www.spectrum.aero
760.444.0180
Spectrum Aeronautical LLC 2036 Palomar Airport Road Carlsbad, CA 92011

SPECTRUM

FORWARD THINKING TECHNOLOGY

Twenty five years of research and development have resulted in a proprietary advanced composite material which, when combined with streamlined aerodynamics and cutting edge engine technology, provides the speed, range and operating efficiency global operations demand.

Spectrum technology makes a quantum difference in airplane weight, cost and fuel consumption. The Spectrum Freedom S.40 and Independence S.33 are modern airplanes that could replace most of the 3,000 utility aircraft that are in government and military inventories world wide. They can cut operating costs and fuel consumption in half and perform most missions faster, better and safer with large cabin comfort and versatility.

All of this will be backed with world-class training, one of the strongest warranties in the industry and an unrivaled support network.

FREEDOM S.40 INTERIOR

Freedom S.40

Independence S.33

PASSION FOR EXCELLENCE

TIME IS MONEY, WEIGHT IS MONEY TOO!

fibeX® – Spectrum's unique feature for greater operating efficiency. Fuel prices are climbing. Concerns about carbon emissions are growing. These are important trends which will increase the cost of operating business aircraft. Spectrum has a powerful weapon that can fight back: an advanced, high-strength lightweight composite material system: fibeX®.

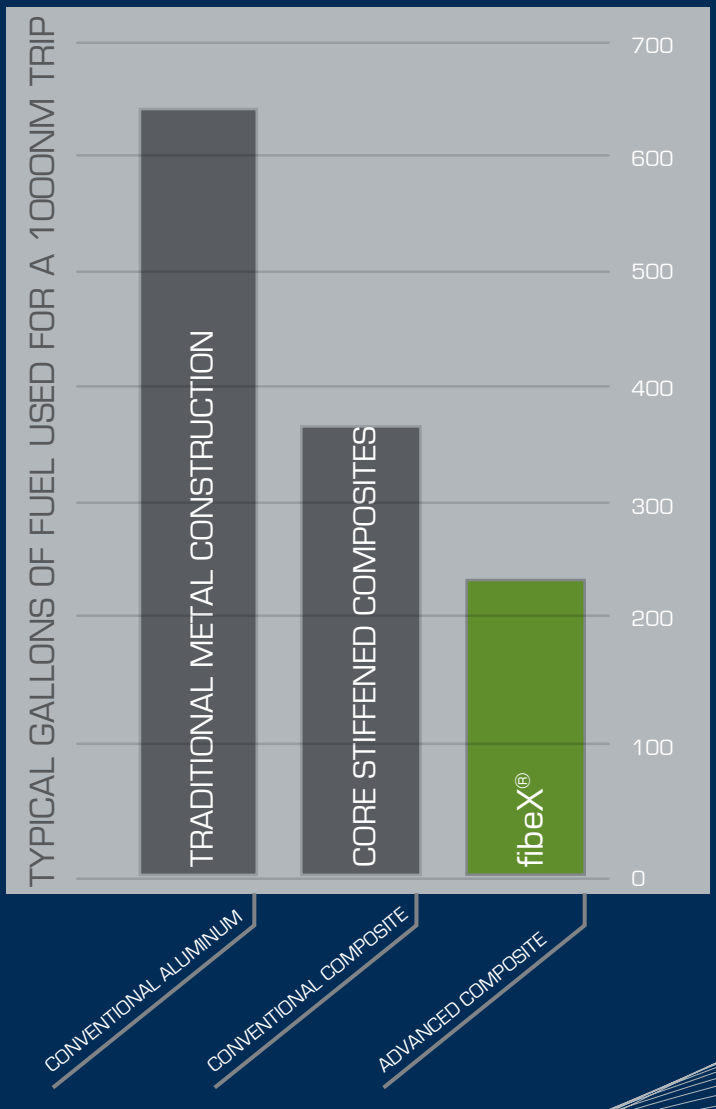
Aircraft weight is a primary driver of operating cost. All other things equal, more weight requires more thrust. More thrust requires more fuel. Larger fuel capacity requires more structure. Additional structure means more weight – and the spiral continues.

For aluminum aircraft, reducing size or sacrificing performance are two methods often used to break the spiral. Spectrum takes a new approach. Using fibeX® to reduce weight and essentially eliminate sandwich panel construction, less thrust is needed. Less thrust requires less fuel. Operating costs are reduced, and an added benefit is the emission footprint is smaller as well.

ALL COMPOSITES ARE NOT THE SAME

Using automated fiber winding techniques combined with proprietary polymer formulations and special tooling processes, fibeX® is used to create parts and advanced structures that are integrated at the molecular level.

fibeX® CONSTRUCTION BENEFITS



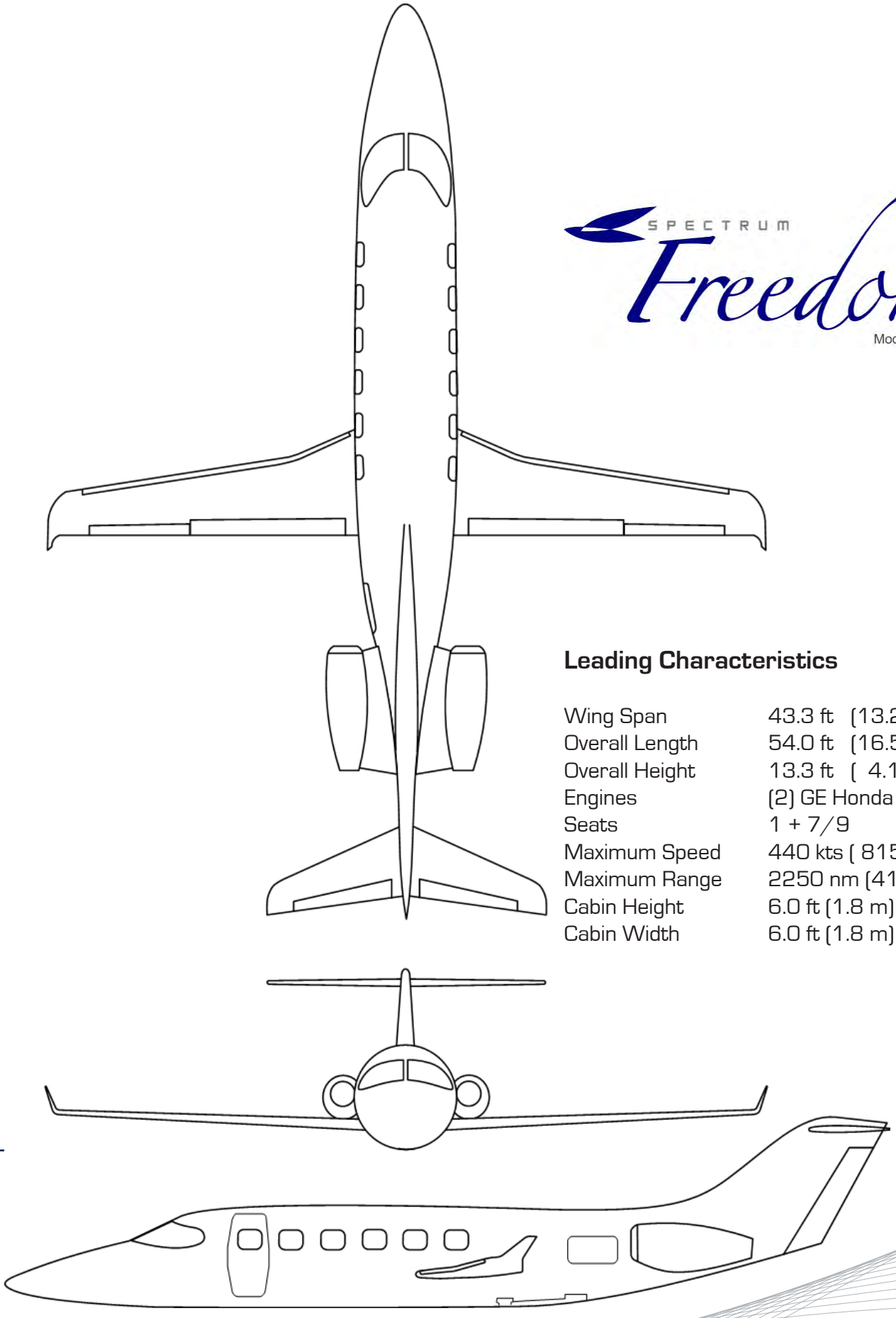
SPECTRUM

760.444.0180 | Spectrum Aeronautical LLC 2036 Palomar Airport Road Carlsbad, CA 92011

SPECTRUM

Freedom

Model S.40



Leading Characteristics

Wing Span	43.3 ft (13.2 m)
Overall Length	54.0 ft (16.5 m)
Overall Height	13.3 ft (4.1 m)
Engines	(2) GE Honda HF-120
Seats	1 + 7/9
Maximum Speed	440 kts (815 kph) (.77M)
Maximum Range	2250 nm (4170 km)
Cabin Height	6.0 ft (1.8 m)
Cabin Width	6.0 ft (1.8 m)

SPECTRUM FREEDOM

Model Designation: S.40

General

Price (2009 USD)	$6.795 million
Seating (req'd crew + exec seating/total passenger seats)	1 + 7/9
Engines	(2) GE-Honda HF-120 turbofans
Thrust	2,095 lbs. / 9319 N each
Time between overhaul (TBO)	5,000 hours
Cabin Height x Width	6.0 ft. x 6.0 ft.

Weights

Maximum Ramp Weight	9,580 lbs.	4,345 kg.
Maximum Gross Takeoff Weight	9,550 lbs.	4,332 kg.
Maximum Landing Weight	8,650 lbs.	3,924 kg.
Empty Weight	4,840 lbs.	2,195 kg.
Basic Operating Weight (includes 1 pilot @ 200 lbs.)	5,040 lbs.	2,286 kg.
Useful Load (MRW - EW)	4,740 lbs.	2,150 kg.
Maximum Fuel Capacity	3,600 lbs.	1,633 kg.
Payload with Max Fuel (based on EW)	1,140 lbs.	517 kg.
Fuel with Max Payload	2,340 lbs.	1,061 kg.
Maximum Zero Fuel Weight	7,240 lbs.	3,284 kg.
Maximum Payload (includes pilot)	2,400 lbs.	1,089 kg.

Performance

Maximum Cruise	440 ktas	815 kph
Maximum Cruise (Mach)	0.77M	0.77M
Maximum Altitude	45,000 ft	13,716 m
Stall Speed (flaps) V_{SO}	86 kts	159 kph
Stall Speed (clean) V_{S1}	102 kts	189 kph
Max Range (IFR reserves, 100 nm alternate)	2,250 nm	4,170 kph
Max Range (NBAA profile, 1+4)	2,030 nm	3,760 km
Initial Climb, MTOW (all engines)	4,650 fpm	1,417 mpm
Time to FL450 (MTOW)	20 minutes	20 minutes
Balanced Field Length (BFL)	3,300 ft	1,006 m

The Spectrum S.40 "Freedom" in Military Service

Spectrum's Freedom S.40 all-composite mid-size business jet provides a unique opportunity to introduce a utility aircraft into the military fleet that, when compared to current "business jet cabin class" civil aircraft currently in service, offers:

- Significantly lower fuel consumption
- Multi-role capable
- Reduced maintenance requirements
- Superior dispatch ability
- Increased overall support/utility capability while reducing costs

In addition to these benefits, the S.40's mission flexibility will permit it to perform a variety of roles that currently require several different aircraft models. Also, its potential for reducing fleet diversity can generate a "multiplier" effect by reducing the cost of training, spares inventory and general maintenance equipment.

Fuel Savings

The Spectrum S.40 represents a tremendous opportunity to reduce fuel consumption in performing current utility/support missions. It consumes less than half the fuel of comparably sized conventional jets. And, it is the first jet to offer better specific range performance than the most fuel efficient aircraft currently in the fleet, the C-12 (Beechcraft King Air 200), while at the same time providing more than 40% greater speed.

In a "time on station" role, the S.40's high aspect-ratio wing and light weight combined with its highly fuel efficient GE Honda Aero Engines' (GEHAE) advanced HF120 turbofan power plants give the S.40 extraordinary loiter performance. Initial estimates for endurance are well over nine hours at typical cruise altitudes, and between 8 ½ and 9 hours at 15,000 feet with standard fuel loading. Given the structure's ability to carry significant weight, options exist to expand fuel capacity. Minor modifications would allow the aircraft to operate more than 11 hours at 15,000 feet.

Range Capability	Spectrum Freedom	C-21A (Learjet 35A)	T-1A Jayhawk (Beechjet 400)
Max Range w 4-Pax (nm)	2030	1252	1294

Range Capability	Spectrum Freedom	Cessna T-47 (Citation II)	C-12 Huron (King Air 200)
Max Range w 4-Pax (nm)	2030	1500	1677

In an intelligence gathering/surveillance role, the Freedom offers a "HI-LOW" planning capability that is superior to the current inventory. King Airs in this application are limited to how high they can fly. Other platforms must fly as high as possible in order to achieve maximum flight duration. The S.40 provides a vehicle that has good fuel economy and capability across a broad range of altitudes. Any electronics package needed will be able to be flown at the required altitude without compromise.

		Spectrum Freedom S.40	C-21A (Learjet 35A)	T-1A Jayhawk (Beechjet 400)
300nm Mission	Flight Time (Hr + Min)	0+47	0 + 44	0 + 46
	Fuel Used (Lbs)	706	1030	1120
600nm Mission	Flight Time (Hr + Min)	1 + 26	1 + 25	1 + 28
	Fuel Used (Lbs)	1103	1684	1748
1000nm Mission	Flight Time (Hr + Min)	2 + 32	2 + 20	2 + 34
	Fuel Used (Lbs)	1654	2585	2742

		Spectrum Freedom S.40	Cessna T-47 (Citation II)	C-12 Huron (King Air 200)
300nm Mission	Flight Time (Hr + Min)	0+47	0 + 52	1 + 07
	Fuel Used (Lbs)	706	966	789
600nm Mission	Flight Time (Hr + Min)	1 + 26	1 +37	2 + 12
	Fuel Used (Lbs)	1103	1504	1319
1000nm Mission	Flight Time (Hr + Min)	2 + 32	2 + 40	3 + 38
	Fuel Used (Lbs)	1654	2220	2093

Savings by reduced fleet diversity

The “one aircraft for many missions” is a long standing principle, but until now has been difficult to implement in the support/utility fleet.

The Spectrum S.40 can replace numerous varieties of aircraft across a wide range of applications: from VIP transport and logistic vehicles to medical evacuation and intelligence gathering. The unique combination of efficiency, cabin volume, range and speed of the S.40 allows it to offer a “multi-role” solution.

The Freedom S.40 will cover a broad range of missions that currently require a mixture of types.

The T-1A Jayhawk is a medium-range, twin-engine jet trainer used in the advanced phase of specialized undergraduate pilot training for students selected to fly airlift or tanker aircraft. It is also used to support navigator training for the U.S. Air Force, Navy, Marine Corps and international services. It is based on the Beech 400A. Nearly 200 T-1’a are currently in service.

Training currently done in the T-1 Jayhawk can be easily accomplished with greater economy by the S.40

The C-21 is the military version of the Lear Jet 35A business jet, introduced into the fleet in the mid 1980’s. In addition to providing cargo and passenger airlift, the aircraft is capable of transporting one litter or five ambulatory patients during aero medical evacuations. There are more than 100 of these aircraft still in service in the US military.

In both cases, these much older aircraft not only require substantial maintenance and parts, but each consumes substantially more fuel than the Spectrum.

One of the most prevalent aircraft in the military’s fleet is the C-12 Huron, and adaptation of the venerable Beechcraft King Air 200. It operates with the US Air Force, US Army, US Navy, and the US Marine Corps.

These aircraft are used for various duties, including embassy support, medical evacuation, as well as passenger and light cargo transport. Some aircraft are modified with surveillance systems for various missions, including the Guardrail programs.

The C-12 first entered service in 1974. Hundreds of these aircraft exist in every guise possible for the military assuming many different roles. Many are over 30 years of age, and are approaching the end of their useful service life.

The Freedom can accomplish the C-12 missions - using the same airfields - while offering better economy, speed, range and cabin accommodations.

The S.40 offers greater cabin volume and range than the C-21, while providing greater efficiency at comparable speeds.

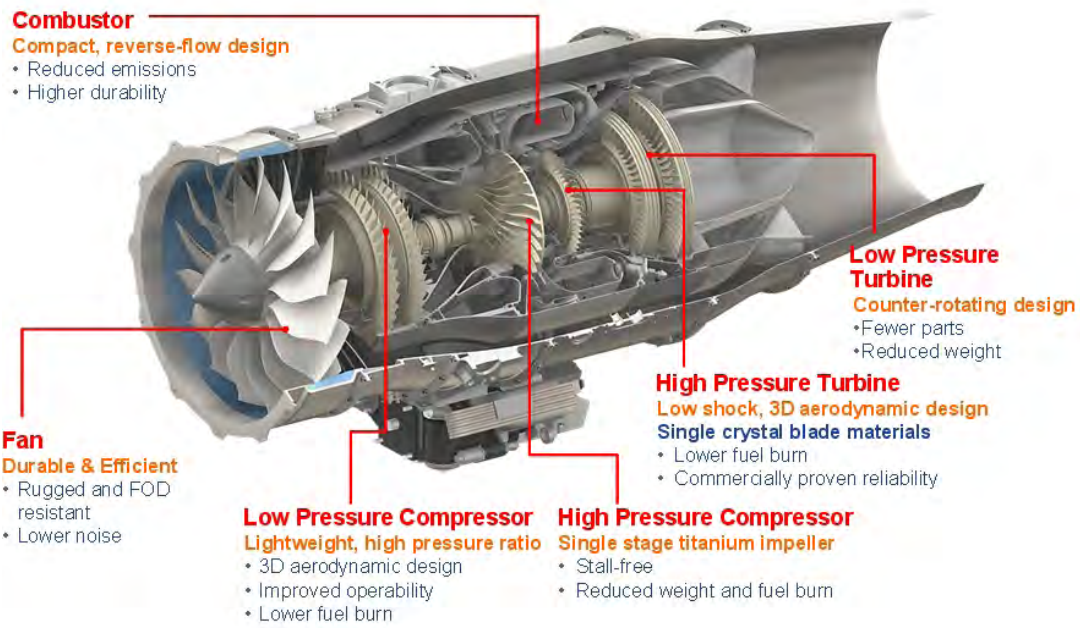
These are only three of the current support/utility aircraft that the Freedom can easily replace. Roles played by Cessna Citations and other business jet class models can also be performed by the S.40.

Reduced Maintenance, Manpower and Parts.

Each hour spent maintaining an aircraft has an enormous impact. The Freedom's unique construction and advanced composite materials will potentially reduce the amount of maintenance needed to support an aircraft by over 40%.

Parts count requirements for inventory are dramatically reduced for the Freedom. Most current support aircraft have well over 16,000 parts. The Spectrum S.40 will have less than 2,000 parts, enabling much lower parts inventory and more efficient logistical management.

GE Honda Aero Engines' advanced HF120 fanjet used to power the S.40 is the first general aviation jet engine that does not require a mid-life hot section inspection. The engines remain "on aircraft" throughout their 5000-hour time-between-overhaul cycle, greatly improving availability.



The 2050 lb thrust GEHAE HF120 offers 5000 hr TBO without a mid-life hot section inspection

These features all come together to reduce downtime and maximize the aircraft's availability for use. Multiple redundancies are designed into all systems used onboard the Freedom to maximize the operator's ability to dispatch the aircraft.

Military Applications of the Spectrum S.40

The payload, speed, range, endurance and cabin size of the S.40 recommends the aircraft for consideration of numerous support functions.

Climb Performance	Spectrum Freedom	C-21A (Learjet 35A)	T-1A Jayhawk (Beechjet 400)
Engine	2 x GE HF120 Turbofan	2 x TFE-731 Turbofan	2 x P&W JT15D Turbofan
Max Thrust per Engine (lbf)	2050 lbf	3500 lbf	2965 lbf
Max Takeoff Weight (lbs)	9550 lbs	18300 lbs	16100 lbs
Thrust-to-weight (lbf/lb)	0.43 lbf/lb	0.38 lbf/lb	0.37 lbf/lb
Max rate-of-climb (SL, ISA)	**4400 fpm**	**4300 fpm**	**3800 fpm**

Climb Performance	Spectrum Freedom	Cessna T-47 (Citation II)	C-12 Huron (King Air 200)
Engine	2 x GE HF120 Turbofan	2 x P&W JT15D Turbofan	2 x P&W PT6A Turboprop
Max Thrust per Engine (lbf)	2050 lbf	2500 lbf	850 shp
Max Takeoff Weight (lbs)	9550 lbs	15100 lbs	12500 lbs
Thrust-to-weight (lbf/lb)	0.43 lbf/lb	0.33 lbf/lb	0.14 hp/lb
Max rate-of-climb (SL, ISA)	**4400 fpm**	**3040 fpm**	**2500 fpm**

The Spectrum S.40 represents a unique aircraft for the US. Its high thrust-to-weight ratio (interestingly, greater than that of an F-16 without the afterburner) combined with the aircraft's low-sweep wing will allow it to climb at a rate that is superior at maximum takeoff weight compared to other support/utility aircraft. If takeoff weights required for equal load and range missions are compared, initial calculations show rates 6,000 feet per minute climb for the S.40 to be possible.

This climb capability allows for the aircraft to be prudently operated in difficult conditions without exposing the aircraft and crew to risks not normally associated with a corporate aircraft.

The same wing that assists the climb will allow for an excellent turning radius. Not only could the aircraft cork-screw in for a landing over an airfield, it could climb directly to a safe altitude in a hostile environment more rapidly than any other support aircraft.

Low weight coupled with the low-sweep wing also allows very slow approach speeds. Current estimates are of 85 to 90 knots for the Spectrum S.40. These speeds permit landings at very short air strips. Additionally, low approach speeds allow circular maneuvering approaches over airfields in hostile conditions. The value of low approach speeds was demonstrated by the U-2 during Vietnam. The spy plane routinely operated from aircraft carriers for a variety of missions. We will have options that currently do not exist in any of the current support aircraft.

Although planned for certification to 45,000 feet, the aircraft's wing, weight and high cabin pressurization will allow operations above this altitude for military applications, enabling consideration of reconnaissance and ESM missions.

Unique applications to be considered and evaluated:

- Combat Medevac
- Combat Resupply and Troop Movement
- Photoreconnaissance (low threat environment)
- Forward Air Control (FAC)
- Transport of Supplies, Equipment, Personnel / logistics management
- Early Warning, Communications, and Strike and Traffic Control
- Long Range Targeting
- Electronic Support and Countermeasures
- A UAV version with Predator Technology for combat resupply
- An Navalized Version could be considered for Carrier on-board Delivery for the US Navy

Aircraft Combat Survivability and Design

While the Spectrum S.40 has not been specifically designed missions in hostile environments, many of its inherent features make it ready off the shelf for many military missions. The aircraft has dramatically reduced susceptibility and vulnerability compared to conventional aircraft.

The Spectrum S.40 has multiple features that enhance its ability to operate in a hostile environment:

- Superior maneuverability
- Best in class climb performance
- Composite construction to reduce radar signature and increase survivability
- Reduced risk of fire (brakes are the only system requiring hydraulic fluid)
- Redundant and rugged push-pull flight controls made of carbon fiber
- Multi-spar wing design for excellent damage tolerance
- Multi spar vertical and horizontal stabilizer
- Reduced heat signature from smaller engines, decreasing exposure to IR guided SAMS.
- Quieter engines for a dramatically reduced noise footprint
- Simplified in-field damage repair

Reconnaissance

The S.40 has the potential to operate in the mid-50000' altitude range. Although civilian certification will only be done to 45,000 feet, the military can opt to go higher. (For instance, the Swedish Air Force uses Gulfstream IV's to 55,000 for intelligence gathering although the plane is certified only to 45,000.)

Although some modification is required, the plane can hoist a reconnaissance package to a significantly useful altitude for extended periods. Its fuel economy will enable functionality for lower altitude operations and achieve useful time on station.

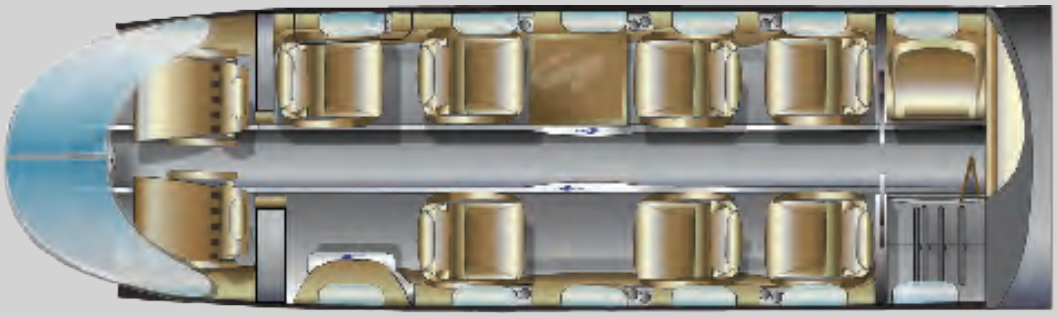
Most importantly, for military planners, it provides functionality across a wide range of altitudes, something previously unobtainable and requiring multiple type platforms.

Building on a combination of the S.40's unique construction, the blending of advanced remote control technology could allow for the creation of UAV reconnaissance (or cargo) aircraft based on both ship and land. There are substantial military and economic reasons for UAV capabilities to be deployed, and the Freedom is a perfect platform to make that happen.

Cargo & Medevac

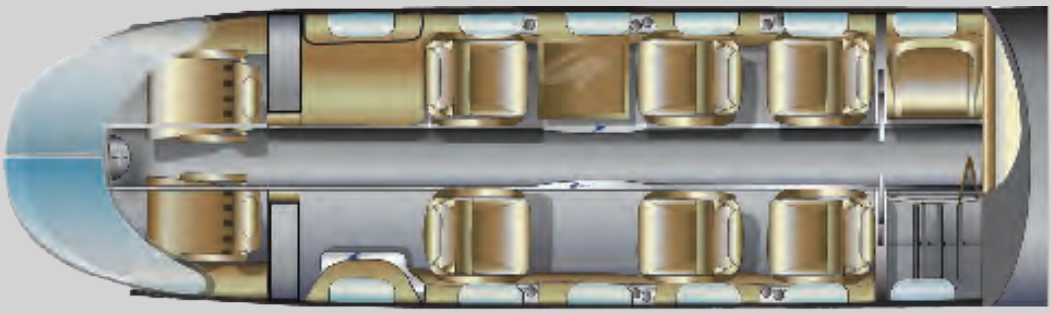
In the Iraq war the preponderance of orders received by USAF are for 1-2 pallets of supplies, and the great majority of missions then flown (with combined orders) containing 3-4 pallets. It is not the most efficient operation using 4 engined aircraft costing tens of millions of dollars when the end user needs only a fraction of the load capability.

With its low weight to thrust ability, a Spectrum S.40 in a cargo capacity, could provide a niche capability in the operational theater. With roughly 4,500 lbs of useful load, the Spectrum would present a solution for small, time sensitive cargo movement and medical evacuation over long distances. The Spectrum's weight allows it to take off and land using very short fields, a capability well suited to supporting deployed forces. Given its range, speed combination, and the short field landing capability, the aircraft could in cases, such as Iraq, depart from a supply field in Kuwait and land directly at forward operating areas, eliminating the need to transition cargo from one aircraft to the next. This unique ability could greatly simplify logistical planning for a great deal of forward deployed troops.

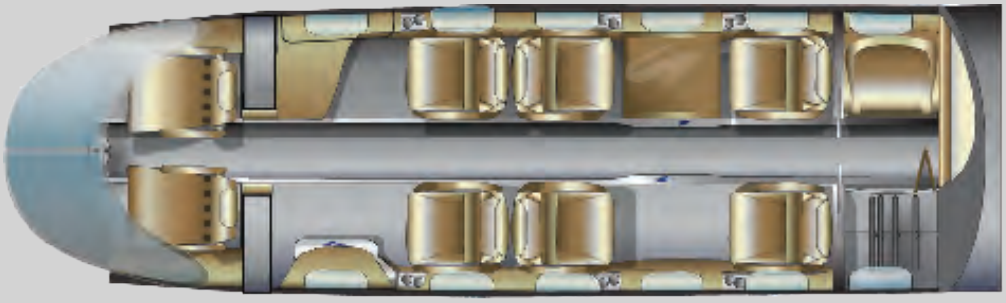


MAXIMUM SEATING

OPTIONAL SINK



FWD CLUB WITH GALLEY



AFT CLUB WITH SLIM-LINE STORAGE (available after initial deliveries)

CABIN VIEWS

FLOORPLAN FLEXIBILITY

The Freedom's baseline seating arrangement is the 'Maximum Seating' floor plan shown in the diagram above. This configuration is designed to provide an excellent balance between cabin comfort and operating efficiency.

For added cabin flexibility, a modular galley unit is available as an option, replacing the single rear facing seat. Subsequent to initial deliveries, a rear club configuration with a slim line galley will also be available.

Optional galley with forward club configuration

AT SPECTRUM, WE DON'T HAVE TO PLANT TREES TO BE GREEN.

PASSION FOR EXCELLENCE

760.444.0180 | Spectrum Aeronautical LLC 2036 Palomar Airport Road Carlsbad, CA 92011 | www.spectrum.aero

BUILDING GREEN, USING FIBEX®

We're proud to be developing aircraft that are inherently friendlier to the environment. Efficiency has always been a prime objective at Spectrum Aeronautical and we're glad that better performance also means lower emissions.

During the past twenty-five years Spectrum has invested in creating a new and unique type of advanced composite: fibeX®. This remarkable material allows us to build exceptionally rugged aircraft that are up to 40% lighter than aluminum airplanes of similar size, resulting in substantially lower fuel consumption – and dramatically reduced emissions.

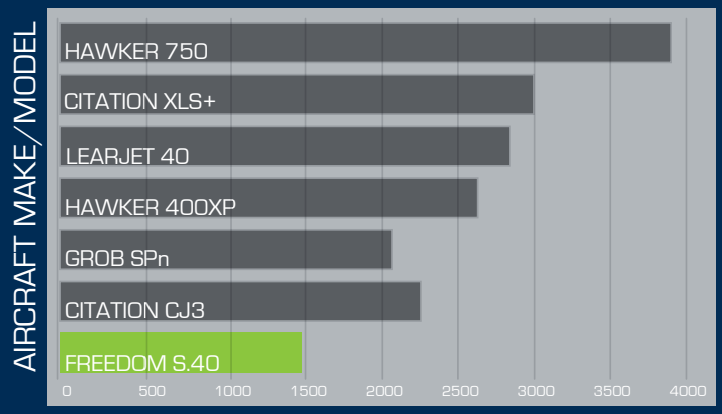
UNSURPASSED VALUE

Spectrum's Freedom S.40 mid-size jet offers stand up cabin accommodations for as many as nine passengers with cruising speeds up 440kts (M0.77) and a maximum range of more than 2200nm.

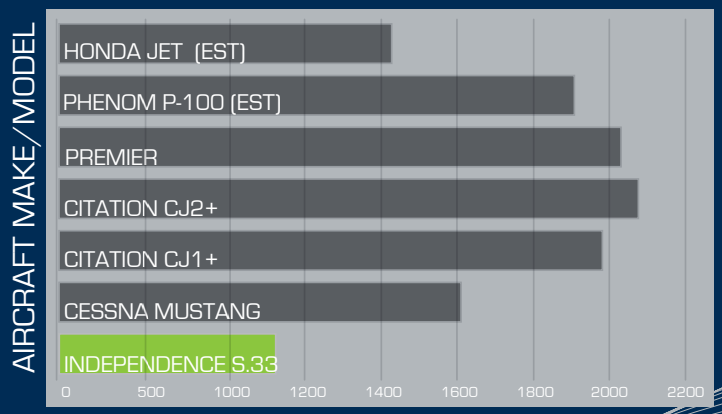
The Independence S.33 has the highest thrust to weight ratio of any business jet, operates safely from 2500-foot runways and has a non-stop range of 2000nm – all while cutting fuel costs in half.

The charts beside show estimates of the amount of CO_2 emitted on a 600nm trip by aircraft in each cabin class when compared with Spectrum's Freedom S.40 and Independence S.33.

LOWEST EMISSIONS



CO_2 EMITTED (KG)



CO_2 EMITTED (KG)

SPECTRUM

YOUR NEW FRONT OFFICE

WELCOME TO THE FLIGHT DECK OF THE FUTURE

At Spectrum, we know that the flight deck is the key to safe and effective pilot/aircraft interface. Our experienced flight deck design team sweats the details, so you won't have to.

The Freedom's flight deck has been carefully crafted to serve both single pilot and two-crew operations. Featuring the Primus Apex avionics suite, the S.40 offers "front office" comfort that is unmatched by any other aircraft in its class. The Primus Apex system, which is already certified and flying, provides:

- **Four high resolution flight displays**
- **Dual redundant AHRS & ADC**
- **Dual digital audio panels**
- **Dual VHF digital COM transceivers**
- **Dual VOR/LOC/GS receivers**
- **Marker beacon receiver**
- **Dual GPS system,**
- **IFR & WAAS certified**
- **3 axis autopilot, YD, alt. hold & alert**
- **Dual integrated FMS**
- **Electronic plates & charts**
- **Electronic checklist**
- **3 Axis electric trim**
- **TCAS I or II**
- **Dual Mode S transponders**
- **TAWS class B or A**
- **Color weather radar & XM uplink**
- **Dual FADEC system**
- **RVSM & FIKI certification**
- **And more ...**

Combining powerful capabilities with an ergonomic interface, the S.40 is ideally suited for single pilot operation. Part 135 and EASA Commercial operators will enjoy a robust set of equipment to meet and exceed requirements. The Freedom's flight deck provides the ease, safety and comfort required in today's (and tomorrow's) business jet operations.

SPECTRUM CONTACT INFORMATION

SALES & CUSTOMER SERVICE
TOLL FREE: 866.306.6717
DIRECT: 760.444.0180
info@spectrum.aero

SPECTRUM AVIATION EUROPE
EU & MIDDLE EAST: +43.699.1270.0584
SUB-SAHARAN AFRICA: +27.83.601.7952
info@spectrumeurope.aero

SAN DIEGO (CARLSBAD), CALIFORNIA
SPECTRUM CORPORATE & SALES FACILITIES
2036 Palomar Airport Road
Carlsbad, CA. 92011
U.S.A.

SPANISH FORK, UTAH
SPECTRUM DEVELOPMENT CENTER
Engineering, flight test and manufacturing.
303 West 3000 North
Spanish Fork, UT. 84660
U.S.A