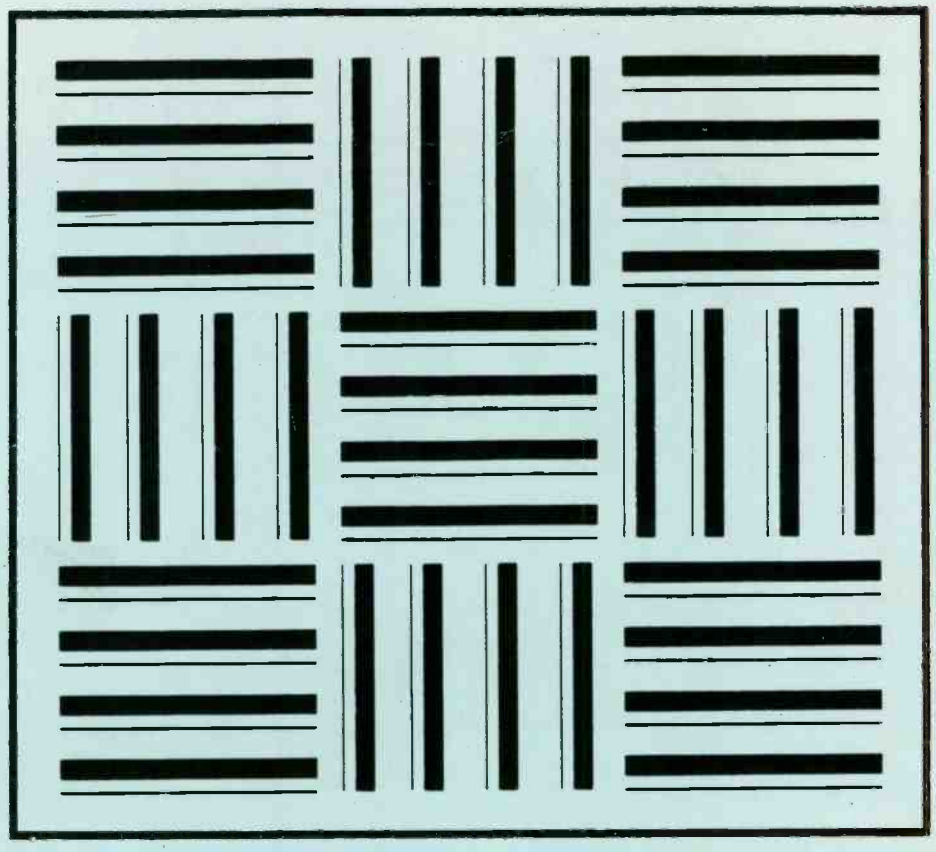

THE NAB GUIDE FOR BROADCAST STATION CHIEF OPERATORS

National Association of
NAB
BROADCASTERS®

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Preface

This publication is intended to serve as an overview and as a source of general information on rules and regulations applicable to AM, FM and television chief operators as of the date of publication. It cannot be considered in any way an official publication whose contents have been approved by any state or federal regulatory agency. Also, since rules and policies are constantly being revised, you should check to see whether or not the laws have been changed.

This publication cannot, and should not, be used as a substitute for professional advice in particular situations. Only by evaluation of specific facts and with the aid of expert advice (namely, an attorney and/or consulting engineer) will you be in a position to know definitively whether your compliance is consistent with the Federal Communications Commission's rules and policies. NAB specifically disclaims any and all liability which might arise in release of this publication.

About the Writer

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Introduction

The Federal Communications Commission requires all AM, FM and TV broadcast stations to designate a chief operator, as stated in Section 73. 1870 of the Commission's Rules. The chief operator helps the station licensee insure that the technical operation of the station complies with FCC requirements. Since the station licensee is ultimately responsible for the operation of the station, it is important that a well qualified individual be designated as the chief operator. The purpose of this book is to provide station licensees, management and technical staff with the information necessary to hire a competent chief operator and to develop and implement procedures that will insure compliance with FCC Rules.

Every station should have a current copy of the FCC Rules concerning broadcasting. Wherever possible, rule references are listed in this book, allowing the reader to do further research. The referenced sources are generally available in the US Government Documents section of libraries.

The information presented here is based on review of the FCC Rules and regulations, FCC Reports, the Federal Register, the Congressional Record, correspondence with the FCC and about 5,000 pages of FCC documentation from station inspections.

Various suggested forms are provided. These include sample operator instructions, station logs, station log review forms and "station inspection" forms for the various broadcast services. Each of these forms can be used to organize the routine operational procedures. A discussion is provided for each form explaining the contents, related rule sections and how the FCC has enforced these rules. The "station inspection" form is based on the forms used by the FCC Field Operations Bureau, but has been expanded to clearly show what violations the FCC commonly detects during an inspection.

The term "operator" is the FCC's designation for any person who is in charge of "operating" the station's transmitter. It specifically refers to the "transmitter duty operator," as described in Section 73.1860. This person is usually an employee. At a television station the "operator" might be the master control operator or at a radio station, a disc jockey. This person should not be confused with the "chief" operator, who is the subject of this book.

Regulatory History of Chief Operators

The licensing of radio operators has always been controversial. Through the years, the required qualifications for a broadcast transmitter operator have varied. During World War II, when there was a shortage of operators holding the First Class Radiotelephone License, routine operation by a "lesser grade" operator was permitted. These "lesser grade" operators were to be supervised by a "chief operator." This was the first time the FCC required stations to designate a "chief operator" to train and supervise "routine duty operators."

FCC Established

In 1910, Public Law 262 passed requiring the Commerce Department to license radio operators. In 1911, the Radio Division of the Commerce Department was established. The Radio Act of 1927 (Public Law 632) established the Federal Radio Commission (FRC) which took over the regulation of broadcasting. Other radio services remained with the Commerce Department. When Congress passed the Communications Act of 1934, creating the Federal Communications Commission, the FCC took over the regulation of all radio services from the Federal Radio Commission and the Commerce Department. They also took over regulation of telephone and telegraph services from the U.S. Postal Service.

Section 318 of the Communications Act of 1934 states "The actual operation of all transmitting apparatus in any radio station for which a station license is required by this Act shall be carried on only by a person holding an operator's license issued hereunder..." The FCC is authorized to waive this requirement under various conditions. These requirements may not be waived for broadcast stations, except those primarily engaged in rebroadcasting other broadcast signals (translators and boosters).

The FCC adopted the then existing rules of the Federal Radio Commission. These rules required the transmitter operator of a broadcast station to hold a First Class Radiotelephone License.

Duty Operator Requirements Reduced During WWII

During World War II, the FCC reduced the operator requirements for the routine operation of broadcast transmitters due to a shortage of First Class operators. Routine operation and minor adjustments could be made by any "qualified holder" of any class of commercial license. Restricted radiotelephone permit holders were required to take an exam to demonstrate an understanding of radiotelephone theory.

In 1943, the FCC decided to endorse Restricted Radiotelephone Permits to permit the operation of broadcast transmitters of 100 watts or less if a First Class operator in charge of the station at which he/she was employed certified that the permittee was able to satisfactorily operate that particular station. This was the start of operator requirement relaxation and the increase in the responsibility of a "chief operator", who at that time had to certify as to the qualifications of "lesser grade" operators.

With the end of World War II, the FCC rescinded the allowance for the use of Restricted Radiotelephone Permit holders to operate broadcast transmitters, since many First Class operators were returning from the war.

In 1951, the FCC proposed authorizing AM and FM stations to operate with less than a First Class operator on duty on a showing that no additional First Class operators were available and that a First Class operator would be on call to handle emergencies. The chief operator (holding a First Class license) was to notify the FCC district Engineer in Charge (EIC) that the operator had been properly trained in the operation of the station.

In 1953, in response to a petition from the National Association of Radio & Television Broadcasters, the FCC reduced operator requirements for the routine operation of nondirectional AM and FM stations with powers of 10 kW or less to Restricted Radiotelephone Permit. This is the same exam-free permit required today to operate all broadcast stations. Stations employing "lesser grade" operators had to have one or more First Class operators as full time employees. These operators were responsible for making the non-routine adjustments and repairs and instructing the other operators.

By 1963, the FCC had found an excessive number of violations at broadcast stations that may have been due to unqualified operators. The FCC increased routine operator license requirements from

Restricted Third Class Radiotelephone to broadcast endorsed Third Class Radiotelephone. These requirements applied to nondirectional AM stations up to 10 kW and FM stations up to 25 kW. Stations using other than First Class operators for routine operation were required to have a First Class operator employed full time or employed part time with a written contract. Although not specifically stated, this was the beginning of the "chief operator" requirement.

Broadcast Endorsed Third

In 1970, the FCC proposed authorizing the operation of high power radio transmitters and AM Directional Antenna (DA) stations by operators holding a broadcast endorsed Third Class License. This inquiry looked into what type of training was required to operate and maintain a directional antenna. Consideration was given to the possibility of establishing another endorsement on the "first phone". An exam on directional array theory and operation would be required to get the endorsement and to be the chief operator of a directional station. This inquiry also looked into the reduction in required operator oversight due to possible automation of transmitter control and logging. They considered requiring automatic logging if a Third Class operator was used. Enforcement action against the chief operator of noncompliant stations was also considered.

In 1972, the FCC adopted rules authorizing the operation of high power radio transmitters and noncritical directional arrays (a critical array has tolerances, as specified on the station license, which are more stringent than those in Rules) by holders of broadcast endorsed Third Class License holders if the station employed at least one First Class Licensee on a full-time or contract basis. These stations were required to designate a chief operator and notify the FCC EIC, in writing, within three days. The chief operator was to inspect the antenna system within two hours after the start of DA operation. Further, DA stations using lesser grade operators were required to make a "partial proof" of the DA performance each year.

The chief operator of an AM DA station and nondirectional high power (>10 kW) AM or (>25kW) FM stations needed to be a full-time employee of the station. One person could not be the chief operator of more than one station in a single service (for example, two AM stations). The rules adopted

at this time also required operators to be fully trained in the operation of the station and required printed step by step instructions and parameter limit charts to be posted. These rules also required a directional antenna system to be "fail safe" in that the failure of any RF relay to switch would take the station off the air. The chief operator was to review the station logs once each day and sign the log on completion of the review.

Stations continuing to use a first phone for DA operation and lower power non-DA stations continuing to utilize "lesser grade" operators did not need to designate a chief operator or complete a DA partial proof. This rulemaking was one of the Commission's typical trades: Requirements were reduced in one area (qualifications of routine duty operator) and increased in another (additional requirements regarding designation of a chief operator). Those stations that did not want to take advantage of the reduced operator requirements did not have to make any changes.

In 1972, the National Association of Broadcasters (NAB) filed a petition seeking several minor changes in the operator requirements. The FCC denied the request that the DA "fail safe" requirement be deleted when lesser grade operators are used. They granted the request that partial proofs be required every three years instead of every year, however, a skeleton proof was then required every year.

FCC Reviews Operator Requirements

In November 1977, the FCC contracted with the Georgia Institute of Technology to study broadcast service regulation, including operator licensing. The report suggested reducing the operator requirements for routine operation of most AM and FM stations (except those AMs with critical arrays) from the Broadcast Endorsed Third to the Restricted Permit. The FCC adopted this proposal in December 1978. At this time, they also stopped issuing the Broadcast Endorsed Third.

In November 1979, the FCC again amended the operator requirements. At this time, they permitted the operation of critical AM directional antenna systems and television stations by Restricted Permit (RP) holders. Television, directional AM, high power AM or high power FM stations using "lesser grade" operators were required to have a designated chief operator. Lower power nondirectional AM and FM stations still did not need to designate a chief operator if they used RP operators. Further, stations not electing to use "lesser grade" operators were not required to designate a chief operator.

In 1980, the FCC found that many broadcast transmitter operators were still taking the exam for the Third Class Radiotelephone License, even though this license did not grant any more broadcast transmitter operating authority than the RP, for which no exam was required. 53,000 Third Class Licenses were issued each year, yet only 2% of the operators needed the license to operate the transmitter they intended to operate (typically marine radio). For this reason, the FCC discontinued the Third Class Radiotelephone License. A similar license was still needed by international agreement for marine radio operation, so the FCC established the Marine Radio Operator Permit. To keep broadcast operators from continuing to pursue this permit, the Marine Radio Operator Permit did not permit the operation of broadcast transmitters.

Also in 1980, the FCC dropped the requirement that the FCC EIC be notified of the designation of a chief operator. Prior to this, the Engineer In Charge of the FCC district was to be notified within three days of the designation of a chief operator or an acting chief operator.

Chief Operator Doesn't Need First Phone

In 1981, the FCC finally finished its review of the broadcast station operator requirements. In this final Report and Order, they eliminated the requirement that a transmitter maintenance technician hold any license above a Restricted Permit. With this action, all AM, FM and TV stations were required to designate a chief operator in writing. This chief operator may hold any class of license (other than a Marine Radio Operator Permit). The chief operator is responsible for operator training, review of logs and various inspections.

In making these changes, the FCC concluded that the written examination for the First Class Radiotelephone license was not a good method of evaluating the qualifications of a technician responsible for the maintenance of broadcast equipment. Most of the commenters on the proceeding agreed with this idea. The FCC went on to conclude that no written exam would be a good evaluation, and they were not in a position to offer a "hands on" exam. While qualifying experience was probably the best training for a technician, the FCC decided against reestablishing the "service record" on a license (which had been suspended in 1952). The service record duplicated data readily obtained from an applicants resume.

Various groups petitioned the FCC for a clarification on the chief operator responsibilities. The FCC modified, again, the responsibilities of the chief operator (Section 73.1870(c)). Previously, the rule had listed specific duties of the chief operator (required inspections, log entries, etc.). The FCC agreed that this put an unnecessary restriction on how labor was divided at individual stations. They modified this section to allow the chief operator to delegate specific duties, but required the chief operator to retain sufficient oversight to insure each requirement was completed properly.

In 1984, the FCC extended the authority of the Restricted Permit holder to several other radio services, including the broadcast auxiliary services (STL, TRL, RPU, etc. under Part 74 of the rules). In this proceeding, the National Association of Radio and Telecommunications Engineers (NARTE) suggested the FCC certify industry groups (such as NARTE and the Society of Broadcast Engineers (SBE)) that certify technicians. The FCC decided, however, to limit its actions in technician certification to a "vigorous overall endorsement of such a certification program or programs."

Deregulatory Trend

Since World War II, the FCC has tended to shift the responsibility for insuring a broadcast station employ qualified operators from the FCC itself to the station licensees. The FCC has decided that the written tests it issued were not a good measure of technician competence. Further, varying levels of competence are required for the operation and maintenance of the various types of broadcast stations. The exam for the first phone included information that was not required for the operation of a typical station, yet the exam did not include enough information for the repair and maintenance of the more complex directional or television stations. The FCC has reduced the requirements for an operator license for a broadcast station to a certification that the operator is eligible for employment in the United States, can speak and hear, can keep a written log and is familiar with the provisions of the treaties, laws, rules and regulations that govern the station to be operated (Section 13.22(c)). The current regulations are more of an operator "registration" system than a "licensing" system.

Chief Operator Required

Every AM, FM or TV broadcast station is required by the FCC to designate a chief operator. This "designation" must be in writing and be "posted" with the chief operator's license (FCC Rules Section 73.1870(b)(3)). Note that the licenses of all operators, whether employed full-time, part-time or on contract, must be posted at the operator duty position (Section 73.1230(b)). Acceptable "posting" may be by affixing the licenses to the wall at the transmitter control point where the operator is on duty, or by enclosing them in a binder or folder at the duty position. Operators employed at more than one station must post the license at one station and post photocopies at all the other stations (Section 73.1820(c)).

The chief operator is required to have an operator license that does not prohibit broadcast operation. Marine Radio Operator Permits and General Radiotelephone Operator Licenses issued after December 31, 1985 carry such a prohibiting endorsement. Operators holding one of these licenses must also hold a Restricted Radiotelephone Operator Permit, allowing operation of a broadcast station (Section 13.3(c)).

Prior to 1981, the FCC required the chief operator to hold a First Class Radiotelephone License. Since this license required an exam that included sections on radio law, electronic theory and broadcast practices, many stations considered the holding of this license as a minimum qualification for employment. Some stations still require the chief operator to hold a General Radiotelephone Operator License, though recently issued licenses do not authorize the operation of broadcast stations. The exam for the General Radiotelephone Operator License covers the technical, legal and operating practices for radiotelephone stations other than broadcast and, as such, may not serve as an indicator of the qualifications for chief operator.

The station licensee is ultimately responsible for the proper operation of the station. Violation notices and forfeiture orders are usually issued to station licensees, even if the violation was due to operator's inattention or improper operation of the transmitter. In such cases, Section 1.89(d) of the Rules states that the station licensee is to inform the FCC of the name and license number of the operator at fault, but the station licensee will generally be held ultimately responsible. Thus, it is vitally

important that the licensee hire qualified operators and a qualified chief operator.

It can be difficult for a nontechnical station manager to determine the qualifications of an applicant. The certification programs offered by the Society of Broadcast Engineers (SBE) and the National Association of Radio & Telecommunications Engineers (NARTE) can provide a means for evaluating applicants. Various grades of certificates are issued to broadcast technicians, based on exam scores and experience.

Broadcast Technologist

Exam - Electronic fundamentals, FCC operating tolerances, safety.

Experience - FCC General Radiotelephone Operator License and two years continuous satisfactory service or three out of last five years of satisfactory service in broadcast engineering.

Broadcast Engineer

Exam - Operating practices, theory, problems and safety.

Experience - Five years suitable experience in broadcast or broadcast related engineering.

Senior Broadcast Engineer

Exam - Operating practices, theory, problems, safety, supervision and management.

Experience - Ten years responsible broadcast or broadcast related engineering.

Professional Broadcast Engineer

Exam - Operating practices, theory, problems, safety, supervision and management.

Experience - Senior broadcast engineer and twenty years of professional broadcast or broadcast related engineering experience in radio and/or television.

Special Endorsements

The Broadcast and Senior Broadcast Engineer certificates have space for special endorsements for AM/FM and TV. These endorsements may be attached by passing subject specific exams.

Figure 1. SBE certificates and qualifications. For further information, see the Program of Certification, available from the Society of Broadcast Engineers, Inc. (Phone: (317) 842-0836)

Figure 1 shows the various SBE certificates and qualifications. There are no suggested certification levels for each of the possible chief operator jobs. The certification levels, however, can be used in comparing applicants. A station's consulting engineer may be able to suggest a minimum certification level for a particular station. Study guides are available from SBE. These may also be used to evaluate candidate qualifications.

NARTE has an extensive classification system for engineers and technicians. In addition, endorsements are available for each certificate in a wide variety of areas, including RF radiating and nonradiating systems (such as telephone inside wiring). For further information on NARTE certification, phone (503) 581-3336.

Finally, just as many employers rely on a trusted CPA in evaluating applicants for bookkeeping positions, many stations employ the services of a consulting engineer in evaluating chief operator applicants. Similarly, station group owners often have the group chief engineer hire the chief operator for each individual station. Some CPAs have developed an exam to evaluate prospective bookkeepers prior to hiring. Consulting engineers or station group engineering directors may have similar exams as well.

Note that the chief operator's job is to insure the station is operating within the terms of the station license and the FCC Rules. This requires more than an understanding of electronics. Further, the electronics in broadcasting are quite different from those in consumer electronics or mobile radio. Keeping your station on the air and sounding (or looking) great is not enough! "If these duties are to be satisfactorily discharged, as the Commission intends they shall, an operator with a considerable degree of technical competence must occupy the chief operator's position. . . . It behooves the station licensee, therefore, to exert the utmost care in selecting the operator who will be designated for this post."[1]

[1] See Report and Order in Docket No. 18930, 35 FCC 2d 290 (1972), Paragraph 29.

Employee vs Contract

A chief operator may be a full-time employee, a part-time employee or a contractor. The chief operator of a directional AM station or a TV station is required to be an employee of the station (as opposed to being a contractor) (Section 73.1870(b)(1)). The employee may be full-time or serve the number of hours a week the station licensee determines is necessary to keep the station compliant with the FCC Rules and its station license. The FCC has distinguished between an employee and a contractor on the basis of inclusion of the employee on the station payroll.

FM stations and nondirectional AM stations operating with 10 kW or less may use a full- or part-time employee for the chief operator, or may employ a contract operator. Written contracts with non-employee chief operators are required to be in the station files and accessible to the FCC during an inspection (Sections 73.1870(b) and 73.1225(c)). The chief operator is to be a licensed operator, not a company. If a company is used for technical services, a station must still designate an individual operator to be the chief operator. This may be someone on the station staff or the contractor staff. Remember that a contractor chief operator must post his/her license (or a photocopy if "employed" by more than one station) at the transmitter control point.

Acting Chief Operator

At times when the chief operator is unable to act (such as during vacations or sickness), the station licensee must designate an "acting" chief operator (Section 73.1870(a)). Since sickness is impossible to "schedule," it is suggested that each station have an alternate chief operator already designated. This designation should also be posted along with the operator license. Be sure the alternate chief is fully informed of the technical operation of the station.

Chief Operator Responsibilities

The principal responsibility of the chief operator is to insure that the station complies with the FCC Rules and the terms of its license. Section 73.1870 of the FCC Rules specifically states that the Chief Operator is responsible for the following duties:

1. Periodic inspections and calibrations of the station's transmission system, monitors, metering and control system; and any repairs or adjustments as needed.

2. Periodic AM field monitoring point measurements, equipment performance measurements and/or any other tests specified in the rules or in the station's license.

3. Review of the station log at least once each week to determine if the required entries are being made correctly and if the station is operating as required by the rules or its license. Upon completion of the review, the Chief Operator (or designee) is to sign and date the log, initiate any corrective action necessary and advise the station licensee of any recurring conditions.

4. Making any other entries which might be required in the station log.

Because the chief operator is responsible for ensuring compliance with the FCC Rules, he or she must be aware of <u>all</u> the rules concerning broadcast stations as well as those specifically required for a given type of service (AM, FM, or TV).

The chief operator's responsibilities are summarized below:

1. General Operator Supervision

    a. Establish operational procedures
    b. Weekly log review to insure procedures are followed
    c. Operator training (where needed)

2. Periodic Transmission System Inspections

    a. Visual inspection of transmission system
    b. Logging of all system parameters to detect slow deterioration
    c. Remote or extension meter calibration
    d. Observation of modulation levels (overall, pilot, subcarriers)
    e. Observation of frequencies (carrier, pilot, subcarriers)

3. EBS Operations

    a. Check encoder/decoder operation
    b. Verify that tests are done correctly
    c. Verify proper logging of EBS events

4. Quarterly Tower Check

    a. Check tower paint
    b. Insure all lamps are operating and no filters broken
    c. Check beacon flash rate
    d. Insure failure of any lamp is detectable by operator
    e. Tower fences and locks in good condition
    f. Ground radials in good condition (where applicable)

5. Annual Performance Measurements, as required

    a. Equipment performance measurements, if required
    b. Overall station inspection

The subcategories listed above are suggested, and will vary station to station. Actual station procedures are left up to the discretion of the station licensee and the chief operator. For example, Section 73.1580 of the Commission's Rules requires the transmitting system and monitors to be inspected "as often as necessary" to insure proper operation. Prior to "deregulation" (one FCC inspector called it "reregulation," since the technical requirements have not been relaxed), the chief operator was required to inspect the transmitting equipment once a week.

Specific Station Requirements

The Station Log

Every broadcaster is required to maintain a station log (Section 73.1800). Previously, the rules contained separate specifications for program, operating and maintenance logs. Those requirements have been eliminated and only certain information now must be recorded on the station log. It must be kept in a neat and legible manner. The log must also be signed and dated by the person making the log entries, and every page must be numbered and dated as well. It must include the following technical information:

1. Readings of the transmitter parameters as required by FCC regulations or the station's instrument of authorization: i.e. license, construction permit, etc.

2. Records of the transmission and receipt of all Emergency Broadcast System (EBS) tests and alerts. This information may be recorded on a special EBS log, but it is considered part of the station log and should be retained accordingly.

3. Records of any malfunction of tower lights, including the nature of the malfunction, the time and date that it was observed and the time and date the light was repaired or replaced.

4. Any other records that may be required by the FCC or by the instrument of authorization: e.g. special requirements imposed in the event of deficient operation or interference to other broadcast services.

Many stations use an automated logging system for recording the transmitter data. Section 73.1820(b) permits automatic devices to record readings for the station log. Such an automatic system must have an alarm system to notify the operator if any of the logged parameters are beyond tolerance. Special attention should be given to the alarming of directional antenna parameters, since the tolerances are based on calculations instead of the parameters directly available on many antenna monitors. Even with automatic logging, the operator is required to inspect the system "periodically". If automatic logging is being used, the other required information (such as EBS, tower lights, etc.) can be recorded on a separate form. However, since this information is part of the station log, it must maintained in accordance with Section 73.1800. Although a formal maintenance log is no longer required, licensees

may also wish to keep technical information with the station log.

The log should be reviewed once each week by the chief operator. If a correction to the log is required after it has been signed by the person making the original entry, it can only be made by striking out the error and making a corrective explanation on the log or an attached sheet. The correction must be signed and dated by the person who kept the log, or by the chief operator.

Station logs must be retained for a period of two years unless the log contains information concerning, or is the subject of, an FCC investigation; then the logs must be retained until specifically authorized by the Commission to destroy them.

Operator Training

The chief operator is required to insure the operators are operating the transmitter correctly. This is typically accomplished through weekly log reviews. However, with the relatively stable systems utilized today, operators do not typically need to make many adjustments or do much limit checking. The FCC does, however, expect the operator to know how to evaluate several parameters to insure the station is operating within specifications.

The FCC expects all operators to be able to determine whether the transmitter is operating within various parameter tolerances. The "routine" observations are not spelled out in the current rules. Earlier rules required various parameters to be logged and also required various control functions to be "remoted". These functions were those that may require adjustment at any time in a typical 24 hour period. An FCC inspector will often check the qualifications of the operator on duty by asking that operator to perform various functions without the aid of the chief operator. Unless the station utilizes the Automatic Transmission System (ATS) (which automatically shuts the station down under an interference causing condition), the operator needs to be able to determine whether the station is operating within licensed parameters, how to adjust these parameters and how to shut the station down on failure of these adjustments. The FCC inspector will typically ask the operator of a non-ATS station to do the following:

1. Determine the final amplifier input voltage and current (including units).
2. Determine whether the operating power is within limits, either through a direct meter indication, calculations or limit charts.

3. Adjust the operating power. Remote adjustments of "power trim" is not specifically required by the Rules. If it is not available to the operator, the transmission system must be stable enough or include automatic controls to insure the transmitter operates within licensed limits.

4. Determine whether other operating parameters are within tolerance (typically antenna monitor readings on DA stations and video modulation parameters on television stations).

5. Run an EBS test and properly log it.

6. Change to day or night power/pattern and determine the operating parameters.

7. Turn the transmitter off.

Transmission System Inspections

Section 73.1580 requires each station to make a complete inspection of the transmitting system and monitors as often as required to ensure proper station operation. This requirement was added when remote control was first authorized. Prior to remote control operation, the routine duty operator could complete a system inspection by walking across the room. With remote control, portions of the transmission system may be quite distant from the routine duty operator (in some cases, hundreds of miles). The requirement for frequent inspection has been steadily reduced. When remote control was first authorized, the FCC required a daily inspection of the transmitter site equipment. This was later reduced to a weekly inspection. When ATS was introduced, required transmitter site inspections were reduced to once a month. Now the FCC has decided to leave the frequency of inspections up to the station licensee. Experience with the individual equipment is the best judge of the required inspection interval. It is suggested that those stations operating by remote control "remote" as many parameters as possible, allowing a fairly complete "inspection" to be made from the control point. Further, many parameters for which the FCC has specified tolerances are signal parameters (as opposed to transmitter parameters) and may be measured "off the air" using monitors at the control point. It is suggested that these parameters be checked at least weekly, as part of the station log review.

The inspection of the transmitter site should include the following items, at a minimum.

1. Log all equipment parameters (transmitters, receivers, etc.).
2. Log calibration of remote metering.

Emergency Broadcasting System (EBS)

EBS is vitally important to both the public and to the FCC, as reflected by the fines issued. The most common EBS violation is a lack of evidence (from station log entries) of the weekly EBS test transmission and reception. The EBS Rules are found in Sections 73.901 through 73.962.

The weekly EBS test is to be broadcast between 8:30 am and local sunset. It is to be scheduled on a random basis. The transmission of the test is to be logged in the station log. Logging the EBS test in the program log is not sufficient, as the program log is not an FCC required log. As a measure to insure that EBS tests are transmitted each week, our suggested "weekly log review" form has a space to fill in the date and time of the test transmission.

Some stations have scheduled the EBS test transmission into a traffic computer. Some of these stations have been cited because the EBS test did not run at a random time. Others have been cited because the computer "cancelled" the "EBS Contract" at some time (perhaps the contract expired or was suspended for nonpayment). Such failures should be caught within one week by the chief operator log review. The FCC inspector should not be the one to discover that you haven't run an EBS test in the past six months.

Every week a station is to receive an EBS test from the station being monitored. The date and time of the received test must be logged (Section 73.961). Failure to receive this test (as evidenced by the lack of a station log entry) should be immediate cause for the chief operator to determine why. The lack of the test reception must be logged as well (Section 73.932(c)). The measures taken to prevent a recurrence should also be logged. These may include repair of the EBS receiver or contacting the monitored station regarding the lack of a test transmission or a defective attention signal transmission. An EBS generator/decoder "self test" is probably not a sufficient test to place the blame with the other station. If there is a question regarding operation of the EBS receiver and decoder, the receiver can often be tuned to your own station for an EBS test. If it works properly, the problem is possibly with the other station.

Several stations have been cited for only running one tone in the EBS attention signal. It's a good idea to occasionally check for the presence of both tones and to check the modulation level.

Each tone is to modulate the transmitter at least 40%. This will result in a peak modulation of at least 80% when both tones are present. The modulation monitor peak flasher can be used to check this. The modulation monitor meter cannot be used for this check since it is not a peak reading meter and the two tone signal is not sinusoidal. If the EBS encoder is followed by audio processing equipment, it is difficult to measure the modulation level of each tone individually. Since the tones are very close together in frequency, it is unlikely that frequency response variations or preemphasis in the system will change the relative amplitude of the tones. If the amplitudes of the individual tones leaving the encoder are within 1 dB of each other, the system will probably meet the specifications. The EBS encoder is required to have a test switch to enable the tones one at a time for such measurements.

The FCC will often check the duration of the EBS tones. They are required to be between 20 and 25 seconds. A duration check should be done now and then, as many EBS tone encoders use resistor-capacitor timing systems, subject to drift as the capacitor ages.

The harmonic distortion of each tone is required to be less than 5%. This is not generally checked by the FCC, but compliance is required nonetheless.

Do not air the EBS tones from video or audio tape cartridge machines. Tone encoders are required to be FCC type accepted. Cart machines are not FCC type accepted and may not be used to broadcast the tones. One station was cited for not using a type accepted EBS encoder because the "permanently affixed" FCC required label had fallen off.

The NAB offers an EBS training videotape outlining EBS regulations and basic procedures. (Contact NAB Services (800) 368-5644.)

Quarterly Tower Inspection

Section 17.47(b) of the Commission's Rules requires an inspection of tower lighting, monitoring and control equipment at least every three months. This is a good time to check various items with regard to the tower. These include tower lighting and marking, tower condition itself, required fences and locks. In addition, directional AM stations are required to keep within +/- 5% from licensed values, both the antenna monitor loop current ratio deviations and the base current radio deviations (Section

73.62(a)). Many stations rely almost exclusively on the antenna monitor readings to insure proper DA performance. Those stations operating nondirectional part of the time probably check base currents relatively frequently, since calibration of the remote base current meter is required to determine operating power for nondirectional operation. Broadcasters not routinely checking directional antenna base currents may want to do this as part of the required quarterly tower lighting inspection, since they're out at the towers anyway. A quick checklist is below. The results of this inspection should be placed in the station log.

Further information on tower maintenance is available in the NAB publication *Radio and TV Towers: Maintaining, Modifying and Leasing.* (Contact NAB Services at 800/ 368-5644.)

Tower Inspection

____ All lights operating properly.

____ No white light visible (red filters not broken).

____ Photocell operates properly.

____ Beacon flash rate between 12 and 40 flashes per minute.

____ Tower light alarm detects the failure of any lamp.

____ Tower light indicator detects the failure of any lamp.

____ Tower paint not faded or chipped.

____ Tower fence in good condition (for hot tower or to meet radiation safety).

____ Tower gate locked and lock in good condition.

____ Tower gate key available.

____ Base insulator clean.

____ Lightning gap adjusted properly.

____ Tower guy anchors in good condition.

____ Tower guy wire sag not excessive.

____ Log DA base currents, ratios and deviations from licensed.

Figure 2. Tower Inspection Checklist

Equipment Performance Measurements

Section 73.1870(c)(2) requires the chief operator (or delegate) to make the equipment performance measurements required by Section 73.1590. Most stations are required to make equipment performance measurements on the installation of a new transmitter or subcarrier equipment (SCA, stereo, etc.). In addition, AM stations not exempted by installation of NRSC-1 audio processing (Section 73.44(e)) are required to make equipment performance measurements annually with no more than 14 months between successive measurements. To be exempt from the annual AM equipment performance measurements, a station must have had the NRSC-1 processing operating before it went on the air or by June 30, 1990. These stations are exempt from performing additional annual equipment performance measurements until June 30, 1994. Such stations are, however, required to make measurements, required by Section 73.1590(a)(1), on the installation of a new transmitter, and by Section 73.1590(a)(3), on installation of stereo transmission equipment. These exempted stations should continue to maintain the measurements completed prior to the beginning of the exemption period for the required maintenance period (2 years) (Section 73.1590(d)).

Note that equipment performance measurements are a set of measurements to demonstrate compliance with the occupied bandwidth specifications of the various services (Sections 73.1590(b), 73.44, 73.317, and 73.687). The measurements are <u>not</u> the previously required audio performance measurements. The FCC no longer specifies audio or video performance quality. Program performance is left to the discretion of the individual station licensee. The FCC required demonstration of compliance with the occupied bandwidth specifications is entirely an interference prevention measure.

Note also that the infrequent requirement for equipment performance measurements does not exempt stations from complying with the occupied bandwidth specifications. Normally, the first check an FCC inspector makes is a spectrum analysis on the station. Often, if the spectrum analysis meets specifications, no further inspection is made.

AM Directional Field Strength Readings

Directional AM stations are required to make monitor point field strength measurements as often as necessary to insure these points are within the licensed limits (Section 73.61(a)). The results of the measurements must be logged in the station log. Stations without approved sampling systems (as specified in Section 73.68) must make monitor point measurements quarterly with intervals not exceeding 120 days.

If an operator finds the directional antenna parameters out of tolerance, the cause should be determined immediately. Out of tolerance DA operation caused by inclement weather is permitted, provided the monitor points are kept within licensed limits. Operation may continue for up to ten days (Section 73.62(b)). The chief operator should approve any such operation and make appropriate log entries. Such log entries should include a description of the weather conditions and the monitor point readings. Since we normally have some advance notice of weather conditions, the chief operator can often "pre-approve" such operation. As the DA parameters approach the authorized limits, the monitor points should be checked to insure the authorized limits are not exceeded. Note that operation beyond 10 days requires a request for a special temporary authorization (STA) (Section 73.62(b)).

If operation outside the DA limits is due to a failure in the system, the procedures of 47 CFR 73.1680 (emergency antennas) should be followed. This allows continued operation with power reduced as necessary to maintain the monitor point field strengths. An arbitrary power reduction on out of tolerance DA operation is not acceptable. The power reduction must be sufficient to maintain the monitor point field strengths. A full record of such operation (with monitor point field strength values) is to be logged. A request for a special temporary authorization is to be made within 24 hours of commencement of such operation.

Depending upon the stability of the directional array, the routine duty operator should keep a close watch on its performance. The routine duty operator cannot typically make any adjustments to the antenna system. A sudden change or an undetected gradual change may require the operator to shut down the transmitter.

If a directional array is not operating within tolerance, it is quite likely it will cause interference. The power must be reduced or the transmitter shut down to reduce the measured field at the monitor points to within limits.

Monitor points are almost always checked during an FCC inspection. Stations are quite frequently found to have excessive fields at the monitor points. Several other problems are commonly found.

In many cases, the monitor point description on the license (the route to the monitor point) does not match the route actually taken. This mismatch can result from typographical errors in license preparation or physical construction in the monitor point area (roads that were once present no longer are). The actual location of a monitor point is very critical. It is suggested that a permanent marker be located at each monitor point and that this marker be maintained. If the marker is shown on the station license but is not there when the FCC inspects, the station will probably be cited. If a modification to the monitor point description is necessary, the procedures of Section 73.158(b) should be followed.

In some inspections, the inspector finds that the field at the monitor point is no longer a valid representation of the radiation in a particular direction. This is often due to wires, tanks or building construction in the area that will result in signal reradiation. If this is the case, the procedures of Section 73.158(a) should be followed to assign a new monitoring point.

Radiation and Hazardous Materials

Applications for construction permits, station licenses and renewal of station licenses require a certification that the operation of the station will either not have a significant effect on the environment or that an environmental assessment has been prepared. Various environmental concerns are addressed in Section 1.1307. A relatively recent addition to this list is the inclusion of public and worker exposure to RF radiation (Section 1.1307(b)). It is suggested that each station evaluate its compliance with the requirements of this section and keep the results of this evaluation on file.

Compliance with the RF radiation spec can be determined either through measurements of the electric and magnetic field strengths or through prediction based on the methods published in the FCC

OST Bulletin no. 65. This bulletin is contained in *A Broadcaster's Guide to FCC RF Radiation Regulation Compliance* which is available from NAB Services, (800) 368-5644.

Compliance with the RF radiation specifications may require fences around the bases of tower. AM stations are required to have fences to protect the public from contact with "hot" RF tower bases. A single "effective" fence with a locked gate and appropriate signs should be provided to assure compliance with these requirements.

Older transmitters utilized transformers and capacitors with PCBs as a cooling and insulating medium. Specific procedures must be used with regard to labeling, inspection and disposal of these items. *A Broadcasters Guide to EPA PCB Regulation Compliance* is available from NAB regarding these EPA regulations.

Sample Operator Instructions & Forms

This section contains sample forms that broadcasters can use to implement operational procedures at their stations. Included is a sample operator instruction sheet covering procedures, applicable to all stations, followed by sample operator instructions, sample station logs, and sample log review forms for each broadcast service. The contents of the forms and operator instructions will obviously vary from station to station. The samples given below may suggest ideas not being currently used at your station.

Sample Operator Instruction Sheet

The FCC expects operators to be able to determine whether the station is operating within the terms of the station license and the rules. There are various parameters to which the operator has traditionally had access (such as power, DA parameters and visual modulation indications). The FCC enforcement of the rules has tended to require operators to supply this information to an inspector, and to evaluate the information for compliance. As the Rules stand, it would appear that operators would need to know very little about the evaluation of technical parameters as long as those parameters stayed within tolerance. It is beneficial, however, to have operators able to interpret these "traditional" parameters. Note that some of the "traditional" parameters (such as operating frequency) were reduced from a "routine" logging to a "once per month" logging requirement prior to the FCC deregulation of such logging. So, it is difficult to determine from the rules which parameters should be monitored more closely (by the duty operator) as opposed to a once per day, once per week or once per month check. If, however, an inspector arrives at the station and finds anything out of tolerance, it might appear that it was not being checked often enough. A thorough log and well trained operators will tend to limit FCC sanctions for a "willful" violation, if a station has taken reasonable precautions to insure against a violation. The time to catch a violation is before the inspector arrives!

Log Signatures

At one time, the FCC required operators to sign the log twice, once when going on duty, then again when going off. Section 73.1800(a) requires an employee making a log entry to sign the log, attesting to its accuracy. The operator signature format suggested here goes beyond that required by Section 73.1800(a) in that the operator signs the log even if no log entry is made. However, this format does provide an "audit trail" showing which operator was in charge of the transmitter at any particular time. The FCC often finds no licensed operator in charge of a transmitter.

EBS Procedures

It is very important that every operator be well aware of the EBS test and alert procedures. Notes can be added to the EBS Checklist clarifying any instructions. Notes might be added regarding the monitoring assignment, adding call letters and areas to scripts, adding cart numbers for announcement scripts. In addition, notes should be added telling the operator how to put the EBS receiver on the air.

The instructions given on the sample forms imply that the EBS test cart has a single cue on it, with "dead air" during the 25 seconds the tones are transmitted. It is very important that the tones originate from an FCC type accepted encoder. Remember, tones from a tape cartridge are not acceptable. The suggested "single cue" method (as opposed to having the cart stop when the tones are to be run) insures the cart is always cued properly. Many stations stopping the cart for the tones end up running the announcement segments in the wrong order.

It is questionable as to whether stations operating 24 hours per day are required to check the EBS receiver prior to starting another day's broadcasting (Section 73.931(d)). However, many stations are cited for inoperable EBS receivers. Thus, a daily check will insure EBS receiver failures are detected quickly.

Tower Light Check

Note that Section 17.47(a) of the Commission's Rules requires a daily inspection of tower lights visually or by observation of an indicator that will detect any failure in the lighting (the loss of one lamp). As an alternative, an alarm to detect such a failure may be installed. The FCC frequently finds one or more tower lights out, yet the operator is not aware of the situation. All tower lighting must be inspected every 24 hours and any failure must be corrected within 30 minutes or else the local FAA Flight Service Station (FSS) must be contacted immediately so they can issue warnings to pilots (Section 17.48(a)). (Follow up that contact with a written confirmation to the FSS for your own records and protection.) The FSS must also be notified when the lights are operative again.

The "minimum reading - maximum reading" approach suggested should detect the failure of any lamp. Programmable monitoring systems may be used to evaluate tower light performance automatically.

Limit Charts

Limit charts are contained on the sample operator instruction sheets for the various services. Note that the FCC limits are limits on the actual parameter. Consideration should be given to the accuracy of the indicating instrument and remote telemetry equipment. The authorized operating window should be "tightened" to allow for these errors. In general, the FCC will cite a station if it finds the monitors at the control point or at the transmitter indicate out of tolerance operation. Out of tolerance operation as reported by the control point equipment should result in operator action to correct the condition. Out of tolerance operation reported by transmitter site monitors or meters indicates actual operation outside authorized limits. Summarizing, the FCC expects all meters and monitors to be accurate and for them to indicate that the operation is within authorized limits.

When remote control was initially authorized, no required remote metering accuracy was specified. Stations testing remote control systems, however, had to report any deviations in excess of 2% of the reading. This 2% tolerance was later written into the rules, then deleted. At this point, there is no specified remote metering accuracy, except on remote RF ammeters and extension meters (Sections 73.57(d)(2) and 73.1550(c)(2)). During an inspection, the FCC will generally expect remote meters to agree with local meters within 2% of the reading.

Limit Charts for AM Parameters

Since AM stations are required to determine power by the direct method, except in an emergency, the operator can be provided with a limit chart that shows the minimum and maximum authorized antenna or common point current. Automatic alarm circuits can be set to detect operation outside the minimum and maximum current, reducing the required operator supervision of the system. The operator must know what to do if these limits are exceeded. If the operator has access to a power control, the power can be adjusted up or down as necessary to keep it within limits. If no power control is available (or it does not allow sufficient adjustment), the operator should shut down the transmitter if the power is too high (an interference causing condition). A station is allowed to continue to operate at reduced power, though the chief operator should be notified as soon as possible to make the required repair (Section 73.1560(d)). The chief operator should log the out of tolerance operation, if interference occurred, and what was done to correct the problem.

AM operators should also know how to make any required mode or power changes. These controls may be automated, but the operator should insure the change actually occurred.

Operators at directional AM stations need to be able to evaluate the performance of the directional antenna system. This involves checking the sample loop current ratios and sample loop current phases against the licensed limits. Some antenna monitors indicate relative loop current instead of loop current ratio, so the operator must calculate the ratio or deviation from licensed ratio. A limit chart can also be designed that relates the minimum and maximum loop current and phase for each tower to the loop current in the reference tower. A sample of this type of limit chart is shown on the

sample form for AM DAs. If the antenna monitor directly displays loop current ratio, the limit chart can show the minimum and maximum ratio for each tower. If the antenna monitor displays ratio deviation, the limit chart can show minimum and maximum deviations (+/- 5% for most stations). Appropriate equipment with alarm circuitry or software can make any required antenna monitor calculations and notify the operator via an alarm of out of tolerance conditions. In any case, the operator is expected to be able to determine whether the directional array is operating within tolerance.

Limit Charts for FM Parameters

Most FM stations determine power by the indirect method. The routine duty operator is expected to know how to determine whether power is within limits and what to do if it is not. Similar to the AM DA loop current chart, the posted instructions for an FM determining power by the indirect method can list the minimum and maximum authorized final amplifier current for various final amplifier voltages. For FCC reference, it is suggested that this chart show the details of the calculation and the source of the efficiency factor. It is also suggested that the station log be preprinted with the licensed transmitter power output (TPO) and efficiency factor for each transmitter. This allows the logs to be used to determine compliance with the power requirement without reference to any other documentation.

FM stations determining power by the direct method may just post a very simple limit chart showing the power limits (90% to 105% of licensed TPO).

Stations determining power by the indirect method may want to use a limit chart similar to that shown.

Limit Charts for TV Parameters

Many TV stations are continuing to log those parameters required to be logged prior to "reregulation". These include the aural transmitter input voltage and current, the visual and aural output power, observations of the waveform monitor and vectorscope (sync, blanking and peak white levels,

etc.). The posted instructions should tell the operator how to make these measurements, how to adjust the parameters (if possible) and what to do if they are out of tolerance.

The only limits shown are those likely to change due to variations in line voltage or final amplifier linearity. Note that the FCC places no lower limit on aural power. The upper limit is 22% of the licensed visual power (aural effective radiated power (ERP) may not exceed 22% of the peak authorized visual ERP (Section 73.1560(c)). The sample instructions assume equal gains and losses between the visual transmitter output and the ERP as between the aural transmitter output and the ERP. This may vary station to station (varied diplexor losses, transmission line losses, antenna gain, etc.). The 80% lower limit and the 110% upper limit for aural power was chosen to arbitrarily match the visual limits, making fewer numbers the operator must deal with, while insuring reasonable signal quality (not excessively low aural power) and reasonable transmitter life (not excessive aural power). The actual number of kilowatts represented by 100% aural power may be chosen to be almost any value, provided the log includes the calculation procedure used to arrive at the actual TPO and ERP (since the FCC limits are based on ERP).

Sample Station Log

Over the years, the FCC has reduced the logging frequency (for stations with approved DA monitoring systems) from once every 30 minutes to once every three hours to as often as necessary (with readings to be logged prior to any adjustments). Further, exactly which readings are to be logged is no longer specified. Many stations have continued to log the "traditional" readings, which are those shown on the sample logs. These allow the transmitter power, DA performance and video modulation to be determined. The frequency of logging readings was last specified by the FCC as at least every three hours. Those stations with very stable systems may want to log very infrequently. We have suggested here that each operator log readings when going on duty. The operator is responsible for the proper operation of the station. The operator who has no idea what the present transmitter parameters are running is probably not being a responsible operator.

Many transmitter control systems implement "exception reporting". These systems notify the operator of any out of tolerance operation, as opposed to the operator routinely "polling" the system and evaluating the readings. Exception reporting systems, which are very similar to the limit alarms required for automatic logging systems by Section 73.1820(b)(4), will generally result in faster detection of out of tolerance conditions, since the operator is notified immediately, instead of at the next system polling. It is still suggested, however, that readings be logged at frequent intervals. These readings may be gathered manually by the operator or automatically reported by the system. Those systems using dedicated circuits between the transmitter and the control point may continuously update a screen with the current data and periodically print log entries. Those employing temporary circuits (such as dial up phone lines) will often store a couple days of data in memory. These data are then dumped to a printer or facsimile machine.

Having a complete record of transmitter parameters enables the station to demonstrate long term compliance to the FCC. It also provides data for the chief operator to review to insure continued compliance. Finally, long term drift in parameters can be detected so required adjustments can be made before out of tolerance operation occurs.

Sample Weekly Log Review Form

Section 73.1870(c)(3) requires the chief operator (or a delegate) to complete a log review no less than once each week. The decision to go to a weekly review instead of daily was done to insure an EBS test is transmitted and received every week. Failure to do so is a very common violation (which often results in a $2,000 or more fine).

The chief operator is only required to sign the log on completion of the review. Use of this form, however, serves as a checklist, insuring all frequently violated rule provisions are checked. This is similar to aircraft pilots using a checklist for every takeoff instead of just looking around and saying "Looks ok to me." The various items on the form should be checked, the form signed, then included as part of the station log.

Control Point Equipment Check

While making the weekly log review, it is suggested that various pieces of control point equipment be checked. The results of these checks should be logged.

Stations are very frequently cited for overmodulation. It is important, therefore, that the modulation monitor be operating properly. A common failure is the failure of the peak flasher lamp, especially when an incandescent lamp is used. Adjusting the peak flasher threshold to the peak level indicated by the modulation meter should cause the lamp to flash, since the meter is typically not a peak responding meter and reads lower than the actual peaks. The other modulation monitor adjustments and calibrations should also be made, insuring the monitor is giving accurate indications.

Other parameters requiring less frequent checking should also be logged at this time. These include stereo and other pilot and subcarrier modulation levels, carrier and subcarrier frequencies, etc.

It is suggested that other equipment parameters also be logged to detect long term deterioration in performance. These include STL parameters, TRL parameters and any remote control data error rate information available. If available, examining the TRL discriminator voltage can be quite useful. It provides an indication of TRL transmitter or receiver frequency drift. Besides the relatively tight frequency tolerances specified by the FCC on this equipment, slight frequency variation can cause a severe increase in the data error rate due to the narrow receiver bandwidth. TRL receive level indications will also indicate deterioration in the TRL transmitter, receiver, transmission lines or antennae.

Other Readings

The FCC often checks power by the indirect and direct method, comparing the results. It is suggested that a range of acceptable transmitter efficiencies be obtained from the transmitter manufacturer. The logged readings should frequently be checked against this efficiency factor. Significant deviation can indicate a failure in the transmitter, the metering system or the antenna system.

Sample Operator Instructions
for
All Radio and Television Stations

Log Signatures

All operators are to sign the station log when going on duty. They are to log the time on and time off duty. This signature verifies that a licensed operator was in charge of the transmitter. It also verifies who made the log entries.

EBS Information

Information is available in the EBS Checklist, posted at the transmitter control point. This checklist includes complete instructions for various EBS situations. In addition, it contains an envelope containing "authenticator words" that are used to verify the authenticity of EBS messages received over the wire service.

EBS Receiver Check

Prior to beginning operation, Section 73.931(d) requires a station to insure it is not "signing on into an emergency." This is easily accomplished by checking the audio on the EBS receiver. Insure the assigned station is not broadcasting emergency programming, but is audible (the receiver is working and is properly tuned). Log the results of this check.

EBS Test Reception

The station should receive an EBS test on the EBS receiver once a week. When this occurs, the test message should be monitored to insure it is indeed a test. If it was a test, the receiver can be reset.

The time the test was received must be logged in the station log.

On occasion, wire services and networks may send EBS tests. The time these tests are received must be logged also in the station log.

EBS Test Transmission

EBS tests will be scheduled by traffic to run once a week on a random basis between 8:30 am and sunset. When scheduled, run the EBS Test cart. At the cue "This is only a test", start the EBS tone generator. The tones will run for about 25 seconds. When the tones stop, the cart will continue with the end of the message. Continue normal programming and log the time of the EBS test in the station log.

EBS Emergency Reception & Transmission

Should an EBS Emergency Action Notification be received on the EBS receiver, the wire service printer or a network, follow the procedures in the EBS checklist, posted at the control point.

Tower Light Check

Every night at 10 p.m., the tower lights must be checked. Observe the remote control display for about a minute. A variety of numbers will appear. Observe the minimum and maximum readings over this one minute period. Use the figure below to determine the tower light conditions. The results of the tower light check are to be logged. The FAA should be immediately notified of any flashing beacon failure (or steady burning top lamp). The local FAA/FSS phone number is (xxx) xxx-xxxx (insert your local FAA/FSS office phone number here). Log the FAA notification and notify the chief operator immediately.

Minimum Reading	Light Condition
<2%	Both steady burning side lights out
<7%	One steady burning side light out
>7%	Side lights ok
>25%	Beacon stuck on

Maximum Reading	Light Condition
<25%	Beacon out
<75%	One beacon bulb out (beacon at half power)
>75%	Beacon ok

Figure 3. Minimum and maximum tower readings for a one minute period.

Sample Operator Instructions and Forms for Nondirectional AM Radio Stations

Logging Readings

Readings are to be logged at the beginning of each operator shift. This allows each operator to knowledgeably certify the station was operating properly.

Limit Checking

Antenna current is to be kept within the limits below.

Night Power (1 KW)	Day Power (5 KW)
Min Ia = 5.31 A	Min Ia = 11.86 A
Lic Ia = 5.59 A	Lic Ia = 12.50 A
Max Ia = 5.72 A	Max Ia = 12.80 A

Antenna Resistance = 32 ohms, Ia = Ant Amps

Transmitter Adjustment

If the antenna current is approaching or has exceeded the above limits, log the readings prior to adjustment, adjust the antenna current, then relog the readings with a notation of the adjustment.

Day/Night Power Change

The times for power change are listed on the station license. In addition, the chief operator has put this month's power change times on the control room clock. Finally, traffic has put the power

change times on the program log. Power must be changed at the specified time. After changing power, log the time of the power change and a new set of readings.

Transmitter On/Off

The transmitter can be turned off by selecting channel 1 and pressing lower. The transmitter can be turned on by selecting channel 1 and pressing raise.

Transmitter Metering & Control

Channel	Parameter (typical day/night)	Raise	Lower
1	Plate voltage (5 KV/2.2 KV)	Plates On	Plates Off
2	Plate current (1.43A/0.64A)	Day Power	Night Power
3	Antenna current (12.50A/5.59A)	Raise Ia	Lower Ia
4	Tower lights		

Figure 4. Nondirectional AM radio station tranmitter metering and control.

Sample Station Log
for
Nondirectional AM Stations

Day:_____ Date:_____ Page:_____
All times are EST EDT

Licensed Operator in Charge of Transmitter

Time On Duty	Operator Signature	Time Off Duty

Time	Final Amplifier Input Volts	Amps	Antenna Amps	Remarks and Adjustments

EBS Receiver Checked: _____ by _____
EBS Test Received from: _____ at _____ by _____
EBS Test Transmitted at: _____ by _____
Tower Lights Checked at: _____ by _____
Carrier on time: _____ by _____
Carrier off time: _____ by _____
Changed to Day Power at: _____ by _____
Changed to Night Power at: _____ by _____

Power Determined by Direct Method

Night Power (1 KW)	Day Power (5 KW)
Min Ia = 5.31 A	Min Ia = 11.86 A
Lic Ia = 5.59 A	Lic Ia = 12.50 A
Max Ia = 5.72 A	Max Ia = 12.80 A

Antenna Resistance = 32 ohms, Ia = Ant Amps

Weekly Log Review
for
Nondirectional AM Stations

Week of Sunday _____ through Saturday _____

____ Operator on duty whenever station on air. (Section 73.1860(a))

____ All operator licenses posted. (Section 73.1230(b))

____ Antenna current within limits. (Section 73.1560(a))

____ Other readings reasonable (expected efficiency).

____ Carrier on/off times as authorized. (Section 73.1745(a))

____ Power change times correct. (Section 73.1745(a))

____ EBS receiver checked daily. (Section 73.931(d)(3))

____ EBS test received 8:30 am to sunset. Day _____ time _____ (Section 73.932(c))

____ EBS test transmitted 8:30 am to sunset. Day _____ time _____ (Section 73.961(c))

____ Tower lights checked daily. (Any failures logged) (Section 17.47(a))

____ FAA notified of top light or beacon failures. (Section 17.48(a))

Weekly Control Point Monitor Check

____ Modulation peak flash lamp ok.

____ Modulation carrier level ok.

____ Modulation ok.

____ EBS receiver ok.

TRL Rx level _____

STL Tx AFC Voltage _____

Carrier Frequency Deviation _____Hz (Section 73.1545(a))

Stereo Pilot Frequency Dev _____Hz

STL Tx Forward Power _____% (Section 73.1570(b))

STL Tx Reflected Power _____%

TRL discrim voltage _____

R/C error rate _____

Log review required by Section 73.1870(c)(3) completed.

_____ _____ _____

signature date time

Sample Operator Instructions and Forms for Directional AM Stations

Logging Readings

Readings are to be logged at the beginning of each operator shift. This allows each operator to knowledgeably certify the station was operating properly.

Limit Checking

During the day, the antenna current must be kept within these limits:

Minimum antenna current:	11.86 A
Maximum antenna current:	12.80 A

At night, the common point current must be kept within these limits:

Minimum antenna current:	9.86 A
Maximum antenna current:	10.64 A

The antenna and common point currents can be adjusted on the remote control.

At night, the directional antenna parameters must be checked. These parameters cannot be adjusted from the control room. If the limits are being approached, notify the chief operator immediately. If the limits are exceeded, the transmitter is to be shut down unless the chief operator advises otherwise (as permitted by Sections 73.62 and 73.1635).

Parameter	Minimum	Maximum
Phase 1	+150.2 dg	+156.2 dg
Phase 3	-150.6 dg	-144.6 dg

Loop current limits vary with the loop current on tower 2. Locate the tower 2 loop current on the chart below. Check the tower 1 and 3 loop current against the indicated limits.

Directional Array Loop Current Limits

Loop 2	Loop 1 Minimum	Loop 1 Maximum	Loop 3 Minimum	Loop 3 Maximum
90.0	49.0	54.1	33.6	37.1
90.5	49.3	54.4	33.8	37.3
91.0	49.6	54.7	34.0	37.5
91.5	49.9	55.0	34.2	37.7
92.0	50.1	55.3	34.4	37.9
92.5	50.4	55.6	34.6	38.1
93.0	50.7	55.9	34.8	38.3
93.5	50.9	56.2	35.0	38.5
94.0	51.2	56.5	35.1	38.7
94.5	51.5	56.8	35.3	38.9
95.0	51.8	57.1	35.5	39.2
95.5	52.0	57.4	35.7	39.4
96.0	52.3	57.7	35.9	39.6
96.5	52.6	58.0	36.1	39.8
97.0	52.9	58.3	36.3	40.0
97.5	53.1	58.6	36.5	40.2
98.0	53.4	58.9	36.6	40.4
98.5	53.7	59.2	36.8	40.6
99.0	53.9	59.5	37.0	40.8
99.5	54.2	59.8	37.2	41.0
100.0	54.5	60.1	37.4	41.2
100.5	54.8	60.4	37.6	41.4
101.0	55.0	60.7	37.8	41.6
101.5	55.3	61.0	37.9	41.8
102.0	55.6	61.3	38.1	42.0
102.5	55.8	61.6	38.3	42.2
103.0	56.1	61.9	38.5	42.5
103.5	56.4	62.2	38.7	42.7
104.0	56.7	62.5	38.9	42.9
104.5	56.9	62.8	39.1	43.1
105.0	57.2	63.1	39.3	43.3

Figure 5. Directional array loop current limits.

Transmitter Adjustment

If the antenna current or common point current is approaching or has exceeded the above limits, log the readings prior to adjustment, adjust the parameter, then relog the readings with a notation of the adjustment.

Day/Night Pattern Change

The times for pattern change are listed on the station license. In addition, the chief operator has put this month's pattern change times on the control room clock. Finally, traffic has put the pattern change times on the program log. The pattern must be changed at the specified time. After changing the pattern, log the time of the pattern change and a new set of readings.

Transmitter On/Off

The transmitter can be turned off by selecting channel 1 and pressing lower. The transmitter can be turned on by selecting channel 1 and pressing raise.

Transmitter Metering & Control

Channel	Parameter (typical day/night)	Raise	Lower
1	Plate voltage (5 KV/2.2 KV)	Plates On	Plates Off
2	Plate current (1.43A/0.64A)	Day Power	Night Power
3	Antenna current (12.50A day only)	Raise Ia	Lower Ia
4	Common Point (10.39 A night only)	Raise Icp	Lower Icp
5	Towers 1 & 2 Loop (R/L to read)	Loop 1	Loop 2
6	Tower 3 Loop (Raise to read)	Loop 3	
7	Towers 1 & 2 Phase (R/L to read)	Phase 1	Phase 2
8	Tower 3 Phase (Raise to read)	Phase 3	
9	Tower 1 Lights		
10	Tower 2 Lights		
11	Tower 3 Lights		

Figure 6. Directional AM station transmitter metering and control.

Sample Station Log
for
Directional AM Stations

Day:_____ Date:_____ Page:_____
All times are EST EDT

Licensed Operator in Charge of Transmitter

Time On Duty	Operator Signature	Time Off Duty
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Time	EP	IP	IA	ICP	L1	P1	L2	P2	L3	P3	Remarks

EBS Receiver Checked at: _____ by _____
EBS Test Received from: _____ at _____ by _____
EBS Test Transmitted at: _____ by _____
Tower Lights Checked at: _____ by _____
Carrier on at: _____ by _____
Carrier off at: _____ by _____
Changed to day ND at: _____ by _____
Changed to night DA at: _____ by _____

Key
EP: Plate voltage (KV)
IP: Plate current (A)
Ia: ND antenna current (A)
Icp: DA common point current (A)
Ln: Tower n sample loop current (%)
Pn: Tower n sample loop phase (degrees)

Parameter Licensed Values
Ia: 12.50 A
Icp: 10.39 A

Tower	Ratio %	Phase deg
1	57.3	+153.2
2	100.0	0.0
3	39.3	-147.6

Sample Weekly Log Review
for
Directional AM Stations

Week of Sunday _____ through Saturday _____

____ Operator on duty whenever station on air. (Section 73.1860(a))

____ All operator licenses posted. (Section 73.1230(b))

____ Antenna current within limits. (Section 73.1560(a))

____ Common point current within limits. (Section 73.1560(a))

____ Loop current ratios within limits. (Section 73.62(a))

____ Phase readings within limits. (Section 73.62(a))

____ Other readings reasonable (expected efficiency).

____ Carrier on/off times as authorized. (Section 73.1745(a))

____ Pattern change times correct. (Section 73.1745(a))

____ EBS receiver checked daily. (Section 73.931(d)(3))

____ EBS test received 8:30 am to sunset. Day _____ time _____
(Section 73.932(c))

____ EBS test transmitted 8:30 am to sunset. Day _____ time _____
(Section 73.961(c))

____ Tower lights checked daily. (Any failures logged) (Section 17.47(a))

____ FAA notified of top light or beacon failures. (Section 17.48(a))

Weekly Control Point Monitor Check

____ Modulation peak flash lamp ok. Carrier Frequency Deviation _____Hz
(Section 73.1545(a))

____ Modulation carrier level ok. Stereo Pilot Frequency Dev _____Hz

____ Modulation ok. Stereo Pilot Injection _____%
(Section 73.1570(b))

____ EBS receiver ok. STL Tx Forward Power _____%

STL Tx Reflected Power _____%STL Tx AFC Voltage _____

Log review required by 73.1870(c)(3) completed.

_____ _____ _____
signature date time

Sample Operator Instructions and Forms for FM Stations

Logging Readings

Readings are to be logged at the beginning of each operator shift. This allows each operator to knowledgeably certify the station was operating properly. Transmission line pressure is to be logged at the beginning of each day (midnight).

Limit Checking

Power is determined by the indirect method. This puts limits on the plate current as a function of plate voltage. Consult the chart below to determine the minimum and maximum plate current for the indicated plate voltage.

Plate Voltage Kilovolts	Minimum Plate Current Amperes	Maximum Plate Current Amperes
4.75	1.408	1.642
4.80	1.393	1.624
4.85	1.379	1.608
4.90	1.365	1.591
4.95	1.351	1.575
5.00	1.338	1.559
5.05	1.324	1.544
5.10	1.311	1.529
5.15	1.299	1.514
5.20	1.286	1.499
5.25	1.274	1.485

Licensed TPO = 5.2 KW
Final Amplifier F = 0.70

Figure 7. FM plate current limits.

Notify the chief operator immediately if transmission line pressure is below 2 psi.

Transmitter Adjustment

If the plate current is approaching or has exceeded the above limits, log the readings prior to adjustment, adjust the plate current, then relog the readings with a notation of the adjustment.

Transmitter On/Off

The transmitter can be turned off by selecting channel 1 and pressing lower. The transmitter can be turned on by selecting channel 1 and pressing raise.

Transmitter Metering & Control

Channel	Parameter (typical reading)	Raise	Lower
1	Plate voltage (5 KV)	Plates On	Plates Off
2	Plate current (1.486 A)	Raise Ip	Lower Ip
3	Relative TPO (100 %)	Raise TPO	Lower TPO
4	Tower Lights		
5	Transmission Line Pressure (5.0 psi)		

Figure 8. FM station transmitter metering and control.

Sample Station Log
for
FM Stations

Day:_____ All times are EST EDT

Date:_____

Page:_____

Licensed Operator in Charge of Transmitter

Time On Duty	Operator Signature	Time Off Duty

Time	Final Amplifier Input Volts	Amps	TPO %	Remarks and Adjustments

EBS Receiver Checked: _____ by _____
EBS Test Received from: _____ at _____ by _____
EBS Test Transmitted at: _____ by _____
Tower Lights Checked at: _____ by _____
Carrier on at: _____
Carrier off at: _____

Power Determined by Indirect Method

Licensed TPO = 5.2 KW
Final Amplifier F = 0.70

%TPO is listed for reference only. It is a measure of relative transmitter output power.

Weekly Log Review
for
FM Stations

Week of Sunday _____ through Saturday _____

____ Operator on duty whenever station on air. (Section 73.1860(a))

____ All operator licenses posted. (Section 73.1230(b))

____ Output power within limits. (Section 73.1560(b))

____ Other readings reasonable (expected efficiency).

____ Carrier on/off times logged.

____ EBS receiver checked daily. (Section 73.931(d)(3))

____ EBS test received 8:30 am to sunset. Day _____ time _____
(Section 73.932(c))

____ EBS test transmitted 8:30 am to sunset. Day _____ time _____
(Section 73.961(c))

____ Tower lights checked daily. (Any failures logged) (Section 17.47(a))

____ FAA notified of top light or beacon failures. (Section 17.47(a))

Weekly Control Point Monitor Check

____ Modulation peak flash lamp ok. Carrier Frequency Deviation _____Hz
(Section 73.1545(b))

____ Modulation carrier level ok. Stereo Pilot Frequency Dev _____Hz
(Section 73.297(b))

____ Modulation ok. Stereo Pilot Injection _____%
(Section 73.1570(b)(2)) (Section 73.322(a)(2))

____ EBS receiver ok. SCA Frequency Deviation _____%

SCA Injection _____% STL Tx Forward Power _____

STL Tx Reflected Power _____ STL Tx AFC Voltage _____

Log review required by 73.1870(c)(3) completed.

_____ _____ _____
signature date time

Sample Operator Instructions and Forms for TV Stations

Logging Readings

Readings are to be logged at the beginning of each operator shift. This allows each operator to knowledgeably certify the station was operating properly.

Transmission line pressure is to be logged at the beginning of each day (midnight).

Limit Checking

Visual and aural power are determined by the direct method. The visual power is to be kept between 80% and 110% (100% is licensed visual power). Aural power is to be kept between 80% and 110% (100% aural represents 10% of the authorized peak visual ERP, 22% of peak visual ERP is authorized). (Section 73.1560(c)(3))

Licensed Visual Power = 1000 KW ERP = 51.3 KW TPO = 100% on power meter
Typical Aural TPO = 100 KW ERP = 5.13 KW TPO = 100% on power meter

Visual Modulation Limits

Parameter	Minimum %	Maximum %
Blanking Level	72.5%	77.5%
White Level	10 %	15 %
Sync Tip	100%	100%

Figure 9. Visual modulation limits.

Notify the chief operator immediately if transmission line pressure is below 2 psi.

Transmitter Adjustment

If the one of the above listed parameters is approaching or has exceeded the above limits, log the readings prior to adjustment, adjust the appropriate parameter, then relog the readings with a notation of the adjustment.

Transmitter On/Off

The visual transmitter can be turned on by selecting channel 1 and pressing raise. The visual transmitter can be turned off by selecting channel 1 and pressing lower. The aural transmitter can be turned off by selecting channel 4 and pressing lower. The aural transmitter can be turned on by selecting channel 4 and pressing raise.

Transmitter Metering & Control

Channel	Parameter	Raise	Lower
1	Visual Plate Voltage	Visual On	Visual Off
2	Visual Plate Current		
3	Visual Output Power	Raise Visual TPO	Lower TPO
4	Aural Plate Voltage	Aural On	Aural Off
5	Aural Plate Current		
6	Aural Output Power	Raise Aural TPO	Lower TPO
7	Tower Lights		

Figure 10. TV station transmitter metering and control.

Sample Station Log
for
TV Stations

Day:_____ All times are EST EDT

Date:_____

Page:_____

Licensed Operator in Charge of Transmitter

Time On Duty	Operator Signature	Time Off Duty

Time	Visual Transmitter			Aural Transmitter			Visual Modulation		
	Plate Volts	Plate Amps	TPO %	Plate Volts	Plate Amps	TPO %	White %	Blank %	Sync %

EBS Receiver Checked: _____ by _____
EBS Test Received from: _____ at _____ by _____
EBS Test Transmitted at: _____ by _____
Tower Lights Checked at: _____ by _____
Carrier on at: _____
Carrier off at: _____

Power Determined by Method

Licensed Visual Power = 1000 KW ERP = 51.3 KW TPO = 100%
Typical Aural TPO = 10 KW ERP = 5.13 KW TPO = 100%

Weekly Log Review
for
TV Stations

Week of Sunday _____ through Saturday _____

____ Operator on duty whenever station on air.	(Section 73.1860(a))
____ All operator licenses posted.	(Section 73.1230(b))
____ Visual and aural power within limits.	(Section 73.1560(c))
____ Video modulation within limits.	(Section 73.682)
____ Other readings reasonable (expected efficiency).	
____ Carrier on/off times logged.	
____ EBS receiver checked daily.	(Section 73.931(d)(3))
____ EBS test received 8:30 am to sunset.	Day _____ time _____ (Section 73.932(c))
____ EBS test transmitted 8:30 am to sunset.	Day _____ time _____ (Section 73.961(c))
____ Tower lights checked daily. (Any failures logged)	(Section 17.47(a))
____ FAA notified of top light or beacon failure.	(Section 17.48(a))

Log review required by 73.1870(c)(3)
completed.

_____ _____ _____
signature date time

Station Inspection Forms

The following data has been adapted from FCC inspection forms for the various services. Information regarding the most frequent violations has been added to aid in the station inspection. In addition, the FCC rule section has been specified to allow further checking into the actual rule requirements. It is suggested that this "mock FCC inspection" be completed periodically, perhaps once a year, to help ensure compliance with FCC Rules.

Not specifically shown here is inspection data for related auxiliary stations (STL, TRL, TSL, RPU, translators, boosters, etc.). It is suggested that a technical evaluation form be designed to meet the needs of these stations. Specific items the FCC would be interested in include frequency, power, deviation, occupied bandwidth and spurious radiation. In addition, insure each of these stations is properly licensed.

Antenna Tower Survey
(adapted from FCC File 1130-A)

____ Tower lighting and marking matches that specified on license
(FAA approval to remove lighting is not sufficient. FCC license must be modified.)

____ Correct number of paint bands, equal width, top and bottom orange

____ Lighting as indicated

____ Paint chipping, peeling and fading (Section 17.50)

____ How many years ago was tower painted (ranges up to 12 years, then beyond)

____ Beacon flash rate between 12 and 40 flashes per minute

____ If lights not always on, is automatic device operational?

____ If any beacons not operational, was FAA notified within 30 minutes?

____ If strobes, are they working according to spec?

____ If tower responsibility designated, is agreement available for inspection? (Section 73.1213(c))

AM Station Inspection Report
(adapted from FCC form FO-794)

____ All current station authorizations posted. (Section 73.1230(a))

____ Station operating as authorized.

____ Power, modes, etc.

____ License accurate as to transmitter coordinates, monitor point locations, etc.

____ All operator licenses posted. (Section 73.1230(b))

____ Chief operator license & designation posted. (Section 73.1870(b)(3))

____ If directional or more than 10 KW, chief operator is employee, not contractor. (Section 73.1870(b)(1))

____ If chief operator is contractor, the contract is available for inspection. (Section 73.1870(b)(3))

____ Chief operator designation assigns responsibilities to individual licensed operator, not a company.

____ Required indicating instruments operational (Section 73.58)

____ Modulation level acceptable (Section 73.1570(b)(1))

____ Carrier within 20 Hz of authorized (Section 73.1545(a))

____ Power within 90 to 105% of authorized (Section 73.1560(a)(1))

____ Studio wiring safe for operators

____ EBS receiver working and tuned to proper station (Section 73.932)

____ EBS test transmission successful. (Section 73.932)

____ Operator knew what to do (Section 73.1860(c))

____ Script matches EBS Checklist (Section 73.961(c))

____ Both tones present (Section 73.906)

____ Tone modulation level proper (minimum 40% each tone) (Section 73.906(c))

____ Tone duration proper (20 to 25 seconds) (Section 73.906(d))

____ Encoder FCC type accepted (Section 73.942(a))

____ FEMA supplied equipment present and operational

____ EBS checklist at operator duty position (Section 73.908)

____ Contains current EBS authenticator envelope (Section 73.910(a))

____ Logs indicate weekly EBS test sent and received (Section 73.961)

____ Logs indicate operation within licensed limits.

____ Remote metering and control operational (Section 73.1400)

____ Generally allowed tolerance on remote metering is 2% of reading

____ Chief operator making weekly log review (Section 73.1870(c)(3))

____ Harmonic & spurious radiation compliant (Section 73.44)

____ Direct and indirect power calculations agree

____ If DA, base current ratios within 5% of licensed (Section 73.62)

____ Linear scale base current meter has full scale no more than 5 times the minimum normal indication. (Section 73.1215(a)(5)

____ Square law scale base current meter has full scale no more than 3 times the minimum normal indication. (Section 73.1215(b)(2))

____ Adequate fence with locked gate around tower bases. Keys available. (Section 73.49)

____ Tower fences and signs sufficient distance to protect public and workers from RF (Section 1.1300)

____ Ground system in good condition

____ If DA, monitor loop current ratios within 5% of licensed. (Section 73.62)

____ If DA, monitor phases within 3 degrees of licensed (Section 73.62)

____ All monitor points within authorized limits (Section 73.61(a))

____ If ND, field strength as expected. (Section 73.189)
No limits are specified, but a reading substantially different than expected may indicate ground system problems or reradiation.

____ Equipment performance measurements available (Section 73.1225(c)(1))
and show occupied bandwidth, harmonics & spurs (Section 73.1590)

____ Most recent antenna or common point impedance (Section 73.1225(d)(1)
measurement data available for inspection.

____ Most recent DA proof of performance available. (Section 73.1225(d)(2))

____ Partial DA proof made as required for changes (Section 73.68(d)(3))
above bases of towers or monitor change where (Section 73.69(c)(4))
DA base currents or monitor points changed.

FM Station Inspection Report
(adapted from FCC form FO-794 and FO-794-C)

____ All current station authorizations posted. (Section 73.1230(a))

____ Station operating as authorized.

____ ERP, TPO, HAAT, etc.

____ License accurate as to transmitter coordinates

____ All operator licenses posted. (Section 73.1230(b))

____ Chief operator license & designation posted. (Section 73.1870(b)(3))

____ If chief operator is contractor, the contract is available for inspection. (Section 73.1870(b)(3))

____ Chief operator designation assigns responsibilities to individual licensed operator, not a company.

____ Required indicating instruments operational (Section 73.58)

____ Modulation level acceptable (Section 73.1570(b)(2))

____ Carrier within 2 KHz of authorized (Section 73.1545(b))

____ Stereo pilot 19 KHz +/- 2 Hz (Section 73.322(a)(2))

____ Stereo pilot injection 8 to 10% (Section 73.322(a)(2))

____ Residual stereo subcarrier < 1% (-40 dB) (Section 73.322(a)(5))

____ Any subcarriers at acceptable freq and level (Section 73.319)

____ Power within 90 to 105% of authorized (Section 73.1560(a)(1))

____ If power determined by direct method, calibration data available (Section 73.267(b))

____ If power determined by direct method, calculated efficiency is reasonable

____ If power determined by indirect method, efficiency factor derivation available (Section 73.267(c))

____ Studio wiring safe for operators

____ EBS receiver working and tuned to proper station (Section 73.932)

____ EBS test transmission successful. (Section 73.932)

____ Operator knew what to do (Section 73.1860(c))

____ Script matches EBS Checklist (Section 73.961(c))

____ Both tones present (Section 73.906)

____ Tone modulation level proper (minimum 40% each tone) (Section 73.906(c))

____ Tone duration proper (20 to 25 seconds) (Section 73.906(d))

____ Encoder FCC type accepted (Section 73.942(a))

____ FEMA supplied equipment present and operational

____ EBS checklist at operator duty position (Section 73.908)

____ Contains current EBS authenticator envelope (Section 73.910(a))

____ Logs indicate weekly EBS test sent and received (Section 73.961)

____ Logs indicate operation within licensed limits.

____ Remote metering and control operational (Section 73.1400)

____ Generally allowed tolerance on remote metering is 2% of reading

____ Chief operator making weekly log review (Section 73.1870(c)(3))

____ Equipment performance measurements available and complete. Required on installation of new transmitter, subcarrier or stereo generator. Maintain for two years. (Section 73.1590)

____ Harmonics, spurious radiation and occupied bandwidth compliant (Section 73.317)

____ Tower fences and signs sufficient distance to protect public and workers from RF (Section 1.1300)

Television Inspection Report
(adapted from FCC FO-794-A)

____ All current station authorizations posted (Section 73.1230(a))

____ Chief operator designated and license posted (Section 73.1870(b)(3))

____ Chief operator is employee, not contractor (Section 73.1870(b)(1))

____ All duty operators licensed and licenses posted (Section 73.1230(b))

____ Power within limits (Section 73.1560(c))

____ Required indicating instruments operational (Section 73.688)

____ Studio wiring safe for operators

____ EBS receiver working and tuned to proper station (Section 73.932)

____ EBS test transmission successful. (Section 73.932)

____ Operator knew what to do (Section 73.1860(c))

____ Script matches EBS Checklist (Section 73.961(c))

____ Both tones present (Section 73.906)

____ Tone modulation level proper (minimum 40% each tone) (Section 73.906(c))

____ Tone duration proper (20 to 25 seconds) (Section 73.906(d))

____ Encoder FCC type accepted (Section 73.942(a))

____ FEMA supplied equipment present and operational

____ EBS checklist at operator duty position (Section 73.908)

____ Contains current EBS authenticator envelope (Section 73.910(a))

____ Logs indicate weekly EBS test sent and received (Section 73.961)

____ Remote metering and control operational (Section 73.1400)

____ Generally allowed tolerance on remote metering is 2% of reading

____ Chief operator making weekly log review (Section 73.1870(c)(3))

____ Equipment performance measurements available and complete (Section 73.1590)

____ All station licenses (including microwave) posted (Section 73.1230(a))

Television Signal Analysis Report
(adapted from FCC FO-794-B)

Visual carrier frequency (Assigned +/- 1 KHz)	_____	(Section 73.1545(c)(1))
Horizontal scan rate (15,734.264 +/- .044 Hz)	_____	(Section 73.682(a)(6))
Vertical scan rate (59.94 Hz)	_____	(Section 73.682(a)(6))
Color subcarrier (3,579,545.454 +/- 10 Hz)	_____	(Section 73.682(a)(5))
Visual/aural separation (4.5 MHz +/- 1 KHz)	_____	(Section 73.1545(c)(2)
Blanking level (72.5% - 77.5%)	_____	(Section 73.682(a)(12))
White level (10% - 15%)	_____	(Section 73.682(a)(13)
Setup interval (5 - 10 IRE)	_____	(Section 73.682(a)(17)
Spiking, overshoot, tilt	_____	
Vertical blanking interval (18 - 21 lines)	_____	
LSB color subcarrier (60 db below peak carr)	_____	(Section 73.687(a)(1))
Video signal pulse spec.	_____	(Section 73.699 fig 6)

Other Publications

Copies of FCC Rules are available from a number of sources. Some of those are listed on the following page.

Government Printing Office

The October 1990 edition of Title 47 of the Code of Federal Regulations (CFR) is available for purchase from Superintendent of Documents, Government Printing Office. This edition includes all amendments to the FCC's rules from October 1, 1989 through September 30, 1990. All broadcast stations should have an up-to-date copy of the FCC rules readily available.

Charge orders may be telephoned to the Government Printing Office order desk at (202) 783-3238 from 8:00 a.m. to 4:00 p.m. eastern time, Monday-Friday (except holidays), or you can send your order with a check payable to the Superintendent of Documents to the Government Printing Office, Washington, DC 20402-9371.

Four volumes of interest to broadcasters are listed on the following page with the price and a description of their domain.

Commercial Sources

A new and very detailed subscription service is now available from **Pike & Fischer, Inc.** (used by consultants and communication law firms) called Broadcast Rules Service. Parts 17, 73 and 74 are updated bimonthly. Part 25, "Satellite Communications," of the FCC rules, NPRMs and NOIs are also included. Start-up cost for the 2100 page master volume is $85 and the annual subscription fee is $175 (prices are subject to change). Call them at (301) 654-6262 or write to: 4550 Montgomery Ave., Suite 433-N, Bethesda, MD 20814.

Another subscription service is offered by the **Rules Service Co.** Updated quarterly, the service costs less than $100 for parts 17, 73 & 74. Call them at (301) 424-9402 or write to: 7658 Standish Place, Suite 106, Rockville, MD 20855.

Title 47 Of The Code Of Federal Regulations

Parts 0 to 19 $18.00

Part 0 - Commission Organization
Part 1 - Practice and Procedure
Part 2 - Frequency Allocation and Radio Treaty Matters
Part 5 - Experimental Radio Services
Part 13 - Commercial Radio Operators
Part 15 - Radio Frequency Devices
Part 17 - Construction, Marking, and Lighting of Antenna Structures
Part 18 - Industrial Scientific, and Medical Equipment
Part 19 - Employee Responsibilities and Conduct

Parts 20 to 39 $18.00

Part 21 - Domestic Public Fixed Radio Services
Part 22 - Public Mobile Service
Part 23 - International Fixed Public Radiocommunication Services
Part 25 - Satellite Communications
Part 32 - Uniform System of Accounts for Telecommunications Companies
Part 34 - Uniform System of Accounts for Radiotelegraph Carriers
Part 35 - Uniform System of Accounts for Wire-telegraph and Ocean-cable Carriers
Part 36 - Jurisdictional Separations Procedures; Standard Procedures for Separating Telecommunications Property Costs, Revenues, Expenses, Taxes and Reserves for Telecommunications Companies

Parts 70 to 79 $18.00

Part 73 - Radio Broadcast Services (Includes AM, FM, TV)
Part 74 - Experimental, Auxiliary and Special Broadcast and Other Program Distributional Services
Part 76 - Cable Television Service
Part 78 - Cable Television Relay Service

Parts 80 to End $20.00

Part 80 - Stations in the Maritime Services
Part 87 - Aviation Services
Part 90 - Private Land Mobile Radio Services
Part 94 - Private Operational-Fixed Microwave Services
Part 95 - Personal Radio Services
Part 97 - Amateur Radio Service
Part 99 - Disaster Communications Service
Part 100- Direct Broadcast Satellite Service

Figure 11. Title 47 of the Code of Federal Regulations.

Still another subscription service with regular updates is provided by the **Broadcast Service Bureau**. The cost is less than $100 annually for parts 0, 1, 2, 5, 13, 17, 73, 74, 76 & 78 which cover all Broadcast, CATV, Allocations and Experimental rules. Call them at (301) 654-8531 or write to: Box 5974, Bethesda, MD 20814.

NAB Publications

To order NAB publications, call NAB Services toll free 1-800-368-5644 or in the Washington, D.C. area, call (202) 429-5376. Mail orders to NAB Services, 1771 N Street, NW, Washington, D.C. 20036-2891.

A Broadcaster's Guide to RF Radiation Regulation and Compliance

A Broadcaster's Guide to EPA PCB Regulation Compliance

Radio and TV Towers: Maintaining, Modifying and Leasing

The *Emergency Broadcast System Training Videotape*

RF Radiation Warning Signs, 9" x 12" or 18" x 24"

SBE Certification

Information and study guides for SBE technical certification is available from the Society of Broadcast Engineers, phone (317) 842-0836.

NARTE Certification

Information and study guides for NARTE technician certification is available from the National Association of Radio and Telecommunications Engineers, phone (503) 581-3336.

APPENDIX

FCC Rules, Part 73, 47 CFR Ch. 1

Sections 73.1800 - 73.1870

must be sent to the FCC in Washington, D.C. not later than the 10th day of limited or discontinued operation. During such period, the licensee shall continue to adhere to the requirements in the station license pertaining to the lighting of antenna structures. In the event normal operation is restored prior to the expiration of the 30 day period, the licensee will so notify the FCC of this date. If the causes beyond the control of the licensee make it impossible to comply within the allowed period, informal written request shall be made to the FCC no later than the 30th day for such additional time as may be deemed necessary.

(b) Noncommercial educational AM and TV stations are not required to operate on a regular schedule and no minimum hours of operation are specified; but the hours of actual operation during a license period shall be taken into consideration in the renewal of noncommercial educational AM and TV broadcast licenses. Noncommercial educational FM stations are subject to the operating schedule requirements according to the provisions of § 73.561.

[43 FR 45850, Oct. 4, 1978, as amended at 53 FR 1032, Jan. 15, 1988]

§ 73.1745 Unauthorized operation.

(a) No broadcast station shall operate at times, or with modes or power, other than those specified and made a part of the license, unless otherwise provided in this part.

(b) Any unauthorized departure from an operating schedule which is required to be filed with the FCC in Washington, D.C., will be considered as a violation of a material term of the license.

[43 FR 45850, Oct. 4, 1978]

§ 73.1750 Discontinuance of operation.

The licensee of each station shall notify the FCC in Washington, D.C. of permanent discontinuance of operation at least two days before operation is discontinued. Immediately after discontinuance of operation, the licensee shall forward the station license and other instruments of authorization to the FCC, Washington, D.C. for cancellation.

[47 FR 40175, Sept. 13, 1982]

§ 73.1800 General requirements related to the station log.

(a) The licensee of each station must maintain a station log as required by § 73.1820. This log shall be kept by station employees competent to do so, having actual knowledge of the facts required. All entries, whether required or not by the provisions of this part, must accurately reflect the station operation. Any employee making a log entry shall sign the log, thereby attesting to the fact that the entry, or any correction or addition made thereto, is an accurate representation of what transpired.

(b) The logs shall be kept in an orderly and legible manner, in suitable form and in such detail that the data required for the particular class of station concerned are readily available. Key letters or abbreviations may be used if the proper meaning or explanation is contained elsewhere in the log. Each sheet must be numbered and dated. Time entries must be made in local time and must be indicated as advanced (*e.g.*, EDT) or non-advanced (*e.g.*, EST) time.

(c) Any necessary corrections of a manually kept log after it has been signed in accordance with paragraph (a) of this section shall be made only by striking out the erroneous portion and making a corrective explanation on the log or attachment to it. Such corrections shall be dated and signed by the person who kept the log or the station chief operator, the station manager or an officer of the licensee.

(d) No automatically kept log shall be altered in any way after entries have been recorded. When automatic logging processes fail or malfunction, the log must be kept manually for that period and in accordance with the requirements of this section.

(e) No log, or portion thereof, shall be erased, obliterated or willfully destroyed during the period in which it is required to be retained. (Section 73.1840, Retention of logs.)

(f) Application forms for licenses and other authorizations may require that certain technical operating data be supplied. These application forms should be kept in mind in connection with the maintenance of the station log.

[43 FR 45850, Oct. 4, 1978, as amended at 48 FR 38481, Aug. 24, 1983; 48 FR 44806, Sept. 30, 1983; 49 FR 14509, Apr. 12, 1984; 49 FR 33663, Aug. 24, 1984; 50 FR 40016, Oct. 1, 1985]

§ 73.1820 Station log.

(a) Entries must be made in the station log either manually by a properly licensed operator in actual charge of the transmitting apparatus, or by automatic devices meeting the requirements of paragraph (b) of this section. Indications of operating parameters that are required to be logged must be logged prior to any adjustment of the equipment. Where adjustments are made to restore parameters to their proper operating values, the corrected indications must be logged and accompanied, if any parameter deviation was beyond a prescribed tolerance, by a notation describing the nature of the corrective action. Indications of all parameters whose values are affected by the modulation of the carrier must be read without modulation. The actual time of observation must be included in each log entry. The following information must be entered:

(1) *All stations:* (i) Entries required by § 17.49 of this chapter concerning any observed or otherwise known extinguishment or improper functioning of a tower light:

(A) The nature of such extinguishment or improper functioning.

(B) The date and time the extinguishment or improper operation was observed or otherwise noted.

(C) The date, time and nature of adjustments, repairs or replacements made.

(ii) Any entries not specifically required in this section, but required by the instrument of authorization or elsewhere in this part.

(iii) An entry of each test of the Emergency Broadcast System procedures pursuant to the requirement of Subpart G of this part and the appropriate EBS checklist. All stations may keep EBS test data in a special EBS log which shall be maintained at any convenient location; however, such log should be considered a part of the station log.

(2) *Directional AM stations without an FCC-approved antenna sampling system* (See § 73.68): (i) An entry at the beginning of operations in each mode of operation, and thereafter at intervals not exceeding 3 hours, of the following (actual readings observed prior to making any adjustments to the equipment and an indication of any corrections to restore parameters to normal operating values):

(A) Common point current.

(B) When the operating power is determined by the indirect method, the efficiency factor F and either the product of the final amplifier input voltage and current or the calculated antenna input power. See § 73.51(e).

(C) Antenna monitor phase or phase deviation indications.

(D) Antenna monitor sample currents, current ratios, or ratio deviation indications.

(ii) Entries required by § 73.61 performed in accordance with the schedule specified therein.

(iii) Entries of the results of calibration of automatic logging devices (see paragraph (b) of this section), extension meters (see § 73.1550) or indicating instruments (see § 73.67) whenever performed.

(b) Automatic devices accurately calibrated and with appropriate time, date and circuit functions may be utilized to record entries in the station log *Provided:*

(1) The recording devices do not affect the operation of circuits or accuracy of indicating instruments of the equipment being recorded;

(2) The recording devices have an accuracy equivalent to the accuracy of the indicating instruments;

(3) The calibration is checked against the original indicators as often as necessary to ensure recording accuracy;

(4) Provision is made to actuate automatically an aural alarm circuit located near the operator on duty if any of the automatic log readings are not within the tolerances or other requirements specified in the rules or station license;

(5) The alarm circuit operates continuously or the devices which record each parameter in sequence must read

each parameter at least once during each 30 minute period;

(6) The automatic logging equipment is located at the remote control point if the transmitter is remotely controlled, or at the transmitter location if the transmitter is manually controlled;

(7) The automatic logging equipment is located in the near vicinity of the operator on duty and is inspected periodically during the broadcast day. In the event of failure of malfunctioning of the automatic equipment, the employee responsible for the log shall make the required entries in the log manually at that time.

(8) The indicating equipment conforms to the requirements of § 73.1215 (Indicating instruments—specifications) except that the scales need not exceed 2 inches in length. Arbitrary scales may not be used.

(c) In preparing the station log, original data may be recorded in rough form and later transcribed into the log.

[43 FR 45854, Oct. 4, 1978, as amended at 44 FR 58735, Oct. 11, 1979; 47 FR 24580, June 7, 1982; 48 FR 38481, Aug. 24, 1983; 48 FR 44806, Sept. 30, 1983; 49 FR 33603, Aug. 23, 1984]

§ 73.1835 Special technical records.

The FCC may require a broadcast station licensee to keep operating and maintenance records as necessary to resolve conditions of actual or potential interference, rule violations, or deficient technical operation.

[48 FR 38482, Aug. 24, 1983]

§ 73.1840 Retention of logs.

(a) Any log required to be kept by station licensees shall be retained by them for a period of 2 years. However, logs involving communications incident to a disaster or which include communications incident to or involved in an investigation by the FCC and about which the licensee has been notified, shall be retained by the licensee until specifically authorized in writing by the FCC to destroy them. Logs incident to or involved in any claim or complaint of which the licensee has notice shall be retained by the licensee until such claim or complaint has been fully satisfied or until the same has been barred by statute limiting the time for filing of suits upon such claims.

(b) Logs may be retained on microfilm, microfiche or other data-storage systems subject to the following conditions:

(1) Suitable viewing—reading devices shall be available to permit FCC inspection of logs pursuant to § 73.1226, availability to FCC of station logs and records.

(2) Reproduction of logs, stored on data-storage systems, to full-size copies, is required of licensees if requested by the FCC or the public as authorized by FCC rules. Such reproductions must be completed within 2 full work days of the time of the request.

(3) Corrections to logs shall be made:

(i) Prior to converting to a data-storage system pursuant to the requirements of § 73.1800 (c) and (d), (§ 73.1800, General requirements relating to logs).

(ii) After converting to a data-storage system, by separately making such corrections and then associating with the related data-stored logs. Such corrections shall contain sufficient information to allow those reviewing the logs to identify where corrections have been made, and when and by whom the corrections were made.

(4) Copies of any log required to be filed with any application; or placed in the station's local public inspection file as part of an application; or filed with reports to the FCC must be reproduced in fullsize form when complying with these requirements.

[45 FR 41151, June 18, 1980, as amended at 46 FR 13907, Feb. 24, 1981; 46 FR 18557, Mar 25, 1981, 49 FR 33663, Aug. 24, 1984]

§ 73.1860 Transmitter duty operators.

(a) Each AM, FM or TV broadcast station must have at least one person holding a commericial radio operator license or permit (any class, unless otherwise otherswise endorsed) on duty in charge of the transmitter during all periods of broadcast operation. The operator must be on duty at the transmitter location, a remote control point, an ATS monitor and alarm point, or a position where extension meters are installed under the provisions of § 73.1550.

(b) The transmitter operator must be able to observe the required transmitter and monitor metering to determine deviations from normal indications. The operator must also be able to make the necessary adjustments from the normal operator duty position, except as provided for in § 73.1550.

(c) It is the responsibility of the station licensee to ensure that each transmitter operator is fully instructed and capable to perform all necessary observations and adjustments of the transmitting system and other associated operating duties to ensure compliance with the rules and station authorization.

(d) The transmitter duty operator may, at the discretion of the station licensee and chief operator, be employed for other duties or operation of other transmitting stations if such other duties will not interfere with the proper operation of the broadcast transmission system.

[46 FR 35463, July 8, 1981, as amended at 49 FR 50048, Dec. 26, 1984]

§ 73.1870 Chief operators.

(a) The licensee of each AM, FM, or TV broadcast station must designate a person holding a commercial radio operator license or permit (any class, unless endorsed) to serve as the station's chief operator. At times when the chief operator is unavailable or unable to act (e.g., vacations, sickness), the licensee shall designate another licensed operator as the acting chief operator on a temporary basis.

(b) Chief operators shall be employed or serve on the following basis:

(1) The chief operator for an AM station using a directional antenna or operating with greater than 10 kW authorized power, or of a TV station is to be an employee of the station on duty for whatever number of hours each week the station licensee determines is necessary to keep the station's technical operation in compliance with FCC rules and the terms of the station authorization.

(2) Chief operators for non-directional AM stations operating with authorized powers not exceeding 10 kW and FM stations may be either an employee of the station or engaged to serve on a contract basis for whatever number of hours each week the licensee determines is necessary to keep the station's technical operation in compliance with the FCC rules and terms of the station authorization.

(3) The designation of the chief operator must be in writing with a copy of the designation posted with the operator license. Agreements with chief operators serving on a contract basis must be in writing with a copy kept in the station files.

(c) The chief operator is responsible for completion of the following duties specified in this paragraph below. When these duties are delegated to other persons, the chief operator shall maintain supervisory oversight sufficient to know that each requirement has been fulfilled in a timely and correct manner.

(1) Inspections and calibrations of the transmission system, required monitors, metering and control systems; and any necessary repairs or adjustments where indicated. (See § 73.1580.)

(2) Periodic AM field monitoring point measurements, equipment performance measurements, or other tests as specified in the rules or terms of the station license.

(3) Review of the station records at least once each week to determine if required entries are being made correctly. Additionally, verification must be made that the station has been operated as required by the rules or the station authorization. Upon completion of the review, the chief operator or his designee must date and sign the log, initiate any corrective action which may be necessary, and advise the station licensee of any condition which is repetitive.

(4) Any entries which may be required in the station records. (See § 73.1820.)

[46 FR 35463, July 8, 1981, as amended at 47 FR 31580, July 21, 1982; 48 FR 38482, Aug. 24, 1983; 48 FR 44806, Sept. 30, 1983; 49 FR 20670, May 16, 1984; 49 FR 50048, Dec. 26, 1984; 50 FR 32416, Aug. 12, 1985]

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