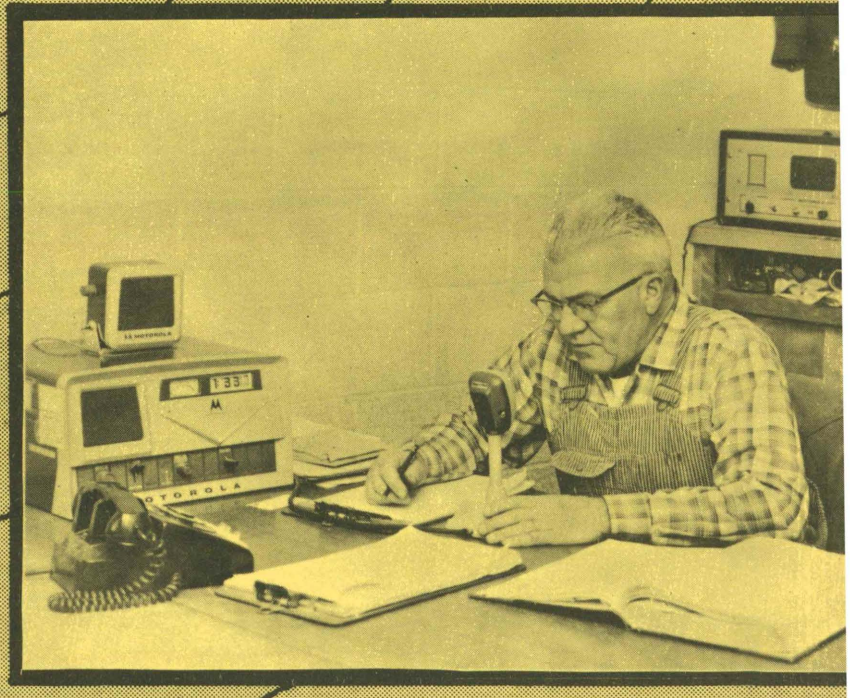
RADIO OPERATOR'S MANUAL . . . .



IOWA STATE HIGHWAY COMMISSION

TABLE OF CONTENTS

IOWA STATE HIGHWAY COMMISSION
AMES, IOWA

R A D I O M A N U A L
2nd Edition

INTRODUCTION

At this writing contracts have been let for the completion of the Iowa State Highway Commission's 99-county system.

The purpose of this manual is to outline the operation of the basic equipment, to show recommended operating procedures, to cover Federal Communication Regulations, and to show our relationship to the Office of Civil Defense.

More effort was made to reduce information to a more useable form. It is hoped that this manual will be referred to as a regular source of information.

DEFINITIONS AND ABBREVIATIONS

PUBLIC SAFETY RADIO SERVICE: Any service of radio communication essential either to the discharge of non-federal governmental functions or to the alleviation of an emergency endangering life or property, the radio transmitting facities of which are defined as fixed, land or mobile stations.

BASE STATION: A station in the mobile service not intended for operation while in motion.

MOBILE STATION: A station in the mobile service intended to be used while in motion or during halts at unspecified points.

CONTROL STATION: An operational fixed station, the transmissions of which are used to control automatically the emissions or operation of another radio station at a specified location.

RELAY STATION: An operational fixed station established for the automatic retransmission of radio communications received from either one or more fixed stations or from a combination of land and mobile stations and directed to a specified location.

REPEATER STATION: An operational fixed station established for the automatic retransmission of radio communications received from one or more mobile stations and directed to a specified location.

OPERATOR: Any person authorized to operate a radio station.

TRANSMISSION: Any operation of a radio transmitter.

FCC: Federal Communication Commission

PL: Private Line

HIGHWAY MAINTENANCE RADIO SERVICE: A public safety service of radio communication essential to official highway activities.

THE SYSTEM

THE BASIC REPEATER

Each county in the Highway Commission radio system has a centrally located radio repeater. The repeater consists of a transmitter, aerial system, and two receivers. Repeaters rebroadcast selective radio communications picked up by the associated receivers. The two receivers referred to above are actually receiving all intelligible signals that occur on two different radio frequencies. These receivers will not transfer their received information to the transmitter for rebroadcasting unless the received signal contains a superimposed coded tone signal. This prevents repeater turn-on by any undesired radio signal.

Associated with each repeater is an aerial system of sufficient height so as to assure county wide coverage. Figure I shows how this height advantage is put to use. On the same figure, note that the communication always goes from a mobile unit to the repeater, then to the other mobile units tuned to the repeater.

LOCAL COUNTY OPERATION

A strictly local in-county operation requires the use of only one pair of radio frequencies and only one of the two receivers located at the repeater. This receiver is tuned to the transmitters of all mobile units and all base stations in the county and produces repeater action from the standard tone used in that particular county.

If an in-county base station calls an in-county mobile unit, the base station signal will be picked up by the repeater and will be rebroadcast by the repeater to the in-county mobile units. When a mobile unit talks to the base station, the same procedure is repeated. The mobile unit's signal is picked up by the same receiver in the repeater and is rebroadcast to the base station. See the block diagram in Figure II.

COUNTY TO COUNTY OPERATION

County to county communication is very important in highway maintenance. This capability was given to County Headquarter Garages, to County Foremen's Mobile Unit, to Engineer's Offices and to the Engineer's Mobile Units. Inter-county communication is complicated by our use of two pair of frequencies, an approximate 50/50 division in frequencies being in use. Figure III shows the frequency and tone distribution used in the individual counties.

Counties that use the same pair of frequencies could communicate by using the desired counties' tone. This method was used in our initial five-county system and proved to be very satisfactory under those conditions.

As our system expanded and use was made of a second pair of frequencies, the above method of inter-county communication became overly complicated. It was then decided to add a second receiver to the repeater that would be tuned to counties on the second pair of frequencies. At that time it was also decided to make use of seven different tones for activating our receivers. Five of these tones were designated as standard tones and

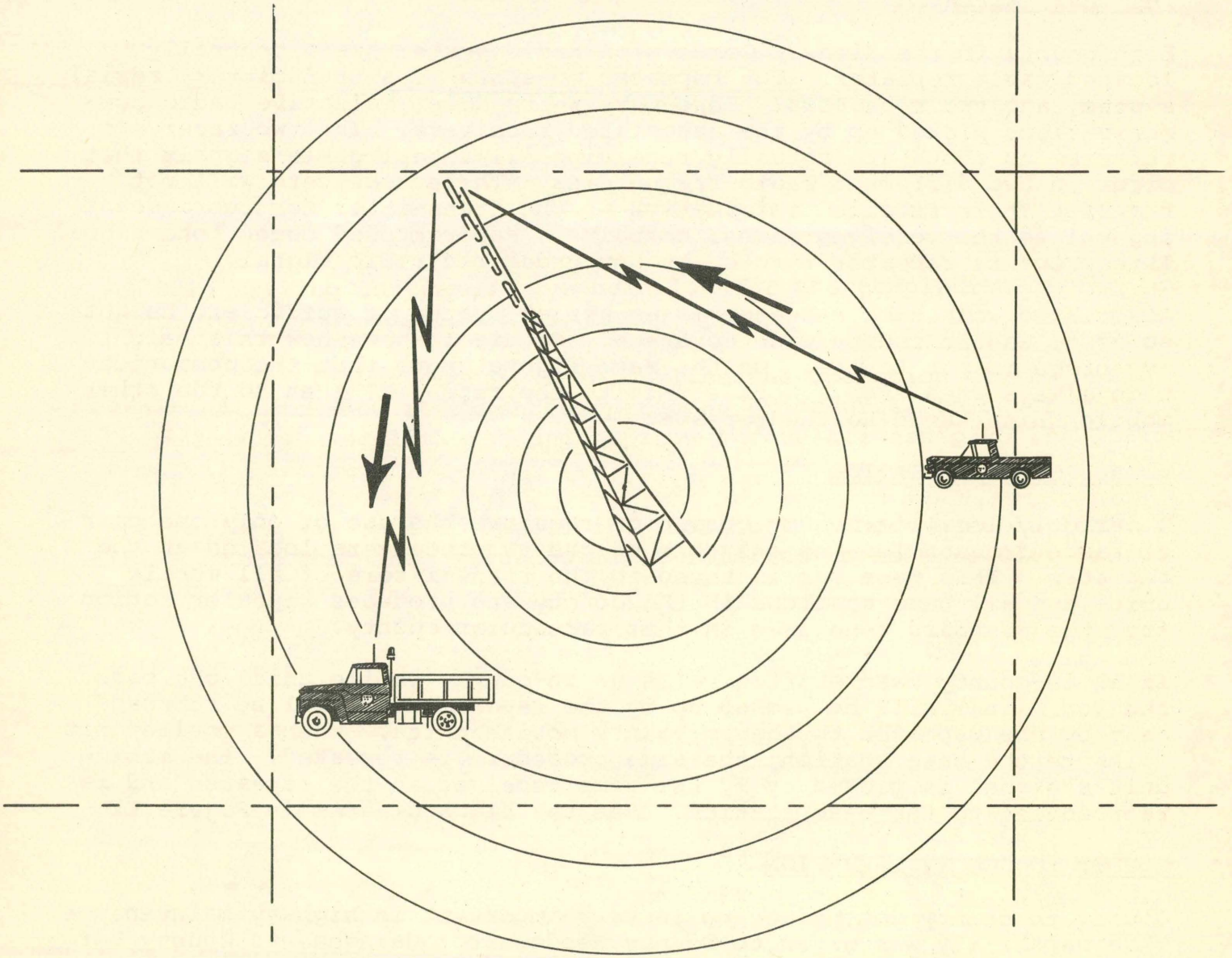
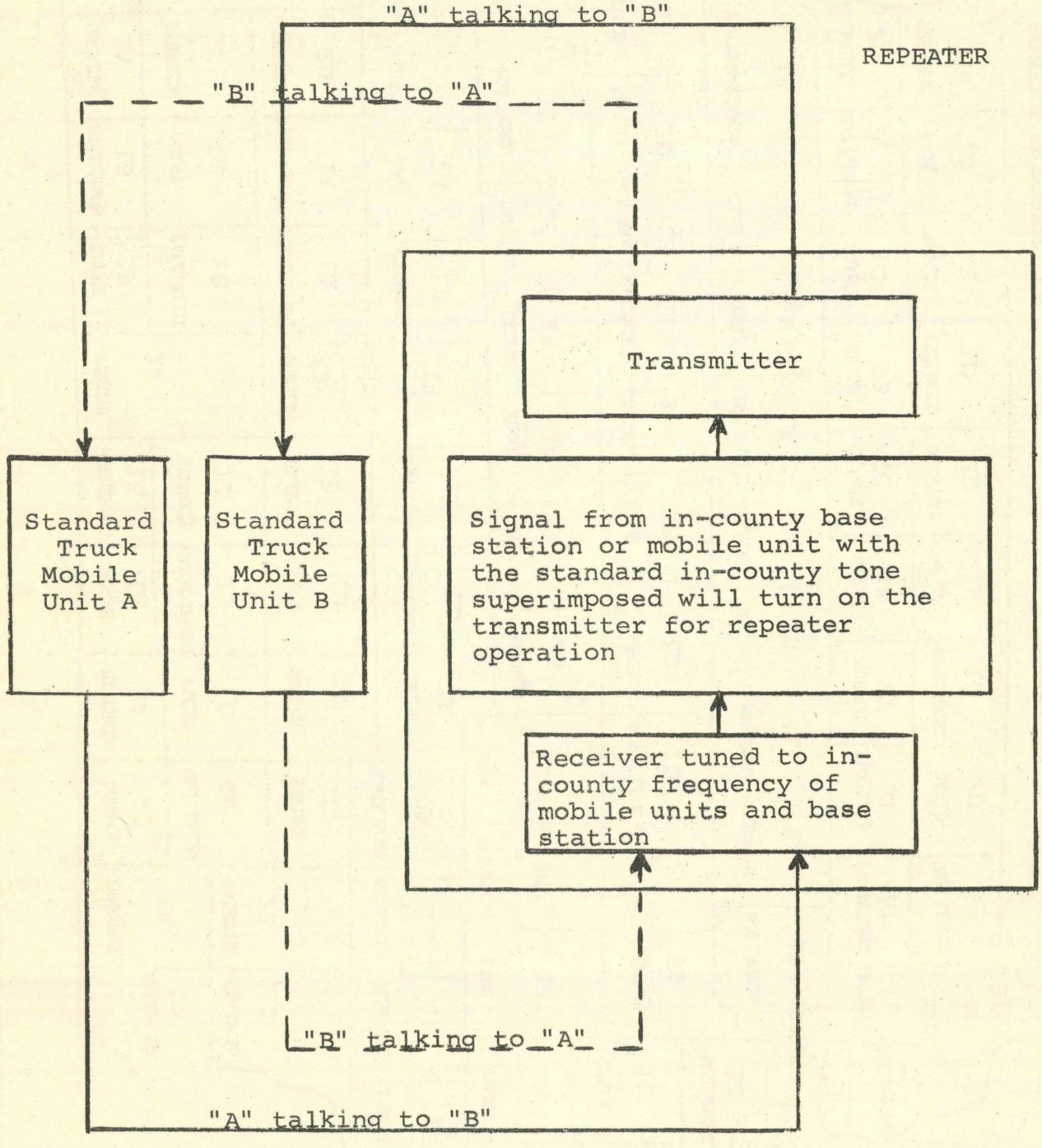


FIGURE I

ILLUSTRATION OF HEIGHT ADVANTAGE GAINED THROUGH THE TOWER OF A CENTRALLY LOCATED REPEATER.

SIMPLIFIED LOCAL COUNTY OPERATION

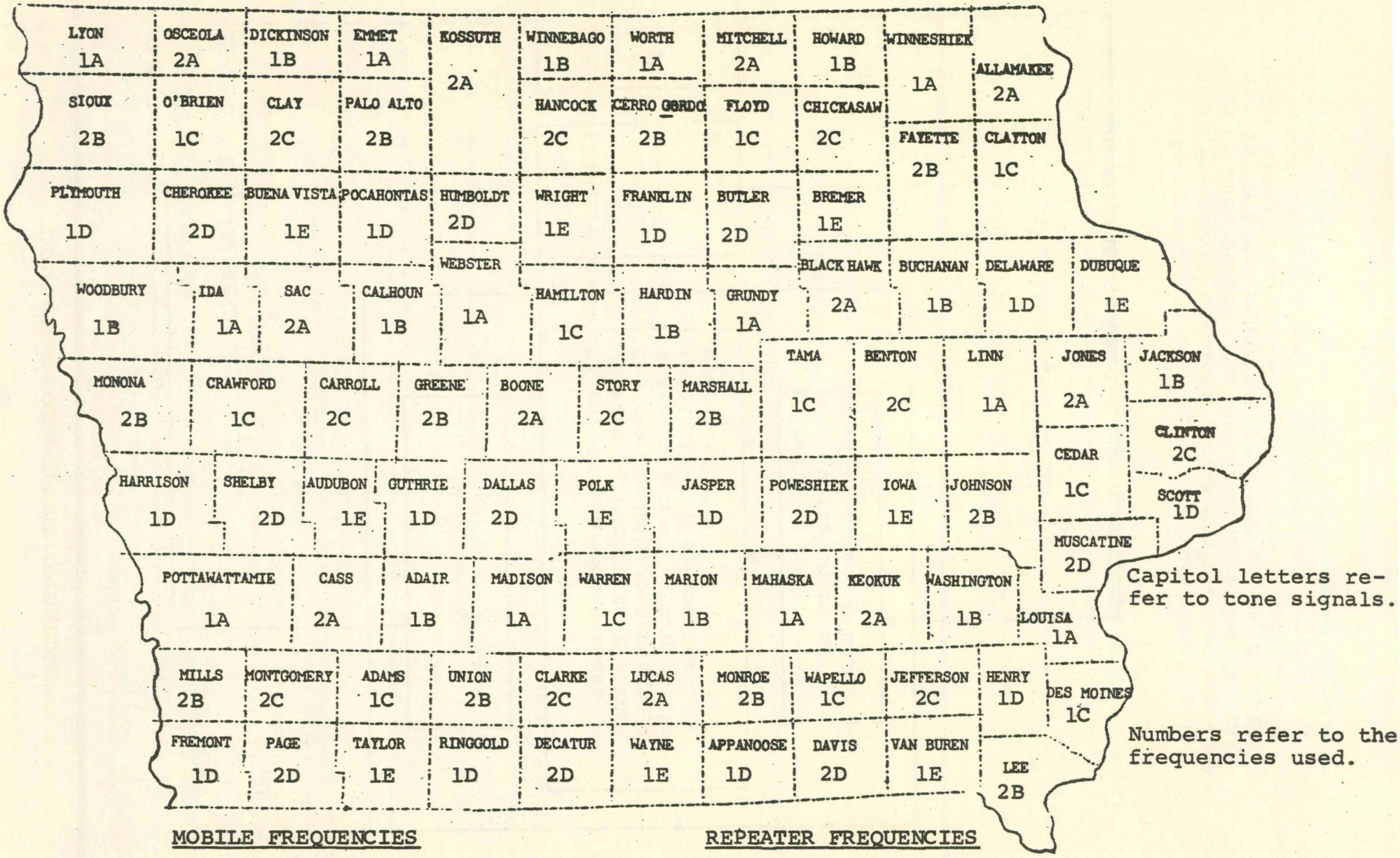
Figure II



Two trucks with standard mobile radio units are talking to each other. One set of lines shows "A" talking to "B"; the other set of lines shows "B" talking to "A".

FIGURE III

STANDARD TONES AND FREQUENCIES USED BY THE IOWA STATE HIGHWAY COMMISSION



Capitol letters refer to tone signals.

Numbers refer to the frequencies used.

MOBILE FREQUENCIES

F1 - T 156.060 - R 159.180
F2 - T 156.105 - R 159.195

REPEATER FREQUENCIES

F1 - T 159.180 - R 156.060 & R 156.105
F2 - T 159.195 - R 156.105 & R 156.060

were assigned to local county operations. Figure III shows their distribution. They are designated by the letters A, B, C, D, and E. A mobile unit or base station transmitting with a standard tone will be received by every repeater within range. However, repeater action will occur only on the in-county repeater. This applies to the use of standard tones only. Under ideal transmitting conditions, repeat action could be initiated on a similar system with two counties of separation. Fortunately, this occurs at very infrequent intervals.

The sixth tone was assigned to our engineers. This tone will activate the repeat function on one of the two receivers of a repeater depending on its transmit frequency. This is called the "F" tone. If the repeater receives an "F" tone, it will repeat an "F" tone. Messages on "F" tone can be received only by County Headquarter Garages, Engineer's Control Stations, Foreman's Mobile Units and Engineer's Mobile Units.

Another tone called the "G" tone was assigned to the local counties for inter-county communication. The "G" tone will also activate the repeat function on one of the two receivers of a repeater depending on its transmit frequency. The repeaters when functioning on "G" tone will activate all base stations at County Headquarter Garages and all Foreman's Mobile Units within range.

The repeater referred to in the above discussion is actually a remotely located repeater of which we have many. Most of our repeaters are located at County Headquarter Garages. Repeaters are also used as base stations and are then called Headquarter Repeaters. Local control of a repeater is obtained through the use of a Remote Control Console. Two additional receivers are required for a Headquarter Repeater to communicate with an adjacent County Headquarter Repeater. Our repeaters will not rebroadcast information from another repeater.

THE STANDARD MOBILE UNIT

The standard mobile unit and the standard control station are our most elementary radio units. They are designed to receive only one "frequency-tone" combination and to transmit on only one "frequency-tone" combination.

ENGINEERS CONTROL STATION AND ENGINEERS MOBILE UNIT

Engineer's Control Stations and Engineer's Mobile Units have an additional capability. They can receive on both repeater transmit frequencies, either simultaneously or separately. However, they are confined to the "F" tone, both for receiving and transmitting.

HEADQUARTERS CONTROL STATION AND FOREMAN'S MOBILE UNIT

The Headquarter's Control Station and the Foreman's Mobile Unit have additional capabilities, resulting from an added receiver and from the choice of three separate tones for use in transmitting. With these units, transmissions can be made on either "Standard", "F", or "G" tones.

A Foreman's Mobile Unit or a Headquarter's Control Station operating in their assigned county can get repeater action on either the "Standard, "F" or "G" tones. These same units can operate through an adjacent county repeater by using either "F" or "G" tones.

A Foreman desiring to talk with his own trucks or base stations should make use of the "Standard" Tone. In talking to Engineer's Units, use should be made of the "F" tone and in talking to an adjoining County Foreman's Unit or Headquarter's Base Stations, use should be made of the "G" tone. The same approach applies to a Headquarter's Base Station.

Both receivers in the Foreman's Unit and the Headquarter's Control Station are continuously tuned to the "F" and "G" tones. In addition, the in-county receiver is continuously tuned to the standard tone and frequency of the county to which the units are assigned.

PRIVATE LINE

So far, we have shown how the individual receiver responds to signals with the proper tone. A receiver when set up for response to a specific tone is said to be on "Private Line". A switch, installed at the control point of all base and mobile receivers allows a choice of "Private Line" or "Non-Private Line" operation. Off "Private Line" the receiver receives all the signals to which the receiver is tuned. This includes Standard, "F" and "G" tone signals, plus signals from any other source that might be on this frequency.

THE SYSTEM IN CONCLUSION

We would now like to tie this information together by showing in block diagram form how twelve different types of base stations and mobile units are competing for the use of a transmitter in a typical remote repeater. Figure IV makes this illustration.

If each of these stations began transmitting without monitoring, the situation would become hopeless. Fortunately, most of our operators use the private line switch and the communications flow at a smooth rate.

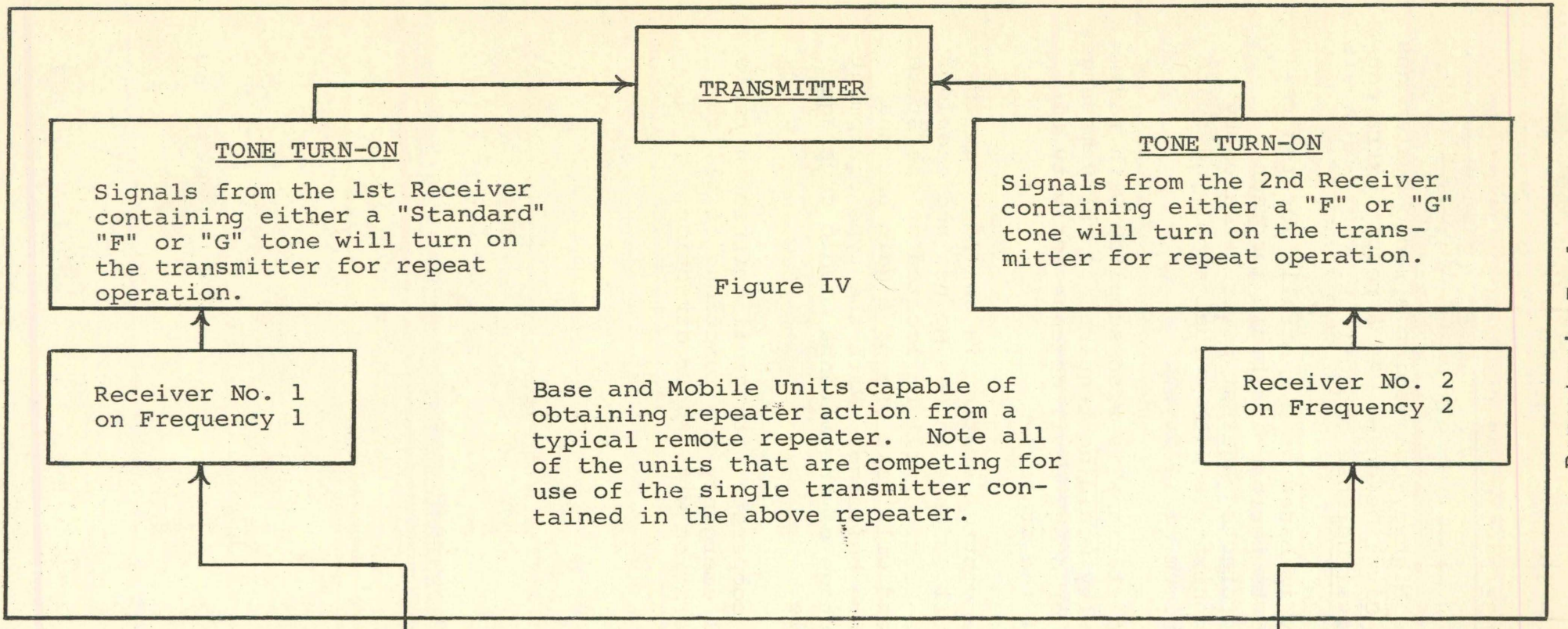


Figure IV

Repeater's Enclosure

Standard Mobile Frequency 1 Tone "Std."	In County Foreman Frequency 1 Tone "Std." "F" or "G"	Adjacent County Foreman Frequency 1 Tone "F" or "G"	Standard Control Station Frequency 1 Tone "Std."
In County Headquarter Control Station Frequency 1 Tone "Std." "F" or "G"	Adjacent County Headquarter Control Frequency 1 Tone "F" or "G"	Engineer Mobile Unit Frequency 1 Tone "F"	Engineer Base Station Frequency 1 Tone "F"

Engineer Mobile Unit Frequency 2 Tone "F"	Engineer Base Station Frequency 2 Tone "F"
Adjacent County Foreman Frequency 2 Tone "F" or "G"	Adjacent County Headquarter Control Station Frequency 2 Tone "F" or "G"

CIVIL DEFENSE PARTICIPATION

The financing of the Iowa State Highway Commission's radio system has been shared with the Office of Civil Defense. As a result extra consideration has been given to civil defense objectives.

The radio system in each county is based on a centrally located repeater which need not be manned to perform its basic function. These repeaters, in turn, are protected against power failures by automatic self-starting power generators with a fuel supply adequate for any national emergency (minimum of 14 days).

This 99-county network of radio stations is also supplied with radiation monitors. Little difficulty would be required to relay messages concerning radioactive fallout or other civil defense activity to stations located in any part of the state.

At this writing a headquarter's control station is on order for installation at the Office of Civil Defense in Des Moines and should be operational this year. This station will be located at the State Office Building in Des Moines and will make use of a gain antenna mounted on a tower above the same building. With the type equipment supplied and the elevator advantage of the antenna, radio coverage of central Iowa will be possible.

Every effort should be made to cooperate with civil defense in radio tests. In the case of national emergency the functions of all our radio stations will be in cooperation with their direction.

GENERAL PROCEDURE

The general efficiency of the system depends largely on the manner in which transmissions are made. Certain basic rules, when followed, will transform an average or poor operator into a good operator.

SPEECH:

Make your voice as emotionless as possible on the air. Emotion tends to distort the voice and may render it incapable of being copied. Your messages will normally require no expression, but will require a high degree of intelligibility. Do not show anger, nervousness, or excitement in your transmissions; this only shows loss of control and will certainly hamper reception of your message.

Among the speech factors to be considered are voice level, voice quality, pronunciation and enunciation. The message which is received with maximum clarity is that which is spoken in a normal voice, slowly and distinctly. A voice louder than necessary will not produce a greater speaker output since it will be limited in the transmitter. In fact, shouting into the microphone will produce distortion and make reception of your message extremely difficult.

Do not try to be humorous on the air. It probably will not sound as funny as you think and may cause misinterpretation of your message. Personal messages should not be transmitted - reserve the system for business.

Don't guess. Check all doubtful words with the sending operator. Never acknowledge a message until definitely certain that the message is correct in every detail.

Control stations with VU meters. Talk into the microphone at a distance and a level so that the average reading of the meter is on the red mark. Disregard voice peaks that go over this reading.

Control stations without meter and all mobile units. Hold the microphone 2 or 3 inches from lips at a slight angle. Speak in a natural voice.

Remember These Points -

A. Make sure the "line is clear" before sending message - LISTEN!!

B. Do not use profane or obscene language. THIS IS THE LAW!

C. Keep conversations brief and confined to business. Use the telephone for long conversations.

D. Choose words carefully; be distinct when speaking.

When Originating Calls -

A. Address the station you are calling.

B. Identify your station.

C. Clear the air when finished by signing off.

When Receiving Calls -

A. Acknowledge calls as quickly as possible.

B. Identify your station.

C. Clear the air when finished by signing off.

EXCEPTIONS -

In taking a call in another operator's mobile unit or at a base station, you may identify yourself with your assigned call. HOWEVER, the call of the station in use must be announced in signing off. In the case of a mobile unit - use the "A" number. This identifies the radio transmitter - this is what the Federal Communication Commission wants.

MOBILE OPERATION:

To originate a call from a mobile unit:

A. Address the station you are calling. MONITOR BEFORE TRANSMITTING

B. Identify your station.

C. Clear the air when finished by signing off.

Example: (Mobile Unit to Base Station)

Mobile Unit: "Polk Headquarters, this is Polk 7030, "Over". (The word, "Over" indicates that you are through transmitting and will wait for a reply.

Base Station: "Go ahead, 7030" or "This is Polk Headquarters, Over."

Mobile Unit: Polk 7030 then completes his message and at the end of the conversation says, "This is Polk 7030, Off."

Base Station: "This is KAX 763, Off."

GENERAL INSTRUCTIONS:

DO THIS ! ! ! !

A. Use the radio unit call number for calling and signing off.

B. Press microphone button to talk.

C. Release microphone button to listen.

D. Wait until other units have completed their messages and have signed off before transmitting a message.

E. Run vehicle engine when transmitting to minimize battery drain.

F. Turn the set off at night.

G. Conversations should be brief and confined to Department business.

H. Only authorized employees or radio maintenance people may use the radio.

I. Check vehicle battery fluid level at least once each week.

J. Pronounce words clearly, slowly and distinctly. Think out the message before making a transmission in order to minimize repeating.

K. Run engines at intervals to keep battery charged if transmitting frequently.

L. Remember that any noise heard by an operator will also be transmitted by the microphone. Close vehicle windows, if necessary, to keep out noise.

M. Note location of dead spots or areas of interference and report for reference to Resident Headquarters.

N. All radio trouble, whether electrical or mechanical, must be reported promptly to Resident Headquarters.

O. Report to Resident Maintenance Engineer any suggestions, ideas or operating procedures that have been found helpful in the use of radio so that such information may be shared with others.

DO NOT DO THIS! ! ! !

A. Do not use profane language. Section 326 of the Federal Communications Act provides that, "no person within the jurisdiction of the United States shall utter any obscene, indecent or profane language by means of radio communication." Violator is subject to severe penalties.

B. Do not change or adjust any radio parts, components, tubes, etc., inside the transmitter/receiver box. This will be done by a licensed serviceman. Certain adjustments by unlicensed persons are a violation of the law and the violator is subject to severe penalties.

C. Do not call other units by driver's name - use unit call numbers.

D. Do not transmit message until set is warmed up - allow approximately five minutes.

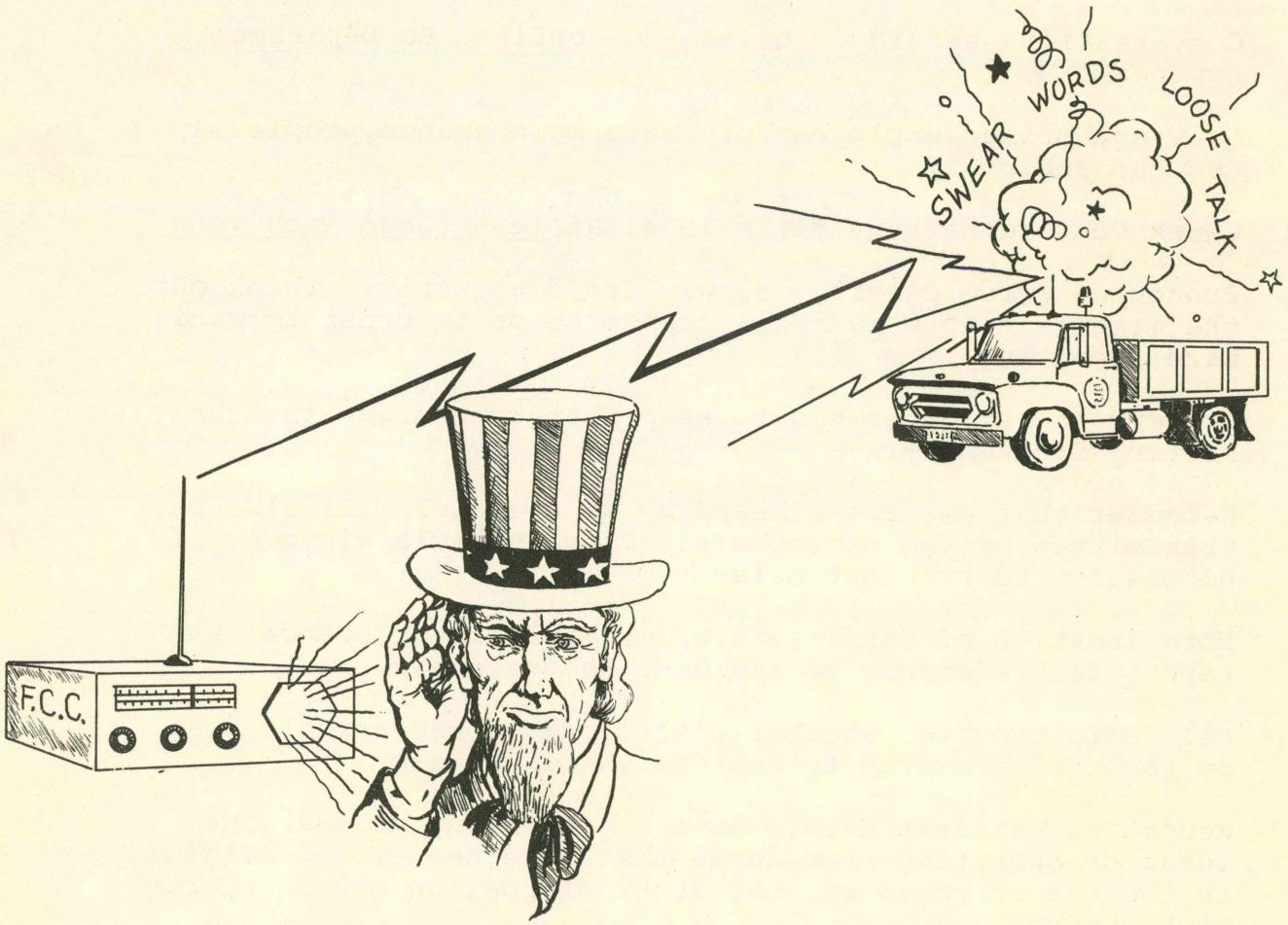


FIGURE V

CONTROL HEARS THE CONVERSATION OVER THE TWO-WAY RADIOPHONE AT ALL TIMES. ALSO, THE U.S. GOVERNMENT MONITORS OUR CHANNEL. SWEAR WORDS, NAME CALLING, ETC., ARE STRICTLY FORBIDDEN. SO REMEMBER THESE TWO RULES IF YOU WANT TO CONTINUE THE USE OF THE RADIOPHONE:

NO CURSING

NO FUNNY BUSINESS

THESE RULES ARE FIRM AND IMPORTANT.

E. Do not operate equipment on transmit with a broken aerial. Operating the transmitter with an aerial not of the exact length may damage the transmitter.

PHONETIC ALPHABET:

Difficult words should be spelled out. The phonetic alphabet should be employed whenever it is necessary to distinguish letters clearly. For example, "Baker" and "Peter" are much easier to differentiate at the receiver than are "B" and "P".

COMMUNICATION PHRASEOLOGY:

To simplify the conveyance of information, a system of numbered signals has been developed. They are called "10" signals. The most common signals are listed below:

PROCEDURE AND OPERATION DETAILS

10-1 Unable to copy (Unable to understand you)

10-2 Signals good

10-3 Affirmative - Granted - Will do

10-4 Message received - "O.K."

10-6 Busy. Standby

10-7 Out of service (or vehicle)

10-8 Back in service

10-9 Repeat

10-10 On minor detail, subject to call

10-11 Remain in service

10-12 Visitors or officials present

10-13 Weather and road conditions

10-14 Correct time

10-17 Urgent, rush present details

10-18 Anything for

10-19 Nothing for you

10-20 What is your location

10-22 Report in person to _____

10-23 Arrived at scene

10-24 Finished with last assignment

10-25 Disregard last information

10-30 Ready for assignment

GENERAL USE

10-43 Do you have contact with _____?

10-44 Message received by all concerned

10-49 Major breakdown of car

ACCIDENT AND VEHICLE HANDLING

10-50 Accident

10-51 Wrecker needed

10-52 Ambulance needed

10-58 Fatal accident

FIRE

10-70 Fire (location)

PERSONAL

10-82 Reserve hotel room for _____

10-87 Pay checks out

TECHNICAL

10-91 Too weak, talk closer to mike

10-92 Too loud, talk farther from mike

10-94 Give a test
J1 - With voice J2 - Without voice

LIMITATIONS OF MOBILES, FACTORS INFLUENCING:

There are a number of conditions which limit the distance which mobile units can reach relay stations. Hills and valleys affect mobile operation. Ordinarily, the higher the elevation is at the location of the mobile unit, the greater is the distance that can be covered. There are locations in each county where reception and transmission are poor.

When parked, moving the vehicle either forward or backward a few feet will in many cases make communication possible. A moving vehicle going through the same area may not experience communication difficulty as it moves directly through these dead spots. This phenomenon is illustrated in the following figure:

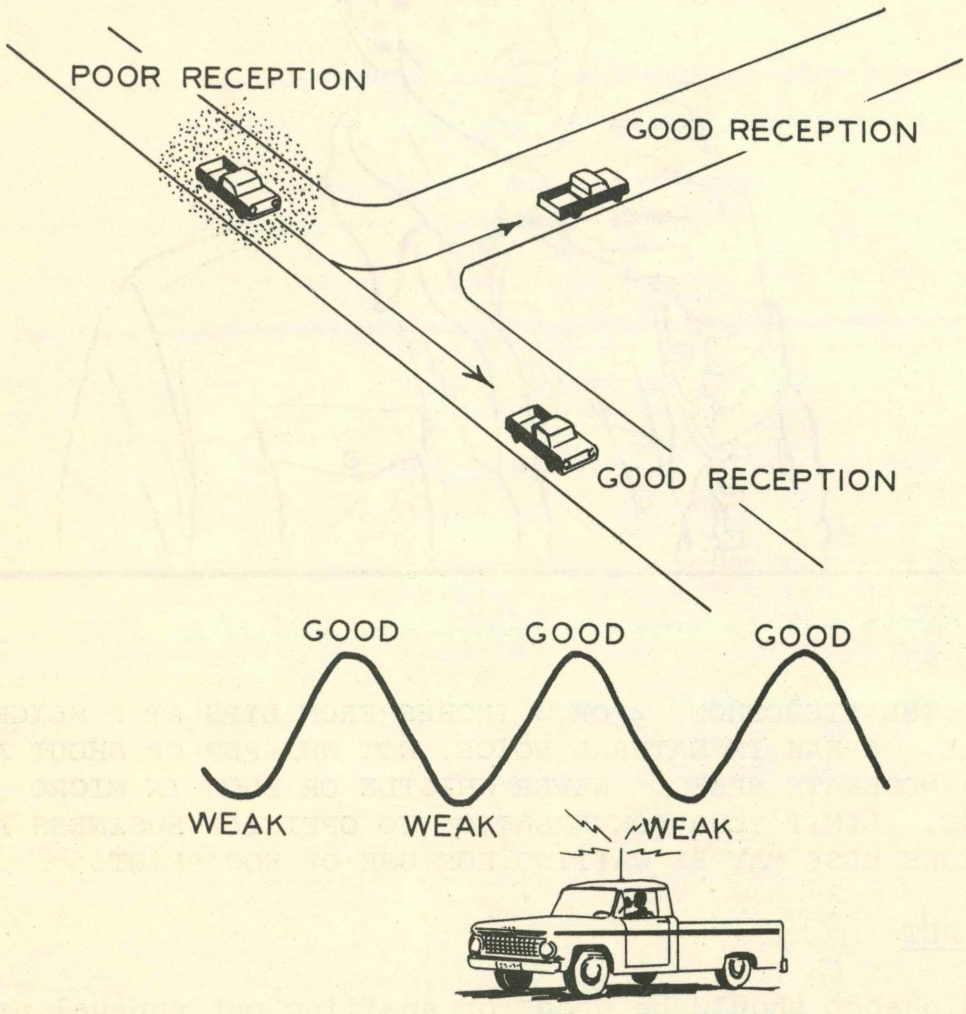


FIGURE VI

SOMETIMES YOU WILL RUN INTO "DEAD SPOTS" WHERE RECEPTION IS POOR. CHANGE THIS BY MOVING AHEAD OR FACING IN ANOTHER DIRECTION.

HOLD THE MICROPHONE 2 OR 3 INCHES FROM LIPS AT A SLIGHT ANGLE. SPEAK IN NATURAL VOICE, NOT WHISPER OR SHOUT AND AT A MODERATE SPEED. NEVER WHISTLE OR BLOW IN MICROPHONE. LIMIT YOUR CONVERSATION TO OFFICIAL BUSINESS AS SOMEONE ELSE MAY BE WAITING FOR USE OF EQUIPMENT.

PHONETIC ALPHABET

The standard alphabet should be used for spelling out unusual names of people or locations. The names used after each letter have been found to be the most understandable over the air. They should always be given as "A-Adam"; never as "A as in Adam" or "B for Baker", etc. It should be memorized thoroughly.

A	Adam	G	George	M	Mary	S	Susan	Y	Young
B	Baker	H	Henry	N	Nancy	T	Thomas	Z	Zebra
C	Charlie	I	Ida	O	Otto	U	Union		
D	David	J	John	P	Peter	V	Victor		
E	Edward	K	King	Q	Queen	W	William		
F	Frank	L	Lewis	R	Robert	X	X-Ray		

REGULATIONS

GENERAL INFORMATION:

Operation of a VHF radio system differs from that of a telephone or carrier system in that no secrecy of communication is assured. All transmissions by any station may be heard by all others in the same system, by other companies in the same or other services and by the general public. It is essential, therefore, that all transmissions be in strict accordance with Federal Communication Commission regulations and that they be carried on in a manner which will be a credit to the Department and its employees. Transmissions by all stations in the system may be monitored continuously by other Department stations as well as by the Federal Communication Commission.

AUTHORIZED USE OF THE SYSTEM:

The stations of the radio system are authorized to operate only as follows:

A. Points of Communication

1. Between a control station and any Mobile Unit.
2. Between Mobile Units and relay stations.
3. Between Control Stations.

B. Authorized Messages in Order of Importance

1. Public Safety and protection of life and important property.
2. Business conducted by Office of Civil Defense.
3. Essential business of Highway Department.
4. Radio tests.
5. Messages where wire line or other communication facilities are inoperative, unavailable, or economically impractical.

C. Messages Not Permitted

1. Any personal message (emergencies excepted).
2. Continuous radiation of unmodulated carrier.
3. Use of profane, indecent or obscene language in any message.

   a. In case accidental transmission of obscene, indecent or profane language does occur, a specific procedure must be followed in order to protect the Department Station licenses which may be revoked for such offenses. The

base station operator must notify the offender immediately upon hearing a violation of the regulations and ask that he not be guilty of such violation again. The base station operator then must enter the following items in the log:

(1) Date
(2) Time
(3) Name of Offender
(4) Code number of mobile unit, or call letters of base station over which transmission was made.
(5) Statement as to nature of violation, that offender was notified and warned not to repeat the violation, and that the violator was notified that such entries would be made in the log.
(6) Signature of offending operator.

AUTHORITY TO OPERATE STATIONS:

No person shall operate any transmitter whether in a mobile or base station without the specific authorization of the local Highway Commission official in charge of the operation. In the case of a local county maintenance operation, this would be the local county foreman.

No person shall be allowed to operate a base station without being fully familiar with the contents of the Radio Operators Manual. It would be impossible to meet fully the Federal Governments requirements if this were not so. The requirements in operating a base station are much more severe than that required for mobile operation.

Only employees of the Iowa State Highway Commission can be allowed permission to operate our radio equipment. A non-employee cannot even be allowed to turn on a radio unit for listening purposes. No employee should be allowed to operate a mobile unit without full instruction by an authorized base station operator or Iowa State Highway Commission Radio Technician.

Government licenses are no longer required for the operation of our radio equipment. This in no way relieves the individual operator of the responsibility in following government regulations.

Part I of the Appendix lists the exact regulations that apply to Highway Maintenance Radio Services.

OPERATING PROCEDURE:

A. All communications regardless of their nature shall be restricted to the minimum practical transmission time. If you have lengthy information and it must go by radio, "Break" every minute or so. Give the others a chance to move their radio traffic.

B. Remember when calling Station to Station, Station to Car, Car to Station, or Car to Car, don't keep up a steady call. Remember, a car could be out of range or the station doesn't hear you; therefore, you might be keeping someone else from moving their radio traffic.

C. Holding the transmit button down continuously is prohibited except when required for test purposes.

STATION IDENTIFICATION:

Base and mobile station calls are assigned on the basis of State, District, Resident and County levels. These station calls are considered as descriptive calls and should not be confused with the authorized government calls.

When contacting a base or mobile station, use the accepted descriptive station call - such as Polk Headquarters, Altoona Shop, Resident 11 Base, 7030 etc. The base station, however, must always sign off with the authorized government call - such as "KDC 910 Off".

A complete breakdown of the descriptive calls is listed in Appendix III. This section may be removed for easier reference.

SUSPENSION OF TRANSMISSION REQUIRED:

The operation of a transmitter shall be suspended immediately when it is found to be interfering with another service.

POSTING STATION LICENSES AND TRANSMITTER IDENTIFICATION CARDS:

Government authorizations should be kept on file at the transmitter site. Transmitters not on view from the operating position should have an identification tag, legibly indicating the call sign and the licensee's name and address and shall be affixed readily visible for inspection.

INSPECTION OF STATIONS:

A. All stations and records of stations in these services shall be made available for inspection at any time while the station is in operation; or shall be made available for inspection upon reasonable request of an authorized representative of the Federal Communication Commission.

B. The transmitter of any type radio equipment may be opened by the Federal Communication Commission inspector or a member of the Department having proper license. Personnel of this Department having a restricted permit or no license at all shall never open the transmitter, even when requested by the Inspector.

C. A file shall be set up for radio records and all operators should acquaint themselves with its location and contents. Failure to provide these records at the request of the Federal Communications Commission Inspector is in violation and warrants the issuance of a citation by the Federal Communication Commission.

FORM OF STATION RECORDS:

A. The records shall be kept in an orderly manner and in such detail that the data required are readily available. Key letters or abbreviations may be used if proper meaning or explanation is set forth in the record.

B. Each entry in the records shall be signed by a person qualified to do so, having actual knowledge of the facts to be recorded. All signatures must be made in full - not initialed.

C. No record or portion thereof shall be erased, obliterated or willfully destroyed within the required retention period. Any necessary correction may be made only by the person originating the entry, who shall strike out the erroneous portion, initial the correction made and indicate the date of the correction.

RETENTION OF STATION RECORDS:

A. Information transmitted and received by a Base Station shall be recorded on the Radio Log as provided. The starting date and finishing date are to be noted under the captions on the face of the log book. The log then will be retained in file for one (1) year.

B. The log must be filed at the operating position and must be available for inspection by the Federal Communication Commission.

SECRECY OF MESSAGE:

In accordance with the strictly enforced Federal law regarding secrecy of communication, each operator shall refrain from discussing or making personal use of any messages or conversation heard on any radio system.

STRAY CONVERSATION:

Operators shall take all possible precaution against conversation of nearby persons being picked up and transmitted. All employees in the vicinity shall remain silent or leave the vicinity of the operator when so requested by the operator.

TOWER LIGHTS:

A. Tower lights shall be inspected for proper performance at least once during each twenty-four hour period. This includes all seven days of the week.

Upon inspection, the information obtained shall be entered into the log book and appropriately signed. The information shall be in ink and the observers signature shall be written out in full, not initialed. If the observation is not made at the Maintenance Garage, a separate radio log book may be maintained.

The basic data to be logged is as follows:

1. Date
2. Time
3. Observation (Under "Remarks")
4. Signature (Under "Operator on Duty")

B. In the event of an observed tower light failure, the following procedure must be followed:

1. Enter "failure" in log book.
2. If it is not possible to resume lighting within thirty minutes, the information should be given to the nearest (FAA) Flight Service Station. The date and time such information was given should be logged.
3. The local Radio Technician should then be notified.
4. The Technician should enter the log book on the repairs made.
5. Upon resumption of lighting, the FAA should again be notified and the date and time logged.

To following the letter of the FCC regulations, all five steps must be followed after each tower light failure.

C. List of FAA offices:

City	Phone
Burlington	(319) 752-4734
Cedar Rapids	(319) 364-3041
Des Moines	(515) 285-1541
Mason City	(515) 423-7512
Moline	(309) 762-2412
Omaha	(402) 341-6178
Ottumwa	(515) 682-1846
Sioux City	(712) 258-1060
Sioux Falls	(605) 338-4841
Waterloo	(319) 233-5528

D. Where at all possible, a local electrician should be found to do this work. In no case should a local maintenance employee be assigned the job. Where it is not possible to secure a local climber, we will make arrangements for a professional climber. Professional climbers are costly, however, and should be avoided. In addition to notifying the FAA, you should notify us during the first working day after such a failure.

Two bulb sizes are used for tower lighting. They are as follows:

(1) 100A21-TS-130 volt (P&E Stock No. 012-113700) - This is a special 100 watt traffic signal lamp, rated for 130 volt service. Two of these bulbs are used in all towers that require lighting. The larger towers with a flashing beacon require two additional lights as listed below.

(2) 500 PS40-130 volt (P&E Stock No. 012-035670) - This is a special 500 watt code beacon bulb. Two of these bulbs are used on the top of the taller towers and are the ones used with the flasher.

The Federal Communication Commission requires that spare bulbs of this type be on stock at all times. I would suggest that four of the smaller bulbs and two of the larger bulbs (if used) be kept for stock. Keep these bulbs in a marked wooden box at the tower site. When an adequate supply of spare bulbs does not exist, fill out a requisition and forward to the Ames Storeroom.

PRIORITY OF MESSAGES:

Priority of messages transmitted within the radio system shall be as listed below. Upon being notified by any station that a message of higher priority is to be transmitted, all other stations shall remain silent until otherwise notified by the station having higher priority or by the control station. It is understood in all cases listed below that priority of mobile traffic must be preserved.

1. Safety of life
2. Safety of property
3. Urgent messages
4. Routine messages
5. Tests

STATION LOGS:

A. By whom kept: Radio station logs should be kept in accordance with Part 89 of the Federal Communication Commission Rules and Regulations, a copy of which should be made a part of the station records. These logs shall be maintained on all transmissions and on certain specified events within the radio network. They shall be kept by the base station operator on the forms provided.

B. Required Information:

Each base station shall be required to keep a log record of the following:

1. The signature of each operator on regular duty during a shift or other period and the time of reporting on and off. These persons shall sign all individual entries during this period of duty. All entries shall be in ink.

2. The individual signature following the entry of any person.

3. Details concerning radio operation during an unusual event such as an accident or disaster when the radio operation was other than that normally carried on. Where a vehicle is involved, record the following:

   (a) Time
   (b) Location
   (c) Name and vehicle license
   (d) Information on the emergency

4. The base station operation should be informed of any aid given to a motorist by a maintenance employee and this information should be properly logged.

5. Radio equipment trouble or unsatisfactory operation and the time and to whom the trouble was reported by the station operator. Keep notes on minor troubles such as loose knobs, etc., which do not require a maintenance call, but which should be fixed on the next call.

6. Reports from radio maintenance personnel of radio installations, adjustments, repairs, frequency and deviation checks will be entered in the log books at the transmitter building.

7. The time and results of daily checks on antenna lights.

C. Corrections:

Log corrections shall be made only by the person who made the original entry. He shall strike out the erroneous portion, initial the correction made, and note the date of the correction. Erasures are not permitted.

D. Filing:

Original log records of each station shall be kept at the station where made. The logs will be kept on permanent file at this location and none shall be destroyed except upon written authority of the communication manager.

AUTHORITY TO INSTALL AND MAINTAIN EQUIPMENT:

Radio installations, adjustments, repair, testing and maintenance work shall be performed only by persons designated by the department as maintenance personnel.

SIGNING OFF:

When the transmission of a message is complete, the Federal Communication Commission requires the operator to sign off.

APPENDIX

PART I

FEDERAL COMMUNICATION COMMISSION RULES AND REQUIREMENTS FOR HIGHWAY MAINTENANCE RADIO SERVICE

Operating Requirements

§ 89.151 Operating procedure.

(a) All communications regardless of their nature, shall be restricted to the minimum practical transmission time.

(b) Continuous radiation of an unmodulated carrier is prohibited except when required for test purposes.

(c) Zone and interzone stations shall employ the standard operating procedure prescribed by the Commission. Copies of such procedure are available for distribution to persons having a legitimate need therefor. Requests for copies should be addressed to the Secretary, Federal Communications Commission, Washington, D.C., 20554.

(d) The Commission expects each licensee to take reasonable precautions to prevent unnecessary interference. If harmful interference develops, the Commission may require any or all stations to monitor the transmitting frequency prior to transmission.

(e) Tests may be conducted by any licensed station as required for proper station and system maintenance, but such tests shall be kept to a minimum and precautions shall be taken to avoid interference to other stations.

§ 89.153 Station identification.

(a) Except as provided in paragraph (b) of this section, the required identification for stations in these services shall be the assigned call signal.

(b) In lieu of meeting the requirements of paragraph (a) of this section, mobile units in the Police, Fire, Forestry-Conservation, Highway Maintenance, and Local Government Radio Services operating above 30 Mc/s may identify by means of an identifier other than the assigned call signal: *Provided*, That such identifier contain, as a minimum, the name of the governmental subdivision under which the unit is licensed; that the identifier is not composed of letters or letters and digits arranged in a manner which could be confused with an assigned radio station call signal: *And provided further*, That the licensee notifies, in writing, the Engineer in Charge of the District in which the unit operates concerning the specific identifiers being used by the mobile units.

(c) Nothing in this section shall be construed as prohibiting the transmission of additional station or unit identifiers which may be necessary for systems operation: *Provided, however*, Such additional identifiers shall not be composed of letters or letters and digits arranged in a manner which could be confused with an assigned radio station call signal.

(d) Except as indicated in paragraphs (e), (f), and (g) of this section, each station in these services shall transmit the required identification at the end of each transmission or exchange of transmissions, or once each 30 minutes of the operating period, as the licensee may prefer.

(e) A mobile station authorized to the licensee of the associated base station and which transmits only on the transmitting frequency of the associated base station is not required to transmit any identification.

(f) Except as indicated in paragraph (e) of this section, a mobile station shall transmit an identification at the end of each transmission or exchange of transmissions, or once each 30 minutes of the operating period, as the licensee may prefer. Where election is made to transmit the identification at 30-minute intervals, a single mobile unit in each general geographic area may be assigned the responsibility for such transmission and thereby eliminate any necessity for every unit of the mobile station to transmit the identification. For the purpose of this paragraph the term "each general geographic area" means an area not smaller than a single city or county and not larger than a single district of a State where the district is administratively established for the service in which the radio system operates.

(g) A station which is transmitting for telemetering purposes or for the actuation of devices, or which is retransmitting by self-actuating means a radio signal received from another radio station or stations, will be considered for exemption from the requirements of paragraph (d) of this section in specific instances, upon request.

§ 89.155 Suspension of transmission required.

The radiations of the transmitter shall be suspended immediately upon detection or notification of a deviation from the technical requirements of the station authorization until such deviation is corrected, except for transmissions concerning the immediate safety of life or property, in which case the transmissions shall be suspended as soon as the emergency is terminated.

§ 89.157 Mobile installations in vehicles not under the continuous control of the licensee.

A mobile radio station licensed in these services may not be installed or maintained in a vehicle, aircraft, or vessel, which is not at all times controlled exclusively by the licensee, unless precautions have been taken to eliminate effectively the possibility of the licensed transmitter being operated during the period that the vehicle, aircraft, or vessel is not under the control of the licensee.

§ 89.159 Emergency operation of mobile stations at fixed locations.

During an emergency requiring a local communication center, any authorized mobile transmitter may be operated temporarily as a base station at a fixed loca-

tion for a period not to exceed ten days. If operation for a longer period is required, such operation must be specifically authorized.

§ 89.161 Communication with other stations.

In those cases which require cooperation or coordination of activities, stations in the Public Safety Radio Services may communicate with stations in other services and with U. S. Government stations.

§ 89.163 Operator requirements.

(a) *Operation during the course of normal rendition of service—radiotelephone.* (1) The following classes of stations transmitting on frequencies above 25 Mc/s may be operated by an unlicensed person, if authorized to do so by the station licensee:

(i) From a control point—a mobile, a base or fixed station.

(ii) From a dispatch point—a base or fixed station.

(2) Mobile stations transmitting on frequencies below 25 Mc/s may be operated by an unlicensed person when such station is associated with and under the operational control of a base station of the same licensee. Mobile stations not associated with such a base station must be operated by a person holding a commercial radio operator license or permit of any class issued by the Commission.

(3) Base stations and fixed stations transmitting on frequencies below 25 Mc/s shall be operated as follows:

(i) From a control point, only a person holding a commercial radio operator license or permit of any class issued by the Commission shall operate a base station or fixed station.

(ii) From a dispatch point, an unlicensed person may operate a base station or fixed station after being authorized to do so by the station licensee: *Provided, however,* That such operation shall be under the direct supervision and responsibility of a person who holds a commercial radio operator license or permit of any class issued by the Commission and who is on duty at a control point meeting the requirements of § 89.113.

(b) *Operation during the course of normal rendition of service—radiotelegraph.* Only a person holding a commercial radiotelegraph operator license or permit of any class issued by the Commission shall operate a station when transmitting radiotelegraphy by any type of the Morse Code.

(c) *Maintenance or test operations.* All transmitter adjustments or tests during or coincident with the installation, servicing, or maintenance of a radio station, which may affect the proper operation of such station, shall be made by or under the immediate supervision and responsibility of a person holding a first- or second-class commercial radio operator license, either radiotelephone or radiotelegraph, who shall be responsible for the proper functioning of the station equipment: *Provided, however,* That only persons holding a radiotelegraph first- or second-class operator license shall perform such functions at radiotelegraph stations transmitting by any type of the Morse Code.

(d) *Unattended operation.* No person is required to be in attendance at a station when transmitting during normal rendition of service and when either:

(1) Transmitting for telemetering purposes or

(2) Retransmitting by self-actuating means a radio signal received from another radio station or stations.

(e) *Licensed operator required.* Notwithstanding any other provisions of this section, unless the transmitter is so designed that none of the operations necessary to be performed during the course of normal rendition of service may cause off-frequency operation or result in any unauthorized radiation, and unless the transmitter is so installed that all controls which may cause improper operation or radiation are not readily accessible to the person operating the transmitter, such transmitter shall be operated by a person holding a first- or second-class commercial radio operator license, either radiotelephone or radiotelegraph as may be appropriate for the type of emission being used, issued by the Commission.

(f) *Licensee responsibility.* The provisions of this section authorizing certain unlicensed persons to operate certain stations, or authorizing unattended operation of stations in certain circumstances, shall not be construed to change or diminish in any respect the responsibility of station licensees to have and to maintain control over the stations licensed to them (including all transmitter units thereof), or for the proper functioning and operation of those stations (including all transmitter units thereof) in accordance with the terms of the licenses of those stations.

[*§ 89.163 as amended eff. 6-22-64; V(64)-2*]

§ 89.165 Posting of operator license.

(a) The original license of each base or fixed station operator, other than an operator exclusively performing service and maintenance duties, shall be posted or kept immediately available at the place where he is on duty as an operator: *Provided, however,* That if an operator who is on duty holds a restricted radiotelephone operator permit of the card form (as distinguished from such document of the diploma form) or holds a valid license verification card (FCC Form 758-F) attesting to the existence of any other valid commercial radio operator license, he may have such permit or verification card, as the case may be, in his personal possession.

(b) Whenever a licensed operator is required for a mobile station, the original license of each such operator, other than an operator exclusively performing service and maintenance duties, shall be kept in his personal possession whenever he performs the duties of an operator at such station: *Provided,* That in lieu of an original license of the diploma form (as distinguished from such document of the card form) he may have in his personal possession a valid verification card attesting to its existence.

(c) The original license of every station operator who exclusively performs service and maintenance duties at that station shall be posted at the transmitter involved whenever the transmitter is in actual operation while service or maintenance work is being performed by him or under his immediate supervision and responsibility: *Provided,* That in lieu of posting his license, he may have on his person either his license or a valid verification card.

§ 89.167 Posting station licenses and transmitter identification cards or plates.

(a) The current authorization for each mobile station and each base or fixed station authorized to be operated at temporary locations shall be retained as a permanent part of the station records, but need not be posted. In addition, an executed Transmitter Identification Card (FCC Form 452-C) or a plate of metal or other durable substance, legibly indicating the call sign and the licensee's name and address, shall be affixed readily visible for inspection, to each of such transmitters: *Provided*, That, if the transmitter is not in view of the operating position or is not readily accessible for inspection, then such card or plate shall be affixed to the control equipment at the transmitter operating position or posted adjacent thereto.

(b) The current authorization for each base or fixed station at a fixed location shall be posted at the principal control point of the station, and a photocopy of such authorization shall be posted at all other control points listed on the authorization. In addition, an executed Transmitter Identification Card (FCC Form 452-C) or a plate of metal or other durable substance, legibly indicating the call sign and the licensee's name and address, shall be affixed, readily visible for inspection, to each transmitter operated at a fixed location, when such transmitter is not in view of, or is not readily accessible to, the operator at the principal control point.

§ 89.169 Inspection of stations.

All stations and records of stations in these services shall be made available for inspection at any time while the station is in operation or shall be made available for inspection upon reasonable request of an authorized representative of the Commission.

§ 89.171 Inspection and maintenance of tower marking and associated control equipment.

The licensee of any radio station which has an antenna structure required to be painted or illuminated pursuant to the provisions of section 303 (q) of the Communications Act of 1934, as amended, and/or Part 17 of this chapter shall comply with the provisions of this section in the operation and maintenance of such tower marking as follows:

(a) Shall make an observation of the tower lights at least once each 24 hours either visually or by observing an automatic and properly maintained indicator designed to register any failure of such lights, to insure that all such lights are functioning properly as required; or alternatively.

(b) Shall provide and properly maintain an automatic alarm system designed to detect any failure of such lights and to provide indication of such failure to the licensee.

(c) Shall report immediately by telephone or telegraph to the nearest Flight Service Station or office of the Federal Aviation Agency any observed or otherwise known failure of a code or rotating beacon light or top light not corrected within 30 minutes, regardless of the cause of such failure. Further notification by telephone or telegraph shall be given immediately upon resumption of the required illumination.

(d) Shall inspect at intervals not to exceed 3 months all automatic or mechanical control devices, indicators and alarm systems associated with the tower lighting to insure that such apparatus is functioning properly.

(e) Shall exhibit all lighting from sunset to sunrise unless otherwise specified.

(f) Shall maintain a supply of spare bulbs sufficient for immediate replacement purposes at all times.

(g) Shall clean and repaint all towers as often as necessary to maintain good visibility.

§ 89.173 Answers to a notice of violation.

Any licensee receiving official notice of a violation of the terms of the Communications Act of 1934, as amended, any legislative act or treaty to which the United States is a party, or the rules and regulations of the Federal Communications Commission, shall, within 10 days from such receipt or such other period as may be specified, send a written answer to the office of the Commission originating the official notice. If an answer cannot be sent, or an acknowledgment made within such period, acknowledgment and answer shall be made at the earliest practicable date with a satisfactory explanation of the delay. The answer to each notice shall be complete in itself and shall not be abbreviated by reference to other communications or answers to other notices. The reply shall set forth the steps taken to prevent a recurrence of improper operation.

§ 89.175 Content of station records.

Each licensee of a station in these services shall maintain records in accordance with the following:

(a) For all stations, the results and dates of the transmitter measurements required by these rules and the name of the person or persons making the measurements.

(b) For all stations, when service or maintenance duties are performed, the responsible operator shall sign and date an entry in the station record giving:

(1) Pertinent details of all duties performed by him or under his supervision;

(2) His name and address, and

(3) The class, serial number and expiration date of his license: *Provided*, That the information called for by subparagraphs (2) and (3) of this paragraph so long as it remains the same, need be entered only once in the station record at any station where the responsible operator is regularly employed on a full time basis and at which his license is properly posted.

(c) For all base and fixed stations except such stations which are authorized to be operated at temporary locations or for unattended operation, the name or names of persons responsible for the operation of the transmitting equipment each day, together with the period of their duty. Each such person shall sign, not initial, the record both when coming on and when going off duty.

(d) [Reserved]

(e) For stations whose antenna or antenna supporting structure is required to be illuminated a record in accordance with the following:

(1) The time the tower lights are turned on and off each day if manually controlled.

(2) The time the daily check of proper operation of the tower lights was made.

(3) In the event of any observed or otherwise known failure of a tower light:

(i) Nature of such failure.

(ii) Date and time the failure was observed, or otherwise noted.

(iii) Date, time and nature of the adjustments, repairs, or replacements that were made.

(iv) Identification of the Flight Service Station (FAA) notified of the failure of any code or rotating beacon light or top light not corrected within thirty minutes, and the date and time such notice was given.

(v) Date and time notice was given to the Flight Service Station (FAA) that the required illumination was resumed.

(4) Upon the completion of the periodic inspection required at least once each three months:

(i) The date of the inspection and the condition of all tower lights and associated tower lighting control devices, indicators and alarm systems.

(ii) Any adjustments, replacements, or repairs made to insure compliance with the lighting requirements and the date such adjustments, replacements, or repairs were made.

§ 89.177 Form of station records.

(a) The records shall be kept in an orderly manner and in such detail that the data required are readily available. Key letters or abbreviations may be used if proper meaning or explanation is set forth in the record.

§ 89.405 Points of communication.

(a) Highway maintenance base stations are authorized to intercommunicate with highway maintenance mobile stations. Highway maintenance mobile stations are authorized to intercommunicate with highway maintenance base stations and other highway maintenance mobile stations.

(b) Each entry in the records shall be signed by a person qualified to do so having actual knowledge of the facts to be recorded.

(c) No record or portion thereof shall be erased, obliterated, or willfully destroyed within the required retention period. Any necessary correction may be made only by the persons originating the entry who shall strike out the erroneous portion, initial the correction made and indicate the date of the correction.

§ 89.179 Retention of station records.

Records required to be kept by this part shall be retained by the licensee for a period of at least one year.

SUBPART K—[Reserved]

SUBPART L—HIGHWAY MAINTENANCE RADIO SERVICE

§ 89.401 Eligibility.

Authorizations for stations in the Highway Maintenance Radio Service will be issued only to states, territories, possessions, and other governmental subdivisions including counties, cities, towns and similar governmental entities.

§ 89.403 Permissible communications.

Stations in the Highway Maintenance Radio Service are authorized to transmit communications essential to official highway activities of the licensee.

(b) Highway maintenance base and mobile stations are also authorized to intercommunicate with other stations in the Public Safety Radio Services and to transmit to receivers at fixed locations: *Provided*, That no harmful interference will be caused to the base-mobile operations of any authorized station.

(c) Highway Maintenance fixed stations are authorized to intercommunicate with other fixed stations in the Public Safety Radio Services and to transmit to receivers at fixed locations.

§ 89.407 Station limitations.

(a) Mobile relay stations in the Highway Maintenance Radio Service will be authorized only on frequencies above 150 Mc/s which are, pursuant to the provisions of § 89.409(e), available for base or mobile stations. Each mobile relay station authorized pursuant to the provisions of this section which is intended to be activated by signals transmitted on a frequency below 50 Mc/s shall be so designed and installed that:

(1) Normally it will be activated only by means of the coded signal or signals or such other means as will effectively prevent its activation by undesired signals;

(2) It will be deactivated automatically when its associated receivers are not receiving the signal on the frequency or frequencies which normally activate it; and

(3) It will be deactivated upon receipt or cessation of a coded signal or signals, or shall be provided with an automatic time delay or clock device which will deactivate the station not more than three minutes after its activation.

(b) Subject to the provisions of § 89.157 communication units of a licensed highway maintenance mobile station may be installed in vehicles of contractors or other persons having a direct responsibility for official highway activities.

(c) Each operator of a station in the Highway Maintenance Radio Service when employing a frequency shared with the Special Emergency Radio Service and designated by limitation note 6 in § 89.409(e) shall listen on the licensed frequency of the station prior to transmitting and shall not transmit until it has been reasonably determined that harmful interference will not be caused to any authorized communication in progress on the frequency.

(d) A control station associated with one or more mobile relay stations, authorized pursuant to this section, may be assigned the mobile service frequency assigned to the associated mobile station. Use of the mobile service frequency by such control station is subject to the condition that harmful interference not be caused to stations of other licensees operating in the mobile service in accordance with the table of frequency allocations as set forth in Part 2 of this chapter.

APPENDIX II

November - 1964

"ASSISTANCE TO THE PUBLIC" NO. 1 - SECTION XVII
MAINTENANCE POLICIES AND PROCEDURES

General

Experience on toll roads show that we can expect an "emergency service need" from one vehicle for each mile per day on the Interstate as the number of miles opened and traffic increases. The average automotive break down runs about 25% out of gasoline, 20% tire trouble, 24% ignition, cooling and vapor lock and 31% other mechanical trouble. "Only a small percentage of emergency situations on freeways require first aid or ambulance service because accident and fatality rate on controlled access highways is relatively low. However, sickness and accidents will occur on freeways."

Because of limited access and other features of Interstate highways, a motorist in trouble is more dependent on the State Highway Patrol and Highway Department for assistance than on other rural state roads. The State Highway Patrol will take charge at the scene of accidents and normally will investigate all vehicles stopped along the Interstate and give assistance when warranted. They not only are law enforcement officers but see "that proper safety rules are observed and to give first aid to the injured". Therefore, when an officer of the State Highway Patrol or Sheriff's Office is at the scene of an accident, they are in responsible charge and the Highway Maintenance forces shall render such assistance as they can within the limitation of the Highway Commission's policy. To give assistance to the public in the absence of a law enforcement offier or to assist when necessary and to increase the efficiency of regular maintenance work, the Highway Commission is equipping automobiles and trucks on the Interstate with two-way radios. This is to set up the procedure to be followed by the Maintenance forces in emergency service to the public.

Radio Base Station

I. Radio calls received from employees for assistance to a motorist, such as high test gasoline, repairs, towing, accident, ambulance and fire-fighting service shall be immediately telephoned to the local Highway Patrol or Sheriff's Office.

The State Highway Patrol has stated they will accept such calls and render the assistance. In towns where there is no Patrol Office, the Foreman should have an understanding with the Sheriff and request that he accept such calls and render the assistance. Where there is no Patrol Office or Sheriff, try to arrange with City Police to transfer the call to the Sheriff or Patrol or render assistance themselves.

II. The radio station operator shall avoid placing calls direct to service stations, garages, ambulance or fire stations. The Commission cannotpay for service runs made for service to a motorist. Direct calls may be made as follows:

A. If a motorist designates a certain service station or garage be called for high test gasoline, tire, repair or tow, the call shall be placed as requested giving motorist's name and vehicle license number, but make it clear you are passing on information and assume no responsibility for the cost of the service.

B. If the person is sick and asks that a certain doctor be called, you shall call the doctor to give him the information and sick person's name. Find out if the doctor will comply with the request so the information can be radioed back to the employee on the road.

C. In case of accident, injury, death or fire, call the Highway Patrol or Sheriff, or in some cases the City or Town Police. If none can be reached to take the responsibility and the employee at the site is positive that someone is badly injured, dead, or a vehicle on fire, you shall call direct for the ambulance or fire truck and then inform the employee at the site that an ambulance or fire truck has been called.

D. Calls for service needed for Highway Commission-owned equipment and property can, of course, be made direct as necessary and the service charges can be paid from road funds.

III. The base station operator should observe the following:

A. Have telephone numbers of Highway Patrol, Sheriff and City Police posted close at hand.

B. Have telephone numbers of ambulance service and fire stations posted close at hand.

C. Record in the radio log time, location, name and vehicle license and information on emergency service calls.

D. If a Highway Patrol Officer or Sheriff is at the site of an accident, <u>they will assume the responsibility</u> of calling for an ambulance or fire truck or tow truck if needed.

<u>Radio Equipped Units on the Interstate</u>

Highway Commission employees driving a radio-equippped automobile or truck shall stop to render assistance at accidents and whenever hailed by a motorist, car hood raised, white cloth showing, or there is evidence of trouble.

A. If pavement is obstructed by a disabled vehicle:

1. Radio base station;

2. Flag traffic;

3. Help move disabled vehicle to shoulder.

B. If vehicle needs gasoline, water, oil or service:

1. On November 4, 1964, the Commission authorized the operators of pickups and trucks assigned to interstate maintenance to furnish regular grade gasoline to a motorist that is out of fuel. Only sufficient gasoline shall be transferred from the truck supply tank to that of the stranded motorist to allow the vehicle to reach the next open gasoline station. No charge is to be made or payment accepted. The stranded motorist will fill out and give to the Commission operator a courtesy card.

2. If the stranded motorist uses high test gasoline and will not take the responsibility to drive on regular gasoline, the Commission operator will radio the shop requesting that a commercial supplier be sent out with high test gasoline at the stranded motorist's expense.

3. The Commission operator should radio the shop so the courtesy service can be recorded on the radio log and help sent if warranted.

C. If the trouble is only a matter of changing a tire:

1. Proceed with your work if an able-bodied man is present, but help change the tire if there are only women or feeble persons present;

2. If you change the tire, radio the base.

D. In case of a vehicle running off the road and there is no evidence of injury to persons or tow truck not needed:

1. Radio the base;

2. Proceed with regular work.

If there is an injury proceed as in "F". If a tow truck is needed:

1. Radio the base;

2. Stand by to flag traffic while the vehicle is being removed. <u>(State equipment is not to be used to pull the vehicle back on the road.)</u>

E. In case of sickness of occupant:

1. Radio the base giving information;

2. Stand by to inform occupant that assistance is on the way and wait until assistance arrives;

3. Proceed with regular work.

F. If there is an accident, injury, death or fire:

1. Radio base;

2. Put out flagmen to direct traffic;

3. Give whatever assistance is possible. <u>If a Patrol Officer or Sheriff is present, let them call the ambulance or fire truck</u>, but if not present, give the base station enough information to call for the help needed.

   Remain at the site as long as necessary to give assistance and to flag traffic safely by the accident until the roadway is again safe.

G. Operators of radio-equipped trucks on salting, sanding and snowplow runs must keep in mind the urgency of their task for safety of all travelers and not unnecessarily delay the work to give assistance in minor cases. In such cases, radio the base the information so other help can be sent and then proceed with the work.

APPENDIX III

May - 1965

Maintenance Department — Radio Communications System

CALL LETTER ASSIGNMENTS
FOR
MOBILE RADIO UNITS

State Headquarters:

State 1	- Maintenance Engineer	(F. A. Smiley)
State 2	- Assistant Maintenance Engineer	(Erle E. Bowen)
State 3	- Maintenance Area Engineer	(C. L. Huisman)
State 4	- Maintenance Operations Engineer	(John H. Moody)
State 5	- Maintenance Special Services Engineer	(E. J. O'Connor)
State 6	- Electronic Design Engineer	(Norbert K. Fox)
State 7	- Maintenance Area Supervisor	(R. C. Hagebock)
State 8	- Maintenance Operations Supervisor	(Raymond C. Hall)
State 32	- T&HP Electronic Equipment Supervisor	(Richard Fryer)
State 101	- Radio Technician	(Kenneth Brown)
State 102	- Radio Technician	(Jim Doggett)
State 103	- Radio Technician	(Joe Mann)
State 104	- Radio Technician	(Robert Swartz)
State 105	- Radio Technician	(Vern Holtorf)
State 106	- Radio Technician	(Bob Pink)
State 107	- Radio Technician	(Don Messenbrink)
State 108	- Radio Technician	(Jim Lynch)
State 109	- Radio Technician	(Dean Tjernagel)
State 110	- Radio Technician	
State 111	- Radio Technician	

District Headquarters:

District 101	- District Engineer	
102	- District Maintenance Engineer	
103	- District Traffic Line Foreman	
105	- District Traveling Mechanic	
106	- District Traffic Line Marker	
107	- District Nurse Truck	
District 201	- District Engineer	
202	- District Maintenance Engineer	
203	- District Traffic Line Foreman	
205	- District Traveling Mechanic	
206	- District Traffic Line Marker	
207	- District Nurse Truck	
District 301	- District Engineer	
302	- District Maintenance Engineer	
303	- District Traffic Line Foreman	
305	- District Traveling Mechanic	
306	- District Traffic Line Marker	
307	- District Nurse Truck	
District 401	- District Engineer	
402	- District Maintenance Engineer	
403	- District Traffic Line Foreman	
405	- District Traveling Mechanic	
406	- District Traffic Line Marker	
407	- District Nurse Truck	

District 501 - District Engineer
502 - District Maintenance Engineer
503 - District Traffic Line Foreman
505 - District Traveling Mechanic
506 - District Traffic Line Marker
507 - District Nurse Truck
District 601 - District Engineer
602 - District Maintenance Engineer
603 - District Traffic Line Foreman
605 - District Traveling Mechanic
606 - District Traffic Line Marker
607 - District Nurse Truck

Resident Maintenance Engineers

Residency 11-1 Resident Maintenance Engineer
Residency 11-2 Ass't. to Resident Maintenance Engineer

County Maintenance Foreman and Sub-Foreman
County name & numbers from 1 to 4

Example:
Polk 1 - Foreman
Polk 2 - Sub-Foreman (Senior)
Polk 3 - Sub-Foreman
Polk 4 - Sub-Foreman

County Mechanics
County name & numbers from 5 to 10

Example:
Polk 5 - Head Mechanic
Polk 6 - Ass't. Mechanic
Polk 7 - Ass't. Mechanic

Maintenance Trucks

With four digit "A" equipment numbers - The numbers are the assigned call. Example: "Polk 7030"

With five digit "A" equipment numbers - 10,000 is subtracted from the equipment number and an "A" prefix is added to the remaining numbers. Examples: 10073 would be Polk 73, 10175 would be Polk 175.

CALL LETTER ASSIGNMENTS FOR BASE RADIO UNITS

NOTE: THE FOLLOWING CALL LETTERS ARE FOR MOBILE CONTACT ONLY. ALL BASE STATIONS SHOULD SIGN OFF WITH THEIR FEDERAL COMMUNICATION COMMISSION LICENSED CALL SIGN.

State Headquarters:

State Headquarters

District Headquarters:

District 10 - Base
District 20 - Base
District 30 - Base
District 40 - Base
District 50 - Base
District 60 - Base

Resident Maintenance Engineers Office:

Residency 11 - Base
Residency 12 - Base
Residency 13 - Base
Residency 14 - Base
Residency 15 - Base
Residency 21 - Base
(etc. through the balance of the Resident Maintenance Engineers)

County Garages:

For Headquarter's Garage:
County name & "Headquarters"

Example:

"POLK HEADQUARTERS"

For Sub-Garages:
Name of town where garage is located & "Shop"

Example:

"ALTOONA SHOP"