

# THRUST LINE

SKY STREAKERS R/C CLUB NEWSLETTER NEW GLOUCESTER, MAINE  
OCTOBER 2002 EDITION

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The deadline for  
submissions is the first day  
of each month.

**FROM THE PRESIDENT**

Here we are again at the close of another training season. That's the official training night anyway. I hope that everyone knows that you are welcome to ask me anytime if you need help. Hey, I am a big boy, if for any reason I won't want to at any particular time, I can say no. It's only a little word that doesn't take very long to say at all. I know that most of the other instructor types are willing to help out most of the time too, just ask. Usually you won't be turned down so it's worth a try.

Congratulations to all of you who have received your wings this season and to those of you who are close, Keep Flying! You will get there soon even if it doesn't seem like it now. I think the learning curve is exponential. You get real good real quick after a long hard time training. Thanks to all of the instructors who donated their time for us to learn to fly. Where would we be without you? Crashed, that's where.

While everyone is gearing up for the building season, I am getting excited about the fall, winter and spring flying season. The winds are turning around to the north and making it possible for some good locations for slope combat to come into play. The guys have already been hitting the Eastern Prom in Portland and the pits in Topsham off and on the last few weeks. I cordially invite all of you (not all at once) to come fly with me on the slope. I have 4 or 5 different planes that are almost indestructible and would be thrilled to let you try your luck at knocking some one out of the sky. It is really hard to explain, you just have to try it to believe it.

Don't forget that the October meeting is for Nomination of Officers. So if you want to be in politics, now is your chance. Also, bring along a plane or project to share with the rest of the group. It's fun to get tips and new ways of doing things to go along with the business of the club.

Be extra careful with the gate now that hunting season is in full swing. We don't want someone to get trapped inside with the gate locked.

We are still searching for a place to meet. Make those contacts and phone calls and bring the info along To the next meeting. Bruce Morse has generously offered his business again this month during the transition period of finding a new place.

See you at the next meeting at Maine Air Power October 10<sup>th</sup> at 7:30 p.m. That's Thursday night.

By Nelson Frost

**DURING HUNTING SEASON -**

Remember to lock the gate when ENTERING the field in order to prevent any hunters from entering the field. You don't want to have to try to find them when it is time for you to leave and you can't lock them in!



### September Meeting Minutes

*submitted by Rosalie Marin, Secretary*

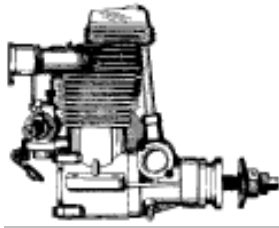
The September 2002 regular monthly meeting was held on Thursday September 12<sup>th</sup> at Maine Air Power in Auburn. Due to circumstances beyond my control, I was unable to attend the meeting.

The AMA has recently mailed out membership renewals for 2003. Don't forget that your membership in the Sky Streakers R/C Club also expires on December 31, 2002 with the complete loss of member privileges on March 31, 2002. Renewal of your membership AFTER 03/31/2003 will require the payment of the \$10.00 initiation fee also.

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**The October Meeting  
will be held on Thursday,  
October 10, 2002  
starting at 7:30 p.m.  
at Maine Air Power  
3100 Hotel Road  
Auburn.**

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### BEGINNING MODEL ENGINE OPERATIONS

*by John Hunton*

We are in the age of the ARF. These Almost Ready to Fly Models are attractive and seem to promise a lot. They bring a new generation of modelers to the flying field who may not be experienced in model engine operation. ARF's will not begin to deliver on their promises if the engine will not start. It is hoped that these notes will assist the beginner to get going successfully and enjoy model aviation to the fullest.

Most trainer type ARFs are powered by model engines of the two-stroke cycle type. Two-stroke cycle basically means that the engine fires every time the piston goes up and compresses the air/fuel mixture (four-stroke cycle engines fire every other time). The big difference in the two types of engine is in how the fuel/air mixture is transferred to the cylinder. While the

four-stroke engine uses the upper part of the piston to pump fuel/air in and exhaust out, the two-stroke uses the bottom of the piston as the induction pump.

When the two-stroke goes up it creates a vacuum in the lower part of the engine (crankcase), a port opens and fuel/air is inducted through the carburetor. After the piston reaches the top of its stroke the intake opening is closed. As the piston moves downward from the force of combustion it moves past an exhaust port which lets most of the products of combustion escape. The piston moves further downward and opens intake ports, which allow the compressed air/fuel mixture in the crankcase to transfer into the upper cylinder. The amount of power generated by the typical combustion action is controlled by the throttle (amount of air/fuel mixture) and the needle valve (ratio of air to fuel). For any given throttle setting, there is an ideal air/fuel mixture, which modern carburetors are capable of providing over a wide range of throttle settings.

While it would seem prudent to set the needle valve to the maximum rpm for every throttle setting, it is important to realize that lubrication for all moving parts is mixed with the fuel.

Therefore as the mixture is changed from rich (needle more open) to lean (needle more closed) there is less lubrication available for the engine. With a lean needle setting and less lubrication the engine will run hotter. With a rich setting the engine will run cooler. As we will see, neither rich nor lean is ideal: too lean leading to short engine life and seizing up at full power and too cool leading to unreliable idle.

Modern engines are generally not run-in at the factory. Parts are not seated yet and fits are tight. A new engine is not reliable at all, so it is prudent to run at least one tank of fuel through it before trying to fly. The way an engine is broken-in determines to a large part how long it will last. Make the first run on a new engine on the rich side to provide good lubrication and to keep the engine relatively cool.

If you are trying to start a new engine this is what will usually happen. The cylinder is cold, therefore the engine needs a richer mixture to begin the combustion process and start to heat up. You can choke the engine to provide that fuel rich mixture by placing your finger over the intake and turning the propeller (this gets fuel up in the fuel line ready to begin feeding) or you can prime it with raw fuel. In either case when you try to start the engine this super-rich mixture will usually cool the glow plug when it is transferred into the upper cylinder. This is why you cannot expect the engine to start if you are flipping or applying the starter continuously. It is best to choke or prime with sufficient fuel to start combustion, then wait a while for the glow plug to heat up again before flipping.

Use the starter in short bursts, leaving a little time between bursts.

Modern engines use muffler pressure to the fuel tank. While there was much resistance in the modeling community to using mufflers when they were introduced many years ago, the use of muffler pressure has greatly improved engine operation reliability. But if you have started your engine and it quits for some reason, residual muffler pressure will continue to cause

fuel to flow into your engine, perhaps even enough to cause hydraulic lock, which can severely damage your engine.

LadyHawks LLC  
Ann Wilson, editor  
via AMA National Newsletter

If you get to a hydraulic lock condition and you try to flip the engine, the propeller will stop dead as the piston moves forward (air is compressible, liquids are not). If you are flipping, and you experience hydraulic lock, your finger will move up the back edge of the propeller blade and it may be cut severely. It is a good idea to wear a glove while flipping an engine. With hydraulic lock it is best to remove the glow plug and flip over the engine by hand or starter to clear the raw fuel.

While you have the glow plug out, attach it to your glow driver to observe the color of the element. A bright orange color is normal. A dull red color indicates that the driver may need charging or the plug needs replacing.

Notice where the fuel level is in your tank is in relation to the middle of the carburetor. If the fuel level is above the carburetor this may cause siphoning into the engine. If it is below the carburetor, it may be difficult for the carburetor to draw it up in time to sustain running. Check this fuel level for first engine operations and add or remove fuel or tilt the model as required for the proper fuel level condition.

During break-in you will probably be adjusting the needle valve more than any other time. Please use a wooden propeller to save your fingers. Factory needle settings are usually very close to optimum so open the needle a few clicks to provide a good rich mixture.

You have started the engine and have run a tank of fuel through it. It is now time to prepare your engine for flight. At full throttle set the needle to optimum, which for now is just the rich side of maximum rpm. If your new engine will hold this setting without seizing it is ready to fly (if not run another tank through it.) There are two conditions that will make this mixture setting invalid. One is that fuel burns off the level in the tank gets lower and this causes the mixture to go leaner.

The other condition is acceleration. With fuel tank behind the engine the force of acceleration during takeoff will tend to make the engine go lean. The usual result of this leaning tendency is engine failure at the worst possible time. Most modelers simulate the takeoff acceleration scenario by tilting the model to the vertical and setting the needle on the rich side of optimum at maximum rpm in that orientation.

A word about the other end, reliable idle. When an engine is idling and the model is coming down, a massive amount of cooling air flows over the engine with little heat being generated. A too rich idle adjustment will cause the engine to run even cooler and it will usually quit. Keep the idle setting fairly lean. Adjust the throttle linkage so full off trim will stop the engine and full on trim will cause a high enough idle setting to be completely reliable and you can adjust trim in the air to a low but reliable position.

It is hoped that these procedures can help you learn successfully in a day what it has taken many of us so many years to develop.

from *LadyHawks Aerie*

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### Did You Know.....

Every day more money is printed for Monopoly® than for the U.S. Treasury.

*Those San Francisco cable cars are the only mobile National Monuments.*

$$111,111,111 \times 111,111,111 = 12,345,678,987,654,321$$

*If the statue in the park of a person on a horse has both front legs in the air, the person died in battle. If the horse has one front leg in the air the person died as a result of wounds received in battle. If the horse has all four legs on the ground, the person died of natural causes.*

Honey is the only food that doesn't spoil.

*There are more collect calls on Fathers Day than on any other day of the year.*

Mel Blanc, the voice of Bugs Bunny, was allergic to carrots.

*Half of all Americans live within 50 miles of their birthplace.*

"I am." Is the shortest sentence in the English language.

*If you were to spell out numbers, you would have to go to one thousand to get to the letter "A".*

40% of all partygoers will snoop in your medicine cabinet.

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### CROSSWIND LANDINGS

by Gary Chudzinski

Throughout the past year, I've heard a number of comments regarding taking off and landing in crosswinds. Many of these pilots ground themselves if the wind is blowing across the runway. This is unfortunate because this difficulty can be overcome with understanding and practice of crosswind operation.

The first ingredient for successful operations is adequate rudder. Your rudder can't be too large, but it can be too small.

Usually kits have an adequate amount, but you should be looking at 40-50% of the total vertical flying surface for excellent response. This should handle crosswinds in the 12-15 mph range. The other, and most important element, is pilot input. In full-scale flight, pilots are taught three distinctive techniques: crab, cross-controls, and a combination of both. These techniques apply to models as well.

**CRAB:** This is the simplest to perform. You turn the aircraft into the wind to maintain a straight-line track coincident to the runway centerline. This is accomplished immediately after rollout approach on final for landing. This track is maintained with small corrections until landing. At touchdown, rudder is used to straighten the ground path and (most important) aileron is applied as if to bank into the wind and held until rollout is complete.

**CROSS CONTROL:** This is definitely more difficult, but more professional and personally rewarding. After rolling out on final approach, apply and hold aileron into the crosswind with sufficient opposite rudder to maintain aircraft heading aligned with the runway heading. Standing on the ground and not in the cockpit makes estimating the amount of control more difficult. So, start out with 1/8 to 1/4 application of each stick (again, aileron into the crosswind, rudder opposite, and you are cross-controlling). Apply enough aileron to maintain track to the runway and continue to hold it, gradually increasing the amount if necessary, until landing is complete. As with crabbing, rudder control is used for steering after all wheels have touched down. For touchdown in a crosswind, do not flare as much. Fly the model onto the ground while retarding the throttle. Remember, do not stop flying the aircraft until it comes to a complete stop.

**COMBINATION:** Uses both techniques with less amounts of each.

There are two more areas of crosswind operations that I would like to comment on. These are taxiing and takeoff. In many ways, the same considerations are given for wind direction and velocity.

**TAXIING:** Those of you who have flown full-scale, light aircraft are instructed to know the direction and intensity of the winds before taxiing. This not only confirms the runway in use, but provides you with information for safe ground taxi. Control input while taxiing in a light aircraft is extremely important for control, and in extreme cases of wind, keeping the wheels on the ground. The same considerations apply to our models, especially the light, high-wing types. The whole idea is to apply control input to keep all wheels firmly planted on the ground. For example, if you are taxiing into the wind with a tail-dragger, apply aft stick to keep positive pressure on the tail wheel. The reverse applies to a tricycle gear. In a tail wind, use forward stick for the conventional and aft stick for trike. For crosswinds, apply aileron into the wind. From an aerodynamic standpoint, you are shaping the control surfaces to give you a lift advantage, however slight it may be.

**TAKEOFF:** Like it or not, cross controlling is the only way to make a safe, straight, good-looking takeoff. You have done it many times but may not have thought of it in those terms. A

good technique is to taxi (using the techniques above) and lineup on the runway centerline. Before increasing the throttle, think about using the ailerons to keep the wings level and the rudder to track straight through the takeoff. Initially, apply about 1/4 aileron stick into the crosswind. As you increase throttle, the aircraft picks up speed which means the controls are generating more and more lift. With the increase in lift, less and less aileron is needed. Meanwhile, continue to track straight with rudder. As the aircraft cleanly breaks ground, keep the wings level, and use enough elevator for a consistent rate of climb. Slowly take out all rudder and continue your flight.

Although somewhat confusing and thought provoking at first, talk yourself through these techniques, then give it a fair chance with practice. Remember, the two most important maneuvers of flight are takeoff and landing. Good luck!

from the *Thorn Creek Flyer*  
Thorn Creek Radio Control Club  
Jim Michalak, editor  
Lansing IL  
via *AMA National Newsletter*

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## INVENTIONS THAT DIDN'T SUCCEED

The waterproof towel.

Glow in the dark sunglasses.

Solar powered flashlights.

Submarine screen doors.

A book on how to read.

Inflatable dart boards.

A dictionary index.

Powdered water.

Waterproof tea bags.

The helicopter ejector seat.

via *Internet*

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## FOR WHAT'S ITS WORTH

I have found that the baby wipes or hand wipes, which come in the rectangular, resealable plastic box, are good for cleaning your hands of all the oil you get on them after a day at the field. They are inexpensive and stay wet for months. You can also wipe the oil off of your airplane if you forget your soap and towels. Try to get the kind that are fragrance free, or your significant other will be wondering where you have been spending your afternoons.

# RADIO FACTS

by James Goss

Do you have any use for fuel tubing other than getting fuel into your fuel tank and sometimes into the bottom of your airplane) and from the tank into the engine? If not, try some of these ideas. Slice off a thin piece and slip it over your metal wing bolts to keep those washers from falling off when you remove the bolts. This will also give the bolts some cushion, putting a nice pressure on the wing without crushing the balsa. And the bolts will not back out due to vibration. Many people use different colors coming from the fuel tank to the engine. Use the clear tubing to the carburetor so that the fellow who is helping you get your engine started can see if it is getting any fuel. Any other color to the muffler is okay, but pink is nice because that would indicate that it goes to the hot part of your engine, the muffler.

Most people use a small piece to cover clevises where they go into the control arm, this will help keep the clevis from coming detached from said control arm. Stick your receiver antenna through this piece of fuel line and it will act as a strain relief and give you a little slack so the antenna won't pull out of the receiver. If you use about an inch and a half of tubing where the antenna exits the fuselage, it will make it a lot easier to get the antenna in and out when you want to move your receiver from one plane to another. Make the exit hole just large enough for the fuel line to have a tight fit. This also keeps the antenna wire from getting any sharp bends, which could cause the wire to break.

If your needle valve is leaking air, you guessed it, make an O-ring from the tubing and place it on the needle valve before reinserting it back in the carburetor. Do you have a long needle valve extension sticking through your cowling? Make the hole for the extension large enough to squeeze in some tubing and put the extension through it. This will keep the long extension from vibrating loose, breaking, or damaging the cowling. It helps if you glue it to the wire.

If you fly on black top and have trouble slowing down before the end of the runway, put a piece of fuel tubing in between the wheel and the wheel collet. Tighten the collet so that there is a little pressure on the wheel from the tubing. This will slow you up on landing but will not cause trouble when taking off, unless, of course, you have a very underpowered airplane.

When attaching a cowl to the airplane, drill the screw holes large enough for a small length of tubing, stick some in the holes, and put screws through the tubing. When you tighten the screws, the tubing will expand in the hole causing the cowl to be isolated from the airplane vibration, thus protecting the cowl. I am sure there are many other uses for fuel line tubing, other than running fuel through it, but that's all I can think of for now.

from *West Jersey Wind*  
West Jersey Radio Control Club  
Tom Voorhis, editor  
Haddonfield NJ  
via *AMA National Newsletter*

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Many of us in the RC hobby have seen how the radio equipment has changed over the years. Some may even remember the vacuum tube systems used in the fifties. Since the solid state RC radio equipment came out using analog modulation, not much has changed until the mid 80's. Up until then we had standard AM, amplitude modulation, and FM, frequency modulation, as a means of modulating the RF cw signal. It is said that FM receivers will pick up less noise than AM receivers. RF noise can come from anything that produces an electromagnetic or electrostatic field, such as lightning, high voltage power lines, or the metal-to-metal contact of two metals rubbing together on your airplane. Noise of this type has amplitude, which is another way of saying it has a voltage value, and will react with an AM receiver more than with an FM receiver. As an example, if you were flying your airplane with an AM receiver, and there was lightning nearby, you may get a glitch, which means your airplane does some aerobatics on its own. For the purpose of this article a glitch will be defined as a sudden loss of your normal signal. Another example of noise can be heard on your regular AM radio in your car or home. During a lightning storm you will hear all kinds of popping on AM, but minimum noise on the FM radio.

AM RC systems are still on the market and a lot of them are still being used for one reason, they cost less. I still have several in use and have never had any problems with noise, or did I? Perhaps that great knife edge snap roll was only a glitch.

Modulation of the transmitted signal can be broken down into two main types, analog and digital. With analog pulse modulation, some characteristic of the pulse such as height or width will be changed in proportion to the original signal. AM uses height change and FM uses width change, also known as pulse width modulation.

In digital pulse modulation, a binary code is generated. The way it works is as follows: An analog voltage signal is generated when you move the transmitter sticks. The sticks are connected to pots, short for potentiometers, which are variable resistors. When the control sticks are moved, the center tap on the pots will have a new dc voltage. This voltage is sampled and its binary equivalent is generated. The rf carrier is then changed according to this voltage signal. All modulation systems will sample the information voltage to be transmitted, but they all have different ways of indicating the sampled amplitude.

The two new forms of modulation in use today for radio control systems are the Pulse-Coded Modulation, PCM, and Pulse-Position Modulation, PPM. This gives us our four systems, AM, FM, PPM, and PCM. This could be confusing to a new comer to our hobby. In pulse position modulation the original signal is first pulse width modulated, then differentiated and clipped. All this means is that you end up with a very narrow pulse width or spike that is either negative or positive going into polarity. These pulses vary their position on a reference line and is in reference to the zero signal pulse position. The

pulse will either lead or lag the reference pulse. The amount of lead or lag is in proportion to the original signal above or below the reference line. Thus the name pulse position modulation. This is still analog modulation because some form of the pulse is changed.

Pulse coded modulation is a form of digital pulse modulation and is the major type of digital modulation in use today. PCM converts the amplitude of the original signal into its binary equivalent. Binary is a simple base two number system in which a one represents a high and a zero represents a low. Either on or off is the whole format for digital electronics. This binary equivalent represents the approximate amplitude of the original signal generated by the control sticks. When you move the control sticks through their complete range you will generate many different unique binary codes, one for each input sampling point of the original signal.

Time sharing of the carrier signal is used to place all your radio's channels in operation. Be it a three, four, six or eight channel radio. The carrier signal is the signal that is generated by the transmitters master oscillator. If you have channel 22 for example, the oscillator will be running at 72,230 mhz. This is determined by the crystal you plug into your transmitter. It would have 72.3 mhz marked on the crystal. By the way, crystals have no polarity, you can plug them in either way. Even if you are not moving a control stick the carrier is still being transmitted. The 50 channels we have to select from is spaced 20,000 hz, or 20khz, from each other. They start at channel 11, which is 72.01 khz, and end at channel 60, which is 72.99 khz. That's not much distance and all your three, four, six or eight channels you have on your radio must be within that bandwidth. We are lucky because Canada only has 10 khz between their channels.

You can't interchange the receiver and transmitter crystals. This is because the receiver oscillator must run at the IF, Intermediate Frequency, above the incoming signal frequency. For example, on ch 22 the transmitter frequency is 72.23 mhz so the receiver will be running at the IF above this frequency or at 83.03 mhz. When these two frequencies beat together, their difference, which is 10.7 mhz is passed on to the IF amps. If your receiver uses double conversion, the 10.7 mhz will be further reduced to 455 khz. This signal will now be demodulated, which takes the coded signal off the carrier and it is then sent to the servo where it is compared to a reference signal generated in the servo. All good RC systems today will be double converted which helps reject unwanted signals from getting to the receiver. They do cost a little more for the extra circuits.

Another question asked by new comers to the RC hobby is how much power does the radio produce and how far away will it work. Most radios today have a maximum rating assigned to them of one watt of radiated power. Due to efficiency most will produce around .75 watts. This is plenty of power for out airplanes because you must keep them near the field to see which side is up anyway. With most systems you can collapse your transmitter antenna and still have control of your plane. Try this experiment: Get about 300 ft. high and have someone to start lowering your antenna until your plane starts to act up, at which time raise the antenna and regain control. This will

give you some idea about distance. Antenna theory could be a complete topic by itself. I hope this information will be of some use to the new members of our club.

Annistown RC Flyers  
Estaboga AL  
Via Internet

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## KNOW ANY OF THESE PEOPLE?

*A lady at work was seen putting a credit card into her floppy drive and pulling it out very quickly. When inquired as to what she was doing, when said she was shopping on the Internet and they kept asking for a credit card number, so she was using the ATM "thingy".*

I was in a car dealership a while ago, when a large motor home was towed into the garage. The front of the vehicle was in dire need of repair and the whole thing generally looked like an extra in *Twister*. I asked the manager what had happened. He told me that the driver had set the "cruise control" and then went in the back to make a sandwich.

*My neighbor works in the operations department in the central office of a large bank. Employees in the field call him when they have problems with their computers. One night he got a call from a woman in one of the branch banks who had this question, "I've got smoke coming from the back of my terminal. Do you guys have a fire downtown?"*

Recently when I went to McDonald's I saw on the menu that you could have an order of 6, 9, or 12 Chicken McNuggets. I asked for a half dozen nuggets. "We don't have half dozen nuggets," said the teenager at the counter. "You don't?" I replied. "We only have six, nine or twelve," was the reply. "So I can't order a half dozen nuggets, but I can order six?" "That's right." So I shook my head and ordered six. McNuggets.

*I was checking out at the local Foodland with just a few items and the lady behind me put her things on the belt close to mine. I picked up one of those "dividers" that they keep by the cash register and placed it between our things so they wouldn't get mixed. After the girl had scanned all of my items, she picked up the "divider" looking it all over for the bar code so she could scan it. Not finding the bar code she said to me, "Do you know how much this is?" and I said to her "I've changed my mind, I don't think I'll buy that today." She said "OK" and I paid her for the things and left. She had no clue to what had just happened...*

I recently saw a distraught young lady weeping beside her car. "Do you need some help?" I asked. She replied, "I knew I should have replaced the battery in this remote door unlocker. Now I can't get into my car. Do you think they (pointing to a distant convenience store) would have a battery to fit this?" "Hmmm, I dunno. Do you have an alarm too?" I asked. "No, just this remote thingy," she answered, handing it and the car keys to me. As I took the key and manually unlocked the door, I replied, "Why don't you drive over there and check about the batteries. It's a long walk."

via Internet