



OFFICIAL NEWSLETTER - December, 1992
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Editorial

The Last Editorial! In the most recent MAAC Mag, there was an interesting little note that went something like this. "You are only truly alone when you fly your first solo and when you sit down to edit the club newsletter." It has been a difficult year for me in terms of travel..about 60,000 air miles so far! It has also been a difficult season for flying with more rain than the normal for two summers. I had a good time in spite of the weather. I learned a great deal about the hobby/sport. No-one has asked for advice, but I have never been backward about being forward, so I will offer my advice for any new or relatively new pilot. Get one, large, correctly trimmed airplane and fly the wings off it. When you have more patches than original plane, get another one and keep on flying. Until you are VERY experienced, I think you should fly just one airplane! Someone told me that he sold a perfectly good glider just because he got sick of looking at it in the sky. That is what I am talking about.

The new year will be a real opportunity for many of you to come forward and take a hand in running SOGG. As you will see from the minutes of the last meeting, ALL the executive have declared their intention not to stand for re-election. The slate of nominees, while it covers all the positions, is not closed. At the Annual General Meeting on **December 13th**, there will be another chance to get your name on the ballot. Don't be shy! Don't wait to be asked! If you have the ability to help out, say so! Your club needs you!! (wheew...when I get up on that soap box, the lack of oxygen makes me ramble a bit.)

Oh well, I guess it will be a short one this time. I am off to sunny southern California at the end of the week and I have to get this thing copied and in the mail or you will all be reading this in the new year. Thanks for putting up with me for the past year and I will go on record here and offer as much assistance to the new editor as my schedule permits. Good flying...and think CLOUDBASE

Minutes of meeting October 4, 1992.

Meeting called to order at 1:30 p.m. with 14 members and 1 guest present. Minutes of April 20/92 read and passed. Minutes of May 3 meeting read, moved by Bud Wallace to accept, seconded by Al Hilborn. Passed.

Treasurers report. There are now 42 members, 8 of whom have not paid the incorporation fee.

Gerald Fritz move a vote of thanks to Werner Klebert for organizing the new winch. Werner pointed out that Kurt Fritz donated the motor and that his son rebuild the motor to better than new condition . Bill Woodward looked after getting the drum built and Charlie Rader donated 400 Ft. of 200 pound test line and Werner added 200 Ft. of 100 pound test line. From all reports the unit operates very well.

Moved by Stan Shaw ,seconded by Bud Wallace that a present be given to Rose Bandmann in appreciation for all the prizes donated in the past, to be looked after by the President.

Werner brought up the fact that there were not provisions in the constitution to allow a new member to join late in the year at reduced fees. Move by Stan Shaw , seconded by Kurt Fritz that new members joining after Sept 1 be charged 1/2 price for membership . Passed .

The secretary reported that the list of names for the initial incorporating members had been submitted to the lawyer, Clyde Halford, but that nothing further has transpired since that time. The names submitted were Bill Woodward, Bill Moar, Gerald Fritz, Fred Freeman, Kurt Fritz, Craig Packham, Werner Klebert, Peter Ashton, Charlie Rader and Keith Armstrong.

The president called for nominations to fill the executive positions for the year 1993. These nominations will be presented at the general election meeting on December 13,92. These nominations are only a starting point for the elections and all positions are open to accept additional nominations. Gerald Fritz is withdrawing from his position and David Woodhouse finds that he is doing too much travelling to due justice to the task of Editor . Names put forward are:

For president	Bill Woodward
For vice president	Bill Moar Peter Ashton Bud Wallace
For secretary	Keith Armstrong Al Hilborn
For treasurer	tan Cyra Bill Moar Carl Schmidt
For editor	Rob Campbell

Stan Shaw moved nominations close, seconded Al Hilborn. Passed.

Moved that Gladis Freeman be sent a fruit basket as a gesture of thank you and get well . Norm Klebert offered to look after this project.

The president announced that at the next meeting there would be a free draw for modelling goodies for those present.

A 50/50 draw was held with Gerry Vander Eyken the big winner.

For show and tell

Charlie Rader had his Switzer TG3 there with coverall covering and painted with dull automotive paint and is considering a clear coat. Model weighs in at about 9 lbs.

Bud Wallace showed a hand launch SKEETER glider he converted to an electric model flying on 6 cells.

Rick Lilly (a new member) showed a Metric which is reported to be a good flyer.

Stan Shaw announced that MAAC will have an open house on October 17, 92 at the new HQ facility located at 5100 South Service Road, Unite 9, Burlington. The new telephone number is 416-632-9808.

Bud Wallace moved that the meeting be adjourned, seconded by Al Hilborn. Passed.

CLUB DAY : Otto Bandmann Memorial

The club contest was postponed one week, to August 2, due to rain, what else to expect this year.

There were 12 contestants of which 3 were novices in that they had not received their wing as of the contest date. As you are aware this contest is the Otto Bandmann memorial contest with appropriate plaques to the winners. The results were:

Novice class	1st place	Paul Schmidt
	2nd place	Allan Hilborn
	3rd place	Charley Raider
Pilot class	1st place	Werner Klebert
	2nd place	Kurt Fritz
	3rd place	Bud Wallace

Those taking part in the contest were the above plus Norm Klebert, Bill Moar, Bill Woodward, Joe Baltaza, Fred Freeman, Stan Crha. Congratulations to the winners and we hope that next year there will be a larger turn out to compete for these much sought after trophies.

Understanding the "R" in R/C

In the past few years of flying with a couple of clubs, I have heard more than my share of mis-information about those black boxes in which we must place such faith. I find it interesting that we put hundreds of hours, not to mention dollars, into building and researching our aircraft and pay great attention to the various currently popular airfoils, but have virtually no knowledge of the radios that control them and allow us, on occasion, to bring them safely back to earth. For those of you who wish to keep it that way, stop reading here!

Many of you have seen me fly and I want to state right up front that while I am a relative newcomer to the joys of soaring, I have been involved in radio for most of my life and have been an amateur radio operator for nearly 20 years. This article will touch on the following topics:

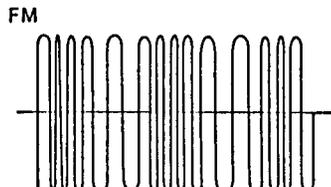
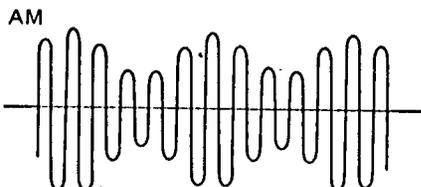
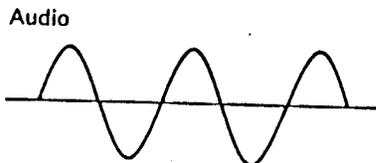
- A) Modulation Techniques: AM and FM
- B) Encoding and PCM
- C) Interference
- D) The Care and Feeding of Your Radio

MODULATION TECHNIQUES

All transmitters emit a stream of Radio Frequency (RF) energy called a Carrier. This carrier has a centre frequency and that is the frequency that is marked on the transmitter and receiver in MegaHertz and occasionally as a Channel Number. Channel numbering is completely arbitrary and is used to simplify identification. The Carrier contains no information but is just a vehicle. Placing information on the carrier is known as Modulation. There are two and only two modulation techniques used in R/C and they are AM (Amplitude Modulation) and FM (frequency Modulation). Although PCM stands for Pulse Code Modulation, this is not really a modulation technique. In the early days of PCM, you could buy an AM or FM version of several manufacturers product. FM is now used almost exclusively in PCM radios.

Amplitude Modulation modifies the amplitude of the carrier in proportion to the information that is being mixed with it. The carrier will then have a shape that conforms to the shape of the modulating signal. At the receiver, the carrier and the modulating signal are separated again through a process called Detection. What happens then is explained later. See Diagram.

Frequency Modulation starts with the same carrier with the same centre frequency, but rather than varying the amplitude, the frequency of the carrier is moved up or down in proportion to the



modulating signal. Again, when the signal gets to the receiver, the carrier and the modulating

signal are separated. If you look at the diagram above, you will get a clearer idea of how these two techniques work and what the similarities and differences are.

ENCODING

In the standard R/C radio, there is something called a FRAME. The frame is made up of a series of pulses whose length describes the positions of the sticks and switches on the transmitter at any given time. The centre value for the pulse is 1.5 milliseconds (msec). The minimum value is one msec and the maximum is 2 msec for a pulse. During a cycle, one pulse for each channel in the transmitter and one long pulse called a sync pulse is sent. This makes up a frame. The sync pulse is there to tell the receiver to start at channel one again. As soon as the transmitter is turned on, it starts to transmit a continuous stream of frames. When the receiver is turned on, it resets on the first sync pulse it receives and then starts to respond to the information in each frame. This encoding is the same for all modern AM and FM radios. Futaba does things in the same way that Airtronics does. The encoding at the transmitter and the decoding at the receiver are accomplished by tiny integrated circuits (IC's) which are all manufactured to the same set of specifications. Futaba transmitters will work with JR receivers etc., as long as they are on the same frequency and use the same modulation technique! This is one of the most persistent myths at the field. Servos are equally interchangeable and although there are several different connectors, the electronics are compatible. I was amused to hear about the new FM servos that appeared a few years ago. These were the same servos that had been sold with the AM gear, with new part numbers and slightly different connectors. The changes had nothing to do with technology and everything to do with getting you to part with more cash to replace all the servos in your airplane.

Now we come to PCM. Pulse Code Modulation is a creation of the computer industry and is only made practical because of the advances in micro-electronics. To better understand the function of this technique, think of one channel only. The "frame" for our single channel contains 16 pulses, each about 400 microseconds in length. The 16 "bits" (a computer term which stands for Binary digITS) each have an assigned function and value. In the new "1024" technology, 7 of the bits are assigned to channel identification, error correction and end of frame designation. The other 9 bits (2 to the power of 9 equals 1024) describe the position of the stick. If our single channel represented the rudder, neutral would have a value of 512. Full right would have a value of 1024 and full left would be described as 0. This means that there are 511 discrete locations for the rudder on each side of centre. The resulting very fine and accurate positioning of the control surface helps explain why all the top precision aerobatics guys fly PCM. The other major advantage of PCM is it's immunity to interference.

INTERFERENCE

The next time there is a thunder storm, turn on a radio and tune in your local AM radio station. You will hear the signal along with occasional static discharge which, if they are bad enough can

completely cover up the signal from the transmitting station. Now, tune in an FM broadcast station from the same location and compare the quality of the signal. Static discharges are not even noticeable. The detection process in an AM receiver responds to changes in amplitude of the received signal. Static discharges change amplitude and can also obliterate the original modulating signal. Since the FM receiver is designed to respond to variations in frequency only, changes in amplitude will go virtually un-noticed. Static discharge will have no effect on the fidelity of the received signal. Although we don't fly in thunder storms as a rule (contests excepted), there are lots of other forms of electronic "noise" that can cause interference to an AM signal such as car ignition systems, large electric motors and dirty insulators on power lines. When there is enough interference of the "noise" variety, an AM receiver can get confused, the receiver misses a sync pulse, and the wrong information goes to the wrong servo. If the condition persists, the pulse train gets saturated, the servos get driven to their limits and a perfectly good airplane gets re-kitted. Most PCM radios have an interesting feature called "Fail Safe" that takes over in the event that there is interference or a failure in the transmitter or if you are unlucky enough to let the aircraft get too far away. Having a bit of experience with your aircraft, you have a good idea as to how you would like the controls to be set if this R/C craft should accidentally become a free flight bird. While holding those settings on the sticks, press the "SET" button on the PCM transmitter and these control settings will be transmitted to the receiver and stored. Those settings will remain in the receiver's memory until the battery is disconnected. At the beginning of each flying session, check that the settings are still in memory and you will have a much better chance of retrieving your airplane in one piece.

So much for Mother Nature and other things outside the normal control of average flyers at an average field. Another form of interference is one that we bring on ourselves. This is called Intermodulation Distortion or IMD for short. Mostly we worry about adjacent channel interference, but that should have been taken care of with everyone going to "Gold Sticker" transmitters and receivers. The Gold Sticker program is designed to get the older transmitters and receivers out of general use. The problem with some, but not all, of the older transmitters is that the signal that they transmit is so broad that it can be "heard" by a receiver on the next channel up or down. Gold sticker transmitters have a much narrower transmitted signal. Gold sticker receivers respond to a narrower band of frequencies and therefore don't hear the transmitter on the next channel. IMD rears its ugly head when we have 3 or more transmitters on at once. If these transmitters are physically close to one another, mixing can occur between a pair of signals and the result appears on the third frequency. (For the technically inclined, the math goes something like this. F_1 is the frequency of the first transmitter and F_2 is the second. F' is the IMD resultant. $F' = F_1 + 2F_2$ or $F' = 2F_2 - F_1$. As you add more signals, the math becomes more complex.) The best defence for this is to maintain a spacing of at least 20 feet between transmitters and to have high and low channels fly at the same time. If you are the third or later guy in the air, turn on your receiver, hold your plane aloft and listen and watch. If you hear servos growling, or see control surfaces fluttering, do not launch.

The Care and Feeding of Your Radio

Modern R/C gear is very reliable and most of the "radio failures" can be traced straight back to pilot error. Perhaps it occurs at the field or maybe it happened much earlier, back in the basement. I had a fly-away early in the season which is a good example of this sort of thing. I was on the hi-start and I gave the sticks a wiggle and everything was fine. I gave the bird a shove and up it went. After a second or two, I tried to give it a bit of correction to the right and nothing happened! I couldn't believe it! In the few seconds between the pre-launch wiggle and the launch, I had a radio failure. The airplane was found and there was very little damage, but I couldn't wait to get my hands on the radio to see what the problem was. I recharged everything and turned it on. It worked perfectly. I did a range test and still no problem, but when I re-installed the switch harness back into the plane, I realized that the slot for the switch was a fraction of an inch too short. The switch was not free to travel to the full "ON" position. The force of the launch had caused the switch to slide back just enough to shut down the receiver. Radio Failure? No...Pilot Error.

Antennas are another source of problems and misunderstanding. Antennas, both on the transmitter and receiver are cut to a specific length. They are "tuned" to the frequency on which they operate. Don't trim the receiver antenna because you dislike that black wire hanging out of the tail end of the airplane. If you do, you will greatly reduce the range of control. Another problem that is more common to power flyers than to glider guiders is that of dirt and oil on the transmitting antenna. As the antenna is extended, each section must make a good electrical connection with the section above and below it. If this does not happen, you will, again, reduce the range of control. As I said earlier, antennas are tuned to the output frequency of the transmitter. Avoid extended periods of transmission with the transmitter antenna collapsed. This can cause the final output transistors to overheat and the repair is not cheap or quick. Radio waves leap of the transmitting antenna and fly through the air at the speed of light (literally) in all directions, but not equally in all directions. Picture a donut with the antenna in the hole. Most of the energy radiates from the antenna at right angles and virtually none radiates from the tip of the antenna. For that reason, pointing the tip of the antenna at the aircraft cuts down on range.

Batteries are the source of great concern and dozens of articles have been written about the care and testing of NI-CAD's. I am not going to spend much time on them. New batteries can be charged for 48 hours on the standard charger. After flying they can be recharged in 24 hours or less. Don't let them get too hot. Don't leave your radio and plane in the car all week in the summer for example. During the off season, run your transmitters and receivers for an extended period, to simulate a flying session, and then recharge them. If you do this a couple times during the winter it seems to ward off evil spirits. (This is one of my own myths which I am too chicken to challenge.) Occasionally, batteries will fail to hold a charge. If, after a charge cycle, the batteries don't hold the charge for what you feel is a normal period, you have two choices. You can ignore the condition and risk your plane and your flying field, or you can cut the connector off the battery pack, trash the rest and buy a replacement. I highly favour the second option.

That is all I have to say for now, but if you have any questions or comments, you can call me at (519) 821-4346 or write to me David Woodhouse, 96 Division Street, Guelph, Ontario, N1H 1R6.