# Novice RC Guide v1.1

**by John Willman, Lincoln Sky Knight Member**

## Orientation and Helpful Tips for New Members and Novice Pilots.

## Take one.

**A PDF Version of this Guide can be found on the LSK Web Site**
**http://www.lincolnskyknights.org**

## *Preface*

*When I started to fly RC planes, LSK did not have a Novice Guide. Learning about RC, flight procedures, flight pre-checks, safety, equipment selection, etc. was hit or miss. Looking back at my novice days, I wish I had a guide that would have started me in the proper direction. I wrote this guide to give new LSK members and novice pilots that head start I didn't have. I hope you find this guide informative and useful. Happy flying!*

*John Willman - Lincoln Sky Knight Member since 1998*

# Welcome to the Wonderful World of Model Aviation!

This guide's primary function is to provide orientation and helpful tips to new members and novice pilots; however, anyone is welcome to take and read this guide. There is a lot of information in this document, but don't feel overwhelmed. Flying RC isn't rocket surgery! This guide is not all-inclusive, but it should provide you with a good foundation as you begin to enjoy your new hobby. There are many experienced LSK members that are more than happy to answer your questions. This guide is just one source of many for answers. Get involved, ask questions and begin the learning process by reading the Novice RC Guide.

## What's in this Guide?

This guide contains five general sections which will provide you with basic information on RC model aircraft.

**Frequently Asked Questions (FAQ):** The FAQ section answers common questions new pilots have about model aviation, such as how much does it cost, how long to planes fly, is it hard to learn how to fly, etc.

**Getting Started:** The getting started section addresses what you need to begin and how to go about purchasing your equipment. Topics such as plane selection, radio selection and locating an instructor are covered.

**Rules and Procedures:** The rules and procedures section address safety and describes how the LSK RC field operates. Subjects such as safe starting of engines and flight line communication are explained.

**Building, Setup, Flight Tips and More:** This section covers some basic tips, ideas for second planes and basic flight tips. This section is not a substitute for an instructor, and should only be used to supplement your flying lessons. For safety reasons, you should not teach yourself to fly solo at LSK.

**Jargon, Acronyms and Abbreviations:** The last section helps you learn the language of flight and RC modeling.

# Frequently Asked Questions

Answers to common questions asked by new pilots.

**Is it hard to learn how to fly?** Flying isn't easy, but it isn't hard either. While rare, some can fly without any instruction; however, it is more common that you will need some flight lessons. I haven't met a person yet that couldn't be taught how to fly. Some students can fly on their own after about 10 to 20 flights, others may need a whole season of instruction. But don't worry about how long it takes you to learn how to fly. Everyone learns at their own pace. Remember, LSK members receive free flying lessons!

Neil Armstrong - Model Pilot

**Who are model pilots?** RC model aviation has no gender or age limits. LSK has both gentleman and lady pilots as well as pilots of all ages, from preteen to young at heart. Pilots as young as five years of age are not unheard of, and it is never too late to enjoy our hobby. Model aviation provides a pleasurable past time and social atmosphere. Model aviation has also been fundamental in providing early interest for the engineers and pilots responsible for the space and aviation industry today. Famous persons such as the Wright Brothers and Neil Armstrong owe their early interest in space and aviation to model aircraft.

**How much does it cost?** Like any hobby/sport, costs can vary greatly. For a glow fuel powered RC plane, beginners should expect to spend a minimum of $300 to get started and $500 is more realistic. You'll need a plane, radio equipment, fuel, starting equipment, club membership and some basic tools. If you have budget constraints, it may be possible to start for less than $300 if you purchase used equipment. Helicopters tend to be more expensive and you can expect to spend $500 to $750 to get started.

**What plane should I get?** If you haven't flown before, you need a trainer. Save that war bird or sweet looking aerobatic plane for a later project. Trainers offer a durability and gentle flight characteristic that are key to learning the basics of flight. There are many trainer planes available, either in kit form or ready to fly (no or very little building.) If in doubt, come on out to the LSK field and ask an experienced modeler for advice. For more information, please read the Plane Selection paragraph in the Getting Started portion of this guide.

**What radio should I get?** First, you need a radio designed for model aircraft. You will need to purchase a radio that at a minimum supports the channel requirements of the plane/heli you wish to fly. For most trainers this is a 4-channel radio and for helis you will need 5channels. But STOP! There are good reasons to purchase a radio that offers more features than you initially need. For more information, please read the Radio Selection paragraph in the Getting Started portion of this guide.

**Should I join the AMA and a flying club?** Yes! You need insurance and a safe place to fly your plane. Most clubs will require you to belong to the AMA for insurance reasons. LSK requires you to belong to the AMA. Club membership has many benefits, such as a safe flying site and new friends in the hobby. But most importantly for new pilots, clubs give you access to experienced modelers that are willing to help.

**What weather can I fly In?** The perfect day is sunny, no wind and 80 degrees. Unfortunately that never happens in Nebraska. In general, planes can be flown year round, day or night, regardless of weather. However, as a rule of thumb you should avoid wet conditions as moisture can get inside your transmitter and short out the radio. Winds don't prevent flying, but high winds can make flying more difficult. In general, beginners should avoid winds over 15 MPH (most days, the wind is below 15MPH.) Temperature also isn't a major factor, but extreme heat/cold does make flying uncomfortable for the pilot.

**The LSK Flying Site**

**What is glow, glow engines, glow fuel?** While very large models will use engines that burn pump gasoline (gas), most model engines burn an alcohol-based fuel we call glow fuel. It is called glow fuel because the ignition source is from a glow plug as opposed to a spark plug. Glow plugs have a small coil of wire that glows orange hot, hence glow plug. Glow fuel typically contains alcohol (methanol), oil (either castor, synthetic, or a combination of both), and a percentage of nitromethane (used to increase performance, also just called "nitro.") Try to avoid calling glow fuel "gas" since it isn't gasoline, and some model planes really do burn gasoline... this helps avoid some confusion. There are also models that use electricity (batteries) for their primary power as well as gliders (gravity powered) and turbines (jet fuel powered.)

**How far away does the radio work?** A standard 72MHz FM and the newer 2.4GHz model aircraft radio has a usable range of about one mile. You'll lose visual contact with your model long before you'll be out of radio range.

**How long do flights last?** The limiting factor is fuel. Most planes carry enough fuel for 10 to 15 minute flights. Planes don't have fuel gauges, so most pilots time their flights and land after a certain number of minutes.

**How often do planes crash?** Shhhh... don't say that word. OK, yes, the planes can and will crash. 99% of all crashes are due to improper maintenance and/or pilot error. With proper instruction, good maintenance, and flying lessons given by experienced LSK members, your chances of having a serious crash during instruction and training are very small. After you learn the proper procedures and skills, you can have hundreds or even thousands of solo flights without a major crash.


Oh! I can't bear to look at this.

**Will a plane crash if the engine stalls or dies?** Probably not. The plane just turns into a glider at that point and you simply glide the plane back to earth and land it.

**What happens when planes crash? Total loss?** Typically no. Most "crashes" are the result of hard landings. With a hard landing, you may have to tweak your landing gear or replace the propeller. A more serious crash may involve some minor repairs to the structure. Even if you have a serious crash, odds are that your engine and radio will survive. That would mean all you need is just a new trainer plane, which is about $100. (The above picture shows a serious crash... note the engine and radio survived.)

**Is flying dangerous?** When the AMA and LSK Club rules are followed, flying is very safe. Accidents are rare. However, injuries and property damage can easily occur if AMA and Club rules aren't followed. Typically, most injuries and property damage are the direct result of flying at unsafe locations or not following the rules. At the LSK field, we have a safe, AMA insured site with lots of instructors that help ensure flying is safe.

**What are radio channels?** The word "channel" is used to describe two things in RC aviation. "Channel" can describe the frequency on which your radio operates, i.e., your radio might broadcast on channel 40. "Channel" can also describe the individual controls on a radio, i.e., my ailerons are plugged into channel-1. Confusing I know... Think of it this way. A FM radio station might be on frequency channel 106.3MHz and have two audio control channels, left and right speakers. It is the same idea with RC radios.

**Frequencies:** Most aircraft radios operate on the 72 MHz band. This band is divided into 50 individual frequencies for RC aircraft use. That means it would be technically possible for 50 planes to be flown at the same place at the same time... but that isn't recommended. At the LSK site, for safety reasons, no more than six (6) planes should be in the air at any one time. Every airborne plane needs to be operating on a separate channel. This is critical because if

two transmitters are turned on at the same time on the same channel, the receiver becomes very confused and the plane will crash. For simplicity, the channels are assigned numbers that range from 11 to 60. Most radios can only be operated on one of the 50 frequencies. The radio will be clearly marked as to which frequency it uses. Be sure you know your Radio Channel as you will be required to use the frequency control board.

**2.4 GHz :** More people are going to the new 2.4 GHz radios. With these systems you do not have a frequency control problem and will have less interference problems. You will not be required to use the frequency control board.

**Individual controls.** Every radio has a certain number of individual servos or devices it can control. These are called channels (ch), not to be confused with frequency channels. For example, a 4ch radio can control four individual controls, such as rudder, elevator, aileron and throttle. Most RC aircraft radios range from 3 to 12 channels. Why the extra channels? More complex planes may use two elevator servos, two aileron servos, gear retracts, flaps, smoke, etc. To enable these extra controls, more channels are required.

# Getting Started

Where to begin???

## Where to Start

STOP! Don't buy or do anything until you speak to several experienced pilots. LSK has many experienced pilots that are willing to help you with everything from equipment selection to flying lessons. You will need a special plane designed for flight training (often simply called a trainer), a radio system, tools, supplies and flight gear. You will also need some basic training on flying until you become experienced enough to fly solo. Each pilot you inquire will probably give you a slightly different opinion, so it is a good idea to talk with more than one pilot to compare ideas. Besides experienced LSK members, another good source for information is a web-based forum called RCUniverse. The address is www.rcuniverse.com.

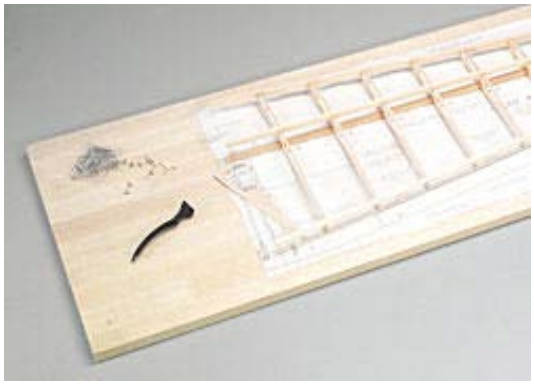
## Plane Selection

You need a trainer. Trainers are inherently designed for the sole purpose of teaching the fundamentals of flying. Trainers offer stability often not found in other planes. Basically everyone learned how to fly with a trainer. If you are unsure of which planes qualify as a trainer, ask an experienced pilot.

**Typical Glow Trainer - GP 40 ARF Shown**

You have several options with trainer plane selection, such as size and level of assembly. The common trainer sizes are 25, 40 and 60. The size refers to the suggested engine size, i.e., 0.25 cu. in., 0.40 cu in and 0.60 cu in. There are also electric trainers available. Things to consider with respect to size; larger trainers tend to cost more, but larger trainers also are easier to see and fly. For this reason, I suggest a 40-sized trainer, which is a good compromise between size and cost. 40-sized trainers are the most common trainer size. You can select to build your trainer from a kit, or purchase a pre built trainer. A kit will probably take 100 hours for a first time builder to assemble. Pre built trainers are often called Almost Ready to Fly (ARF) or Ready To Fly (RTF.) An ARF typically will require some assembly, such as joining the wing halves and radio installation. Typical ARF assembly times are 20 hours. You can also purchase a Ready To Fly, or RTF plane. A RTF will be nearly fully assembled, include a radio and engine, and can typically be flight ready in about an hour.

If you have the time, I strongly suggest you build from a kit. Building will give you an in-depth knowledge of the inter-workings of your plane. If you want to get into the air quickly, I'd suggest an ARF. I'd avoid most RTFs unless you are under serious time/budget constraints. I'd also be careful about bundled systems that include the plane, engine and radio. While a bundled system may offer a good savings, be sure you understand which radio and engine is included before you purchase.



**Building from a kit.**

## Engine Selection

**Typical Glow Engine - OS46FX Shown**

RC Trainers are available with various motor types, from no motor (glider) to electric and glow power. The most common motor types are glow, but electrics are becoming more popular as battery technology advances. Electric motors tend to have higher initial costs as you must buy all of your fuel (battery) up front, but electrics do offer a quieter and less messy flight. If you are interested in electrics, ask around to locate experienced pilots familiar with electric planes. Glow engines offer the most bang for your buck and are the most common model aircraft engine type.

Most likely your trainer of choice will require a glow engine. Your trainer will have a suggested size of engines, for example a 40-sized trainer may list suggested engine sizes of .35-.46 (2-stroke) and .40-.52 (4-stroke.) Any of the manufacturer suggested engine sizes will work well. Notice the different engine range for 2-stroke and 4-stroke engines. 4-stroke engines typically offer smoother power bands, can swing larger props, and are more fuel efficient; however, they can be difficult to set up and cost more than 2-strokes. As you progress, you will probably want a 4-stroke engine, but for now, only consider 2-stroke engines.


**Glow Engine Fuel**

Consider looking at the better and larger sport 2-stroke engines. Some engines use bushings instead of bearings. Better engines typically use bearings. Why look at bigger and better engines? Your second plane of course! Purchasing a good engine for your trainer means you can use your trainer engine in your second plane! For the 40 sized trainer example I listed here, my suggestion is to use a bearing 0.46 2-stroke, such as an OS-46FX. If you are under budget constraints, I'd suggest a slightly smaller bushed engine, such as the OS-40LA. Kits and ARFs leave the engine selection to you. A RTF will include an engine.

You will need some fuel. One gallon is enough to start as it will provide you with 10 to 20 flights on most trainers. All glow fuel is NOT created equally. The two key ingredients you need to pay special attention to are oil and nitromethane. Always follow the engine manufacture's recommendation for oil and nitro. There are two basic oil types, castor and synthetic. Castor tends to make a mess on your engine and plane, but it has very good lubrication properties that can save engines from damage, especially when engines are run too lean (a common novice mistake.) Synthetic oil leaves little mess on engines and planes, and lubricates better than castor under normal conditions, but it offers little to no protection during lean runs. Fuels often contain one or both of these oils. The amount of oil is important. Too little oil and your engine will not be lubricated properly. Your engine instructions should indicate the minimum percentage of oil, typically around 16%-20%. Be sure the fuel you purchase meets the type and minimum oil percentages. Nitromethane, or just nitro for short, is rocket fuel... no kidding. Nitro is added to model fuel for two reasons 1) it increases power and 2) it makes starting easier and idle more reliable. More nitro is good up to a point. Don't assume that your sport engine will produce monster power on a 25% nitro fuel... that won't happen. For engines to realize large power gains from high nitro fuel, they must be designed for high nitro use. A typical sport engine will have a suggested nitro range of 5% to 15%. If under budget constraints, get 5% fuel; otherwise, I'd suggest starting with 10%.

**Glow Plug**

Glow plugs are responsible for igniting the fuel-air mixture in your engine. Plugs are available designed for different engines and heat ranges. Be sure you know which plugs are recommended for your engine. It is a good idea to keep an extra plug in your flight box as they do wear out over time.

## Radio Selection

Radio selection is probably the most confusing aspect of RC for novice pilots. There are a lot of radio types and functions... I guarantee you will be confused. STOP!
At this point there are only a few basic things you need to know about radios.


**Typical Radio Kit included with Transmitter**

You will need a radio designed for model aircraft. It should be on the 72MHz FM band or the newer 2.4 GHz and clearly marked for aircraft use. Don't buy a surface (car/boat) radio as these are not legal for aircraft use. Most entry level radios are sold as complete sets. They will include a transmitter, receiver, batteries, battery chargers, a power switch, wiring and servos... everything you need to get started. With a radio set, the transmitter and receiver will be matched on one of the 50 available aircraft frequencies, numbered 11 thru 60. Don't worry too much about which frequency channel you purchase. But, you may wish to ask which frequency channels are used most

often at LSK so you can avoid heavily used channels.

**6-Channel Computer Transmitter**

There are two basic radio types, non-computer and computer radios. Non-computer radios have limited setup features, while computer radios have advanced setup features. Advanced features allow for more detailed plane setup as well as the ability to remember settings for multiple models. Unless you are under budget constraints, get a computer radio.

**4-Channel Non-Computer Transmitter**

Radios can be designed for sailplanes, powered planes, helicopters, or a combination of any of the above three. This is particularly true with computer radios. Some radios will only contain software for one craft type, while others may contain software for all three. While it is technically possible to program an aircraft radio for helicopter use and vice versa, it is much easier if the proper software is available in the radio. So, if you think you may wish to try your hand at a heli someday, consider getting a radio that supports both planes and helis.

**Typical Servo**

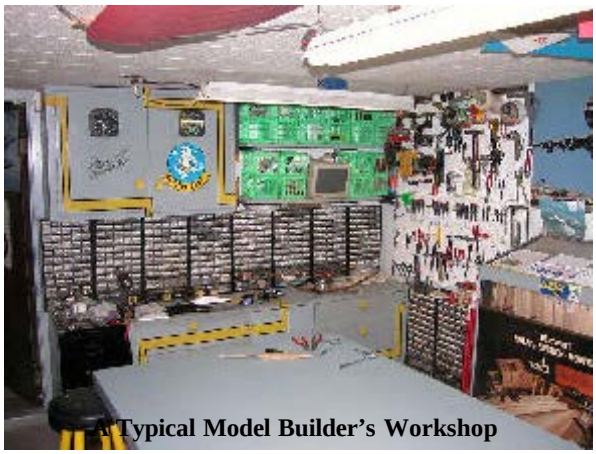
Radios are available with a range of individual control channels, typically three to twelve. Most likely your trainer will only need four channels: aileron, elevator, throttle and rudder. However, your second plane will probably use five channels and you will want to start exploring more advanced radio features such as mixing. For this reason, I suggest purchasing a computer six-channel or above radio. However, if you are under budget constraints, a 4-channel non-computer radio will work just fine.

There are many other features radios may offer, such as more secure radio links using PCM encoding and advanced mixing. Your radio will probably have some of these features. Don't worry about these features for now. You will learn when and how to use these features as you progress.


**Typical Receiver**

As for brand... There are some differences between brands, but the major five (Futaba, JR, Airtronics, Hitec and Multiplex) all make good entry level radios. You may wish to ask around to see which brands are in common use at LSK. There are two reasons for this 1) During your flight lessons, your instructor may wish to "buddy box" the radios, which sometimes does not work between brands 2) If you need help programming your radio, it is easy to find help if you are using a familiar radio.

## Building Tools & Supplies



**A Typical Model Builder's Workshop**

Even if you purchase an assembled RTF, you will need some basic building tools at some point. I've listed some of the tools and supplies you will probably need. This is not a complete list and as you progress, you may find the need for additional tools. Most pilots build up their shops slowly over time as they determine which items they need on a regular basis.

### Basic List

Building/Work area - You need a large flat surface.

Hobby Knife, i.e. Xacto

Straight Edge Ruler, Protractor and Triangle Square

Various sand papers - 80grit to 220 grit

Razor Saw

Hand drill and bits from 1/32" to 1/4"

Various Glues - CyA (super glue), Epoxy (5min and 30min)

Covering Iron

Hex Ball Drivers

Small Screw Drivers

Blue (medium) thread locking compound

Various RC parts, such as extra fuel tubing, screws, wheel collars, props, etc.

Prop Balancer

### Advanced List

Specialized Building Area - Many build a perfectly flat work bench. You need a flat surface to accurately build.

Dremel or other rotary tool and bits - Advanced wood working tools, T-Bar sanders, razor planes, balsa strippers, etc - Power cutting tools, such as a table saw, jig saw, band saw, drill press

Foam working tools such as a Hot Wire foam cutter

More glues, such as aliphatic rosin (wood glue), silicon, Goop, Polyurethane, etc.

Trim Iron and Heat Gun - Soldering Iron, Flux and Silver Solder

More advanced Measuring devices such as a CG balance jig, Throw meter, incidence meter

More RC parts, extra gear sets for servos, more screws, extra servo horns, etc.

# Field Equipment

When you visit the field, you will need some basic tools as well as some specialized starting and testing equipment. You will need a way to carry your stuff. You can purchase or make a flight box. A flight box typically includes a place for a starting battery, tools and basic gear. You may also wish to consider getting a fishing tackle box. A tackle box will often have many small sealed compartments that are perfect for storing small spare parts, such as screws, wheel collars, extra glow plugs, etc. I've listed some of the tools and supplies you will probably need. This is not a complete list and as you progress, you may find the need for additional tools and equipment. Most pilots start with basic tools and slowly build up their flight gear and replace basic items with more advanced items.

**Getting Ready to Fly!**

**Basic List**

Fuel and manual fuel pump

Basic Glow Plug Booster (heater)

Chicken Stick (Used to flip the propeller when starting engine)

Glow Plug Wrench, extra Glow Plug

Hex Ball Drivers & small screwdrivers

Small Wrench (For checking prop nut)

Extra propellers

Battery Tester - This is one item many leave off the basic list. I cannot stress enough that you MUST check your flight battery before EVERY flight... you need a battery tester.

Wide clear plastic tape - for field mending small holes in covering

Extra wing bolts or rubber bands


**Flight Box with Starting Equipment.**

**Advanced List**

Fishing Tackle Box with various of spare parts

Advanced or Smart Glow Booster

Power Panel

Remote IR Temperature Gauge

Electric Starter

Field battery chargers


**Battery Tester**

## Where to Purchase Equipment

There are three basic sources of purchasing equipment. Local hobby shops (LSH), mail-order/web stores, and used equipment (either locally or via the web such as e-bay.) Unless you are under strict budget constraints, I suggest avoiding used equipment unless you seek expert advice on what you are purchasing. However, there are a lot of good deals on used equipment for the savvy shopper. Local hobby shops give you the advantage of seeing before you buy, in addition to being able to take the item home today. Mail-order and web stores tend to offer the largest selection and the best prices. Most of us tend to purchase a little from all three sources. Just a word of caution: Often sales clerks (both LHS and Mail-Order) know little about the items they are selling unless they are model hobbyist. Please seek the advice of several experienced pilots before purchasing. Locally, there is only one hobby store: Hobby Town USA. For mail order, one of the best places sources for entry level equipment is Tower Hobbies: www.towerhobbies.com. **The final word on equipment selection and where to buy: It is your money.**

## Learning to Fly

**Learning to Fly is Fun!**

Your top priority is to locate an instructor. There are many experienced LSK pilots that are willing to help you learn how to fly. There are a few pilots that managed to solo without the aid of an instructor, but most will tell you that if they had it to do over again, they would have found an instructor. Your instructor should take you through the basics of model flight, from safety concerns to takeoffs, flying around and landing. Everyone learns thru different methods and at different speeds. If you are uncomfortable with your instructors methods, don't hesitate to locate another instructor. I have included some pointers in the Basic Building, Setup and Flight section of this guide. I would however like to stress that the included tips in no way substitute for an instructor. In addition to field instruction, consider getting a flight simulator. There are several computer programs for the PC that simulate RC flight. These range in features as well as price, but most start around $200. I realize this sounds like a lot, but consider the following. One of the keys to learning to fly RC planes is stick time. A simulator is an excellent practice tool that can be used night or day, regardless of weather. As you become more experienced, the simulator will also be a good tool for learning harder more complex maneuvers. If the simulator prevents just one crash, your money ahead.


**A popular Flight Simulator**

# Rules and Procedures

It is everyone's responsibility to follow and enforce the rules. Following safe starting and flight line control procedures is key to a smoothly operating flying site.

***This section is a must read for all new LSK members and new pilots. Model aircraft can be potentially dangerous. The AMA and LSK rules and procedures are in place to help ensure your modeling experience is safe and fun.***

## Safety and the Rules.

RC planes are not toys. OK, they kinda are, but they should not be treated as such with respect to safety. RC planes, even trainers, can cause serious property damage and personal injury, including death. When the rules and proper safety checks are followed, RC planes are very safe.

There are two sets of rules you need to follow. AMA rules and LSK club rules. If you don't know what the rules are, **STOP!** Locate, read and be sure you understand the rules. You can find a copy of the rules in the LSK Clubhouse, on the AMA web site (www.modelaircraft.org) and on the LSK web site (www.lincolnskyknights.org) The full AMA and LSK rules tend to change slightly every year so I did not include them in this guide. However, I'd like to point out some of the basic rules that do not change from year to year.

1. Don't drink alcohol before or during any modeling participation
2. Don't fly in front of spectators until you have proven your plane is flight worthy
3. Don't fly unassisted in front of spectators until you become a qualified pilot
4. Never fly behind the flight line.
5. Always write your name and AMA number on your model (can be on inside.)
6. Always range check your radio before flying for the day
7. Obey any flying site rules
8. You must use the Frequency Control Board at the LSK site if using 72MHz radios.

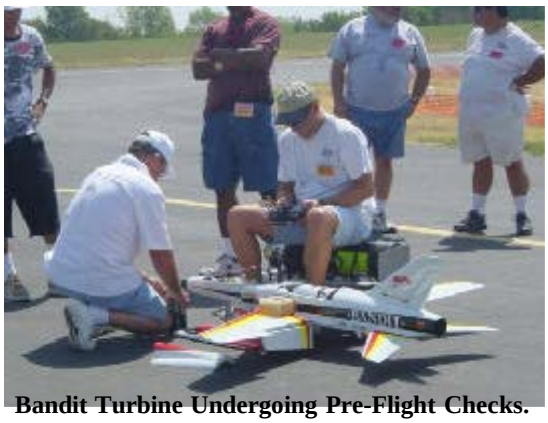
If you travel to other flying sites, be aware that not all clubs use the same rules. Be sure you know, understand and follow any rules at flying sites you may visit.

**Common Sense**

In addition to written rules, there are some common sense rules you should follow. While these aren't written in stone, using common sense makes the LSK flying site more pleasant. Everyone has a different grasp of what constitutes common sense, so I will give some examples. If you plan on breaking-in or otherwise running an engine for an extended period of time, please move to the end of the pits as it is less disruptive. Don't let your children have free run of the field. Don't pit in such a way that is blocks access for other pilots. Etc.

## Pre-flight/Post-Flight Checks and Engine Starting

You should treat your model no different from a full scale plane. Like a full scale plane, you should perform pre-flight safety checks before EVERY flight. Many planes are lost due to problems that would have been detected in a pre-flight check. Don't become a member of S.A.D (Society of Airplane Destroyers!) Pre-flight checks are designed to verify the safety and proper operation of your plane's critical systems.



**Bandit Turbine Undergoing Pre-Flight Checks.**

An experienced pilot that properly performs pre-flight checks will have a ritual they perform before each flight. Watch an experienced pilot and notice how they check their plane before every flight. To start, you may wish to write down your pre-flight checklist. Eventually, you will automatically perform the pre-flight checks without the need for the list.

Pre-flight checks aren't written in stone as each plane may have different items that need special attention during the pre-flight. Listed below are general pre-flight checklists that would apply to most glow powered trainers from assembly to taking the runway to landing.

**FUNDAMENTAL PRE-FLIGHT RULE: Do not fly your plane if you detect a problem!**

I know this sounds simple, but some pilots will fly their plane even if they know something is not quite right. DON'T DO IT! You will lose planes this way and endanger your fellow pilots. If you detect a problem after you are airborne, YELL OUT! An experienced pilot will join you at the flight line to determine the best course of action. Depending upon the problem, sometimes it is not safe to attempt to land on the runway, i.e., control problems.

## Sample Pre-flight Checklist

**Before leaving home:** Checks to perform before you even get to the field. There is the obvious non-safety related stuff like don't forget your plane, fuel and radio, but there is one important safety check.

1. Verify your transmitter is off. As you drive up to the field, you could unknowingly shoot down a fellow members plane.

**Plane Assembly:** When assembling the plane at the field, you should perform a series of checks designed to inspect and verify the structural integrity of your model. If you leave your plane assembled between flying sessions, you should periodically disassemble the plane to perform these checks.

1. Check all internal structure for cracks and other signs of stress.
2. Verify that internally mounted radio gear and linkages are properly secured. *Don't forget to verify servo arm screws are in place!*
3. Check internal wiring for loose connections or worn wires
4. Check fuel tank and fuel hoses and look for signs of leaking fuel

**Fully Assembled Ground Check:** Once your plane is assembled, you need to check the entire plane, concentrating on removable parts, control surfaces, engine, prop and anything else that could come loose like screws. It is best to start at one location and move around the entire plane. I start at the nose of the plane and work my way around. Some items are to be "tug" tested, such as engines and control surfaces. Other items require visual inspection such as verifying screws are in place. Occasionally, items that are visually checked, such as screws, should actually be tested, i.e., get out your screwdriver and check for tightness.

1. Check engine, spinner and prop to ensure they are secure. If necessary, remove the front of the spinner and check prop nut for tightness. Don't forget to check muffler bolts and the screws that hold the engine mount to the fire wall.
2. Check that the wing, canopy, cowl, or any other removable part is securely attached. If your wing uses rubber bands, be sure you used good clean rubber.
3. Check landing gear, wheels and wheel collars.
4. Check all control surfaces and verify that hinges, clevises, etc. are secure.
5. Verify that all covering is firmly attached, particularly at seams.
6. Check the structural integrity of the entire airframe, look for cracks, dents, etc.

**Pre Ignition Check:** These checks are typically performed just prior to moving your plane to the starting area. When flying more than once, you should repeat these steps before every flight.

**Always secure your channel before turning on your transmitter.**

1. Fuel plane and/or verify that fuel has been added.
2. Check battery status in plane.
3. Verify your radio frequency and double check that YOUR card is attached to the frequency control board on the proper frequency. Remember, NEVER turn on your radio until you have properly secured your frequency on the control board.
4. Range check your radio. Always follow the suggested range check procedure for your radio. You should occasionally perform two tests, one with the engine off and one with the engine on. If you notice a large separation in range between the two tests, i.e., more than 20%, STOP! You have a problem.

**Engine Starting and Takeoff Checklist:** This list represents your last chance to find any problems before you take to the air. When flying more than once, you should repeat these steps before every flight.

1. Remember, be sure your card is on the Frequency Control Board before you turn on your transmitter. Verify you have the proper model memory selected (if using a computer radio) and that both your TX and RX are on. Also verify that you have all switches and trims on your TX in the proper position for starting/takeoff if applicable.
2. Verify the plane is properly responding to your control inputs. Don't just check for movement, be sure the movement is the proper direction. Don't forget to check the throttle movement.
3. Clear the area of loose items and verify what is in the extended prop blast area. Are there models you could blow over or slime with exhaust? If necessary, move your plane.
4. Verify your plane is properly secured, either by another person or a mechanical device. Holding your plane by yourself is NOT properly secured.
5. Notify persons in the immediate area that you are going to start your engine.
6. Follow the starting instructions for your engine. Pay careful attention to anything that could be sucked into the prop such as loose clothing, transmitter straps, booster cables, etc. Always adjust your engine from behind the prop.
7. Once started, move your plane to the flight line. Do NOT taxi unless you started in the staging area. If you started in the pits, have a nother pilot carry your plane to the staging area.
8. Verify once again that all control surfaces move the proper direction... this is your last chance!
9. Check that runway is clear and no planes are on approach. Follow the field procedures for

taking the runway. Details follow in the Flight Line Procedures section.

10. Start your flight timer and Enjoy your flight!

**Post-Landing Checklist:** Yes, there are some checks you should perform after you land.

1. Check your fuel level. If you are getting too close to an empty tank, shorten your flights.
2. Re-Check your battery. I know you will check it again before your next flight; however, certain battery problems are easier to detect immediately after heavy use. This is why it is a good idea to check your battery just after you turn the RX off.
3. Be sure your TX is off and remove your card from the Frequency Control Board if used, so others can fly on your frequency. Remember, after flying, NEVER turn your TX off until your engine is off and you have retrieved your plane. Glow engines have been known to restart themselves when warm.

**Crash/Hard Landing Checklist:** If you have a hard landing or crash, even if everything looks OK at first, you need to be very careful as damage can be hidden. You should perform the following after every accident.

1. Disassemble your plane to the point where you can check the entire structure. This may mean removing items like cowls you typically don't remove between flying sessions.
2. Reassemble your plane and follow the above checklists. Pay special attention to items that may have hidden damage, such as loose equipment, stripped gears in servos, cracked wood, chipped props, etc. Be sure you range check the model.

**Additional Engine Safety Tips**

Don't hand start engines. Use a "Chicken Stick" or electric starter. I know most engines can be finger started, but believe me, even a really small prop hurts really bad.

Don't stand in the prop arc. By this I mean don't stand on edge, i.e., left or right side of the prop. If the prop fails, it may hit you.

Always point your plane away from spectators and other pilots when starting.

Don't stand in front of the plane with engine running above idle. If the plane breaks free of its restraints, it could strike you. Always move behind the plane when advancing the throttle.

Never make engine adjustments in front of the plane. Even small 40 sized engines can produce more than one horse power. You don't want that delivered to your fingers.

## Flight Line Procedures

At LSK, we don't have a control tower. The only time you will see marshal controlled flight lines at LSK is during larger contests and events. For day-to-day flying, it is everyone's responsibility for ground, departure and approach control. This isn't complicated... simply announce your intentions and verify there are no conflicts before proceeding. Watch and listen to other pilots to see how this works.

**The basic flight line rules are:**

1. Always follow the flight pattern. In other words, all takeoffs and landings are performed into the wind. On calm days or crosswind days, verify with other pilots which direction they have been flying.
2. Dead stick landings are always given the highest priority.
3. Takeoffs are always given the lowest priority.

**An Example of Flight Line Procedures**

I'll start up and move my plane to the flight line. I'll then shout out to pilots in the air to verify it is OK for me to take the runway. I do this by shouting "OK to take off!?" Most pilots will shout back that it is OK... some just nod. I will verify everyone heard me and responded. I will also double check the pattern direction at this time and verify no one is on landing approach. If everything is fine, I'll announce "Taking the runway!" and taxi my plane from the flight line onto the runway. Once I am airborne and beyond the edge of the runway, I'll announce "Runway Clear!" Simple huh? It is often hard to hear with all the nosie. Now don't be shy, belt out your intentions!

Landing is similar. Announce your intention to land. "OK to Land!?" Assuming it is OK, Pilots should shout back that it is "OK!" Then, you should verify you have the right to the runway by shouting "Landing!" Once down, announce "On the Runway!" Quickly remove your plane from the runway and announce "Runway Clear!" If you overshoot the landing, be sure to tell the other pilots that you need to go around to try again. Also, if your plane stops on the runway, be sure to tell pilots your plane is on the runway and you need to retrieve it.

What to do if there are conflicts... Simple, just be sure to communicate with your fellow pilots. If you are on the runway ready to takeoff and someone shouts “Deadstick” or “Landing”, be sure the other pilot knows you are on the runway.

## Retrieving “Lost” Planes

At some point, we all have to retrieve a downed plane. Maybe because we crashed, or ran out of fuel, or simply missed the runway. Below are some tips and safety concerns.

1. Take a horizon landmark fix on where you last saw your plane. For example, “It landed on a line toward that big tree.” This is key to finding a downed plane.
2. Once in tall grass and corn, it is very hard to tell where you are. Have one person stay in the pits that knows the location of the horizon landmark. They will be your “eyes.” Use 2-way radios or cell phones so the “searchers” in the field can keep in contact with the “landmark eyes” back in the pits.
3. It’s always a lot further out... I don’t know how this illusion works, but believe me, your plane is a lot further out than you initially think.
4. ALWAYS inform pilots when you intend to cross the runway.

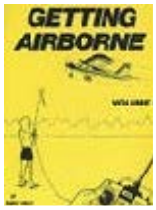
## Just Me, Myself and I

Flying at the LSK field with no one else there can be dangerous. Consider what would happen if you are struck by your plane and become injured. For this reason, flying by yourself is not recommended.

# Building, Setup and Flight Tips

Because a novice RC pilot should not attempt to instruct themselves to solo at LSK, actual flight lessons are not included in this guide. This guide offers supplemental information for your instructor given flight lessons.

## Fundamentals of Flight




**One of many yellow Harry Higley Books**

Understanding how and why planes fly isn't required to become a RC pilot; however, it is strongly suggested. It is much easier to lean how to fly if you have a fundamental understanding of what makes planes fly. You should have a firm grasp of lift, thrust, drag, airfoils, how CG effects flight, angle of attack, stalls, flight controls, etc. I have not included a detailed section on flight theory as there are many good sources for this information on the web and in books. For information specific to RC model flight, look for the Harry Higley's series of books on the subject which can be found at your favorite hobby source or on Amazon.com. For more advanced model flight theory, I suggest reading RC Model Aircraft Design by Andy Lennon.

## Building Tips

**Straight and True Models Fly Better**

1. One of the most important parts of building is ensuring your plane is built straight and true. Planes that are true fly much better than crooked planes. One key to building straight is having a flat work surface.
2. Another very important part of building is keeping everything light. Excess weight kills plane performance.
3. Don't bother modifying your plane unless you really know what you are doing. Stock trainers fly just fine and modifications are not needed or recommended.
4. A scrap piece of ceiling tile or sheet rock is a good building surface than you can secure parts to with pins. Use wax paper or plastic wrap to prevent gluing parts to the building surface.
5. Double check everything before gluing. Double check everything before gluing.
6. 100% Silicon caulk works well for securing fuel tanks and fuel lines. You may need to lightly roughen the tank with coarse sand paper for a better bond.

7. Be sure your plane balances where the plans indicate. You will hear that it is very bad to be extremely tail heavy... this is true. But the same can be said for being extremely nose heavy.

## Radio Installation Tips

1. Servos have a rubber isolation pad and brass eyelet used for mounting. Always use the isolator pads and eyelet. The eyelet is inserted such that the flange side is toward the mounting surface.
2. Servo mounting screws tend to strip easily at the head. For a much better screw, look for socket head servo mounting screws. They are locally available at Waverly RC.
3. Velcro straps that can be found at hardware stores in the electrical department are perfect for holding receivers and batteries in place. Be sure to still wrap your receiver and battery in foam. Small pieces of these velcro straps are also perfect for bundling wires for a tidy installation.
4. Use thread lock on any metal to metal connections. Do not use thread lock on metal to plastic connections. I suggest regular strength (blue.)

**Thread Locker**

## Engine Mounting Tips

1. Always use thread lock on metal to metal screw connections. I suggest regular strength (blue.)
2. You can insert T-nuts (blind nuts) into most plastic motor mounts by heating them with a soldering iron and pressing them in place. To do this, first drill the engine hole pattern on the mount. Then press the t-nuts into the holes on the bottom of the mount rails.
3. Engine soft mounts more than double life span of your plane and radio.

## Covering Tips

1. The gas produced by covering adhesive is directly related to the heat used. If you are fighting bubbles, lower your iron heat.
2. Plastic coverings will stretch when pulled as heat is applied.
3. Covering takes time to learn how to apply well. Consider getting a book that covers covering techniques, such as the Harry Higley's series.

## Plane Colors

1. Select colors that are easy to see in various sky conditions. Try to select colors of different shades or intensities as many colors blend at long distances. For example, light blue and light green will blend to a light grey at a distance, while dark red and light yellow will be easy to distinguish at a distance. I personally think that bright yellow is the easiest color to see in both sun and clouds. Watch other planes to see which colors you can see best.
2. There is no need to mark the left and right wing differently for orientation. It won't help you keep orientation.
3. However, you should mark the top and bottom of the wing differently for orientation reasons. Use bold patterns as small or fine patterns cannot be seen at a distance.

## Engine Tips

1. Read your instructions for starting and tuning your engine. The answer to your question is probably in there.
2. Remember, engines only need three items to run 1) fuel, 2) compression and 3) glow. For a stubborn engine, verify fuel is making it to the carburetor, that there are no air leaks, and that your glow plug and booster are working properly.

## Propeller Tips

1. Proper propeller selection can make a world of difference in plane performance. There is often a wide range of props that will work with your engine. Try experimenting with different props to see which ones you like best.
2. Typically, high pitch props produce more speed, while higher diameter props produce more thrust.
3. Do not over prop (to high pitch and/or diameter) your engine. This is very hard on engines. The same can be said for under propping.
4. Always balance your props.
5. There are various prop styles. APC props are typically the most efficient and I consider them to be some of the better props available. However, to start, I'd suggest using a less expensive composite prop, such as a Mater Airscrew. Always keep a spare prop in your flight box.

## Novice Flying Tips

1. Don't be embarrassed... we all started at the same place.
2. Relax... you'll be fine.
3. Most pilots tend to over control the plane. It doesn't take much stick movement to get a response from the plane. Use light and smooth stick movements. Don't jab the sticks.
4. Don't fly too high or too far out. While there is safety in altitude, if you get too high or too far away it is hard to see your plane. If you have a hard time seeing your plane, immediately tell your instructor.

**"Buddy Boxed" radios**

5. Don't fly directly overhead. It is easy to loose orientation not to mention your neck will cramp if you are directly overhead.
6. Never take your eyes off the plane. Typically this happens when the student talks to their instructor. I know it is common courtesy to look at someone when you talk to them, but don't do it in this case... watch your plane.
7. When first learning to fly, use elevator for speed control and throttle for altitude control. This may seem backwards at first, but you really need to think this way, especially during landings.
8. Planes don't turn like cars. Planes turn by changing some of the wings lift to a horizontal force. Turns are performed by 1) establishing a bank with aileron and 2) use elevator to increase the wings lift to perform the turn. You can't just hold the turning inputs. You must fly the plane. If you start banking too much, relax the aileron input. Not turning fast enough, add more elevator, etc. Concentrate on performing both left and right turns while maintaining a constant altitude and airspeed.
9. Orientation - many new pilots become confused when the plane is heading toward them. You can try to imagine you are inside the plane... this works for some. Or, when the plane is coming toward you, if you place the aileron stick under the low wing, this is the proper direction to roll to level. Think of it as propping the low wing up with the aileron stick. After awhile, you will automatically make the proper corrections without needing to think about it.

# Solo Check List

Your goal is to fly solo, that is, fly without the aid of an instructor. Every instructor will have their own unique teaching techniques, but you should at a bare minimum know and master the items on the following lists before you fly solo.

**Knowledge Requirements**

1. Understand the AMA and LSK rules.
2. Understand how to perform pre-flight checks.
3. Understand the flight pattern and flight line procedures

**Flight Skill Requirements**

1. Be able to safely start and properly adjust your engine
2. Smooth and straight takeoff in either direction
3. Be able to fly a figure eight pattern without losing altitude or large changes in speed
4. Be able to induce and recover from stalls and spins
5. Be able to approach and land from either direction

The first time you manage a flight on your own is a good reason to celebrate! Congratulate yourself... you deserve it! However, consider not leaving the nest right away. Many pilots get into trouble quickly after their instructor leaves. Wait until you have a firm grasp on solo flight before thanking and parting company with your instructor. Once you start flying on your own, consider asking a fellow pilot to "spot" for you when you fly. Having an experienced pilot close to you is nice if you should start to get into trouble. Don't be embarrassed to ask for a spotter. In fact, at most contests and events, spotters are required for EVERY pilot, regardless of pilot skill.

# Special Interests and Second Planes

After you learn flight basics and you master your trainer, you will desire a second plane. Generally, your second plane should stay in the 25-60 size range. You should again seek the advice of experienced pilots. There are many planes of various performance and design to choose from. Much of your decision on a second plane will depend upon what sparks your interest. There is no rule that says you need a special interest, but most pilots eventually tend to concentrate on one or more special areas of RC. Below are some of the more common special interests. This list is not all-inclusive. For a full listing of special interests, visit the AMA web site at www.modelaircraft.org. LSK has members that participate in nearly every special interest area of model aviation. Ask around to find out who does what and to get more information.

**Sport Flying:** Most pilots fall into this category. They fly for the sheer thrill of flight. Hey, who can blame them... flying is FUN! While sport pilots don't compete, they typically enjoy basic aerobatics. Sport planes come in all shapes and sizes. Some are simple aerobatic planes while others may be modeled after full scale planes. Most sport planes are in the 25-120 size range and have moderate performance.

**Aerobatics:** Competition aerobatics is the pursuit of performing aerobatics precisely. Aerobatics offers an endless challenge for pilots. LSK offers an aerobatic contest (pattern contest) every summer. There are various levels in a contest such that pilots compete against other pilots of similar skill. There are high performance planes designed specifically for aerobatic competition, but you can use any sport plane to fly aerobatics.

**Combat:** Combat involves lightning reflexes and glow fuel in your veins. At a combat meet, pilots attempt to "shoot down" other planes by cutting an enemy's paper streamer with their propeller. For safety reasons, the are special combat planes that must be used. LSK holds a combat contest every summer.

**3D/Fun Fly:** 3D is an offshoot of precision aerobatics and what some call fun-fly. Often aerobatic pilots are 3D pilots and vice versa. 3D describes special aerobatics that occur at stalled or very slow flight speeds. Special planes are typically required for 3D.

**Racing:** Pretty much self explanatory as speed is the key. For safety reasons, there are special racing planes. The closest racing events I am aware of are about 20 minutes north of the LSK field in Mead, NE.

**Helicopters:** I mention this because several LSK members also fly helis. While not really a special interest offshoot of model planes, helis do offer unique fun.

**Scale:** Scale planes are designed to look like their larger counterparts. Scale planes vary in detail, with the better models being nearly indistinguishable for the real thing. While most scale pilots are master builders, you can purchase pre built scale ARF planes! Part of the challenge and fun of scale planes is flying them in a realistic manner. LSK offers a scale contest every summer.

**Jets:** Ok, this won't be your second plane, but there are real turbine powered model aircraft. These planes look, sound and smell like real jets because they are real jets! Occasionally, a turbine will show up at the LSK field, but if you really want to see these planes burn holes in the sky, visit the Tecumseh Jet Rally held in late summer.

**Giant Scale:** Any plane at or more than 1/4 scale or 80" wing span is considered giant scale. Bigger planes tend to fly better and there is something magical about commanding a large plane. If you have a desire for large planes, make gradual steps to the size you would like to fly.

**Gliders:** Sailplanes, gliders and the like offer very quiet and clean enjoyment. If you are interested in gliders, inquire about the Lincoln Area Soaring Society (LASS), the local glider club. Many LSK members are also LASS members.

## Travel and Events

Once you solo, the whole world of RC is available to you! Many RC pilots enjoy attending events and traveling to other fields. Events can range form competitions to fun-fly social events. LSK offers many events throughout the year. There are also many events at neighbor clubs within an hours drive. Some pilots travel because they enjoy attending competitions, while others travel to events for a unique a fun filled day flying. Traveling to events is fun... you'll make new friends, experience a new flying site, and typically there is plenty of good food at events. Of course, spectators are always welcome at any event. You can find out more about LSK and local events by: checking the back of every AMA Model Aviation issue, looking at the LSK Clanking Armor newsletter, visiting the LSK web site (www.lincolnskyknights.org), and checking the LSK clubhouse bulletin boards.

# Jargon, Acronyms and Abbreviations

Learn the language of flying models...

**3D** - A type of aerobatic flight that is performed while the airplane is at high angles of attach (also called high alpha), stalled or at zero airspeed.

**Aerobatics** - combination of the words Aerial and Acrobatics

**Aileron** - Control surface located on the trailing edge wing. Used to control roll.

**Air beater** - a helicopter

**Aircraft ply** - a very strong plywood rated for aircraft use, typically 3 to7 layers.

**Airfoil** - Cross section of a lifting shape, i.e. wing

**Airfoil - flat bottom** - A airfoil that the bottom side is noticeably flat. These airfoils typically generate high lift but also have high pitching moments that cause the plane to balloon as airspeed is increased.

**Airfoil - symmetrical** - A airfoil where the top and bottom sides are identical in shape. This type of airfoil is used for high performance aerobatic planes and has little to no pitching moment.

**Airfoil - semi-symmetrical** - A cross between a flat bottom airfoil and a fully symmetrical airfoil. Typically used on aerobatic trainers.

**Aliphatic Resin** - wood glue, such as Titebond II or Elmer's ProBond Wood glue

**Anhedral** - Wing (or stab) configuration where the tips are lower than the center of the wing. Anhedral reduces roll stability. This is the opposite of Dihedral.

**AOA** - Angle of attack, the angle at which an airfoil travels thru the air, see also incidence. Increased AOA's generate more lift, until the airfoil stalls. Past the stall, increasing AOA reduces lift.

**ARF** - Almost ready to fly, a plane that requires little assembly

**Ball link** - Same as Clevis, but uses a ball and socket instead of a pin. A ball link is commonly used to connect push rods to control horns.

**Balsa wood** - wood that comes from the Balsa tree, very strong and light

**Biplane** - A plane with two primary wings

**Boost tab** - Part of a control surface that is forward of the hinge line. Boost tabs reduce loads on the servo by applying a force in the same direction as control surface movement.

**Burn holes in the sky** - flying with the sole purpose of just flying around and having fun.

**CA** - Superglue (cyanoacrylate). Very fast and strong adhesive. CA comes in various types for different uses, such as thin, medium, thick, foam safe, etc.

**Canard** - A stabilizer that is placed in front of the primary wing

**Carbon Fiber** - fibers made from specially prepared carbon, used in composites. Can be found in various forms, tows, weaves, mats, etc.

**Castor** - A oil made from castor seeds used to lubricate some model engines.

**Center of Gravity** - Balance point of plane, see also Center of Mass. The balance point of planes is a critical measurement. See also Nose Heavy and Tail Heavy.

**Center of Mass** - A point in all three axis which describes the center of mass of a plane

**CG** - Center of Gravity

**Ch.** - Channel

**Chord** - Length wise direction of a airfoil (fore/aft.) Often measurements are listed with reference to the chord,. For example, your CG may be at 25% chord

**Clevis** - Pinned device used to connect control rods to servo arms or control horns.

**Cloth & Dope** - covering that uses a cloth and a nitrate dope to seal the weave.

**Control Horn** - A device mounted to a control surface to which a force is applied (typically a control rod) that moves the control surface.

**Composite** - A composite item is made from two or more materials that when combined make a final material that takes on a whole new set of properties. Such as a carbon fiber plate that is made from carbon fibers and epoxy.

**Coupling** - Where one control surface effects a movement typically controlled by another surface. For example, ailerons are used for roll, but may cause a small amount of yaw.

**Crystal** - A crystal oscillator that sets the transmitter and receiver tuned frequency. Often, these are user changeable. It is illegal for users to change crystals in transmitters. You may change crystals in a receiver. Also written as XTAL.

**CyA** - See CA

**Datum** - an imaginary and often arbitrary straight line along the length of a fuselage used for reference.

**Dead Stick** - Engine flame-out

**Dihedral** - A wing where the tips are higher than the center. Dihedral is responsible for roll stability. The opposite is anhedral.

**Down Thrust** - Engine/prop is angled down. This is typically done to offset "ballooning" on certain plane designs.

**Drag** - A friction force that offsets thrust

**Dumb Thumbs** - a pilot error

**Elevator** - Control surface attached to the stab, used to control pitch.

**Epoxy** - A two part adhesive (resin and hardner) Very strong, can be found in different working times, 5min and 30min are used a lot in models

**Fiberglass** - fibers made from glass, typically woven into a cloth and used for composites.

**Fin** - Vertical non-moveable part of the tail. Rudder attaches to the fin. The fin is responsible for spin and yaw stability.

**(On) Final** - final approach to runway.

**Flaps** - Movable high lift/drag devices at the trailing edge root of the wing. Flaps are located toward the root of the wing. Ailerons are toward the tips.

**Flight line (#1)** - a staging area between the pits and the runway

**Flight line (#2)** - A Do Not Pass Behind line. Typically this is a line that runs parallel to the runway that extends out infinitely.

**Flair** - A nose high attitude used to bleed speed just before landing

**Flight Box** - A utility and tool box that houses a RC pilots starting, test and maintenance gear

**Flying Wires** - A system of open air wire supports, typically found in biplanes or turn of the century scale models.

**Four-stroking** - with respect to 2-stroke engines, a condition where a rich mixture setting causes every other stroke to not fire, hence the engine is 4-stroking.

**Fuse** - Fuselage

**Fuselage** - Structural part of the plane that typically houses equipment.

**Glow Booster (or just booster)** - Battery device used to preheat a glow plug. Once the engine starts, heat from combustion will keep the plug glowing without the need for the battery booster.

**Gravity Gust (Gravity Surge)** - Joke for a plane stalling and dropping like a rock, i.e. I must have flown thru a gravity surge.

**Hanger Queen** - A plane that is rarely flown, typically do to the excellent condition of the model and the pilot does not wish to risk the plane in the air.

**Hanger Rash** - Damaged caused to a plane while on the ground or during storage and transport.

**High Wing** - Wing is attached to the top of the fuse above the CG

**Hit** - Radio Interference

**Incidence** - The angle of attack of a surface with respect to the planes datum. For example, plans may indicate that the incidence of a wing needs to be positive 1 degree with respect to the datum.

**Inside Maneuver** - Any maneuver where a pilot would experience positive G's. Opposite is Outside Maneuver. See also Positive Maneuver.

**Kevlar** - Dupont brand name for a very tough light weight fabric. Generic name is Armid. Kevlar is often used in composites to make them tear resistant.

**Laminar Flow** - A smooth airflow that is very low drag.

**Lean** - An engine setting where the air/fuel mixture has too little fuel. A lean engine can overheat, shutdown, or backfire.

**Lift** - Airfoils generate lift when moved thru the air. Lift is what counters gravity in planes.

**Light Ply** - a hybrid plywood that is very light and reasonably strong.

**Low wing** - Wing is attached to the bottom of the fuse.

**MAC** - See Mean Aerodynamic Chord

**Mean Aerodynamic Chord** - The average, or mean chord of a wing. This has more meaning when talking about tapered or swept wing.

**Midair** - a collision that occurs in flight

**Mid wing** - Wing is attached mid-fuse

**Mix** - The automatic combination of controls. Can be done mechanically or electronically. For example, aileron stick movement may be mixed with rudder such that the rudder also moves when you move the ailerons.

**Monoplane** - a plane with one primary wing

**Negative Maneuver** - Any maneuver where a pilot would experience negative G's. Opposite is Positive Maneuver. See also Outside Maneuver.

**Nose Heavy** - A condition where a plane's balance point is too far forward. Nose heavy planes are difficult to fly because the stab/elevator must work very hard to keep the plane level.

**Outside Maneuver** - Any maneuver where a pilot would experience negative G's. Opposite is Inside Maneuver. See also Negative Maneuver.

**P-factor** - describes an effect that causes yaw issues on takeoff. This typically only effects VERY large models.

**Pilot** - Look in mirror

**Pilot Station** - designated area for pilots to stand when flying

**Pits** - Where one assembles, fuels and works on their plane.

**Polyhedral** - A wing with multiple dihedral steps

**PolyUrethane Glue** - Very strong slow set expanding glue. Also just called poly.

**Positive Maneuver** - Any maneuver where a pilot would experience positive G's. Opposite is Negative Maneuver. See also Inside Maneuver.

**Prop** - Propeller

**Prop Nut (#1)** - Nut used to hold prop onto the crank shaft of the engine

**Prop Nut (#2)** - fool

**Propeller** - Rotating airfoil used to generate thrust

**Propeller diameter** - the diameter of the prop (tip to tip), i.e. a 12"x6" prop has a 12" diameter (diameter is always listed first)

**Propeller pitch** - the AOA of the prop blade, i.e. a 12"x6" has a 6" pitch (pitch is always listed last). In theory, a 6" pitch prop should move forward 6" for every revolution.

**Pull-Pull** - A control system that uses cables to pull a control surface both ways.

**Pusher** - A plane where the prop faces rearward

**Push-Pull** - A control system that uses a rigid rod to move control surfaces

**Rekitted** - crash, i.e. plane was turned back into a kit

**Rib** - Component of a wing that forms the airfoil shape.

**Rich** - An engine setting where the air/fuel mixture has too much fuel. Rich engines produce low power and can flood/flame out.

**Right Thrust** - Engine/prop is angled to the right. This is typically done to counteract torque effects.

**ROG** - Rise off ground

**Root** - Part of the wing closest to the fuselage

**RTF** - Ready to fly

**RX** - Receiver

**Rudder** - control surface attached to the fin, used for yaw control.

**Servo** - A closed loop control device that moves to a commanded position. You command servos to move from your radio.

**Shot Down** - Crash due to someone turning on a transmitter on your frequency while you are flying.

**Short kit** - partial kit, you will need to supply a lot of the parts

**Slats** - High lift devices that are installed at the leading edge of the wing. Can be fixed or retractable.

**Solo** - flying by one's self... , i.e. a newbies first flight without help from an instructor is a solo flight.

**Spar** - Key structural component of a wing that runs span-wise.

**Spinner** - Cosmetic cone placed on the front of the engine.

**Stab** - Stabilizer

**Stabilizer** - horizontal non-movable part of the tail. Elevators attach to the stabilizer. The stab is responsible for providing pitch stability.

**Staging Area** - An area close to the runway where running models wait for runway clearance

**Stall (engine)** - Engine flame-out

**Stall (flight)** - Wing at too high AOA for a given airspeed. Technically, a stall requires flow separation. What this means to the pilot is that lift is greatly reduced and drag is greatly increased when wing are stalled.

**Stratosphere** - Joke for where some pilots like to fly, i.e. really high

**Starting area** - where one starts there plane. Some fields have specific starting areas, others allow staring at the flight line or pits.

**Synth** - See Synthesizer

**Synthesizer** - A module that replaces crystals such that a TX/RX can have a user selectable frequency. This feature is only found on higher end radios.

**T-Tail** - A tail that has a very high stabilizer, making the tail look like the letter "T"

**Tail dragger** - landing gear consisting of mains and a tail wheel.

**Tail Heavy** - A condition where the plane's balance point is too far aft, tail heavy planes are difficult to impossible to fly because they are unstable in pitch.

**Three-point-landing** - A landing in a tail dragger where all three wheel touch at the same time.

**Throw** - The amount of control surface movement, typically measured in degrees.

**Thrust** - A forward force that propels the plane, it is offset by drag

**Tip** - Part of the wing furthers from the fuselage.

**Tractor** - A plane where the prop faces forward, i.e. the plane is tractored.

**Trike** - landing gear consisting of mains and a nose wheel.

**Trim** - To trim a plane is to adjust it for hands off level flight

**TX** - Transmitter

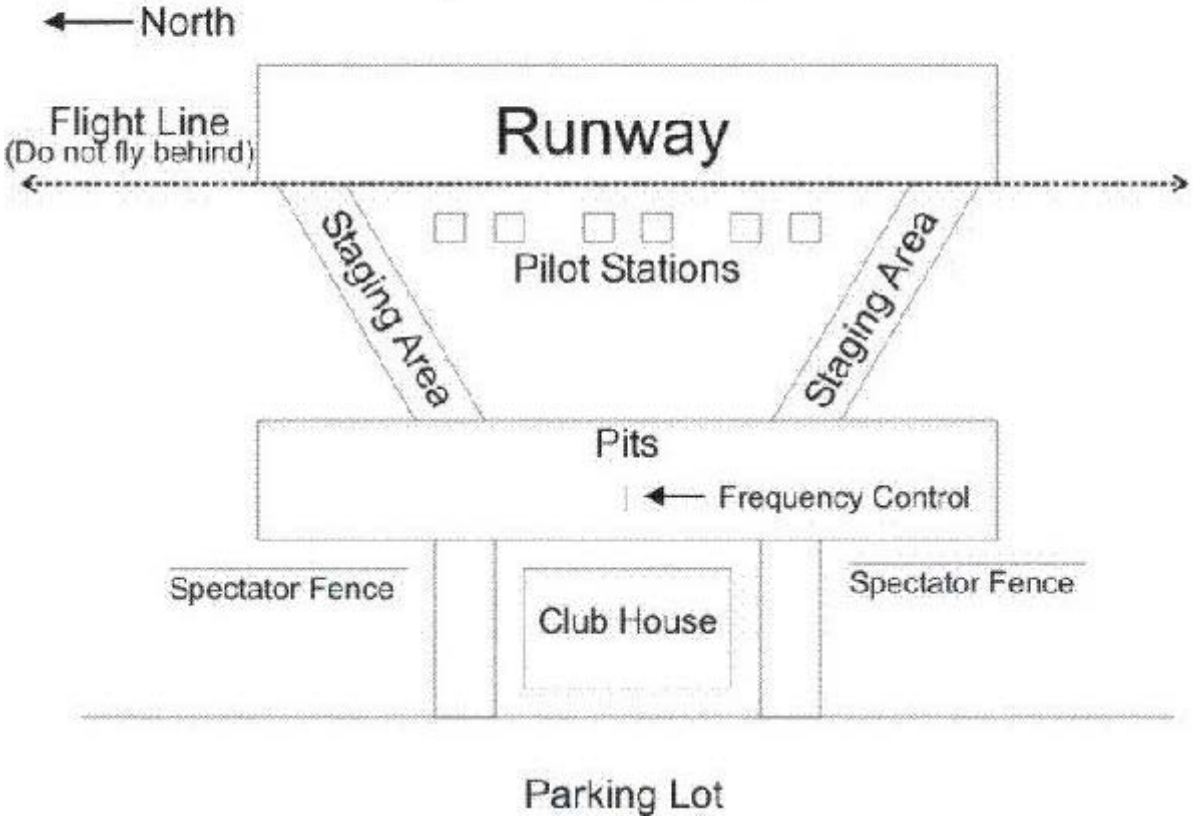
**V-Tail** - A non-conventional tail in the shape of a "V"

**Wing** - Primary lifting device

**Xtal** - See Crystal

# General LSK Field Layout

(Not to Scale)

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