25,000	10,000	3,000	800	0	0
Wing	26,000	12,000	2,000	2400	1400	800
Tail	3,000	2,000	0	0		
Body	(optional)	(optional)	(optional)	0	0	400
Tank Configurations						
% fleet with Center Tanks	92	97	97			6
% of Center Tanks with Heat Input	64	78	72			0
% fleet with Tail Tanks	36	25	0			0
% fleet with Body Tanks	2	0	8			54
Tank Pressure						
Positive	+1.5	+1.5	+1.5	2	2	+1.5
Negative	-0.5	-0.5	-0.5	-1	-1	-0.5
Bleed flow available after ECS						
Bleed pressure avail after ECS						
Bleed temperature avail after ECS						
Precooler flow avail after ECS						
Precooler max outlet temperature at max flow						
Payload (lbs)	100,000	55,000	40,000	35,000	22,000	1,200
passengers	400	250	150	75	50	6
Short mission						
Range (nm)	2,000	1,000	500			1000
Ground Time (hr)	2.00	1.50	1.25			
Block Time (hr)	4.6	2.3	1.6			
# of flights per day	2,914	3,682	35,548			
Medium Mission						
Range (nm)	4,000	2,000	1,000	450	250	3000
Ground Time (hr)	2.00	1.50	1.25	0.33	0.33	
Block Time (hr)	8.6	4.6	2.8	1.4	1.1	
# of flights per day	1,141	919	10,053	10,000	20,000	
Long mission						
Range (nm)	6,000	4,000	2,000			6500
Ground Time (hr)	2.00	1.50	1.25			
Block Time (hr)	12.7	8.9	5.1			
# of flights per day	544	541	2,566			
Distribution						
% short missions	63%	72%	74%			54%
% medium missions	25%	18%	21%	100%	100%	27%
% long missions	12%	11%	5%			19%
Operating environment						
Max. Cruise Alt.	43,000	43,000	37,000	35,000	25,000	41,000
Ground temp max	130 Deg F	130 Deg F	130 Deg F	122 Deg F	122 Deg F	122 Deg F
Ground temp min	-65 Deg F	-65 Deg F	-65 Deg F	-40 Deg F	-40 Deg F	-40 Deg F
Distribution of Ground Temp	-40 to 122 F	-40 to 122 F	-40 to 122 F	-40 to 122 F	-40 to 122 F	-40 to 122 F
Distribution of Cruise Temp	-87 to -22 F	-87 to -22 F	-87 to -22 F	-87 to -22 F	-87 to -22 F	-87 to -22 F
Distribution of Flash Point	100 to 150 F	100 to 150 F	100 to 150 F	100 to 150 F	100 to 150 F	100 to 150 F
Vmo	365	360	340	320	250	360
Mmo	0.92	0.85	0.82	.0.80	0.5	0.83
M cruise	0.85	0.80	0.77	0.75	290T/220E	0.8
Climb rate (Max, Sea Level)	5,000	5,000	4,500	3000	2000	
Descent rate (Normal)	2,000	1,500	2,000	2000	2000	
Descent rate (Max)	3,500	4,000	3,000			

Standards-modeled

Model	Large	Medium	Small	Regional T/fan	Regional T/prop	Bizjet
General						
Fleet size	2,000	1,400	8,600	1,000	2,000	787
MTOGW	800,000	330,000	160,000	78,000	40,000	90,500
MLW	600,000	270,000	130,000	69,000	38,000	75,300
Fuel Volume:						
Total	0	0	0	0	0	0
Center	54,000	24,000	5,000	3,200	1,400	6,150
Wing	25,000	10,000	3,000	800	0	0
Tail	26,000	12,000	2,000	2,400	1,400	6,150
Body	3,000	2,000	0	0	0	0
	(optional)	(optional)	(optional)	0	0	0
Tank Configurations						
% fleet with Center Tanks	92	97	97			0
% of Center Tanks with Heat Input	64	78	72			0
% fleet with Tail Tanks	36	25	0			0
% fleet with Body Tanks	2	0	8			0
Tank Pressure						
Positive	+1.5	+1.5	+1.5	2	2	2
Negative	-0.5	-0.5	-0.5	-1	-1	-0.5
Bleed flow available after ECS						-
Bleed pressure avail after ECS						-
Bleed temperature avail after ECS						-
Precooler flow avail after ECS						-
Precooler max outlet temperature at max flow						-
Payload (lbs)	100,000	55,000	40,000	35,000	22,000	6,500
passengers	400	250	150	75	50	6 to19
Short mission						
Range (nm)	2,000	1,000	500			1,000
Ground Time (hr)	2.0	1.5	1.3			1
Block Time (hr)	4.6	2.3	1.6			3
# of flights per day	2,914	3,682	35,548			1
Medium Mission						
Range (nm)	4,000	2,000	1,000	400	250	3,000
Ground Time (hr)	2.0	1.5	1.3	0.5	0.3	1
Block Time (hr)	8.6	4.6	2.8	1.0	1.1	7
# of flights per day	1,141	919	10,053		20,000	1
Long mission						
Range (nm)	6,000	4,000	2,000	800		6,000
Ground Time (hr)	2.0	1.5	1.3	0.5		1
Block Time (hr)	12.7	8.9	5.1	2.0		15
# of flights per day	544	541	2,566			1
Distribution						
						Now/2002
% short missions	63.4%	71.6%	73.8%	0.0%	0.0%	82.9/74.4
% medium missions	24.8%	17.9%	20.9%	100.0%	100.0%	16.5/20.2
% long missions	11.8%	10.5%	5.3%	0.0%	0.0%	0.6/5.4
Operating environment						
Max. Cruise Alt.	43,000	43,000	37,000	35,000	25,000	51,000
Ground temp max	130 Deg F	130 Deg F	130 Deg F	122 Deg F	122 Deg F	133°F
Ground temp min	-65 Deg F	-65 Deg F	-65 Deg F	-40 Deg F	-40 Deg F	-65°F
Distribution of Ground Temp	-40 to 122 F	-40 to 122 F	-40 to 122 F	-40 to 122 F	-40 to 122 F	-40 to 122 F
Distribution of Cruise Temp	-87 to -22 F	-87 to -22 F	-87 to -22 F	-87 to -22 F	-87 to -22 F	-87 to -22 F
Distribution of Flash Point	100 to 150 F	100 to 150 F	100 to 150 F	100 to 150 F	100 to 150 F	100 to 150 F
Vmo	365	360	340	320	250	340KTAS
Mmo	1	1	1	.080	1	1
M cruise	1	1	1	1	290T/220E	1
Climb rate (Max, Sea Level)	5,000	5,000	4,500	3,000	2,000	6700/3600 @ 51,000# / 90,500
Descent rate (Normal)	2,000	1,500	2,000	2,000	2,000	2,000
Descent rate (Max)	3,500	4,000	3,000	0	0	20,000

Cost Estimator

NOTES:

This page attempts to estimate the performance related costs to the airlines of increased airplane weight and / or reduced fuel volume. These costs include increased fuel burn and payload reduction. They do not include airline maintenance costs, manufacturers cost or airplane price changes.

The assumptions used in this cost estimate are shown on the top of the Performance & Cost Trades worksheet

Data is not ready for the Regional Turboprop.

Input airplane weight increase and / or fuel volume decrease. The airline cost will update automatically.

Model	Large	Medium	Small	Regional T/fan	Regional T/prop	Bizjet
Input :						
Airplane weight increase (lb)	1,000	1,000	1,000	1,000	1,000	1,000
Fuel volume decrease (gal)	100	100	100	100	100	100
Airline cost increase (total fleet per year)						
short mission	\$16,050,712	\$8,691,207	\$63,252,006	\$0	\$0	\$2,041,454
medium mission	\$8,212,986	\$2,932,221	\$21,346,537	\$19,765,404	\$0	\$1,895,636
long mission (takeoff weight limited)	\$153,400,000	\$86,450,000	\$224,318,714	\$0	\$0	\$592,000,794
long mission (fuel volume limited)	\$306,800,000	\$181,545,000	\$717,819,886	\$0	\$0	\$1,340,923,194
Output:						
Total Airline Cost Increase (entire fleet per year)	\$484,463,698	\$279,618,429	\$1,026,737,144	\$19,765,404	\$0	\$1,936,861,077
Total Airline Cost Increase (per airplane per year)	\$242,232	\$199,727	\$119,388	\$19,765	\$0	\$225,216

Performance & Cost Trades

Assumptions:

Fuel Density = 6.70 Lbs/Gal

Model	Large	Medium	Small	Regional T/fan	Regional T/prop	Bizjet	
Assumed Fuel Price (\$ / gallon)	\$0.70	\$0.70	\$0.70	\$0.70	\$0.70	\$1.50	
Trades when not limited by takeoff weight or fuel volume (short / medium missions) (i.e. add extra fuel to carry extra aircraft weight over a fixed range with a fixed payload)						Bizjet data based on generic bizjet, not the modelled bizjet	
Airline Cost per Airplane							
Short mission							
Range (nm)	2,000	1,000	500				400
# of flights per year per airplane	795	1,300	2,120				149
% Block fuel / 1000 lbs OEW	0.17%	0.30%	0.63%				0.34%
Block Fuel (lb)	89,647	21,279	7,142				2100
Lbs block fuel / 1000 lbs OEW / Flight	152	64	45				7
Lbs block fuel / 1000 lbs OEW / Year	121,158	82,988	95,389				1,060
\$ / 1000 lbs OEW / Year	12,658	8,670	9,966				237
Medium mission							
Range (nm)	4,000	2,000	1,000	450	250		1000
# of flights per year per airplane	475	795	1,300	3650	3650		74
% Block fuel / 1000 lbs OEW	0.18%	0.34%	0.68%	1.30%	0%		0.34%
Block Fuel (lb)	185,366	41,433	12,859	3987	1534		3900
Lbs block fuel / 1000 lbs OEW / Flight	334	141	87	52	0	13	
Lbs block fuel / 1000 lbs OEW / Year	158,488	111,993	113,674	189,183	0	985	
\$ / 1000 lbs OEW / Year	16,558	11,701	11,876	19,765	0	220	
Long mission							
Range (nm)	6,000	4,000	2,000			2000	
# of flights per year per airplane	350	475	795			52	
% Block fuel / 1000 lbs OEW	0.19%	0.35%	0.81%			0.34%	
Block Fuel (lb)	298,697	86,603	25,174			6400	
Lbs block fuel / 1000 lbs OEW / Flight	568	303	204			22	
Lbs block fuel / 1000 lbs OEW / Year	198,634	143,977	162,108			1,137	
\$ / 1000 lbs OEW / Year	20,753	15,042	16,937			255	
Trades when limited by takeoff weight (50% of long missions) (i.e. reduce payload by amount of increased aircraft weight to maintain fixed range)							
Range Trade (N. Mi. / 1000 lbs OEW)							
	-25	-45	-90	-160		-300	
Payload Trade (Reduced payload / 1000 lbs OEW)							
	1,000	1,000	1,000	1000	1000	1000	
Airline Cost							
Reduced Payload (lb)	1,000	1,000	1,000	1000	1000	1000	
Passengers left behind (210 lbs/pass)	4.8	4.8	4.8	4.8	4.8	4.8	
Range (nm)	6,000	4,000	2,000			2000	
\$ per Revenue Seat Mile	\$0.130	\$0.130	\$0.130	\$0.135	\$0.135	\$0.138	
# of flights per year per airplane	350	475	795			52	
\$ / 1000 lbs OEW / airplane / year	1,300,000	1,176,190	984,286	0	0	68,837	
Cost assumes the airplane is takeoff weight limited on every flight.							
Trades when limited by fuel volume (50% of long missions) (i.e. reduce payload by amount of increased aircraft weight and OEW/gallon trade)							
Range Trade (N. Mi. / 1000 lbs OEW)							
	-12	-20	-25				
Airline Cost							
Increased OEW effect (per 1000 lbs)							
\$ / 1000 lbs OEW / airplane / year (Same as takeoff weight limited case)	1,300,000	1,176,190	984,286	0	0	68,837	
Decreased fuel volume effect (per 100 gal)							
Payload reduction per gal of fuel	10	11	22	0	0	43	
Reduced Payload (lb)	1,000	1,100	2,200	0	0	0	
Passengers left behind (210 lbs/pass)	4.8	5.2	10.5	0.0	0.0	0.0	
Range (nm)	6,000	4,000	2,000				
\$ per Revenue Seat Mile	\$0.130	\$0.130	\$0.130	\$0.135	\$0.135		
# of flights per year per airplane	350	475	795				
\$ / 100 gal / airplane / year	1,300,000	1,293,810	2,165,429	0	0	87,084	
Cost assumes the flight is fuel volume limited on every flight.							

Temperatures

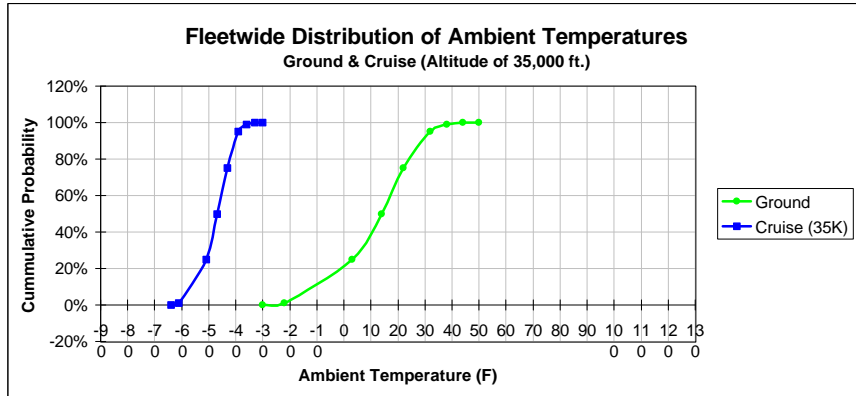
Condition of Day	Cummulative Probability	Ground	Cruise (35K)	Ground	Cruise (35K)
		(Deg C)	(Deg C)	(Deg F)	(Deg F)
Min	0.01%	-40	-66	-40	-87
Extremely Cold	0.1%	-30	-64	-22	-83
Very Cold	1%	-22	-61	-8	-78
Cold	25%	3	-51	37	-60
Average	50%	14	-47	57	-53
Warm	75%	22	-43	72	-45
Hot	95%	32	-39	90	-38
Very Hot	99%	38	-36	100	-33
Extremely Hot	99.9%	44	-33	111	-27
Max	99.99%	50	-30	122	-22

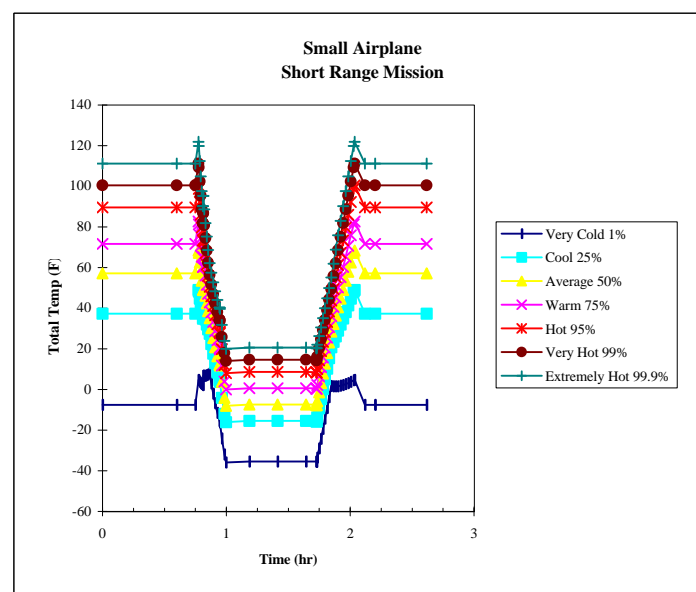
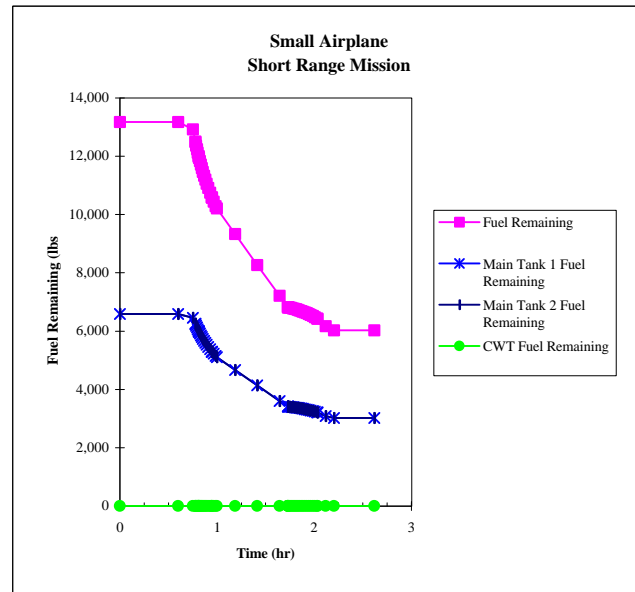
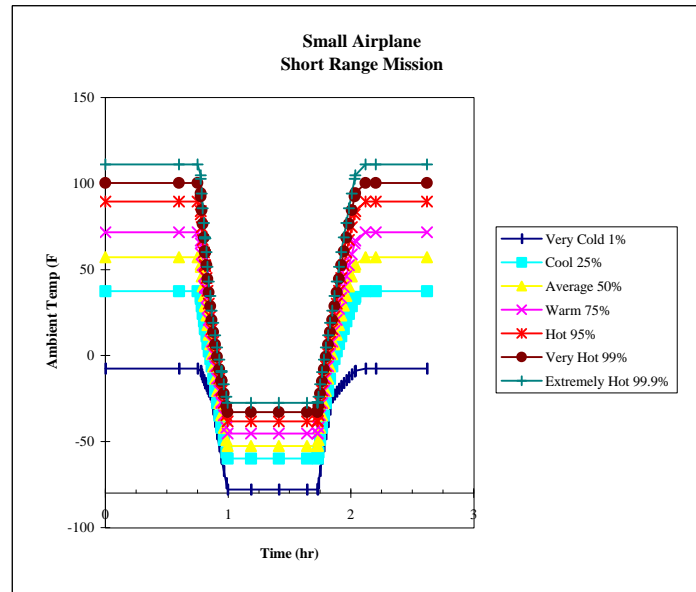
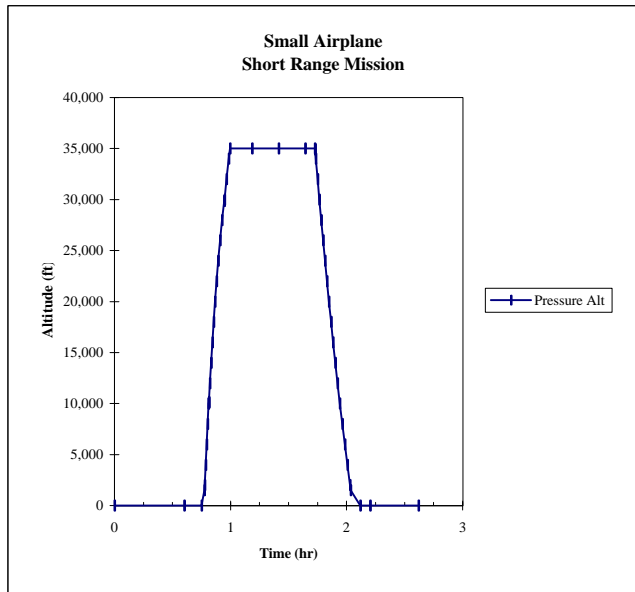
BOLD Indicates cases to run in thermal model

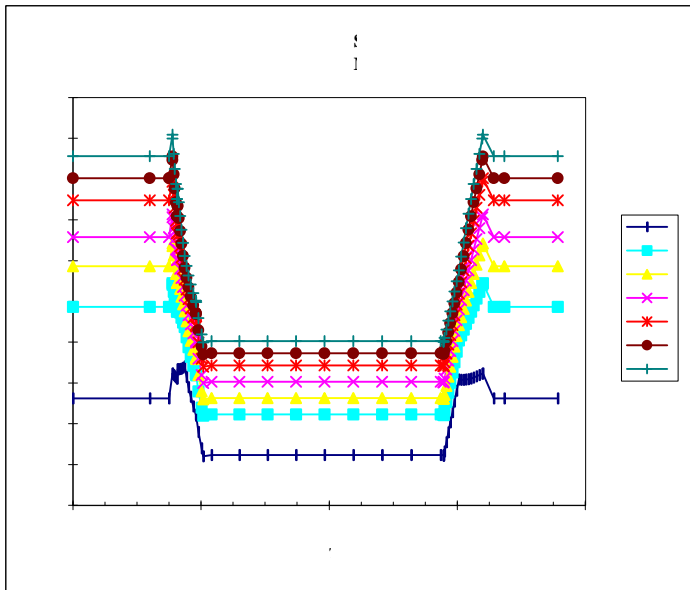
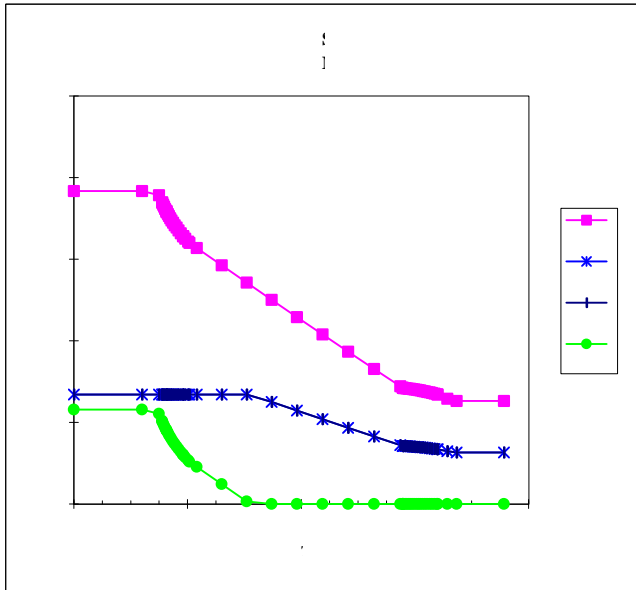
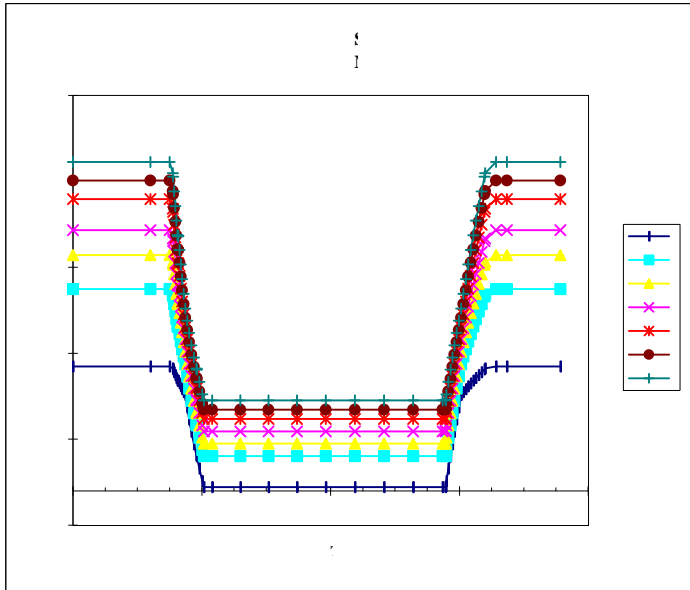
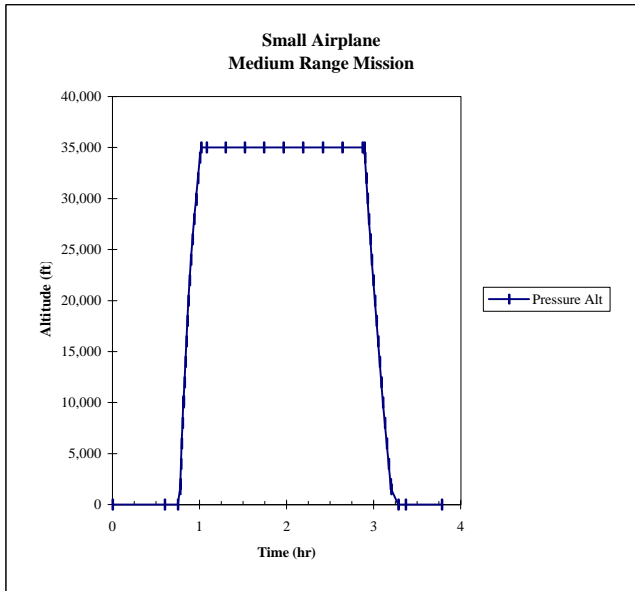
NOTE: This temperature data is built into the profiles

	Very Cold 1%	Cool 25%	Average 50%	Warm 75%	Hot 95%	Very Hot 99%	Extremely Hot 99.9%
Ground Ambient (F)	-8	37	57	72	90	100	111
Enroute Ambient (35k, Deg F)	-78	-60	-53	-45	-38	-33	-27
Enroute Isa + (F)	-12	6	13	20	28	33	38

Altitude	Ambient Temperature - Degrees F						
0	-8	37	57	72	90	100	111
1000	-8	35	54	68	86	96	107
2000	-9	33	52	65	82	92	103
3000	-10	31	49	62	78	88	98
4000	-11	29	46	59	75	84	94
5000	-12	26	43	56	71	80	90
6000	-13	24	40	53	67	76	86
7000	-13	22	37	49	64	73	81
8000	-14	20	35	46	60	69	77
9000	-15	18	32	43	56	65	73
10000	-16	16	29	40	52	61	69
11000	-17	13	26	37	49	57	64
12000	-18	11	23	33	45	53	60
13000	-18	9	21	30	41	49	56
14000	-19	7	18	27	38	45	52
15000	-20	5	15	24	34	41	47
16000	-21	2	12	21	30	37	43
17000	-22	0	9	18	26	33	39
18000	-23	-2	7	14	23	29	35
19000	-23	-4	4	11	19	25	30
20000	-24	-6	1	8	15	21	26
21000	-28	-10	-3	5	12	17	23
22000	-31	-13	-6	1	8	14	19
23000	-35	-17	-10	-3	5	10	15
24000	-39	-21	-13	-6	1	6	12
25000	-42	-24	-17	-10	-3	3	8
26000	-46	-28	-21	-13	-6	-1	5
27000	-49	-31	-24	-17	-10	-4	1
28000	-53	-35	-28	-20	-13	-8	-2
29000	-56	-38	-31	-24	-17	-11	-6
30000	-60	-42	-35	-28	-20	-15	-10
31000	-64	-46	-38	-31	-24	-19	-13
32000	-67	-49	-42	-35	-27	-22	-17
33000	-71	-53	-45	-38	-31	-26	-20
34000	-74	-56	-49	-42	-35	-29	-24
35000	-78	-60	-53	-45	-38	-33	-27
36000	-81	-63	-56	-49	-42	-36	-31
36089	-82	-64	-56	-49	-42	-37	-31
37000	-82	-64	-56	-49	-42	-37	-31
38000	-82	-64	-56	-49	-42	-37	-31
39000	-82	-64	-56	-49	-42	-37	-31
40000	-82	-64	-56	-49	-42	-37	-31
41000	-82	-64	-56	-49	-42	-37	-31
42000	-82	-64	-56	-49	-42	-37	-31
43000	-82	-64	-56	-49	-42	-37	-31
44000	-82	-64	-56	-49	-42	-37	-31
45000	-82	-64	-56	-49	-42	-37	-31
46000	-82	-64	-56	-49	-42	-37	-31
47000	-82	-64	-56	-49	-42	-37	-31
48000	-82	-64	-56	-49	-42	-37	-31
49000	-82	-64	-56	-49	-42	-37	-31
50000	-82	-64	-56	-49	-42	-37	-31
51000	-82	-64	-56	-49	-42	-37	-31
52000	-82	-64	-56	-49	-42	-37	-31
53000	-82	-64	-56	-49	-42	-37	-31
54000	-82	-64	-56	-49	-42	-37	-31
55000	-82	-64	-56	-49	-42	-37	-31
56000	-82	-64	-56	-49	-42	-37	-31
57000	-82	-64	-56	-49	-42	-37	-31
58000	-82	-64	-56	-49	-42	-37	-31
59000	-82	-64	-56	-49	-42	-37	-31
60000	-82	-64	-56	-49	-42	-37	-31

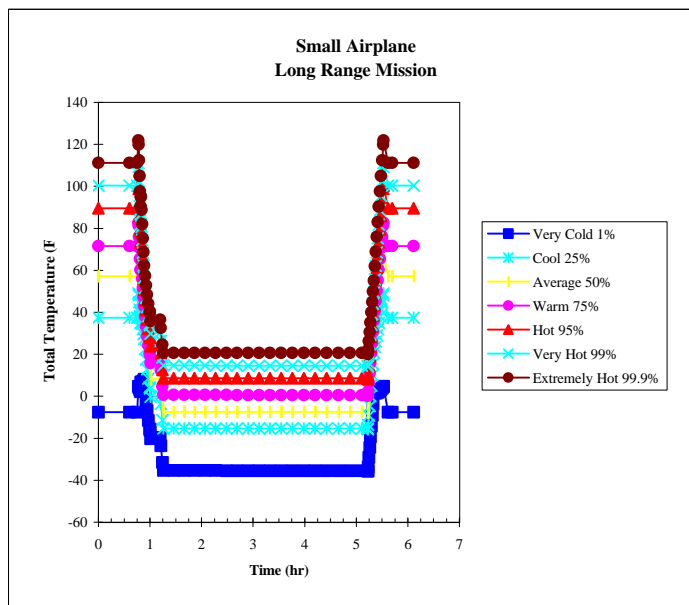
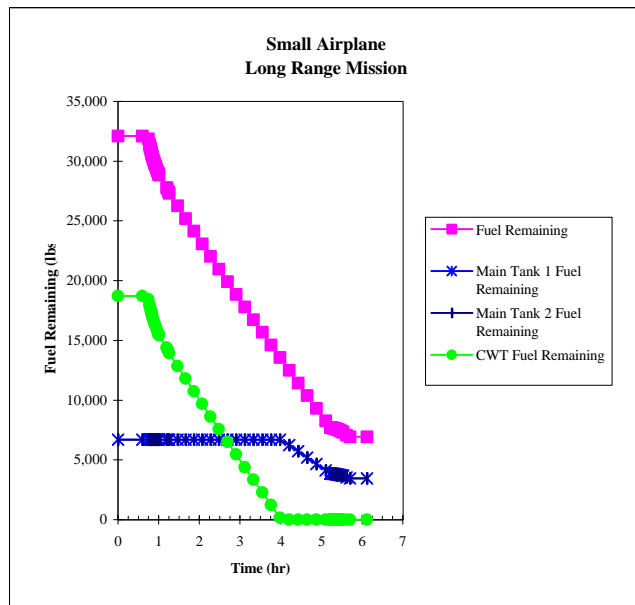
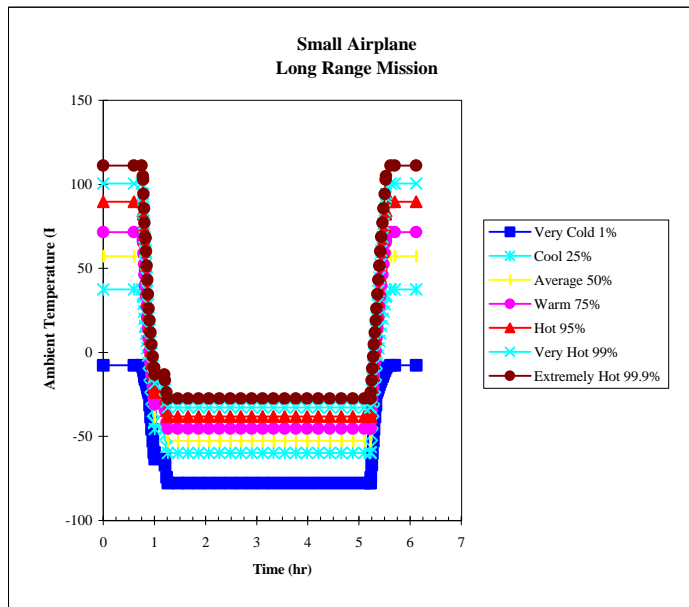
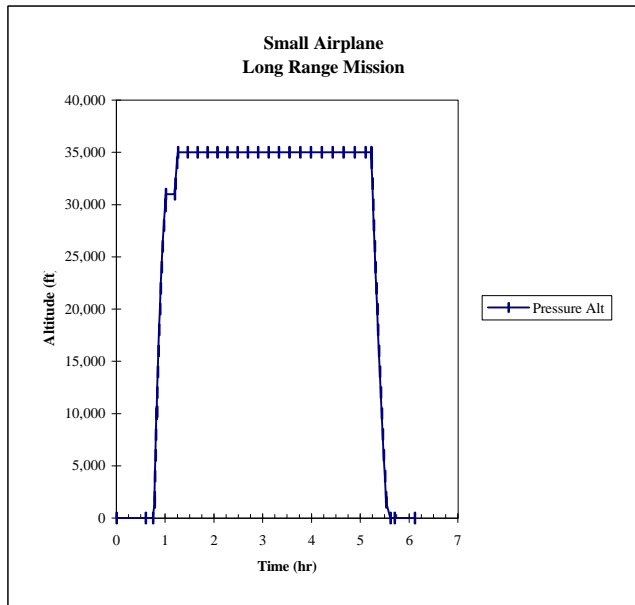


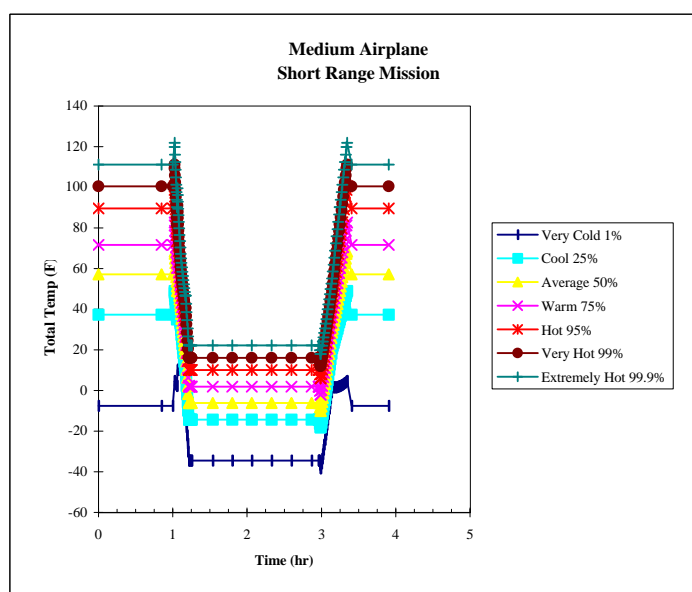
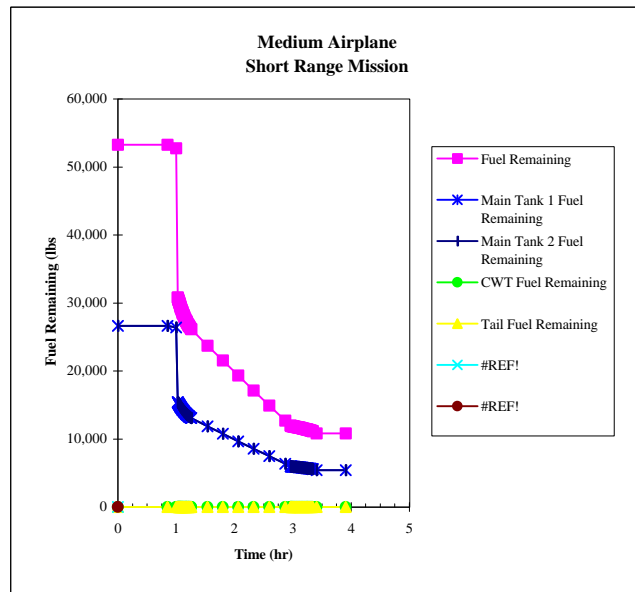
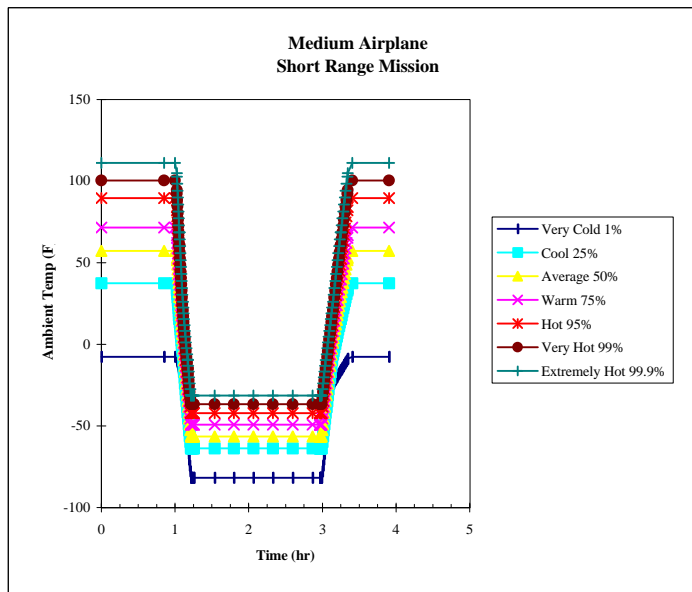
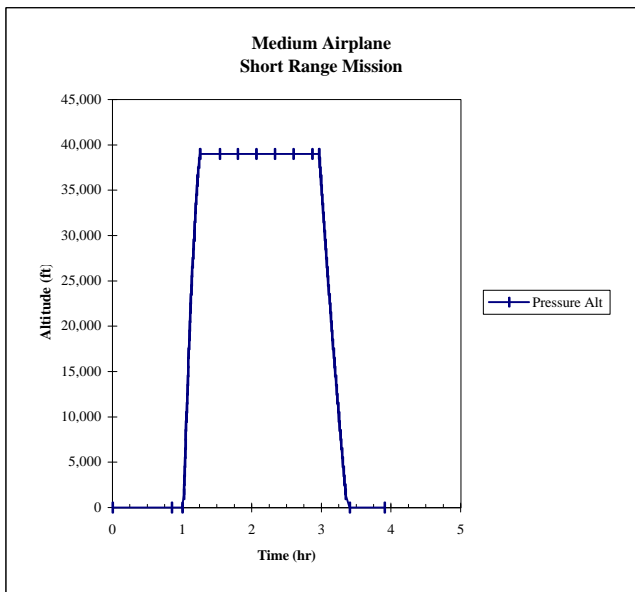


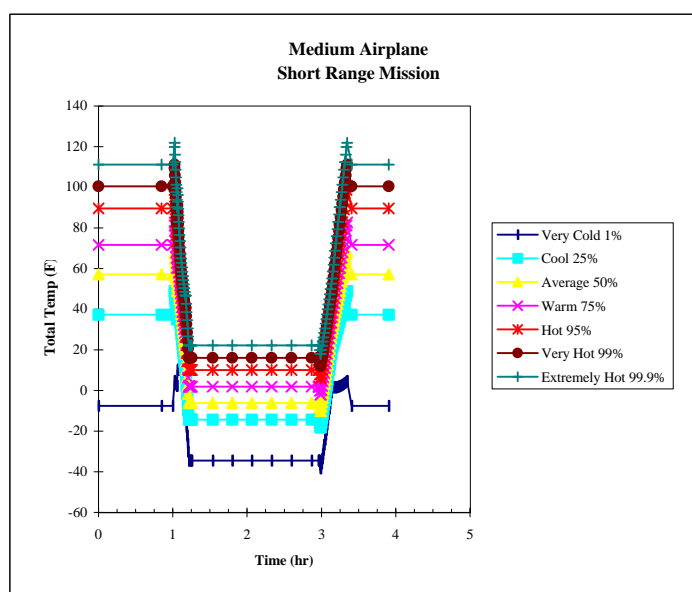
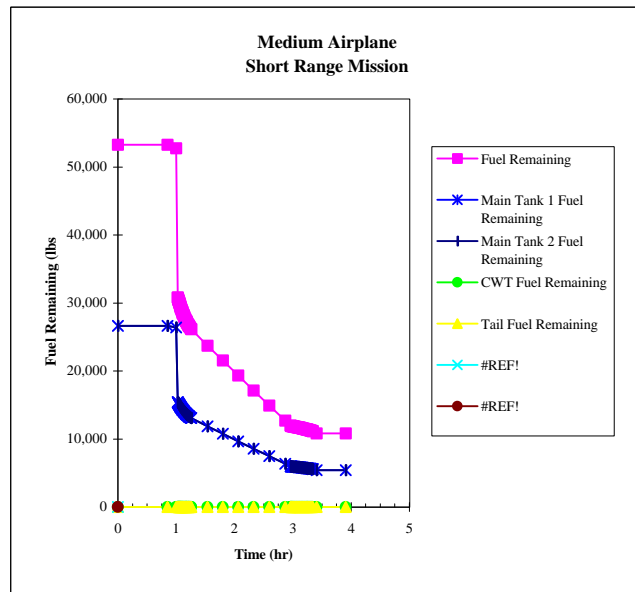
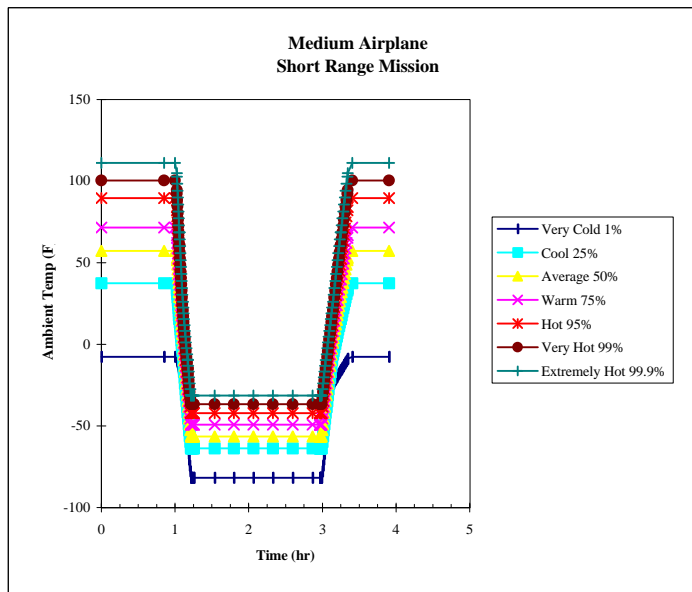
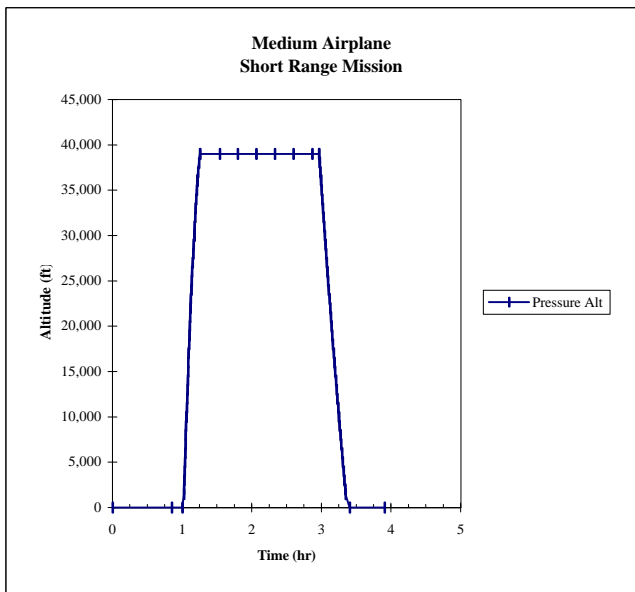


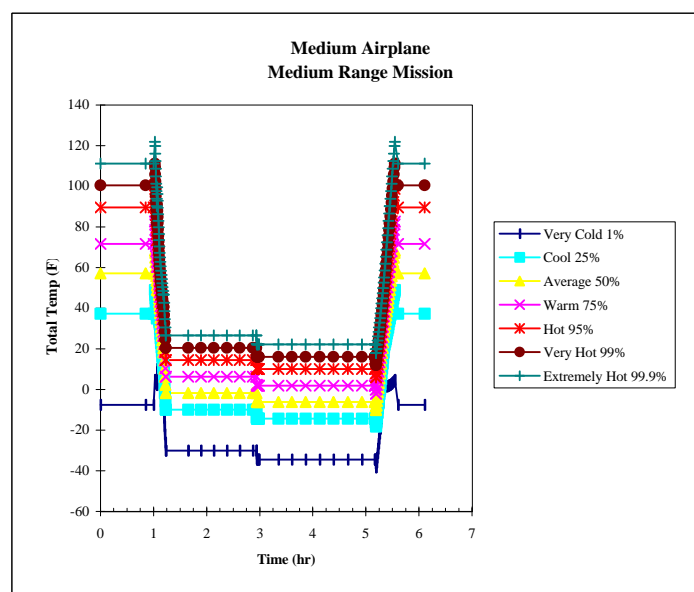
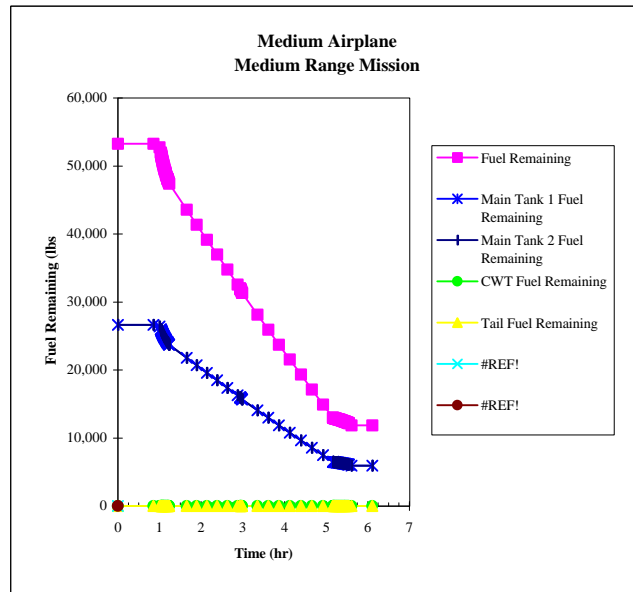
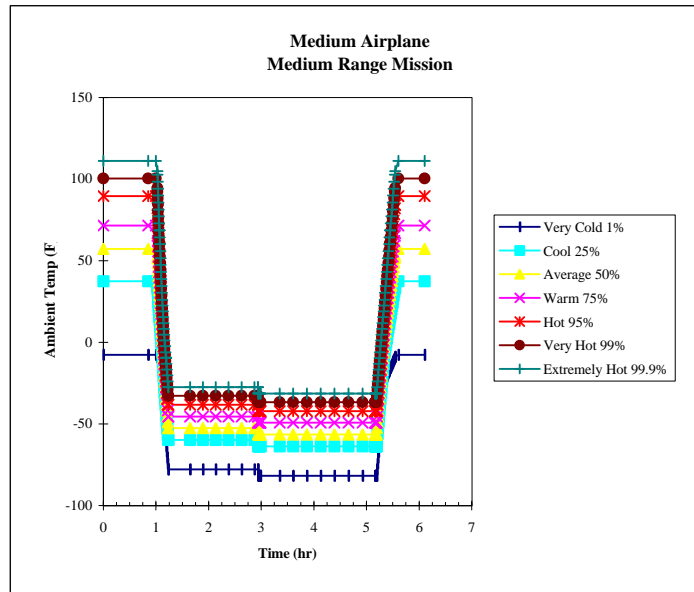
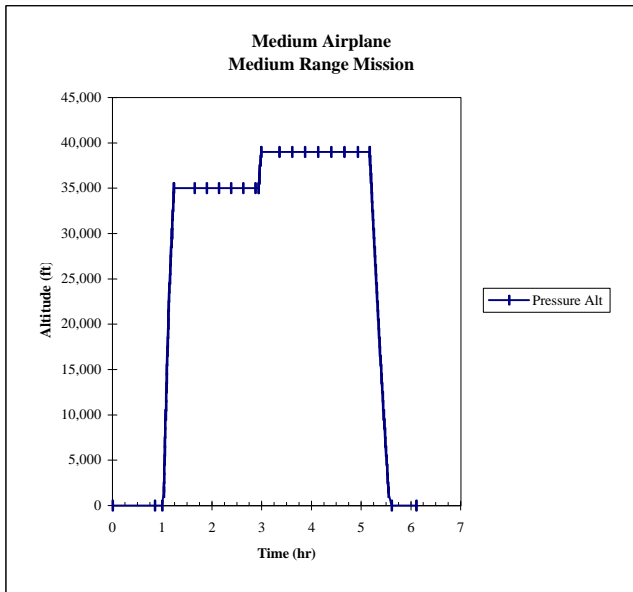
Small Commercial Transport
Long Range Mission

366.9	6.1	0	1999.9	0.000	104633	-8	37	57	72	90	100	111	-8	37	57	72	90	100	111	0	0	6934	3467	3467	0	0
-------	-----	---	--------	-------	--------	----	----	----	----	----	-----	-----	----	----	----	----	----	-----	-----	---	---	------	------	------	---	---



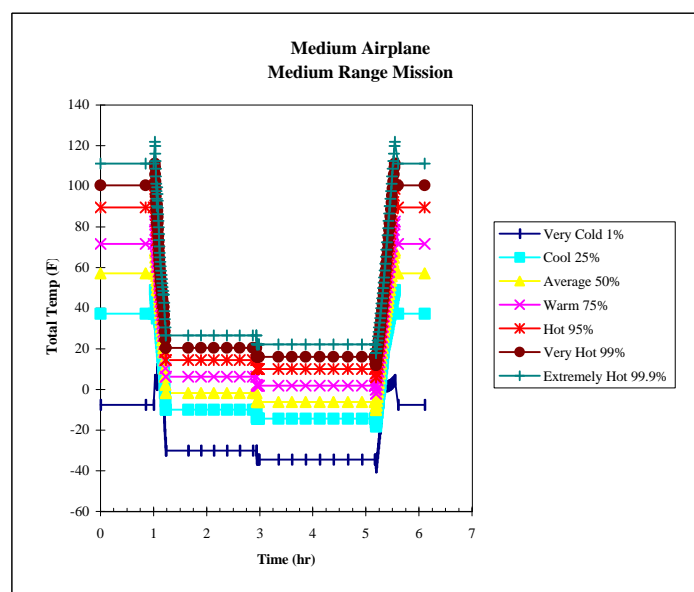
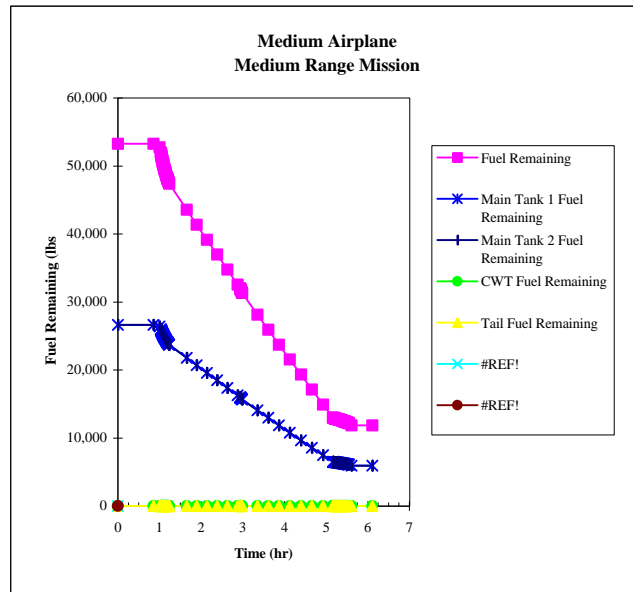
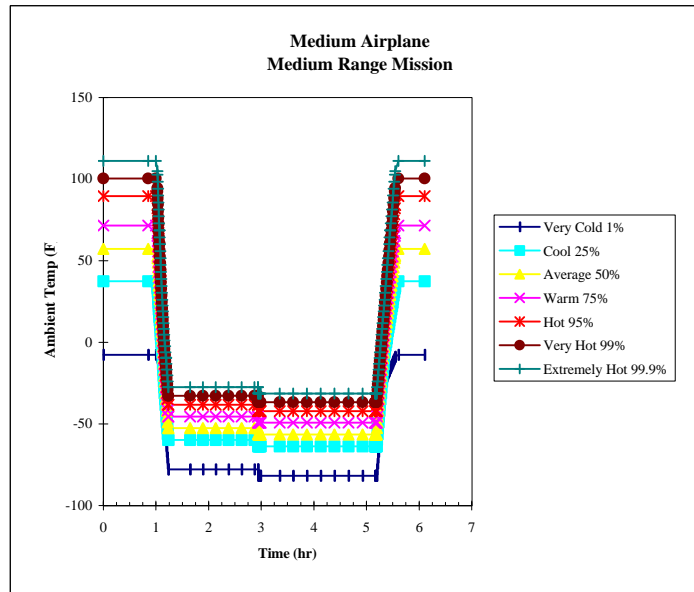
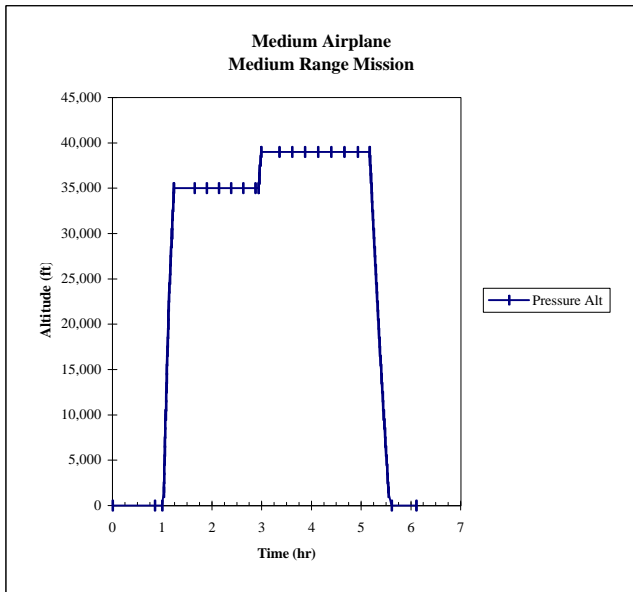


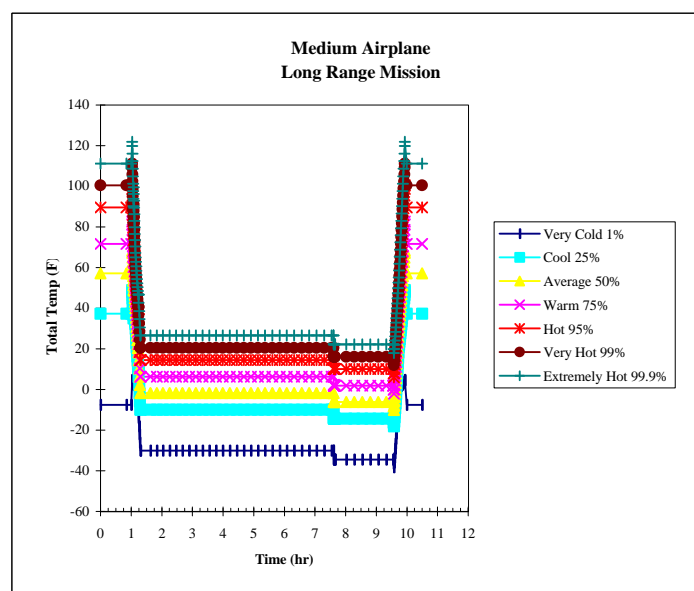
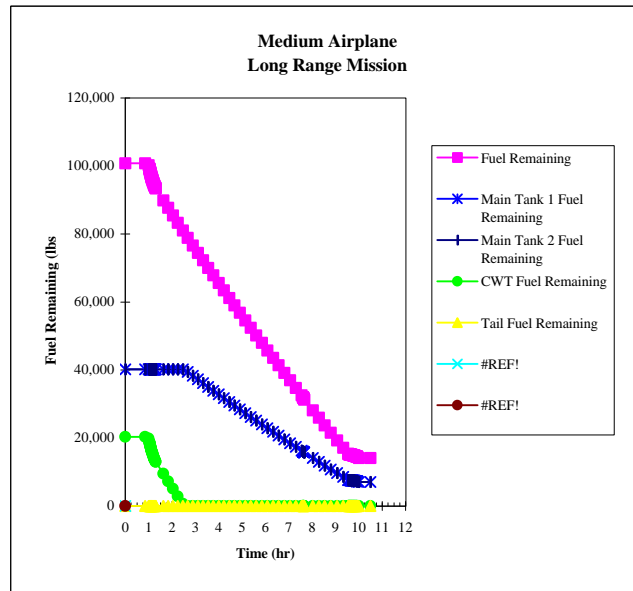
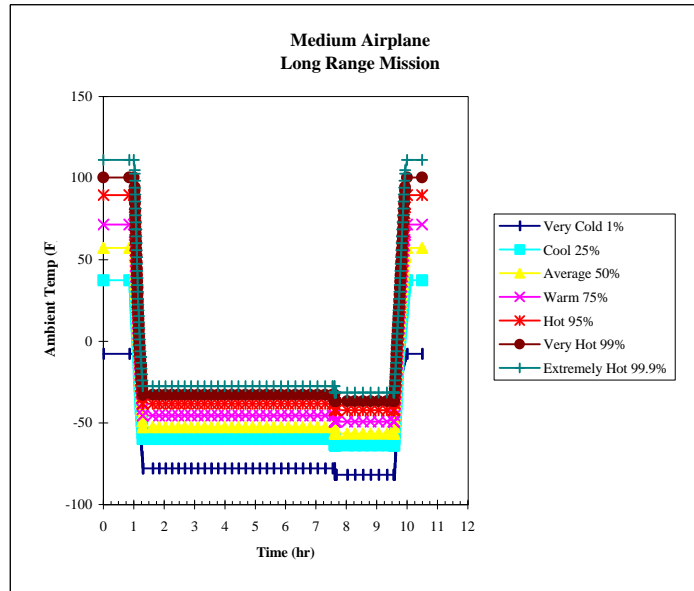
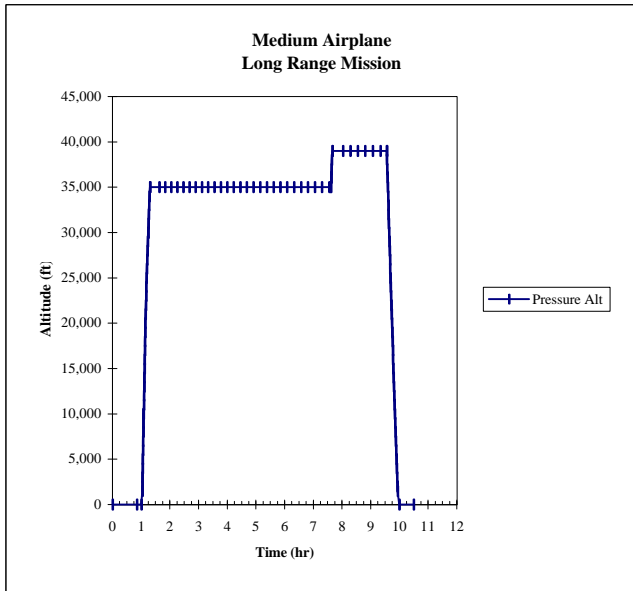


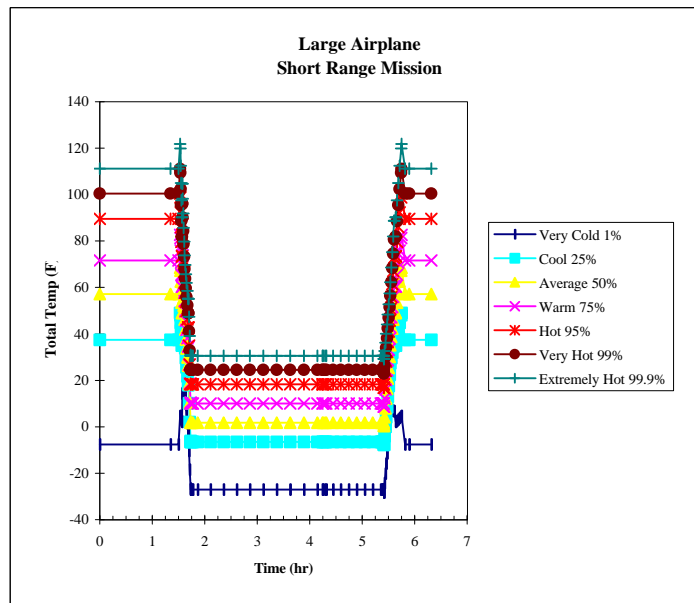
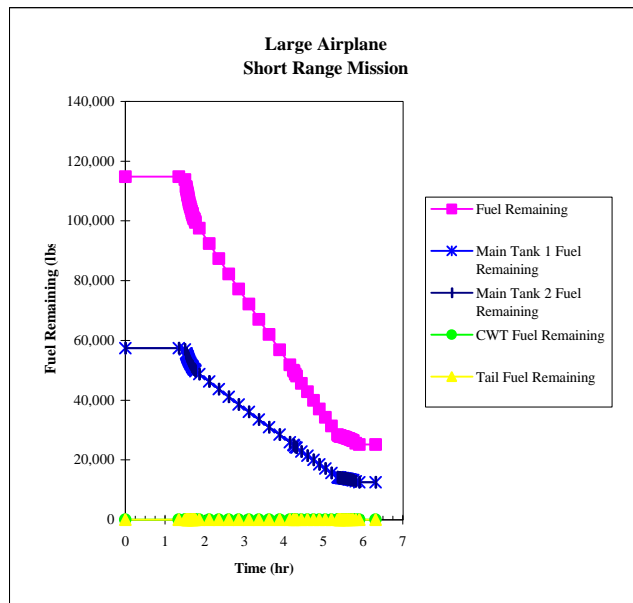
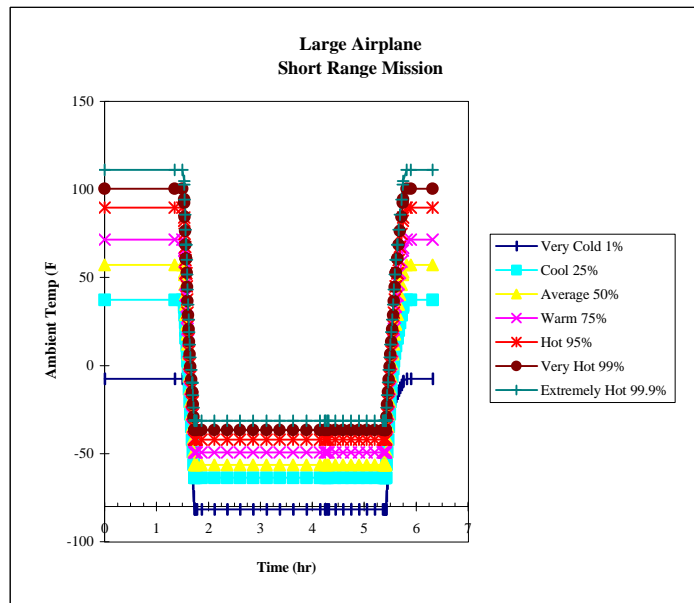
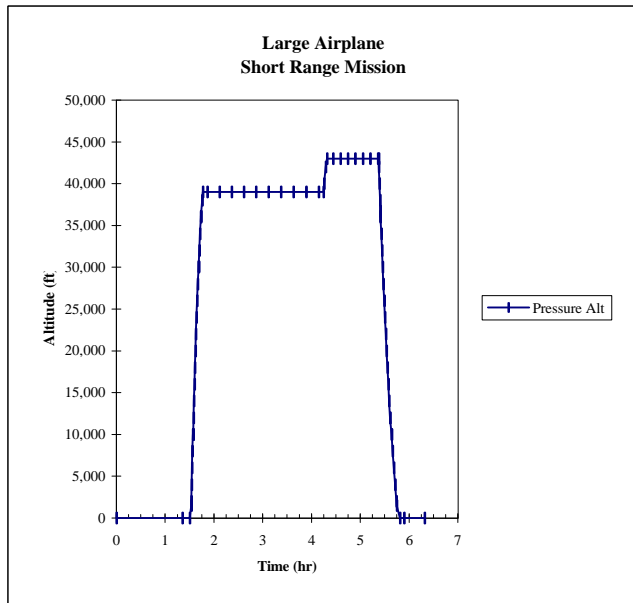


**Medium Commercial Transport
Medium Range Mission**

312.1	5.2	35000	1886.0	0.741	238284	-78	-60	-53	-45	-38	-33	-27	-36	-16	-8	0	8	14	20	1916	32	12901	6451	6451	0	0	-1786	-0.1
312.7	5.2	34000	1889.9	0.726	238267	-74	-56	-49	-42	-35	-29	-24	-34	-14	-6	2	10	16	22	1836	31	12884	6442	6442	0	0	-1793	-0.1
313.2	5.2	33000	1893.8	0.711	238249	-71	-53	-45	-38	-31	-26	-20	-31	-12	-4	4	12	18	24	1750	29	12866	6433	6433	0	0	-1807	-0.2
313.8	5.2	32000	1897.5	0.696	238233	-67	-49	-42	-35	-27	-22	-17	-29	-9	-1	6	14	20	26	1656	28	12851	6425	6425	0	0	-1828	-0.1
314.3	5.2	31000	1901.2	0.682	238218	-64	-46	-38	-31	-24	-19	-13	-27	-7	1	9	17	23	28	1675	28	12835	6418	6418	0	0	-1814	-0.2
314.9	5.2	30000	1904.9	0.668	238203	-60	-42	-35	-28	-20	-15	-10	-24	-5	3	11	19	25	31	1698	28	12820	6410	6410	0	0	-1800	-0.2
315.4	5.3	29000	1908.5	0.655	238187	-56	-38	-31	-24	-17	-11	-6	-22	-2	6	13	21	27	33	1709	28	12804	6402	6402	0	0	-1789	-0.2
316.0	5.3	28000	1912.1	0.641	238172	-53	-35	-28	-20	-13	-8	-2	-19	0	8	16	23	29	35	1709	28	12789	6394	6394	0	0	-1781	-0.1
316.6	5.3	27000	1915.6	0.628	238156	-49	-31	-24	-17	-10	-4	1	-17	3	10	18	26	32	37	1746	29	12773	6387	6387	0	0	-1762	-0.2
317.1	5.3	26000	1919.2	0.616	238139	-46	-28	-21	-13	-6	-1	5	-14	5	13	21	28	34	40	1786	30	12756	6378	6378	0	0	-1743	-0.2
317.7	5.3	25000	1922.7	0.604	238121	-42	-24	-17	-10	-3	3	8	-12	8	15	23	31	37	42	1823	30	12738	6369	6369	0	0	-1725	-0.2
318.3	5.3	24000	1926.2	0.592	238103	-39	-21	-13	-6	1	6	12	-9	10	18	26	33	39	45	1861	31	12721	6360	6360	0	0	-1707	-0.2
318.9	5.3	23000	1929.7	0.580	238086	-35	-17	-10	-3	5	10	15	-6	13	20	28	36	42	47	1896	32	12703	6351	6351	0	0	-1690	-0.2
319.5	5.3	22000	1933.1	0.569	238068	-31	-13	-6	1	8	14	19	-4	15	23	31	38	44	50	1922	32	12685	6343	6343	0	0	-1677	-0.2
320.1	5.3	21000	1936.6	0.558	238048	-28	-10	-3	5	12	17	23	-1	18	26	33	41	47	53	1940	32	12665	6333	6333	0	0	-1666	-0.2
320.7	5.3	20000	1939.9	0.547	238028	-24	-6	1	8	15	21	26	2	21	28	36	44	49	55	1951	33	12646	6323	6323	0	0	-1658	-0.2
321.3	5.4	19000	1943.3	0.536	238009	-23	-4	4	11	19	25	30	-2	22	30	38	47	53	59	2006	33	12626	6313	6313	0	0	-1638	-0.2
321.9	5.4	18000	1946.7	0.526	237989	-23	-2	7	14	23	29	35	2	23	32	41	49	56	62	2059	34	12606	6303	6303	0	0	-1619	-0.2
322.5	5.4	17000	1950.0	0.516	237967	-22	0	9	18	26	33	39	-2	25	34	43	52	59	65	2110	35	12584	6292	6292	0	0	-1602	-0.2
323.2	5.4	16000	1953.3	0.506	237947	-21	2	12	21	30	37	43	2	26	36	45	55	62	69	2154	36	12564	6282	6282	0	0	-1588	-0.2
323.8	5.4	15000	1956.6	0.497	237923	-20	5	15	24	34	41	47	2	28	38	48	58	65	72	2202	37	12540	6270	6270	0	0	-1572	-0.3
324.4	5.4	14000	1959.9	0.487	237901	-19	7	18	27	38	45	52	2	29	40	50	61	69	76	2251	38	12518	6259	6259	0	0	-1556	-0.3
325.1	5.4	13000	1963.2	0.478	237876	-18	9	21	30	41	49	56	2	30	43	53	64	72	79	2295	38	12493	6247	6247	0	0	-1541	-0.3
325.7	5.4	12000	1966.4	0.469	237850	-18	11	23	33	45	53	60	2	32	45	55	67	75	83	2337	39	12467	6234	6234	0	0	-1528	-0.3
326.4	5.4	11000	1969.7	0.461	237826	-17	13	26	37	49	57	64	2	33	47	58	70	79	87	2372	40	12443	6221	6221	0	0	-1517	-0.3
327.0	5.5	10000	1972.9	0.452	237799	-16	16	29	40	52	61	69	2	35	49	60	73	82	90	2394	40	12416	6208	6208	0	0	-1511	-0.4
327.0	5.5	10000	1972.9	0.452	237799	-16	16	29	40	52	61	69	2	35	49	60	73	82	90	2394	40	12416	6208	6208	0	0	-1511	-0.4
327.7	5.5	9000	1976.0	0.444	237773	-15	18	32	43	56	65	73	2	37	51	63	77	85	94	2394	40	12390	6195	6195	0	0	-1511	-0.4
328.4	5.5	8000	1979.1	0.436	237746	-14	20	35	46	60	69	77	3	38	53	65	80	89	98	2392	40	12363	6182	6182	0	0	-1513	-0.5
329.0	5.5	7000	1982.2	0.428	237720	-13	22	37	49	64	73	81	3	40	56	68	83	92	101	2429	40	12337	6168	6168	0	0	-1501	-0.5
329.7	5.5	6000	1985.3	0.420	237693	-13	24	40	53	67	76	86	3	41	58	71	86	95	105	2478	41	12310	6155	6155	0	0	-1487	-0.5
330.4	5.5	5000	1988.3	0.413	237665	-12	26	43	56	71	80	90	4	43	60	73	89	99	109	2524	42	12282	6141	6141	0	0	-1473	-0.5
331.1	5.5	4000	1991.3	0.406	237636	-11	29	46	59	75	84	94	4	45	63	76	92	102	112	2568	43	12253	6127	6127	0	0	-1461	-0.5
331.7	5.5	3000	1994.3	0.398	237607	-10	31	49	62	78	88	98	4	46	65	79	96	106	116	2621	44	12225	6112	6112	0	0	-1447	-0.5
332.4	5.5	2000	1997.3	0.391	237577	-9	33	52	65	82	92	103	5	48	67	81	99	109	120	2670	44	12194	6097	6097	0	0	-1433	-0.6
332.8	5.5	1500	1998.8	0.388	237561	-9	34	53	67	84	94	105	5	49	68	83	100	111	122	2692	45	12178	6089	6089	0	0	-1427	-0.6
336.5	5.6	0	1998.8	0.000	237222	-8	37	57	72	90	100	111	-8	37	57	72	90	100	111	0	0	11839	5919	5919	0	0	0	0.0
366.5	6.1	0	1998.8	0.000	237222	-8	37	57	72	90	100	111	-8	37	57	72	90	100	111	0	0	11839	5919	5919	0	0	0	0.0



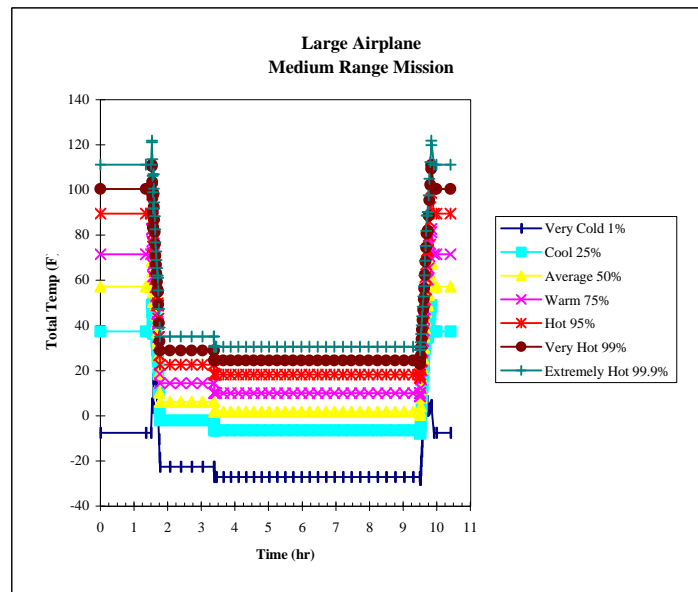
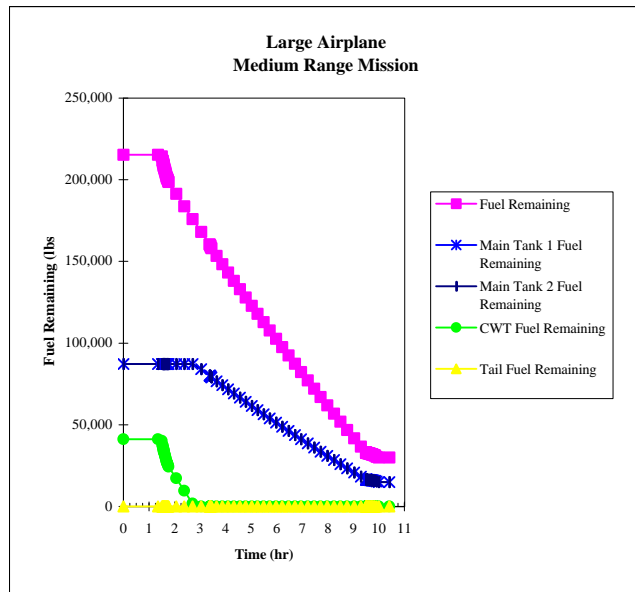
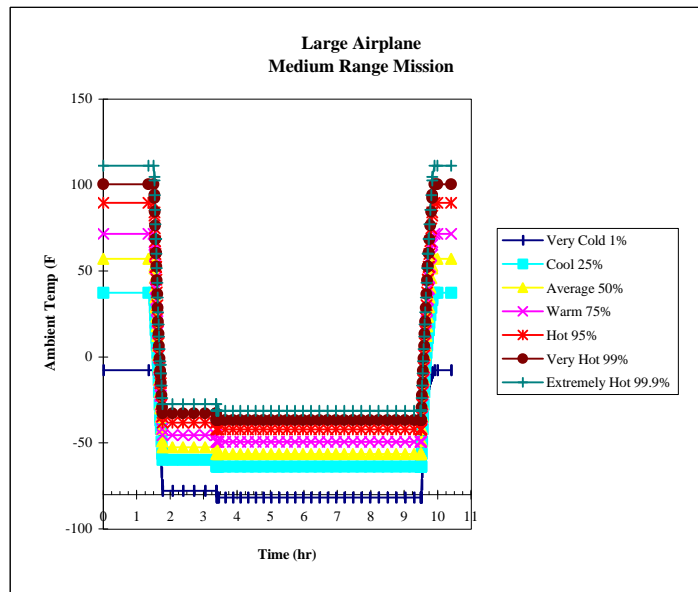
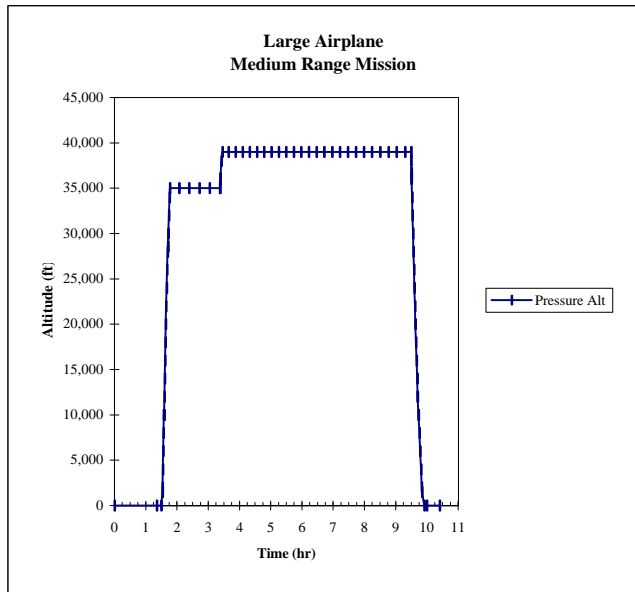


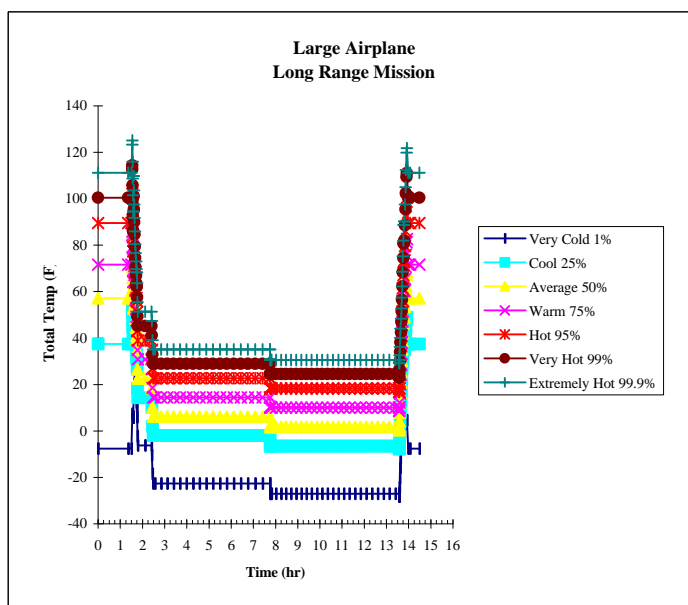
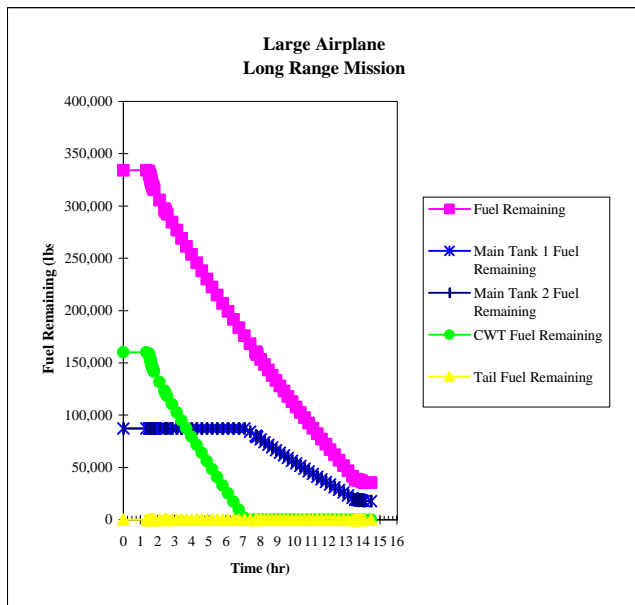
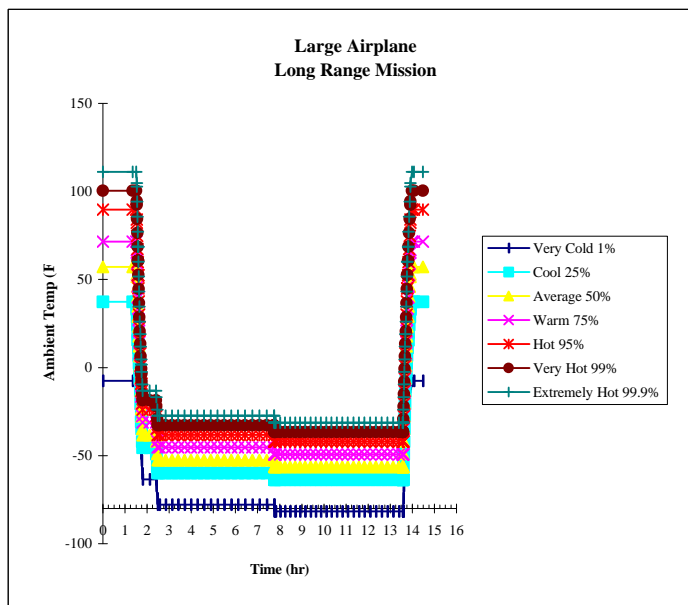
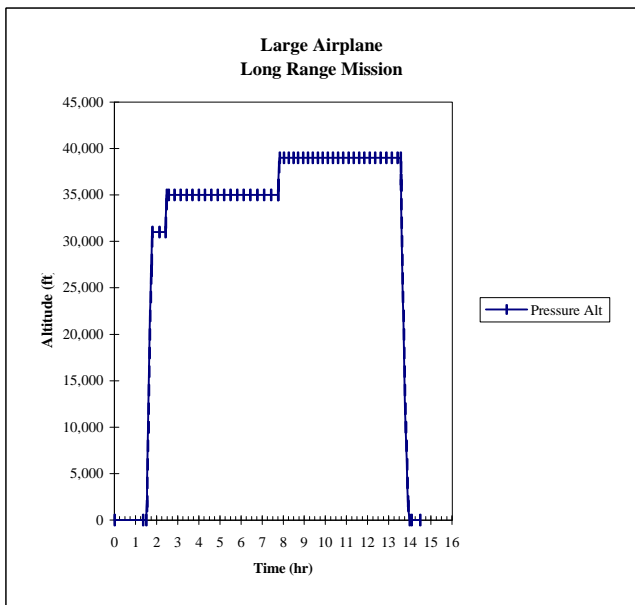


**Large Commercial Transport
Medium Range Mission**

Ground Time (takeoff) = 90.000 minutes	Main 1 Fuel Volume = 13,000 gal	Tank Volume 13,260	Threshold fuel in CWT to trigger
Ground Time (landing) = 30.000 minutes	Main 2 Fuel Volume = 13,000 gal	Tank Volume 13,260	tail fuel transfer = 10,000 gal
	CWT Fuel Volume = 25,000 gal	Tank Volume 25,500	
	Tail Tank Fuel Volume = 3,000 gal	Tank Volume 3,060	

Time		Pressure Alt	Dist	Mach Number	Weight	Ambient Temperatures (Degrees F)						Total Temperatures (Degrees F)					
minutes	hours	feet	N. Mi.	lbs	Very Cold 1%	Cool 25%	Average 50%	Warm 75%	Hot 95%	Very Hot 99%	Extremely Hot 99.9%	Very Cold 1%	Cool 25%	Average 50%	Warm 75%	Hot 95%	
0.0	0.0	0	0.0	0.000	675500	-8	37	57	72	90	100	111	-8	37	57	72	90
81.0	1.4	0	0.0	0.000	675500	-8	37	57	72	90	100	111	-8	37	57	72	90
90.0	1.5	0	0.0	0.000	674600	-8	37	57	72	90	100	111	-8	37	57	72	90
92.0	1.5	1500	5.4	0.388	671951	-9	34	53	67	84	94	105	5	49	68	83	100
92.1	1.5	2000	6.0	0.405	671785	-9	33	52	65	82	92	103	6	49	68	82	100
92.7	1.5	4000	8.3	0.420	671124	-11	29	46	59	75	84	94	5	46	64	77	94
93.2	1.6	6000	10.8	0.435	670466	-13	24	40	53	67	76	86	4	43	59	72	87
93.8	1.6	8000	13.5	0.451	669807	-14	20	35	46	60	69	77	4	39	55	67	81
94.3	1.6	10000	16.3	0.468	669146	-16	16	29	40	52	61	69	3	36	50	62	75
94.3	1.6	10000	16.3	0.468	669146	-16	16	29	40	52	61	69	3	36	50	62	75
95.0	1.6	10000	20.0	0.602	668409	-16	16	29	40	52	61	69	16	50	65	76	90
95.0	1.6	10000	20.0	0.602	668409	-16	16	29	40	52	61	69	16	50	65	76	90
95.6	1.6	12000	23.7	0.624	667754	-18	11	23	33	45	53	60	17	48	61	72	84
96.2	1.6	14000	27.8	0.647	667082	-19	7	18	27	38	45	52	18	46	58	68	79
96.8	1.6	16000	32.3	0.671	666390	-21	2	12	21	30	37	43	19	44	55	64	74
97.6	1.6	18000	37.4	0.696	665677	-23	-2	7	14	23	29	35	20	42	52	60	70
98.3	1.6	20000	43.0	0.723	664936	-24	-6	1	8	15	21	26	21	41	49	57	65
99.2	1.7	22000	49.3	0.750	664165	-31	-13	-6	1	8	14	19	17	37	45	53	61
100.1	1.7	24000	56.3	0.779	663360	-39	-21	-13	-6	1	6	12	13	33	41	49	57
101.1	1.7	26000	64.3	0.809	662507	-46	-28	-21	-13	-6	-1	5	8	29	37	45	53
102.2	1.7	28000	73.8	0.840	661583	-53	-35	-28	-20	-13	-8	-2	5	25	33	42	50
102.6	1.7	28599	76.9	0.850	661286	-55	-37	-30	-23	-15	-10	-5	4	24	32	41	49
102.6	1.7	28599	76.9	0.850	661286	-55	-37	-30	-23	-15	-10	-5	4	24	32	41	49
103.3	1.7	30000	82.4	0.880	660799	-60	-42	-35	-28	-20	-15	-10	-2	18	27	35	43
104.3	1.7	32000	91.1	0.850	660063	-67	-49	-42	-35	-27	-22	-17	-10	10	18	27	35
105.6	1.8	34000	101.6	0.850	659250	-74	-56	-49	-42	-35	-29	-24	-19	2	10	19	27
106.3	1.8	35000	107.7	0.850	658800	-78	-60	-53	-45	-38	-33	-27	-23	-2	6	14	23
123.8	2.1	35000	250.8	0.850	651689	-78	-60	-53	-45	-38	-33	-27	-23	-2	6	14	23
143.2	2.4	35000	408.5	0.850	643927	-78	-60	-53	-45	-38	-33	-27	-23	-2	6	14	23
162.7	2.7	35000	567.9	0.850	636164	-78	-60	-53	-45	-38	-33	-27	-23	-2	6	14	23
182.4	3.0	35000	728.9	0.850	628401	-78	-60	-53	-45	-38	-33	-27	-23	-2	6	14	23
202.3	3.4	35000	891.4	0.850	620639	-78	-60	-53	-45	-38	-33	-27	-23	-2	6	14	23
202.7	3.4	35000	894.8	0.850	620477	-78	-60	-53	-45	-38	-33	-27	-23	-2	6	14	23
203.4	3.4	36000	900.6	0.850	620069	-81	-63	-56	-49	-42	-36	-31	-27	-6	2	10	19
203.5	3.4	36089	901.2	0.850	620031	-82	-64	-56	-49	-42	-37	-31	-27	-6	2	10	18
203.5	3.4	36089	901.2	0.850	620031	-82	-64	-56	-49	-42	-37	-31	-27	-6	2	10	18
205.5	3.4	38000	917.5	0.850	618978	-82	-64	-56	-49	-42	-37	-31	-27	-6	2	10	18
206.9	3.4	39000	929.1	0.850	618279	-82	-64	-56	-49	-42	-37	-31	-27	-6	2	10	18
219.1	3.7	39000	1027.7	0.850	613629	-82	-64	-56	-49	-42	-37	-31	-27	-6	2	10	18
232.4	3.9	39000	1136.3	0.850	608550	-82	-64	-56	-49	-42	-37	-31	-27	-6	2	10	18
245.9	4.1	39000	1245.9	0.850	603471	-82	-64	-56	-49	-42	-37	-31	-27	-6	2	10	18
259.5	4.3	39000	1356.5	0.850	598392	-82	-64	-56	-49	-42	-37	-31	-27	-6	2	10	18
273.3	4.6	39000	1468.1	0.850	593313	-82	-64	-56	-49	-42	-37	-31	-27	-6	2	10	18
287.1	4.8	39000	1580.8	0.850	588234	-82	-64	-56	-49	-42	-37	-31	-27	-6	2	10	18
301.1	5.0	39000	1694.4	0.850	583155	-82	-64	-56	-49	-42	-37	-31	-27	-6	2	10	18
315.2	5.3	39000	1809.2	0.850	578077	-82	-64	-56	-49	-42	-37	-31	-27	-6	2	10	18
329.5	5.5	39000	1924.9	0.850	572998	-82	-64	-56	-49	-42	-37	-31	-27	-6	2	10	18
343.9	5.7	39000	2041.7	0.850	567919	-82	-64	-56	-49	-42	-37	-31	-27	-6	2	10	18
358.4	6.0	39000	2159.4	0.850	562840	-82	-64	-56	-49	-42	-37	-31	-27	-6	2	10	18
373.0	6.2	39000	2278.2	0.850	557761	-82	-64	-56	-49	-42	-37	-31	-27	-6	2	10	18
387.7	6.5	39000	2398.0	0.850	552682	-82	-64	-56	-49	-42	-37	-31	-27	-6	2	10	18
402.6	6.7	39000	2518.8	0.850	547603	-82	-64	-56	-49	-42	-37	-31	-27	-6	2	10	18
417.6	7.0	39000	2640.6	0.850	542525	-82	-64	-56	-49	-42	-37	-31	-27	-6	2	10	18
432.7	7.2	39000	2763.3	0.850	537446	-82	-64	-56	-49	-42	-37	-31	-27	-6	2	10	18
447.9	7.5	39000	2887.0	0.850	532367	-82	-64	-56	-49	-42	-37	-31	-27	-6	2	10	18
463.2	7.7	39000	3011.7	0.850	527288	-82	-64	-56	-49	-42	-37	-31	-27	-6	2	10	18
478.7	8.0	39000	3137.2	0.850	522209	-82	-64	-56	-49	-42	-37	-31	-27	-6	2	10	18
494.3	8.2	39000	3263.8	0.850	517130	-82	-64	-56	-49	-42	-37	-31	-27	-6	2	10	18
510.0	8.5	39000	3391.3	0.850	512051	-82	-64	-56	-49	-42	-37	-31	-27	-6	2	10	18
525.8	8.8	39000	3519.7	0.850	506972	-82	-64	-56	-49	-42	-37	-31	-27	-6	2	10	18
541.7	9.0	39000	3649.0	0.850	501893	-82	-64	-56	-49	-42	-37	-31	-27	-6	2	10	18
557.7	9.3	39000	3779.3	0.850	496815	-82	-64	-56	-49	-42	-37	-31	-27	-6	2	10	18
569.5	9.5	39000	3875.2	0.850	493096	-82	-64	-56	-49	-42	-37	-31	-27	-6	2	10	18
569.8	9.5	38000	3877.8	0.850	493080	-82	-64	-56	-49	-42	-37	-31	-27	-6	2	10	18
570.3	9.5	36672	3881.2	0.850	493059	-82	-64	-56	-49	-42	-37	-31	-27	-6	2	10	18
570.3	9.5	36672	3881.2	0.850	493059	-82	-64	-56	-49	-42	-37	-31	-27	-6	2	10	18
570.5	9.5	36089	3883.3	0.840	493046	-82	-64	-56	-49	-42	-37	-31	-28	-8	0	9	17
570.5	9.5	36089	3883.3	0.840	493046	-82	-64	-56	-49	-42	-37	-31	-28	-8	0	9	17
570.6	9.5	36000	3883.6	0.838	493044	-81	-63	-56	-49	-42	-36	-31	-28	-8	1	9	17
571.4	9.5	34000	3890.2	0.805	492999	-74	-56	-49	-42	-35	-29	-24	-4	12	20	28	37
572.3	9.5	32000	3896.9	0.773	492952	-67	-49	-42	-35	-27	-22	-17	-20	0	8	16	24
573.2	9.6	30000	3903.4	0.742	492902	-60	-42	-35	-28	-20	-15	-10	-16	4	12	20	28
574.1	9.6	28000	3910.0	0.713	492850	-53	-35	-28	-20	-13	-8	-2	-11	8	16	24	32
575.0	9.6	26000	3916.4	0.685	492793	-46	-28	-21	-13	-6	-1	5	-7	13	21	29	37
576.0	9.6	24000	3922.9	0.659	492731	-39	-21	-13	-6	1	6	12	-2	18	25	33	41
576.9	9.6	22000	3929.3	0.634	492665	-31	-13	-6	1	8	14	19	3	22	30	38	46
578.0	9.6	20000	3935.8	0.610	492593	-24	-6	1	8	15	21	26	8	27	35	43	51
579.0	9.6	18000	3942.1	0.587	492516	-23	-2	7	14	23	29	35	7	30	39	47	56
580.1	9.7	16000	3948.4	0.565	492434	-21	2	12	21	30	37	43	7	32	42	51	61
581.1	9.7	14000	3954.7	0.544	492346	-19	7	18	27	38	45	52	7	34	46	56	67
582.2	9.7	12000	3960.9	0.525	492251	-18	11	23									



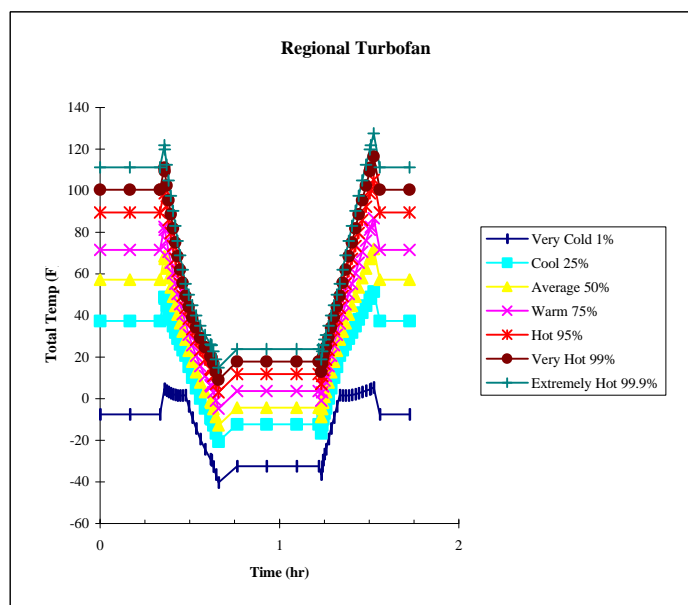
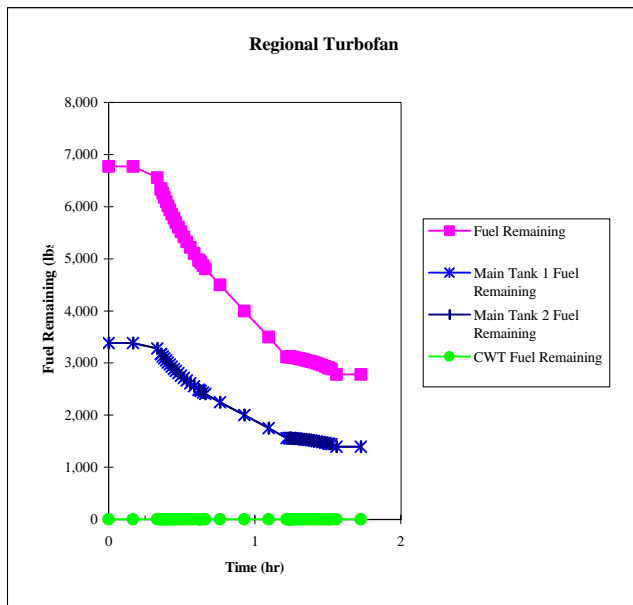
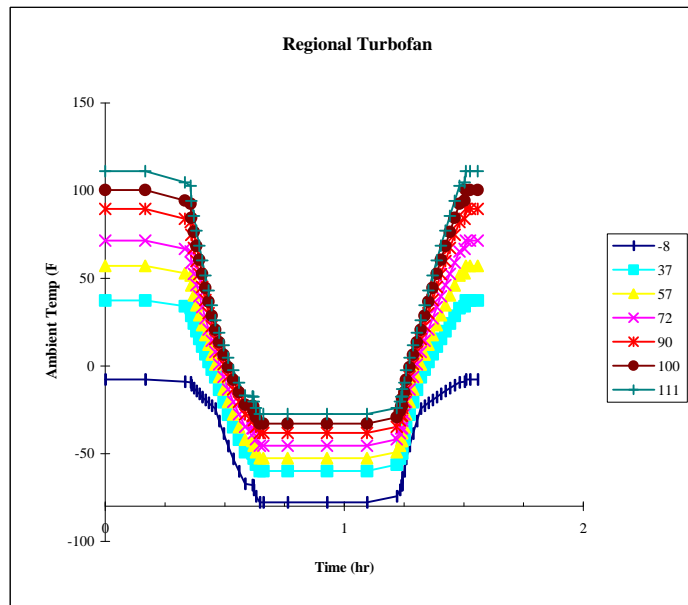
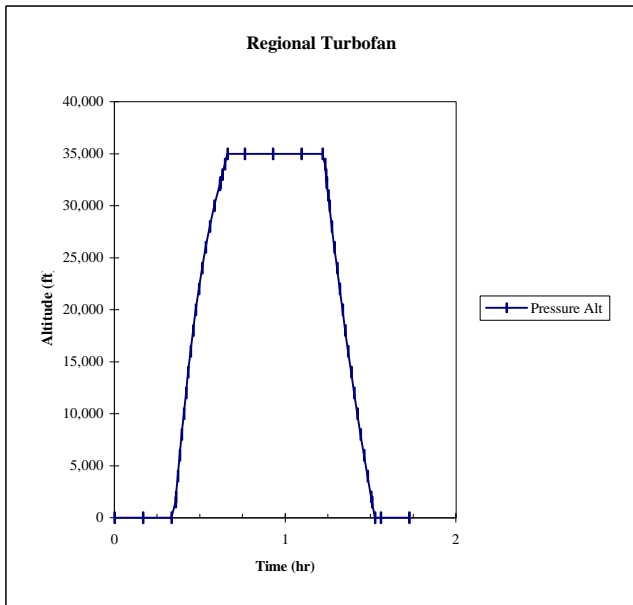


**Large Commercial Transport
Long Range Mission**

804.0	13.4	39000	5794.7	0.850	501893	-82	-64	-56	-49	-42	-37	-31	-27	-6	2	10	18	24	31	19076	318	41673	20837	20837	0	0	0	2.0	
813.8	13.6	39000	5874.8	0.850	498769	-82	-64	-56	-49	-42	-37	-31	-27	-6	2	10	18	24	31	18994	317	38549	19275	19275	0	0	0	2.0	
814.2	13.6	38000	5877.4	0.850	498754	-82	-64	-56	-49	-42	-37	-31	-27	-6	2	10	18	24	31	2980	50	38534	19267	19267	0	0	3149	-1.8	
814.6	13.6	36672	5880.7	0.850	498733	-82	-64	-56	-49	-42	-37	-31	-27	-6	2	10	18	24	31	3087	51	38513	19257	19257	0	0	3242	-2.2	
814.6	13.6	36672	5880.7	0.850	498733	-82	-64	-56	-49	-42	-37	-31	-27	-6	2	10	18	24	31	3087	51	38513	19257	19257	0	0	2267	-1.0	
814.8	13.6	36089	5882.8	0.840	498719	-82	-64	-56	-49	-42	-37	-31	-28	-8	0	9	17	23	29	3120	52	38499	19250	19250	0	0	2233	-1.0	
814.8	13.6	36089	5882.8	0.840	498719	-82	-64	-56	-49	-42	-37	-31	-28	-8	0	9	17	23	29	3120	52	38499	19250	19250	0	0	2391	-1.2	
814.9	13.6	36000	5883.1	0.838	498717	-81	-63	-56	-49	-42	-36	-31	-28	-8	1	9	17	23	29	3124	52	38497	19249	19249	0	0	2386	-1.1	
815.7	13.6	34000	5889.8	0.805	498672	-74	-56	-49	-42	-35	-29	-24	-24	-4	4	12	20	27	33	3213	54	38452	19226	19226	0	0	2311	-1.0	
816.6	13.6	32000	5896.5	0.773	498625	-67	-49	-42	-35	-27	-22	-17	-20	0	8	16	24	30	36	3304	55	38405	19203	19203	0	0	2262	-0.9	
817.5	13.6	30000	5903.1	0.742	498575	-60	-42	-35	-28	-20	-15	-10	-16	4	12	20	28	34	40	3407	57	38355	19178	19178	0	0	2217	-0.9	
818.4	13.6	28000	5909.7	0.713	498522	-53	-35	-28	-20	-13	-8	-2	-11	8	16	24	32	38	44	3571	60	38302	19151	19151	0	0	2159	-0.8	
819.3	13.7	26000	5916.2	0.685	498465	-46	-28	-21	-13	-6	-1	5	-7	13	21	29	37	42	48	3738	62	38245	19123	19123	0	0	2104	-0.8	
820.3	13.7	24000	5922.7	0.659	498403	-39	-21	-13	-6	1	6	12	-2	18	25	33	41	47	53	3926	65	38183	19092	19092	0	0	2046	-0.8	
821.3	13.7	22000	5929.1	0.634	498336	-31	-13	-6	1	8	14	19	3	22	30	38	46	52	57	4135	69	38116	19058	19058	0	0	1989	-0.8	
822.3	13.7	20000	5935.6	0.610	498264	-24	-6	1	8	15	21	26	8	27	35	43	51	56	62	4346	72	38044	19022	19022	0	0	1935	-0.9	
823.4	13.7	18000	5942.0	0.587	498187	-23	-2	7	14	23	29	35	7	30	39	47	56	62	69	4542	76	37967	18984	18984	0	0	1896	-0.9	
824.4	13.7	16000	5948.4	0.565	498105	-21	2	12	21	30	37	43	7	32	42	51	61	68	75	4749	79	37885	18943	18943	0	0	1862	-1.0	
825.5	13.8	14000	5954.6	0.544	498016	-19	7	18	27	38	45	52	7	34	46	56	67	74	82	5023	84	37796	18898	18898	0	0	1823	-1.0	
826.6	13.8	12000	5960.9	0.525	497920	-18	11	23	33	45	53	60	7	37	50	61	73	81	89	5359	89	37700	18850	18850	0	0	1776	-1.1	
826.6	13.8	12000	5960.9	0.525	497920	-18	11	23	33	45	53	60	7	37	50	61	73	81	89	5359	89	37700	18850	18850	0	0	1237	-0.2	
828.5	13.8	10000	5970.3	0.452	497750	-16	16	29	40	52	61	69	2	35	49	60	73	82	90	5704	95	37530	18765	18765	0	0	970	0.4	
828.5	13.8	10000	5970.3	0.452	497750	-16	16	29	40	52	61	69	2	35	49	60	73	82	90	5704	95	37530	18765	18765	0	0	1362	-0.3	
829.9	13.8	8000	5977.3	0.436	497607	-14	20	35	46	60	69	77	3	38	53	65	80	89	98	5810	97	37387	18694	18694	0	0	1328	-0.4	
831.5	13.9	6000	5984.4	0.420	497458	-13	24	40	53	67	76	86	3	41	58	71	86	95	105	5924	99	37238	18619	18619	0	0	1295	-0.5	
833.0	13.9	4000	5991.3	0.406	497302	-11	29	46	59	75	84	94	4	45	63	76	92	102	112	6008	100	37082	18541	18541	0	0	1262	-0.6	
834.6	13.9	2000	5998.3	0.391	497142	-9	33	52	65	82	92	103	5	48	67	81	99	109	120	6061	101	36922	18461	18461	0	0	1243	-0.7	
835.0	13.9	1500	6000.0	0.388	497101	-9	34	53	67	84	94	105	5	49	68	83	100	111	122	6074	101	36881	18441	18441	0	0	1241	-0.7	
839.0	14.0	0	6000.0	0.000	496301	-8	37	57	72	90	100	111	-8	37	57	72	90	100	111	12000	200	36081	18041	18041	0	0	0	0	
844.0	14.1	0	6000.0	0.000	495801	-8	37	57	72	90	100	111	-8	37	57	72	90	100	111	6000	100	35581	17791	17791	0	0	0	0	
869.0	14.5	0	6000.0	0.000	495801	-8	37	57	72	90	100	111	-8	37	57	72	90	100	111	0	0	35581	17791	17791	→0←	0	0	0	0

**Large Commercial Transport
Short Range Mission**

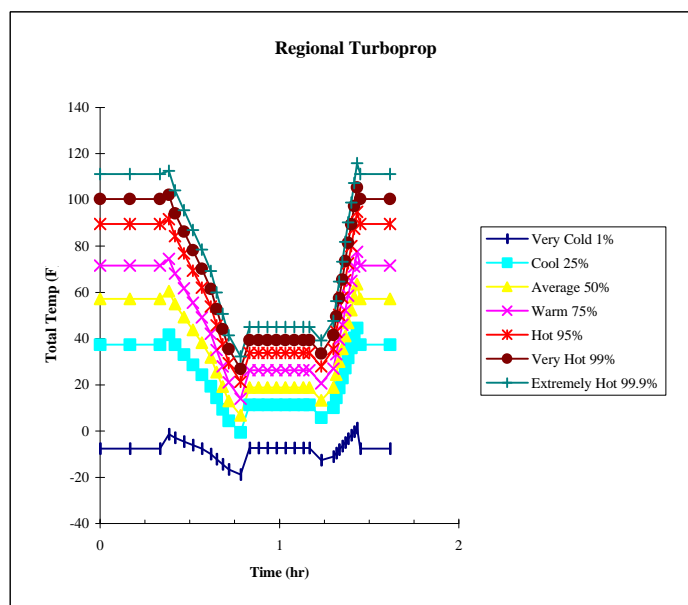
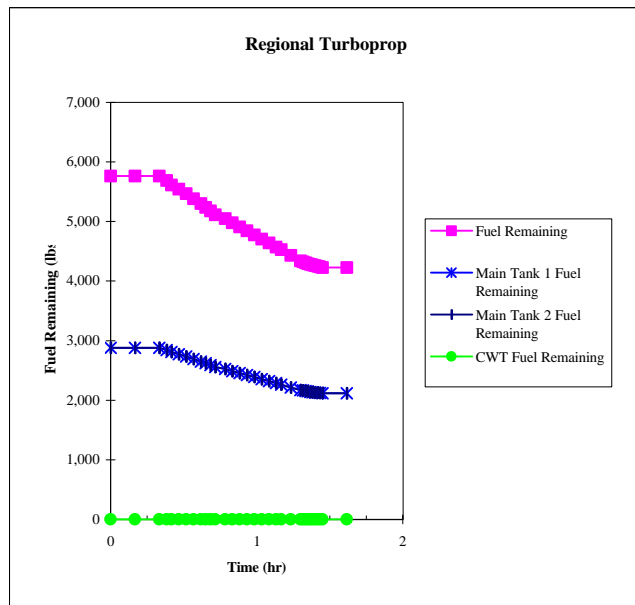
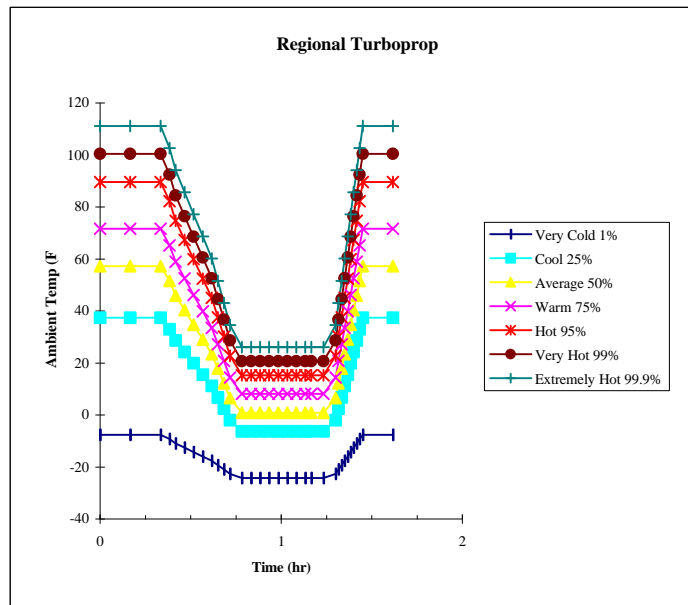
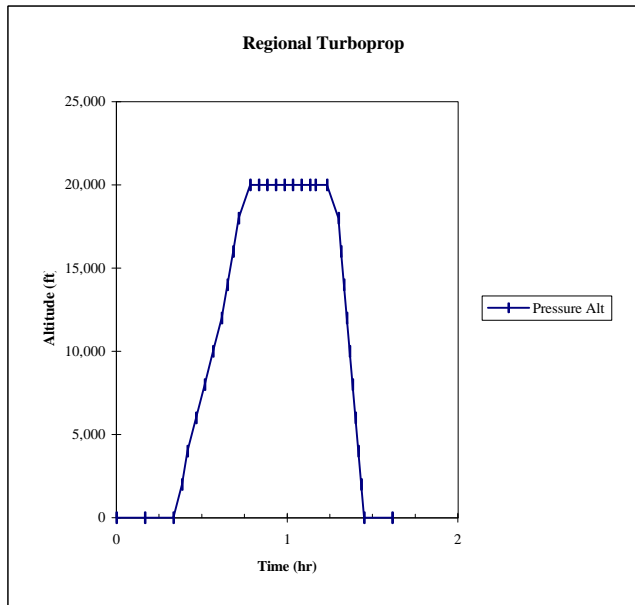
339.9	5.7	8000	1977.5	0.436	487152	-14	20	35	46	60	69	77	3	38	53	65	80	89	98	5810	97	26932	13466	13466	0	0	1336	-0.5
341.4	5.7	6000	1984.4	0.420	487003	-13	24	40	53	67	76	86	3	41	58	71	86	95	105	5924	99	26783	13392	13392	0	0	1303	-0.6
342.9	5.7	4000	1991.4	0.406	486849	-11	29	46	59	75	84	94	4	45	63	76	92	102	112	6008	100	26629	13315	13315	0	0	1269	-0.7
344.5	5.7	2000	1998.3	0.391	486689	-9	33	52	65	82	92	103	5	48	67	81	99	109	120	6061	101	26469	13235	13235	0	0	1250	-0.8
344.9	5.7	1500	2000.0	0.388	486648	-9	34	53	67	84	94	105	5	49	68	83	100	111	122	6074	101	26428	13214	13214	0	0	1249	-0.8
348.9	5.8	0	2000.0	0.000	485848	-8	37	57	72	90	100	111	-8	37	57	72	90	100	111	12000	200	25628	12814	12814	0	0	0	
353.9	5.9	0	2000.0	0.000	485348	-8	37	57	72	90	100	111	-8	37	57	72	90	100	111	6000	100	25128	12564	12564	0	0	0	
378.9	6.3	0	2000.0	0.000	485348	-8	37	57	72	90	100	111	-8	37	57	72	90	100	111	0	0	25128	12564	12564	0	0	0	



Regional Turboprop Mission

Ground Time (takeoff) = 20 minutes Main 1 Fuel Volume = 700 gal Tank Volume = 714
 Ground Time (landing) = 10 minutes Main 2 Fuel Volume = 700 gal Tank Volume = 714
 ^ CWT Fuel Volume = 0 gal Tank Volume = 0
 JRS Guess

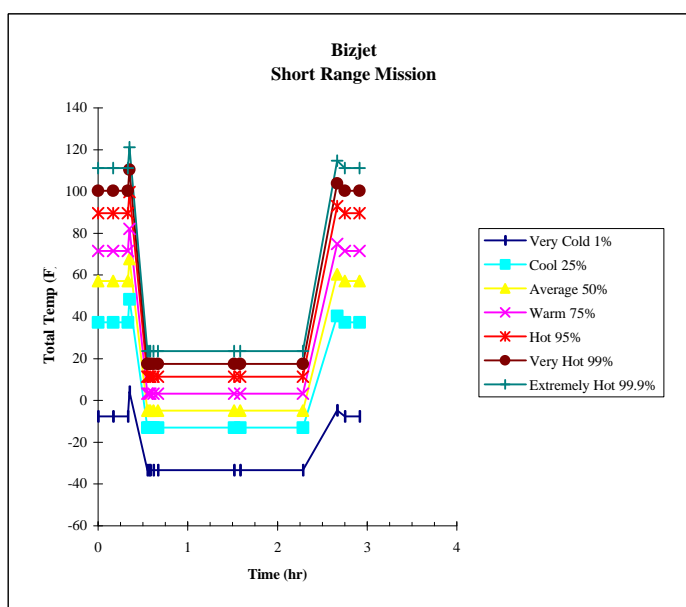
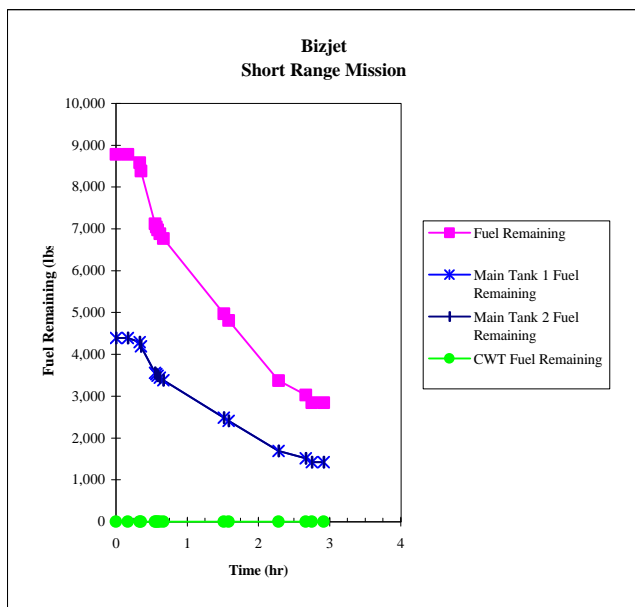
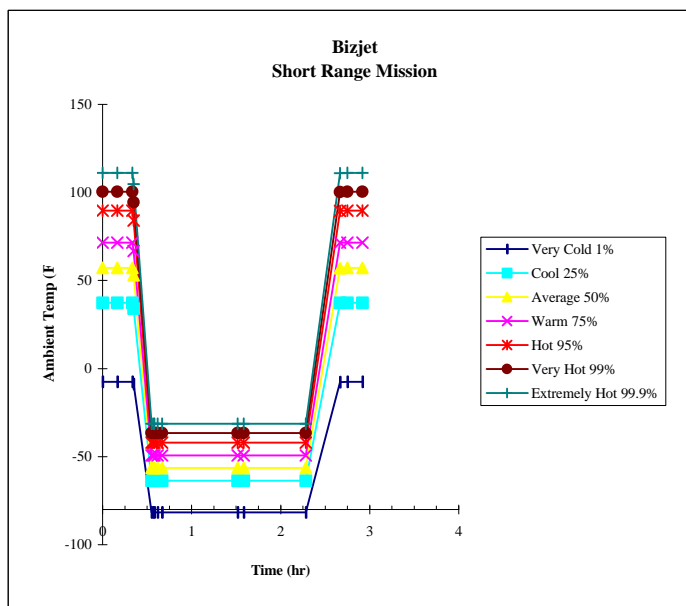
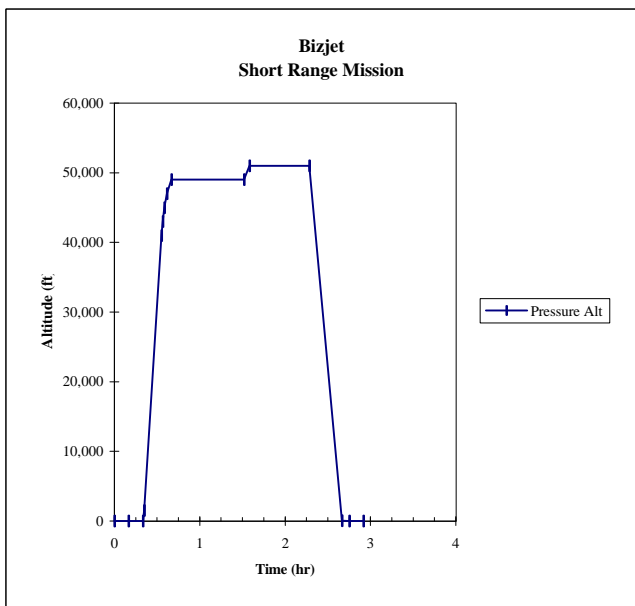
Time		Pressure Alt	Dist	Mach Number	Weight	Ambient Temperatures (Degrees F)										Total Temperatures (Degrees F)										Fuel Flow	Fuel Flow	Fuel Remainin g	Main Tank 1 Fuel Remainin g	Main Tank 2 Fuel Remainin g	CWT Fuel Remainin g	Rate of Climb / Descent
minutes	hours	feet	N. Mi.	lbs		Very Cold 1%	Cool 25%	Average 50%	Warm 75%	Hot 95%	Very Hot 99%	Extremely Hot 99.9%	Very Cold 1%	Cool 25%	Average 50%	Warm 75%	Hot 95%	Very Hot 99%	Extremely Hot 99.9%	lb/hr	lb/min	lbs	lbs	lbs	lbs	ft/min						
0.0	0.0	0	0.0	0.000	41100	-8	37	57	72	90	100	111	-8	37	57	72	90	100	111	0	0	5764	2882	2882	0	0						
10.0	0.2	0	0.0	0.000	41100	-8	37	57	72	90	100	111	-8	37	57	72	90	100	111	0	0	5764	2882	2882	0	0						
20.0	0.3	0	0.0	0.000	41100	-8	37	57	72	90	100	111	-8	37	57	72	90	100	111	0	0	5764	2882	2882	0	0						
23.0	0.4	2000	8.0	0.297	41023	-9	33	52	65	82	92	103	-1	42	61	75	92	102	113	1784	30	5687	2843	2843	0	667						
25.0	0.4	4000	16.0	0.299	40952	-11	29	46	59	75	84	94	-3	37	55	68	84	94	104	1744	29	5616	2808	2808	0	800						
28.0	0.5	6000	25.0	0.301	40880	-13	24	40	53	67	76	86	-5	33	49	62	77	86	96	1712	29	5544	2772	2772	0	750						
31.0	0.5	8000	36.0	0.303	40802	-14	20	35	46	60	69	77	-6	29	44	56	69	78	87	1682	28	5466	2733	2733	0	727						
34.0	0.6	10000	47.0	0.306	40721	-16	16	29	40	52	61	69	-8	24	38	49	62	70	79	1658	28	5385	2692	2692	0	714						
37.0	0.6	12000	58.0	0.295	40637	-18	11	23	33	45	53	60	-10	19	32	42	54	62	69	1640	27	5301	2651	2651	0	706						
39.0	0.7	14000	65.0	0.285	40575	-19	7	18	27	38	45	52	-12	14	26	35	46	53	60	1636	27	5239	2620	2620	0	737						
41.0	0.7	16000	75.0	0.274	40516	-21	2	12	21	30	37	43	-14	9	19	28	38	44	51	1540	26	5180	2590	2590	0	762						
43.0	0.7	18000	85.0	0.263	40450	-23	-2	7	14	23	29	35	-17	4	13	21	29	35	41	1446	24	5114	2557	2557	0	783						
47.0	0.8	20000	95.0	0.252	40383	-24	-6	1	8	15	21	26	-19	-1	7	14	21	27	32	1356	23	5047	2524	2524	0	741						
50.0	0.8	20000	108.6	0.441	40316	-24	-6	1	8	15	21	26	-7	11	19	26	34	39	45	1356	23	4980	2490	2490	0	0						
53.0	0.9	20000	122.1	0.441	40248	-24	-6	1	8	15	21	26	-7	11	19	26	34	39	45	1356	23	4912	2456	2456	0	0						
56.0	0.9	20000	135.7	0.441	40180	-24	-6	1	8	15	21	26	-7	11	19	26	34	39	45	1356	23	4844	2422	2422	0	0						
59.0	1.0	20000	149.2	0.441	40112	-24	-6	1	8	15	21	26	-7	11	19	26	34	39	45	1356	23	4776	2388	2388	0	0						
62.0	1.1	20000	162.8	0.441	40045	-24	-6	1	8	15	21	26	-7	11	19	26	34	39	45	1356	23	4709	2354	2354	0	0						
65.0	1.1	20000	176.3	0.441	39977	-24	-6	1	8	15	21	26	-7	11	19	26	34	39	45	1356	23	4641	2320	2320	0	0						
68.0	1.1	20000	189.9	0.441	39909	-24	-6	1	8	15	21	26	-7	11	19	26	34	39	45	1356	23	4573	2287	2287	0	0						
70.0	1.2	20000	198.9	0.441	39864	-24	-6	1	8	15	21	26	-7	11	19	26	34	39	45	1356	23	4528	2264	2264	0	0						
74.0	1.2	20000	215.9	0.366	39766	-24	-6	1	8	15	21	26	-13	6	13	21	28	34	39	1356	23	4430	2215	2215	0	1250						
78.0	1.3	18000	235.9	0.363	39676	-23	-2	7	14	23	29	35	-11	10	19	27	35	42	48	1350	23	4340	2170	2170	0	1500						
79.0	1.3	16000	241.9	0.361	39661	-21	2	12	21	30	37	43	-10	14	24	33	43	50	56	900	15	4325	2163	2163	0	2000						
80.0	1.3	14000	246.9	0.358	39646	-19	7	18	27	38	45	52	-8	19	30	40	50	58	65	900	15	4310	2155	2155	0	2000						
81.0	1.4	12000	251.9	0.355	39631	-18	11	23	33	45	53	60	-6	23	36	46	58	66	73	900	15	4295	2148	2148	0	2000						
82.0	1.4	10000	255.9	0.353	39616	-16	16	29	40	52	61	69	-5	27	41	52	65	73	82	900	15	4280	2140	2140	0	2000						
83.0	1.4	8000	260.9	0.350	39606	-14	20	35	46	60	69	77	-3	32	47	59	73	81	90	600	10	4270	2135	2135	0	2000						
84.0	1.4	6000	264.9	0.347	39596	-13	24	40	53	67	76	86	-2	36	52	65	80	89	99	600	10	4260	2130	2130	0	2000						
85.0	1.4	4000	268.9	0.345	39586	-11	29	46	59	75	84	94	0	40	58	71	87	97	107	600	10	4250	2125	2125	0	2000						
86.0	1.4	2000	273.9	0.343	39576	-9	33	52	65	82	92	103	1	45	64	78	95	105	116	600	10	4240	2120	2120	0	2000						
87.0	1.5	0	278.9	0.000	39566	-8	37	57	72	90	100	111	-8	37	57	72	90	100	111	0	0	4230	2115	2115	0	0						
97.0	1.6	0	278.9	0.000	39566	-8	37	57	72	90	100	111	-8	37	57	72	90	100	111	0	0	4230	2115	2115	0	0						



Bizjet
Short Range Mission

Ground Time (takeoff) = 20 minutes Main 1 Fuel Volume = 3075 gal Tank Volume = 3136.5
 Ground Time (landing) = 10 minutes Main 2 Fuel Volume = 3075 gal Tank Volume = 3136.5
 ^ CWT Fuel Volume = 0 gal Tank Volume = 0
JRS Guess

Time	Time	Pressure Alt	Dist	Mach Number	Weight	Ambient Temperatures (Degrees F)						Total Temperatures (Degrees F)						Fuel Flow	Fuel Flow	Fuel Remaining	Main Tank 1 Fuel Remaining	Main Tank 2 Fuel Remaining	CWT Fuel Remaining	Rate of Climb / Descent		
						Very Cold 1%	Cool 25%	Average 50%	Warm 75%	Hot 95%	Very Hot 99%	Extremely Hot 99.9%	Very Cold 1%	Cool 25%	Average 50%	Warm 75%	Hot 95%								Very Hot 99%	Extremely Hot 99.9%
0.0	0.0	0	0.0	0.000	58385	-8	37	57	72	90	100	111	-7.60	37.40	57.20	71.60	89.60	100.40	111.20	0	0	8785	4393	4393	0	0
10.0	0.2	0	0.0	0.000	58385	-8	37	57	72	90	100	111	-7.60	37.40	57.20	71.60	89.60	100.40	111.20	1200	20	8785	4393	4393	0	0
20.0	0.3	0	0.0	0.000	58185	-8	37	57	72	90	100	111	-7.60	37.40	57.20	71.60	89.60	100.40	111.20	12000	200	8585	4293	4293	0	0
21.0	0.4	1500	0.0	0.380	57985	-9	34	53	67	84	94	105	4.17	48.38	67.78	82.04	99.73	110.42	121.12	12000	200	8385	4193	4193	0	3000
33.0	0.6	41000	72.0	0.800	56720	-82	-64	-56	-49	-42	-37	-31	-33.30	-12.99	-4.87	3.25	11.37	17.46	23.55	6325	105	7120	3560	3560	0	3000
34.0	0.6	43000	80.0	0.800	56650	-82	-64	-56	-49	-42	-37	-31	-33.30	-12.99	-4.87	3.25	11.37	17.46	23.55	4200	70	7050	3525	3525	0	2000
35.0	0.6	45000	90.0	0.800	56574	-82	-64	-56	-49	-42	-37	-31	-33.30	-12.99	-4.87	3.25	11.37	17.46	23.55	4560	76	6974	3487	3487	0	1300
37.0	0.6	47000	103.0	0.800	56486	-82	-64	-56	-49	-42	-37	-31	-33.30	-12.99	-4.87	3.25	11.37	17.46	23.55	2640	44	6886	3443	3443	0	800
40.0	0.7	49000	122.0	0.800	56371	-82	-64	-56	-49	-42	-37	-31	-33.30	-12.99	-4.87	3.25	11.37	17.46	23.55	2300	38	6771	3386	3386	0	700
91.0	1.5	49000	513.0	0.800	54571	-82	-64	-56	-49	-42	-37	-31	-33.30	-12.99	-4.87	3.25	11.37	17.46	23.55	2118	35	4971	2486	2486	0	0
95.0	1.6	51000	542.0	0.800	54413	-82	-64	-56	-49	-42	-37	-31	-33.30	-12.99	-4.87	3.25	11.37	17.46	23.55	2370	40	4813	2407	2407	0	500
137.0	2.3	51000	864.0	0.800	52976	-82	-64	-56	-49	-42	-37	-31	-33.30	-12.99	-4.87	3.25	11.37	17.46	23.55	2053	34	3376	1688	1688	0	0
160.0	2.7	50	1002.0	0.180	52633	-8	37	57	71	89	100	111	-4.71	40.51	60.41	74.88	92.97	103.83	114.69	895	15	3033	1517	1517	0	-2000
165.0	2.8	0	1002.0	0.000	52449	-8	37	57	72	90	100	111	-7.60	37.40	57.20	71.60	89.60	100.40	111.20	2208	37	2849	1425	1425	0	0
175.0	2.9	0	1002.0	0.000	52449	-8	37	57	72	90	100	111	-7.60	37.40	57.20	71.60	89.60	100.40	111.20	0	0	2849	1425	1425	0	0

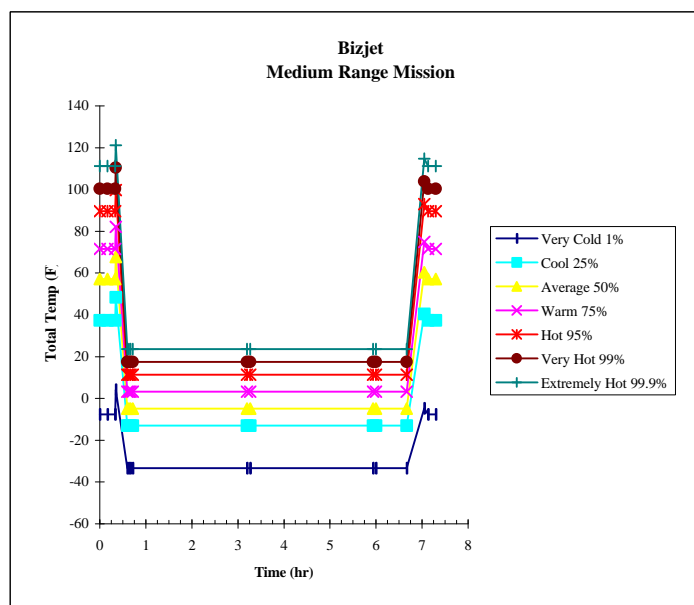
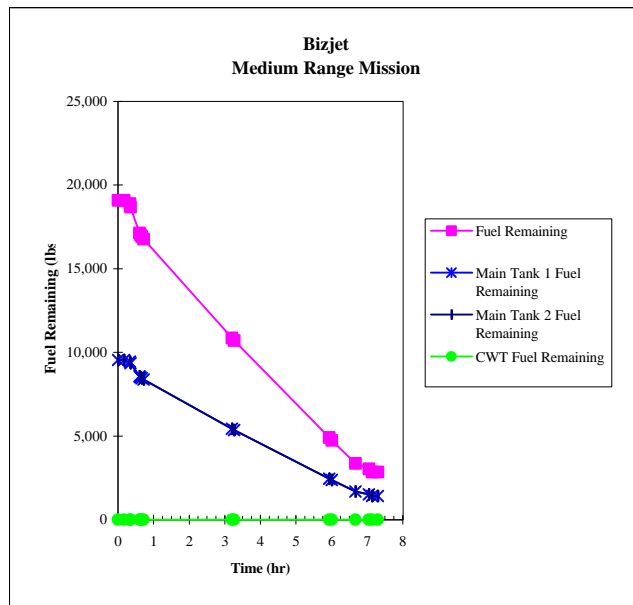
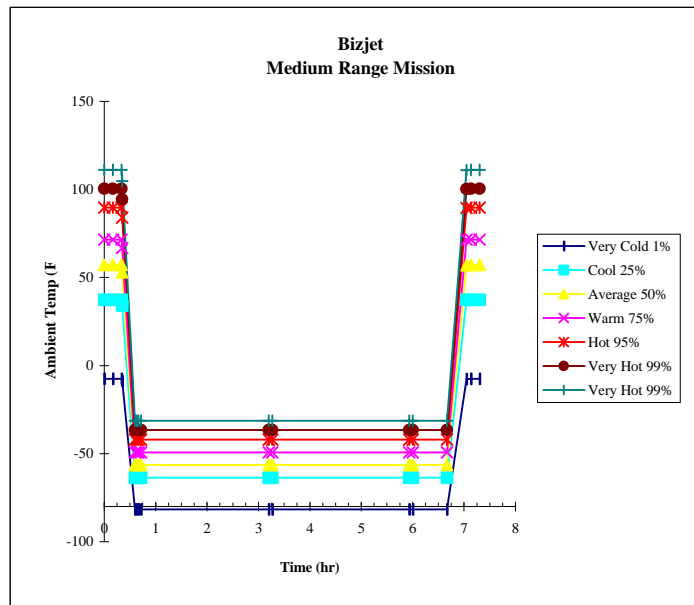
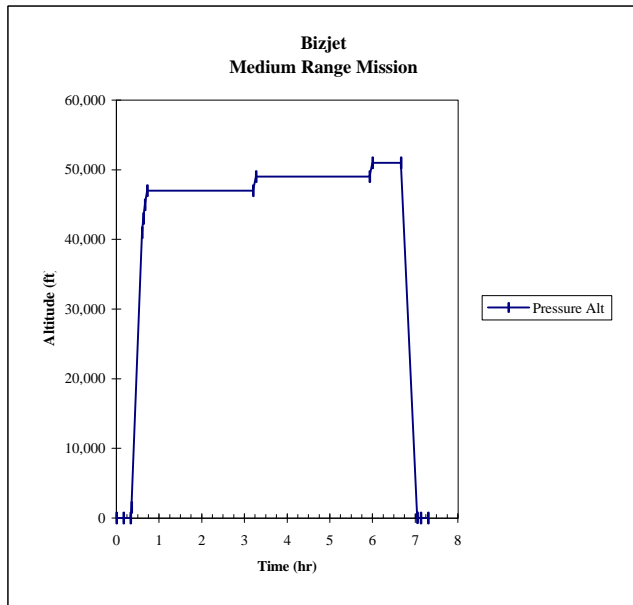


Bizjet
Medium Range Mission

Ground Time (takeoff) = 20 minutes Main 1 Fuel Volume = 3075 gal Tank Volume = 3136.5
 Ground Time (landing) = 10 minutes Main 2 Fuel Volume = 3075 gal Tank Volume = 3136.5
 ^ CWT Fuel Volume = N/A gal Tank Volume = #VALUE!

JRS Guess

Time		Pressure Alt	Dist	Mach Number	Weight	Ambient Temperatures (Degrees F)										Total Temperatures (Degrees F)						Fuel Flow	Fuel Flow	Fuel Remainin g	Main Tank 1 Fuel Remainin g	Main Tank 2 Fuel Remainin g	CWT Fuel Remainin g	Rate of Climb / Descent
minutes	hours	feet	N. Mi.	lbs		Very Cold 1%	Cool 25%	Average 50%	Warm 75%	Hot 95%	Very Hot 99%	Very Hot 99%	Very Cold 1%	Cool 25%	Average 50%	Warm 75%	Hot 95%	Very Hot 99%	Extremely Hot 99.9%	lb/hr	lb/min	lbs	lbs	lbs	lbs	lbs	ft/min	
0.0	0.0	0	0.0	0.000	68689	-8	37	57	72	90	100	111	-7.60	37.40	57.20	71.60	89.60	100.40	111.20	0	0	19089	9545	9545	0			
10.0	0.2	0	0.0	0.000	68689	-8	37	57	72	90	100	111	-7.60	37.40	57.20	71.60	89.60	100.40	111.20	1200	20	19089	9545	9545	0			
20.0	0.3	0	0.0	0.000	68489	-8	37	57	72	90	100	111	-7.60	37.40	57.20	71.60	89.60	100.40	111.20	12000	200	18889	9445	9445	0			
21.0	0.4	1500	0.0	0.380	68289	-9	34	53	67	84	94	105	4.17	48.38	67.78	82.04	99.73	110.42	121.12	6224	104	18689	9345	9345	0	2600		
36.0	0.6	41000	90.0	0.800	66733	-82	-64	-56	-49	-42	-37	-31	-33.30	-12.99	-4.87	3.25	11.37	17.46	23.55	2910	49	17133	8567	8567	0	2600		
38.0	0.6	43000	101.0	0.800	66636	-82	-64	-56	-49	-42	-37	-31	-33.30	-12.99	-4.87	3.25	11.37	17.46	23.55	3390	57	17036	8518	8518	0	1000		
40.0	0.7	45000	115.0	0.800	66523	-82	-64	-56	-49	-42	-37	-31	-33.30	-12.99	-4.87	3.25	11.37	17.46	23.55	3120	52	16923	8462	8462	0	800		
43.0	0.7	47000	137.0	0.800	66367	-82	-64	-56	-49	-42	-37	-31	-33.30	-12.99	-4.87	3.25	11.37	17.46	23.55	2376	40	16767	8384	8384	0	700		
192.0	3.2	47000	1276.0	0.800	60467	-82	-64	-56	-49	-42	-37	-31	-33.30	-12.99	-4.87	3.25	11.37	17.46	23.55	2385	40	10867	5434	5434	0	0		
196.0	3.3	49000	1302.0	0.800	60308	-82	-64	-56	-49	-42	-37	-31	-33.30	-12.99	-4.87	3.25	11.37	17.46	23.55	2175	36	10708	5354	5354	0	500		
356.0	5.9	49000	2527.0	0.800	54508	-82	-64	-56	-49	-42	-37	-31	-33.30	-12.99	-4.87	3.25	11.37	17.46	23.55	2355	39	4908	2454	2454	0	0		
360.0	6.0	51000	2556.0	0.800	54351	-82	-64	-56	-49	-42	-37	-31	-33.30	-12.99	-4.87	3.25	11.37	17.46	23.55	2063	34	4751	2376	2376	0	500		
400.0	6.7	51000	2864.0	0.800	52976	-82	-64	-56	-49	-42	-37	-31	-33.30	-12.99	-4.87	3.25	11.37	17.46	23.55	895	15	3376	1688	1688	0	0		
423.0	7.1	50	3002.0	0.180	52633	-8	37	57	71	89	100	111	-4.71	40.51	60.41	74.88	92.97	103.83	114.69	2208	37	3033	1517	1517	0	-2000		
428.0	7.1	0	3002.0	0.000	52449	-8	37	57	72	90	100	111	-7.60	37.40	57.20	71.60	89.60	100.40	111.20	0	0	2849	1425	1425	0	0		
438.0	7.3	0	3002.0	0.000	52449	-8	37	57	72	90	100	111	-7.60	37.40	57.20	71.60	89.60	100.40	111.20	0	0	2849	1425	1425	0	0		

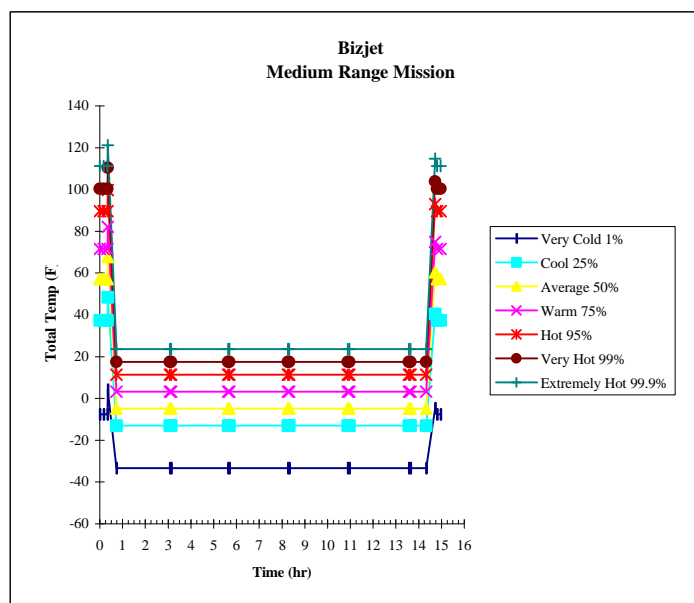
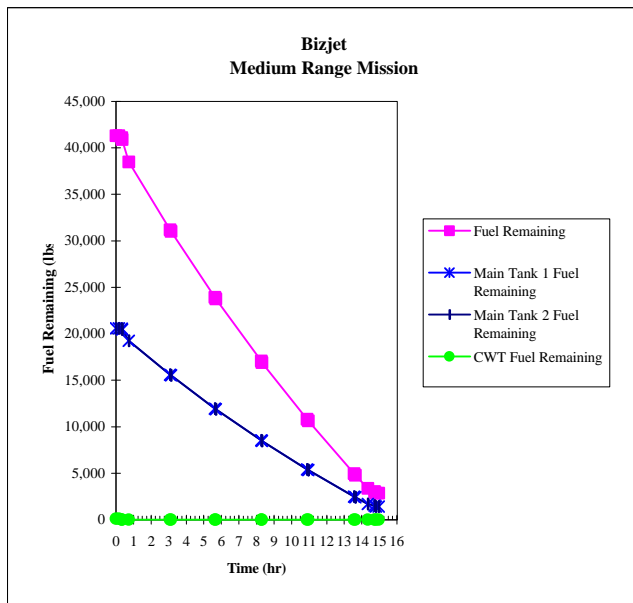
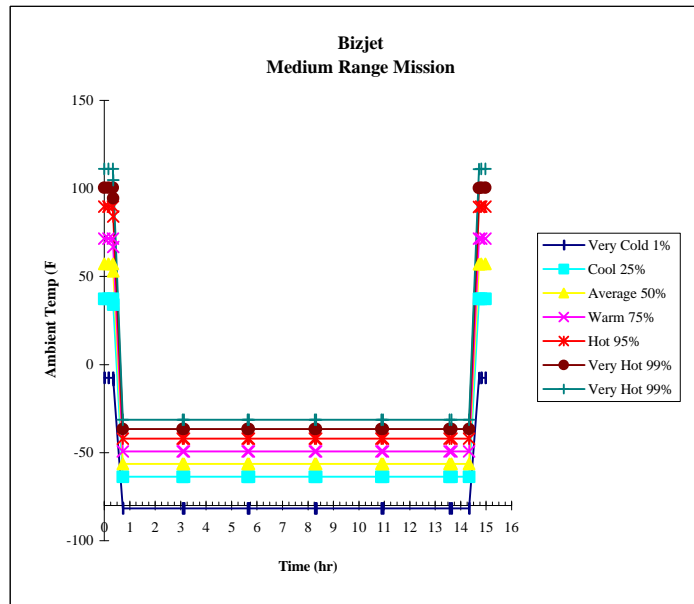
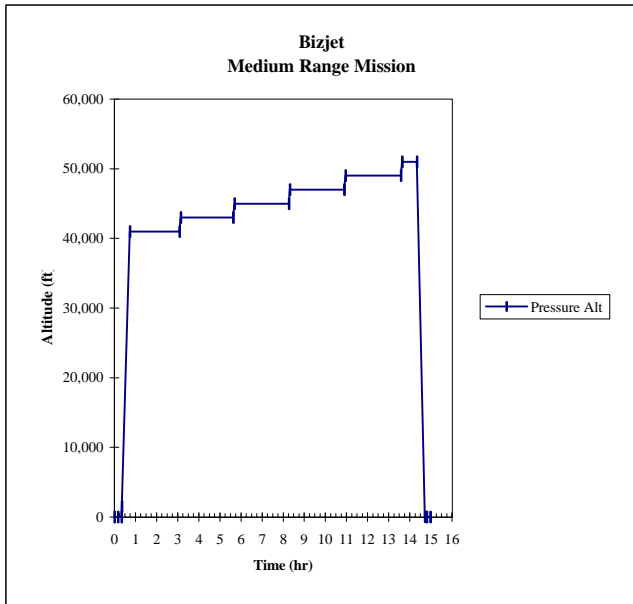


Bizjet
Long Range Mission

Ground Time (takeoff) = 20 minutes Main 1 Fuel Volume = 3075 gal Tank Volume = 3136.5
 Ground Time (landing) = 10 minutes Main 2 Fuel Volume = 3075 gal Tank Volume = 3136.5
 ^ CWT Fuel Volume = N/A gal Tank Volume = #VALUE!

JRS Guess

Time		Pressure	Dist	Mach	Weight	Ambient Temperatures (Degrees F)										Total Temperatures (Degrees F)						Fuel	Fuel	Fuel	Main	Main	CWT	Rate of				
minutes	hours	Alt	N. Mi.	Number	lbs	Very Cold	Cool 25%	Average	Warm 75%	Hot 95%	Very Hot	Very Hot	Very Cold	Cool 25%	Average	Warm 75%	Hot 95%	Very Hot	Extremely	Hot 99.9%	lb/hr	lb/min	Remainin	Tank 1	Tank 2	Remainin	Remainin	Remainin	g	g	g	ft/min
0.0	0.0	0	0	0.000	90900	-8	37	57	72	90	100	111	-7.60	37.40	57.20	71.60	89.60	100.40	111.20	111.20	0	0	41300	20603	20603	95	0	0	0	0	0	
10.0	0.2	0	0	0.000	90900	-8	37	57	72	90	100	111	-7.60	37.40	57.20	71.60	89.60	100.40	111.20	111.20	1200	20	41300	20603	20603	95	0	0	0	0	0	
20.0	0.3	0	0	0.000	90700	-8	37	57	72	90	100	111	-7.60	37.40	57.20	71.60	89.60	100.40	111.20	111.20	12000	200	41100	20550	20550	0	0	0	0	0	0	
21.0	0.4	1500	0	0.380	90500	-9	34	53	67	84	94	105	-4.17	48.38	67.78	82.04	99.73	110.42	121.12	110.42	6237	104	40900	20450	20450	0	1550	0	0	0	0	
44.0	0.7	41000	145	0.800	88109	-82	-64	-56	-49	-42	-37	-31	-33.30	-12.99	-4.87	3.25	11.37	17.46	23.55	23.55	3106	52	38509	19255	19255	0	1550	0	0	0	0	
185.0	3.1	41000	1226	0.800	80809	-82	-64	-56	-49	-42	-37	-31	-33.30	-12.99	-4.87	3.25	11.37	17.46	23.55	23.55	3620	60	31209	15605	15605	0	0	0	0	0	0	
188.0	3.1	43000	1247	0.800	80628	-82	-64	-56	-49	-42	-37	-31	-33.30	-12.99	-4.87	3.25	11.37	17.46	23.55	23.55	2840	47	31028	15514	15514	0	1500	0	0	0	0	
338.0	5.6	43000	2392	0.800	73528	-82	-64	-56	-49	-42	-37	-31	-33.30	-12.99	-4.87	3.25	11.37	17.46	23.55	23.55	3280	55	23928	11964	11964	0	0	0	0	0	0	
341.0	5.7	45000	2413	0.800	73364	-82	-64	-56	-49	-42	-37	-31	-33.30	-12.99	-4.87	3.25	11.37	17.46	23.55	23.55	2594	43	23764	11882	11882	0	1500	0	0	0	0	
496.0	8.3	45000	3595	0.800	66664	-82	-64	-56	-49	-42	-37	-31	-33.30	-12.99	-4.87	3.25	11.37	17.46	23.55	23.55	3160	53	17064	8532	8532	0	0	0	0	0	0	
499.0	8.3	47000	3618	0.800	66506	-82	-64	-56	-49	-42	-37	-31	-33.30	-12.99	-4.87	3.25	11.37	17.46	23.55	23.55	2377	40	16906	8453	8453	0	1500	0	0	0	0	
653.0	10.9	47000	4795	0.800	60406	-82	-64	-56	-49	-42	-37	-31	-33.30	-12.99	-4.87	3.25	11.37	17.46	23.55	23.55	2370	40	10806	5403	5403	0	0	0	0	0	0	
657.0	11.0	49000	4820	0.800	60248	-82	-64	-56	-49	-42	-37	-31	-33.30	-12.99	-4.87	3.25	11.37	17.46	23.55	23.55	2178	36	10648	5324	5324	0	1000	0	0	0	0	
814.0	13.6	49000	6024	0.800	54548	-82	-64	-56	-49	-42	-37	-31	-33.30	-12.99	-4.87	3.25	11.37	17.46	23.55	23.55	2370	40	4948	2474	2474	0	0	0	0	0	0	
818.0	13.6	51000	6053	0.800	54390	-82	-64	-56	-49	-42	-37	-31	-33.30	-12.99	-4.87	3.25	11.37	17.46	23.55	23.55	2020	34	4790	2395	2395	0	1000	0	0	0	0	
860.0	14.3	51000	6370	0.800	52976	-82	-64	-56	-49	-42	-37	-31	-33.30	-12.99	-4.87	3.25	11.37	17.46	23.55	23.55	895	15	3376	1688	1688	0	0	0	0	0	0	
883.0	14.7	50	6508	0.180	52633	-8	37	57	71	89	100	111	-4.71	40.51	60.41	74.88	92.97	103.83	114.69	114.69	2208	37	3033	1517	1517	0	-2000	0	0	0	0	
888.0	14.8	0	6508	0.000	52449	-8	37	57	72	90	100	111	-7.60	37.40	57.20	71.60	89.60	100.40	111.20	111.20	0	0	2849	1425	1425	0	0	0	0	0	0	
898.0	15.0	0	6508	0.000	52449	-8	37	57	72	90	100	111	-7.60	37.40	57.20	71.60	89.60	100.40	111.20	111.20	0	0	2849	1425	1425	0	0	0	0	0	0	



climb

SMALL AIRPLANE

HPR FT	HGEO FT	TIME HR	DIST NM	WEIGHT LB	ROC FPM	MACH	T FF LB/HR
1500	1500	0	0	110211	4525	0.388	16119
2000	2000	0.0019	0.5	110181	4482	0.3914	15950
4000	4000	0.0094	2.4	110063	4309	0.4056	15290
6000	6000	0.0173	4.5	109945	4135	0.4204	14649
8000	8000	0.0256	6.8	109826	3950	0.436	14004
10000	10000	0.0342	9.2	109708	3753	0.4523	13350
10000	10000	0.0342	9.2	109708	500	0.4523	13350
10126	10126	0.0384	10.5	109651	500	0.5068	13555
10126	10126	0.0384	10.5	109651	3783	0.5068	13553
12000	12000	0.0469	13.3	109539	3577	0.5245	12980
14000	14000	0.0566	16.5	109417	3355	0.5443	12377
16000	16000	0.0669	20.1	109293	3125	0.5651	11750
18000	18000	0.078	24	109166	2889	0.5869	11125
20000	20000	0.09	28.5	109036	2658	0.6098	10562
22000	22000	0.1031	33.4	108900	2438	0.6338	10082
24000	24000	0.1175	39.1	108759	2217	0.6589	9600
26000	26000	0.1334	45.5	108611	1986	0.6853	9125
28000	28000	0.1513	53	108451	1752	0.7131	8679
29855	29855	0.1702	61.1	108291	1531	0.74	8289
29855	29855	0.1702	61.1	108291	2091	0.74	8289
30000	30000	0.1714	61.6	108282	2072	0.74	8248
32000	32000	0.1886	69.1	108144	1806	0.74	7682
34000	34000	0.2088	77.8	107995	1521	0.74	7134
35000	35000	0.2204	82.7	107914	1373	0.74	6868

HPR FT	HGEO FT	TIME HR	DIST NM	WEIGHT LB	ROC FPM	MACH	T FF LB/HR
1500	1500	0	0	116192	4236	0.388	16119
2000	2000	0.002	0.5	116160	4195	0.3914	15950
4000	4000	0.0101	2.6	116033	4029	0.4056	15290
6000	6000	0.0185	4.8	115907	3863	0.4204	14649
8000	8000	0.0274	7.3	115780	3686	0.436	14004
10000	10000	0.0367	9.9	115653	3498	0.4523	13350
10000	10000	0.0367	9.9	115653	500	0.4523	13350
10137	10137	0.0412	11.3	115592	500	0.5069	13551
10137	10137	0.0412	11.3	115592	3536	0.5069	13550
12000	12000	0.0503	14.2	115472	3341	0.5245	12980
14000	14000	0.0606	17.7	115342	3129	0.5443	12377
16000	16000	0.0716	21.5	115208	2910	0.5651	11750
18000	18000	0.0836	25.8	115072	2685	0.5869	11125
20000	20000	0.0965	30.6	114932	2463	0.6098	10562
22000	22000	0.1107	35.9	114786	2253	0.6338	10082

SMALL AIRPLANE

ENROUT CRUISE ANALYSIS 35000 0 (FEET)
 WIND (KNOTS) = 0 DTEMP (EG C.) = 0

WEIGHT LB	DISTAN NMI	(TIME HR	FUEL LB	NMI/LB	VELOCIT KTS	FUEL FL LB/HR	MACH
107914	0	0	0	0.09151	429.432	4692.7	0.745
107029	81.3	0.1893	886	0.09205	429.432	4665.4	0.745
105970	179	0.4169	1944	0.09268	429.432	4633.4	0.745
104912	277.5	0.6462	3003	0.09332	429.406	4601.6	0.74496
104523	313.9	0.7309	3392	0.09355	429.395	4590.1	0.74494

ENROUT CRUISE ANALYSIS 35000 0 (FEET)
 WIND (KNOTS) = 0 DTEMP (EG C.) = 0

WEIGHT LB	DISTAN NMI	(TIME HR	FUEL LB	NMI/LB	VELOCIT KTS	FUEL FL LB/HR	MACH
113693	0	0	0	0.08792	429.432	4884.4	0.745
113379	27.6	0.0642	313	0.08812	429.432	4873.3	0.745
112321	121.2	0.2822	1372	0.08879	429.432	4836.6	0.745
111263	215.5	0.5019	2430	0.08945	429.432	4800.7	0.745
110204	310.6	0.7232	3489	0.09011	429.432	4765.7	0.745
109146	406.3	0.9461	4547	0.09076	429.432	4731.5	0.745
108087	502.7	1.1706	5606	0.09141	429.432	4698.1	0.745
107029	599.8	1.3967	6664	0.09205	429.432	4665.4	0.745
105970	697.5	1.6243	7722	0.09268	429.432	4633.4	0.745
104912	796	1.8535	8781	0.09332	429.406	4601.6	0.74496
104808	805.7	1.8761	8885	0.09338	429.403	4598.5	0.74495

ENROUT CRUISE ANALYSIS 31000 0 (FEET)
 WIND (KNOTS) = 0 DTEMP (EG C.) = 0

WEIGHT LB	DISTAN NMI	(TIME HR	FUEL LB	NMI/LB	VELOCIT KTS	FUEL FL LB/HR	MACH
126532	0	0	0	0.07859	437.114	5562.2	0.74496
125495	81.7	0.187	1037	0.07903	437.088	5530.8	0.74491

SMALL AIRPLANE

ENROUTE DESCENT ANALYSIS

WIN D (KNOTS) = 0 DTEMP (DEG)

HPR FT	HGEO FT	TIME HR	DIST NM	WEIGHT LB	FUEL LB	ROD FPM	MACH	T FF LB/HR
35000	35000	0.3078	99.9	104523	400	3096	0.74	760
34923	34923	0.3074	99.7	104522	400	3101	0.74	760
34923	34923	0.3074	99.7	104522	400	2274	0.74	760
34000	34000	0.3005	96.9	104517	395	2239	0.7258	760
32000	32000	0.2855	90.6	104506	383	2195	0.6962	775
30000	30000	0.2701	84.5	104493	371	2143	0.6681	820
28000	28000	0.2544	78.4	104480	358	2091	0.6414	877
26000	26000	0.2382	72.4	104465	343	2039	0.6159	933
24000	24000	0.2217	66.4	104449	327	1989	0.5917	996
22000	22000	0.2047	60.4	104432	309	1941	0.5687	1062
20000	20000	0.1873	54.5	104413	290	1894	0.5469	1132
18000	18000	0.1695	48.6	104392	270	1843	0.526	1206
16000	16000	0.1512	42.7	104369	247	1792	0.5062	1283
14000	14000	0.1323	36.8	104344	222	1741	0.4874	1365
12000	12000	0.1129	31	104317	194	1691	0.4694	1450
10000	10000	0.0928	25.1	104287	164	1640	0.4523	1540
8000	8000	0.0722	19.3	104254	132	1591	0.436	1633
6000	6000	0.0509	13.4	104218	96	1541	0.4204	1732
4000	4000	0.0289	7.5	104179	56	1483	0.4056	1853
2000	2000	0.0059	1.5	104134	12	1421	0.3914	2004
1500	1500	0	0	104122	0	1405	0.388	2045

ENROUTE DESCENT ANALYSIS

WIN D (KNOTS) = 0 DTEMP (DEG)

HPR FT	HGEO FT	TIME HR	DIST NM	WEIGHT LB	FUEL LB	ROD FPM	MACH	T FF LB/HR
35000	35000	0.3081	100	104808	401	3094	0.74	760
34923	34923	0.3076	99.8	104808	400	3099	0.74	760
34923	34923	0.3076	99.8	104808	400	2272	0.74	760
34000	34000	0.3008	96.9	104802	395	2237	0.7258	760
32000	32000	0.2858	90.7	104791	383	2193	0.6962	775
30000	30000	0.2704	84.6	104779	371	2142	0.6681	820
28000	28000	0.2546	78.5	104765	358	2089	0.6414	877
26000	26000	0.2385	72.4	104751	343	2037	0.6159	933
24000	24000	0.2219	66.4	104735	327	1987	0.5917	996

A310-308 4000NM, ISA conditions																	For Calculation use only!		
ALT.	A/C WT	MACH	TIME	FUEL	DIST	RATE	GRDT	ALPH	WFE	Loutr	Lintr	Ctr	Trim	Rintr	Routr	FOB	delta tim	delta fue	delta dist
(FT)	(KG)	()	(MN)	(KG)	(NM)	(FTMN)	(DEG.)	(DEG.)	(KG/H)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)			
0	127295	0	0	0	0	0	0	0	0	3000	9532	0	0	9532	3000	25064			
0	126170		45	1125	0	0	0	0	1500	3000	8969.5	0	0	8970	3000	23939			
1500	125809	0.388	46.64	1486	3.3	3946.3	8.78	3.2	13291	3000	8789	0	0	8789	3000	23578	1.64	361	3.3
2000	125781	0.391	46.76	1514	3.8	3959.5	8.75	3.2	13286	3000	8775	0	0	8775	3000	23550	1.76	389	3.8
3000	125725	0.398	47.02	1570	4.9	3994.8	8.7	3.21	13301	3000	8747	0	0	8747	3000	23494	2.02	445	4.9
4000	125670	0.406	47.27	1625	6	4018	8.62	3.21	13272	3000	8719.5	0	0	8720	3000	23439	2.27	500	6
5000	125615	0.413	47.51	1680	7.1	4092.4	8.66	3.2	13362	3000	8692	0	0	8692	3000	23384	2.51	555	7.1
6000	125561	0.42	47.76	1734	8.2	4116.5	8.59	3.2	13329	3000	8665	0	0	8665	3000	23330	2.76	609	8.2
7000	125507	0.428	48	1788	9.3	4070.5	8.37	3.2	13153	3000	8638	0	0	8638	3000	23276	3	663	9.3
8000	125454	0.436	48.25	1841	10.4	4012.1	8.12	3.2	12967	3000	8611.5	0	0	8612	3000	23223	3.25	716	10.4
9000	125400	0.444	48.5	1895	11.6	3975.1	7.93	3.21	12840	3000	8584.5	0	0	8585	3000	23169	3.5	770	11.6
10000	125346	0.452	48.75	1949	12.8	3930.8	7.73	3.21	12695	3000	8557.5	0	0	8558	3000	23115	3.75	824	12.8
10000	125271	0.541	49.1	2024	14.6	4035.2	6.63	1.55	12907	3000	8520	0	0	8520	3000	23040	4.1	899	14.6
11000	125217	0.551	49.35	2078	16.1	3934	6.37	1.54	12644	3000	8493	0	0	8493	3000	22986	4.35	953	16.1
12000	125164	0.561	49.61	2131	17.6	3824.9	6.1	1.54	12373	3000	8466.5	0	0	8467	3000	22933	4.61	1006	17.6
13000	125109	0.571	49.88	2186	19.2	3710.5	5.83	1.54	12094	3000	8439	0	0	8439	3000	22878	4.88	1061	19.2
14000	125055	0.582	50.15	2240	20.8	3592.4	5.56	1.54	11819	3000	8412	0	0	8412	3000	22824	5.15	1115	20.8
15000	125000	0.593	50.43	2295	22.5	3471.5	5.3	1.53	11552	3000	8384.5	0	0	8385	3000	22769	5.43	1170	22.5
16000	124944	0.604	50.73	2351	24.4	3368.1	5.06	1.53	11332	3000	8356.5	0	0	8357	3000	22713	5.73	1226	24.4
17000	124888	0.615	51.03	2407	26.3	3258.9	4.82	1.51	11097	3000	8328.5	0	0	8329	3000	22657	6.03	1282	26.3
18000	124830	0.627	51.34	2465	28.3	3139.8	4.58	1.5	10842	3000	8299.5	0	0	8300	3000	22599	6.34	1340	28.3
19000	124772	0.639	51.67	2523	30.4	3012.1	4.33	1.48	10570	3000	8270.5	0	0	8271	3000	22541	6.67	1398	30.4
20000	124713	0.651	52	2582	32.6	2875.9	4.07	1.47	10284	3000	8241	0	0	8241	3000	22482	7	1457	32.6
21000	124653	0.664	52.36	2642	35	2782.7	3.88	1.45	10115	3000	8211	0	0	8211	3000	22422	7.36	1517	35
22000	124592	0.677	52.72	2703	37.5	2677	3.68	1.44	9913	3000	8135.5	0	90	8136	3000	22361	7.72	1578	37.5
23000	124530	0.69	53.11	2765	40.1	2559.8	3.46	1.42	9681	3000	8055.8	0	187.5	8056	3000	22299	8.11	1640	40.1
24000	124466	0.703	53.51	2829	42.9	2432.9	3.24	1.41	9422	3000	7973.8	0	287.5	7974	3000	22235	8.51	1704	42.9
25000	124401	0.717	53.93	2894	45.9	2299.7	3.02	1.38	9141	3000	7888.8	0	392.5	7889	3000	22170	8.93	1769	45.9
26000	124334	0.731	54.38	2961	49.2	2189.8	2.83	1.35	8936	3000	7799	0	505	7799	3000	22103	9.38	1836	49.2
27000	124265	0.745	54.84	3030	52.6	2072.6	2.64	1.31	8718	3000	7707	0	620	7707	3000	22034	9.84	1905	52.6
28000	124193	0.76	55.34	3102	56.3	1951.5	2.44	1.27	8489	3000	7608.5	0	745	7609	3000	21962	10.34	1977	56.3
29000	124120	0.775	55.87	3175	60.3	1835	2.26	1.22	8248	3000	7505.8	0	877.5	7506	3000	21889	10.87	2050	60.3
29959	124046	0.79	56.41	3249	64.5	1708.7	2.08	1.16	8009	3000	7401.3	0	1012.5	7401	3000	21815	11.41	2124	64.5
29959	124046	0.79	56.41	3249	64.5	2417.1	2.94	1.16	8009	3000	7401.3	0	1012.5	7401	3000	21815	11.41	2124	64.5
30000	124044	0.79	56.43	3251	64.6	2412.8	2.93	1.16	7999	3000	7397.8	0	1017.5	7398	3000	21813	11.43	2126	64.6
31000	123988	0.79	56.86	3307	67.9	2266.2	2.77	1.31	7690	3000	7316	0	1125	7316	3000	21757	11.86	2182	67.9
32000	123931	0.79	57.31	3364	71.5	2114.9	2.59	1.46	7387	3000	7231.3	0	1237.5	7231	3000	21700	12.31	2239	71.5
33000	123871	0.79	57.8	3424	75.2	1959.5	2.41	1.63	7114	3000	7140	0	1360	7140	3000	21640	12.8	2299	75.2
34000	123809	0.79	58.34	3486	79.3	1796	2.22	1.8	6842	3000	7041.5	0	1495	7042	3000	21578	13.34	2361	79.3
35000	123744	0.79	58.92	3551	83.7	1627.7	2.02	1.98	6574	3000	6936.5	0	1640	6937	3000	21513	13.92	2426	83.7
35000	123745	0.79	58.92	3551	83.7	0	0	1.99	4200	3000	6936.5	0	1640	6937	3000	21513	0	0	0
35000	122000	0.79	83.99	5296	273.9	0	0	1.93	4153	3000	4384	0	5000	4384	3000	19768	25.07	1745	190.2
35000	121000	0.79	98.48	6296	383.9	0	0	1.9	4127	3000	3884	0	5000	3884	3000	18768	39.56	2745	300.2
35000	120000	0.79	113.06	7296	494.6	0	0	1.87	4101	3000	3384	0	5000	3384	3000	17768	54.14	3745	410.9
35000	119000	0.79	127.74	8296	606	0	0	1.84	4076	3000	2884	0	5000	2884	3000	16768	68.82	4745	522.3
35000	118000	0.79	142.5	9296	718	0	0	1.81	4051	3000	2384	0	5000	2384	3000	15768	83.58	5745	634.3

A310-308 4000NM, ISA conditions																	Fuel Distribution			For Calculation use only!		
ALT.	A/C WT	MACH	TIME	FUEL	DIST	RATE	GRDT	ALPH	WFE	Loutr	Lintr	Ctr	Trim	Rintr	Routr	FOB	delta tim	delta fue	delta dist			
(FT)	(KG)	()	(MN)	(KG)	(NM)	(FTMN)	(DEG.)	(DEG.)	(KG/H)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)						
0	148835	0	0	0	0	0	0	0	0	3000	11160	15712	2574	11160	3000	46606						
0	147710	0	45	1125	0	0	0	0	1500	3000	11160	14587	2574	11160	3000	45481						
1500	147273	0.388	46.94	1562	3.9	3198.4	7.11	4.14	13291	3000	10942	14587	2574	10942	3000	45044	1.94	437	3.9			
2000	147238	0.391	47.09	1597	4.6	3208.7	7.08	4.14	13286	3000	10942	14552	2574	10942	3000	45009	2.09	472	4.6			
3000	147169	0.398	47.4	1666	5.9	3236.7	7.04	4.14	13301	3000	10942	14483	2574	10942	3000	44940	2.4	541	5.9			
4000	147101	0.406	47.71	1734	7.3	3254.3	6.98	4.14	13272	3000	10942	14415	2574	10942	3000	44872	2.71	609	7.3			
5000	147034	0.413	48.01	1801	8.6	3315.8	7.01	4.13	13362	3000	10942	14348	2574	10942	3000	44805	3.01	676	8.6			
6000	146967	0.42	48.31	1868	9.9	3334.1	6.94	4.13	13329	3000	10942	14281	2574	10942	3000	44738	3.31	743	9.9			
7000	146900	0.428	48.62	1935	11.3	3292.5	6.76	4.13	13153	3000	10942	14214	2574	10942	3000	44671	3.62	810	11.3			
8000	146833	0.436	48.92	2002	12.7	3240.2	6.55	4.13	12967	3000	10942	14147	2574	10942	3000	44604	3.92	877	12.7			
9000	146767	0.444	49.23	2068	14.2	3206.1	6.39	4.13	12840	3000	10942	14081	2574	10942	3000	44538	4.23	943	14.2			
10000	146700	0.452	49.55	2135	15.7	3165.8	6.22	4.13	12695	3000	10942	14014	2574	10942	3000	44471	4.55	1010	15.7			
10000	146607	0.541	49.98	2228	18	3299	5.41	2.17	12907	3000	10942	13921	2574	10942	3000	44378	4.98	1103	18			
11000	146542	0.551	50.29	2293	19.7	3210.9	5.19	2.17	12644	3000	10942	13856	2574	10942	3000	44313	5.29	1168	19.7			
12000	146476	0.561	50.6	2359	21.6	3115.5	4.96	2.16	12373	3000	10942	13790	2574	10942	3000	44247	5.6	1234	21.6			
13000	146410	0.571	50.93	2425	23.5	3015.6	4.74	2.16	12094	3000	10942	13724	2574	10942	3000	44181	5.93	1300	23.5			
14000	146342	0.582	51.27	2493	25.6	2912.3	4.51	2.15	11819	3000	10942	13656	2574	10942	3000	44113	6.27	1368	25.6			
15000	146274	0.593	51.62	2561	27.7	2806.6	4.28	2.15	11552	3000	10942	13588	2574	10942	3000	44045	6.62	1436	27.7			
16000	146205	0.604	51.98	2630	30	2716.1	4.08	2.14	11332	3000	10942	13519	2574	10942	3000	43976	6.98	1505	30			
17000	146135	0.615	52.35	2700	32.3	2620.9	3.88	2.12	11097	3000	10942	13449	2574	10942	3000	43906	7.35	1575	32.3			
18000	146064	0.627	52.74	2771	34.8	2517.1	3.67	2.1	10842	3000	10942	13378	2574	10942	3000	43835	7.74	1646	34.8			
19000	145992	0.639	53.15	2843	37.5	2405.6	3.46	2.08	10570	3000	10942	13306	2574	10942	3000	43763	8.15	1718	37.5			
20000	145917	0.651	53.57	2918	40.3	2286.8	3.24	2.06	10284	3000	10942	13231	2574	10942	3000	43688	8.57	1793	40.3			
21000	145842	0.664	54.02	2993	43.3	2205	3.07	2.05	10115	3000	10942	10730	5000	10942	3000	43613	9.02	1868	43.3			
22000	145764	0.677	54.48	3071	46.4	2112.4	2.9	2.03	9913	3000	10942	10652	5000	10942	3000	43535	9.48	1946	46.4			
23000	145685	0.69	54.97	3150	49.8	2010.2	2.72	2.01	9681	3000	10942	10573	5000	10942	3000	43456	9.97	2025	49.8			
24000	145604	0.703	55.48	3231	53.4	1899.8	2.53	1.99	9422	3000	10942	10492	5000	10942	3000	43375	10.48	2106	53.4			
25000	145520	0.717	56.02	3315	57.2	1785.1	2.34	1.95	9141	3000	10942	10408	5000	10942	3000	43291	11.02	2190	57.2			
26000	145433	0.731	56.6	3402	61.4	1690.6	2.18	1.92	8936	3000	10942	10321	5000	10942	3000	43204	11.6	2277	61.4			
27000	145344	0.745	57.21	3491	65.9	1591.2	2.02	1.87	8718	3000	10942	10232	5000	10942	3000	43115	12.21	2366	65.9			
28000	145250	0.76	57.86	3585	70.7	1490.7	1.87	1.82	8489	3000	10942	10138	5000	10942	3000	43021	12.86	2460	70.7			
29000	145153	0.775	58.55	3682	76	1384.3	1.71	1.76	8248	3000	10942	10041	5000	10942	3000	42924	13.55	2557	76			
29959	145055	0.79	59.27	3780	81.6	1268.9	1.54	1.69	8009	3000	10942	9943	5000	10942	3000	42826	14.27	2655	81.6			
29959	145055	0.79	59.27	3780	81.6	1795	2.18	1.69	8009	3000	10942	9943	5000	10942	3000	42826	14.27	2655	81.6			
30000	145052	0.79	59.3	3783	81.7	1790.4	2.18	1.7	7999	3000	10942	9940	5000	10942	3000	42823	14.3	2658	81.7			
31000	144976	0.79	59.88	3859	86.3	1638	2	1.87	7690	3000	10942	9864	5000	10942	3000	42747	14.88	2734	86.3			
32000	144896	0.79	60.52	3939	91.2	1480	1.81	2.05	7387	3000	10942	9784	5000	10942	3000	42667	15.52	2814	91.2			
33000	144809	0.79	61.24	4026	96.7	1313	1.62	2.24	7114	3000	10942	9697	5000	10942	3000	42580	16.24	2901	96.7			
34000	144714	0.79	62.06	4121	103	1127.5	1.39	2.44	6842	3000	10942	9602	5000	10942	3000	42485	17.06	2996	103			
35000	144604	0.79	63.04	4231	110.4	913.9	1.14	2.65	6574	3000	10942	9492	5000	10942	3000	42375	18.04	3106	110.4			
35000	144606	0.79	63.04	4231	110.4	0	0	2.65	4955	3000	10942	9492	5000	10942	3000	42375	0	0	0			
35000	143000	0.79	82.64	5837	259.1	0	0	2.6	4880	3000	10942	7886	5000	10942	3000	40769	19.6	1606	148.7			
35000	142000	0.79	94.99	6837	352.9	0	0	2.57	4833	3000	10942	6886	5000	10942	3000	39769	31.95	2606	242.5			
35000	141000	0.79	107.46	7837	447.5	0	0	2.54	4788	3000	10942	5886	5000	10942	3000	38769	44.42	3606	337.1			
35000	140000	0.79	120.05	8837	543.1	0	0	2.51	4745	3000	10942	4886	5000	10942	3000	37769	57.01	4606	432.7			
35000	139000	0.79	132.75	9837	639.5	0	0	2.48	4705	3000	10942	3886	5000	10942	3000	36769	69.71	5606	529.1			

**Small Commercial Transport
Short Range Mission**

Enroute Temp = STD + 0.000 Degrees C Main 1 Volume = 505.3 gal
 Enroute Temp = STD + 0.000 Degrees C Main 2 Volume = 505.3 gal
 Ground Time (takeoff) = 1.000 minutes CWT Volume = 0 gal
 Ground Time (landing) = 2.000 minutes

Time	Time	Pressure Alt	Dist	Mach Number	Weight	Ambient Temp	Ambient Temp	Total Temp	Fuel Flow	Fuel Flow	Fuel Remainin g	Main Tank 1 Fuel Remaining	Main Tank 2 Fuel Remaining	CWT Fuel Remainin g	Rate of Climb / Descent
minutes	hours	feet	N. Mi.		lbs	Degrees C	Degrees F	Degrees F	lb/hr	lb/min	lbs	lbs	lbs	lbs	ft/min
0.0	0.0	0	0.0	0.000	64270	15.0	59.0	59.00	1260	21	6770	3385	3385	0	0
10.0	0.2	0	0.0	0.000	64060	15.0	59.0	59.00	9000	150	6560	3280	3280	0	0
11.5	0.2	1500	1.9	0.388	63851	12.0	53.7	69.11	7471	125	6351	3176	3176	0	3193.7
11.6	0.2	2000	2.6	0.391	63832	11.0	51.9	67.51	7405	123	6332	3166	3166	0	3166.2
12.3	0.2	4000	5.4	0.406	63754	7.1	44.7	61.36	7143	119	6254	3127	3127	0	3053.2
12.9	0.2	6000	8.4	0.420	63676	3.1	37.6	55.15	6887	115	6176	3088	3088	0	2937.1
13.6	0.2	8000	11.5	0.436	63598	-0.8	30.5	49.11	6637	111	6098	3049	3049	0	2816.9
14.4	0.2	10000	15.0	0.452	63519	-4.8	23.3	43.07	6386	106	6019	3010	3010	0	2692.5
15.1	0.3	12000	18.7	0.469	63439	-8.8	16.2	37.14	6148	102	5939	2970	2970	0	2559.1
15.9	0.3	14000	22.7	0.487	63359	-12.7	9.1	31.31	5910	99	5859	2930	2930	0	2421.6
16.8	0.3	16000	27.1	0.506	63276	-16.7	1.9	25.58	5678	95	5776	2888	2888	0	2280.1
17.7	0.3	18000	31.9	0.526	63192	-20.7	-5.2	19.96	5454	91	5692	2846	2846	0	2137.1
18.6	0.3	20000	37.3	0.547	63106	-24.6	-12.3	14.45	5231	87	5606	2803	2803	0	1993.6
19.7	0.3	22000	43.2	0.569	63017	-28.6	-19.5	9.05	5012	84	5517	2759	2759	0	1831.5
20.8	0.3	24000	49.9	0.592	62924	-32.5	-26.6	3.77	4795	80	5424	2712	2712	0	1670.2
22.1	0.4	26000	57.5	0.616	62825	-36.5	-33.7	-1.39	4582	76	5325	2663	2663	0	1502.7
23.5	0.4	28000	66.4	0.641	62720	-40.5	-40.9	-6.44	4375	73	5220	2610	2610	0	1331.1
25.1	0.4	30000	76.8	0.668	62605	-44.4	-48.0	-11.24	4171	70	5105	2553	2553	0	1156.7
27.0	0.4	32000	89.3	0.696	62478	-48.4	-55.1	-15.92	3972	66	4978	2489	2489	0	978
27.2	0.5	32200	90.7	0.699	62464	-48.8	-55.8	-16.37	3952	66	4964	2482	2482	0	959.8
27.3	0.5	32250	91.0	0.700	62461	-48.9	-56.0	-16.45	3947	66	4961	2481	2481	0	955.3
27.9	0.5	33000	95.2	0.700	62421	-50.4	-58.7	-19.39	3852	64	4921	2461	2461	0	1205.1
28.8	0.5	34000	101.0	0.700	62367	-52.4	-62.2	-23.30	3728	62	4867	2434	2434	0	1116.5
29.7	0.5	35000	107.3	0.700	62309	-54.3	-65.8	-27.22	3604	60	4809	2405	2405	0	1019.2
35.8	0.6	35000	152.5	0.770	62000	-54.3	-65.8	-19.11	3039	51	4500	2250	2250	0	0
45.7	0.8	35000	225.6	0.770	61500	-54.3	-65.8	-19.11	3029	50	4000	2000	2000	0	0
55.7	0.9	35000	299.1	0.770	61000	-54.3	-65.8	-19.11	3018	50	3500	1750	1750	0	0
63.1	1.1	35000	355.0	0.770	60620	-54.3	-65.8	-19.11	3009	50	3120	1560	1560	0	0
64.0	1.1	34000	360.7	0.700	60622	-52.4	-62.2	-23.30	2991.6	50	3122	1561	1561	0	433.6
64.3	1.1	33000	362.9	0.700	60620	-50.4	-58.7	-19.39	3054	51	3120	1560	1560	0	445
64.6	1.1	32250	364.6	0.700	60618	-48.9	-56.0	-16.45	2342.2	39	3118	1559	1559	0	457.3
64.6	1.1	32200	364.7	0.699	60618	-48.8	-55.8	-16.37	2340.9	39	3118	1559	1559	0	458
65.1	1.1	31000	368.2	0.682	60614	-46.4	-51.6	-13.59	2312.4	39	3114	1557	1557	0	475.6
65.5	1.1	30000	371.0	0.668	60610	-44.4	-48.0	-11.24	2289	38	3110	1555	1555	0	490.8
66.4	1.1	28000	376.7	0.641	60603	-40.5	-40.9	-6.44	2241.7	37	3103	1552	1552	0	523.5
67.3	1.1	26000	382.4	0.616	60595	-36.5	-33.7	-1.39	2192.5	37	3095	1548	1548	0	558
68.2	1.1	24000	387.9	0.592	60586	-32.5	-26.6	3.77	2143.8	36	3086	1543	1543	0	595.7
69.2	1.2	22000	393.5	0.569	60576	-28.6	-19.5	9.05	2094.6	35	3076	1538	1538	0	635.6
70.1	1.2	20000	398.9	0.547	60566	-24.6	-12.3	14.45	2044.1	34	3066	1533	1533	0	675.2
71.1	1.2	18000	404.4	0.526	60554	-20.7	-5.2	19.96	1991.2	33	3054	1527	1527	0	722.7
72.2	1.2	16000	409.8	0.506	60541	-16.7	1.9	25.58	1938.3	32	3041	1521	1521	0	770.4
73.2	1.2	14000	415.3	0.487	60528	-12.7	9.1	31.31	1883.9	31	3028	1514	1514	0	821.2
74.3	1.2	12000	420.7	0.469	60512	-8.8	16.2	37.14	1828.5	30	3012	1506	1506	0	875.1
75.4	1.3	10000	426.1	0.452	60496	-4.8	23.3	43.07	1773.4	30	2996	1498	1498	0	929.1
76.5	1.3	8000	431.5	0.436	60477	-0.8	30.5	49.11	1717	29	2977	1489	1489	0	989.8
77.7	1.3	6000	436.9	0.420	60457	3.1	37.6	55.15	1661.3	28	2957	1479	1479	0	1053.6
78.9	1.3	4000	442.4	0.406	60435	7.1	44.7	61.36	1604	27	2935	1468	1468	0	1123.9
80.2	1.3	2000	447.9	0.391	60410	11.0	51.9	67.51	1544	26	2910	1455	1455	0	1201.1
80.5	1.3	1500	449.3	0.388	60404	12.0	53.7	69.11	1529.1	25	2904	1452	1452	0	1221.8
81.5	1.4	0	453.5	0.378	60383	15.0	59.0	73.82	1484	25	2883	1442	1442	0	1283.9
83.5	1.4	0	453.5	0.000	60283	15.0	59.0	59.00	3000	50	2783	1392	1392	0	0

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
1	de	Haviland	Dash 8	Series 301																
2																				
3	Total	Weight	18640 kg	41000 lbs																
4	Fuel	Full Tank	5764 lbs																	
5																				
6																				
7			Time	Time	Pressure	Distance	Climb /	Rate of	Sonic	Mach	Fuel	Fuel Flow	Fuel Flow	Fuel	Tank 1	Tank 2	Weight	Ambient	Ambient	Total
8					Altitude		Descent	Climb /	Velocity	Number	Consume			Remaining	Fuel Rem.	Fuel Rem.		Temp	Temp	Temp
9							Speed	Descent			Total									
10																				
11			minutes	hours	feet	n. miles	kts	ft/min	ft/s		lbs	lbs/hr	lbs/min	lbs	lbs	lbs	lbs	Celcius	Farenheit	Farenheit
12																				
13	CLIMB		0.00	0.00	0.00	0.00	0.00	0.00	1116.40	0.000	0.00	0.00	0.00	5764.00	2882.00	2882.00	41100.00	15.00	59.00	59.00
14	Type I	High Speed	3.00	0.05	2000.00	8.00	195.00	666.67	1108.70	0.297	77.16	1784.00	29.73	5686.84	2843.42	2843.42	41022.84	11.04	51.87	60.89
15	Propeller	RPM 900	5.00	0.08	4000.00	16.00	195.00	800.00	1101.00	0.299	147.71	1744.00	29.07	5616.29	2808.14	2808.14	40952.29	7.08	44.74	53.75
16	ISA		8.00	0.13	6000.00	25.00	195.00	750.00	1093.20	0.301	220.46	1712.00	28.53	5543.54	2771.77	2771.77	40879.54	3.11	37.60	46.62
17			11.00	0.18	8000.00	36.00	195.00	727.27	1085.30	0.303	297.63	1682.00	28.03	5466.37	2733.19	2733.19	40802.37	-0.85	30.47	39.49
18			14.00	0.23	10000.00	47.00	195.00	714.29	1077.40	0.306	379.20	1658.00	27.63	5384.80	2692.40	2692.40	40720.80	-4.81	23.34	32.36
19			17.00	0.28	12000.00	58.00	187.00	705.88	1069.40	0.295	462.97	1640.00	27.33	5301.03	2650.51	2650.51	40637.03	-8.77	16.21	24.50
20			19.00	0.32	14000.00	65.00	179.00	736.84	1061.30	0.285	524.70	1636.00	27.27	5239.30	2619.65	2619.65	40575.30	-12.74	9.07	16.67
21			21.00	0.35	16000.00	75.00	171.00	761.90	1053.20	0.274	584.23	1540.00	25.67	5179.77	2589.89	2589.89	40515.77	-16.70	1.94	8.88
22			23.00	0.38	18000.00	85.00	163.00	782.61	1045.10	0.263	650.37	1446.00	24.10	5113.63	2556.82	2556.82	40449.63	-20.66	-5.19	1.11
23			27.00	0.45	20000.00	95.00	155.00	740.74	1036.80	0.252	716.51	1356.00	22.60	5047.49	2523.75	2523.75	40383.49	-24.62	-12.32	-6.63
24	CRUISE	Max Cruise	30.00	0.50	20000.00	108.55	271.00	0.00	1036.80	0.441	784.26	1356.00	22.60	4979.74	2489.87	2489.87	40315.74	-24.62	-12.32	5.09
25	Type I	Rating	33.00	0.55	20000.00	122.10	271.00	0.00	1036.80	0.441	852.02	1356.00	22.60	4911.98	2455.99	2455.99	40247.98	-24.62	-12.32	5.09
26	Propeller	RPM 900	36.00	0.60	20000.00	135.65	271.00	0.00	1036.80	0.441	919.78	1356.00	22.60	4844.22	2422.11	2422.11	40180.22	-24.62	-12.32	5.09
27	ISA		39.00	0.65	20000.00	149.21	271.00	0.00	1036.80	0.441	987.54	1356.00	22.60	4776.46	2388.23	2388.23	40112.46	-24.62	-12.32	5.09
28			42.00	0.70	20000.00	162.76	271.00	0.00	1036.80	0.441	1055.29	1356.00	22.60	4708.71	2354.35	2354.35	40044.71	-24.62	-12.32	5.09
29			45.00	0.75	20000.00	176.31	271.00	0.00	1036.80	0.441	1123.05	1356.00	22.60	4640.95	2320.47	2320.47	39976.95	-24.62	-12.32	5.09
30			48.00	0.80	20000.00	189.86	271.00	0.00	1036.80	0.441	1190.81	1356.00	22.60	4573.19	2286.60	2286.60	39909.19	-24.62	-12.32	5.09
31			50.00	0.83	20000.00	198.90	271.00	0.00	1036.80	0.441	1235.98	1356.00	22.60	4528.02	2264.01	2264.01	39864.02	-24.62	-12.32	5.09
32	DESCENT		54.00	0.90	20000.00	215.90	225.00	1250.00	1036.80	0.366	1333.98	1356.00	22.60	4430.02	2215.01	2215.01	39766.02	-24.62	-12.32	-0.32
33	Type I	High Speed	58.00	0.97	18000.00	235.90	225.00	1500.00	1045.10	0.363	1423.98	1350.00	22.50	4340.02	2170.01	2170.01	39676.02	-20.66	-5.19	6.81
34	Propeller	RPM 900	59.00	0.98	16000.00	241.90	225.00	2000.00	1053.20	0.361	1438.98	900.00	15.00	4325.02	2162.51	2162.51	39661.02	-16.70	1.94	13.95
35	ISA		60.00	1.00	14000.00	246.90	225.00	2000.00	1061.30	0.358	1453.98	900.00	15.00	4310.02	2155.01	2155.01	39646.02	-12.74	9.07	21.08
36			61.00	1.02	12000.00	251.90	225.00	2000.00	1069.40	0.355	1468.98	900.00	15.00	4295.02	2147.51	2147.51	39631.02	-8.77	16.21	28.21
37			62.00	1.03	10000.00	255.90	225.00	2000.00	1077.40	0.353	1483.98	900.00	15.00	4280.02	2140.01	2140.01	39616.02	-4.81	23.34	35.34
38			63.00	1.05	8000.00	260.90	225.00	2000.00	1085.30	0.350	1493.98	600.00	10.00	4270.02	2135.01	2135.01	39606.02	-0.85	30.47	42.48
39			64.00	1.07	6000.00	264.90	225.00	2000.00	1093.20	0.347	1503.98	600.00	10.00	4260.02	2130.01	2130.01	39596.02	3.11	37.60	49.61
40			65.00	1.08	4000.00	268.90	225.00	2000.00	1101.00	0.345	1513.98	600.00	10.00	4250.02	2125.01	2125.01	39586.02	7.08	44.74	56.74
41			66.00	1.10	2000.00	273.90	225.00	2000.00	1108.70	0.343	1523.98	600.00	10.00	4240.02	2120.01	2120.01	39576.02	11.04	51.87	63.87
42			67.00	1.12	0.00	278.90	0.00	0.00	1116.40	0.000	1533.98	0.00	0.00	4230.02	2115.01	2115.01	39566.02	15.00	59.00	59.00

Airplane Standards (3).xls

	R	S	T	U	V	W	X	Y	Z
1	GV - Max Range Mission (6506 NM)								
2		ZFW	Ramp Wt	Total Fuel	Reserve Fuel	Landing Wt			
3		49600	90900	41300	2849	52449			
4									
5	Condition	Time - Minute	Fuel Burn - lb	Distance - NM	Airplane Wt - lb	Fuel Remaining - lb	Wing Area - sq ft	Fuel Flowrate - lbs/hr	Rate of Climb/Descent - ft/min
6									
7	Ground idle	10	200	0	90700	41100	0.00		-
8	Takeoff	1	200	0	90500	40900	0.38	12000	-
9	Climb to 41kft	23	2391	145	88109	38509	0.80	6237	1550
10	Cruise at 41kft	141	7300	1081	80809	31209	0.80	3106	-
11	Climb to 43kft	3	181	21	80628	31028	0.80	3620	1500
12	Cruise at 43kft	150	7100	1145	73528	23928	0.80	2840	-
13	Climb to 45kft	3	164	21	73364	23764	0.80	3280	1500
14	Cruise at 45kft	155	6700	1182	66664	17064	0.80	2594	-
15	Climb to 47kft	3	158	23	66506	16906	0.80	3160	1500
16	Cruise at 47kft	154	6100	1177	60406	10806	0.80	2377	-
17	Climb to 49kft	4	158	25	60248	10648	0.80	2370	1000
18	Cruise at 49kft	157	5700	1204	54548	4948	0.80	2178	-
19	Climb to 51kft	4	158	29	54390	4790	0.80	2370	1000
20	Cruise at 51kft	42	1414	317	52976	3376	0.80	2020	-
21	Descent to 0 ft	23	343	138	52633	3033	0.18	895	2000
22	Approach-Land	5	184	0	52449	2849	0.00	2208	-

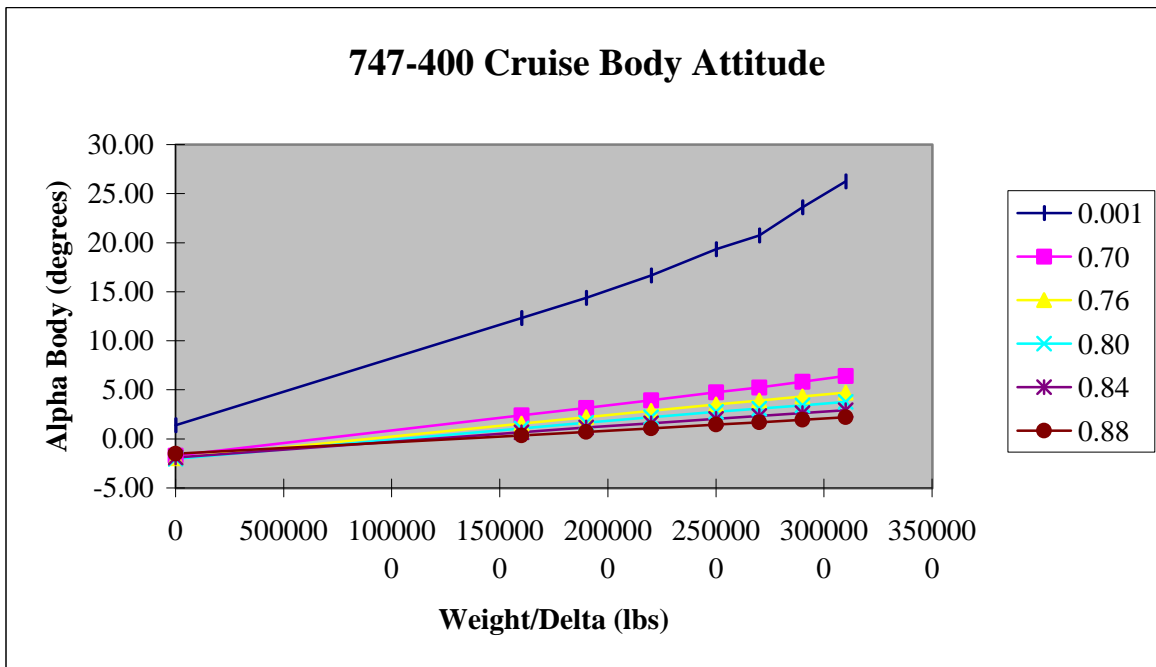
cl-alpha

737

		MACH								
		0	0.45	0.50	0.55	0.60	0.65	0.70	0.72	0.74
Cl	0.3	2.13	1.95	1.93	1.91	1.89	1.87	1.83	1.72	1.66
	0.7	6.49	5.77	5.69	5.53	5.35	5.09	4.79	4.65	4.55

747-400

		MACH					
		0.001	0.70	0.76	0.80	0.84	0.88
Wt/Delta	0	1.39	-1.71	-1.97	-2.02	-1.89	-1.52
	1600000	12.32	2.40	1.55	1.07	0.67	0.35
	1900000	14.37	3.17	2.21	1.65	1.15	0.70
	2200000	16.67	3.95	2.86	2.21	1.60	1.06
	2500000	19.33	4.75	3.50	2.75	2.05	1.45
	2700000	20.72	5.24	3.91	3.10	2.35	1.70
	2900000	23.61	5.84	4.32	3.43	2.64	1.95
	3100000	26.25	6.43	4.73	3.76	2.92	2.20



med-long-data

35000	138000	0.79	145.56	10837	736.7	0	0	2.44	4665	3000	10942	2886	5000	10942	3000	35769			82.52	6606	626.3
35000	137000	0.79	158.47	11837	834.7	0	0	2.41	4625	3000	10942	1886	5000	10942	3000	34769			95.43	7606	724.3
35000	136000	0.79	171.5	12837	933.6	0	0	2.38	4585	3000	10885	1000	5000	10885	3000	33769			108.46	8606	823.2
35000	135000	0.79	184.64	13837	1033.3	0	0	2.35	4550	3000	10385	1000	5000	10385	3000	32769			121.6	9606	922.9
35000	134000	0.79	197.87	14837	1133.7	0	0	2.32	4516	3000	9885	1000	5000	9885	3000	31769			134.83	10606	1023.3
35000	133000	0.79	211.21	15837	1234.9	0	0	2.28	4483	3000	9385	1000	5000	9385	3000	30769			148.17	11606	1124.5
35000	132000	0.79	224.64	16837	1336.9	0	0	2.25	4450	3000	8885	1000	5000	8885	3000	29769			161.6	12606	1226.5
35000	131000	0.79	238.18	17837	1439.6	0	0	2.22	4417	3000	8385	1000	5000	8385	3000	28769			175.14	13606	1329.2
35000	130000	0.79	251.81	18837	1543.1	0	0	2.19	4385	3000	7885	1000	5000	7885	3000	27769			188.77	14606	1432.7
35000	129000	0.79	265.54	19837	1647.3	0	0	2.16	4354	3000	7385	1000	5000	7385	3000	26769			202.5	15606	1536.9
35000	128000	0.79	279.37	20837	1752.2	0	0	2.13	4323	3000	6885	1000	5000	6885	3000	25769			216.33	16606	1641.8
35000	127000	0.79	293.3	21837	1857.9	0	0	2.09	4293	3000	6385	1000	5000	6385	3000	24769			230.26	17606	1747.5
35000	126000	0.79	307.32	22837	1964.4	0	0	2.06	4262	3000	5885	1000	5000	5885	3000	23769			244.28	18606	1854
35000	125000	0.79	321.45	23837	2071.6	0	0	2.03	4235	3000	5385	1000	5000	5385	3000	22769			258.41	19606	1961.2
35000	124000	0.79	335.66	24837	2179.5	0	0	2	4207	3000	4885	1000	5000	4885	3000	21769			272.62	20606	2069.1
35000	123000	0.79	349.97	25837	2288	0	0	1.97	4180	3000	4385	1000	5000	4385	3000	20769			286.93	21606	2177.6
35000	122000	0.79	364.37	26837	2397.3	0	0	1.93	4153	3000	3885	1000	5000	3885	3000	19769			301.33	22606	2286.9
35000	121000	0.79	378.86	27837	2507.3	0	0	1.9	4127	3000	3385	1000	5000	3385	3000	18769			315.82	23606	2396.9
35000	120000	0.79	393.44	28837	2618	0	0	1.87	4101	3000	2885	1000	5000	2885	3000	17769			330.4	24606	2507.6
35000	119000	0.79	408.12	29837	2729.4	0	0	1.84	4076	3000	2385	1000	5000	2385	3000	16769			345.08	25606	2619
35000	118000	0.79	422.88	30837	2841.4	0	0	1.81	4051	3000	1885	1000	5000	1885	3000	15769			359.84	26606	2731
35000	117000	0.79	437.74	31837	2954.2	0	0	1.77	4026	3000	1385	1000	5000	1385	3000	14769			374.7	27606	2843.8
35000	116756	0.79	441.38	32081	2981.8	0	0	1.77	4020	3000	1263	1000	5000	1263	3000	14525			378.34	27850	2871.4
35000	116756	0.79	441.38	32081	2981.8	1866.9	2.32	1.75	6574	3000	1263	1000	5000	1263	3000	14525			0	0	0
36000	116696	0.79	441.94	32141	2986.1	1674.2	2.09	1.94	6270	3000	1233	1000	5000	1233	3000	14465			0.56	60	4.3
36089	116690	0.79	442	32147	2986.5	1518.9	1.9	1.95	6244	3000	1230	1000	5000	1230	3000	14459			0.62	66	4.7
36089	116690	0.79	442	32147	2986.5	1518.9	1.9	1.95	6244	3000	1230	1000	5000	1230	3000	14459			0.62	66	4.7
37000	116625	0.79	442.63	32212	2991.3	1357.4	1.7	2.13	6007	3000	1197	1000	5000	1197	3000	14394			1.25	131	9.5
38000	116548	0.79	443.42	32289	2997.2	1172.6	1.46	2.33	5756	3000	1159	1000	5000	1159	3000	14317			2.04	208	15.4
39000	116459	0.79	444.37	32378	3004.4	944.6	1.18	2.53	5461	3000	1114	1000	5000	1114	3000	14228			2.99	297	22.6
39000	116460	0.79	444.37	32378	3004.4	0	0	2.54	3987	3000	1114	1000	5000	1114	3000	14228			0	0	0
39000	115000	0.79	466.51	33838	3171.6	0	0	2.49	3925	3000	384	1000	5000	384	3000	12768			22.14	1460	167.2
39000	114000	0.79	481.88	34838	3287.7	0	0	2.45	3885	3000	384	1000	4000	384	3000	11768			37.51	2460	283.3
39000	113000	0.79	497.4	35838	3404.9	0	0	2.41	3845	3000	384	1000	3000	384	3000	10768			53.03	3460	400.5
39000	112000	0.79	513.08	36838	3523.3	0	0	2.37	3806	3000	384	1000	2000	384	3000	9768			68.71	4460	518.9
39000	111000	0.79	528.92	37838	3642.9	0	0	2.33	3772	3000	384	1000	1000	384	3000	8768			84.55	5460	638.5
39000	110000	0.79	544.89	38838	3763.6	0	0	2.29	3739	3000	384	1000	0	384	3000	7768			100.52	6460	759.2
39000	109171	0.79	558.25	39667	3864.4	0	0	2.26	3711	3000	384	171	0	384	3000	6939			113.88	7289	860
39000	109171	0.79	558.25	39667	3864.4	-2344	-2.9	2.27	947	3000	384	171	0	384	3000	6939			0	0	0
38035	109165	0.79	558.66	39673	3867.5	-1708.7	-2.1	2.08	954	3000	384	165	0	384	3000	6933			0.41	6	3.1
37000	109155	0.773	559.27	39683	3872	-1688.7	-2.2	2.17	935	3000	384	155	0	384	3000	6923			1.02	16	7.6
36089	109146	0.758	559.81	39692	3876	-1786.4	-2.3	2.23	904	3000	384	146	0	384	3000	6914			1.56	25	11.6
35000	109137	0.741	560.42	39701	3880.4	-1784.7	-2.4	2.3	869	3000	384	137	0	384	3000	6905			2.17	34	16
34000	109129	0.726	560.98	39709	3884.3	-1790.6	-2.4	2.34	833	3000	384	129	0	384	3000	6897			2.73	42	19.9
33000	109121	0.711	561.54	39717	3888.2	-1804.6	-2.5	2.38	794	3000	384	121	0	384	3000	6889			3.29	50	23.8
32000	109114	0.696	562.09	39724	3891.9	-1824.7	-2.5	2.42	751	3000	384	114	0	384	3000	6882			3.84	57	27.5
31000	109107	0.682	562.64	39731	3895.6	-1810	-2.6	2.44	760	3000	384	107	0	384	3000	6875			4.39	64	31.2
30000	109100	0.668	563.19	39738	3899.3	-1795.3	-2.6	2.46	770	3000	384	100	0	384	3000	6868			4.94	71	34.9
29000	109093	0.655	563.75	39745	3902.9	-1784.6	-2.6	2.49	775	3000	384	93	0	384	3000	6861			5.5	78	38.5
28000	109086	0.641	564.31	39752	3906.5	-1776.6	-2.6	2.51	775	3000	384	86	0	384	3000	6854			6.06	85	42.1

27000	109079	0.628	564.88	39759	3910.1	-1757.1	-2.7	2.53	792	3000	384	79	0	384	3000	6847			6.63	92	45.7
26000	109071	0.616	565.45	39767	3913.6	-1737.9	-2.7	2.55	810	3000	384	71	0	384	3000	6839			7.2	100	49.2
25000	109063	0.604	566.03	39775	3917.2	-1720.1	-2.7	2.58	827	3000	384	63	0	384	3000	6831			7.78	108	52.8
24000	109055	0.592	566.61	39783	3920.7	-1701.8	-2.7	2.59	844	3000	384	55	0	384	3000	6823			8.36	116	56.3
23000	109047	0.58	567.2	39791	3924.2	-1685.3	-2.7	2.59	860	3000	384	47	0	384	3000	6815			8.95	124	59.8
22000	109038	0.569	567.8	39800	3927.6	-1671.7	-2.7	2.6	872	3000	384	38	0	384	3000	6806			9.55	133	63.2
21000	109030	0.558	568.4	39808	3931.1	-1660.9	-2.8	2.61	880	3000	384	30	0	384	3000	6798			10.15	141	66.7
20000	109021	0.547	569	39817	3934.5	-1652.9	-2.8	2.61	885	3000	384	21	0	384	3000	6789			10.75	150	70.1
19000	109012	0.536	569.61	39826	3937.8	-1633.4	-2.8	2.62	910	3000	384	12	0	384	3000	6780			11.36	159	73.4
18000	109003	0.526	570.23	39835	3941.2	-1615	-2.8	2.63	934	3000	384	3	0	384	3000	6771			11.98	168	76.8
17000	108993	0.516	570.85	39845	3944.6	-1597.9	-2.8	2.63	957	3000	381	0	0	381	3000	6761			12.6	178	80.2
16000	108983	0.506	571.48	39855	3947.9	-1583.5	-2.8	2.64	977	3000	376	0	0	376	3000	6751			13.23	188	83.5
15000	108973	0.497	572.11	39865	3951.2	-1567.7	-2.9	2.64	999	3000	371	0	0	371	3000	6741			13.86	198	86.8
14000	108962	0.487	572.75	39876	3954.5	-1551.5	-2.9	2.64	1021	3000	365	0	0	365	3000	6730			14.5	209	90.1
13000	108951	0.478	573.4	39887	3957.8	-1536.7	-2.9	2.64	1041	3000	360	0	0	360	3000	6719			15.15	220	93.4
12000	108940	0.469	574.06	39898	3961	-1523.8	-2.9	2.64	1060	3000	354	0	0	354	3000	6708			15.81	231	96.6
11000	108928	0.461	574.71	39910	3964.3	-1513	-2.9	2.64	1076	3000	348	0	0	348	3000	6696			16.46	243	99.9
10000	108917	0.452	575.38	39921	3967.5	-1506.3	-3	2.64	1086	3000	343	0	0	343	3000	6685			17.13	254	103.1
9000	108905	0.444	576.04	39933	3970.6	-1506.5	-3	2.64	1086	3000	337	0	0	337	3000	6673			17.79	266	106.2
8000	108892	0.436	576.7	39945	3973.8	-1508.2	-3	2.64	1085	3000	331	0	0	331	3000	6661			18.45	278	109.4
7000	108881	0.428	577.37	39957	3976.9	-1496.7	-3.1	2.64	1102	3000	325	0	0	325	3000	6649			19.12	290	112.5
6000	108868	0.42	578.04	39970	3979.9	-1482	-3.1	2.64	1124	3000	318	0	0	318	3000	6636			19.79	303	115.5
5000	108856	0.413	578.72	39982	3983	-1468.5	-3.1	2.64	1145	3000	312	0	0	312	3000	6624			20.47	315	118.6
4000	108843	0.406	579.4	39995	3986	-1456.4	-3.1	2.64	1165	3000	306	0	0	306	3000	6611			21.15	328	121.6
3000	108829	0.398	580.09	40009	3989	-1442.7	-3.1	2.64	1189	3000	299	0	0	299	3000	6597			21.84	342	124.6
2000	108816	0.391	580.79	40022	3992	-1428.8	-3.1	2.63	1211	3000	292	0	0	292	3000	6584			22.54	355	127.6
1500	108808	0.388	581.14	40030	3993.5	-1422.3	-3.2	2.63	1221	3000	288	0	0	288	3000	6576			22.89	363	129.1
0	108655	0	584.79	40183	3993.5	0	0	0	0	3000	212	0	0	212	3000	6423			26.54	516	129.1

35000	117000	0.79	157.36	10296	830.8	0	0	1.77	4026	3000	1884	0	5000	1884	3000	14768			98.44	6745	747.1
35000	116748	0.79	161.12	10548	859.3	0	0	1.77	4020	3000	1758	0	5000	1758	3000	14516			102.2	6997	775.6
35000	116748	0.79	161.12	10548	859.3	1867.1	2.32	1.75	6574	3000	1758	0	5000	1758	3000	14516			0	0	0
36000	116688	0.79	161.68	10608	863.6	1674.5	2.09	1.94	6270	3000	1728	0	5000	1728	3000	14456			0.56	60	4.3
36089	116682	0.79	161.74	10614	864	1519.2	1.9	1.95	6244	3000	1725	0	5000	1725	3000	14450			0.62	66	4.7
36089	116682	0.79	161.74	10614	864	1519.2	1.9	1.95	6244	3000	1725	0	5000	1725	3000	14450			0.62	66	4.7
37000	116617	0.79	162.37	10679	868.8	1357.7	1.7	2.13	6007	3000	1692.5	0	5000	1693	3000	14385			1.25	131	9.5
38000	116540	0.79	163.16	10756	874.7	1172.9	1.46	2.33	5756	3000	1654	0	5000	1654	3000	14308			2.04	208	15.4
39000	116451	0.79	164.11	10845	881.9	944.9	1.18	2.53	5461	3000	1609.5	0	5000	1610	3000	14219			2.99	297	22.6
39000	116452	0.79	164.11	10845	881.9	0	0	2.54	3986	3000	1609.5	0	5000	1610	3000	14219			0	0	0
39000	115000	0.79	186.13	12297	1048.2	0	0	2.49	3925	3000	883.5	0	5000	883.5	3000	12767			22.02	1452	166.3
39000	114000	0.79	201.5	13297	1164.3	0	0	2.45	3885	3000	383.5	1000	4000	383.5	3000	11767			37.39	2452	282.4
39000	113000	0.79	217.02	14297	1281.5	0	0	2.41	3845	3000	0	1000	3767	0	3000	10767			52.91	3452	399.6
39000	112000	0.79	232.7	15297	1399.9	0	0	2.37	3806	3000	0	1000	2767	0	3000	9767			68.59	4452	518
39000	111000	0.79	248.54	16297	1519.5	0	0	2.33	3772	3000	0	1000	1767	0	3000	8767			84.43	5452	637.6
39000	110000	0.79	264.51	17297	1640.2	0	0	2.29	3739	3000	0	1000	767	0	3000	7767			100.4	6452	758.3
39000	109000	0.79	280.63	18297	1761.9	0	0	2.25	3706	3000	0	767	0	0	3000	6767			116.52	7452	880
39000	108119	0.79	294.95	19178	1870	0	0	2.22	3677	2943	0	0	0	0	2943	5886			130.84	8333	988.1
39000	108119	0.79	294.95	19178	1870	-2339.7	-2.9	2.23	947	2943	0	0	0	0	2943	5886			0	0	0
38036	108112	0.79	295.36	19185	1873.1	-2354.9	-2.9	2.04	954	2939.5	0	0	0	0	2939.5	5879			0.41	7	3.1
38035	108112	0.79	295.36	19185	1873.1	-1708	-2.1	2.04	954	2939.5	0	0	0	0	2939.5	5879			0.41	7	3.1
37000	108103	0.773	295.97	19194	1877.6	-1689.4	-2.2	2.13	935	2935	0	0	0	0	2935	5870			1.02	16	7.6
36089	108094	0.758	296.51	19203	1881.6	-1686.5	-2.2	2.19	904	2930.5	0	0	0	0	2930.5	5861			1.56	25	11.6
36089	108094	0.758	296.51	19203	1881.6	-1787.5	-2.3	2.19	904	2930.5	0	0	0	0	2930.5	5861			1.56	25	11.6
35000	108085	0.741	297.12	19212	1886	-1786.2	-2.4	2.26	869	2926	0	0	0	0	2926	5852			2.17	34	16
34000	108077	0.726	297.68	19220	1889.9	-1792.7	-2.4	2.3	833	2922	0	0	0	0	2922	5844			2.73	42	19.9
33000	108069	0.711	298.23	19228	1893.8	-1807.4	-2.5	2.34	794	2918	0	0	0	0	2918	5836			3.28	50	23.8
32000	108062	0.696	298.78	19235	1897.5	-1828.1	-2.5	2.38	751	2914.5	0	0	0	0	2914.5	5829			3.83	57	27.5
31000	108055	0.682	299.33	19242	1901.2	-1813.9	-2.6	2.4	760	2911	0	0	0	0	2911	5822			4.38	64	31.2
30000	108048	0.668	299.89	19249	1904.9	-1799.5	-2.6	2.42	770	2907.5	0	0	0	0	2907.5	5815			4.94	71	34.9
29000	108041	0.655	300.44	19256	1908.5	-1789	-2.6	2.44	775	2904	0	0	0	0	2904	5808			5.49	78	38.5
28000	108034	0.641	301	19263	1912.1	-1781.2	-2.6	2.46	775	2900.5	0	0	0	0	2900.5	5801			6.05	85	42.1
27000	108027	0.628	301.57	19270	1915.6	-1761.8	-2.7	2.49	792	2897	0	0	0	0	2897	5794			6.62	92	45.6
26000	108019	0.616	302.14	19278	1919.2	-1742.6	-2.7	2.51	810	2893	0	0	0	0	2893	5786			7.19	100	49.2
25000	108011	0.604	302.72	19286	1922.7	-1724.9	-2.7	2.53	827	2889	0	0	0	0	2889	5778			7.77	108	52.7
24000	108003	0.592	303.3	19294	1926.2	-1706.6	-2.7	2.54	844	2885	0	0	0	0	2885	5770			8.35	116	56.2
23000	107995	0.58	303.89	19302	1929.7	-1690.1	-2.7	2.55	860	2881	0	0	0	0	2881	5762			8.94	124	59.7
22000	107987	0.569	304.48	19310	1933.1	-1676.5	-2.7	2.56	872	2877	0	0	0	0	2877	5754			9.53	132	63.1
21000	107978	0.558	305.08	19319	1936.6	-1665.7	-2.8	2.55	880	2872.5	0	0	0	0	2872.5	5745			10.13	141	66.6
20000	107969	0.547	305.68	19328	1939.9	-1657.6	-2.8	2.57	885	2868	0	0	0	0	2868	5736			10.73	150	69.9
19000	107960	0.536	306.29	19337	1943.3	-1637.8	-2.8	2.57	910	2863.5	0	0	0	0	2863.5	5727			11.34	159	73.3
18000	107951	0.526	306.9	19346	1946.7	-1619.3	-2.8	2.58	934	2859	0	0	0	0	2859	5718			11.95	168	76.7
17000	107941	0.516	307.52	19356	1950	-1602.1	-2.8	2.59	957	2854	0	0	0	0	2854	5708			12.57	178	80
16000	107932	0.506	308.15	19365	1953.3	-1587.7	-2.8	2.59	977	2849.5	0	0	0	0	2849.5	5699			13.2	187	83.3
15000	107921	0.497	308.78	19376	1956.6	-1572	-2.9	2.6	999	2844	0	0	0	0	2844	5688			13.83	198	86.6
14000	107911	0.487	309.42	19386	1959.9	-1555.7	-2.9	2.6	1021	2839	0	0	0	0	2839	5678			14.47	208	89.9
13000	107900	0.478	310.07	19397	1963.2	-1540.9	-2.9	2.6	1041	2833.5	0	0	0	0	2833.5	5667			15.12	219	93.2
12000	107888	0.469	310.72	19409	1966.4	-1528.1	-2.9	2.59	1060	2827.5	0	0	0	0	2827.5	5655			15.77	231	96.4
11000	107877	0.461	311.38	19420	1969.7	-1517.3	-2.9	2.59	1076	2822	0	0	0	0	2822	5644			16.43	242	99.7
10000	107865	0.452	312.04	19432	1972.9	-1510.7	-3	2.59	1086	2816	0	0	0	0	2816	5632			17.09	254	102.9

10000	107865	0.452	312.04	19432	1972.9	-1510.7	-3	2.59	1086	2816	0	0	0	0	2816	5632			17.09	254	102.9	
9000	107853	0.444	312.7	19444	1976	-1511	-3	2.59	1086	2810	0	0	0	0	2810	5620			17.75	266	106	
8000	107841	0.436	313.36	19456	1979.1	-1512.9	-3.1	2.59	1085	2804	0	0	0	0	2804	5608			18.41	278	109.1	
7000	107829	0.428	314.02	19468	1982.2	-1501.4	-3.1	2.59	1102	2798	0	0	0	0	2798	5596			19.07	290	112.2	
6000	107817	0.42	314.69	19480	1985.3	-1486.6	-3.1	2.59	1124	2792	0	0	0	0	2792	5584			19.74	302	115.3	
5000	107804	0.413	315.37	19493	1988.3	-1473.2	-3.1	2.59	1145	2785.5	0	0	0	0	2785.5	5571			20.42	315	118.3	
4000	107791	0.406	316.05	19506	1991.3	-1461.1	-3.1	2.59	1165	2779	0	0	0	0	2779	5558			21.1	328	121.3	
3000	107778	0.398	316.74	19519	1994.3	-1447.3	-3.1	2.59	1189	2772.5	0	0	0	0	2772.5	5545			21.79	341	124.3	
2000	107764	0.391	317.43	19533	1997.3	-1433.4	-3.2	2.58	1211	2765.5	0	0	0	0	2765.5	5531			22.48	355	127.3	
1500	107757	0.388	317.78	19540	1998.8	-1426.9	-3.2	2.58	1221	2762	0	0	0	0	2762	5524			22.83	362	128.8	
0	107603	0	321.46	19694	1998.8	0	0	0	0	2685	0	0	0	0	2685	5370			26.51	516	128.8	

descent

22000	22000	0.2049	60.4	104717	310	1940	0.5687	1062
20000	20000	0.1875	54.5	104698	291	1892	0.5469	1132
18000	18000	0.1696	48.6	104677	270	1841	0.526	1206
16000	16000	0.1513	42.7	104654	247	1790	0.5062	1283
14000	14000	0.1324	36.9	104629	222	1740	0.4874	1365
12000	12000	0.113	31	104602	195	1690	0.4694	1450
10000	10000	0.0929	25.2	104572	165	1639	0.4523	1540
8000	8000	0.0723	19.3	104539	132	1590	0.436	1633
6000	6000	0.051	13.4	104503	96	1539	0.4204	1732
4000	4000	0.0289	7.5	104464	56	1482	0.4056	1853
2000	2000	0.0059	1.5	104419	12	1420	0.3914	2004
1500	1500	0	0	104407	0	1404	0.388	2045

ENROUTE DESCENT ANALYSIS

WIN D (KNOTS) = 0 DTEMP (DEG

HPR FT	HGEO FT	TIME HR	DIST NM	WEIGHT LB	FUEL LB	ROD FPM	MACH	TFF LB/HR
35000	35000	0.3086	100.2	105424	401	3090	0.74	760
34923	34923	0.3082	100	105424	401	3094	0.74	760
34923	34923	0.3082	100	105424	401	2269	0.74	760
34000	34000	0.3014	97.1	105419	396	2233	0.7258	760
32000	32000	0.2863	90.9	105407	384	2189	0.6962	775
30000	30000	0.2709	84.7	105395	372	2138	0.6681	820
28000	28000	0.2551	78.6	105381	359	2085	0.6414	877
26000	26000	0.2389	72.6	105367	344	2034	0.6159	933
24000	24000	0.2223	66.5	105351	328	1983	0.5917	996
22000	22000	0.2053	60.6	105333	310	1936	0.5687	1062
20000	20000	0.1879	54.6	105314	291	1888	0.5469	1132
18000	18000	0.17	48.7	105293	270	1838	0.526	1206
16000	16000	0.1516	42.8	105270	247	1787	0.5062	1283
14000	14000	0.1326	36.9	105245	222	1737	0.4874	1365
12000	12000	0.1132	31.1	105218	195	1686	0.4694	1450
10000	10000	0.0931	25.2	105188	165	1636	0.4523	1540
8000	8000	0.0724	19.3	105155	132	1587	0.436	1633
6000	6000	0.051	13.4	105119	96	1537	0.4204	1732
4000	4000	0.0289	7.5	105079	56	1480	0.4056	1853
2000	2000	0.0059	1.5	105035	12	1417	0.3914	2004
1500	1500	0	0	105023	0	1402	0.388	2045

LARGE AIRPLANE

ENROUTE DESCENT ANALYSIS

descent

WIN D (KNO TS) = 0 DTEMP (DEG

HPR FT	HGEO FT	TIME HR	DIST NM	WEIGH LB	FUEL LB	ROD FPM	MACH	T FF LB/HR
43000	43000	0.3722	134.8	488363	1714	3026	0.85	2524
42000	42000	0.3667	132.1	488349	1700	3028	0.85	2622
40000	40000	0.3558	126.8	488319	1671	3068	0.85	2817
38000	38000	0.3451	121.6	488288	1640	3178	0.85	2980
36672	36672	0.3382	118.2	488267	1619	3277	0.85	3087
36672	36672	0.3382	118.2	488267	1619	2292	0.85	3087
36089	36089	0.334	116.2	488254	1606	2257	0.8399	3120
36089	36089	0.334	116.2	488254	1606	2417	0.8399	3120
36000	36000	0.3333	115.9	488252	1604	2412	0.8384	3124
34000	34000	0.3193	109.2	488208	1559	2336	0.8047	3213
32000	32000	0.3049	102.6	488161	1512	2286	0.7727	3304
30000	30000	0.2901	96.1	488111	1463	2239	0.7422	3407
28000	28000	0.2751	89.6	488058	1410	2180	0.7131	3571
26000	26000	0.2596	83.1	488002	1353	2124	0.6853	3738
24000	24000	0.2436	76.7	487941	1292	2066	0.6589	3926
22000	22000	0.2273	70.3	487875	1226	2008	0.6338	4135
20000	20000	0.2104	63.9	487803	1155	1954	0.6098	4346
18000	18000	0.1932	57.6	487727	1078	1914	0.5869	4542
16000	16000	0.1756	51.3	487645	997	1881	0.5651	4749
14000	14000	0.1577	45.1	487558	909	1841	0.5443	5023
12000	12000	0.1394	38.9	487462	814	1793	0.5245	5359
12000	12000	0.1394	38.9	487462	814	1250	0.5245	5359
10000	10000	0.109	29.5	487293	645	976	0.4523	5704
10000	10000	0.109	29.5	487293	645	1370	0.4523	5704
8000	8000	0.0843	22.5	487152	503	1336	0.436	5810
6000	6000	0.0591	15.6	487003	355	1303	0.4204	5924
4000	4000	0.0331	8.6	486849	200	1269	0.4056	6008
2000	2000	0.0067	1.7	486689	40	1250	0.3914	6061
1500	1500	0	0	486648	0	1249	0.388	6074

ENROUTE DESCENT ANALYSIS

WIN D (KNO TS) = 0 DTEMP (DEG

HPR FT	HGEO FT	TIME HR	DIST NM	WEIGH LB	FUEL LB	ROD FPM	MACH	T FF LB/HR
39000	39000	0.3518	124.7	493096	1661	3105	0.85	2899
38000	38000	0.3464	122.1	493080	1646	3164	0.85	2980
36672	36672	0.3396	118.7	493059	1625	3261	0.85	3087
36672	36672	0.3396	118.7	493059	1625	2280	0.85	3087
36089	36089	0.3353	116.6	493046	1612	2246	0.8399	3120

descent

36089	36089	0.3353	116.6	493046	1612	2404	0.8399	3120
36000	36000	0.3346	116.3	493044	1610	2400	0.8384	3124
34000	34000	0.3205	109.7	492999	1565	2325	0.8047	3213
32000	32000	0.306	103	492952	1518	2275	0.7727	3304
30000	30000	0.2912	96.5	492902	1468	2229	0.7422	3407
28000	28000	0.2761	89.9	492850	1415	2170	0.7131	3571
26000	26000	0.2605	83.5	492793	1358	2115	0.6853	3738
24000	24000	0.2445	77	492731	1297	2057	0.6589	3926
22000	22000	0.2281	70.6	492665	1231	1999	0.6338	4135
20000	20000	0.2112	64.1	492593	1159	1945	0.6098	4346
18000	18000	0.1939	57.8	492516	1082	1906	0.5869	4542
16000	16000	0.1762	51.5	492434	1000	1872	0.5651	4749
14000	14000	0.1582	45.2	492346	912	1833	0.5443	5023
12000	12000	0.1398	39	492251	816	1785	0.5245	5359
12000	12000	0.1398	39	492251	816	1244	0.5245	5359
10000	10000	0.1093	29.6	492081	647	973	0.4523	5704
10000	10000	0.1093	29.6	492081	647	1366	0.4523	5704
8000	8000	0.0846	22.6	491939	504	1332	0.436	5810
6000	6000	0.0592	15.6	491790	356	1300	0.4204	5924
4000	4000	0.0332	8.6	491635	201	1266	0.4056	6008
2000	2000	0.0067	1.7	491475	41	1247	0.3914	6061
1500	1500	0	0	491434	0	1245	0.388	6074

ENROUTE DESCENT ANALYSIS

WIN D (KNOTS) = 0 DTEMP (DEG

HPR	HGEO	TIME	DIST	WEIGHT	FUEL	ROD	MACH	T FF
FT	FT	HR	NM	LB	LB	FPM		LB/HR
39000	39000	0.3534	125.2	498769	1669	3093	0.85	2899
38000	38000	0.348	122.6	498754	1653	3149	0.85	2980
36672	36672	0.3411	119.3	498733	1632	3242	0.85	3087
36672	36672	0.3411	119.3	498733	1632	2267	0.85	3087
36089	36089	0.3368	117.2	498719	1618	2233	0.8399	3120
36089	36089	0.3368	117.2	498719	1618	2391	0.8399	3120
36000	36000	0.3361	116.9	498717	1617	2386	0.8384	3124
34000	34000	0.3219	110.2	498672	1572	2311	0.8047	3213
32000	32000	0.3074	103.5	498625	1524	2262	0.7727	3304
30000	30000	0.2925	96.9	498575	1474	2217	0.7422	3407
28000	28000	0.2772	90.3	498522	1421	2159	0.7131	3571
26000	26000	0.2616	83.8	498465	1364	2104	0.6853	3738
24000	24000	0.2455	77.3	498403	1302	2046	0.6589	3926
22000	22000	0.229	70.9	498336	1235	1989	0.6338	4135
20000	20000	0.212	64.4	498264	1163	1935	0.6098	4346
18000	18000	0.1946	58	498187	1086	1896	0.5869	4542
16000	16000	0.1769	51.6	498105	1004	1862	0.5651	4749

descent

14000	14000	0.1588	45.4	498016	915	1823	0.5443	5023
12000	12000	0.1403	39.1	497920	819	1776	0.5245	5359
12000	12000	0.1403	39.1	497920	819	1237	0.5245	5359
10000	10000	0.1096	29.7	497750	649	970	0.4523	5704
10000	10000	0.1096	29.7	497750	649	1362	0.4523	5704
8000	8000	0.0848	22.7	497607	506	1328	0.436	5810
6000	6000	0.0594	15.6	497458	357	1295	0.4204	5924
4000	4000	0.0333	8.7	497302	201	1262	0.4056	6008
2000	2000	0.0067	1.7	497142	41	1243	0.3914	6061
1500	1500	0	0	497101	0	1241	0.388	6074

cruise

ENROUT CRUISE ANALYSIS 35000 0 (FEET)
WIND (KNOTS) = 0 DTEMP (EG C.) = 0

WEIGHT LB	DISTAN NMI	(TIME HR	FUEL LB	NMI/LB	VELOCIT KTS	FUEL FL LB/HR	MACH
125019	0	0	0	0.08033	429.634	5348.6	0.74535
123964	85.1	0.1982	1055	0.08106	429.647	5300.1	0.74537
122905	171.3	0.3988	2114	0.0818	429.646	5252.6	0.74537
121847	258.3	0.6012	3172	0.08252	429.63	5206.3	0.74534
120789	346	0.8054	4231	0.08324	429.601	5160.9	0.74529
119730	434.5	1.0114	5289	0.08396	429.558	5116	0.74522
118672	523.8	1.2192	6347	0.08468	429.5	5072.3	0.74512
117613	613.8	1.4287	7406	0.08538	429.432	5029.8	0.745
116555	704.5	1.64	8464	0.08607	429.432	4989.1	0.745
115496	796	1.853	9523	0.08676	429.432	4949.5	0.745
114438	888.2	2.0677	10581	0.08744	429.432	4911	0.745
113379	981.1	2.2841	11640	0.08812	429.432	4873.3	0.745
112321	1074.7	2.5021	12698	0.08879	429.432	4836.6	0.745
111263	1169	2.7217	13757	0.08945	429.432	4800.7	0.745
110204	1264	2.943	14815	0.09011	429.432	4765.7	0.745
109146	1359.8	3.1659	15873	0.09076	429.432	4731.5	0.745
108087	1456.2	3.3904	16932	0.09141	429.432	4698.1	0.745
107029	1553.3	3.6165	17990	0.09205	429.432	4665.4	0.745
105970	1651	3.8441	19049	0.09268	429.432	4633.4	0.745
105424	1701.7	3.9622	19595	0.09301	429.42	4616.9	0.74498

LARGE AIRPLANE

ENROUTE CRUISE ANALYSIS 39000 0 (FEET)
WIND (KNOTS) 0 DTEMP (EG C.) = 0

WEIGHT LB	DISTAN NMI	(E TIME HR	FUEL LB	NMI/LB	VELOCIT KTS	FUEL FL LB/HR	MACH
559723	0	0	0	0.02341	487.534	20826.3	0.85
557761	46	0.0944	1962	0.02349	487.534	20758	0.85
552682	165.8	0.3401	7041	0.02368	487.534	20584.2	0.85
547603	286.6	0.5878	12120	0.02388	487.534	20415.9	0.85
542525	408.4	0.8376	17199	0.02407	487.534	20253.4	0.85
537446	531.1	1.0894	22278	0.02426	487.534	20095.5	0.85

cruise

532367	654.8	1.3431	27357	0.02445	487.534	19940.3	0.85
527288	779.4	1.5987	32436	0.02464	487.534	19789.3	0.85
522209	905	1.8564	37514	0.02482	487.534	19640.5	0.85
517130	1031.6	2.1159	42593	0.02501	487.534	19494.4	0.85
512051	1159.1	2.3774	47672	0.02519	487.534	19351.4	0.85
510274	1203.9	2.4694	49450	0.02526	487.534	19302.1	0.85

ENROUTE CRUISE ANALYSIS 43000 0 (FEET)
WIND (KNOTS) 0 DTEMP (EG C.) = 0

WEIGHT LB	DISTANCE NMI	TIME HR	FUEL LB	NMI/LB	VELOCITY KTS	FUEL FL LB/HR	MACH
508348	0	0	0	0.02533	487.534	19249.2	0.85
505898	62.2	0.1276	2450	0.02546	487.534	19149.8	0.85
503037	135.3	0.2775	5311	0.02561	487.534	19035.5	0.85
500175	208.8	0.4282	8172	0.02577	487.534	18922.2	0.85
497314	282.7	0.5799	11034	0.02592	487.534	18810.8	0.85
494453	357.1	0.7325	13895	0.02607	487.534	18698.1	0.85
491591	431.9	0.886	16756	0.02623	487.534	18584.4	0.85
488730	507.2	1.0404	19618	0.02639	487.534	18471.7	0.85
488363	516.9	1.0603	19985	0.02641	487.534	18457.3	0.85

ENROUTE CRUISE ANALYSIS 35000 0 (FEET)
WIND (KNOTS) 0 DTEMP (EG C.) = 0

WEIGHT LB	DISTANCE NMI	TIME HR	FUEL LB	NMI/LB	VELOCITY KTS	FUEL FL LB/HR	MACH
658800	0	0	0	0.02002	489.956	24470.7	0.85
651689	143.1	0.292	7111	0.02022	489.956	24233.4	0.85
643927	300.8	0.614	14873	0.02043	489.956	23984.9	0.85
636164	460.2	0.9393	22636	0.02063	489.956	23745.3	0.85
628401	621.2	1.2678	30398	0.02084	489.956	23509.9	0.85
620639	783.7	1.5996	38161	0.02105	489.956	23281.2	0.85
620477	787.1	1.6066	38323	0.02105	489.956	23276.5	0.85

ENROUTE CRUISE ANALYSIS 39000 0 (FEET)
WIND (KNOTS) 0 DTEMP (EG C.) = 0

WEIGHT LB	DISTANCE NMI	TIME HR	FUEL LB	NMI/LB	VELOCITY KTS	FUEL FL LB/HR	MACH
--------------	-----------------	------------	------------	--------	-----------------	------------------	------

cruise

618279	0	0	0	0.02111	487.534	23098.3	0.85
613629	98.6	0.2022	4650	0.02129	487.534	22903.3	0.85
608550	207.2	0.4249	9729	0.02148	487.534	22695.8	0.85
603471	316.8	0.6497	14808	0.02168	487.534	22491	0.85
598392	427.4	0.8766	19887	0.02188	487.534	22285.1	0.85
593313	539	1.1056	24966	0.02208	487.534	22080.5	0.85
588234	651.7	1.3366	30044	0.02228	487.534	21878.8	0.85
583155	765.3	1.5698	35123	0.02249	487.534	21681.1	0.85
578077	880.1	1.8051	40202	0.02269	487.534	21487.7	0.85
572998	995.8	2.0426	45281	0.02289	487.534	21299.2	0.85
567919	1112.6	2.282	50360	0.02309	487.534	21115.6	0.85
562840	1230.3	2.5236	55439	0.02329	487.534	20936.2	0.85
557761	1349.1	2.7672	60518	0.02349	487.534	20758	0.85
552682	1468.9	3.0129	65597	0.02368	487.534	20584.2	0.85
547603	1589.7	3.2607	70675	0.02388	487.534	20415.9	0.85
542525	1711.5	3.5105	75754	0.02407	487.534	20253.4	0.85
537446	1834.2	3.7622	80833	0.02426	487.534	20095.5	0.85
532367	1957.9	4.0159	85912	0.02445	487.534	19940.3	0.85
527288	2082.6	4.2716	90991	0.02464	487.534	19789.3	0.85
522209	2208.1	4.5292	96070	0.02482	487.534	19640.5	0.85
517130	2334.7	4.7888	101149	0.02501	487.534	19494.4	0.85
512051	2462.2	5.0503	106228	0.02519	487.534	19351.4	0.85
506972	2590.6	5.3137	111306	0.02538	487.534	19211.7	0.85
501893	2719.9	5.579	116385	0.02556	487.534	19075.5	0.85
496815	2850.2	5.8462	121464	0.02573	487.534	18944.4	0.85
493096	2946.1	6.043	125183	0.02586	487.534	18851.6	0.85

ENROUTE CRUISE ANALYSIS 31000 0 (FEET)
WIND (KNOTS) 0 DTEMP (EG C.) = 0

WEIGHT LB	DISTANCE NMI	TIME HR	FUEL LB	NMI/LB	VELOCITY KTS	FUEL FL LB/HR	MACH
775750	0	0	0	0.01688	498.75	29554.4	0.85
766100	163.8	0.3284	9650	0.01707	498.75	29214.6	0.85
757630	309.1	0.6198	18120	0.01724	498.75	28922.1	0.85

ENROUTE CRUISE ANALYSIS 35000 0 (FEET)
WIND (KNOTS) 0 DTEMP (EG C.) = 0

WEIGHT LB	DISTANCE NMI	TIME HR	FUEL LB	NMI/LB	VELOCITY KTS	FUEL FL LB/HR	MACH
--------------	-----------------	------------	------------	--------	-----------------	------------------	------

cruise

754999	0	0	0	0.0173	489.956	28324.6	0.85
752602	41.5	0.0848	2397	0.01737	489.956	28209.8	0.85
744840	177.2	0.3617	10159	0.01759	489.956	27855.1	0.85
737077	314.6	0.6421	17922	0.01781	489.956	27517.1	0.85
729315	453.7	0.9259	25685	0.01802	489.956	27186.6	0.85
721552	594.4	1.2132	33447	0.01825	489.956	26853.6	0.85
713790	736.9	1.5041	41210	0.01847	489.956	26527.2	0.85
706027	881.2	1.7984	48972	0.01869	489.956	26210.8	0.85
698264	1027.1	2.0964	56735	0.01891	489.956	25903.8	0.85
690502	1174.8	2.3978	64497	0.01913	489.956	25608.8	0.85
682739	1324.2	2.7026	72260	0.01935	489.956	25322.2	0.85
674977	1475.2	3.0109	80023	0.01957	489.956	25038.3	0.85
667214	1627.9	3.3226	87785	0.01979	489.956	24761.8	0.85
659452	1782.4	3.6378	95548	0.02	489.956	24493	0.85
651689	1938.5	3.9565	103310	0.02022	489.956	24233.4	0.85
643927	2096.3	4.2785	111073	0.02043	489.956	23984.9	0.85
636164	2255.6	4.6037	118835	0.02063	489.956	23745.3	0.85
628401	2416.6	4.9323	126598	0.02084	489.956	23509.9	0.85
620639	2579.2	5.2641	134360	0.02105	489.956	23281.2	0.85
620477	2582.6	5.271	134523	0.02105	489.956	23276.5	0.85

ENROUTE CRUISE ANALYSIS 39000 0 (FEET)
WIND (KNOTS) 0 DTEMP (EG C.) = 0

WEIGHT LB	DISTANCE NMI	TIME HR	FUEL LB	NMI/LB	VELOCITY KTS	FUEL FL LB/HR	MACH
618279	0	0	0	0.02111	487.534	23098.3	0.85
613629	98.6	0.2022	4650	0.02129	487.534	22903.3	0.85
608550	207.2	0.4249	9729	0.02148	487.534	22695.8	0.85
603471	316.8	0.6497	14808	0.02168	487.534	22491	0.85
598392	427.4	0.8766	19887	0.02188	487.534	22285.1	0.85
593313	539	1.1056	24966	0.02208	487.534	22080.5	0.85
588234	651.7	1.3366	30044	0.02228	487.534	21878.8	0.85
583155	765.3	1.5698	35123	0.02249	487.534	21681.1	0.85
578077	880.1	1.8051	40202	0.02269	487.534	21487.7	0.85
572998	995.8	2.0426	45281	0.02289	487.534	21299.2	0.85
567919	1112.6	2.282	50360	0.02309	487.534	21115.6	0.85
562840	1230.3	2.5236	55439	0.02329	487.534	20936.2	0.85
557761	1349.1	2.7672	60518	0.02349	487.534	20758	0.85
552682	1468.9	3.0129	65597	0.02368	487.534	20584.2	0.85
547603	1589.7	3.2607	70675	0.02388	487.534	20415.9	0.85
542525	1711.5	3.5105	75754	0.02407	487.534	20253.4	0.85
537446	1834.2	3.7622	80833	0.02426	487.534	20095.5	0.85
532367	1957.9	4.0159	85912	0.02445	487.534	19940.3	0.85

cruise

527288	2082.6	4.2716	90991	0.02464	487.534	19789.3	0.85
522209	2208.1	4.5292	96070	0.02482	487.534	19640.5	0.85
517130	2334.7	4.7888	101149	0.02501	487.534	19494.4	0.85
512051	2462.2	5.0503	106228	0.02519	487.534	19351.4	0.85
506972	2590.6	5.3137	111306	0.02538	487.534	19211.7	0.85
501893	2719.9	5.579	116385	0.02556	487.534	19075.5	0.85
498769	2800	5.7431	119509	0.02567	487.534	18994.4	0.85

climb

24000	24000	0.1263	42	114633	2042	0.6589	9600
26000	26000	0.1436	49	114471	1822	0.6853	9125
28000	28000	0.1631	57.2	114297	1598	0.7131	8679
29855	29855	0.184	66.2	114120	1383	0.74	8289
29855	29855	0.184	66.2	114120	1889	0.74	8289
30000	30000	0.1853	66.7	114110	1871	0.74	8248
32000	32000	0.2046	75.1	113956	1605	0.74	7682
34000	34000	0.2276	85	113787	1322	0.74	7134
35000	35000	0.241	90.7	113693	1173	0.74	6868

HPR FT	HGEO FT	TIME HR	DIST NM	WEIGHT LB	ROC FPM	MACH	T FF LB/HR
1500	1500	0	0	129082	3694	0.388	16119
2000	2000	0.0023	0.6	129045	3657	0.3914	15950
4000	4000	0.0116	3	128900	3505	0.4056	15290
6000	6000	0.0213	5.6	128754	3353	0.4204	14649
8000	8000	0.0315	8.4	128608	3190	0.436	14004
10000	10000	0.0423	11.4	128461	3016	0.4523	13350
10000	10000	0.0423	11.4	128461	500	0.4523	13350
10162	10162	0.0477	13.1	128389	500	0.5071	13544
10162	10162	0.0477	13.1	128389	3070	0.5071	13542
12000	12000	0.0579	16.4	128253	2895	0.5245	12980
14000	14000	0.0699	20.4	128101	2701	0.5443	12377
16000	16000	0.0827	24.9	127947	2502	0.5651	11750
18000	18000	0.0966	29.9	127788	2296	0.5869	11125
20000	20000	0.1118	35.5	127623	2093	0.6098	10562
22000	22000	0.1286	41.8	127450	1901	0.6338	10082
24000	24000	0.1471	49.1	127268	1708	0.6589	9600
26000	26000	0.1679	57.5	127074	1507	0.6853	9125
28000	28000	0.1918	67.5	126862	1301	0.7131	8679
29855	29855	0.2178	78.7	126641	1094	0.74	8289
29855	29855	0.2178	78.7	126641	1495	0.74	8289
30000	30000	0.2194	79.4	126628	1476	0.74	8248
31000	31000	0.2312	84.5	126532	1349	0.74	7965

HPR FT	HGEO FT	TIME HR	DIST NM	WEIGHT LB	ROC FPM	MACH	T FF LB/HR
31000	31000	0	0	125495	1357	0.7449	7990
32000	32000	0.013	5.7	125394	1220	0.745	7705
34000	34000	0.0447	19.4	125159	924	0.7452	7156
35000	35000	0.0647	28	125019	761	0.7454	6891

LARGE AIRPLANE

climb

HPR FT	HGEO FT	TIME HR	DIST NM	WEIGHT LB	ROC FPM	MACH	T FF LB/HR
1500	1500	0	0	571691	4629	0.388	75955
2000	2000	0.0018	0.5	571554	4613	0.3914	75487
4000	4000	0.0091	2.3	571011	4537	0.4056	73623
6000	6000	0.0165	4.3	570471	4425	0.4204	71491
8000	8000	0.0242	6.4	569933	4274	0.436	69018
10000	10000	0.0321	8.6	569394	4114	0.4523	66503
10000	10000	0.0321	8.6	569394	0	0.4523	66503
10000	10000	0.0405	11.4	568823	0	0.5838	69827
10000	10000	0.0405	11.4	568823	4429	0.5838	69827
12000	12000	0.0483	14.3	568293	4170	0.6052	66844
14000	14000	0.0566	17.5	567752	3896	0.6275	63860
16000	16000	0.0654	21.1	567199	3640	0.651	61097
18000	18000	0.0749	25	566633	3403	0.6755	58500
20000	20000	0.0852	29.3	566050	3098	0.7011	55160
22000	22000	0.0962	34.1	565449	2932	0.728	53553
24000	24000	0.1081	39.5	564828	2716	0.756	51555
26000	26000	0.1209	45.4	564179	2466	0.7854	49211
28000	28000	0.1353	52.3	563491	2183	0.8162	46567
30000	30000	0.152	60.5	562740	1847	0.8484	43799
30097	30097	0.1529	61	562701	1828	0.85	43653
30097	30097	0.1529	61	562701	2700	0.85	43653
32000	32000	0.1654	67.2	562178	2397	0.85	40354
34000	34000	0.1804	74.6	561600	2069	0.85	36957
36000	36000	0.1982	83.3	560973	1699	0.85	33491
36089	36089	0.1991	83.8	560944	1681	0.85	33334
36089	36089	0.1991	83.8	560944	1519	0.85	33334
38000	38000	0.2232	95.5	560182	1175	0.85	30422
39000	39000	0.2386	103	559723	994	0.85	29009

HPR FT	HGEO FT	TIME HR	DIST NM	WEIGHT LB	ROC FPM	MACH	T FF LB/HR
39000	39000	0	0	510274	1323	0.85	28807
40000	40000	0.0136	6.6	509892	1144	0.85	27464
42000	42000	0.0498	24.3	508954	770	0.85	24874
43000	43000	0.0749	36.5	508348	585	0.85	23669

HPR FT	HGEO FT	TIME HR	DIST NM	WEIGHT LB	ROC FPM	MACH	T FF LB/HR
1500	1500	0	0	671951	3821	0.4017	76160
2000	2000	0.0022	0.6	671785	3808	0.4052	75734
4000	4000	0.011	2.9	671124	3744	0.4198	73957
6000	6000	0.02	5.4	670466	3640	0.4351	71817

climb

8000	8000	0.0294	8.1	669807	3504	0.4512	69356
10000	10000	0.0391	10.9	669146	3359	0.468	66841
10000	10000	0.0391	10.9	669146	0	0.468	66841
10000	10000	0.0498	14.6	668409	0	0.6023	70338
10000	10000	0.0498	14.6	668409	3625	0.6023	70338
12000	12000	0.0594	18.3	667754	3381	0.6242	67182
14000	14000	0.0696	22.4	667082	3141	0.6472	64224
16000	16000	0.0806	26.9	666390	2918	0.6712	61482
18000	18000	0.0925	32	665677	2709	0.6963	58925
20000	20000	0.1054	37.6	664936	2465	0.7226	55941
22000	22000	0.1194	43.9	664165	2304	0.7501	54250
24000	24000	0.1345	50.9	663360	2107	0.7788	52183
26000	26000	0.1513	58.9	662507	1887	0.8089	49818
28000	28000	0.1704	68.4	661583	1621	0.8403	47128
28599	28599	0.1767	71.5	661286	1527	0.85	46266
28599	28599	0.1767	71.5	661286	2255	0.85	46266
30000	30000	0.1876	77	660799	2064	0.85	43826
32000	32000	0.2051	85.7	660063	1759	0.85	40354
34000	34000	0.2262	96.2	659250	1430	0.85	36957
35000	35000	0.2387	102.3	658800	1255	0.85	35304

HPR FT	HGEO FT	TIME HR	DIST NM	WEIGHT LB	ROC FPM	MACH	T FF LB/HR
35000	35000	0	0	620477	1500	0.85	35058
36000	36000	0.012	5.8	620069	1301	0.85	33259
36089	36089	0.0131	6.4	620031	1283	0.85	33102
36089	36089	0.0131	6.4	620031	1159	0.85	33102
38000	38000	0.0466	22.7	618978	805	0.85	30211
39000	39000	0.0704	34.3	618279	621	0.85	28807

HPR FT	HGEO FT	TIME HR	DIST NM	WEIGHT LB	ROC FPM	MACH	T FF LB/HR
1500	1500	0	0	790626	3130	0.4246	76691
2000	2000	0.0027	0.7	790422	3117	0.4283	76259
4000	4000	0.0135	3.8	789608	3054	0.4437	74464
6000	6000	0.0246	7.1	788793	2956	0.4597	72317
8000	8000	0.0361	10.5	787974	2829	0.4766	69890
10000	10000	0.0482	14.3	787146	2695	0.4943	67394
10000	10000	0.0482	14.3	787146	0	0.4943	67394
10000	10000	0.0616	19.1	786215	0	0.6242	70690
10000	10000	0.0616	19.1	786215	2869	0.6242	70690
12000	12000	0.0737	24	785380	2656	0.6468	67607
14000	14000	0.0868	29.4	784515	2445	0.6704	64672
16000	16000	0.101	35.5	783615	2249	0.6951	61943

climb

18000	18000	0.1164	42.3	782679	2092	0.7209	59848
20000	20000	0.1333	49.9	781695	1869	0.7479	56856
22000	22000	0.1519	58.6	780656	1725	0.7761	55074
24000	24000	0.1723	68.4	779554	1551	0.8056	52962
26000	26000	0.1954	79.8	778359	1348	0.8364	50660
26854	26854	0.2064	85.3	777807	1237	0.85	49459
26854	26854	0.2064	85.3	777807	1828	0.85	49459
28000	28000	0.2173	90.9	777280	1682	0.85	47350
30000	30000	0.2391	101.8	776291	1405	0.85	43826
31000	31000	0.2517	108.1	775750	1248	0.85	42064

HPR FT	HGEO FT	TIME HR	DIST NM	WEIGHT LB	ROC FPM	MACH	T FF LB/HR
31000	31000	0	0	757630	1352	0.85	41772
32000	32000	0.0132	6.5	757092	1191	0.85	40074
34000	34000	0.0469	23.2	755805	843	0.85	36700
35000	35000	0.0695	34.3	754999	660	0.85	35058

HPR FT	HGEO FT	TIME HR	DIST NM	WEIGHT LB	ROC FPM	MACH	T FF LB/HR
35000	35000	0	0	620477	1500	0.85	35058
36000	36000	0.012	5.8	620069	1301	0.85	33259
36089	36089	0.0131	6.4	620031	1283	0.85	33102
36089	36089	0.0131	6.4	620031	1159	0.85	33102
38000	38000	0.0466	22.7	618978	805	0.85	30211
39000	39000	0.0704	34.3	618279	621	0.85	28807

