Conklin & de Decker

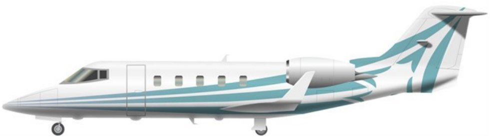
A JSSI Company

The Conklin & de Decker Report

Bombardier Learjet 55/55B

Created on August 29, 2019

by Doug Strangfeld



PO BOX 121184
1006 North Bowen, Suite B
Arlington, TX 76012

www.conklindd.com

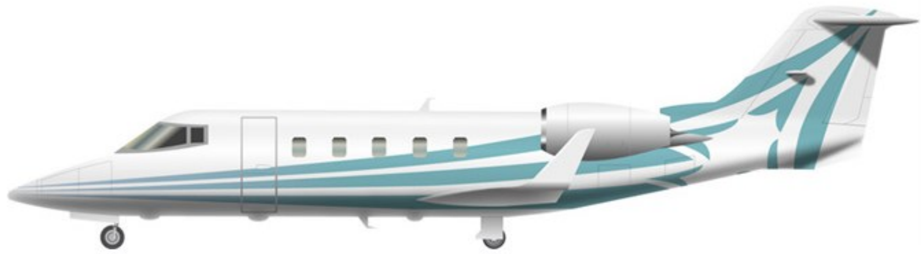
Data version: V 19.1

Bombardier Learjet 55/55B

RANGE
1,870 nm

SPEED
490 kts

PASSENGERS
7 people



Cost

ACQUISITION COST	ANNUAL COST	VARIABLE COST	FIXED COST
$850,000	**$1,696,070**	**$2,938/hr**	**$520,693**

MAX PAYLOAD	2,450 lb	ENGINES	2 Honeywell Engines TFE 731-3AR
TOTAL CABIN AREA	403 cu ft	AVIONICS	—
WINGSPAN	43.7 ft	APU	—

Assumptions

This report uses custom assumptions that differ from Conklin & de Decker default values for Annual Utilization (Hours), Fuel Price (Jet A).

ANNUAL UTILIZATION (DISTANCE)	170,400 nm	FUEL PRICE (JET A)	$4.45/gal
ANNUAL UTILIZATION (HOURS)	400 hrs	LABOR COST	$136/hr
AVERAGE SPEED (STANDARD TRIP)	426 kts	ACQUISITION COST	$850,000

Bombardier Learjet

Bill Lear founded Learjet in the late 1950s as the Swiss American Aviation Corporation. Lear had a vision to build a jet-powered business airplane because business aircraft during this time period were mainly piston-powered and slow. He began laying out plans to build a jet-powered business aircraft based on the Swiss P-16 fighter. He ultimately ran into opposition from the company board of directors to build this aircraft and sold his controlling interest to the Siegler Corporation for $100 million to finance the venture.

The tooling for building the aircraft was purchased and moved from Switzerland to Wichita, KS. LearJet opened in September 1962, while the plant at Wichita's airport was under construction. Assembly of the first Learjet began in 1963. The norm for a new concept aircraft was to hand build a prototype for flight testing. Lear decided to take a huge risk by skipping this step and moving directly into production. This was extremely risky because the designs could fail, forcing redesign and retooling that would force the company into bankruptcy. Lear took the risk in order to beat the competition.

The risk paid off and the Learjet 23, a six- to eight-seater aircraft, first flew on October 7, 1963. The first production model was delivered in October 1964. Despite a healthy backlog of orders, Lear did not have the capital necessary to begin production. In order to resolve this issue, Lear sold a portion of his holdings to the public and made it a public-owned corporation. Several models followed, with the Model 24 first flying on February 24, 1966, and the Model 25 first flying on August 12, 1966. On September 19, the company was renamed Lear Jet Industries Inc.

In 1969, Learjet merged with Gates Aviation and was renamed Gates Learjet Corporation. Production of aircraft then began in Tucson, AZ, as well as Wichita. Company headquarters moved to Tucson in 1986. In 1987, Gates Learjet was bought by Integrated Acquisition and renamed Learjet Corporation. All aircraft production was moved back to Wichita. Integrated Acquisition filed for Chapter 11 bankruptcy in 1990 and Bombardier then stepped in to purchase Learjet. It has been a subsidiary of Bombardier ever since.

Learjet 55/55B

The Learjet 55 was Learjet's entry into the medium-sized business jet field. In designing the 55, Learjet utilizes the earlier Longhorn 28/29 wing with winglets and marries it to a larger fuselage. The step-down aisle in the cabin has 5 feet 9 inches of headroom. Power is supplied by two Honeywell TFE 731 engines that produce 3,700 pounds of thrust each.

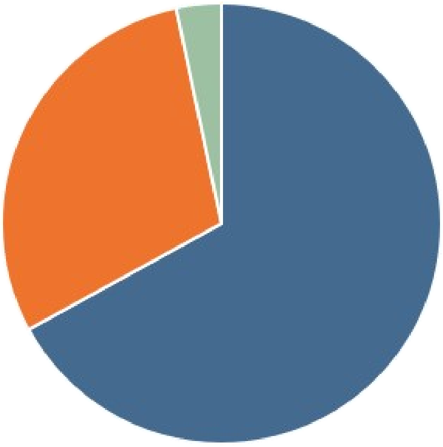
The Learjet 55B introduces a digital flight deck, modified wings, and an improved interior.

The first production aircraft flew on August 11, 1980.

1. Cost

ACQUISITION COST	ANNUAL COST	VARIABLE COST	FIXED COST
$850,000	**$1,696,070**	**$2,938/hr**	**$520,693**

Total Annual Cost With Market Depreciation



$1,753,870

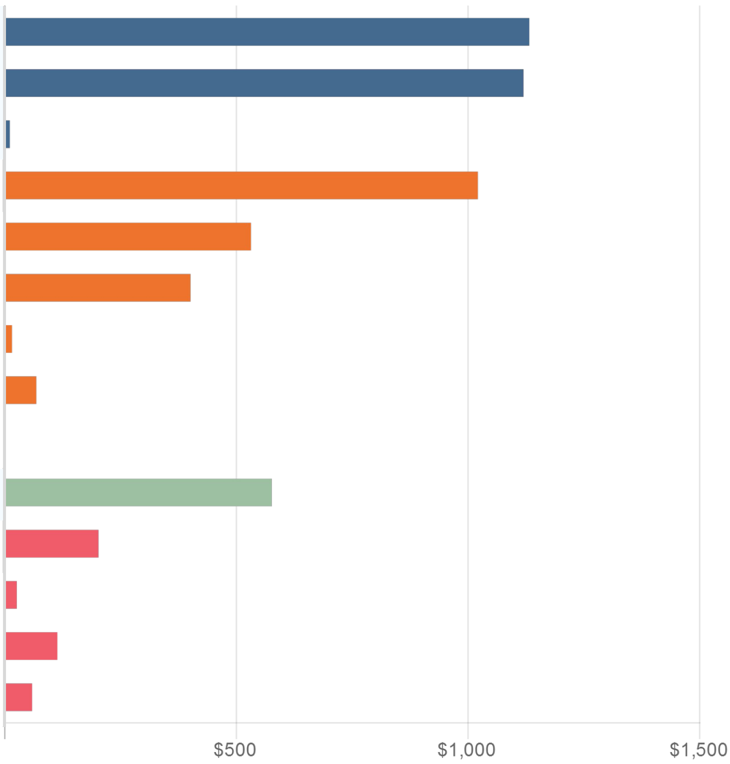
- 67% - Variable Cost - $1,175,377
- 30% - Fixed Cost - $520,693
- 3% - Market Depreciation - $57,800

Hourly Variable Cost

PER FLIGHT HOUR

$2,938/hr

Fuel [1]	**$1,134**
Fuel	$1,121
Additives	$13
Maintenance	**$1,023**
Maintenance Labor [2]	$533
Parts Airframe/Engine/Avionics	$403
Thrust Reverser Allowance	$17
APU Allowance	$70
Major Periodic Maintenance	—
Engine Reserves	$578
Miscellaneous Reserves	**$204**
Landing/Parking	$28
Crew Expenses	$115
Supplies/Catering	$61



1. Fuel is calculated using Fuel Cost x Fuel Burn + 15% - 252 gal/hr

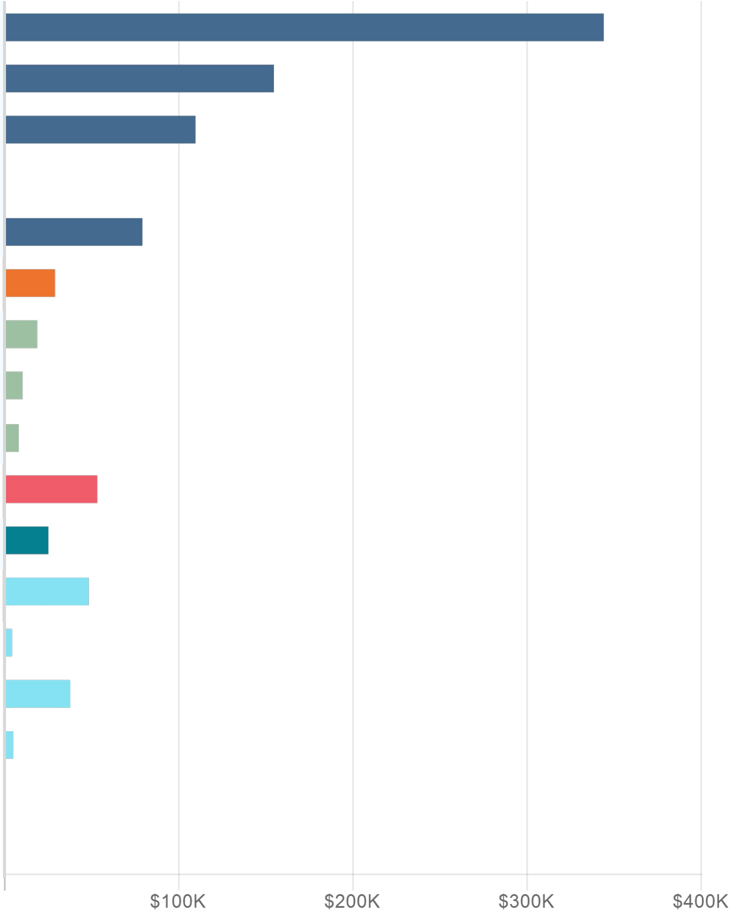
2. Maintenance Labor Cost is calculated using the ratio of Maintenance Labor Hours per Flight Hour and the Labor Rate: 3.92 labor-hr/Fhr @ $136/hr

Annual Fixed Cost

ANNUAL COST

$520,693

Crew	**$344,500**
Captain	$155,000
Copilot	$110,000
Flight Attendant	—
Benefits	$79,500
Hangar	$29,300
Insurance	**$19,125**
Hull	$10,625
Single Limit Liability	$8,500
Aircraft Modernization	$53,600
Training	$25,500
Miscellaneous	**$48,668**
Navigation Chart Service	$4,638
Refurbish	$38,080
Computer Maintenance Program	$5,250
Weather Service	$700
Other	—



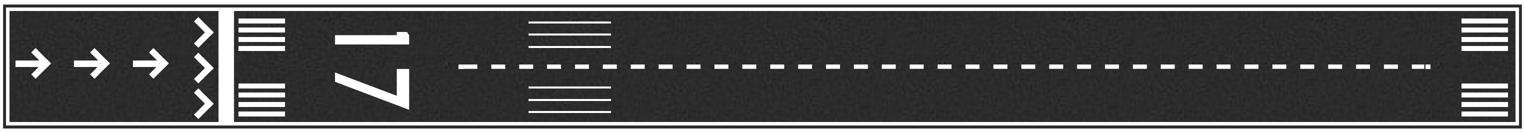
2. Performance

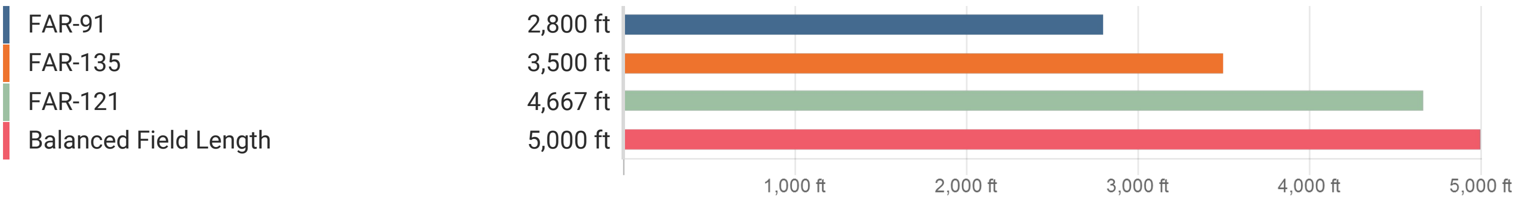
NORMAL CRUISE	LONG-RANGE CRUISE	MAXIMUM CRUISE
447 kts	**420 kts**	**490 kts**

RATE OF CLIMB	MAX CERT. ALTITUDE	INITIAL CRUISE ALTITUDE	TIME TO CRUISE ALTITUDE
4,059 ft/min	**51,000 ft**	**39,000 ft**	**17 min**

ENGINE OUT RATE OF CLIMB	ENGINE OUT CEILING
1,200 ft/min	**25,400 ft**

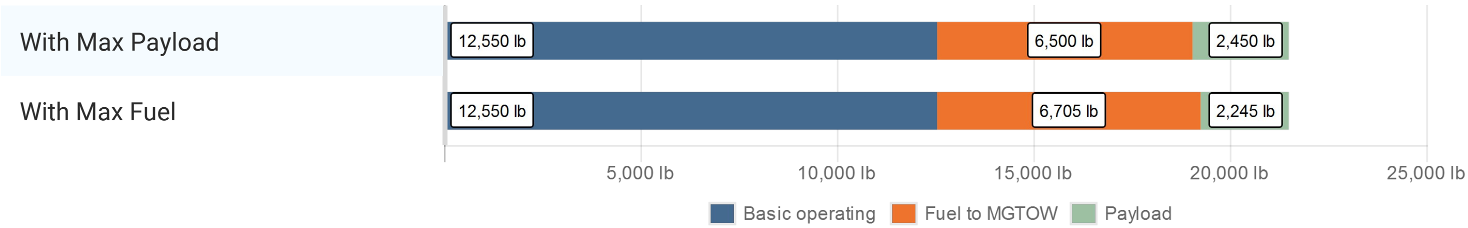
Field Length





3. Weight/Payload

Weight Breakdown



With Max Payload

MAXIMUM PAYLOAD	RANGE AT MAX PAYLOAD
2,450 lb	**1,904 nm**

With Max Fuel

AVAILABLE PAYLOAD	PASSENGER CAPACITY
2,495 lb	**12.5 people**

RAMP	21,750 lb
MAX LANDING	18,000 lb
BASIC OPERATING	12,550 lb
USEFUL LOAD	9,200 lb

MAX TAKEOFF	21,500 lb
ZERO FUEL	15,000 lb
USABLE FUEL	6,705 lb

4. Range

Long-Range Cruise

RANGE
1,960 nm

AVERAGE SPEED
420 kts

ENDURANCE
4.67 hrs

PASSENGERS
4 people

Maximum Cruise

RANGE
1,780 nm

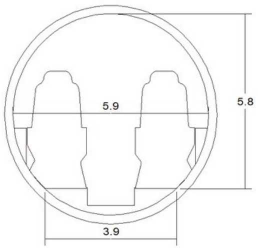
AVERAGE SPEED
447 kts

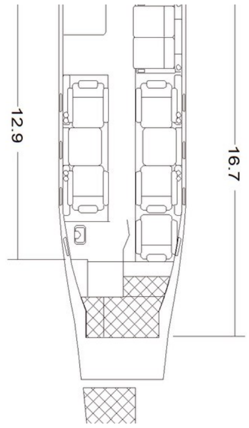
ENDURANCE
3.98 hrs

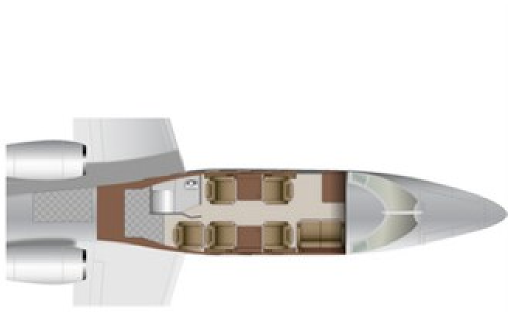
PASSENGERS
4 people

SEATS FULL RANGE	1,870 nm
FERRY RANGE	2,040 nm

5. Interior





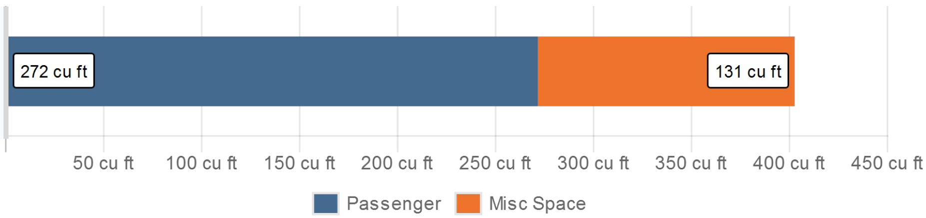


PASSENGERS
7 people

CREW
2 people

AREA PER PASSENGER
38.9 cu ft/person

CABIN VOLUME BREAKDOWN
403 cu ft



TOTAL CABIN AREA
403 cu ft

PASSENGER AREA
272 cu ft

MISC SPACE (GALLEY, LAV, ETC.)
131 cu ft

CABIN WIDTH
5.9 ft

CABIN LENGTH
16.7 ft

CABIN HEIGHT
5.75 ft

TOTAL BAGGAGE AREA
60 cu ft

INTERNAL
40 cu ft

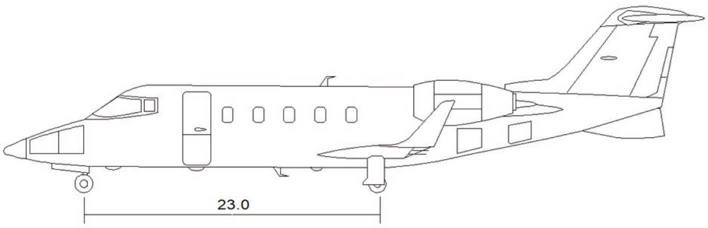
EXTERNAL
20 cu ft

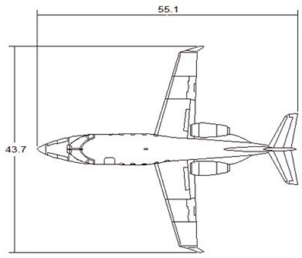
DOOR
10.6 sq ft

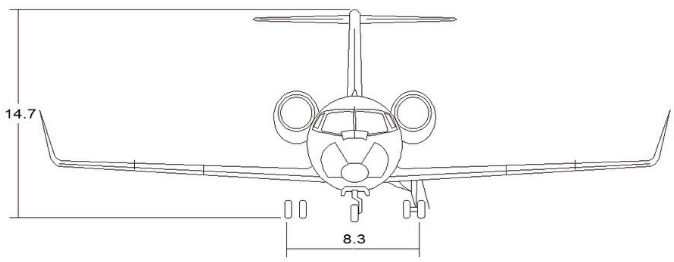
WIDTH (DOOR)
2 ft

LENGTH (DOOR)
5.3 ft

6. Exterior







WINGSPAN

43.7 ft

FUSELAGE

55.1 ft

POWERPLANT

2 Honeywell Engines TFE 731-3AR

THRUST

3,700 lb

THRUST REVERSER

Optional

7. Equipment

AVIONICS

—

COCKPIT VOICE RECORDER	—
FLIGHT DATA RECORDER	—
EICAS	—
GROUND WARNING SYSTEM	—
TRAFFIC WARNING SYSTEM	—
MAINT DIAG SYS	—
VHF 8KHZ SPACING	—

AUXILIARY POWER UNIT

—

MEETS STAGE 3 NOISE LEVELS	Yes
REGULATORY CERTIFICATION	1981 (STC) - LJ 55, 1986 (STC) - LJ55B 1987 (STC) - LJ55C original type certificate issued 1966 for LJ 24
IFR CERTIFIED	Yes
PRODUCTION	1981 - 1987
SINGLE POINT REFUEL	—
EXTERNAL LAV. SERVICE	—

Explanation of Terms

Introduction

The following describes the content of each cost element used in *The Conklin & de Decker Report*. **Aircraft not yet certified will be noted as Awaiting Cert in bold red on the program screen and bold print in the footnotes section printout. This is to indicate the data shown is preliminary in nature. If an aircraft is marked as Preliminary Data, the aircraft has been certified but the data is still preliminary at this stage.**

Methodology and Disclaimer

It is the opinion of Conklin & de Decker that the data presented in this publication is based on resonable methodologies and assumptions, and reliable sources. Manufacturer data may be based on differing assumptions, sales price adjustments, individually negotiated fleet contracts, differing warranties, or specialty maintenance programs particular to a manufacturer or year of production, and is therefore, in the opinion of Conklin & de Decker, not suitable for comparison with other aircraft. Conklin & de Decker has made adjustments based on research, which in its opinion are reasonable and necessary in order to provide a database that is suitable for comparative purposes. Actual experience will vary, and the data does not reflect specialized maintenance contracts, seperately negotiated fleet deals, or other items unique to particular sales transactions.

The Conklin & de Decker Report is not intended as a budgeting tool. Due to fluctuations in market costs, operating conditions and other factors, we make no warranties or representations regarding the future costs of maintenance or operation of any aircraft.

General Assumptions - Fixed Wing

All fixed wing aircraft costs are estimated using a cash flow method rather than an accrual method. These cost estimates reflect a 10 year time period to balance warranty with mature aircraft costs. The 10 year time period starts with the latest model year for each aircraft type. No funds are accrued to cover major maintenance costs beyond this 10 year period. For example, if any scheduled maintenance items (i.e. Major Inspections, Overhauls or Life Limited Parts) are due a maintenance action after this time period no funds are accrued to cover the cost of these on-condition items. During the warranty period new aircraft may see labor costs 15% less and parts costs 30% less than aircraft not under warranty.

General Assumptions - Helicopter

Our helicopter maintenance costs are estimated using an accrual method rather than a cash flow method. Our costs include an estimate of funds that should be set aside in order to pay for actual and eventual maintenance over one operational life of each of the components on the helicopter. For example, if the helicopter has a retirement item with a life of 5,000 hours, the maintenance cost accrued per hour is equal to the cost of the item divided by its life interval of 5,000 hours. A cash flow system shows estimated costs over a fixed period of time based upon the typical period of an individual operator’s ownership and does not reflect any maintenance costs the helicopter would experience beyond that fixed period. For more detailed information please refer to the other maintenance categories. Warranty is considered for all new helicopters, but its effect is negligible. One operational life starts with the latest model year for each helicopter type.

Aircraft Categories

Corporate - Jets, Turboprops Helicopters and Pistons

Corporate costs assume the aircraft is owned and operated by a company solely for company use. The aircraft is flown by a professional pilot. These aircraft are required to maintain a very high reliability rate and are kept in excellent condition. Equipment levels are assumed to be appropriate for the transportation of executives in instrument meteorological conditions (IMC).

Business - Turboprops

Business costs assume the aircraft is owner flown by small business. If single pilot operations are approved (generally aircraft less than 12,500 lbs max take-off weight), we show a single pilot. Maintenance reflects the same safety standards as Corporate but is not as labor-intensive as Corporate. Insurance costs for single pilot turbine operations are higher than if flown with two pilots. Equipment levels are suitable for flight in IMC.

Business - Pistons

Business costs assume the aircraft is owner flown by a businessperson who is also a rated pilot. No crew salaries are included. Insurance costs for owner-flown aircraft are higher than if flown by a professional pilot. Business hangar costs are assumed to be at a smaller airport with fewer amenities versus Corporate hangar costs (T-hanger vs. heated, executive-style hangar). Annual utilization is also assumed to be half that of Corporate. Maintenance reflects the same safety standards as corporate. Equipment levels are suitable for flight in IMC.

Commercial (Helicopter Only)

Commercial costs assume the aircraft is part of a fleet owned and operated for commercial purposes. Relative cost per hour is lower than a corporate aircraft. The aircraft is flown by a professional pilot whose primary job is pilot. Aircraft utilization is much higher than corporate. Pilot salaries are generally 20-30% lower than corporate pilots and Insurance is generally 50-100% higher than corporate. Aircraft maintenance and component overhauls are usually done in-house as opposed to sending the aircraft to a certified maintenance facility. These aircraft generally have fewer optional equipment items.

EMS (Helicopter Only)

EMS costs assume the aircraft is owned and operated by a company solely for emergency transport of patients from an accident scene to a medical facility. The aircraft is flown by a professional pilot. These aircraft are required to maintain a very high reliability rate and are kept in excellent condition. Equipment levels are assumed to be appropriate for the transportation of people experiencing a life threatening medical emergency in instrument meteorological conditions (IMC).

Offshore (Helicopter Only)

Offshore costs assume the aircraft is part of a fleet owned and operated for transporting personnel to offshore oil rigs. Relative cost per hour is generally lower than for a corporate aircraft. The aircraft is flown by a professional pilot whose primary job is pilot. Aircraft utilization is much higher than corporate. Pilot salaries are generally 20-30% lower than corporate pilots and insurance is generally 50-100% higher than corporate. Aircraft maintenance and component overhauls are usually done in-house as opposed to sending the aircraft to a certified maintenance facility. These aircraft generally have fewer optional equipment items.

Utility (Helicopter Only)

Utility costs assume the aircraft is part of a fleet owned and operated for utility purposes like stringing high voltage power lines, lifting equipment and logging. The aircraft is flown by a professional pilot whose primary job is pilot. Aircraft utilization is much higher than corporate. Pilot salaries are generally 20-30% lower than corporate pilots and insurance is generally 50-100% higher than corporate. Aircraft maintenance and component overhauls are usually done in-house as opposed to sending the aircraft to a certified maintenance facility. These aircraft generally have fewer optional equipment items.

Fuel Cost

Conklin & de Decker's fuel cost per gallon is the average of 300 U.S. FBO’s surveyed monthly by a third party. The fuel cost is currently updated twice annually.

No additives are included in the fuel cost but taxes and fees are.

Fuel Additives

The cost of fuel additives used for anti-icing or as a fungicide. Also includes the unscavenged engine oil on Rolls-Royce Viper engines.

Data Sources for Maintenance Costs

Newly Fielded and Newly Developed Aircraft

Manufacturer supplied cost data and our knowledge of similar aircraft models utilizing similar maintenance philosophies are used to estimate costs for aircraft not yet certified and aircraft new to the market. **Aircraft not yet certified will be noted as Est Data in the footnotes section printout**.

Mature Aircraft

Manufacturer supplied cost data, our knowledge of similar aircraft models utilizing similar maintenance philosophies in conjunction with operator and maintenance facility cost data are used to calculate the estimated costs for aircraft that have been in-production for a longer period of time or have gone out of production. New aircraft within this category reflect the benefit of warranty coverage. An aging factor is applied to the maintenance labor and parts based on the age of the aircraft.

Sales Tax

There are no sales taxes included in these costs.

Fuel Burn - Fixed Wing

The average fuel burn is shown in gallons per hour for the make/model aircraft. All data is generally derived from flight manuals and is calculated at typical cruise speeds and includes ground fuel. Cruise altitude assumed for unpressurized aircraft is 8,000 feet. For pressurized aircraft a flight altitude corresponding to an 8,000 foot or less cabin altitude is used.

Jets

The fuel burn calculation includes taxi, take-off and climb, cruise, decent and landing for a 600 NM trip. The 600 NM trip is used so all jets in the program can be compared on an equal basis. The profile is as follows:

- Two pilots and four passengers at 200 lbs. each. (Some VLJ or similar aircraft may use one pilot and/or three passengers for weight considerations).
- Start, taxi and take-off (include fuel for 10 minutes ground time).
- ISA, Standard Day (sea level, 59F/15C)
- Normal climb at ISA Standard conditions, no wind.
- Climb direct to altitude (no step climb), minimum rate of 500 feet/minute.
- Altitude for jets to be an odd numbered flight level between FL 350 – FL 450 (if not able to climb directly to FL 350, then next lower odd altitude).
- Cruise at altitude for at least 50% of the total flight time.
- Cruise speed to be at a constant Mach. For some aircraft where high speed cruise is not a typical speed for a 600 NM trip, we may use an intermediate (normal) cruise speed that is commensurate with that aircraft on a 600 NM trip. We will not use long range cruise unless required to make the 600 NM trip.
- Normal descent at ISA Standard conditions (no winds, 15C at sea level). Typically this is about 2,000 feet/minute descent. A high speed/maximum descent schedule will not be used if a slower descent schedule is available.
- NBAA IFR reserves for a 200 NM alternate.
- Trip fuel includes start, taxi and take-off fuel.
- Trip time is measured from take-off to touchdown.

Turboprops

The fuel burn calculation includes taxi, take-off and climb, cruise, decent and landing for a 300 NM trip, a typical trip length for a turboprop. This includes a crew of two at 200 lbs. each (one for single engine turboprops) and four passengers at 200 lbs. each unless otherwise noted. Fuel for the NBAA IFR reserves for a 200 NM alternate is also included in the calculation. We use the 200 NM reserve instead of the 100 NM reserve in to allow for a fair comparison between jets and turboprops.

Piston

The fuel burn calculation includes taxi, take-off and climb, cruise, decent and landing for a 200 NM trip, a typical trip length for a piston. This includes a crew of one at 200 lbs. and two passengers at 200 lbs. each unless otherwise noted. Thirty minute VFR reserve fuel is also included in the calculation.

Average fuel burn is trip fuel/trip time. To that amount we add 15% additional to account for real world conditions to include:

- Pilot flying techniques.
- Using other than recommended power settings.
- Air Traffic Control Restrictions - restricting the aircraft to less than optimum altitudes. Lower altitudes usually increase fuel burn.
- Ground delays - Running engines while spending extra time on the ground.
- Auxiliary Power Unit (APU) operation - Running the APU can amount to 20-30 gph.
- Tankering Fuel - Carrying more fuel than is required for a single flight.

Fuel Burn - Helicopter

The fuel burn calculation includes taxi, take-off and climb, cruise, decent and landing for a 50 NM trip. This includes a crew of two at 200 lbs each and four passengers at 200 lbs each unless otherwise noted. The average fuel burn is depicted in gallons per hour for the make/model aircraft. All data is generally derived from flight manuals and is calculated at typical cruise speeds to include ground fuel. Numerous surveys of helicopter operators have confirmed our fuel burn calculations. Cruise altitude is assumed to be 2,000 feet.

Lubricants (Piston and Helicopter Aircraft Only)

Cost of all lubricants such as engine oil, transmission oil and hydraulic fluid. A standard percentage (3%) is used for all Helicopters. Surveys have confirmed this to be a realistic estimate.

Maintenance - Labor

Maintenance labor cost estimates for fixed wing aircraft reflect a 10-year time period to balance warranty with mature aircraft costs.

What is included in our Fixed Wing Aircraft labor calculation:

All labor required for:

- Scheduled maintenance to include the flat rate labor cost for all inspections that occur during the 10-year time period.
- Discrepancies found during scheduled maintenance inspections/events for the airframe and avionics (on-condition).
- Routine engine maintenance not covered by our estimated engine restoration costs.
- Labor for the removal/replacement of components requiring overhaul/inspection/servicing.
- Unscheduled maintenance discrepancies.
- Troubleshooting unscheduled maintenance discrepancies.

What is not included on our Fixed Wing Aircraft labor calculation:

Labor required for:

- Any inspection that falls outside of the 10- year time period.
- Major engine maintenance covered by our estimated engine restoration costs.
- Off aircraft overhaul and repair of components.
- Maintenance labor required for optional equipment aircraft completion items (interior), aircraft cleaning and washing, any administrative labor, stocking of aircraft supplies or travel to repair aircraft.

Helicopters

Maintenance labor costs for helicopters assume one full operational life of the helicopter. An aging factor is applied based on the age of the aircraft.

What is included in our Helicopter labor calculation:

All labor required for:

- Scheduled maintenance to include all Inspections for a full-life period.
- Discrepancies found during scheduled maintenance inspections/events for the airframe and avionics (on condition).
- Routine engine maintenance not covered during engine overhaul
- Labor for the removal/replacement of components requiring overhaul/inspection/servicing.
- Unscheduled maintenance discrepancies.
- Troubleshooting unscheduled maintenance discrepancies.
- Minor airworthiness directives and service bulletins.

What is not included in our Helicopter labor calculation:

Labor required for:

- Major engine maintenance covered by our estimated engine restoration costs.
- Maintenance labor required for optional equipment aircraft completion items (interior), aircraft cleaning and washing, any administrative labor, stocking of aircraft supplies or travel to repair aircraft.

Maintenance - Parts

Fixed Wing Aircraft

What is included in our Fixed Wing Aircraft parts calculation:

- All airframe, avionics and minor engine consumable parts required for routine scheduled line maintenance.
- Unscheduled maintenance.
- On-condition maintenance.
- Parts associated with airworthiness directives and mandatory service bulletins.

What is not included in our Fixed Wing parts calculation:

- Parts used in the normal overhaul of components, life-limited parts and engines
- Parts required for inventory costs, optional equipment, and aircraft completion items (interior).

Helicopters

What is included in our Helicopter parts calculation:

- All airframe, avionics and minor engine consumable parts required for routine scheduled line maintenance.
- Unscheduled maintenance
- On-condition maintenance
- 20% of the total component overhaul and life limited parts cost has been added to account for premature removal of these parts due to failure
- Parts associated with airworthiness directives and mandatory service bulletins.

What is not included in our Helicopter parts calculation:

- Inventory costs, optional equipment, and aircraft completion items (interior).

Computerized Maintenance Program

The annual subscription cost of a typical computerized tracking and record keeping service for scheduled aircraft maintenance and components.

Weather Service

The annual subscription cost of a typical computerized weather forecasting service.

Book Depreciation

The book depreciation expense is the amount recorded on the “books” and reported on the financial statements. This depreciation is based on the matching principle of accounting. For example, if a machine costs $500,000 and is expected to be used for 10 years and to have no salvage value at the end of the 10 years, the annual depreciation expense might be $50,000 each year. (This assumes the straight-line method and the machine was acquired on the first day of an accounting year.)

Another company purchasing the same machine might believe that the machine will be useful for only 5 years and have $100,000 salvage value. In that case the company will record $80,000 ($400,000 divided by 5 years) each year. The two companies did their best to match the machine’s cost to the accounting periods that the machine is being used to earn revenues.

In The Conklin & de Decker Report we assume book depreciation of 10% per year for 10 years using the straight-line method of depreciation with no salvage (residual) value.

Market Depreciation

Market Depreciation is a widely changing variable based on the value of the aircraft in the marketplace. Until the aircraft is sold no one really knows the exact market value of the aircraft. Once an aircraft is sold the difference between what the aircraft was purchased for and the eventual selling price (Residual Value) is referred to as Market Depreciation. Aircraft, unlike automobiles and other equipment tend to retain more of their value for a longer period of time. Until the aircraft is sold market depreciation is an estimate. See the Residual Value Chart in the Cost Supplement.

In The Conklin & de Decker Report we assume market depreciation of 4% per year for Jets, 6% per year for Turboprops and Piston and 5% per year for Helicopters. Market depreciation percentages are based on our historical residual value data for these aircraft types.

Refurbishing

This is the cost of maintaining the appearance of the interior and exterior of the aircraft. Included is cleaning and repairs of the cockpit and cabin furnishings, re-upholstering seats, new carpet, refinishing the cabin furnishings, and repainting the outside airframe.

We use a formula to calculate this cost. For example; We use a value of 10 labor hours per seat for the Beech Bonanza G36. This value can be found in footnote 10 in the Fixed Cost section of the report. This value will be different based on the aircraft group.

To calculate the refurbishment cost for the Beech Bonanza G36 we would take the 10 labor hours and multiply it by the total number of seats, in this case 5. We now have 50 labor hours for the aircraft. 50 labor hours is then multiplied by the labor cost per hour found in footnote 2 in the Variable Cost section of the report. For this example the cost will be $90. We then end up with a total refurbishment cost of $4,500, per year for the Beech Bonanza G36.

Engine Restoration Cost - Fixed Wing

Engine allowances for each turbine fixed wing aircraft use a set aside estimate to cover the cost of scheduled and unscheduled maintenance, all required inspections and overhauls.

All piston fixed wing aircraft use a set aside estimate to cover the cost of an overhaul of the engine at the recommended Time Between Overhaul (TBO). The footnote denotes the engine plan used.

Engine Restoration Cost - Helicopter

The engine costs are estimated using an accrual system. Our costs include an estimate of the funds an operator should set aside in order to pay for engine restoration maintenance over the full operational life of the helicopter. Unscheduled engine maintenance labor and parts are not included. We assume two cycles per hour.

Major Periodic Maintenance

Disclaimer: Major Periodic Maintenance costs are included for helicopters only. They **ARE NOT** included for fixed wing aircraft.

The maintenance labor and parts required for component overhauls. Parts only for life limited parts; labor is included in the airframe maintenance labor cost. These costs are estimated using an accrual system. These costs are an estimate of the funds an operator should set aside to pay for these costs over the full operational life of the aircraft. For example, an item with a life of 20,000 cycles and a cost of $20,000 would have a cost of $1 per hour.

Thrust Reverser Allowance (Jets only)

The parts and labor costs required to overhaul the thrust reversers with a set overhaul interval. Routine costs for on-condition thrust reversers are included in the maintenance-parts and labor. For aircraft with optional thrust reversers, an allowance will not be shown unless they are installed on half or more of the current fleet.

Propeller Allowance

The maintenance labor and parts costs required to overhaul the propellers, including the cost of any life-limited parts.

APU Maintenance Allowance

Includes all costs associated with the maintenance and overhaul of the Auxiliary Power Unit (APU) except routine maintenance and minor servicing. For Honeywell units, if covered by *JSSI* APU maintenance plan, it is their annual fee divided by the aircraft's annual flight hours; otherwise it is the *Honeywell MSP* hourly rate. For other units manufactured by other than Honeywell, we use JSSI's hourly rates. If the unit is not covered by JSSI we estimate the hourly cost.

Landing and Parking Fees

Represents typical U.S. charges associated with landing and parking the aircraft away from home base. We use a formula based on the maximum gross weight of the aircraft.

Crew Expenses

If shown, this is the cost incurred by the flight crew (Pilots, Flight Engineer & Flight Attendant), when away from home base, for accommodations, transportation and meals. The costs are typical of a major metropolitan area and use a formula that includes $250 per pilot per night: Hotel $150, Meal $50, Misc $50.

Small Supplies and Catering

The costs incurred for minor supplies for the cabin and cockpit (flashlight batteries, napkins, toilet paper) and all in-flight catering for the crew and passengers. We use a formula based on the number of crew plus passengers and size of the aircraft. Larger aircraft will incur higher costs.

Crew Salaries

If shown, these are the annual Captain, Copilot, Flight Attendant and Flight Engineer/Other Crew salaries for each category of aircraft.

Flight Attendant salaries are normally applicable only to the largest corporate aircraft. The flight attendant salary (if shown) is used for cost purposes only. Flight attendants are not included in the weight buildup, or as part of the minimum crew. Salaries are obtained from a recognized salary survey unless otherwise noted. Salaries assume an U.S. Based crew.

Crew Saleries - Benefits

This cost covers the expense of benefits such as medical coverage and pension funds offered by a typical corporate flight department. This cost is 30% of wages.

Hangar

Hangar cost expenses vary by aircraft size. Yearly rental costs for all aircraft are calculated by multiplying the aircraft square footage by the U.S. cost per square foot per year averaged from major business aviation airports in large metropolitan areas. Fixed wing aircraft square footage is calculated by multiplying aircraft length by wingspan.

Insurance - Hull

We use the all-risk category for our hull insurance cost in The Conklin & de Decker Report. We calculate this cost as a percentage of the aircraft hull value. The percentages we use are averaged totals obtained from major insurance underwriters. Keep in mind your insurance cost may be different as these costs are based on aircraft mission as well as pilot and flight department safety records. Exclusions include illegal use of an aircraft; using an aircraft for purposes other than that described in the policy; wear and tear; piloting the aircraft by someone not named in the policy; operating an aircraft outside stipulated geographical boundaries; and damage or destruction of an aircraft resulting from war, riots, strikes, and civil commotions, mechanical breakdown loss, structural failure loss, and conversion. The hull value includes instruments, radios, autopilots, wings, engines, and other equipment attached to or carried on the plane as described in the policy.

You can buy hull insurance at three different levels: ground only – (not in motion); ground including taxi; and all risk. Ground only (not in motion) covers your airplane for all risk exposures while the airplane is on the ground and not in motion, i.e. vandalism, theft, windstorm, flood, fire, etc. Ground including taxi means everything covered under ground only (not in motion), plus risks during taxi, i.e. hitting a parked airplane, hitting a hangar, running into taxi-way lights and signs, etc. All risk adds risks during flight. Accordingly, the premiums increase as you go from ground only – (not in motion) to all risk.

Recurrent Training

There are two types of recurrent flight training, one-time and full service contract recurrent flight training. We use the cost for one-time recurrent flight crew training using a professional, simulator-based training program (if available) or the equivalent. This cost includes travel and lodging. Full service contract recurrent training covers training twice a year on one aircraft or once a year on one aircraft and once a year on another less expensive aircraft. The cost for full service contract training is approximately 60% more than one time recurrent flight training.

Aircraft Modernization & Uninsured Damage

The cost of installing desired optional service bulletins, avionics upgrades, as well as the cost of repairing damage to the aircraft that is not covered by the insurance (i.e. the cost of the hull insurance deductible or small claims not submitted to the insurance company). This cost is based on the aircraft group (Large Jet, Medium Jet etc) and aircraft age. We have 3 cost groups for aircraft age; new, used less than 10 years and used older than 10 years. We assume a new aircraft will have a lower Modernization cost than an older one and a large jet like the Challenger 605 will have a higher Modernization cost than a VLJ like the Cessna Citation Mustang. A new aircraft like a Falcon 2000LX will have a lower modernization cost than used Falcon 2000.

Navigation Chart Service

This is the cost for an annual subscription to an enroute and approach chart service tailored to the aircraft's operation. This cost will differ depending on aircraft mission. For example, helicopters and piston fixed wing get regional subscriptions; long-range jets get a worldwide subscription.

Insurance - Combined Single Limit Liability

Here is the legal definition: Aircraft liability will pay on the behalf of the insured all sums which the Insured shall become legally obligated to pay as damages because of Bodily Injury sustained by any person and Property Damage caused by an occurrence and arising out of the ownership, maintenance or use of the aircraft. In addition, the insuring company shall have the right and duty to defend any suit against the Insured seeking damages on account of Bodily Injury or Property Damage even if any of the allegations of the suit are groundless, false or fraudulent and may make such investigation and settlement of any claim or suit as it deems expedient. The company shall not be obligated to pay any claim or judgment or to defend any suit after the applicable limit of the Company’s liability has been exhausted by payment of judgments or settlements.

Condensed down into layman’s terms aircraft liability insurance protects you if your aircraft injures other people or damages property. There are two ways aircraft insurance liability is structured; Combined Single Limit Liability Insurance (smooth limit or level limit) and Combined Single Limit Liability Insurance (sub-limit).

We use pricing based on the Combined Single limit “Smooth Limits” in The Conklin & de Decker Report.

Combined Single Limit “Smooth Limits” combines coverage for both property damage and bodily injury per occurrence into a single limit with no further limitation. In other words, regardless of whether the claim against you arises from injuries or death to persons or from damage to another’s property, the amount of protection you have is the Combined Single Limit. It is usually expressed as a single number, for example $1M each occurrence. In general this type of coverage provides more protection when compared to sub-limited coverage and is also more expensive.

The most common and least expensive coverage is a sub-limited coverage. Sub-limited coverage is also Combined Single Limited coverage but it places a limitation on your coverage for a specific loss in the form of a lower amount than the each occurrence amount. These limits apply to all or a type of bodily injury. For example, a $1M each occurrence limited to $100K per person places a maximum amount of coverage for death of or injuries to any person at $100K. This amount is part of, and not in addition to, the $1M each occurrence limit. Be aware of policy wording that states the sub-limit is per person. This means all persons, passengers and non-passengers alike are limited to the $100K. The only acceptable sub-limit is per passenger.

Your insurance cost may be different from ours as these costs are based on aircraft mission as well as pilot and flight department safety records. Our insurance premium costs assume professional pilots who attend regular refresher training at least annually and who have an accident free record. Consult with your aviation insurance broker to determine your risks and recommended coverage. Our Liability limits are: VLJ's - $25M, Jets 11 seats or less - $100M, Jets 12 seats or more - $200M, Turboprops - $50M, Piston; $1M; Turbine Helicopter - $25M; Piston Helicopter - $1M

Cabin Dimensions

Cabin Height, Width, and Length are based on a completed interior. On "cabin-class" aircraft, the length is measured from the cockpit divider to the aft pressure bulkhead (or aft cabin bulkhead if unpressurized). For small cabin aircraft, the distance is from the cockpit firewall to the aft bulkhead. Height and width are the maximum within that cabin space. **Cabin Volume** is the passenger cabin (empty volume, cockpit divider/back of pilot seat to back-most point of rear seating) + front passenger area (if single pilot) = total cabin volume. It is measured with headliner in place with no chairs or other furnishings.

Internal Storage: If the area is clearly defined then it is calculated and displayed as a separate value from the cabin volume.

In the case of helicopters and there are rear clamshell doors we assume the cabin/baggae space ends at the rear perimeter of the flat floor.

We assume a standard 20 cubic feet for the front passenger area of all single pilot aircraft.

Cabin Door Height and Width are the measurements of the main passenger cabin entry door.

Baggage

Internal Baggage Volume is the baggage volume that is accessible in flight by the passenger. This amount may vary with the interior layout.

External Baggage Volume is the baggage volume not available in flight (nacelle lockers, etc.).

Typical Crew/Pass Seating

This is the typical crew and passenger seating commonly used on the aircraft. This is not the maximum certificated seats of the aircraft. These numbers may vary for different operations (Corporate, Commercial, EMS, etc.).

Certified/IFR Certified

The first is whether the aircraft is certified (or expected to be). New models in flight test are not certified. IFR Certified refers to whether the aircraft is certified for flight under IFR.

Price

Price - New (Typical) is the selling price of a typically equipped new aircraft. For current production aircraft this is the price of the current year's model. For out of production aircraft, this refers to the selling price from the last year the model was produced. For aircraft not yet in production, it reflects the proposed price for an early delivery. This figure is in thousands of US Dollars. New aircraft prices do not reflect escalation factors for future delivery dates.

Price - Pre-owned Range is the low and high selling price of the aircraft. Fixed-wing aircraft are based on the latest available edition of The Aircraft Bluebook Price Digest and The Airliner Price Guide.

Range

Range - NBAA IFR Res (NM) - Seats Full is the maximum IFR range of the aircraft with all passenger seats occupied. This uses the NBAA IFR alternate fuel reserve calculation for a 200 N.Mi. alternate. This is used for jet and turboprop aircraft.

Range - NBAA IFR Res (NM) - Tanks Full is the maximum IFR range of the aircraft with the maximum fuel on board and no passenger seats occupied. This uses the NBAA IFR alternate fuel reserve calculation for a 200 N.Mi. alternate. This is used for jet and turboprop aircraft.

Range - 30 Min Res (NM) - Seats Full is the maximum VFR range of the aircraft with all passenger seats occupied. This is used for all piston fixed-wing aircraft and helicopters.

Range - 30 Min Res (NM) - Tanks Full is the maximum VFR range of the aircraft with the maximum fuel on board and no passenger seats occupied. This is used for all piston fixed-wing aircraft and helicopters.

Balanced Field Length

BFL is the distance obtained by determining the decision speed (V1) at which the take-off distance and the accelerate-stop distance are equal (fixed-wing multi-engine aircraft only). This is based on four passengers and maximum fuel on board (turbine aircraft). For single-engine and all piston fixed-wing aircraft, this distance represents the take-off field length at Maximum Take-off Weight (MTOW). Please refer to Comparative Field Lengths - Jets and Turboprops at the end of this document for a more in-depth explanation. BFL is based on a Dry Level Runway, No Wind, NBAA IFR Reserves and 86 degrees F.

Landing Runway Length

The landing distance, as required by the regulations, is the distance needed to land and come to a complete stop from a point 50 feet above the threshold end of the runway. It includes the air distance required to travel from the 50 foot height to touchdown plus the stopping distance (Maximum brakes, no thrust reversers). For FAR 91 operators (not for hire) there is no requirement for any additional safety margin.

A different set of requirements exist for air carriers and commercial operators (FAR 121, FAR 91 subpart K and FAR 135). The required landing distance from the 50 foot height cannot exceed 60% of the actual runway length available. In all cases, the minimum airspeed allowed at the 50 foot height must be no less than 1.3 times the aircraft stall speed in the landing configuration. This speed is commonly called the aircraft’s VREF speed and will vary with landing weight.

Under FAR 121, FAR 91 Subpart K and 135 an optional runway (normally the planned divert airport runway) the aircraft can land on within 80% of the available runway length is required.

All landing distances are calculated assuming optimum landing conditions. No allowances are made for a variety of real world factors such as worn tires and brakes, non optimum runway conditions, one engine inoperative, etc. No allowances are made for thrust reversers. A FAR 91 operator can legally land on a runway without requirement for any margin to be left over after stopping.

Conklin & de Decker shows the FAR 91, 121 and 135 Landing Field Lengths at sea level for all fixed wing turbine aircraft. Fixed wing piston aircraft show FAR 91 landing distance. The FAR 121 Landing Field Length is computed by multiplying the FAR 91 Landing Distance by 1.667. The FAR 135 Landing Field length is computed by multiplying the FAR 91 Landing Distance by 1.25.

Aircraft Landing configuration for all fixed wing turbine aircraft is four passengers and NBAA IFR Fuel Reserve for a 200 NM alternate on board.

The landing distance is computed for fixed wing piston aircraft at maximum landing weight and NBAA IFR Fuel Reserves for a 100 NM alternate.

Rate of Climb

The rate of climb, given in feet per minute, is for all engines operating, at MTOW in ISA conditions. One Engine Out rate of climb is for one engine inoperative rate of climb at MTOW, ISA. Climb rates assume landing gear and flaps are retracted, and any anti-ice systems are turned off.

Cruise Speed

Max - (KTAS) is the maximum cruise speed at maximum continuous power. This may also be commonly referred to as High Speed Cruise. Normal cruise speed is the recommended cruise speed established by the manufacturer. This speed may also be the same as Maximum Cruise Speed. Long Range Cruise is the manufacturer's recommended cruise speed for maximum range.

Stall Speed

The stall speed in landing configuration, four passengers and NBAA IFR Fuel Reserves (turbine) or VSO (piston).

Ceiling

Certified Ceiling is the maximum altitude a particular aircraft is certified to operate at. (This does not mean the aircraft can reach this altitude at all weights)

Service Ceiling (fixed-wing) is the highest altitude at which a 100 fpm rate of climb is possible at MTOW with all engines running. This is NOT the Certificated Ceiling that was established by a regulatory authority.

Service OEI is the service ceiling with one engine inoperative.

Service Ceiling (Helicopter) - The lesser of the highest altitude at which a 100 fpm rate of climb is possible at MTOW with all engines running OR the maximum certificated altitude for operation of this helicopter.

Service OEI (Helicopter) - The service ceiling with one engine inoperative.

Hover IGE (Helicopter) - HIGE is a condition where the downwash of air from the main rotor is able to react with a hard surface (the ground), and give a useful reaction to the helicopter in the form of more lift force available with less engine power required. It is a condition of improved performance encountered when operating near (within 1/2 rotor diameter) the ground. HIGE is the ability to hover motionless within one blade diameter of the ground.

What is occurring is the air is impacting with the ground and causing a small build up of air pressure in the region below the rotor disk. The helicopter is then "floating" on a cushion of air. This means that less power is required to maintain a constant altitude hover. IGE conditions are usually found within heights about 0.5 to 1.0 times the diameter of the main rotor. So if a helicopter has a rotor diameter of 48ft, the IGE region will be about 24 - 48ft above the ground. The height will vary depending on the type of helicopter, the slope and nature of the ground, and any prevailing winds.

Hover OGE (Helicopter) - HOGE occurs when the helicopter rotor downwash is not affected by the proximity of the landing surface. In other words, OGE usually occurs when the helicopter is more than one-half of the rotor diameter above the ground. HOGE performance is particularly important when the helicopter is being utilized for utility or EMS operations. The helicopter being used for an EMS mission needs the ability to hover land on a rooftop helipad or in a confined area, many times at a high altitude. A helicopter performing a utility mission with a sling load needs the capability to hover with that load while lowering it.

CO2

This cost reflects a Carbon Offset Fee, whether mandatory or voluntary. The cost is shown as $/Metric Tonne of CO_2 produced. This amount is calculated based upon the default aircraft hourly fuel burn. The calculation is as follows: (tonnes of fuel per hr)*(3.15 tonnes of CO_2 per tonne of fuel)*(cost per tonne).

Comparative Field Lengths - Jets and Turboprops

The Balanced Field Length (BFL) performance of aircraft can be very confusing. Most often the confusion arises from the basic differences in operating regulations governing the types of aircraft. There are two regulations that govern runway distance requirements for jets and turboprops. These regulations are FAR 23 (aircraft with a gross weight of 12,500 pounds and under) and FAR 25 (Air Transport Category aircraft with a gross weight over 12,500 pounds). These two regulations vary significantly. The more stringent rules of FAR 25 provide the passenger with greater safety margins than those used for FAR 23 private aircraft.

For example, FAR 23 makes no allowance for loss of power or an engine or propeller failure. Additionally, the published distance requires no allowance for either being able to stop on the remaining runway or to continue the take-off on one engine after an engine failure.

By contrast, FAR 25 regulations intended for Air Transport Aircraft such as business jets and large turboprops assures their passengers and crew that in the unlikely event of a loss of engine power during take-off the aircraft can either:

- Stop within the remaining runway length
- Take-off and climb on the remaining good engine.

This distance is known as Balanced Field Length. BFL is the distance obtained by determining the decision speed (V1) at which the take-off distance and the accelerate-stop distance are equal. Decision speed is the point where the pilot decides to either continue with the take-off or slam on the brakes and stop the aircraft.

To illustrate how these regulations work let's look at a typical situation involving a small turboprop (FAR 23) and a small business jet (FAR 25), both seating six passengers. We'll assume maximum gross weight, sea level, International Standard Atmospheric (ISA) conditions and a dry, level, hard surface runway.

The small turboprop can legally take-off from a 2,600-ft runway operating under FAR 23. Although it has no requirement to consider an engine failure let's assume an engine fails at its published rotation speed (Vr) of 94 knots. Rotation speed is the point when the aircraft starts to lift off the ground. Its distance to accelerate to Vr and stop is 3,400 ft, 800 ft longer than the take-off distance. If the take-off is continued after engine failure at Vr, then the runway required jumps to 4,750 ft, 82% longer than the take-off distance of 2,600 ft. Although 4,750 ft is the BFL for the turboprop it is not a legal requirement under Part 23 for runway length decision.

The small business jet has a BFL of 4,500 ft runway in the same conditions, 250 ft shorter than the turboprop under the same contingencies and with the same margin of safety.

Although the small business jet could take-off or accelerate/stop like the turboprop from a shorter runway the pilot is not permitted to base the runway length decision on anything other than the BFL data while operating under FAR 25.

Annual Utilization

Hourly annual utilization is calculated by dividing the annual utilization in NM by the average trip speed of the aircraft. The assumed annual utilization for Jets is 175,000 NM, Turboprops is 115,000 NM. Corporate Pistons assume a utilization of 45,000 NM and Business Pistons is 22,500 NM. Helicopters assume a utilization of 45,000 NM.

Maintenance Assumptions

Our cost numbers assume that aircraft maintenance is performed at a qualified service facility unless indicated otherwise in the aircraft categories explanations.

Weights

Maximum Take-off Weight is specified during aircraft certification. It is the maximum weight of the aircraft at take off.

Basic Operating Weight is the empty weight, typically equipped, plus unusable fuel and liquids, flight crew @ 200 pounds each (see Typical Crew/Pass Seating) and their supplies. The flight crew includes the pilot (s) along with the flight attendant and flight engineer if required.

Useable fuel is the useable fuel available for consumption by the power plants and/or auxiliary equipment. It does not include the trapped fuel that may exist in the fuel tanks that can not be collected by the fuel system. Fuel is measured in gallons x 6.7 pounds per gallon (Jet fuel) or 6 pounds per gallon (AVGAS).

Payload - Full Fuel is the useful load minus the useable fuel. The useful load is based on the maximum ramp weight minus the basic operating weight.

Payload - Maximum is the maximum zero fuel weight minus the basic operating weight.

Fleet Size

Substantial savings can be gained from Economies of Scale. A larger operator is able to negotiate discounts in parts costs, fuel prices and other cost drivers. The larger the operator's fleet, the more negotiating power they might have. A larger operation also gains experience in performing inspections and other maintenance more economically and efficiently, resulting in more savings. Another area a larger operator can find savings is having an avionics or engine expert on staff. A smaller operator would have to go to an outside expert at a much increased cost.

Created on Aug 29, 2019, by Doug Strangfeld
Data Version: V 19.1