Sydney Radio Control Society

February 2007

Newsletter

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Quarterly General Meeting

To be held at the field on Saturday 24th February at 11.00am followed by a BBQ lunch.

Agenda:

- ***Apologies***
- ***Previous Minutes***
- ***Matters Arising***
- ***President's Report***
- ***Treasure's Report***
- ***Secretary's Report***
- ***Other Business***

THE 2006 – 2007 COMMITTEE

NAME	POSITION	PHONE	E-MAIL ADDRESS
Mike Close	President	(02) 9872 6469	mikeclose@cherry.com.au
Matt Holloway	Vice President	(02) 9670 1164 0412 522 050	mholloway@mmm.com
Rex Broadbent	Secretary	(02) 9686 3114 0417 471 361	rexpat@optusnet.com.au
Ewald Klinkenberg	Treasurer & Registrar	(02) 98312817	klink07@bigpond.com
Stephen Liseo	Newsletter Editor	0418 456 114	liseos@hillsgrammar.nsw.edu.au
Baldo Polizzi	Ordinary Member	(02) 9630 4019 0418 479971	balmap5@bigpond.com
Corinne Pellatt	Ordinary Member		corinnepellatt@yahoo.com.au

CLUB EVENTS

	Date
Quarterly General Meeting	Saturday 24th February
Hog Day	Sunday 17th June
Kevin Grey Fun Fly	Saturday 11th August
Scale Rally	Sunday 21st October

A reminder that there is no general flying when club events are held

These items can be purchased from the Club Treasurer

Club metal badges	$5 ea.
Club cloth badges	$5 ea.
SRCS stickers	50c ea
Club tee shirt	$25 ea
Club caps	$15 ea.

At the moment the Club has plenty of stock of caps and shirts available, so why not lash out and invest in a new Club shirt and cap. Don't forget that the Club badges issued to this years financial members must be worn at all times. A perfect place to wear it is on your new cap.

These items are available from **Ewald Klinkenberg** at the field.

Sizes for the shirts are small, large and extra large in blue or grey.

PRESIDENT'S LETTER

As most of you will know the Club decided a few meetings ago, and it has since been confirmed, that our membership is closed. However the Committee have been given some discretion, with the guidance that applicants who are new to flying or to the Sydney area should be closely looked at. We try to be consistent with the application of this guidance. Whilst this has resulted in a few hard decisions having to be made it is very pleasing to report that our membership numbers are definitely increasing more positively than they have for many years. To all of you who have joined, or rejoined after a period away from modelling, I would like to welcome you all to the club. I hope that you enjoy the comradeship and the facilities that we offer for many years to come. Many of you of course are trying the sport for the first time. I believe that we have a group of very good instructors to help you and I would like to thank them all as well for the time that they put in to help you. I can remember almost every flight that I did whilst I was learning and there is no doubt that successful experiences during this period greatly contribute to the long term pleasure that can be obtained by all who continue to participate.

Learning to fly and being told that you can fly solo is a very satisfying achievement and one you should be very proud of. However as Churchill said after the battle of El Alamein "It is not the end, it is not even the beginning of the end but it might just be the end of the beginning". There are always new skills to learn whether it is doing new things with your current aircraft, doing them better, or flying more challenging or different aircraft. The more we practice the better pilots we will be. You can often see people going out to fly at the field and it does not look like they have any aim with their flying. At times I agree it is fun just to go and fly, but most times we take off we should have an aim of something to practice which we know we are not so good at. It could be just holding the aircraft straight and level in a modest cross wind or it could be trying to perfect the last quarter of an outward rolling circle with a single roll! Challenging yourself may occasionally increase the frustration but overall it gives a sense of achievement and also the more skilled we are, the more likely we are to be able to deal with an unexpected situation.

There are a couple of pieces is this newsletter concerning common courtesy and safety. I would commend you to read them carefully. Any debris that is left behind can be clearly identified as coming from us. We only fly where we do through the generosity of Roadmaster and the farmer. Lets keep the place tidy for them, as upsetting them could be instant termination of our use of the field. The committee want to fly like everyone else and do what we do on a voluntary basis. That does not include clearing up other people's mess. Correct use of the key board is vital for everyone. It was reported at the last QGM that when a member took his transmitter back to the pound his frequency key had been removed. Not good and it was fortunate that there had not been a problem. Also just as reminder, the reason for not allowing aircraft under the main awning is so that over the years we do not get a build up of oil soaking into the tables where we socialise and eat. That was one of the reasons behind the Phil Hibble shelter and the new table top so that it is available for the field repairs that are occasionally needed. Oil builds up one drop at a time so even if you think you have been careful one little bit of a future problem may have been left behind.

All the rules that we have are set by the members and not by the Committee. These are set at the four general meetings that we hold during the year. We always encourage as many members as possible to be there and welcome ideas and positive criticism on how your club can be even better. The details on the next meeting are also in this Newsletter.

I hope to see you all at the QGM and happy and safe flying.

Mike Close
President

Minutes of Quarterly General Meeting 18 November 2006

Held at the airfield, starting at 11am.

Present: Col Bacon, John Cahill, David Bacon, Phil Montgomery, Prederag Stajcic, Atul Rathod, R Rapley, Mike Close, Nicolas Murdaca, John Murdaca, Michael Murdaca, Noel Dalton, Matt Holloway, John Howard, Baldo Polizzi, Ewald Klinkenberg, Derek Slevin, Phil Norris, Rex Broadbent.

Apologies: Bob Fear, Steve Liseo, Corrine Pellatt, Robert Zyp, Paul Toyne, Col Bruce, Gary Charlton, Renton Wright, Col Lyttle.

Chair: Mike Close

Minutes of previous meeting: As this was the AGM, these minutes could only be accepted at the next AGM. However, no changes to these minutes were requested.

Attendances and apologies were tabled.

Matters arising:

1. Keyboard: still being addressed Mike Close
2. Separate helicopter area. Will work with any ideas that Ray has. Does not seem feasible at present. Mike Close.

Treasurer's Report: The profit and loss account, with balance sheet, for the period July to November 2006 (up to the date of the QGM) with the comparative figures for the same period last year, were tabled.

Acceptance proposed by Ewald Klinkenberg; seconded Baldo Polizzi. The motion was passed.

Secretary's Report: no correspondence had been received or sent.

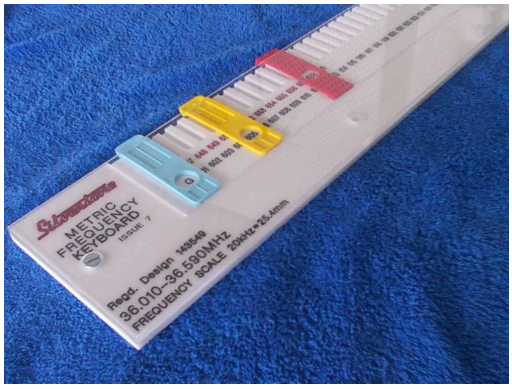
General Business:

1. Christmas party. Phil Norris has arranged with the restaurant at Riverstone RSL for 10th December 2006 at 12 noon. The restaurant has been told to expect around 35 people.
2. Transmitter pound protocol. A document on what is expected of members and their guests regarding the transmitter pound will be written by Mike Close.
3. Car spaces at the airfield. Car space markings will be painted on the railway sleepers by Matt Holloway.
4. Paragliders. Mike Close advised that he has had talks with the farmer who owns the ground on which our airfield operates. The farmer has been approached by a paraglider association regarding taking off and landing on the area we use, on Saturdays. Mike Close respectfully has acknowledged to the farmer that he can do whatever he wants with his land. However, for safety reasons we could not operate models within 400 metres while paragliders are taking off or landing, which would be a severe inconvenience on our busiest day. Mike advised that at present the farmer seems to favour not having the paragliders.

The meeting closed at 11.25am.

Minutes recorded by Rex Broadbent.

SILVERTONE© KEYBOARD – SRCS



The correct use of the Silvertone © Keyboard is a vital safety procedure at SRCS as well as at many other clubs throughout Australia. Occasionally things are not done correctly, and how many of us can honestly say we have never made a mistake. This is always a good opportunity to review both our own and the club's procedures. At the last QGM we were asked to summarise the correct procedures.

Under no circumstances should anyone other that the pilot either put in or remove a key from the board whilst flying is in progress. THIS IS ABSOLUTELY FUNDAMENTAL. It is all too easy for someone else to remove the wrong key and that is a potential disaster. If there is a problem the primary responsibility will always come back to the pilot not the person they asked, or offered, to remove it.

The only exception would be at the end of the day if you are the last person to leave. If you are absolutely sure that there is no one left and particularly if you know that the person has gone and left his key in the board then it should be removed. Similarly if you are the first person there and there is a key in the board. In both cases you need to be careful to make sure that for example no one is getting ready to fly a float plane off Eastern Creek. I know from personal experience it is very frustrating to wait for half an hour for the frequency only to find that the person is not there. If a key is in the board that does not appear to belong to anyone then all flying should stop and every pilot at the field should confirm that they are not currently using that frequency. People have occasionally borrowed someone else's key so you cannot automatically assume because 'Fred' is not there that his key is not being used by someone else.

It is of course a firm rule that keys have to be marked with the name and frequency of the pilot so you should not use someone else's key anyway. This is to ease the management of frequencies and also, as in a recent case, to enable a transmitter's owner to be identified when he left and forgot it. If we don't know who the owner is the only option is to leave it in the shed - unsecured. Will it be there next day?

As soon as you arrive at the field you should put your transmitter in the pound together with the key. The only exception is if you leave it secured in a car. You only put the key in the board and get the transmitter out again when your model is ready to range check and fly. There is nothing worse than to find a key is in the board on your frequency when the pilot is checking and assembly his model or refuelling it. I know when there are only a few people present that we sometimes know that there is no one else on our frequency but this should not change the requirement to return the transmitter and remove the key when it is not in use. The club rule is that you have the frequency for a maximum of 20 minutes at a time. Other people turn up and it has happened that a pilot has been out on the flight line with an aircraft and has two frequency keys in the board!

The keyboard has to be used even if you are the only person at the field. If someone else turns up they might assume that they know what frequency you are on and also switched on without checking rather than wait till you finish your flight. You might have a different model or have changed your crystal. You can't make assumptions where safety is concerned but it can be easy to do.

These rules should be straight forward to apply, don't forget that the plane that is lost might be yours and an out of control plane could damage more than just the aircraft itself.

Mike Close on behalf of the SRCS Committee.

To all members of Sydney Radio Control Society.

We are creating a problem for ourselves. Over a period of time I have noticed that a lot of stuff is left behind in the pits area.

There is a written rule and common courtesy dictates that what you bring to the field you take home with you. Whether it is a model plane that is still in one piece or in many pieces, please take all of it home with you.

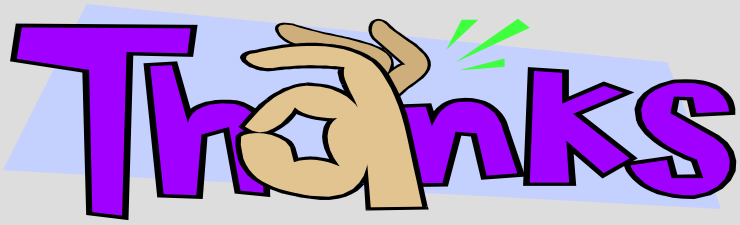
We have found empty cans, rubber bands, bits of card board and cigarette butts all over the place. Please take it home with you.

If the problem gets too bad we stand a good change of losing the field and it is going to be difficult to find another field like this within the Sydney area.

So please make an extra effort to take your rubbish home with you and police the area in helping to keep it clean.

Thanks for your cooperation and safe flying

Ewald



As a Club we would like to thank Ron from **Tates Tyre & Brake** in Riverstone for storing the mower for the last few month – A BIG THANKS RON.

The mower is now securely stored at Mac's Plant hire in a new box trailer. Thanks to Matt Holloway for organising this. Also for security reasons, there are only certain members that can sign out the trailer.

Also special thanks to Noel Dalton for lending us his time and mower whilst the Club's mower has been unavailable.

Safe flying

TREASURES REPORT

Balance Sheet December 2006

	This Year	Last Year	Difference
Assets			
Current Assets			
Cash On Hand			
Westpac - chq a/c	$4,282.47	$6,696.24	($2,413.77)
Petty Cash	$10.00	$10.00	$0.00
Total Cash On Hand	$4,292.47	$6,706.24	($2,413.77)
Investments			
Westpac term deposit	$17,317.96	$16,553.03	$764.93
ANZ term deposit	$32,274.96	$30,290.22	$1,984.74
Total Investments	$49,592.92	$46,843.25	$2,749.67
Total Current Assets	$53,885.39	$53,549.49	$335.90
Other Assets			
Deposits Paid	$50.00	$50.00	$0.00
Total Other Assets	$50.00	$50.00	$0.00
Buildings			
Furniture & Fixtures			
Equipment at Cost	$16,185.23	$17,775.23	($1,590.00)
Less Accum Dep	-$11,154.47	-$10,766.28	($388.19)
Total Furniture & Fixtures	$5,030.76	$7,008.95	($1,978.19)
Total Assets	$58,966.15	$60,608.44	($1,642.29)
Liabilities			
Long-Term Liabilities			
Total Liabilities	$0.00	$0.00	$0.00
Net Assets	$58,966.15	$60,608.44	($1,642.29)
Equity			
Retained Earnings	$53,699.08	$56,441.70	($2,742.62)
Current Year Surplus/Deficit	$5,267.07	$4,166.74	$1,100.33
Total Equity	$58,966.15	$60,608.44	($1,642.29)

Profit & Loss
July 2006 through December 2006

Income		
Club Badges	$13.00	$9.00
Club Clothing	$20.00	$15.00
Donations	$0.00	$5.00
Gate Keyes	$540.00	$165.00
Interest	$1,764.04	$788.24
Joining Fees	$900.00	$300.00
Member Fees	$20,437.00	$17,710.00
Scale Day	$763.70	$780.90
Total Income	$24,437.74	$19,773.14
Expenses		
Badges	$112.90	$0.00
Bank Charges	$58.00	$44.10
Competition Prizes	$75.00	$67.50
Consumer Affairs	$43.00	$78.00
Field Maintenance	$40.00	$53.70
Food & drink	$56.04	$0.00
Hall hire	$0.00	$55.00
Key refund	$0.00	$30.00
Locksmith	$1,472.00	$0.00
Website	$264.00	$390.50
MAS fees	$15,369.00	$13,088.00
Postage & shipping	$54.25	$100.00
Scale Rally	$342.16	$429.73
News letter	$568.42	$440.22
Stationary	$108.90	$32.65
Toilet Services	$55.00	$0.00
Refund of membership	$552.00	$797.00
Total Expenses	**$19,170.67**	**$15,606.40**
Net Surplus / (Deficit)	**$5,267.07**	**$4,166.74**

Membership

Member Type	No
Associate	9
Junior	3
Life	5
Pensioner	6
Senior	103
Total	126

Red Bull Air Race

The Red Bull Air Race World Series was established in 2003 and is an international series of air races with the participation of some of the world's most skilled pilots. Pilots fly individually against the clock through a slalom course. This year for the first time the event was held in Perth. I was lucky enough to attend and have to say that for any aviation enthusiast this is an absolute must see event.

At the races, currently 11 pilots compete against each other. The race winner is the competitor who accomplishes the best time after two runs of the same course. Pilots race on a twisted course with five groups of specially erected spinnaker obstacles. Flying against the rules results in disqualification or in a time penalty added to the flying time.

Perth was a great venue for the event and it is absolutely incredible to be so close to the action. The event will be held in Perth for the next two years and I would strongly recommend that you make the trek to the west coast to catch this spectacle.

Stephen Liseo

Christmas Party 2006 Riverstone Memorial Club Sunday 10th December


SC
122501

Spread Spectrum Technology

What is Spread Spectrum Technology?
Spread spectrum techniques are methods by which energy generated at one or more discrete frequencies is deliberately spread or distributed in either the frequency or time domains. This is done for a variety of reasons, including the establishment of secure communications, increasing resistance to natural interference and jamming and to prevent detection

Spread spectrum technology is not new, in fact the technology can be traced back as far as the early 1900's. The first real application of the technology appears to be during WWII where it was used for secret radio communications and interestingly in the use of unmanned radio controlled weapons in an attempt to make them more difficult to jam.

Why the photo of Hedy Lamarr I hear you ask. Hedy befriended a maverick musician, George Antheil. He is known for his experimental symphonies, one required 16 player pianos. They met at a Hollywood party where they discussed the war in Europe and the threat to America from Germany and Hitler. The following afternoon, Antheil went to Lamarr's home to discuss what they could do to stop Hitler.

With Antheil's help, Lamarr designed a new kind of guidance system for torpedos. Even though her formal education consisted of private schools without technical training, she had absorbed quite a bit about weaponry during her marriage to the arms merchant, Mandl.

Hedy knew that "guided" torpedoes were much more effective hitting a target, a ship at sea for example. The problem was that radio-controlled torpedoes could easily be jammed by the enemy. Neither she nor Antheil were scientists, but one afternoon she realized "we're talking and changing frequencies" all the time. At that moment, the concept of frequency-hopping was born.

Antheil gave Lamarr most of the credit, but he supplied the player piano technique. Using a modified piano roll in both the torpedo and the transmitter, the changing frequencies would always be in synch. A constantly changing frequency cannot be jammed.

They offered their patented device to the U.S. military then at war with Germany and Japan. Their only goal was to stop the Nazis. Unfortunately or predictably, the military establishment did not take them or their novel invention seriously. Their device was never put to use during World War II.

Spread Spectrum for Hobby Use
The last couple of years have seen the emergence of spread spectrum technology for use in radio control hobbies. The company leading the pack in this field is Spektrum. Initially the technology was being using with radio controlled cars and the park fliers, more recently however the company has developed 6 and 7 channels radios that are being marketed as a direct competitor for the radios that most of us are currently using. In fact the company's web site features testimonials and examples of some very large models competing successfully at American events.

Other companies have recently started to produce similar radios in the 2.4GHz band; however currently there are no standards for this type of equipment and because of the proprietary way that Spektrum has implemented the technology there is unlikely to be in the future. This means

that Spektrum receivers will only operate with Spektrum transmitters however the nature of the technology is such that different manufacturer's equipment although working on the same band will not interfere with each other. Time will tell I guess. The M.A.A.A last year approved the use of this equipment and I have included the section of the M.A.A.A manual of procedure that covers these frequencies at the end of this article. You may be interested to know that these procedures were written by SRCS's Mike Close. Of interest in this document is the section that states that individual clubs have the right to restrict the use of 2.4GHz so it will be interesting to see how quickly this technology is adopted in Australia. Also worth noting is that Spektrum have developed transmitter modules that will plug into other manufacturer's radios that will convert them to use this technology. To date I have only seen these available for car transmitters by JR, Futaba and Airtronics however they may soon manufacture these for our aircraft transmitters making the transition to this technology less expensive.

I have included some information that describes the way the technology works, I sourced this from the Spectrum web site so apologies if it sounds like a sales pitch at times however it is interesting and very clever technology.

Spektrum's DSM Technology

In development for over four years, Paul Beard designed Spektrum's DSM 2.4GHz Spread Spectrum Technology. The DSM 2.4GHz Spread Spectrum Technology utilizes Direct Sequencing Spread Spectrum technology that has been optimized for RC use. Unlike current narrow band 27 and 75MHz systems, Direct Sequencing Spread Spectrum or DSSS generates a wide signal on a single frequency, and information is encoded with its own Globally Unique Identification number (called GUID) such that the receiver only recognizes the information from its specific transmitter. And with over 4.2 billion available GUID codes, it is virtually impossible for a receiver to be controlled by anything other than its mating transmitter. Spektrum calls this optimized form of modulation DSM-Digital Spectrum Modulation.

The Spektrum DX7 7 Channel Computer Radio

FHSS VS. DSSS

There are two primary types of Spread Spectrum technology- Frequency Hopping (FHSS) and Direct Sequencing (DSSS). FHSS systems transmit a narrow band signal and rapidly jump from one frequency to the next spending a few milliseconds on each frequency. DSSS systems transmit on a single selected frequency but on a very wide band. Only a small portion of that band is used for specially encoded information. Originally, Spektrum engineers started their development with FHSS-based systems because they were relatively easy and inexpensive to develop. However, it was soon discovered that FHSS had several limitations that would prevent it from being the optimal solution for RC.

While more difficult and costly to develop, engineers began experimenting with Direct Sequencing Spread Spectrum and optimized the modulation scheme to overcome critical response and re-link issues. In addition, DSSS offered 18dB increase of processing gain for significant improvements in range. With years of development and testing the DSSS modulation scheme was optimized for RC car use and Spektrum's DSM 2.4GHz Spread Spectrum Technology was born.

How DSM Works

Collision avoidance eliminates the possibility of more than one Direct Sequencing Spread Spectrum system from transmitting on the same frequency. Here's how it works: When the transmitter is turned on, the system scans the 2.4GHz band looking for an open channel. 79 channels are available. When an open channel is found, the system locks in and transmits on that channel. This process takes about 2 seconds. In the unlikely event an open channel is unavailable, the transmitter continues to scan without emitting a signal until an open channel becomes available. The transmitter will remain on that selected channel until it's turned off. Each individual module is factory programmed with its own unique serial code called GUID (Globally Unique Identification code). Once a receiver is programmed to a specific module (called binding) the receiver will only recognize that module ignoring signals from any other sources. And with over 4 billion possible GUID codes, it's virtually impossible for a receiver to listen to anything other than its bound transmitter.

When the receiver is turned on, it scans the 2.4GHz band and searches for its specific transmitter's encoded signal. When found, it locks in on that channel. If the signal is lost, the receiver goes into a hold mode, positioning the servo to a preset fail-safe position until the signal is reacquired. If the receiver is turned on before the transmitter, it will continuously scan the band until the encoded transmitter signal is present. During this period, the receiver drives the servos to the preset fail-safe position. All Direct Sequencing Spread Spectrum systems are required by the FCC to incorporate active collision avoidance, making it impossible and illegal for more than one transmission on a single frequency.

SM1001 DSM Module
Designed to plug into existing Futaba Radios

Binding

Each module has it own unique code (called GUID). The receiver must be programmed to a specific module so that the receiver will only recognize that module, ignoring signals from any other sources. This process called binding is push-button-easy and takes only about 30 seconds. During the binding process the servo fail-safe positions are also set. It's necessary to bind the receiver to the module during first installation and is recommended when the receiver is moved from one car to another. Multiple receivers can be bound to a single transmitter module, common when using one transmitter to operate several models.

M.A.A.A 2.4 GHz EQUIPMENT POLICY

1. INTRODUCTION

This frequency band specified for this application in Australia covers the frequency range 2.4000 GHz to 2.4835 GHz.

The use of the 2.4 GHz band for model aircraft is a developing technology and as such this document provides the current M.A.A.A. Policy and Guidance. However it is to be expected that as development continues and experience is gain that it will be subject both to refinement and possibly significant changes.

2. REQUIREMENTS

The M.A.A.A. requires that the equipment used for the control of model aircraft using frequencies in the 2.4 GHz band complies with the requirements of the Australian Communications and Media Authority (ACMA) and the relevant Class licence,

Radiocommunications (Low Interference Potential Devices) Class Licence 2000. This is available from the ACMA and is posted on their web site http://www.acma.gov.au

Only equipment that is specifically approved by the M.A.A.A. for aircraft use is permitted. A list of the M.A.A.A. permitted equipment is included in this document as Appendix A. In addition, this equipment shall not be used outside any limitation on the approval stated in Appendix A.

The equipment shall be used in accordance with the manufacturer's instructions.

The M.A.A.A. does not require that any additional testing is undertaken on approved equipment. However to ensure compliance with the Class Licence and the Australian Radiocommunications Standards the equipment shall be identified as being traceable to those Standards by the application of an Australian "C Tick". The "C-Tick" is a logo attached to the equipment that shows that the supplier takes the responsibility for compliance with, and traceability to, the Standards.

The pilot cannot control the actual frequency of operation as it is determined by the technology used within the equipment. However the M.A.A.A. still requires that a keyboard, or similar system, identifies who the individual users of this band are. It is recommended that Clubs use a similar system to the one used by them for the other approved frequency bands, whether this is a Silvertone© type keyboard system or otherwise. This will just identify the name of the owner of transmitters actually either in use or ready for use.

The maximum number of transmitters to be available for use under this system at the same time is not to exceed ten. The reason is that at some time in the future the technologies used may mean that the maximum number is limited by the actual technology. Whilst with currently approved equipment this specific number is conservative in most environments, this limit should also ensure that there is no practical limitation on the actual number operating at any given time.

3. GUIDANCE

Whilst not part of the M.A.A.A. Requirements, the following information is provided to assist users of this class of equipment.

1. Not all equipment currently supplied for model use is suitable for model aircraft. Equipment that is suitable for model aircraft may have different standards of performance.
2. The band is a common user band. This means that many applications can use the same frequencies including, but not limited to, computer networks, hands-free phones, data links, as well as other model applications.
3. The maximum output power allowed by the class licence means that applications in this band are restricted to local areas.
4. The Class Licence and Supporting Radiocommunications Standards require that the technology incorporates 'collision avoidance'. This means that the frequency that all equipment uses is determined by the technology in a way that should not allow it to interfere with other equipment operating in the immediate area. This significantly reduces the possibility of interference including of course between the systems controlling model aircraft, but it is always possible that interference can occur particularly if models are flown toward other interference sources.
5. Because every time a system is switched on the actual frequencies in use both locally and in the general environment may be different, the possibility of interference may vary each time the equipment is used.
6. The actual technology used to achieve satisfactory performance both with model aircraft and to achieve 'collision avoidance' will vary between equipments. The difference may be very significant. The performance of different equipment designs may therefore vary considerably.
7. Equipment that is different to the one you are using, whether for models or another applications may have a much greater or lower range, due to actual output power or the

gain of the antenna. Whilst the maximum output power is specified in the class licence, fixed systems in particular, may use antennas which provide a much stronger signal in specific directions.

8. Aircraft modellers should be aware of possible sources of interference and look out for evidence of it happening.
9. Any suspicion of interference should be investigated, particularly if a pattern develops such is in a particular direction or with particular types of equipment. It should be remembered that for the reasons stated in 5 above there may be a pattern even if the interference does not occur every time a system is operated.
10. Clubs have the right to restrict the use of 2.4GHz, particularly where sources of interference have been identified.
11. Because of the wavelength of the radiated signal from the transmitter to the receiver, there is more likely to be interference caused by metal or carbon fibre components in the airframe than with the lower frequencies used up to now. Whilst the technology may overcome the interference to some extent the user has to be aware of the possibility of "on board" generated interference. In the event that the airframe contains either significant amounts of carbon fibre or metal, or if the modeller suspects there might be a problem, then testing the range in various directions from the model whilst on the ground and comparing the range with the same antenna arrangement, at the same height and orientations, but outside the model is a wise precaution.
12. In the event of a modeller suspecting that there is a problem with the performance of his/her particular equipment then he/she should take it to a manufacturer approved repair station for investigation.
13. As the technology advances, and as experience of operation is gained, the advice and requirement may change.

Stephen Liseo

Sources

http://www.wikipedia.com
http://www.spektrumrc.com.au
http://www.modelflight.au
http://hypatiamaze.org/h_lamarr/scigrrl.html