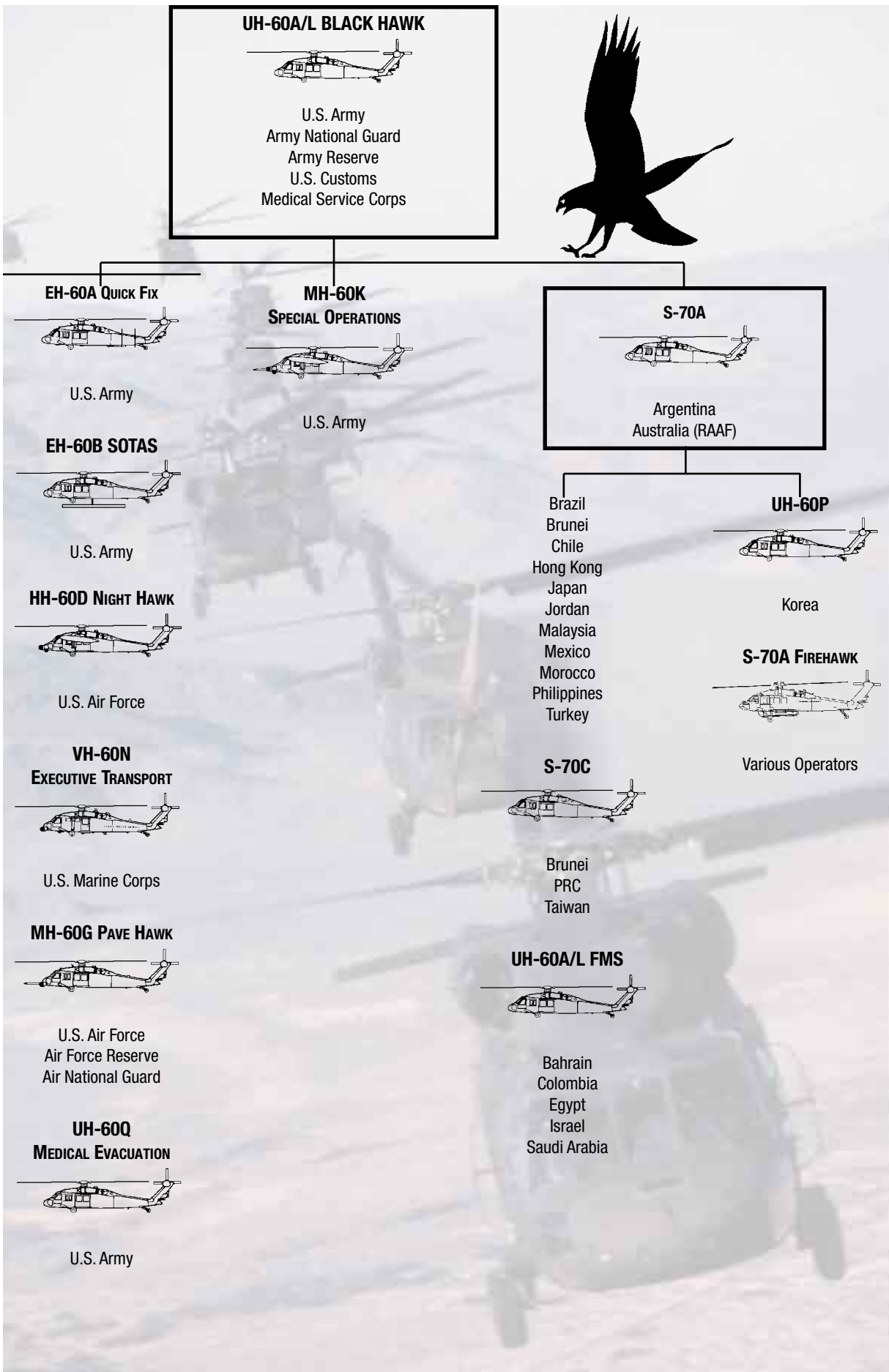




**H-60/S-70A
LINEAGE**



Since its introduction, the Black Hawk helicopter and its derivatives have amassed over five million flight hours



**H-60/S-70
PROGRAM
STATUS**

UNITED STATES MILITARY CUSTOMERS



ARMY



ARMY NATIONAL GUARD



MARINE CORPS



AIR FORCE



NAVY



COAST GUARD

H-60 BLACK HAWK SERIES

■ Delivered	1,725
■ Fleet Flight Hours	3,200,000

SH-60 NAVAL HAWK SERIES

■ Delivered	354
■ Fleet Flight Hours	1,500,000

INTERNATIONAL CUSTOMERS MISSIONS



VIP TRANSPORT



UTILITY



SEARCH AND RESCUE



NAVAL

S-70A/B INTERNATIONAL HAWK

■ Delivered	583
■ Fleet Flight Hours	700,000
■ Countries	24



Weights and Performance

**TECHNICAL
INFORMATION**

1

WEIGHTS

■ Maximum takeoff gross weight	22,000 lb	9,977 kg
■ Empty weight, standard configuration	11,744 lb	5,326 kg
■ Maximum gross weight, external load	23,500 lb	10,658 kg
■ Maximum external load	9,000 lb	4,082 kg

POWERPLANT

ratings per engine, standard day, sea level

■ Type	Two General Electric T700-GE-701C	
■ 2.5-minute OEI contingency	1,940 shp	1,447 kw
■ 10-minute takeoff power	1,890 shp	1,409 kw
■ 30-minute intermediate power	1,800 shp	1,342 kw
■ Maximum continuous power	1,662 shp	1,239 kw
■ Normal fuel capacity, usable	359.7 gal	1,362 l



BLACK HAWKS are powered by two T700-GE-701C engines, which provide efficient, reliable power in all types of operating conditions

PERFORMANCE

22,000 lb gross weight, standard day, sea level unless otherwise noted

■ Maximum speed (V _{NE})	195 kts	361 km/hr
■ Maximum cruise speed (V _H)	149 kts	276 km/hr
■ Maximum rate of climb	2,250 ft/min	11.43 m/sec
■ Service ceiling	13,200 ft	4,021 m
■ Hover ceiling, out of ground effect	4,300 ft	1,311 m
■ Hover ceiling, in ground effect	9,000 ft	2,743 m
■ OEI service ceiling	3,700 ft	1,128 m
■ Range at Long Range Cruise Speed*		
- Internal fuel	248 nm	460 km
- Internal fuel plus two 230 US gallon external aux tanks	591 nm	1,095 km

* 4,000 feet, 132 knots, 20-minute reserve





Specifications

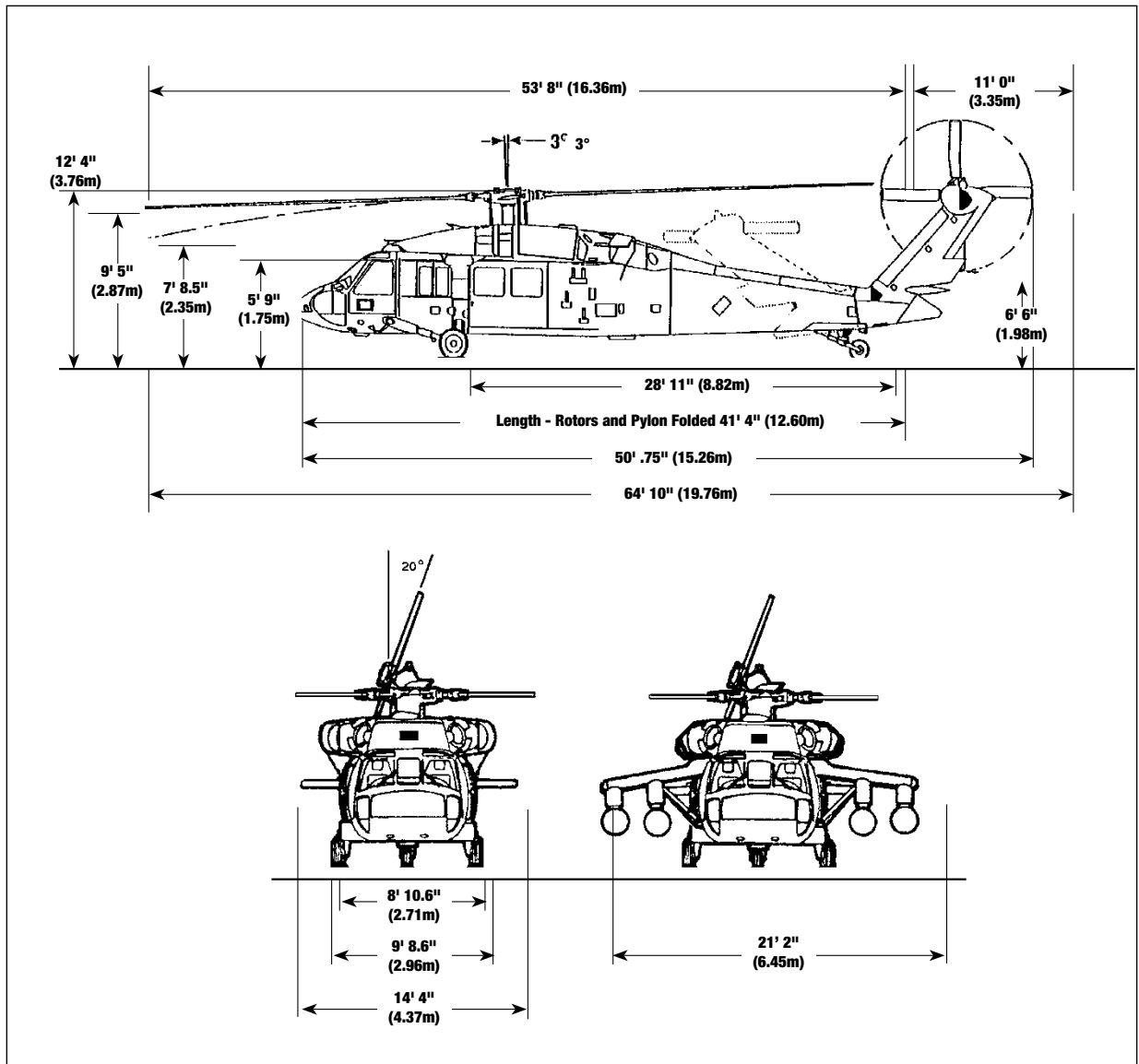
DIMENSIONS

■ Overall length	64.83 ft	19.76 m
■ Overall width	53.67 ft	16.36 m
■ Overall height	17.50 ft	5.33 m
■ Fuselage length	50.04 ft	15.26 m
■ Fuselage width	14.33 ft	4.37 m
■ Folded length *	41.33 ft	12.60 m
■ Folded width *	9.72 ft	2.96 m
■ Folded height *	8.98 ft	2.74 m
■ Wheelbase	28.92 ft	8.82 m
■ Main wheel tread	8.88 ft	2.71 m

ROTORS

■ Main rotor diameter	53.67 ft	16.36 m
■ Tail rotor diameter	11.00 ft	3.35 m

* Air transport configuration: main rotor hub lowered, main rotor blades, stabilator and tail pylon folded.





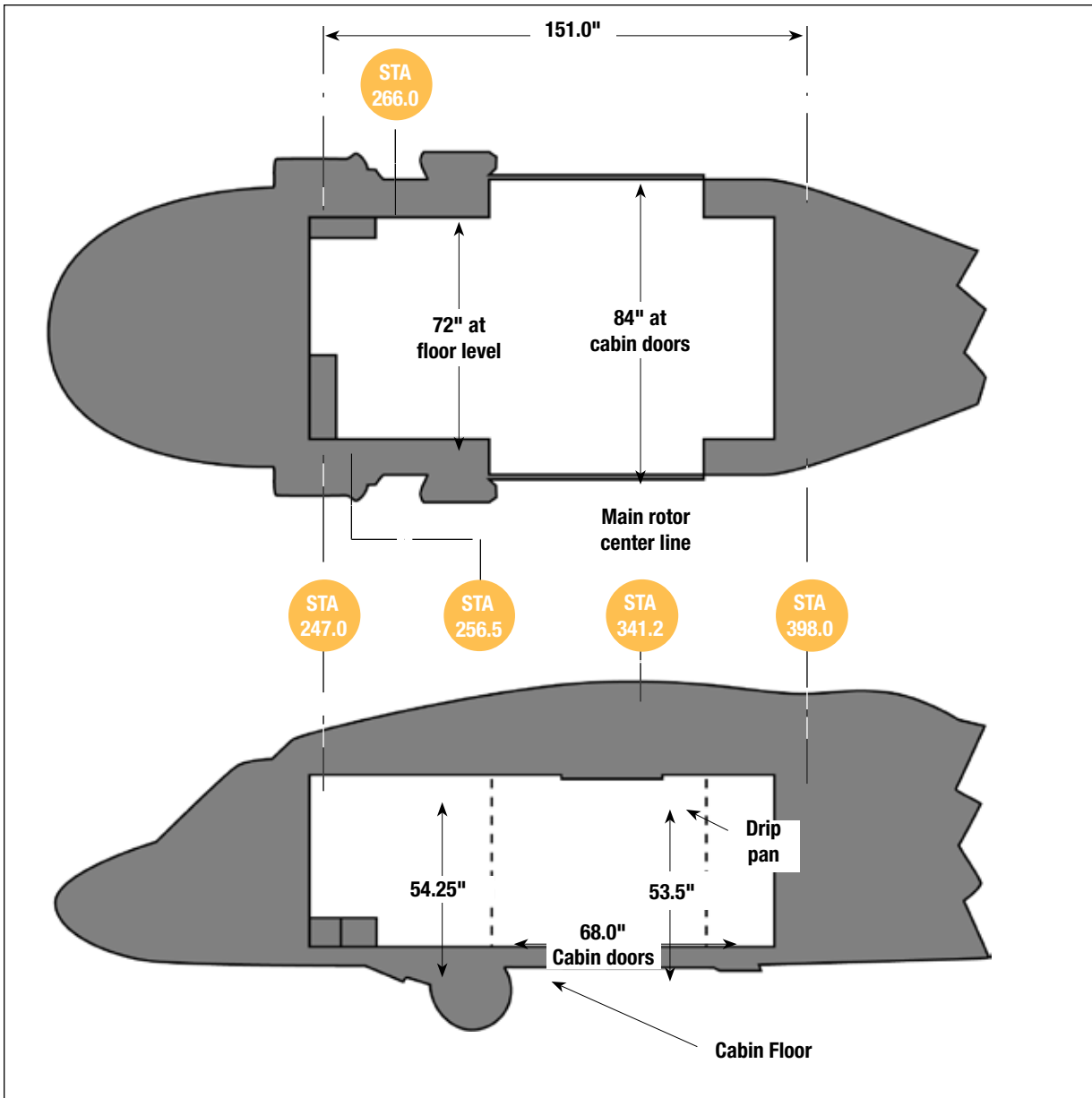
Cabin Dimensions

GENERAL DATA

■ Cabin length	12.58 ft	3.84 m
■ Cabin width	7.00 ft	2.14 m
■ Cabin height	4.50 ft	1.37 m
■ Cabin area	88.00 sq ft	8.18 sq m
■ Cabin volume	396.00 cu ft	11.22 cu m
■ Storage compartment volume	20.34 cu ft	0.58 cu m
■ Capacity, normal	12 passengers plus 2 pilots	
■ Capacity, maximum	20 passengers plus 2 pilots	



Large sliding cabin doors on both sides of the aircraft allow fast and easy ingress and egress





**TECHNICAL
INFORMATION**

4

S-70 Offers Flexible Cabin Arrangements

CASUALTY EVACUATION

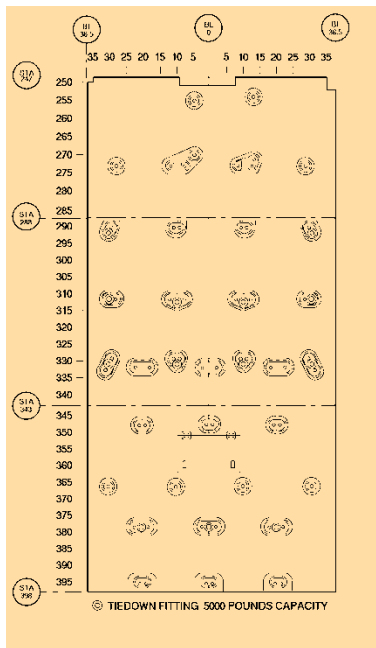
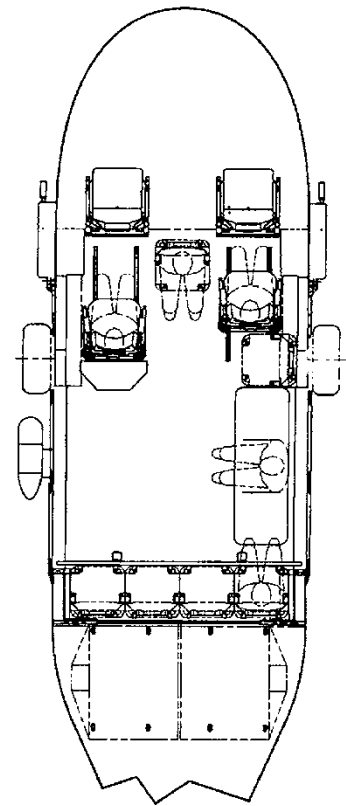
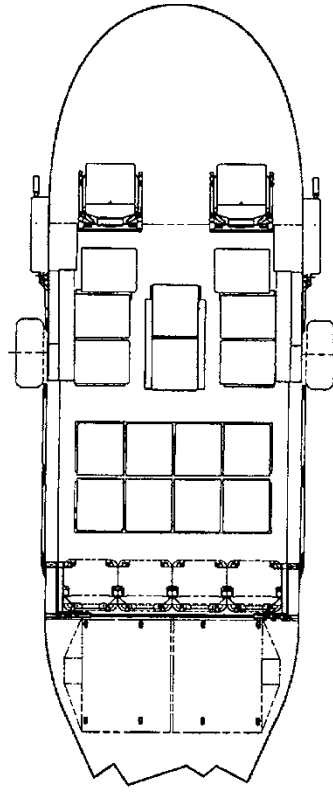
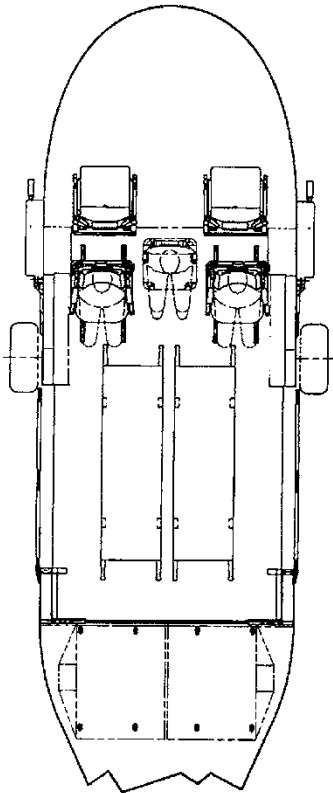
- Six litters
- Five crew

TROOP TRANSPORT

- 12-20 troop seats
- Two crew

SEARCH AND RESCUE

- Ten rescuees
- Two crew



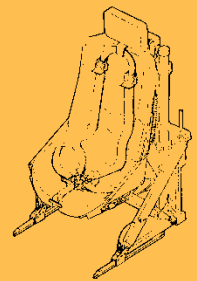
Well-placed tie-down fittings contribute to S-70 cabin flexibility

Roomy cabin and large doors enhance HAWK helicopter effectiveness in SAR missions



Survivability and Crashworthiness Design Features

TECHNICAL INFORMATION



Stroking crew seats are armored, offering maximum crash and ballistic protection

SAFETY

- Designed with state-of-the-art safety and reliability features
- Padded cabin designed to FAA regulations for G-loading, egress, flammability
- Load limiting crew and troop seats
- Jettisonable cockpit doors
- Crashworthy fuel cells (65 foot drop)
- Energy absorbing landing gear (30 fps limits)
- Anti-plow keel beams
- High mass components are retained in 20/20/18G crash conditions



Troop seats with five-point harness provides maximum protection for cabin passengers



Swing-out armor side panels protect pilot and copilot from ballistic threats



Large cabin doors and windows allow quick escape in emergency conditions



Landing gear absorb energy of up to 30 feet per second and provide wirestrike protection



Utility Configuration

AIRFRAME

- Nose and transition section equipment compartments
- Two hinged jettisonable cockpit doors with emergency "pop-out" windows
- Two cabin gunner stations with sliding hatches
- Two cabin sliding doors with two jettisonable windows each
- Heated glass windshields
- Windshield and gunners' stations windows defogging and defrosting
- Dual windshield wipers
- Bleed-air heating system
- Blower ventilation system
- Armored pilot and copilot seats
- 410 cubic foot cabin with 300 psf cabin floor and provisions for up to 20 seats
- Crashworthy cabin troop seating for 15 troops
- Quilted cabin head and side liners
- Two 20 cubic foot storage compartments
- Upper and lower wire strike protection systems
- Door and ignition locks
- 9000 lb capacity cargo hook
- Gunner station hardpoints for 7.62 mm pintle-mounted guns
- Fixed, tail-wheel type main landing gear
- Dual oleo main landing gear with kneeling capability for transport configuration
- Swiveling tail wheel with locking capability
- Two hand-held fire extinguishers
- Hard points for External Stores Support System (ESSS) or External Tank System (ETS)
- Manual tail pylon fold
- Low reflective paint
- Slewable stabilator with automatic and manual control



POWERPLANT AND FUEL SYSTEM

- Two General Electric T700-GE-701C engines with integral particle separators
- APU for engine start, ground power, and in-flight emergency power
- Dual suction fuel systems with self-sealing lines, breakaway fittings and crossfeed capability
- Dual crashworthy, self-sealing fuel tanks with a total capacity of 360 gallons
- Fuel boost pumps for prime and high altitude operation
- Single point gravity and pressure fueling and defueling
- Low level fuel warning system
- Engine and APU fire detection and extinguishing systems
- Engine anti-icing system
- Hover Infrared Suppression System (HIRSS)
- Main transmission with two isolated input/accessory modules
- Intermediate and tail gearboxes with interconnecting drive shafts
- Magnetic chip detectors with fuzz burn-off capability

ROTOR AND CONTROLS

- Four-blade articulated main rotor system with one-piece titanium hub and elastomeric bearings
- Ballistically tolerant main rotor blades with titanium spars, fiberglass skins, and honeycomb cores
- Bifilar vibration suppression system
- Provisions for manual blade fold (four blades aft)
- Dual, redundant and isolated pilot flight controls
- Dual, redundant parallel primary and tail rotor servos with jam protection
- Tail rotor centering quadrant
- Dual, independent, transmission-powered 3000 psi hydraulic systems
- Third, back-up, electrically-powered 3000 psi hydraulic system
- Redundant stability augmentation system with airspeed, attitude and heading hold
- Four-blade, cross beam tail rotor
- Complete provisions for main and tail rotor blade de-ice systems
- Manual rotor brake



BLACK HAWKS can lift external loads up to 9000 pounds

Tail landing gear swivels to improve maneuverability of aircraft when on the ground



Utility Configuration

ELECTRICAL

- Two 30/45 KVA AC generators
- Two 200 amp DC converters
- Single 20/23.8 KVA APU-driven AC generator
- Single 10.0 amp-hour battery
- External power monitor panel
- Controllable landing light
- Controllable IR searchlight
- Standard and IR position lights
- Two anti-collision strobe lights
- NVG-compatible cockpit and cabin lighting
- Portable maintenance/inspection light
- Two cabin DC receptacles
- Two cabin AC receptacles
- Controllable search light

AVIONICS

- Command instrument system
- Dual AN/ARC-222 VHF/AM-FM communication radios
- FM homing system for single AN/ARC-222
- Five-station C-6533 ICS
- Single AN/ASN-43 gyro magnetic compass
- Single AN/ARN-149 ADF
- Single AN/ARN-147 VOR/ILS/MB
- Single TNL-8100 GPS
- Single AA-300 radar altimeter
- Single AN/APX-100 IFF transponder
- Complete provisions for:
 - AN/APR-39(V)1 radar warning system
 - AN/ALQ-144 IR jammer
 - M-130 chaff dispenser
 - Single AN/ARC-164 UHF-AM

INSTRUMENTS

- Airspeed indicators (2)
- Vertical velocity indicators (2)
- Barometric altimeter
- Encoding altimeter
- Standby magnetic compass
- Outside air temperature indicator
- Master warning panels (2)
- Caution advisory panel
- Vertical situation indicators (2)
- Horizontal situation indicators (2)
- VSI/HSI mode selectors (2)
- Stabilator angle indicators (2)
- Digital clocks with sweep second hands (2)
- Dual, heated pitot static system
- Vertical Instrument Display System (VIDS) containing:
 - Dual power turbine tachometers
 - Dual main rotor speed tachometers
 - Dual engine torque meters
 - Fuel quantity indicators and totalizer
 - Main transmission oil temperature and pressure indicators
 - Engine oil temperature and pressure indicators
 - Power turbine inlet temperature indicators
 - Rotor overspeed monitor

The BLACK HAWK's cockpit features large, easy-to-read displays and well-organized controls

TECHNICAL INFORMATION

7



Central Display Unit (CDU) provides instant, easy-to-read information on engine and transmission performance





**TECHNICAL
INFORMATION**

8

Optional Mission Equipment

S-70 flexibility is enhanced with a wide range of optional mission equipment



External Stores Support System (ESSS)



External Tank System (ETS)



Six-patient litter system



30-million candlepower Nightsun



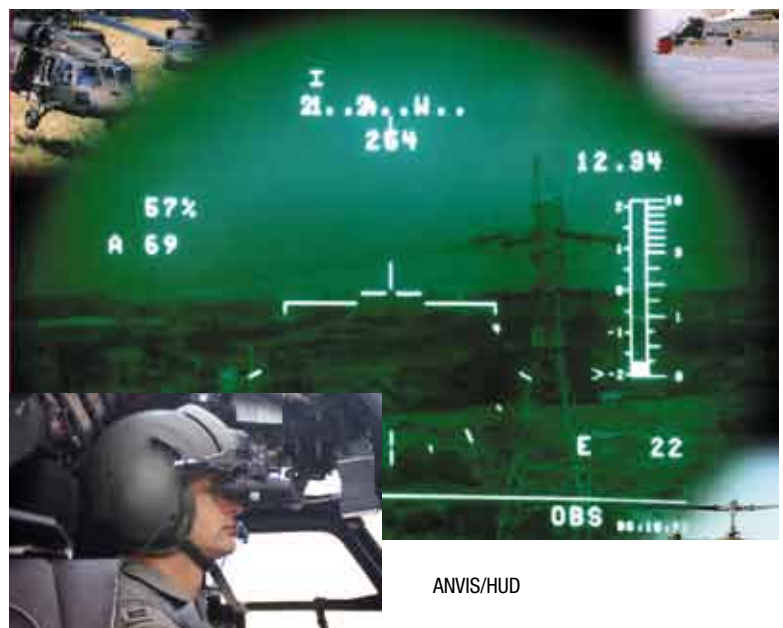
600-pound capacity external rescue hoist



Loudhailer



Emergency flotation system



ANVIS/HUD



Optional Electronic Equipment

Available optional electronics satisfy the most stringent mission requirements

NAVIGATION/COMMUNICATIONS

- ADF-60
- MDF-124
- DME-42
- FMS-800 flight management system
- TDR-90 transponder
- ELT

MISSION SYSTEMS

- Color weather radar
- FLIR
- Digital map

TECHNICAL INFORMATION



"Glass" cockpit



Moving digital map displays are offered as a component of the digital "glass" cockpit



Weather radar and FLIR



Digital multi-function display panels combine information from multiple analog displays, reducing cockpit clutter and aircrew workload



Overhaul Periods and Retirement Times

SCHEDULED OVERHAUL PERIOD (TBO)

The following overhaul periods apply to the latest configuration of the affected component. Please refer to *Manual TM 1-70-23AW-2* for current official TBOs.

COMPONENT

■ Main rotor blade spindle nut	500 hours
■ Oil cooler axial fan	2,000 hours
■ Tail rotor pitch change shaft	2,000 hours

SCHEDULED RETIREMENT TIMES

The following retirement times apply to the latest parts and components available for the S-70A helicopter. The list below includes all significant items with retirement life limits less than 5,000 flight hours. Please refer to *Manual TM 1-70-23AW-2* for current official life limits.

LIFE LIMIT

■ Oil cooler viscous bearing	500 hours
■ Tail rotor drive shaft bearing	2,000 hours
■ Pitch control shaft bearing	2,000 hours
■ Main rotor blade spindle nut	2,500 hours
■ Tail landing gear shock strut piston	3,000 hours
■ Main rotor blade expandable pin	4,700 hours



Retractable steps and recessed hand- and foot-holds allow easy access to entire aircraft



Retractable and pop-out steps and handhold ease field and base maintenance by providing easy access to work areas



Engine cowlings which open to become stable work platforms and designated walk areas allow access and protect aircraft during maintenance





Direct Operating Cost Utility Service

The following information is supplied to aid in the preparation of estimates of the cost of operation for the S-70A helicopter in utility service. Costs have been calculated in general accordance with the practices described in *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 assumes no benefit from warranties.

Direct operating costs are calculated for an S-70A flying 345 hours per year for eight years. Unscheduled removals and overhauls are based on historical fleet-wide data.

■ Fuel and Lubricants	\$335.39
- Average fuel consumption at 162 gallons/hour	
- Fuel cost per gallon: \$2.01	
- Cost for lubricants at 3% of fuel	
■ Labor	\$245.43
- 4.55 Total maintenance MH/FH	
- Labor rate at \$54 per hour	
■ Reserve for Retirement Items	\$152.00
■ Reserve for Overhaul and Unscheduled Repairs	\$365.00
- Airframe and avionics	
- Engine parts	
■ Reserve for Engine Overhaul	\$188.00
Total direct cost per hour	\$1,285.82



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-70 aircraft or its components.

Black Hawk: the multi-mission choice





Payload/Range Performance Basic Configuration

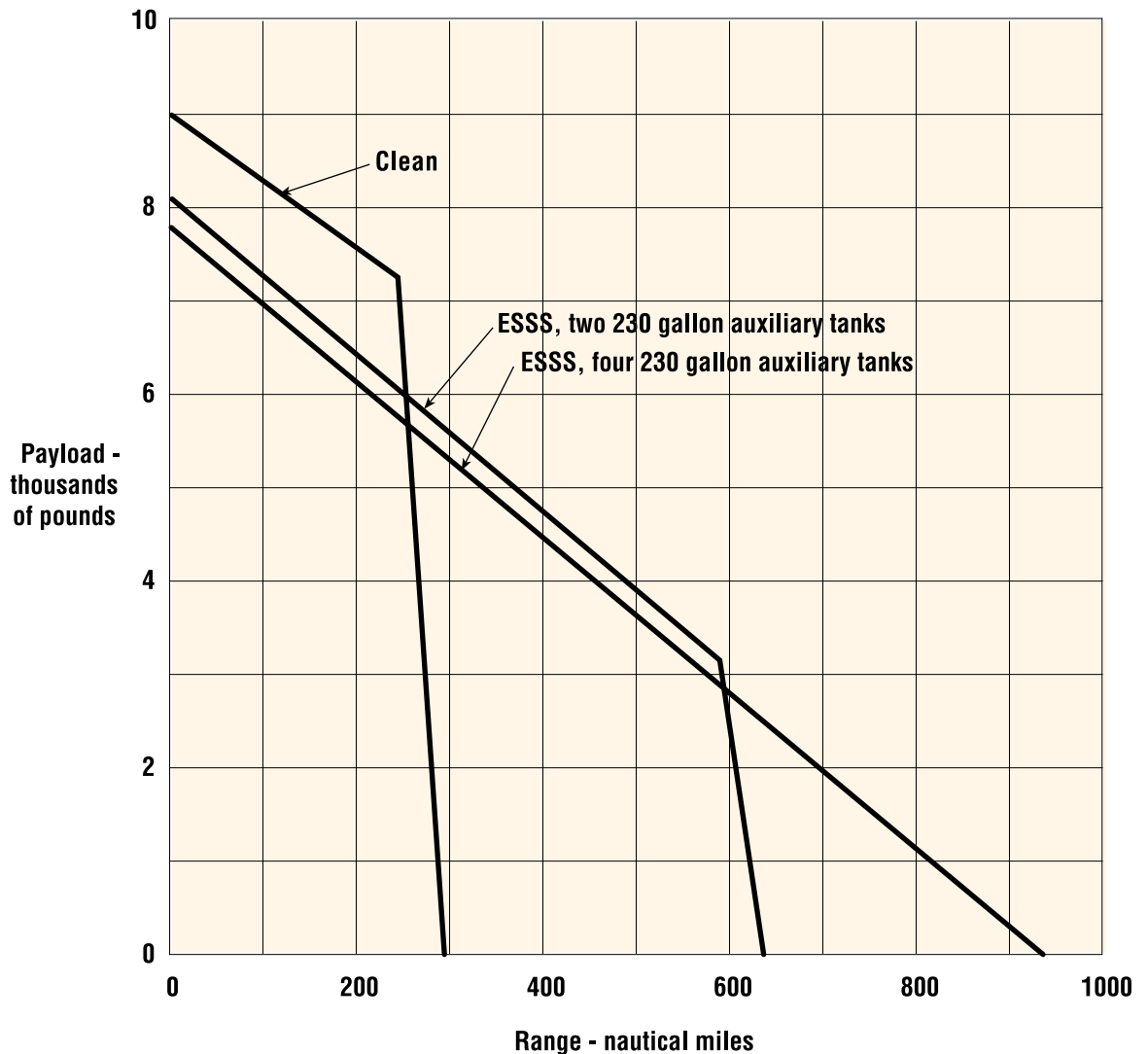
MISSION

- Takeoff at maximum gross weight
- Cruise at 4,000 feet, ISA, Long Range Cruise Speed*
- Reserve: 20 minutes at Long Range Cruise Speed*

WEIGHTS

	Clean	ESSS with two 230 gallon tanks	ESSS with four 230 gallon tanks
■ Basic Empty Weight	11,744 lb	11,744 lb	11,744 lb
■ ESSS and External Fuel Provisions	60 lb	60 lb	60 lb
■ ESSS (Four Station)	–	660 lb	660 lb
■ 230 US Gallon Aux Fuel Tanks (0, 2, 4)	–	320 lb	640 lb
■ Crew (3)	705 lb	705 lb	705 lb
■ Fluids	60 lb	60 lb	60 lb
■ Operating Weight	12,569 lb	13,549 lb	13,869 lb

* Speed for 99% best specific range

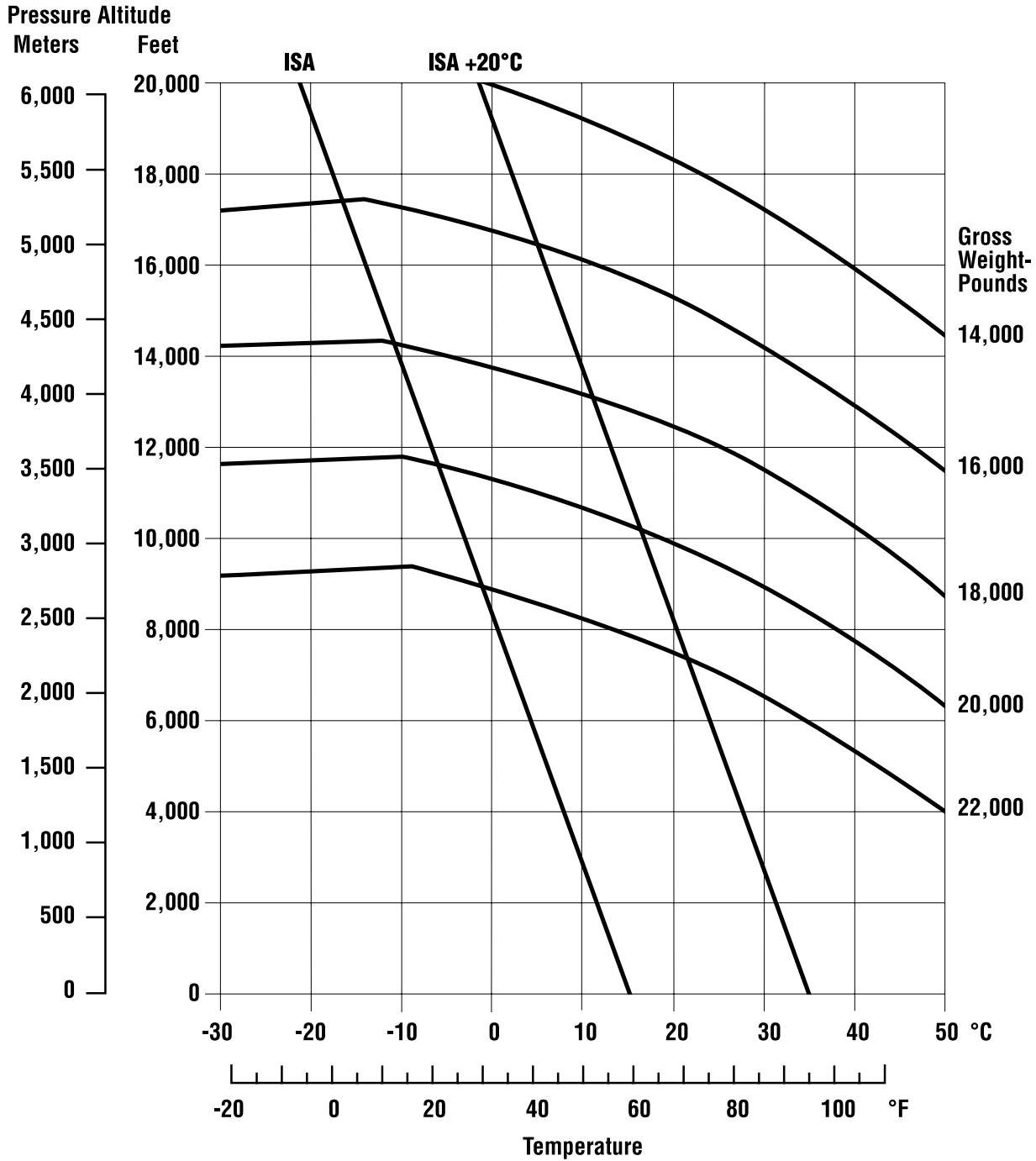




Hover Ceiling

Five Foot Wheel Height, Ten Minute Rating, HIRSS Active

**TECHNICAL
INFORMATION**

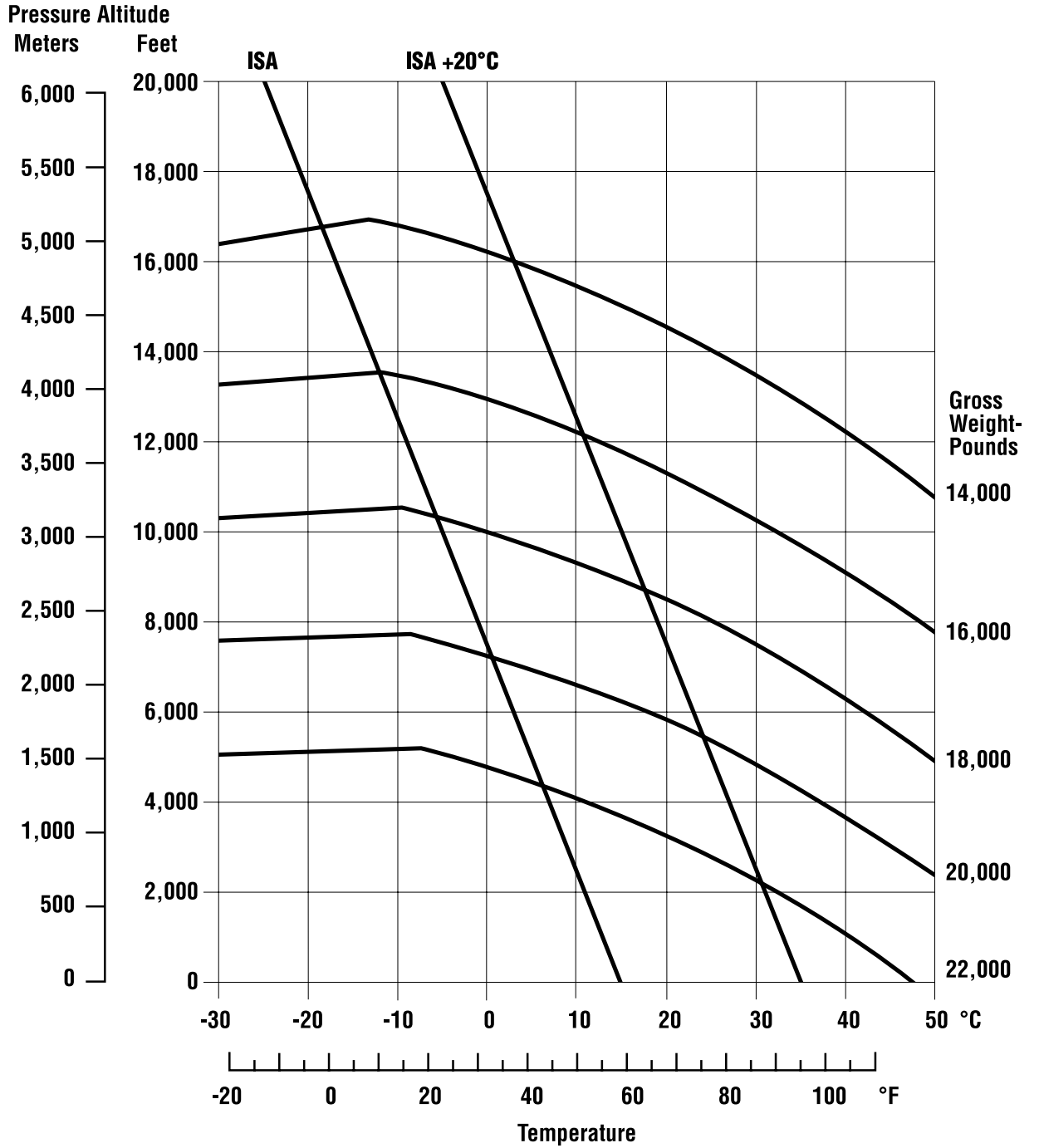


Hot and high, Arctic cold...and everything in between - Black Hawks perform their missions safely and reliably



**TECHNICAL
INFORMATION**

**Hover Ceiling - Out of Ground Effect
Ten Minute Rating, HIRSS Active**

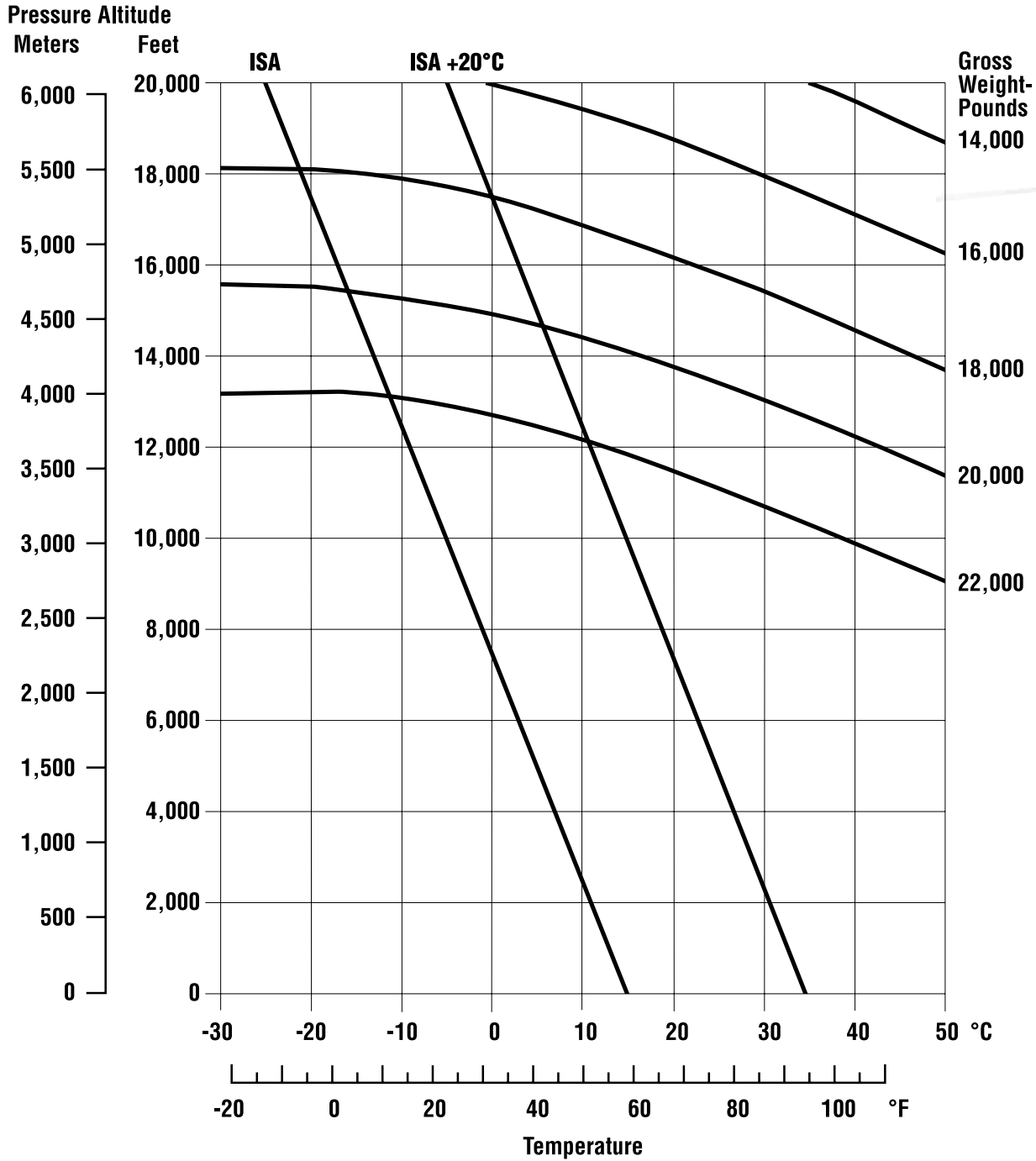




Twin Engine Service Ceiling

IRP, 100 fpm ROC, V_{BROC}

TECHNICAL INFORMATION



The Black Hawk's legendary ruggedness and survivability have made it the world's premier medium utility helicopter

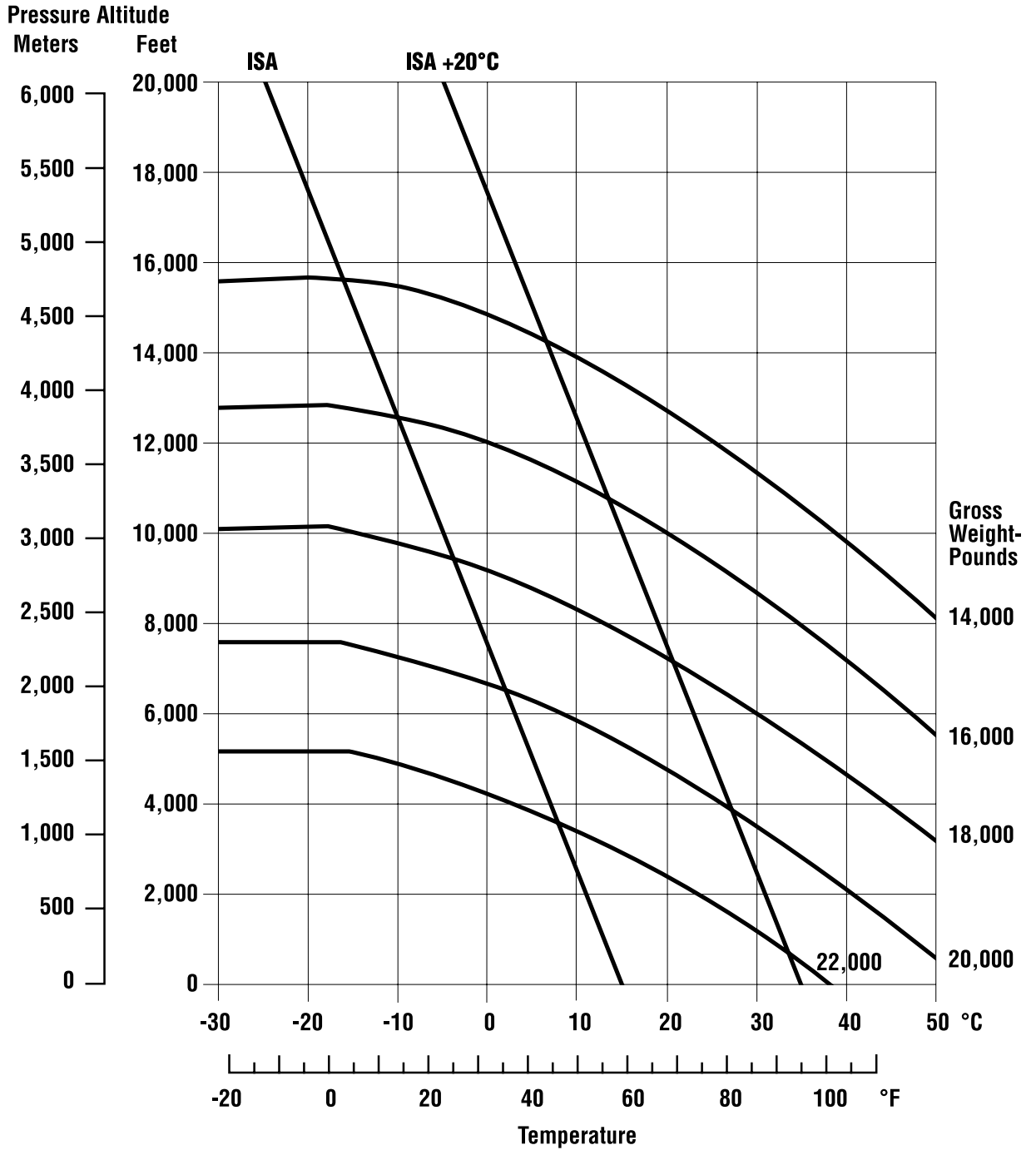


**TECHNICAL
INFORMATION**

16

Single Engine Service Ceiling

IRP, 100 fpm ROC, V_{BROC}

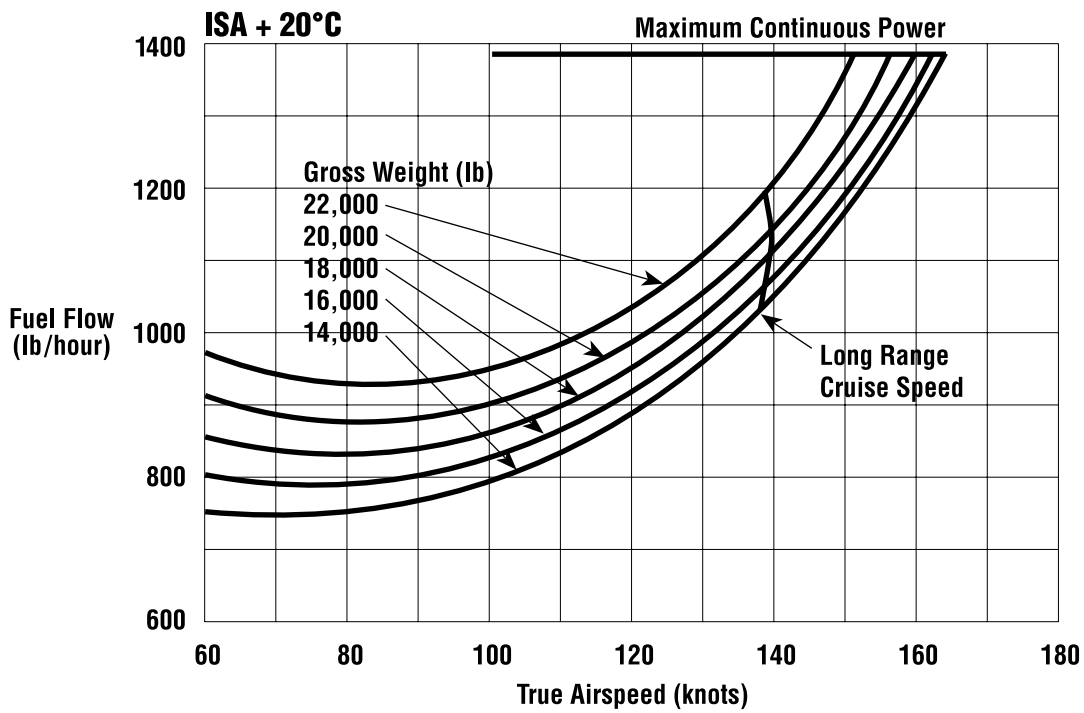
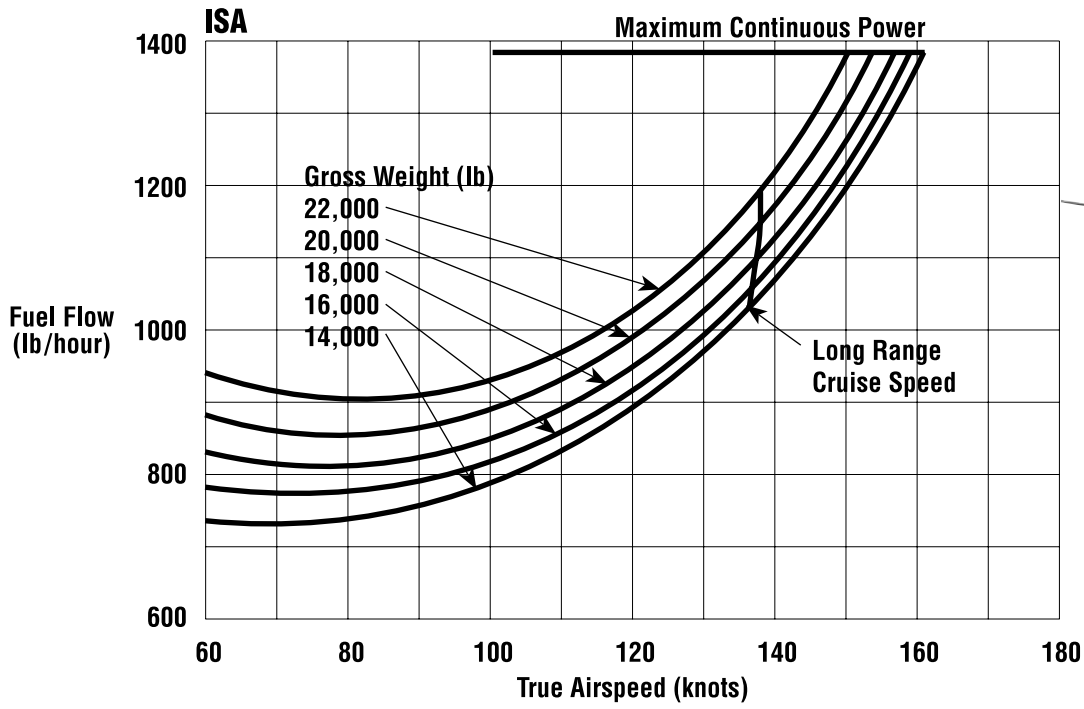




Level Flight Fuel Consumption - Sea Level

-701C Engines, Clean, HIRSS Active

**TECHNICAL
INFORMATION**

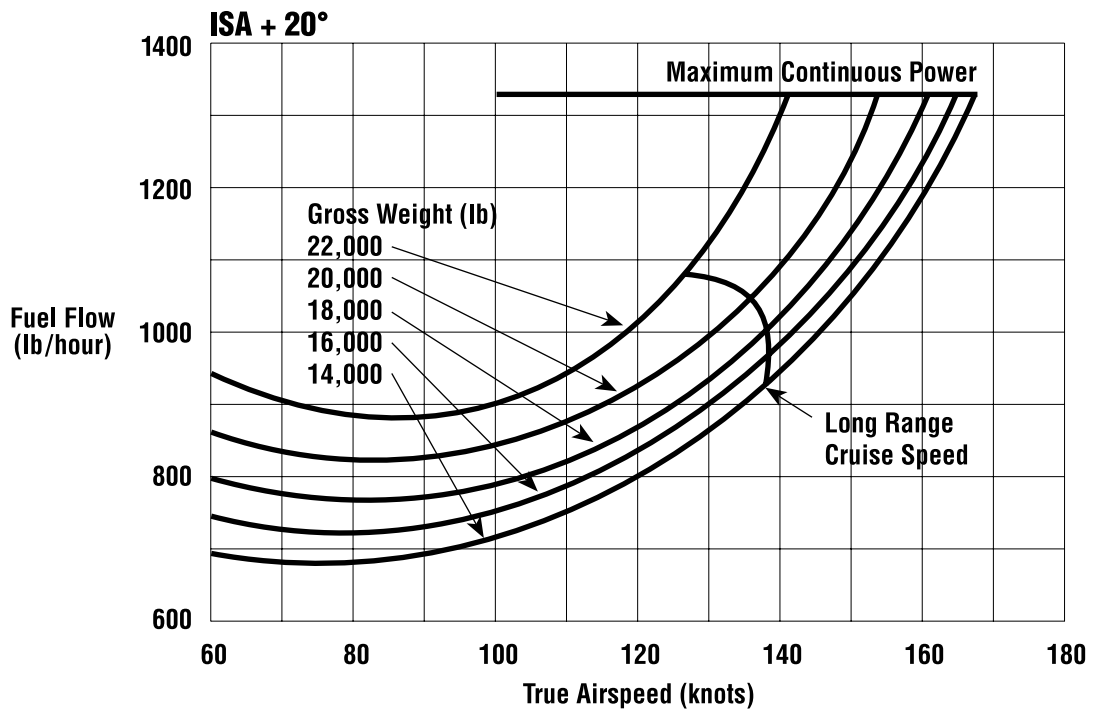
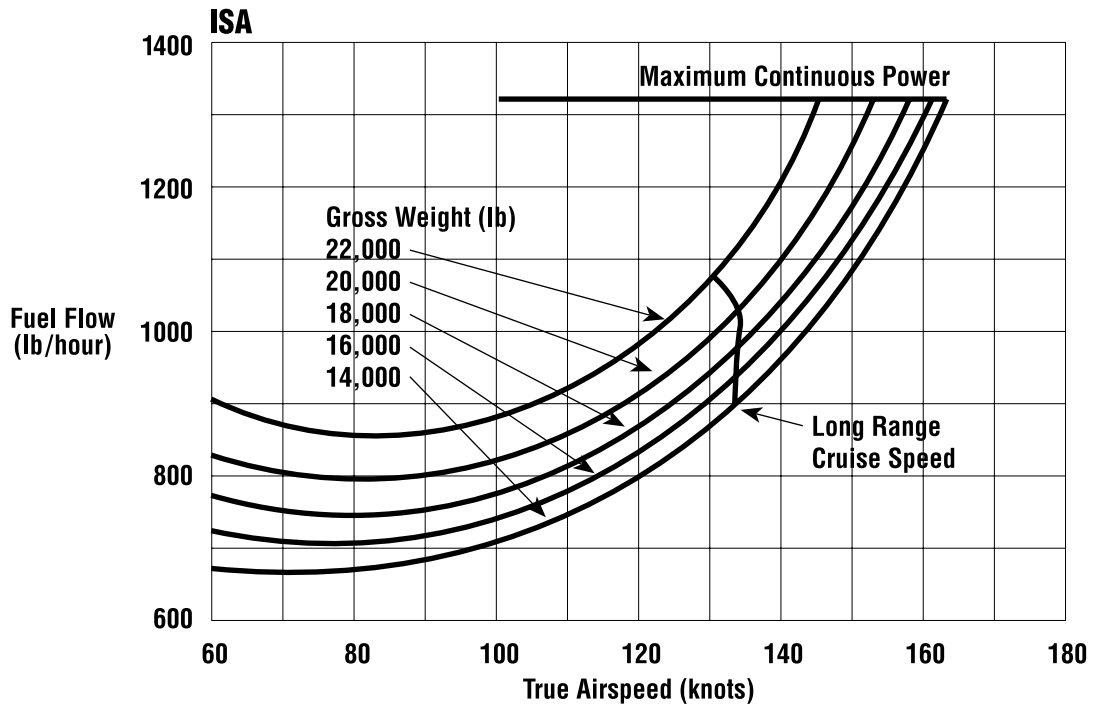


External fuel tanks extend the range of the S-70 - allowing it to cover the vast distances required in many SAR missions.



**TECHNICAL
INFORMATION**

**Level Flight Fuel Consumption - 4,000 Feet
-701C Engines, Clean, HIRSS Active**





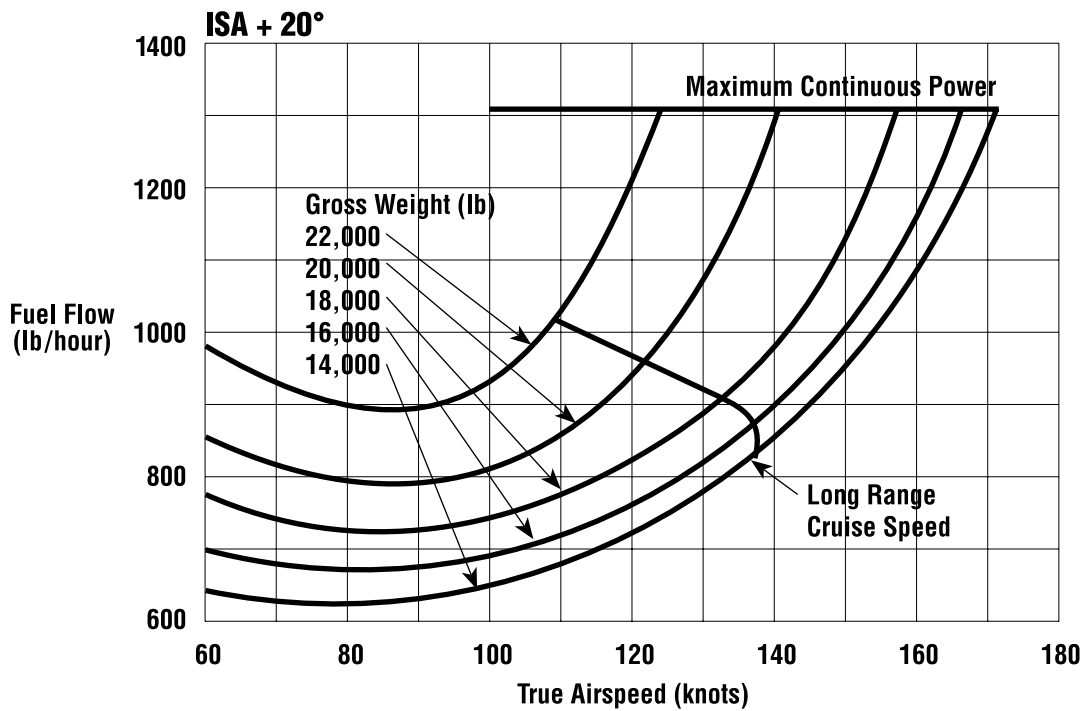
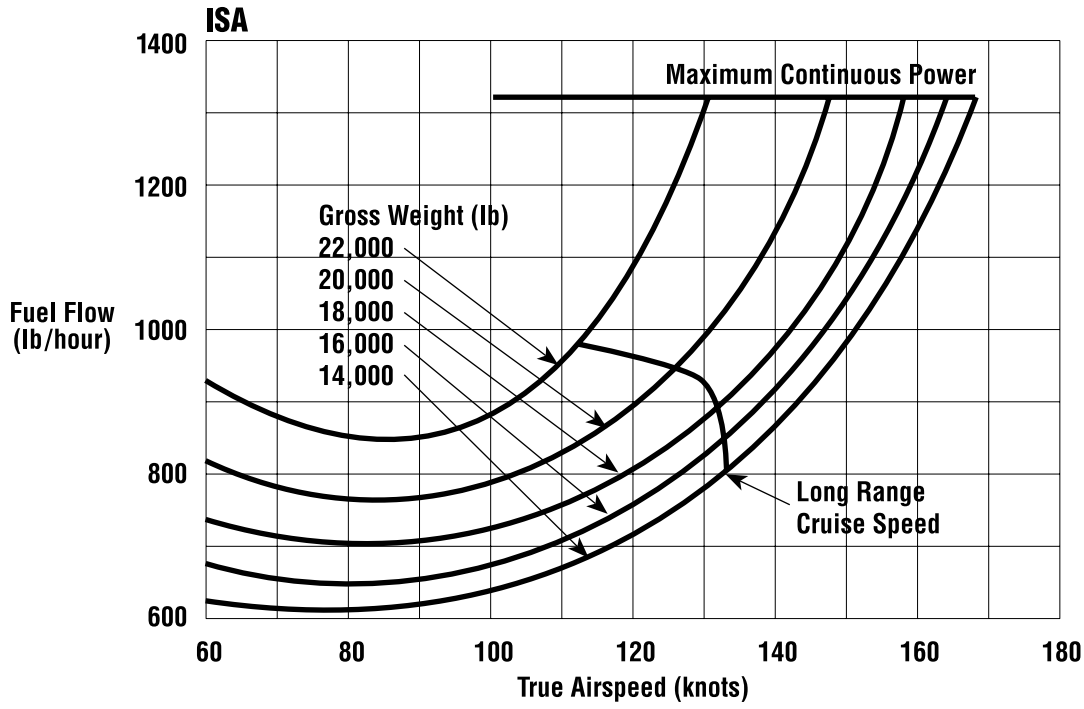
Level Flight Fuel Consumption - 8,000 Feet

-701C Engines, Clean, HIRSS Active

TECHNICAL INFORMATION



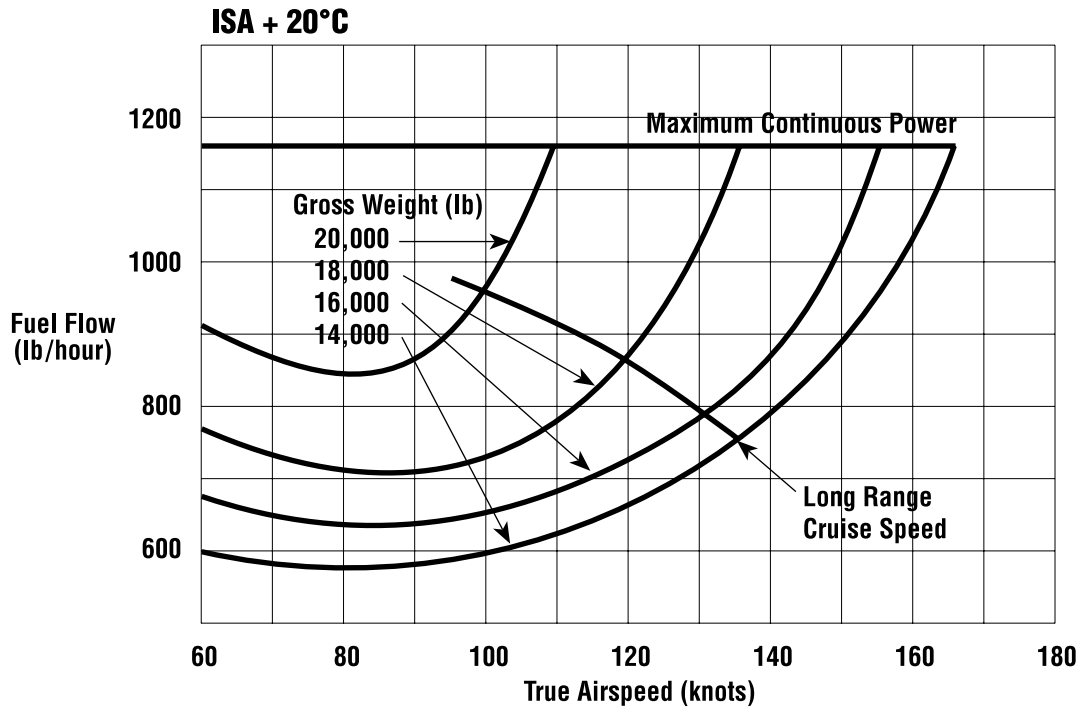
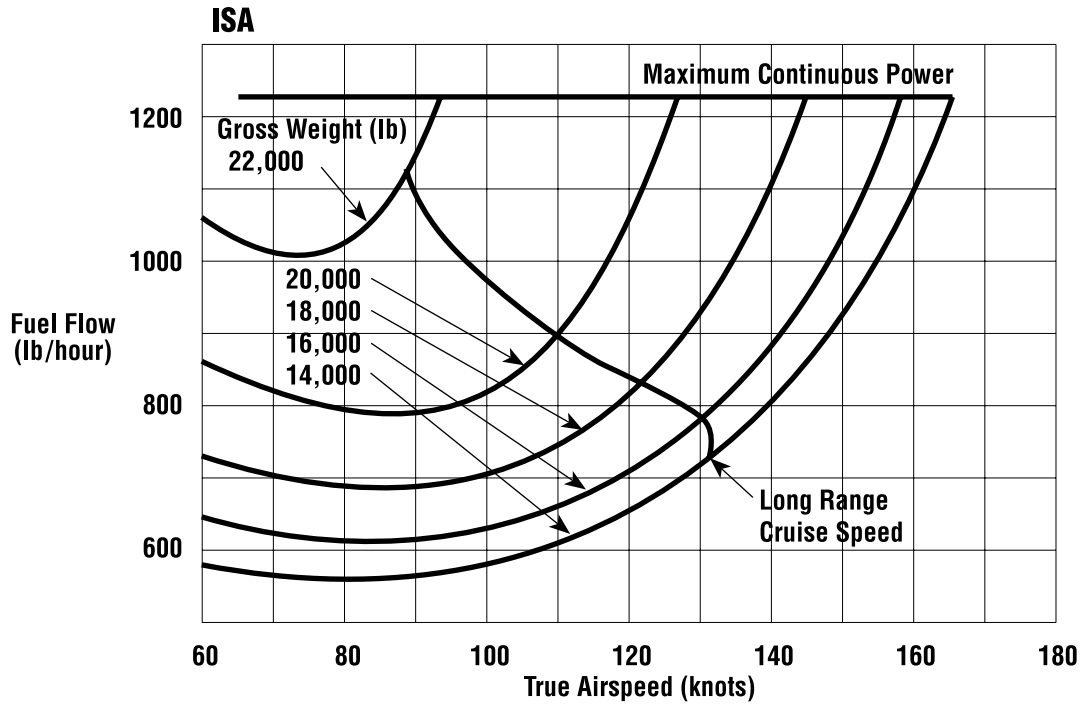
Speed, power, range and reliability - the qualities Black Hawk operators know they can rely on

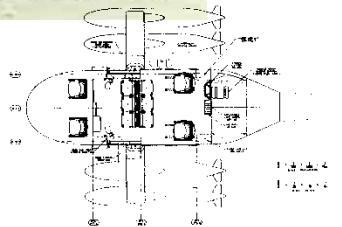
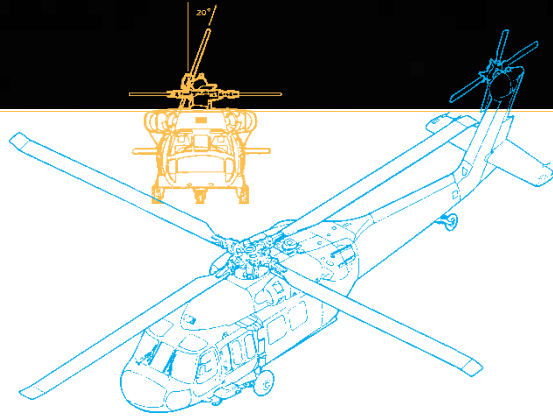




**TECHNICAL
INFORMATION**

**Level Flight Fuel Consumption - 12,000 Feet
-701C Engines, Clean, HIRSS Active**





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SEPTEMBER 2002

S70A TI S70-046