

IOWA STATE HIGHWAY COMMISSION

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Radio Manual

VOLUME 3
1969

HAND HELD
CITIZENS BAND

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THE
IOWA STATE HIGHWAY COMMISSION

RADIO MANUAL

Volume 3

Hand Held

Citizens Band

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Issue 1

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IOWA STATE HIGHWAY COMMISSION

HAND-HELD CITIZENS BAND

RADIO MANUAL

I N T R O D U C T I O N

The hand-held CB radios have been provided for your use and should result in increased efficiency, better coordination, and an overall savings in operating expenditures of the Highway Commission.

In order to reach the above objectives, proper administration and use of the radios is essential. Toward this end this hand book has been planned for your use. No matter what degree of technical perfection is achieved in design of this equipment, the benefits derived from it can be unsatisfactory if operators are unacquainted with or fail to use correct operating procedures. It is of utmost importance that all conversations be as brief and concise as possible and beyond question of propriety. It is necessary that the greatest amount of judgement, courtesy, and cooperation be exercised in the use of this equipment.

DEFINITIONS AND ABBREVIATIONS

CITIZENS RADIO SERVICE: A radio communications service of fixed, land, and mobile stations intended for short distance personal or business radio communications, radio signaling, and control of remote objects or devices by radio; all to the extent that these uses are not specifically prohibited in this part.

CLASS D STATION: A station in the citizen's radio service licensed to be operated on an authorized frequency in the 26.96-27.23MHz_z band or on the frequency 27.255MHz_z with input power of 5 watts or less, and for radio telephony only.

GOVERNMENT ASSIGNED CALL SIGN: The Call Sign assigned by the FCC. For the Highway Commission it is KRH3629.

UNIT NO.: Number assigned to the hand-held radio by the Highway Commission.

CHANNEL: The frequencies assigned the citizen's radio service have been designated channel numbers by the FCC. Channel 3 is 26.985 MHz_z and channel 13 is 27.115 MHz_z.

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.

RADIO DESCRIPTION

Two types of hand held radios are currently in use at the Highway Commission. The first type radio does not have a channel select switch. The second type unit does have a channel select switch marked F₁ and F₂.

On the radios having an F₁ and F₂ switch on the back, "Call" and "Charge" slide switches are mounted on the side of the unit. When the "Call" switch is in the ON position, the radio will transmit an audible signal as the "Push to Talk" button is depressed. The "Call" feature is used to alert the person being called if he is not listening to the radio. The "Call" switch must be in the OFF position when transmitting voice. The "Charge" switch and "Charge and Power" plug used during the battery charging process will be discussed in the Battery Charging section. "External Antenna", "Microphone", and "Earphone" jacks will not be used.

The radios not having the F₁ and F₂ switch on the back have no additional switches provided.

Both models have "OFF/Volume" and "Squelch or Quiet" controls. In general a range of about two or three miles will be obtained with either model. For temporary vehicular installation call the Radio Shop, Ames.

RADIO OPERATION

1. BE SURE ALL RADIOS TO BE WORKING TOGETHER ARE ON THE SAME CHANNEL. The model having a channel select switch is on channel 13 when in the F_1 position and channel 3 when in the F_2 position. The model not having a select switch is on channel 13.
2. The "Call" switch should be in the OFF position.
3. The "Charge" switch does not affect transmission and will only be used during battery charging. Therefore, the switch can be in either position.
4. Turn the "Volume" control fully clockwise to turn on the radio.
5. Turn the "Squelch or Quiet" control clockwise until noise just stops. If the control is turned too far beyond this point, the desired signal may not be received. To receive weak signals, turn the control counter-clockwise allowing noise to be heard.
6. To transmit fully depress the "Push to talk" switch and speak directly into the speaker in a normal tone.
7. Adjust the "Volume" control counter-clockwise to a comfortable level when receiving the test transmission. Excessively loud volume setting will run the batteries down at a faster rate.

CALLING PROCEDURE

The effectiveness of communications depends largely on the manner in which transmissions are conducted. Certain basic rules must be followed in order to comply with FCC regulations and to obtain good communications. The government assigned Call Sign for all units is KRH3629. Both the Call Sign and unit number is shown on the front of the radio.

Calling Procedure:

1. Calling: "KRH3629 Unit 1 calling Unit 2."
2. Response: "Unit 2 to Unit 1, over."
3. Conduct the required business.
4. Clearing: "KRH3629 Unit 1 and 2 off."

Note: Unit 1 cleared as he originated the call. If Unit 2 originated the call, the unit numbers in the above example would be reversed and Unit 2 would clear. This unit number is shown on the radio case.

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".

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

REGULATIONS

GENERAL INFORMATION:

Operation of a 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 transmission be in strict accordance with Federal Communication 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.

DO THIS ! ! !

1. Use the Radio Call Sign and Unit number for calling and signing off.
2. Wait until other units have completed their message and have signed off before transmitting a message.
3. Press the push to talk switch to talk.
4. Release the push to talk switch to listen.
5. Turn the radio off when not in use.
6. Messages should be brief and confined to Highway Commission business.

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

8. 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.

DO NOT DO THIS ! ! !

1. 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 communications." The violator is subject to severe penalties.

2. Do not change or adjust any radio parts, components, etc. inside the radio housing.

Adjustments by other than the Licensed Radio Technician are a violation of the law and the violator is subject to severe penalties.

3. Do not transmit with broken antenna.

Operating the radio with a broken antenna may damage the transmitter.

4. Do not allow unauthorized personnel to use radio equipment. Only trained Iowa State Highway Commission personnel are authorized to use radio equipment.

5. Do not call other units using the operator's name. Use Call Sign and Unit numbers.

6. In accordance with the strictly enforced Federal Law regarding secrecy of Communication, Do not discuss or make personal use of messages or conversation heard on any radio system.

AUTHORIZED MESSAGES:

1. Business of the Iowa State Highway Commission.
2. Public safety and protection of life and property.
3. Radio tests.

MESSAGES NOT PERMITTED:

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

In case accidental transmission of obscene, indecent 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 radio operator hearing the violation must call the Radio Shop giving the following information for entry in the Radio Shop Log.

- (1) Date
- (2) Time
- (3) Name of Offender
- (4) Unit number of the radio 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 in the Radio Shop Log is required.

AUTHORITY TO OPERATE STATIONS:

No person shall operate any radio without the specific authorization of the local Highway Commission Official in charge of the operation. No person shall be allowed to operate a base station without being fully familiar with the contents of the Radio Manual. It would be impossible to meet fully the Federal Government's requirements if this were not so.

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 radio without full instruction by an authorized operator or Iowa State Highway Commission Radio Technician.

FEDERAL COMMUNICATIONS COMMISSION RULES AND REGULATIONS.

VOLUME VI, PART 95 - CITIZENS RADIO SERVICE.

(Sections not involving radio operation have been removed.)

95.83 - Prohibited uses.

(a) A Citizens radio station shall not be used:

- (1) For engaging in radio communications as a hobby or diversion, i.e., operating the radio station as an activity in and of itself.
- (2) For any purpose, or in connection with any activity, which is contrary to Federal, State, or local law.
- (3) For the transmission of communications containing obscene, indecent, or profane words, language, or meaning.
- (4) To carry communications for hire, whether the remuneration or benefit received is direct or indirect.
- (5) To communicate with stations authorized or operated under the provisions of other parts of this chapter, with unlicensed stations, or with U.S. Government or foreign stations, except for communications pursuant to 95.95 (b)

and 95.121 and, in the case of Class A stations, for communications with U.S. Government stations in those cases which require cooperation or coordination of activities.

- (6) For any communication not directed to specific stations or persons, except for: (i) Emergency and civil defense communications as provided in 95.85 (b) and 95.121, respectively, (ii) test transmissions pursuant to 95.93, and (iii) communications from a mobile unit to other units or stations for the sole purpose of requesting routing directions, assistance to disabled vehicles or vessels, information concerning the availability of food or lodging, or any other assistance necessary to a licensee in transit.
- (7) To convey program material for retransmission, live or delayed, on a broadcast facility.

NOTE: A Class A, Class B, or Class D station may be used in connection with the administrative, engineering, or maintenance activities of a broadcasting station; a Class A, Class B, or Class C station may be used for control functions by radio which

do not involve the transmission of program material; and a Class A, Class B, or Class D station may be used in the gathering of news items or preparation of programs: Provided, that the actual or recorded transmissions of the Citizens radio station are not broadcast at any time in whole or in part.

- (8) To interfere maliciously with the communications of another station.
- (9) For the direct transmission of any material to the public through public address systems or similar means.
- (10) To transmit superfluous communications, i.e., any transmissions which are not necessary to communications which are permissible.
- (11) For the transmission of music, whistling, sound effects, or any material for amusement or entertainment purposes, or solely to attract attention.
- (12) To transmit the word "MAYDAY" or other international distress signals, except when a ship, aircraft, or other vehicle is threatened by grave and imminent

danger and requests immediate assistance.

- (13) For transmitting communications to stations of other licensees which relate to the technical performance, capabilities, or testing of any transmitter or other radio equipment, including transmissions concerning the signal strength or frequency stability of a transmitter, except as necessary to establish or maintain the specific communication.
- (14) For relaying messages or transmitting communications for a person other than the licensee or members of his immediate family, except: (i) Communications transmitted pursuant to 95.85 (b) (7), and 95.121; and, (ii) upon specific prior Commission approval, communications between citizens radio stations at fixed locations where public telephone service is not provided.
- (15) For advertising or soliciting the sale of any goods or service.
- (16) For transmitting messages in other than plain language. Abbreviations, including nationally or internationally recognized operating signals, may be used only if a list of all such abbreviations is filed with the Commission.

viations and their meaning is kept in the station records and made available to any Commission representative on demand.

- (b) A Class D station may not be used to communicate with, or attempt to communicate with, any unit of the same or another station over a distance of more than 150 miles.
- (c) A licensee of a Citizens radio station who is engaged in the business of selling Citizens radio transmitting equipment shall not allow a customer to operate under his station license. In addition, all communications by the licensee for the purpose of demonstrating such equipment shall consist only of brief messages addressed to other units of the same station.

95.85 - Emergency Use.

- (a) All Citizens radio stations shall give priority to the emergency communications of other stations which involve the immediate safety of life of individuals or the immediate protection of property.
- (b) Any station in this service may be utilized during an emergency involving the immediate safety of life or the immediate protection of property for the transmission of emergency communications. When so used, certain

provisions in this part concerning use of frequencies (95.41(d)); prohibited uses (95.83 (a) (5) and (6)); operation by or on behalf of persons other than the licensee (95.87); and duration of transmissions (95.91 (a) and (b)) shall not apply. However, any emergency use which necessitates taking advantage of these exceptions to usual requirements shall be subject to the following conditions:

- (1) As soon as possible after the beginning of such emergency use, notice shall be sent to the Commission in Washington, D.C., and to the Engineer in Charge of the radio district in which the station is located, stating the nature of the emergency and the use to which the station is being put.
- (2) The emergency use of the station shall be discontinued as soon as possible, and the Commission in Washington, D.C., and the Engineer in Charge shall be notified immediately when such special use of the station is terminated. If the emergency use is of less than 24-hour duration, a single notice containing all of the required information will serve to comply with the notice requirements of this paragraph.

95.87 - Operation by, or on behalf of, persons other than the licensee.

- (a) Transmitters authorized in this service must be under the control of the licensee at all times. A licensee shall not transfer, assign, or dispose of, in any manner, directly or indirectly, the operating authority under his station license, and shall be responsible for the proper operation of all units of the station
- (b) Citizens radio stations may be operated only by the following persons, except as provided in paragraph (c) of this section:
 - (1) The Licensee.
 - (5) Employees of the licensee only while acting within the scope of their employment.

95.91 - Duration of Transmissions.

- (a) All communications or signals, regardless of their nature, shall be restricted to the minimum practicable transmission time. The radiation of energy shall be limited to transmissions modulated or keyed for actual permissible communications, tests, or control signals. Continuous or uninterrupted transmissions from a single station or between a number of communicating stations is prohibited, except for communications

involving the immediate safety of life or property.

5.95 - Station Identification

- (a) The call sign of a citizens radio station shall consist of three letters followed by four digits.
- (b) Each transmission of the station call sign shall be made in the English language by each unit, shall be complete, and each letter and digit shall be separately and distinctly transmitted. Only standard phonetic alphabets, nationally or internationally recognized, may be used in lieu of pronunciation of letters for voice transmission of call signs. A unit designator or special identification may be used in addition to the station call sign but not as a substitute therefor.
- (c) Except as provided in paragraph (d) of this section, all transmissions from each unit of a citizens radio station shall be identified by the transmission of its assigned call sign at the beginning and end of each transmission or series of transmissions directed to or exchanged with a unit of the same station or units of other stations. Each required identification shall include not only the call sign of the station unit transmitting, but also the call sign

of the station or stations with which the transmitting unit is communicating, or attempting to communicate. In the case of communications between units of the same station (intrastation), after identifying itself by its assigned call sign, the transmitting unit may identify the other units by unit designators. For communications between units of different station (interstation), the complete sign of all stations involved must be transmitted. If the call sign of the station being called is not known, the name or trade name may be used, but when contact has been made the called station shall thereafter be identified by its call sign. Examples of proper identification procedure are set forth at the end of this paragraph. Where transmissions or exchanges of transmissions of greater length are permitted by this part, the identification shall also be transmitted at least every 15 minutes. Each transmission or exchange of transmissions conducted on different frequencies shall be fully and separately identified in accordance with the foregoing on each frequency used.

EXAMPLES OF PROPER IDENTIFICATION

Intrastation communications:

- (1) Calling: "KZZ 0001 base, calling unit 2."
Response: "KZZ 0001 unit 2, to base, over."
Clearing: "KZZ 0001 base, clear with unit 2" and
KZZ 0001 unit 2, clear with base."
- (2) Calling: "KZZ 0001 unit 1, calling unit 3."
Response: "KZZ 0001 unit 3, to unit 1, over."
Clearing: "KZZ 0001 unit 1, clear with unit 3" and
"KZZ 0001 unit 3, clear with unit 1."

Interstation communications:

- Calling: "KZZ 0001 calling KZZ 0002,"
or "KZZ 0001 calling KZZ 0002 unit 3" (if appropriate).
- Response: "KZZ 0002 to KZZ 0001, over."
- Clearing: "KZZ 0001 clear with KZZ 0002," and KZZ 0002 clear with KZZ 0001. "

BATTERY CARE AND CHARGING

The batteries are rechargeable and can be recharged up to 500 times. For maximum recharging life the batteries should only be recharged when the radio performance begins to be affected as evidence by decreased volume, range, or intelligibility.

The batteries will last a full eight hour work day with the following duty cycle:

- 4.0 hours - Radio "ON".
- 2.4 hours - Radio receiving communications
- 1.6 hours - Radio transmitting.

The operating time on batteries can be greatly extended by keeping the transmit time to a minimum. Keeping the volume down on the receiver will also extend battery life. The battery drain is as follows:

- 0.010 A - Radio "ON"
- 0.040 A - Radio receiving communications
- 0.225 A - Radio transmitting.

Charging procedure for models with "Charge and Power" jack is as follows: The battery need not be removed from the radio to be charged.

1. Plug the charger into the "Charge and Power" jack on the radio.
2. Put the "Charge" switch in the charge position.
3. Plug the charger into standard 120 VAC outlet.
4. A maximum of 12 hours recharging time is required to fully charge the battery

Although the battery will not be damaged if left on charge longer than 12 hours, the battery life will be adversely affected.

Charging procedure for models without "Charge and Power" jack is as follows:

1. Disengage bottom end of hand strap by lifting up on metal clip.
2. Loosen the two screws on the bottom of the radio and remove the battery section from the radio.
3. Insert the 120 VAC exposed into a standard wall receptical. A maximum of 12 hours recharging time is required to fully charge the battery. Although the battery will not be damaged if left on charge longer than 12 hours, the battery life will be adversely affected.

RADIO MAINTENANCE AND REPAIR

For radio repair CALL RADIO SHOP, PHONE 515-232-7250, Ext. 256. All repair work will be done in Ames.

