Introduction

There are new transmitters coming onto the New Zealand Market and this document sets out the policy for their use, as well as being a small tutorial to aid the understanding of how they work. There are two main types, DSSS and Synthesised.

DSSS (Direct Sequence Spread Spectrum) At the date of this document, there is only one on the NZ market, the Spektrum , but it is expected to be more in the near future. The NZMAA supports the use of DSSS radio control equipment in New Zealand provided that it conforms to the current Radio Spectrum Management regulations. See http://www.rsm.govt.nz/licensing/gurls/gurl-srd.html

1. While they do not need a peg, and the channel concept is irrelevant, some clubs may require modellers to continue to use a "dummy" peg, so that modellers retain good peg habits If this is the case, the local instructions must be followed.

2. Their use does not invalidate our insurance

3. Right now, they are short-range systems and the manufacturer strongly recommends their use in park flyers only. They must be used in accordance with the manufacturer 's recommendations. However, there has just been a much longer range version announced via press release. The range is not known, but, once again, strictly follow the manufacturer 's recommendations.

4. The probability of mutual interference increases somewhat with increasing numbers in use. However, other more practical air-space limitations will generally set an upper limit for models flying, this limit will be set by the local club, having consideration for it's environment. The manufacturer states they have had 30+ operating simultaneously. Most clubs do not allow more than 6 A/C in the air at one time, due to the rapidly increasing risk of mid-air collisions.

5. The manufacturers claim they are interference-free. That is not absolutely correct, but it is unlikely that any realistic interfering environment will affect the Spektrum system. Note that the system selects, more or less randomly, two unused spread-spectrum channels (out of 79 available) every time it is powered up. So the opportunities for interference will change depending upon the site and other 2.4 GHz systems in local use, and may well vary every time the system is switched on.

Frequency Synthesised transmitters.

There are a number of these coming onto the market, and are essentially of two types.

1. Where they are integral to the transmitter and are controlled by it's embedded software. Typically these take a two-step process before any emissions occur, i.e., the first step is to advise the operator which channel will be used. The second step is for the operator to enable the transmission. These systems tend to be used in older, more expensive transmitters.
2. The second type, and newer, is a stand-alone module that is designed to replace existing single-crystal modules. These can essentially be regarded as "dial-a-crystal" modules. They typically have two or more small channel select switches to set the channel to be used. The channel setting information is normally read only as they are powered-up. Ie, it is not possible to change channels while the transmitter is turned on. Typically the switches are marked in Channel numbers to one of 4 generally accepted standards and these are

- European. Channel 55 (34.950MHz) to Channel 90 (35.300MHz) at 10 kHz intervals. Note, NZ, like some European countries, do not operate below Chan 60 ie, 35.000 MHz
- USA Channel 11 (72.010MHz) to Channel 60 (72.990MHz) at 20 kHz intervals
- Japan/Asia Channel 51(40.510MHz) to Channel 93 (40.930MHz) at 10 kHz intervals
- Australia Channel 601 (36.010MHz) to Channel 659 (36.590MHz) at 10 kHz intervals

3. This can be a cause of confusion as different frequencies can use the same channel number, furthermore none of the channel numbers align with the NZMAA ones. Note that many other different regional numbering schemes exist as well (South Africa, France, European 40MHz surface, USA 75MHz surface use, USA 50 and 53MHz Ham use are some examples)

4. For convenience, Appendix 1 contains a chart of the 4 standard channel numbers, actual frequencies and their NZMAA equivalent channel numbers.

5. Synthesised frequency equipment will give you much greater flexibility in your frequency selection but it also has more opportunities for errors and you should take great care if you use such equipment. Remember that most people you are flying with will not have the same facilities and your operations must fit in with what is accepted as normal operating procedures.

6. You must have a separate transmitter flag, marked with the channel for every frequency that you are prepared to use when you change frequencies.

7. You must take extra care when using the frequency control system, as your opportunities to reserve the wrong frequency will be much greater. Special checks and procedures will be in place at the Nationals, rallies, MANZ meetings and any other event where the public may be present, and these are listed in Appendix 2.

8. Until use of this type of equipment becomes common, you may find that the ability of your transmitter to select any frequency will be viewed with suspicion by some and, in the event of interference being suspected you will find that you are the first person checked. The only way to avoid problems is to be scrupulously careful in your operations. If there is a suspicion that you might transmit on the wrong frequency, it is very strongly recommended that you ask another modeller to perform an independent check.

9. Although synthesised sets have the potential in the long term to be more reliable and cheaper to produce than plug-in crystal sets, remember that they still use a master crystal in the transmitter module and the receiver and that any crystal will drift in frequency over time. You should take any opportunity made available by the NZMAA to have your transmitting frequency checked, as a master crystal drifting will affect all the other frequencies synthesised from it. Curing the problem will be a job for the technician/importer/manufacturer with precision test equipment.

10. Some synthesised modules are known to be prone to interference from cellphones. Therefore a minimum RC transmitter-cellphone separation of 2 metres shall be kept at all times. It is neither necessary nor desirable to have an outright ban of cellphones at flying fields. Some modellers have to be in contact, or on-call, as a condition of employment. Furthermore they can be a valuable means of calling for help should an accident occur. The NZMAA can assist in advising which modules are known to be troublesome.

11. At all times, the operator of a synthesised RC transmitter shall be strictly liable for the frequency selection and correct use of the NZMAA frequency control system.

12. The Radio Spectrum Management regulations governing the use of model control frequencies may be viewed at http://www.rsm.govt.nz/licensing/gurls/gurl-aero-model-control-srd.html

13. Regardless of the transmitter type, transmitter pounds should be used wherever it is practical to staff one. Generally their use will be mandatory at the Nationals, rallies, public displays and MANZ events.

Appendix 2

Refer spreadsheet “Foreign to NZ Freq Converter”

Appendix 2
Special checks and procedures for synthesised transmitters

Check In/Scrutineering

1. A pilot's briefing will emphasise the extra care that needs to be taken with synthesised modules. There are two quite distinct dangers that both users, and safety officers, must always be aware of. One is the ease with which changes can be made. The other is that the displayed channel will not be the same as the NZMAA one.

2. Modellers are warned that some synthesised modules are known to be prone to interference from cellphones. Therefore a minimum transmitter-cellphone separation of 2 metres shall be kept at all times.

3. Such transmitters must be presented to the transmitter pound for a frequency verification check. To prevent a model being “shot-down” by a synthesised transmitter being powered up on some indeterminate frequency, no other A/C shall be flying while this process is taking place.

4. Safety Officers/transmitter pound staff should note that only “FM” modules will read approximately correctly on a frequency counter, and even then, an apparent “error” of 1-2 kHz may be observed (It will be different for “PPM” or “PCM”). This is normal, and is not an error. An AM set (although no AM synthesised modules are yet known of) will NOT read correctly on a frequency counter.

5. It is very strongly recommended that the pilot assists this process by presenting the manufacturer’s instruction booklet to show that he/she knows the frequency of operation, and can select this without error.

6. If it is apparent to the safety officer that the modeller has inadequate knowledge of how to select frequencies reliably and safely, he may order that modeller not to operate that transmitter or module.

7. Modules shall only be those approved by the transmitter manufacturer. In nearly every case it will be the one supplied by the transmitter manufacturer.

8. On successful verification of the frequency of operation, a sticker will seal the frequency selectors, and the frequency shall be written on the sticker.

9. The Safety Officer shall keep a register of all synthesised transmitters being presented. This register can be a notebook, but must record the date, transmitter type, owner and frequency of operation, as a minimum.

After Check-In

10. A modeller may change channels during the day, but they must repeat the check/sealing process detailed above. Extra care must be taken during this time to ensure that nobody is flying on either the old or new channels during this time. The transmitter antenna must be removed if possible, if this is not possible, the check must be performed when nobody else is flying in that band.

11. Any change in channel must be recorded in the register.

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