MCRCF FREQUENCY POLE

What It Is And How To Use It

The Frequency Pole is our club mechanism for ensuring a simple control against local radio frequency interference during operations at the flying field. The objective is to prevent the chance of being electronically shot down while in-flight.

Only "GOLD STICKERED" (radios made after 1991) AMA compliant transmitters and receivers are allowed at the club field. An exception to this is "HAM" radio equipment designed for remote control of aircraft operating in the 50-MHZ band. Only licensed (HAM) radio operators are allowed to use this type of equipment.

Radio frequency interference can come about when two or more model aircraft radios are transmitting concurrently on frequencies that happen to cause inter-modulation effects at the receivers. MCRCF rules allow that no more than three people may concurrently use active radio operation at the field . Generally, R/C modelers understand the sense of not trying concurrent operations on the same frequency (channel) as another aircraft in flight. Yet, radio interference can also occur, when three pilots are operating at the same time on different frequencies that just happen to be at a critical spacing apart. There are two main causes of such interference, i.e., second harmonic interference modulation (2IM), and third order harmonic interference modulation (3IM). Detailed technical information on these can be obtained in other publications. A method has been devised to avoid this problem by each member taking responsibility to use the Frequency Pole.

3IM Pattern Computation:
It has been shown that interference can result from concurrent operations with a particular pattern of separation among the three channels in operation. The other two transmitters could cause third-order harmonic interference modulation (3IM) on your channel. A chart is provided below that lists for even - (OWB) numbered channels that could cause the 3IM problem. Put the data for your channel number on your frequency pin and keep it with your transmitter. You can use the the computation method on the chart for other channels not given on the chart. Simply multiply the first channel by two, then subtract the second channel number, next multiply the second number by two, and subtract the first --- if either calculation resulted in your channel number, " YOU SHOULD STAY ON THE GROUND".

3RD ORDER HARMONIC INTERFERENCE CHART

For: Channel 12	For: Channel 14	For: Channel 16	For: Channel 18	For: Channel 20	For: Channel 22
14 - - 16	16 - - 18	14 - - 12	16 - - 14	16 - - 12	18 - - 14
16 - - 20	18 - - 22	18 - - 20	20 - - 22	18 - - 16	20 - - 18
18 - - 24	20 - - 26	20 - - 24	22 - - 26	22 - - 24	24 - - 26
20 - - 28	22 - - 30	22 - - 28	24 - - 30	24 - - 28	26 - - 30
22 - - 32	24 - - 34	24 - - 32	26 - - 34	26 - - 32	28 - - 34
26 - - 40	26 - - 38	28 - - 40	28 - - 38	30 - - 40	30 - - 38
28 - - 44	28 - - 42	30 - - 44	30 - - 42	32 - - 44	32 - - 42
30 - - 48	30 - - 46	32 - - 48	32 - - 46	34 - - 48	34 - - 46
32 - - 52	32 - - 50	34 - - 52	34 - - 50	38 - - 56	38 - - 54
34 - - 56	34 - - 54				

For: Channel 24	For: Channel 26	For: Channel 28	For: Channel 30	For: Channel 32	For: Channel 34
18 - - 12	20 - - 14	20 - - 12	22 - - 14	22 - - 12	24 - - 14
20 - - 16	22 - - 18	22 - - 16	24 - - 18	24 - - 16	26 - - 18
22 - - 20	24 - - 22	24 - - 20	26 - - 22	26 - - 20	28 - - 22
26 - - 28	28 - - 30	26 - - 24	28 - - 26	28 - - 24	30 - - 26
28 - - 32	30 - - 34	30 - - 32	32 - - 34	30 - - 28	32 - - 30
32 - - 40	32 - - 38	34 - - 40	34 - - 38	38 - - 44	38 - - 42
34 - - 44	34 - - 42	38 - - 48	38 - - 46	40 - - 48	40 - - 46
38 - - 52	38 - - 50	40 - - 52	40 - - 50	42 - - 52	42 - - 50
40 - - 56	40 - - 54	42 - - 56	42 - - 54	44 - - 56	44 - - 54

For: Channel 38	For: Channel 40	For: Channel 42	For: Channel 44	For: Channel 46	For: Channel 48
26 - - 14	26 - - 12	28 - - 14	28 - - 12	30 - - 14	30 - - 12
28 - - 18	28 - - 16	30 - - 18	30 - - 16	32 - - 18	32 - - 16
30 - - 22	30 - - 20	32 - - 22	32 - - 20	34 - - 22	34 - - 20
32 - - 26	32 - - 24	34 - - 26	34 - - 24	38 - - 30	38 - - 28
34 - - 30	34 - - 28	38 - - 34	38 - - 32	40 - - 34	40 - - 32
40 - - 42	42 - - 44	40 - - 38	42 - - 40	42 - - 38	44 - - 40
42 - - 46	44 - - 48	44 - - 46	46 - - 48	44 - - 42	46 - - 44
44 - - 50	46 - - 52	46 - - 50	48 - - 52	48 - - 50	50 - - 52
46 - - 54	48 - - 56	48 - - 54	50 - - 56	50 - - 54	52 - - 56

For: Channel 50	For: Channel 52	For: Channel 54	For: Channel 56
32 - - 14	32 - - 12	34 - - 14	34 - - 12
34 - - 18	34 - - 16	38 - - 22	38 - - 20
38 - - 26	38 - - 24	40 - - 26	40 - - 24
40 - - 30	40 - - 28	42 - - 30	42 - - 28
42 - - 34	42 - - 32	44 - - 34	44 - - 32
44 - - 38	46 - - 40	46 - - 38	48 - - 40
46 - - 42	48 - - 44	48 - - 42	50 - - 44
48 - - 46	50 - - 48	50 - - 46	52 - - 48
52 - - 54	54 - - 56	52 - - 50	54 - - 52

Frequency Channels to avoid -

DO NOT USE the following channels:

Channels 20 & 21 --- This avoids interference with TV channel 4.

The following channels should be avoided:

Channels 13, 14, 33, 34, 38, 46, and 56 ---- These are adjacent to the strongest "pagers" detected in the local area. There is no definite indication of a regular problem on any of these channels, but why tempt fate unnecessarily?

The Frequency Pole is always located on the southern side of the transmitter impound area located in the pits. Club members are expected to put their "frequency pin" on the Frequency Pole. This provides a way of identifying who is actively using a certain radio frequency channel or is awaiting a turn to use it. In addition to the frequency pin display a second channel number is required to be displayed on the transmitter in use.
This is in accordance with AMA and MCRCF rules.

The frequency pin is supplied by the club secretary and shall be appropriately endorsed and stamped for approved current membership, AMA membership and approved pilot status. Frequency pins for all channels used by a member may be obtained from the Club Secretary or the Director of Membership. The members name and AMA number must appear on the pin. The pin, for example, may be glued to a card approximately 3 inches square and adhered to a clothes pin for ease of use and display.

If you are not the first one using a radio at the field, put your frequency pin under the bottom-most pin on the vertical part of the frequency pole, i.e., in the next available spot and put your transmitter on the impound shelf located on the gazebo. For the example shown in the attached figure, you would put your pin under number **16.**
You may not turn on your radio for any reason until your pin reaches one of the three spots on the green top horizontal bar or the one spot on the yellow horizontal bar.

The yellow bar is reserved for one pin whose owner needs to make engine or radio equipment adjustments. There are special rules for yellow bar operation, as follows:

1. No frequency conflict can be allowed between any channels indicated on the green bar and the one for yellow bar operation.

2. Transmitter must have its antenna fully collapsed during yellow bar operation.

3. Yellow bar operation should not extend more than 15 minutes, i.e., the time for one average flight. Longer periods are permitted providing other pilots are not waiting to use this feature.

4. During their yellow bar operation, pilots must be physically away from spectators and any other active flyers.

When one of the flyers finishes a flight and turns that radio "OFF", that pilot must remove the frequency pin for that radio channel from the green bar. That pilot may put his pin down the frequency pole at the next available spot, i.e., under #16. For the next pilot waiting to fly, in this example #24, after checking for any frequency interference, the next pin in line may be moved to the horizontal green bar. The whole process is repeated in this manner for other flyers.

DO NOT FLY UNTIL THIS PROCESS IS FULLY UNDERSTOOD.

If you have questions, ask a club officer or training instructor for assistance.

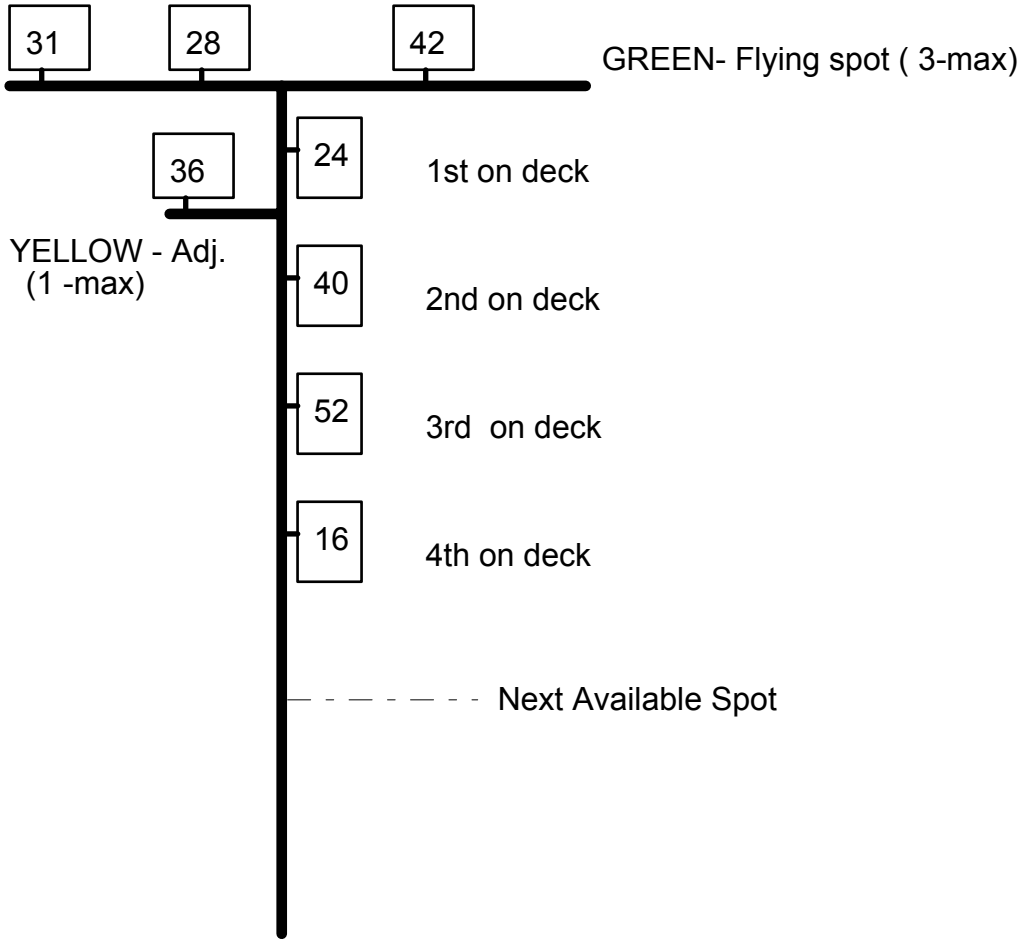

Figure 1. MCRCF FREQUENCY POLE