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AMA NEWS

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AMA PETITION TO FCC ASKS FOR 30 RC FREQUENCIES

Following a year of intensive effort, the AMA Frequency Committee has developed a broad-based proposal to the Federal Communications Commission, covering anticipated RC frequency needs for now through 1990. The effort has involved coordination with the RC industry, model car and boat organizations, and model groups in other countries.

The basic draft of AMA's proposal is published here, as it was circulated to the industry and other interests. The final version submitted to the FCC may be slightly different, but is not expected to have any major revisions since much preliminary coordination with other groups had already been accomplished.

By past experience it is hoped that FCC action will be forthcoming before the end of 1979—it typically takes about a year for petitions to go through the governmental rules change process. When that process begins AMA will advise all RC'ers how they can respond to the FCC to support the petition. In the meantime, it should be appreciated that a considerable amount of AMA volunteer and headquarters time went into developing this proposal, involving much legal counseling and discussions with FCC officials. It's a complicated process which requires and depends upon the AMA, as a national association, to bring together all the inputs and resources available to present a composite petition embracing all interests. The text of the AMA proposal follows. Not included, however, due to limited space, are many attachments which will be submitted to the FCC in support of various points made in the proposal.

The Academy of Model Aeronautics, Inc. hereby requests the Federal Communications Commission to allocate additional frequencies for use for the remote control of models. The period of concern is from the present (1978) to 1990. The Commission in the past has fashioned its modeler frequency allocations in response to crisis requests on the part of the AMA, without any effort on the part of AMA or the Commission to fashion a long-range, enduring resolution to the modeler frequency requirement that would take into account both the partial frequency relief, previously accorded in response to ad hoc crisis requests, and the continuing growth in RC model activities. The present petition seeks to remedy that situation and to effect a long-range solution to the modeler frequency requirement.

The present and proposed picture concerning frequency allocation for model planes, cars, is graphically illustrated in Figs. 1 and 2. In addition it should be noted that the petition proposes to allow the use of narrow band FM on all RC frequencies and this in itself offers the means to provide more channels in less space in order to permit further expansion to accommodate continued growth of the activity.

In support of this petition the following is offered:

1. The AMA is the governing body for model aircraft activities in the United States. Its membership, which has doubled in the past six years, in mid-1978 was 71,000, of which approximately 75% regularly fly radio controlled model aircraft under licenses issued by the Commission. Furthermore, as the United States representative of the Federation

Aeronatique Internationale (FAI), the Academy is concerned with radio control (RC) activities worldwide as well as those within the United States. It should also be noted that approximately 10% (over 5,000) of the AMA's membership is composed of youngsters below the age of 19 but above the FCC's minimum age requirement of 12 years for the Radio Control Service.

2. RC activities began in the 1930's and have grown into a recognized sport with an estimated 250,000 modelers in the United States who use approximately half a million transmitters to control model planes, boats and cars by radio. An industry with an annual sales volume of over \$200 million per year has developed to supply the electronics, kits and related accessories to RC modelers. The electronics part of this industry has pioneered and refined RC equipment, which has been copied throughout the world. Because operation of RC models is, by necessity, limited to short range, line-of-sight circumstances, low power (i.e., one watt or less) transmissions have proven quite adequate in the absence of interference. Hence, interference to other radio services from RC transmitters has been essentially zero, with no known complaints to the FCC based on RC operations. This is verified by a supporting letter of February 3, 1978 from the Chief of the Commission's Field Operations Bureau.

3. At the present time, virtually all RC activities are conducted under license by the Commission in the Radio Control (RC) Service (formerly the Class C Citizens Radio Service). In the RC Service, licensees are permitted to operate on six 27 MHz channels and

seven 72 MHz channels. Both frequency bands are increasingly subject to interference.

27 MHz Operations

4. Five of the six channels available in the 27 MHz band are interleaved with the Citizens Band (CB) Radio Service (formerly the Class D Citizens Radio Service); and the remaining channel is shared with CB operations; the latter generally operating at higher power, making the channel useless for RC operations. In previous filings, the AMA has advised the Commission of the numerous instances in which licensees in the CB service have participated in "shooting down" model aircraft in flight by intentionally transmitting on the RC channel used by the modelers (in violation of the Commission's Rules) or by using such strong signals on the adjacent channels that the low power signals of the RC transmitters (generally in the neighborhood of several hundred milliwatts) are overcome by the adjacent channel signal with resulting loss of model aircraft. These cases are well documented in previous filings with the Commission. In support of the statements in this paragraph, documents are attached, to provide emphasis concerning the safety and economic factors caused by RC interference problems. The RC interference situation is far more serious than those associated with communications which tend to be more annoying than damaging or physically injurious.

5. The 27 MHz band was the birthplace of RC operations and many countries have allocated 27 MHz channels for RC operations because of the pioneering efforts of U.S. modelers in that band. Since the 27 MHz band is used in many international model aircraft meets, suitable operating rights in this portion of the spectrum are of importance to the model aircraft fraternity and should be preserved.

6. Nevertheless, the AMA believes that the illegal CB operations will eventually drive RC activities away from the 27 MHz band and that alternate frequencies will have to be found. Furthermore, other countries are beginning to move away from the 27 MHz band frequencies due to interference problems similar to those experienced in this country.

7. The potential—and in most major population areas the de facto—loss of the 27 MHz frequencies has been the chief stimulant to the search for new RC frequencies. Interference from CB operations to RC models was given serious consideration in FCC Docket 20120. The Commission noted, in its Report and Order, 60 FCC 2d 762, 38 RR 2d 97 (1976) that:

"We believe that, eventually, alternate frequencies must be found to supplant the pre-

RADIO CONTROL (R/C) SERVICE—FREQUENCY ALLOCATIONS FOR MODEL PLANES, CARS, BOATS

Fig. 1. PRESENT (1978) — Total R/C Channels — 12

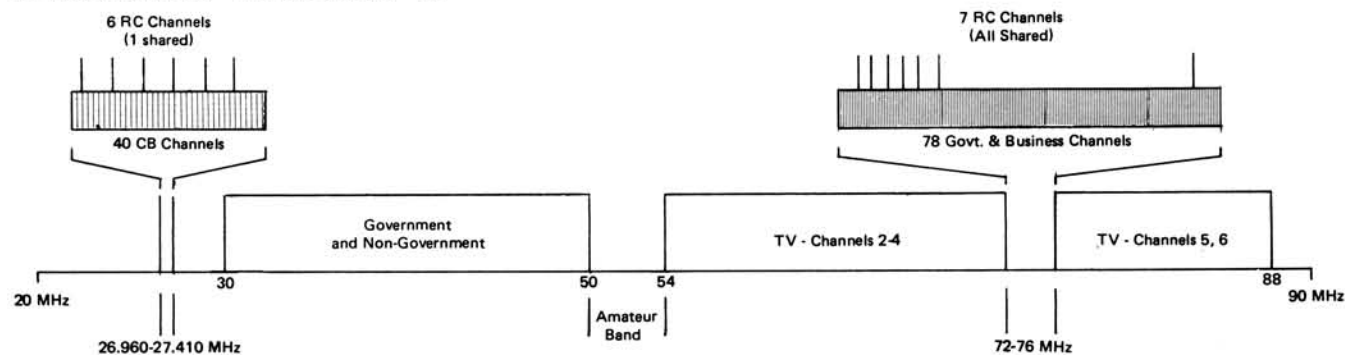
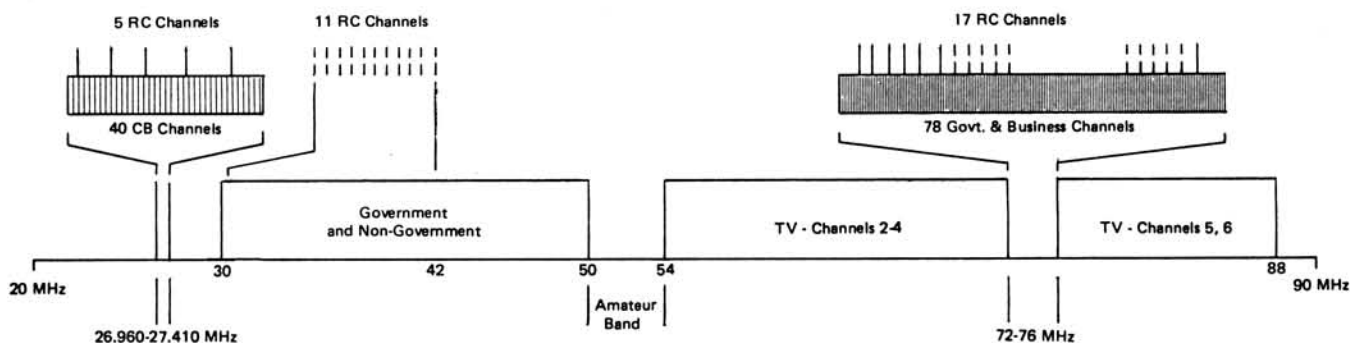


Fig. 2. PROPOSED (1979-1990) — Total R/C Channels — 30 (less if exclusive, more if shared). Includes Present Plus Additional Shown as Dashed Lines.



sent 27 MHz Class C Allocation because of the increasing problems of interference by Class D users to Class C radio control operations." (Emphasis added by AMA.)

8. Since 1976 the use of 27 MHz for radio control has been steadily diminishing. Most manufacturers have ceased production of 27 MHz RC equipment; and service for existing equipment is becoming difficult to obtain. In most parts of the country CB interference has resulted in abandonment of 27 MHz for RC. Where RC operation has continued on 27 MHz most users are now model boat or car operators; relatively few use such equipment for model aircraft since the safety problems for the latter are more serious. Thus, it is obvious that 27 MHz, at least for model aircraft, is a rapidly fading area of activity.

72-76 MHz Operations

9. Because of the problems with the 27 MHz frequencies discussed above, the AMA petitioned the Commission for and was granted access to five frequencies in the 72 MHz band in 1966; two additional 72 MHz frequencies were added in 1971. The 72 MHz assignments are located between TV channels 4 and 5 and are available only on a shared basis with operational fixed stations in other radio services, such as industrial and land transportation users, operating in that band. Four frequencies are available only for control of model aircraft while the remaining three are available for use by any modeler, including those operating model cars and boats.

10. The 72 MHz assignments are not exclusive RC allocations, since each of the seven RC frequencies is available to operational fixed stations in other radio services—operational fixed stations which may operate with transmitter output powers up to 300 watts. This is in sharp contrast to the several hundred milliwatt power level generally employed by the aircraft modelers. Furthermore, the modelers have no recourse when interference develops since the FCC rules provide that RC use of 72

MHz channels is secondary to operational fixed uses.

11. In many areas, RC sharing with fixed stations is no problem. But in many of the larger urbanized areas, industrial and other licensees are turning to use of 72-76 MHz frequencies for point-to-point operations. Additionally, licensees in the Manufacturers, Special Industrial and Railroad Radio Services may use 72 MHz frequencies for low power mobile, telemetry and remote control systems.

12. The increased land mobile service use of 72-76 MHz frequencies makes sharing of the band by modelers more difficult, if not impossible in some cases. In some cities, such as Houston, Texas and Tampa, Florida, only a few of the seven 72 MHz RC channels theoretically available may be used, due to high power operational fixed sharing; an apparent new trend caused by recent FCC allocations. Although exclusive frequencies are far more desirable, and such exclusive allocations are requested where possible, modelers have no objection to sharing frequencies with other like radio users. Indeed, the use of radio is increasing at a rate that makes it extremely difficult for any particular group to acquire or retain exclusive frequencies in the lower frequency ranges. However, any sharing, to be tolerable, must be among groups having compatible operations. If power levels used by all licensees are of the same order of magnitude, modelers would be willing to share with other radio users.

53 MHz Operations

13. Some modelers are also licensed radio amateurs and use Amateur frequencies in the 53 MHz band for model control activities. A recent survey by the American Radio Relay League showed 3% of amateurs engage in RC activities. Projected on the current total of 328,000 Amateur Radio Service licensees, as many as 10,000 amateurs may operate RC equipment. Not all 10,000, of course, use 53 MHz equipment, as many may also hold an

RC license and may prefer to conduct their RC operations on a 72 MHz channel.

However, 53 MHz users represent the more technically oriented modelers for whom an Amateur license has uses beyond radio control. Most modelers do not wish to devote time to the study of Morse code and radio theory in order to obtain an Amateur license; these subjects are not necessary to the pursuit of the basic activity—radio control of models—which requires their full attention. Thus, the requirements for an Amateur license, based on specialized skill in an area in which the modeler has no direct interest, have held down the number of RC enthusiasts operating on 53 MHz frequencies to a small fraction of the total.

Need for Additional Frequencies

14. The shared nature of the frequencies available to modelers couple with the illegal use of many of the prime RC frequencies by CB operators have combined to cause severe problems to modelers who wish to pursue their activity in a legal manner. The interference problem has been particularly severe at larger regional, national, and international meets which attract thousands of spectators and many competitors. The larger meets, which involve up to 300 RC entries, must be carefully organized so that two contestants are not transmitting on the same frequency at the same time—an incredibly difficult task with the small number of frequencies now available, especially when a large percentage of those frequencies cannot be used because of local interference, whether intentional or unintentional.

Virtually all model aircraft equipment operates on only a single frequency and it is not possible to quickly change a conflicting frequency. Severe interference on a given channel does not just inconvenience those fliers equipped with that channel—they cannot participate at all. This can be incredibly

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FCC PETITION (Cont. from page 65)

frustrating for a modeler, who may have traveled from the East Coast to a California national championship only to find that his single channel is unusable due to interference.

15. The real problem is simply that there are not enough usable RC channels available to satisfactorily accommodate the activity. The fact is that there are many reasons why all of the existing channels cannot be used at one time, except in rare situations. Because of this it has been determined—after considerable study by user groups—that the total number of frequencies to handle the long term need of the modeler fraternity (for the next 10 to 15 years) is judged to be 30, which would include the seven 72 MHz frequencies now available. This is based on several factors:

a. Enough contests have successfully used as many as 17 channels in recent years, by combining the 12 RC Service channels with several from the 53 MHz Amateur band, to demonstrate that there are many situations where many more channels could be utilized. Conversely, it is a fact that competition and even private model operating activity is being severely limited by the lack of enough usable channels.

b. More channels than can actually be used are necessary since past experience has shown that some of the allocated RC channels cannot be used in some areas due to local interference problems. As has been noted, the entire 27 MHz RC band is useless in most areas, due to illegal "sharing" by CB'ers. Likewise, the availability of channels is aggravated in many areas by legal shared use of 72 MHz frequencies where high power allocations render low power operation unsafe. Thus, unless channels can be made on a truly exclusive basis—the preferred situation for RC—more channels are needed for sharing situations than would be the case for a lesser number of **exclusive** assignments.

c. Based on steady growth of the number of RC participants over the past 10 years, with no signs of diminishing except for the interference problems which prevent more rapid expansion, more channels are needed—simply to accommodate the growth factor. Since the last channel allocations in 1971, the increase in RC activity has been at least 100%, as indicated by the increase in AMA members reporting over the past six years that they engage in RC flying. Thus, if 12 RC channels were satisfactory in 1971, then at least that many more again are needed now that AMA's membership has doubled since that time. Also, other RC model activities—boats and cars—have more than doubled during the same period. A doubling of the current number of RC channels, plus the existing amateur frequencies, would therefore not be unreasonably—the net result would still be more utilization per channel than existed in 1971.

d. There is a growing trend toward an increasing number of flying sites being established; very often near other such sites. Thus, there is a need to accommodate groups operating within interference range of each other. If enough frequencies are available, interference can be avoided by agreements between adjacent groups to use different sets of frequencies. In this manner, an increased number of RC channels would relieve another major problem facing modelers: the need for more operating sites. Given the present frequency availability, modelers must, for safety of operations, limit site locations to those separat-

ed by three miles or more from any existing site. This minimum mileage separation seriously restricts the number of sites which can be accommodated in a given area.

16. The most important single need for the long term is the allocation of "**interference-free**" channels for RC operations. This requirement is inherent in the characteristics of the RC activity wherein loss of control of the model, due to interference, may result in severe damage to property or personal injury. Interference-free operation can be best assured with exclusive channel allocations and the availability of such allocations can reduce the total number of channels necessary. Thus 20 exclusive channels may better serve modeler needs than the sharing of 30.

Additional channels shared with other low-power users are an alternative to exclusive allocations only if the sharing services are selected to minimize mutual interaction and if the total number of such channels are adequate so that even with many not useable in a given area enough others would be available to serve modeler needs. The fact that RC models are used only during the daytime, and mostly in non-industrial areas should make such a selection of shared users possible.

In any case, simultaneous use of a number of channels is required in virtually all RC activities, be it racing competition or merely a group of fun-fliers at the local flying field. Because of the nature of the activity, which makes it vital for each RC operator to use one channel without any sharing by another RC operator on the same channel, RC channels cannot be shared as for communications where several operators can talk at once. Thus for any group of RC participants the number of channels available will dictate how many can participate at the same time.

Note: 23 new channels (in addition to the current seven on 72 MHz) will permit the current five 27 MHz RC channels to be gradually phased out, perhaps within the five-year period the Commission has in the past allowed for amortization of equipment requiring replacement.

Potential New Frequencies

17. An extensive study by modeling leaders, which included visits and discussions with FCC personnel to obtain factual information, has concluded that probably no one frequency band is available to provide the 23 new RC channels needed. But a combination of several frequency groups may offer the solution. AMA's Frequency Committee has examined FCC frequency assignments in various frequency bands and, taking into consideration existing equipment which will continue to function for a number of years, the potential for interference in the bands examined and technical characteristics of the radio equipment, has developed some suggestions as to areas of the radio spectrum in which suitable RC frequencies may be located.

72 MHz Band

18. The AMA believes that at this time the most likely place for additional frequencies is in the 72 MHz band. Primarily this is because 72 MHz is now the most popular and heavily used band for RC activities and much 72 MHz equipment is available over the counter. Use of other frequencies in the same band would accordingly present minimal problems in making new or converting existing equipment, with careful selection of specific frequencies to be used, taking into consideration intermodulation, interference, image problems and

other such technical characteristics which may reduce the value of certain frequencies.

19. Since the main problem at 72 MHz has been the use of the same frequencies by high power stations in other radio services, the Commission's table of frequency allocations was examined to determine whether any 72 MHz frequencies could be found that are not available for high power use in any radio service. The search revealed that, under present FCC rules, the following frequencies are available only for low power (not more than one watt) assignments in the Special Industrial, Manufacturers and Railroad Radio Services: 72.44 MHz, 72.48 MHz, 72.52 MHz, 72.56 MHz, 72.60 MHz, 75.44 MHz, 75.48 MHz, 75.52 MHz, 75.56 MHz, 75.60 MHz.

20. These 10 frequencies would be most compatible with low power RC operations. Other 72 MHz assignments may also be shared for RC purposes if selected for minimum conflict with high power fixed systems. In some locations, where frequencies are already approved for high power operation, they may be suitable in many cases for modelers use, if a maximum number of such frequencies are authorized for RC so that various choices may be made to avoid interference problems in a particular area. In other words, if 20 such frequencies were made available on a nationwide basis, different combinations of up to 10 or so might be usable in various areas of the country, depending on local high power assignments. It should also be noted that as with the current sharing of 72 MHz RC frequencies for model plane, boat and car users, the same proportion of such sharing would be acceptable for any additional frequencies in this band.

30-42 MHz Frequencies

21. There are 11 "guard band" channels, each 10 kHz wide, that separate government and non-government assignments in the 30-42 MHz band. These 10 kHz slices of spectrum are presently not assigned to any radio service, but are available in many radio services on a developmental basis. The center frequencies of these guard bands are: 30.565, 31.995, 33.005, 33.995, 35.005, 35.995, 37.005, 37.995, 39.005, 39.995 and 42.005 MHz. Because of the tentative nature of developmental authorizations and the fact that the bandwidth available would not permit conventional FM voice use, there has been very little use of the frequencies to date. A search of the Commission's frequency assignment records shows only a few assignments on these frequencies.

22. The advantage of using 30-42 MHz frequencies is that much of the existing 27 MHz equipment, most of which is now unusable because of CB interference, can be converted to operate on these channels. Conversion of existing equipment by the modelers themselves would apparently not be possible due to the Commission's type acceptance rules. However, due to the large quantities of 27 MHz equipment, largely unusable by modelers due to interference problems, manufacturers may find it profitable to "retrofit" the equipment for 30-42 MHz operation, much as existing land mobile equipment was "narrow banded" after the various "channel splitting" frequency allocations of recent years. This is particularly likely if the 30-42 MHz retrofit is exempt from Type Acceptance procedure, with units to be certified that they meet criteria without formal application for each model: it is not reasonable to expect manufacturers to go through the procedure for previous equipment which were not originally required to be

Type Accepted. It should be noted that the very low power involved should minimize any problems from such retrofits.

The fact that there are now few, if any, assignments on these 30-42 MHz frequencies suggests that an allocation to the RC Service would have negligible effect on existing uses of the spectrum, while providing most welcome relief to RC modelers. On the other hand, there is limited information available to the public on government uses of the adjacent frequencies.

Meanwhile, AMA monitoring teams have "listened" to many of these frequencies in the Cleveland area, to provide a basis for recommending them for RC use: Seven frequencies were monitored for at least 70 hours each. Fourteen potential "image frequency" spots were checked for at least 24 hours each and the behavior of "guard band" neighbors were evaluated with most favorable results. The teams were most impressed with the "clean" nature of the guard band frequencies, which suggests good potential for RC use.

222-224 MHz Band

23. The 222-224 MHz band is shared by government and Amateur radio users. Perhaps 10 low power RC channels with 40 kHz spacing could be made available within that band, under the RC Service. However, any other users of these RC channels should be compatible with a one watt RC maximum power level.

24. The Commission had originally proposed a Class E Citizens Radio Service in this portion of the frequency spectrum. That proposal now seems to have been abandoned due to objections by the government to sharing with an undisciplined CB type service as well as objections from the Canadian and Mexican administrations. However, this might be reconsidered on the basis of minimal problems with RC operations due to the very low power needed.

UHF Operations

25. Other countries have frequencies available for RC operations in the UHF band. The German radio authority has recently allocated a band of RC frequencies at 433 MHz and good operational results have been reported. Similarly, the Swiss have RC equipment operating in this range. Also, the British have recently announced the availability of 459 MHz RC FM equipment. This would appear to be a good opportunity for the U.S. to make some frequencies available in the same area of the UHF band, compatible with those in other countries. Additionally, the 900 MHz region may be technologically feasible. RC operations in this area would appear to be compatible with current microwave oven useage.

International compatibility is a major concern of the AMA because the culmination of each year's competition are international championships, which pit fliers from all nations against each other. Thus, U.S. fliers may be flying with U.S. RC equipment in Europe and vice versa—compatibility with European RC assignments is therefore highly desirable.

Technical Requirements

26. The present FCC regulations for RC equipment in the 72 MHz band have served well from a technical viewpoint and are recommended as the basis for any new RC frequency allocations. Specifically, no interference problems from RC equipment to other services have been encountered. The low power requirement of less than one watt has proved satisfactory in RC operations, without causing problems to other services.

27. The only modification proposed to

these requirements is to permit any type of modulation, providing that the radiated bandwidth requirement is complied with. This would allow more effective modulation techniques, such as narrow band FM, to be developed and this in itself may offer the means to eventually accommodate an even further expansion of RC activity without necessarily requiring any increase of spectrum as more channels could be provided in less space by use of spectrum saving techniques.

Narrow band FM would be the logical choice for use with 10 kHz width, on the 11 guard channels within the 30-42 MHz band. Furthermore, if FM is permitted on new 72 MHz channels of 20 kHz width, the technical advantages of FM, using 5 kHz deviation, such as better interference rejection, could be utilized. It should be noted that several countries now authorize FM for RC use. This RC use of FM is very popular in Germany since it has minimized interference problems.

Summary

28. To summarize, the needs of the RC modelers are:

- **30 RC channels**, including the present seven 72 MHz allocations. The 23 new channels should be allocated on an RC exclusive basis, if at all possible.

- **Exclusive RC channels** if possible; if not, sharing may be an acceptable alternative if other users employ similarly limited power levels.

- **Freedom to use any type of modulation**, particularly narrow band FM, commensurate with bandwidth requirements.

29. The needs of the RC modelers have been well-documented in previous filings and are summarized in this petition. The relief requested may be provided without inconveniencing any other radio users; the frequencies

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