1976 GUIDE TO CB RADIOS

Introduction To A Revolution

From subculture to institution overnight, Citizens Band radio has entered the American scene. . .

Beginning with the truckers' strike in 1973, nurtured by the attentions of the media and popularized by a song celebrating the wry rebellion of a "Convoy" of defiant tractor-trailer drivers, Phase II of the Communications Revolution is underway. Citizens Band radio is a fixture in American life.

There are more that 6,000,000 CB sets in use today. The Federal Communications Commission is swamped with applications for new CB licenses. Boat and aircraft owners, finding that CB offers new areas of convenience in talking with land transceiver stations not available with standard VHF equipment, have begun adding CB capability to their craft. And the highways of the nation ring with the clarion call to ignore posted speed limits and dodge state police radar units.

Straight enthusiasts of CB are fond of issuing disclaimers to the effect that beating the speed limit is not the real reason for CB's popularity. A half hour of listening in on any channel other than the emergency and calling channels should serve to evaporate this contention. The Smokey reports are where all the excitement is. That is part of the fad component of CB.

But the straight enthusiasts are right, in a way. It is the far broader application of CB that will insure its permanence in American culture. Communication is the key, not speed. From Gutenburg, through Marconi, to David Sarnoff—to C.B. McCall—advances in personal communication have served to free the individual.

In emergency situations, the freedom to communicate can be a very important freedom. For a station wagon driver with a broken axle, 15 miles west of Chitlin Switch, Georgia, at three in the morning, the ability to contact his fellow man is worth the price of a brand new antenna. For a woman on a highway whose husband has just had a heart attack at the wheel, it is priceless. Any citizen confronting crime, danger or simple inconvenience will appreciate all over

again the value of being able to pick up a mike and advertise a "breaker," a request to interrupt any conversation which might be going on at the time.

(Bill Crutchfield of Crutchfield Corp., Charlottesville, Va., a major distributor of CB and other automotive electronics accessories, has asserted that Washington eventually will perceive CB's life-saving potential and will "press for laws requiring emergency CB radios to be installed in the cars of the future.")

Simply driving into a strange town and being able to ask directions, find a motel, even locate a good cup of coffee, all are so much better than not being able to do these things, that this should be considered a prime reason for CB's eventually becoming a permanent institution in American life.

The CB buyer too anxious to wait for a Detroit version probably will want to install his own CB. Installation is comparatively simple: and like most simple mechanical tasks, it can be fouled up with comparable ease.

The first-time CB installer must follow directions exactly. Electronics theory does not submit to "mechanic's feel," and intuitions can destroy a set in seconds. Do not trim the antenna lead, for example; it is that long because it has to be that long, exactly. Just stow the extra feet of wire. And don't turn the set on before it is connected to the antenna. Believe it or not, you will smoke the set immediately. And, in fact, don't even turn it on before the antenna has been tuned, a relatively simple operation. Follow the directions.

In purchasing the equipment, the buyer should be aware that prices can range wildly on both radios and antennas. Since the FCC very rigorously limits power output to four watts, the antenna is a critical component. (The use of illegal linear amplifiers magnifies the signal power, but is frowned upon by other CB owners because it interferes with their signals; in addition, this possibly is the violation which will provoke the most drastic FCC response, even ahead of profane language.)

Antenna height is regulated, so the quality of the antenna is the only factor under the control of the CB purchaser. Of the three basic types of antenna, probably the best is the base-loaded variety. It is the most versatile; it can be mounted virtually anywhere on the vehicle. The effective length of an antenna must be equal to either the full wavelength of a CB signal, about 433.07 inches, or some quarter-length multiple of this figure. The loading coil inside most antennas brings the effective length up to one-fourth of this figure, or about 108 inches, without the owner's having to suffer the inconvenience of driving a car with a nine-foot antenna sticking out of it.

There are such things, however, and the nine foot whip is popular in areas where garage doors and low overpasses pose no problem. But for the city dweller, a 40 inch base-loaded antenna will provide nearly equal performance.

Dual antennas frequently are mounted on trucks and campers, and provide excellent reception and transmission. Until recently, a chief disadvantage has been that duals had to be mounted no less than 100 inches apart. As they have to be in a side-by-side configuration, this made it impossible to use them on any vehicle less than eight feet across. Technology has tried to eliminate this obstacle, and duals are seen more often.

Unfortunately, many dual setups utilize center-loaded antennas. On these, the SWR adjustment, used to tune the antenna when it first is connected to the CB set, is mounted directly on the loading coil. It is easily knocked out of adjustment, adding a complication to the career of the CB operator.

Generally, the ideal location of an antenna is in the center of the ground plane of the vehicle, which usually means right in the middle of the roof. Most car owners hesitate to drill a hole in this spot, however, and are willing to sacrifice performance to avoid it. Gutter-clip mounted antennas are among the easiest to install, and offer the added advantage of quick removal when the owner leaves his car. However, they perform poorly over long distances. Each time the gutter-clip antenna is removed and replaced, it must be retuned. For this reason, this type is center-loaded, with the SWR adjustment in place.

Although the nine foot whip models generally outperform the other types, they are easily broken, whether made of steel or Fiberglass. Six foot whips are available, but perform little better than the 40 inch base-loaded antennas.

Deciding on a radio is a problem. One decision involves straight AM transceivers vs. the new, highly-touted SSB equipment. Although desperately complicated, the difference between the two boils down to one practical commonplace: you get what you pay for. And SSB transceivers start at about $250, at least $100 more than many standard sets. The SSB units do not triple the number of channels you can talk on, however, as some manufacturers of SSB sets suggest.

Stated far too briefly, SSB works as follows. CB radio works on a "carrier wave" of a certain width. This carrier wave comes into being as soon as the set is snapped on. When the snapper-on starts talking, his voice is added to the carrier wave as two much narrower bands, one on either side of the carrier band. These are the side bands. The CB receiver at the other end accepts this entire complement of carrier wave and two side bands, translates the electromagnetic energy back into kinetic energy in the form of sound, and your conversation is underway.

SSB units throw all their power—limited by federal law to four watts—behind one of the two side bands. But, although you now can choose between the carrier wave, one side band and the other side band, making a total of three, you have not actually tripled your number of available frequencies. Remember, the vast majority of persons receiving your signal are receiving on only the original 23 CB channels. So you will be received on the carrier-wave frequency of which your side-band transmission is an adjunct.

What the SSB unit does do, however, is legally triple the power of your transmission. All the power is thrown behind one side band signal, rather than being divided between two side bands and a carrier wave. This has the very desirable effect of strengthening your signal greatly, enabling it to get through a jumble of conversational CB operators, as well as through the variety of interfering signals produced by high-tension cables, faulty ignition systems and other incidental transmitters of random electromagnetic signals well known to the CB world. The CB signal operates strictly on a line-of-sight rule, however, and cannot travel beyond about 30% past the horizon, no matter how the power is jacked up (except for skip transmission, essentially useless).

The value of SSB radio must be determined by the individual purchaser. In this it is no different from all the rest of the CB equipment available. The cost must be balanced against the quality of the performance provided. A toy-type walkie-talkie CB may cost one-third what an average mobile transceiver costs. The main difference between models is the number of controls in place. The walkie-talkie may have only one channel, and it may have no controls other than on-off and volume. Available CB sets have a wide variety of controls, starting from "squelch," which reduces background noise, to built-in meters which measure the set's power output at any given moment, as well as the input from distant CB sets.

It is worthwhile to remember that you should no more buy a used CB radio without testing it than you would buy a used car without driving it. Defective CB radios usually look exactly like good CB radios. Be suspicious. The FCC currently is receiving about 17,000 applications for CB licenses every day, and not everybody using CB bothers to apply. This indicates that there are a lot of CB radios in circulation. Not every one of them is in the hands of a scrupulous person.

(The best example of this is the story of the blind CB enthusiast who went on the air to tell all his friends of the great array of expensive communications equipment he had just received for Christmas. Within a couple of hours, two men walked into his house and stole all of it, plus his stereo system. Total loss was over $10,000, the story says.)

Increasingly, manufacturers are designing all-in-one models incorporating the CB tranceiver into an am/fm/stereo tape deck unit. This development so far is controversial. The people who make them say they represent a technological great leap forward; the people who don't make them say they don't. Already, with the transceiver concept (say the opposition), the set's workings have been greatly condensed; the transmitter and the receiver share some of the electronic circuitry, making smaller size possible. To cram all that extra stuff into the same unit, small enough to mount under a conventional dash or on a conventional transmission hump, is to court disaster, they say.

Deciding on this type unit is still pretty much without guidelines. Presumably, manufacturers of tube-type radios 15 years ago might have wanted people to think that the transistor types were just too small to work right.

Increasing number of CB users insures travellers against finding themselves lost in strange territory. Here van-mounted unit by J.I.L. earns its keep.

Among the first accessories considered by the new CB owner is the power mike. With competition keen in the industry, prices have to be shaved someplace. Knowing that the beginner looks for a few features that he has heard about somewhere, such as an automatic noise limiter and an RF gain control, manufacturers find that they can provide these attractive features at a competitive price by selling the set with a microphone of limited quality. The mike will work, but the enthusiast who has been in CB long enough to have developed some familiarity with good performance frequently will go shopping.

The power mike, or pre-amp mike, has its own built-in amplification circuits. A voice entering a pre-amp mike will remain fairly loud even at the limits of the signal's range, where a voice using a standard mike will sound weak and faint.

Because a good pre-amp mike for a mobile CB radio can set the buyer back from $35 to well over $50, it is of the utmost importance that the buyer make certain that the mike is compatible with his transceiver. Power mikes are sold with bare wires at the end of the cord, so that the connector plug will have to be soldered on after purchase. The store owner who sells the mike often will perform this simple task, sometimes for a slight charge. However, different radios use connector plugs with different numbers of prongs. The unwary shopper might easily buy a pre-amp mike and attach the connector, and then find that it won't plug into his set. No reputable dealer would allow a beginner to make this mistake, but when dealing with a mail-order house, the enthusiast must be sure he knows what he is doing.

Another compatibility question is in the switching system of the radio. CB sets are switched to the "transmit" mode when the push-to-talk button on the microphone is depressed. This switching is accomplished basically through one of two systems, relay and electronic. A mike designed for one system will not function if attached to a radio using the other. Both the new mike and the new radio come with a set of manufacturer's specs which provides this sort of information. Fact sheets sold with microphones usually list CB models with which the mikes are compatible, so it is not difficult to avoid mismatching.

Other options available to the first-time CB buyer include the converter. This is a tiny unit installed behind the dash. The converter uses the AM radio circuitry to receive CB signals. The existing AM antenna lead plugs into the converter, which plugs into the AM antenna-lead socket on the regular car radio. The converter owner finds the CB channels on his converted AM car radio by a hit-and-miss method, marks the channel locations on his car radio dial, and for about $29.95 he is ready for all the CB listening he thinks he needs. He might be right.

However, this system eliminates the emergency applications which make CB radio of value beyond just picking up the latest Smokey reports, because he can't transmit. He has saved over a hundred dollars, as well as the trouble of installing an antenna and a mount for the set. In return, he might some dark night face that lonely 15 mile walk back to Chitlin Switch to find somebody to fix his broken axle.

He also effectively is cut out of Phase II. He is passive in the face of the revolution in personal communication freedom.

Until recently, the FCC required that the new CB owner wait to get his license before transmitting. Now, as long as his license application has been sent in, he can use his CB, but must identify himself when transmitting with the letter K, his first and last initials and his Zip code.

Another change in FCC enforcement involves an operator's using only his handle when transmitting. The call letters a CB owner is assigned when he gets his license have a purpose, according to the FCC, and violators increasingly are being tracked down and fined. The first fine usually is $50, with only a couple of increases for persistent violators before licenses are revoked and equipment confiscated. If the FCC is successful in its current Automatic Transmitter Identification System proposal, every CB set will be required to have a built-in feature which will broadcast a coded identification signal every time the push-to-talk button is pressed. Industry and hobbyist groups are resisting this move.

Many dealers and manufacturers issue a license application with every new CB unit sold. Applications also may be obtained by contacting the FCC, which has offices in most cities, listed in the phone book under "U.S. Government." The license requires no test. As a part of the license application, the applicant must state that he has in his possession a copy of the FCC Rules and Regulations, Volume VI, Part 95. Part 95 delineates all the sorts of behavior that is expected of the responsible CB owner and operator. Copies are available through the FCC, at $5.35 each, or at most CB shops.

The FCC traditionally has considered Part 95 to be of the utmost importance in maintaining order in the airwaves. To this end, the agency requires that every licensed enthusiast keep a copy near every transceiver.

ANTENNAS & MIKES

The antenna is the basic accessory every new CB owner must buy. The microphone frequently is the first voluntary accessory purchase. Listed below are some companies which produce these two essential ingredients of a CB outfit. Some are firms which also manufacture CB sets, some specialize in one or two accessory items and some have extensive product lines.

Antennas

ANIXTER-MARK
5439 W. Fargo
Skokie, Ill., 60076
(312) 675-1500

ANTENNA DESIGN, INC.
802 Washington
Burlington, Ia., 52601
(319) 752-2787

ANTENNA, INC.
23850 Commerce Park Rd.
Cleveland, O., 44122
(216) 464-7075

ANTENNA SPECIALISTS CO.
12435 Euclid Ave.
Cleveland, Oh., 44106
(216) 791-7878

AVANTI RESEARCH AND DEVELOPMENT. INC.
340 Stewart Ave.
Addison, Ill., 60101
(312) 543-9350

BLAZER COMMUNICATIONS, INC.
34 Mildred Dr.
Fort Myers, Fla., 33901
(813) 936-8581 and 936-3818

BLUE STREAK ANTENNAS
2100 E. Wilshire Ave.
Santa Ana, Calif., 92705
(714) 542-7228

BREAKER CORP.
1101 Great Southwest Pkwy.
Arlington, Tex., 76011
(817) 461-5061

CAL KUSTOM HAWK
23011 S. Wilmington
Carson, Calif.
(213) 775-8621

CHANNEL MASTER
Ellenville, N.Y., 12428
(914) 647-5000

CUSH CRAFT CORP.
621 Hayward St.
Manchester, N.H., 03103
(603) 627-7877

GEMTRONICS
356 South Blvd.
Lake City, S.C., 29560
(803) 394-3565

HY-GAIN ELECTRONICS CORP.
8601 N.E. Hwy. 6
Lincoln, Neb., 68505
(402) 464-9151

NEW-TRONICS CORP.
15800 Commercial Park Dr.
Brookpark, O., 44142
(216) 267-3150

PEARCE-SIMPSON
P.O. Box 520800
Biscayne Annex
Miami, Fla., 33152
(305) 592-5550

RAY JEFFERSON
Main & Cotton Streets
Philadelphia, Pa., 19127
(215) 487-2800

RCA
Distributor and Special Products Division
Cherry Hills Offices
Bldg. 206-2
Camden, N.J., 08101
(609) 963-8000

RUSSELL INDUSTRIES, INC.
3069 Lawson Blvd.
Oceanside, N.Y., 11572
(516) 536-5000

SHAKESPEARE CO.
P.O. Box 246
Columbia, S.C., 29202
(803) 779-5800

SHARP ELECTRONICS CORP.
10 Keystone Place
Paramus, N.J., 07652
(201) 265-5600

SKYHAWK ANTENNA SYSTEMS
P.O. Box 7673
Van Nuys, Calif., 91407
(213) 997-1909

SPARKOMATIC CORP.
Milford, Pa., 18337
(717) 296-6444

TELE COMM
P.O. Box 3232
Margate, N.J., 08042
(609) 646-6606

TENNA CORP.
19201 Cranwood Pkwy.
Cleveland, O., 44128
(216) 475-1400

Microphones

ASTATIC CORP.
Harbor & Jackson Streets
Conneaut, O., 44030
(216) 593-1111

RECOTON CORP.
46-23 Crane St.
Long Island City, N.Y., 11101
(212) 392-6442

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ANTENNAS & MIKES

REGENCY ELECTRONICS, INC.
7707 Records St.
Indianapolis, Ind., 46226
(317) 545-4251

ROBYN INTERNATIONAL, INC.
Box 478, 10901 Northland Dr.
Rockford, Mich., 49431
(616) 866-1557

SHURE BROTHERS, INC.
222 Hartrey
Evanston, Ill., 60209
(312) DA8-9000

TELEX COMMUNICATIONS, INC.
9600 Aldrich Ave., South
Minneapolis, Minn., 55420
(612) 884-4061

Both Antennas & Mikes

COLLINS RADIO
4311 Jamboree Rd.,
Newport Beach, Calif., 92663
(714) 833-4632

ECHO COMMUNICATIONS, INC.
North 144 W. 5690 Pioneer Rd.
Cedarburg, Wis., 53012
(414) 377-5050

KRACO ENTERPRISES
505 E. Euclid
Compton, Calif., 90221
(213) 774-2550

METRO SOUND
11144 Weddington St.
North Hollywood, Calif., 91601
(213) 877-5577

PHILMORE MFG. CO., INC.
40 Inip Dr.
Inwood, N.Y., 11696
(516) 239-6161

ROYCE ELECTRONICS
1746 Levee Rd.
North Kansas City, Mo., 64116
(816) 842-7505

SILTRONIX
330 Via El Centro
Oceanside, Calif., 92054
(714) 757-8860

SONAR RADIO CORP.
73 Wortman Ave.
Brooklyn, N.Y., 11207
(212) 649-8000

SURVEYOR MFG. CORP.
29245 Stephenson Hwy.
Madison Heights, Mich., 48071
(313) 544-9110

TURNER
909 17th St., N.E.
Cedar Rapids, Ia. 52402
(319) 365-0421

The 100 Most-Asked Questions About CB

Consider this a primer if you're a beginner; call it a refresher course if you're a pro.

1. What is Citizens Band radio? Citizens Band Radio, or CB as it's usually referred to, is fairly simple and inexpensive equipment for two way radio communication. The service is licensed by the Federal Communications Commission (FCC) and is intended for short distance radio communications for pleasure or business.

2. How old is CB radio? The FCC established the Citizens Radio Service in 1958.

3. How many types of CB sets are there? There are three basic types, the base station for home or office, the mobile, for car, boat or airplane and the handheld walkie talkie .

4. How many channels does a CB radio have? Most sets have 23 AM channels, but sets can have from one up to 23. Single Side Band sets give the user 46 channels in addition to the 23 AM channels.

5. How are channels fixed? Usually by crystals with the crystals set for one or more channels. A new channel selection feature in some sets is a digital frequency synthesizor, which eliminates crystals.

6. Do I need a license for my CB? Yes.

7. What type of license do I need? You will need a Class D license from the FCC which will enable you to legally operate the 23 CB AM and related 46 SSB channels.

8. How do I get a license? You will usually get an FCC license form when you get your CB. If not, most radio stores have them. Fill it out and send it to the FCC.

9. Do I have to take a test? No.

10. How much does a license cost, and how long is it good for? The cost is $4 and it's good for 5 years.

11. What exactly is the FCC? It is the Federal Communications Commission and it regulates all radio broadcasting, except military, in the United States.

12. How many radios can I operate with my license? You can operate up to 16 sets. If you are going to operate more than that, say for a trucking firm which has 25 sets, you must file an explanation with the FCC.

13. Can I talk on all channels? No, FCC regulations restrict the use of channels 9 and 11.

14. Why can't I use channels 9 and 11? You can use these channels, but 9 is only for emergency traffic, to report an accident, etc. Channel 11 is the national calling channel and extended conversations on this channel are forbidden.

15. Who can operate my set? Private stations can be operated only by the person named in the license or his immediate family. Business stations can only be used by employees of that business while acting within the boundaries of that business. Association licenses can only be used by members of that association as long as they are using the radio for business that relates to the association.

16. How far can I talk on my CB? This can depend on many things, the power output of your set, the antenna and outside interference. But generally from three to 20 miles, or sometimes from 30 to 40 miles on AM. With single sideband since the legal power output is greater the distance a transmission will cover is also greater. But the FCC limits transmissions to within 150 miles of your set.

17. Can I broadcast without having a license? You can use an interim call sign after you have filed for your license. Your interim call sign would be the letter K then your initials and zip code, such as KMP 89502.

18. What's a handle? A handle is a code name you make up yourself. These names can pertain to your business, a mechanic, for example, may call himself the "Magic Wrench."

19. Can I legally use a handle instead of my call sign? No.

20. What's the 10-Code? A code used by law enforcement agencies and picked up by CBers. The code consists of numbers, beginning with 10 that stand for certain things, like 1020 (your location) 1036 (the time) or 1004 (OK, message received or I understand).

21. What's the Q code? It is a variation of the 10 code and is used primarily by ships.

22. What is an ANL? This stands for Automatic Noise Limiter and it is a supplementary noise-blanker system that helps to eliminate background noise. It may come with or without a manual switch.

Royce 1-606 is widely distributed.

23. What's a Noise Blanker? It's a system built in the radio that reduces static-type noise caused by the car engine or ignition.

24. What's Delta Tune? It is essential for operation of single sideband sets. Often a voice will come over the air sounding like Donald Duck. The Delta Tune Control enables you to tune in this station so you can understand it. The other station was broadcasting out of tune, slightly above or below the correct frequency.

25. What's RF Gain? The RF gain reduces the level of the incoming signal and is used in connection with the standard volume control. Together these controls help reduce atmospheric noises.

26. What's a Mike Gain Control? This helps control the output of your mike and shouldn't be confused with a preamp mike. A preamp increases the power of the mike, the mike gain decreases it.

27. What's a preamp microphone? A microphone that has a built-in amplifier for better audio and distance.

28. What's a preamp? It is a special box that can increase the strength of an incoming signal. It is connected to a separate power source, either AC or DC. Some preamps have their own control switch. But while a preamp increases the incoming voice, it also increases the incoming interference and background noises.

29. What's SWR? SWR is the abbreviation for Standing Wave Ratio. This is the important measurement to determine if your CB system, radio, cable and antenna are in balance.

30. What's an SWR meter? This is a meter that is incorporated in the circuitry or a set or is a separate unit. It is used to determine correct antenna tuning.

31. What is a good SWR reading? A low SWR measurement. 1.5 to 1 or better—ideal is 1 to 1—shows that your system is operating efficiently with a minimum loss and is in balance.

32. What's an S-Meter? This is the meter on the face of the radio that lets you know the output or input of a signal. It is often used for a radio check with the numbers read of with "you're hitting me with 8 pounds." This means the person's signal is hitting eight on the S-Meter.

33. What's an S/RF Meter? This meter serves two functions. It not only measures the strength of incoming signals, but also of outgoing transmissions.

34. What's a phone patch? A phone patch on your set will enable you to connect a caller on your CB to the telephone to talk to somebody you have dialed for him.

35. What's a digital frequency counter? It is affixed to your antenna wire and measures the strength of the incoming signals. It is also used to check the accuracy of transmitting crystals or to check the accuracy of your channel selector.

36. What's a PA switch? This is a special feature on many CB sets. It enables you to use your radio through an external speaker as a public address system.

37. What's a Clarifier Control? This control is quite similar to the Delta Tune or Fine Tuning control on a radio. It is 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.

38. What's a linear? It is an illegal device that amplifies the transmission power of a CB radio.

39. How much power can I legally transmit? An AM CB transmitter may not exceed 4 watts output and an SSB equipped transmitter may not exceed 12 watts output.

40. What's a carrier? It is a radio wave constant amplitude, frequency, and phase at a particular frequency of operation. The radio wave is altered by interruption or changes in amplitude to carry the intelligence (voice signal) to be transmitted.

41. What's PEP? This is the abbreviation for "peak envelope power" output and it is a measurement of peak power output of the transmitter and corresponds to the peak of the voice signal.

Phone handset style is chosen by Realistic for Model CB-Fone 23.

42. Do I need a license for my walkie talkie? Walkie talkies that have up to 100 mW transmitter power do not have to be licensed. But any set that puts out more than this must be licensed by the FCC.

43. Is there any special cable or wire used to connect by CB with the antenna? Yes. Coaxial cable is specially designed to minimize loss in efficiency or power. Like the antenna, it is matched to the radio system.

44. Are there different types of CB antennas? Yes. While most are built to be omnidirectional, to pickup signals from all directions, there is also a beam type of antenna. The beam antennas are usually used for base units and generally include an antenna rotator.

45. What is a ground plane antenna? This is one of the most popular types of antennas used for base stations. Since a ground is needed for the antenna to work and you want to raise it above actual ground level you must bring a

ground up to the level of the antenna. 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 enabling you to install your antenna at any height above the actual ground you can. A ground plane antenna in an automobile uses the car body as the ground.

46. **Is there more than one type of antenna for a car?** Yes. There are those that can be mounted to the lip of the trunk, the back bumper, the rain gutter, or the magnetic mount which can be put wherever you want.

47. **Do I have to drill holes in my car to install an antenna?** Most mobile antennas are designed so that they can be clipped or bolted on rather than affixed permanently. However, rear deck mount antennas do require drilling holes into the trunk or fenders. The cowl mount antenna requires a ground wire.

48. **What's a loading coil?** Loading coils are built into mobile antennas so as to reduce the necessary length of the vertical element. They electrically "lengthen" the antenna. There are base or center loaded antenna models. These "loaded" models are about 40 inches long, but aren't nearly effective as 6' or 9' whip antennas.

49. **Where's the best place to mount the antenna on my car?** Since mobile antennas are basically omnidirectional the best place would be right in the center of the car's roof. But these same omnidirectional antennas can be slightly directional if they are mounted off center. For example, an antenna mounted on the left rear fender will be slightly more directional toward the right front fender.

50. **Are there any restrictions on how high my antenna can be?** Yes. With your mobile the only restriction would be one of having it too large for the car, truck, camper, etc. But there are definite legal restrictions on how high you can have the antenna for your base station. Omnidirectional antennas may be 60 feet above the ground or 20 feet above the top of a building which is over 40 feet tall. Directional (beam) antennas are limited to 20 feet above the ground or 20 feet above a building.

51. **Are two antennas better than one on a vehicle?** Dual or twin antennas make your radio system much more efficient. But duals generally must be installed no less than 100 inches apart. So while truckers can use duals, many autos aren't wide enough to accommodate duals. There are, however, some antennas on the market that can be mounted closer than 100 inches. So if you want to put duals on our car they are available.

52. **What does it mean to "tune my antenna"?** This means to match the antenna to your radio by using an SWR meter. To be properly tuned the meter must read 1.0, or a 1.0 to 1 ratio. To get this it may be necessary to adjust the height of your antenna. If your antenna is extended to its full length, however, and you still can't get it in tune you may need to get what is called a matchbox. The matchbox is a small box with two knobs on it that is connected to the antenna wire. By turning these knobs the SWR can be brought into the proper ratio, or in other words, your radio will be properly tuned. Some antennas also come pre-tuned so that you don't have to do anything to them when you get them.

53. **When I tune my radio and antenna does it matter what channel the radio is on?** Yes it is best to have one of the middle channels on the radio—Channels 10, 12, 13, or 14. But don't use 9 or 11.

54. **Will using my CB radio at home bother television sets?** It can. The best way to cure it should this occur is to purchase one of the several filters on the market that cut out the interference before it gets your TV.

55. **Can I use my CB in the car and the house?** Yes, as long as your mobile and base antennas are matched (tuned) to your set.

56. **What outside interference can bother my CB?** Interference can come from atmospheric conditions, electrical wires, ignition systems of your car or one close by or other stations operating on the same channel.

57. **What's skip?** Radio signals are often bounced off the earth's ionosphere and "skipped" a long ways. CB signals that skip off the ionosphere can seem very close to your receiver when in fact they are often coming from hundreds of miles away.

58. **What's the phoenic alphabet?** When spelling a word on the radio people often use words to represent each letter, such as Alpha for A, Bravo for B. etc.

59. **Can I put a CB in my plane or boat?** Yes there are no restrictions against it and FCC regulations cover radio installations in these vehicles the same as in a car or a home.

One leader in transceiver field is Standard, manufacturer of Horizon 29.

60. **How old do I have to be to get an FCC Class D license?** You have to be 18 or older.

61. **Do I have to have a copy of CB rules and regulations Part 95, when applying for a license?** Yes you must have in your possession or have ordered a copy when you apply for a license.

62. **When is it legal to use my CB?** You may use your CB at any time 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.

63. **Can I mention or publicize my business on my CB.?** No. A CB cannot be used for advertising or soliciting the sale of any goods or services.

64. **How long am I allowed to talk on my CB?** Communications between the same parties may not exceed five minutes in length. At the end of five minutes there must be a one minute lag before the conversation can legally continue.

65. **What should I do with my license when I get it?** Your license or a clear copy must be posted by your station.

66. **Why is there a blank space on my channel selector between channels 22 and 23?** The FCC frequency list allows more space between these channels. Some people put a different crystal in this opening to have their own private channel. But the use of these non specific channels is not specifically authorized by the FCC.

67. **What are the FCC fines for operating illegally?** The typical fine is $50. But for continued violations, the FCC can increase the fine, call for a prison sentence and confiscate your equipment.

68. **What's the most common violation?** The most common violation is the failure to use your proper call sign.

69. **What's a scanner?** It is a monitor receiver which scans a number of frequencies or channels. It stops automatically when activated by a signal.

70. **Can I receive any channels on my CB when I am transmitting or monitoring another channel?** Yes, some radios have a scanner like device which allows you to hear an incoming signal from a preselected channel even though you are on another channel.

71. **Can I transfer my license to somebody else?** No, this is against FCC regulations.

72. **Are there any magazines or newspapers that feature CB news?** Yes there are, books like *S9, CB Magazine, CB News, CB Guide, CB Times, CB Today,* and *The CBer's News.*

73. **How do I call for help or assistance on my CB?** Use the emergency channel 9 if it is monitored in your area—there are 1500 REACT units across the country that monitor 9—and notify the person who answers your call the nature of the trouble and your exact location.

74. **Can I call the police on my CB?** In many states, policemen monitor channel 19. If there is an emergency you can try to Break for a "smokey". If nobody answers go to channel 9 and notify a REACT unit of the problem and they will notify the authorities.

75. **How can I get a radio check?** You can simply ask for a break, give your call sign and ask for a radio check. Somebody will usually come back to you and tell you how they are receiving you, such as "you're hitting me with 8 pounds." This means you are registering 8 on his S meter. Never use channels 9 or 11 for a radio check.

76. **Is there any way to secure my equipment against theft?** Thieves love CBs. They are being stolen out of cars, trucks, campers, etc., by the thousands each day. You can get a bracket that locks to your CB, or you can install a removable sliding mounting bracket and take the radio out whenever you leave the car unattended. There are also a great many burglar alarms on the market. You may want to investigate these.

77. **Will the popularity of CB continue?** Manufacturers feel it will. They have predicted that by 1980 there will be between 20 to 25 million CBs in this country.

78. **Is my CB license good outside the country?** No. For information on CB usage in other nations contact the nearest consulate for that nation.

79. **Do I need a special antenna for a CB on my boat?** Several manufacturers make antennas that are specifically designed for marine usage.

80. **If I have a CB radio on my boat will I usually need any other type of communications equipment?** Yes, because the Coast Guard and most other yachtsmen have VHF radios. So at sea a CB radio can be useless in case of emergency.

81. **Will I have any problem with my CB radio interferring with the other electronic equipment on my boat?** No.

82. **Are there any special features I should look for in purchasing a CB for my boat?** Yes, it is a good idea to get a CB that has a built in PA switch so that you can hook up a hailer.

83. **Is my CB the same as ham radio?** No, CB operates on different radio frequencies than ham radio.

84. **Is it hard to learn to use a CB?** No, it is very easy. All you have to do is remember the rules, know how to turn a dial and push a mike button.

85. **Does a power mike boost my wattage output?** No.

86. **Does my squelch control decrease my incoming wattage?** No, it is a circuit that prevents weak signals and interference from being picked up by the receiver, but will not diminish stronger signals.

87. **Can I get a CB that operates off batteries other than walkie talkies?** Yes, certain mobile CB sets have battery pack attachments for portable use.

88. **Will the AM CB band ever have more than 23 channels?** Yes, there is some movement toward opening up 50 channels or frequencies.

89. **Is there anything that will automatically turn off my car radio when there is an incoming transmission on my CB?** Yes, an automatic radio silencer available at most CB stores. They are inexpensive and easy to install.

90. **Can I operate more than one CB off of a single antenna?** Yes, with a coax switch that puts the operating radio on the antenna.

91. **What's a dummy load?** This is a device that is connected to a CB radio so that it can be tested without hooking the set up to an antenna.

92. **Will I ever be able to buy a new car with a CB already in it?** Yes, many of the companies are now offering CBs as optional equipment in new vehicles.

93. **What does it mean to be "throwing carriers"?** This is a CB term for somebody who holds down the mike to prevent others from talking or keeps clicking the mike off and on.

94. **How long does it take to get my FCC license?** The FCC is so flooded with requests for new licenses that it can take from 10 to 20 weeks.

95. **Are there any other national CB organizations like REACT?** Yes there is ALERT (Affliated League of Emergency Radio Teams) which is based in Washington, D.C. and serves as the CBers voice before government bodies. There is also Ten-4, which publishes rosters of local club affliates and a periodic newsletter for members.

96. **What's a Pl Network?** It's a tuned circuit at the output stage of a transmitter to match it to the antenna/feedline.

97. **What's VOX?** This stands for Voice-Operated Transmitter, which, when an operator speaks into the mike, the VOX circuitry automatically activates the transmitter without depressing the mike button.

98. **Are telephone handsets the same on my CB as on my telephone?** No, telephone company handsets utilize a carbon microphone and use a totally different receiving element.

99. **What's bleed over?** That is where a signal transmitted on one channel can be heard on the one next to it.

100. **What channel do boatmen mostly use?** The marine channel has been generally agreeded to be 13.

In-helmet headset, optional passenger intercom are features of Beltek Enduro motorcycle model.

Free Enterprise Forges Ahead

The Art Of Stealing Radios

(Sometimes it's scary)

As CB owners multiply, so do CB thieves. Insurance companies are predicating their rates on an expected 100,000 thefts of CB radios in 1976. North and South, Eastern crime belt or Great Southwest, car- and truck-mounted CB antennas stand out like beacons in the wee hours of the morning, when professionals cruise the streets looking for easy money. The Los Angeles Police Department noted 1825 CB sets stolen in 1975; the June 1, 1976 figure was 1264. (The number of CB units stolen from boats remains small, according to a spokesman for the sheriff's department guarding Marina del Rey in Southern California, possibly because professional thieves find all the volume they can handle simply by driving around tearing radios out of cars.)

Even peaceful, law-abiding Reno, Nev., which in 1974 showed a 7.7% decrease in per capita major crimes while the nation wide figure was climbing by 18%, is seeing a boom in organized CB thefts, according to Officer Brad K. Crase of the Reno Police Department Crime Prevention Unit.

"It was about the middle of last year that we started to realize that we had a problem," Officer Crase says. "We had the computer pull information as far back as last April, and we found that from April to December we had 92 sets stolen. The majority of these were in November and December."

December, January and February saw 156 reported CB thefts, Crase says. The number for the same period a year before was 75.

Recovery of stolen property depends first on the ability to identify what is stolen and what isn't, Crase points out. However, only 23 of last year's 92 victims could give the serial numbers from the stolen sets. Shoving a stack of burglary reports across his desk, Crase shakes his head. "You can see how many of the victims didn't even know the brand name of the lost radio set." He leafs through the stack of burglary reports. "'Unknown'...'Unknown'...'Unknown'..."

Without some kind of concrete proof that the CB set is his, Crase adds, the victim can only watch as a sympathetic officer carries it back to the 'unclaimed' locker.

Officer Crase has been travelling around to clubs in his area, marking members' CB units with an electric vibrating pencil. He marks the set with the driver's license number of the owner, then files a card with that number and other pertinent information at police headquarters.

"The mark goes all the way through the metal," he says. "You can't scratch it off. You'd have to cut out the metal section the mark is on before you could remove it." So far this year, he has marked 383 CB sets.

"You see, the police department has the burden of proving that any item is stolen," Crase explains. "Without identifying marks of some kind, that is sometimes impossible. If an unmarked set is found along with other stolen property, it goes into storage." Six months later, it is auctioned off.

"If there is no other stolen property involved," Crase complains, "we just have to give the set back to the person we found with it and let him go.

"More than once, I've sat right here knowing I was talking with a person who was caught with a stolen CB radio, and then seen him walk out that door with the set under his arm."

A victim who identifies a recovered CB unit by claiming he recognizes some scratch or mark on it is out of luck, says Crase. "Unless he told us about that mark before, in his burglary report, he'll just have to wait for the auction like everybody else."

Unmarked sets and owner carelessness are the police department's biggest headaches, according to Crase. Hauling out his stack of burglary reports again, he points out how many thieves entered the car, truck or camper through doors left unlocked.

"They'll hit a car in a driveway or a parking lot. They'll walk right up into a guy's driveway to hit his car in broad daylight," Crase claims. "Sometimes it's scary how gutsy these people are."

The people who steal CB radio sets, by and large, are not kids who crave a CB of their very own, Crase says. "For the most part, they do a fairly professional job."

The most common means of entry are unlocked doors, forced wing windows ("usually on the driver's side; it looks more like you're just trying to get into your own car if you work on the driver's side"), and slip wires.

A slip wire is about a foot and a half of stiff wire, like a straightened-out coat hanger. The thief bends a hook into one end, forces that end into the car between the weather stripping and the window glass and hooks the ridge around the top of the door locking button. He pulls up and the door is unlocked.

"Thieves usually don't like to break windows," says Crase. "You can't break a car window silently, the way you can a house window."

"Slip wires are so easy to use, but the thing is, for 99¢ a pair at any auto parts supply store, anybody can buy door locking buttons with no ridges around the top." Without the ridge, a slip wire just won't work. With the ridge, it's a snap.

"It usually takes a good pro about a minute and a half to two minutes to get into the car, get the CB and split," says Officer Crase. The time might go up to five minutes, but that is as long as the thief will want to take, he says.

"Retail on unmarked sets is high," he claims, "as high as 50%." And while the back-alley market for hot sets opens onto Main Street, Crase denies that there are great numbers of otherwise straight citizens willing to buy stolen property.

"It's just that there are an awful lot of naive people in the world who just think that they're getting a good deal."

"Suppose you come to me and say, 'Listen, I've got a good CB set here, I've gotten good use out of it, it's almost new, I hate to let it go but I'm broke. Give me $95.00 for it and it's yours. Please! I need the money for my family.' "

Crase continues, "So I tell myself, 'What a deal! I hate to take advantage of this guy's troubles, but if I don't, somebody else will,' and I give you the 95 bucks. You paid $75.00 to the guy who ripped off the set in the first place. He made $75.00, you made $20.00, and I buy some poor guy's CB set for an $80.00 discount and think I'm doing you a favor because your family's hungry."

Many organized CB theft rings ship the stolen sets out of state, Crase says. "Just recently, we broke up one ring that would go around ripping off all week. They had an outlet, or outlets, in Sacramento. They would drive the sets down there over the weekend and unload them."

The Reno Police Department, taken aback by the extent of the organization the new ring had mounted in a relatively short time, decided to take long-shot measures, Crase recalls.

"We had a guy in the department here do essentially a Baretta number. We got a van and put CB antennas on it, he dressed up like some kind of a hippy. Filthy, a bastard. He started hanging around with these gang members, he was accepted by them. This was all very well planned out. Two guys were assigned exclusively to this case.

"It took three or four weeks to break up the operation completely."

CB thieves generally don't take anything but CB units, Crase says. "People after a CB radio are after a CB radio. Basically, they will just drive down the street looking for aerials."

For this reason, Crase likes the fold-down and removable antennas which disappear in seconds, leaving no sign to the thief who doesn't actually walk up and look into the car to see if it contains a CB.

Crase also endorses the CB mounts which permit easy removal of the set itself, either to be taken away with the driver when he leaves the vehicle or to be locked in the trunk.

"Whether it's in the trunk or not, all the average thief is looking for is a CB radio he knows is there. If he looks into the car and sees the empty bracket, he's not going to start trying to pry the trunk lid open."

Alarms and mounting brackets are good, too, Crase says. "But the locking brackets are a deterrent only in some respects. You have to remember, some of the people we're talking about are so coarse and so crude they just rip the whole thing apart with a crowbar."

For both the crude types with crowbars and the CB surgeons who do the job with a coat hanger, two screwdrivers and a socket wrench, Crase's two-minute hit can mean a $75.00 score. Prorated on an eight-hour shift, figuring a five-day week and two weeks off for vacation... Hold it! Enough. Obviously neither the burgeoning CB theft rings nor the skilled freelancers are working anywhere near as full a schedule as that. But it's just as obvious that many a fast buck is finding its way into the wallets of the midnight mechanics, and that all due precaution is, at this rate, the least the CB owner can provide to protect his property.

Below is a list of some of the companies which manufacture anti-theft equipment for CB radios.

LOCKING MOUNTS: Shur-Lok Mfg Co., Hutchins, Tex., from $29.95; Magni-Power Co., Wooster, O., from $29.95, and Thief-Proof Mount 'n Lock, South Shore Trading Co., Hempstead, N.J.

SLIDE-OUT MOUNTS: CB Caddy, Inc., Fort Worth, Tex., from $9.95.

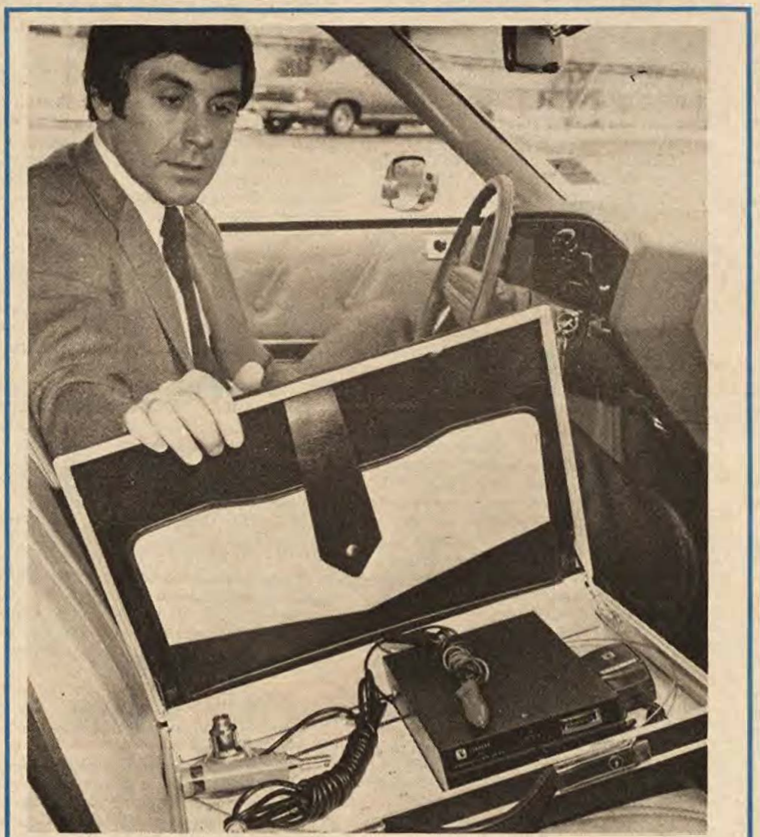
ALARM SYSTEMS: Stan-Gard Systems, Inc., Farmington Hills, Mich., from $59.95; Hope Electronics, Overland Park, Kan., from $19.95, and Blue Ridge Electronics, Inc., Swannanoa, N.C., $12.95 or two for $23.95.

STOWABLE ANTENNA MOUNTS: SouthCom, Inc., Fort Worth, Tex., $4.95, and Shur-Lok Mfg. Co., Hutchins, Tex.

MISCELLANEOUS: Pickett Enterprises, Phoenix, Ariz., phony decals that say the vehicle is protected by an alarm system, $2.00 for six decals, and Miltronics, Inc., St. Louis, Mo., a device which fills the car with tear gas if the CB unit is tampered with, $7.95 or two for $14.00.

Antenna Specialists Co. makes combination-lock antenna model.

Out of sight, out of mind, the saying goes. Easy-off antennas promote peace of mind



One way to foil thieves is to take equipment with you. Magnetic mount antenna by Antenna specialists Co. teams up here with Johnson set featuring cigaret lighter power source.

CITIZENS BAND RADIO MANUFACTURERS

AMERICAN ELECTRONICS
Box 311
91 N. McKinley
Greenwood, Ind., 46142
(317) 868-7285

ARTHUR FULMER COMMUNICATIONS
P.O. Box 177
Memphis, Tenn., 38101

ASTROSONIX
(see BOMAN INDUSTRIES)

AUDIOVOX CORP.
150 Marcus Blvd.
Happauge, N.Y., 11787
(516) 231-7750

AUTOMATIC RADIO
2 Main St.
Melrose, Mass., 02176
(617) 321-2300

BELTEK
(ENDURO)
1093 Bedmar St.
Carson, Calif., 90746
(213) 537-6180

BOMAN INDUSTRIES
(ASTROSONIX)
9300 Hall Rd.
Downey, Calif., 90241
800-421-2533
or (213) 869-4041

BROWNING LABORATORIES, INC.
1269 Union Ave.
Laconia, N.H., 03246
(603) 524-5454

COBRA
(see DYNASCAN CORP.)

COMMANDO COMMUNICATIONS CORP.
P.O. Box 11071
Chattanooga, Tenn., 37401
(615) 756-8981

COMMUNICATIONS POWER
2407 Charleston Rd.
Mountain View, Calif., 94043
(415) 965-2823

CORNELL DUBLIER ELECTRONICS
150 Auel
Newark, N.J., 07101
(201) 589-7500

CRAIG CORP
921 W. Artesia Blvd.
Compton, Calif., 90220
(213) 537-1233
In Canada:
WITHERS EVANS, LTD.
2738 S.E. Marine Dr.
Vancouver 16, B.C.

DORADO CB PRODUCTS
P.O. Box 43
El Paso, Tex., 79940
(915) 544-0360

DYN ELECTRONICS, INC. (ROBERTS)
3095 N.W. 77th Ave.
Miami, Fla., 33122
(305) 592-6710

DYNASCAN CORP.
(COBRA)
1801 W. Belle Plaine
Chicago, Ill., 60613
(312) 327-7270

ECHO COMMUNICATIONS, INC.
N. 144 W. 5690 Pioneer Rd.
Cedarburg, Wis., 53012
(414) 377-5050

ENDRUO
(see BELTEK)

FAR EASTERN RESEARCH LABS, INC. (XTAL)
8749 Shirley Ave.
Northridge, Calif., 91324
(213) 993-9101

FANON/COURIER CORP.
990 S. Fair Oaks Ave.
Pasadena, Calif., 91105
(213) 799-9164

FIELDMASTER RADIO CORP.
21212 Vanowen St.
Canoga Park, Calif., 91303
(213) 347-6810

GC ELECTRONICS
400 S. Wyman
Rockford, Ill, 61101
(815) 968-9661

GEMTRONICS
division Gem Marine Products, Inc.
P.O. Box 1408
Lake City, S.C., 29560
(803) 394-3565

GENERAL ELECTRIC CO.
Mobile Radio Dept.,
Section P
P.O. Box 4197
Lynchburg, Va., 24502

HANDIC U.S.A., INC.
14560 N.W. 60th Ave.
Miami Lakes, Fla., 33014
(305) 558-1522
In Canada:
SCOTTCOMM RADIO, INC.
Chomedy, Laval, Quebec

HITACHI SALES CORP. OF AMERICA
401 W. Artesia Blvd.
Compton, Calif., 90220
(213) 537-8383

HY-GAIN ELECTRONICS
8601 N.E. Hwy. 6
Lincoln, Neb., 68505
(402) 464-9151
In Puerto Rico:
HY-GAIN DE PUERTO RICO, INC.
Box 68
Naguabo, P.R., 00718

I.A. SALES CO. OF CALIFORNIA (UTAC)
766 Lakefield Rd., Suite H
Westlake Village, Calif., 91361
(805) 497-3966

J.I.L. CORP. OF AMERICA, INC.
737 W. Artesia Blvd.
Compton, Calif., 90220
(213) 537-7301

JOHNSON, E.F. CO.
299 10th Ave. S.W.
Waseca, Minn., 56093
(507) 835-2050
In Canada:
A.C. SIMMONDS & SONS, LTD.

KRACO ENTERPRISES, INC.
505 E. Euclid Ave.
Compton, Calif., 90221
(213) 744-2550 and
(213) 639-0666

KRIS, INC.
Pioneer Rd.
Cedarburg, Wis., 53012
(414) 375-1000

LAFAYETTE RADIO ELECTRONICS CORP.
111 Jericho Turnpike
Syosset, N.Y., 11791

LAKE ELECTRONICS, INC.,
1948 E. Lehigh Ave.
Glenview, Ill., 60025
(312) 729-6767

MEGA CORP.
3665 Woodhead Dr.
Northbrook, Ill., 60062

MIDLAND INTERNATIONAL CORP.,
Communications Division,
Dept. CB
Box 19032
Kansas City, Mo., 64141
(816) 474-5060

MOTOROLA, INC.
Communications Products Division
9401 W. Grand Ave.,
Franklin Park, Ill., 60131
(312) 451-1000

NATIONAL RADIO CO.
89 Washington St.
Melrose, Mass., 02176
(617) 622-7700

NUVOX ELECTRONICS CORP.
150 Fifth Ave.
New York, N.Y., 10011
(212) 243-2110

PACE
(see PATHCOM, INC.)

PAL ELECTRONICS
2969 W. Weldon
Phoenix, Ariz., 85017
(602) 264-0214

PALOMAR ELECTRONICS CORP.
563 N. Citracado Pkwy.
Escondido, Calif., 92025
(714) 746-2666

PANASONIC CO.
One Panasonic Way
Secaucus, N.J., 07094
(201) 348-7000

PATHCOM, INC.
(PACE)
24049 S. Frampton Ave.
Harbor City, Calif., 90710
(213) 325-1290

PEARCE-SIMPSON
P.O. Box 520800
Biscayne Annex
Miami, Fla., 33152
(305) 592-5550

RAY JEFFERSON
Main and Cotton Streets
Philadelphia, Pa., 19127
(215) 487-2800

RADIO SHACK
(REALISTIC)
P.O. Box 1052
Forth Worth, Tex., 76107

RCA
Distributor and Special Products Division
Cherry Hill Offices,
Bldg. 206-2
Camden, N.J., 08101
(609) 963-8000

REALISTIC
(see RADIO SHACK)

REGENCY ELECTRONICS, INC.
7707 Records St.
Indianapolis, Ind., 46226
(317) 545-4251

ROBERTS
(see DYN ELECTRONICS, INC.)

ROBYN INTERNATIONAL, INC.
Box 478
10901 Northland Dr.
Rockford, Mich., 49341
(616) 866-1557

ROYCE ELECTRONICS CORP.
1746 Levee Rd.
North Kansas City, Mo., 64116
(816) 842-7505

SBE, INC.
220 Airport Blvd.
Watsonville, Calif., 95076
(408) 722-4177

SHAKESPEARE CO.
P.O. Box 246
Columbia, S.C., 29202

SHARP ELECTRONICS CORP.
10 Keystone Pl.
Paramus, N.J. 07652
(201) 265-5600

SIDEWINDER INTERNATIONAL U.S.A., INC.
357 7th St.
Wayland, Mich., 49348

SILTRONIX
330 Via El Centro
Oceanside, Calif., 92054
(714) 757-8860

SONAR RADIO CORP.
73 Wortman Ave.
Brooklyn, N.Y., 11207
(212) 649-6000

SPARKOMATIC CORP.
Milford, Pa., 18337
(717) 296-6444

STANDARD COMMUNICATIONS CORP.
108 W. Victoria
Carson, Calif., 90248
(213) 532-5300

SURVEYOR MFG. CO.
29245 Stephenson Hwy.
Madison Heights, Mich., 48071
(313) 544-9110

TEABERRY ELECTRONICS CORP.
6330 Castle Place Rd.
Indianapolis, Ind., 46250
(317) 842-0280

TELE COMM COMMUNICATIONS
P.O. Box 3232
Margate, N.J., 08402
(609) 646-6606

TENNA CORP.
19201 Cranwood Parkway
Cleveland, Ohio 44128
(216) 475-1400

TRAM/DIAMOND CORP
Lower Bay Rd.
P.O. Box 187T
Winnisquam, N.H. 03289
(603) 524-0622

UTAC
(see I.A. SALES CO. OF CALIFORNIA)

VECTOR, INC.
23824 Hawthorne Blvd.
Torrance, Calif., 90505
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XTAL
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