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**The meeting for August will be on Tuesday, Aug 9th, 2005, at KCRC Field at 7:00 PM. Please plan to attend.**

**Being Safe Means Learning from Others' Mistakes**  
 by Jack Frost

Merriam Webster's Dictionary defines safety as "the condition of being safe from undergoing or causing hurt, injury, or loss."

When I look at modeling safety from this point of view, it seems clear to me that we all have a responsibility to try to provide a state of being—condition—that would prevent ourselves and others from being hurt, injured, or killed. In addition, we should all endeavor to eliminate the loss of equipment and property damage.

What does this mean? I think it means that just because we can do something, doesn't mean we should.

How many times have you thought or said or heard the following:

"I'm only going to start the engine once. I'm not going to set up the plane restraint."

"Pull tests are silly. I've never had a line fail."

"This propeller should be good for one more flight."

"This battery should be okay. I'm going to make it a short flight."

Do the actions associated with these statements help to establish a condition that would prevent hurt, injury, or loss? I think not. Who would say these things? I must admit that I've said a couple of them, and I'm reasonably sure that you have too.

Someone once said, "There are old pilots, and there are bold pilots, but not many old, bold pilots." Simply stated, pilots whose actions repeatedly establish unsafe conditions are more likely to have some sort of mishap.

Unsafe conditions don't only exist while airborne either. Take a look around your flying site. I'd be willing to bet that you can find a number of things that could be done better.

How about that chair with the almost broken leg? Or the fence with just a couple of nails sticking out to gouge someone? Or the hole that someone dug and then abandoned?

Many people genuinely concerned with safety have either been injured themselves or had someone

close to them injured. Wouldn't it be better to be able to learn a lesson from someone who has already been hurt than to be wounded yourself?

Years ago, my wife's finger was cut by a propeller. It struck her finger with such force that it not only cut her to the bone, but it broke the bone. It took a long time to heal, and it still bothers her to this day. While I'm sorry that this happened, it doesn't make her finger any better.

Fingers don't grow back, eyes don't repair easily, and accidents cost much more than money. It may seem cool to be able to tell your friends about how many stitches it took to sew your hand up, how much blood you lost, or how long it will take to heal; however, that cool factor quickly diminishes if you lost any fingers or any use of your hand.

Let's face it, serious injuries change us physically and emotionally, but most importantly, they change us permanently.

Build straight, fly as often as you can, have fun, and be safe!.....Jack Frost

The above article was reprinted from the AMA national newsletter.

**The recent vandalism at our sister club in Harriman points up the need for precautions at our own field. There are sicko's and dingbats out there who will put forth a great deal of sweat and effort in order to destroy something that gives pleasure to another group of people.**

**Our club has a gate and a combination lock. This will not keep out a determined vandal, but it might slow him down. It will not slow anyone down if it is not closed and It has been found open a few times lately.**

**It is the duty of each member to see to it that the gate is locked when no one is there.If you are the last one to leave, LOCK THE GATE.**

# AT THE FIELD

At the field recently, I was privileged to witness the most spectacular crash that these old eyes have ever seen. One of our very talented and swashbuckling members was doing his best to twist the wings off his Extra 300 when he suddenly forgot what he was doing and froze on the sticks! I was sitting under the shade structure and couldn't see the plane but I heard the unmistakable scream of a big engine winding up to its maximum RPMs. I looked at the member and saw that he was freaked out and then saw just a flash as the model, doing 500 MPH straight down, hit the asphalt and literally exploded about 50 feet in front of him. I found the cowl, engine, and ruptured muffler halfway down the hill toward the lake and there was nothing but confetti on the runway, with the pieces of the radio gear lying in the middle of it. Strangely enough, when we tested the radio, everything worked! We're not sure about the engine at this point.

The purpose of this article is to talk about the etiquette of the spectators when they are witness to something like this. One of the witness's ( see addendum ) to this particular event almost collapsed from hysterical laughter at the sight of the poor guy's face when he looked around to see if any one had seen what happened. As much as I regret it, I also might have said something that could be construed as facetious and not very sympathetic,

There are several ways to approach the response you take. You might turn away as though you didn't see anything, and try to ignore what's going on. This is certainly a safe action. Another approach is to say something like " I've seen you make better landings.", and offer to help pick up the pieces. If you choose this method, you might want to keep your expression neutral and not look directly into his eyes. The best way is to be very sympathetic and offer to help in any way you can to soften the pain and guilt he must feel from screwing up.

Under no circumstances should you break out into loud laughter. In addition to being very unfeeling, it can also be very dangerous, depending on the personality of the poor slob who just busted up a bunch of dollars worth of expensive machinery. While most of the members do not go armed, a thrown transmitter can inflict a good bit of bodily hurt!

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( Addendum ) A week later, this member lost his own Extra 300 in a very similar accident. As of this date we still haven't found this model.

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I suppose that one of the worst things we have to contend with is the occasional total destruction of one of our pride and joys. My personal viewpoint is that just as soon as you start flying a model, resign yourself to the fact that at some point in the future, it is going to crash. It is as

sure as death and taxes. If you fly it, eventually it WILL be damaged by something you do or something you fail to do. Most times it is what we call " Dumb Thumbs ".

The radios are extremely durable and dependable, but a loose screw or a bad connection or a broken wire or any number of other things can do you in.

You should always be alert to possible trouble in the radio installation and engine mounting. Try to anticipate areas of possible problems when you are planning the installation. Make sure that things are anchored properly, with no wires in a bind or under strain. Make sure that the servo mounts are firm and well glued, all screws snugged down, and wires routed so that they are not subject to abrasion. Pushrods need to be well supported and firmly attached to servo arms and control surfaces, with keepers on the clevises. Also keep all the slack out of the control surface hookup because a floppy surface will flutter at speed and flutter will kill a servo! If you hear a buzz when you're flying, it probably means that you have flutter, so slow down, land and check for looseness in a control surface. One of the best ways to be safe is to fly at least one mistake high, and use the throttle judiciously. Some folks have a thing for speed and try to squeeze just as many revs out of the engine as they possibly can. Generally this means the poor engine is starving for fuel, which contains the oil that keeps the engine cool and lubricated. Run it a little rich and it will last longer.

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Here are a couple of pictures demonstrating how not to land a model. In the first is Jeff Procise's very pretty



Hangar 9 P-51. A big old Saito 180 in the nose. In the second, you can see what happens when the model gets into a unexpected attitude.

You've all heard the motto " Speed Kills "? It really does. I'm glad I didn't see this one happen. The one I saw last week, and the results seen here have me just a little antsy at the field!.....



## **Minutes from July Meeting**

Meeting was called to order by President Phil Spelt at 7:00 PM on July 12th with 19 present.

Minutes from June meeting were approved as printed in the newsletter.

Treasurer's report was given by Treasurer Joel Hebert and was approved. KCRC's finances are in good shape.

### **OFFICERS REPORTS**

There were no official reports given by officers present.

### **OLD BUSINESS**

There was some discussion of the club's intention of electrifying the shade structure. The committee chairman, Denny Evans, was not present so nothing of consequence was done.

### **NEW BUSINESS**

Several items of interest to the members came out of some discussion about conduct of some members of KCRC. The consensus of opinion seems to be that some of the new members are not being given the rules and regulations governing the conduct of flying at KCRC field, although any members going through the training program set up by the club should be given the rules. It was suggested that all new members be given a set of KCRC rules and regulations, and the Executive Board will give some thought to the problem of more adequately defined safety rules..

Someone mentioned that a member was making high speed passes low and in the middle of the runway. This has been discussed many times in the past and is something that needs to be addressed by the safety committee. It is a dangerous practice because of the proximity of other flyers in the pit area, and the fact that a radio can experience a glitch at any moment. My understanding was that we had a rule prohibiting this but I couldn't find it in my set of rules.

One of the things brought up is the use of the tables behind the flyers on the flight line being used to adjust and work on balky engines. It is an annoyance to have an engine making a lot of noise directly behind someone trying to hear the engine on his own model in the air. A suggestion was made by Karl Gerth that members doing this should use a table that is well away from the flight line. Something else for the safety committee to address.

Dennis Hunt brought up the need for more permanent toilet facilities at the field, as well as the need for running water. This was discussed at length with the result being that nothing was done. It was said that the cost would be prohibitive and that " we don't need water at the field ".

The runway maintenance program was discussed with the result that a committee made up of Skip Dishner and Bill Dodge will check on the feasibility of surfacing or sealing it. Dill Dodge spent a good deal of effort filling cracks earlier in the year, and sealing is needed before winter.

Ed Hartley mentioned that the bank on the east end of the field is in dire need of bush-hogging before the undergrowth gets more dense. It was decided that Ed will try to get the fellow who did it last time to do it again. Up to \$200 was approved. Ed also will see if the same fellow can grade the driveway and if so, Ed is approved to get it done and new gravel put down.

Gary Lindner mentioned that the spectator fence has some broken posts at the west end. Someone mentioned that he saw a member backing up to the fence, couldn't see the post and broke it off. Gary suggested that some colorful nylon rope might improve the visibility of the fence. Gene Waters said it is possible that he can get some free steel cable to replace the rope. This will be put up if Gene can get it. ( I hope it's colorful! )

Dennis Hunt mentioned the upcoming SPA contest and said that KCRC members need to come out and compete in it. It is a low stress contest and a good way to get into competition. Workers are also needed.

### **Model of the Month**

Gene Waters brought out his little jewel of a P-51. He handcarved the molds and formed the fuse from ABS plastic. The fuse is complete with panel lines and rivets. The wing is foam covered with thin balsa. Power is furnished by a LiPo battery turning an AXI brushless motor. It is a beauty.

Craig Dieter showed his " Salvage One ", so named from an Andy Griffiths program. He put it together by taking a fuselage from one crash and a wing from a crashed Avistar and forming a new model. Powered by a Super Tiger Sport .40, he says it flies like a pattern model.

Jim Scarbrough brought out his taped together new model from RaidenTech to show. An ARF, complete with retracts, for only \$119! The model is a .60 size with a wingspan of 66 inches. Very impressive for the price.

Gene won the contest with his pretty.

### **Crash of the Month**

Bud Weisser brought a prepared statement describing his entry. It was a hilarious account of a total disaster ( mentioned in the " At the Field" column). Bud was not eligible for the glue since he is a former winner of this dubious honor.

Phil Spelt told of his misfortune with his Intruder pattern ship. He was apparently having some kind of radio problem when his wing collapsed from a not-called-for high speed maneuver. The entertainment came from his account of trying to locate the model in the trees after the crash. Ed Hartley, Phil Spelt and Phil Cope combined efforts and, with the aid of Ed's electric Slo Stick equipped with a digital camera, located the plane. Getting it out of the tree involved Phil Cope's expertise with a bow and a fish arrow and some line. After several days of effort, the radio parts and engine have been recovered. The plane was a loss.

Phil Spelt won the coveted award. Meeting adjourned at 8:13. Minutes taken by Jim Scarbrough ( Mike Foley was tied up at work ).



# This'n That

I have asked Scott Anderson to do a series of articles on electric models since there is considerable interest in them at KCRC . Here is his first.

## CONVERTING GLOW TO ELECTRIC Part I by Scott Anderson

Most of you know that I have been working with electrics and have recently pushed the envelope by converting a 2-meter pattern plane to electric and it is truly amazing to fly.

I want to say right off that I am not an EXPERT in electric flight but have spent many hours doing research and working with some of the top companies and pilots in the United States.

This series of articles should give you a base knowledge to be able to understand how to take that favorite plane and convert it to electric, or how to get the right power for that foamy.

Let us start with the motors, there are three types of motors and all have a place to be used. The first is the simplest and most common it is a brushed can motor and has two wires running from the motor and usually has a set of caps on the leads to help with the RF noise that the brushes create while running. A brushed motor does need a break in period like a glow and has parts that will wear out. These motors can be used direct drive or also can use a gearbox. The motor is controlled with a simple speed controller and does not usually produce a lot of power.

The second can motor is a brushless which does not have any brushes and does not usually produce any noise. They also can be used direct or with a gear box and there are three wires coming from the motor and it uses a special speed controller and they produce a lot more power and are more efficient running.

The third motor is an out runner, which is also brushless. The outer can on this type rotates while the shaft is stationary. This motor does not usually use a gear box but is used direct drive and is very efficient with exceptional power.

So how do you know what to use? Well, Hobby-Lobby has a section on their web page. You fill in the specs for your plane and they will run the numbers and send you an email with motor-battery combo's, or there are several commercial programs you can buy. I have one called "Motorcalc7" and it does a good job. Or you can ask others what they are using for a plane similar to yours.

So what do all the numbers on the motor mean ? Well, that varies from manufacture to manufacture but it is usually the can size (length and diameter ) and number of turns for the motor or RPM rating. The rpm is usually a Kvr rating so if you have a xxx-850 that 850 rpm is per volt. Therefore, you hear stuff like watts and watt/lbs. Well, there is a general guide for plane performance and it is as follows :

Watts per pound -- Performance Potential

less than 50 watts per pound -- Unable to rise off ground  
50 to 60 watts per pound--Can rise off ground and perform simple aerobatics  
60-75 watts per pound---Easily loops from level flight. More

impressive aerobatic performance.  
75-100 watts per pound--"Fighter"-like performance. Aggressive climbs  
100-150 watts per pound--Extended vertical runs. Unlimited aerobatics  
> 150 watts per pound---Wings are unnecessary!

**Notes: 746 Watts = 1 horsepower  
1000 milliamps = 1 amp**

A rule of thumb says 50 watts per pound of flying weight is required to take off, fly around and land. 75 Watts per pound will provide a nice flying plane with limited aerobatics, 100 Watts per pound will provide a very quick plane with good aerobatics, and over 100 Watts per pound will do almost any maneuver you want.

To give you an Idea, my E-Focus II is putting out 2200 watts, which is > 200 watts per pound and can hover without a problem and accelerate straight up from standing still.

Okay, so let us do some simple math. You have a 7-pound plane and you want unlimited vertical so you need 100 watts per pound. That is 700 watts you need minimum to make a good flying plane. In the next article we will talk more about watts/amps/volts and start talking about controllers....Scott

Thanks, Scott. I thought this was a good, informative article. I have often wondered what was needed to make my electric floaters do some of the stuff that I see Denny and Larry doing.

Here is a couple of pictures of Model of the Month entries at the July meeting. The first one is Gene Water's very beautiful P-51. Gene carved the hardwood molds and vacuum

formed the fuse. The wing is balsa covered foam. Gene also made the spinner! Power provided by an AXI motor and LiPo cells.



The next picture is Craig Dieter's Salvage One. Named from an Andy Griffith's program. Craig took the fuse from a previous crash and a wing from a crashed



Avistar and created the model. He says it flies like a pattern model on a simple Sport .40 two stroke engine..

# Spread-Spectrum for R/C

Phil Spelt

AMA 1294, SPA 177, NSRCA 2032

President, Knox County (TN) R/C Society

Recent articles in *Model Aviation* (July, 2005, p. 46) and the *Hobbytown USA flyer HobbyOutlook* have suggested that Spread Spectrum (SS) is on the horizon for R/C aircraft. In fact, it is already being tested with R/C car racing. In this article, I will explain what SS is, what its benefits and drawbacks may be, and what is left to be done to transition this technology to aircraft.

## What is SS?

Our present radio systems transmit on a particular frequency ("channel"), hence our "narrow-band" systems. In SS, on the other hand, data is transmitted over a frequency spectrum that is spread over a wide range of the radio frequency (rf) band (Fig. 1). Notice the noise level

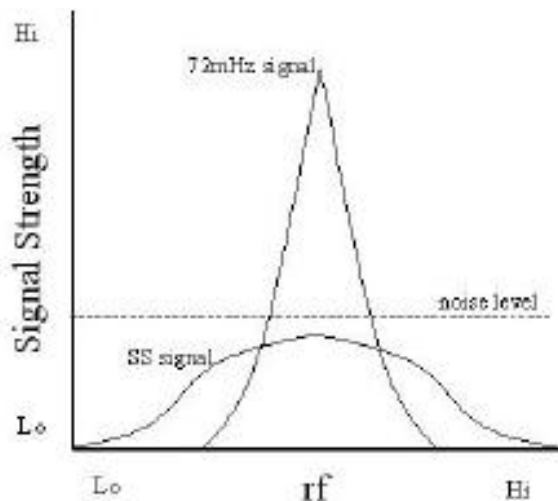


Figure 1. SS and narrow-band signals

line in Fig. 1. Presently, we are OK as long as our radio signal is above that noise. Also notice that the SS signal level is all below the noise. How that works is in the next section.

## How SS Works

SS does not work by simply spreading the signal over a wide spectrum band. Rather, it sends little packets of data on a variety of different frequencies, such that the overall effect is to appear to do so. Fig. 2 shows this conceptually.

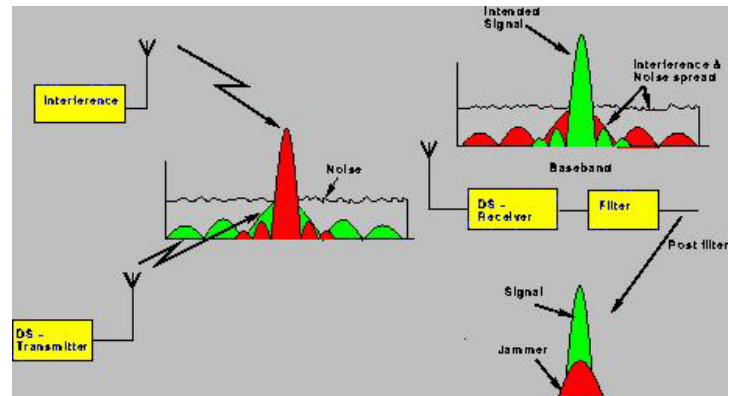


Figure 2. SS signal and "dispredding"

(Figs 2,4 & 5 are taken from the dissertation of Jacobus Petrus Franciscus GLAS, Circuits and Systems Research Lab, Agere Systems.) The left part of this figure shows the delivery of the spread signal (green), with a spike of "interference" signal (red). This spike is similar to one of our current channels, with the exception that the SS signal is at 2.4 GHz, and our channels are at 72 MHz. The upper right part of Fig. 2 shows the combining of the SS signal at the receiver, with noise spread out. The lower right is the overall signal to noise ratio following combination of the SS signal.

## How SS is Created

There are three (or 4, or 5, depending on how you count) ways to assure that the SS signal is properly reassembled at the appropriate receiver.

**Direct Sequence spreading uses a code to mark each bit-stream of data - sort of as if all my SS transmissions said "Phil", and others had all "Ed" and still others all "Mike". My Rx would look for all the "Phil" signals and ignore the others.**

**This is illustrated in Figure 3, below. In cell phone parlance, this is known as Code Division Multiple Access, or CDMA.**

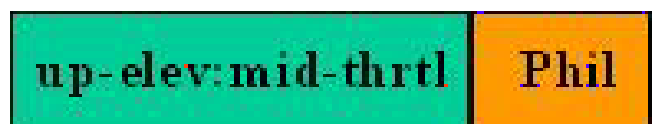
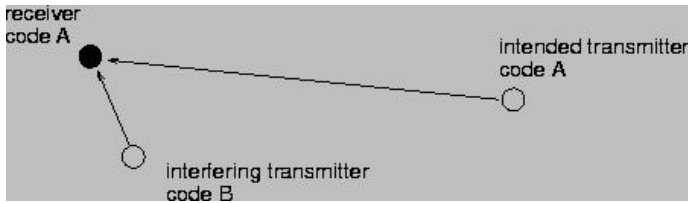


Fig. 3. Direct Sequence code.

Direct Sequence SS is the most straight-forward, but has at least one limiting factor, shown in Figure 4.

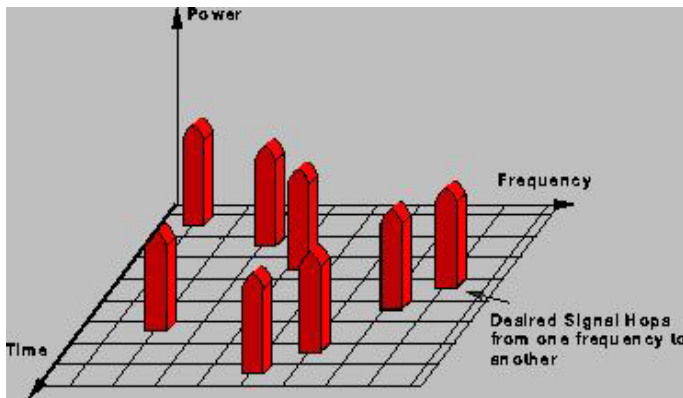
( over )



**Fig. 4. Near-Far Effect.**

The “Near-Far” effect results from an interfering Tx (code B, bottom left in Fig 3) being closer to the receiver for code A than code A’s Tx (right).

**Frequency Hopping SS does just what the name implies - spreads the signal across a variety of frequencies, as shown in Fig. 4.**



**Figure 4. Frequency hopping SS.**

Frequency hopping spreads the signal out over both frequency and time, as shown above. Frequency hopping is not affected by the near-far phenomenon, as is direct sequencing. However, it does require fast frequency hopping synthesizers in the Tx & Rx to produce enough gain to make the signal “receivable.”

**Time Hopping SS is similar to frequency hopping, except that the signal is spread only over time. In cell phone parlance, this is known as Time Division Multiple Access, or TDMA. Hybrid Systems for SS make use of two or several of these methods. A hybrid Direct Sequence-Frequency Hopping system captures the best aspects of both systems.**

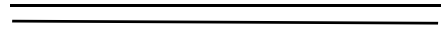
**SS Benefits and Drawbacks**

As you may have figured out by now, the major benefit of SS for R/C is the virtual elimination of interference of all kinds - electromechanical interference (noisy clevises, for example) occurs below about 300 MHz, so is well below the 2.4 GHz of SS, and interference from other Tx’s is also a

thing of the past, as seen by the above discussion. In addition, SS will eliminate most of the multi-path (spectral reflections) effects when the rf signal bounces off buildings, the ground, etc. This multi-path issue is what causes ghosts on a TV screen when using an antenna in the city. SS is already being tested in R/C car racing, and seems to work as well as anticipated.

The major drawback is antenna orientation. Apparently, SS is sensitive to antenna orientation, which is OK for cars operating on a flat (2-dimensional) surface, but is a problem yet to be worked out for the 3-D world of aircraft. Of course, another great benefit of SS is that it is totally compatible with our present system of assigned frequencies, supplementing rather than replacing it. Anyone flying as SS system, moreover, would not need to worry about having the pin - as there IS no assigned frequency. How long before we see SS available for R/C aircraft? HAH! That’s the 2.4 GHz question...

--pfs



One of the really good things about a club newsletter is that it can be used to get a broad spectrum of ideas out to the membership. In this issue is a good article on converting glow to electric power and also a thoughtful article on the future of RC. Just to be fair to all parties, I included a safety article I found in the AMA newsletter.

Since there was a surplus of information to print, I added a couple of pages to the newsletter. I don’t think that this will be a continuing thing, however. Sometimes it is like pulling teeth to get something that might be of interest to the general membership, and sometimes I fail...

One thing that will be printed in an upcoming issue is a set of safety rules for the field. We already have at present a set of rules that may or may not be adequate. Perhaps it is more of an enforcement problem.

I felt sure that we had rules about flying close to the runway, but I haven’t found it. Perhaps it was an earlier set that was replaced by the new bylaws and rules passed in 2002.

The Executive Council is going to look into this problem and will bring it before the club.

You might want to attend a few club meetings and take an interest in the things that will affect your flying at KCRC field.....Jim