

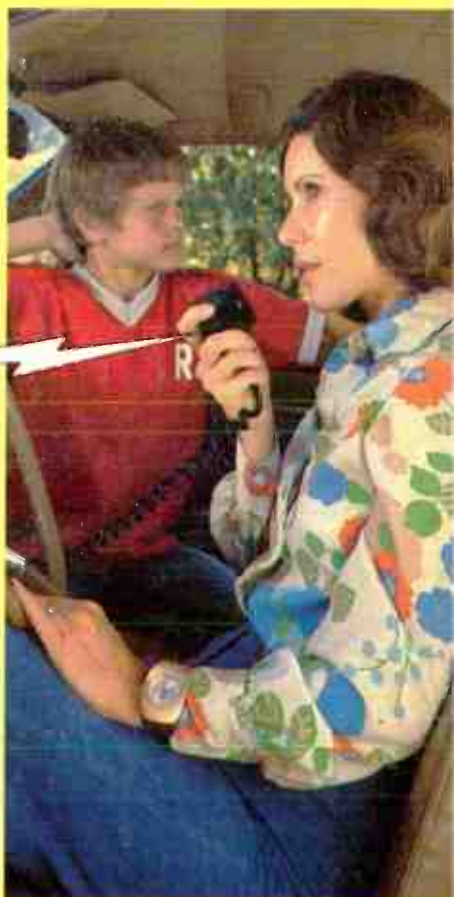
ALL ABOUT CB TWO-WAY RADIO

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Radio Shack

A layman's plain-talk guide to the equipment, rules, and benefits of low-cost citizens band two-way radio for business, family and personal use



BY RADIO SHACK'S EDITORIAL AND TECHNICAL STAFF • 116 PAGES • 1976 EDITION

ALL ABOUT CB TWO-WAY RADIO

by

Hy Siegel, KXL 2778 / K9CCN

and Radio Shack's Staff

of CB Engineering and Marketing Experts

Radio Shack[®]
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DEDICATION

There are many communications, audio, and quality-control engineers in the Radio Shack family who have — anonymously — helped us build enduring quality into the Realistic product line. We dedicate this book to them in typical CB-ese: Little Bob, Lean Mean Wayne, Smokey Sy, Tokyo Jerry, ‘‘Margarita’’ Casey, Pickey Peter, Fussy Frank, Smilin’ Jim and many, many others. The first-named and last-named are no longer with us for reasons of physical and/or motivational disability. The rest are 10-8. Their act will be hard to follow.

The Management

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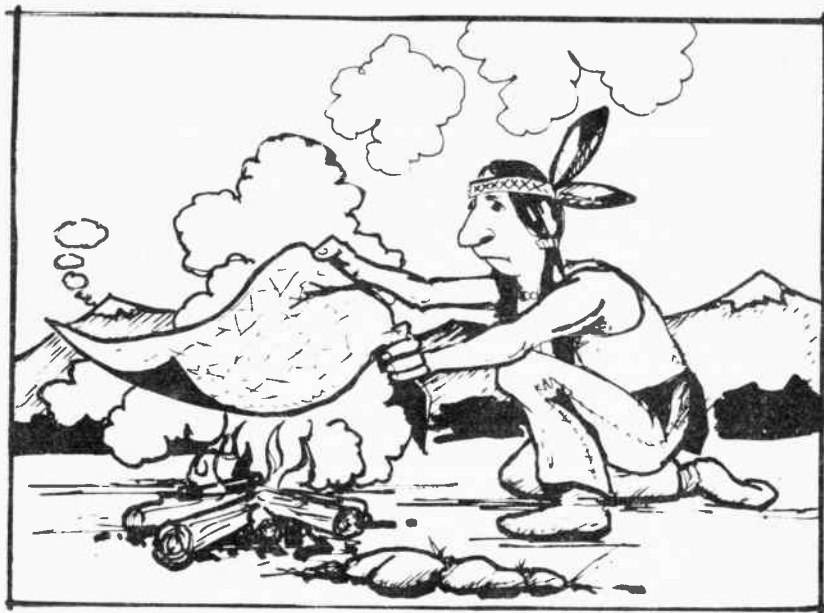
PREFACE

To some readers it may come as a surprise to learn that Radio Shack has been a leader in the CB business since 1959 and has fielded a Realistic CB line since 1960. We and CB have been around together for a long, long time. Surprisingly, it took most retailers and the financial press about 15 years to recognize CB for what it really is — a telephone system for whose use you don't have to pay Ma Bell a nickel (later a dime, now two dimes) a call to use.

The old-style CBER seemed to be a born FCC rule-bender with an irresistible urge to talk about equipment, not always in cultivated language. But his shennanigans with the equipment created the need for rugged reliability and better selectivity. Being somewhat of a know-it-all, our book (62-2044) the *Realistic Guide to CB Radio* is just fine for him.

But the recent surge in sales and its correspondingly broader market base among such diverse groups as truck drivers, college kids, and nervous tourists, created a demand for a book for so-called laypersons. Our alleged right to produce such a tome stems from our alleged preeminence in all phases of the business. After all, we make our own cable, antennas and crystals; we design our own transceivers; our product is sold worldwide — wherever the blessings of CB are type-accepted by the people in power.

So here it is: the beginners bible of the Citizens Band. It's one of the few books guaranteed (by the size of the print run) to be a best seller before publication. The FCC has many rule changes under consideration. We will update whenever these come into law. Nothing, however, threatens the usefulness of equipment on the market today for many years to come. The most immediate prospect seems to be the addition of 7 or more new channels. If you've ever heard a CB busy signal you'll agree with us that more is better than less!



I. Personal Two-Way Communications

Ever since the first time two people got beyond shouting distance of each other, man has looked for ways to communicate — to keep in touch — over a distance. Some primitive cultures used drums or smoke signals. These were reasonably effective and, at the time, served their purpose. Today, however, traffic noises in most areas would drown out the drums and the fire department (or the Environmental Protection Agency) would quickly be on hand to drown out your smoke signal fire.

As civilization advanced, the need for effective communications became a matter of increasing importance and methods of communicating grew more refined. Among the many methods used to convey messages over the years were semaphore flags or flashing a shuttered lantern in a coded pattern and signaling with mirrors using reflected sunlight. Again, these methods served their purpose within their limitations. The sending and receiving parties had to be practically within sight of each other, and if trees or buildings or other obstructions got in the way communication was effectively cut off.



Homing pigeons served well and faithfully to carry messages, although their speed left something to be desired, and their dependability was not too certain should there be a larger, hungry bird of prey along their route. Actually, written messages, whether carried by pigeons, pony express or other means, were for many years the ultimate in personal two-way communications. They were reasonably dependable, providing you could get a letter carrier to where you wanted a message sent.

Necessity being the mother of invention, as the need grew for ever faster and more efficient means of communicating, technology rose to the challenge and the telegraph came into existence. At last there was a means for conveying a message from one place to another almost instantly—providing, of course, that you were near a telegraph office and that there were lines strung (and working) to where you wanted a message sent.

Today, thanks to the tremendous advances that have been made in electronics technology, we have instantaneous communication of one type or another to and from just about any place you might want to communicate with. Basically, this two-way communications equipment falls into two general categories—*wired*, and *wireless*—which simply means: *radio*.

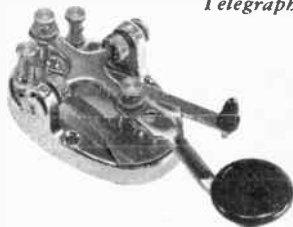
Wired

Wired communications, meaning that wire, cable or some form of physical connection is needed between the two points of communication, falls into three major categories: cables, telegraph and teletype; telephones; and intercoms.

Cables, telegraph and teletype are used primarily by business, industry and government where dependable "workhorse" communication is required. In some cases, such as news service teletype, stock market teleprinters and some types of facsimile (photo reproducing; like a Xerox machine that delivers its copies at the other end of the wire), the equipment is only one way — a central sending station sends the same information to many receivers in various locations. Teletype and facsimile equipment is highly sophisticated and very expensive. This type of equipment is designed for installation in an office and in most cases cannot be easily moved to different locations.



Teletype operator



Telegraph key

Telegraphy is by comparison a much less expensive and far less sophisticated means of communication. The sending and receiving equipment used can be as simple as a switch, or "key", for sending the code, and a bell, buzzer or other sounding device for receiving the code signals from another station. Early telegraph stations were actually little more than this. Telegraphy is probably the most basic means of electrical communication in use today.

The commonest and most well-known form of personal two-way communication is undoubtedly the telephone. Nearly every home and certainly every office in this country has one. With your telephone and a little cooperation from



Wired intercom

“Ma Bell” you can instantly call any one of the millions of other telephones in this country and even around the world. You probably take your telephone very much for granted. Imagine what life would be like without it!

Intercoms are a great convenience around the home, office or shop. An inexpensive—often battery-powered—intercom can be used in most situations where short distance communication is needed between two or more fixed points. They are perfect for kitchen-to-garage or -workshop, upstairs-to-downstairs, office-to-office, or office-to-plant communication. They can be used between nearby houses or buildings—just about anywhere that you can string the intercom wire.

Wireless (Radio)

Wireless, or radio, communication can be used in place of any of the wired systems just mentioned. The obvious difference is that in place of the wire or cable connecting the two points, a radio signal is sent from one location and received at the other.

Wireless intercoms, for example, are growing in popularity for home and office use because they eliminate the inconvenience of having to string wires from one unit to another. In fact, however, wireless intercoms are not really “wireless”. Their signals travel along the AC house wiring. For this reason they will work only if both intercoms are plugged into outlets which come off the same power company transformer.



Wireless intercom

Two-way radio has become indispensable in almost every area of business, industry, government and public service. It is of vital importance in aircraft and boating safety, and has become a tremendous convenience for personal use. Once you begin using two-way radio yourself you'll wonder how you ever got along without it . . . and not having it will be as difficult to imagine as life without your telephone.

When you mention two-way radio, usually the first thing that comes to mind is police radiocommunications. From its wide exposure in movies and on TV,



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everyone is familiar with their “mobile” (used in a vehicle) radio. Your fire department also uses two-way radio, as do most public utilities, many delivery services, plumbers, appliance repairmen, cab companies, towing services, gas stations . . . almost any service-related business has found that two-way radio dispatching helps them provide more efficient service to their customers in addition to saving them time and money.



For safety, as well as convenience, two-way radio is a necessity in aircraft and on commercial vessels and many large pleasure boats. Even smaller boats are learning that it is a definite advantage to be radio equipped now and safety-conscious boaters would no sooner go out in a radioless craft than they would go out in a rowboat without oars.

Another form of two-way radio with which you may be familiar is Amateur or “Ham” radio. Hams come from every walk of life, all ages. They are men and women who are hobbyists, experimenters, company presidents, students, mothers and just plain folks who enjoy the fascinating pastime of using two-way radio to talk to other Hams all over the world. Hams have been of great service to many communities, especially in times of disaster where they were able to provide communications when other means were not available.

Many of the important advances in communications technology have been made by Hams. To become an Amateur radio operator requires passing a test proving proficiency in using Morse code (telegraphy) and a thorough knowledge of electronics theory as well as Federal rules and regulations. However, Hams are prohibited from using their equipment for any type of business or commercial purposes.



Marine two-way radio



Mobile telephone

A mobile telephone can be a great convenience for both business and personal use. With a telephone in your car you can make and receive phone calls as you travel in much the same way that you use your home telephone. The drawbacks to this communications system, unfortunately, are the fairly high initial cost of installation, monthly service charge, and cost per call. In many areas there is a waiting list for mobile telephone service which may be anywhere from a few weeks to several months or more.



"Telephone-Type" CB Transceiver



Citizens Band Radio

Citizens Band, or CB, as it is usually referred to, is a two-way radio service licensed by the Federal Communications Commission (FCC) and intended for short distance (under 150 miles) personal and business radiocommunications. Having a CB two-way radio in your car is almost like having a telephone in your car and it's just as easy to use. It gives you many of the advantages of a mobile telephone for a very modest initial investment and *no* continuing service charge or cost per call—no matter how much you use it! In some cases, CB allows you to communicate with places where a telephone could not reach.



A Citizens Band radio can be installed in your home or office, mounted in a vehicle, or carried with you wherever you go. You can use CB two-way radio in your car, truck, recreational vehicle, boat, golf cart, airplane, tractor or mobile home.

The possibilities for using CB radio are practically limitless. Use it for business, for personal communications, or both. The use you personally can make of CB will depend on your occupation (salesperson, farmer, trucker, serviceperson, doctor, lawyer, private detective, executive, plumber, rancher, etc.), how you spend your leisure time (traveling, hunting, fishing, boating,



camping), where you live (city, country, desert, small town), and many other factors.

You can use CB to provide communication between your car and your home or office, or between your home and office; a nurse or doctor may use it to keep in touch with a hospital or particular patient; commercial services use CB to dispatch their cars and trucks.

Use CB to call home if you're stuck in traffic and will be late for dinner; call your spouse on his or her way home from work if you need extra groceries, or to have the clothes picked up from the laundry; use CB to keep in touch with the babysitter or with a neighbor while you're out shopping.

Two-way Citizens Band radiocommunications are used by forestry services, ski patrols, TV technicians, surveyors, electricians, construction crews, security patrols, highway maintenance crews, business executives, truckers, farmers and salespersons. Boaters use CB for economical ship-to-shore communications. Racing teams use it to communicate between driver and pit crew.

In many areas you can use your CB radio to call ahead and make reservations at hotels, motels and restaurants as you travel along the highway in your car. You can call a CB-equipped garage or service station to obtain assistance if you're having car trouble.

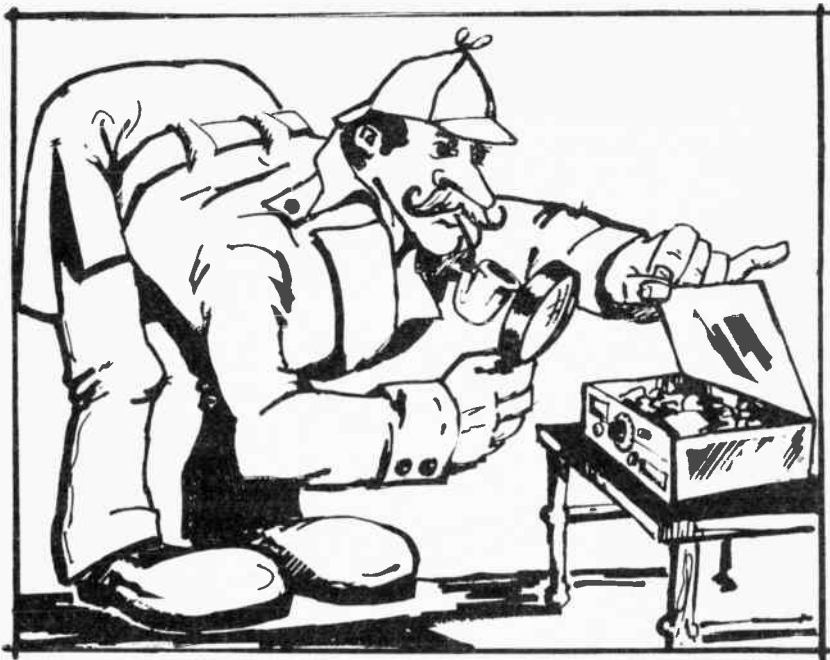
There is also a national *Highway Emergency Locating Plan* (HELP) in which Citizens Band channel 9 is monitored along thousands of miles of highway by clubs, individuals, police departments, rescue units, hospitals, garages and other facilities which can provide assistance to you in the event of an emergency or if you simply need street directions.



CB-equipped race car



One of the largest groups providing this worthwhile public service is *REACT* (Radio Emergency Associated Citizens Teams). REACT has volunteer teams throughout the United States and in many parts of Canada that monitor channel 9 twenty-four hours a day to provide assistance to motorists and provide local two-way radio communication in response to emergencies.



II. Taking the Mystery Out of CB

Citizens Band Radio is easy to understand, and even easier to use. There is really nothing mysterious about it — anyone can operate a CB radio with no more technical skill than it takes to use the telephone or tune in television.

The purpose of this book is not to help you qualify for a degree in electronics engineering, but simply to let you know what CB radio is and how you can use it. We've included just a touch of technical information to let you know how it works. Should you want to learn more about the technical side of electronics, your local Radio Shack store or dealer has an excellent selection of books including everything from an *Electronics Dictionary* through *Integrated Circuit Projects*. We especially recommend *From 5 Watts to 1,000 Watts*, a complete programmed course in electronics theory plus other information required for an Amateur Radio license.

Background

Two-way radio for the use of the general public, officially called the *Citizens Radio Service*, originally came about in 1947. At this time the Federal Communications Commission (FCC), recognized the need for a type of two-way radio service which could be used by a far greater number of individuals and businesses than the existing business, public service and Amateur Radio services. However, this first Citizens Radio Service was severely limited in function. Equipment for it was expensive and not very widely available. Communications were unreliable and limited practically to line of sight — not much of an improvement over smoke signals!

Citizens Band radio as we know it today got its start in 1958 with the creation by the FCC of "Class-D". The term *Citizens Band* is generally understood as referring to this Class-D Citizens Radio Service.

The new Class-D Citizens Radio Service made possible far more effective communications with greater range and reliability. The cost of modern CB radios, unlike almost everything else, is actually lower today than it was in 1958 —and you get a lot more for your money! Modern solid-state (all transistor) CB radio equipment is as far removed technologically from early tube-type CB's as a new sports car is from the Model-T.



*CB, yesterday and today.
Modern, solid-state
transceiver at right.*

In recent years the use of Citizens Band two-way radio has skyrocketed, particularly since TV coverage of the gasoline shortage and truckers strike in late 1974 brought CB to the attention of the public. After the strike, truckers found CB radio was ideal for passing road condition information along the highways and it helped make the long driving hours less tedious. If you do any highway traveling you may have noticed the great number of "18 wheelers" (interstate trucks) that now have "ears" (CB radio antennas).



CB-equipped interstate truck

The gasoline shortage had another effect on the growth of CB. Many businesses realized two-way radio could save them time and money by reducing wasted travel. Delivery services, salespeople, repair and maintenance companies, and other businesses found CB useful for keeping in touch with their offices and a great aid to planning their routes more efficiently. Large companies, as well as small, were learning that they could be "radio dispatched" without the much greater expense of special business band radio equipment.

Savings-conscious individuals discovered CB radio could cut their traveling time and expense too. A call on CB on the way home could eliminate the need for going back out for last-minute shopping needs or to pick up Junior from his Little League practice.

ALL ABOUT CB TWO-WAY RADIO

Later on in this chapter we'll outline some typical applications for CB radio. Undoubtedly you'll be able to think of many more to fit your own particular needs.

The Electronic Industries Association (EIA) reports that as of December, 1974, there were more than 6,250,000 CB radios in use in this country for business or personal reasons. They also estimate that one out of every 33 vehicles on the road is equipped with CB radio. This includes one of every five interstate trucks and one in seven recreational vehicles. CB is also found in one in seven pleasure boats. Across the country, one of every 28 families is already using CB radio, and in rural areas among farm families the number is one in 15.

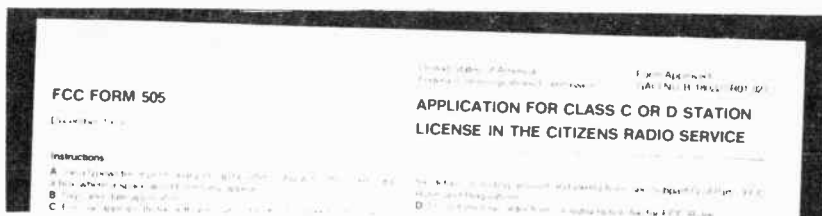


Some Basic Information

In the following chapters we'll give you more detailed information on CB radio equipment, FCC rules and regulations, licensing and operation, but for now let's just outline the basics:

Citizens Band is a two-way radio service licensed by the Federal Communications Commission, and intended for short distance (not over 150 miles) personal or business radiocommunications. Any U.S. citizen, male or female, 18 or more years of age is eligible to apply for a license. Persons under 18 may operate a CB station under the direct supervision and control of someone who is licensed.

Getting a CB license is actually easier than obtaining a driver's license. No technical knowledge is required. Applicants do not have to pass any test or examination. A CB license costs \$4.00 and is good for five years. Any number of CB radios can be covered by a single license as long as they remain under the



control of the licensee and are in the same geographical area. *The license must be in your possession before you are authorized to begin operating.*

CB license applications are included with all Realistic CB radio equipment sold by Radio Shack stores and dealers, or you may obtain an application by writing to the FCC office in your area (See Appendix "C" or check your phone book under U.S. Government). Chapter VII has more information on licensing and regulations.

The equipment you will need for CB operation is explained in the next chapter. Basically, it consists of the two-way radio itself, a microphone or handset, and an antenna. The two-way radio is a combination transmitter and receiver—the **transmitter** section for transmitting or *sending* a radio signal, and the **receiver** section for receiving or *hearing* radio signals from other CB radios. This combined transmitter and receiver is known as a **transceiver**.

Transceivers which are normally installed in cars, trucks, boats, planes and other vehicles are known as *mobile* transceivers. Those which are usually used in homes, offices or other fixed locations are called *base station* transceivers. One other type of CB transceiver is the hand-held portable, or *walkie-talkie*.



Typical Applications

Once you begin using CB you'll find many ways in which it can make your life easier and more fun, as well as save you time and money. You'll probably wonder how you ever got along without it!

Personal and Family. Use CB to keep in touch between your car and home while running errands or driving to and from work. Save extra trips by being able to let your husband know that you need extra groceries; let your wife know you're tied up in traffic and will be home late; call your wife while she's on her way home from her bridge club to tell her Junior needs a ride home from basketball practice.

If you're a two-car (or more) family, CB is great for keeping in touch between cars, or contacting members of the family while they are in their cars — you might even get a chance to talk to your son or daughter this way!

Keep in touch with friends and neighbors around town on CB. Plan and coordinate social events, parties or just casual, spur-of-the-moment get-togethers — CB is the biggest party line ever.

Ever have car trouble far from home, late at night, in rotten weather? With CB you can get help without even getting out of your car. Even if your battery is too low to turn over your engine, you can still call for help — modern solid-state CB radios require very little power from your battery!





Business Use. Call your office to get your messages via CB. Save time and trips by being able to tell field employees of other calls to make. Keep in touch with executives traveling between offices or on the way to meetings. Car-to-car communications are always a convenience and often a necessity in business. Call your associate to let him know you need the contracts he has with him to close a million dollar deal! . . . or to let him know it's his turn to buy lunch and you'll meet him at Joe's Grill.

Sales and Service. Two-way radio communication is practically indispensable for any service-type business. With CB you can save time and money—provide more efficient service to your customers. Salespersons can plan their calls and avoid having to double back over their routes. How many times a day do you drop 20¢ into a pay phone to call your office? Three times? Five? More? Those coins quickly add up—not to mention the time and trouble spent looking for phone booths—and getting a parking place.

Doctors and Nurses. Keep in touch with your office, hospital or a particular patient. No need to call in to an answering service to get messages, just pick up your microphone and get them instantly. No delay on important calls either! CB can literally be a real lifesaver when used by members of the medical profession.



CB is widely used by security police

Security Police. A CB communications system can be installed in your patrol cars, and walkie-talkies provided for foot patrolmen at a fraction of the cost of other radio communications systems requiring special licensing. Two-way radio in this profession is not just a convenience, it's a *must* for both safety and efficiency.

In many cities around the country, neighborhood Citizen Patrols use CB radio to call for police assistance and to communicate between volunteers patrolling in cars or on foot to report any suspicious or criminal activity. These volunteer groups of concerned citizens have been instrumental in many areas in effectively reducing the crime rate.

Truckers and Deliverymen. Interstate truckers are already aware of the value of CB radio on the highway as a means of learning of road and traffic conditions and obtaining assistance in locating destinations. Local truckers and deliverymen can use CB to an even greater extent, especially when it comes to finding an address in an unfamiliar area. There's almost always someone around who can provide assistance via CB radio. Radio dispatched delivery vehicles save time and money too!

Farmers and Ranchers. Citizens Band radio is ideally suited to the communications needs of farms and ranches. In some cases it is the only possible means of communication in areas where telephones are inaccessible. A mobile unit on a jeep, truck or tractor, or battery-operated portable equipment for use on foot or horseback can be a tremendous help in the day-to-day operation of a farm or ranch.

Construction Crews. A CB communications network can be set up almost

instantly on any construction site and has far more versatility and flexibility than wired systems of intercoms or field telephones. Again, CB can save you time and money! Whether you're calling for additional materials or coordinating the activities of various work crews, two-way radio communication quickly pays for itself.

Travel and Vacation. Experienced CB users will tell you that they would rather travel without a spare tire than without their two-way radios. Your CB radio can get you help on the highway, directions when you're lost and advice on what to see, where to go, where to eat and where to stay—it can even get someone to repair your flat tire.

While we don't advocate traveling without a spare tire, we *do* advocate having CB in your car whenever you travel. A CB radio can make any trip, anywhere in the country, safer and more pleasant for you and your family. If you travel with more than one vehicle, CB keeps the caravan in touch so decisions can be made without having to stop for a conference each time, and helps you avoid losing stragglers.

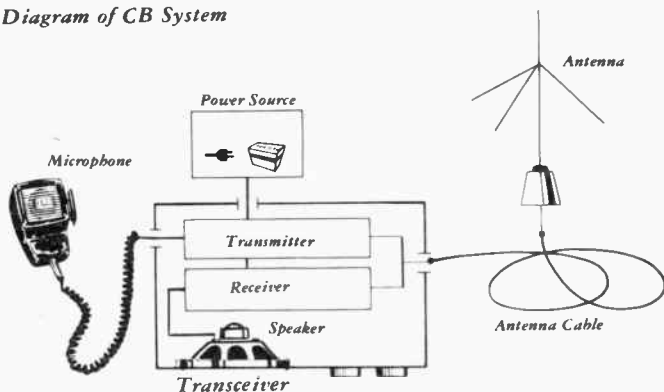
Camping, Hunting, Fishing. The great outdoors is a great place to use CB *walkie-talkies* in particular. CB is about the only way you can keep in touch in the wilderness (unless you want to go back to smoke signals), or even in city parks. It's ideal between campsites, hunting parties, hiking groups, fishing boats and boat-to-shore.

These are just a few of the things for which CB two-way radio can be used. You can probably think of many more for your own business, family or personal needs, perhaps even some which would aid your community. So now that you know what you can use CB for, let's look at what you need to use CB.



CB adds to camping safety and enjoyment

Block Diagram of CB System



III. Parts of the System

The pieces of equipment which make up a complete two-way CB radio station are really quite easy to understand and use. Actually, you can hold everything needed for two-way communications in one hand (that's known as a walkie-talkie!) and you'll learn more about that later in this chapter. For now, let's look at an overview of the typical CB station.

The heart of your two-way radio system is the transceiver. This, as we've mentioned earlier, is a combination transmitter and receiver. Connected to the transceiver is a microphone into which you talk, and built-into the transceiver is a speaker through which you hear other stations. The transceiver is also connected to a source of power—either 120 volts AC, a 12 volts DC car battery or self-contained batteries—and to an antenna which serves both to radiate transmitted and receive incoming radio signals.

Transceivers

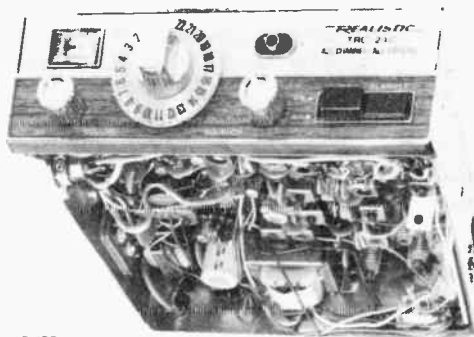
CB radio transceivers are truly remarkable examples of modern technology. Solid-state circuitry makes it possible to produce two-way radios that are a fraction of the size and weight of older tube-type equipment, considerably more reliable, longer lasting, and which require far less current to operate—an

especially important feature when you are powering your CB radio with your car battery!

Transceivers are made up of several separate but interconnected circuits, some of which are shared by both the transmitting and receiving functions of the set. Basically, the transmitter circuit converts the sound waves you produce by speaking into the microphone into electrical energy which is then sent out through the antenna as a radio signal.

The receiver circuit essentially reverses this process: the radio signal coming in through the antenna is electrical energy which is amplified and goes to the speaker where it is converted into mechanical energy (sound waves) which you then hear as a voice.

*Inside view of
mobile CB
transceiver*



Base or Mobile

CB transceivers are usually divided into two classes — base station and mobile station. The difference is typically determined by whether the set will operate on 120 VAC or 12 VDC, and by the size of the transceiver.

This can be misleading since many “base station” transceivers can operate not only on 120 VAC but also on 12 VDC, and often are supplied with mounting brackets for mobile installation. They can also be used in marine applications, for recreational vehicles, and, in an emergency, if the AC power fails, they may be operated from a battery.

On the other hand, “mobile” CB radios are generally much more compact than “base” radios and are equipped for operation only on 12 VDC. To use a mobile CB radio as a base station you would need a power supply which converts 120 VAC to 12 VDC.

Confused? There’s no need to be. Look at it this way — in selecting a CB



*Power supply for base station
use of mobile transceiver*

radio you decide what your needs are and choose your equipment accordingly. Do you want a compact, easily mounted radio primarily for use in your car? Then you want a mobile transceiver which, should you wish to use it as a base station occasionally, will require a power supply that converts 120 VAC to 12 VDC, as mentioned above.

If you plan to operate primarily from your home or office, you should use a transceiver which has a built-in power supply for use on 120 VAC — a base station transceiver.

In addition, if your base station transceiver is of the base/mobile type, as all Realistic base stations are, then you can also use it when the need arises as a mobile or marine station operating on 12 VDC. A radio of this type is especially useful in motor homes where you can use the DC power on the road and the AC power when you stop and hook-up or have your AC generator running.

Power Sources. While we're on the subject, let's look at the types of power that can be used to make your CB set operate.

120 VAC. This is standard house current. The number is sometimes written differently (ie. 110, 115, 117, 125), but in any event it is the alternating current which comes from the wall outlets in homes and offices throughout the country.

If your CB transceiver is designed to operate on AC, it will be equipped with a plug just like that on your TV, radios and other electrical appliances. **NEVER ATTEMPT TO CONNECT A MOBILE CB RADIO TO 120 VAC BY INSERTING THE POWER WIRES INTO AN AC OUTLET.** This will result in damage to the set.

12 VDC. This is the type of battery power found in most cars, trucks, boats

and other vehicles. It is usually taken to mean “negative ground,” that is, where the negative, or “minus” side of the battery is connected to the vehicle chassis or frame.

CAUTION: Some trucks, foreign cars and older American cars were made with a positive ground electrical system—where the “plus” side of the battery is connected to the vehicle chassis. In some cases, older vehicles will have a 6 VDC electrical system. If you aren’t sure, ask any mechanic!

Although many CB transceivers are designed to operate on 12 VDC negative or positive ground (check your owners manual), some can only be used on 12 VDC negative ground.

If your vehicle is positive ground or has a 6 VDC system you will need a “DC voltage inverter.” This is a device which changes 12 VDC positive ground to 12 VDC negative ground, or steps up 6 VDC negative ground to 12 VDC negative ground.

*Voltage inverter for use with
6 VDC or 12 VDC positive
ground systems*



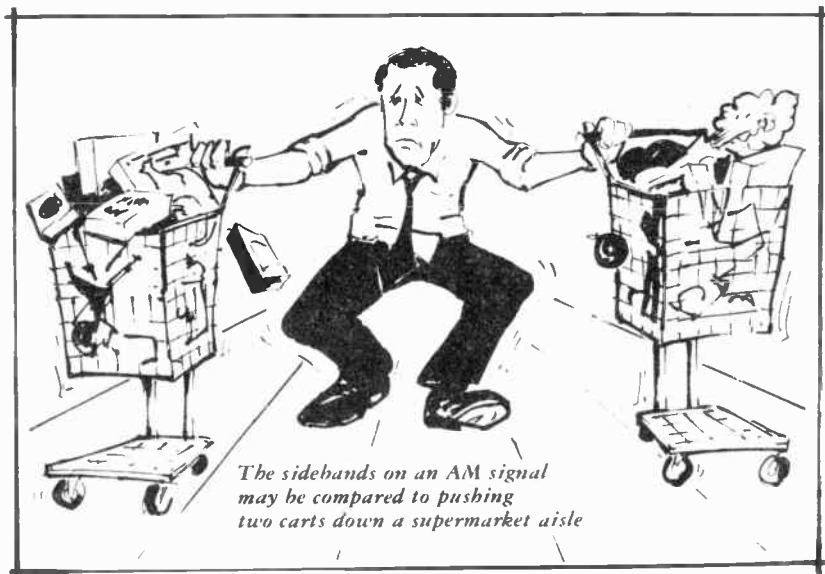
AM or SSB

AM, AM/SSB. Another distinction between types of CB transceivers is whether they are designed to operate in just the “AM” (amplitude modulation) mode or both AM and “SSB” (single sideband). The majority of CB radios in use today are designed to operate on AM only, and most transceivers which may be used on SSB also have the capability to be used on AM. You can not communicate across modes, that is, an AM only station will be unable to communicate with a station operating in the SSB mode.

Both AM and SSB are terms describing methods of conveying voice information on a radio signal. AM is the method used by standard broadcast radio stations, those you listen to on your ordinary car, home or portable radio. Single

sideband is the latest and most efficient way to send and receive voice communications on the Citizens Band. The primary advantages of SSB over regular AM communications are greater range and more channels to choose from. In very simple terms, here's how it works:

In AM transmission, a "carrier" signal is broadcast with a "sideband" on each side of it. Both sidebands carry the same voice information. Imagine yourself as the carrier with two loaded grocery carts (sidebands), one on each side of you, as you try to push them down a supermarket aisle. First, you'll need a fairly wide aisle and, second, you'll have to divide your strength between the two carts.



Now remove one cart, step to the side of the aisle and get behind the remaining cart. You now need only a third of the space you needed before, and you can concentrate all your strength on pushing a single cart. Thus SSB eliminates the carrier and one of the sidebands. It is then able to put all its power into the remaining sideband which effectively triples your power over an AM signal.

This is why AM sets are rated at 4 watts output power and SSB sets are rated at 12 watts PEP (peak envelope power) output. PEP is a measurement of the peak power output of the transmitter and corresponds to the peak of the voice

SSB is like pushing only a single grocery cart down the aisle



signal. This tripled effective power and narrower signal makes SSB transceivers reach out farther.

In addition, since you can also select either the upper or lower sideband to operate on, SSB increases the number of channels available to you. Instead of just 23 AM channels to choose from, with an AM/SSB transceiver you also have 23 lower sideband channels and 23 upper sideband channels, or a total of 46 additional channels on which to communicate.

It should be mentioned, however, that SSB does have two drawbacks in comparison to AM. First, it's more complex in circuitry and costs considerably more money. And secondly, SSB requires the use of an added control—called a clarifier (explained later in this chapter)—and thus is slightly more difficult to use.

Controls

Knobs, Dials, Switches, Buttons and Indicators. When you have your transceiver connected to an appropriate power source (and your CB license in your possession), you are ready to operate it—provided you've read the manual and know what to turn, flip, push or slide. Actually, the controls on a CB two-way radio are no more difficult to use than those on a television set or your car radio.

Almost every CB transceiver has the same three basic controls — OFF/VOLUME, SQUELCH and a CHANNEL SELECTOR. Additional controls, if any, vary from one model to another. The owner's manual supplied with your CB radio will explain the added controls or features built into your particular set.

OFF/VOLUME Control. This is just like the control on radios and TV's. It turns on the transceiver and adjusts the loudness of the sound. On some CB sets there is a separate POWER button to turn the set on and off. This way you can leave the VOLUME control set at the desired listening level instead of having to readjust it each time you turn the radio on and off.

SQUELCH Control. The SQUELCH control eliminates background noise while you are listening for calls, or "monitoring," your CB radio. Normally, this control is adjusted *just to the point* where it silences the receiver. If adjusted past this point, it effectively reduces the sensitivity of your CB receiver, allowing only stronger signals to be heard.

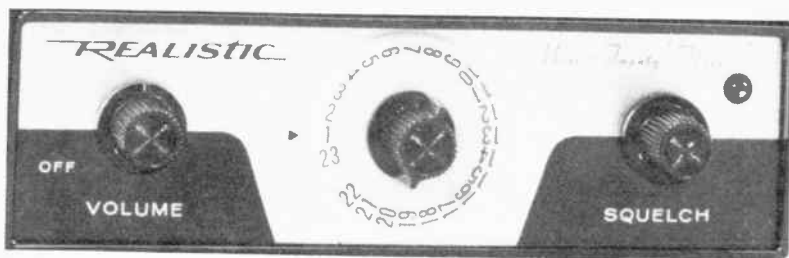
This can be a handy feature, for example, when two or more vehicles are traveling close together. By adjusting the SQUELCH to its full "on" position, only signals from the nearby vehicle will be strong enough to "break through" the squelch circuit and be heard.

CHANNEL SELECTOR Switch. The CHANNEL SELECTOR on your CB transceiver serves the same purpose as the channel selector on a TV set — it changes from one channel to another. With a TV, of course, you just *receive* the station on the channel you have selected. With your CB radio you *receive and transmit* on that channel. To talk to another CB station, both transceivers must be switched to the same channel.

Most CB transceivers today have full 23 channel capability. This means that the CHANNEL SELECTOR has 23 numbered positions allowing you to operate on any of the 23 channels presently allocated to the Citizens Radio Service.

There are also some CB radios available with less than 23 channels. These units are ideal for uses where you need only a few channels for your communications requirements; they are considerably lower in cost than 23 channel sets.

If, for example, you only want a CB transceiver in your car in case of an emergency, or to obtain directions while traveling, a 3-channel radio could be equipped with crystals for channel 9 (national emergency and highway assistance channel), channel 11 (national calling channel) and channel 19 (widely used as the truckers, or moving vehicle channel).



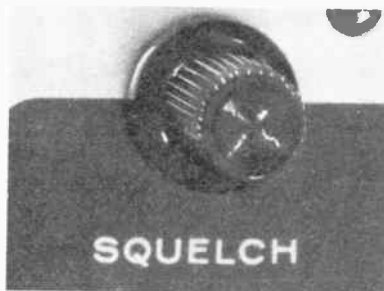
Basic CB Transceiver Controls



Off/Volume



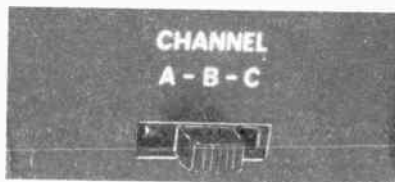
Power Button



Squelch Control



23-Channel Selector



3 and 6-Channel Selector

Usually, transceivers with less than 23 channels have their CHANNEL SELECTOR control (or switch) marked with letters of the alphabet. You determine which channels they will represent by installing crystals for the channels you want. (We'll talk more about crystals later in this chapter.)



Microphone with PTT Switch



Indicator Lamps

PUSH-TO-TALK (PTT) Switch. This is another control that every CB set has in common. However — except for walkie-talkies — it is not located on the transceiver itself. This is the transmit/receive switch which is conveniently located on the body of the microphone. The transmit/receive switch — or as it is more commonly called, the PUSH-TO-TALK button — does exactly that: you push the button to transmit, release it to receive.

MODULATION Lamp. A MODULATION lamp may be either a small pilot-size lamp or a larger indicator with or without the word “modulation” on or near it. This lamp flashes as you speak, or “modulate,” your radio signal. Modulation is the process of adding voice intelligence to your signal.

The brightness of the lamp is directly proportional to the percentage of modulation (the amount that your voice fills your signal — ideally as near 100% as possible). In this way it gives you an indication that you are getting maximum “talk power” from your transmitter. Some base station transceivers also have an ON-THE-AIR lamp which simply serves to indicate that the radio is in the “transmit” mode as opposed to the “receive” mode.

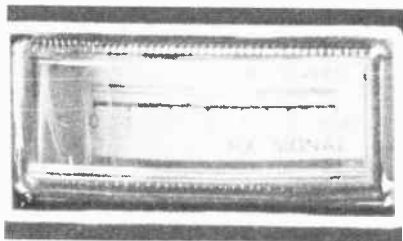
S/RF Meter. An S/RF meter serves a dual function. When the transceiver is in the receive mode the meter indicates the strength of the incoming signal. In the transmit mode the meter shows radio frequency (RF) transmitter power output.

On some CB sets the modulation lamp is also built into the meter and functions as described above. Some deluxe CB stations also have an SWR meter. This meter provides an indication of how well matched the antenna is to the transceiver.

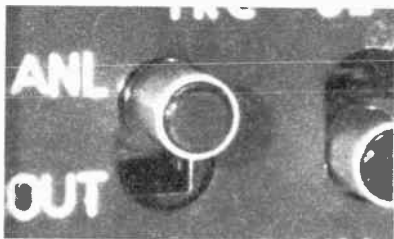
ANL Switch. Most CB radios have an ANL (automatic noise limiter) circuit. On some this circuit is an integral part of the unit and is always "on." Other transceivers have an ANL switch which permits you to switch it out of the circuit for slightly better sensitivity when noise reduction is not necessary. The ANL helps reduce noise or interference such as that caused by auto ignition systems.

NOISE BLANKER Switch. A NOISE BLANKER is another, more sophisticated circuit which serves to reduce noise from auto ignitions and other sources of electrical disturbance. It is sometimes used in addition to an ANL for even more effective elimination of interference.

PA Switch. The PA (public address) switch adds an extra feature to many CB transceivers. When this switch is in the PA position you can use your CB radio, through an external speaker, as a public address system. With some units you can still receive CB calls while using the PA function.



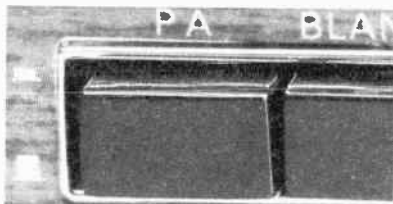
S/RF Meter



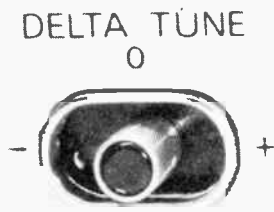
Automatic Noise Limiter



Noise Blanker



Public Address Switch



Delta Tune



RF Gain Control

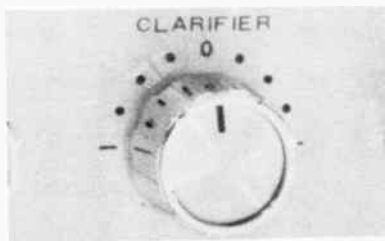
DELTA TUNE Switch. The DELTA TUNE switch serves as a "fine tuning" control. On some transceivers it is in fact identified as a FINE TUNING control. If you are receiving a signal which is slightly off frequency (doesn't sound clear) you can use the DELTA or FINE TUNING control to tune slightly off frequency for better reception. This control is also useful in helping to reduce adjacent channel interference caused by another station operating slightly off frequency on an adjacent channel.

RF GAIN Control. The RF GAIN control may be used to adjust the sensitivity of the circuitry which amplifies incoming signals in your receiver. This can be advantageous when receiving strong signals from very nearby stations which may "overload" your receiver causing a distorted signal. It can also be used to reduce interference, in crowded signal areas, from weaker stations in the background.

The controls we've described so far are fairly standard regardless of whether your transceiver is a base or mobile unit, and regardless of whether it is an AM or AM/SSB unit. In addition to those controls already described most AM/SSB transceivers have two more controls not found on AM only transceivers.



AM-LSB-USB Switch



Clarifier Control

AM-LSB-USB Switch. This control is used to select the mode of operation for both the transmit and receive sections of the transceiver. In the AM position you

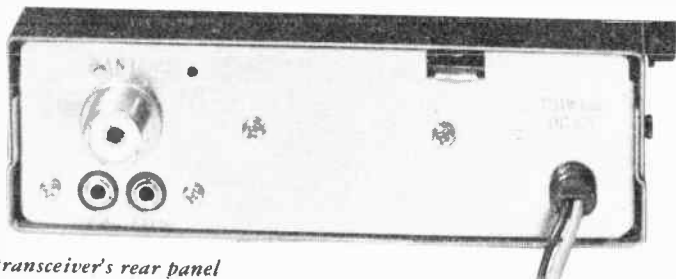
transmit and receive in AM. In the LSB position both the transmitter and receiver sections of the transceiver operate on the lower sideband portion of the channel; in USB on the upper sideband portion.

CLARIFIER Control. The CLARIFIER control is very similar in function to the DELTA or FINE TUNING control. Especially important for SSB operation, it allows you to tune the receiver frequency slightly so that you are receiving the station you are listening to exactly on frequency.

It's called a clarifier because on an SSB signal it really does "clarify" reception. Without it, if the station you're receiving is not precisely on frequency, what you would hear would sound much like an unintelligible Donald Duck, or an equally undecipherable growl.

The Back of the Box. The rear panels of most CB transceivers are pretty much the same. The power cable, or a plug to which the power cable is connected, is located on the rear panel. There is also a connector to which the antenna cable is attached. Some units have a jack which permits you to connect an external speaker if desired. If the CB set has a PA facility, the jack for the external PA speaker is also on the rear panel.

Crystals. Crystals are the precise frequency-determining devices which cause your CB transceiver to transmit and receive signals in exactly the right spot in



Your transceiver's rear panel has the connections for power, antenna and external speakers.



Crystals are precision-made to assure you of exact frequency operation.



the radio frequency spectrum. It is the crystal frequency that determines what channel you are operating on.

At one time it was necessary to have a transmit crystal and a receive crystal for each channel you wanted to use—46 crystals for full 23-channel operation. Today, through the use of circuits called *frequency synthesizers*, nearly all 23-channel CB radios come completely equipped with crystals for all channels. This is now done with 14 to 16 crystals. These crystals are multiplied and divided together to provide 23 channels without the expense and extra space required by 46 individual crystals.

The latest advance in frequency synthesis circuits is called *digital frequency synthesis*. This circuit, combined with *phase lock loop* circuitry, makes it possible to mathematically derive all 23 (or even more) channels with a greater degree of stability than previously possible, using only one or two crystals!

Transmitter Power. Radio power is usually described in terms of *output*, the power actually being sent to the antenna, or as *input* power, the power applied to the transmitter circuit which will result in a percentage of this figure as the actual power output to the antenna. For example, a circuit operating with 70% efficiency may have an input power of 10 watts while its power output would be 7 watts.

The transmitter power output on your CB radio is limited by FCC regulations to 4 watts on AM and 12 watts PEP (peak power) on SSB. What do we mean by “watts of power?” Think of ordinary light bulbs. A 15-watt bulb gives more light than a 7-watt light bulb. A 60-watt bulb more than a 15-watt, and a 100-watt bulb gives more light than a 60-watt bulb. Obviously, the more wattage the more power.

Although the 4 watts maximum allowed for your AM transmitter may not sound like much, especially when you consider a 50,000 watt broadcast station, this power is really quite sufficient for CB communications.

Walkie-Talkies

A walkie-talkie is a portable, hand-held CB two-way radio with its own built-in power source (batteries) and built-in antenna. Operation of the controls is just like any regular CB set, with the major difference being that the transmit/receive push-to-talk switch is on the side of the walkie-talkie case instead of on an external microphone.

There are walkie-talkies available, like Realistic's TRC-101B and TRC-100, that have about the same transmitter power as a full size CB radio; and the

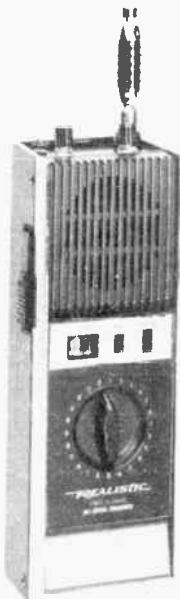
TRC-101B even has full 23-channel operation! Other units operate at lower power and have from 1 to 6 channels.

Walkie-talkies are not limited to use with other walkie-talkies. They also work with base and mobile CB stations. An FCC license is required if the walkie-talkie has a power input of over 100 milliwatts (mW). 100mW is one-tenth of one watt.

100 Milliwat Walkie-Talkies. Under Part 15 of the FCC Rules and Regulations, provisions are made for the operation of two-way radios with up to 100 mW transmitter power without the need for a license. A licensed CB radio station is not permitted to communicate with 100 mW walkie-talkies unless the 100 mW units are type accepted under Part 95 and being used with a license.

100 mW walkie-talkies can be fairly sophisticated units with many of the features of higher power sets including more than one channel operation, call signals, squelch controls and provision for use of external power sources. Or, they may be very basic "toy" models with minimal features.

The range of these license-free walkie-talkies, due to their very low power, is fairly limited. However, for many purposes they are excellent and can be used



*Full-power
23-channel
walkie-talkie*



*100 mW license-free
walkie-talkies*



100 mW "toy" walkie-talkies

to provide efficient wireless communication. For example, they are ideal for many outdoor activities: boating, camping, hiking. The "toy" walkie-talkies will keep youngsters occupied for hours on end, indoors or out.

Antennas

The antenna you use with your CB radio is just as important as the radio itself. No matter how good your transceiver is, it will be of little value without an antenna.

An antenna is basically a metal structure designed to radiate and receive radio signals. The design is such that the antenna is "resonant" at the particular frequency for which it will be used so that it will perform with optimum efficiency.

When we refer to an antenna as resonant, this simply means that its size and shape are such that it will operate best at the frequency (in this case, CB's 27 MHz) we desire. For example, in tuning a musical instrument, a tuning fork may be used. The tuning fork is designed to be resonant at a particular frequency, say middle C. When the guitar, piano or other instrument being tuned is tuned to match the note from the tuning fork, the tuning fork and instrument are in resonance.

Just as there are base and mobile transceivers, there are specific antennas designed for base and mobile use. The major difference in design between base and mobile antennas is, of course, size. Generally, the larger the antenna the more effective it will be. Obviously the size of a mobile antenna is limited, while base station antennas can be considerably larger and more elaborate in design.

Base Station Antennas. The most popular type of antenna being used for CB base stations today is the "ground plane" antenna. Any antenna requires a *ground* to operate. With some antennas this is accomplished with a physical connection into the earth. A mobile antenna uses the car's body to serve as the ground.

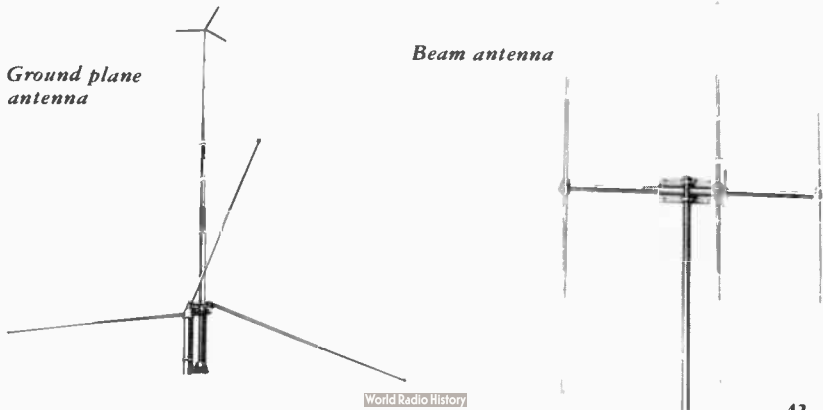
Since this ground is needed, yet you want to raise your antenna above actual ground level, a means is needed for bringing "ground" up to the level of the antenna. This is where the ground plane antenna comes in.

A ground plane antenna is designed with an upright or vertical element known as the *radiator*, and several horizontal elements called *radials* at its base. These radials serve as an artificial ground, thus permitting the antenna to be installed at any height above the actual ground itself.

Ground plane antennas are *omnidirectional*. That is, they radiate and receive radio signals equally well in all directions. They can also be designed to provide an increase in effective signal power. This is called *gain*.

Radio Shack, for example, manufactures ground plane antennas under their exclusive Archer brand name described as $\frac{1}{4}$ -wave, $\frac{1}{2}$ -wave and $\frac{5}{8}$ -wave. These sizes refer to the actual physical size of the antenna in relation to the electrical size of the frequency they are designed for (in this case 27 MHz).

Using the $\frac{1}{4}$ -wave as a reference standard for measuring purposes, a $\frac{1}{2}$ -wave gain-type ground plane antenna increases the effective radiated power (ERP) of the transmitted signal nearly $2\frac{1}{2}$ times. With the $\frac{5}{8}$ -wave antenna ERP is increased even more so that a 4-watt AM signal goes out with an ERP of about $12\frac{1}{2}$ watts.

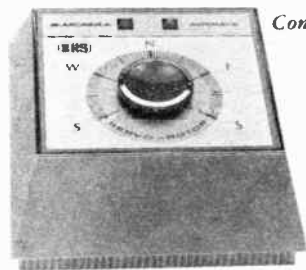


ALL ABOUT CB TWO-WAY RADIO

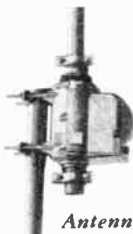
The most effective, or powerful, base station antenna is a *beam* antenna. As the name implies this type of antenna “beams” or points the signal in a specific direction. Its design is similar in appearance to a TV antenna.

A beam antenna provides the greatest gain of any type of CB antenna, however, this is limited to one direction only. If your beam is pointing East, you will send and receive extremely well in this direction and poorly in other directions. The gain from Radio Shack’s Archer “Crossbow” beam antenna is such that the power from this antenna (in the direction it’s pointed) becomes equivalent to about *85 watts of power*.

Unless you are going to be communicating between the same two fixed points at all times, an antenna rotator should be used with a beam antenna. A rotator allows you to point the antenna, by means of a remote control box, in any desired direction.



Control box



Antenna rotator



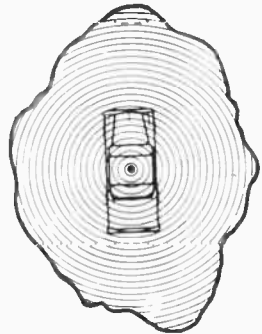
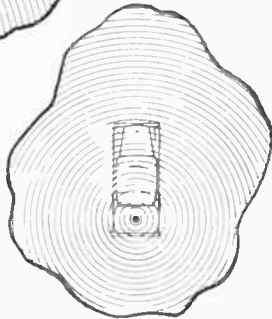
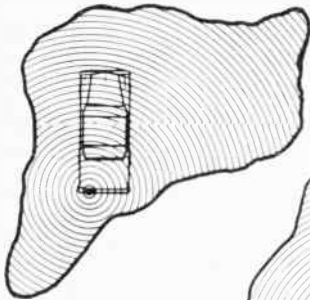
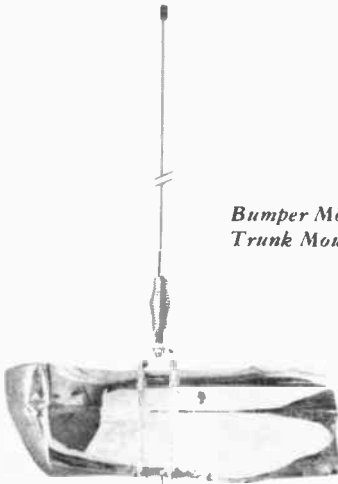
Mobile antenna loading coil

Mobile Antennas. Most CB mobile antennas are pretty much alike, differing only in minor details of construction. The similarity lies in the use of a vertical element, with the car body serving as the ground for the antenna and, in effect, taking the place of the radials in a ground plane type antenna. They differ in the method of mounting and in the use of *loading coils* in some cases to reduce the length of the vertical element.

A full-size CB whip antenna is 108" long (102" whip, 6" spring). This is an optimum electrical size for resonance on CB channels. An antenna of this length, however, may not always be practical. For this reason, loading coils are used to allow the antenna to be physically shorter while electrically “lengthening” the antenna.

The ideal location for mounting a mobile antenna is in the center of the car roof. This results in the best omnidirectional pattern because the mass of the car body is evenly distributed under the antenna.

*Bumper Mount Antenna and
Trunk Mount Antenna*

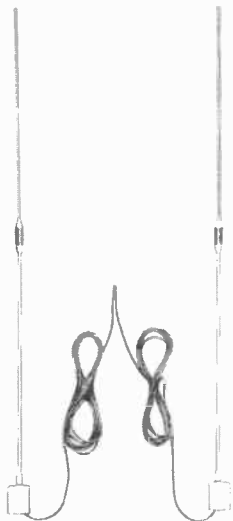


Directional patterns

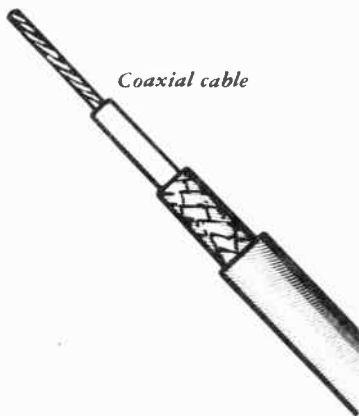
Although CB mobile antennas are designed to be omnidirectional, their location on the car body will tend to make them slightly directional, usually toward the greatest area of the car. For example, an antenna mounted on the left rear fender will be slightly more directional toward the right front fender.

ALL ABOUT CB TWO-WAY RADIO

Twin antennas, such as the Archer Twin Truckers, or Twin Trunkers, are designed to be more directional toward the front and back of the vehicle. This is an advantage on the road where you are usually communicating with vehicles in front of or behind you on the same highway.



Twin Trucker antenna



Antenna Cable. Finally, there is the cable, or wire, used to connect the CB transceiver to the antenna. This "coaxial" cable is specially designed to minimize loss in efficiency or power. Like the antenna, it is matched to the CB system.

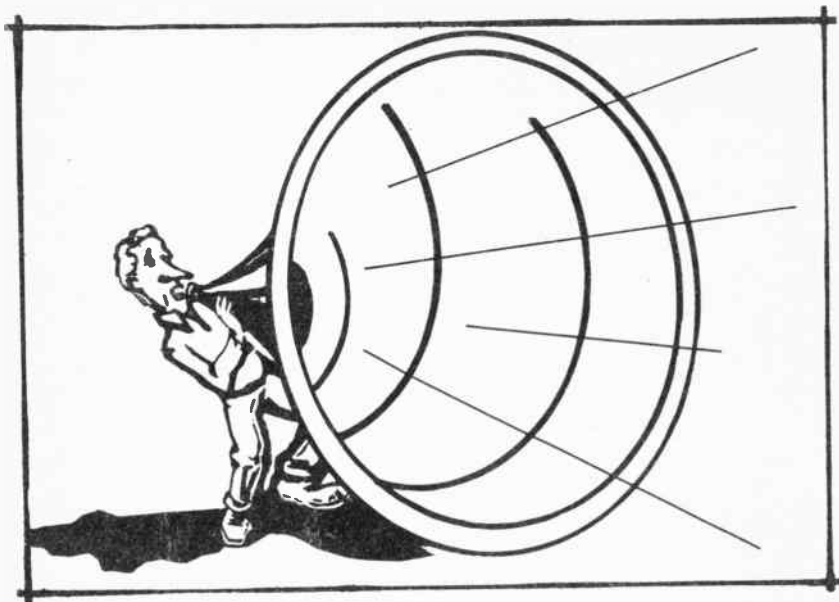
The cables used with CB antennas are known as RG-58/U and RG-8/U. RG-8/U is a heavier cable with lower loss characteristics that make it especially useful when the transceiver is a long distance from the antenna.

A coaxial cable is made up of a center conductor surrounded by low-loss insulation, which is in turn surrounded by a braided shield which serves as a second conductor. Radio Shack stores sell coaxial cables with the correct connectors already fastened to each end. This design aids in minimizing signal loss, as well as helping to prevent pickup of interference from electrical devices and auto ignition systems.



CB on wheels . . . and water





IV. How Far Can You Talk?

Now that you know what CB radio is all about—what you need in the way of equipment and how you can use it for your own business or personal communications needs—the question that has probably come to mind is: “*How far can I talk?*” It would be convenient if we could simply say that mobile-to-mobile your range will be 5 to 15 miles, from a base to a mobile 10 to 25 miles, and between base stations 15 to 30 miles.

Actually, as an average, these figures are fairly reasonable. Under some circumstances, however, the range of your CB equipment may be considerably more or considerably less. If all CB stations were operated in wide open flat country with no obstructions from hills, trees and buildings, and if atmospheric conditions and weather did not change from day to day, it would be fairly easy to tell you exactly how far your CB set would reach.

Since this is obviously not the case, and CB stations are used in all parts of the country under every type of weather condition and with other variations from station to station, it would be impossible to state with any degree of certainty exactly what your range will be. We can, however, in the next few pages, give

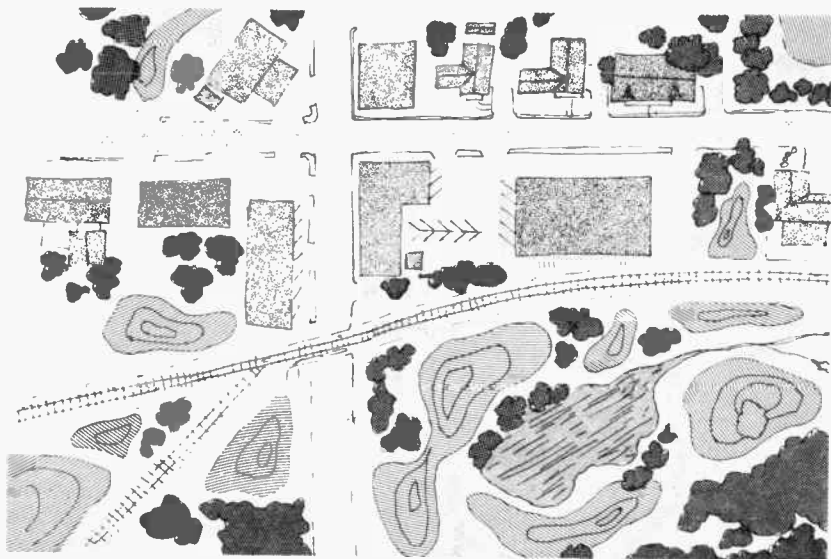
you some idea of the factors which will influence the distance over which your CB radio will operate so that you will be aware of what they are and what you can expect in the way of communications.

CB Is Excellent for Most Local Applications

Citizens Band radio is, as we've mentioned before, for short-distance communications. Although under "skip" conditions it would be possible for an ordinary CB radio set to send and receive signals between New York and Los Angeles, according to FCC regulations CB may not be used for distances greater than 150 miles.

In more practical terms, the effective range of your CB radio will depend upon several factors: quality of your transceiver and antenna, antenna height, terrain over which you are communicating (flat and level, water, hilly, city with buildings and other obstructions), and atmospheric conditions. We'll discuss these (with a minimum of technical "gobbledygook") in the following pages.

The area you might want to communicate over could be an entire small town or city, most or all of a medium size city, a portion of a large city or an entire



ALL ABOUT CB TWO-WAY RADIO

ranch or farm. You will be able to communicate with trucks or other vehicles which are nearby or even several miles from your car when you're on the highway (depending upon whether the road is straight or winding, hilly or flat, etc.).

By selecting good quality equipment, such as Realistic-brand two-way CB radios and Archer antennas, your CB station will provide you with consistently reliable communications. The next chapter will give you some examples of typical applications and suggested types of equipment.

Factors Which Affect Distance

Antennas. The performance of any two-way radio system depends to a great deal on the efficiency of its antenna. Since Citizens Band radio uses relatively low transmitter power, the antenna is more important than you might normally imagine. The antenna you use with your CB equipment is as vital as the two-way radio itself—not even the best CB transceiver will work effectively if it is connected to a poor quality antenna.

The use of a good antenna, properly installed and matched to your CB set, and placed as high as physically and legally possible, will do more to increase the range of your communications than a considerable (and illegal) increase in transmitter power.

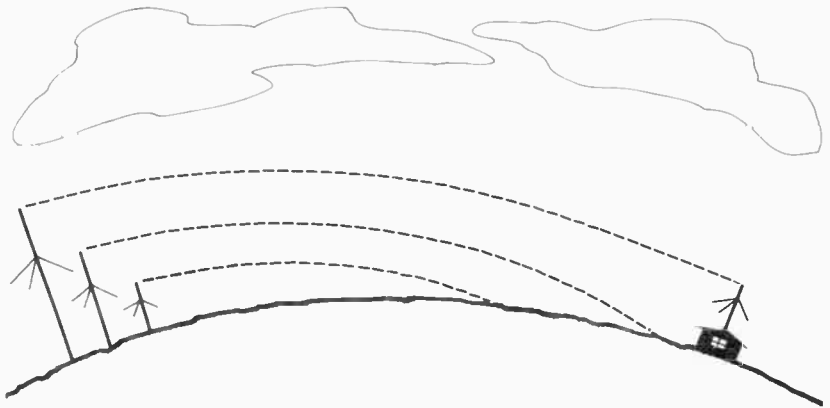
In selecting an antenna for your CB system, a good rule of thumb to go by is simply “get the best antenna you possibly can.” Your local Radio Shack store sells a wide variety of antennas under the exclusive Archer brand name. Radio Shack manufactures these antennas to exacting electrical and mechanical standards to provide you with the best performance possible.

If you will need communications capability in all, or most directions, select an *omnidirectional* (all direction) type of antenna. On the other hand, if most of your communicating will usually be toward one direction from your base, a directional “*beam*” antenna may be more suitable. With a beam you can “point” your signal where you want it. Most beam antenna installations include an antenna rotator—this is a remotely controlled motor which turns the antenna to point it in whatever direction you wish at any time.

Mobile antennas are nearly all designed to be omnidirectional, although they do have some directional characteristics depending on how and on which part of

the vehicle they are mounted. Size and type of mounting are usually the primary considerations in selecting a mobile antenna.

The most efficient mobile antenna is the full-size 102" whip; or for trucks, a set of twin truckers. Often, however, you may not be able to use a large antenna on your car. As we explained in Chapter III, many CB antennas have been designed in smaller sizes with what is known as a "loading coil" built into them. The loading coil electrically "lengthens" the antenna so it will work properly with your CB radio.



A higher antenna provides greater range

Last, but certainly not the least consideration in respect to antennas, is *height*. Just as the higher you are above ground the farther you can see visually, the higher your antenna is placed above ground the farther it can "see" radio signals. With a mobile installation you are, of course, limited by the height of the vehicle. With your base station you can (and where distance is important, you should) get your antenna as high as is legally permissible. (See chapter VII.)

AM or SSB. As we mentioned in the last chapter, one of the advantages single

sideband offers over conventional AM radio transmission is increased range. In situations where you are trying to get as much distance as possible from your CB station you should consider using SSB. In addition to the added range, SSB, you will recall, provides you with twice as many usable channels to operate on—a definite advantage in areas where the CB channels may often be crowded.

Terrain and Obstructions. Another factor which will affect the distances over which you can communicate, and over which you will have little control, is the terrain in your area and obstructions between communicating stations. Hills, trees, valleys, buildings, mountains, bodies of water, flat plains—each of these configurations will affect your two-way radio signals. In some of these areas, such as over bodies of water, you will have greater range. In other areas, hilly or mountainous regions or cities with tall buildings, you will find the distances over which you can communicate are more limited.

Citizens Band radio communications make use of what is known as a *ground wave*—so called because the radio signal follows a path pretty much along the ground, or along the curvature of the earth.

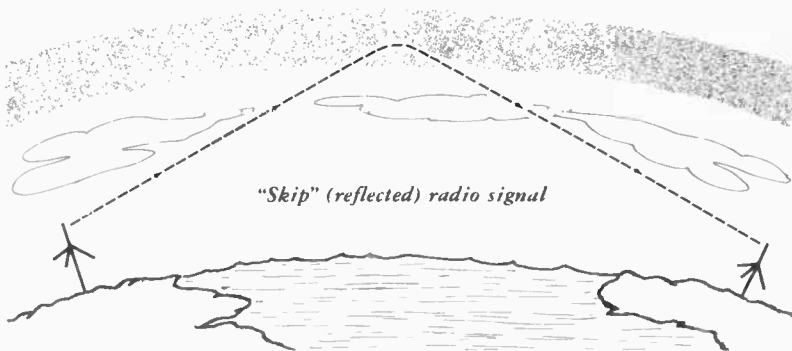
Imagine looking out over the ocean at the horizon. Again, the higher you are the farther away your line of sight horizon will be, just as your radio range horizons extend farther when your antenna is higher. Ground wave radio signals actually travel about 30% beyond the line of sight horizon, along the curvature of the earth. If you are down in a valley, or behind a mountain, these ground waves start out at a disadvantage. Likewise, if there are a number of obstructions along the path of the radio wave—buildings, trees, hills, etc.—these obstructions will absorb a portion of the strength of your radio signal

Ground-wave radio signal



enroute, weakening it and thus reducing your effective communications range. **Atmospheric Conditions.** Atmospheric conditions, which, again, you have no control over, will affect your CB communications primarily in two ways — *interference* and *skip*. Lightning and other forms of atmospheric electrical interference show up as static, often making communications difficult, especially when listening to a weak station. Fortunately, these conditions occur infrequently, and seldom interfere to the extent that communications are seriously hampered.

Skip occurs when your radio signal is reflected back from layers of ionized atmosphere surrounding the earth. This phenomenon is what makes long distance shortwave radio communication possible. The reflected signal comes back to earth a great distance, often hundreds or even thousands of miles, from its point of origin. It is not legal to “talk skip” on CB (remember the 150 mile limit). When skip conditions are present the CB channels may become unusually cluttered with distant stations to the point that they interfere with normal, local communications. Again, however, these conditions occur infrequently.



As you can see, the range possible with your CB radio is determined by a number of factors. Once again, however, let us stress that perhaps the single most important factor which can affect your communications range is your antenna installation. Only by selecting and properly installing the best possible antenna for your CB radio can you be assured of optimum performance and the greatest possible range from your Citizens band station.

All things considered, you will find Citizens Band two-way radio suitable for virtually any local business or personal communications need!

There's a CB radio for every need from this basic 3-channel set (at right) to a deluxe 23-channel AM/SSB model (below).



V. Equipment Selection Examples

Now that you are ready to select your Citizens Band radio equipment, there are several factors which you will want to consider carefully. What use will you make of your CB radio? Strictly business? Strictly personal? Both?

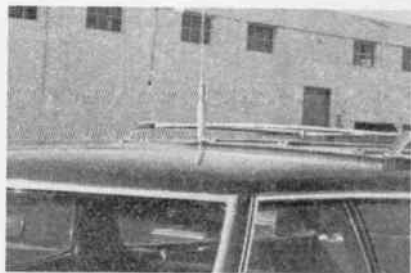
Will you be using it locally, over relatively short distances, or traveling between towns or out in the country? Do you want SSB or will just regular AM be suitable? Do you need full 23 channel operation, or will just three channels be adequate?

How many units will you need? You may want to start with one, two or three, then perhaps add additional radios later (remember to take the total number of stations you expect to use into consideration when you apply for your CB license).

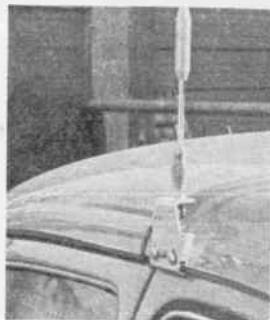
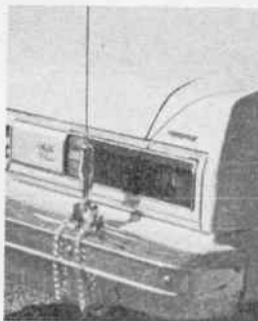
Your CB radios do not have to be identical models, however, they do require common channels and modes — AM or SSB. For example, you might want an AM/SSB 23-channel transceiver in your home or office, and a regular 23-channel AM set in the family station wagon which is used for traveling.

In your second car, which is used primarily for running errands around town, a compact three-channel AM set may be all you need. All you need do is use the same channel with each radio and remember to listen in the AM mode at your base station.

Careful consideration must be given to your choice of an antenna. As we've mentioned earlier in this book, your antenna can make a real difference in how well your CB system performs. For your mobile station the main consideration is usually the type of mounting — bumper mount, roof mount, no-hole trunk mount, magnetic mount, etc.



Various mobile antennas



In choosing an antenna for your base station you will have to decide whether you want an omnidirectional or directional antenna. If you choose a directional (beam) antenna you should also consider using a rotator with it.

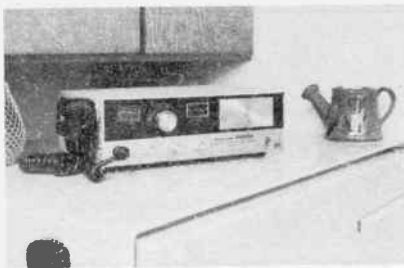
In the following table we will describe typical CB applications and suggest a transceiver and antenna for each. Keep in mind that these are simply a few of the combinations of equipment for use in typical situations. Your actual choice of a transceiver and antenna will depend upon your own needs, budget and personal preferences.

An informed person, such as a Radio Shack salesperson, will be able to suggest specific models best suited for your particular situation.

| TYPICAL SITUATION | TRANSCEIVER | ANTENNA | REMARKS/ACCESSORIES |
|--|---|---|---|
| <i>Family use.</i> Home station and two cars. Short distance communication around town, between cars when traveling. | Home: TRC-55 Cars: TRC-24C 's | 21-902 ½-wave 21-908 no-hole trunk mount | Full 23-channel capability is especially helpful when traveling to allow use of popular local channels, or for special services (auto repair, motel reservations, etc.) |
| <i>Highway assistance.</i> For use in car when traveling to obtain directions or aid in the event of car trouble. | TRC-9A | 21-930 cowl mount CB/FM/AM | Equipped with channel 9; crystals for two additional channels may be added. |
| <i>Motorhome.</i> Traveling and vacation use cross country. For highway assistance use, directions, information. | TRC-48 | 21-942 Twin Truckers II | AC/DC power lets you operate from battery, or AC from generator or camp hook-up. SSB capability gives extra range in remote areas while still providing regular AM operation. |
| <i>Boating.</i> Boat-to-boat and boat-to-shore communication while fishing, water skiing, sailing, etc. | Permanent Installation: TRC-24C Walkie-Talkie: TRC-35C | 21-912 marine Built-in | Walkie-talkie for use in smaller vessels where installation is not practical. Equipped with one pair of crystals; two additional channels may be added; rechargeable batteries may also be desirable. |

| | | | |
|---|--|--|---|
| <i>Outdoor recreation.</i> Camping, hiking, hunting, etc. | Base: TRC-52 Walkie-Talkies: TRC-35C's | 21-921 back-of-set Built-in | Use 12-volt battery for base station power. |
| <i>Ranch or Farm.</i> Base station, vehicles, men on horseback or on foot. | Base: TRC-55 Vehicles: TRC-11's Walkie-Talkies: TRC-100B's | 21-1133 ¾-wave 21-1094 body mount whips Built-in | TRC-11's and TRC-100B's equipped with one pair of crystals; add crystals for up to five more channels. |
| <i>Service station.</i> With tow truck and/or other service vehicles. | Base: TRC-30A Vehicles: TRC-24C's | 21-1133 ¾-wave 21-1094 body mount whips | Full 23-channel capability allows communication with any CB equipped motorist. |
| <i>Retail store.</i> Any local business with delivery and/or service vehicles. | Base: TRC-30A Vehicles: TRC-11's | 21-902 ½-wave 21-909 gutter clamp | TRC-11's are equipped with one pair of crystals; add crystals for up to five more channels. |
| <i>Construction company.</i> From main office to distant job site office; site office to work areas, foreman's jeep; between areas or work crews at job site. | Main office: TRC-55 Site office: TRC-30A Jeep: TRC-56 Crew Walkie-Talkies: TRC-100B's | 21-933 beam with 15-1220 rotator 21-901 ¼-wave 21-1094 body mount whip Built-in | Beam antenna lets main office point signal to job site. Telephone handset of TRC-56 is easier to hear in noisy areas. TRC-100B's equipped with one pair of crystals; add up to five extra channels so crews may communicate simultaneously without interfering with each other. |

See your Radio Shack catalog for complete descriptions of listed equipment.



Typical CB base stations

VI. Installation

Once you have selected the particular CB transceiver and antenna which will best suit your CB communications requirements, your next concern will be the installation of your equipment in your home, office or vehicle.

Your CB installation, whether base or mobile, can be as simple or as elaborate as you want to make it. It can be set up permanently or on a temporary, easily moveable basis; custom installed or just placed conveniently.

Just as your choice of equipment may run anywhere from a 23-channel AM/SSB base station transceiver with a beam antenna and rotator, to simply a 3-channel walkie-talkie, your preference in installing your station will also depend largely upon your personal requirements.

It is not within the scope of this book to provide detailed instructions for custom-installing a home CB station behind a wall or in a decorator cabinet, or built into a desk or easy chair, or directions for in-dash mounting of a mobile two way radio—although all of these are possibilities you may wish to attempt or have done professionally for you.

What this chapter will do, along with the owners manuals supplied with your CB transceiver and antenna, is give you the basic information you will need for

deciding where and how to install your equipment, and provide instructions for a basic, straightforward base station and mobile installation.

Plan Ahead

Before you begin running wires, drilling holes or putting up shelves, stop and think about the total installation. Go over each step of what you will be doing and where you will be doing it. You'll find that planning ahead will help your installation go together easily and efficiently.

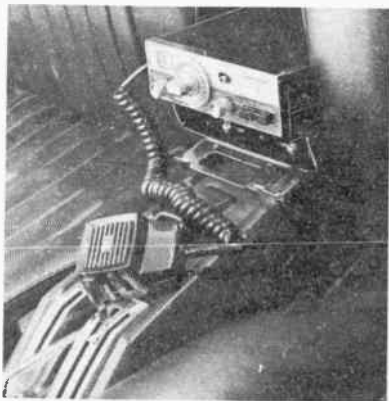
Consider each step carefully — take your time — it's no fun connecting the cable to your mobile antenna only to find that you'll have to disconnect it in order to run it through your car.

By now you know that in any CB installation, base or mobile, there are five main elements which must be provided for: the transceiver, the microphone, the antenna, the antenna cable and a source of power for the transceiver.

The positioning and installation of each of these elements must be carefully planned for safety, accessibility, convenience and comfort. Consider the end result before you begin.

Will your base station transceiver be precariously balanced on a shelf where a tug of the mike cable can bring it crashing down? Can your power cord and antenna cable be run neatly, out of the way where no one will be likely to trip over them? Will the microphone be easy to reach and use without being where it will get in your way?

Is your mobile transceiver going to be where it may interfere with the



operation of your emergency brake or gearshift? Can you reach the controls easily? Is the channel selector visible? Will the mike cable get tangled in your steering wheel? Can the power cable be connected securely and positioned so that it can not short out? Is the antenna cable routed where it will not trip the driver or passengers, or get tangled in the brake or gas pedal? Will the antenna interfere with opening the trunk?

Before you actually mount your mobile transceiver, hold it in place and check carefully to be sure there are no potential problems. Be sure that it will not interfere with the safe operation of your car or the comfort and safety of its passengers. Check to be certain that you will have enough clearance to be able to mount the unit to its bracket and to connect the microphone and antenna.

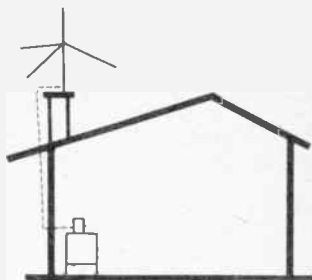
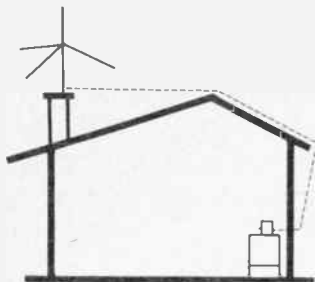
Setting Up Your Base Station

A base station installation is fairly simple. It is really just a matter of placing the transceiver in the desired location, connecting it to a source of power (usually a 120-volt AC wall outlet), and connecting an antenna. You do, of course, have to install an outdoor antenna for optimum performance.

The first step is to decide where you are going to locate your transceiver and where you are going to mount your antenna — and consider each in relation to the other. Again, *plan ahead*.

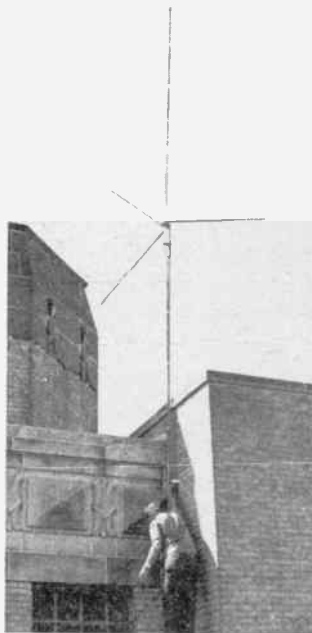
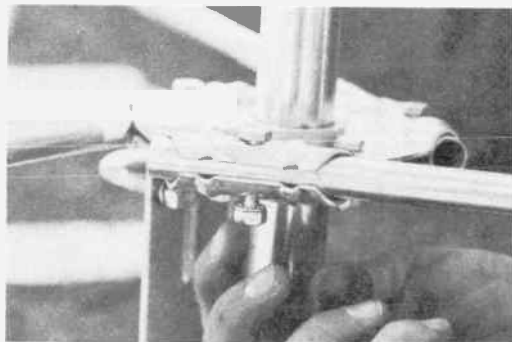


Deluxe CB station with SSB transceiver, scanning monitor and shortwave receiver



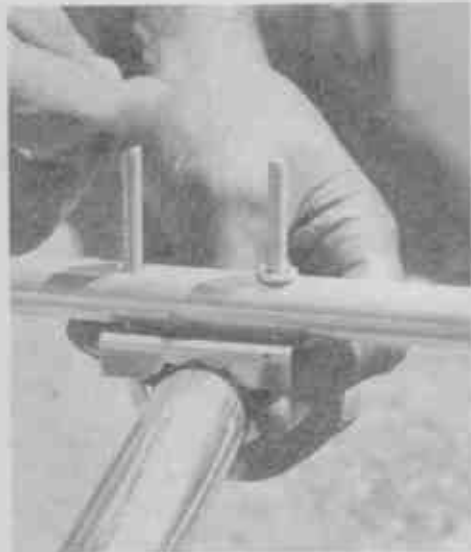
*Short, direct cable as in illustration
at right improves efficiency*

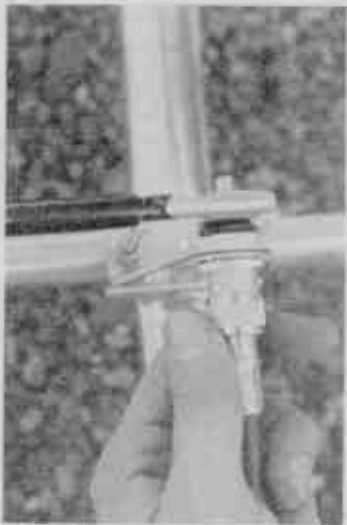
You will want to mount your antenna and locate your CB radio so that the cable between them can be kept as short and direct as possible. Excessive cable length can reduce the effectiveness of your CB communications, unless the additional length is to allow for greater antenna height.





*Setting up your base station antenna is not difficult . . .
Follow the directions carefully, taking one step at a time.
Be sure all hardware is fastened securely*





and connections made properly. Mount the antenna so that it will withstand wind and weather.

NOTE: *An antenna raising is a great excuse for a party!*

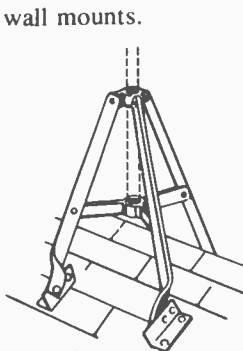


ALL ABOUT CB TWO-WAY RADIO

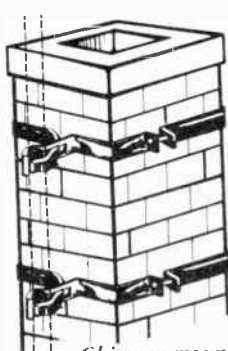
Your base station antenna will have to be assembled before you put it up. Read the instructions supplied with the antenna carefully before beginning. Take your time. It's a lot easier to do it right the first time instead of having to do it over! A word of caution: *watch out for overhead power lines.*

Everything you need to install an antenna correctly is available at your local Radio Shack store. They manufacture Archer antennas. You can also get some expert advice and suggestions which may save you time and effort.

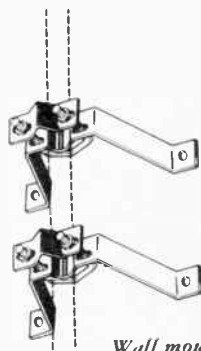
There are several different ways of mounting a base station antenna. One of the most popular is the chimney mount which is simply strapped securely to your chimney with steel straps. Other methods include tripod mounting and wall mounts.



Tripod mount



Chimney mount



Wall mount

Lightning Protection. Your CB antenna will probably be the highest point on your house, and it will accumulate a static charge, particularly during thunderstorms. Chances of having your antenna struck by lightning are reduced considerably if the static charge is drained off. This may be done by grounding the antenna mast directly, and the antenna through a coax static discharge unit.



Coax static discharge unit

These devices will not withstand a direct hit from lightning. In severe storms the safest thing to do, to protect your equipment (and yourself), is to disconnect the antenna from the transceiver.

Grounding is accomplished by running a large conductor (No. 8 gauge or

larger) wire from the antenna mast and from the coax discharge unit to a rod or pipe driven into the ground. An outdoor water pipe which comes up from underground may be used. The coax static discharge unit connects between your antenna cable and transceiver and helps protect your equipment from damage.

Operating Position. If your base station is going to be operated continuously for extended periods of time, as in a business where it will be used for dispatching, you will want the operating position to be comfortable enough to allow hours of operation without fatigue.

Desk-type microphone with locking push-to-talk switch



Station controls should be within easy reach and the microphone immediately at hand. You might want to replace the hand-held mike normally supplied with your transceiver with a desk-type microphone. These usually have a lock position or switch which allows you to transmit without having to hold down the mike button.

Installing Your Mobile Two-Way Radio

Installing a CB radio in any type of vehicle — car, truck, boat, recreational vehicle, or even on a motorcycle — consists of essentially the same steps as in installing a base station.

To begin with, you have to decide where and how you are going to mount your transceiver and antenna. You then have to run the cable from the antenna to the transceiver and provide a source of power (in this case, usually 12 VDC from the vehicle battery).

Actually, installing a two-way radio in your car is easier than installing a stereo tape player. You don't have the two additional speakers to mount and run wires to. Your mobile installation may be permanent or temporary. Since all the same elements are involved, let's look first at a quick and easy temporary set up.

ALL ABOUT CB TWO-WAY RADIO

If, for example, you do a lot of traveling and use rental cars, or have a used car lot and drive a different car every few days, or for any reason would like to have two-way CB radio that you can quickly and easily move from one vehicle to another, you can do so very simply. All you need is a magnetic mount CB antenna (Radio Shack No. 21-940) and a cigarette lighter plug for power.



*Magnetic
mount antenna*

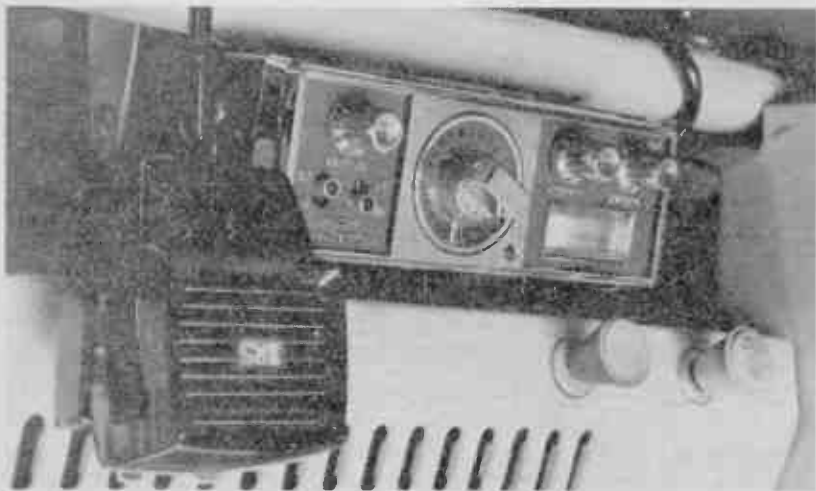
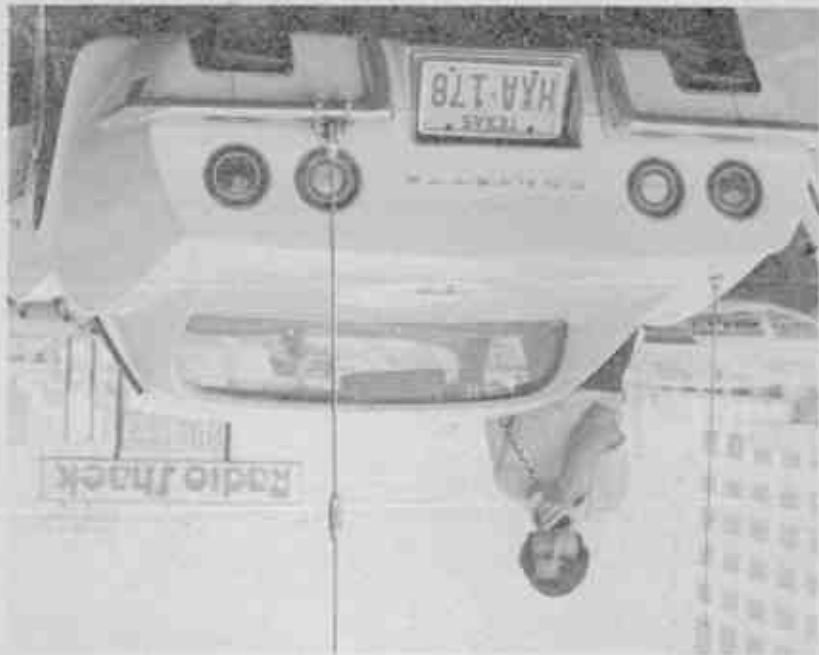
Cigarette lighter plug

To set up your mobile radio, simply place the magnetic mount antenna in the center of the roof or trunk, run the antenna cable in through the window and connect it to the transceiver. Place the transceiver on the seat next to you, plug the power cord into the cigarette lighter socket and you are on the air!

In a permanent installation the antenna is mounted securely and the antenna cable run neatly through the car; the transceiver is fastened, usually under the dash or to the transmission hump, or in some cases inside the glove compartment, and the power leads are securely connected to a source of 12 VDC.

Another method of installation which is becoming quite popular is the use of slide-in mounting brackets. With this method one part of the mounting bracket is permanently installed in the vehicle (or vehicles). The CB transceiver is attached to the mating half. When the transceiver is to be used you simply slide it into the bracket and connect the antenna and power cables. Disconnect and slide out to remove as a deterrent to theft or to use it on more than one vehicle.

Mounting the Transceiver. Begin your mobile installation by deciding where you are going to mount your CB radio. Attach the mounting bracket to the



transceiver and try it in the position where you plan to mount it.

Will you be able to reach it easily? Once the mounting bracket is installed, will you have enough room to fasten the screws to the bracket? What about room for the microphone and antenna connectors?

Quite often you can take advantage of one or more holes already in the



Drill holes for mounting

underside of your dashboard for fastening the mounting bracket, or make use of an already-installed bolt which can do double duty by holding up one end of your transceiver bracket while still serving its original purpose.

Carefully position the mounting bracket where you are going to mount it and mark the spot where you will drill the mounting holes. *Before* you drill any holes check carefully behind the dash to be sure you will not be going into anything else, as into the bottom of your car radio, a wiring harness or a panel switch.

Use a punch to start the spot where you are going to drill. This will keep your drill bit from skidding off the spot where you want your hole. Check your positioning again before you drill your second hole to be certain the alignment is correct.

Consult the installation instructions supplied with your CB radio, and using



Fasten mounting bracket securely

Attach transceiver to bracket



the appropriate hardware, fasten the mounting bracket securely to the dash. You may, at this point, want to use one of the mounting screws to fasten your CB radio ground lead (usually the black, unfused lead).

On vehicles with non-metal dashboards a connection to some part of the

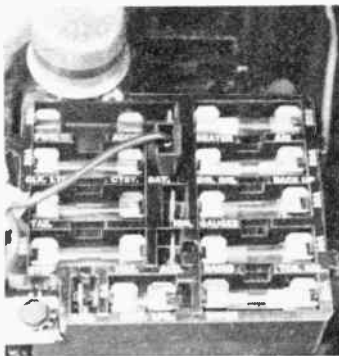
ALL ABOUT CB TWO-WAY RADIO

chassis will be needed. Look for an already installed screw to use, possibly one in a metal support structure.

Fasten the CB transceiver securely to the bracket. If you are going to install a microphone clip or hanger, select the location for it. Keep in mind the safety and convenience factors already mentioned. Mount the mike clip where you can reach it easily without leaning, and where it will not interfere with the safe operation of your vehicle.

Magnetic mike clips are available which do not require drilling additional holes. You might want to use one of these at least temporarily, until you decide exactly where and how to best mount your mike clip.

Fuse Block



Power Source. Your transceiver's ground (negative) lead should, at this point, be connected to a point which contacts the frame or chassis of the vehicle, or—in a boat—to the negative (“-”) side of the battery.

The positive lead for your CB radio (usually red, with an in-line fuse) has to be connected to the positive terminal of the battery. This can be done by connecting it to the accessory terminal of your ignition switch, to the fuse block, or to any “hot” lead. You might want to have your auto mechanic or service station attendant help you with this step if you are not sure of exactly where to make this connection.

For positive ground vehicles the positive lead goes to the vehicle's chassis (see your owner's manual for specific instructions).

Wherever you decide to connect the power source leads for your transceiver, be sure the connections are secure, taped if necessary, and route the wires neatly behind the dash. You can fasten them to some other wiring harness already in the car to keep them from hanging down or getting in the way.



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Check over your connections and mounting, then see if you have power by turning the transceiver on for a moment (it should light up and you will hear some noise from the speaker). Don't forget to turn the ignition key to the accessory position if you have the radio wired to the accessory terminal. *Never press the microphone switch without having an antenna connected to the transceiver.*

Mobile Antenna Installation

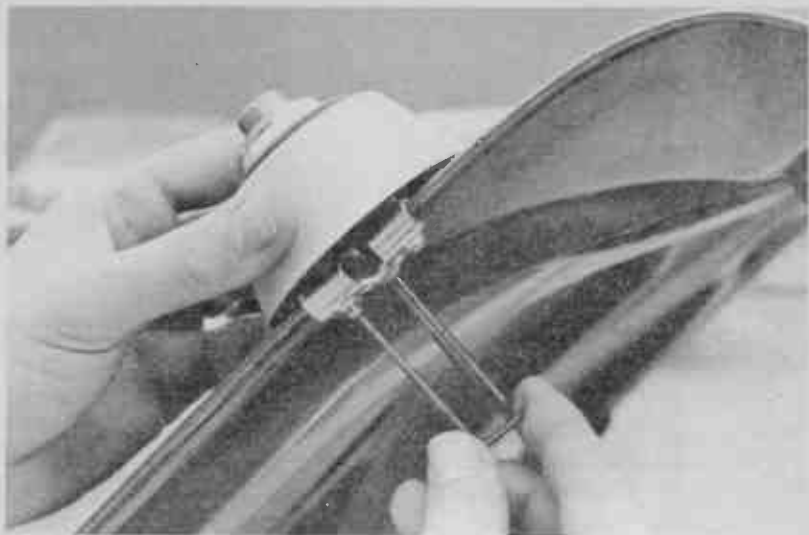
Mounting the Antenna. There are many types of mobile antennas available for CB, and just about as many ways of mounting them. Follow the instructions supplied with your particular antenna and you should have little difficulty regardless of which you use.

One of the most popular mobile CB antennas, since it does not require drilling any holes into your car body, is the trunk mount antenna. This antenna uses two set screws to fasten it to the lip of your car trunk lid.

To install the trunk mount antenna, slip the mounting bracket over the edge of your trunk lid and fasten the two screws firmly. Screw the antenna on to the base.



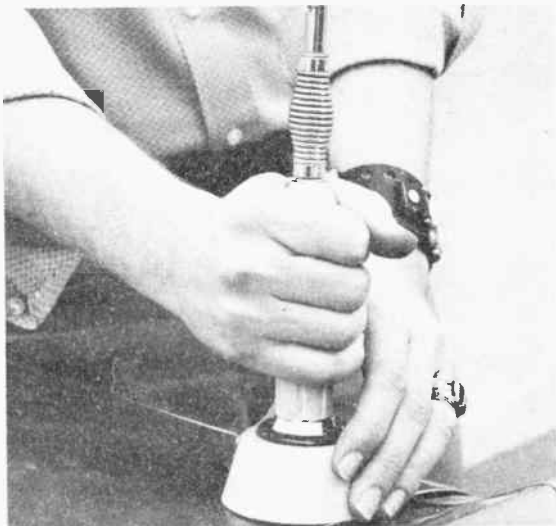
Place base over trunk lip



Tighten set screws

Position coil on base





Screw loading coil on to base

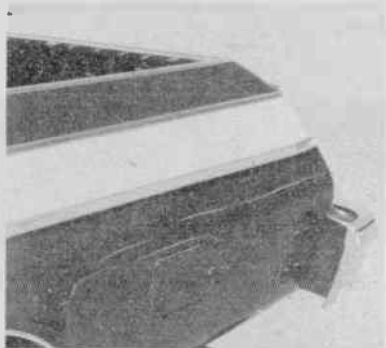
Running the antenna cable from the antenna to the CB transceiver (or vice-versa) may require the removal of the back seat. This can be done in many cars by simply pressing down and back on the seat, then lifting it off its bracket. You might want to get some help from your mechanic if you have difficulty removing the seat.

You can then route the antenna cable through the trunk and under the seats to your transceiver. If you don't want to simply run the cable under your floor-mats, or along the edge of the floor, you can in many cars remove the splash guards and run the antenna cable along with the tail-light wiring.

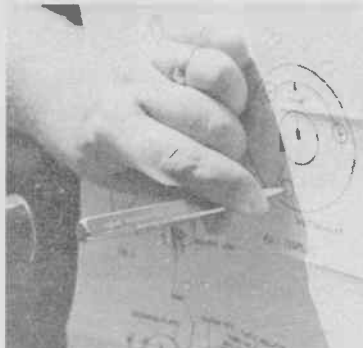
With the cable routed through the car and secured where it will not get in the way, all that remains to be done is to connect it to the transceiver. Screw the antenna connector on to the back of the transceiver firmly, re-check your installation, and you're on the air!

NOTE: Some vehicles have ungrounded (not in contact with the vehicle frame) or non-metallic body panels. These will require that the antenna be mounted on a grounded, metallic part of the body or on the vehicle bumper.

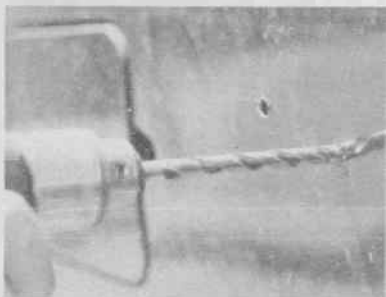
Installing a Body-Mount Whip Antenna



Select the location for mounting



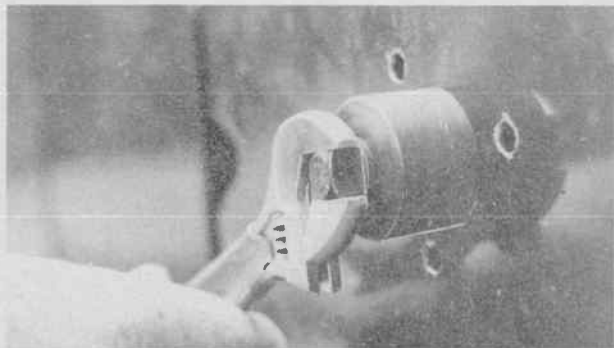
Use the template supplied and a punch to start holes



Drill mounting holes carefully

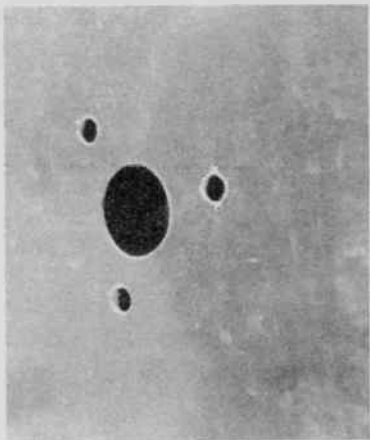


Drill center hole and cut or file to size

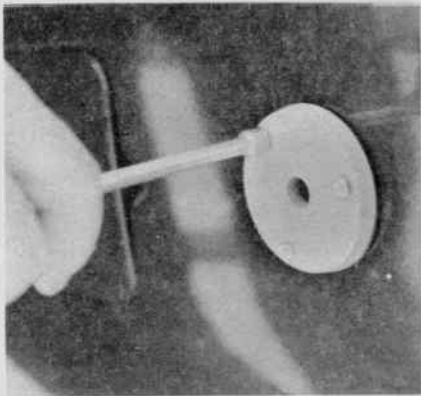


A metal punch makes this step easier, but it's not absolutely necessary

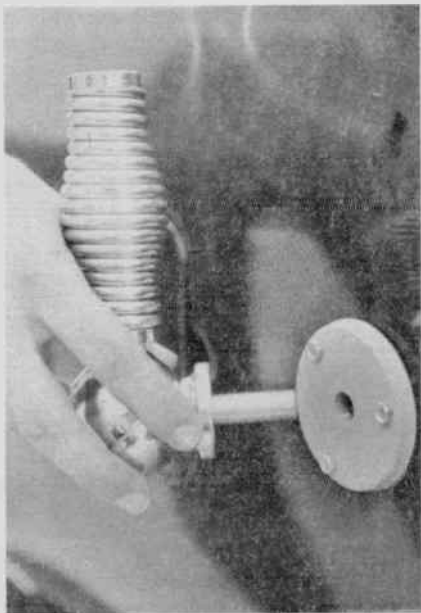
ALL ABOUT CB TWO-WAY RADIO



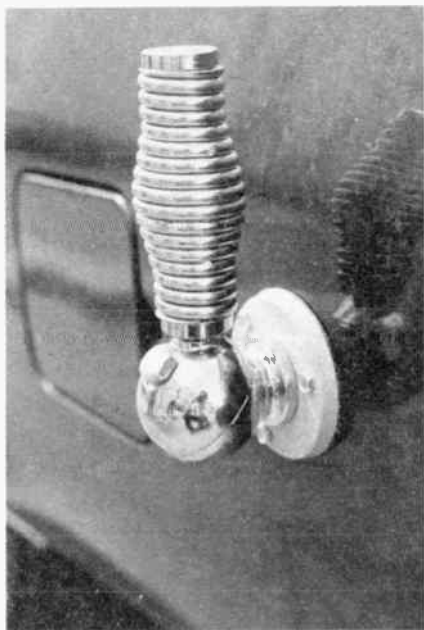
Be sure center hole is large enough so mounting nut will not touch metal



Fasten base plate to car



Install ball-mount and spring



*Adjust to upright position
and tighten nut*

Screw whip into spring



Final Touches: Antenna Matching and Ignition Noise Suppression

Antenna Matching. Normally, your CB radio antenna may be used with excellent results just as it comes to you. Radio Shack's own Archer antennas are engineered and manufactured to exacting standards so that additional tuning will not be necessary.

The actual improvement in performance which may be gained by "tuning" or "matching" your antenna will range from slight to negligible in most cases. However, those CB users who want to be assured of getting absolutely optimum performance out of their CB system may do so with a low-cost device known as an SWR meter.



CB station tester with SWR meter

Antenna tuning requires only slight adjustments in the length of the antenna or antenna elements. With some antennas this is done by sliding one piece into another and tightening a set screw. On others it requires trimming or actually cutting the antenna.

Obviously, once you cut off a piece of your antenna you cannot replace it, so this operation must be done very carefully to avoid going too far. Specific instructions for tuning each type of antenna are supplied with the antenna.

Directions for using an SWR meter or other CB station tester are supplied with the particular units. Basically, their use consists simply of connecting the meter between the transceiver and antenna, adjusting the meter calibration, and reading the meter. A reading of 1.2 through 1.5 to 1 is average.

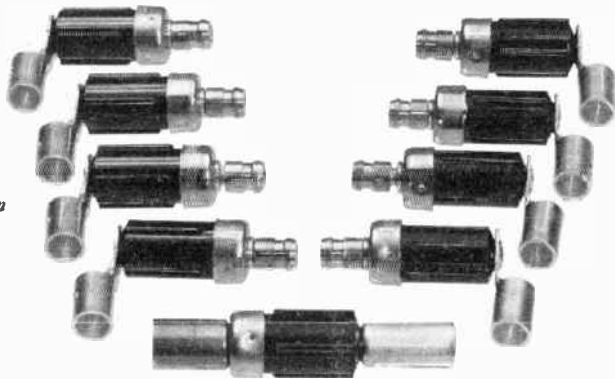
Ignition Noise Suppression. The noise you may hear on your CB radio caused by your vehicle's electrical system is referred to as ignition noise. In recent years, most cars have been engineered to eliminate this annoying problem.



Alternator and generator noise filters



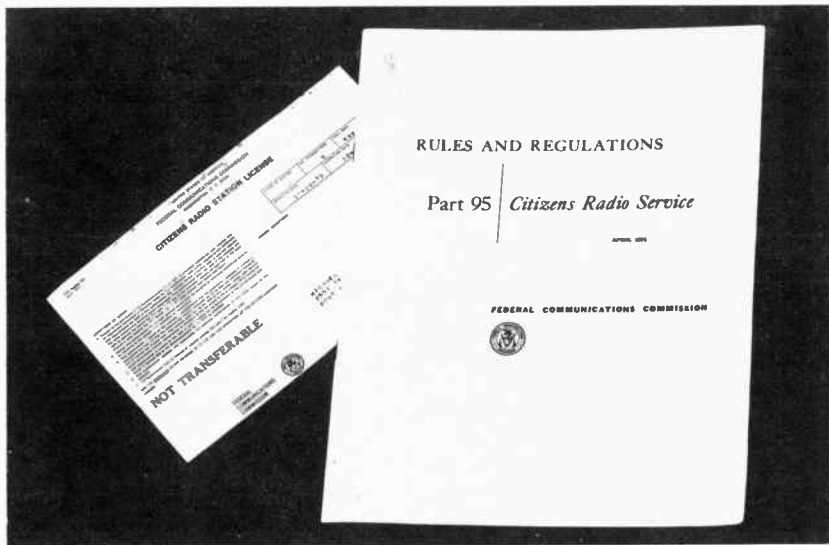
Spark plug ignition noise suppressors



With some vehicles, and particularly older models, it can still be a problem.

Primarily, the areas which may produce noise interference on your radio are the generator or alternator, and the spark plugs. The generator or alternator will produce a whining sound which will vary in pitch with the speed of the engine. A noise filter can be easily installed which will greatly reduce this type of interference.

Ignition noise may also show up as a popping sound through your radio which will also vary with engine speed. This is caused by the high voltage discharge of your spark plugs and may be eliminated through the use of special resistance wiring or resistor spark plugs, or by the addition of an ignition noise suppression kit to your existing electrical system. These easily installed ignition noise suppression kits are available from Radio Shack.



VII. FCC Rules and Regulations

The Federal Communications Commission is the agency of the U.S. Government with the responsibility for licensing and regulation of the Citizens Radio Service. The rules and regulations established by the FCC for CB are not intended to hamper your use of two-way radio, but rather to assure you and the other users of CB radio of a usable communications service with the greatest benefits for everyone.

The FCC regulations for the use of CB radio are much like a traffic light at a busy intersection—each keeps the flow of traffic orderly and gives everyone a chance to get through. If, for example, there were no restrictions on distance, power and antenna height, a high-powered station with a giant antenna 200 miles away talking to his neighbor down the road might interfere with your communications locally.

Without the time limitation on communications an inconsiderate “ratchet jaw” might hog a channel for hours. If the equipment you use did not meet the standards set by the FCC it might be poor in quality and possibly interfere with communication on other channels, or it might be off frequency so that others would be unable to hear you.

Getting Your License

Getting your CB license is easy and inexpensive. There is no test to take and no special knowledge is required. All you need do is: 1) meet the eligibility requirements, 2) obtain a copy of Volume VI, Part 95, of the FCC rules and regulations, 3) fill out the application form, and 4) send it with a check or money order for \$4.00 to the FCC.

Eligibility. Any citizen of the United States 18 years of age or older is eligible to apply for a CB license. Persons under the age of 18 may operate a CB radio under the direct supervision of a person who is licensed.

Also, a person who is not a citizen of the U.S. who has a temporary or permanent U.S. address and is acting as a private citizen and not as a representative of a foreign government may obtain a license. Foreign governments, or their representatives, are not eligible for a CB license.

Copy of Part 95. When you apply for your CB license you are required to certify that you either have in your possession or have ordered a copy of Volume VI, Part 95 of the Commission's rules governing the Citizens Radio Service.

Part 95 may be ordered from the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402. An order form is supplied at the bottom of CB license application Form 505. The cost for Part 95 is \$5.35.

INVOICE REMOTE CONTROL LICENSES

Class D Station License (VEEP)

Class E Class F Class G (Specify No. _____ and date in statement applying need)

15 Certification

• The applicant is a citizen of the United States or a permanent resident of the United States.

• The applicant is at least 18 years of age or older at the time of application.

• The applicant is not under the direct supervision of a licensed person at the time of application.

• The applicant is not a member of the Armed Forces of the United States or a member of the Armed Forces of any other country.

• The applicant is not a member of the Armed Forces of any other country.

WILLFUL FALSE STATEMENTS MADE ON THIS FORM OR ATTACHMENTS ARE PUNISHABLE BY FINE AND IMPRISONMENT U.S. CODE TITLE 18 SECTION 1001

16 _____

17 Date _____

ORDER FORM

Name (Print Last)

Company Name Or Address (Print Last)

Street Address

City

State

Zip Code

Billing by Check (Make payable to: Superintendent of Documents)

Billing by Direct Account

MAIL ORDER FORM TO
Superintendent of Documents
Government Printing Office
Washington, D.C. 20402

ALL ABOUT CB TWO-WAY RADIO

What you actually receive is a subscription to Volume VI which includes Parts 95, 97 and 99. Only Part 95 applies directly to CB, and even that is loaded with, for the average CBer, a great deal of superfluous information. Hopefully, the FCC will in the near future simplify this requirement, perhaps with a less expensive publication.

Later in this chapter we'll list those items which will be of importance to you. This information, however, does not eliminate the requirement that you obtain a copy of Part 95.

CB License Application. The form you will need to apply for your CB license is FCC Form 505. You can obtain a copy of Form 505 by writing to the FCC in Washington, D.C., the nearest FCC Field Engineering Office (see Appendix C), or from any Radio Shack store. A copy of Form 505 is packed with all Realistic CB transceivers.

Filling out Form 505 is quite easy. Read the instructions carefully, take your time and fill out the form legibly — use a typewriter or print in capital letters. There are only 17 items on the form. Take them one at a time and you should have no difficulty obtaining your CB license.

United States of America
Federal Communications Commission

Form Approved
GAO No. B-180271 (R1) 021

FCC FORM 505
December 1974

**APPLICATION FOR CLASS C OR D STATION
LICENSE IN THE CITIZENS RADIO SERVICE**

Instructions

A. Use a typewriter or print neatly in capital letters. Sign and date in block letters in a box where a space would normally appear.

B. Sign and date application.

C. Enclose appropriate fee with application. DO NOT SUBMIT TO AIR MAIL. Check up money order payable to Federal Communications Commission. Fee schedule for an application: \$4.00 for equipment license; \$1.00 for station.

D. Details on coding amount and exemptions: see Subpart G of Part 1 FCC Rules and Regulations.

E. Do not use one order form for subsequent fees for FCC Rules.

**E-MAIL APPLICATION TO FEDERAL COMMUNICATIONS COMMISSION
GETTYSBURG, PA. 17325**

1. Complete if license is for an individual.

Applicant's First Name: **MICHAEL** **H** **LAWRENCE**

2. Date of Birth: **7** **7** **44**
Month Day Year

3. Complete if license is for a business.

Applicant's Name of Business, Organization, or Partnership:

Item 1. If you are applying as an individual, whether you plan to use CB for personal or business use, print or type your first name, middle initial and last name, one letter to a box.

Item 2. Enter your date of birth. A common mistake is filling in today's date. This will result in your application being returned to you and will delay your receiving your license.

United States of America
Federal Communications Commission

Form Approved
GAO No. B-180271R01-021

FCC FORM 505

December 1974

APPLICATION FOR CLASS C OR D STATION
LICENSE IN THE CITIZENS RADIO SERVICE

Instructions

A Use a typewriter or print clearly in capital letters. Skip all or part of a box, a box where a space would normally appear.
B Sign and date application.
C Enclose appropriate fee with application. DO NOT SUBMIT CASH. Make check or money order payable to Federal Communications Commission. No fee is required for an application filed by a governmental entity, governmental

entity, including an entity, or exemptions, see Subpart G of Part 1 FCC Rules and Regulations.
D Do not enclose order form or subscription fee for FCC Rules.

E MAIL APPLICATION TO FEDERAL COMMUNICATIONS COMMISSION
GETTYSBURG PA. 17325

1 Complete if license is for an individual:

MICHAEL H LAWRENCE
Applicant's First Name LAST

2 Date of Birth:

7 7 49
Month Day Year

3 Complete if license is for a business:

Applicant's Name of Business, Organization, or Partnership

4 Mailing Address (Number and Street) if P.O. Box or RFD (do not list on this form):

3225 S. ADAMS ST.

5 City:

FORT WORTH TX 76110

8 State: TX
9 Zip Code: 76110

8 If item 4 is P.O. Box or RFD, Give Address (or Location) of Principal Station:

9 City:

10 State:

11 Type of Applicant (Check one):

- Individual Association Corporation
 Domestic Partnership Partnership
 Sole Proprietor or Individual Family Business Act
 Other (Specify)

12 This applicant is:

- New Licensee
 Renewal
 Licensee - Transfer of Registration

IMPORTANT
Use Current Call Sign

13 This application is for (Check only one):

- Class C Station License
NON-VOICE REMOTE CONTROL OF MESSAGES
 Class D Station License VOICE

14 Single (check one) or multiple (check all that apply) operating the following:

- CB RTTY Morse Code Other (Specify)

15 Certification

* I certify that the information furnished on this form is true and correct. I understand that anyone who furnishes false or misleading information on this form or who omits material or information requested on the form may be subject to criminal sanctions (including fines and imprisonment) and/or civil sanctions (including civil penalties).

WILLFUL FALSE STATEMENTS MADE ON THIS FORM OR ATTACHMENTS ARE PUNISHABLE BY FINE AND IMPRISONMENT U.S. CODE TITLE 18 SECTION 1001

Item 3. If you are applying for a license as a business, organization or partnership enter its name here. Skip a box between words in the company or group name wherever a space would normally occur.

Items 4, 5, 6, 7. Fill in the mailing address, city, state and zip code where the person or organization applying for the license may be reached.

Items 8, 9, 10. If the address listed in item 4 is a P. O. Box or RFD number, fill in the address or location of the principal station.

ALL ABOUT CB TWO-WAY RADIO

United States of America
Federal Communications Commission

Form Approved
GAO No. B-180227(R)01-001

FCC FORM 505

December 1974

APPLICATION FOR CLASS C OR D STATION LICENSE IN THE CITIZENS RADIO SERVICE

Instructions

A. Use a typewriter or print clearly in capital letters. Stay within the blocks. Skip a box where a space would normally appear.
B. Sign and date application.
C. Enclose appropriate fee with application. **DO NOT SUBMIT CASH.** Make check or money order payable to: Federal Communications Commission. No fee is required for an application filed by a governmental entity. For assistance

see Part 97, including amount and exemptions, see Subpart G of Part 97, FCC Rules and Regulations.
D. Do not enclose order form or subscription fee for FCC Rules.

E. MAIL APPLICATION TO FEDERAL COMMUNICATIONS COMMISSION
GETTYSBURG, PA. 17325

1. Complete if license is for an individual.

Applicant's First Name
MICHAEL LAWRENCE

2. Date of Birth
Month: 7 Day: 7 Year: 44

3. Complete if license is for a business.

Applicant's Name of Business, Organization Or Partnership

4. Mailing Address (Number and Street, if P.O. Box or R.F.D. is Used Also For Out-Of-Town B. 10)

3225 So. Adams St.

5. City

FORT WORTH

6. State 7. Zip Code

TX 76010

NOTE
Do not operate until you have your own license. Use of any call sign not your own is prohibited.

8. If item 4 is P.O. Box or R.F.D. Give Address Or Location Of Principal Station

9. City

10. State

11. Type of Applicant (Check one)

- Individual Association Corporation
 Business Partnership Governmental Entity
 Sole Proprietor (or Individual Doing Business As)
 Other (Specify):

12. This application is for

- New License
 Renewal
 Increase in Number of Transmitters

IMPORTANT
Give Current Call Sign

13. This application is for (Check only one)

- Class C Station License (NON-VOICE REMOTE CONTROL OF MODELS)
 Class D Station License (VOICE)

14. I anticipate that if approved, applicant will operate during the five-year license period (Check one)

- Yes No If No, Specify No. of years (statement justifying need)

Item 11. Mark the box next to the type of applicant you are—an individual, business partnership, association, etc.

Item 12. If this is the first time you have applied for a CB license mark the box for *New License*.

Item 13. Mark the box for Class D Station License.

Item 14. Mark the box next to the total number of CB radios you expect to be using under your license. If you will require 16 or more you must attach an explanation to the form explaining why. For example, if your business has a fleet of 20 trucks and you intend to put a CB set in each truck simply state this in attached note, or, if your association has (or expects to have) 70 members

explain this in your note.

Item 15. Read this item carefully and be sure that you comply with the requirements it lists, including having, or having ordered, your copy of Part 95.

Item 16. After reading item 15, sign the form on line 16. If the application is for an individual, sign your name as it appears in item 1. If the application is being made on behalf of a business or other organization an authorized individual should sign the form.

Item 17. Enter the date.

License Fee. The completed application should be sent with a check or money order for \$4.00, payable to the Federal Communications Commission, to: Federal Communications Commission, Gettysburg, PA 17325.

C. Enclose appropriate fee with application. DO NOT SUBMIT CASH. Make checks or money order payable to Federal Communications Commission. No fee is required for an application filed by a governmental entity. For address see

E-MAIL APPLICATION TO FEDERAL COMMUNICATIONS COMMISSION
GETTYSBURG, PA. 17325

1 Complete if license is for an individual

MICHAEL **H** **LAWRENCE**
Applicant's First Name (First Last)

2 Date of Birth

7 **7** **44**
Month Day Year

3 Complete if license is for a business

Applicant's Name of Business, Organization, Or Partnership

4 Mailing Address (Number and Street if P.O. Box or RFD is Used Also Fill in Boxes 5-6)

3225 SO. ADAMS ST.

5 City

FORT WORTH

6 State 7 Zip Code

TX **76110**

8 If Item 4 is P.O. Box or RFD, Give Address Or Location Of Principal Station

9 City

10 State

NOTE
Do not operate until you have your own license. Use of any call sign not your own is prohibited.

11 Type of Applicant Check one

Individual Association Corporation
 Business Partnership Governmental Entity
 Sole Proprietor or Individual (Using Business Address)
 Other Specify _____

12 This application is for

New License
 Renewal
 Extension/Nonpayment of Transmittal

IMPORTANT
Get Current Call Sign

13 This application is for Check only one

Class C Station License
NON VOICE REMOTE CONTROL OR MODIFIED

Class D Station License VOICE

14 This application is for a station which will operate during the following time period Check one

Full Part No station (Specify No. _____)
with attachment (if filing needs)

15 Certification

I hereby certify that the information furnished on this application is true and correct to the best of my knowledge and belief, and that I am not aware of any information which would cause this application to be considered false or misleading.

WILLFUL FALSE STATEMENTS MADE ON THIS FORM OR ATTACHMENTS ARE PUNISHABLE BY FINE AND IMPRISONMENT U.S. CODE TITLE 18 SECTION 1001

16 *Michael H. Lawrence*

17 Date *December 19, 1975*

General Regulations

A great deal of the information in Part 95 relates to technical requirements and areas of the Citizens Radio Service other than Class D. All you really need be concerned with regarding these technical requirements is that your CB transceiver is *type accepted*.



Type acceptance means that the piece of equipment, as manufactured, has been approved by the FCC and meets their technical standards. Any modification to the equipment after it is manufactured would void the type acceptance. Type accepted CB radios have a label attached to them stating that they meet these standards. All Realistic CB transceivers are type accepted.

Following are some of the FCC regulations directly relating to Class D Citizens Band of which you should be aware. The parenthetical numbers refer to the paragraph in Part 95 from which the information has been taken.

Station Authorization (95.11). All CB radio stations must be licensed by the FCC. Stations operating without a license are unauthorized and illegal.

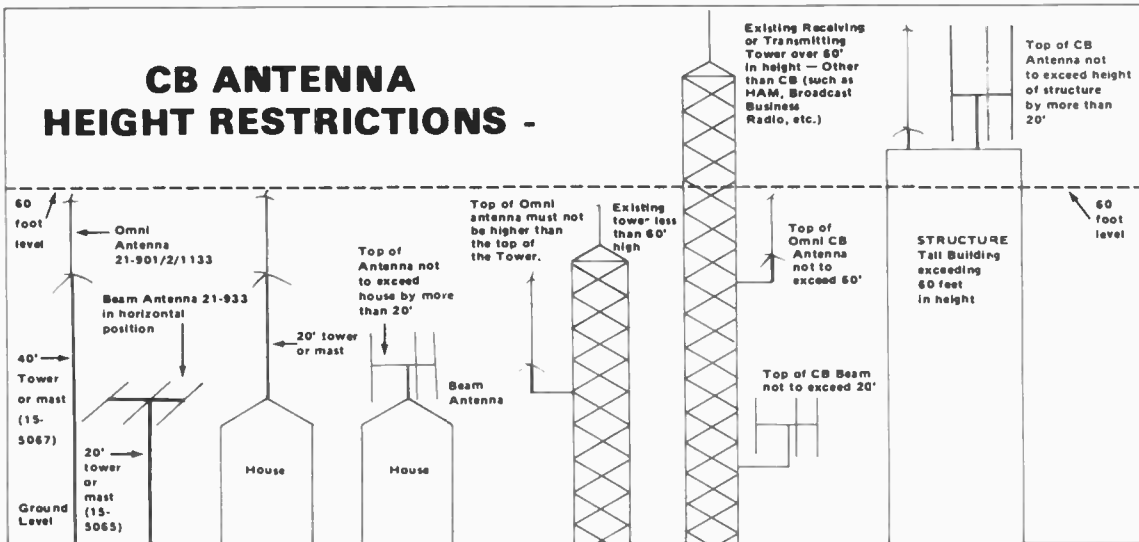
License Term (95.33). Your CB license will be issued for a term of 5 years from the date of original issuance, major modification or renewal.

Limitations on Antenna Structures (95.37). Your CB antenna, regardless of whether it is used for receiving or transmitting or both, must comply with the following:

Omnidirectional antennas (those that radiate equally well in all directions) may be 60 feet above ground or 20 feet above the top of a building which is over 40 feet tall (measured to the highest point of the antenna).

Directional (beam) antennas are limited to 20 feet above ground or 20 feet above a building (again measured to the highest point of the antenna).

CB ANTENNA HEIGHT RESTRICTIONS -



Permissible Communications (95.81). Your CB radio may be used primarily for communications to facilitate the personal or business activities of the licensee, and for communication relating to: the immediate safety of life or the immediate protection of property; the rendering of assistance to a motorist, mariner or other traveler.



FCC rules and regulations are for the benefit of all Cbers

Prohibited Communications (95.83). A citizens radio station shall not be used: for any purpose, or in connection with any activity, which is contrary to Federal, State, or local law; for the transmission of communications containing obscene, indecent, profane words, language, or meaning.

You may not: communicate with an Amateur Radio Station, an unlicensed station, or foreign stations; convey program material for retransmission, live or delayed, on a broadcast facility.

NOTE: A CB station may be used in connection with administrative, engineering, or maintenance activities of a broadcasting station, or in the gathering of news items or preparation of programs provided that the actual or recorded transmissions of the CB station are not broadcast at any time in whole or part.

Your CB station may not be used: to intentionally interfere with the communications of another station; for the direct transmission of any material to the public through a public address system or similar means; for the transmission of music, whistling, sound effects, or any material for amusement or entertainment purposes, or solely to attract attention.

You may not transmit the word *Mayday* or other international distress signals, except when the station is located in a ship, aircraft, or other vehicle which is threatened by grave and imminent danger and requests immediate assistance.

A CB station shall not be used: for advertising or soliciting the sale of any goods or services; 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 and their meaning is kept in the station records and made available to any commission representative on demand.

You may not carry on communications for hire (as an end in itself), whether the remuneration or benefit received is direct or indirect.

A CB 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.

Emergency and Assistance to Motorist Use (95.85). 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.



*CB adds to your
safety and security
while traveling*

Any CB station may be utilized during an emergency involving the immediate safety of life of individuals or the immediate protection of property for the transmission of emergency communications. It may also be used to transmit communications necessary to render assistance to a motorist.

Persons Authorized to Operate Your Station (95.87). *Private* stations may be operated by the person named on the license and members of the licensee's

immediate family living in the same household.

Business stations may be used by employees of the business while they are acting within the scope of their employment.

Associations. Each member of the association may operate the station provided the communication relates to the business of the association.

A CB radio station 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.



Duration of Transmissions (95.91). All communications must be restricted to the minimum practical transmission time. Communications between CB stations is not to exceed five continuous minutes (except in the case of communications involving the immediate safety of life or property). At the conclusion of the five-minute period or a communications exchange of less than five minutes the participating stations must remain silent for at least one minute before making any further transmissions.

Station Identification (95.95). You must identify your radio transmissions with your FCC issued call sign before and after each transmission or series of brief transmissions. *Nicknames* or *handles* may also be used to identify your radio transmissions provided they are accompanied by the FCC assigned call sign. It is not necessary to transmit the call sign of the station with whom you are talking.

Posting Station License and Transmitter Identification Cards (95.101). Your original license, or a clear photocopy of your license, must be posted at all locations from which the station is operated. If a photocopy of the license is used, the location of the original must be noted on the photocopy.

The station authorization (license) for each mobile unit must be retained as a permanent part of the station's records, but there is no requirement that the license be posted at the location of mobile station operation.

An identification card indicating your call sign, name and address, must be attached to each transmitter. This identification must be clearly visible and easily identifiable for inspection.

The FCC will, upon request, provide you with a transmitter identification card FCC Form 452C. If you use a substitute for the Form 452C, you must display your call sign, name and address in the same format as the Form 452C; use a heavy card, metal plate or similar durable material.

UNITED STATES OF AMERICA **FCC Form 452-C**
FEDERAL COMMUNICATIONS COMMISSION (July 1972)
TRANSMITTER IDENTIFICATION CARD

1. Station call sign: _____

2. Name and Address of Permittee or Licensee: _____

FCC Form 452C or a similar identification card must be attached to your transceiver

Operating Procedures

Channel Selection. In selecting the channel you are going to operate on there are several things to consider:

There are a total of 23 channels available to all CB radio users. These channels are available on a shared basis—no one station has any more right to any particular channel than any other station. By cooperating with other CBers and observing common courtesy everyone will be able to derive the maximum benefit from the use of their CB two-way radios.

Channel 11 is intended for use as a calling channel only. Use it to establish contact with another station, then move to another channel (except channel 9) to conduct your business or personal communications.

Channel 9 may be used only for communications involving immediate or potential emergency situations and/or assistance to motorists. Assistance to

ALL ABOUT CB TWO-WAY RADIO

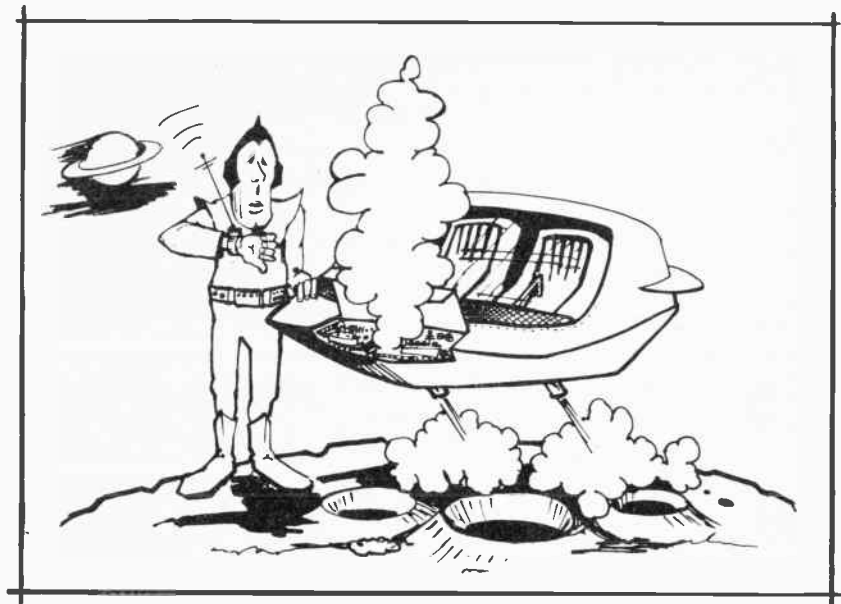
motorists includes such things as finding street directions, open filling stations or other travel-related activities as well as assistance in the event of an accident or mechanical breakdown.

Although not officially sanctioned, *channel 19* is growing in use nationally as the moving vehicle, or truckers, channel. Communications on this channel relate to road conditions, accidents, and traffic reports.



Truckers throughout the country use channel 19 for exchanging information.

Any of the remaining channels may be used for your business or personal communications, however, to prevent unintentional interference to channels 9 and 11, the FCC recommends that all transmissions involving highway travelers be conducted on a channel other than channel 10, preferably one several channels removed from channels 9 or 11.



VIII. CB Tomorrow

Every few years something comes along which catches the imagination of the public. Some enjoy a meteoric rise in popularity, then fade into obscurity. Others become such an important part of our lives that it is hard to imagine a time when they didn't exist.

Is CB radio here to stay? Or, is it just a passing fad that will be remembered nostalgically as something that was big in the seventies: a hula hoop—or one of those other “newfangled” ideas that will never catch on, like the horseless carriage, talking pictures, telephones and television?

The answer seems obvious. CB two-way radio is here to stay! More than that, CB radio will ultimately be an integral part of our daily lives—as common as wristwatches and as indispensable as ball point pens.

In the next decade and beyond, as CB continues to grow and expand in versatility, convenience and design, what can you look forward to? The area for speculation is wide open.

Today's Radio Will Still Be A Good Investment

As things change will this mean that the equipment you buy today will be unusable tomorrow? Certainly not! Your 10 year old black and white VHF TV set is as useful as ever. Newer sets simply add more features — color TV reception and UHF stations.

Similarly, the CB equipment you buy now will be just as usable ten years from now—you need only replace or upgrade your equipment if you decide you want whatever new features are then available.

At this point, of course, we can only speculate upon what things will be like tomorrow. We can make some educated guesses, perhaps going off into the wild blue yonder, or, more likely, fall far short of what will actually be achieved.

Twenty years ago who would have imagined that men would walk on the moon, that you could buy an inexpensive radio, small enough to fit in your pocket (actually smaller than the batteries you needed then to power a portable radio), or that everyone could have and use their own personal two-way radio!



So what lies in store for Citizens Band radio? What seems likely to happen in terms of growth in both usefulness and technology?

More Channels. As the number of people using CB continues to grow and as the channels become more crowded in many areas of the country the need for more space will become more pressing. There is already a proposal under consideration by the FCC to increase the number of channels available for CB from 23 to 100.

SSB. Single sideband, already in use today, may well be the dominant mode in the future. Because of its advantages (outlined earlier in this book) it will certainly grow in use and, as new developments and breakthroughs are made in electronics, decrease in price.

Standard Equipment. Today, most people consider a car radio to be a basic and essential accessory. In a few years it seems likely that people will think of a CB radio in much the same way. There are already a number of progressive car and truck dealers who will custom install your Realistic CB radios on your new vehicle.

Marine Use. CB is already growing in use, especially on inland waterways, as a means of ship-to-shore and ship-to-ship communications. Although it is not presently monitored by the Coast Guard they may do so in the future. It is also possible that one or more channels may eventually be set aside strictly for marine use.

Special Services. Another possibility for the future may be the establishment of specific channels for certain services. For example, today channel 9 is used for emergencies and motorist assistance, channel 19 (unofficially) is used by moving vehicles on the highways.

With more channels available it might be possible to set aside a channel for making motel reservations as you travel, restaurant reservations on another channel, and camping arrangements on still another. Some areas may eventually establish tourist information services, again on a specific channel all across the nation.

Priority Channels. In line with the idea of channels set aside for special services, transceivers may be designed with one or more “priority” channel features. A priority feature would either automatically switch your radio to a special channel or alert you to tune to that channel (perhaps with a lighted indicator) for special bulletins or information.

This priority feature would be invaluable to travelers if it were used on a nationwide basis to broadcast road conditions, weather or traffic information.

Equipment Design. Electronics technology has experienced tremendous advances over the past decade, particularly in the area of microminiaturization. The development of solid-state circuitry made it possible to greatly reduce the size of two-way radio equipment. Now integrated circuits are making possible even greater reductions in size.

Pocket size CB with all the power and features of today’s deluxe sets is certainly conceivable, and the Dick Tracy wrist radio is no longer a far-fetched idea. Imagine a full-feature CB transceiver the size of your watch with a built in digital clock!

Hands Free Operation. For years Ham radio operators have used a “voice operated relay” (VOX) to switch their equipment to transmit. This circuit could be used with CB sets to eliminate the need to press a button to transmit—a really handy feature for your wrist radio. In 1970 Radio Shack offered the PortaVOX voice-actuated one-watt, three channel walkie-talkie with boom mike headset. It was undoubtedly ahead of its time and is no longer in the Radio Shack line.

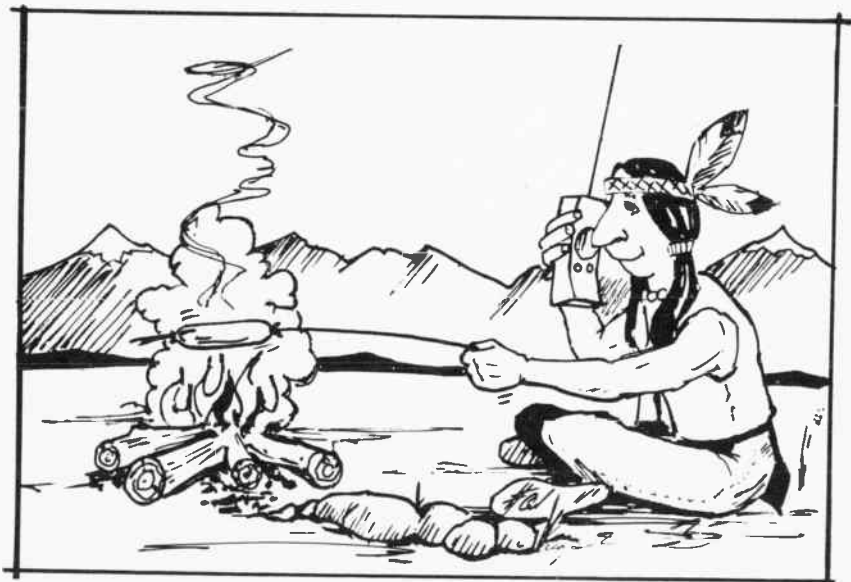
Repeaters. Again borrowing an idea from Ham operators, CB may someday be used with a system of local repeaters. Repeaters are automatic transmitter and receiver relay systems which could increase the efficiency of CB communications tremendously.

With a repeater your transmitted signal is picked up by the repeater’s receiver and simultaneously rebroadcast through the repeater’s transmitter. A centrally located repeater station on a high building could make it possible to have excellent communications all over your town with considerably greater range than is now possible through direct station-to-station communications.

Selective Calling. Selective calling is a technique which is available today. It is used by paging companies to activate a particular subscriber's paging unit without disturbing other subscribers. In CB it could be used in much the same way — a base could alert one or more specific mobile units, and the various mobile units could leave their sets in a standby condition until alerted by a message directed to them.

Antenna Design. Your two-way wrist radio would be pretty cumbersome if you had to use a 102'' long CB antenna. Through the use of loading coils we can reduce the size of CB antennas considerably. Perhaps the antenna technology of the future will make it possible to reduce the size of a CB antenna to just a few inches.

And More! The possibilities are practically unlimited for the potential use of CB radio. One day you may be able to use a pocket, wrist or even ring size two-way radio to instantly communicate with any other station in your area — perhaps even in the world! Science Fiction? Perhaps, but today's science fiction gadget has a way of becoming tomorrow's household appliance.





IX. Glossary

AC — Abbreviation for alternating current. 120 VAC is 120 volts of alternating current. Normal house current.

AC/DC — Abbreviation for alternating current or direct current. Term is applied to equipment designed to operate on either kind of current, such as base/mobile transceivers which may be powered from 120 VAC or 12 VDC.

align — To adjust or tune a circuit to the proper frequency.

AM — Abbreviation for amplitude modulation, which is the mode used to convey voice signals in most CB communications. The other mode used in CB is single sideband.

amateur radio — Another radio communications service licensed by the FCC. Amateur radio operators, also known as "Hams", must pass a test of Morse code proficiency, electronics theory and regulations in order to obtain a license. Amateur radio is strictly for hobby and experimental purposes and may not be used for business.

amplifier — A device or circuit which increases the strength of a signal. In CB transceivers, an amplifier is used to increase the strength of the received radio signal to an audible level.

antenna — A metallic structure, usually an arrangement of rods or wires, used for receiving or radiating radio signals.

ANL — Abbreviation for automatic noise limiter. An ANL circuit is used in CB transceivers to reduce noise or interference such as that caused by auto ignition systems.

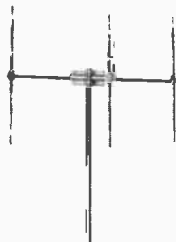
automatic gain control — A circuit which automatically maintains a signal at a certain desired level even though the source, or input signal may vary in level.

background noise — Noise heard along with the desired sound signal. Usually caused by atmospheric interference.

band — A range of frequencies between two definite limits. For example, the broadcast radio band includes all frequencies from 535 to 1605 kHz. Citizens Band includes the frequencies between 26.965 and 27.255 MHz.

base station — A CB radio station, usually installed in a fixed location and operated from 120 VAC. Also can be a station used as the central or control station of a group of stations.

beam antenna — A directional antenna which focuses the transmitted signal in a narrow directional path and receives signals from the same narrow segment of the horizon.



call letters — The system of letters and numbers assigned to each individual CB licensee to identify transmitting stations.

carrier — A radio wave of constant amplitude, frequency, and phase at a particular frequency of operation. This radio wave is altered by interruption or changes in amplitude to "carry" the intelligence (voice signal) to be transmitted.

CB — Abbreviation for Citizens Band.

channel — A specific frequency used for communication. In CB, each frequency is assigned a designated channel number. For example, channel 9 is 27.065 MHz.

channel selector — Switch or dial used for selecting the specific channel being used.



clarifier control — A fine tuning control used on SSB transceivers to allow you to tune the receiver frequency slightly so that you are receiving the station you are listening to exactly on frequency.

Class D — Citizens Radio Service, commonly known as Citizens Band, which uses frequencies between 26.965 and 27.255 MHz for voice communications of a business or personal nature.

coax — Abbreviation for coaxial cable. A two-conductor cable, or transmission line, in which one conductor completely surrounds the other and acts as a shield for the inner conductor. Used for connecting the antenna to the transceiver.



communication — The transmission of information from one point, person, or piece of equipment to another.

communications receiver — A radio receiver designed for reception of radio signals from stations operated primarily in the 535 to 1605 kHz broadcast band and 1 to 30 MHz shortwave radio bands.

crystal — In CB, a piezoelectric natural (quartz) or synthetic crystal that has been ground to the proper size to produce a natural vibration at the desired frequency and to produce that frequency when set into vibration. Crystals are used to control the frequency, or channel, on which a CB set operates.



crystal control — The use of a crystal to maintain a transmitter (or receiver) on its assigned frequency.

DC — Abbreviation for direct current. Batteries are a source of direct current, such as the 12 VDC battery used in most cars and trucks.

delta tuning — A fine tuning control used on some transceivers to allow you to tune slightly off frequency for better reception of a station which may be transmitting slightly above or below the correct frequency.

directional antenna — An antenna which radiates or receives signals more effectively in some directions than others. See also *beam antenna*.

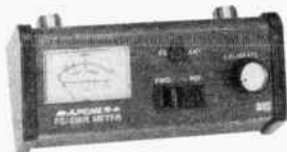
dual conversion — Type of receiver circuit design which provides greater selectivity.

effective radiated power — Abbreviated ERP. The antenna input power times the gain of the antenna expressed in watts. A measurement of effective signal power being radiated from an antenna. It may be more or less than the input provided by the transmitter.

FCC — Abbreviation for Federal Communications Commission. The FCC is a board of commissioners appointed by the president which has the power to regulate all electrical communications systems originating in the U.S.

FET — Abbreviation for field effect transistor. A semiconductor whose application is similar to a vacuum tube. Typically used in high-performance receivers.

field strength meter — A measuring instrument for determining the relative strength of radiated energy (field strength) from a transmitter.



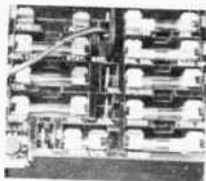
filter — A selective network of resistors, capacitors, crystals, inductors or combinations of these elements which allow certain frequencies or signals to pass easily while opposing the passage of others. Filters are used, for example, to block noise impulses or signals while allowing the passage of the desired radio signals.

frequency synthesizer — Circuit used in CB transceivers to provide full 23-channel operation without the need for 23 separate pairs of crystals. The frequency synthesizer uses various combinations of several crystals to achieve full 23-channel capability. See text, Chapter III.

fuse — A protective device, usually a short piece of wire which melts and breaks when a current which exceeds its rated value flows through it.



fuse block — An insulating base on which fuse clips or other contacts are mounted.



gain — Any increase in power.

gain control — A device for varying the gain of an amplifier or system.

ground — A metallic connection with the earth to establish a zero electrical potential.

grounded — Connected to earth or to some conductor which takes the place of earth.

ground-plane antenna — A nondirectional vertical antenna with metal radials which create an artificial ground, thus permitting the antenna to be mounted above the actual, or earth, ground.



ground wave — A radio wave which travels along the earth's surface, as opposed to waves reflected from the upper atmosphere (sky waves).

ham — Slang for amateur radio operator.

Hertz — A term meaning cycles per second. Abbreviated Hz.

high frequency — The frequency band between 3 and 30 MHz which includes Citizens Band. Abbreviated hf.

ignition noise — Interference produced by sparks or other ignition discharges in a car, motor, furnace or other type of ignition system.

impedance — The opposition a circuit offers to the flow of alternating current.

ALL ABOUT CB TWO-WAY RADIO

impedance match — the condition in which the impedance of a component or circuit is equal to another impedance to which it is connected. For example, the antenna, coaxial cable and transceiver of a CB station. With proper impedance match there will be maximum transfer of energy.

input — The driving force applied to a circuit or device. Also, the terminals (or other connection) where the driving force may be applied to a circuit or device.

input power — The amount of DC power (wattage) applied to the final or RF power output stage of a transmitter.

integrated circuit — Abbreviated IC. A subminiature device which contains a combination of interconnected circuit elements. Integrated circuits are used in CB equipment for both their size and reliability.



interference — The disturbance of reception of desired signals by undesired or stray signals. Interference may come from atmospheric conditions, electrical devices such as ignition systems or from other stations operating on the same channel.

jack — A socket to which a wire (or wires) is connected to one end and a plug is inserted into the other. Your CB microphone has a plug which is inserted into the microphone jack on your transceiver.



kHz — Abbreviation for kilohertz. 1000 cycles per second.

kilo — Prefix meaning 1000.

lead — A wire to or from a circuit.

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LED — Abbreviation for light emitting diode. Used for panel lights and digital readouts in electronic equipment.

line filter — A device inserted in series with the power line to block noise or other interference from devices such as motors.



line of sight — The distance from an elevated point to the optical horizon, or another elevated point which may be beyond the optical horizon.

load — Any energy or power consuming device which is connected to another device that is supplying power or energy to the first device. An antenna serves as a load for the power output of a CB transmitter.

loading coil — A coil of wire used in many antennas which serves to electrically lengthen the antenna while permitting it to be shorter physically.



mega — Prefix meaning one million.

meter — An electrical or electronic measuring device.



MHz — Abbreviation for megahertz. One million cycles per second.

microphone—A device for converting sound waves into an electrical signal.



milli — Prefix meaning one thousandth.

mobile radio—A two-way radio that is either portable or installed for use in a car, boat, truck or other vehicle.

modulate—The placing of voice information on a radio signal.

modulation indicator light—Lamp on a CB transceiver which gives a visible indication of modulation. See text, Chapter III.

multimeter—A test instrument with suitable switching facilities to measure voltage, current and resistance. Also called a volt-ohm-milliammeter (VOM).



negative — Usually the grounded side of a battery. Also referred to as the minus or “-” side.

nickel-cadmium cell — A battery cell with a positive electrode of nickel and oxide and a negative electrode of cadmium. Often used in walkie-talkies or other devices where rechargeable batteries are desired.



noise blanker—A circuit which momentarily silences the receiver (without a perceptible loss of audio intelligence) during brief noise bursts. Superior in performance to an automatic noise limiter.

noise limiter — See ANL.

omnidirectional antenna — An antenna which radiates or receives signals equally well in all directions.

PEP — Abbreviation for peak envelope power. The actual maximum power developed by a single sideband transmitter on signal peaks.

phase lock loop — Circuit used with digital frequency synthesizers for maximum stability of frequency. See text, Chapter III.

piezoelectric—The property exhibited by the crystals used for frequency control in CB transceivers which causes a voltage to be produced when they are subjected to mechanical stress, and conversely, a mechanical stress to be produced when they are subjected to voltage.

plug—A device attached to the end of a cord. When inserted in a jack, it establishes a connection between the conductor or conductors.



positive — The plus “+”, or usually ungrounded side of a battery.

power output — The power in watts delivered by a transmitter to the antenna. In CB this is limited to 4 watts maximum on AM, 12 watts PEP on SSB. See text, Chapter III.

power supply — A unit or circuit which supplies electrical power to another unit or to the balance of a circuit. In CB transceivers the power supply is an integral part of the circuitry.

ALL ABOUT CB TWO-WAY RADIO

PTT — Abbreviation for press-to-talk or push-to-talk. A transmit/receive switch, usually a button mounted on a microphone, which when pressed puts the transceiver in the transmit mode, when released in the receive mode.

Q signals—A system of three letter abbreviations starting with the letter Q. Each code is an abbreviation for a complete statement. For example, QRT means "stop transmitting", QRX means "stand-by". Can also be used as questions.

radio—A general term referring to the use of electromagnetic waves. In particular, communication by electromagnetic waves transmitted through space.

radiocommunication—A term used to denote transmission of sound, pictures, signals, writing, etc. via radio.

radio frequency—Any frequency between an audio sound and the infrared light portion of the spectrum. Abbreviated rf.

radio horizon—The line beyond which direct radio waves cannot continue along the earth's surface. This distance is affected by atmosphere refraction; hence, it is not constant and does not necessarily equal the optical horizon.

radio receiver—A device for converting radio waves into sound.

radiotelephone—The complete radio receiver and transmitter (or transceiver) required at one station for voice radio communication.

range—The maximum distance at which reliable communications may be maintained.

receiver—A device equipped for reception of incoming electrically transmitted signals.

regulated power supply—A power supply in which the output voltage is held constant as the load or source is varied.

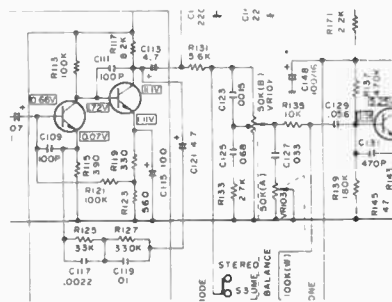
RF—Abbreviation for radio frequency.

rig—Slang for transmitter or transceiver.

scanner—A monitor receiver which scans, or sequentially samples a number of frequencies, or channels, for the presence of a signal.



schematic diagram—A line drawing of an electrical circuit in which the electrical connections and components are represented by graphical symbols.



selectivity—The ability of a receiver to reject transmissions from frequencies other than the specific one to which it is tuned.

sensitivity—In a receiver, the minimum input signal required to produce a specified output at a specified signal-to-noise ratio. A more sensitive receiver circuit will be able to detect, or receive, weaker signals than a less sensitive receiver.

series—A way of arranging components end to end so that current flowing through one component must flow through all others.



shielded cable — A cable in which the insulated conductor (or conductors) is enclosed in a conducting envelope which is grounded to reduce the effect of magnetic or electrical fields. See also *coax*.

short circuit — Also called just "short". An abnormal relatively low-resistance connection between two points of a circuit. Usually accidental or unintentional, as when two wires touch that should be separated.

shortwaves — Radio frequencies which fall above the broadcast band and are used for long-distance sky-wave communications. Typically 3-30 MHz.

sidebands — The frequency bands on both sides of the carrier in which the voice intelligence is carried.

signal strength — The strength of the signal from a transmitter delivered at a specific location.

signal-to-noise ratio — A ratio of the magnitude of a signal to that of the noise.

single sideband — A transmission system in which only one of the sidebands produced during modulation is transmitted and the other is suppressed. The carrier wave is also suppressed. See text, Chapter III.

sky wave — A radio wave that has been reflected from one of the layers of the ionosphere.

S-meter — A meter used in some CB receivers to indicate the strength of the received signal. A signal strength meter.



S/Rf meter — As above, and also provides an indication of transmitter power output.

solid-state — Devices that can control current without moving parts, heated filaments, or vacuum gaps. Semiconductors and transistors are typical solid-state devices.

speaker — A device which converts electrical signals back into sound.



speech amplifier — A voltage amplifier between (or sometimes built-into) the microphone and the transmitter.

speech clipper — An amplitude limiting circuit to limit the peaks of a speech frequency signal used in AM voice transmitters to maintain a high average percentage of modulation.

squelch circuit — A circuit in a receiver for reducing the background noise in the absence of signals.

SSB — Abbreviation for single sideband.

static — Noise heard on a radio receiver due to atmospheric electrical disturbances such as lightning or man-made interference from electric motors, lights, etc.

static charge — The accumulated electrical charge on an object.

static discharge unit — A grounded protective device consisting of a spark gap and attached to a lead-in to allow built-up excessive static electricity on the antenna to flow across the gap to ground rather than along the lead-in to the radio equipment.



surface wave — A ground wave which travels along the surface of the earth.

switch — A mechanical or electrical device which breaks or completes a path for electrical current.

SWR — Abbreviation for standing wave ratio. SWR is measured to determine how well matched a CB system (transceiver, antenna, antenna cable) is. A low SWR measurement (1.5 : 1 or better) is an indication that the system is operating efficiently, with a minimum of loss.

SWR bridge — Meter used for measuring SWR.



10 code — Numbered abbreviations prefixed by "10" used to convey specific messages. For example, 10-20 stands for "location", 10-4 means "affirmative", or "message received". Can also be used as questions. See Appendix A.

terminal — A point for the connection of two or more conductors.



traffic — Messages handled by communications stations.

transceiver — A combination transmitter and receiver housed in a common cabinet and employing some common circuit components for both transmitting and receiving. See text, Chapter III.

transistor — A solid-state device made from semiconductor material which is typically used to amplify signals.



transmit — To send a message, program, or other information from one location to another.

transmitter — The equipment used to generate and amplify an rf carrier signal and modulate this carrier with intelligence.

tuning — the adjustment of the frequency of a circuit or system to obtain optimum performance.

TVI — Abbreviation for television interference. Usually the reception of CB or other signals on a television receiver, interfering with TV reception. Most often the result of poor TV design, rather than a malfunctioning CB radio.

two-way communication — Communication between two radio stations, each having both transmitting and receiving equipment.

VHF — Abbreviation for very high frequencies. The band of frequencies between 30 and 300 MHz.

volt — The unit of measurement for electromotive force.

volume — The intensity of a sound.

volume control — A variable resistor used to adjust the loudness of a radio receiver.



walkie-talkie — A two-way radiocommunication set designed to be hand carried and operated. See text, Chapter III.

watt — The unit of measurement for electrical power.

wave — A physical activity that rises and falls, or advances and retreats, periodically as it travels through a medium, such as a radio wave.

whip antenna — A simple vertical antenna such as that used on cars, trucks or other vehicles.



APPENDIX A

THE "10" SIGNALS

| Code No. | Meaning | Code No. | Meaning |
|-----------------|---|-----------------|--|
| 10-1 | Receiving Poorly | 10-39 | Your Message Delivered |
| 10-2 | Receiving Well | 10-41 | Please Tune To Channel |
| 10-3 | Stop Transmitting | 10-42 | Traffic Accident At |
| 10-4 | OK, Message Received | 10-43 | Traffic Tieup At |
| 10-5 | Relay Message | 10-44 | I Have A Message For You (or) |
| 10-6 | Busy, Stand By | 10-45 | All Units Within Range Please Report |
| 10-7 | Out Of Service, Leaving Air | 10-46 | Assist Motorist |
| 10-8 | In Service, Subject To Call | 10-50 | Break Channel |
| 10-9 | Repeat Message | 10-60 | What Is Next Message Number? |
| 10-10 | Transmission Completed, Standing By | 10-62 | Unable To Copy, Use Phone |
| 10-11 | Talking Too Rapidly | 10-63 | Net Directed To |
| 10-12 | Visitors Present | 10-64 | Net Clear |
| 10-13 | Advise Weather/Road Conditions | 10-65 | Awaiting Your Next Message/Assignment |
| 10-16 | Make Pickup At | 10-67 | All Units Comply |
| 10-17 | Urgent Business | 10-70 | Fire At |
| 10-18 | Anything For Us? | 10-71 | Proceed With Transmission In Sequence |
| 10-19 | Nothing For You, Return To Base | 10-73 | Speed Trap At |
| 10-20 | My Location Is | 10-75 | You Are Causing Interference |
| 10-21 | Call By Telephone | 10-77 | Negative Contact |
| 10-22 | Report In Person To | 10-81 | Reserve Hotel Room For |
| 10-23 | Stand By | 10-82 | Reserve Room For |
| 10-24 | Completed Last Assignment | 10-84 | My Telephone Number Is |
| 10-25 | Can You Contact ? | 10-85 | My Address Is |
| 10-26 | Disregard Last Information | 10-89 | Radio Repairman Needed At |
| 10-27 | I Am Moving To Channel | 10-90 | I Have TVI |
| 10-28 | Identify Your Station | 10-91 | Talk Closer To Mike |
| 10-29 | Time Is Up For Contact | 10-92 | Your Transmitter Is Out Of Adjustment |
| 10-30 | Does Not Conform To FCC Rules | 10-93 | Check My Frequency On This Channel |
| 10-32 | I Will Give You A Radio Check | 10-94 | Please Give Me A Long Count |
| 10-33 | EMERGENCY TRAFFIC AT THIS STATION | 10-95 | Transmit Dead Carrier For 5 Seconds |
| 10-34 | Trouble At This Station, Help Needed | 10-99 | Mission Completed, All Units Secure |
| 10-35 | Confidential Information | 10-200 | Police Needed At |
| 10-36 | Correct Time Is | | |
| 10-37 | Wrecker Needed At | | |
| 10-38 | Ambulance Needed At | | |

Note: Any 10-code signal may be reversed by stating it as a question. For example, 10-20? would mean "What Is Your Location?" or 10-36? "What Is The Correct Time?"

CB Slang

CBers, like any special interest group, develop a language of their own. Many of the words and phrases you'll hear originated with the truckers and relate to traveling, road conditions and police speed traps. New words and phrases come into use constantly. These that follow are some of the most often used.

Advertising — Police car with its lights on.

Back Door — Rear vehicle of two or more running together (via CB).

Beat the Buses — Vehicle driving ahead of a group and going just enough over the speed limit (but not fast enough to get a ticket) to bring out any hidden police cars to investigate. Lead vehicle watching for speed traps.

Bear — A police officer. See "Smokey".

Bear Cave — Also Bear Den. Any police station.

Bear in the Air — Police aircraft used to clock highway traffic.

Bean Store — Restaurant or road stop where food is served.

Big 10-4 — Very much in agreement; "You said a mouthful!"

Bottle Popper — Beverage (usually beer) truck.

Boulevard — Highway.

Break — Request to use channel, often given with channel number. ie. "Break channel one-four" (I'd like to make a call on channel 14).

Breaker — Station requesting a break.

Brown Bottles — Beer.

Brush Your Teeth and Comb Your Hair — Radar unit ahead.

Bushel — 1,000 pounds.

Camera — Police radar unit.

Charlie — The FCC. Also, "Uncle Charlie".

Chicken Coop — Truck weighing station.

Chicken Inspector — Weight station inspector.

Clean — No police in sight.

Clear — Communications completed.

Cotton Picker — Used in place of any stronger terms. ie. "That cotton picker just cut me off!"

County Mounty — County police or sheriff.

Cowboy Cadillac — An El Camino or Ford Ranchero.

Cut Some Z's — Get some sleep.

Drop the Hammer — Accelerate.

Ears — A CB radio or the antenna for a CB radio.

Eighteen Wheeler — Any tractor-trailer truck regardless of actual number of wheels.

Eye-In-The-Sky — Police aircraft.

Evil Knievel — Motorcycle rider.

Fat Load — Overweight load.

Feed the Bears — Pay a traffic ticket.

Fifty Dollar Lane — Leftmost or passing lane.

Flip-Flop — Return trip, or "U" turn.

Fluff-Stuff — Snow.

Fly in the Sky — Police aircraft.

Four Wheeler — Any passenger vehicle with four wheels.

Front Door — Lead vehicle of two or more running together (via CB).

Good Numbers — As in "All the good numbers to you". Best regards and good wishes.

Got Your Ears On? — Are you listening to your CB radio?

Grass — Median strip or alongside of road.

Green Stamps — Money.

Green Stamp Road — Toll road.

Ground Clouds — Fog.

Haircut Palace — Bridge or overpass with low clearance.

Hammer — Accelerator pedal.

Handle — Name used on CB radio.

Harvey Wallbanger — Reckless driver

Holding On to Your Mud Flaps — Driving right behind you.

Hole in the Wall — Tunnel.

Home 20 — Where you live. Home town.

Invitations — Police traffic citations; tickets.

Keep the Shiny Side Up and the Dirty Side Down — Don't have an accident.

Land Line — Telephone.

Local Yocal — City police.

Loose Board Walk — Bumpy road.

Mama Bear — Policewoman.

Mercy! — Expletive exclamation.

Mile Marker — Milepost on interstate highways.

Mix-Master — Highway cloverleaf.

Modulate — Talk.

Monfort Lane — Passing lane.

ALL ABOUT CB TWO-WAY RADIO

Nap Trap — Rest area or motel.
Negatory — Negative.

On the Side — Standing by and listening.

Pickum-Up — Pickup truck.
Picture Taker — Police radar.
Plain Wrapper — Unmarked police car. Usually given as: Smokey in a plain brown wrapper (brown car), plain green wrapper (green car), etc.
Portable Chicken Coop — Portable truck scale.
Portable Parking Lot — Auto carrier.
Post — Milepost on interstate highways.
Pregnant Roller Skate — Volkswagen.
Pull the Big Switch — To turn off the CB radio.

Radio — A CB transceiver.
Ratchet Jaw — Overly talkative CBER.
Rig — CB radio; also truck tractor.
Rocking Chair — Vehicle between lead "front door" and rearmost "back door" vehicles.
Roger Ramjet — Driver of a car going well over the speed limit.
Rollerskate — Small car such as a compact or import.
Rolling Road Block — Vehicle going under the speed limit and holding up traffic.

Sailboat Fuel — Running empty.
Seatcovers — Passengers.
Shake the Trees and Rake the Leaves — Lead vehicle watch ahead, rear vehicle watch behind.
Skating Rink — Slippery road.
Smokey — Any police officer.
Smokey the Bear — State police.
Smokey's Got Ears — Police with CB radio.
Spy in the Sky — Police aircraft.
Super Skate — High performance car, Corvette or other sports car.
Super Slab — Major highway.

Taking Pictures — Police using radar.
Ten-four — Affirmative (see 10-code, Appendix A).
Threes — Best regards.
Threes and Eights — Best regards, love and kisses (those "good numbers").
Tijuana Taxi — Police car with lights and identification on it.
Town — Any city, regardless of size. ie. New York town, Dallas town, Podunk town, etc.
Truck 'em Easy — Have a good trip.
Twenty — Location (10-20).

Twisted Pair — Telephone.

Twister — Highway interchange.

Two Wheeler — Motorcycle.

Uncle Charlie — The FCC.

Wall-to-Wall Bears — Heavy police patrol.

Wall-to-Wall and Treetop Tall — Receiving you loud and clear.

Willy Weaver — Drunk driver.

Window Washer — Rainstorm.

X-ray Machine — Police radar.

APPENDIX C

FCC FIELD OFFICES

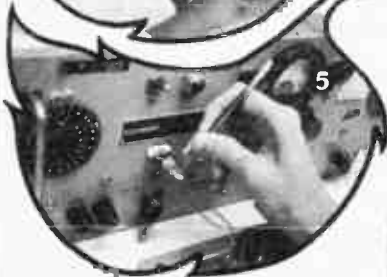
Mailing addresses for Commission Field Offices are listed below. Street addresses can be found in local directories under "United States Government."

Field Engineering Offices

Address all communications to Engineer in Charge, FCC

Alabama, Mobile 36602
Alaska, Anchorage (P.O. Box 644) 99501
California, Los Angeles 90012
California, San Diego 92101
California, San Francisco 94111
California, San Pedro 90731
Colorado, Denver 80202
District of Columbia, Washington 20554
Florida, Miami 33130
Florida, Tampa 33602
Georgia, Atlanta 30303
Georgia, Savannah (P.O. Box 8004) 31402
Hawaii, Honolulu 96808
Illinois, Chicago 60604
Louisiana, New Orleans 70130
Maryland, Baltimore 21202
Massachusetts, Boston 02109
Michigan, Detroit 48226
Minnesota, St. Paul 55101
Missouri, Kansas City 64106
New York, Buffalo 14203
New York, New York 10014
Oregon, Portland 97204
Pennsylvania, Philadelphia 19106
Puerto Rico, San Juan (P.O. Box 2987) 00903
Texas, Beaumont 77701
Texas, Dallas 75202
Texas, Houston 77002
Virginia, Norfolk 23510
Washington, Seattle 98104

Radio Shack has a plant in Fort Worth that grows crystals



for CB, Scanners and Walkie-Talkies

- ① Artificially grown quartz crystals lapped to desired frequency
- ② Measured and sorted into frequency groups
- ③ Mounted to base and secured with conductive glue
- ④ Final silver plating for precise fundamental frequency
- ⑤ 100% Quality Control tested. We try to make them better than Brand X — because it's our own name that goes on the box.

Only where you see this sign

Radio Shack

A TANDY CORPORATION COMPANY

OVER 4300 STORES AND DEALERS • 50 STATES • 9 COUNTRIES

Radio Shack manufactures its own CB and Scanner cable in Fort Worth

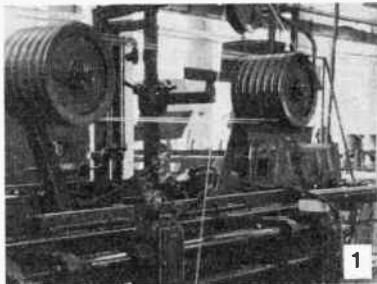
(Brand X just didn't measure up to Realistic's specs)

Radio Shack manufacturing makes us unique among retailers. And it creates benefits for our customers: Total quality control. Cost control. Exclusivity.

Fig. 1 shows our high-speed extruding machine. It takes two strands of wire, precision spaces them, then applies a coat of clear plastic insulation—at a rate of over 1,000,000 linear feet in 24-hours.

Fig. 2 is a view of our "braiders". They attach the shielding to our coaxial cable. Next, a second coat of insulation is applied.

We think Radio Shack makes better cable. After all, it's our own name that goes on the box. Not Brand X.



Coaxial Patch Cords

| | |
|---|-------|
| PL-259 at each end, except* one end only. | |
| 20-Foot RG58/U Cable. 278-967 | 4.49 |
| 20-Foot RG58/U Cable.* 278-966 | 3.99 |
| 50-Foot RG58/U Cable. 278-971 | 8.95 |
| 50-Foot RG8/U Cable. 278-970 | 12.95 |
| 100-Foot RG8/U Cable. 278-972 | 24.95 |
| 2-Foot RG58/U Cable. 278-968 | 3.29 |
| 5-Foot RG8/U Cable. 278-969 | 3.99 |

RG8/U Cable

Heavy-duty type. Made with a polyfoam dielectric that gets more RF power into the antenna, more signal into the receiver than standard dielectrics. 52 ohms. 25-foot minimum order.
19¢/foot. 500 ft. up, 18¢/foot. 278-1325

Mobile Cable Assemblies

Ready-to-use 20-foot cables with connectors attached.

| | |
|-------------------------------|------|
| PL-259 Plug to Lugs. 278-966 | 3.99 |
| PL-259 Plug Each End. 278-967 | 4.49 |

RG58/U Cable

Same high-quality polyfoam as our RG8/U cable.
9¢/foot. 500 ft. up, 8¢/foot. 278-1326

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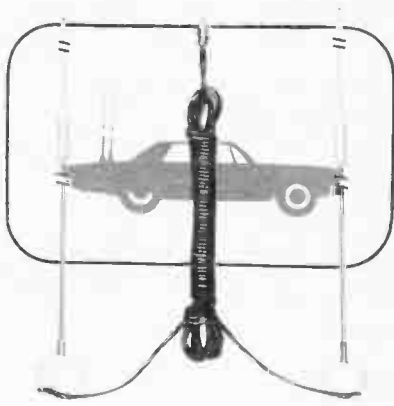
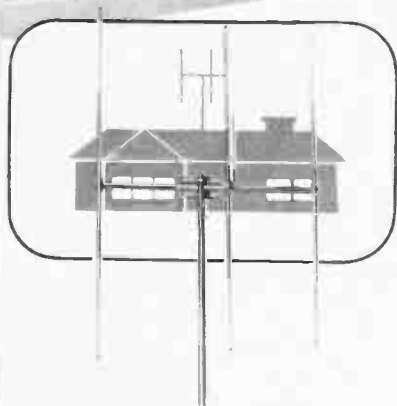
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About **37⁹⁵***

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About **27⁹⁵***

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