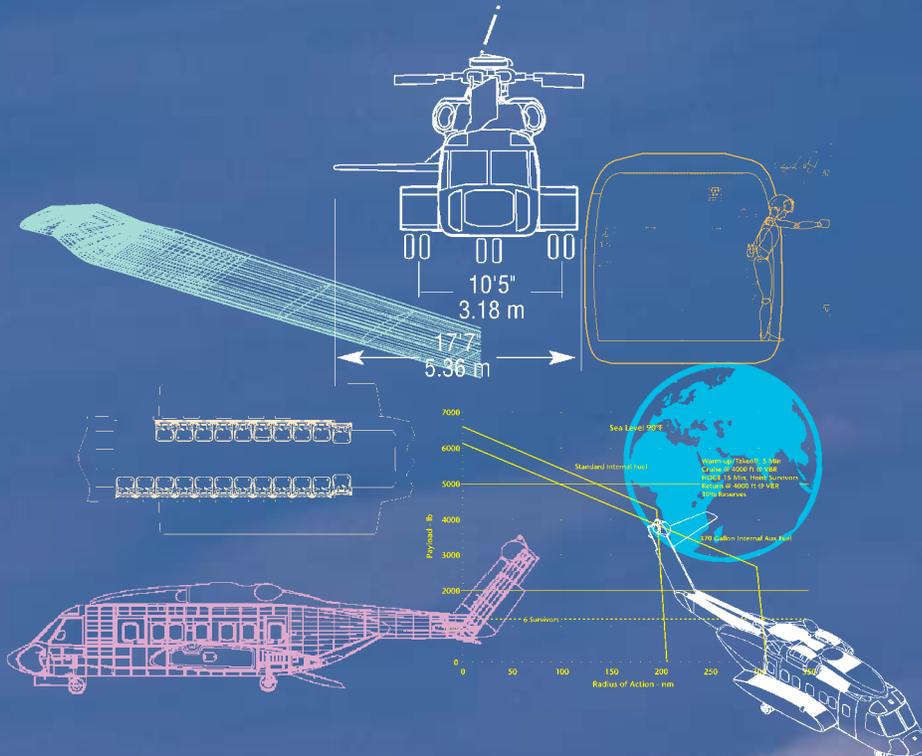




SIKORSKY S-92 HELICOPTER



# Technical Information



**Sikorsky**

A United Technologies Company



## Program Status

TECHNICAL  
INFORMATION

1

Launched at the Paris Air Show in 1995, the S-92 has been developed to provide both civil and military operators with the first true replacement for the S-61. From its inception, the S-92 was designed to provide unprecedented levels of safety, maintainability, reliability, and operational economics.

Since its first flight in December 1998, the S/H-92 has accumulated over 1000 test hours in its development and certification program. The production configuration has been established with General Electric CT7-8 engines and a Collins cockpit, and agreements have been signed with several commercial customers. Basic FAA Type Certification is scheduled for the fourth quarter of 2002. Expanded certification for specific customer requirements will be completed in 2003, with production deliveries beginning in the third quarter.



*Parts manufactured by worldwide partners come together on the S-92 assembly line at Sikorsky's Stratford, Connecticut facility.*

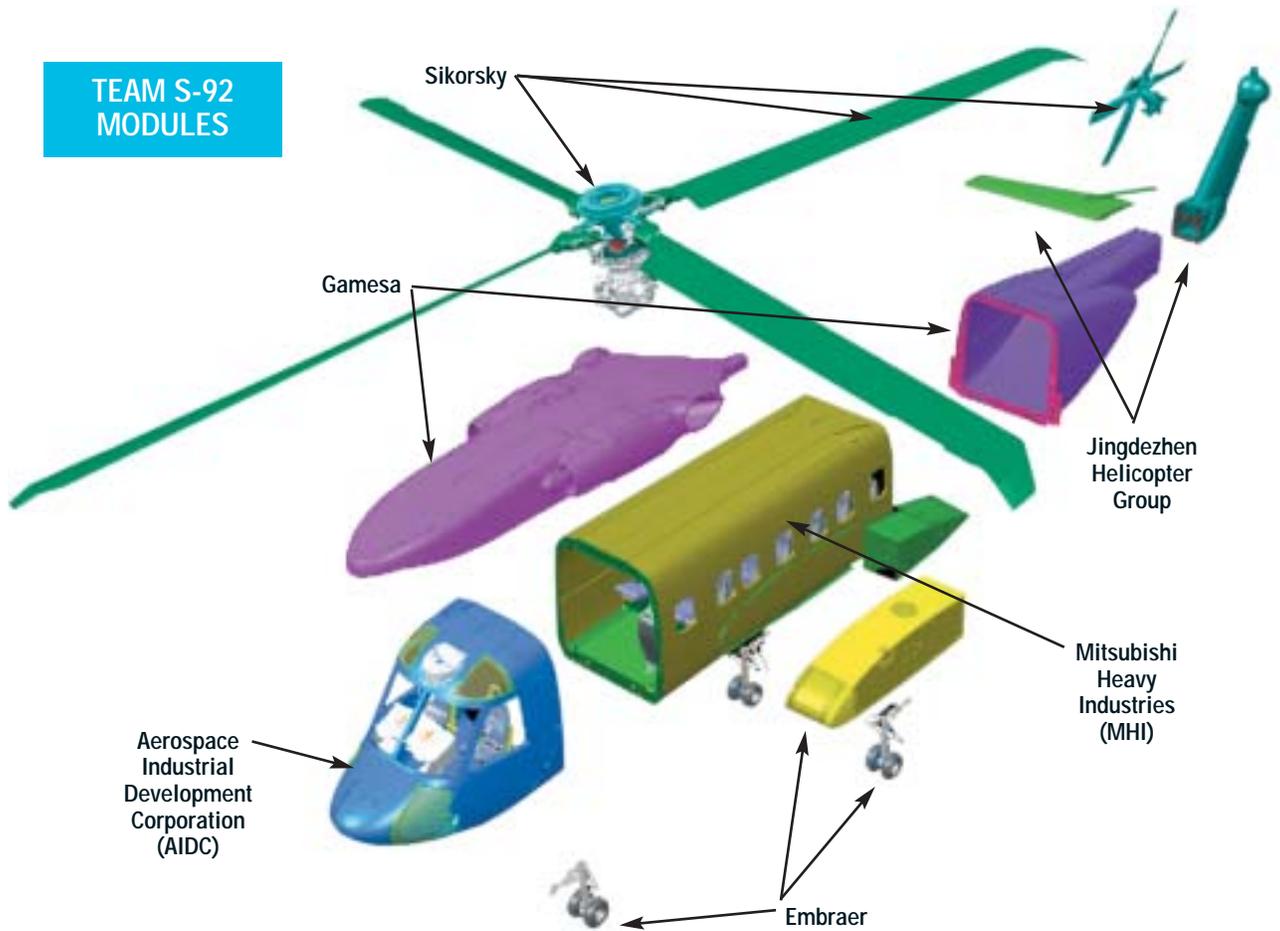


## S-92 Production Team

The S-92 Helicopter is being developed and produced by a worldwide, collaborative team led by Sikorsky Aircraft. Sikorsky provides the system integration function, and is developing all dynamic components. The S-92 program philosophy is to provide a common baseline aircraft to which customers add options. The aircraft is then built to order, configured for the customer's specific mission.

Missions include Offshore Oil transport, VIP transport, Airline Service, Air Cargo, Utility, Troop Transport, Naval Operations, and Search and Rescue Operations.

### TEAM S-92 MODULES



#### S-92 TEAM PRINCIPAL PARTICIPANTS

- **Aerospace Industrial Development Corporation (Taiwan)**  
Cockpit, including electrical harnesses, hydraulic lines and selected flight control components
- **Embraer (Brazil)**  
Sponsons, fuel cells, and landing gear
- **Gamesa (Spain)**  
Aft transition tailcone and main rotor pylon. Also responsible for fabrication of the aircraft interiors
- **Jingdezhen Helicopter Group/CATIC (People's Republic of China)**  
Vertical tail assembly to include fabrication of the horizontal stabilizer
- **Mitsubishi Heavy Industries (Japan)**  
Main cabin section, the largest subassembly on the project
- **GE Aircraft Engines (USA)**  
CT7-8 turboshaft engines
- **Rockwell Collins (USA)**  
Cockpit liquid crystal multi-function displays and communication/navigation suite
- **FlightSafety International (USA)**  
Integrated product team for training



## General Specifications

**PERFORMANCE**

*Standard Day, Sea Level at 26,150 lb/11,861 kg gross weight*

■ Maximum speed (VNE)	165 kts	306 km/hr
■ Maximum cruise speed (VH)	151 kts	280 km/hr
■ Best range speed (99% best specific range)	137 kts	254 km/hr
■ Range: civil configuration (3,000 ft, ISA plus 10°c.)		
- with 19 passengers and 30-minutes reserve plus 10%	439 nm	813 km
- with 19 passengers and no reserve	538 nm	996 km
■ Maximum range with internal auxiliary fuel (370 gallons)	687 nm	1,272 km
■ Service ceiling	15,000 ft	4,572 m
■ Hover ceiling out-of-ground effect	6,370 ft	1,942 m
■ Hover ceiling in-ground effect	10,700 ft	3,261 m

**WEIGHTS**

■ Maximum takeoff gross weight, civil configuration		
- internal load	26,150 lb	11,861 kg
- external load	28,300 lb	12,837 kg
■ Maximum external load	10,000 lb	4,536 kg
■ Weight empty, offshore oil	15,900 lb	7,212 kg
■ Weight empty, search and rescue	16,000 lb	7,257 kg
■ Maximum fuel load, (internal, standard)	5,130 lb	2,327 kg

**GENERAL DATA**

■ Crew seating capacity	2	
■ Passenger seating capacity, offshore oil	19	
■ Passenger seating capacity, military transport	22	
■ Baggage compartment volume	140 cu ft	3.96 cu m
■ Fuel capacity (internal, standard)	760 US gal	2,877 L

**POWERPLANT**

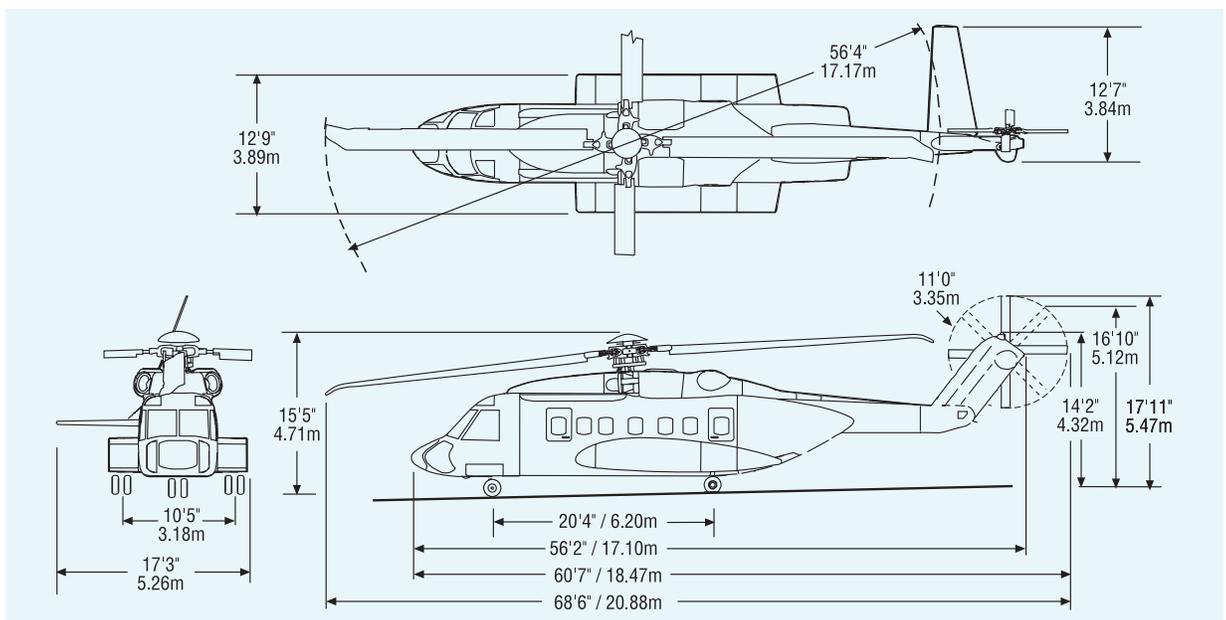
■ Engine quantity and type	Two General Electric CT7-8
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# Aircraft Dimensions

## DIMENSIONS

■ Main rotor diameter (blade tip circle)	56' 4"	17.17 m
■ Tail rotor diameter (blade tip circle)	11' 0"	3.35 m
■ Fuselage length	56' 2"	17.10 m
■ Fuselage width	12' 9"	3.89 m
■ Fuselage height (to top of tail pylon)	14' 2"	4.32 m
■ Length over-all (including rotors)	68' 6"	20.88 m
■ Height over-all		
- to tip of tail rotor, positioned vertically	17' 11"	5.47 m
- to tip of tail rotor, positioned diagonally	16' 10"	5.12 m
■ Width (including horizontal stabilizer)	17' 3"	5.26 m
■ Width (blades parked at 45° to fuselage)	40' 0"	12.36 m
■ Main landing gear tread	10' 5"	3.18 m
■ Wheel base	20' 4"	6.20 m
■ Passenger cabin length (with bulkhead)	20' 0"	6.10 m
■ Passenger cabin width	6' 7"	2.01 m
■ Passenger cabin height	6' 0"	1.83 m



The S-92 features a spacious, stand-up cabin

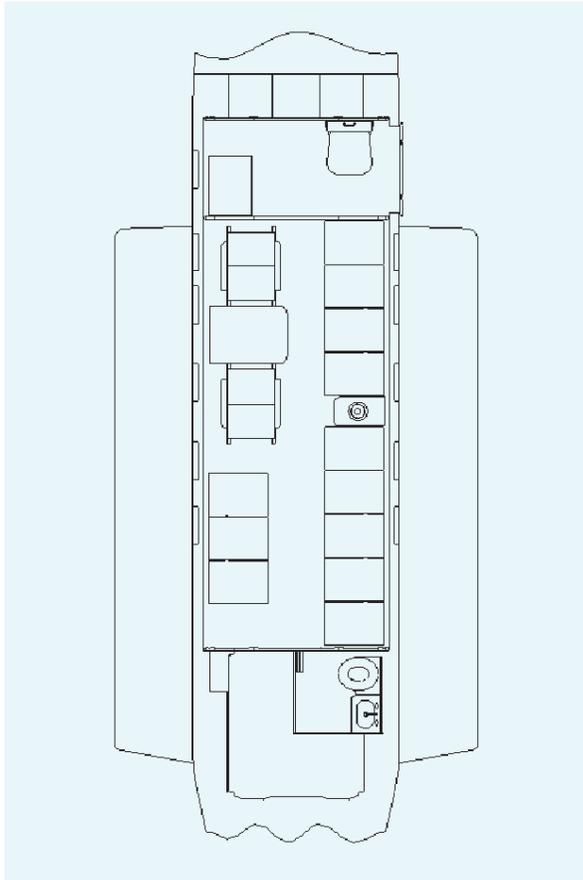
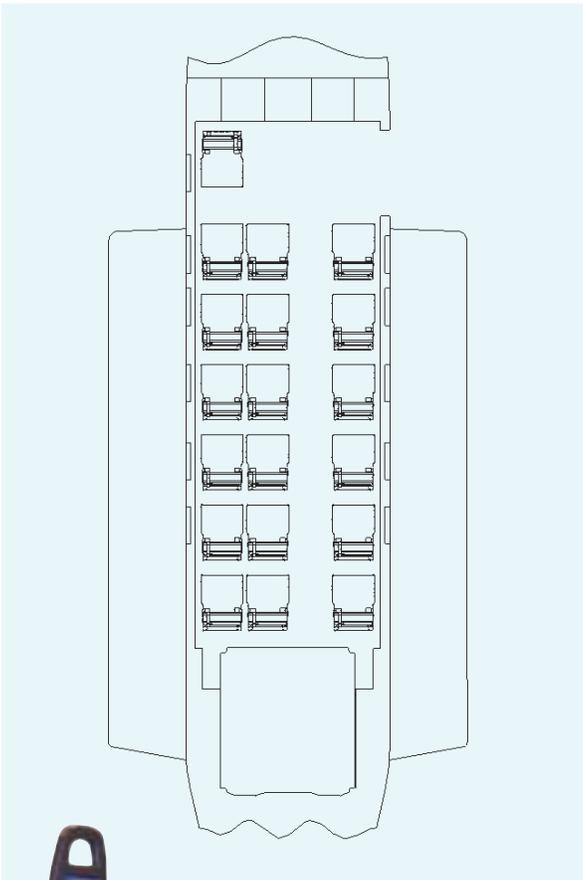
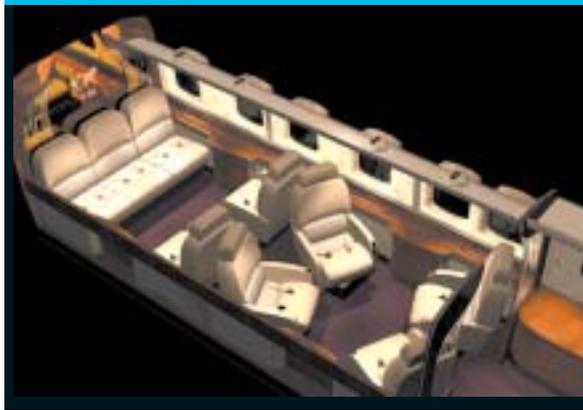


# Cabin Arrangements

OFFSHORE OIL TRANSPORT/AIRLINE SERVICE



VIP TRANSPORT



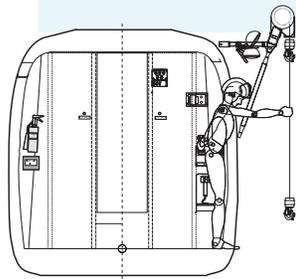
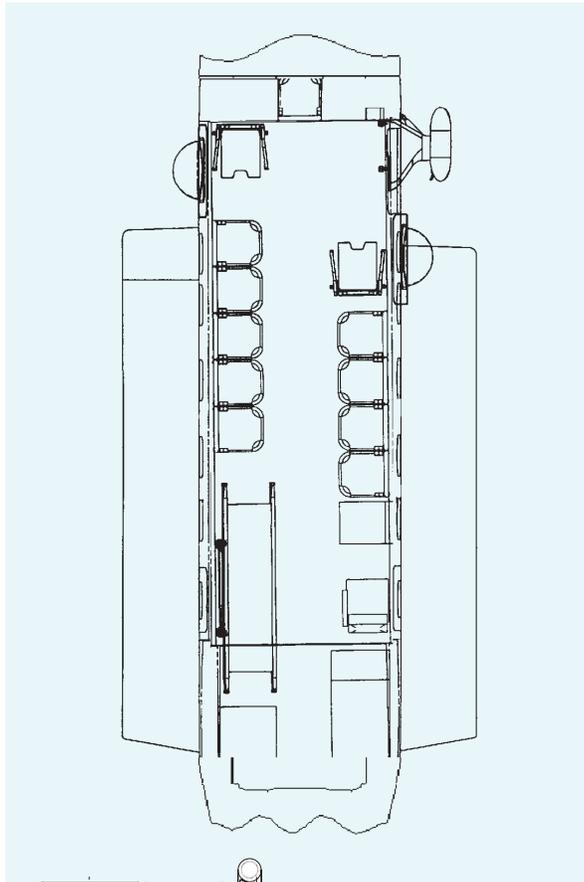
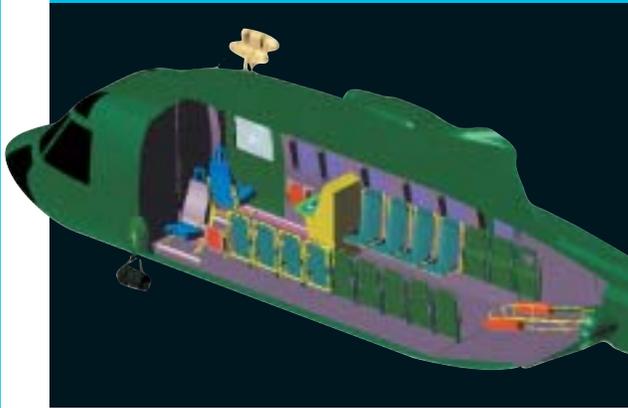
- 19 Crashworthy airline-style seats

- Multiple configurations include swivel chairs, divans, tables, and cabinets
- Restroom facilities are available



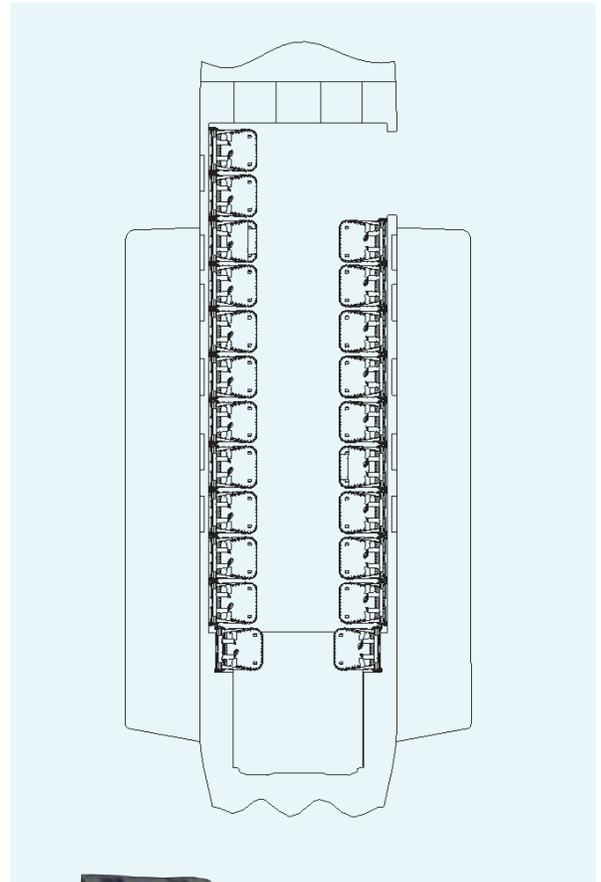
# Cabin Arrangements

SEARCH AND RESCUE (SAR)



■ Large cabin offers ample space for seats, litters, auxiliary fuel, and SAR emergency equipment

MILITARY TROOP TRANSPORT

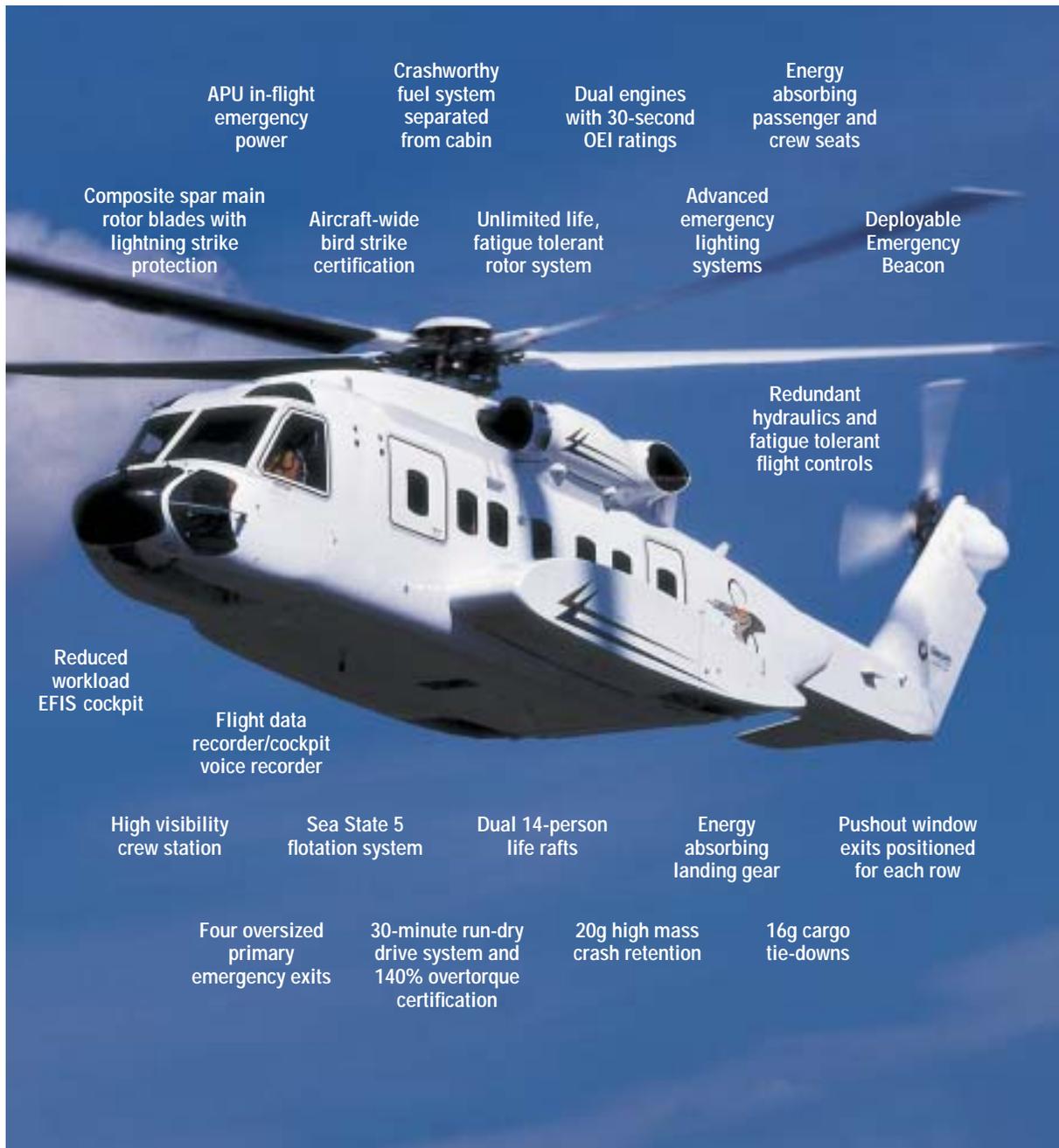


■ 22 Crashworthy troop seats





# Safety Features



APU in-flight emergency power

Crashworthy fuel system separated from cabin

Dual engines with 30-second OEI ratings

Energy absorbing passenger and crew seats

Composite spar main rotor blades with lightning strike protection

Aircraft-wide bird strike certification

Unlimited life, fatigue tolerant rotor system

Advanced emergency lighting systems

Deployable Emergency Beacon

Redundant hydraulics and fatigue tolerant flight controls

Reduced workload EFIS cockpit

Flight data recorder/cockpit voice recorder

High visibility crew station

Sea State 5 flotation system

Dual 14-person life rafts

Energy absorbing landing gear

Pushout window exits positioned for each row

Four oversized primary emergency exits

30-minute run-dry drive system and 140% overtorque certification

20g high mass crash retention

16g cargo tie-downs

*The S-92 helicopter will be the first helicopter fully certified to the harmonized FAA, JAA Part 29 requirements.*

*This certification basis, combined with input from the offshore oil community, will result in the most comprehensive set of safety features ever integrated into a single helicopter design.*



## Equipment and Features

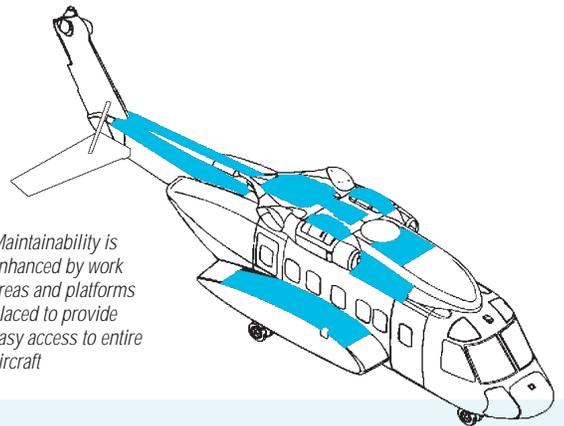
### Standard Offshore Configuration

#### AIRFRAME

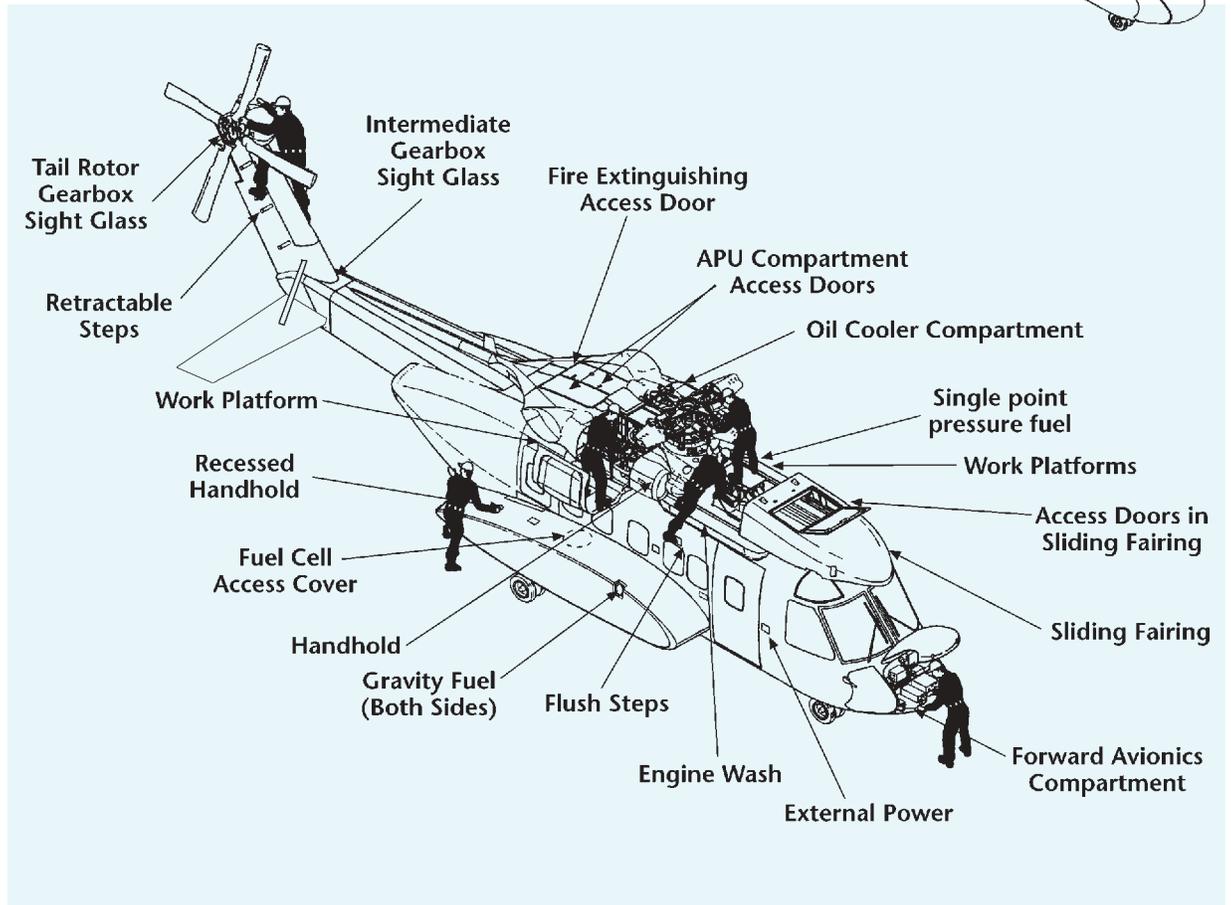
- Active vibration control system
- Nose electronics bay with hinged door
- Heated windshields
- Windshield wipers (2)/washer system
- Cockpit with openable clear view windows
- Jettisonable cockpit windows (2)
- Crashworthy pilot and co-pilot seats
- Airline interior with 19 crashworthy passenger seats
- 75 psf cabin floor
- Four cabin emergency exits
- Ten double pane windows
- Upward-hinged upper door
- Airstair lower door
- Bleed air heat system (two zone)
- Chin and side window defogging system
- Ventilation system (two zone)
- Exterior fuel sponsons (2)
- Hydraulic-powered rear ramp
- Retractable tri-cycle landing gear
- Emergency flotation system
- Sponson-stowed life rafts (left and right)
- High-quality exterior finish



The S-92 design sets a new standard for aircraft maintainability



Maintainability is enhanced by work areas and platforms placed to provide easy access to entire aircraft





## Equipment and Features

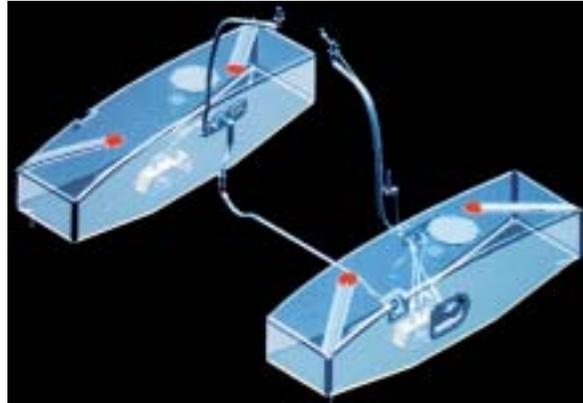
### Standard Offshore Configuration

#### POWERPLANT AND FUEL SYSTEM

- Two General Electric CT7-8 engines with integral particle separators
- APU for engine start, ground power, heating, and in-flight emergency power
- Dual channel FADEC with autostart, power assurance and OEI training mode
- Dual suction fuel feed system with breakaway fittings, and crossfeed capability
- Crashworthy fuel tanks (2) with a combined capacity of 700 gallons
- Single-point pressure fueling and defueling
- Dual point gravity refueling
- Low level fuel warning system
- Engine and APU fire detection and dual extinguishing systems
- Engine inlet anti-ice system



APU provides ground power and engine start. Flight rated for emergency/supplemental power.



Isolated sponsons, suction feed and self-sealing breakaway valves enhance fuel system crashworthiness.



The GE CT7-8 engine is derived from the proven CT7/T700 family, which has accumulated over 28 million hours of operation.



## Equipment and Features

### Standard Offshore Configuration

#### TRANSMISSION

- Main transmission with two input/accessory modules
- Intermediate and tail gearboxes with interconnecting shafts
- Chip detectors with fuzz burn-off
- Low maintenance drive shafts
- Rotor brake
- Diaphragm-type tail drive couplings
- Vibration monitoring

#### ROTORS AND CONTROLS

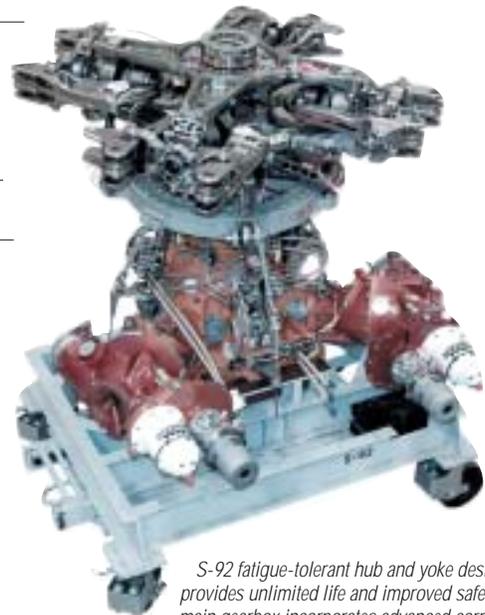
- Four-bladed, articulated main rotor system with fatigue-tolerant design and elastomeric bearings
- Composite construction main rotor blades
- Four-bladed flexbeam tail rotor
- Elastomeric main and tail rotor rod end bearings
- Low maintenance, rotor-mounted vibration suppression system
- Manual blade fold (two blades forward, two blades aft)
- Dual, redundant isolated pilot flight controls
- Dual, redundant, primary and tail rotor servos
- Tail rotor centering quadrant
- Dual, independent transmission-powered 4000 psi hydraulic systems
- Back-up, independent 4000 psi hydraulic system
- Redundant stability augmentation system with airspeed, attitude, and heading hold functions



*The S-92 main transmission features a unique planetary gear system, and utilizes advanced materials for long life.*



*Bearingless composite flexbeam tail rotor design is bird strike certified*



*S-92 fatigue-tolerant hub and yoke design provides unlimited life and improved safety, and the main gearbox incorporates advanced corrosion-resistant materials and coatings.*





# Equipment and Features

## Standard Offshore Configuration

### AVIONICS

- Rockwell Collins glass cockpit with four multi-function displays
  - Primary flight instruments
  - Multi-purpose navigation display
  - Graphic engine instrument and caution/advisory (EICAS) display
  - Built-in-test (BIT) displays
- Proline IV communications/navigation suite
  - Dual VHF Communications
  - Dual VOR
  - DME
  - ADF
  - Transponder (Mode S)
  - Dual Radio Management Units
  - Dual Audio Control Units
- ARINC-429 and MIL-STD 1553 data-bus compatibility
- Dual AHRS
- Weather radar
- HUMS
- Passenger briefing system with page/chime feature



### AUTOMATIC FLIGHT CONTROL SYSTEM

- Dual, digital Hamilton Sundstrand AFCS with fully-coupled flight director

### ELECTRICAL SYSTEMS

- |  |   |   |
|--|---|---|
| <ul style="list-style-type: none"> <li>■ Two 75 KVA, 400 hz 3-phase, transmission-driven main generators</li> <li>■ Two 200 amp AC/DC convertors</li> <li>■ 35 KVA air-cooled APU-driven backup generator</li> </ul> | <ul style="list-style-type: none"> <li>■ 100 amp AC/DC backup converter</li> <li>■ 15 amp-hour battery</li> <li>■ Upper anti-collision strobe light</li> <li>■ Landing lights</li> <li>■ Cargo loading light</li> </ul> | <ul style="list-style-type: none"> <li>■ Controllable searchlight</li> <li>■ AC/DC cabin power receptacles</li> <li>■ Integral cockpit lighting</li> <li>■ Wide-area cabin lighting</li> <li>■ Emergency lights</li> <li>■ HEELS</li> </ul> |
|--|---|---|

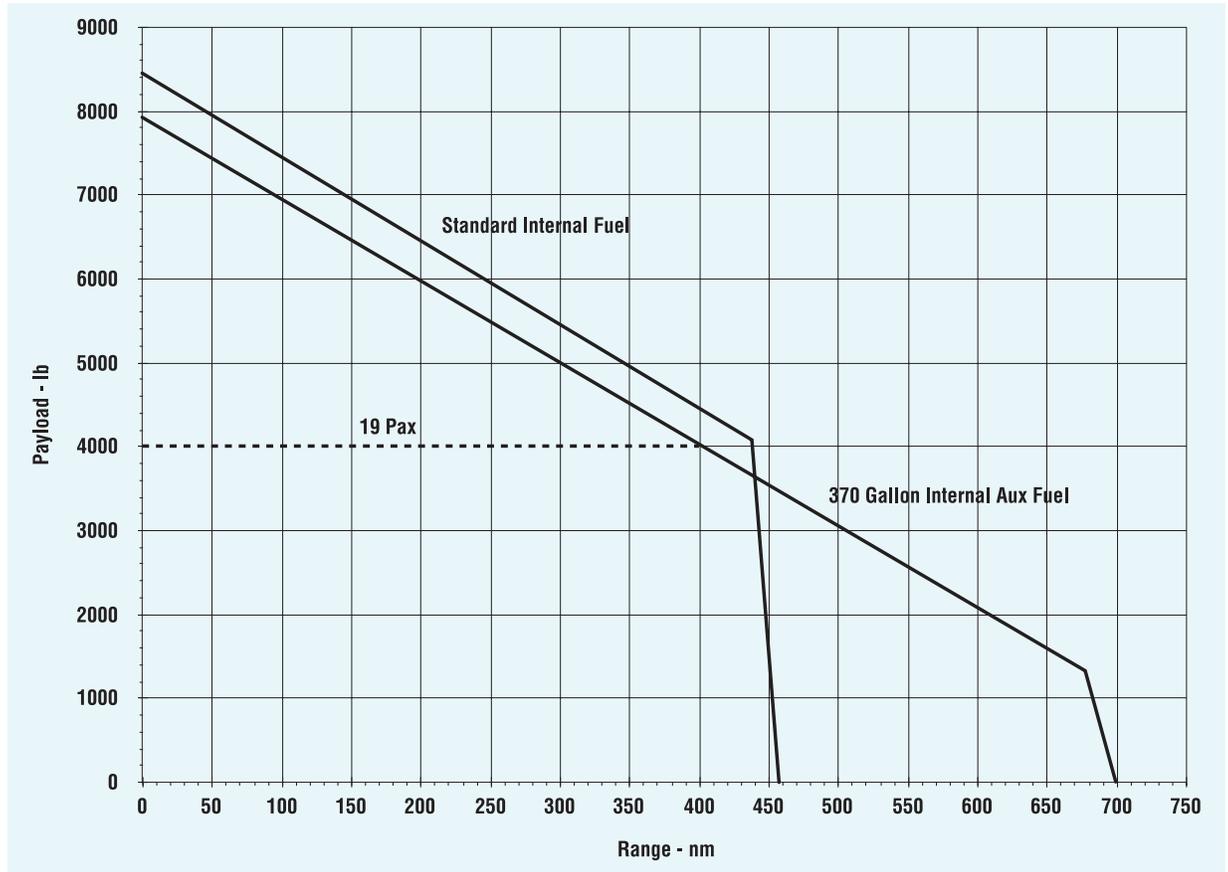


The S-92 cockpit and display panel, shown here with an optional fifth liquid crystal, multi-function display.



# Mission Performance

## Offshore Oil Configuration



### MISSION

- Takeoff at maximum gross weight (25,500 lb)
- Sea Level, ISA+ 10°C
- Cruise at 3,000 feet, Long Range Cruise Speed\*
- JAA Reserve: 30 minutes plus 10%
- Average fuel flow: 1,240 lb/hr

### WEIGHTS

■ Offshore Configuration weight	15,658 lb
■ Crew	400 lb
■ Engine oil/washer fluid	37 lb
■ Tiedown kit/manuals	10 lb
<b>Operating weight</b>	<b>16,105 lb</b>

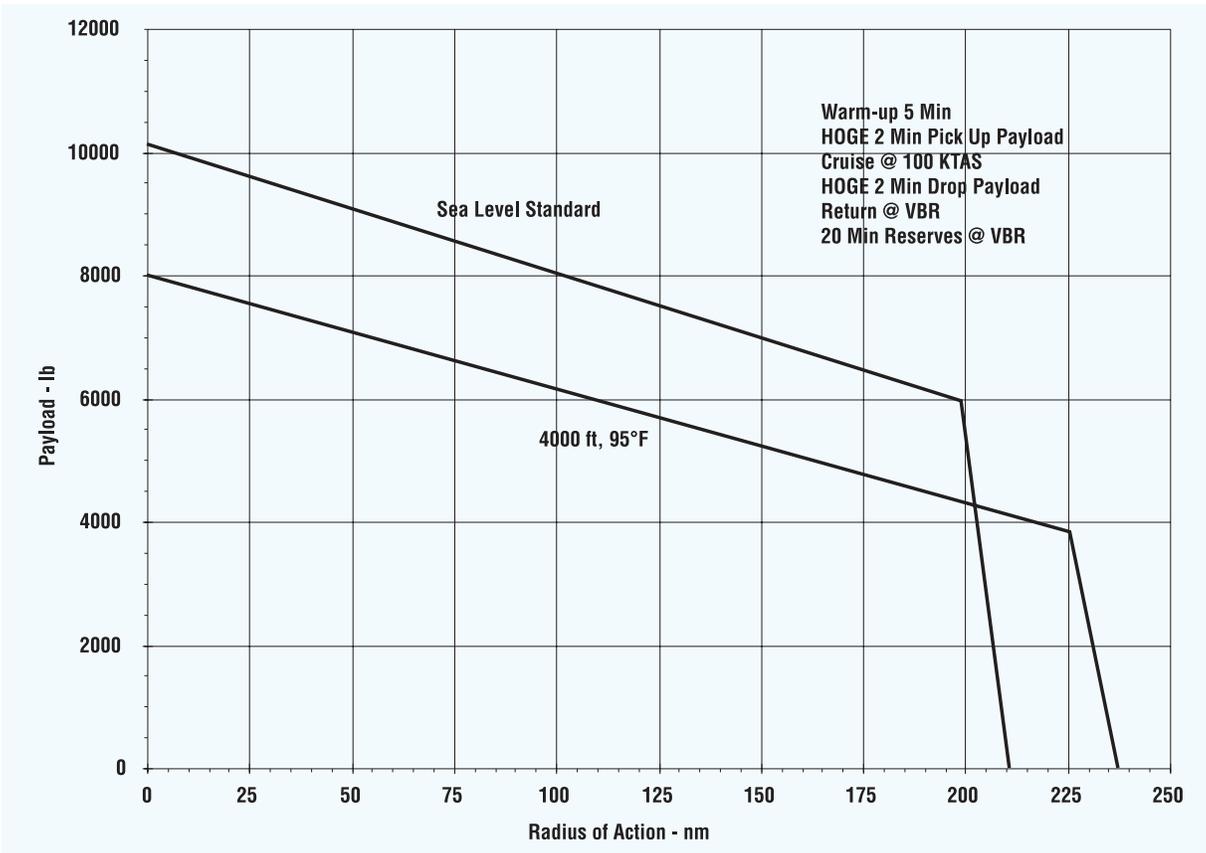
\* Speed for 99% best specific range



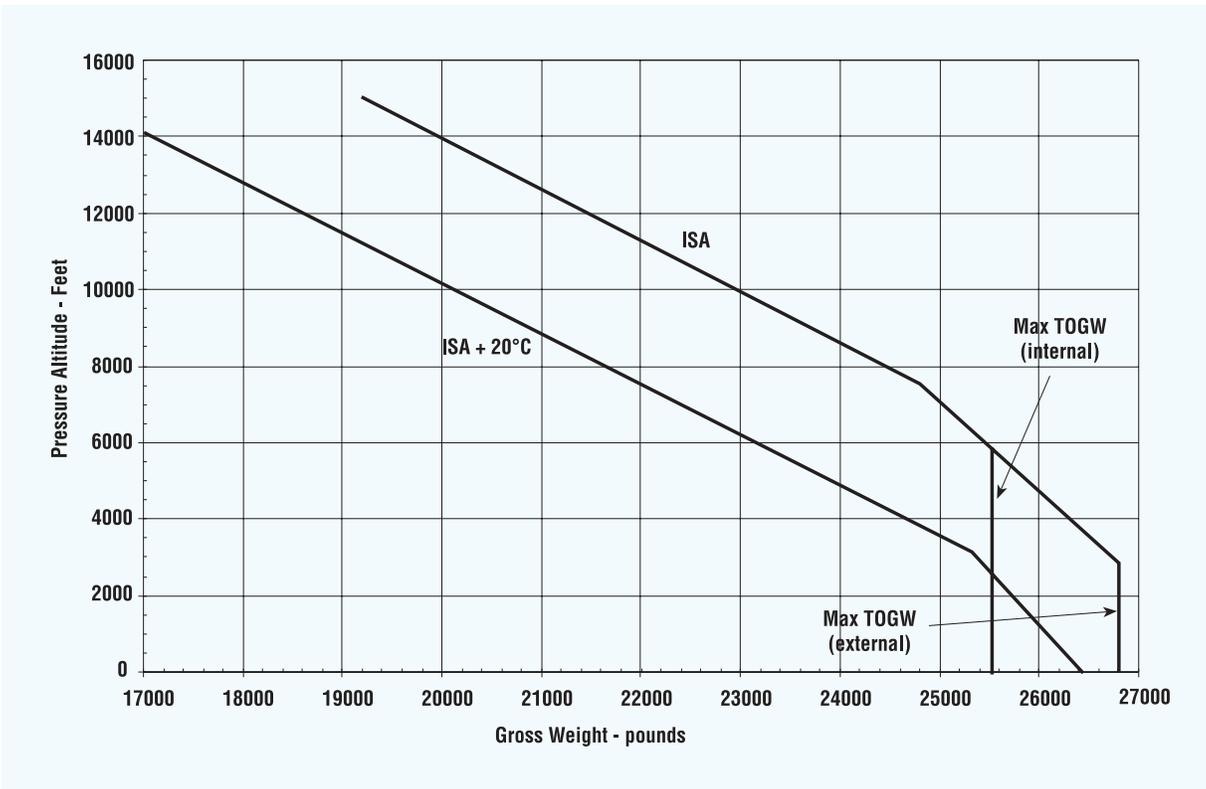


# Mission Performance

## External Lift



## HOGE Ceiling

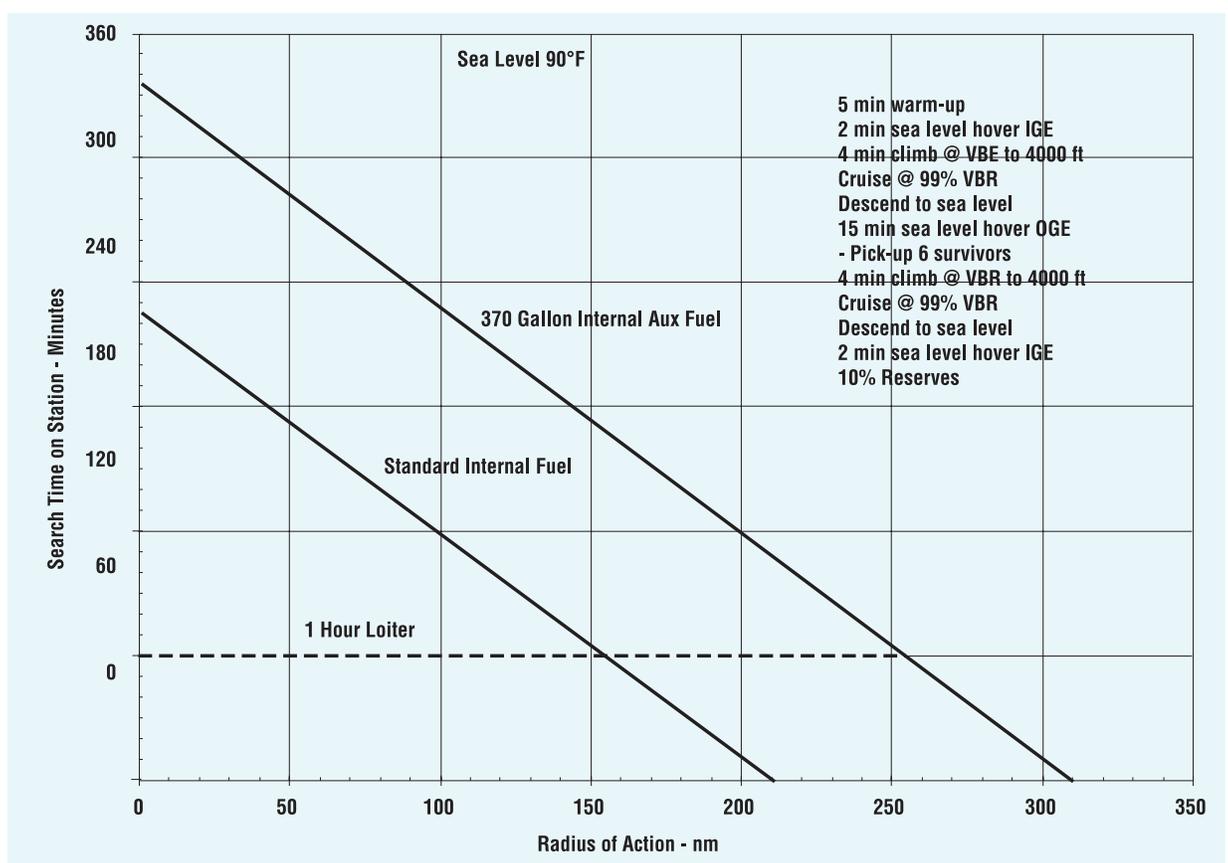
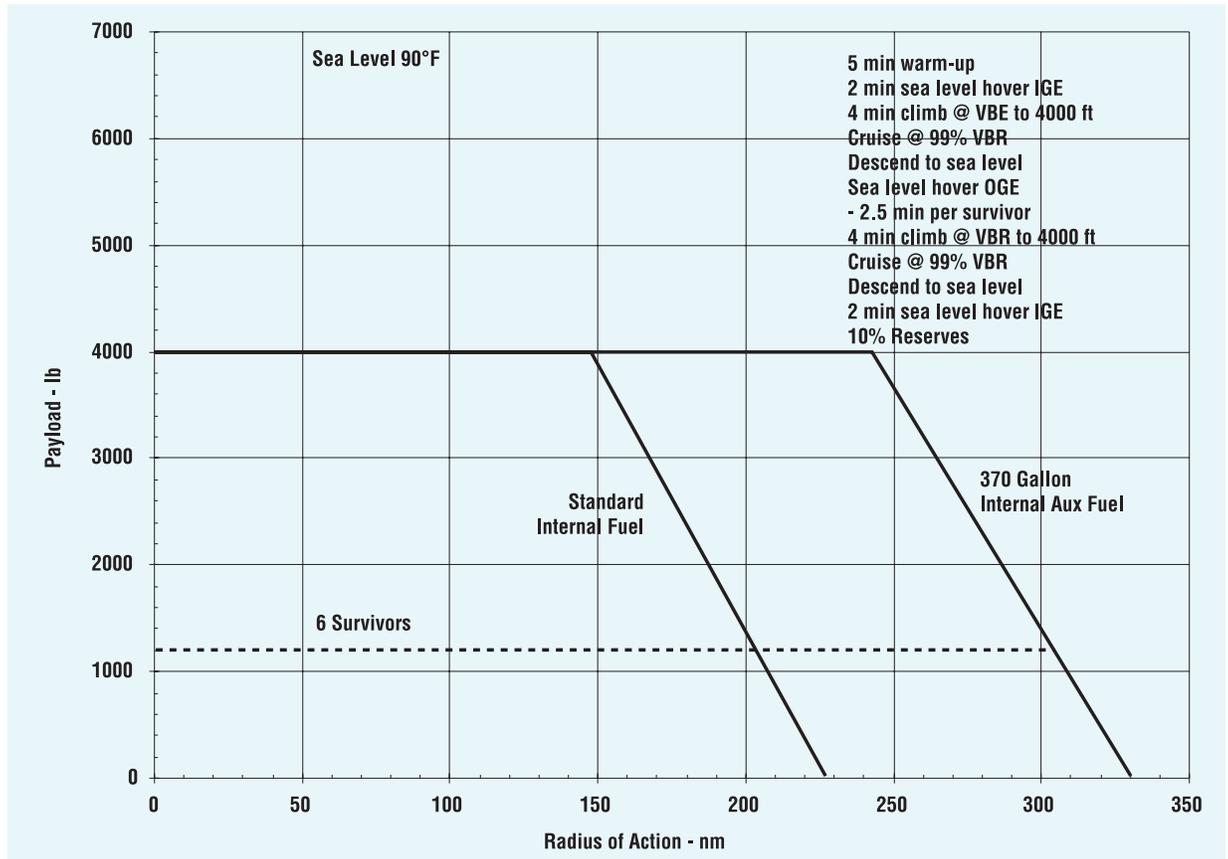




TECHNICAL INFORMATION

14

Mission Performance  
Search and Rescue (SAR)





# Optional Equipment

**AIRFRAME AND ROTORS**

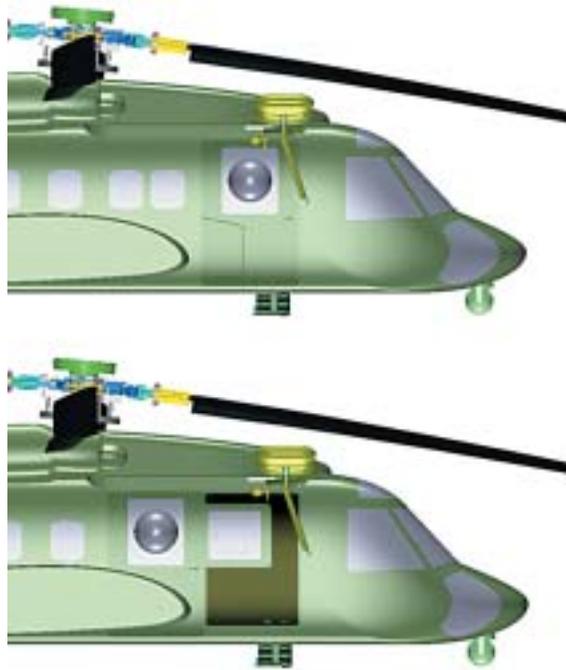
- Overhead cockpit windows
- Full sliding door
- Sliding upper cabin door, right side
- Sliding cabin window, left-side, forward
- Jettisonable cabin windows
- 200 psf cabin floor
- Mixer work platform
- Tail pylon pullout steps
- Air conditioning system
- Cold weather heat system
- Main and tail rotor blade de-ice

**FURNISHINGS**

- Armored crashworthy pilot/copilot seats
- Utility type soft cabin interior
- Crashworthy, fold-up troop seats (up to 22)

**PROPULSION/FUEL SYSTEMS**

- Ballistic self-sealing fuel system
- Internal aux fuel system (185 gallons x 2)
- External aux fuel system (230 gallons x 2)
- External pneumatic ground start capability



*Optional 50-inch sliding door facilitates ingress and egress of rescues and litters during SAR missions*



*Spacious cabin accommodates up to 22 troops, 12 litters, or 3 standard LD3 cargo containers.*



## Optional Equipment

### ELECTRICAL SYSTEMS/LIGHTING

- Lower anti-collision light
- Logo lights
- Recognition lights
- Rotor head inspection light
- Emergency floor lighting

### AVIONICS

- Fifth color 6" x 8" LCD (center position on instrument panel)
- SAR AFCS upgrade with coupled search patterns
- Universal flight management system (UNS-1C) with GPS
- Doppler
- TCAS I
- Lightning sensor

### SPECIAL MISSION EQUIPMENT

- Hydraulic rescue hoist (600 lb, 250 fpm)
- Cargo hook (10,000 lb capacity)
- 12 Litter medevac kit
- Floor roller system
- Ramp roller system
- Ramp cargo flippers
- Cargo loading winch
- Sea anchor



Up to 10,000 pounds of external cargo may be carried using the stowable cargo hook.



The roomy cabin of the S-92 affords ample space for casualty evacuation



The rear ramp and optional floor roller systems allow fast and efficient loading and unloading of cargo.



SAR mission equipment options include 600 pound capacity rescue hoist



# Component Overhauls and Retirement Times

## OVERVIEW

Minimization of direct operating costs has, from the start, been established as a primary design criteria of the S-92 helicopter program. Projected DOCs have been continuously monitored during all phases of development. The underlying philosophy has been to reduce operator costs through the extension of component lives and minimization of the number of components subject to overhauls. As a result of holding to this philosophy, all components on the S-92, with the exception of the main gearbox, require only on-condition maintenance. The main gearbox itself has a TBO of 6,000 hours, higher than any gearbox previously introduced by Sikorsky into the commercial marketplace.

With the dramatic reduction in overhauls and life-limited components, the S-92 design will provide operators a savings in excess of \$400 per flight hour in maintenance costs compared to any other-helicopter in the its class.

*The S-92 has only one component requiring scheduled overhaul, and only two components with a retirement life of less than ten years or 12,000 hours.*



*Unlimited life main rotor blade incorporates composite spar technology and utilizes a swept, tapered anhedral tip. This design provides improved lift and maneuverability.*



*Anti-torque control is provided by unlimited life tail rotor blades with bearingless composite flexbeam. The pitch control links use elastomeric bearings.*



*Designed to flaw tolerant certification requirements, the unlimited life S-92 main rotor head features redundant load paths and elastomeric bearings. The result is 50,000 hours before overhaul.*



## Cost of Operation

### Offshore Transport Service

The following information is supplied to aid in the preparation of estimates of the cost of operation for the S-92 helicopter in offshore oil transport service. Costs have been calculated in general accordance with the practices described in the *Guide For Presentation of Helicopter Operating Cost Estimates*, published by the Committee on Helicopter Operations Cost. The estimates presume a mature operation in which there has been opportunity for costs to stabilize and assume no benefit for warranties.

Direct operating costs are calculated for a new S-92 flying 1,000 hours per year using 1999 prices. Reliability and maintainability characteristics are based on Sikorsky's H-60 experience. The H-60 fleet has accumulated in excess of 4 million flight hours since the model's introduction in 1978. The S-92 design incorporates the lessons learned on the H-60 program and thereby provides a significant improvement in cost-effectiveness.

#### VARIABLE COSTS

FUEL AND LUBRICANTS	SIKORSKY ESTIMATE	OPERATOR ESTIMATE
■ Average fuel consumption (gallons/hour)	178.0	
■ Fuel cost per gallon (\$)	1.51	
■ Cost for fuel (\$/hour)	269.00	
■ Cost for lubricants (3% of fuel)	8.00	
<b>Total cost for fuel and lubricants (\$/hour)</b>	<b>277.00</b>	
<b>LABOR</b>		
■ Labor rate (\$/hour)	47.30	
■ Direct maintenance (MH/FH)	2.1	
■ Indirect maintenance (MH/FH)	2.0	
■ Total maintenance (MH/FH)	4.1	
<b>Total labor cost (\$/hour)</b>	<b>192.00</b>	





# Cost of Operation

## Offshore Transport Service

RESERVE FOR RETIREMENT ITEMS	LIFE LIMIT	SIKORSKY ESTIMATE	OPERATOR ESTIMATE
■ Squibbs	5 years	0.75	
■ Tail rotor servo coupling bearing	2,000 hours	0.84	
■ Retirement items with lives greater than 12,000 hours		13.24	
<b>Total retirement item cost (\$/hour)</b>		<b>14.83</b>	

OVERHAUL ITEMS	TBO	SIKORSKY ESTIMATE	OPERATOR ESTIMATE
■ Main gearbox	6,000 hours	39.02	
<b>Total overhaul item cost (\$/hour)</b>		<b>39.02</b>	

RESERVE FOR UNSCHEDULED REPAIRS	SIKORSKY ESTIMATE	OPERATOR ESTIMATE
■ Electrical	16.06	
■ Fuel system	2.71	
■ Hydraulic system	32.04	
■ Landing gear	15.54	
■ Lighting	2.82	
■ Airframe	28.93	
■ Rotors	98.96	
■ Power train	57.24	
■ Flight controls	45.85	
■ Avionics	88.40	
■ Propulsion	38.68	
■ Utility systems	1.96	
<b>Total unscheduled repair cost (\$/hour)</b>		<b>429.19</b>

<b>Total engine overhaul and spares cost (\$/hour)</b>	<b>220.00</b>
<b>Total variable cost (\$/hour)</b>	<b>1,172.00</b>





## Cost of Operation

### Offshore Transport Service

#### FIXED COSTS

RESERVE FOR RETIREMENT ITEMS	SIKORSKY ESTIMATE	OPERATOR ESTIMATE
■ Salary (\$/year)	54,275.00	
■ Salary with benefits (x 1.3)	70,558.00	
■ Pilot hours per year	800	
■ Crew cost per hour	88.00	
<b>Total crew cost for two pilots (\$/hour)</b>	<b>176.00</b>	
<b>ANNUAL COSTS</b>		
■ Hull insurance, assumed rate (%)	3.6	
■ Hull insurance, annual cost (\$/hour)	180.00	
<b>Total insurance cost (\$/hour)</b>	<b>180.00</b>	
■ Depreciation (\$/hour)	680.00	
<b>Total Fixed Costs (\$/hour)</b>	<b>1,036.00</b>	

#### TOTAL OPERATING COST SUMMARY

■ Total variable cost	1,172.00
■ Total fixed cost	1,036.00
<b>Total operating cost (\$/hour)</b>	<b>2,208.00</b>

The operating data provided herein are estimates only. Sikorsky endeavors to ensure that this data is current and meaningful for operating cost evaluations. Sikorsky, however, does not warrant, and you should not rely upon, this data as defining the operating costs or overhaul/retirement times for any particular S-92 aircraft or its components.

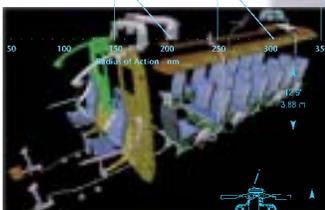
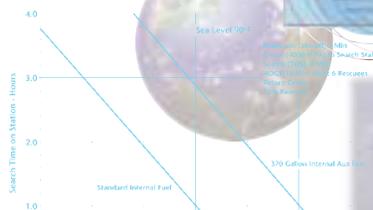


# S-92

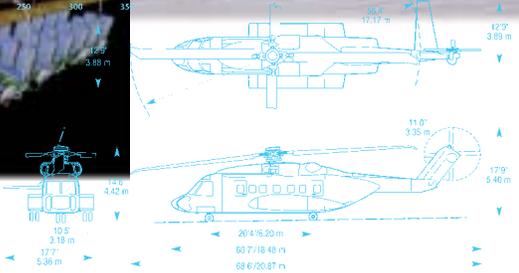
Range



SPEED



PAYLOAD



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January 2002 S92 016