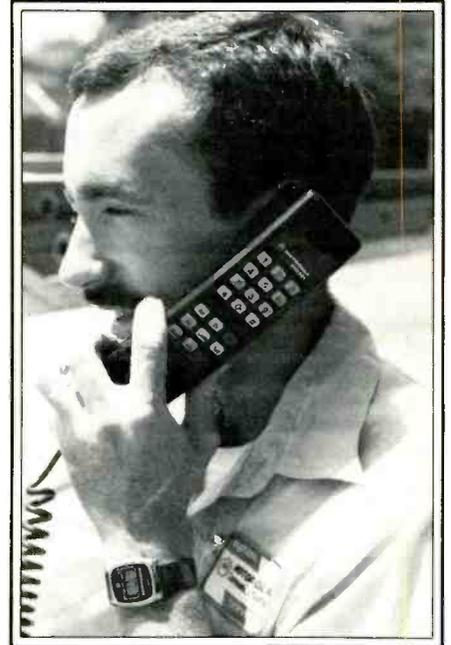
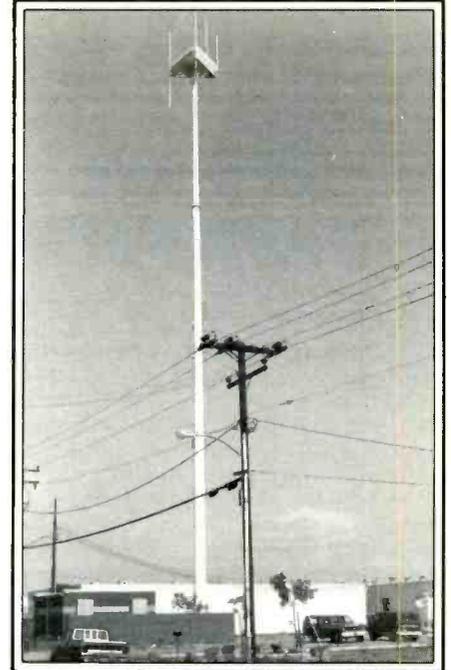


Here's a typical cellular base station antenna.



A mobile cellular system consists of three major components: the remote control head with handset, the trunk-mounted transceiver, and the antenna.

More Than You Ever Wanted To Know About

Cellular Mobile Telephones

BY GORDON WEST, WB6NOA

It's finally here—an \$8.8 billion car telephone service that works exactly like your home or office phone system. No more waiting for an open channel, no more noisy connections, no more missed calls because you were "out of range." All of these problems have been solved with a new generation of mobile telephones—the cellular mobile radio (CMR) network.

The History Of Car Phones

Car telephones have been around for years, but operating a car telephone was like operating a two-way radio. The very early car telephone systems required saying "over" before the other party on the phone could talk back to you in your vehicle. Those early car telephone systems were also plagued with static if you were more than a few miles from the base transponder. You often had to wait up to 15 minutes before the channel was clear to make a phone call. You also had to have your unit placed on the proper channel to receive a phone call if the telephone service offered this feature.

Car telephones in the 1970's went into a slightly refined stage called "Improved Mobile Telephone System" (IMTS), with now only 150,000 users crowded onto just a handful of channels. This would allow for full duplex conversations, similar to a regular phone call. You would not have to drop in the word "over" when you expected a response from the party on the phone. Full duplex would also allow both parties to interrupt each other during a phone call, which is convenient to keep someone from being long-winded. However, the IMTS system still used only 54 VHF and UHF channels, and these channels would become occupied for sometimes hours during rush hour. When you finally did make your connection, you were acutely aware that you were operating a fragile radiotelephone system rather than your trusty old telephone apparatus back at the office. You had to worry about not parking under a bridge for fear you might get cut off from the party you finally contacted through the chance of an open channel during rush hour. You also had to contend with static, adjacent channel

The cellular telephone's handset contains most of the programming controls.

interference, and spark plug noise from the dune buggy right behind you on the freeway.

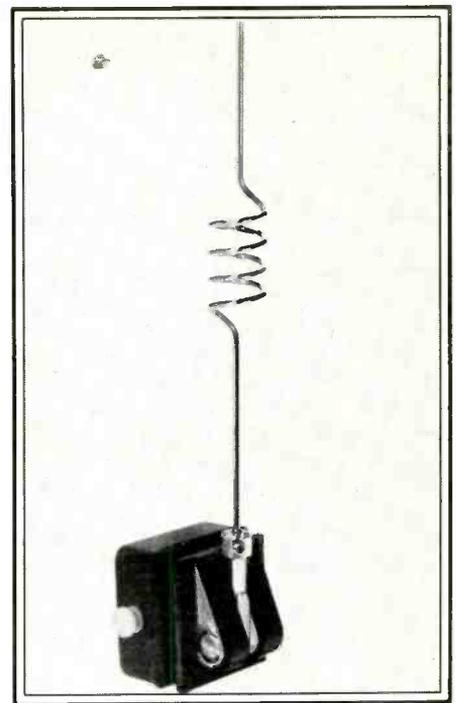
Finally, Cellular

We are now entering into a whole new world of mobile telephone communicating. Instead of operating your telephone like a radio station, you simply pick it up and make a phone call just as if you were in the office. As you drive around town, your cellular car phone will stand ready for any incoming phone call.

"I receive probably 25 phone calls a day, and rarely will the calling party know that they are talking over a car telephone



A cellular mobile phone installation is neat and attractive.



Antenna Specialists produces this mobile antenna suitable for cellular operation.

system," comments Katherine Jorgenson, a new Orange County, California, cellular radiotelephone user.

"Even when I tell them I am talking from a car phone, they don't believe it—there's no static, no echo, no garbled sound—only a clear connection exactly like a regular, everyday telephone conversation," adds Jorgenson.

The cellular telephone system utilizes 666 channels in the 800 MHz region, 40 MHz wide. These ultra-high radio frequencies are well above the very highest frequency you can receive with a UHF tuner on your TV set. Propagation characteristics of low-power signals on this band are quite predictable, and there is seldom a problem from amplitude modulation ignition noise, power line noise, radar noise, and even CB radio transmissions that sometimes occlude regular mobile telephone frequencies. Signals at 800 MHz propagate crystal clear, and are by nature line of sight.

Well, almost line of sight. At 800 MHz, signals tend to reflect quite easily off of steel buildings, concrete walls, and other structures that one might consider obstacles to incoming signals at lower frequencies. This allows you to transmit and receive signals from low-power stations in underground garages, in tunnels, and in among high-rise buildings.

Out in the open, 800 MHz tends to fill in shallow valleys and even reflect around ridges and refract over tall mountains. Although one would think that 800 MHz waves won't go as far as other radio waves on lower frequencies, they do!

Unlike other mobile telephone systems that rely on a single mountaintop transmitter to service mobile units on a specific mobile phone channel, the cellular radiotelephone

system is based on distance, contour-engineered, hexagonal cells that are interconnected to provide a mobile unit uninterrupted coverage within a defined service area. Each individual cell is developed by precision field strength measurements to a central, low-power transmitter and receiving antenna system that serves only that cell. The mileage that any one cell may cover is dependent on the expected usage of car phones within that cell. Out in the open country, a cell might encompass up to 10 miles in radius. However, in downtown areas or around busy airports, a cell could be as small as one-half mile. Each system may contain up to 333 full-duplex channels, all of which are reusable as soon as a mobile unit goes from one cell to another.

Now comes the best part of cellular radio and the ability to always access an open channel. As you drive from one cell to another, your radio system automatically is handed off from the cell you're leaving to the next cell with available channels that you are entering into. This requires, needless to say, some sophisticated, computerized equipment in both your mobile unit as well as at the individual cell sites. Computerized module control units (MCU), electronic switching systems (ESS), and mobile telephone switching offices (MTSO), will keep your calls loud and clear as you drive from one cell to another. As you leave a cell, your signal strength begins to rapidly decay, and this begins the hand-off sequence. When another cell senses your signal is getting stronger, or detects a favorable doppler shift, it will automatically take your call in less than 100 milliseconds. You won't even know that you have changed over to a new transmitter/receiver station. Such handoffs might occur several times in the course of a

conversation as the mobile unit moves from cell to cell in the coverage area.

"Our customers have been quite impressed with the reception of telephone conversations here in Orange County, California. Only now and then in the start-up stages of our system have they noticed a change in audio level as their computerized equipment switches from one cell to another," comments Mark Sheppard of Sheppard Communications, Huntington Beach, California, a specialist in cellular telephone installation and service. "From a technical standpoint, the system is truly amazing; we have only had it on the air for a few months, and there are only a few bugs to be worked out," adds Sheppard.

The electronic layout of each cell is also a marvelous work of art that is tough to compute on paper, and even harder to make work in the real geography of where the system is implemented. Thousands of hours of field strength tests are required to establish cell boundaries, and even simple changes from day to night and summer to winter may adversely affect cellular range unless all of these factors have been taken into account in the original engineering process.

"Our cellular system went on the air in February," comments an East Coast cellular radiotelephone engineer. "For the first two months, our coverage was exactly as planned—then spring came. Just as we predicted, each cell shrank in coverage area because the new foliage began to absorb our 800 MHz signals!" adds our Eastern engineer. They had planned for this, and nicely adjusted their transmitter and receiver antennas to take up the seasonal variations in coverage.

The best part of this whole system is that you will never know that you are going from

Cellular History

1921—Detroit police begin using first mobile telephone service.
1946—First commercial mobile service introduced by Bell System in Saint Louis in 150 MHz band.
1949—FCC establishes radio common carriers.
1956—FCC opens 450 MHz band for common carrier use.
1958—Bell proposes a 75 MHz bandwidth system in the 800 MHz band.
1964—Automatic operation mobile service inaugurated. Improved Mobile Telephone Service (IMTS) eliminates need for push-to-talk operation and allows customers to do own dialing.
1968—FCC opens Docket 18262 to focus attention on mobile service and seek more efficient systems.
1970—FCC conducts investigation of mobile service and finds urgent need to expand and improve service; invites industry to propose innovative mobile system.
1971—AT&T files proposal for development of cellular mobile system.
1974—FCC allocates 40 MHz of 800-900 MHz spectrum for cellular systems and opens filing to all those interested in developing cellular systems.
1975—FCC modifies 1974 ruling to include RCCs.

1975—Illinois Bell files application with FCC to begin developmental test of high-capacity cellular system in Chicago area.
1977—Licenses granted for Chicago system and to American Radio Telephone Service (ARTS) for Washington, DC/Baltimore area.
1978—Experimental service begins in Chicago, serving about 2,000 customers.
1980—FCC issues inquiry and proposed rulemaking for cellular service, emphasizing need to expedite the process to bring service to the public as quickly as possible. Advanced Mobile Phone Service (AMPS) created as AT&T subsidiary to develop and market cellular service nationwide.
1981—FCC issues report and order outlining rules for cellular industry.
1982—FCC decision on reconsideration creates competition by dividing each of the 90 largest markets into two licenses—wireline and non-wireline. Some 194 applications for top 30 markets pour into FCC in June. Avalanche of nearly 400 applications for markets 31 through 60 in November.
1983—Additional 560 applications filed for markets 61 through 90 in March. FCC approves Ameritech system in Chicago, with first U.S. commercial cellular service beginning a week later.

one radio zone to another, and everything does its thing automatically, silently, and you will never miss a call!

Cellular Availability

Before you start thinking about equipment, make sure that your city is on the air with the new cellular system. Thirty major cities are on the air now with cellular radio, and 95 more cities will be on the air by January, 1985. Before you begin shopping for cellular radiotelephone equipment, be sure to find out the progress of cellular radio in your area! It may still be a year off!

Finding The Right Dealer Connection

Everyone in the mobile electronics industry is reaching for cellular radiotelephone business. Although two-way radio sales and installation have normally gone to the professional land/mobile radio dealer, organizations such as Radio Shack, car auto installers, new car dealers, and even your local garage/radio entrepreneur is both selling the equipment as well as offering installation of the equipment.

Although there is a great debate in the mobile radio industry as to who should truly

do the selling and servicing of the equipment, there is so much equipment available that everyone wants in on the act. A word of caution—you should choose your dealer and installer carefully.

"Now that we have begun shipping products, there will be quite a few auto sound dealers getting into the cellular market," indicates Audiovox President, John Shalam. He further indicates that their new equipment will first be sold to new car dealers; but when supply begins to build up, they may look for additional distribution.

"Auto sound dealers are going to give it a try. I'm not sure the numbers will be too sub-

Cellular Radio: Glossary

Access number: The mobile telephone number assigned to a customer giving the user access to cellular service.

Cell: A section of the coverage area, usually one to eight miles in radius, and the basic geographical element upon which cellular service is based. Conceptually, the cell is hexagon-shaped; in actuality its shape depends on geographic considerations.

Cell site: The base station of a cell which includes an antenna and low-powered transceivers and computerized equipment to serve mobile units in that cell. Each cell can access up to 45 of the 333 channels the FCC has reserved for each cellular system.

Cellular Geographic Service Area (CGSA): The coverage area of a cellular system in which high quality telephone service can be obtained. Users frequently will be able to use their units beyond the CGSA, but the quality of the transmission may not be at optimum levels.

Duplex service: A service which permits the user to speak and listen at the same time as in standard telephone service. Some mobile and portable phone services allow only one-way communication.

Improved Mobile Telephone Service (IMTS): Until the introduction of cellular service, IMTS was the most sophisticated mobile service available to consumers. Its limited channels are inadequate to meet the demands for mobile communications existing today. Cellular will not eliminate IMTS, but most IMTS telephone units will not be compatible with the cellular system.

Module Control Unit (MCU): The microprocessor at the cell site transmitter which monitors the signal strength of all calls. When a

signal drops below a preset level, the MCU signals the Mobile Telephone Switching Office, which controls the network of cell sites.

Mobile Telephone Switching Office (MTSO): The electronic center that controls the network of cell sites in a geographic area. The MTSO performs a number of functions, but the most important from a user's point of view is monitoring and transferring calls as the user moves from cell to cell.

Party Line: The type of service found on some older mobile telephone systems which, because of the nature of the technology used, allows users to hear calls made by other users. Cellular mobile technology assures greater privacy through the use of numerous, random frequencies to carry calls.

P.02 Grade of Service: The grade of service engineered by Pac-Tel Mobile Access. This means that customers can expect to experience a busy signal (all channels busy) in only two out of 100 attempts during the busiest hours.

Roaming: The act of sending or receiving a call in a cellular service area other than the unit's home CGSA. National cellular carrier agreements are expected to permit PacTel customers to use their units in other areas equipped with cellular systems.

Scratch Pad Dialing: Feature on cellular mobile telephone unit which allows a number to be stored at any time, even when the unit is engaged on another call.

Wireline company: A telephone company or its parent corporation. Each coverage area will be authorized one cellular service affiliated with a wireline company and one owned by a non-wireline company.

Cellular Phone Manufacturers

Advanced Cellular Technology Inc.
Henri Van Houten, VP-Sales and Marketing
1919 Hartog Dr.
San Jose, CA 95131
408/293-2923
Mobile phones

The Antenna Specialists
Rick Reed, Sales Manager, Cellular
12435 Euclid Ave.
Cleveland, OH 44106
216/791-7878
Suppliers of cellular base and mobile antenna systems.

Auxton Computer Enterprises Inc.
Jim Thompson, VP-Marketing
200 E. Robinson St., Suite 1560
Orlando, FL 32801
305/425-3300
Customized cellular software

Avantek
Scott Helling, Manager, Powertech Amplifier
Applications 481 Cottonwood Dr.
Milpitas, CA 95035
408-946-3080
Power amplifiers, pre-amplifiers and oscillators

Cellular Radio Systems
Kenneth Orashan, president
5730 S. Kenton Way
Englewood, CO 80111
303/370-6073
Mobile units

Celwave Technologies Inc.
Oscar Harris, Manager, Cellular Products
Rt. 79
Marlboro, NJ 07746
201/462-1880
Complete cellular base and mobile antenna systems, duplexers, combiners, cable.

Chatlos Systems Inc.
Amy G. Peters, Regional Account Executive
125 Algonquin Pkwy
Whippans, NJ 07981
201/887-1456 or 800/631-8117

CTI Inc.
Jim Tucker, President
P.O. Box 71, Highway 45 South
Corinth, MS 38834
601/287-8081
One- to 4-cell systems

Decibel Products Inc.
Bob Corwin, Director of Marketing
3184 Quebec
Dallas, TX 75247
214/631-0310
Complete suppliers of RF antenna systems.

E.F. Johnson Co.
Mobiletelephone Systems Operation
Nick Stanley, J. Michael Anderson, Tom Asp
299 Johnson Ave. S.W.
Waseca, MN 56093
507/835-6222
Complete product line of RF equipment: mobiles, subscriber units, cell site radio systems, complete Celltrex turnkey cellular system through ITT Telecom

Ericsson Communications
Radio Systems Unit
Mats Ljunggren, Marketing Manager
1290 Wall St. W

Lyndhurst, NJ 07071
201/939-5300
Turnkey systems

Fujitsu America Inc.
Kiyoshi Kawai, Director, Radio Communications
or Sales Manager
10 E. 53rd St.
New York, NY 10022
212/308-7920
Base station radios, mobile and portable units

General Electric Company
Mobile Communications Business Division
John Berti, Jack Hurley
Mountain View Rd.
Lynchburg, VA 24502
804/528-7242
Everything from mobile/portables to turnkey systems; marketing system with Northern Telecom

Glenayre Electronics
Dave Leop, Cellular Product Manager
12 Pacific Highway
Blaine, WA 99230
206/676-1980
Mobile units

Harris Corp., RF Communications Group
Mobile Telephone Division
Nick Studer, National Sales
1680 University Ave.
Rochester, NY 14610
716/244-5830
Full system turnkey supplier, including mobiles, portables at a later date, IMTS cellular transition package available

Hitachi America Ltd.
Dudley M. Meyer
National Accounts Manager
290 Gateway Dr., Suite 1000
Norcross, GA 30071
404/446-8820
Mobile units

ITT Telecom
Network Systems Division
H.E. Rollin, Program Director
3100 Highlands Blvd.
Raleigh, NC 27604
919/872-8951
Complete turnkey Celltrex cellular systems (large to small); base radios and mobile units offered through agreements with other vendors

Japan Radio Co. (JRC)
c/o Nissho Iwai American Corp.
Takao Tsuji, Manager-Electronics Dept.
1211 Ave. of the Americas
New York, NY 10036
212/730-2228
Mobiles, portables and base station RF equipment

Kathrein Inc.
William A. Wickline, P.E., President
26100 Brush Ave., Suite 319
Cleveland, OH 44132
216/289-1271
Professional antenna systems

Kokusai Electric Co. Ltd. America Mike
Musso, Naoya Kimura
363 Coral Circle
El Segundo, CA 90245
800/421-5702, 213/615-3191
Mobiles, base stations, portables under development

Millidyne Inc.
Al Kruhm, program manager
1770 Walt Whitman Rd.
Melville, NY 11747
516/420-0757
Complete turnkey systems

Mitsubishi International
Robert Foley, Supervisor
Communications Equipment Sales
1098 Tower I.a.
Bensenville, IL 60106
312/595-6494
Mobile/portables, base station equipment and turnkey systems in conjunction with Stromberg-Carlson

Mobira Oy
Kari-Pekka Wilska, Vice President
P.O. Box 86, SF-24101 Salo 10, Finland
011-358-24-6101
Telex 6823 mobi sf
Mobile units

Motorola Inc.
Phil Petersen
Strategic Sales Manager
Common Carrier Markets
1301 E. Algonquin Rd., SH 4
Schaumburg, IL 60196
312/576-3058
Complete turnkey systems, from engineering design through installation and maintenance; mobile/portables

NEC America Inc.
Mobile Radio Division
Vernon Hull, Manager, Mobile Engineering
4936 W. Rosecrans Ave.
Hawthorne, CA 90250
213/973-2071
Complete turnkey systems, from engineering design through installation and maintenance; mobile/portables

New England Engine Corp.
Stephen Faulkner
Cellular Marketing Manager
Route 1, P.O. Box 335
Rowley, MA 01969
617/948-7331
Emergency generators for cellular transmitting sites.

Northern Telecom Inc.
Raju Patel, VP-Marketing
1201 East Arapaho Rd.
Richardson, TX 75081
214/234-7782
Complete "Enterprise" turnkey systems (switching) in conjunction with General Electric (radio portion)

Northern Telecom
Bill Adams, Director, DMS-10 Marketing
4001 E. Chapel Hill-Nelson Highway
Research Triangle Park, NC 27709
919-549-5000
Cellular software for DMS-10, a small central office switch

NovAtel Communications Inc.
(Formerly Westech/Systems Inc.)
David Frye, Vice President-C.O.O.
2820 Peterson Pl.
Norcross, GA 30071
404/449-6666
Mobile phones and systems, including engineering

OKI Advanced Communications
Tony Russo, Vice President
1 University Plaza
Hackensack, NJ 07601
201/646-0011
Mobile/portables

Panasonic Industrial Company
Telecommunications Division
Carl Mathis, National Sales Manager
1 Panasonic Way
Secaucus, NJ 07094
201/348-7933
Mobile/portables, complete systems

Quintron Corp.
Neil Quellhorst
Program Coordinator, Cellular Products
1 Quintron Way
Quincy, IL 62301
217/223-3211
Flexible cell-site equipment, single-cell system

Stromberg-Carlson Corp.
Bill Woodruff, General Manager
P.O. Box 7000
Longwood, FL 32750
305/339-1600 x161
Mobile/portables, base station equipment and turnkey systems in conjunction with Mitsubishi International.

Tactel Systems Inc.
(Formerly Tactec Systems Inc.)
William H. Cole, Vice President, Marketing
Country Club Rd.
Meadow Lands, PA 15347
412/228-6570, 6476
Mobile/portables

TeleConcepts Inc.
Robert Winkler, president
36 Holly Dr.
Newington, CT 06111
203/666-5666
Mobile units

Telesaver Inc.
Joel Maloff, Director
Systems Marketing and Sales
20 Gwynns Mill Court
Owings Mills, MD 21117
301/363-2500
Small cellular switch

Toshiba America Inc.
(Represented in the U.S.
by Tactel Systems Inc.)

Valmont Industries
Larry Hbler, Tom Kyle
Valley, NB 68064
402/359-2201
Manufacturer and installer of cellular pole and tower structures.

Walker Telecommunications Corp.
Burt Walker, president
200 Oser Ave.
Hauppauge, NY 11788
516/435-1100
Mobile units

Western Electric
Commercial Sales Organization
P.O. Box 28000
Greensboro, NC 27420
800/334-8155
Complete system and services offerings

stantial this year, but by 1985 it will be an entirely different story."

Radio Shack, via its parent company, Tandy Corporation, will also join the national retailers who will be carrying cellular mobile phones. A local Southern California Radio Shack dealer indicates that he has received many inquiries about the new cellular phone system.

What's the first question that everyone asks? *What's the price of a typical cellular system?* Today it's \$3,000 for purchasing the equipment outright, but by next year industry experts predict that the price may drop to as low as \$2,000. One new manufacturer is promising a \$1,000 unit!

The second most often asked question?

How much does it cost to make a phone call? Many systems throughout the country charge approximately \$30.00 to \$45.00 per month for the service and about fifty cents per minute for phone calls. When the service charge is around \$60.00 per month, the actual on-the-air charges may drop to as low as twenty-five cents per minute. Some companies may charge no basis air time fee, but you must guarantee them several hundreds minutes of on-the-air time per month at a pre-determined dollar amount.

As an average, once you have purchased your \$3,000 cellular phone, it will probably cost you an additional \$125 per month to place and receive calls.

The actual installation of the equipment is

quite straightforward. Twelve VDC feeds the 3 watt, 9 pound transceiver unit buried in your trunk or under the seat. An interconnect data cable then marries the 28-ounce control head with your hidden transmitter/receiver. Coaxial cable (it looks like CB cable, but it's actually very expensive, low-loss cable) interconnects your trunk transmitter/receiver to a 7-inch antenna that has curls in the mid-section.

Although almost anyone can basically install the equipment, the programming of the setup is crucial to the proper operation of your unit. If you buy your cellular radio from one organization, and then have it installed somewhere else, chances are you are not going to be satisfied with its performance. I

Answers To Common Questions About Cellular Telephone

Question: Are there any commercial cellular telephone systems operating in the U.S.?

Answer: Yes. Chicago became operational last year. The other 29 cities in the Top 30 which should be operating by the end of 1984 are:

New York Metro
Greater Los Angeles
Philadelphia
Detroit/Ann Arbor
Boston Metro
San Francisco/Oakland
Washington, DC
Dallas/Fort Worth
Houston
St. Louis
Miami/Ft. Lauderdale/Hollywood
Pittsburgh
Baltimore
Minneapolis/St. Paul
Cleveland

Atlanta
San Diego
Denver/Boulder
Seattle/Everett
Milwaukee
Tampa/St. Petersburg
Cincinnati
Kansas City
Buffalo
Phoenix
San Jose
Indianapolis
New Orleans
Portland, OR

Q: How many cells do you need to service a metro area?

A: This will depend on the size of the city, its topography, and the number of subscribers on the system. Cells can be subdivided at any time to meet traffic needs. It has been estimated that a market like Washington, DC, would need 7 to 18 cells. The initial three cell test set-up for Jacksonville likely would be tripled when commercial operation begins.

Q: What frequencies are used for cellular telephone?

A: The FCC has assigned 666 channels between 825-845 MHz and 870-890 MHz for use in each market. There is a 30 kHz spread between channels to eliminate "crosstalk" or interference.

Q: Will a cellular telephone ever be used for data transmission?

A: That is a planned future application. Stockbrokers, real estate agents, and others may eventually be able to receive and transmit data over their in-car cellular radiotelephone linked via a modem to a portable terminal or computer.

Q: Will the advent of cellular wipe out the present market for mobile radio?

A: Not at all. Some small businesses will certainly switch to cellular, but major users—police, fire, service organizations—will continue to operate their own dedicated systems.

Q: Will cellular telephones be offered by auto makers as optional equipment?

A: Absolutely. Automobile makers have already seen the potential of cellular telephones. General Motors is offering them on one model in the Chicago market, and Ford plans to make them available on 1985 models. Three car rental companies have announced their intention to make the units available in selected models.

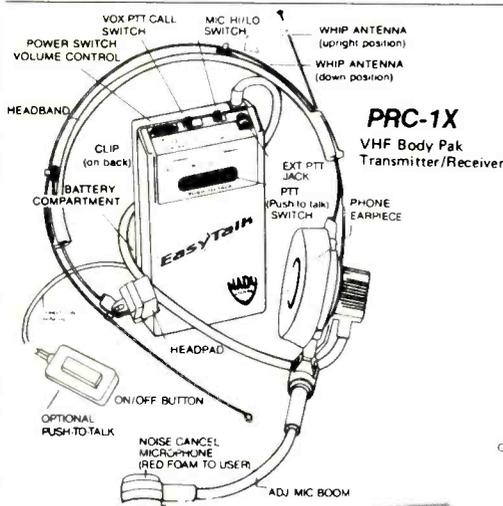
Q: What about overseas?

A: Several countries are already using a form of cellular service. A Scandinavian system serving Norway, Sweden, Denmark, and Finland has some 48,000 subscribers, and one in Saudi Arabia recently began with 2,000 subscribers but expects to have 19,000 by the end of 1984. Other countries with cellular systems are Japan and Australia.

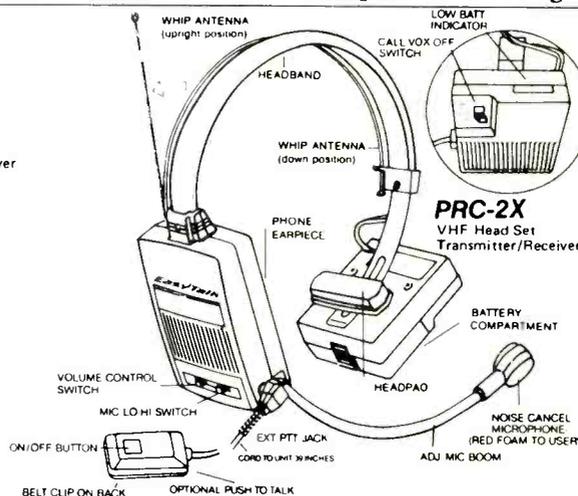
EasyTalk™

PERSONAL RADIO COMMUNICATORS

Walkman Style Walkie Talkie
Communication Devices up to 1/2 mile range.*



PRC-1X
VHF Body Pak
Transmitter/Receiver



PRC-2X
VHF Head Set
Transmitter/Receiver

AUTOMATIC OR MANUAL TRANSMISSION: Voice-triggered VOX operation allows hands-free operation, or can be operated manually with either PTT (Push-to-Talk) switch on unit, or remotely with plug-in PTT switch on one meter cable.

CHOICE OF MODELS: Choose the model best suited to your application. The PRC-1X is a body pack transmitter with an attached headset. The PRC-2X is a transceiver completely housed in the headset.

***NEW EXTRA FEATURES**

BEEPER "CALL": EasyTalk™ unit can be put in "call" mode when headset is removed. Loud, intermittent beeps clearly signal incoming calls.

NOISE-CANCEL MICROPHONE: Unidirectional microphone responds only to user's voice and eliminates most loud, extraneous noises, allowing VOX operation in higher noise environments.

LOW BATTERY INDICATOR: To guarantee optimum performance, flashing LED signals user when battery is low and needs replacement.

13.5 KV High Voltage POWER SUPPLY



New hi-volt power supplies made by Wabash Co. Their original use was probably to electrify the coronas in a photo-copy machine. The high voltage nature of this device should "spark" your imagination - small lasers or bug zappers, etc. Input 115 V, 60 Hz. Output 13.5 KV 0.5 ma. Shpg. Wt. 6 Lbs SPL-470-33A \$12.00

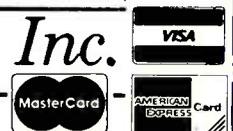
SPECIFICATIONS (GENERAL)
Power Source • 9VDC (Type 006 Px1)
or (Type MNI604x1) Alkaline
Frequency Range • 49.830 - 49.890 mHz
Current Drain • Standby
15mA/Receive 65mA/Transmit 85mA
Service Area • Approx. 1/4 Mile (400
meters) Optimum Conditions-to 1/2 Mile
Dimensions • 4.68" (H) x 2.44" (W) x 1.06" (D)
Weight • 8.92 oz. (250 grams)

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PRC 3X VHF BodyPak similar to PRC
1X, but full duplex \$60.00 2/\$115.00
Push to Talk button for PRC 1X & 2X
\$10.00 @

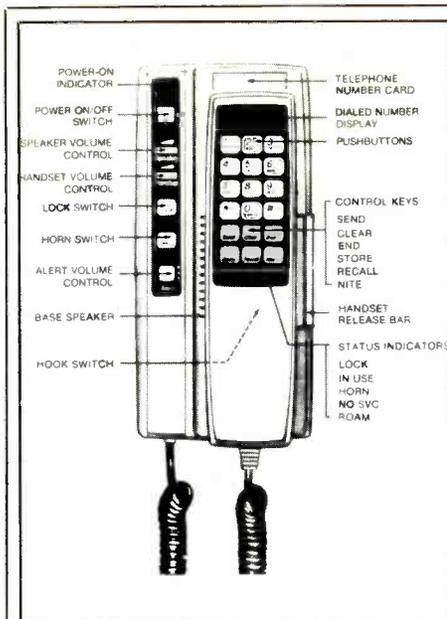
This product is new & guaranteed functional. Comes w/ 9 volt battery.

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CIRCLE 20 ON READER SERVICE CARD



A Technical Overview On How Cellular Mobile Phones Work?

The cellular telephone that mobile systems customers will use is similar to pushbutton telephone, but has some modifications to make it easier to use in a car.

Cellular phones differ from conventional phones in that the numbers are not transmitted as they are dialed—one at a time. Rather, to minimize on-air time, they are stored—with a display allowing the user to see what number has been dialed—and then are transmitted all at once when the “SEND” button is pushed. Another change allows the number to be entered and sent with the handset still on the hook.

The mobile phone includes a speaker in the base, as well as one in the handset. This allows the user to hear the called party answer before having to pick up the phone. In fact, when the optional “hands-free” feature is purchased, the user need not pick up the handset at all—a major convenience on winding roads or in heavy traffic. When the hands-free feature is used, the customer “hangs-up” by pushing the “END” button.

The “POWER ON/OFF” button allows the user to turn the phone off to avoid being disturbed. Or, while away from the car, the user can leave the power on (and the car key in the auxiliary power position) with the optional horn alert feature activated. This blows the horn anytime a call is received. An alternative installation activates the lights

rather than the horn. The “ALERT VOLUME CONTROL” adjusts the ring volume.

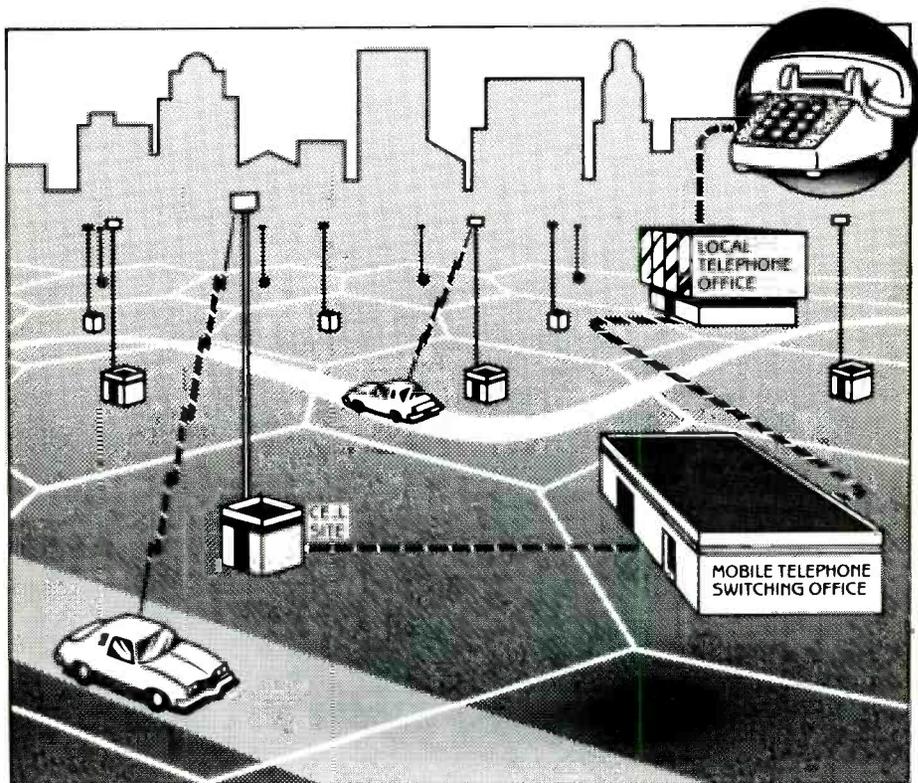
When a car is left with attendant parking or in other situations where the customer is concerned about unauthorized use of the phone, the unit can be locked electronically by pushing the “LOCK” button. The phone is unlocked by pushing a preset three or four-digit code known only to the customer.

Other features include separate volume controls for the base and handset speakers and a switch that adjusts the brightness of the lighted displays for easy viewing.

The cellular phone also includes a num-

ber of features common in advanced push-button phones. These include “Last Number Recall” (the last number dialed can be redialed just by pushing SEND), “Repertory Dialing” (10 or more telephone numbers can be stored and recalled by a two-digit code), and “Scratch Pad Dialing” (a number can be stored for dialing at any time, even when the phone is in use on another call).

Wherever the user goes within the cellular system, cellular phones provide instantaneous, direct access to the nationwide public telephone system—to local, long distance, or even international calls.



Cellular technology is based on a grid of hexagons, or cells, that cover specific geographic areas. Each cell contains a low-powered radio transmitter and control equipment located in a building called a cell site.

The cell site is connected by wireline facilities to a Mobile Telephone Switching Office (MTSO), which is connected to the regular landline network through the telephone central office. With its electronic switching capability, the MTSO monitors the mobile

units and automatically switches or “hands-off” conversations in progress as the mobile unit moves from one cell to another.

Each cell has a set of radio frequencies, allowing reuse of every channel for many different simultaneous conversations in the given service area.

As demand for the service grows, dividing cells into smaller cells can meet customer needs even in the most densely populated areas.

recommend you only buy the cellular equipment from an organization that provides all of the service and programming for your particular piece of equipment on the specific service offered in your local area. This way you will end up with good service from a compatible unit that can take advantage of all of the benefits of cellular radiotelephone coverage.

And now the icing on the cake: With cellular, the scanner crowd won't be able to

eavesdrop on your constantly channel-switching phone calls. For every 100 times you pick up the handset to make a phone call, you will receive a dial tone within one second at least 98 of those times. The other two times, you may have to wait approximately 20 seconds before your unit finds a dial tone—and that's not bad!

The tiny handset will memorize 30 often-called phone numbers and prioritize all of those emergency numbers that you never

can remember. It will double as a minicalculator. It will also tell a calling party that you are out of the car and instruct them to punch in their phone number.

Need I say more? If you are the professional that constantly needs to stay in touch while in your vehicle, the cellular radiotelephone service may be just the answer for you. Stop by any business radio dealer for a demonstration. By 1990, there may be 12,000,000 users. Will you be one? **PC**