The Broadcaster's Guide To

RADIO STATION DEVELOPMENT

By

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THE BROADCASTER'S GUIDE

TO

RADIO STATION DEVELOPMENT

A step-by-step guide to planning,
licensing, building and operating
a broadcast radio station

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DEDICATION

To my wife Joan who has stood by faithfully

while radio has engulfed my life

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INTRODUCTION

"Any qualified citizen, firm or group may apply to the Federal Communications Commission for authority to construct a standard (AM), frequency modulation (FM), or television broadcast station" is a direct quote from an FCC Bulletin. Sounds simple doesn't it? It is, IF you go about it in the right way. There will be certain rules and procedures you must follow in order to succeed. These rules and procedures are not difficult to follow but they do require some work on your part . . . . . You CAN do it.

How do you start your own broadcast station? This depends pretty much on which type of station you have in mind. Some stations require licensing by the FCC, while others need only follow certain FCC rules. Some radio stations may sell advertising time, while others may not. Some radio stations can cost thousands of dollars to build, while others can be built for under a hundred dollars.

To start your radio station you must decide which of several type stations and formats are best for you. You must then find a frequency on which to operate, find a suitable location, and obtain financing. If the proposed station will be owned by an institution or corporation you will need approval from its officers. If your plans are for a licensed radio station there will be forms and exhibits to prepare for the FCC. How to go about all this is described in the following pages along with step-by-step instructions, hints, references, and where to get additional help if needed. Since much of the information is inter-related, I suggest that you read this entire book through first to prevent needless waste of your time and money. Make a list of the things you must do, in an order most convenient for you, then use this book as a reference for completing those tasks.

Costs of the various materials and services mentioned throughout this book are representative of the costs at the time of its writing. Current price levels may or may not stabilize resulting in substantially different price levels two or three years from now.

Occasionally your attention will be called to a reference appearing in the appendices or in the FCC rules and regulations. References appearing in the appendices will be shown as a letter designator and item number such as (A-3) indicating appendix A, item number 3. References to a specific FCC rule or regulation will be shown as (FCC R, R, Part 1.573). A list of abbreviations used in this book follows.

Good luck with your project.

Ernest G. Wilson

ABBREVIATIONS USED IN THIS BOOK

ac	Alternating current
AHAAT	Antenna height above average terrain
AM	Amplitude modulation
CATV	Cable television
CAFM	Cable FM
C-C	Carrier current
CP	Construction permit
dc	Direct current
ERP	Effective radiated power
FCC	Federal Communications Commission
FM	Frequency Modulation
H	Horizontal
kHz	Kilohertz (1000 cycles per second)
kW	Kilowatt (1000 watts)
MATV	Master antenna system
MHz	Megahertz (1,000,000 cycles per second)
MSL	Mean sea level
mV/M	Millivolt per meter (unit of field strength)
PTA	Parent-teacher association
R, R	Rules, regulations (FCC)
SCA	Subsidiary communications authorization
TPO	Transmitter power output
TV	Television
V	Vertical
uV/M	Microvolts per meter (unit of field strength)

WHICH TYPE OF STATION IS BEST FOR YOU?

There are many things to consider before jumping into broadcasting. Let us begin by asking a few questions the answers to which will help direct your efforts.

Q: Who will be your audience?

Q: How large is the audience you wish to serve?

Q: How much money do you have to spend for equipment?

Q: Do you have a location for your station?

Q: Do you, or does someone you know, have a working knowledge of electronics?

Q: Will the station be operated for profit?

Q: Do you have an attorney that can help you?

Q: How can your station help the community?

Q: What legal entity will own the station (individual, partnership, association, corporation, institution)?

With the answers to the above questions at least partially thought out we may proceed by discussing the different types of broadcast facilities and some of their characteristics. The information contained in this and following chapters should assist you in your search for these answers. At your first opportunity, if the station is to be owned by someone other than yourself, ask the proposed owner to help in resolving these questions. Your final answers will largely determine your station's programming, which type will be constructed, construction costs, and many other facets that should become apparent as you read on.

TYPES OF STATIONS

There are several types of stations from which to choose. Some will require licensing while others will not. It is possible to operate one or several different types of stations simultaneously to serve varied audiences.

The Carrier Current Station

A carrier current (C-C) station is one which operates with a minimum of power, either as a closed-circuit system or by direct radiation. Carrier current stations cover a limited range.

With the closed-circuit system, radio frequency energy is coupled into power lines, intercom lines, or other such conductors and travels along these conductors. Radios in close proximity to the lines receive the signal through induction.

The direct radiation system uses an antenna with a maximum length of ten feet and a maximum transmitter power output (TPO) of 100 milliwatts (.1 watt). A combination of the closed-circuit and direct radiation systems utilizes a special coaxial cable with controlled radiation characteristics (A-26).

Range of a carrier current station seldom exceeds one mile but can provide coverage of a school campus, dormitories, cluster housing, apartment houses, and small communities. Carrier current stations operate on frequencies between 535 and 1605 kilohertz (kHz), which is called the standard broadcast band, and are received by standard (AM) radios.

This type of station is not licensed by the FCC, but it must abide by certain FCC rules. Restrictions concerned with maximum power, field strength, and avoidance of harmful interference to public safety and broadcast stations are covered by FCC Rules and Regulations, Part 15 (see appendices A-3, A-4).

Several factors make the carrier current station ideal for the beginning braodcaster. These include the selling of advertising time, unlimited operation time, and no license requirements for announcers, disk jockeys, transmitter, or transmitter operators. Further, carrier current transmitters may be built by you instead of purchasing them from commercial sources (A-26. This can save you a substantial amount of money. All of your studio equipment may be built by you. Some hi-fi equipment may work out very well for studio use.

Many radio stations began with carrier current systems before moving on to a larger operation. This allows the staff of the station time to develop skills, procedures, and techniques for a "quality sound" on the air.

The Cable FM Station

A cable FM (CAFM) station is one which transmits its signal over an existing cable TV (CATV) distribution system. Although transmission takes place over a closed system the audience can far exceed that of a carrier current station. Commercial cable TV companies may have 5000 to 100,000 subscribers in your area. This gives you a potentially good listening audience. A CAFM station may also transmit over master antenna (MATV) systems which are used in schools, colleges, apartment houses and small communities.

An FM modulator is installed at the "head end" of the CATV or MATV system and receives audio signals from your studio by way of broadcast-grade telephone lines. Your FM modulator (basically a low power transmitter) is tuned to an FM channel that will not interfere with other FM or TV stations already provided by the cable system. Your signal is received by anyone who has an FM receiver connected to the cable system and who is tuned to your channel (frequency).

Operating hours of CAFM stations are unlimited, may be operated in stereo and do not require FCC licensing of the modulator (transmitter) or the operators of the station. Although not requiring an FCC license the CAFM station still must abide by certain FCC Rules governing profanity, obscenity, equal time, etc.

CAFM stations may sell advertising time (spot announcements) and, with the audiences available through CATV systems, the income can be pretty good. The Intercollegiate Broadcasting System (IBS), through a survey of campus operated radio stations, received reports of income up to $17,000 a year. The average income appeared to be about $2,000 a year. With a small initial cost the CAFM station owner can develop an audience, train his staff and improve his equipment in preparation for future expansion into non-commercial or commercial broadcasting.

The Class D FM Station (Non-commercial)

A class D FM station operates with a maximum transmitter output (TPO) of ten watts with the signal radiated directly from an antenna system. A properly located and designed antenna system can make the class D FM station receivable to a distance of ten miles or more. This means the possibility of over 300 square miles of coverage. Multiple antenna elements (bays) provide a still greater coverage area and should be considered in the initial planning of the station.

Class D FM stations normally operate on a channel in the lower portion of the FM band (between 88 and 92 MHz) and are receivable on regular FM radios including FM auto radios and portables. The lower twenty channels of the FM band are reserved by the FCC for use by non-commercial stations.

Class D FM stations and operators must be licensed by the FCC. Applications for authority to construct a non-commercial station are covered later in this book and in the FCC Rules and Regulations, Volume I, and Part 73 of Volume 3 (see appendices A-13, A-15). Operators of a class D station are required to have a minimum of a third class radiotelephone permit with broadcast endorsement (A-29). A person having a second class, or higher grade, radiotelephone license must be under contract for maintenance of the transmitter even if only on a part time basis. Certain documents must also be maintained by the station which include program, maintenance, and operating logs.

Class D stations are considered to be non-commercial by the FCC and advertising time therefore may not be sold. FCC Rules and Regulations, Part 73.503 does allow however for the announcement once each hour, of the name of contributors that have donated materials, services, or monies to the station. Instead of selling advertising time, the non-commercial station owner may solicit contributions as a means of providing the station with income.

Construction time and costs are greater for a class D station compared to C-C or CAFM stations but then so is the potential audience. Several other factors different from C-C or CAFM stations include finding an FM channel on which to

operate which will be approved by the FCC, finding a good transmitting site, and the possible formation of a non-profit group as legal entity - owner of the station.

You must apply for an FCC Construction Permit (CP) which, when approved, authorizes the construction of the station. Granting of a CP by the FCC takes about 90 days after preparing and filing the proper application and exhibits. This 90 days, your actual construction and testing time, and another 10 days to receive "program test authority" from the FCC is the minimum length of time before you are "on the air". The FCC issues your final FM broadcast license about 60 days after that. All this may seem like a long time but the resulting license is good for three years and is renewable.

Stereo operation is not recommended for class D stations due to inadequate margin for noise degradation which would be quite noticable due to multipath and weak signal reception. Stereo operation would also require the addition of costly frequency and modulation monitoring equipment normally not required by class D stations.

The FM Broadcast Station (Non-commercial, class A, B or C)

Non-commercial FM stations operate with a greater output power than class D stations. Non-commercial stations are classified as type A, B or C dependant on their power output and zoning. Class A stations broadcast with an effective radiated power (ERP) of up to 3000 watts (3kW) and an antenna height of 300 feet above the average terrain (AHAAT). Class B stations are allowed up to 50kW ERP with an AHAAT of 500 feet. Class C stations may operate up to 100 kW ERP with an AHAAT of 2000 feet. The operating frequency (channel) is the same for class D stations.

Greater power output requires more planning, larger equipment and antenna, extra monitoring equipment and, of course, greater cost. Some additional FCC rules apply: While a second class radiotelephone licensee may inspect and maintain lower-power transmitters (less than one kW) a first class licensee is required if your transmitter power output is one kW or more. Additional work must be completed in determining the coverage area and in the preparation of exhibits which must accompany the application for a construction permit.

Some knowledge of electronics is required for proper completion of the application for construction permit. Step-by-step instructions are presented in later chapters of this book but you may still need some outside help. The engineer at your local commercial station may be able to help you and should be contacted as soon as possible. If you have $300 to $600 to invest you may wish to employ a broadcast consulting-engineer to prepare your application and exhibits for the construction permit.

The FM Broadcast Station (Commercial, Class A,B,C)

The commercial FM station is classed the same as the non-commercial FM station in regards to maximum authorized power outputs and antenna heights. Minimum power for a commercial FM station (class A) is 100 watts. The commercial FM station operates on an assigned channel (frequency) between 92 and 108 MHz and is receivable by regular FM radios.

The commercial FM Station derives its operating capital through the sales of spot announcements with additional revenue possible through the lease or rental of special receivers. Some commercial stations apply for the Subsidiary Communications Authorization (SCA) available from the FCC. This allows the station to broadcast background music which is receivable only by special radio receivers. These special receivers are rented to store owners which use them to "tune in" on the commercial free background music from the commercial station. FM stations, because of their transmission characteristics are able to simultaneously broadcast the SCA signal and a monophonic or stereo signal.

Commercial FM station applicants will have additional expenses not required by non-commercial stations. Commercial class A applications require a $200 filing fee, another $1350 grant fee when the CP is approved, and an annual fee based on the station's spot announcement rate but not less than $52. The necessary equipment would not be covered under an educational grant nor would equipment be available through donations as is the case with non-commercial stations. Construction costs, fees and a margin for first year operating expenses could amount to more than $30,000 for a class A commercial station.

Applications may be filed to construct an FM station only on the channel listed for that community in the FCC's Table of Assignments (FCC R, R, 73.020). The FCC allows applications for class A stations within ten miles of the assigned community and within fifteen miles for class B/C stations. The FCC also allows the filing of petitions to amend the Table of Assignments which could make an FM channel available in a community not currently listed. Commercial FM stations are licensed for a specific city, called the city of license, and its surrounding communities.

Protection from interference accorded to FM stations is limited to the protection that results from the FCC Rules regarding minimum mileage separation (FCC R, R 73.207 and 73.209).

Your application for a construction permit must also include the results of a "community needs" survey. This survey should be conducted and documented by you to ascertain the interest and needs of your community. The FCC will require a showing on your application of how you intend to serve those interests and needs. It may be advisable to have your attorney check your survey and application forms. It would be wise also to have a broadcast engineer or consultant check over your engineering data.

Other FCC Rules and Regulations pertinent to the application, construction, programming, control and operation of your commercial FM station can be found in BROADCASTING YEARBOOK (A-11) and FCC R, R Part 73, Subpart B(A-15).

The Standard (AM) Broadcast Station (Commercial)

An applicant for a standard broadcast station must be prepared to hire a broadcast consultant or have the ability to research, design and prepare technical portions of his application. The application for a standard broadcast station involves an assessment of community needs, a frequency search, facilities location and interference considerations.

Standard broadcast stations may operate on local, regional or clear channels. Stations with up to one kW output during the day (up to 250 watts at night) may

serve an area of approximately 2500 square miles. Stations with output powers of 500 to 5,000 watts cover larger centers of population and their surrounding communities, with a coverage area of up to 10,000 square miles. Stations with output powers of ten kW to fifty kW are considered regional stations and may cover an area of several states (particularly at night).

Construction of an AM station can be rather costly. A good used 500 watt transmitter begins at about $4,000. Because of interference problems, most new AM stations are required to be directional; this means the installation of several towers costing up to $4,000 each. Directional antenna systems also require engineering studies, antenna phasing equipment and good ground conductivity, all of which adds to the expense. Filing, grant and annual fees must also be considered in addition to first year operating expenses. Plan to spend at least $40,000 for a 1000 watt day time station.

Standard broadcast station channels are scarce with those that might be available requiring interference studies with resultant costly station construction. The FCC has, in the near past, put a freeze on the acceptance of AM station construction permits. It might be less bothersome and expensive to purchase an existing AM station.

PROGRAMMING

You will undoubtedly want your station to be known throughout your community for its special character and rapport. Part of that character and rapport involves your programming, the material you present to your audience. Your programming can of course take many shapes depending on the community needs and interests and your own particular interests. No one station can be all things for all people, of course. Let us examine some of the possibilities, remembering that your particular programming may be a mixture of the following.

Entertainment

Entertainment programming includes programs of general or specific interest including public service messages, sports, news and recorded music. The recorded music offered may be Rock, Country, Middle-of-the-Road, "Easy listening", Jazz, Contemporary, Underground, Classical, Background, etc. Usually entertainment programming includes a "personality" as an announcer of disc jockey. See appendices A-27 and A-29 for sources of program materials, records, etc.

Educational

Educational programming includes general and specific interest programs, including instructional programs prepared for use by both schools and the general public. News, special events, school-related activities, sports, drama and musical entertainment are also included. Educational programming is often employed by schools and colleges and may be used in conjunction with their broadcast training facilities. Program material sources, records, tapes, etc., are included in the books listed in appendices A-27 and A-29.

Community/Alternative

The community or "alternative" radio station tends to operate at the grass roots level, its prime concern being communication with the people of the community. Controversial issues affecting the community are openly discussed, community meetings are broadcast live, and attempts are made to arouse community awareness and community action. Musical entertainment may also be presented, usually classical and esoteric music. See appendix A-23.

Religious

"Religious" stations generally offer educational programs of a religious nature, inspirational entertainment (including music and drama), theological discussions, and broadcasts of religious services. See appendix A-27.

Conversational

Some stations devote a substantial portion of their broadcast time to conversational programming. These include interviews, talk shows (where listeners call in) and/or simply supply conversation without audience response. Program hosts must be articulate, knowledgeable, and understanding of how to talk to and with the audience.

All News

"All news" stations are generally limited to large market areas where potential advertising revenue can sustain the operation. The necessity to continually gather news throughout the day requires a large expense for a news staff, news wire services, affiliations with news gathering agencies, and mobile radio equipment and cars.

For more information on radio programming see "Modern Radio Station Practices" (A-35).

GETTING STARTED

There are several forms, information bulletins, and reference materials that are both helpful and necessary toward getting your radio station started. Some of these require several weeks for delivery. Others may be found as near as your local public library, FCC field office and radio station(s). In any case, you should attempt to get them in your hands as soon as possible.

Appendix A lists the various forms and reference materials you will need along with addresses and approximate costs if any. Depending upon which type of station you wish to start, certain materials will be more important to you than others. Of course for a broad understanding of the broadcasting field you may wish to obtain all the reference materials you can.

Below is a list of appendix items needed by you according to the type of station that interests you most. Send for them immediately.

Type of Station	Appendix A Item Number
Carrier Current	1,3,4,11,12,16,17,18,19,26,27,28,29
Cable FM (CAFM)	11,12,22,24,26,27,28,29
FM (Non-Commercial)	1,2,5,6,9,10,11,12,13,14,15,16,17,18 19,20,21,22,23,25,26,27,28,29
AM or FM (Commercial)	1,2,7,8,9,10,11,12,13,14,15,16,17,18, 19,20,21,22,26,27,28,29

HOW TO GET ALONG WITH THE FCC

Contrary to popular opinion the Federal Communications Commission is not comprised of ugly monsters waiting with fangs bared ready to gobble up wrong doers. All my dealing with the FCC has shown me that the people that make up that group are just as human as you and I. They even make mistakes like you and I and therefore expect you and I to make mistakes.

The principal task of the FCC is to ensure coherent and dependable radio communications. They want to be certain that your station does not interfere with existing stations, that your station is needed, and once you get your station on the air no one interferes with it. In the face of what occassionally seems to be outrageous bureaucracy and outmoded or unnecessary laws the FCC does a reasonably good job. Anything you can do to make their job easier will result in less paper work for you and them, less wasted time, and a better working relationship between the both of you.

In all of your dealing with the FCC strive to be specific, concise, complete, neat, follow directions and above all be HONEST. The FCC does not wish to scold or fine broadcasters and do so only when pushed into it. If you try your hardest to follow the FCC rules, regulations and procedures, admit to your mistakes and take steps to correct those mistakes, you are pretty safe. It is the willful and knowing disregard for FCC Rules, Regulations and procedures that upsets the FCC the most.

Remember also that FCC field offices (H) can offer little help other than to provide forms and make available certain reference materials. They cannot give advice other than is already part of the Rules and Regulations. It won't hurt to make an effort to know the people at your local FCC field office. They may, on occasion, be able to give you advance information about FCC changes and policies.

COMMUNITY NEEDS ASSESSMENT

The FCC has a growing interest in the effectiveness of broadcast stations in meeting the needs of the community. Broadcast stations are licensed to meet the public interest, convenience and necessity. Proof that your station can and will strive to meet this requirement rests with you. A part of the application for a construction permit requires an exhibit showing the results of a community needs assessment survey.

A survey form should be prepared by you considering fully the area your station is to serve, including the nature of the community such as residential, business, rural, and the ethnic and educational background of your proposed audience.

Visit your community, and through your survey form and personal conversations make a list of the apparent needs and interests of the persons polled. Talk with minority groups and leaders, church groups, civic officials, school administrators, newspaper editors, and the general public on a door-to-door basis if need be.

Consider ways your station can be beneficial to the community such as presentation of local news, public service messages, open debates, free speech messages, editorials, minority discussions, live and prerecorded broadcasts of city and county meetings, etc. Compile all your information. If you later file an application for a licensed broadcast station you will have a neat exhibit to send along.

BUSINESS RELATIONS

As a beginning broadcaster you will need help and support from various persons and groups. The amount of help and the approach you take in asking for help and continued support will depend somewhat on the type of station you propose. If you are planning an educational non-commercial station to be owned and operated by a school or college you should be concerned with how you will present your ideas to the Board of Trustees. On the other hand, if you are planning a commercial station you should be concerned with the competition offered by other commercial broadcasters. The following information is presented as suggestions and hints in a general overview.

Relations with your School Board

If you propose a station which will be under the jurisdiction of a school board, you must consider things from the point of view of that school board. They will be concerned with how much your proposed radio station will cost and what the continuing costs are likely to be. They will be concerned about your proposed programming and who will be responsible for its preparation. They will worry about libelous statements, editorials, obscenity and profanity on the air. They will want to know how your station will help in the education or training of students. Who will supervise students, what hours will the station be on the air, and what area will it cover, why, why, why?

Getting the Board on your side is not an overwhelming task, but it will take a little work on your part. First check with school administrators and board members one at a time, and note their reactions and concerns. Keep notes. Next, prepare a proposal for presentation to the school board which includes answers and solutions to the board's anticipated concerns. Send a copy of the proposal to each board member and other interested persons prior to the board meeting you will be attending.

Your proposal should be short but specific to ensure that it's read by all concerned. Point out that the application for construction permit (if you are planning for a licensed station) costs little to nothing and does not obligate the school board or you to actually construct the station.

While waiting for approval of your construction permit you will have time to search out possible funding through federal or private grants and examine the possibility of donations of equipment. On-going costs of the station would include electrical power, space, and some new equipment from time to time. Audio visual equipment may be used in the beginning. Upgrade your station over a period of time from school capital outlay budgets and through the construction of equipment using instructional supply budgets.

Programming could include topics of community interest, local and school news, interviews with civic leaders and school administrators, public service announcements, music, etc. A teacher or faculty advisor may be responsible for the preparation, supervision and presentation of programming materials. Point out that future programming could include live coverage of football, basketball and baseball games.

Probably the toughest thing to do is convince the board that libelous statements, obscenity, profanity, etc., will not be broadcast. Reliable students,

operators and faculty are the answer. The FCC Rules and Regulations are specific in these areas. Apparently there are insurance companies that carry libel suit policies (A-30, A-31) although little is known about them other than their addresses.

As to the educational and training aspects of your proposal, consider educational and instructional programs that can be broadcast directly to your school and other schools for use in the classroom. Include the fact that students operating the station gain experience in announcing (speech), station operation (technical), management (business, legal), typing, creative writing (secretarial, English), editing, news reporting (journalism), etc. The proposed station may be made part of a school department such as speech, drama, electronics, etc.

Supervision will be a worry to most school officials. Consider building the station so it will be within view of a supervisor or teacher. The station might be supervised by special personnel, parents, or closed circuit TV. Night operation, when teachers may not be available, could have the parents of the students involved act as supervisors on a rotational basis.

Gain community support, before your presentation to the school board, by talking with the PTA, teachers, local businessmen, the mayor, and local service organizations. With a few members of the community on your side and present at the school board meeting, present your proposal and watch the board members fight over which one should make the motion to approve it. . . . . .

Relations with other broadcasters

Your entering into broadcasting will present the other local radio station owners and managers with somewhat of a dilema. On the one hand, a non-commercial station may not take advertising dollars away from the commercial broadcaster although it can spirit away some of the audience. A loss of listeners can result in a loss of sales and this will make the commercial station owner unhappy.

Non-commercial stations, carrier current and CAFM stations may operate with unlimited hours, which may also be displeasing to the commercial station owner. One case in particular that is annoying to "day time" AM commercial stations is the fact that they must record local night time sports events then broadcast them the following day. Twenty-four hour stations could broadcast the live action because they can broadcast at night. Local commercial stations might also feel some competition presented by your station; this could force them to upgrade their programming and talent creating an additional expense.

This brings us around to the other side of the coin. The FCC thinks favorably of the broadcaster that is concerned about the community his station serves. The FCC tends to encourage beginning broadcasters especially since non-commercial broadcasters generally try to be community oriented. Further, school and college stations, training grounds for broadcasters, can supply local commercial broadcasters with skilled full and part time help. This offers an advantage to both student and broadcaster. It behooves the commercial broadcaster then to help the non-commercial station get started by offering advice and possible donations of old equipment (also good for a tax deduction).

In view of the commercial broadcasters plight, non-commercial broadcasters should approach them with the understanding they may be helpful one time and resentful the next.

If you are planning the construction of a commercial station other local broadcasters will certainly view you in a dim light. You will be a definite threat to them and their share of the community's advertising dollars.

You should be prepared to accept the possibility of several "Petitions to Deny" your application being sent to the FCC by those same threatened broadcasters. Your application may be denied or accepted through the process of an FCC hearing. FCC hearings can be lengthy and attorney costs high.

It has been my experience that the technical personnel of stations, the chief engineers, not the program and operations people, get along well with other station technical persons. Engineering people are mostly concerned with proper transmitter performance, equipment specifications and have a lot in common. The program directors, sales staff, and owners at different stations have a lot in common also, they are busy trying to get the other station's audience and as much advertising as possible. This means competition which, at times, can be unfriendly.

Of course you may not have any problems. Your best approach might be to locate your station in an area that is relatively untouched by broadcasting sales and enjoy those dollars yourself.

Relations with the Cable Company

The cable system operator can gain a great deal by carrying FM and CAFM stations. There is considerable profit in selling second cable taps for FM receivers and even more profit selling the original hook up. Cable companies must be franchised in the city or county where they provide service and usually try to stay on the good side of civic offices. Because of these positive features cable operators are almost always cooperative, its just good business.

The sales operator is under no obligation to carry FM or CAFM station signals, but most likely will. If you are proposing a CAFM station be sure to check with the cable company before making elaborate plans. You might consider asking the cable company to loan or give you the equipment needed by their "head end" to transmit your signal. They will probably want to maintain the equipment anyway as if it were their own. You might also persuade them to pay the rental charges for the audio lines from your studio to their head end. This would be so if the proposed station will be owned by an educational institution.

If you are planning an FM station, especially a high powered one, be careful to locate your transmitter site for minimum interference to the cable company antennas and receivers. Overloading their system with strong signals will bring quick complaints from both the cable company and their subscribers.

Relations with the public

All broadcasters should be sharply aware of the needs of the community they serve. Always be ready to help in providing public service and offering advice as a leader in your community. Strong AM and FM stations often cause interference to home hi-fi equipment, TV and CATV systems. Complaints will arise concerning this interference and you should be ready to assist in correction of the problem even though the major problem is in the complaintant's equipment.

Make air time available for qualified spokespersons in your community. Join local business and service organizations to bring you close to the problems of the community. These business and service organizations will, in turn, help support your station and your efforts.

WHERE DO WE GO FROM HERE

Now that you have a good idea of what is involved in starting a radio station your next step is to complete the planning of your own. You will need a frequency on which to operate, a suitable site for your studio and a proper location for your transmitter and antenna. If your plans are for a licensed station you will need to complete various forms and exhibits and submit them to the FCC.

The following pages will help you achieve your goal by the easiest and shortest way possible, but that will still require much time. The following chapters include frequency search procedures, facilities planning, step-by-step preparation of your applications, examples of exhibits, local notice of filing, call letter requests, etc.

SCHEDULE OF EVENTS

There will be a great deal of interplay between you and the FCC when applying for a broadcast station construction permit and license. The procedures go like this:

You do the following:	The FCC responds with:
1. Select your frequency Select your location Research community needs	
2. Complete FCC application Requested facilities Legal qualifications Financial qualifications Purpose and objectives Program intentions Technical information/maps Antenna site information	
Mail to FCC in Washington	Sends receipt by post card
Publish public notice	Publishes public notice
	Grants construction permit (Approximately 90 days)
	Requests call letters
3. Begin construction Suggest call letters	Issues call letters
4. Complete construction Test equipment Notify FCC field engineer	Field office inspects station
5. Complete application for license Informal request for program tests Mail to FCC in Washington	Authorizes program tests (Approximately 90 days)
6. Start normal operation (Program tests)	Grants license (4 to 6 weeks)

How soon you will be on the air depends largely on how well you have prepared your paper work and how technically correct your station construction has been. If all is well you should be on the air in between 90 and 120 days plus your construction time from the date you first submitted your application.

SELECTING YOUR FREQUENCY

One of the deciding factors on whether you build a carrier current, Cable FM, FM or AM station will be the availability of a frequency on which to operate. Your search for an available frequency must be performed differently for each type of station as described below:

Carrier current frequencies:

Selection of a frequency for carrier current stations simply involves listening to the broadcast band (AM) in your area with a sensitive receiver. Standard broadcast stations can be heard at much greater distances at night. It is therefore important to check for clear spots on the band during both daytime and night time hours to avoid the selection of a frequency that might be subject to interference.

Standard broadcast frequencies are assigned in 10 kHz steps to broadcast stations. It is acceptable practice for carrier current stations to use one of the standard frequency assignments not receivable in its area. The standard broadcast frequencies begin at 540 kHz and continue in 10 kHz steps, thus 550, 560, 570 . . . . 1580, 1590 and 1600 kHz. The lower frequencies are generally preferred by carrier current broadcasters because FCC Rules permit a slightly greater range due to the longer wavelengths. The FCC Rules, Part 15 and FCC Bulletin OCE-12 (see appendix A-4) gives all the information on restrictions of field strength and coverage area.

Cable FM frequencies

Selection of a frequency for use by a cable FM station will depend on the availability of channel space provided by the cable company's "head end" equipment. Some cable companies use broadband receivers and amplifiers to supply their cable with all FM stations received by their antenna system. Other cable companies select the most popular FM stations and process their signals individually so as to "Channelize" them. In "channelizing " stations the cable company may convert the station's original frequency to a different frequency. By doing this the cable company can space each station equally across the band. In some cases the cable company will insist that no more stations can be added as their channels are all taken. In most cases however an extra FM station or CAFM station can be squeezed in between existing channels if the cable company is willing.

In any case your first step should be the making of an appointment with the cable company manager or owner. Discuss your desires with him and together determine your best choice of frequency.

Non-Commercial FM frequencies

The lower 20 channels of the FM band are reserved for use by non-commercial stations except as otherwise listed in the FCC Rules, Part 73. The FM band begins with channel 201 at a frequency of 88.1 MHz. Channel numbering continues with frequency steps of 200 kHz (0.2 MHz) thus, 202 (88.3 MHZ), 203 (88.5 MHz), to channel 220 at 91.9 MHz. In Alaska, the frequency band of 88 to 100 MHz is allocated to other radio services. However, channels 261 through 300 are available for broadcast use. Channel 206 (89.1 MHz) is reserved for the United Nations in New

York City.

If your proposed station will be in the vicinity of a Channel 6 TV station you should contact the FCC about their current restrictions. The FCC may reject your application for a frequency below 90 MHz or insist on colocation of your FM station with that of the Channel 6 TV station. If your proposed station will be within 60 miles of Monterey, West Virginia or North Eastern Colorado you must abide by the instructions included in Part 73.515 of the FCC rules.

Non-commercial class A, B and C stations (more than 10 watts output) proposed for operation on channels 218, 219 or 220 must maintain a minimum distance away from stations operating on channels 221, 222 and 223. Tables listing the minimum allowable milage between stations operating on these channels are included in the FCC Rules, Parts 73.207 and 73.504. Stations proposed for location within 199 miles of the Mexican Border must comply with FCC Rules, Part 73.507.

For channels 218, 219, and 220 the maximum power output is limited to 3 kW with an AHAAT of 300 feet for class A stations, 50 kW with an AHAAT of 500 feet for class B stations and as otherwise outlined in Part 73.211 of the FCC Rules. If your proposed station frequency will be 10.6 or 10.8 MHz above or below another nearby station you must comply with the minimum spacing between stations as outlined in the FCC Rules, Part 73.504.

Selection of a frequency for non-commercial FM stations is best performed with the aid of a work sheet/chart you can make, some reference materials, and topographic maps covering 50 miles in all directions from your proposed station location. Maps suitable for this purpose include the 15 minute series quadrangle or sectional aeronautical charts, see appendix A-21. A suitable work sheet is shown as appendix D. Detailed frequency search procedures are included in the following pages.

Commercial FM frequencies

The FCC has established which frequencies (channels) may be used commercially, by class of station, for communities throughout the United States. FM broadcast stations may be assigned only on the channels listed in the FCC's "Table of Assignments", FCC Rules, Part 73.202.

A channel assigned to a community listed in the Table of Assignments may be applied for within ten miles of that community if it is a class A channel. Application may be made for class B and C channels within fifteen miles of the listed community. The above is true providing no other channel in the listed community has been similarly assigned to another community and providing the unlisted community has not already removed a channel from any other listed community.

In Alaska the frequency band 88-100 MHz is used for other than broadcast service, however, 100.1 through 107.9 MHz may be used. In Hawaii, the frequency band 98-108 MHz is allocated for non-broadcast use with 88.1 through 97.9 MHz being available.

A petition to amend the Table of Assignments may be filed with the FCC but will not be considered if the change will affect the minimum milage separation between cochannel and adjacent channel stations in accordance with FCC Rules, Part 73.207.

Protection from interference is limited solely to the protection that results from the minimum assignment and separation requirements as outlined in the FCC Rules, Part 73.209.

Commercial AM frequencies

The FCC has established the operating frequencies for Standard Broadcast stations in respect to a Class number. Although the FCC has made exceptions in the assignment of frequency and power, they will do so only upon evidence that a proposed station will not cause interference and it will serve in the public interest.

Class I	10 kW to 50 kW	Dominant clear channel stations permitted to operate on one of the following frequencies: 640,650,660,670,700,720,750,760,780,820,830,840, 870,880,890,1020,1030,1040,1100,1120,1160,1180, 1200,1210,kHz
Class II	10 kW to 50 kW	Secondary clear channel stations limited by, but subject to, interference from Class I stations. Directional antenna systems required to protect coverage area of class I stations. Permitted to operate on one of the following frequencies: 670,720,780,880,890,1020,1030,1100,1120,1180, 1210, kHz
Class III	1 kW to 5 kW	Considered Regional stations and may operate on one of the following frequencies: 550,560,570,580,590,600,610,620,630,790,910,920, 930,950,960,970,980,1150,1250,1260,1270,1280, 1290,1300,1310,1320,1330,1340,1350,1360,1370, 1380,1390,1410,1420,1430,1440,1460,1470,1480, 1590,1600,kHz
Class IV	.25 kW to 1 kW	Considered Local stations and may operate on one of the following frequencies: 1230,1240,1400,1450,1490

The FCC Rules and Regulations, Part 73, Subpart A, should be reviewed concerning limitations of frequency assignments, permitted hours of operation, and signal strengths near Canadian and Mexican borders.

Commercial and Non-Commercial FM stations

The best place for an FM station antenna is on top of a hill or building. FM radio waves travel a line-of-site path. Objects, buildings, hills, etc., between your antenna and your audience's receivers will reduce the quality of their reception. High antenna locations permit better signal coverage by filling in "shadowed" areas and by reduction of ground reflections.

There are several possibilities to explore in finding a suitable antenna site. If your station is to be located on school or church grounds there will undoubtedly be a roof on one of the buildings you can use. A tower of at least 40 feet in height should be used on buildings less than 4 stories for better coverage. To minimize reflection losses from the roof top a minimum tower height of 20 feet should be used. Be sure to check with city and county offices regarding ordinances concerned with maximum heights above existing structures and roof loading.

Stations that are to be located amidst office buildings, especially concrete buildings, may have an irregular radiation pattern. The radio waves may travel between buildings instead of through them giving you a coverage area that follows the lay of the streets.

If at all possible the transmitter and antenna should be located on a hill or mountain a short distance away from the community you wish to serve. If you plan a mountain top installation then you must also consider your transmitter's requirements. It will need electrical power, large transmitters may need 230-volt service and perhaps 3-phase service. It must also be fully controllable from your studio and must be provided with your audio signal input. You will need a minimum of one telephone line for transmitter control and another for your audio signal (two if stereo).

Your audio lines must be "equalized" for an audio response of 50 to 15,000 cycles per second which may not be possible with some mountain top telephone lines. Check with your local electrical power and telephone companies about the availability and costs of lines to your proposed site before making any other plans. Don't forget that your transmitting site must also be accessable during all times of the year including the winter mess of rain, snow and mud.

Depending on the height of your tower it may be free standing or require guy wires. A simple tower, requiring only enough room to stand it up, would be a wooden telephone or power pole about 100 feet long with 10 to 20 feet stuck in the ground. A word of caution about wooden poles however, DO NOT pour concrete in the mounting hole. The absence of adequate drainage around the pole will allow accumulated water to rot the base. A guyed tower should have guy wires every 30 feet in elevation. The other end of the guy wire should be anchored in concrete at a distance from the tower that produces an angle of about 45 degrees for best stability. A 100-foot guyed tower should have guy wires at the 30, 60 and 90 foot points. This means the guy wires from the 90 foot point will be anchored 90 feet from the base of the tower (angle of 45 degrees). Be sure to check if you will have enough room to guy your tower.

A good location might be found by talking with communications persons in your area. Your city or county communications director (or some similar title) should know of most hill/mountain top 2-way or repeater radio installations. With luck you may be able to use someone's existing tower and building for free or a nominal rental fee. In areas that have UHF television stations, usually mountain top installations, the owners probably would be interested in leasing part of their building and some tower space. Non-commercial radio installations have a good chance for a donation of building and tower space.

The FCC requires your antenna to be horizontally polarized first of all; having met that requirement, you may add vertical polarization to the system. Vertical polarization is helpful in filling in shadowed areas behind hills and buildings and aids reception by portable, table and auto radios. Your vertical power output may not exceed your horizontal power output however according to FCC Rules. Circularly polarized antennas, a combination horizontal and vertical antenna in one unit, is still more effective than separate horizontal and vertical units, but may cost more initially.

The signal strength of radio waves is based on the voltage induced in a receiving antenna wire by those waves. Signal levels are usually quite small ranging from microvolts (uV), millionths of volts to millvolts (mV), meaning thousandths of volts. The length of the receiving wire also helps determine the amount of voltage induced by the radio wave. A standard unit used in field strength measurements is the Meter. A wire, 1 meter long, which has 1 millivolt of signal induced in it by a radio wave is said to be in a field intensity of 1 millivolt per meter (1mV/M). Signal levels are thusly expressed as so many millivolts per meter (mV/m) or microvolts per meter (uV/M).

The number of antenna bays has a direct affect on the coverage area as does the antenna height. Consider an antenna height of 100 feet above the average terrain (AHAAT) with a single bay antenna and a power output of 10 watts. According to the figures in appendix B, the distance to the 1 millivolt per meter (1mV/M) contour would be 2 miles. If the antenna height is doubled to 200 feet AHAAT the distance to the 1 mV/M contour increases to 2.9 miles. To reach the same distance of 2.9 miles with an AHAAT of 100 feet would require almost 4 times the output power. An effective radiated power (ERP) of 4 times can be obtained by a four bay antenna.

Antenna bays may cost up to $800 each with a good four bay system costing about $3,000. Light duty towers may cost $2 to $4 a foot, with heavier duty towers costing twice that much. Although antenna height is preferred, you may need to compromise between the cost of additional bays, erection of tall towers and costs associated with hill/mountain top installations.

Another consideration is the amount of tower space needed for the number of antenna bays you intend to use. Spacing between bays should be one wave-length, which works out to be about 10 feet. This means a four-bay antenna system will require 30 feet of tower space. The bottom bay should be at least one wave-length above the roof or ground to avoid reflections. This adds another 10 feet, for a total of 40 feet required for a four-bay antenna system.

Antenna gain is largely determined by the number of bays used. A two-bay antenna gives about twice the effective radiated power (ERP) of a single bay. A three-bay antenna gives about three times the ERP, a four-bay about 4 times, etc. Where high antenna heights are not practical or available you might think more antenna bays would be better, but this is not necessarily so. Multiple bays

produce an almost "beamed" signal which may pass over a nearby area. The "beamed" signal can be purposely distorted, "tilting" it so it will fill in dead areas, but this only complicates the system and adds additional expense. A four-bay antenna system seems to be the best compromise.

Your antenna system is fed power from your transmitter by a coaxial transmission line. The transverse size, length and type of insulation all affect the efficiency of the line. The larger the transverse size the greater the amount of power will be delivered to the antenna. The longer the transmission line the less will be the power delivered to the antenna. A short and fat transmission line seems to be your best bet for maximum efficiency. Appendix I shows approximate costs and efficiencies of popular transmission lines.

Your effective radiated power (ERP) is a function of your transmitter power output (TPO), transmission line efficiency and antenna gain. As an example, a 10 watt transmitter is connected through a transmission line that has an efficiency of 80% at the length used, to a four-bay antenna (gain of 4):

10 watts x .80 x 4 = 32 watts ERP

This example also applies to higher power outputs: the resultant numbers would be larger.

By the way, the engineering data section of the application for a class D station (10 watts) does not require a showing of ERP. This means if your AHAAT is rather low (about 100 feet), the FCC considers your coverage area to be that produced by only 10 watts although you may actually have 32 watts ERP.

Antenna systems that combine both horizontal (H) and vertical (V) polarization split the available transmitter power between the two planes. In a system where equal numbers of H and V bays are used, half of the power is fed to the H bays and half the power is fed to the V bays. A four-bay H and four-bay V antenna system would give one half the effective radiated power output of a four-bay H antenna in the horizontal plane.

EXAMPLE: Transmitter power output (TPO) = 10 watts

Transmission line efficiency = 80%

Composite four-bay H and four-bay V antenna with power splitter

10 watts x .80 x .50 x 4 = 16 watts ERP Horizontal

10 watts x .80 x .50 x 4 = 16 watts ERP Vertical

Of course, other combinations may also be used with different amounts of power being delivered to each plane. A four-bay H and two-bay V antenna would have two-thirds of the available power delivered to the H bays and one-third of the power delivered to the V bays. Assuming a 10 watt TPO and line efficiency of 80% the system would provide 21 watts ERP horizontal and 5 watts ERP vertical. Best practice is considered having equal amounts of power in both planes.

Circularly polarized antennas typically have a gain of .50 per bay. This means a two-bay antenna would be required for a total gain of 1 in all planes.

Choosing your transmitter is also an important step. If you have lots of money it will be easy to buy the best. The price of a new 10 watt transmitter ranges from $1,500 to $3,000. A 1 kW transmitter equipped for stereo and SCA operation can cost over $8,000. There are several used transmitter dealers, however, and the possibility of donations if you are considering building a non-commercial station. See appendix A-26.

Because of the small signal produced by a 10 watt transmitter, multipath and weak signal reception make it almost useless for stereo operation. Class D stations (10 watt) are not required to have a frequency or modulation monitor, however all stereo stations must have them. A stereo frequency and modulation monitor can cost more than a 10 watt transmitter. Unless you have an overwhelming desire to broadcast stereo with a class D station, avoid doing so.

Whether you decide to buy a new or used transmitter, be sure to get at least three copies of the instruction manual. This will make it easier to sell later if you wish to change transmitters. The manual may also be your only aid in repairing your transmitter if the manufacturer goes out of business. Keep one manual with the transmitter, one at the station and have one at home.

Carrier current stations

Carrier current stations have many advantages, one of which is the possibility of building your own transmitter. Surplus army and navy transmitters can sometimes be converted to operate on the standard broadcast band enlisting the talent of a radio amateur to do the job. Commercially built carrier current transmitters are also available with prices up to $400. See appendix A-26.

The output from your carrier current transmitter will be coupled into some form of transmission lines. Where the power lines are to be used as the transmission means, the transmitter should be located near a power distribution point. Audio signals from your studio are delivered to your transmitter by a telephone line or an audio line you yourself have installed. The audio response of the line should be good from 50 Hz to at least 10,000 Hz.

If you plan to use an antenna and directly radiate your signal, remember to abide by the FCC Rules, Part 15 (A-3, A-4) which limits the length of your antenna to 10 feet and your transmitter power to 100 milliwatts. Several small transmitters each with its own 10 foot antenna may be installed at key locations and all be fed from one common audio signal line. In this way you can still have a large coverage area with small amounts of power in addition to concentrating your signal to areas where your audiences will be.

Your radio signals may also be distributed by coaxial cables with controlled radiation characteristics. The coaxial cables are placed along hallways, corridors, outside walk ways and roof edges. Larger distances can be covered by stringing the cable on existing telephone or power poles. Be sure to check with the telephone and power companies before doing so.

The FCC does not go around looking for carrier current stations that violate radiation restrictions. If your surrounding community is happy and does not have interference caused by your station, you will probably not be bothered.

CAFM Stations

Your cable FM station facility will depend mostly on the conditions that exist with the CATV company. Your CAFM transmitter should be installed at the CATV company's "head end" with your audio signal being delivered to it by telephone lines. Your telephone lines should be equalized to 15,000 Hz for best audio quality. If you plan a stereo operation then you will require two identical phone lines.

Some CATV company head ends do not have provisions for telephone lines. Although the telephone company could install them for you, the costs may be prohibitive. If the cable TV company is so equipped, you may be able to send your audio signals from your studio to their head end by a sub-channel over the company's cable. Your signal is de-modulated and then fed to your transmitter and comes back down the cable to your audience.

The cost of a CAFM transmitter including stereo capability is between $400 and $600. Your telephone lines, depending somewhat on the distance between your studio and the CATV head end, will lease for about $15 to $30 per month. See appendix A-26, A-11, A-24.

Standard Broadcast (AM) stations

Standard Broadcast stations usually require more ground area then FM stations due to the complexity of the Standard Broadcast station's antenna system. Antenna towers may reach heights of 300 feet or more requiring a guy wire radius up to 300 feet. Directional antenna systems may have up to six towers with spacing between towers of up to 1500 feet. All this requires land on which to build the antenna system which can amount to several acres.

Because of the space requirements AM stations transmitter and antenna sites are quite often located outside of the space limitations of cities. The unused part of the antenna site may be used for other such things as cattle grazing, car parking, storage, etc. Care must be taken to protect the antenna system, however, which may require fencing around one or all of the antenna towers and guy wire anchors.

Ground conductivity is another important consideration. The better the conductivity the better the antenna efficiency. Some areas therefore make good to excellent antenna sites, while others may be worthless. For information about good ground conductivity consult the FCC R, R's, Part 73, Subpart A.

The AM transmitter must be located near the antenna system with a small cinder block, concrete, or metal building housing it. A fence around the building with solid doors and locks on the building will help reduce vandalism.

Several telephone lines will be needed between your studio and transmitter site. You will need a program line equalized at least to 10 kHz, a transmitter control line, and a standard telephone for communication with the studio.

Studio Equipment and Production Facilities

Below is a suggested list of studio equipment. This should be considered the minimum requirement for a satisfactory studio operation. The Modulation Monitor will not necessarily be required for carrier current, cable FM stations and Class D FM stations. The listed items shown with an asterisk (*) must have stereo capability if you intend to broadcast in stereo. With the exception of the modulation monitor, this list may be used to equip a separate production room.

Quantity	Description	Quantity	Description
1	*5-8 Channel Console	1	*Studio Monitor Speaker
2	12" Turntables	1	*Monitor Speaker Cabinet
2	*Equalized Phone Preamps	1	Microphone (Cardioid)
2	12" Tone Arms	1	Microphone Stand
2	*Phono Cartridges	1	*Set of Headphones
1	Studio Clock	1	Modulation Monitor
1	*Tape Recorder (Reel)	1	Tape Recorder (Cartridge)

The studio and production rooms should be as far from noise producing areas as possible. However, you may wish your studio to be a "showplace" with large windows permitting spectators to watch your broadcasting operation. Although this may raise the noice level of your studio, you may wish to compromise for the sake of public relations. Sound deadening drapes may be used near and around windows and walls which help with the decor of the room as well. Accoustic deadening materials should also be used on all flat surfaces such as doors, walls, and ceiling to avoid sound reflections. Floors should be carpeted. Set glass windows at an angle so reflections are toward the ceiling or floor. Equipment mounting cabinets must be solid and perhaps shock mounted to eliminate vibrations. Doors should be mineral filled, weather stripped and lockable. Refer to Appendix A-26 for further information on studio equipment and construction.

FREQUENCY SEARCH PROCEDURES

Non-Commercial FM stations

Begin your frequency search by determining the call letters and addresses of all non-commercial stations within 50 miles of your proposed transmitter site. List each of these stations according to their frequency on the work sheet shown in appendix D. Much of the information needed to complete your work sheet can be found in the BROADCASTING YEARBOOK and FM STATION ATLAS (See appendix A for where to get them). Allocation conditions change from the time of their printing however, so these books cannot be considered to be the final authority. Also consult BROADCASTING MAGAZINE (see appendix A) for the current public notices of new station applications, call letters issued, construction permit grants, and license grants.

Call, write or visit each of the stations you have listed on your work sheet. Ask them to confirm the information you already have and to provide you with information you don't have yet. Ask for their exact geographic location. It should be given to you in degrees, minutes and seconds for both lattitude and longitude. As a last resort if you cannot obtain the exact geographic location use the address of their transmitter site. You should also ask for the distance to their 1 mV/M contour. Their ERP and AHAAT would be nice to know also but may not be needed if you know the distance to their 1 mV/M contour. The 1 mV/M contour is the perimeter of the primary coverage area of a station.

The FCC will not grant an application for a construction permit if your proposed station will cause interference within the 1 mV/M contour of any other station or if any other station will cause interference within your proposed station's 1 mV/M contour according to the conditions shown in appendix J. The distance to the 1 mV/M contour is determined through the use of the FCC's F(50,50) curves which appear in this book as appendix B.

If the persons at these stations are nice guys they will give you all the information you will need on the phone and perhaps send you photocopies of their coverage maps. On the other hand, some station management may be reluctant to release this information or may try to give you erroneous information. It may then be necessary for you to personally visit that station.

Each station is required by the FCC to maintain a PUBLIC ACCESS FILE of which copies of all of their applications are a part (FCC R, R, 1.526). This file must be made available for inspection by anyone requesting it while visiting the station during normal working hours. The only identification you will need will be giving your name and address. Failure on their part to be cooperative can be corrected by writing a letter to the Complaints and Compliance Division of the FCC in Washington. It may be helpful to inspect their entire applications file to see how they prepared their forms. This will give you a better idea of how to prepare yours.

When you have completed your frequency search work sheet and have included all existing and proposed stations, look it over carefully. If there is a channel that is unassigned and the 3 channels either side of it are also unassigned or are assigned to Class D stations, the chances are good you have found a channel to use. You need not continue the rest of the frequency search procedure unless you wish to double check your find.

Appendix E is a photographically reduced portion of a larger map which was prepared as an exhibit for radio station KVHS. This map will serve as an example for the next step in your frequency search. Any map showing an area to a 50 mile radius can be used for this purpose however.

You may wish to use your map several times so it will be wise to use a plastic sheet as an overlay. All your marking can be done on this overlay and saved for future reference. You will need a minimum of two overlays. Plastic sheets can be purchased at most stationary stores. You will also need a felt pen with a fine point that will mark on plastic and a compass for drawing circles.

Place your plastic overlay on your map. From your worksheet information mark the location of each station listed including your own proposed transmitter site. Label each location with the station's call letters and channel number (frequency).

Using your compass and felt pen, draw a circle around each station that represents the distance to their 1 mV/M contour.

Most class D (10 watt) stations are considered to have an AHAAT of 100 feet. At that height they would have a 1mV/M contour at a distance of 2 miles. Appendix E shows stations KZSU (211), KALX (214) and KDHS (213) as being class D stations with their 1mV/M contour at 2 miles. Radio station KANG (210) which appears on the same map has a 1mV/M contour at 35 miles because of an ERP of 20 kW and an AHAAT of 900 feet. If you are planning a class A, B or C station or a highly elevated antenna you must know your AHAAT. See pages 34 and 35 for AHAAT determination.

Where you do not have a station's 1 mV/M data you must know their ERP and AHAAT. With their ERP and AHAAT you can easily find the distance to their 1 mV/M contour with the FCC's F (50,50) curves or the tables prepared for you as part of Appendix B. See page 65 for an explanation of how to use the curves and tables.

Around your own station location draw four circles to scale which represent the distance to your 100 mV/M, 10 mV/M, .5 mV/M and .1 mV/M contours as determined by the F (50,10) curves or tables in appendix C. If you propose a class D station you may use the F (50,50) curves or tables instead.

Now take another sheet of plastic for a second overlay and plot the reverse conditions. This second overlay is prepared to show possible interference to your 1 mV/M contour which could be caused by other stations.

Draw a circle to scale around your station's location that represents your proposed 1 mV/M contour as determined by the F (50,50) curves or tables.

Use the F (50,10) curves or tables (appendix C) to determine the following coutours. Draw circles to scale around all other stations that represents the distance to their individual .1 mV/M, .5 mV/M, 10 mV/M, and 100 mV/M contours.

Now check each of your overlay sheets carefully. You are looking for a channel that meets the requirements of the FCC Rules, Part 1.573 which has been summarized for you in appendix J. Select a channel you feel may meet these requirements and submit it to a test using appendix J. If it meets the requirements of Part 1.573 you have found your channel.

If your selected channel fails the test, try another channel and still another until you have exhausted all possibilities. If you are proposing a station with more than 10 watts ERP you should now consider reducing your power and/or antenna height. This will reduce the distance to interference contours perhaps making a channel available. The FCC Rules, Part 1.573 also allows the use of directional antennas with up to 15 db discrimination, roughly 30 times more power in one direction than another. A directional antenna may allow you to squeeze your station into an otherwise congested area.

Keep your map and overlays as they will be helpful in preparing your FCC application for construction permit and accompanying exhibits.

Commercial FM Stations

The FCC Rules, Part 73.202, Table of Assignments, lists communities under State headings for which the FCC has assigned specific channels and classes of stations. You should become familiar with Parts 73.202 through 73.209 before attempting a frequency search for a commercial FM station (A-15).

The FCC will only accept applications for new stations if the proposed channel is listed for the community where the station is to be built or within 10 miles of that community. For this reason, applicants for new commercial FM stations may have to search for an available channel several miles from where they would like to build their station. In some cases the nearest available channel may be in another part of the state or in a different state all together.

Begin your frequency search by marking the location, channel number and call letters of all known commercial FM stations on a plastic overlay positioned on a map of your state. Plastic sheets and marking pen that will write on plastic can be found at most stationary stores.

Broadcasting Yearbook (A-11) has listings of radio stations by State and city (community) including addresses, ERP, owners and other information. Since the Broadcasting Yearbook is published only once each year you will want to supplement its information with up-to-date listings. Broadcasting Magazine (A-12) which is published weekly, lists current public notices of new station applicants, call letter issueances, construction permit and license grants.

Compare your completed map with the FCC's Table of Assignments (FCC R, R, 73.202). Look for a city (community) whose channel allocation has not been granted to a station or is currently under application by someone else. When found, move quickly, and file your application for construction permit.

Commercial AM Stations

An available AM frequency will be quite difficult to find. Many consulting engineers now believe that no more are available. The FCC has, in the recent past, not accepted applications for new AM stations. This does not stop the persistant and potential broadcaster however. Channels can be found although the construction will probably require an elaborate and directional antenna system in addition to much communication with the FCC.

References you will need for your frequency search include BROADCASTING YEARBOOK (A-11) BROADCASTING MAGAZINE (A-12), NARBA Official Notification List (from Cooper-Trent, Inc., Washington, D.C.), and a map of the U.S. which also shows 200 miles inside the Canadian and Mexican borders.

Prepare a work sheet consisting of each AM frequency (540 kHz) to 1600 kHz), a column showing the class of station assigned to that frequency, and a column for comments. With the information contained in the above references and with the aid of the FCC Rules and Regulations, Part 73, Subpart A (Volume III) determine the distance to the following contours for each station in your area: 25uV/M, .5 mV/M, 2 mV/M, 25 mV/M.

Around each of your work sheet stations draw a circle whose diameter indicates

the relative day and night coverage for the above field strength contours. Look for an "opening" between coverage contours. This opening will be an area where contours do not overlap in accordance with the following interference criteria: Co-channel stations must maintain a 20:1 signal ratio where either station's 25 uV/M contour may not overlap the other station's .5 mV/M contour. First adjacent channel stations and your channel may not overlap each other's .5 mV/M contour. Second adjacent channel stations and your channel's 2 mV/M contours may not overlap each others 25 mV/M contour.

It is advisable to have a consulting engineer check your findings and prepare your application exhibits for you.

HOW TO PREPARE YOUR APPLICATION

General Information

A few general hints should be considered first. Use one copy of your application form as a work sheet. Mark on it only with a pencil so you can make changes when required. Remove sections of the application form that will not apply to you such as the AM and TV sections if you are applying for an FM station.

Look over the entire application thoroughly. Read all the instructions. Some of the sections will require additional information typed or drawn on a separate sheet, called an "exhibit", which will be attached to your application. Some sections may not apply to your proposed station at all, when this is the case simply answer the question with "not applicable" or "does not apply".

Exhibits must be clearly identified with the exhibit number, the applicant's name and the date of the application. Appendix G is a good example of how to mark your exhibits. A good system for identifying exhibits shows the number of the exhibit and to which section of the application it belongs, for example:

SECTION II	(Legal Qualifications)	Exhibits L-1, L-2 or II-1, II-2, etc.
SECTION III	(Financial Qualifications)	Exhibits F-1, F-2, or III-1, III-2, etc.
SECTION IV	(Program Service)	Exhibits P-1, P-2 or IV-1, IV-2, etc.
SECTION V	(Engineering Data)	Exhibits E-1, E-2 or V-1, V-2, etc.

All sections of the application may be filled out by you. If you do not have technical or legal background, it will be wise to have your work checked by a broadcast engineer and by an attorney. Non-commercial stations may be able to obtain these services as a donation or favor. Try it.

Check your application twice, have someone else go through it with you, as incomplete applications will be rejected by the FCC.

FCC forms change from time to time although the basic information remains essentially the same. For this reason the following procedures and instructions do not attempt to cover application questions by item number but rather as a

general discussion.

The completion of FCC forms 340 (non-commercial applications) and 301 (commercial applications) are similar with a few extra requirements needed for form 301. The completion of form 340 will be discussed first. You should complete as much of your form 301 (if applying for a commercial station) as you can from the form 340 instructions. Additional instructions for completion of your form 301 will follow the form 340 instructions.

FCC Form 340, Non-commercial FM stations

SECTION I

Read the instructions carefully and comply with them fully. Fill in the necessary information on the first page if you wish, the second page must be completed later when all exhibits and other pages have been completed.

SECTION II

The applicant for any station must be a legal entity. This means that schools, both public and private, school districts, church groups, educational foundations, etc., qualify. Others wishing to apply must form a non-profit corporation or association for the purpose of operating a non-commercial broadcast station. City, county and state offices should be contacted regarding the proper procedures for forming a non-profit legal entity in your area. Your organization will need a charter or articles of association or incorporation which must specify your organization is empowered to construct the proposed station. Answer each question honestly and precisely.

When the applicant for the station is to be a non-profit organization it will need a governing board. A governing board may be selected according to the guidelines or laws pertaining to the formation of the organization. Members of the governing board must be listed in this section including their residence, office held, citizenship, occupation and how they became a member of the board. Where the applicant is to be a school or school district, officers include the Principal, District superintendent and members of the school board.

SECTION III

This section is best completed after section IV and V when you have a better idea of how much your costs will be. The FCC is trying to determine in this section if you will be able to construct, operate and maintain your station if they grant you a construction permit. You must list in this section all the costs you anticipate and where the money will come from. These costs are only estimates and do not have to be exact. Keep it simple.

If buildings, towers, studio equipment, etc., already belong to the applicant then they should not be shown as "new" costs. Simply write "see exhibit F-1" in the appropriate box on the form. Then prepare a listing of all buildings, equipment, etc., that are already owned, on a separate piece of paper and label the top of the sheet as exhibit F-1.

SECTION IV

The FCC will be looking closely at the exhibits prepared for this section. Prepare them with a great deal of thought. Your station should serve the public interest, convenience and necessity. The FCC will be looking for how you intend to meet that obligation. Exhibit P-1 of this section should show the purpose and objectives of your proposed station. This is where your community needs assessment comes in handy. Your survey compilation combined with a statement of your intended program policies should make a quite adequate exhibit.

A second exhibit, exhibit P-2, should show your proposed weekly programming. Although the bulk of your programming may be entertainment you should include topics such as news, community meetings, discussion groups, public service announcements, bi-lingual presentations and other topics included in your community needs survey. Non-commercial stations are not required at the present time to present specific percentages of educational or instructional programs, however the FCC will consider this in their determination of how well you will serve the needs of your community.

Another exhibit required by this section includes your sources of program material and how you will produce your own programs. This exhibit can simply state "programs other than recorded musical entertainment will be produced in the proposed studios and/or by remote broadcast". Include in this exhibit the names and addresses of proposed program sources such as public service announcements from national or local charitable organizations, news services, network affiliations and educational institutions (A-27).

SECTION V-B

This section requires the showing of your proposed transmitter location by street address or some other form of identification. If your transmitter will be located out-of-view of your operator such as another room, top of a building, top of a hill, etc., then it will be operated by "remote control". Most stations using remote control have their control unit in their studio so the announcer (disc jockey), often doubling as the transmitter operator, controls the transmitter. The remote control point therefore is usually the same as the studio address.

It is not necessary to finalize your decision of which make of transmitter, type of antenna or transmission line you will buy or ultimately use. You may enter any type approved transmitter on your application that meets your power requirements, and change it later. You may also enter the make and model number of any transmission line and change it later. You may also list any make and model of antenna including a homemade one as long as you know its gain characteristics. THE IMPORTANT THING IS TO GET YOUR APPLICATION MAILED to assure you a good chance of getting your selected frequency before someone else does.

If you wish to change any of the above equipment entries at a later date you may need to submit an application for modification of your construction permit but this should not prove difficult. This may not be necessary.

You may use any type approved transmitter in place of the one listed on your application as long as it has the same rated power output and you list it on your application for license. If you wish to use a homemade transmitter an extra exhibit must accompany your application showing complete engineering data

for it. If you propose to use other than a type approved transmitter in place of the one listed on your application you will have to prepare an application for modification of your CP. You may change to another make and model of transmission line as long as the efficiency remains the same. An antenna similar to the one on your application may be substituted later providing the antenna gain and height do not change. See appendix A-26.

A vertical plan sketch of your proposed antenna structure is also required by this section. An example of a vertical plan sketch appears as appendix K. Obstruction lighting will not be needed if there are nearby structures such as trees, buildings, power poles, utility poles and hills which are higher than your proposed antenna. Antenna structures under 120 feet in height generally do not require obstruction marking or lighting unless close to an airfield. More information on obstruction marking and lighting can be found in the FCC Rules, Part 17. Although the FCC and FAA may accept your proposed antenna structure local authorities may not. Be sure to check with city, county and state authorities and ordinances concerning antenna towers.

The radiation center of your antenna system is the center most point of all the bays used, as if they were all one large antenna. Your elevation above mean sea level may be found easily by phoning or visiting city or county offices concerned with planning, public works, etc. Your exact geographic coordinates to the nearest second can also be furnished by the same offices.

The antenna data part of this section may seem a little tricky but the following information should help:

(a) A single bay horizontal antenna has a power gain of 1.

(b) A single bay vertical antenna has a power gain of 1.

(c) An antenna bay with a power gain of 1 produces a free space field intensity at one mile for one kilowatt in-put of 137.6 mV/M if it is not directional.

(d) Antenna field gain is the square root of the antenna power gain.

(e) "Effective free space field intensity at one mile in mV/M for one kilowatt antenna input power" will be field gain times 137.6 mV/M.

EXAMPLE: A 4 bay horizontal, non-directional antenna has a power gain of 4.

The antenna field gain is 2 (square root of 4)

Its free space field intensity is 137.6 mV/M x 2 = 275.2 mV/M

If you propose the use of a directional antenna, the gain characteristics in all directions must be obtained from the manufacturer.

Attach an exhibit showing the exact location of your proposed transmitter and studio sites. U.S. Geological quadrangles of the 7.5 or 15 minutes series may be used for this exhibit and must show the area within 15 miles of your proposed site (A-21).

Another exhibit required by this section must show the FCC the nature of the surrounding terrain in the vicinity of your proposed station. Read the preparation

instructions on the form carefully before preparing the exhibit. Snapshot photos may be used, but a minimum size of 8 x 10 inches is recommended.

Check with your local airport for someone with a plane that can fly you over your proposed site. Take pictures in several directions but be sure you know the compass heading for each by asking the pilot. A very good camera equipped with a haze filter should produce excellent results. A camera with a focal plane shutter will work best as it is least disturbed by the vibrations of the plane. Be sure to date and properly identify each photo exhibit.

If your proposed site is on a hill top, building, etc., you may take your pictures from that point, looking in eight different directions, preferably for each 45 degrees with 00 degrees at true North.

An example of how a map may be marked showing direction from which photographs were taken appears as appendix G.

If your application is for a class D (10 watt) station this section is finished except for a signature.

You may sign this section if you prepared it but be sure to check the proper title box. Remember, it is against the law in most states for anyone to use the title of Registered Professional Engineer or Consulting Engineer unless they legally hold that title. Checking the chief operator's box implies you are a second or first class radiotelephone licensee; if you do not have a license, do not check this box. You cannot go wrong by checking the Technical Director box.

Class A, B and C station applications will need some additional work in this section. Sharpen your pencil, here we go . . . . . .

In the appropriate box, indicate your proposed transmitter output power (TPO) in kilowatts. Your antenna input power in kilowatts is simply your TPO times Transmission line efficiency factor (obtain from appendix I). The power dissipation within transmission line in kilowatts is the difference between transmitter output power and antenna input power. Your effective radiated power in kilowatts is your antenna input power in kilowatts x antenna gain.

Class A, B and C stations are required to have certain monitors. In the appropriate box indicate the make and type number of the frequency and modulation monitors you intend to use. Stereo stations will also require a stereo modulation monitor. Any type approved monitors may be shown here and be replaced by another type approved monitor after you have been granted your CP. Just show the change on your application for license (A-26).

On the topographic map required by an earlier exhibit you drew the location of your proposed transmitter and studio sites. You must now add to that map the location of all known radio stations including commercial and government receiving stations within two miles. Draw a circle around the locations of the other transmitting and receiving sites. Your city or county communications director should be able to help you with locations. The FCC is trying to determine with this exhibit if your proposed station will cause interference to, or will receive interference from, other radio facilities.

On this same topographic map draw lines within the two mile radius separating the area as to its nature such as rural, residential, business, industrial, etc. Clearly identify each area.

You will need two more circles drawn on your topographic map. One circle should be drawn around your transmitter site that represents a two mile radius, the second circle should represent the ten mile radius. Draw eight radial lines from the two mile radius to the ten mile radius beginning with the first at 00 degrees (true North). The other radials are drawn at 45 degree intervals in a clockwise direction. A good example of how the radials are drawn is shown in appendix G.

You must now find the average elevation of each of these eight radials between the two mile and ten mile circles. You will need an adding machine or calculator. On a separate sheet of paper, properly identified with the radial headings, in degrees, write down the elevations, in feet, above mean sea level (MSL) taken from the map's contour lines. The elevations listed should be at regular intervals of not less than 50 points between the two mile and ten mile circles along the radial. Add all the elevations for that radial together and divide by the number of r adials (8). This gives you the average terrain elevation around your transmitter site. Keep your worksheets, you will need them later. Instructions on how to read topographic contour lines can be obtained from the same source as the map (A-21).

Once an antenna and its support are selected you can determine the antenna height (center of radiation*) above the ground. To this figure add the elevation of the ground directly under the antenna to determine the antenna height above mean sea level.

To calculate signal coverage (distance to various signal contours) you must use the antenna height above the average terrain (AHAAT). This figure is obtained by subtracting the average terrain elevation (feet above MSL) from the antenna height above mean sea level. The result may be a negative height. Negative antenna heights are not uncommon in hilly or mountainous areas.

Stop for a moment and study appendix F. Note the 270 degree radial: the antenna radiation center is at 333 feet above mean sea level (MSL), while the average terrain elevation is 336 feet above MSL. This means that for this radial the antenna height above the average terrain elevation is minus three (3) feet. Although a negative antenna height limits the distance an FM signal will travel, the FCC tends to ignore this and prefers predicted distances to signal contours based on a minimum height of 100 feet. One hundred feet is the lowest elevation shown on the FCC's F(50,50) and F(50,10) curves.

The 315 degree radial profile graph in appendix F shows an average terrain elevation of 46 feet above MSL. With the antenna radiation center at 333 feet the antenna height above the average terrain for this radial is 287 feet. This is the figure that would be used in predicting the distance to various signal strength contours for this radial.

Using the examples above, determine the antenna height above the average terrain (AHAAT) for each of your eight radials. Enter your figures on the application form.

* The antenna manufacturer can provide you with this information.

Included with this section of the application are graphs prepared by you showing the profile of the terrain for each of the eight radials. Each profile graph must be properly identified and show elevations in feet and land distances in miles. Be sure to also show the height of your antenna radiation center and the source of the topographic information. Use appendix F as your guideline.

The following formula should be used to determine your free space field intensity in millivolts per meter at one mile:

$$\sqrt{ERP/1000} \quad X \quad 137.6 \text{ mV/M}$$

The ERP is the effective radiated power radiated in the direction of that radial. When using an omni-directional antenna your answer for each radial will be the same. If you propose to use a directional antenna you must obtain the gain characteristics for all directions from the antenna manufacturer.

EXAMPLE: Using an omni-directional antenna and ERP of 250 watts

(1) $\sqrt{250/1000} = \sqrt{.25}$

(2) $\sqrt{.25} = \sqrt{.5}$

(3) .5 x 137.6 mV/M = 68.8 mV/M (free space field intensity)

Predicted distance in miles to the 1 mV/M and 50 uV/M contours may be found with the help of the FCC's F(50,50) curves or the tables in appendix B. If your ERP or AHAAT does not appear on the distance tables you may interpolate between the next higher and lower powers and elevations or use the F (50,50) curves. See "How To Use the FCC Field Strength Curves" section in the following pages of this book.

If the FCC feels that your proposed station may cause interference to other stations or that other stations will cause interference to your station they will ask for an engineering study. They will hold your application until your study is received by them: ultimately they will reject your application if they do not receive the study. You have all the necessary information already. It is part of your frequency search worksheets and overlays. You might just as well send it along now as an exhibit, it will avoid trouble later. You will need two exhibits. One shows interference contours against your 1 mV/M contour. The other shows your interference contours against other station's 1 mV/M contours. Examples of both of these exhibits appear as appendix E.

Section V-B should now be complete. If it has not been signed yet, do it now.

SECTION V-G

This section is self explanatory. You will need an exhibit prepared from an Instrument Approach Chart or Sectional Aeronautical Chart (A-20). An example of the exhibit appears as appendix G. Another exhibit, a vertical plan sketch, was prepared earlier; just send extra copies. Sign this section.

FCC Form 301, Commercial AM and FM Stations

SECTION I

Refer to Section I of the form 340 instructions.

SECTION II

The FCC asks specific questions in the section about the applicant's background, corporate holdings, stocks, business interests, and some personal information. The legal entity for a commercial station may be an individual or group; however, the FCC is interested not only in ownership but who will be in actual control of the station.

SECTION III

This section asks specific questions about how the station will be financed including a personal financial statement covering the last 2 years.

SECTION IV-A

Part I of this section requires three exhibits: (1) the method you used to determine the needs and interests of the community you wish to serve, (2) the needs and interests you believe your station can provide, (3) a listing that is typical and illustrative of the programs you will broadcast to meet the community needs. These programs might include live coverage of city, county and school board meetings, interviews with civic leaders and minority groups, cultural programs such as concerts, operas, religious programs, etc.

Part II of this section is not applicable to new station applications.

Part III will be your programming commitment to the FCC which they will expect you to carry out. Your programming may be modified later by submitting an informal application (letter) to the FCC outlining your proposed changes. Failure on your part to uphold your commitment may be reason for the FCC to reject your application for renewal later on.

Part IV of this section is not applicable to new station applications.

Part V asks how much of your broadcast time will be allocated for commercial announcements. The NAB (National Association of Broadcasters) Radio Code, included in BROADCASTING YEARBOOK (A-11) may be used as a guide. The radio code suggests no more than 18 minutes of commercial time per hour.

Part VI of this section simply asks about your proposed station policies and procedures.

Part VII is the certification of this section and is completed by the signature of the applicant, if an individual, or by one of the officers, if the applicant is a corporation or an association.

SECTION V-A
(AM Applications)

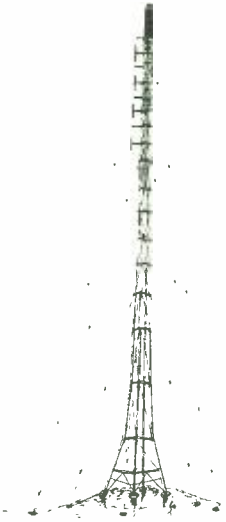
You may refer to section V-B of the form 340 instructions for partial completion of this section. The FM data in section V-B does not apply to AM however. The engineering data and exhibits for this section should be prepared by a consulting broadcast engineer.

SECTION V-B
(FM Applications)

Refer to Section V-B of the form 340 instructions on how to calculate Antenna input power, ERP and how to predict the distance in miles to your 3.16 mV/M and 1 mV/M contours.

SECTION V-G

Refer to Section V-G of the form 340 instructions.



LOCAL NOTICE OF FILING

Immediately after sending your application for CP to the FCC in Washington you must have a legal notice published in your local newspaper. This notice must be published twice a week for two consecutive weeks in a daily newspaper serving the community in which your station will operate. This two week notice must be published within the three week period immediately following the mailing of your application for CP. If your local paper is published weekly instead of daily then your notice must appear once a week for three consecutive weeks within the four week period following the mailing of your application. (FCC R, R, 1.580)

The notice must contain the following information:

(a) The purpose of the application

(b) Date of submission

(c) Type, class and power of station

(d) Location of transmitter and studio

(e) Antenna height above average terrain

(f) Where copies of the application may be seen

EXAMPLE: The John Jones Foundation for Oral Community Communications, on January 16, 1975, did submit to the Federal Communications Commission an application for authority to construct a non-commercial FM station in the city of Anytown, California. The proposed class A station is to operate on channel 201, 88.1 Mhz, with an effective radiated power of 250 watts at an antenna height of 400 feet above average terrain. The station transmitter is to be located at number 12, Knob Hill Circle, Anytown, California. Individuals who wish to advise the Commissions of facts related to this application should file comments with the FCC, Washington, DC, 20554. A copy of this application is available for public inspection at the John Jones Foundation for Oral Community Communications studio and offices, 4444 Orange St., Anytown, California, during normal business hours.

SELECTION OF CALL LETTERS

Unlicensed stations such as Carrier Current and Cable FM may use any call letters they desire. Care should be exercised however, to choose call letters that will not be confused with call letters of existing stations.

The FCC will not consider requests for call letters nor will they reserve call letters prior to the granting of your construction permit. Immediately following your construction permit grant however you must request your desired call letters. If you do not choose your own call letters the FCC will choose them for you. See FCC Rules, Part 1.550.

Call letters must consist of 4 letters beginning with K west of the Mississippi River and beginning with W east of the Mississippi River. Your selected call letters should be in good taste (although they can also be clever). KRAP and KRUD may be clever but perhaps are not in good taste. Most often call letters are chosen to indicate the location or some particular facet of a station. KFOG is located

in San Francisco where it is foggy. K101 indicates their operating frequency 101.3. Schools often incorporate the school's initials such as KVHS, Clayton Valley High School. Call letters that closely resemble other call letters in the area should be avoided. KIZE AND KIZZ for example should not be so closely located as to confuse the listeners.

Check the AM, FM and TV call letter section of BROADCASTING YEARBOOK (A-11) to determine which call letters are in use already. Sometimes, call letters are in use but will not appear in the YEARBOOK (e.g. certain documented vessels), and will not be available. If you happen to unknowingly choose one of these the FCC will provide you an opportunity for another selection.

Your request for call letters may be made informally, that is, by a standard letter. The letter must contain a statement that a copy of the request has been sent to all licensed radio and TV stations and stations under construction within a 35 mile radius of your community. The letter is sent to the FCC in Washington, DC. A copy of the letter is sent to each of the stations within the 35 mile radius to notify them of your intended call letters in any case they have any objections.

Your request should also indicate up to 5 choices of call letters in descending order of preference.

EXAMPLE: Pursuant to Federal Communications Commission Rules, Part 1.550, the John Jones Foundation for Oral Community Communications herewith requests the following call letters in order of descending preference:

KJJF

KSPK

KCOM

KJOC

KJFO

A copy of this request has been mailed to all radio and TV stations in accordance with the above cited rules.

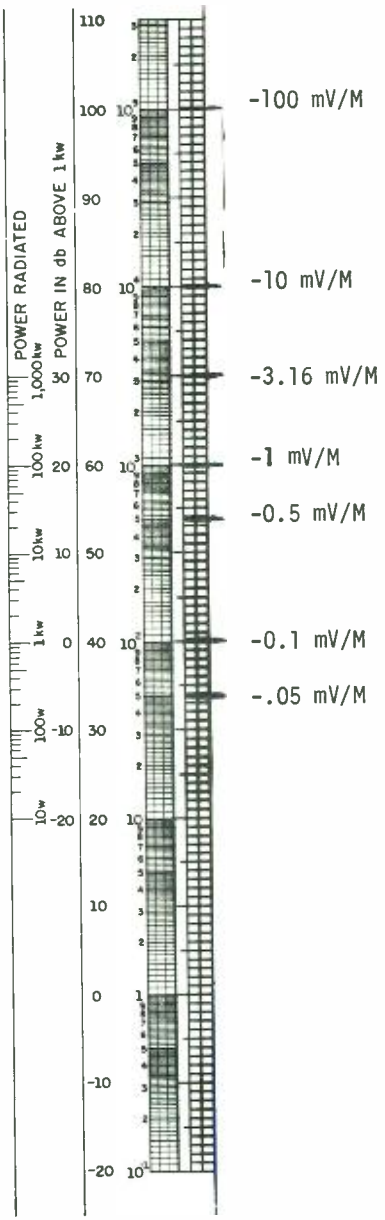
(Signature)

_____

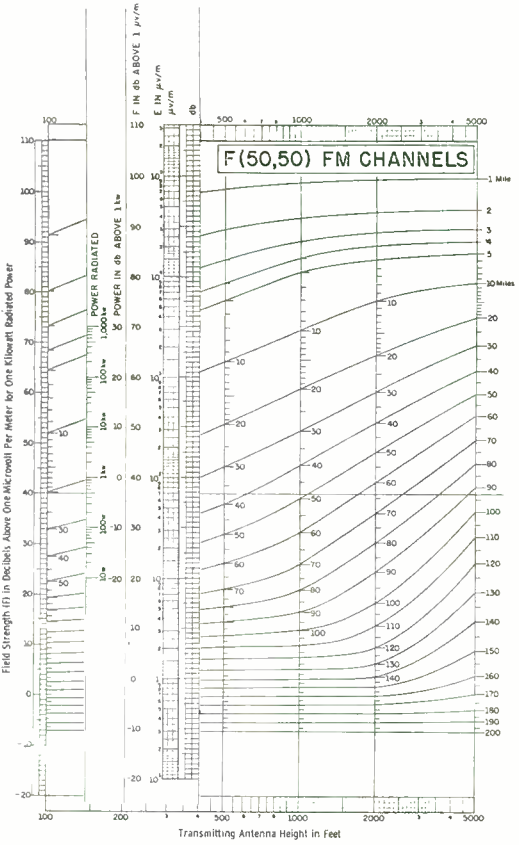
John Jones
President

The FCC's field strength charts appear as appendices B and C. For all their numbers and lines they are really quite simple to use. The scale along the right side of the curves shows the predicted field strength in uV/M for 1 kW of radiated power. The scale is logarithmic with major divisions at multiples of 10 and minor divisions for numbers in between. There are only seven points on the scale that are needed for your frequency search and construction permit application. These seven points are marked for you on the sliding scale to the right.

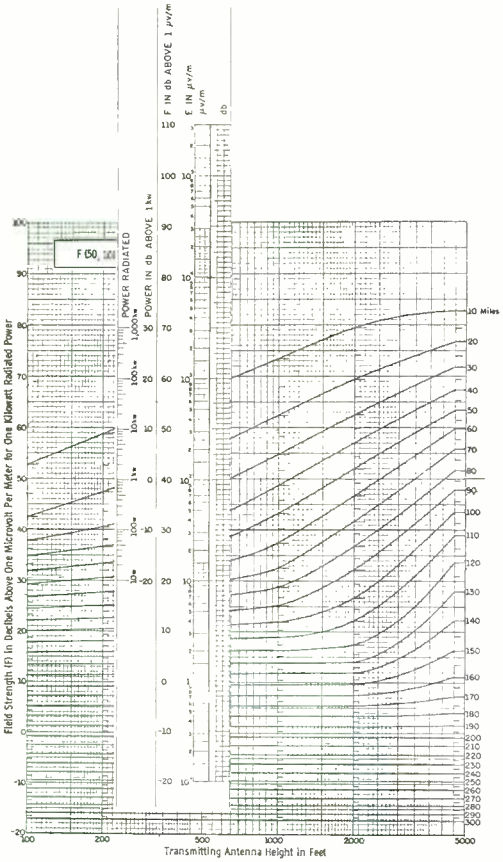
Although the chart is direct reading for 1 kW of radiated power you will require the use of the sliding scale for other powers. You may make a photocopy of the sliding scale or cut it from this page or appendix B when you are ready to use it. The sliding scale should be trimmed and used as the ordinate vertical scale. Place it on the chart with the appropriate gradation for power in line with the horizontal reference line on the chart. The right edge of the scale is placed in line with the appropriate antenna height gradations. The chart is then direct reading in uV/M for that power and antenna height above average terrain.



EXAMPLE: For 500 watts ERP, antenna height of 400 feet, find the distance to your 1 mV/M contour on the F (50,50) curves



EXAMPLE: For 100 watts ERP, antenna height of 800 feet find the distance to your 100 uV/M contour with F (50,10) curves



For your convenience tables have been prepared from the F (50,50) and F (50,10) curves for the field strength voltages needed for your interference studies and for your application for CP. The F (50,50) tables are used to determine distances to your 3.16 mV/M, 1 mV/M and 50 uV/M contours. The F(50,10) tables are used to determine the distances to your 100, 10, .5, and .1 mV/M contours.

To use the tables simply locate your ERP along the top of the table and your AHAAT along the left side. The distance to the listed field strength contour is shown where the ERP and AHAAT columns intersect.

WHERE TO GET FUNDING

The lack of sufficient money is probably one of the most discouraging problems facing all of us. The commercial station owner may borrow from any number of lending institutions if he can show a reasonable need and will have the potential to repay it. The non-commercial station owner, however, cannot rely on his station to make money. The potential may be there for contributions from the public, but this may not be substantial. If the station is part of an educational system, funding can come from various capital or instructional budgets.

Other sources of funding open to non-commercial stations are through government and private grants. Some monetary grants are given which require the grantee to produce a matching amount of money; in other words, the grant covers 50% of the money needed. Other grants are available that cover the total amount required for construction of a non-commercial station. In some cases grants are made for the continued operation and maintenance of non-commercial stations. Some possible sources of monetary grants are listed below:

Governmental Grants: Health, Education & Welfare, Title III

Non-Commercial educational broadcasting facilities
Volume 40, No. 47, Part II, Title 45, Chap. 1, Part 153
of the Federal Register, March 10, 1975

Corporation for Public Broadcasting
888 16th Street, N. W.
Washington, DC 20006

Vocational Education

State Department of Telecommunications

One organization that claims to have information on over 50,000 government, private, corporation and association grant programs is:

Funding Sources Clearing House
149 Ninth Street
San Francisco, CA 94103

or

116 South Michigan Avenue
Chicago, Illinois 60603

The following companies provide an equipment leasing plan. They either have the equipment you require or can make arrangement to purchase it and provide a lease plan for you.

International Financing Inc.
PO Box 88947
Seattle, WA 98188

Leasametric
822 Airport Blvd.
Burlingame, CA 94010

APPENDIX A

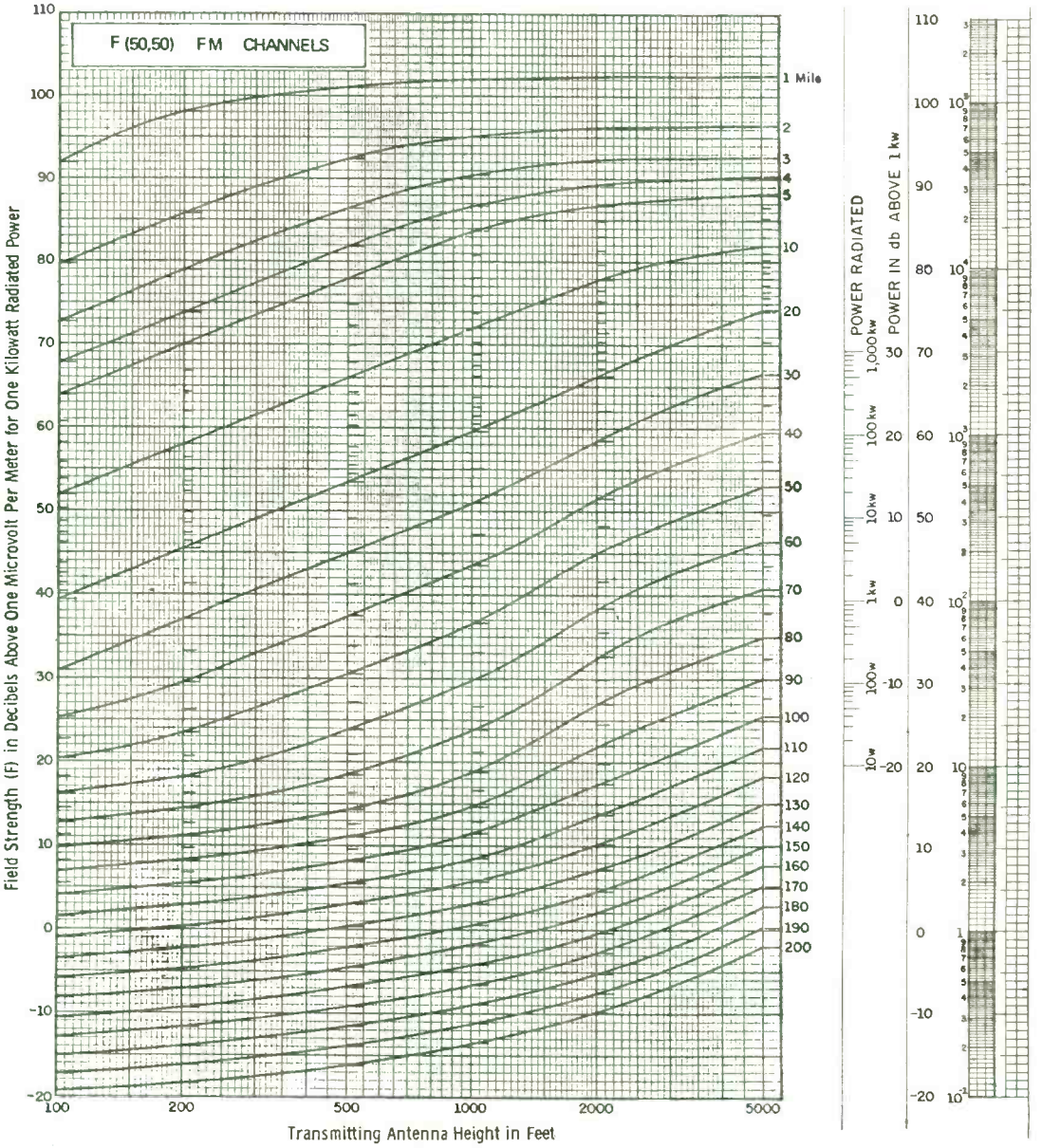
Forms and Reference Materials

Description and Title	Available From:
1. FCC Bulletin 1-A; Printed Publications	Federal Communication Commission Washington DC 20554
2. FCC Bulletin 1-B; How to apply for a broadcast station	-Or-
3. FCC Bulletin OCE-11; Does my transmitter need a license?	FCC Field Offices (free) (see appendix H)
4. FCC Bulletin OCE-12; Operation in the 535-1605 kHz band without a license.	
5. FCC Form 340; Application for a non-commercial broadcast station construction permit	
6. FCC Form 341; Application for a non-commercial broadcast station license	
7. FCC Form 301; Application for a commercial broadcast station construction permit.	
8. FCC From 302; Application for a commercial broadcast station license.	
9. Procedural Manual; The Public and broadcasting.	
. . . . .	
10. Radio Equipment List; Equipment acceptable for licensing	FCC Field Offices (H) (for inspection by public)
	-Or-
	Information Planning Associates 310 Maple Drive Rockville, Maryland 20850 ($25.00)

11. Broadcasting Yearbook Annual Edition ($30.00) Broadcasting Cable Source book Annual Edition ($20.00)	Broadcasting Publications 1735 DeSales Street N.W. Washington, DC 20036 -or-
12. Broadcasting Magazine Weekly Edition ($30.00/year)	Borrow from your local radio or TV station, or Cable TV system.
13. FCC Rules & Regulations ($8.50) Vol. 1 (Parts 0,1,13,17,19)	U.S.Government Printing Office Washington DC 20402 (allow 6 months for delivery)
14. FCC Rules & Regulations ($7.00) Vol. II (Parts 2,5,15,18)	-Or-
15. FCC Rules & Regulations ($18.50) Vol. III (Parts 73,74,76,78)	Read necessary section at your local radio or TV station, FCC field office or law library. Broadcasting Yearbook also includes copies of most pertinent regulations and procedures.
16. Journal of College Radio Bi-monthly Magazine ($5.00/year)	Journal of College Radio Central State University Dept. of Oral Communications Edmond, Oklahoma 73034
17. Journal of College Radio Annual Edition $4.00)	
18. Broadcast Engineering Monthly Magazine ($6.00/year) (Free to broadcast stations)	Intertec Publishing Corp. 1014 Wyandotte Street Kansas City, Missouri 64105
19. Broadcast Management/Engineering Monthly Magazine ($15.00/year) (Free to broadcast stations)	Broadband Information Services 274 Madison Avenue New York, NY 10016

20.	FAA Sectional Aeronautical Charts or Instrument Landing Chart for local airport. (5 copies) ($1.00/each)	Jeppeson & Co. 8025 E. 40th Avenue Denver, Colorado 80207 -Or- National Oceanographic Survey at local Federal Offices -Or- Flight suppliers at your local airport.
21.	Topographic Quandrangle Maps (4 copies) (Must cover area within 15 mile radius of your proposed station) Map reading instructions	U.S. Geological Survey 1200 Eads Street Arlington, Virginia 22202 -Or- Federal Center Building #41 Denver, Colorado -Or- Local Geological Survey Offices
22.	FM Station Atlas ($2.50)	FM Atlas Publishing Co. Box 24 Adolph, Minnesota 55701
23.	Sex and Broadcasting ($2.15) (A handbook for community radio stations)	The Book People 7th Street Berkeley, CA
24.	Cable FM Broadcasting - an enriching experience (How to start a CAFM station)	Panaxis Productions PO Box 5516 Walnut Creek, CA 94596
25.	Carrier-Current Techniques: Wired-Wireless Broadcasting	

26.	The Broadcaster's Guide to Equipment Sources.	Panaxis Productions Box 5516 Walnut Creek, CA 94596
27.	The Broadcaster's Guide to Program Sources	
28.	Questions and Answers for FCC Examinations	
29.	How to Get Into Broadcasting	
30.	Questions and Answers for Broadcast Permit Exams	
31.	Libel Insurance for broadcasters	Broadcasters Libel Insurance Employers Reinsurance Corp. 21 West 10th Street Kansas City, MO 64105 Wm. K. O'Connor Association Insurance Consultants 175 West Jackson Blvd. Chicago, IL 60604
32.	Broadcast station operating guide by Sol Robinson ($12.95)	Broadcast Book Division 1735 DeSales St., N.W. Washington, DC 20036
33.	The business of radio broadcasting by Ed Routt ($12.95)	
34.	AM-FM Broadcast planning guide by Harry A. Etkin (12.95)	
35.	Modern Radio Station Practices by Johnson & Jones	Wadsworth Publishing Co. Belmont, CA (send for details)



FM CHANNELS

ESTIMATED FIELD STRENGTH EXCEEDED AT 50 PERCENT
OF THE POTENTIAL RECEIVER LOCATIONS FOR AT LEAST 50 PERCENT
OF THE TIME AT A RECEIVING ANTENNA HEIGHT OF 30 FEET

Predicted Distance in Miles to your 3.16mV/M Contour (F50,50)

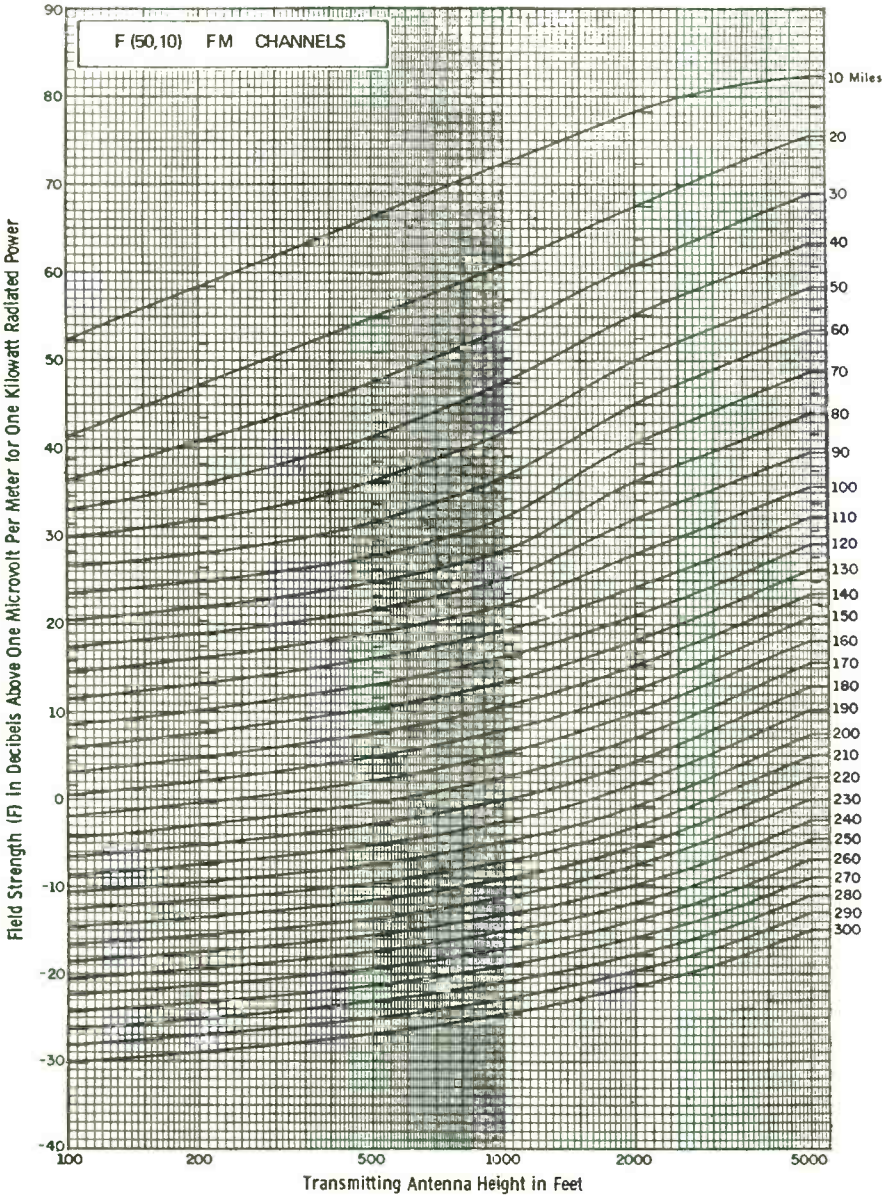
AHAAT in feet	Effective Radiated Power in Watts								
	10	25	50	100	250	500	1000	2500	5000
3000	4.0	6.0	8.1	10.2	14.1	17.1	20.4	25.6	29.0
2800	3.9	6.0	8.0	10.0	13.8	16.7	19.0	24.6	28.0
2600	3.9	5.8	7.8	9.7	13.3	16.1	18.0	23.8	28.0
2400	3.9	5.6	7.6	9.4	12.7	15.5	17.0	22.6	27.0
2200	3.7	5.6	7.4	9.1	12.2	14.9	16.5	21.5	26.0
2000	3.7	5.4	6.9	8.8	11.6	14.1	16.3	20.0	24.0
1800	3.7	5.3	6.8	8.4	10.8	13.4	15.5	19.2	22.6
1600	3.6	5.0	6.5	8.0	10.0	12.5	14.5	18.3	21.3
1400	3.3	4.8	6.2	7.6	9.4	11.5	13.5	17.3	20.0
1200	3.2	4.6	5.6	7.1	8.9	10.4	12.5	16.1	18.8
1000	3.1	4.2	5.2	6.5	8.3	9.6	11.0	14.8	17.5
900	3.0	4.0	5.0	6.3	7.9	9.3	10.8	14.0	16.6
800	2.9	3.8	4.7	5.8	7.5	8.8	10.0	13.2	15.6
700	2.8	3.6	4.4	5.3	7.0	8.3	9.5	12.4	14.6
600	2.6	3.3	4.1	4.9	6.5	7.8	8.5	11.2	13.3
500	2.4	3.0	3.8	4.5	5.8	7.1	8.0	10.0	12.0
400	2.2	2.8	3.4	4.0	5.0	6.3	7.2	9.2	11.0
300	1.9	2.5	2.9	3.5	4.4	5.2	6.2	8.1	9.0
250	1.7	2.2	2.7	3.2	4.0	4.8	5.6	7.5	8.0
200	1.6	2.0	2.4	2.9	3.4	4.2	5.0	6.7	7.5
150	1.5	1.8	2.0	2.5	3.1	3.7	4.6	5.6	6.2
100	1.2	1.5	1.8	2.0	2.5	3.0	3.5	4.5	5.2

Predicted Distance in Miles to your 1.0mV/M Contour (F50,50)

AHAAT in feet	Effective Radiated Power in Watts								
	10	25	50	100	250	500	1000	2500	5000
3000	10.1	14.0	17.1	20.0	25.6	29.7	34.0	39.3	44.0
2800	10.0	13.8	16.7	19.4	24.6	28.9	32.7	38.6	43.0
2600	9.7	13.4	16.1	18.8	23.8	27.6	31.7	37.6	42.0
2400	9.4	12.7	15.5	18.2	22.6	26.6	30.6	36.3	40.0
2200	9.1	12.2	14.9	17.5	21.5	25.4	29.3	35.0	39.0
2000	8.8	11.7	14.1	16.6	20.0	24.0	27.9	33.4	38.0
1800	8.4	10.8	13.3	15.9	19.2	22.5	26.4	31.3	36.0
1600	8.0	10.0	12.5	15.0	18.3	21.3	25.0	30.0	34.3
1400	7.6	9.5	11.5	14.0	17.3	19.8	23.4	28.3	31.4
1200	7.5	9.0	10.4	12.9	16.1	18.6	21.5	26.2	30.0
1000	6.5	8.3	9.6	11.6	14.8	17.3	19.6	24.1	27.5
900	6.3	7.9	9.3	10.8	14.0	16.5	18.8	22.9	26.0
800	5.8	7.5	8.8	10.0	13.2	15.7	18.0	21.7	25.0
700	5.4	7.1	8.3	9.5	12.4	14.8	17.2	20.5	23.8
600	4.9	6.4	7.8	8.9	11.2	13.6	16.0	19.2	22.5
500	4.5	5.8	7.1	8.0	10.0	12.4	14.8	18.0	20.0
400	4.0	5.0	6.3	7.5	9.2	10.8	13.2	16.4	18.0
300	3.5	4.4	5.2	6.5	8.1	9.4	11.2	14.4	16.0
250	3.2	4.0	4.8	5.8	7.5	8.8	10.0	13.2	14.5
200	2.9	3.6	4.2	5.0	6.7	7.9	9.2	11.6	13.5
150	2.5	3.1	3.7	4.3	5.6	6.8	8.0	9.4	11.5
100	2.0	2.6	3.0	3.6	4.5	5.4	6.6	8.3	9.5

Predicted Distance in Miles to your 50uV/M Contour (F50,50)

AHAAT in feet	Effective Radiated Power in Watts								
	10	25	50	100	250	500	1000	2500	5000
3000	42.3	48.3	52.9	57.7	64.6	70.0	75.0	81.9	87.0
2800	41.5	47.4	51.9	56.7	63.5	69.3	73.8	80.4	85.0
2600	40.2	46.2	51.0	55.6	62.2	67.8	72.5	79.3	84.5
2400	39.1	45.2	49.1	54.4	60.6	66.1	71.4	78.1	83.0
2200	37.8	43.9	48.5	53.0	59.0	64.6	69.5	76.7	81.0
2000	36.4	42.3	46.9	51.5	57.4	62.2	67.4	74.4	79.0
1800	34.3	40.1	45.0	49.8	55.6	60.0	65.0	71.9	77.0
1600	32.9	38.6	42.6	47.6	53.3	57.6	62.2	68.8	73.0
1400	30.5	36.0	40.0	44.7	50.9	55.0	58.8	65.8	70.0
1200	28.9	34.0	38.0	42.0	48.2	52.2	56.6	62.8	66.6
1000	26.9	31.3	35.4	39.6	45.0	49.1	53.7	59.9	63.0
900	25.3	30.0	34.0	38.1	43.6	47.9	52.3	58.3	62.7
800	24.1	28.8	32.7	36.7	42.1	46.4	50.6	56.8	60.0
700	23.0	27.5	31.1	35.2	40.4	44.9	49.0	54.0	58.6
600	21.3	25.9	29.6	33.3	38.6	42.9	47.1	52.9	57.0
500	19.5	24.1	27.7	31.3	35.3	40.0	45.0	50.8	55.0
400	16.0	21.8	25.4	28.9	34.0	37.7	42.1	46.7	52.5
300	15.0	19.2	22.4	26.0	30.8	34.5	38.7	44.6	38.5
250	14.0	18.0	20.6	24.1	28.8	32.6	36.6	42.2	46.6
200	12.5	16.4	18.8	21.8	26.4	30.0	34.0	39.3	43.3
150	10.5	14.4	16.8	19.2	23.6	27.1	30.7	36.3	40.0
100	9.0	11.7	13.9	16.2	19.5	23.0	26.0	31.7	36.6



FM CHANNELS

ESTIMATED FIELD STRENGTH EXCEEDED AT 50 PERCENT
OF THE POTENTIAL RECEIVER LOCATIONS FOR AT LEAST 10 PERCENT
OF THE TIME AT A RECEIVING ANTENNA HEIGHT OF 30 FEET

Predicted Distance in Miles to your 100mV/M Contour (F50,10)

AHAAT in feet	Effective Radiated Power in Watts								
	10	25	50	100	250	500	1000	2500	5000
3000	*	*	*	*	*	*	1.4	2.3	3.1
2800	*	*	*	*	*	*	1.4	2.3	3.1
2600	*	*	*	*	*	*	1.4	2.3	3.0
2400	*	*	*	*	*	*	1.4	2.3	3.0
2200	*	*	*	*	*	*	1.4	2.2	3.0
2000	*	*	*	*	*	*	1.4	2.2	2.9
1800	*	*	*	*	*	*	1.4	2.2	2.9
1600	*	*	*	*	*	*	1.4	2.1	2.8
1400	*	*	*	*	*	*	1.3	2.1	2.8
1200	*	*	*	*	*	*	1.3	2.1	2.7
1000	*	*	*	*	*	*	1.3	2.0	2.6
900	*	*	*	*	*	*	1.2	2.0	2.5
800	*	*	*	*	*	*	1.2	1.9	2.4
700	*	*	*	*	*	*	1.2	1.9	2.3
600	*	*	*	*	*	*	1.2	1.8	2.2
500	*	*	*	*	*	*	1.1	1.7	2.1
400	*	*	*	*	*	*	1.0	1.6	1.9
300	*	*	*	*	*	*	*	1.4	1.7
250	*	*	*	*	*	*	*	1.3	1.5
200	*	*	*	*	*	*	*	1.2	1.4
150	*	*	*	*	*	*	*	1.0	1.3
100	*	*	*	*	*	*	*	*	1.0

* Less than 1 mile

Predicted Distance in Miles to your 10mV/M Contour (F50,10)

AHAAT in feet	Effective Radiated Power in Watts								
	10	25	50	100	250	500	1000	2500	5000
3000	1.4	2.2	3.0	4.0	6.7	8.3	11.1	15.1	18.4
2800	1.4	2.2	3.0	3.9	6.5	8.2	10.5	14.5	17.6
2600	1.4	2.2	3.0	3.9	6.4	8.1	10.2	14.0	17.0
2400	1.4	2.2	2.9	3.8	6.3	7.9	10.0	13.5	16.4
2200	1.4	2.2	2.9	3.8	6.2	7.7	9.7	12.9	15.7
2000	1.4	2.2	2.9	3.7	6.0	7.4	9.3	12.0	15.1
1800	1.4	2.1	2.8	3.6	5.8	6.9	8.7	11.4	14.0
1600	1.4	2.1	2.8	3.4	5.5	6.6	8.1	10.4	13.1
1400	1.3	2.1	2.8	3.3	5.3	6.2	7.4	10.1	12.0
1200	1.3	2.1	2.6	3.2	5.0	6.0	6.9	9.2	10.8
1000	1.2	2.1	2.3	3.1	4.6	5.6	6.4	8.8	10.0
900	1.2	2.0	2.2	3.0	4.4	5.2	6.1	8.1	9.3
800	1.2	1.8	2.2	2.9	4.0	5.0	5.8	7.8	8.9
700	1.2	1.8	2.1	2.8	3.9	4.6	5.3	7.2	8.2
600	1.2	1.7	2.1	2.5	3.6	4.2	5.0	6.7	7.8
500	1.1	1.7	2.0	2.4	3.2	4.0	4.6	6.2	7.2
400	*	1.5	1.8	2.2	3.0	3.4	4.0	5.5	6.5
300	*	1.4	1.6	1.9	2.6	3.0	3.4	4.8	5.5
250	*	1.3	1.5	1.8	2.3	2.9	3.2	4.2	4.9
200	*	1.2	1.4	1.6	2.2	2.7	2.9	3.9	4.4
150	*	*	1.3	1.4	1.9	2.1	2.5	3.2	3.9
100	*	*	*	1.1	1.6	1.8	2.0	2.8	3.1

*Less than 1 mile

Predicted Distance in Miles to your 0.5mV/M Contour (F50,10)

AHAAT in feet	Effective Radiated Power in Watts								
	10	25	50	100	250	500	1000	2500	5000
3000	17.2	21.8	26.3	30.9	38.2	44.0	49.6	57.9	64.0
2800	16.6	21.1	25.3	30.0	37.3	42.6	48.6	56.5	63.0
2600	16.0	20.0	24.4	28.8	36.0	41.6	47.6	55.2	62.0
2400	15.4	19.1	23.3	27.7	34.6	40.0	46.0	54.0	60.0
2200	14.7	18.5	22.2	26.7	33.3	38.3	44.0	52.0	58.0
2000	14.0	17.7	20.8	25.4	31.7	26.6	42.0	50.0	56.0
1800	13.1	16.8	19.3	23.9	30.0	35.0	40.0	48.0	54.0
1600	17.1	15.8	18.1	22.1	27.9	32.7	38.2	45.5	50.8
1400	10.9	14.6	17.1	20.0	25.8	30.0	35.2	42.0	48.0
1200	10.0	13.5	16.1	18.7	23.6	27.9	32.5	39.2	44.6
1000	9.5	12.0	14.7	17.3	21.4	25.3	29.3	35.8	40.9
900	9.0	11.3	13.9	16.4	20.0	24.1	28.1	34.2	39.5
800	8.5	10.4	13.0	15.6	19.0	22.6	26.6	32.5	37.5
700	8.0	9.3	11.9	14.6	18.0	21.3	25.3	30.8	35.7
600	7.5	8.6	10.9	13.5	17.0	19.6	23.2	28.7	33.3
500	7.0	7.7	10.0	12.1	15.6	18.0	21.3	26.4	30.8
400	6.5	6.9	9.0	10.4	13.8	16.4	19.0	24.2	28.3
300	6.0	6.1	8.1	9.0	11.7	14.4	17.0	20.7	25.0
250	5.0	5.4	7.2	8.2	10.3	12.9	15.5	19.0	22.9
200	4.0	4.7	6.3	7.5	9.0	11.2	13.8	17.3	20.0
150	3.5	4.2	5.4	6.7	8.0	9.6	11.7	15.2	18.2
100	3.0	4.0	4.5	6.0	7.0	8.0	9.0	11.7	14.8

Predicted Distance in Miles to your 0.1mV/M Contour (F50,10)

AHAAT in feet	Effective Radiated Power in Watts								
	10	25	50	100	250	500	1000	2500	5000
3000	38.2	45.7	51.2	57.9	66.3	73.1	78.7	89.1	96.0
2800	37.3	44.6	50.0	56.5	65.0	71.1	77.5	87.5	95.0
2600	36.0	43.0	49.0	55.2	63.8	70.0	76.7	85.8	92.5
2400	34.6	41.9	47.6	54.0	62.1	68.5	75.1	84.6	91.3
2200	33.3	40.0	46.0	52.0	60.0	66.7	73.6	82.5	90.0
2000	31.7	38.3	44.0	50.0	58.0	64.4	71.5	80.9	87.5
1800	30.0	36.7	42.0	48.0	56.0	62.2	69.1	79.0	85.0
1600	27.9	34.4	40.0	45.5	52.6	58.6	65.8	75.0	82.5
1400	25.8	31.7	36.7	42.0	50.0	56.0	62.0	70.0	77.5
1200	23.6	29.3	34.2	39.2	46.4	52.0	58.0	66.0	72.5
1000	21.4	26.7	30.8	35.8	42.7	48.2	54.0	62.0	68.2
900	20.0	25.3	29.3	34.2	41.0	46.4	52.0	60.0	66.3
800	19.0	24.0	28.0	32.5	39.2	44.6	50.0	58.0	64.4
700	18.0	22.7	26.7	30.8	37.3	42.0	48.0	56.0	62.3
600	17.0	20.7	24.7	28.7	35.0	40.0	45.8	53.6	60.0
500	15.6	19.1	22.6	26.7	32.8	37.5	42.6	50.0	56.8
400	13.8	17.9	20.0	24.2	29.8	34.5	40.0	48.0	54.4
300	11.7	15.2	17.8	20.7	26.4	31.2	36.4	44.4	51.0
250	10.3	13.9	16.6	19.0	24.5	29.0	34.0	42.3	49.1
200	9.5	12.2	14.9	17.3	21.7	26.7	32.0	40.0	47.5
150	8.0	10.0	12.7	15.2	18.9	23.3	28.3	36.7	44.3
100	6.8	8.0	10.0	11.7	15.2	17.8	22.2	30.0	40.0

APPENDIX D

Frequency Search Work Sheet

Channel & Frequency	Call Letters	Geographic Location	Distance in Miles	ERP & AHAAT	Distance to 1 mV/M
201					
202					
203					
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205					
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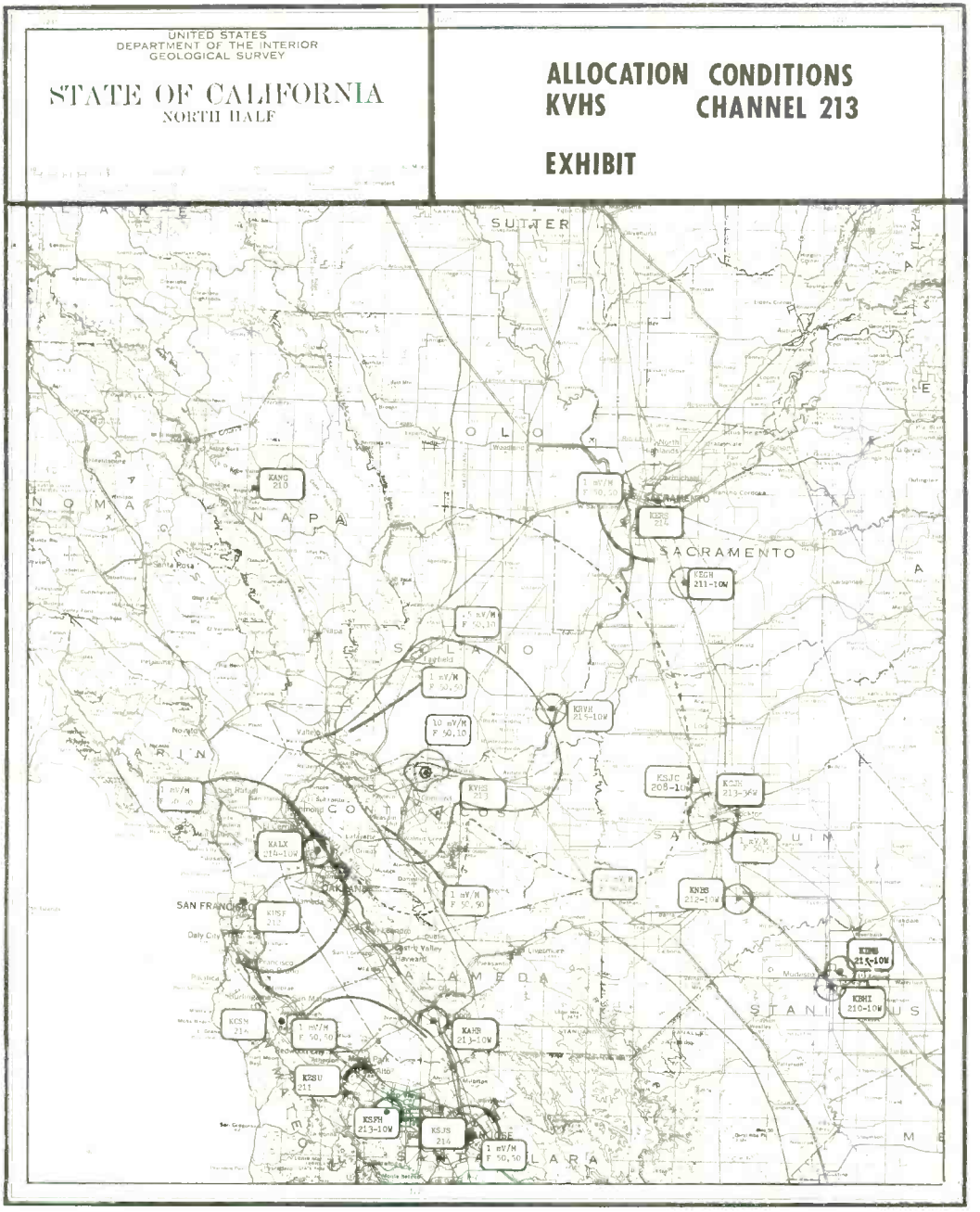
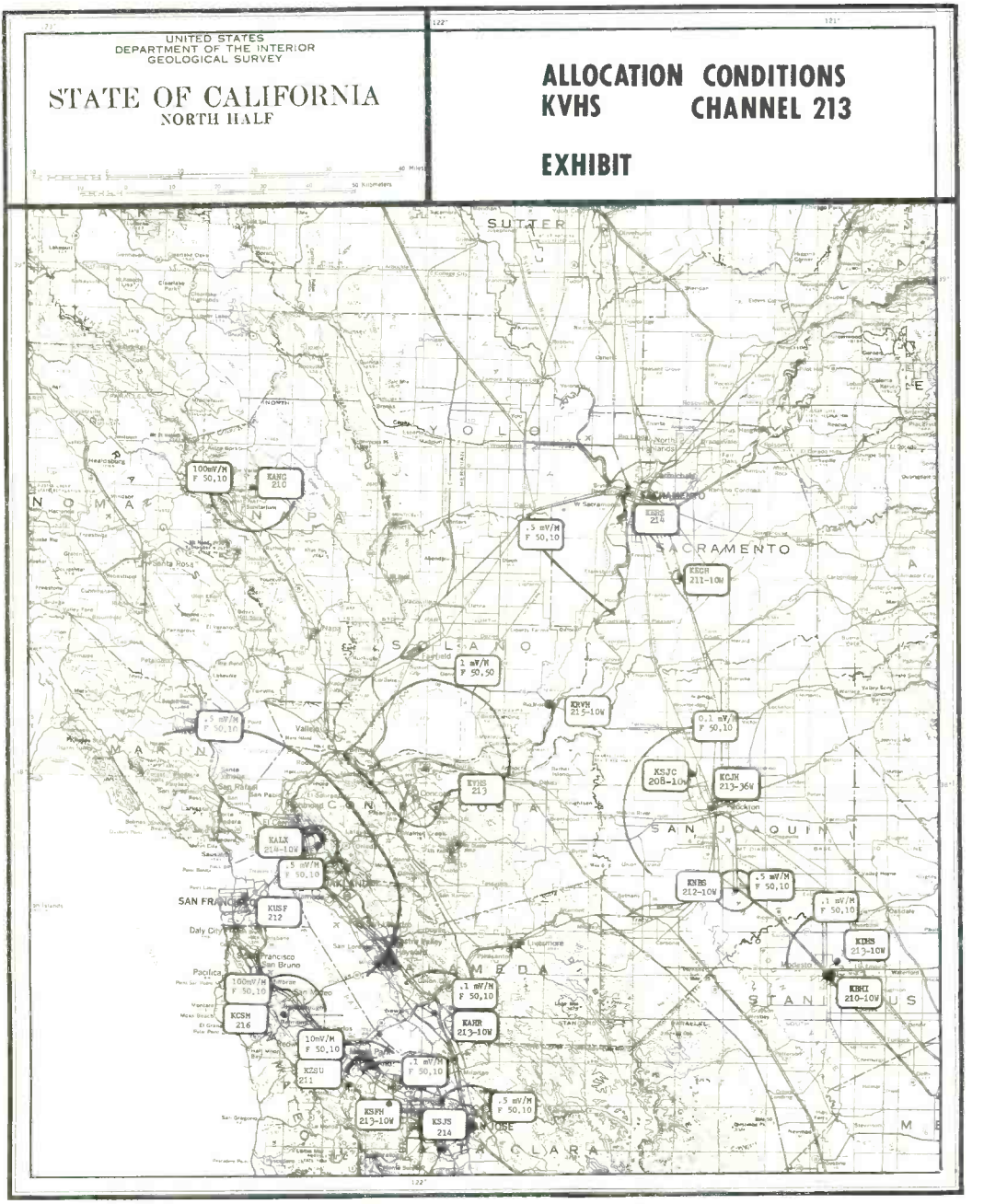
APPENDIX E

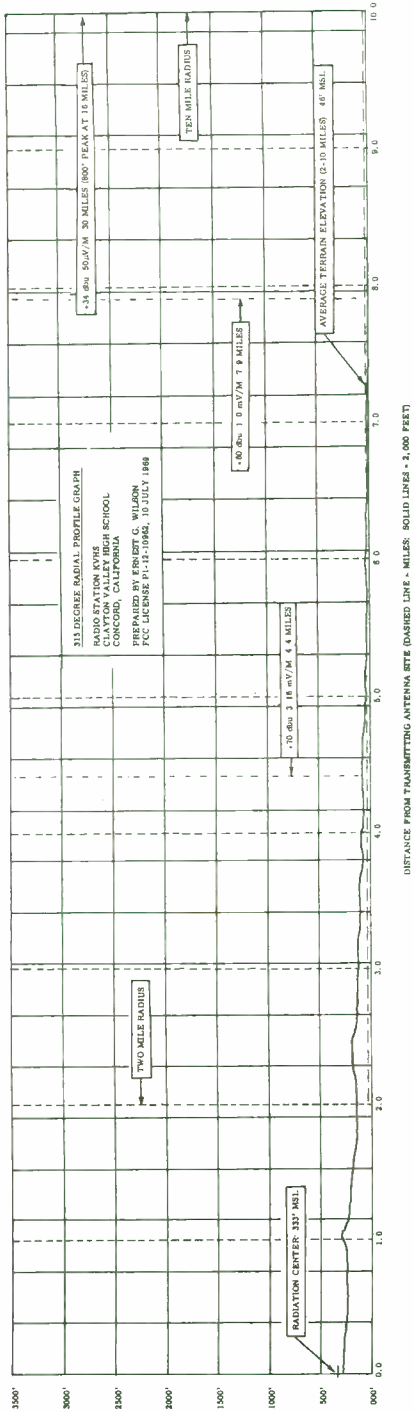
MAP OF INTERFERENCE TO OTHER STATIONS



APPENDIX E

MAP OF INTERFERENCE FROM OTHER STATIONS

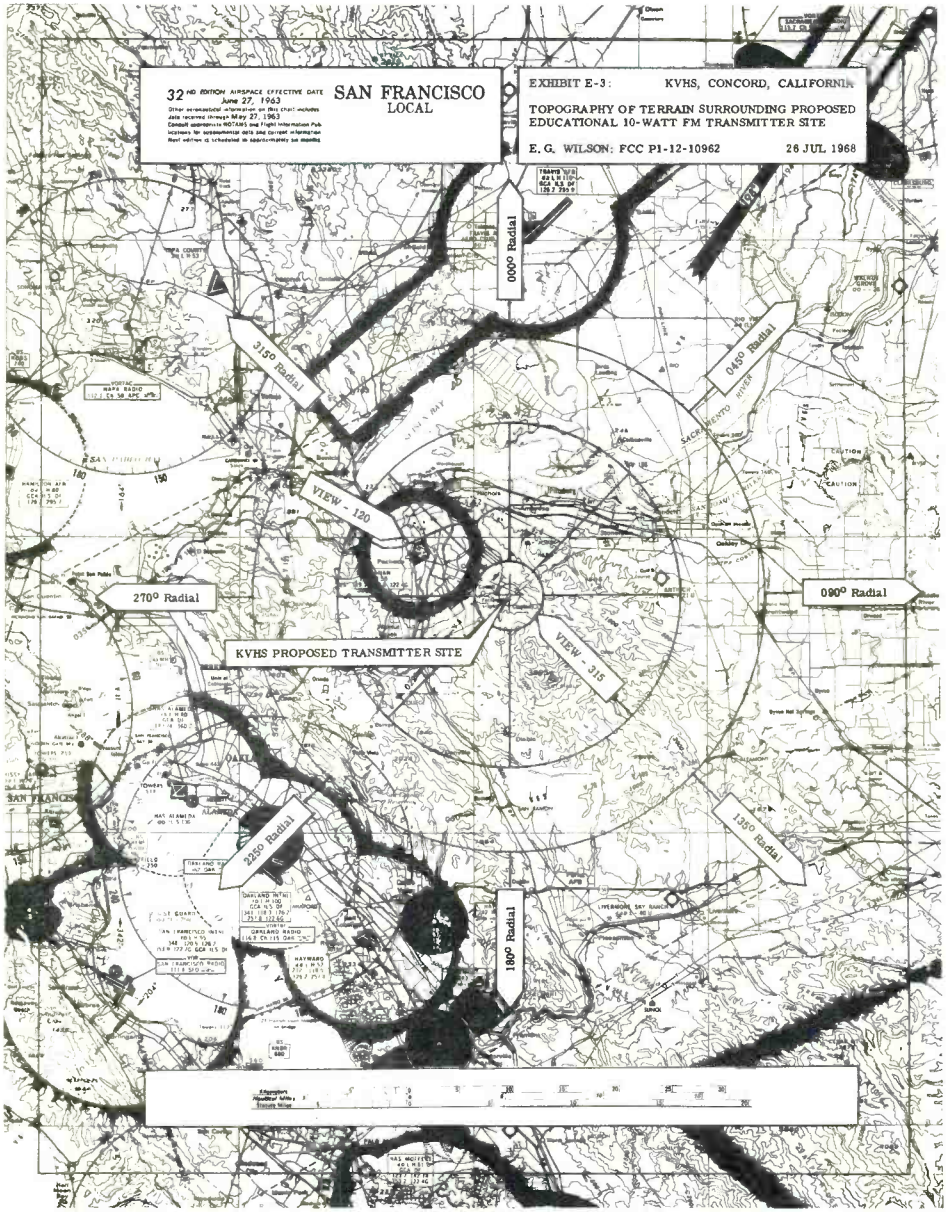




APPENDIX F

APPENDIX G

Aeronautical Map



APPENDIX H

Federal Communications Commission Offices

Headquarters
(202) 655-4000

1919 M St. N.W.
Washington, DC 20036

Broadcast Bureau
(202) 632-6460

Broadcast Facilities
(202) 632-6485

License Division
(202) 632-6334

District	Address and Phone
1	1600 Custom House Boston, Mass 02109 (617) 223-6608
2	Rm 748 Federal Bldg 641 Washington St. New York, NY 10014 (212) 620-5745
3	1005 U.S.Custom House Philadelphia, PA 19106 (215) 597-4410
4	George M. Fallon Federal Bldg Room 819, 31 Hopkins Plaza Baltimore, MD 21201 (301) 962-2727
5	Military Circle 870 North Military Highway Norfolk, VA 23502 (703) 520-4100
6	1602 Gas Light Tower Atlanta, GA 30303 (404) 526-6381
7	919 Federal Bldg. Miami, FLA 33130 (305) 350-5541
8	829 Federal Bldg. South New Orleans, Louisiana 70130 (504) 527-2094
9	5636 Federal Bldg. 515 Rusk Avenue Houston, Texas 77002 (713) 226-4306
10	1100 Commerce St., Federal Bldg, Room 13 E7 Dallas, Texas 75202 (214) 749-3243
11	US Courthouse, Rm 1754 312 N. Spring St. Los Angeles, CA 90012 (213) 688-3276
12	323A Customhouse 555 Battery San Francisco, CA 94111 (415) 556-7700
13	314 Multnomah Bldg 319 S.W. Pine St. Portland, Oregon 97204 (503) 221-3097
14	8012 Federal Office Bldg 909 First Avenue Seattle, WA 98014 (206) 442-7653
15	504 New Customhouse Denver, Colo 80202 (303) 837-4054
16	691 Federal Bldg. St. Paul, Minn. 55101 (612) 725-7819
17	1703 Federal Bldg. Kansas City, MO 64106 (816) 374-5526
18	1872 U S Courthouse Chicago, ILL 60604 (312) 353-5386

19	1054 Federal Bldg. Detroit, Michigan 48226 (313) 226-6077	22	U.S.Post Office & Courthouse 747 Federal Building Hato Rey, Puerto Rico 00903 (809) 753-4008
20	905 Federal Bldg. 111 W. Huron St. Buffalo, NY 14202 (716) 842-3217	23	US Post Office Bldg Rm G63 4th & G St, PO Box 644 Anchorage, Alaska 99510 (907) 272-1822
21	502 Federal Bldg, Box 1021 Honolulu, Hawaii 96803 (808) 546-5640	24	Room 216 1919 M Street NW Washington, DC 20554 (202) 632-7000

APPENDIX I

Coaxial Cable Characteristics per 100 feet

Cable Type	Maximum Power Rating	(90 MHz) db loss	(90 MHz) Efficiency	(100 MHz) db loss	(100 MHz) Efficiency	Cost per foot
RG-8 (RG-213)	700 watts	1.9	64%	2.0	63%	$ .25
RG-17 (RG-218)	2 kW	.7	85%	.8	83%	1.20
1/2 inch (Heliax)*	2 kW	.79	83%	.8	83%	1.80
7/8 inch (Heliax)*	6 kW	.34	92%	.35	92%	3.50
1 5/8 inch (Heliax)*	11 kW	.19	95%	.20	95%	6.00

To find the efficiency for other lengths of cable complete the following:

1. Divide your cable length (in feet) by 100 and multiple by the db loss shown above. This gives you the total db loss for your cable length.

2. Multiply the total db loss by 0.1. Use this number as the exponent (e) in the following calculation. This is easily done with a good calculator.

3. Now divide 100 by $10^{(e)}$. This equals the % of efficiency for your cable.

EXAMPLE:

250 feet of 7/8 inch Heliax cable at 90 MHz

(1) $\frac{250}{100} \times .34 = .85$ (total db loss)

(2) $.85 \times .1 = .085$ (used for exponent)

(3) $10^{(.085)} = 1.216$ and $\frac{100}{1.216} = 82.22\%$

* Trademark of Andrews Corporation

APPENDIX J

Interference conditions as derived from FCC Rules, Part 1.573

CO CHANNEL STATIONS

Your 1 mV/M contour does not overlap their .1 mV/M contour.

Your .1 mV/M contour does not overlap their 1 mV/M contour.

FIRST ADJACENT CHANNEL

Your 1 mV/M contour does not overlap their .5 mV/M contour.

Your .5 mV/M contour does not overlap their 1 mV/M contour.

SECOND ADJACENT CHANNEL

Your 1 mV/M contour does not overlap their 10 mV/M contour.

Your 10 mV/M contour does not overlap their 1 mV/M contour.

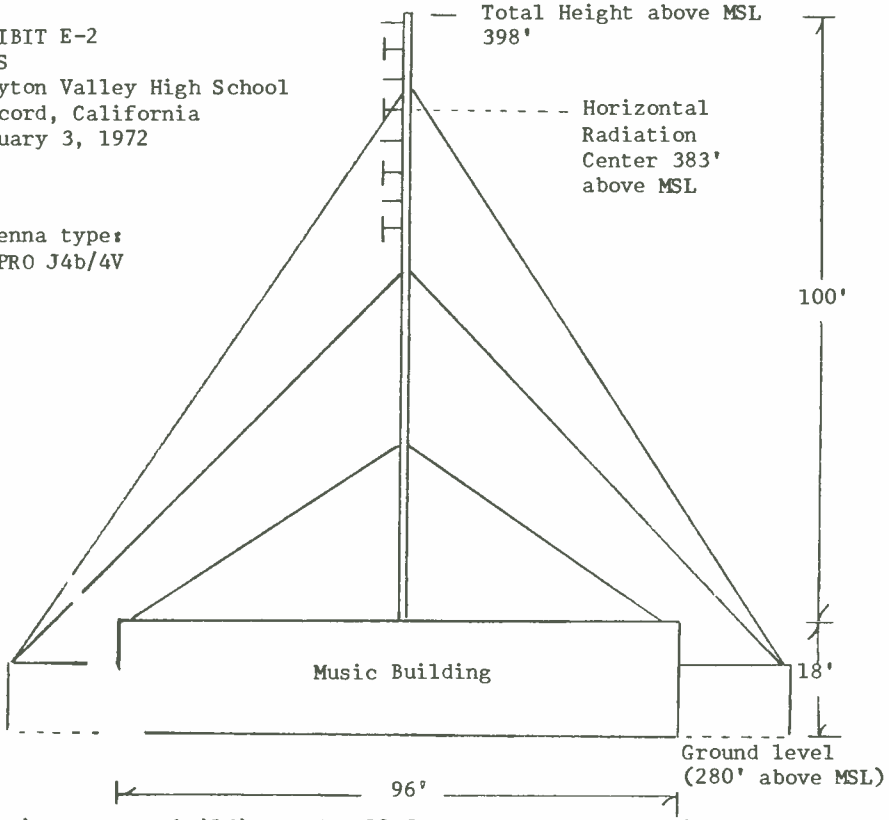
THIRD ADJACENT CHANNEL

Your 1 mV/M contour does not overlap their 100 mV/M contour.

Your 100 mV/M contour does not overlap their 1 mV/M contour.

EXHIBIT E-2
KVHS
Clayton Valley High School
Concord, California
January 3, 1972

Antenna type:
JAMPRO J4b/4V



Existing support building. Top 20 feet of top guys are fiberglass attached with steel pre-forms to steel guy wires. All other guys are steel. Guy wires are anchored to 2 inch iron pipe in concrete (part of covered walk-way support).

Prepared by:
Ernest G. Wilson
Technical Director