



**Pilots Operating Handbook,**  
**Background Information & Checklists**  
**Sikorsky S-76A Exec & EMS**

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## **Disclaimer**

All materials, information and checklists in this manual are intended for flight simulation use only. The information is intended solely for use with the Nemeth Designs Sikorsky S-76A in Flight Simulator 2004.

The Sikorsky S-76A by Nemeth Designs is not designed to be, and should not be used as a training substitute or a flight training device. Checklists and Pilot's Operating Handbook (POH) are not to be used as a substitute for their real world equivalents.

Illustrations, descriptions, schematic diagrams and other data are provided only for explanatory purposes. They may not be used as the basis for real flight training and/or operations. We accept no liability for conformity of the contents with international, national or local flight regulations. This software is designed for entertainment purposes only.

Although the S-76A has been designed to replicate the flight characteristics of the S-76 helicopter as closely as possible, it is not designed as a flight training device. Not all aircraft systems and avionics are fully operational, and some systems do not function in the same manner as their real world counterparts. This aircraft is intended for entertainment purposes only.

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This software has been developed specifically for use with Microsoft® Flight Simulator 2004. It will NOT work in previous versions of the simulator. At this time, this software does not have full functionality in Microsoft® Flight Simulator FSX (v10).

## **Introduction**

Thank you for your purchase of the Sikorsky S-76A by Nemeth Designs. A great deal of work has gone into ensuring that this helicopter is as accurate as possible in relation to its larger, real world cousin. We have researched the aircraft extensively, and have used suggestions and guidelines from real world S-76 pilots and engineers to ensure that this is as real as it gets.

This manual provides background information on the S-76A, taken from Sikorsky Aircraft Pilot Operating Handbooks, instructional manuals, and maintenance manuals. Panel layout maps are provided to allow you to familiarize yourself with the aircraft. This aircraft is worlds away from the default Bell 206 in MSFS2004. Please take the time to read through the manual and become familiar with the checklists.

At the time of writing, we are working towards compatibility with FSX (Flight Simulator 10). Due to very(!) significant changes in the simulation engine, we cannot guarantee that the S-76A will work completely in FSX. Like all other Nemeth Designs aircraft, we will continue to work at upgrading the aircraft, and patches will be released occasionally. For more information, check the support forums (below).

Finally, due to limitations in the FS2004 simulator engine, certain systems cannot be replicated fully and appropriately. We have done our best to workaround these limitations. Where a system is not achievable in FS2004, we have indicated such in this manual.

Please enjoy the S-76A, one of the most popular and beautiful medium twin helicopters out there. We have enjoyed developing it immensely, and hope that you enjoy flying it just as much!

*Peter & Tamas Nemeth*

*We would like to thank the following individuals for all of their support:*

*Greg Hulme  
Steve Chase  
Kirk Sunley  
Ed Easterbrook  
George A. Arana  
Philip Nordlander  
Christoffer Stenvall  
Robyn Hamilton*

## **Online Support**

Please feel free to contact Nemeth Designs with any problems – no matter how minor – using our online support forum at:

[simFlight Network - Nemeth Designs Forum](http://forums.simflight.com/viewforum.php?f=156)

(<http://forums.simflight.com/viewforum.php?f=156>)

## PART I

### Aircraft Introduction

Having concentrated almost exclusively on the military market, in January 1975, Sikorsky Aircraft announced plans to develop a twin turbine medium class helicopter for the civilian market. Sikorsky had carefully evaluated the needs of potential customers, and investigated several options.

Prior to starting the design process, extensive consultations with the offshore, EMS and executive charter markets took place. This led to the S-76 - originally named "Spirit" in honour of the U.S. bicentennial - which showed the influence of the combat proven S-70 Blackhawk transport helicopter. The development of the S-76 began in early 1975, and on March 13<sup>th</sup>, 1977 the first aircraft (S/N 760002) took to the air.

Within months of certification, initial sales in its intended markets were strong, no doubt due to the new aircraft exceeding operator's requirements. Though sales have fallen off through the late 1990s and early 21<sup>st</sup> century due to increased competition, they still remain strong.

As military budgets were slashed, Sikorsky realised that it had to continue to focus on its commercial sales. The S-76B appeared in 1983, primarily in response to operator demands for increased power. This model featured one of the first uses of the dependable Pratt & Whitney Canada PT6 in the rotor wing environment. Some S-76A models that had not been sold were up-engined with Turbomeca Arriel 1S1 turbines, and are referred to as the S-76A+.

The current model is the S-76C/C+. As operators pushed their existing airframes harder, and the market produced more competitors, Sikorsky again responded with increased power, this time choosing Turbomeca Arriel 2S2 engines, along with new "glass" panel integrated avionics suites.

Despite an airframe design over 25 years old, Sikorsky recently announced the S-76D model, due for certification in 2008. Though few details are known about the S-76D, it has been announced that it will feature Thales TopDeck integrated cockpit systems. Power will come from the P&WC PW210S Helipack system. The S-76D will be the first S-76 to incorporate a full anti-ice system, allowing flight into known icing conditions. Numerous airframe & rotor system revisions, many developed during the design of the S-92 heavy commercial helicopter, will carry the S-76 into the 21<sup>st</sup> century.





## **Included Aircraft**

### ***S-76A Offshore / Executive***



**N38** – Operated by Federal Aviation Administration (US) – Executive Transport (s/n 7960087)



**N568MX** – Operated by Nemeth Air (Fictional) – Executive Transport

### ***S-76A EMS / SAR***



**VH-HSR** – Operated by CHC International for Royal Australian Air Force Search & Rescue (Fictional registration)



**C-GIMZ** – Operated by Canadian Helicopters for Ontario Ministry of Health Air Ambulance. (Old paint scheme)(s/n 760169)

## **General**

The S-76A is a twin-engined, medium class commercial transport helicopter. The aircraft is certified for IFR operations, with either 1 or 2 pilots. Power is provided by 2 Allison 250-C30 or 250-C30S gas turbines. A composite 4-bladed main rotor is driven by both engines through a main transmission system, which also provides power to the tail-fin mounted 4-bladed tail rotor system.

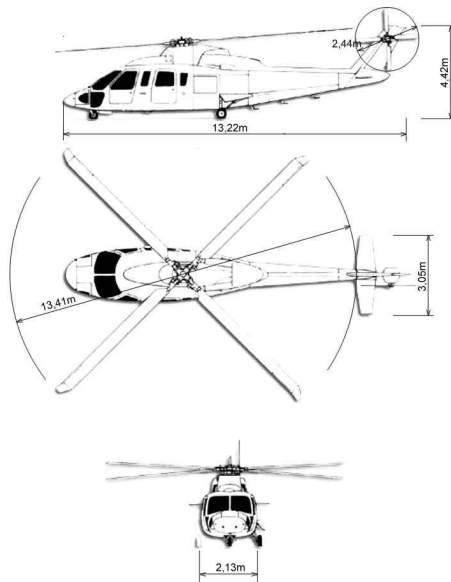
Normal cruise speeds between 120–130 KIAS provide the S-76 with a nominal range of 400NM. Depending on interior configurations, the S-76 is capable of carrying up to 12 passengers. Extended range tanks can increase radius, though at a weight penalty.

As weight is the enemy of long range helicopter operations, the S-76 was the first rotorcraft to feature extensive use of composite materials in the airframe and rotor systems.

Flight control of the S-76 is hydraulic in nature, with feedback through an artificial feel system. Extensive stability aids are available, all the way up to the Sperry Heliflight 4 axis AFCS (automatic flight control system) which theoretically allows the aircraft to be flown hands off from takeoff to hover landing.

Avionics differ vastly from aircraft to aircraft, ranging from VFR-only round dial instrumentation, all the way through to integrated glass cockpit systems with RNAV (GPS) navigation capabilities. The majority of S-76's are certified to Category A IFR flight.

## **Dimensions**



Fuselage Length .....	43.3 ft
Rotors Turning .....	52.5 ft
Fuselage Width .....	7.00 ft
Horizontal Stabilizer Width .....	10.0 ft
Landing Gear Track .....	8.40 ft
Vertical Stabilizer Height .....	11.9 ft
Tail Rotor in Motion .....	14.4 ft
Ground Clearance .....	1.00 ft
Main Rotor Diameter .....	44.0 ft
Tail Rotor Diameter .....	8.00 ft
Tail Rotor Clearance .....	6.50 ft

## **Weights:**

Max Take Off.....	10 500 lb
Empty	
Exec & Offshore.....	5930 lb
EMS.....	7369 lb
Fuel .....	286.4 US Gal
.....	(1850 lb approx)
External Cargo Sling Max .....	3 300 lb
Hoist Max .....	600 lb

## **Range / Endurance**

Endurance .....	3.0 hr (@600lb/hr)
Range.....	approx. 400 NM

## **Speeds / Limitations**

Velocity Never Exceed (VNE).....	155 KIAS
Normal Cruise.....	125-135 KIAS
Sideways / Tail first.....	35 KIAS
Sliding Door Open/Hoistng .....	74 KIAS
Landing Gear / Spotlight Extended .....	120 KIAS
Max Ground Speed.....	40 KIAS
Ceiling (Absolute).....	15 000 ft
Take off & Landing.....	6 900 ft

## **Engines / Fuel Systems**

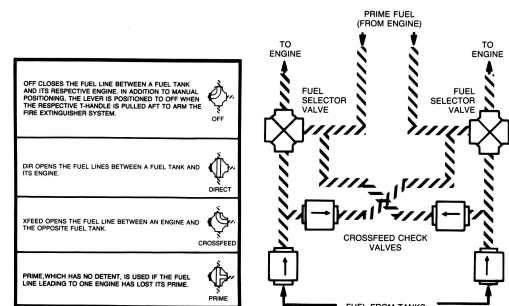
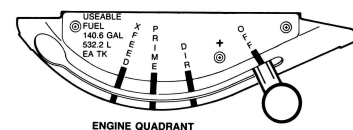
Two Allison 250-C30 / C30S gas turbine engines are mounted side by side aft of the main transmission. Each engine drives a separate input to the main transmission. Each engine is controlled by an automated fuel governor system, with manual controls for state in the cockpit overhead (See Engine Control Quadrant). Each engine incorporates a DC Starter / Generator which provides DC electrical power in addition to engine starting. Each engine is down rated to 650 continuous shaft horsepower. Torque limits below are those recommended by the manufacturer:

2 ½ minute OEI.....	111% TQ (T5 826° C)
30 minute OEI.....	104% TQ (T5 798° C)
Take Off & 30 minute Max.....	104% TQ (T5 768° C)
Max Cruise (no time limit) .....	85% TQ (T5 694° C)

Fuel is contained in a pair of tanks located under the aft bench seat and forward of the main landing gear. Capacity of each tank is 143.2 US Gallons, of which 2.3 US Gal is unusable. Fuel is drawn up to the engine FCU (Fuel Control Unit) by an engine driven suction pump. For single engine operations, the system is capable of cross feed.

Some S-76A aircraft (offshore operators) have been fitted with an additional 100 US Gal auxiliary long range tank in the baggage compartment. There is a corresponding decrease in useful payload capacity.

The aircraft also incorporates a continuous ignition system to prevent engine flame out when landing in very wet / snowy environments.





## **Main / Tail Rotor Systems**

The main rotor system consists of a fully articulated main rotor head with four main rotor blades. The blades themselves are based on a titanium main spar surrounded by a Nomex honeycomb core. Length of the main rotor blades is 239.75 inches. The main rotor head features a bifilar vibration dampening system, which works with the flexible composite main rotor to ensure that the S-76A rides extremely smoothly. To reduce noise in flight, and to improve rotor performance, rotor blade tip caps are swept. As with most U.S. designed helicopters, rotation is counter clockwise. Blade swept area is 114.75 square feet. At full speed (100%  $N_R$ ), the main rotor system spins at 293 rpm. Because of the forward tilt of the transmission (13° forward of vertical), droop stops are incorporated to prevent the blades from being dangerously low at the front of the aircraft at low  $N_R$ . These droop stops are disabled as  $N_R$  increases through 55%, and re-engage below 45%  $N_R$ .

The tail rotor system is also made up of 4 blades, of approximately 4 ft in length. These blades likewise feature a Nomex honeycomb core, skinned with graphite. Unlike traditional tail rotor systems, the S-76 tail rotor is based on a torsion spar system. Displacement of the anti-torque pedals results in the pitch change mechanism twisting the tail rotor blades around their spar, increasing or decreasing torque effect as required.

## **Flight Control Systems**

The S-76A broke from tradition as well with the main flight control system. Cockpit controls are not directly connected to any flight surfaces. Instead, the S-76A features a “fly by fluid” hydraulic control system. Control stick movements are transmitted physically to a hydraulic mixing unit, which then moves flight controls hydraulically. An artificial hydraulic feedback or ‘feel’ system is installed. For safety, the aircraft features dual, independent hydraulic servo control system.

Because it uses a hydraulic system, the aircraft has a number of stability assist systems that reduce pilot workload, increase passenger comfort, and minimize airframe stress. A force trim, or pitch-bias trim system allows the controls to be positioned for desired aircraft pitch in forward flight. Via the mixing unit, the aircraft has lateral cyclic/collective coupling, which reduces sideways (translating) tendencies in hover with power changes. Collective/anti-torque coupling automates tail rotor pitch changes with increased power. These systems operate transparently.

## **Automated Flight Control Systems (AFCS)**

The S-76A was one of the first helicopters to be equipped with Automated Flight Control Systems, often referred to as ‘autopilots’. These systems vary in control authority from the first Phase II systems (limited 3 axis authority) through the AFCS Phase III system, culminating with the 4 axis, full authority Sperry Heliflight system, which allows the aircraft to be theoretically flown from takeoff to touchdown in a ‘hands-off’ mode. Full 4 axis control is required for this aircraft to be legally flown by a single pilot in IFR conditions.

### ***FS 2004 Note:***

*In order to avoid release delays, the S-76A has been shipped without an autopilot. Various excellent freeware helicopter autopilot gauge systems can be downloaded from simulation sites such as [Avsim.com](http://Avsim.com) or [Hovercontrol.com](http://Hovercontrol.com)*

## **Hydraulic Systems**

The S-76A has four independent hydraulic systems. Pressure is provided by a pair of engine driven hydraulic pumps. The first and second hydraulic systems (or ‘stages’) provide flight control actuation. These systems are redundant, and are capable of being driven by either hydraulic pump. Nominal system pressure is 3000 PSI. A priority valve is installed in the hydraulic system to ensure the preservation of flight control if a high flow (leak) state is encountered. The primary and secondary stages are interconnected electrically so that if one stage fails, the other cannot be turned off. The secondary stage also provides pressure to the utility system.

The utility hydraulic system provides pressure to raise and lower the landing gear, powers the pedal damper system and the nose vibration absorber. In case of a secondary stage failure, the landing gear also incorporates an emergency nitrogen gas blow down system.

The third hydraulic stage is associated with the wheel braking system, and is isolated from all other stages. It too operates at 3000 PSI.

The final hydraulic stage is interconnected with the primary and secondary systems, and energizes the rotor brake system on aircraft equipped with it.

***FS 2004 Note:***

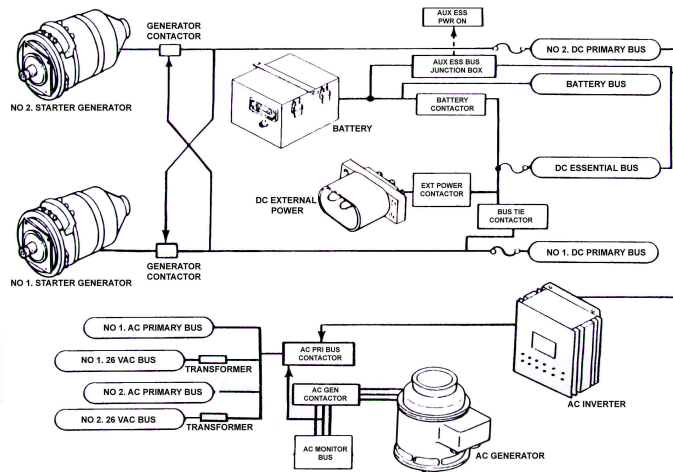
*This aircraft is NOT equipped with a rotor brake system due to limitations in the FS2004 simulation engine.*

## **Electrical Systems**

DC electrical current is provided to the aircraft by:

- baggage compartment mounted 24V, 34 AH NiCad battery
- External power connector over the starboard main gear door,
- A pair of engine mounted 28V DC starter / generators.

There are 2 DC power busses onboard. No 1 Generator provides power to the No 1 DC primary buss, the essential buss and the battery charge buss.



No 2 Generator provides power to the No 2 DC primary buss and the AC inverter system. In case of DC gen failure, the other generator will automatically provide power for all DC electrical systems.

AC power for the avionics and medical systems (in EMS aircraft) is provided by the AC generator. This is driven by the aircraft transmission. The AC buss can also be powered by the DC / AC inverter, which is fed from the No 2 DC primary buss. The AC power system provides both 26 V AC power (for avionics) and 115 V AC power (for other systems).

## **Fire Protection System**

Fire protection on the Sikorsky S-76A is provided by fire detection & extinguishing systems. In addition, design features such as individually sealed fuel tanks within the fuselage structure, a suction fuel system and a spill resistant fuel vent system, and the use of flame retardant materials in the cabin reduce the likelihood of fire.

The engine fire detection system has sensors (photocell) in each engine compartment. In addition the baggage compartment is equipped with a smoke detection system. Cabin fires can be fought with portable extinguishers, one located in the cockpit, and one in the aft cabin.

The engine fire suppression system mounts a bottle charged with fire suppressive materials in either engine bay. The system can cross feed, allowing the second bottle to be discharge if the fire is not out.

When a fire is indicated the appropriate engine T-Handle will illuminate. The extinguisher system is armed by pulling the T-Handle aft (shutting down that engine and securing its fuel supply) and selecting the fire extinguisher switch to **MAIN**. By selecting **RESERVE**, the opposing bottle will also be discharged.

## PART II

### S-76A Flight Guide

*By Greg Hulme*

Welcome to the Nemeth Designs Sikorsky S-76A helicopter for FS9. This section should assist you in understanding the flight characteristics of the S-76A and give you a more realistic and better simulator flight experience.

In order to understand the following sections, please review the glossary for some common aviation & helicopter acronyms.

### GENERAL

The S-76A is a large and complex helicopter, most likely the largest you've flown. There are a lot of complex systems that need to function properly to get off the ground and more importantly, get back on it safely! She is designed to fly, and to fly FAST! Every move should be carefully planned out before doing it. Because of the speed of this helicopter, it is very easy to get behind it, and very difficult to get back ahead.

The S-76A requires delicate hands and feet to fly smoothly. Other helicopters (especially in FS9) can be muscled around the sky. This is not one of them. You need to treat an S-76A gently, and ask her to do things for you. She will. Make demands, be rough with her and....

The A model S-76 is heavy and underpowered compared to later versions. Many flights will be conducted near Maximum Take Off Weight (MTOW), which leaves you without much power reserve. This is especially true for EMS aircraft (lots of extra equipment) and offshore aircraft (lots of extra fuel). Fly smoothly and gently and stay several steps ahead of the aircraft. Taking the time to learn to fly the S-76A properly will improve all of your helicopter flying experiences.

### START UP

Every flight must begin with a walk-around. This is true even in FS9. This is a chance to ensure that the aircraft is ready to go, the crew is ready to go and the flight is ready to go. The S-76A is not the sort of aircraft you can just jump into and go. Please consult and follow the checklists in the following sections to ensure the aircraft is started according to the manufacturer's recommendations.

### TAXI

For many, the S-76A may be the first wheeled, retractable gear helicopter they've flown. Therefore, even taxiing to the runway can be a new experience. As with all flight aspects, being gentle on the controls will bring rewards.

Taxiing is accomplished by releasing the parking brakes (which were on for the start & rotor engagement). Apply collective to get the aircraft slightly light on the wheels (60-65%TQ), and gently apply forward cyclic to get the aircraft moving. The rotor disk in the real aircraft is canted forward to allow for a level platform in flight and a higher rate of airspeed. Take this into account when ground taxiing and don't tilt the disk to low. The S-76A has very flexible blades. Blade strikes **really** irritate maintenance – which you don't want to ever do.

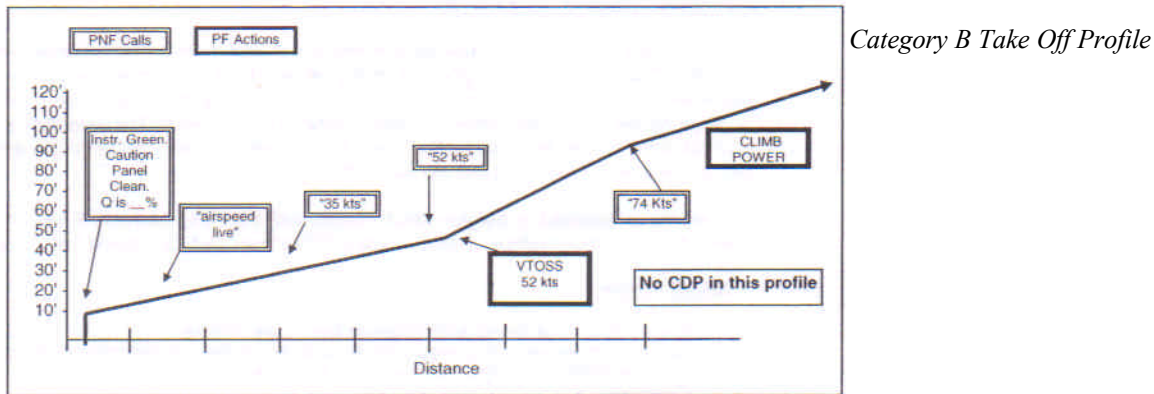
All steering is accomplished with the pedals and not with the cyclic. Left turn, left pedal and then a slight left offset with the cyclic to tilt the rotor disk into the turn. Of course, a right turn is the opposite. Try to use back cyclic to slow the aircraft down, rather than riding the wheel brakes. Remember, the S-76 is a fast aircraft, both on the ground and in the air. Take your time, and don't rush turns. Those with fixed wing experience are likely more used to the mechanics of ground taxiing. The normal taxi speed in an S-76 is no greater than a fast walk, and is always at the discretion of the PIC.

## TAKE OFF

Now that you have mastered the taxi and find yourself lined up with the runway for departure, apply collective smoothly and raise the aircraft into a hover. Hover power in the real S-76A is generally quite high depending on gross weight, wind and ambient temperature.

The simulator model, depending on fuel and crew configuration, should lift into the hover at 80% TQ. Slight, gentle aft cyclic will help bring the nose up. The real S-76A hovers quite nose high, so a higher than normal hover is generally preferred. Establish 10-15 ft AGL hover, with no movement in any direction. Quickly check that center of gravity, TP, TQ & T5 are within limits. Now you are ready for departure.

Depending on the departure technique you are using (we will assume here a normal runway departure - Class B), apply collective and forward cyclic. Once the airspeed is alive, continue your departure at approx 15 ft AGL and gain forward airspeed. At 52 knots (VTOSS) raise the nose level and watch your rate of climb increase.



Your Critical Decision Point (CDP) on this departure is when you decide that you do not have sufficient runway remaining for a rejected takeoff. Once CDP is called and a positive rate of climb is achieved, the gear can be retracted. Some companies call for the gear at a specified altitude (3-500 ft AGL) while others prefer to retract the gear as soon as a positive rate of climb is achieved. Once at 74 knots (VBROC), continue your climb on the runway heading to assigned ATC altitude or minimum VFR altitude, before you make a turn on course. Pre-takeoff checks are completed after you are at a safe minimum altitude.

## CRUISE

Cruise power in the S-76A is dependent on a few things: fuel, altitude, temperature and VNE or VNO. Max continuous TQ is 85%. If you are operating at a higher density altitudes or higher ambient temperatures you may find that your limiting factor is T5 temperatures and not TQ.

A fast cruise at max cont TQ is going to burn more fuel. The S-76A fuel flow for fast cruise is generally calculated at 300 lbs per hour X 2 engines. Do your math carefully so as not to require another fuel stop or worse, run out! Cruise checks cover most relevant concerns and require a fuel calculation to your destination and reserves. Many S-76A's are used for offshore operations where fuel calculations are critical.

### **IFR / VFR Fuel Planning:**

**IFR:** Fuel to Destination Airport  
 + Fuel to Alternate Airport  
 + Fuel for 2 approaches (including missed approach)  
 + Fuel for 45 minutes at economy cruise speed

**VFR:** Fuel to Destination Airport  
 + Fuel for 45 minutes at economy cruise speed

Once established in the cruise, set the autopilot if equipped and verify GPS heading, distance remaining and fuel. Remember that the aircraft manufacturer has specified a VNE of 155 KIAS. Many companies use 145 KIAS as their VNO. Keep these figures in your mind, as they are easy to breach in this aircraft.

## DESCENT

The S-76A was designed to fly and fly fast. Both of these requirements she handles very well. The hardest thing that new S-76A pilots find is that one has to get the aircraft slowed down for descent early. Many S-76A first officers, myself included, came from a VFR background flying ASTARS and/or Bell 206 Jet Rangers. The S-76A is a race car compared to the others and many new pilots tend to fly the aircraft at the edge of its performance envelope. I can still hear my Training Captain telling me to “Slow down!” ...over and over. The S-76A will not descend without getting your forward airspeed bled off.

Lower your collective and keep the nose at 0° to 5° nose up. Once the airspeed drops below 90 knots you will start to see and feel a rate of descent. Now is a good time to plan those descent and landing checks. Get the gear down when your airspeed is below 120 KIAS. The key to a good descent is planning, though nothing replaces experience. A 500 fpm ROD is comfortable for all passenger operations, so always try and get your approach angle setup for this approach.

<p><b><i>Descent Planning:</i></b>  <i>Top of Descent:</i></p> <ul style="list-style-type: none"> <li>• <i>Altitude Change required (Current – Approach Alt. MSL)</i></li> <li>• <i>Remove 0's from resulting number.</i></li> <li>• <i>Multiply x 3 – this is NM back from destination to start descent.</i></li> </ul> <p><i>Rate of Descent Required:</i></p> <ul style="list-style-type: none"> <li>• <i>Divide GROUND speed by 2.</i></li> <li>• <i>Add a 0 to the resulting number.</i></li> <li>• <i>This is your required rate of descent.</i></li> </ul>	<p><i>Example:</i></p> <ul style="list-style-type: none"> <li>• <i>At 6000ft, Approach Alt 2000ft (Alt Change = 4000)</i></li> <li>• <i>4000 – 0's = 4</i></li> <li>• <i>4 x 3 = 12NM (don't forget to add length of approach)</i></li> </ul> <ul style="list-style-type: none"> <li>• <i>GS = 140 / 2 = 70</i></li> <li>• <i>70 + 0 = 700</i></li> <li>• <i>700 fpm ROD</i></li> </ul>
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## APPROACH

In the approach phase of the flight, all descent and landing checks should be complete - a final check by the flying pilot that the gear is down and locked, brakes released (if required) and any other final landing checks (i.e. radar set to standby). There are critical numbers to know and understand when flying any multi-engine helicopter, including this S-76A.

You have to realize that this helicopter is 2 things: **heavy** and **power limited**. The power required to keep the aircraft aloft is dependent on airspeed and you must be committed to land when at either 55% TQ dual engine (110 % single with engine loss) or your airspeed is lower than 35 KIAS.

<b><i>WARNING</i></b>
<p><i>The S-76A <b>WILL NOT FLY AWAY ON 1 ENGINE BELOW 35 KNOTS.</b> Rotor RPM (<math>N_R</math>) will drop catastrophically, airspeed will bleed off rapidly, and a extremely high rate of descent will develop that <b>YOU CANNOT RECOVER FROM.</b></i></p>

Keep your airspeed above 35 KIAS for the duration of the approach until your approach angle allows you to successfully make the landing area. This is the Landing Decision Point. Flare the aircraft to bleed off airspeed and increase collective to transition into a hover.



The approach is probably the single most difficult phase of the flight to perform properly. Things to remember:

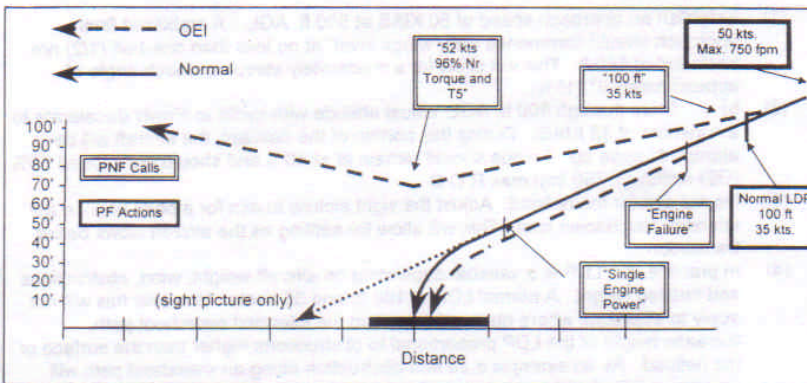
- Airspeed on approach: 35 KIAS minimum until a safe landing can be conducted on your helipad.
- **Always** plan a *rejected approach path* in the event of an engine failure prior to LDP. Once LDP is called, you ARE going to land – hopefully where you planned to.
- Watch your TQ. High gross weight = High TQ. Remember your single engine restrictions.

## LANDING

This is something that all of you have done (I hope?). The S-76A has only a few issues where landing is concerned. Remember, you are not in a skid-equipped helicopter. Wheels are great for hard paved surfaces, but not so forgiving in the bush. Plan your landing site. Remember your initial training for:

- Size
- Shape
- Surface
- Slope
- Sheer
- Sun.

You have the benefit here of a high tail rotor also, but don't forget to protect the tail when landing and maneuvering in any confined area.



Hover Landing Profile

Once over your spot, lower the collective slowly until the rear tires touch the ground. Watch your ADI & remember that the S-76A hovers nose up. For a true vertical hover landing, parking brakes or toe brakes will keep the aircraft from moving after touch down, but there can be NO movement at all.

A little trick with the real S-76A is to touch down with a slight forward airspeed. This makes it easier than coming to a complete hover first. Practice here makes perfect. The S-76A touchdown speed is restricted to below 40 KIAS & toe brakes below 34 KIAS. Remember, run on landings take less power than conventional hovering landings. NO sideward momentum when touching down.

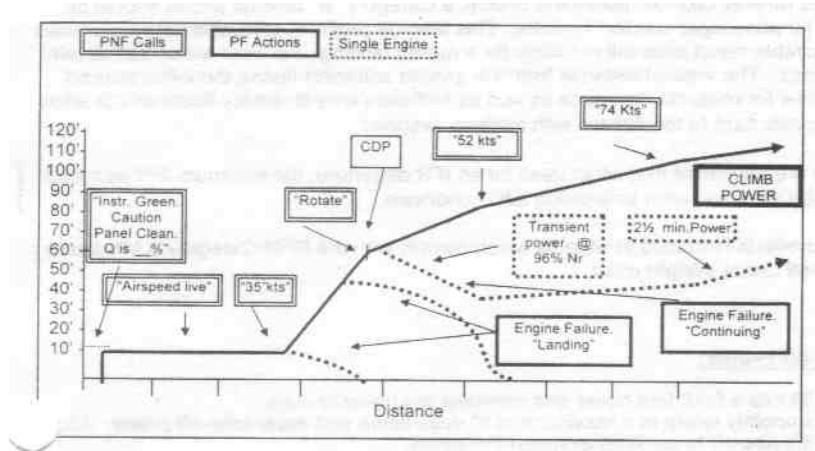
The S-76A has a high lateral center of gravity, and is a top-heavy aircraft. Dynamic rollover with this aircraft is a real concern both on landing and during taxiing.

Have your F/O conduct post-landing checks and taxi your S-76A back to the "barn". Don't forget to reduce power to GRND IDLE when you are done, and then cool the engines down for 2 minutes before shutdown.

## FINAL THOUGHTS

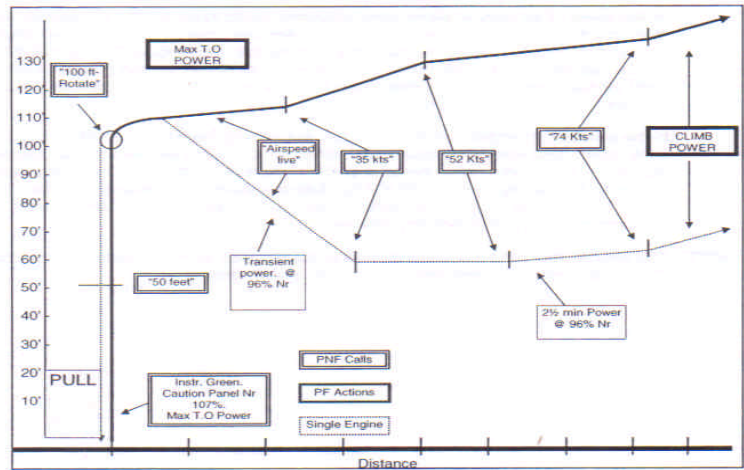
The S-76A helicopter is one of the most challenging and rewarding aircraft that I have ever flown. In my 1300 hours of S-76A time I have had the opportunity to use the aircraft for ambulance, executive transfer and offshore operations. The aircraft is a very versatile VFR and IFR aircraft. Challenge yourself in the IFR environment with this aircraft as you won't find a better platform than the S-76A for IFR flying.

**Greg Hulme**  
 AH753943  
 ATPL-Rotor  
 IFR PIC S-76A, S-76C+

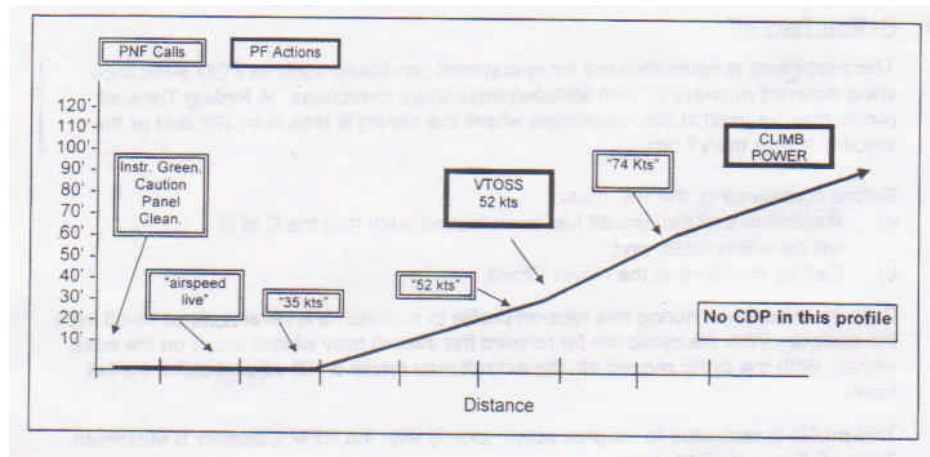


Category A Take Off Profile

Vertical Take Off Profile



Rolling Take Off Profile



## Instrument Panels



- I. Main Instrument Panel
- II. Center Panel
- III. Main Switches
- IV. Avionics
- V. Engine Control Quadrant
- VI. Other Switch Panels

***FS 2004 Note:***

*Pilot & Co-Pilot doors can be opened from the Virtual Cockpit by Left Clicking on them. Repeat to Close.*

***FS 2004 Note:***

*Main Passenger Doors (Exec/Offshore) & Right Sliding Door (EMS/SAR) can be opened & closed using the "SHIFT+E" command.*



## I. Main Panel

- |   |   |         |                                 |
|---|---|---------|---------------------------------|
| 1 | Standby Artificial Horizon                    | 26 / 29 | Engine 1 / 2 Fire Warning       |
| 2 | ADF Indicator                                 | 27 / 28 | Engine 1 / 2 Engine Out Warning |
| 3 | DME ( <i>ETA only for next GPS waypoint</i> ) | 16      | Attitude Indicator (See Below)  |



- |    |                                    |
|----|------------------------------------|
| 4  | L / R N1 Tachometer                |
| 5  | L / R T5 (ITT) Temperatures        |
| 6  | L / R Fuel Flow (lbs/hr)           |
| 7  | L / R Engine Oil Temp & Pressure   |
| 8  | Pri / Secondary Hydraulic Pressure |
| 9  | Transmission Oil Temp & Pressure   |
| 10 | 1 / 2 Fuel Quantity (Lbs)          |

### Horizontal Situation Indicator

- |    |                    |
|----|--------------------|
| 17 | HIS (See Below)    |
| 18 | VOR2 / ADF switch  |
| 19 | VOR1 / ADF switch  |
| 20 | VOR1 / VOR2 switch |
| 21 | NAV / GPS switch   |

- |   |    |
|---|----|
| Gear Up Caution Light                                   | 11 |
| Airspeed (KIAS)   | 12 |
| Torque Gauge  | 13 |
| <b>T5 Digital Repeater (See Below)</b>                  | 14 |
| Triple Tachometer (N <sub>L</sub> L/R, N <sub>R</sub> ) | 15 |

- |    |   |
|----|---|
| 22 | Marker Beacon Indicator                           |
| 23 | Pressure Altimeter<br>(Knob adjusts Alt. Setting) |
| 24 | Vertical Speed Indicator                          |
| 25 | Radar Altimeter<br>(Knob adjusts Decision Height) |

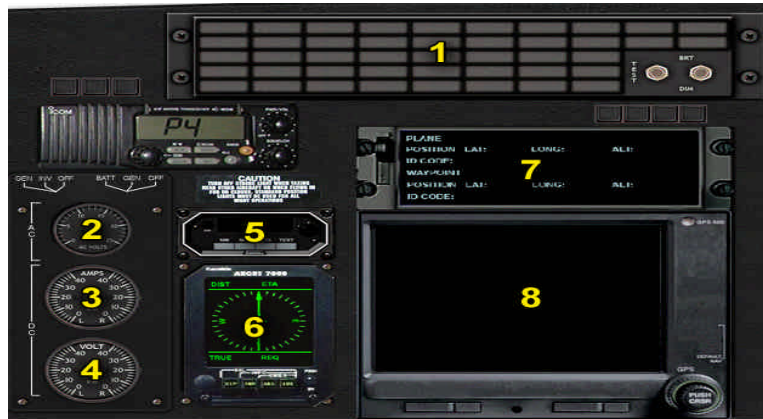
- |   |   |   |   |   |                  |
|---|---|---|---|---|------------------|
| ● | ○ | ○ | ○ | ○ | 350 °C and above |
| ● | ● | ○ | ○ | ○ | 695 °C and above |
| ● | ● | ● | ○ | ○ | 769 °C and above |
| ● | ● | ● | ● | ○ | 799 °C and above |
| ● | ● | ● | ● | ● | 827 °C and above |

### T5 Digital Repeater & Warning Lights (#14 above)





## II. Center Panel



- |   |                                |   |                                      |
|---|--------------------------------|---|--------------------------------------|
| 1 | Caution & Warning Panel        | 5 | DME (Minute ETA for GPS only)        |
| 2 | DC Battery / Generator Voltage | 6 | Argus Next waypoint course indicator |
| 3 | DC Battery / Generator Amps    | 7 | FMS Waypoint Information             |
| 4 | AC Generator Voltage           | 8 | MSFS2004 Garmin GPS500 (default)     |

### ***FS 2004 Note:***

*On the real world aircraft, avionics (radios, GPS, etc.) come on with generator start. The S-76A is NOT equipped with an “Avionics Master” switch. FS2004 requires this. By default “CTRL+SHIFT+A” turns on avionics on this aircraft.*

## Caution & Warning Panel

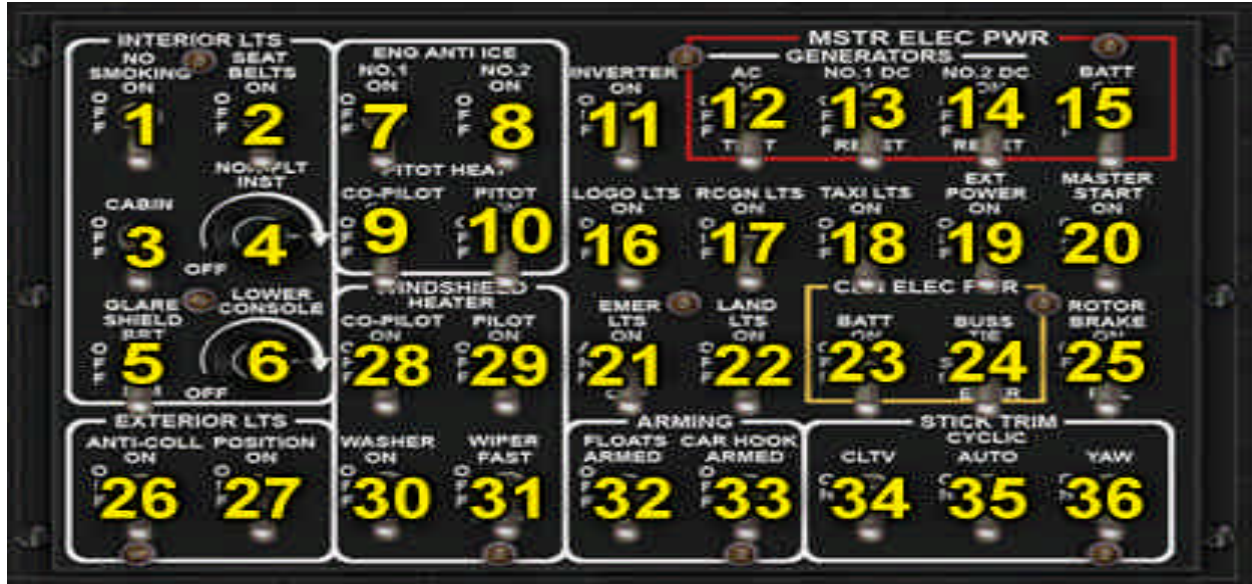


- |    |   |    |  |
|----|---|----|--|
| 1  | Hydraulic Servos # 1 Failed                     | 21 | Main Transmission Oil Pressure Low             |
| 2  | A/C Battery Hot                                 | 22 | Main Transmission Oil Temp High                |
| 3  | A/C Battery Offline ( Flight Inst. Failure)     | 23 | Main Transmission Oil Chip Detected            |
| 4  | DC Gen 1 & 2 Busses Separate                    | 24 | Co-Pilot Pitot Heat On (Advisory)              |
| 5  | Engine 1 Inlet Heat On                          | 25 | Baggage Compartment Smoke Alarm                |
| 6  | DC Gen 1 Failed                                 | 26 | Intermediate Gear Box – Oil Hot or Chip Detect |
| 7  | DC Gen 1 Over temperature                       | 27 | Tail Gear Box – Oil Hot or Chip Detect         |
| 8  | AC Gen Failed                                   | 28 | Pilot Pitot Heat On (Advisory)                 |
| 9  | AC Gen Main Bearing Hot                         | 29 | Engine 2 Fuel Pressure Low                     |
| 10 | AC Inverter Powering all AC Busses              | 30 | Engine 2 Oil Chip Detected                     |
| 11 | Engine 1 Oil Pressure High / Low                | 31 | Engine 2 Anti-Ice Caution (OAT<2°C)            |
| 12 | Fuel Tank 1 (Port) below 80lb (Speed < 80 KIAS) | 32 | Engine 2 Inlet Heat On                         |
| 13 | Engine Anti Particulate System On               | 33 | Engine 2 Oil Pressure High / Low               |
| 14 | Windshield Heat – Too Hot                       | 34 | Fuel Tank 2 (Stbd) below 80lb (Speed <80KIAS)  |
| 15 | Autopilot System Failed                         | 35 | Door Open – See Avionics Panel for location    |
| 16 | Engine 1 Fuel Pressure Low                      | 36 | DC Gen 2 Failed                                |
| 17 | Engine 1 Oil Chip Detected                      | 37 | DC Gen 2 Over temperature                      |
| 18 | Engine 1 Anti-Ice Caution (OAT < 2°C)           | 38 | Press To Test All Annunciators                 |
| 19 | AC Inverter Failed                              | 39 | Hydraulic Servos #2 Failed                     |
| 20 | Engine Bleed Air Valves Open                    | 40 | Rotor Brake On / System Problem                |

### III. Main Switch Panel

(Grayed out switches inoperative in FS2004)

1	Passenger No Smoking Sign	10	Pilot (R) Pitot Heat
2	Passenger Seatbelts Sign	11	AC Inverter
3	Passenger Lights Master	12	AC Generator
4	Cockpit Lights (VC)	13	Engine 1 DC Starter / Generator
5	Glare Shield Lights	14	Engine 2 DC Starter / Generator
6	Avionics Lights	15	Battery Master
7	Engine 1 Inlet Heaters	16	Vertical Stabilizer Logo Lights
8	Engine 2 Inlet Heaters	17	Recognition / Pulselites
9	Co-Pilot (L) Pitot Heat	18	Main gear Taxi Lights



19	External Power	28	Co Pilot Windshield Anti-Ice Heater
20	Master Start Energizer	29	Pilot Windshield Anti-Ice Heater
21	Passenger / Cockpit Emergency Lights	30	Windscreen Washer Pump
22	Nose Spotlight / Landing Light (steerable)	31	Windscreen Wipers Fast – Off - Slow
23	Cabin Buss Battery Connect	32	Emergency Floats Arm
24	Cabin AC Buss Tie	33	Emergency Cargo Hook Release Arm
25	Rotor Brake	34	Stick Trim - Collective Arm
26	Anti-Collision Strobes (A/C-Off-AC & S)	35	Stick Trim – Cyclic Auto PBA Arm
27	Position Lights	36	Stick Trim – Yaw Arm

**FS 2004 Note:**

To extend & retract landing light, switch located on collective in Virtual Cockpit must be used. Main switch panel controls only light power.

## IV. Avionics

(Grayed out switches inoperative in FS2004)



- |   |  |
|---|--|
| 1 | Radio Active Frequency   |
| 2 | Radio Standby Frequency (Only standby freq. can be altered)    |
| 3 | Active / Standby Frequency Selector                            |
| 4 | Radio Power (Avionics Master must be on to transmit / receive) |
| 5 | Standby Frequency Selector                                     |

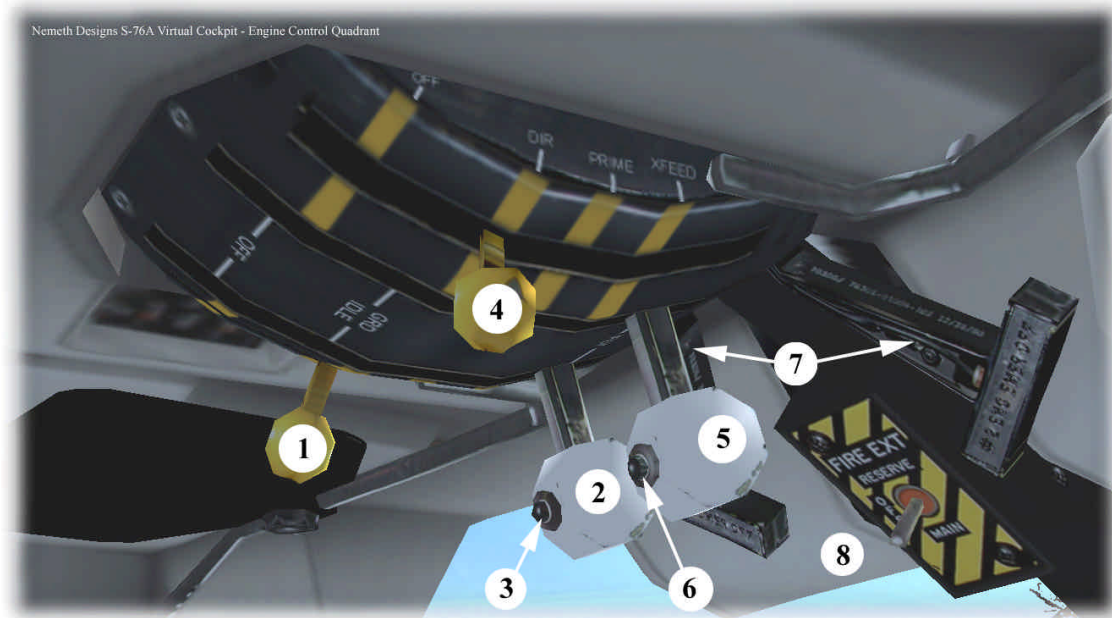
- |    |                            |    |                                    |
|----|----------------------------|----|------------------------------------|
| 37 | Nav 1 Radio (ILS Receiver) | 41 | ADF Receiver                       |
| 38 | COM 1 Radio                | 42 | Transponder                        |
| 39 | COM 2 Radio                | 43 | Door Open / Unlocked Warning Panel |
| 40 | Nav 2 Radio                | 44 | Electric Door Locks                |



- |   |   |
|---|---|
| 1 | Com 1 Receive On/Off (Receive automatically on when Transmit Selector on Com 1) |
| 2 | Com 2 Receive On/Off (Receive automatically on when Transmit Selector on Com 2) |
| 3 | Transmit Selector Com 1 / Com 2   |
| 4 | Nav Ident Selector ( Up = Nav 1, Dwn = Nav 2, Center = Off)                     |
| 5 | ADF Ident Selector  |

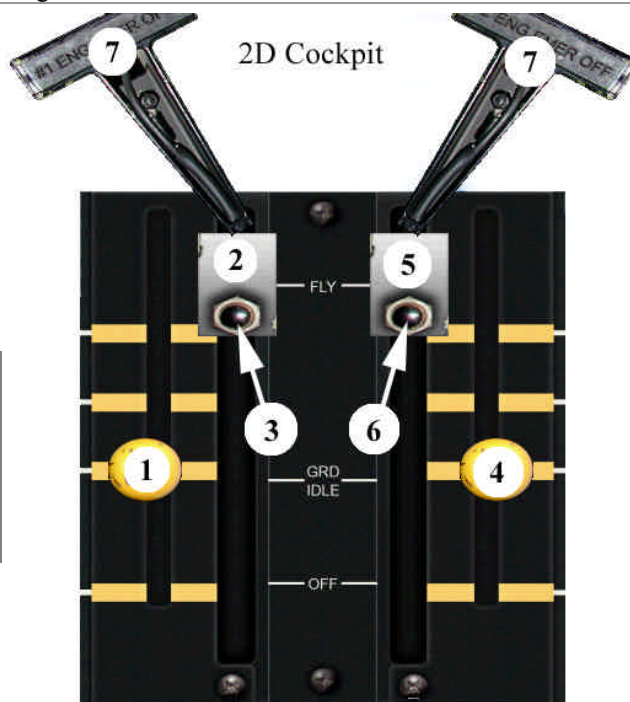


## V. Engine Control Quadrant



### Virtual Cockpit

- |   |   |
|---|---|
| 1 | Engine 1 Fuel Control ( <i>Left click to move fwd, Right click to move back</i> ) |
| 2 | Engine 1 Power Lever ( <i>Left click to move fwd, Right click to move back</i> )  |
| 3 | Engine 1 Starter Button   |
| 4 | Engine 2 Fuel Control ( <i>Left click to move fwd, Right click to move back</i> ) |
| 5 | Engine 2 Power Lever ( <i>Left click to move fwd, Right click to move back</i> )  |
| 6 | Engine 2 Starter Button   |
| 7 | Fire T Handle ( <i>Left click to move aft / Shutdown</i> )                        |
|   | (Note: T Handles are NOT independent. They will shut down BOTH engines)           |
| 8 | Engine Fire Extinguisher Main / Reserve Switch                                    |



**FS 2004 Note:**  
To move levers in  
**2D cockpit** view,  
left click on desired  
control position

## VI. Other Switches



*Located above Circuit Breakers on ceiling*

1	Extinguisher Fire Circuits – Test
2	Fire / Smoke Detector Test
3	Engine 1 Prime Pump
4	Engine 2 Prime Pump
5	Fire Warning Annunciator Test
6	Continuous Ignition Arm Switch (For flight in snow / significant humidity)



1	Landing Gear Emergency Blow Down
2	Landing Gear Extension Lever
3	Landing Down Locks Engaged Light
4	Landing Gear Unlocked / In transit Light
5	DC Generator 1 Ground Fault / Over Volt Test Switch
6	DC Generator 2 Ground Fault / Over Volt Test Switch
7	AC Generator Over Volt / Under Volt Test Switch
8	AC Generator / Inverter Feed Fault Switch – DC Gen 2 link



**Part III****Appendix A – FS2004 Quickstart Checklist**

Because of the way some aircraft systems are modeled for the S-76A, reliable starting and engine indications may not be available using FS2004's "Automatic Start" (CTRL+E) feature. For correct realism it is suggested that you save a flight with the S-76A shut down at your departure location. Please refer to this quickstart to ensure correct aircraft start sequence.

1	External Area – <b>Clear</b>
2	Exterior Check – <b>Complete</b>
3	Interior Check – <b>Complete</b>
4	Doors – <b>Closed &amp; Secure</b>
5	Parking Brake – <b>Set</b>
6	Switches – <b>All Off</b>
7	Fire T Handles – <b>Forward</b>
8	Engine 1 & 2 Power Levers – <b>Aft (Off)</b>
9	Engine 1 & 2 Fuel Control – <b>Aft (Off)</b>
10	Battery – <b>On</b>
11	Anti-Collision Light – <b>On</b> (Fwd position) (Landing Light should be on for night start)
12	Inverter - <b>On</b>
13	Annunciator Panel – <b>Test</b>
14	Fire Warning – <b>Test</b>
15	Rotor Brake – <b>As Desired</b>
16	Stick Trims – <b>On</b>
17	Fuel – <b>Check Quantity Sufficient</b>
18	DC Generators – <b>1 &amp; 2 On</b>
19	External Power – <b>On</b> (If available)
20	Master Start – <b>On</b>
	<i>It is suggested to follow the odd day / odd engine start pattern. Below it is assumed that Engine 1 will be started first. Alter as required if starting Engine 2 first.</i>
21	Engine 1 Fuel Lever – <b>Xfeed</b>
22	Engine 1 Starter – <b>Depress</b> (Release at 54% N1)
23	Engine 1 Power Lever – <b>Grnd Idle</b>
24	Engine 1 N1, T5, Oil Temp, Oil Press, DC Gen 1 Warning – <b>Checked</b>
25	Avionics – <b>On</b> (CTRL+SHIFT+A, check GPS on)
26	Radios – <b>On</b>
27	Rotor Brake – <b>Rel, then Off</b>
28	Engine 2 Fuel Lever – <b>Xfeed</b>
29	Engine 2 Starter – <b>Depress</b> (Release at 54% N1)
30	Engine 2 Power Lever – <b>Grnd Idle</b>
31	Engine 2 N1, T5, Oil Temp, Oil Press, DC Gen 2 Warning - <b>Checked</b>
32	Lights – <b>As Required</b>
33	AC Gen – <b>On</b>
34	Altimeters, ATIS, Clearances – <b>Set, Received &amp; Understood</b>
35	Passenger Briefing – <b>Complete, Passengers Secure, No Smoking &amp; FSB signs on</b>
36	Engine 1 & 2 Power Levers - <b>Fly</b>
37	Rotor Nr – <b>100%</b>
38	Engine 1 & 2 Fuel Levers – <b>Direct</b>
39	Anti-Ice – <b>As Required</b> (On below 2 C)

## **Appendix B – Glossary of Terms**

### **General:**

<b>PIC</b> .....	Pilot in Command (Aircraft Captain)
<b>PNF</b> .....	Pilot Not Flying (First Officer –F/O)
<b>SOP</b> .....	Standard Operating Procedures
<b>IFR</b> .....	Instrument Flight Rules
<b>VFR</b> .....	Visual Flight Rules ( 3 NM horizontal, 1000 ft from cloud vertically)
<b>LDP</b> .....	Landing Decision Point
<b>CDP</b> .....	Critical Decision Point
<b>LTE</b> .....	Loss of Tail Rotor Effectiveness due to main rotor wash, crosswinds)
<b>Vortex Ring State</b> .....	Loss of Main Rotor efficiency due to recirculation of rotor wash

### **Weight Related:**

<b>MTOW</b> .....	Maximum Take Off Weight
<b>EW</b> .....	Empty Weight (including oil & req'd equip., no fuel, pax, optional equip)
<b>RTOW / RLW</b> .....	Restricted Take Off / Landing weight to comply with Category A reqmnts.

### **Turbine Related:**

<b>N<sub>I</sub></b> .....	Turbine Speed (% of Max)
<b>T<sub>5</sub></b> .....	Interstage Turbine Temp.
<b>TQ</b> .....	Engine / Transmission Torque (% of Max)
<b>N<sub>R</sub></b> .....	Main Rotor RPM Percentage
<b>OEI</b> .....	One Engine Inoperative

### **Speeds**

<b>KIAS</b> .....	Knots Indicated Airspeed
<b>A/S</b> .....	Airspeed (KIAS)
<b>VNE</b> .....	Velocity Never Exceed
<b>VNO</b> .....	Velocity Never Operate (Company dictated)
<b>VTSS</b> .....	Vertical Take Off Safety Speed (>52 KIAS – S-76A)
<b>VBROC</b> .....	Vertical Best Rate of Climb Speed (74 KIAS – S-76A)
<b>ROD</b> .....	Rate of Descent (Vertical Speed)

### **Navigation:**

<b>GPS</b> .....	Global Positioning System
<b>RNAV</b> .....	Semi-Precision approach using GPS as primary nav source. (Horizontal)
<b>VNAV</b> .....	Precision approach using RNAV & GPS vertical guidance. (Vertical)
<b>ILS</b> .....	Instrument Landing System – radio based precision approach
<b>DME</b> .....	Distance Measuring Equipment (NM to station)
<b>NM</b> .....	Nautical Mile (1.4 Statute Miles, 2.24KM)
<b>ASL</b> .....	Above Sea Level (Altitude)
<b>MSL</b> .....	Mean Sea Level (Altitude)
<b>AGL</b> .....	Above Ground Level (Altitude)
<b>Density Alt</b> .....	Altitude corrected for temperature, humidity & field elevation
<b>ADI</b> .....	Attitude Display Indicator (Artificial Horizon)
<b>HIS</b> .....	Horizontal Situation Indicator