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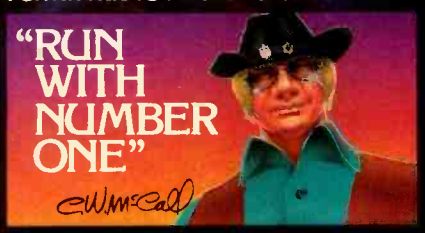

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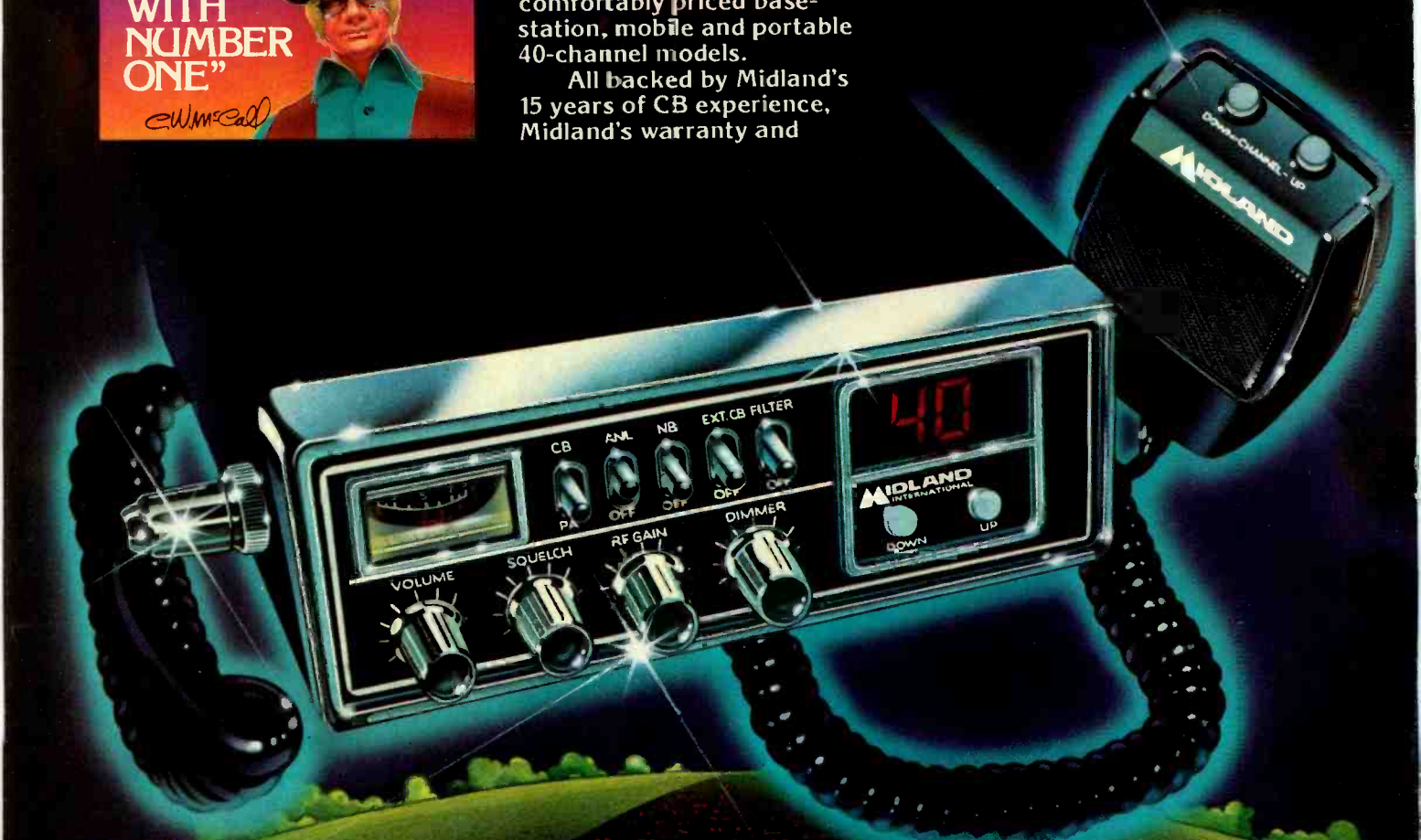

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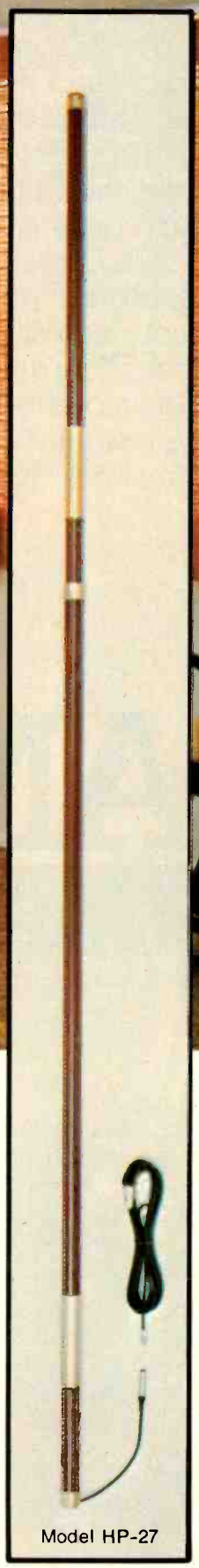

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CB RADIO S9

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America's Oldest & Largest CB Magazine

Vol. 17 No. 5 May 1977

COVER STORY

As the Sun sinks slowly in the West, and our row-boat sinks slowly in the lake, we realize the fun of having CB handy while doing our back-to-nature "thing." Cover illustration by John Kane.

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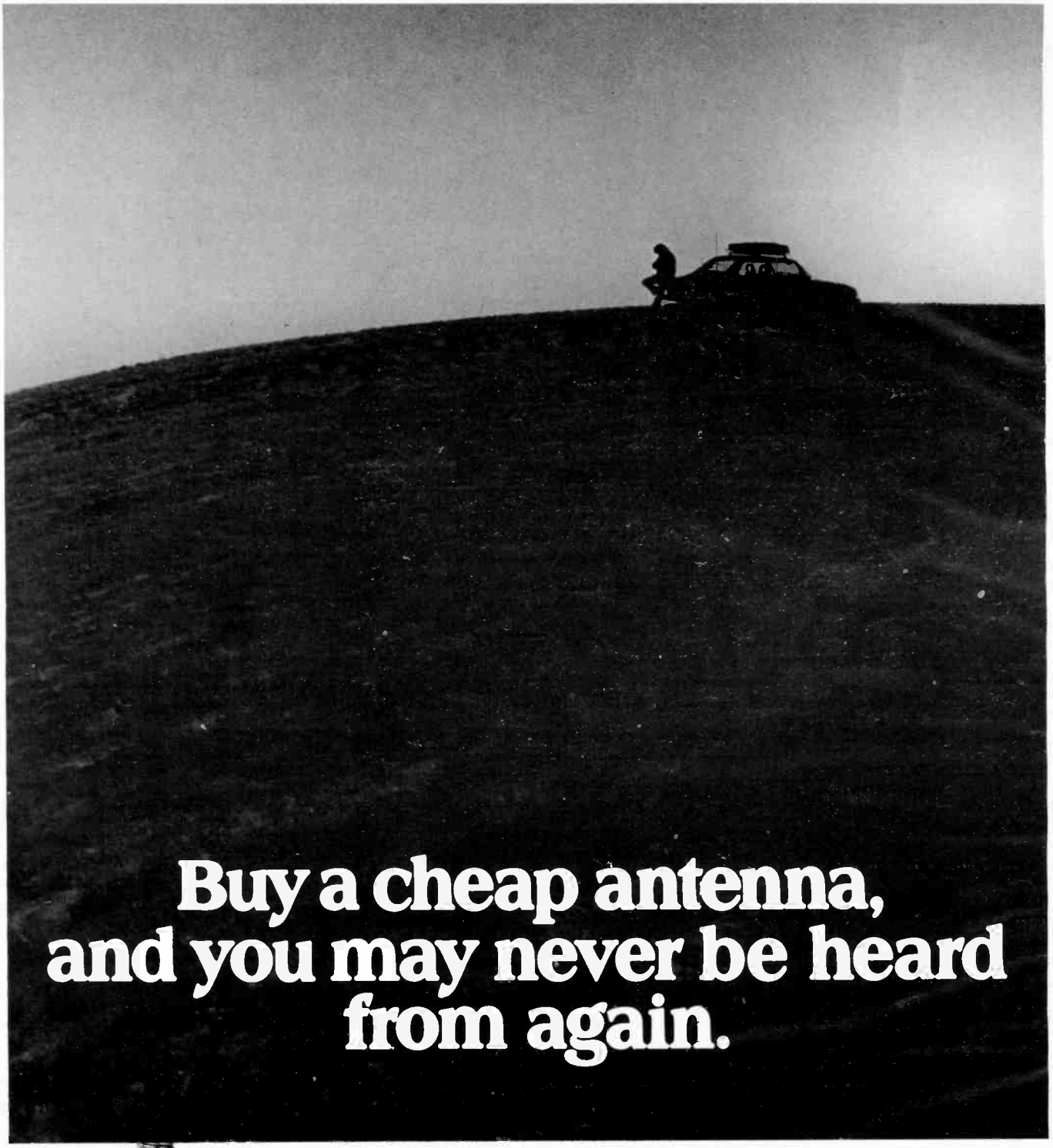

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Message from the Publisher

First off, I want to thank the many readers who took their valuable time to send us names of local CB dealers in response to our ad in the March S9. Already we've gotten thousands of dealer names from all over the country. Literally hundreds of S9 readers contributed toward this effort, and by the time the program is complete, the number of cooperating readers will be well in the thousands.

We're now in the process of checking the dealer names against our existing mailing list. Those names that haven't already been receiving CB RADIO MARKETING will be mailed a request card to send back. Upon receipt of that card, we'll be able to send them CBRM free every month. When the final tabulations are complete, the thousands of loyal S9 readers who helped out in this campaign will be notified that their subscriptions have been extended in appreciation of their efforts.

Please be patient on this matter. It'll take from three to four months to complete the tabulation, the verification, and the updating of the subs.

Now, if I might, I'd like to ask your assistance in another unrelated area. As you may already know, I have personally been syndicated to write a weekly CB Radio column for newspapers by King Features, the country's largest feature syndicate. My columns are already appearing in several leading papers including the Chicago Tribune and Detroit Free Press.

Unfortunately, many fine papers already have other syndicated columns, and are reluctant to make a change. What they don't realize is that the columns they're now publishing are either weak in content, full of misinformation, or just plain dull. To turn out a vibrant column a writer has to live CB radio every day. Believe me, I do just that. I eat, sleep and breathe CB Radio. It's a major part of my life style.

The column I've been writing is far better than those written by other columnists. I don't say that merely to brag, but because I truly believe it. If you want up-to-date, timely and interesting news available in your local paper every week, I've got the material for just that. But you've got to let the editor of your local paper know that you want it.

Please write the local paper and tell the editor you'd like to see them publish "CB IN ACTION" by Dick Cowan, which is syndicated by King Features. With enough reader pressure, they'll make the switch. And we'll both be better off. So will CB Radio.

CB Newswire

YOUR CB NEWSPAPER MAY, 1977 INCLUDED IN S9

They All Know Red Apple!

His handle is "The Red Apple."

Ron Vnuk, through his citizen band radio base station, is a "good buddy" to truck drivers and to anyone else who needs help finding streets and locations in the City of Manitowoc, Wisc.

Vnuk also depends on his good buddies in the ever-widening CB circle to help him do the things he is no longer able to do.

"I can't work at my job anymore," Vnuk says, "but the CB keeps my mind active."

Vnuk has multiple sclerosis. He's had it for 22 years, but until this year he was able to work.

This fall when Vnuk spent a few days at Holy Family Hospital, his CB friends "Kilowatt," "Green Machine," "Orange Peel" and "The Godfather" rigged up a portable CB unit for him in his hospital room. It created quite a stir at the hospital.

'They're nice guys," Vnuk says. "They'll do anything for me."

Vnuk's handle, "The Red Apple," is posted on truck dispatchers' boards in several locations, including one in North Carolina.

"I know the city pretty well," Vnuk says, "and if I can give the drivers some help I feel as though I'm being useful." Sometimes, he says, the same drivers pass through Manitowoc again, and break for "Red Apple" just to say "hello" and see how he's coming along.

Vnuk was using a mobile CB unit long before the current popularity of CB.

He worked for the Chicago Bridge and Iron Co. and traveled throughout the United States.

His first handle was "The Polish Count," but there were a lot of CBers with the same type handle, and he began looking for a new one. One day he was passing through Wittenberg, Wis., and talked to "Mama Duck" over his mobile unit.

"She was eating something and told me it was a red apple. I said, 'That's my new handle,' and that's how I got this name," he explained.

He thinks of his CB unit as an information base.

He starts the day "reading the mail".

"And sometimes I'm at it from 7 a.m. to midnight," he says.

His wife, Joyce, works in an office, and although she's not an active CBer, her handle is "Twinkle Toes."

Their son, Brad, is on the cross-country track team at Lincoln High School. His handle is "Distance Runner."

Vnuk's CB base station is in the basement of his home.

"Nothing fancy," he says of his equipment, "but I've certainly met a lot of nice people through my CB."

Penn. CB'ers Aid In Saving Hunter's Life

A gallant wintertime effort by three Noxen men on an ambulance assignment with the help of local CB'ers can be credited with saving the life of an out-of-state man, who was the victim of a hunting accident. An uncertain location, rough roads in State Game Lands, snow and ice, road blocks and poor communications were all working against the men as the rescue was underway.

The story as heard from those at the scene follows: Thomas Kabusk, 46, was hunting with his brother Paul, both of Trumbull, Connecticut, in Section 57 near Gate 1 of Pennsylvania Game Lands above Noxen when the accident occurred. Both men had found a post and climbed trees to wait for deer season to open at 7 a.m.

Paul knew his brother had to be in trouble when he heard the shot at about 5:40. He ran to the scene and found Thomas had fallen from his post in the tree. The victim had been wounded in the right side of his chest, evidently by his own rifle which accidentally discharged. The bullet entered at an upward angle and went through the back of his shoulder. Kabusk was conscious and bleeding badly. His rifle still hung in the tree branches.

CB'ERS HELP

The rescue began as a nearby hunter with a walkie-talkie was found, who sent out the call for help. The urgent message was received and passed on by CB'ers. "Overdrive" picked up the call and broadcasted it to "83, the PA mail carrier" who then forwarded the message to "Angel" who alerted the Noxen Ambulance. Ralph McCormick received the telephone call at his home at 6:10 a.m. and then phoned David Crossmon and Bob Crispell who assisted in the rescue.

The men in the ambulance soon discovered they had serious problems. First of all, they were not sure of where the victim was located. Radio broadcasts from those at the scene weren't being received clearly by the ambulance radio. Only one CB broadcaster came in clearly, that was Evelyn Hettesheimer, known as "Heavy Evy", also of Noxen. She soon realized the situation and joined the rescue team relaying messages from those at the scene to those in the ambulance so that the victim could be located. She also telephoned the hospital to alert them to the emergency.

Another problem encountered by the rescuers in the game lands was the rough icy roads which weren't made to be traveled by their 1968 Cadillac ambulance. Upon arrival, other hunters assisted in transporting the victim to the roadway where the ambulance waited.

TRAFFIC BLOCKED

Their journey wasn't over, however, as they left the game lands enroute to the Tyler Hospital, Tunkhannock. Crossmon, at the radio, received a message that a tractor trailer had jackknifed on Copper Mine Hill, Route 309, blocking all traffic. Their destination was changed to the Nesbitt Hospital, Kingston. Icy highways made their journey slow and difficult.

In Shavertown a driver of a VW panicked as the ambulance approached. The VW suddenly stopped in the path of the ambulance. Crispell, behind the driver's wheel, had no choice but to maneuver the ambulance up over the highway divider into the lanes of oncoming traffic until they reached an intersection where they crossed back over to the correct lane. Meanwhile McCormack was in the back doing what he could for the victim, packing the wound, controlling the bleeding and treating for shock. Rescuers finally reached the hospital at 7:50, more than two hours after the accident occurred.

At the hospital Kabusk was listed in serious condition. Besides the gun wound, he suffered a fractured leg and arm.

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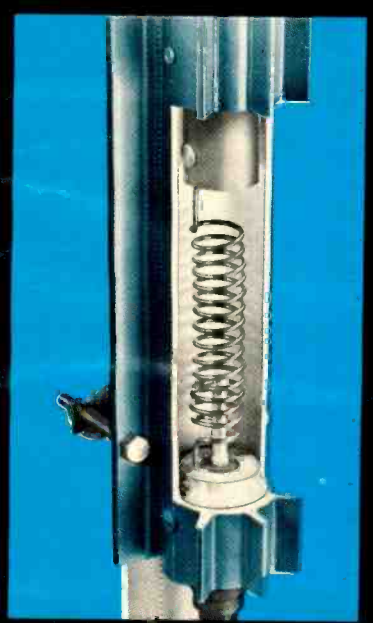

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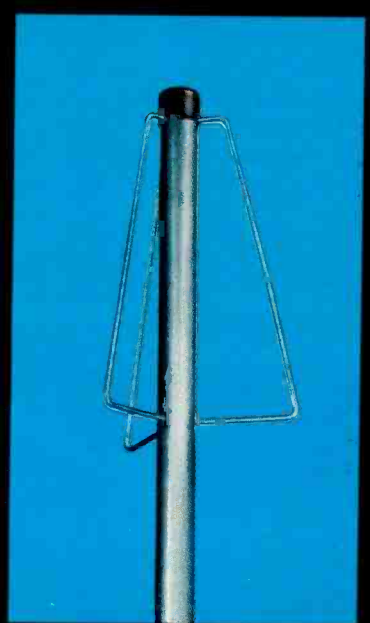

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CB Newswire

YOUR CB NEWSPAPER MAY, 1977 INCLUDED IN S9

EUROPE DIGS CB!

Cleo calls Zebulon and Challenger breaks to Alpha Whisky on France's illegal but tolerated and flourishing Citizens Band radio network.

Stamped on by some governments, tolerated or fully permitted by others, the CB mania which has swept the United States is creeping up on Europe.

But European CBers tend to speak "in clear," apart from their nicknames. There are no smokey bears or cotton-pickers yet on European airways, and long-distance truckers rarely are CB-equipped, because of the problems of different national regulations in a region where you can cross a frontier every few hours.

"We are usually 10 years behind developments in the States, and whatever will happen if the full force of CB hits us I just don't know," said an official of the French Post Office, which controls the nation's airwaves.

"Look what's happening in Italy. There are hundreds of thousands of operators"—estimates run around 300,000 at least—"and the airwaves are chaotic."

The official, and French CBers, complain bitterly of being "swamped" by their good buddies in Italy in certain reception conditions.

CB is legal in Italy for private use up to five watts power output, similar to the U.S. rules, and users are supposed to be licensed. Most are not, and this is tolerated as, according to the French, are much higher power outputs which boom in over their low-power sets.

Around Europe, CB at this power, giving a basic range of 10-15 miles, usually is legal only for business purposes—taxis, tow trucks, ambulances, a fleet of service vehicles, for example—with private use restricted to walkie-talkies with a mile or two range.

In Holland, officials say there are "a very large number" of illegal operators, and several pressure groups are trying to have the 27 MHz band, the CB range, opened for free use without examinations or licences—but the authorities show no signs of weakening.

CB is illegal—even for walkie-talkies—in neighboring Belgium, but sales of walkie-talkies are booming for children, and French CBers in border regions constantly chat with fully equipped Belgian CBers. "They sometimes come across the border to operate a bit more freely, however," one French enthusiast said.

In Scandinavia, full power CB is legal except in Denmark. Tens of thousands of licenced operators use CB sets, often from coastal island holiday homes or boats.

In France, the situation is "hypocritical," one radio dealer said. "CB is supposed to be restricted to professional use. A guy comes in here with a company letterhead—how am I to know if he's authorized—so I sell him a set. It's up to him to get a license."

Post Office officials admit they believe many of the "professional reasons" given to get licenses are phony. The radio dealer said he got a veiled hint from communications police that they would be cracking down in the future, but experienced CBers say the police are too understaffed to expand their activities.

Much simpler and general practice, according to CBers, is to get a cheap walkie-talkie license, then buy a full CB rig. Many CBers use their official license number on their illegal sets without any trouble. But the dealer said, "We sell a minority of the sets in use. . . . Most of them come in illegally from Switzerland," where sets are much cheaper and more varied, but paradoxically, the Swiss ban CB operators.

"The radio police only crack down on blatant misuse," says film producer Roland (Zebulon) Nonin, president of the largest French CB club. "Like when some silly kid puts a linear amplifier on his rig and blasts out a massive signal, or uses dirty language. The radio police are too undermanned to do anything but react to complaints and check suspicious political usage."

(See our detailed report on CB in W. Germany elsewhere in this issue.)

Florida CBers Help Family

Papa Bear was on the air with the Godfather and when they finished talking, a St. Petersburg family had a new temporary home to replace one that burned earlier that day.

With the help of the Queen of Hearts, Red Rider, his wife Skinny Minnie, Voodoo Lady, Midnight Flower and countless other CB'ers, James and Johnnie Williams were given furniture, clothing and food. By late afternoon the Williams were offered a temporary home in Kingfish's motor home.

They will be moving into a house owned by the Queen of Hearts, Mrs. Jeannetta Thomas. She and others arranged for the water and electricity to be turned on and Mrs. Thomas had the house painted.

Papa Bear, known as Tom Overman in his job at the St. Petersburg Police Department, said Godfather called him to tell him of the Williams' plight. Just a few hours earlier their home was destroyed in a roaring fire. It had left the Williams and their grandchild who lives with them homeless.

The two men began calling for help. By late afternoon, they had collected a dining room suite, a bookcase, end tables, piles of clothing and boxes of food. More came in the following day.

Lady Deep Diver managed to come up with a bed for the child said Overman.

The CB'ers say the Williams case is just one of many where they have offered help. Mrs. Thomas, a CBer for eight years, said the Central West Coast Communications and Freedom CBers, organizations in which she is a member, offer assistance routinely.

CBers paid for the funeral of a Largo man, they have found lost children and raised money for others in need. They help their own members, too she said.

"When Hot Chocolate was in the hospital, we arranged to take care of her four children," said Mrs. Thomas.

Overman is a newcomer to CB radios. He got his unit last November.

"You wouldn't believe the people you get on the channel," said Overman. "You just hit the key and you've got more help than you would ever need."

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CB Newswire

YOUR CB NEWSPAPER MAY, 1977 INCLUDED IN S9

"MY Father's Dead!" Calls 4-Year Old Over CB Set

One day last January, Allan Cain had just left his home in Sterling, Md., about noon when the call came for him over his CB radio: "My father's dead. My father's dead."

The call from Mount Weather was by 10-year-old Roger Washington, whose father William, 38 years old, was one of Cain's best friends.

Washington, who had been stricken with a heart attack when only Roger and his 4-year-old brother Brian were at home, had lots of friends. Scores of them, fellow CBers, heard the call for help, and by last night, dozens of them had convened at the Holly House community center in Sterling Park to see how they could help.

From throughout the Washington area, other CBers had pledged more than $600 by the first night to help the Washington family.

Some of those concerned had heard of the first appeal for help from Washington's station, which could reach the legal maximum of a 150-mile radius because of its altitude. Others heard relays from other CBers.

Washington was an active member of the Loudoun County CBers Club and the equipment manager for the county's Little League organization. Only a few weeks before his death, he was driving food and clothes to county families the club had picked out as needy.

"That's the type of guy he was," said Cain, a drywell mechanic. "He knew his heart problem and just felt that, instead of babying himself, he wouldn't put himself in a wheel chair and be over protective. He wanted to live life, but he knew he was bound to have another attack sooner or later."

As proof of his nonchalance, his call sign, or "handle" in CBers' parlance, was "Heart Trouble." He had had open-heart surgery in 1962 and a heart attack last August.

Because of his friend's heart condition, Cain and his family were on their way up to Washington's home in Bluemont to help move a live evergreen that the Washingtons had bought as a Christmas tree and which they were going to plant outside.

At about the same time, Washington was chopping wood and carrying it to a new Franklin stove which he had bought to reduce the family's electric-heating bill.

When Cain got the broadcast, the first thing he did was drop the family off. "I thought, which wasn't good thinking, that Joyce was there," he said.

But Joyce Washington, whom his friend married 10 years ago, had gone out to get some groceries.

By the time Cain was back on the air 10 minutes later, Roger was still broadcasting the same message and Cain told him to call the operator for an ambulance.

By that time, however, other CBers had called the Round Hill Rescue Squad, who administered artificial respiration in vain en route to Loudoun County Hospital.

There, Washington was pronounced dead on arrival.

2 N.J. PD's Go CB!

The Woodbury, N.J., chief of police Tuesday credited a volunteer group of citizen band radio operators with a dramatic decrease in robberies here during 1976.

Robberies were described as armed robbery, robbery involving force and muggings.

According to Chief F. Dean Kimmel, robberies decreased from 44 during 1975 to only nine last year.

"I have to give credit to the CHEC organization," Kimmel told the city council after giving a report on the police department for 1976.

CHEC (Citizens Helping to Eliminate Crime) is a two-year-old organization of CB operators who patrol the city acting as "eyes and ears" for the police department. Their calls are received directly in police headquarters and in three patrol cars equipped with CB radios.

The organization, which at one time numbered 75 members, now has 58 volunteers.

"I don't think there's a way to really measure their effectiveness," Kimmel said, talking of the deterrent value of the group. The chief said that potential criminals may drop their plans when they spot a car with the familiar "whip" antenna.

"I can't say enough about them," he added.

Kimmel called the CHEC program the most successful crime-prevention program in the city. And he agreed with Mayor Frederick Bayer who recently called for more citizen participation in the fight against crime.

"CHEC is one of the finest crime prevention programs in the area," he said.

Nevertheless, total police complaints in 1976 came to 11,738, compared with 9,868 the previous year. And breaking and enterings increased from 267 to 334. Arrests increased from 814, to 879, with arrests for breaking and enterings almost tripling to 63.

Meanwhile, in W. New York, N.J., the citizen band radio operator will be part of a volunteer communication system that will help out "Smokey."

The pilot program, already under way, will have CB'ers become additional eyes and ears for the law. Town officials were offered the assistance of the Reilly Cab Co. to make use of the cab firm's system.

Police information to citizens or witnessed incidents by residents can be transmitted by CB to and from Reilly Cab which in turn is called to and from the police department by telephone.

Police officials say the auxiliary members of the department will assist with their newly installed CB radios in a recently purchased auxiliary police car. These 40-channel radios also will be installed in the cars of Mayor Anthony M. DeFino and Police Chief Thomas P. Fitzpatrick.

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CB Newswire

YOUR CB NEWSPAPER MAY, 1977 INCLUDED IN S9

Gays Establish Patrol Via CB

"Did you see that sedan?"

On San Francisco's Castro street, in the gray hours before daybreak when there are as many young gays standing in front of bars as inside them, the Richard Heakin Memorial Butterfly Brigade switches on its walkie-talkies and waits for punks.

"Did you see that sedan?"

The word crackles through the January night along the walkie-talkie network in the handful of blocks surrounding 18th and Castro streets, the Times Square of the San Francisco gay community.

The sedan is a blue Olds. Its four occupants may have cranked down a window and yelled a taunt at the clusters of young men standing in the shadows, chatting and staring at each other.

They also may not have. The car had whizzed by, and none of the butterfly brigade could be certain if it had been a whoop of mockery or support.

"It may be a false alarm," radios Jamal Redwing from the corner of Castro and Market streets.

"I thought he was staring at us and flipped us the bird but I might have been wrong. It might have been a wave."

Armed only with steel whistles and the portable CB radios, they've been standing on the corners for eight weekends. They eye .passing motorists and pedestrians, ever alert for the punks—usually straight high school boys in their parents' cars with a mouthful of insults and an evening to kill.

The brigade, 30 strong, is named for Richard Heakin, a gay activist beaten to death last June 6 outside a Tucson bar. The idea behind the radios and whistles is to prevent a similar incident in San Francisco by arriving quickly and in numbers at the site of possible trouble.

Brigadier Dick Gayer isn't sure whether it's been the brigade, the cold weather or just good luck that has kept the violence on Castro street to a single knife brandishing since the patrols started last December.

"It's not the kind of weather that induces anti-gay people to come out," said Gayer. "When the weather gets nicer, we'll have more beatings."

Gay Action, sponsor of the butterfly brigade, estimates 40 beatings of gays occurred in Eureka Valley last year.

Gayer has documented ten cases. None of the handful of suspects arrested has been tried.

Police Captain Rene Aufort of the Mission station, which watches over Eureka Valley, says the valley is a "pretty well-behaved area and not much of a problem."

He said there have been one or two serious assaults there a month, a lower rate than several other problem areas of the city. He said that his officers rarely pursue reports of verbal assaults.

"When some kid goes by and yells something there's not much we can really do about it," Aufort said. "There's no real law against it."

Aufort recalls other citizens' patrols, especially one in the Haight. They don't last, he said.

They get tired of patrolling at night. It wears off in two or three months."

The captain said he assigned one squad car to fulltime patrol in the area and ordered others to cruise by regularly.

They pass by the butterfly brigade from time to time. Glances are exchanged. They aren't particulary friendly, we're-on-the-same-team glances, but they aren't hostile. Just curious.

Other cars pause and stare at the sight of the white headbands and tall radio antennas of the brigade. There are shouts of "right on" and "good work" as the night crowd heads for the bars.

The major stumbling block seems to have been paying for the four radios. The brigade bought the cheaper $10 models, but discovered that reception was like two tin cans and a string.

The $50 models work better, but Gay Action had to hold two dances to raise money to pay them off.

Over the air, the brigade charts the movements of passing punks from block to block, in hopes of catching a glimpse of the license number and tracing the owner of the vehicle.

The brigade suspects that most of the cars are registered to parents who are unaware that their children are using the cars to harass gays.

Alfred says about 25 verbal assaults have occurred from passing cars and a handful of license plates recorded.

But most butterfly brigadeers hope their radios, whistles and their show of numbers will suffice to keep the streets passable even after the weather changes.

"We hope to be so successful that we drive ourselves out of business," Alfred said. He rubbed his hands in his jacket pockets as the 2 a.m. temperature dipped into the 40s. "I hope we don't have to do this forever."

CB Operator Pledges To Stay Off The Air

Kenneth O. Thompson, alias "HK," says he's signing off.

Thompson, 21, Upper Darby, Pa. was bound over for the federal grand jury in Philadephia last January, yesterday, along with Stuart M. Herbets, 22, of Philadelphia, on charges of obscene and illegal use of CB radio.

"I've got no equipment to broadcast on," Thompson said after a hearing before Magistrate Gene Tullio Leomporra. "Besides, my wife's against it."

Thompson's equipment was seized by FBI agents who arrested him Dec. 17. Federal agents also seized what they claimed was illegal, overpowered equipment belonging to Herbets and four others that day in the region's first crackdown against CB violators.

Thompson and Herbets, who uses the CB handle "Goon," were charged with broadcasting profane and obscene language and violating Federal Communications Commission regulations limiting broadcast power. The charges carry penalties of five years and a $5,000 fine.

Thompson was also charged with making threats to inflict bodily harm in CB broadcasts and could face 10 years in jail and a $20,000 fine if convicted.

Susan Thompson, the defendant's wife, said, "I think they're blowing it out of proportion to let other CBers, the new ones, know not to mess around."

Thompson said he and Herbets, who allegedly got into an obscene and hostile argument over the airways, "have been friends, but we've had our hassles."

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CB Newswire

YOUR CB NEWSPAPER MAY, 1977 INCLUDED IN S9

Lady No Name Directs Rescue Efforts By CB In Missouri

Without the help of Lady No Name, Guppy, Cartoon, Starship, Mouse and others Audrey Felts might have become a traffic fatality victim.

Miss Relts, 47, was driving a car that plunged off a bridge and slid about 12 feet down an embankment. The woman was trapped in the car, bruised and cut, as the temperature dipped to 12 degrees.

"She could have frozen to death," said a family spokesman. "From looking at the car later, it looks like the door was in contact with something because she couldn't open it."

But, Miss Felts had a CB set and managed to call for help. Her distress signal was heard by Lula Farmer, Kansas City, Mo., known as Lady No Name on CB channels.

"I tried to clear the channel and I got 'Birmingham' out of her," said Mrs. Farmer. "She said, 'help me, please help. I'm hurt bad.'"

After contact with Miss Felts, Lady No Name directed other CB operators in a search for the woman. She was rescued about 30 minutes after her initial transmission.

CB "Skip" Saves Lives!

A man and a boy stranded in Ontario in —40c weather last December scribbled their names on the windshield of the vehicle to identify their bodies for rescuers after they had abandoned any hope of being found alive.

"We were afraid they would never find us alive," Ronald Oveson, 13, of International Falls, Minn., told The Chronicle-Journal this morning.

Ronald and friend Richard Frenette, 34, were stranded on a deserted logging road after their car ran out of gas about 8 p.m.

But the signal from their CB rig skipped 1,200 miles and led to their rescue.

The signal was picked up by Harry Cameron, 30, of McDonalds Corners, near Perth about 40 miles south of Ottawa.

Mr. Cameron called Perth OPP who in turn notified district headquarters in Kenora and the car was found about 2 a.m.

According to Mr. Oveson, both he and Mr. Frenette had reconciled themselves to their fate.

"We kind of gave up hope. We thought no one would ever find us," said Mr Oveson.

The pair were lost in a maze of logging roads in the Cuddle Lake area.

"It's a very isolated area, said Emo OPP Constable Walter Wroblowsky.

"There's nothing up there at all at this time of year."

Const. Wroblowsky estimated the two would have died within three or four hours had Mr. Cameron not contacted OPP as to their plight.

After receiving the call from Perth, Kenora OPP contacted Emo detachment who then alerted the Fort Frances search and rescue unit.

The latter have a close liaison with the Borderland Breakers, a local CB club.

OPP members of search and rescue and the CB club travelled to the Manitou Access Road where the signal originated.

Two members of the club, Rick Lindholm and John Plasky, picked up a faint signal from the car and they tried to zero in on it.

The pair was finally located and although heavily clothed, showed signs of suffering from the extreme cold.

They were both taken to their homes and did not require medical attention.

Emo OPP received calls from CB'ers in New York state and various points along the Ontario-Quebec border after the Cameron alert.

How did the two men get into their perilous ordeal?

It started innocently enough.

Mr. Oveson directed his friend to Cuddle Lake, "where we caught some big sturgeon."

On the way back the two noticed the road "didn't seem like the one we came in on."

After a couple of hours of trying to find their way out of the labyrinth, the pair ran out of gas.

To complicate matters, their CB wasn't working. Or so they thought.

Mr. Oveson continually kept barking out distress calls on Channel 9.

Then they got lucky.

"Someone heard us," said Mr. Oveson. It was Mr. Cameron.

"I could barely make out his voice, but there was someone there.

"I was so excited I kept putting out the calls and giving our location."

Around 1:30 a.m., the two became delirious, but unknown to them help was on the way.

Mr. Frenette was the one who reached the search and rescue unit. As the rescuers came closer, the signal became clearer.

"We were sick to our stomachs," said the junior high school student.

"We waited and waited, but there was no signs of the OPP.

"There was no one."

Half an hour after they gave up hope, they were rescued.

Miss. CB'ers Conduct Search

One boat having mechanical problems and another one lost in the Mississippi Sound were objects of a search by the Kay Bee, a Coast Guard Auxiliary vessel out of Bay St. Louis, according to a Coast Guard spokesman in Gulfport.

Ed Simms of Gulfport contacted Open Gulf Watch Citizens Band Radio Club in Gulfport before noon and reported that he and a companion were stranded three-and-a-half miles south of North Island after their 24-foot craft, the Candy Andy, sustained a broken steering cable.

Rufus Bunker, operator of the Monkey Dew, a 28-foot pleasure craft out of Morgan City, La., contacted Open Gulf Watch early and said he had run aground while en route to Florida but did not know his location.

A member of the Mississippi Coast REACT team, equipped with a direction finder went out with the Kay Bee in the afternoon in an effort to locate the missing vessel.

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CB Newswire

YOUR CB NEWSPAPER MAY, 1977 INCLUDED IN S9

Suffolk County, New York Police Praise Their "Ears"

Three members of the Suffolk County, Long Island (N.Y.) police department described CB radio as an absolute "plus" for law enforcement agencies. Appearing on the WPIX-TV PROGRAM "SUBBURBAN CLOSEUP," Sergeant Michael Estrada, "Kodiak", Officer James Byrne, and Officer James McGarry of the Suffolk County Highway Patrol Division told of numerous incidents where CB radio had helped speed police response in emergencies, and had promoted greater community awareness of the police department's job.

"From the day a citizens band radio was installed in my patrol car," said Sergeant Estrada, "I felt there was a much better relationship between me and the people I was protecting. It's very much like the old "cop on the beat" situation, where an officer was able to talk to people and they always knew they could call on him to help."

Suffolk County first installed CB radios in a few patrol cars as an experiment in 1976. When it became obvious that the radios were being put to good use, the department added CB's to all the highway units.

Officer Byrne, who's better known to Long Island commuters as Batman, told of many occasions when mobile CB operators had warned him of accidents and dangerous conditions long before the reports would have reached him through normal police channels.

"I feel it's made me a better policeman," said Byrne. "I've got an ear on the traffic, and I can now "spot" situations a mile or two up the road where I might be needed."

During the half-hour program, the three policemen discussed their personal views of CB, two of them have CB units in their own cars—and offered tips for mobile operators who use their CB's to contact local police. "Let us know what's happening on the road," said Officer James McGarry (his handle is Choir Boy) "but try to avoid blocking traffic or getting yourself hurt. Make sure help is on the way by using your CB radio, then let the proper authorities handle the situation. They're better trained for it."

Panel members for the CB discussion on CB which was broadcast over N.Y. City TV station WPIX-TV (Channel 11). At the left is the host, Paul Bloom (SUPER STAR), then Suffolk County Police Officer James McGarry (CHOIR BOY), Sgt. Mike Estrada (KODIAK), Officer James Byrne, and the program's producer, Joe Hall (COMMANDER). CB'ers within the N.Y. metropolitan area who didn't see the program when it was originally broadcast last January will get a chance to see it rerun twice this summer.

Massachusetts CBers in Short-wave 'Rescue'

The airy web of citizens band radio turned into a helping hand after the house of Blue Bass Base was destroyed by fire New Year's Eve.

Blue Bass Base is the CB code name of James McCallum, 30, an unemployed carpenter who lived on Gunner's Exchange with his wife, Kay, and their three sons.

Their plight came to the attention of fellow CBers Todd Hopwood, "Cobra;" Roger Andrews, "Leapfrog;" and "Dick Tracy," a woman Hopwood knows only by her handle.

The three set up a general CB rendezvous from noontime to 4 p.m. in a parking lot and began to broadcast for donations.

As Hopwood told it, the response was heartening.

He estimated up to 1000 CBers poured into the lot, including many strangers who interrupted journeys to pull in. They dropped money into donation buckets and bought chances on a CB radio raffled off by Perrault Electronics of Plymouth.

At the end of the day, Hopwood said, he and Andrews were able to surprise the McCallums with $1100 in checks and cash plus "four or five vans full of food and clothing."

Hopwood said CB clubs in the surrounding areas had taken up the cause and have perhaps increased the donations to $1500 to $1600.

McCallum's oldest son, Robert, 19, is a CBer with the code name "Cartoon." The other sons are Scott, 12, and Ricky, 8.

Hopwood said that when Mrs. McCallum, a Jordan Hospital employee, was apprised of the donations she began to cry. She said she hadn't known there were still people left who cared for the troubles of others.

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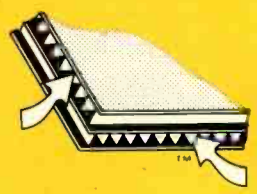

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COSELL: One last question. Do your designers ever think about the guy who'll be using your units?

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CB Newswire

YOUR CB NEWSPAPER MAY, 1977 INCLUDED IN S9

Daddy's Dobie— A Pennsylvania Pal!

The parking lot outside Hardee's Drive-In in Lancaster was a forest of mobile antennas.

Inside, Killer Queen, Spider, Mighty Munchkin and about a hundred other CBers were busy putting the eyeball on each other and trading tales of adventure on the airwaves.

The monthly coffee break of the Channel 20 Club had come to order. The noise level was a low roar, which is about as orderly as the meetings ever get.

The good buddies of Channel 20 are not a club in the strict sense. There are no officers, dues or by-laws. The members are simply those who chat regularly on CB Channel 20.

They gather at Hardee's on the first Wednesday of each month to eyeball and exchange the latest CB news and gossip. All are residents of Lancaster and the surrounding suburbs.

The center of attention was Robert S. Martin Sr., 40, known to his Channel 20 friends as Daddy's Dobie, or simply DD.

Martin has been confined to a wheelchair since 1971 when he was injured in a job accident. His story is typical of the many disabled persons who have become CB enthusiasts.

"Life was a big bore," he recalled. "All I did was watch TV."

His friend, Harold Wickersham, whose CB handle is High Boots, suggested he buy a CB. Martin did.

"That decision changed my life," he declared. "Now I'm meeting beautiful people. There's nothing CBers won't do for you."

At first he was shy about breaking into conversation. But once he mastered the ten code there was no stopping him.

"I hear you morning, noon and night," kidded Martin "Catfish" Turnowchyk. "When do you sleep?"

Martin admitted that he spends hours on the channels talking to friends, especially in Lancaster confined to wheel chairs. He knows them as Single Tree, Fat Man, Ironside and Wheeler.

He keeps tabs on his friends and they return the favor. "If I'm not on the air they call to see if I'm all right," he explained.

His CB handle comes from an expression he uses when praising his pet Doberman Pinschers. "That's daddy's dobie," he would exclaim. His wife Edie picked up the cue and dubbed herself Mommy's Dobie. Eugene Danner, their 18-year-old son, is known on the airwaves as Hutch.

If Martin is the inspiration of the Channel 20 Club, then Larry "Brown Jug" McMinn is the organization. McMinn, the manager of Hardee's, began holding the meetings at his drive-in in October 1975.

"We had 10 or 15 people coming back then," he reminisced. "Now it's over 100. It's fantastic."

Most of the employees at Hardee's are now CBers. McMinn listed Blue Bird, Fire Fly, Wildfire, Blue Dragon, Muskrat and City Mouse.

Lancaster has several channel clubs and many of the clubs share the same members. Meeting times and places are heavily publicized on the air.

"You just find the channel that has the people you like talking to," explained McMinn.

Doug Baker, who took the handle Bookmaker in memory of his uncle's unusual line of work, explained why he preferred being on Channel 20.

"You get known on a channel—people recognize your voice," Baker noted. "Once you've made friends you can always get assistance, for yourself or someone else."

John F. Snyder, a Lancaster truck driver, and his wife Barbara bought their first CB mobile unit about a few months ago. Now they own two mobile units and a home base. The 22-year-old trucker took the handle Longhair for obvious reasons. His wife is known as Daisy.

Like many CBers, the Snyders have given directions to countless lost motorists in the Lancaster area who ask for help on Channel 20.

Sometimes the trouble is more serious.

"I was on Route 441 about two weeks ago when we had that bad windstorm. The wind had blown a tree down and it nearly broke an electrical utility pole," Snyder said.

After making a few contacts on the air, a repair crew was quickly dispatched to the scene, he explained.

CBers are often amazed when they finally eyeball the people whose voices they know from the airwaves.

"You form a mental picture of who you're talking to, but nine out of 10 times you're all wrong," explained Mrs. Snyder. "They don't look anything like you think they should."

Eighteen-year-old Lisa Murse, nicknamed Killer Queen, said monitoring her CB is like a phone call. "Only you talk to a whole lot of people at the same time," she added.

CBer's Tip Aids Police In Arrest

State police in Niles, Mich., said a tip from a citizens band radio operator led to the arrest of a man and woman on charges ranging from carrying a concealed weapon to driving under the influence of intoxicants and carrying an open container of liquor in an auto.

Arrested on the weapon and driving charges was John Hayes, 68, South Bend. His passenger, Dorothy Davis, 72, was arrested on the open container charge, police said.

Troopers said the two were arrested after they stopped an auto on US-31 at the north Niles city limits shortly after 5 p.m. upon being notified by a CB'er that the car was being driven in an erratic manner.

Confiscated from the car were a .38 handgun and a nearly empty whiskey bottle, police said.

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CB Newswire

YOUR CB NEWSPAPER MAY, 1977 INCLUDED IN S9

5 Die In Snow—Despite CB Rig?

Five Springfield, Oh., area men who were found dead in their car on a rural Fostoria, Ohio, road one night last January, apparently had been in touch with local CB operators throughout most of the day in anticipation of being rescued.

Snowmobile crews reportedly were dispatched in response to the men's radioed calls for help, but no one was able to find them until evening.

The victims finally were discovered about 7:30 p.m. by Doug and Steve Loomis, who were notified of the car's location by the Red Cross.

Dr. O. C. Garlo, Seneca County coroner, said the five men apparently died of carbon monoxide poisoning. He ruled the deaths accidental. The coroner said that a snowdrift apparently blocked the car's exhaust.

The men were identified as Harold E. Newton, 46; Orville L. Chapman, 44; Paul R. Lemaster, 47, and Larry D. Perkins, 20, all of Springfield, and William Loeffler, 18, of Mechanicsburg, Oh.

Relatives said the men apparently were on their way home from a job in the Bowling Green area.

Mrs. Lurelle Loomis, mother of the two brothers who found the victims, said she had called the local radio station to offer her home to stranded travelers. About 7:30 p.m., she said, she received a call from Red Cross workers who asked her to look out for some stranded, and possibly ill, travelers along Buckley Road.

Mrs. Loomis sent her sons who found the men in the car and notified authorities. Doug Loomis said he and his brother had walked past the car earlier in the day, but had not bothered to check it, thinking no one would be inside.

Later, when the brothers did look in the car, Doug Loomis said, they noticed there was a CB radio in it.

Mrs. Loomis said she cannot understand why the men did not attempt to seek shelter at one of the three houses along Buckley near where their car was

Bill Jaekel, of Jaekle's Marathon station, a headquarters of sorts for CB'ers in the Fostoria area, said that snowmobilers had been dispatched by CB'ers but they went beyond the location given, but were unable to find the men's car.

A relative of the Loeffler youth said she received a collect call Friday morning from a CB operator who told her that the men's car had become stuck and that they would be rescued by snowmobilers.

Va. Calls The The Coast Guard

A Coast Guard helicopter came to the rescue of three duck-hunting Tidewater men who were caught by the big freeze January on deserted Cobb Island off Virginia's Eastern Shore.

"It was like Antarctica out there," shivered Webster Chandler, a Norfolk antique dealer who left for the week-long hunting trip with two Virginia Beach men.

He, Frank Thomas, and George Walsh, all 25, departed Oyster in a 19-foot motorboat for a trailer on the northern end of the island. They planned to stay until a day after duck season ended.

"Monday we went down to the gut where our boat was tied up, and it was covered with ice. Not little ice, but big, heavy ice 4-feet thick. I've never seen anything like it.

"We waited a few days and got worried when our fuel supply went out. Luckily, we had a CB rig and called for help," Chandler said.

Help was quick to arrive. An Eastern Shore CB'er called *Country Boy* monitored their distress call and informed another operator named *Giddyup* who telephoned the Coast Guard.

The helicopter flew to the island about 2 p.m.

The copter took on all their gear, the men and the hunters' Chesapeake Bay retriever.

All were safely dropped at Oyster where they had left their car.

CB Radio Prank Keeps Fans Away From La. Racetrack

Louisiana Downs race track general manager Vincent J. Bartimo said the CB radio buff who spread word about a mechanical breakdown at the track was a prankster.

There was no breakdown as the CBer claimed, said Bartimo.

"It really is tragic," he said. "We had extremely high advance reservations as did local motels. All it takes is one deceitful wrongdoer to use his CB radio to destroy a day that could have created hundreds of thousands of dollars in revenue for the entire area."

Bartimo said the track switchboard received hundreds of calls from persons who heard the message, "No racing at Louisiana Downs today, good buddy," and wanted to make sure the track was open.

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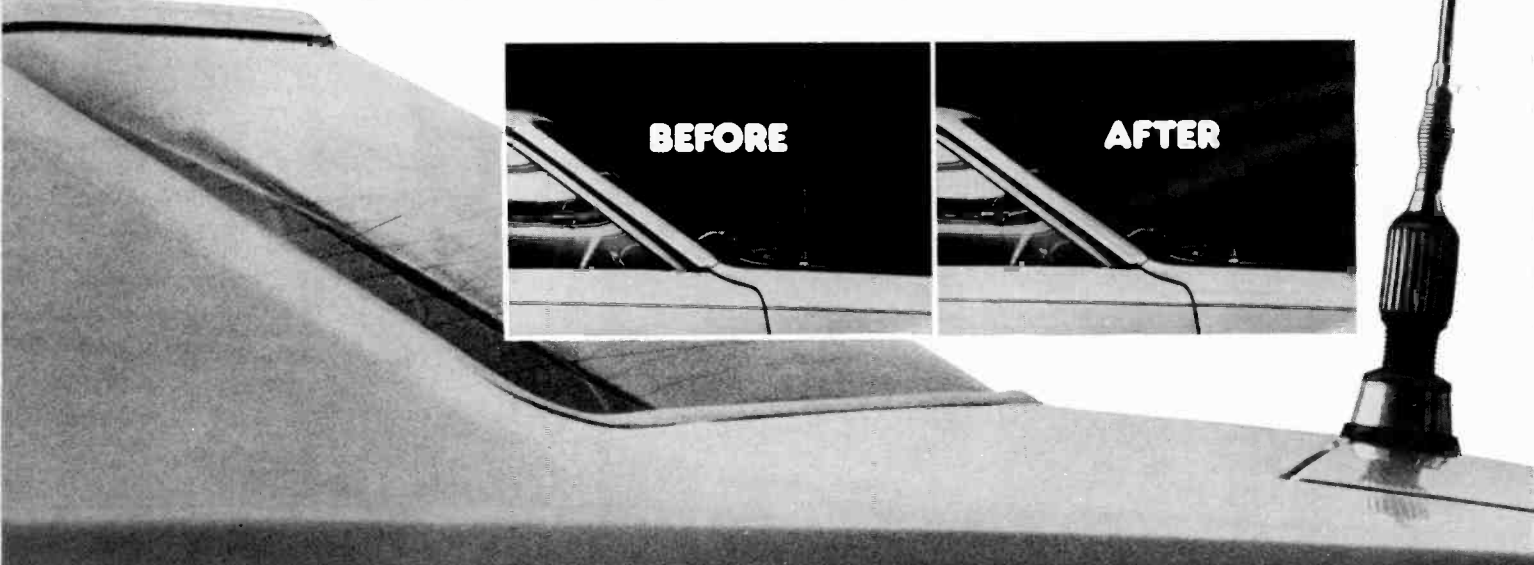

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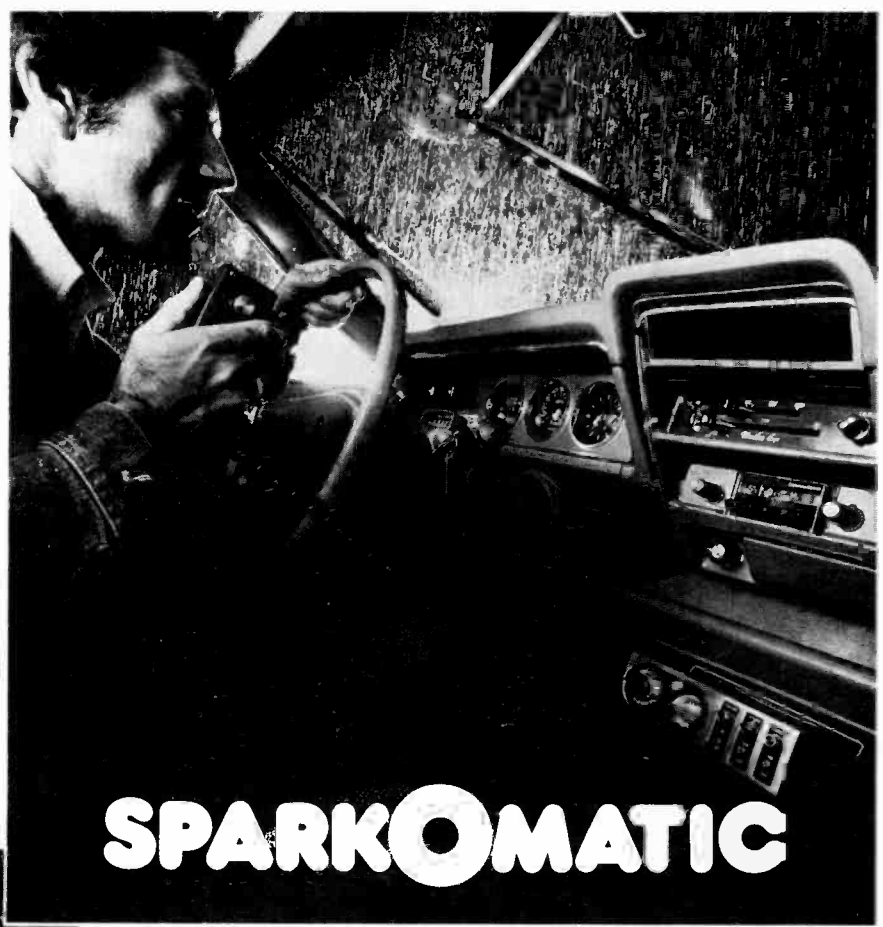


SPARKOMATIC

TOMCAT'S "Smatter-of-Facts" About: Uncle Charlie & The CB'ers

A VERY SHORT HISTORY OF THE FCC

Along about the time someone first hooked a telegraph key to make a **dah-dit** emerge from a spark gap radio transmitter, someone else realized that, for sure, licenses would be required, accompanied by a detailed set of rules and regulations in order to maintain normalcy on the airwaves. The federal agency which started licensing transmitters and those who operate them, went through several structural and name changes and is today known as the Federal Communications Commission; it's bureaucratic handle is simply **FCC;** CB'ers are prone to lovingly refer to the agency as **Uncle Charlie.**

WHAT'S THE FCC UP TO?

Well, **somebody** really has to be in charge of the radio frequencies and who can use them and what goes out over them. All things considered, why **not** the FCC? Do you think the National Park Service or the Dept. of Health, Education and Welfare would have been a better choice? No—obviously, it is just as well the FCC is doing it. Let's face it, if the National Park Service was in charge of communications and broadcasting, what would the FCC people have to do all day?

The FCC licenses and regulates on a number of different levels in such diverse areas as CB, Ham radio, broadcast (AM/FM/TV), satellites, ships, aircraft, business and industrial, land line telephone and telegraph, domestic and overseas radiotelephone, public safety, and dozens of other communications interests.

Unless someone tried to get it all together there might be total chaos—imagine what would happen if all radio frequencies sounded like one big CB channel! The FCC has counterparts in almost all foreign governments, agencies which perform a similar service for their own domestic radio stations. Once in a while all of these people get together to attempt to coordinate things on an international basis. This attempts to avoid such things as TV stations near the border of one country attempting to battle it out with another TV station operating on the same channel only 3 miles across the border in the neighboring country, or police stations trying to dispatch on the same frequency used by the local pizza delivery service.

RULES GOVERNING CB'ERS

The FCC established a set of rules and regulations governing the operation of CB stations. Originally these rules were called Part 19, however the name was later changed to Part 95. Over the years these rules have undergone many major and minor changes, and the current regulations are considerably different than those which were in use in 1958.

CB'ers have traditionally found the FCC rules to be either too confusing or restrictive to meet their needs. In addition to Part 95, there are sections of other federal regulations which relate to CB operations, including the Communications Act of 1934.

WHO OWNS THE AIRWAVES?

The public owns the airwaves used by all who would transmit a radio frequency thereupon. It has been argued that, if this is true, then frequencies should be open for the full and unrestricted use of all people, without any fees or regulations. And yet the FCC has charged fees and set forth a complete set of operating rules, license requirements for operators and transmitters, and other regulatory do-dads. The apparent discrepancy here is the correlation that all natural resources are available for free and unregulated public use—if you think so, try to get into a National Park without paying an admission—and while you're there, ask the Ranger if you can take a few trees home with you.

STAR CB'ERS

Among the show biz personalities who are CB'ers are Jackie Gleason, Jerry Lewis, Marlon Brando, Don Imus, Flip Wilson, Tennessee Ernie Ford, Gary U.S. Bonds, Long John Nebel, Jose Feliciano, Chuck Napier, and Herb Jeffries.

COMMERCIAL ASPECTS OF CB

The first commercially successful 27 MHz CB equipment included the International Crystal Executive ("the Icebox"), the Heath CB-1 ("lunchbox"), and the Globe CB-100.

By 1973, CB sales were better than $1-million per year, hitting almost $5-million in 1975, about *$2-billion* in 1976.

FEES FOR CB'ING

Early CB licenses were issue at no cost, however the FCC later decided to charge fees forthe licenses. Several different fees were tried, running as high as $20 and as low as $4 per license. Recently the Government told the FCC to hold off on asking for these fees and there is no charge or fee in effect at this time.

VIOLATIONS OF FCC RULES

Operating in total conformity with the FCC's Part 95 is something which is expected of every CB operator, however monitoring any CB channel quickly discloses that this ideal situation does not presently exist.

FCC officials monitor CB frequencies. This is done by monitoring stations at fixed locations, by mobile units, and by employees of the FCC field offices.

Those who are monitored in violation of the FCC rules may possibly feel the wrath of the FCC. The tools of wrath include notices for the CB'er to explain to the FCC why his/her station license should not be revoked, notices stating that apparently the CB'er owes the FCC a fine ranging from $50 to several hundred dollars.

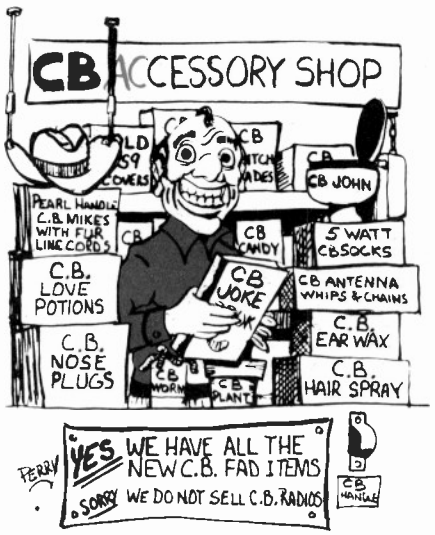
Backing up the FCC in their enforcement efforts is the Department of Justice and the U.S. Marshal. Sometimes the FCC, possibly accompanied by the FBI or U.S. Marshal, may make an inspection of a CB station suspected of rules violations.

The FCC has been known to *pick off* random CB'ers at will for minor rule infractions, however they seem far more interested in busting those who are major offenders. Sometimes a mobile FCC strike force will roll into a specific city and perform several days or weeks of intensive monitoring, issuing huge numbers of violation notices to all violators within earshot.

Looking over recent FCC actions against CB'ers, it seems that the majority of those who were busted violated regulations governing output power of the transmitter, antenna height, use of callsigns, working skip, operating off frequency, use of dirty language.

Despite all of this, the majority of those who appeared in the FCC's *glory roll* were not cited for specific violations which took place while they were on the air, *but for failing to reply to the FCC's violation notices!* Yes, that's a violation of Section 1.89 of the FCC's rules—something not explained in Part 95!

The failure of many CB'ers to use their FCC callsigns has caused the FCC monitors no little grief in attempting to identify and locate violators. In an effort to be able to get the locations the FCC has recently begun FCC's message to violators at unknown shouting CB'ers on the channels, using the FCC's own CB stations.



CB PRODUCTS

The CB marketplace has produced, in addition to actual CB equipment, such items as CB greeting cards, CB socks, CB toys and dolls, CB drinking glasses, CB songs, CB shirts and belt buckles, CB rings and pins, CB books, CB newspapers, CB magazines, and even CB board games.

IGNOBLE EFFORTS

A Detroit CB'er created a club called the UNITED CB'ers OF AMERICA which was determined to skirt the FCC rules in a novel manner. He took his CB license and modified (himself) to make it appear to cover THOUSANDS OF mobile units. Then, whenever anybody around the country joined his club, he would send them a photocopy of his faked CB license and tell them that they were operating under his license as one of his mobile units, thus permitting access to the majority of CB channels, for when this was taking place, many channels were restricted to use only by stations of the same licensee. The FCC was not happy. They swooped down upon the club's founder and many of the clubs officers. There were jail sentences and fines dished out. Counterfeiting CB licenses is a no-no.

CB'S BIGGEST FLOP

The FCC's plan to have CB'ers use Channel 11 as a calling channel. They ran it up the flagpole, nobody saluted. The idea was eventually tossed down the dumper.

CB'ERS CAN'T WIN

CB'er Martin Martines of Rahway, N.J., learned that you can't beat the system. A detective on Martines local police department claimed that Martines' CB signal was coming through his clock radio. Taking direct action, the cop simply charged Martines with violation of an anti-noise ordinance which was enacted to quiet things like loud playing radios—even though it was the detective's radio that was producing noises! Did you guess that the local judge fined Martines $200? Martines is appealing. (CB'ers wishing to aid Martines, should contact KDQ-5911, George King, 637 Franklin St., Elizabeth, NJ 07207.)

CB TALL STORY

Fellow I know invented a really clever CB mobile whip—based it on the concept of a thermometer, calls it the *Thermotenna*. The thing is a 9 foot plastic tube of mercury with a bulb of the mercury at the bottom. There are heating coils wrapped around the bulb, these vary the height of mercury in the tube. This whole arrangement is connected to the antenna output of a CB rig. By giving a little heat to the mercury bulb, the liquid antenna can be changed to be exactly resonant on each specific CB channel. Channel 40, for instance has the highest frequency and the shortest wavelength, while Channel 1 has the lowest frequency and the longest wavelength. When going from Channel 40 to Channel 1, the mercury in the antenna actually lengthens by several inches! Two major antenna manufacturers are interested in marketing the device. So far the only major obstacle has been the difficulty in shaking down the 9 foot thermometer when you want to go back from Channel 1 to Channel 40.

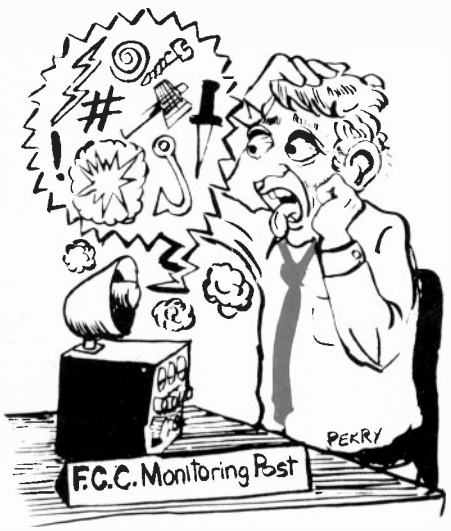
SELF POLICING

From time to time someone comes up with the idea that CB'ers should police their own channels for rule violators, since similar ecorts have been successful in other radio services, most notably the Amateur Radio Service (although the FCC listens there too).

Several national attempts at CB self policing have been dismal failures for any number of reasons, not the least of which being that those who were doing the self policing created more hostility than they did good, and were amongst the more offensive inhabitants of the channels.

Of course, the major obstacle to self policing is the (little known) fact that CB transmissions are covered under Section 605 of the Communications Act. This is the famous anti-wiretap pro-

vision, which prohibits anybody from recording, refering to, or making use of your transmissions without your permission. Anybody sending you a self-policing notice would be in violation of this and could be in-line for a hassle from the FCC.



CB TRIVIA

The "father" of the concept of using Channel 9 for emergency communications is Roy Freeland, Sr., of International Crystal Mfg. Co., who came up with the idea in 1959.

The FCC's first reaction of horror that the CB frequencies were being used for hobby purposes, despite their rules saying that hobby use wasn't permitted, was on December 7th, 1959, when there were less than 50,000 CB'ers authorized and the band was little more than 1 year old. They issued a strongly worded press release (#81482) crying out upon the fact that CB'ers "have either intentionally or mistakenly interpreted Part 19 . . . to permit unrestricted use of the stations and amateur-type communications."

The world's first CB Jamboree was held in the Spring of 1960, in New Jersey, and sponsored by the 5 Watt Wizards CB Club of New York.

WHAT'S IN A NAME?

The FCC entitled it's largest radio service, the Citizens Radio Service, which was subdivided into four separate sections. The Class A section, which operates at 462 MHz, is primarily used by business and industrial licensees—the equipment is rather expensive in comparison to 27 MHz gear. The name of the Class A section of the Citizens Radio Service is being changed to the General Mobile Radio Service. The Class B section had covered low powered walkie talkies operating on 465 MHz, but this was cancelled several years ago by the FCC. The Class C section covers radio control on frequencies in the 27 and 72 MHz bands, and the new name for this it to be the Radio Control (R/C) Radio Service. Class D is the service which we use, its name is changing to the Citizens (CB) Band Radio Service. Class E was a proposal several years ago for additional frequencies to be established in the region of 200 MHz, however this has not been approved by the FCC. In 1943 Al Gross received FCC license W10XVX for experimenting with personal 2-way equipment in what might eventually be a CB type service in the 200 to 250 MHz frequency range.

NOBLE EFFORTS

Over the years there have been several notable efforts by CB'ers to get the FCC to back down on some of the rules which didn't sit too well with the operators.

In 1961 there was a CB'er in New Mexico, Ernie Walker was his name. He liked to shoot skip, which was (and still is) against the FCC's CB rules. The FCC told Ernie to cool it; Ernie told the FCC to SIT ON IT—that he was entitled to freedom of speech and that their attempted censorship of his station was unconstitutional. Instead of cooling it, Ernie decided to force the issue. He started working skip on a grand scale, working as many as 300 skip stations per day! He collected 18,000 QSL cards and was receiving 50% as much mail as all of his home town of Esponola did. Ernie's station, 15W1670, was known as THE FRIENDSHIP STATION, and he was famous from coast to coast—the sunspots were on Ernie's side! The FCC was infuriated. Ernie, who was confined to a wheelchair, was starting to fill up the file folders in Washington. Finally, after a number of written warnings and threats the FCC told him to show cause why they should not revoke his license. Walker defended himself by saying that he hadn't done anything wrong since the FCC had set up the CB service to serve the business and personal needs of its licensees—and that his transmissions were within the scope of that stipulation. The FCC contended that Ernie's transmissions to his mobile units were fraudulent since his mobile units were all parked out in front of his location—that, in fact, the transmissions were "thinly veiled solicitations for replies from random or unknown stations. His license was revoked. Ernie was not to be written off the books so easily, for he received much publicity and support from CB'ers across the nation—letter writing campaigns were started, newspaper stories started appearing. A club which existed at that time that they would help him beat the FCC. (supposedly on a national basis) told Ernie Instead they used Ernie for their own purposes —Ernie was the loser, no rules were changed —Ernie's cause went down the drain.

In 1962, a CB'er from Falls Church, Va., named Warren Holleman wanted to modify his license to cover 5 units instead of 2. The FCC told him nix because of past offenses and violations of the rules, including the nature of his transmissions and the length of same. Holleman demanded a hearing by an FCC Hearing Examiner. When it was all over, FCC Hearing Examiner Thomas H. Donahue, said the FCC's CB rules were for the birds! In a 34-page commentary, Donahue observed that the CB rules "place licensees in a state of perpetual violation" and "lose all semblance of guides to conduct." Donahue then went through the CB rules and blasted them chapter-and-verse, complaining that what the FCC was trying to say was, "Here . . . is a Citizens Radio Station License. You may operate your station for, among other things, your private personal affairs. There are no understandable standards covering the contents of transmissions you may make but if we don't like what you say we will take your license away." CB'ers were jubilant at this, but it caused the FCC to look over what they said in their rules—and tighten them up!

CONFRONTATIONS WITH UNCLE CHARLIE

If you should ever receive a written notice of violation from the FCC, best bet is to answer it as soon as possible in the manner which is advised in the letter. Some operators have had moderate luck in explaining the circumstances of the violation charged, coupled with asking for a reduction of the amount of the fine. Whether or not this will be of any help, it will certainly sit better with the FCC than if you ignore the letter. Ignoring the letter will almost certainly cost you your license.

If you get a violation notice of any kind that you would rather not get into explaining, you can always try sending your license back to the FCC and requesting that it be cancelled. Of course, then you won't have a CB license anymore, but it *may* help to get you off whatever hook you are on.

The FCC has a right to make personal visits to inspect your station. They will generally drop in like this on those who are suspected of operating equipment which is illegal or malfunctioning, and usually while the station is actively engaged in communications. After the FCC people have properly identified themselves and asked to be admitted for an inspection, licensees must permit them to enter. Refusal will only bring them back, angry, with a search warrant and a U.S. Marshal. If you have any doubts as to the authenticity of someone seeking entry to your home as an FCC Inspector, you can try checking with the FCC Watch Officer at 202-632-6975.

AN INSTANT HISTORY OF CB RADIO

The CB radio service has been around for a long time, longer than most people realize. In 1944, FCC Commissioner E. K. "Jack" Jett had an article published in the Saturday Evening Post which described a proposed Citizens Radio Service. In 1945 the FCC issued licenses W8XAF, W8XAG, and W8XAH to Al Gross of Cleveland, Ohio, for the purposes of developing CB equipment for use in the 460 MHz band. In 1945-46 Gross' company (The Citizens Radio Corporation) began testing prototype gear. By 1947, John Mulligan of Elmira, N.Y., had also started experimenting with 460 MHz gear for Motorola, his callsign was W2XQD. By 1948, Al Gross had received FCC type approval on his walkie-talkie and obtained an order for 25,000 sets from Montgomery-Ward. Both Gross and Mulligan are still very much active in CB radio.

CB, as we know it today, on the 27 MHz (11 Meter band) was conceived

by the FCC in 1957, adopted officially on July 3, 1958, and the band was opened for communications on September 11, 1958. Licensing of stations in the new 27 MHz service began rather modestly with very few applicants during October and November of 1958, but had reached 600 per month in January of 1959. In May of 1959 the number of licenses issued jumped from 600 per month to about 5,500 per month. In November of 1976 the FCC received 403,090 CB license applications, issued 222,754 licenses, and had more than 7,300,000 CB licenses in their computer, this represents more than 20-million CB transceivers.

THE FIRST CB WAS
GUSTAV RETCHNIK
THE CRAZY BOHEMIAN

CB OR NOT CB

There were a number of things which qualified as CB long before the FCC came up with this radio service. Other famous CB's included C. B. DeMille, Crumb Bums, Collar Bones, Crossed Bayonets, Crazy Bohemians, Christmas Bonuses, Corned Beef, Cinnamon Buns, Corn Bread, Crashing Bores, Chicken Breasts, and Coors Beer. The U.S. Navy's Construction Battalions have been called **Sea Bees** for more than 30 years. The term **CB'er,** meaning a user of CB radio, was coined and first used by Tomcat in a 1959 magazine story about Citizens Radio.

HOW THE CB RULES GET CHANGED

The FCC can decide to change the rules governing CB. They will usually announce the proposed change they have in mind, allow a brief period for comments from interested parties, and then put the changes into effect.

Users themselves can try to change the rules by submitting petitions (properly filed with several copies) to the FCC outlining their proposals. The FCC may then request comments on such proposals before deciding upon the fate of such proposals.

Sometimes the FCC will modify the rules to reflect customary practices already in effect by the millions of CB licensees. This happens on rare occasions when there is popular and spontaneous **grass roots** support for a particular operating practice. There have been occasions when CB'ers have tried to force the issue and bully the FCC into rule changes. These efforts have failed.

CB CALLSIGNS

The first identifications issued by the FCC for operation in the 27 MHz CB service were considered, by the FCC (at least) to be little more than serial numbers, as opposed to more formal callsigns granted to broadcast, ham, and other communications stations. The feeling was that the little low powered CB units were restricted by their limited transmitting range and by FCC operating regulations to very short distance coverage. Therefore, the identifications issued did not conform to international agreements covering callsign blocks which various nations may issue. So the first CB stations took to the air with identifications such as 2W1965, 18W-2101, 24W2424, etc.—the numerals before the letter "W" represented the FCC radio district in which the licensee lived. Later the FCC switched over to similar identification numbers, but using the letters "A," "B," and or "Q" instead of the "W," which created some problems for stations living in the 4th FCC district who happened to receive a "Q" identification number. Then, as these numbers started to become used up, the FCC announced a plan whereby there would be additional letters added after the "Q" to permit more identification numbers to be created, so they commenced issuing calls such as 18QA-2766, 19QB5548, etc. The idea was to change the letter "Q" to a new letter each year, so that it would easily determine the year in which the CB'er received his/her license. This would be a 7 year cycle, with the letters "R" through "W" to be used in addition to "Q." The idea had to be shelved when many overseas countries started making a howl about the FCC issuing callsigns to CBers from prefix blocks which didn't belong to the U.S. No problem, the FCC then switched over to a system of 3 letters, commencing with "K," followed by 4-digits. Again, the callsign was structured to indicate the year the license was issued plus the FCC district in which the licensee lived. For a while it was confusing while the amazing conglomeration of old and new callsigns all mixed on the same channels.

(continued on page 125)

What's The Truth About 40 Channel Rigs?

Does 40-Channel Mean Better Technical Performance, or Worse?

By Herb Friedman

NO one quite knows *who* started the stories, or more important, *why* they were started, but it is being *claimed* that the new 40-channel transceivers have *less than half* the power output of the 23-channel models, that the 40-channel transceivers have *less talk power* than the 23-channel models, that the 40-channel models *cannot* be used with power mikes . . . and, well, you name some important, desired level of technical performance and a self-proclaimed expert somewhere will claim—often by implying he has a source right in the F.C.C.'s test lab—that 40-channel transceivers are inferior to any 23-channel model.

LIES! That's *all* these tall tales are. Many in the industry suspect they were created by a few dealers with shelves stocked to the ceiling with 23-channel models they hoped to unload on uninformed new CB'ers at almost list prices; but whatever the source or reason for the rumors the plain truth is that 40-channel transceivers actually will deliver a *more* effective signal at the receiving station when compared to many 23-channel models! Even at their *worst*, the modulation characteristics, which we call *talk power*, of the 40-channel models will be *equal to the best* of the typical 23-channel models.

The reason for the superiority of 40-channel transmitters is something know as FCC *type-acceptance*. Under the type-acceptance program for 40-channel transceivers each model must pass specific performance tests in an FCC laboratory, and then the design and assembly of future models must strictly conform to the original sample(s) furnished the FCC, no changes can be made without the approval of the FCC.

Now you might logically ask "Why did the FCC get so tough about performance standards?". Actually, the FCC got tough to protect you, the CB'er. One of the reasons for the FCC's strict type-acceptance program for 40-channel was tests they made in 1976. For years the FCC has specified a maximum of 4 watts RF output AM, or 12 watts P.E.P. sideband, and a maximum of 100% modulation for AM. (Greater than 100% modulation distorts not only the transmitted signal but can create *sideband splatter* that spills into adjacent and alternate channels, interfering with other contacts.) Yet when the FCC tested 26 randomly-selected transceivers in 1976, 24 failed to pass the standards then in force even though the manufacturers had certified their equipment conformed to FCC standards. Now when you get a situation where the government can't trust the reports certified to them you can

bet there's going to be a crackdown of sorts, and that's just what the Citizen's Band got in the 40-channel type-acceptance program; and though many dealers and manufacturers screamed to the sky, the plain truth is that you, the active CB'er, can only benefit from 40-channel type-acceptance.

Here's why. For the CB'er the four most important aspects of 40-channel type-acceptance and the transceivers which qualify (which can be the only models sold) are the power limitation of 4 watts AM or 12 watts P.E.P. single sideband, the 100% modulation limitation, the allowed maximum bandwidth of 8k Hz per channel (4k Hz in the case of SSB), and RF output harmonic attenuation of at least 60 dB.

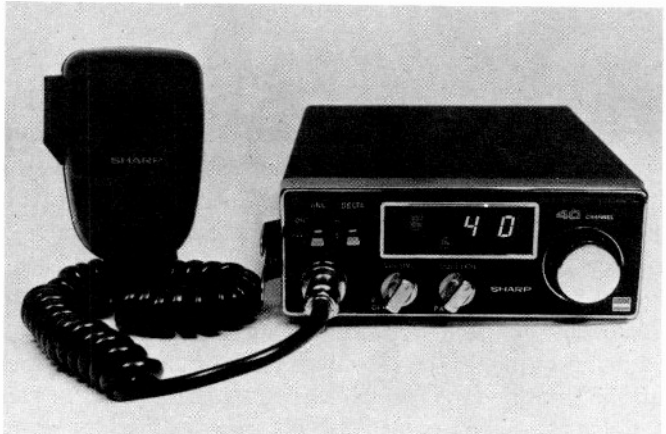
Basically, these requirements are characteristic of the best, or better-performing 23-channel equipments, and in all cases provide the most effective communications performance.

Let's start off with the power output limitation of 4 watts. We all know there were many 23-channel transceivers that delivered in excess of 4 watts output when powered from 13.8 VDC. Though the typical *quality* transceiver delivered 3.5 to 3.8 watts output (4 watts is absolute maximum and the manufacturer must allow some headroom for manufacturing tolerances), a few transceivers were pushed to 4.5 and 5 watts RF output. This is too small an increase to be of any importance at the receiving station—the power output would have to be 7 watts minimum for the receiving station to notice any effective change (the *magic* 3 dB factor)—but a dealer could "push" an overpowered transceiver on an unsuspecting newcomer to CB. He would connect a power meter and then "prove" the transceiver with 5 watts output was better than a legal model running 3.8 watts output.

But was the illegal higher power any more effective? NO!!! Manufacturers who deliberately overpowered failed to provide the additional modulation required for 100% modulation of the "extra" power. Now a peculiar thing happens with modulation: it isn't linear. For example, a 100% modulated 3.5 watts output sounds much louder than 50% modulated 7 watts output. Out where the signal dies into the noise level, a 100% modulated signal under the noise might be readable while a 50% modulated signal with carrier over the noise might be unreadable. The CB'er who purchased greater than 4 watts output thinking he was putting something over on everyone else actually put out a "weaker signal", one that could not be boosted with a power mike because a power mike cannot increase the maximum percent modulation built into the transceiver by the manufacturer.

So firstly, the type-acceptance for 40-channels prevents anyone from playing fast and loose with power output claims.

Moving on to 100% modulation limiting we find that's the real biggie in 40-channel performance. It is a characteristic of the ear—everyone's ear—that it senses volume level in terms of the average power of any type of audible signal, but it is the peak power (voltage or current) that determines percent modulation. It is also a characteristic of speech that average power is only 20% that of peak power. If a transmitter without 100% modulation limiting was modulated to exactly 100% modulation the average power of the voice is equal to only 20% average modulation. A full 80% of the available modulation capability isn't being used. But see what happens under FCC type-acceptance of 40-channel transceivers. In plain language the FCC says *every* transceiver must be limited to 100% modulation; no matter how high the modulating signal, modulation cannot exceed 100%. If a manufacturer provides an extra 10 to 20 dB of microphone amplification he is really building a power mike into the transceiver because the 100% limiting prevents overmodulation. In effect, a compressor—the same type of device used in commercial communications transmitters—is being built into the 40-channel transceivers. A manufacturer could even build the extra amplification into the microphone itself and claim he is supplying a power mike with the transceiver, and that's just what some manufacturers are doing. But whether the extra amplification is built into the microphone or the transceiver makes no difference—it's just a selling feature—the important fact is that it's there, and it's there because of the FCC's 100% modulation limiting requirement.



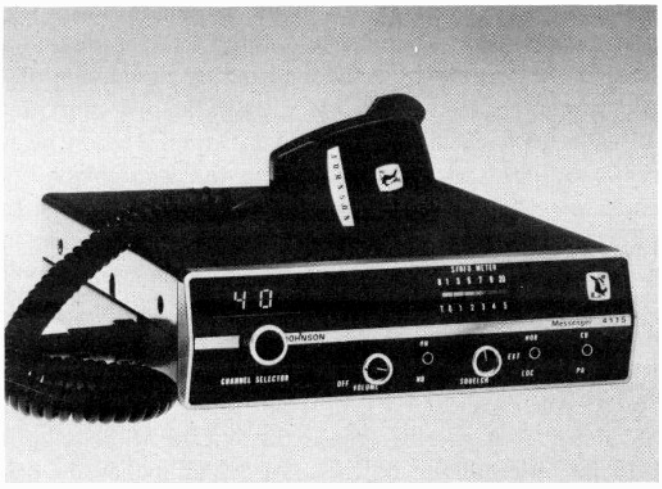
Does more channels mean less performance? Weird rumors to that effect started appearing last December and have snowballed into something on the lips and minds of many operators. This Sharp 40-channel rig will nevertheless outperform most 23-channel rigs. Price? Well—some folks were saying that 40-channel gear was going to be priced out of sight, yet this rig is less than $150...

Now it is true that many 23-channel models built by reliable manufacturers did provide 100% modulation limiting, but the fact is many 23-channel models *did not!* Under 40-channel type-acceptance rules which require testing of the equipment by the FCC, *all* will have 100% modulation limiting.

The importance of 100% modulation limiting is not restricted solely to the effect on modulation distortion. When 100% negative modulation is exceeded spurious frequencies are generated on other CB channels (and this interference is termed *sideband splatter*). So 100% modulation limiting also eliminates splatter interference

to other channels as well as preventing splatter from other channels from causing interference to your contact.

Depending on the type of 100% modulation employed it is possible to generate sideband splatter even when modulation is limited to 100%. This is caused by using a simple clipper device to literally chop off any modulation waveform that would exceed 100%. Trouble is, this creates square waves which generate harmonics that appear on adjacent channels as sideband

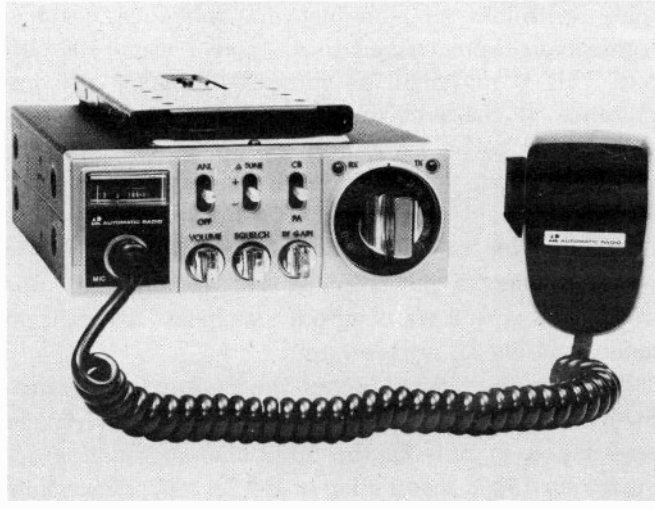


This new 40-channel rig from E. F. Johnson incorporates some nifty features not available in 23-channel rigs—things such as variable light intensity on the channel readout LED's, self-adjusting noise limiter to vary with changing noise conditions, and lots more. Makes 23-channel rigs look like pioneer gear by comparison.

splatter, not to overlook the fact the modulation is being deliberately distorted. This type of limiting distortion and splatter is squashed in the 40-channel transceivers because the total bandwidth (for AM—two sidebands is limited to 8k Hz: 4 kHz per sideband. This means splatter causing harmonics are not allowed and a low pass filter must be provided to reduce the modulation harmonics. By filtering the harmonics the distortion of the modulating signal is similarly reduced and the signal at the receiving end is *clean* even when the clipping type of 100% modulation limiting is employed.

Finally, we come to the requirement that harmonics of the RF output be attenuated at least 60 dB. Though many early 23-channel transceivers had TVI filters that provided up to 60 dB second harmonic attenuation, many 23-channel models had no harmonic filtering at all, or had a TVI filter with a minimal amount of harmonic surpression. With the new 40-channel models there are no *ifs, ands,* or *buts.* You get at least 60 dB harmonic attenuation and this means that most of you will be free of TVI as long as you haven't put the sky hook right up against your neighbor's TV antenna. And if you do cause harmonic TVI—usually evidenced as "herringbone" interference on TV channels 2 and 5—the built in 60 dB attenuation will probably make your interference a borderline case, one easily cleared up by placing a low cost low-pass TVI filter in series with your transceiver and its antenna.

Before summing up, a word about power mikes. For some reason rumor has it the FCC does not permit power mikes with the 40-channel transceivers. *Not true!* For part 15 certification of the transceiver, which is also required along with type-approval of the transmitter, spurious radiation must be attenuated even allowing for all accessory connections: this includes remote and P.A. speakers which might be used and the microphone and its cable. Somehow, a few power mike manufacturers and distributors got the Part 15 certification tangled up with the 100% modulation limiting requirement, though the two are not in the least interrelated. Since the FCC now requires 100% modulation limiting regardless of what is fed into the modulator there's nothing to stop you from using a power mike, though adding a power mike to a rig that already has a modulation system that effectively contains a power mike is sort of redundant, not to forget that the "extra" power mike can cause distortion by overloading the transceiver's normal microphone preamplifier; and in some instances a power mike run at full gain (output level) has been known to "blow" the normal microphone input transistor of the associated transceiver.



Another new 40-channel rig comes from Automatic radio—at less than $185, the manufacturer still offers a rig which beats many 23-channel rigs costing much more!

But if you believe a power mike will help your personal communications go ahead and give it a try; there's nothing in the 40-channel rules to stop you.

Summing Up. Though the 40-channel rules encompassing type-acceptance and certification covers a lot more technical ground, we've singled out the highlights just to show that in no event will you get reduced performance from 40-channel transceivers. The true fact is most of you will get *a lot better performance,* and your chances of being stuck with a real "lemon" are almost nil with 40-channel transceivers. In short, unlike the 23-channel models which except for the "gold plated specials" ranged in performance from *absolutely rotten to excellent,* the 40-channel models will typically range from *very good to excellent.* In this day and age you couldn't ask for, or find, a better value. Could you?

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S9 LAB REPORTS

The equipments shown here were put through their paces by Larry Friedman. Included along the battery of test gear employed is a B&K #2040 Signal Generator, Bird wattmeters, Tektronix RF spectrum analyzer, several regulated power supplies, and DB meters. Equipments selected for testing and review have unusual features, features which might be of high interest to a specific CB communications need, or overall performance of unusually high quality. Manufacturers wishing to submit transceivers and other equipment for testing and review in this column should contact the Editor.

• GENERAL ELECTRIC 3-5811

Description: A 40 channel AM transceiver for mobile, and P.A. operation. Requires a power source of 12 to 13.8 VDC with negative or positive ground. Overall dimensions are 6½-in. wide x 2¼-in. high x 8-in. deep.

Features include double conversion, a remote speaker jack, a P.A. speaker jack, monitoring of CB through PA speaker, and an S/RF meter.

There are front panel controls and switches for: Channel selection, volume, squelch, ANL, PA/CB/PA-CB (feeds CB through PA speaker).

Standard equipment includes a microphone, mobile mounting bracket and a DC power cable.

Receiver Test:

AM input sensitivity	0.55 μV
Adjacent channel rejection	64 dB
AGC action	7 dB
Input level for S9 meter reading	44 μV

Transmitter Test:

AM RF output into 50 ohms	3.7 watts
85% modulation sensitivity (0 dB is average)	+12 dB
Modulation limited to 100%	yes

Editorial Comments: This transceiver is supplied with a quick release mobile mounting bracket. A mounting bracket and wiring kit for a second vehicle are available. Many optional accessories are available from General Electric.

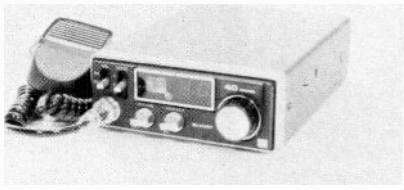
• SHARP CB-2460

Description: A 40 channel AM transceiver for mobile, and P.A. operation. Requires a power source of 12 to 13.8 VDC with negative or positive ground. Overall dimensions are 5⅞-in. wide x 2¼-in. high x 8¾-in deep.

Features include double conversion, a remote speaker jack, a P.A. speaker jack, delta tune, S/RF meter, and an L.E.D. digital channel indicator that blinks when tuned to channel 9.

There are front panel controls and switches for: Channel selection, volume, squelch/PA, ANL, and delta tuning.

Standard equipment includes a microphone, mobile mounting bracket and a DC power cable.



Receiver Test:

AM input sensitivity	0.3 μV
Adjacent channel rejection	67 dB
AGC action	4 dB
Input level for S9 meter reading	5 μV
Delta tuning range	+2/—2.3 KHz

Transmitter Test:

AM RF output into 50 ohms	3.6 watts
85% modulation sensitivity (0 dB is average)	—6 db
Modulation limited to 100%	yes

Editorial Comments: This transceiver has an unusually effective speech compresser, that delivers notably good crisp and clear modulation. It produces talk power that won't be stepped on.

• REALISTIC NAVAHO TRC-57

Description: A 23 channel AM/SSB transceiver for mobile, base, and P.A. operation. Requires a power source of 12 to 13.8 VDC with negative or positive ground and 120 VAC. Overall dimensions are 14⅞-in. wide x 3⅞-in. high x 10½-in. deep.

Features include double conversion, a remote speaker jack, a P.A. speaker jack, headphone jack, S/RF meter, SWR meter, noise blanker, digital clock (only when A.C. powered) rapid set controls for digital clock, and clarifier tuning.

There are front panel controls and switches for: Channel selection, volume, squelch, clarifier, AM/USB/LSB selector, SWR calibrate, RF gain, PA/CB, noise blanker, ANL, SWR meter set, and clock set pushbuttons.

Standard equipment includes a microphone, mobile mounting bracket, a DC power cable and A.C. power cable.

Receiver Test:

AM input sensitivity	0.6 μV
Adjacent channel rejection	67 dB
SSB opposite sideband rejection	65 dB
AGC action	11 dB
Input level for S9 meter reading	56 μV
Clarifier Tuning	+800/—1000 Hz

(continued on page 42)

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The TRC-467 is a high-performance mobile unit with PLL circuitry and 3 ceramic filters for superior selectivity. S/RF meter shows strength of incoming and outgoing signals. Switchable noise limiter for reduced interference or maximum clarity on stronger signals. Variable squelch. LED modulation indicator. With dynamic plug-in mike, mounting bracket, power cables for any 12 VDC positive or negative ground vehicle. Just 119.95*.

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The TRC-452 is a versatile transceiver with PLL circuitry and plenty of control features for getting the most from mobile CB. Adjustable RF gain for optimum reception of strong and weak signals. Switchable automatic noise limiter cuts ignition-type interference. Adjustable squelch eliminates background noise. Large, illuminated S/RF meter. Lighted channel selector. LED modulation indicator. You can even use the TRC-452 as a mobile public address system—just add an exterior speaker. With plug-in dynamic mike, universal mounting bracket, power cables for any 12 VDC positive or negative ground vehicle. Only 139.95*.

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S9 LAB REPORTS

(continued from page 39)

Transmitter Test:

AM RF output in 50 ohms	3.6 watts
SSB RF output into 50 ohms	12 watts P.E.P.
85% modulation sensitivity (0 dB is average)	0 dB
Modulation limited to 100%	yes

Editorial Comments: Digital clock is a relatively large, bright, L.E.D. display. Extremely easy to read, well lit meters. Front-facing speaker produces notably good audio. Excellent SSB stability.

• ROYCE 1-682

Description: A 40 channel AM transceiver for mobile, and P.A. operation. Requires a power source of 12 to 13.8 VDC with negative or positive ground. Overall dimensions are 7⅞-in. wide x 2⅜-in. high x 8¾-in. deep.

Features include double conversion, a remote speaker jack, a P.A. speaker jack, a submaster volume control built into the microphone, continuous variable fine tuning, L.E.D. digital channel indicator, channel indicator dimming, and an S/RF meter.

There are front panel controls and switches for: Channel selection, volume, squelch, RF gain, fine tuning, PA/CB, ANL, and a channel indicator dimmer.

Standard equipment includes a microphone, mobile mounting bracket and a DC power cable.

Receiver Test:

Am input sensitivity	0.5 μV
Adjacent channel rejection	62 dB
AGC action	13 dB
Input level for S9 meter reading	26 μV
Fine tuning range	±1.8 KHz

Transmitter Test:

AM RF output into 50 ohms	3.6 watts
85% modulation sensitivity (0 dB is average)	+10 dB
Modulation limited to 100%	yes

Editorial Comments: The large L.E.D. digital display is easily seen from the drivers position. The submaster volume control switch built into the microphone provides even more convenient operation because the driver doesn't have to reach across to the transceiver.

MORE TO COME NEXT MONTH!

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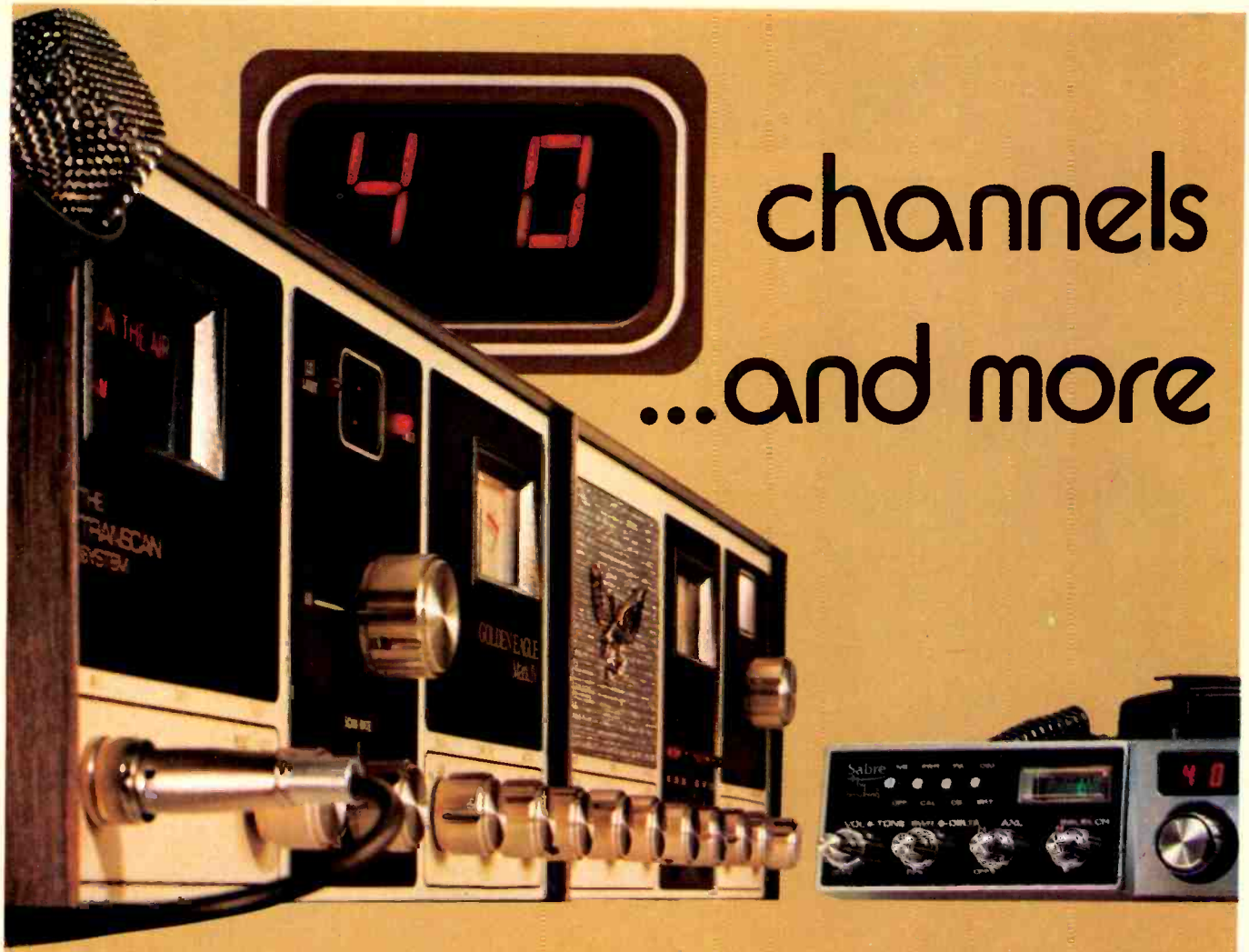

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In fact, Courier's Nightrider 40DR offers a whole passel of most wanted features like **RF Gain** that lets you tune up weaker signals and tone down overly strong ones. **Noise Limiter/Blanker** to reduce background and man-made noises. A **Tone** switch that let's you adjust the audio just the way you like it. And, an extra-large **S/RF Meter** fully illuminated for day or night reading. Plus, a pulsating **"On-the-Air"** light that lets you know how you're modulating. And a **PA** switch that enables your Courier Nightrider 40DR to double in brass.

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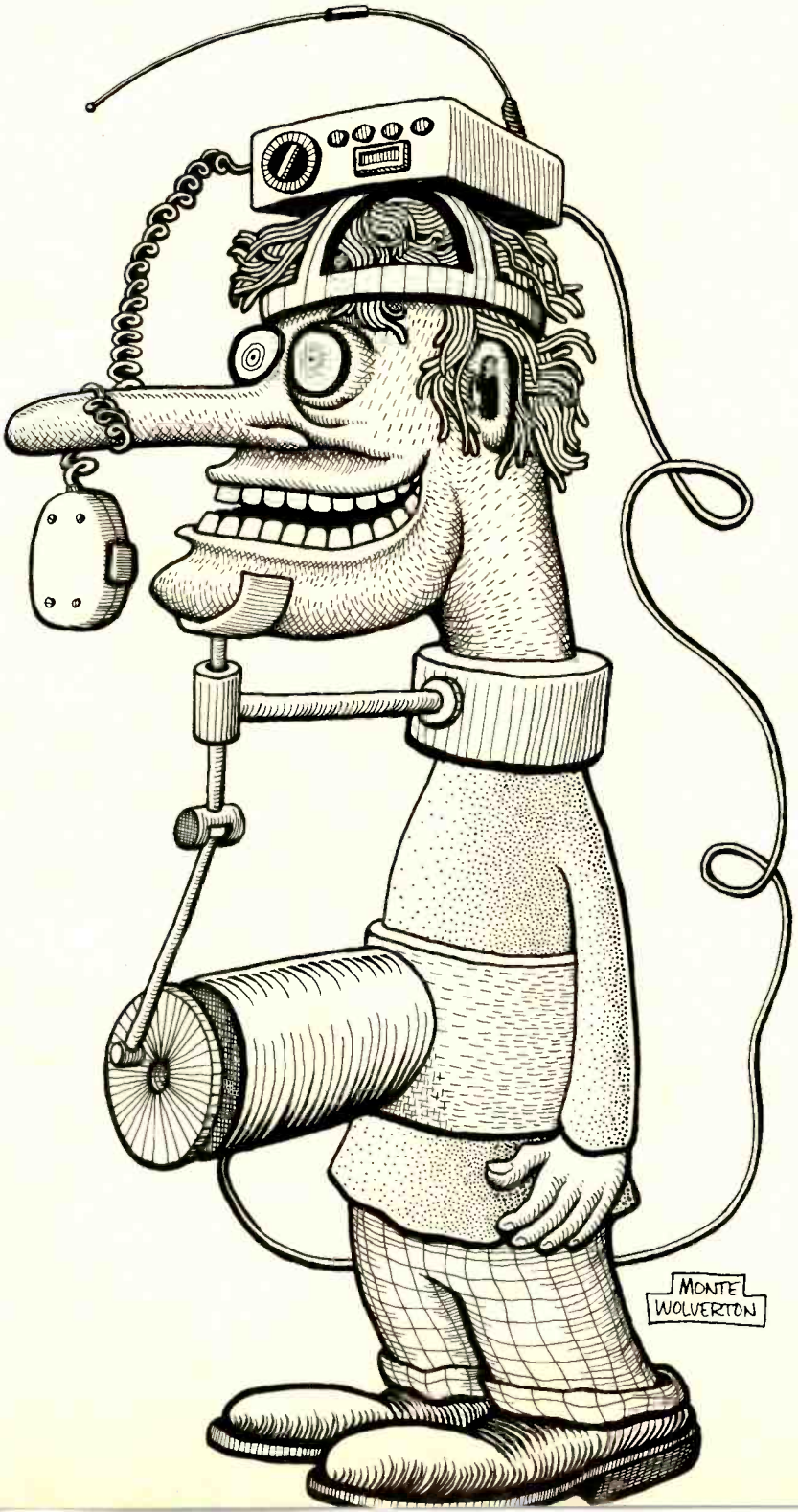


TUNING IN ON TINSELTOWN

What's New in CB Movies?

"CITIZENS" HOUND

THE hairy "good buddy" behind the CB unit (a Realistic TRC 56) is Tramp, enacting his first major film role in "Citizens Band", Hollywood's first movie about CB and CB'ers.

The ten-year old mongrel, cuddled up to star Paul Le Mat, and waiting patiently for the cameras to turn, was trained and wrangled by veteran animal handler Frank Weatherwax.

Frank discovered Tramp in the Hollywood Dog Pound and spent two years training and grooming him for stardom. Now the wet-nosed performer's career is starting to roll. He recently played the legendary huskie, Buck, in the television film version of Jack London's "Call of the Wild".

In Paramount's "Citizens Band" Tramp plays Ned, the lovably clumsy pet of CB'er Le Mat. He lives at Paul's home, a rustic CB repair station, and goes along on Paul's adventures in his specially-equipped scanning-and-tracking car, a '56 Chevy Nomad.

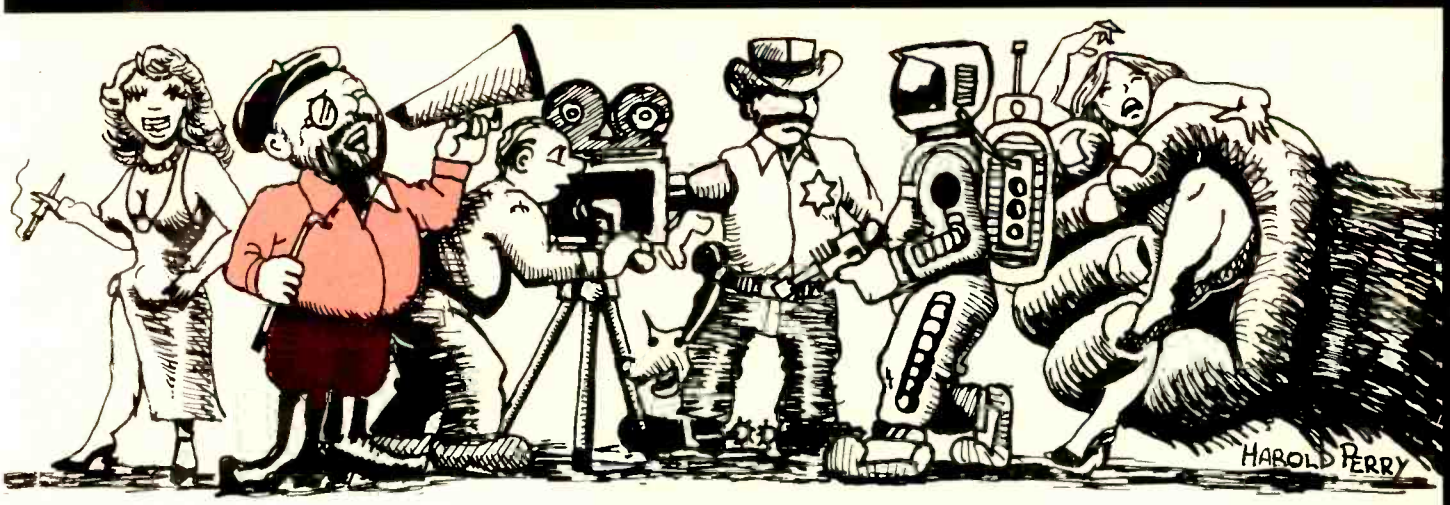
Tramp's first big film role called for him to roll in the mud, stick his foot in his food, get threatened by Paul's crotchety father (Roberts Blossom), and sit in on a CBers' discussion about the problem of "bleeders" and "rachet jaws."

Frank Weatherwax and his brother Rudd were the owners of Lassie. Frank was a dog trainer on the "Thin Man" films (which starred William Powell, Myrna Loy, and the wire-haired terrier Asta). Frank's many other movie credits include Walt Disney's "Old Yeller", "Sounder", "The Hindenburg", "Dog of Flanders", "The Little Ark", "Island of Blue Dolphins" and "Junior Bonner".

Also starring in "Citizens Band" are Candy Clark, Ann Wedgeworth, Marcia Rodd, Charles Napier, Bruce McGill, and Alix Elias. The comedy-drama was directed by Jonathan Demme from an original screenplay by associate producer Paul Brickman. The Fields Company production was filmed entirely on locations in northern California.

"Don't take it personally, Tramp! Lots of CB'ers can't get a break on Channel 9."

"Bartender—a round of beers for my buddies; and an S9 for the canine." Actually, that's not what they say in the film, but we couldn't resist the temptation. This shot of Paul LeMat and his pooch pal are from the new film CITIZENS BAND. Photos by Elliott Marks.



FROM "MARY HARTMAN" TO "CITIZENS BAND"

WILL Seltzer, the young actor who played the mass murderer on the "Mary Hartman, Mary Hartman" television show, is a CBer in the new movie "Citizens Band".

Seltzer co-stars in the Paramount picture, playing a high school basketball star who uses his CB in "Lover's Lane". His handle is "Warlock". His classmate-sweetheart is played by Joanne Pollizzi.

It was Seltzer who kidnapped Louise Lasser on "MHMH" and held her hostage in an abandoned Chinese laundry.

The talented actor's career is rolling along. He was also seen recently in the TV mini-series "Once an Eagle", co-starring as the shell-shocked Private Brewster.

In "Baby Blue Marine" Will was an Army private who lost Glynnis O'Conner to Jan Michael Vincent.

He has also acted in episodes of "Columbo", "Hawaii Five-O", "The Bob Newhart Show" and "Shazam". He had regular roles on the series "Second Start" and "Karen".

Will, born in Azusa, Ca., starred in the year-long run of "You're a Good Man, Charlie Brown" at the Ivar Theatre in Hollywood.

He lived for two years in Denver, where he studied music and recorded an album for Tumbleweed Records. In the Army in Germany, Will served as a radio and teletype operator and radio maintenance man.

You may also recognize Will from the popular Datsun commercial in which he plays a gas station attendant.

Joanne Pollizzi, Will Seltzer, and Alix Elias on location in the film "CITIZENS BAND."

Seltzer, of Mary Hartman TV fame, plays a CB'er whose handle is "Warlock." Not a newcomer to communications, while in the U.S. Army Will was a radio operator.

COMING EVENTS!

If you wish your Jamboree or Coffee Break listed in this column, the information must be sent to S9 at least 4 months in advance.

MAY

Bakersfield, Calif., Monthly Coffee Breaks of the Golden Empire Sideband Assoc. First Saturday of every month. Kern Co. Fairgrounds, Union Ave., Old Highway 99, Ming Avenue, Bldg. 2. For more info write: Assoc., P.O. Box 967, Bakersfield, Calif., 93302, or call 805-399-1321.

Johnson City, New York, Annual Coffee Break, May 1st Lutheran Fellowship Center. Exit 71 N. from Rt. 17. North Stella Ireland Rd. #3, ⅛ mile. For information: Susquehanna Valley CB Club Inc., Box 364, Viestal, N.Y. 13859.

Chagrin Falls, Ohio, 2nd Annual Jamboree. May 1st at Chagrin Falls Armory, Chagrin Blvd. Monitor Channel 8. For more info contact: Happy Talk CB Club, P.O. Box 13, Twinsburg, Ohio 44087.

Columbus, Indiana, Jamboree, May 7 & 8th, Barthomeu Country 4H Fairgrounds, Junction US 31A South and State Rt. 58. Sponsored by Town & Country Citizens Band Radio Club Inc. Contact Floyd Whitehead, 1-812-372-3524.

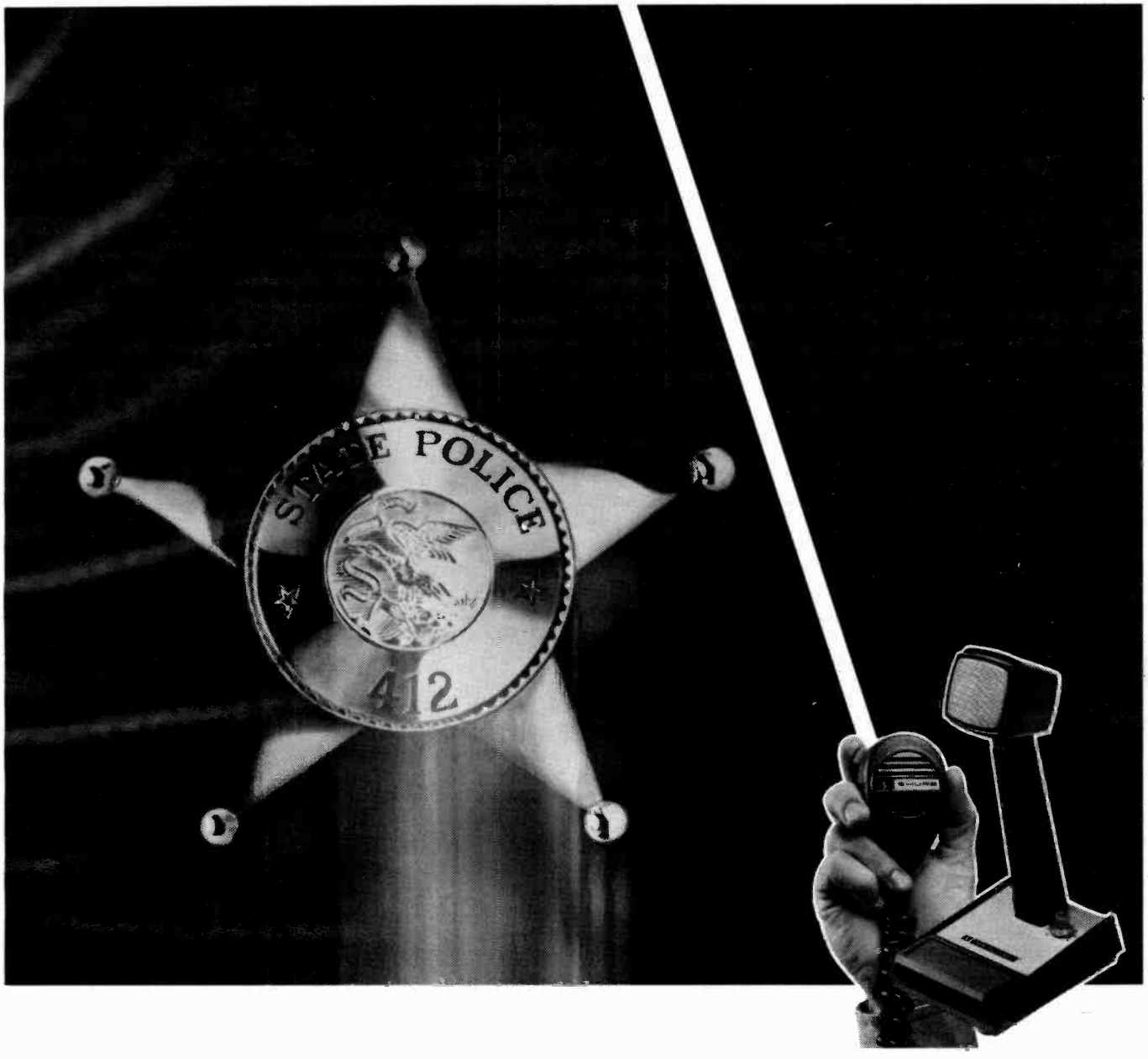
Manhattan, Kansas, 2nd Annual Jamboree of Manhattan React 2800 Inc. May 7th-8th at Pottorf Hall, Cico Park. Monitor Channel 21. For more info call or write "Godfather" (913)-539-6146 or "Budman" (913) 776-5296. Manhattan React 2800 Inc., Box 62, Manhattan, Kansas 66502.

Toronto, Ontario (Mississauga) National CB & Electronic Communications Show. May 13th, 6-11 PM, May 14 & 15th at Toronto Int'l Centre, 6900 Airport Rd. For more info contact George Bachir, Show Manager, 6 Caulfield Road, Rexdale, Ontario. M9W-IW8. (416) 745-1993.

Bronx, New York, Super CB Jamboree, May 15th Desert Inn, 30-80 Whitestone Parkway. Contact: American CB Radio Club Inc., P. O. Box 321, Bronx, N.Y. 10469.

Church Hill, Tenn., Second Annual Jamboree of Patriots Communication Club Inc., May 20-22. Seven miles

(continued)



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Now you can have professional reliability in a Shure CB microphone. This means 100% more "talk power" than the utility mics usually supplied with CB rigs.

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north of Kingsport on Highway 11-W. For more information write Patriots Communications Club, P.O. Box 142, Church Hill, Tenn. 37642.

Halifax, Pennsylvania, 3rd Annual Peter's Mt. CB Coffee Break. May 22, Halifax Area Park. For more info: contact Larry Troutman, President, RD #2, Halifax PA 17032.

International Falls, Minn., 1st International Jamboree, May 27 & 28th at Smokey Bear Park, Union Hall and K.O.A. Campgrounds. For further info: Chris Cantrell, Box 1022, International Falls, Minn. 56649.

Cheyenne, Wyoming, 4th Annual Cheyenne Midnight Modulators Jamboree. May 27th-29th. For more information write CMM Jamboree, P.O. Box 3376, Cheyenne, Wyoming 82001 or call Larry at (307) 634-5367, evenings only.

Turners Falls, Mass. CB Fair, May 28th at Millers Falls Rod & Gun. For more info contact. Cross Roads CB Courtesy Club, P.O. Box 753, Greenfield, Mass. Sally Baker, Secretary.

Florence, Ala., Jamboree and Coffee Break. May 28 & 29th, Tri-Cities CB Club at Florence-Lauderdale County Coliseum, 702 East Spring St. Contact: James Stough, c/o Tri-Cities CB Club, P.O. Box 2281, Florence, Ala. 35630.

Turrell, TX Annual Memorial Day Coffee Break & Rest Stop of the Kaufman County React. May 27-29th at rest stops on both sides of Interstate 20 at milemarker 525. Eight miles east of Terrell. For info write club at Box 949, Terrell, TX 75160.

Madison, Illinois, 1st Annual Break of Flipper-Tail CB Club. May 29th Kiroation Home, 1000 Madison Avenue (Route 3). For more information write: Bill Skinner, President Flipper-Tail CB Club, P.O. Box 1205, Granite City, Illinois, 62040.

JUNE

Ottumwa, Iowa, 2nd Annual Armadillo Flats National Jamboree, June 3rd-5th, Ottumwa Coliseum. Hosted by Armadillo Flats Iowa. For more information contact Armadillo Flats, Inc., P.O. Box 313, Oskaloosa, IA.

Great Bend, Kansas, Jamboree, June 4-5, sponsored by Kansas Flatlanders CB Club. For more information contact: Bob Shanks, The Budman, 1209 8th. 792-2209 or Box 114, Great Bend, Kansas 67530.

Beaufort, South Carolina 4th Annual Jamboree of the Low Country Modulator CB Club. June 11-12th at the National Guard Armory. For more info contact Low Country Modulators, P.O. Box 4736, Burton, S.C. 29902. (803) 524-8539 or 524-3349.

Franklin, Pennsylvania, 1st Annual Coffee Break of the Undecided CB Club, June 12. At the 4-H Grounds off Route 62. For more information please contact Jim Mast, Jr., 327 Bissell Avenue, Oil City, Pa. 16301.

Wichita, Kansas, 3rd Annual Good Guys Jamboree. June 17-19th, Cotillion Ballroom, 11120 W. Highway 54. For more information contact: William Webber, Chairman, P.O. Box 1694, Wichita, Kansas 67201.

Wellington, Ohio 2nd Annual MDA Jamboree sponsored by Greater Cleveland CB Council. June 17-19th at "Clare-Mar Lakes Campgrounds". Benefits Muscular Dystrophy. For more info & advanced camping reservations contact The Wonder Man, P.O. Box 35453, Cleveland, Ohio 44135.

Mt. Pulaski, Ill. Coffee Break of Vinegar Hill CB Club. June 19th at Recreation Center, Rt. 54 & 121. For more info contact Club at P.O. Box 61, Mt. Pulaski, Ill. 62548. Glen Michaelis—President.

Fond du Lac, Wisconsin. 2nd Annual Charity CB Jamboree, June 24th-26th, at Fond du Lac Fairgrounds. For more info write Fox Valley Wave Lengths, P.O. Box 415, Fond du Lac, Wisconsin 54935.

Munice, Indiana, June 25 & 26th. 1st Annual Magic City Modulators Jamboree and Coffee Break, Delaware County Fairgrounds. For informatiJon contact Gloria King, 406 E. 3rd St., Munice, Ind. Phone 289-8701.

Abingdon, Illinois, 2nd Annual Jamboree of Sky Watch CB Club. June 25 & 26th at Fall Festival Grounds, Rt. 41. For more info: Sky Watch CB Club, P.O. Box 29, Abingdon, Illinois 61410. 309-462-2834.

Newton Falls, Ohio, First Annual Jamboree of Ohio Community Center, June 25-26. Sponsored by the Blue Knights International Sidebanders Ass'n. For more info write Blue Knights SSB, P.O. Box 126, Niles, Ohio 44446.

JULY

Bailey, Colorado, Annual Convention of National CB'ers Association, Inc. July 1st-3rd, at the Farmers Union Bldg. For details write to Association at Rt. 1, Box 108, Pine, Colorado 80470. Deana M. Klappel—Secretary.

Shallotte, North Carolina, 1st Independence Jamboree of the Land and Sea Search and Rescue CB Club, July 2 & 3. At the National Guard Armory Bldg., Hwy. 17 South, halfway between Myrtle Beach, S.C., and Wilmington, N.C. For info, P.O. Box 843, Shallotte, N.C. 28459. Telephone (919) 754-6564. Mon. Channel 22.

Beatrice, Nebraska, NEB Sidebanders Club 1st Annual Jamboree, July 2-4

at Gage County Fairgrounds. For more information contact: NEB Club, Box 81, Holmesville, Neb. 68357.

Whitney Point, New York, Electronic Show and CB Jamboree, July 8-10th, Whitney Point Fairgrounds. Rt. 11, Exit 81 81. For more information: International Order of Chiefs and Squaws QSL Club, P.O. Box 25, Binghamton, New York 13903, (607) 722-3536 or 772-8860.

Whitney Point, New York, Jamboree of International Order of Chiefs & Squaws QSL Club. July 8-10th at Whitney Point Fair Grounds, North of Binghamton, South of Syracuse. Rt. 11—Use exit 8 off Rt. I-81. For more info write Club at P.O. Box 25, Binghamton, N.Y. 13903. (607) 722-3536 or (607) 797-9051.

Butte, Montana, Treasure State CB Jamboree, July 15-17th at Rodeo Grounds. Sponsored by Bagdad Shrine —proceeds to Shrine Hospital. For more info: write, P.O. Box 3083, Butte, MT 59701.

Bristol, Ind. Jamboree, July 16-17, Eby's Pines, Rt. 2, Junction U.S. 131 & Interstate 80-90. Contact Chairman, R. M. Shipman, P.O. Box 7092, Toledo, Ohio 43615.

Jacksonville Beach, Florida, July 16 & 17th, Jacksonville Beach Coliseum. 4th Annual Voice of the Beaches Jamboree. For information: Bill Jackson, P.O. Box 50906, Jacksonville Beach, Fla. 32250 or 904-285-2937.

Douglas, Wyoming, Jamboree of Jackalope CB Club. July 22-24th at the 4-H Bldg., State Fair Grounds. For more info write the Club at P.O. Box 789, Douglas, Wyoming 82633. Or call Mama Blue at (307) 358-2289 or 2320.

Shortsville, New York, Superbreak & Jamboree of the Alert React CB Club. Sunday July 24th at the Turner-Schrader American Legion Post on Rt. 21 north. For more info contact the Club at P.O. Box 613, Shortsville, New York 14548.

AUGUST

Bakersfield, Calif., 1st Annual Jamboree of the Golden Empire Sideband Assoc. August 5-7th. At Kern Co. Fairgrounds, Union Ave. (Old Highway 99) and Ming Ave. For more info write: G.E.S.A. Inc, P.O. Box 967, Bakersfield, Calif. 93302 or call 805-399-1321.

Alexandria, La. 12th Annual CB Jamboree of Mid-State CB Radio Club, Inc. August 6 & 7th at the Rapides Parish Coliseum. For information write. Mid-State CB Club, P. O. Box 1945, Alexandria, La.

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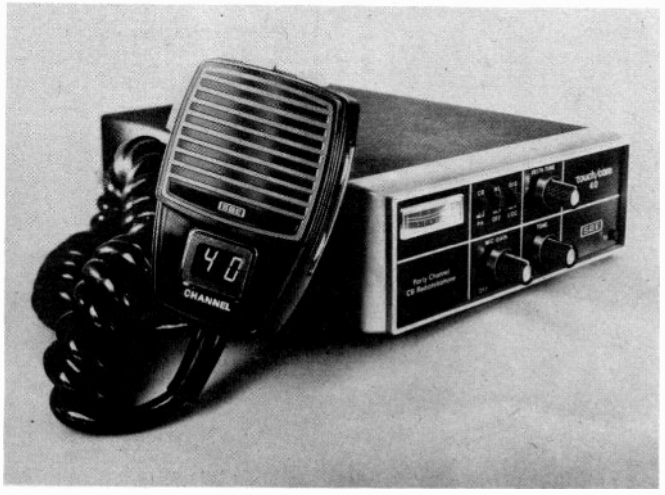
ON THE COUNTERS



NEW SBE TOUCH-COM 40: WITH LED READOUT ON MIC

SBE, Inc., a leading manufacturer of Citizen's Band, Marine and other personal communications products, will be giving visitors to the PC '77 show a look at the company's new line of 40-channel CB radios, including the Touch-Com 40, a unique 40-channel CB transceiver with controls for all key functions and an LED readout in the microphone head.

According to SBE, all normal CB functions on the Touch-Com 40 are controlled from the microphone offering drivers extra convenience and safety during CB communications. Two up/down buttons on top of the microphone control channel selection. By momentarily pressing the appropriate button, the unit will automatically step upwards or downwards one channel at a time. Holding either button down will automatically step through all 40 channels. Channel readout is on the microphone, and features large, base-station size LED's, polarized for easy daylight viewing. Full range volume and squelch thumbwheel controls are located on the right side of the microphone. A push-to-talk switch is on the left.

The Touch-Com 40 includes the famous SBE "Formula D" circuitry, with phase-lock-loop digital synthesis for precise frequency accuracy and stability on all 40 channels. A 4-pole ceramic I.F. filter assures sharp selectivity and adjacent-channel rejection in the double-conversion receiver section. Field Effect Transistors in the receiver RF stage lead to optimum sensitivity and a high signal-to-noise ratio. Receiver automatic gain control yields smooth, undistorted audio under varying signal conditions. Audio tone is adjustable. The transmitter section features maximum legal output power, and the exclusive SBE "Speech-Spander" circuit for automatic control of modulation for varying speech levels.

Front panel controls on the Touch-Com 40 are: audio tone, public address volume, local/distance switch, delta tune, "on-air" transmit light, and a large illuminated combination power output/S meter. The unit operates on either 13.8 DC positive or negative ground systems.

Further information is also available by writing SBE, Inc., Dept. P, 220 Airport Blvd., Watsonville, Calif. 95076, or mark number E01 on Reader Service Card.

NEW 40-CHANNEL KRIS XL-40

Kris, Inc. introduces the XL-40, a modestly priced 40-channel AM mobile with advanced PLL circuitry and a broad range of features.

The FCC type accepted unit is attractively styled in a black/semi-matte cabinet with chrome knobs. It features a large, illuminated S/RF meter; illuminated channel selector; transmit indicator; automatic noise limiter; CB/PA switch; internal/external speaker switch; ON/OFF volume control; full-range, low threshold squelch control; and S-meter jack for larger, optional Kris S-meter.

For Information About Our Advertisers . . .

The Kris XL-40 produces 4 W maximum legal output and is capable of modulating 100%. Sensitivity is 0.5 uV for 10 dB (S+N)/N; Selectivity is 5 kHz minimum @ 6 dB down; ADJ channel rejection is greater than 60 dB; and harmonic suppression is more than 60 dB.

The unit is supplied with connectors, mounting bracket, plug-in dynamic microphone and installation instructions. For more information, write to Kris, Inc., Pioneer Road, Cedarburg, WI 53012, or mark number E02 on Reader Service Card.

Motorola has unveiled a line of four U.S.-made under-dash 40-channel citizens band radio models. The basic unit, model 4000, offers such standard features as a digital phase lock loop synthesizer; a dual gate F.E.T.. front end; a rugged plug-in Motorola power microphone with a built-in amplifier; a top fire speaker; a large, illuminated S/RF meter; an automatic noise limiter and a wide range automatic gain control.

MOTOROLA'S NEW 40 CHANNEL CB RADIO LINE

Motorola's 40 years' experience in FM two-way communications backs the company's new line of FCC type-accepted 40-channel citizens band radios, antennas and accessories.

The new line, being manufactured at Motorola facilities in Illinois, includes four under dash 40-channel CB radios, a complete line of Motorola-designed and manufactured antennas, a base station converter and desk microphone for home or office CB operation, an external speaker and test equipment.

The new CB radios, whose performance levels equal or exceed those of the 23-channel CB sets, offer the latest state of the art in both solid-state technology and in styling.

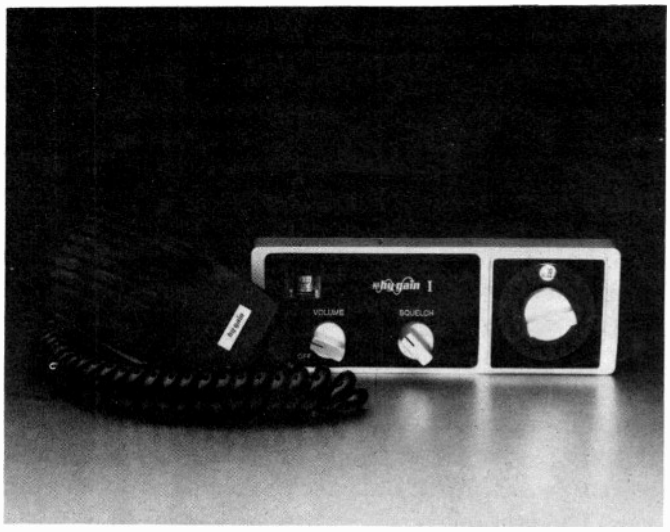
All four radio models feature a digital phase lock loop synthesizer, providing reliable on-frequency operation, and cover the full range of 40 CB channels.

Equipped with dual gate F.E.T. front end, the Motorola CB units offer better protection from off-channel interference than conventional transistor designs. Motorola's automatic noise limiter (ANL) and a wide range automatic gain control (AGC) reduce annoying audio blast. Both the ANL and the AGC circuits are designed for easy hands-off operation requiring a minimum of adjustment by the operator.

Other features available, depending on the model, include an exclusive "Extender" noise blanker which reduces both ignition noise and other manmade interference, and an L.E.D. digital channel readout with dimmer. All models offer a newly designed speaker with improved voice recognition and fidelity. A large, easy-to-read, illuminated S/RF meter provides visual indication of the incoming and outgoing signal strength.

In addition to the Motorola antennas and base station converter and desk microphone, Motorola is also offering a complete line of CB test equipment for consumer use.

Prices for the four Motorola CB radio models range from $179.95 to $259.95. The base station converter and desk microphone are priced at $44.95 and $48.00, respectively. Single antenna mounting packages are priced at $28.95, and dual mount configurations at $68.95. Mark number E03 on Reader Service Card.



HY-GAIN TRANSCEIVER WITH PHASE-LOCK-LOOP

The new 40-channel Hy-Gain I (2701) is an advanced Phase-Lock-Loop citizens radio that will transmit and receive on all 40 channels. It has an easy to read illuminated S/RF meter and 40 channel selector. As well as advanced compact styling (¼"H X 6⅜"W X 7⅝"D).

Its small size, however, does not preclude big features like automatic modulation control. Built-in mic preamp. Full time built-in ANL (automatic noise limiter) circuitry for extra quiet operation. External speaker jack. TVI (television interference) filter. And floating ground which accepts positive or negative without opening the unit or switching wires.

The 2701 has a full 4 watts RF output, the legal maximum. Plus exceptional sensitivity to help pull in even distant signals.

Suggested retail price is $139.95.

Mark number E04 on Reader Service Card.

40-CHANNEL CB/AM-FM-MPX/STEREO CASSETTE COMBINATION UNIT

In addition to the expanded new CB channels, the new unit, J. I. L. Model 615CB, features a new, easy-to-use CB microphone that incorporates all necessary CB function controls, including channel selector, "push-

to-talk" control, RF gain, and a bright LED channel readout, making the 615CB convenient to use even while driving.

The unit's front panel incorporates such other CB controls as variable squelch, the CB/Radio-Tape mode selector, RECEIVE and TRANSMIT indicator lights, and J. I. L.'s patented stand-by control. STAND-BY monitors CB while cassettes or AM-FM radio is being played, interrupts for CB messages, and returns to the original program automatically.

The cassette section includes controls for fast forward/eject and a tape play indicator light. The AM-FM-MPX section provides AM-FM selector, Mono/Stereo Switch, MPX indicator light and antenna trimmer. The unit delivers 5 watts per channel RMS power output and a frequency response of 50-10,000 Hz. Controls include Volume with bass boost, balance, and tone adjustment. Mark number E05 on Reader Service Card.

NEW REALISTIC RIG

Radio Shack has introduced their new Realistic TRC-452 40-Channel Citizens Band Two-Way Radio.

The TRC-452 features new phase lock loop synthesizer circuitry for full 40-channel coverage with no extra crystals to buy and a greater degree of frequency stability. The transceiver is FCC type-accepted and certified. Rated at 4 watts maximum RF power output.

An automatic modulation gain control circuit is said to eliminate the need for power microphones and provides full 100% modulation. An RF gain control provides best reception of both strong and weak signals. An adjustable squelch control silences background noise. A switchable ANL (automatic noise limiter) reduces ignition-type interference.

Other features include: public address facility, illuminated S/RF meter and channel selector, LED modulation indicator, plug-in dynamic mike and universal mounting bracket for vehicles or boats. Operates on 12 VDC, positive or negative ground electrical systems. Size, 2¼ x 6 x 8½".

The Realistic TRC-452 40-Channel CB Two-Way Radio is priced at $139.95. Available exclusively from Radio Shack stores and dealers, nationwide.

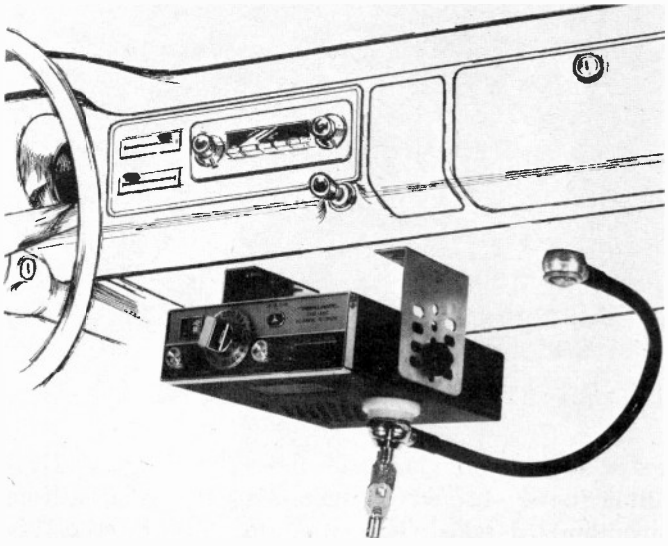
Mark number E06 on Reader Service Card.

KEEPING PACE

The PACE 8030 is the "road companion" that'll be there when you need it. Solid state reliability assures that. Plus, 40-channel capability with "get-on-now" accessibility. Electronic channel selection. Add to this, Pace performance, RF Gain control, Delta Tune, Noise Blanker switch, S/RF Meter, Automatic Noise Limiter switch. All made possible by the latest manufacturing and quality control techniques. It features:

- RF Gain Control—Provides precise variable control so that when increased, weak signals are made stronger. When lowered, strong signals are received without distortion.
- Delta Tune—If another CB'er is off frequency and sounds raspy, Delta Tune shifts your receiver frequency to match his and thus fine-tune his voice.
- Noise Blanker Switch—Reduces static-type noise caused by man-made interference i.e. car ignition systems.
- S/RF Meter—Displays relative strength of both outgoing and incoming signals. Useful in determining one's own transmitting performance or another CBer's. And, also important in maintaining a check on the entire transmitting system.
- Automatic Noise Limiter Switch—Switchable on/off to automatic reduction of atmospheric hissing.

Mark number E07 on Reader Service Card.



CABLE LOCK SAFEGUARDS RADIOS IN VEHICLES

The Prague CB Radio Cable Lock protects CB radios against theft through the use of a strong steel cable which is joined to the heavy steel framework of the vehicle dashboard on one end and locks to the CB radio by means of an integral pick-proof seven-pin cylinder lock on the other end. The cable, a 5/16" diameter stranded steel aircraft cable (6000 lb. test) is almost impossible to sever, assuring full protection to the CB radio, yet the integral lock allows the CB radio to be removed instantly at the turn of a key, without unbolting, disassembling anything or using any tool except the key.

The Prague Lock is a highly successful cable lock which has been used for over five years by Federal and State agencies, major corporations, hospitals, schools and colleges to protect sophisticated and expensive typewriters, office machinery, computers and calculators, medical electronics and communications devices.

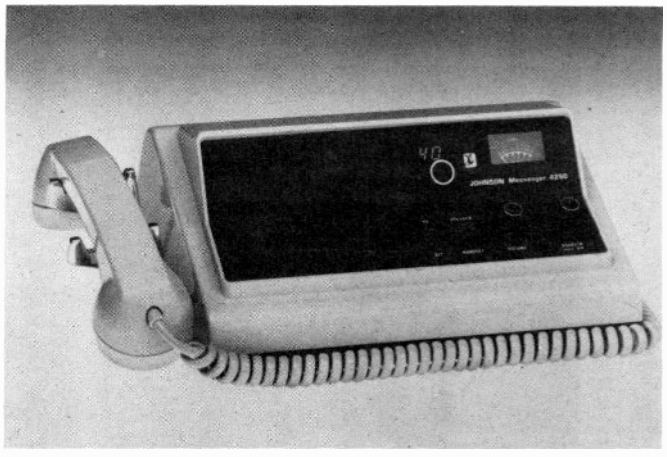
Both the integral lock and the special fitting at the dashboard end of the cable are designed so that they are cut-proof, offering no opening into which a hack saw can be slipped. This, combined with the inherent strength of the cable, gives complete security.

Dealer inquiries are invited.

Available from: I. O. Prague Corporation, 33 Cain Drive, Plainview, New York 11803, or mark number E08 on Reader Service Card.

BASE STATION HAS 40 CHANNELS PLUS HANDSET

A new 40-channel CB base station, the "Messenger 4250", has been introduced by the E. F. Johnson Company. In addition to complete coverage of the new expanded CB band, the radio features the attractive styling and operating advantages of radiotelephone design. It can be used either like a conventional CB radio, with its large front mounted speaker, or with automatic speaker silencing when the handset is lifted.



With the speaker silenced, the handset provides private listening without disturbing others. Handset listening also improves intelligibility over background noises in home, factory or office. A front panel switch selects either the conventional speaker or automatic speaker silencing modes.

Circuitry in the new Messenger 4250 features Johnson's "X300D" IC, which contains a complete PLL circuit utilizing a single intergrated circuit chip. Designed for long term reliability, the X300D circuitry is an exclusive Johnson development. Another exclusive feature is built-in TANL (Tapered Automatic Noise Limiter), which automatically and continuously adjusts itself to incoming signal conditions eliminating the need for manual operator control. Channel readout on the Messenger 4250 is a large, bright LED display. For operation in subdued light, the display may be dimmed by pulling the squelch control. A large illuminated panel meter is also provided for monitoring received signal strength and relative transmitter output power. The radio also features a built-in PA function which can be used as a handy paging system. The radio operates from 117 VAC standard household current.

The suggested retail price is $259.95. For more details contact any Johnson CB dealer or write: Personal Communications Division, E. F. Johnson Company, Clear Lake, Iowa 50428, or mark number E09 on Reader Service Card.

CB CONVERTER

The Solitron Model 10-4 CB converter allows all 40 channels to be received through an existing AM car radio. Crystal controlled for complete stability, its sensitivity is greater than .5mv, which is equal to or greater than that of most mobile CB transceivers. The compact size of 2¼w x 4⅛d x 1h"—slightly larger then a pack of cigarettes—allows for easy installation under most car or truck dashboards. A voltage regulator is built-in to reduce alternator and ignition noise. The unit will operate with existing car antennas, including windshield types. The suggested list price is $22.95. Contact Solitron, 256 Oak Tree Rd., Tappan, N.Y. 10983, or mark number E10 on Reader Service Card.

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SUPER CATALOG

Off press and ready for mailing is Allied Electronics' 1977 Engineering Manual and Purchasing Guide. The guide is filled with a wide selection of industrial-type electronic parts, components, supplies and equipment which keep engineers, technicians, purchasing agents, teachers and hobbyists requesting Allied's guide year after year. And, new in this year's guide is the introduction of metric measurements on many electronic parts and components.

The 1977 edition of the guide is 212 pages full of high-quality electronic parts and equipment from Allied and other leading manufacturers. Choose from a wide variety of new products, in addition to the traditional items which have set the standard for Allied's previous guides.

You'll find wire, cable, solid state devices, test equipment, resistors, trimmers and potentiometers, transformers, switches, timers, connectors, relays, tools, capacitors, new solar energy products, CB test equipment and even a microcomputer, plus many other electronic parts too numerous to list. Allied offers bulk pricing for quantity buyers, and six nationwide stocking locations assure prompt delivery of ordered merchandise.

There's no need to rely upon a friend or business associate for access to Allied's 1977 guide. Write today for your own copy. Send $1.00, to help cover postage and handling, to: Allied Electronics, Dept. S9, 401 East 8th Street, Forth Worth, Texas 76102, or mark number E11 on Reader Service Card.

GET ALARMED!

A new automobile anti-theft alarm, the PROTECTOR II, is available from Alarm Research & Manufacturing Co., Inc., West Springfield, Massachusetts.

The PROTECTOR II is a fully automatic auto alarm. The entire system is controlled by the ignition key. No additional keys or switches are necessary. Simply remove the ignition key and the PROTECTOR II is automatically turned on protecting the vehicle from unauthorized entry. Forgetting to turn it on is impossible. Additional features are a circuit that temporarily disables the ignition system so the vehicle cannot be "hot-wired", automatic re-set and exit and entrance delays for user convenience. Product reliability is assured by the use of solid state components and integrated circuits. The small size of the unit allows it to be installed in the glove compartment, trunk or other out-of-the-way location. Included with the alarm are complete easy to follow instructions, plunger switches, wire connectors and installation wire. Post paid the PROTECTOR II is $69.95.

Extensive research indicated there was a need for a low cost, reliable, simple to install auto alarm that would feature ease of operation. Concentrated efforts of the research and development and engineering staffs of this three year old company has produced an alarm that meets these needs and in addition is maintenance free, simple to operate with no false alarms.

In some states insurance companies are offering a 10% discount on comprehensive insurance coverage for vehicles that have installed PROTECTOR II. See your insurance agent for details.

For the PROTECTOR II dealer in your area or if you are interested in becoming a dealer contact Alarm Research & Mfg. Co., Inc., Dept. S9, 1686 Riverdale Street, West Springfield, MA 01089, or mark number E12 on Reader Service Card.

NEW CB SERVICE MONITOR

The Measurements Model CB-27E Service Monitor is a low-cost, rugged, portable instrument for accurately trouble shooting and aligning citizens band transceivers operating in any of 40 channels presently assigned. Transceiver frequencies can be checked and offset from mid-channel frequencies measured by the front panel meter and calibrated against internal frequency standard by zero-beating with the built-in speaker. Additional channels in the 27 MHz spectrum can be added if assigned. If powered with the optional NICAD battery, the CB-27E can check the transceiver without removing it from the vehicle.

Phase-locked loop circuitry referenced to a 20 MHz "AT" cut crystal assures accurate and stable frequency performance. An incremental tuning range of ± 5 kHz is provided for simulated SSB receiver tests. Frequency and voltage standards used during factory calibration of this instrument are traceable to the National Bureau of Standards. Features include: provision for adding future channels; 455 kHz crystal I.F. output with modulation and output level control, and provision for two additional I.F. frequencies; monitor and transmitter are both protected against overloading if transmitter is accidently keyed; 1 kHz sine wave AM internal modulation and jack for external modulation covering speech frequencies; built-in transmitter meter; only 1.5 watts power consumption; and instant "ON", no warm-up. Selling price $495.00 F.O.B. Manchester, N.H.

For complete technical data, write: McGraw-Edison Company, Edison Electronics Division, Dept. 27E, Grenier Field, Manchester, N.H. 03103, or mark number E13 on Reader Service Card.

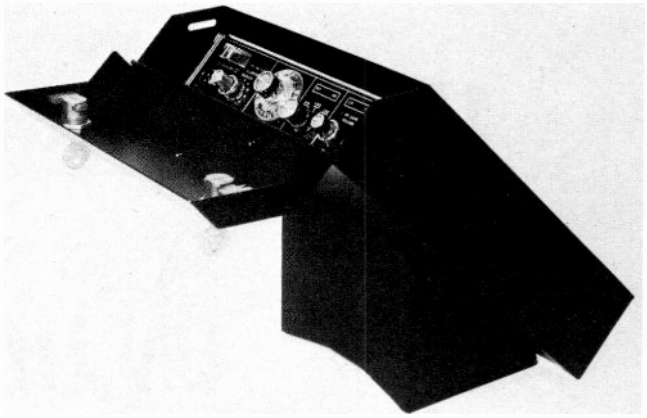
SECURITY CONTAINER

A new approach in theft prevention of CB radios has been introduced by CB Security Unlimited. The CB SAVER is a maximum security locking container that completely conceals the radio when not in use, but allows easy access for normal operation.

Industry estimates say that more than $15-million worth of CB radios will be stolen this year. In most cases, insurance coverage will not apply unless the radio is "permanently mounted". The CB SAVER meets this requirement even though the radio can be quickly removed from the compartment once it is unlocked.

Made of heavy duty steel, the CB SAVER bolts to the chassis, dash or other location. An optional floor mounting bracket is offered. When installed, there is no access to the mounting hardware.

The radio slides into the unit and is held by heat-treated springs. Entry points are provided for wiring and microphone connections.



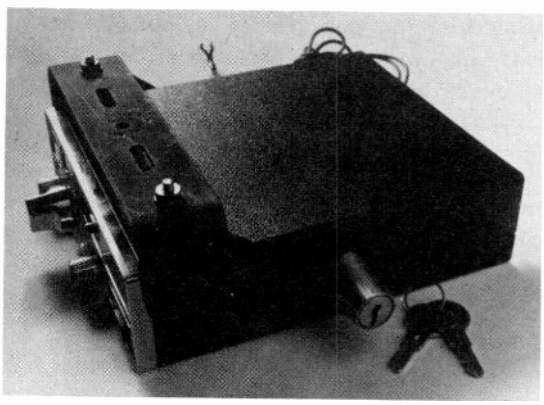
When not in use, a double-locking door closes over the front of the container. Now the radio cannot be seen, which authorities propose as one of the first considerations in preventing theft. In operation, the door swings out of the way exposing the radio.

The CB SAVER will accept 98 percent of the radios on the market. It can also be used for marine radios or for stereo tape decks.

The company also registers the engraved serial number of each CB SAVER and the number of the customer's equipment free of charge.

List price is $49.95. Dealer inquiries are invited.

Contact: CB Security Unlimited, P.O. Box 24649, San Jose, CA 95124, or mark number E14 on Reader Service Card.



TWO WAY PROTECTION

Two free-spinning locks from Brammall provide a new protection for CB radios. The design of the tapered locks prevents them from being twisted loose or snapped off by crooks. Yet the owner can easily remove the CB radio for overnight storage in the car trunk or the home. The Brammall Barrel kit comes complete with keys specially made for the individual locks, mounting hardware and a warning sticker for the car window which provides space for the serial number of the equipment. Available for $9.95 where CB radios are sold, truck stops and hardware stores.

Brammall Inc., P.O. Box 208, Angola, Indiana 46703, 219/665-3176, or mark number E15 on Reader Service Card.

(continued on page 126)

15 16 17 ON THE SIDE.....

S9's Monthly Column for Sidebanders

by Bill Sanders,
SSB-295
KW-5304

FIXEM-UP DEPT.: SIDEBAND ID NUMBERS

Single Sideband operators don't use AM type handles or unit numbers for identification purposes. Instead they use special Sideband ID numbers. Those many readers who have written to us asking about how they may obtain a set of these numbers are advised that we recommend joining the SSB Network, which is the nation's oldest and largest group of Sidebanders. A self-addressed stamped envelope sent to the Sidebanders' Service Bureau, P.O. Box 381-R, Smithtown, N.Y. 11787, will bring you information telling how you can become a part of this vast network. Their national "SSB" ID numbers can be obtained without cost or fee. We suggest that all Sidebanders avail themselves of this opportunity to join this network—even if you are a future Sidebander, or an old-timer who already has "local" numbers.

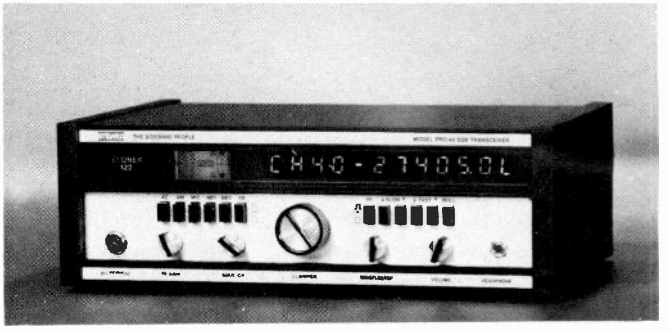
NEW SIDEBAND RIG

A new single sideband base station has recently been introduced by *STONER—The Sideband People*. A number of unusual engineering techniques have been employed in the STONER Model PRO-40.

To eliminate crossmodulation interference ("bleed-over") STONER has avoided the conventional transistor r.f. amplifier/mixer technique used in virtually all CB receivers. In fact, no r.f. stage is used at all and the mixer employs hot carrier diodes. There are no amplifying stages in the "front end" which could be overdriven by strong signals. The receiver exhibits extraordinary selectivity through the use of two separate crystal filters. Reception in the area of the unwanted sideband is totally suppressed.

Another unique aspect of the PRO-40 is the use of a computer microprocessor for the selection of channels. The microprocessor automatically selects Channel 16 (the sidebanders' calling channel) upon the application of power. Data entry switches are used to shift the channels in either direction and at a fast or slow rate.

One of the most striking features of the PRO-40 is the continuous reading, six digit frequency display. Jumbo LED's produce a highly visible readout of exact frequency on both receive and transmit. The channel numbers are also indicated, as well as the sideband in use. The display is driven by the microprocessor, which autotracks when the channels are changed.



A newly developed SWR indicator is used in the PRO-40. Most SWR meters require calibration and do not indicate the optimum antenna frequency without extensive measurements. The PRO-40 SWR meter works much the same as the tuning indicator on an FM receiver. Deviation from the centerline of the meter indicates mistuning of the antenna and whether the antenna is tuned high or low of the operating frequency.

Sideband operators will appreciate the audio notch filter incorporated in the PRO-40. Called the "Whistle-stop," the filter can be tuned through the audio passband to null out heterodyne whistle caused by AM carriers.

Other features include a large 10-turn clarifier knob, a dual time constant noise blanker and extensive television interference (TVI) suppression techniques.

The PRO-40 measures 15½" wide, 11" deep and 5¼" high. The highly functional control panel is complemented by solid wood end panels. Retail price of the equipment is $995.00.

We hope to have more details in a future issue!

A LOCAL SIDEBAND CLUB?

This column receives a considerable amount of mail from readers who ask about a local Sidebanders' club in their area—maybe there is a club in their area which they are unable to contact, or have contacted it but find it not to be to their satisfacion, or (in most cases of folks who don't live in population centers)—there simply isn't a Sideband club!

Sure there are AM clubs—and these clubs are almost always willing to accept all local operators, be they AM'ers or Sidebanders, but the art of 11 Meter Sideband has grown in its own direction at this point and many Sidebanders want to get off on their own and hash over their own unique interests. *And why not!*

If you are faced with this, cheer up! It's easy to form your own local group—*do your own thing!* It doesn't take a lot of members, you can do it with only a handful of Sidebanders.

We went to the people at the SSB Network and spoke to them about how to get it together with a local group, since they have a number of years experience in helping local Sideband clubs become established.

Their advice is to start out small and casual—as informal as possible. The original people should just sit down over some coffee and discuss their plans—do they really need a local club, are they willing to accept the fact that running a local club is hard work which is not only thankless but also means that 3 to 6 people will end up doing most of the work while all of the other members think of ways it could be done *much* better.

Discuss some of the projects which the club will embark upon. Don't have any ideas? Well, you might set up a group of members who will stand watch on the local Sidebanders' channels for the purpose of reminding stray AM'ers of the fact that they are potential jammers of Sideband communications. Then consider setting up a technical assistance committee—one or more members who can give some aid and advice to members whose Sideband gear or installation has problems.

Then there are other things—meetings, jamborees, service to the community, publicity, roll calls, a committee which will suggest operating channels and standards for the local gang. There's plenty to do with your group when you come right down to it—and you can also select one member to be a liason with AM clubs in your area—a member who can lecture and demonstrate Sideband gear, handle any problems of interference between both factors.

After you get it all together, get on the air and start talking up the idea for your local club—set a time for your first meeting, and invite anyone who is interested. Lay your plans on those who attend—ask for a showing of hands from those who would like to be part of the club which you propose. If you get a good showing—then take it from there!

But whatever you do—don't get so bogged down in Roberts Rules of Order, points of order, *Mr. Chairman!*, committee reports, reading and amending minutes of the previous meeting, etc., that your club ceases to be fun, interesting, and useful.

Let those who wish to be part of the group select a name for the organization. Try to make the name representative of your own local community—something like the *Crestview Heights Sidebanders*, or the *Sideband Club of Crenshaw County*, or the like, so that those who hear of your organization will immediately know where you hail from. Names such as the *Stragglers and Complainers Radio Club*, or the *Elbow Bender CB'ers*, are cute as all get-out but don't really say very much about where you're from or the fact that you are Sidebanders!

Members of the group will probably want to have some uniform means of identification, possibly sideband identification numbers for the members. You can create your own local numbers from the initials of your club, followed by the individual membership number of each operator. If you wish, *SSB Network* will provide your group with a block of *national* sideband numbers for the use of your members. The national numbers can be used in addition to your local numbers, or they can be used as the sole numbers issued by the group to its members. Among the many sideband groups now issuing *SSB Network* numbers to members are *The Tysons Corner SSB Club* (contact Russ, SSB-1824/TCV-001 in Vienna, Va.), *The Flathead Valley Sidebanders* (contact Jon, SSB-59/FVS-79 in Columbia Falls, Mt.), *The Crossroads Courtesy CB Club* (contact Don, SSB-3216 in Greenfield Mass.) and a large club in North Carolina (the name of which I seem to have misplaced—but I do recall that Duke, SSB-413 in Asheville, is assigning the numbers).

For information on obtaining national *SSB Network* numbers for your club members (present and future), plus a sample club constitution and by-laws you might use, have one of your officers write to The SSB Network, P.O. Box 381-N, Smithtown, N.Y. 11787. Ask about your group affiliating with the *SSB Network*—and mention the approximate number of members in the group, or at least how many you expect to have within the next 6 months. Please include a self-addressed stamped envelope.

By the way, there is no charge or fee to affiliate a club with the *SSB Network*, and there are no dues, no cost for obtaining a block of their ID numbers for assignment for your local members.

Once you've gotten your club with a solid footing and your members on the air—you'll probably have a number of local operators seeking membership. And as your club grows your scope of operations can grow too.

After a while you can plan some social events, you might wish to set up a club station somewhere—and you could even consider (as some clubs have) setting up a service to monitor Sidebanders' emergencies on Channels 9L, 16L, or some other predetermined mobile emergency frequency.

Local Sideband club activity can be one of the major factors in maintaining Sideband as an effective and orderly expanding method of communications in your area.

FREQUENCIES VS CHANNELS

Last month we mentioned a suggestion from a reader concerning the preference for using the last 3 digits of the frequencies rather than the channel numbers for the newly allocated frequencies—known to some as

Channels 24 through 40. It does seem though that a sufficient number of Sidebanders rather like the sound of the last 3 digits—which, as it turns out, are very similar to the channel numbers on these new frequencies. For instance, Channel 36 is on 27.*365*, Channel 37 is on 27.*375*, so really there is some ease at converting all of this in your mental computer—much easier than remembering that Channel 16 is 27.155! So, if that's what Sidebanders prefer, at least in this sideband column, we will generally make the following frequency/channel references:

Frequency Identification	=	FCC Channel
315		31
325		32
335		33
345		34
355		35
365		36
375		37
385		38
395		39
405		40

CHANNEL USAGE UPDATE

Sidebanders around the nation seem, generally, to have made good progress in utilizing 365 to 405. A few letters still trickle in from some readers who are strongly opinionated that we have dropped the ball by not demanding that 10 frequencies, 315 through 405, be reserved. Of course, this is the scheme set forth by a west coast based outfit which purports to speak for high frequency operators. Not content with operating on frequencies outside of the band, the group has now taken the position that its members should also use 25% of the total available frequency space *within* the band, this despite the fact that the group represents possibly .003% of the 11 meter population! Not only is this crackpot plan now afoot, but operators supporting this group have also been told that they should "discourage the use of any other club numbers" on these frequencies, which they still consider to be part of the HF band! Most Sidebanders are ignoring this nonsense—however the FCC hasn't been ignoring the group. It's leaders were sent a letter from the FCC threatening them with civil or criminal proceedings. The club reacted by modifying their "rules," to include operations within the band, however *not* advising members to stay off unauthorized HF frequencies above the band. Despite the fact that many Sidebanders have gotten busted by the FCC for operating on out-of-band frequencies suggested by the group, the club has not offered any legal aid or monies to support these unfortunates—nor have they even told members to stay clear of the unauthorized frequencies in light of the FCC's present heavy monitoring and enforcement campaign on HF frequencies. Quite a "club!"

Truckers have made a few noises about vacating Channel 19, except one of the frequencies which they have been considering is 395! Other frequencies which would not mix in with Sidebanders have also been considered too, so let's hope that they find a more suitable spot and can stick with it without wandering all over the band at the turn of a whim. This will be their third move in about 2 years! They certainly won't be happy on a sideband channel, unless they are going to use sideband!

FCC ACTS AGAINST HF INTERNATIONAL MEMBERS

More than twenty HF sideband operators were recently directed by the FCC to show cause why their licenses should not be revoked for alleged violations of Section 301 of the Communications Act of 1934 (operating on unauthorized frequencies).

The FCC alleges that the operators, "as members of an *HF International*", have (in the words of the FCC) "participated in an organized scheme to operate radio transmitting apparatus illegally and avoid detection by identifying with *HF* numbers in lieu of their assigned callsigns."

While individual operators who happened to be members of this organization have been busted in the past, this is the first inkling that the FCC seems to be actively seeking out members of *HF International* on the basis of membership in that organization. It has long been the contention of defenders of *HF International's* numbering system (prefixes HF, HFA, HFX, HFA, HFB, HFC, HFD) that it was the users of so-called "statewide designate whiskey" numbers who were offending the FCC, and not those who use(d) *HF International's* numbers. Apparently they were wrong!

Here are those who the FCC busted in this action:

PHILIP KARLIN, Sayville, New York
HOWARD P. BENJAMIN, Springfield, Oregon
RONALD E. BRUNK, Salem, Oregon
BRUCE E. SMITH, Eugene, Oregon
WALLING'S FLOOR SERVICE, Eugene, Oregon
HORACE A. LANDRY, Fern Park, Florida
SAMUEL E. BRANCH, Orlando, Florida
CHARLES W. WILSON, JR., Sacramento, Calif.
KENNETH K. MARSHALL, Simi, California
STUART A. COLE, Chula Vista, California
WALTER J. TAUBENKRAU, Eugene, Oregon
ROBERT H. JUZELIN, Springfield, Oregon
RANDY L. OVENDEN, Harlingen, Texas
DONALD W. EARLEY, Arleta, California
PHILLIP M. SCHILLER, Salem, Oregon
RAMAX PRINTING SERVICE
Partner: Raymond R. Soash
ALLISON E. BEYER, Lewiston, Montana
ARTHUR GALVEZ, Lake Havasu City, Arizona
BERNARD E. MANCHESTER, Veneta, Oregon
RAYMOND C. STANDRING, Vallejo, California
RONALD F. GOING, Houston, Texas

OVERSEAS MAIL

Dee, SSB-100, has it made. He travels around the world and gets to bring his sideband rig with him. Some of his observations include the fact that many U.S. military folks in the Adriatic Sea are Sidebanders and can be heard on 16L and 16U, as well as 1L and 2L. Milan (Italy) has few Sidebanders to boast, although many operators have been hassled by the authorities about TVI and that could be one of the reasons. Dee is mostly in Baghdad or Basrah in Iraq, and doesn't bring his rig there since they don't really appreciate its use in the Arabian Gulf. Dee hails from Houston, Texas.

STATESIDE MAIL

Lee, better known as SSB-205, has been working with some other operators in southern New Jersey on establishing an Emergency/Relay group in his area, one which will function on sideband. He asks that any other operators around the country who wish to exchange or offer thoughts on this to drop him a letter at 425 Wade East, Millville, N.J.

Don—who resides in Pittsfield, Me., asks if it is legal for sideband operators to utilize Channel 9. Why not? Channel 9 was established for emergency communications—sideband operators can have 'em too!

Jon, SSB-59/FVS-79, of the *Flathead Valley Sidebanders* in northwest Montana, has about 250 members. He says that they use 15/16/17 LSB and says that AM operators (he prefers to call them DSB, or double sideband operators) have been cooperative.


THE SSB NETWORK

FOUNDED 1964

REGISTRATION

This is to Certify that the Sideband ID Numbers:

SAMPLE

have been assigned to:

SAMPLE

and that this has been registered in our records on this date: SAMPLE 19

For: Sidebanders' Service Bureau
P.O. Box 381
Smithtown, NY 11787

(This is not a license to transmit on any radio frequency or frequencies.)

COMMUNICATIONS VIA JUNGLE SIDE BAND SSB 11 METERS

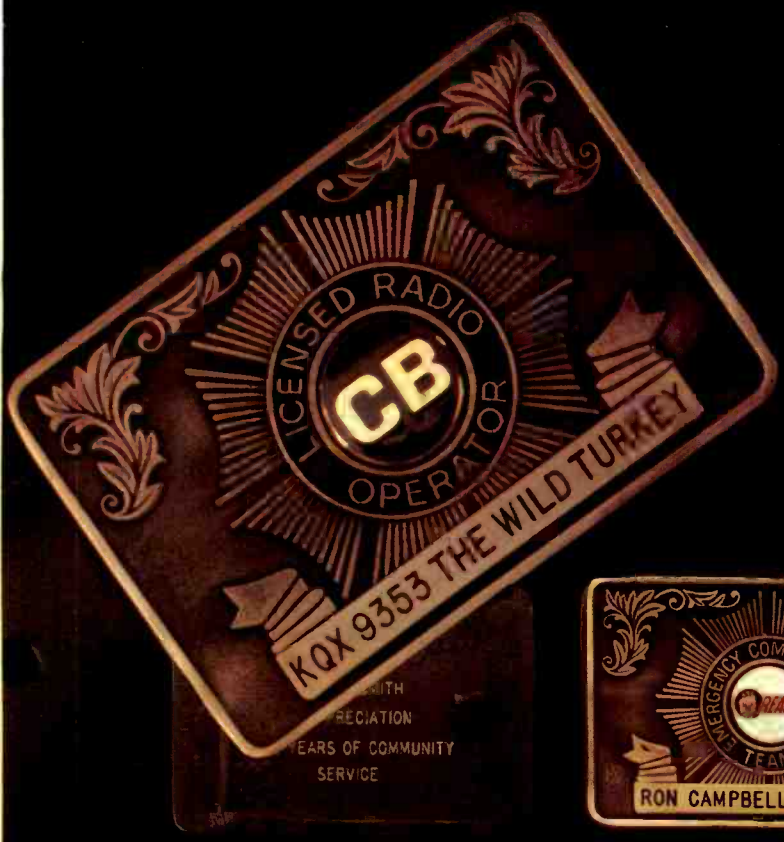
COMMUNICATIONS VIA JUNGLE SIDE BAND SSB 11 METERS

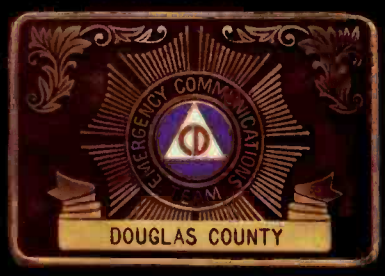
NEW CERTIFICATE

The SSB Network has reprinted their membership certificate, and redesigned it along the way. We like the new design, still same size (8½ by 11 inches) and in the smart looking gold and black color combination which looked so nifty on the previous certificates. Want one? Send them a self-addressed stamped envelope for an application—*The SSB Network*, P.O. Box 381, Smithtown, N.Y. 11787. Those who are already members of the SSB Network who don't yet have one of these newer design certificates can also get one—when you write to them, let them know your *SSB Network* number and ask 'em about it—don't forget the self-addressed stamped envelope.

The Citizens Band Collection

Your name, call or handle permanently routed in solid silicone bronze and richly enamel filled . . . Countless hours of handcraftsmanship have gone into creating these truly unique badges and belt buckles.





THE BELT BUCKLE

Designed exclusively for the CB radio operator with your choice of finish. The pewter finish buckle is protected with a coat of lacquer and will retain its natural silvertone appearance with no polishing. The solid bronze buckle is considerably harder than the pewter finish buckle, offering more resistance to impact and scratching. Buckle emblems include a bold "CB", an easily identifiable "MIC and also the official "React" and "Civil Defense" emblems (available only to members of those organizations). All buckles may be personalized on the front with name, call sign or handle. Lettering is deeply routed into the metal and then filled with a hard engraver's enamel. Engraving of an inscription into the back of the buckle is done in an elegant jewelry style lettering.

THE BADGE

A perfect way to be identified at jamborees, coffee breaks, or team drills. Badge is a heavily gold plated jewelers metal with a heavy duty badge pin. Your choice of emblem and personalization is included in price. Badge shown here is actual size.

ORDER FORM

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

ENCLOSE PAYMENT (NO C.O.D.)

☐ CHECK ☐ MONEY ORDER ☐ BANKAMERICARD ☐ MASTER CHARGE

CARD NUMBER _____ CARD EXPIRES _____

SIGNATURE OF CARDHOLDER _____

NOTE: Be sure to indicate buckle style and emblem choice.

Style A: "Licensed Radio Operator"
Style B: "Emergency Communications Team"

Please type or print clearly wording for badge or front and/or back of buckle. We are not responsible for mistakes due to illegible handwriting. Specify which badge or buckle gets which wording and emblem if more than one is ordered. Attach a separate sheet if needed.

ITEM	DESCRIPTION	PRICE	QTY	TOTAL
1	Solid Bronze Buckle—Style ☐A ☐B Emblem ☐CB ☐MIC ☐REACT ☐CD	14.95		
2	Pewter Finish Buckle—Style ☐A ☐B Emblem ☐CB ☐MIC ☐REACT ☐CD	10.95		
3	Front Personalization—Front of Buckle Routed & Filled	3.95		
4	Back Engraving—Jewelry Style on Back of Buckle	.20/ltr		
5	Leather Belt-Top Grade Cowhide, Black (belt size_____)	7.95		
6	Badge—Includes Engraving & Emblem ☐CD ☐MIC ☐REACT ☐CD	8.95		
	SUB TOTAL			
	SALES TAX (Cal. add only)			
	SHIPPING & HANDLING	1.50		
	TOTAL			

Western Badge & Trophy Co.
1716 W. WASHINGTON BLVD.,
LOS ANGELES, CA 90007

S9/5-77

Johnson CB is all new for 1977. Quietly efficient, beautifully uncomplicated.

Our new 40-channel Messenger CB radios are a study in electronic elegance. With a clean uncluttered appearance; with engineering advances and features you can't get on any other CB. The quietest, most fully featured CB's Johnson has ever designed. The perfect blend of form and function.

But that's what you'd expect from a company that's been making CB radios longer than anyone else in the business. A company that designs and builds the most sophisticated, professional 2-way radio equipment money can buy... the E. F. Johnson Company.

And for 1977, Johnson delivers more quality, more features and more value per dollar than ever before. We deliver more because we design and build every Messenger CB right here in the U.S.A. We watch every operation. We control quality every step of the way. We operate every radio before we release it, then we back it up with a one year parts and labor warranty plus more than 1,000 Authorized Johnson CB Service Centers.

We started fresh with our 40-channel line. We devised a totally new frequency synthesis system: our exclusive X300D CMOS IC chip... a single chip with a complete phase-lock-loop circuit for greater accuracy and reliability.

Other Johnson quality features are: a completely redesigned receiver for quietest operation... our exclusive Tapered Automatic Noise Limiter (TANL), the only noise limiting system in CB that adjusts itself for optimum clarity and quieter listening all the time... our own voice tailored audio circuitry to drop off unwanted frequencies... our unique electronic speech compression for maximum transmit range.

Johnson CB is quality CB. Quiet, efficient, beautifully functional.

JOHNSON

PERSONAL COMMUNICATIONS DIVISION
E. F. JOHNSON COMPANY, CLEAR LAKE, IOWA 50428

Johnson CB. Clearly the professional's choice.

HUSTLER

"Hustloff"

STOP RIP-OFF
—three models—

Instant mount or dismount—store out of sight in trunk

Instant mount or dismount—store out of sight in car

New Hustle-away CB antenna eliminates faulty grounds-erratic SWR of magnetics and hinged flip-outs!

Outsmart the rip-off, quick and easy! Turn the knob and store your antenna out of sight. To remount, slip the antenna back in place and spin the knob. It's that quick, that easy! And most important, you get complete freedom from erratic grounding, questionable SWR that can cause CB radio failure. The Hustler design is positive, definite and equal in electrical and mechanical performance to the best permanently mounted mobile antennas.

TRUNK LIP MOUNT "HUSTLOFF"
Stainless steel 48" antenna and mount—
Model HT-27.
Heavy duty 55" antenna and mount—
Model HHT-27.

RAIN GUTTER MOUNT "HUSTLOFF"
Fiberglass 42" antenna and mount—Model RFG
All versions include cable, connectors attached, ready to operate.

THIS HUSTLER COVERS 40+ CHANNELS

"the home of originals"

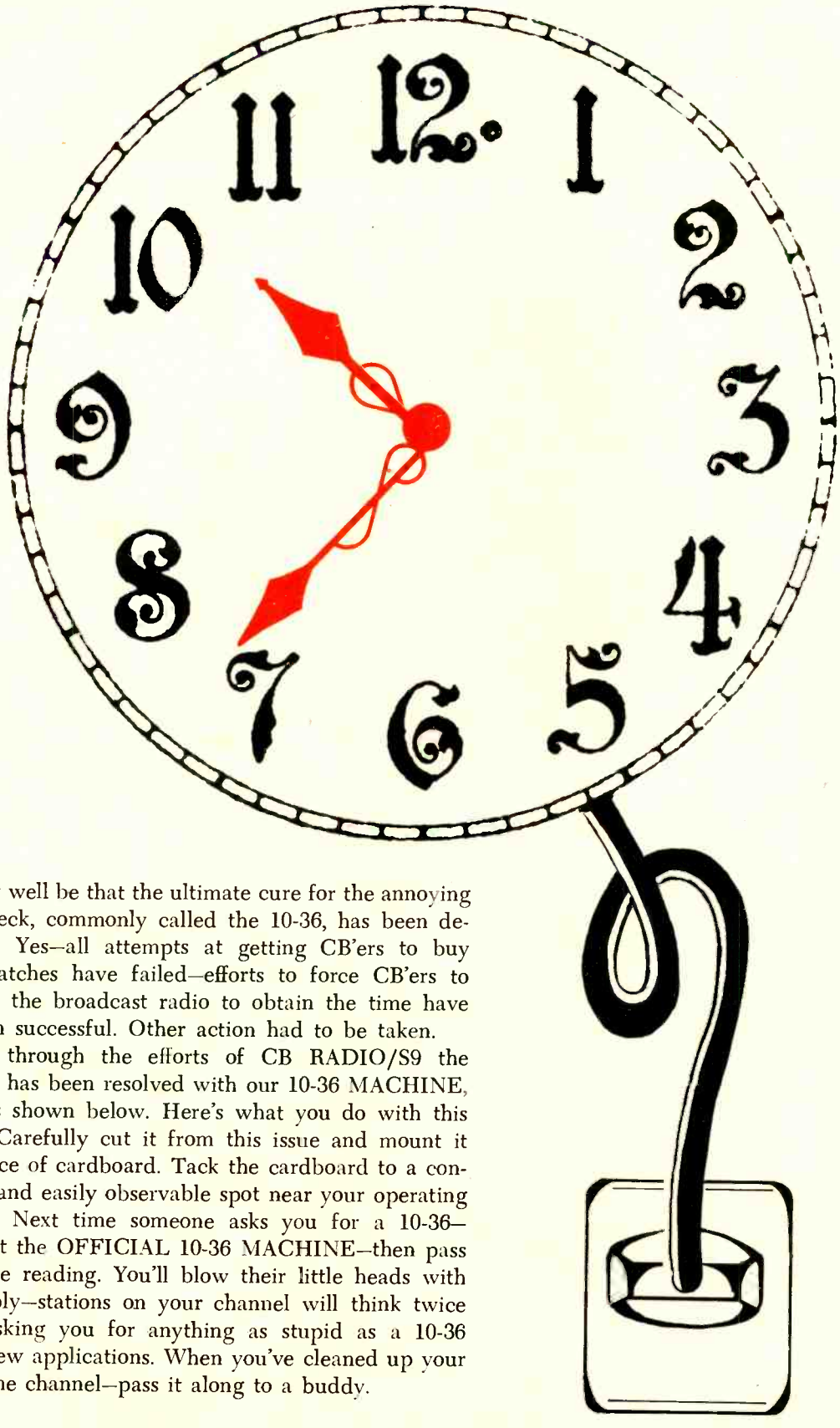
HUSTLER

Available from all distributors who recognize the best!

new·tronics corporation
15800 Commerce Park Drive
Brookpark, Ohio 44142

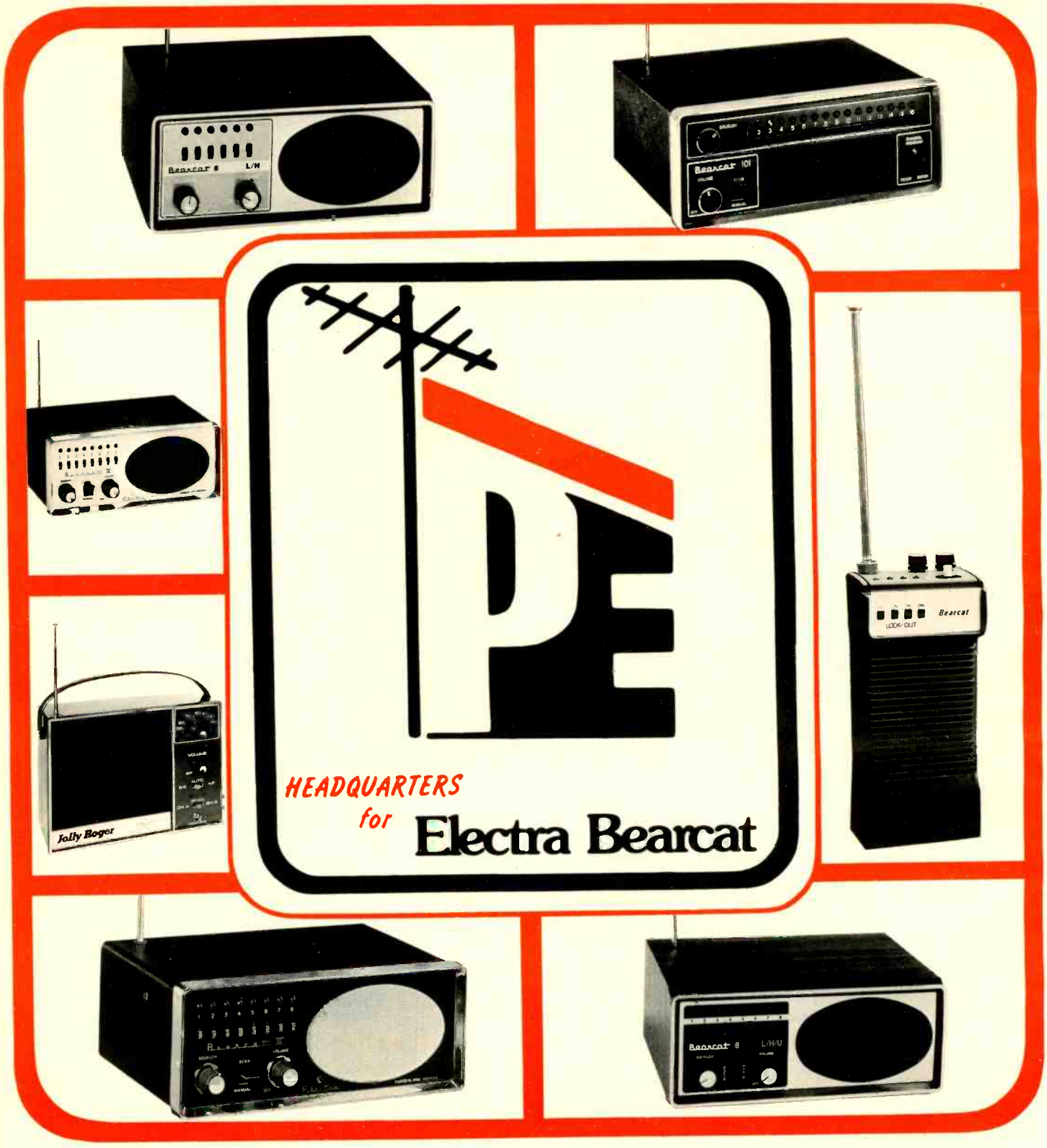
AVAILABLE IN CANADA FROM
superior
SUPERIOR ELECTRONICS INC.

The Official 10-36 Machine



IT may well be that the ultimate cure for the annoying time check, commonly called the 10-36, has been developed. Yes—all attempts at getting CB'ers to buy wrist watches have failed—efforts to force CB'ers to listen to the broadcast radio to obtain the time have not been successful. Other action had to be taken.

Now, through the efforts of CB RADIO/S9 the problem has been resolved with our 10-36 MACHINE, which is shown below. Here's what you do with this device. Carefully cut it from this issue and mount it on a piece of cardboard. Tack the cardboard to a convenient and easily observable spot near your operating position. Next time someone asks you for a 10-36—glance at the OFFICIAL 10-36 MACHINE—then pass along the reading. You'll blow their little heads with your reply—stations on your channel will think twice about asking you for anything as stupid as a 10-36 after a few applications. When you've cleaned up your own home channel—pass it along to a buddy.



PALOMAR East. ltd.

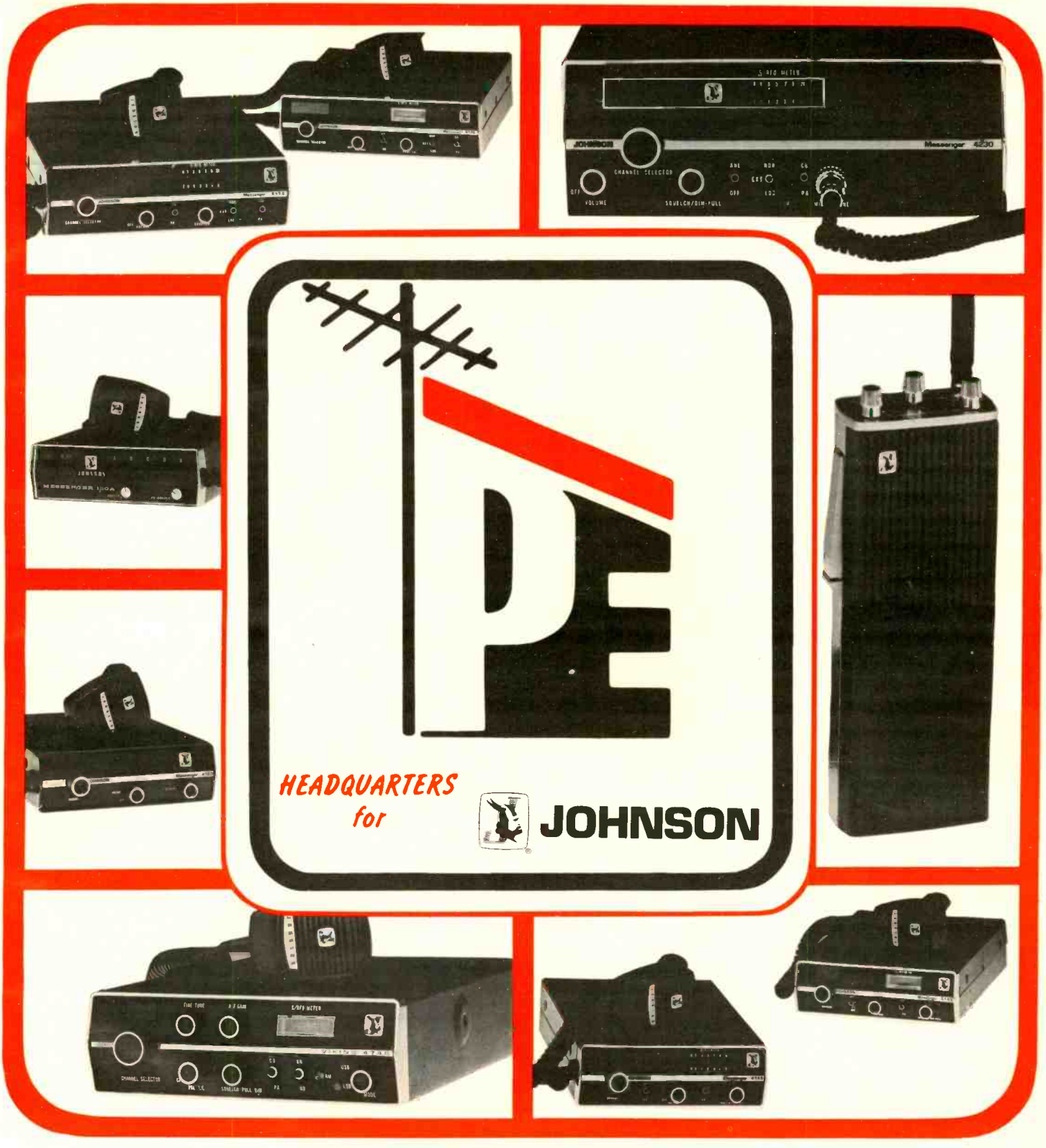
WORLDWIDE ELECTRONIC DISTRIBUTORS

Palomar Square, 80 Blaisdell Rd., Orangeburg, N.Y. 10962

2629 North 24 Drive, Phoenix, Arizona 85009

FOR SPEED SERVICE: phone (914) 359-8800 plus the new Arizona No. (602) 257-8404

For Information About Our Advertisers . . .



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2629 North 24 Drive, Phoenix, Arizona 85009

FOR SPEED SERVICE: phone (914) 359-8800 plus the new Arizona No. (602) 257-8404

. . . Use S9 READER SERVICE.

Anatomy of a Scanner

by Gordon West, KMX-8483

PART 6: LOW BAND

IN this continuing series on "scanners", we have already covered the basics of what make up a good scanner receiver. Now that we have explained all about what it takes to monitor different frequencies, let's take a look and see who uses what frequencies and what type of messages may be intercepted and monitored by you on those frequencies.

Table A indicates how the federal Communications Commission breaks down to various services allowed to transmit and receive two-way radio messages. We see that the FCC places different users in frequency groups. Take for instance the Class D citizens band—they have now put us in a group of 40 channels beginning near 27 MHz. The same holds true for other services, such as the State Police Service which has a group of "channels" around 42 MHz.

If we know where these groups are, and who transmits on what general group of frequency "channels", it will greatly simplify our "searching" for new and exciting channels.

The listing of frequencies is quite extensive. So, we will break down each band of frequencies in upcoming monthly issues of S9. This month we will begin at the very bottom of the FM frequency spectrum, beginning with . . .

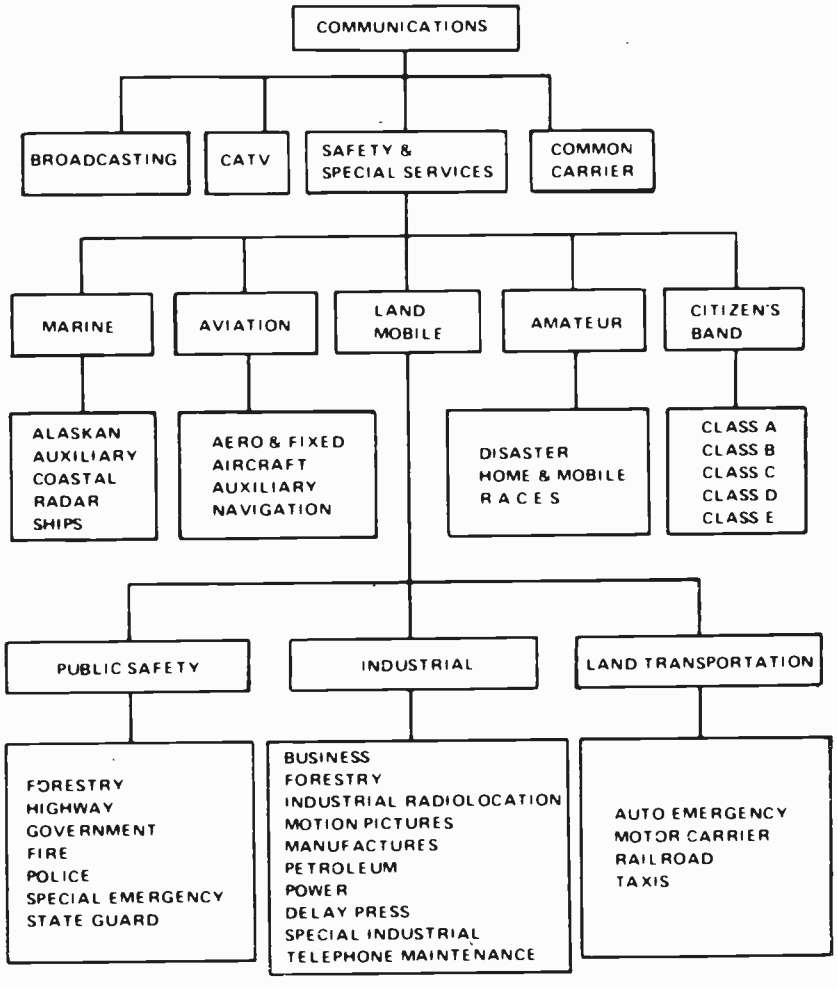

Table A

LOW BAND

Low band frequencies extend from 25 MHz up to 50MHz. An easy way for you to determine that your local users are operating on low band is to take a look at the type of antenna used on the *vehicle*. Mobile units operating between 25 and 50 MHz usually sprout a 54 inch whip antenna affixed to a large stainless steel spring. The whole affair is mounted on the rear-end of the vehicle. These long antennas are a quarter wave length long and yield the best range over any other band in mountainous terrains. Low band signals tend to hug the earth and penetrate into forests, buildings, and over hills and into valleys. Base to mobile range on low band is generally between 40 and 70 miles. Base stations on low band that

UHF BAND

Police, Fire, Business

900 MHz
500 MHz
450 MHz
440 MHz
430 MHz
400 MHz

HIGH BAND

Police, Fire, Business

170 MHz	Forestry & Government
160 MHz	
150 MHz	Class "A" CB
144 MHz	Ham
130 MHz	Aircraft
108 MHz	FM Music Band
88 MHz	

LOW BAND

Police, Fire, Business

50 MHz	
45 MHz	
40 MHz	
30 MHz	
27 MHz	Class "D" CB
20 MHz	Foreign Broadcasts
4 MHz	
2 MHz	SSB Marine
1.6 MHz	AM Entertainment
550 KHZ	
200 KHZ	Marine & Air Navigation

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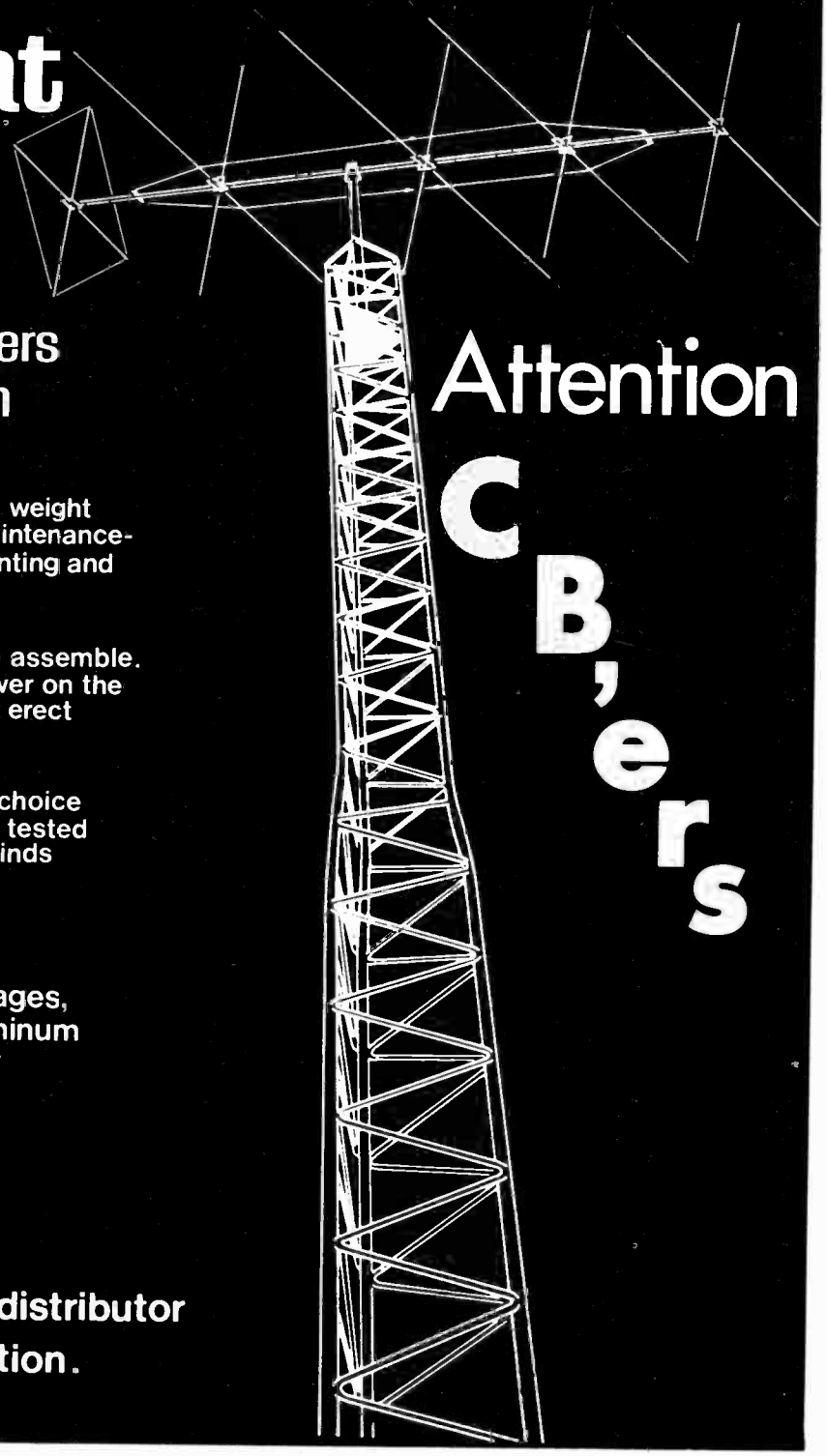

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Attention CB'ers

NOMINAL MOBILE COVERAGE — 40 MC BAND
(LOW BAND)
CURVES VALID FOR SMOOTH EARTH
USING DIPOLE BASE STATION ANTENNA
AND QUARTER WAVE MOBILE WHIP ANTENNA*

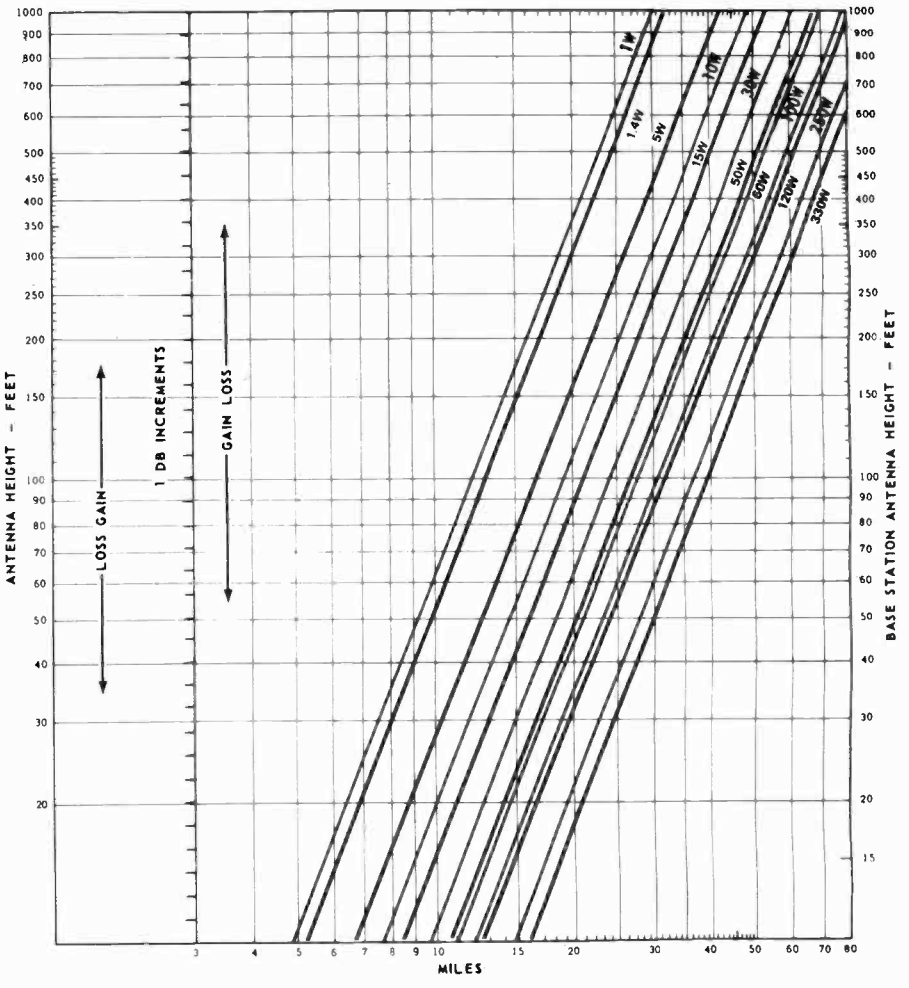


Chart based on propagation calculation procedures developed by Kenneth Bullington, Bell Telephone Laboratories, with correction factors added to compensate for losses experienced in average actual situations.

***Portable radio antennas normally will not provide this caliber of efficiency, so range estimates should be lowered.**

have mountain top antennas may many times communicate with mobile units up to 150 miles away. Mobile units on low band may easily communicate up to 15 miles away with their signals penetrating mountains and valleys. A lot of highway patrols use low band because their signals will penetrate in the environment that they operate in—over long stretches of super "slab".

Sometimes low band signals skip off the ionosphere and are reflected back 800 to 1,000 miles away. This generally occurs only in the summer months and will become more of a nuisance in the upcoming years as the sunspot cycle peaks in 1980.

Once again, to spot a low band user, take a look for that tall whip antenna on the stern end of the vehicle. If it's about 54 inches long (about half the length of a tall CB whip antenna), he'll be using low band.

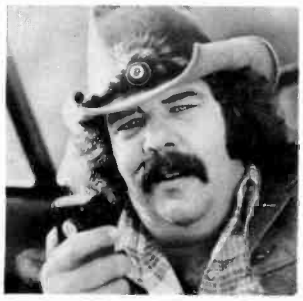
25.02 to 25.32 MHz is used exclusively by the petroleum industry. Here you may intercept calls regarding oil spill cleanup operations, as well as other messages relating to those services provided by petroleum industries.

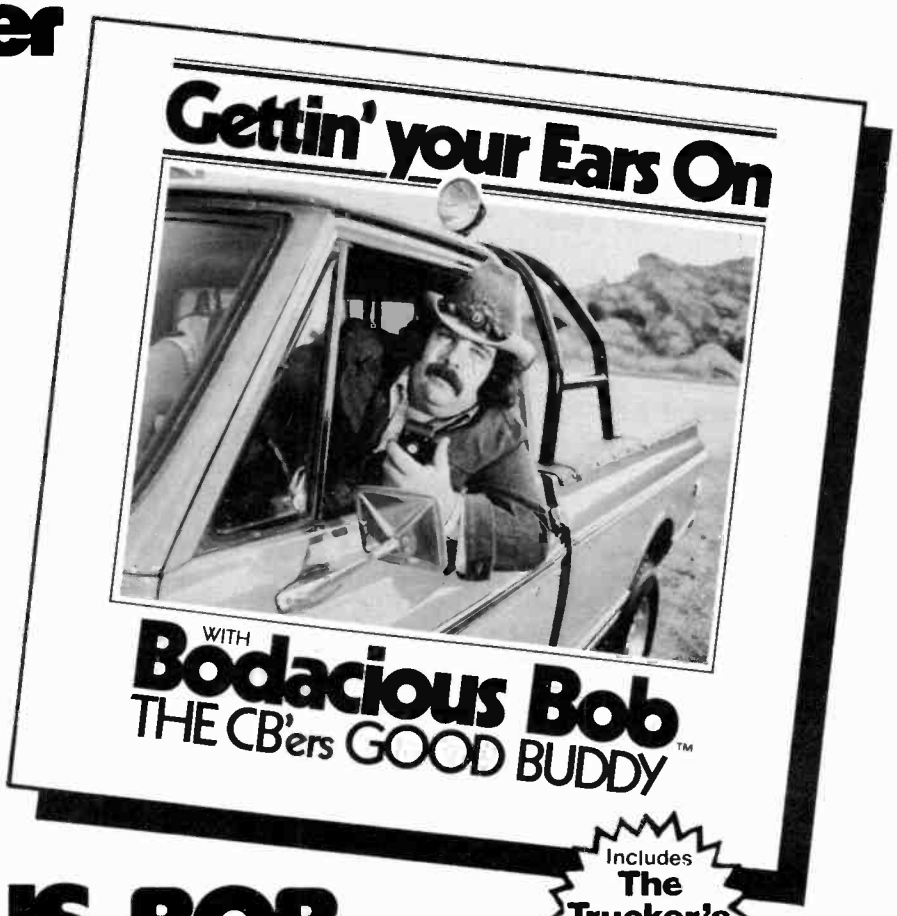
25.87 to 26.47 MHz are used exclusively by the remote broadcast pickup service. Here you might intercept the direct reporting of tragedies by radio stations and television stations. You might also hear the live broadcast from a football game or other major sports event in your area. These are the frequencies that are used by the radio and television stations to bring the excitement "in the field" to their radio listeners via a "remote pickup" channel.

26.62 MHz is allocated to the Civil

EVERY CB'er NEEDS A GOOD BUDDY.

NOW HE'S HERE!





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(Check or money order please)

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or ☐ Master Charge # _____

Exp. Date _____

Signature _____

Name _____

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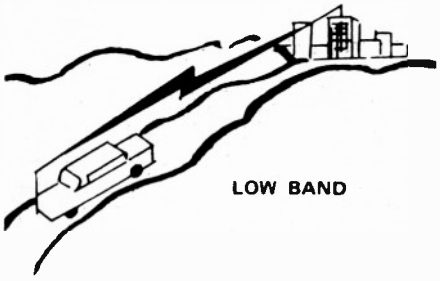
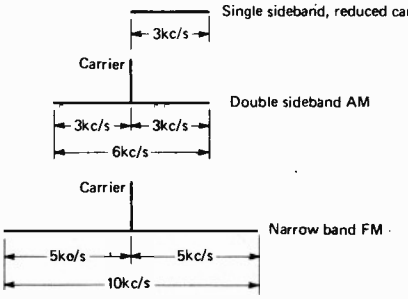
API-S9



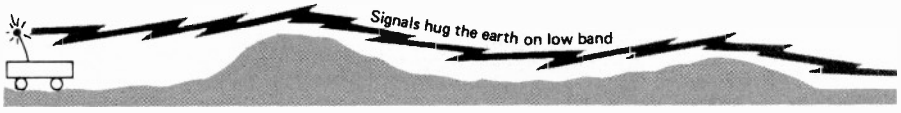


Air Patrol. You might be able to pick up transmissions from an aircraft looking for wreckage of a downed aircraft in your area. Sometimes the CAP utilizes AM instead of FM, so you might hear only garbled messages. This is because your scanner will only pick up FM transmissions clearly.

26.965 to 27.405 is the Class D citizens band with 40 channels allocated. Since CBers use AM and single sideband, it would really be impossible to clearly pickup on your scanner CB channels.

The same holds true for frequencies between 28 MHz and 29.7 MHz in that it is the amateur radio "10 meter" band and signals here too are generally single sideband and cannot be intercepted clearly by an FM scanner.

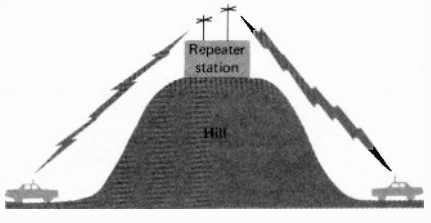
29.71 to 29.79 are a group of frequencies dedicated to the Forest Products Service, and calls here are generally scarce and contain very little excitement. If you're interested in agriculture, however, you might be able to pick up some exciting things going on over these channels.



30.58 to 33.40 MHz are shared by the Special Industrial Services, the petroleum industry, the General Business Service, the Forestry Conservations Service, and five channels of Special Emergency Service. Except for the Special Emergency Service, the radio calls will generally be unexciting unless you're interested in the nitty gritty of how a business operation takes place. Anyone who operates a qualified business may have the potential of operating on one of the general business frequencies—from florists to funeral homes—you'll hear it all! Special industrial frequencies would carry radio traffic relating to construction sites, farming, and fuel delivery services. Those five channels for special emergency units beginning at 33.02 MHz might be interesting to listen to, in that you might hear your local ambulance service responding to the scene of an accident. Once again, take a look and see if they sport that long whip antenna before you try and tune them in on low band.

33.42 to 33.98 MHz are a group of frequencies allocaated to fire departments. These could prove to be exciting frequencies to listen to when you want to catch the details on that fire in your local area if they are using these frequencies. Some channels may be the primary fire channels, and other ones could be allocated to routine messages, such as which units have what lengths of hose or which fire chief is on duty today and off duty tomorrow.

Just above 35 MHz are a group of channels allocated for mobile telephone service. These are fun to listen in on in that you can hear mobile telephone conversations directly from the high powered base stations in your area. You will be able to hear both sides of the conversation clearly because the mobile unit is automatically being retransmitted on the base station's frequency. Check with your local telephone company for the exact frequencies of mobile telephone service in your area utilizing "Z" channels.



37.02 to 37.42 MHz are frequencies allocated to your local police department. This might be your community police, city police, county police, or other departments that need moderate range for their mobile units but assigned to police work basically—as opposed to highway patrol work which are alloca-

ted other frequencies. I don't need to tell you all of the excitement that can be received on a police frequency. From stakeout to robberies, you'll probably hear it all on these dedicated police frequencies.

37.44 to 37.86 MHz are frequencies allocated to power and water utility services. I can't think of too many exciting things you can hear on these channels except for possibly an accident where a broken hydrant is spewing forth! None the less, this is where water and power calls are transmitted on.

39.02 to 39.98 MHz are more local community police frequencies—that could prove exciting!

42.02 to 42.94 MHz are police frequencies operated by your state police network. Since state police vehicles are generally used for highway patrol work, this is where to tune in to the highway patrol that sports those long whip antennas. Since low band is best suited for long range "hilly" transmissions, these are the frequencies that are used to transmit your license plate number to headquarters when you get nabbed going over the double nickle on that state highway.

43.70 to 44.60 MHz are a group of frequencies allocated to trucks and buses. Can't think of too many exciting calls that would take place here unless you're really interested to know who is using what type of vehicle to transport certain types of cargo—or which bus is behind schedule! Take a listen, but don't expect too many exciting calls in this frequency range.

44.62 to 46.04 MHz are more frequencies utilized by the state police, your local city police, as well as some channels utilized by the local government services. Sometimes those local government frequencies can be exciting in that they contain transmissions from undercover narcotics units, constables making warrant arrests, and other government related items. Take a listen, and you might hear that next drug raid going down in your local area!

46.08 to 46.50 are frequencies allocated to fire calls. Within those frequencies you'll also find specific channels for low-powered portable fire department walkie talkies used by the fire chiefs at the site of that raging fire. All sorts of exciting calls can be intercepted on these fire frequencies. Also be prepared to listen to some boring calls on these fire frequencies, too! On one channel you might hear a life and death message of how many people are trapped on the third floor of a burning building, and on another channel you might hear how many feet of three-inch hose a certain fire truck has and where he wants to lay it out to get dry!

47.02 to 47.40 MHz are frequencies utilized by your state department of highway maintenance. Here you will intercept calls on where the latest chuck hole is on a state highway, and how the construction is going on on an overpass over another stretch of state highway. Interesting? Maybe!

47.42 MHz is the frequency allocated to the American Red Cross. In times of disaster, civil disorder, or other major event, the American Red Cross utilizes many base stations and portable transmitters on this specific frequency. Quite a lot of excitement can be heard. During the times of calm, chances are you won't hear much until a disaster strikes. The American Red Cross shares this frequency with no other service, so all calls that you hear will be relating to American Red Cross activities.

47.44 to 47.68 are frequencies shared by both special emergency services, as well as the industrial service. Luckily, they alternate. So, on one channel you might hear an ambulance responding red lights and sirens to the scene of an accident, and on the next channel up, you might hear a farmer on a tractor radioing his base as to how many artichokes he has planted in his field. Those ambulance channels should prove exciting and the special industrial frequencies—try not to go to sleep listening to those kind of calls!

47.70 to 48.54 are more channels to bore you to death relating to the Department of Water and Power. Save your time—you won't hear much excitement here unless a water main breaks underneath a super highway loaded with 5:00 p.m. rush traffic!

48.56 to 49.58 MHz are frequencies shared by the forest products service as well as the petroleum industry. Unless you're really into forestry goods or petroleum goods, chances are these channels will hold little excitement as you scan them.

From 50 MHz to 54 MHz is the amateur radio six-meter band. Most transmissions here are single sideband or AM and relatively few amateurs on six meters utilize FM. Since your scanner can only pick up FM transmissions, you'll hear little on the six-meter band except around 52 MHz where there is a little FM ham activity. Beyond 54 MHz lies the channel 2 television band and the commercial FM broadcast band at 88 through 108 MHz.

The aircraft band at 108 through 132 MHz has to be picked up on a specially built scanner tailored to only that frequency band. However, a lot of excitement takes place on that band that utilizes AM, rather than FM. That's why it takes special scanners to pick up aircraft transmissions. Your tri-band scanner cannot pick up this frequency

range. Special scanner monitors are commercially available to scan the AM aircraft band from 108 to 132 MHz.

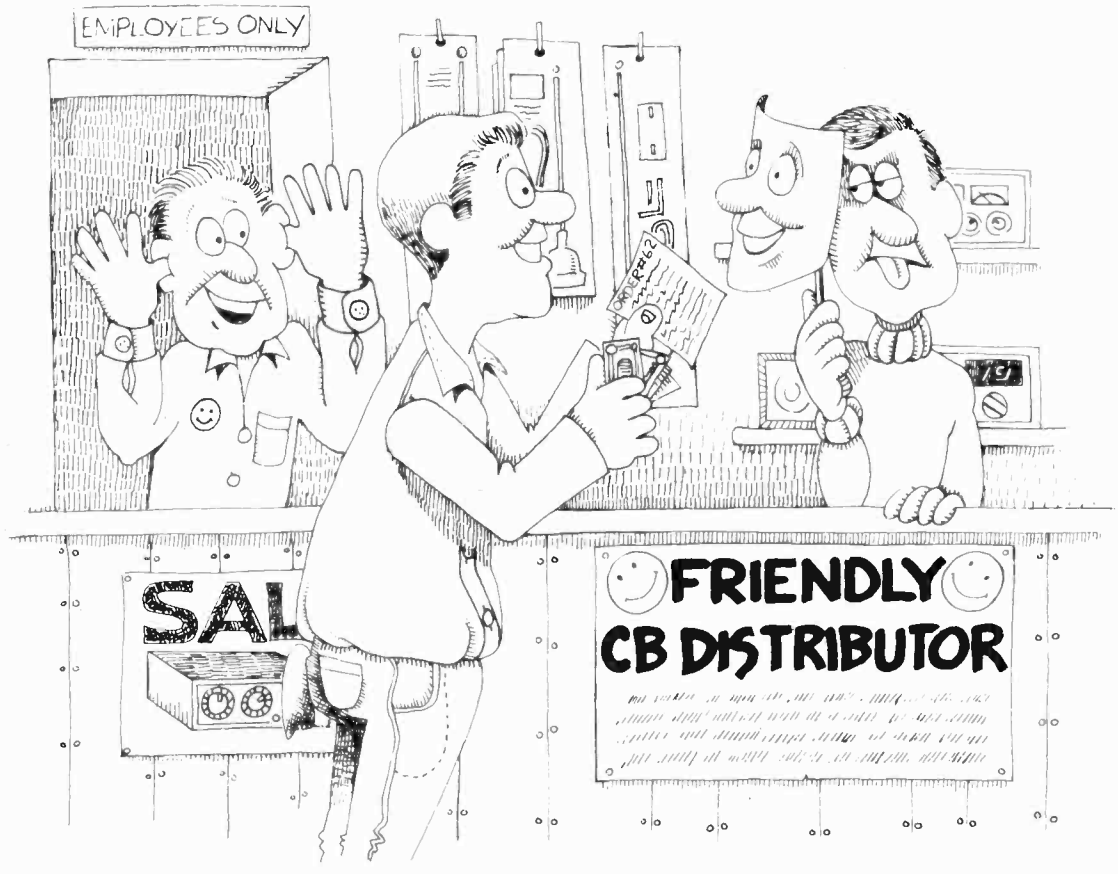
Where's all the excitement on low band? Those remote broadcast pickup frequencies between 25.87 MHz to 26.47 MHz should prove interesting. Here you will monitor news in its making as an on-the-scene radio newsman or television newsman broadcasts a situation directly to the television or radio station for airing. Many times you'll hear a lot more on these remote broadcasts than what actually comes out on the air—you'll hear drama in its makings.

Obviously, the police, fire, and special emergency frequencies are good ones to have in your scanner if the local police, fire, and ambulance services use those frequencies in your area. Again, you'll hear news before it actually gets onto the commercial airwaves—news as it is happening.

Notice how all those "excitement" frequencies are packed in together? This is why it's necessary to do your scanning with a good quality scanner that has good "selectivity". Selectivity is the ability to hear one channel but reject the next channel up or the next channel below the desired channel you wish to monitor. The higher the selectivity, the better you can tune in to each channel without adajacent channel interference. Since the FCC usually groups special services in a tight frequency range, it takes a scanner with tight selectivity to hear all the calls well. How disappointing it would be to tune into a local ambulance frequency and hear the ambulance responding red light and siren to the hospital; just as the ambulance attendant is about to broadcast the patient's vitals, some other service a few channels away comes on the air and you hear nothing but garbled transmission. You missed all the excitement when a tow truck was possibly being dispatched on a business channel only two or three channels away from the one you're listening to dedicated to special emergency situations. You need a selective scanner to pick up only the calls you want to hear on that precise frequency.

For directories of 2-way operations in your area, it's CRB Research. Get their catalog by sending them a request accompanied by a No. 10 (long) self-addressed stamped envelope. Their address is CRB Research, Inc. P.O. Box 56, Commack, N.Y. 11725. Trying to listen without one or more of these excellent publications cut the fun in half.

Next month is high-band month and believe me, this is where the real excitement is. You'll hear those life and death situations on your scanner monitor receiver. See you next month.



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TOMCATTIN' with "Tomcat!"

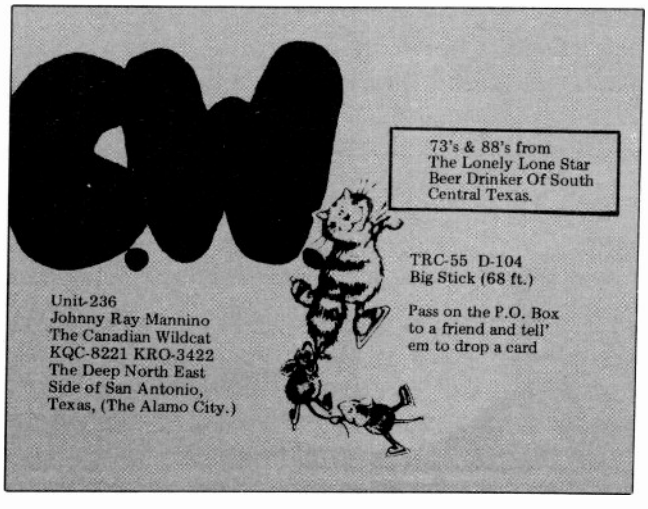
Across The Channels With
S9's Editor, Tom Kneitel (Tomcat/ KEZ5173)

SLEAZY RIDER (UNIT 944-M) tells me that he wasn't looking forward to having his wheels in the repair shop for a few days, especially since his mobile rig was installed in the car. What was he to listen to during his 30 minute daily drive to the saltmines—where would he get those 10-13's? Realizing that his wife's car had a tape deck, he got a brainstorm. The day before he sent his car to the pit stop, he taped the CB chatter all the way to the saltmine. Next day he popped the tape into the tapedeck and listened to the CB all the way to work—and he says that the previous day's 10-13's were just as valid the following day—same slow-down spots on the parkway! . . . Several side-banders have asked me to comment on the fact that the FCC didn't set aside any exclusive side-band channels when they opened up the new frequencies last January. Well, it could be interpreted as just the opposite too—why didn't they set aside any exclusive AM channels? Nobody really knows why, after implying that they would wake up to the fact that there should be some FCC action on the matter of separating AM and sideband operations into different exclusive channels, they eventually dropped the idea. At this point it doesn't seem likely that they will do much about it in the immediate future. One solution might be if manufacturers of AM-only rigs would make them for Channels 1 through 35—and not include in them the new sideband channels, Channels 36 through 40! It's a thought! It looks as if the only ones who give a damn about improving communications are concerned AM and sideband operators—there is a strange lack of interest in the plight of the guy and gal behind the mike, the FCC cranks out reams of scuzzy rules and regulations which seem to be on a different wavelength than the needs of the licensees; the manufacturers have not been big in the finding-out-our-problems department and seeing what they could do to help in those matters in which Uncle Charlie isn't interested; and the FCC's Personal Use Radio Advisory Committee (PURAC)—supposedly composed of a cross section of CB operators and industry people—doesn't seem to have done much more than wring their hands and take the rap for CB'ers causing so much TV interference! Hey—the problem of trying to sort out AM and sideband operations onto their own exclusive channels isn't the only CB problem which is going begging for a solution—there are many other problems on an operators' level which are being ignored by the FCC, manufacturers, PURAC and others who might be in a position to help—what about the use/misuse of Channel 9? The FCC hasn't even taken any official notice (in Part 95) of Channel 19 and its current status in the CB world! I think that the CB operators are getting the fuzzy end of the lollypop and I'm getting the message that, based upon past experience, we operators are going to be pretty much on our own in trying to sort it all out. What can manufacturers do? They can pack in with their equipment some literature which tells the new operator more about CB than how to hook up the rig to the battery. What can the FCC do—they can try to stop issuing greenstamps for skip-working long enough to actually listen to what's going on and then try to understand and evaluate the *real* problems on the channels. A dozen guys shooting skip on a channel don't create the havoc of 2 AM operators on a channel used by sideband operators, or 2 sideband operators on a channel used by AM operators. What can PURAC do? Something, *anything!* What can *you* do? Well, Bunky, it looks like you, and I, and everybody else sitting out there behind the microphones of CB land are first going to have to wake up to the fact that it is unlikely that the bureaucrats are going to do much more than produce *Catch 22* type effects on our behalf. Then you can become indignant. As soon as you realize that help *isn't* on the way —that the CB Fairy is *not* going to descend from the ionosphere and wave a magic wand to solve CB's problems—then maybe we can all decide to cooperate with one another and do the job

ourselves! As to Sidebanders who complain that AM operators are yakking away on sideband channels—my advice is to make more use of the channels. Many instances of this seem to take place when sideband channels quiet down. Best motto I've heard comes from the *SSB Network* which sez: *Use 'em or Lose 'em!* . . . The *Holiday Inn* in Ft. Worth has installed CB—you can make reservations over Channel 19 . . . Each week I receive at least 8 to 12 copies of something called the "CB'ers Chain Letter." It's a racket started by a guy in Knoxville—maybe he made a bundle of greenstamps from this "send your QSL card

THE WALL HAS EARS. Midtown Holiday Inn In Forth Worth, Texas (headquarters town of the Radio Shack store chain) posted this sign to go with their wall-mounted CB radio, a Realistic TRC-30A. Inset: Desk clerk uses CB to acknowledge room availability to motorist.

and $1 to the name on top of the list and don't break the chain" nonsense, but *you* won't! I file mine in *File 13*—if you receive such a letter, I suggest you do the same; unless you've got money to waste! . . . Tony Troiano, a CB'er in Maryland, tells me that he started out in CB around 1959 as 24WO827, and has a rather complete collection of S9's dating back to 1962 when we started! Tony, you've got us beat, would you believe that a few of the older issues are missing from our office reference library? . . . Another oldster is Harald, of Warren, Me. In 1959 he was IQ4222—today he is *GREAT DANE* on the AM channels and SSB-2701 on the sideband channels. Harald comments that the CB service and *S9* have both come a long way down the slab since he started out with his *General Radiotelephone* rig! . . . Here's a dedicated CB'er—Fred—the *MECHANIC,* of Woodburn, Ore. He started out in CB back in 1965 (as KNC2128) and is still very active on the channels. He carries a 1-watt walkie talkie in his fly fishing vest too! Guess you're really hooked on CB, eh Fred? Does it have an antenna *tuna*? Sorry about that . . . The Mexicans have relented in their CB ban. Seems that there were so many bandidos roaming the Mexican highways ripping-off the touristas that they decided to let CB rigs stay in cars as they cross the border. Now you can hail the Mexican Highway Patrol on the rigs who will (hopefully) come to your rescue from the *Citizens Banditos* . . . There has been some unhappiness in 18-Wheeler circles with Channel 19—too many 4-wheelers messing up the channel with nonsense they claim. The truckers have been thinking about movin' along to a new channel—they have already tried 10 and 19—what's next? One of the possibilities is Channel 30, which would be a much better choice than the other possibility, which is Channel 39 and smack in the midst of sideband operations. It will be interesting to see if they try to bulldoze their way on to an already occupied sideband frequency the way they set up shop on Channel 19 after they became bored



with Channel 10! . . . A QSL card (wallpaper) from Unit 236, Johnny, says that he's the *Lonely Lone Star Beer Drinker of South Central Texas.* Johnny says to pass his P.O. Box along and drop him a card. It is really nice looking, so go ahead and drop Unit 236 a QSL at P.O. Box 18523, San Antonio, Tex. 78233 . . . Latest nation to catch *CB fever* is Australia. Even before it became legal (a month or so ago) there were upwards of a quarter of a million *Aussie* CB'ers jamming the channels.

Tomcat!

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4 Centennial maintains a full-time working staff of trained CB sales experts. This means instant service when you call or drop in to place your CB equipment orders.

5 Centennial backs up every product sold with superior service. You need never worry about being stuck with inferior merchandise or factory rejects. ——The most liberal dealer policy in the industry.

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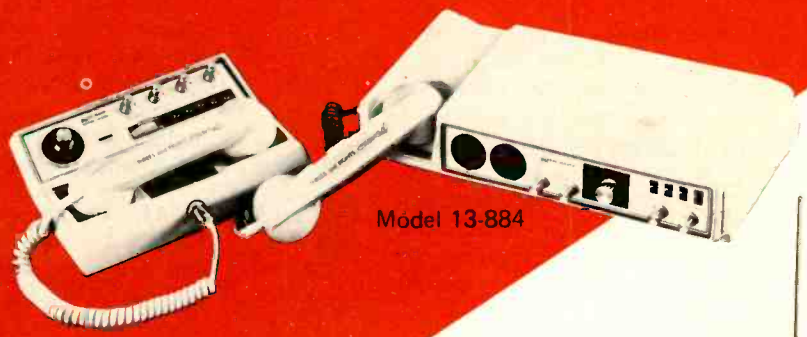

Model 13-884

Model 13-892

Model 13-955

Model 18-279

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TOMCAT'S CB CHANNEL TOPICS: Your Handy Guide to Full CB Entertainment

EVERY week I go out to the mailbox and get my copy of *TV GUIDE* to see what's happening on the video channels. But, since I have been spending so much of my time reading the mail on the CB channels, it seems to me that there's a real need for a similar guide to the CB channels.

Hey, you can't *always* know where the action is, can you? And how annoying it is to find out that after sitting on Channel 5 for two hours you missed all the fun over on Channel 8 when the natives revolted and overthrew the Channel Master in a bloody insurrection.

Have no fear, TOMCAT is here—my idea is to come out with a weekly guide to what there is to hear on CB—the highlights of the channels. Using this handy publication you'll always be aware of the action—and knowing exactly when and where it is! Of course, stations reserve the right to make last minute changes—but at least you've got a fighting chance to be in on the better grade of stuff available on the CB channels.

Here's a sample of one evening's highlights—go to it!

2 8 PM **MARGIE & FRED.** Fred had a business meeting today. He'll be calling Margie to say why he's 2 hours late for dinner. Don't miss the fireworks.

9 8:15 **SUDSY'S FLAT TIRE.** Everybody told him the tires were bald and to replace them. Now he's calling for someone to come out and help him change one.

16 **SIDEBAND SUBJECTS.** Two AM operators start giving each other radio checks. No less than 96 sideband operators rise to the occasion to let them know where it's at.

1 8:30 **THE PINK BUTTERFLY PROGRAM.** Last week the PINK BUTTERFLY had no less than 45 breakers waiting the chance to shout her. Who will be Breaker No. I this week?

9 **THE LOST DOG CAPER.** A taped replay of the big search operation of last summer when CHICKEN HEAD's hound trotted off into the woods after a squirrel at the CB club picnic. A favorite. (3 hours—simulcast in stereo on the local police frequency).

19 8:45 **GEAR JAMMER ARRIVES.** The long awaited return of GEAR JAMMER, that lovable, burly, 18-wheeler. Passing through town, heading westbound on that Route Eight Seven. Hear him cuss out the 4-wheelers, ogle the seatcovers. Expected to remain in range for 6 minutes.

24 9 PM **SKIP'S IN!** Did you cash in on last week's bonanza? This week you'll hear Costa Rica, Peru, Uganda, and Eureka (Montana). Start heating up the filaments on those footwarmers, gang! Get those ears on!

7 9:30 **NUTSY & NERD TIME!** The evening ritual as these two clowns conduct 10-36 operations, give S-meter readings, report that their respective modulations are **crystal clear.** On every night for the past 3 years. Stations are located 500 feet apart.

11 **RUBBER MOUTH ON DUTY.** Continuing drama as RUBBER MOUTH, that fearless and offensive champion of all of the Breakers of the world comes on duty as Channel Master. Will control this channel for at least 1½ hours—do not attempt to use channel unless he knows you.

20 **THIS CHANNEL WILL BE CLOSED DOWN BY A CHUCKER FOR 15 MINUTES.**

28 **THIS CHANNEL WILL BE MONITORED BY UNCLE CHARLIE TONIGHT, AT LEAST 2 HOURS. THEY'RE AFTER KINGPIN AND HIS 500 WATT LINEAR.**

4 9:45 **BETTY BOOP HOLDS**

DOWN THE CHANNEL. Watch what happens when a new operator attempts to use Channel Four as his home channel without asking BETTY BOOP, Secretary of the **North Side Channel 4 CB Club.**

10 **ROCK CONCERT.** Tonight's Rock Concert will feature selections by Fats Domino, The Doors, and Hot Tuna. Your genial host—THE FONZ, location **still** unknown.

20 **KEEN TEEN DATE TIME.** After chucking operations subside, we hope that you will listen to no less than 6 guys try to pick-up FOXY MAMA. Hey guys—she's 12 years old!

9 **10 PM** **LOST STRANGER RIDES AGAIN.** Don't miss the fun when a lost motorist tries to get local information. He will jam the LOST DOG CAPER (still in progress), and will be shouted off the channel by the **County Radio Emergency Ears Patrol** (CREEP) which guards the channel from time to time.

12 **TECHNICAL ADVICE HOUR.** Did the battery fall out of your power mike? Can't figure out how to hook up that coax connector? SWR too high? Take your sick signal to ARTHUR THE AUTHORITY—he thinks a **carrier frequency** means how many times the USS RANGER comes into port—but what the hell, it's all in fun and ARTHUR's a nice fellow. You'll make a guy happy if you ask him to tell you how he first got on the radio back in the days they called it "wireless." (Usually runs at least 3 hours.)

21 **10:30** **BATTLE OF THE CENTURY!** JACK THE RIPPER and THOR battle it out over who-stepped-on-who, who was on the channel first, who had their nickel's worth. These two are a proven top draw—real heavyweight contenders evenly matched, and crowd pleasers from way back. JACK THE RIPPER has devastated no less than 7 channels in the past 6 months, but THOR is running 200% modulation with 250 watts, and has stacked 10-element beams.

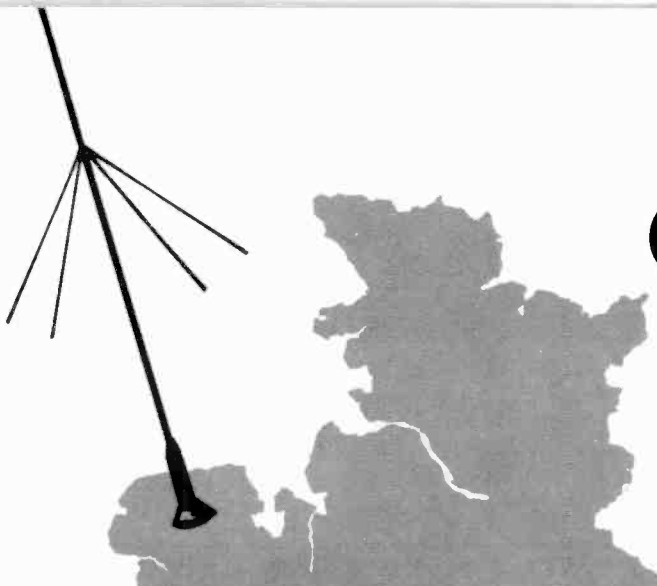
5 **11 PM** **SERMONETTE.** Inspirational message, this week from KUNG-FU, a defrocked Zen High Priest. Tonight's topic: **Is it truly said that skip is a gift from Heaven?**

8 20 **SIGN OFF.** Beddie Bye kiddies, until tomorrow.

11 **CHANGING OF THE GUARD.** Be on hand as RUBBER MOUTH passes control of the channel to THE BIONIC TONGUE, apprentice Channel Master. (A few shortie breaks may be permitted from unfamiliar stations after Midnight.)

CB IN GERMANY

by Wolfgang R. Schulz,
THE HAMBURGER



IF the channels weren't as crowded as they are, you North American operators might well hear some of us here in West Germany (Federal Republic of Germany). In the eastern part of the country behind the Iron Curtain CB is strictly forbidden.

But here in West Germany, CB is *looking good!* Before CB became approved, the 27 MHz band was used for industrial and scientific equipment. After a while, some clubs and organizations were able to obtain licenses for 2-way communications; these were mostly auto clubs who requested use of the frequencies for equipment to be installed in members' vehicles to aid them should they have an accident. A license fee of $2 per month to the government plus an additional fee to the club (from each member) was established. Most of these clubs have attempted to lay claim to "their" channels on an exclusive basis, however (with the exception of the Red Cross and a few other similar organizations) it is really not possible to successfully retain a "private" channel.

In 1974, a conference was held in Lisbon (Portugal) by the nations belonging to the West European Post and Telegraph Commission. It was suggested at that meeting that member nations establish a public 2-way service in the 11 meter band with "as little restriction as possible." Germany made this into law. Effective July 1, 1975, CB came into its own here.

Type accepted sets are the only ones which we can use, and each piece of portable or mobile equipment must display an engraved official acceptance number (starting with the letters PR).

The operating rules are different than those existing in the U.S. and Canada, especially in the following 5 areas:

1. The antenna output may be only ½-watt, DC input only 2 watts.
2. Only 12 frequencies may be used. These correspond with Channels 4 to 15.
3. Directional antennas are *not* permitted.
4. All stations must be either portable or mobile.
5. No license or registration is required.

Base stations? If you want to operate from a home or office there are variations in these rules. Equipment may run 5 watts, must be type accepted, and government officials must come and personally inspect the installation. A monthly fee of $6 (that's more than $70 per year!) is added to your phone bill. You can use any *handle* or Unit Number you like, so long as nobody else has it—otherwise *they give you* a handle like *Ali 15* or *Hanse 12*. Beam antennas are *not* permitted.

Now you might think that the technical limitations make it difficult to *get out*. Not so! Germany has 61 million residents, and our nation is smaller than the whole state of Nevada—so we are all really sitting in each other's laps!

The restriction against beam antennas has made it a challenge to match the rig into the antenna to get as much distance as possible—we really do quite well!

The 10 Code, which is so popular in North America, is not used here. We make much use of the Q Codes however. We don't use the *break* system of operations, although the word *break* might be used at the end of a transmission. If you want to use a channel here, you announce QRX—if you are seeking a specific station you announce QRZ and the other station's identification. *Skip* is simply called *DX conditions*. Instead of the word channel, we say QRG. Instead of using the channel number, we usually refer to the last three digits of the actual frequency—so Channel 4 (27.005) would be referred to as "005."

Channels *aren't* restricted for certain uses here, although Channel 9 (we call "065") is suggested for clubs. Others attempt to use this frequency only for calling and emergency, but it is unofficial and many stations do not recognize any restrictions such as these. But with so many CB'ers here, all limited to only 12 frequencies it is not easy to unofficially set aside one channel for special purposes and expect everyone to cooperate—although it would be nice to have such a channel.

CB is a lot of fun, even with the crowded channels. Nobody really knows how many CB'ers there are, but in Hamburg, where I live (2-million population), there are about 30,000 CB'ers. The CB industry is trying to get the government to open up additional frequencies, for CB is rapidly expanding in Germany!

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Stand By. Breaker. You're Next!

By Gary Deckelnick [Baby Bull/KCS-0994]
Contributing Editor

SAL GAROFALO still remembers the day, about 24 months ago, when he finished installing his base station. He was a true neophyte, one of the millions drawn to CB by tales of the truckers and pop songs like Convoy. "I didn't even know how to ask for a break to get on a channel," he recalls today. "I was just copying the mail and hoping to learn something."

The first thing he learned is that the channels were disorganized, cluttered with newcomers like him who knew little about CB radio but who persisted in talking anyway. It was a rare night when someone could complete even a brief conversation without being stepped on by an overeager breaker.

For the past six months, however, things have changed around Toms River, N.J., where Sal hangs on Channel 14. He has assumed for himself the job of channel monitor, one of the most difficult and thankless jobs known to CBers. Based on the responses he gets, however, he does his job well.

You will not find channel monitor in any of the FCC regulations. The government, quite properly, did not provide any method for CB'ers to allocate air time. The federal regulations merely require a CB'er to share air time with everyone else and to take a 60 second pause after each 10-minute transmission.

It's impossible, however, to talk on any channel for a few minutes without interruption. In fact, 10 seconds may frequently be too much to ask. But a channel monitor is the guy who tries to make order out of chaos, asking breakers to wait their turn and assigning to them the order in which they are to talk.

Without cooperation, it's a job impossible to perform. And there is no way Sal, better known as the Hot Pepper Base, can demand cooperation. But Sal usually gets it.

"It's all in what you say," Sal explains. "The big thing is to ask someone, not tell them. Most of the people realize that if they interrupt someone, then someone will interrupt them.

"Pretty soon, no one will be able to talk. So no one really resists a channel monitor because it helps them. But you have to be polite. And you have to be fair."

Sal's experience differs from that of another self-appointed channel monitor, a man who shall be nameless who *tries* to control Channel 5 in a small Philadelphia suburb. The man, who I will call the *Windy* base, refused to talk with S9. But plenty of his not-so-goodbuddies were willing to talk about him.

"Every time I heard *Windy*, I feel like throwing a dead carrier," says Fran Erickson, a YL who graces the same suburb under the name *Hot Tamale*. "He says he is a channel monitor; he wants to be a channel boss."

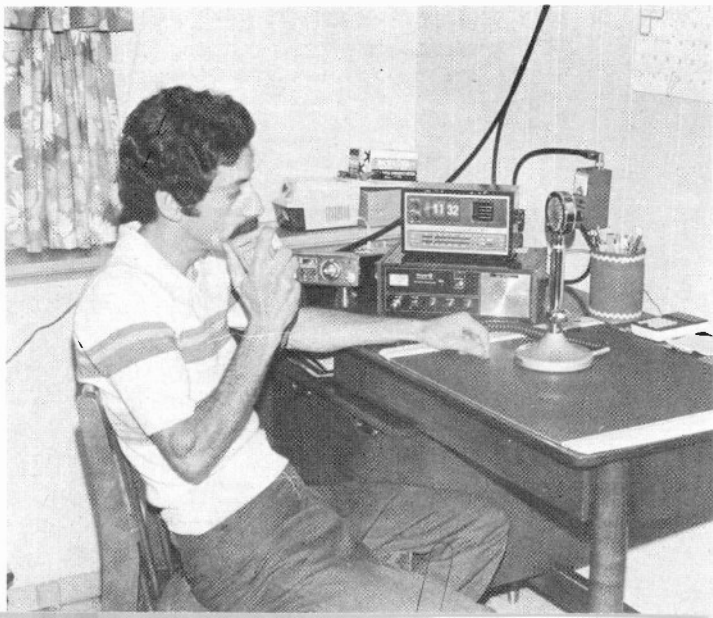
Windy starts his evening events by ordering all kids off the channel. If someone doesn't obey, he just steps on them until conversation is impossible. And when he monitors the channel all the CB'ers can be sure of one thing—he is also the first to get a break.

"He used to give his friends priority, too," says the Hot Tamale. "But now he doesn't have any friends anymore. Most of his conversation is just arguing with people who don't recognize his authority over the channel."

But *Windy* is an old-time CBer, a guy who has had his license for almost two decades. When he began talking, there was no problem with overcrowded channels. The problem was finding someone to talk to.

"He doesn't realize that those days are gone," explains the *Green Tornado*, a man who *used to be Windy's* friend but who now hangs on another channel so he doesn't have to compete. "He thinks the channel is his because he used it for years. He is willing to share it but he doesn't know how. He cannot understand that all those people who may know less about CB than he does have just as much right on the air."

Sal Garofalo, the Hot Pepper Base, gives a break.



Sal, like *Windy*, has a fiery temper, But the *Hot Pepper* base never lets it show on the air. And his friends never hear the channel clogged by Sal agruing with someone.

"I used to get angry but my wife cured me of that," say Sal. "I follow her advice now. I just get off the channel. I walk away; I just leave the radio."

Because he works Channel 14, Sal has a job more difficult than other channel monitors. Channel 14 nationally is the favorite haunt of kids. That is because the inexpensive walkie-talkies, the kind sold as toys for which licenses are not required, are all pre-set for Channel 14.

That means two kids talking on the WT's can interfere with a CB transmission. So can one kid using a WT to talk to a friend on dad's base station. Nothing gives a kid a bigger thrill than ratchet-jawing with a real CB.

"Most of the kids in my area are really polite," says Sal. "But if they are not, the easiest thing to do is to leave them alone. Let them make their shout. They're usually done in a few seconds, anyway."

The Jellybean Base of Cicero, Ill., agrees. "The only way you can work as a channel monitor is to win respect, not demand it," says Mrs. Jellybean, who, with her husband, work as a channel monitor in the Chicago suburb. "If you start fighting with people on the channel, you ruin everything. If the others on the channel want you to work as a monitor, they won't answer the guy who is interrupting. Then he can't really talk."

Deciding who is going to be a channel monitor is a relatively easy job, agree the people who perform the task. It usually falls to whoever is willing to do it properly.

Doing it properly requires a dedication that few CB'ers have. A monitor must be on the station at regular times. There's no such thing as a channel monitor who does not work regularly. And he must be willing to put up with a lot of guff, especially in the beginning. Most CBers are naturally suspicious of channel monitors and acceptance takes time.

S9 surveyed channel monitors across the country—the successful ones—to find out how they do their job. Based on their experiences, I have been able to compile a list of nine commandments which are essential to a successful operation.

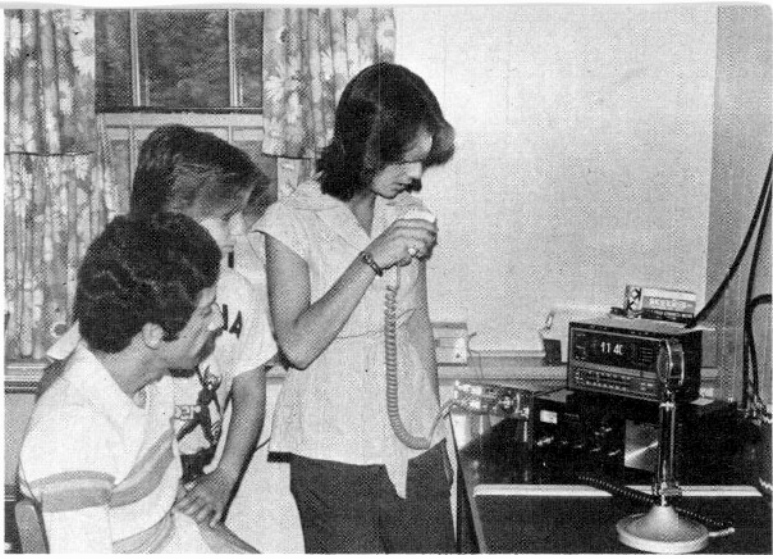
1. Remember the FCC has made no provision for channel monitors. Regardless of how right you think you are, *no one is required to respect your authority or even request a break!*

2. Work regular hours. An infrequent channel monitor is no channel monitor.

3. Keep your own conversations seldom and brief and be the last to take a break. Once anyone suspects a monitor is favoring himself, his usefulness is ended.

4. Be polite. Never *tell* a breaker to stand by. *Ask* him. Remember the word "please" and use it often.

5. Don't argue with someone who won't listen. Let him have his way. Usually, he'll make his shout and leave. Encourage other hobbyists not to answer someone with poor radio etiquette.



Sal watches while his daughters learn the fine art of CBing.

6. Be tolerant of mobiles. They may not realize they are stepping on someone. Remember they quickly pass out of range. Fighting with them is more trouble than it's worth.

Never, never transmit dead carriers or try to interrupt a rule violator. That leads only to CB battles and an unuseable channel.

8. Obey all FCC rules, or, at least, the important ones. A channel monitor may work successfully if he forgets his call letters but he cannot operate when he uses profanity or illegal equipment. He loses the respect of others on the channel.

9. Try to keep all conversations brief. A breaker who is asked to stand by will not wait forever.

There is one other item that is not a commandment but makes good sense. Do not try to monitor a channel without the proper equipment. Do not, for example, monitor a channel with a beam. Your ears are just too poor to hear all the *breakers*.

How well a channel monitor is doing his job can be assessed in only one way. Listen to the channel and then talk with some of the regulars. And talk with them, if possible, when the monitor is off the air.

Sal passes both tests easily. Listen to Channel 14 in Toms River today. Hobbyists there are patient and courteous. It's easy to make a shout and complete a conversation. Just wait your turn.

Then chat with the regulars on 14 but chat in the daytime when Sal and his wife are working and the *Hot Pepper* Base is off the air.

"We don't have a channel monitor," says one goodbuddy. "Sure, I know the *Hot Pepper* base. He's no monitor. He just help us out."

"A channel monitor,!" exclaims another. "No one is telling me what to do. The air is free. We just listen to that one Hot Pepper base because he's helping all of us."

And in the evenings, when all the hobbyists return home from work and go on the air, there will be Sal.

"Breaker, one-four,"

"Stand by, breaker, you're next."

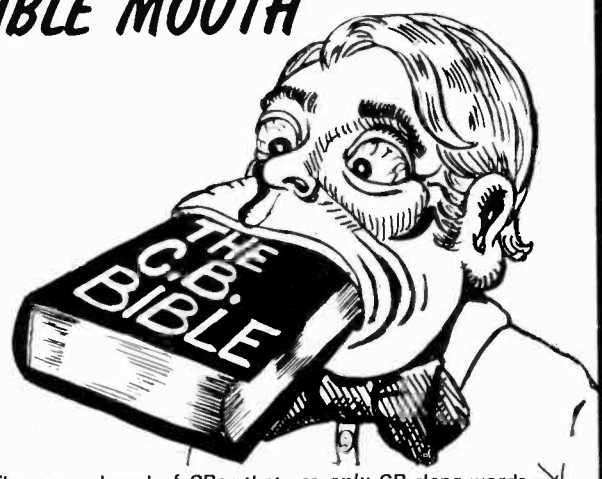
Nuts and Bolts Dictionary

By Harold Perry

A Special THANKS to our goodbuddies who sent in these great CB Slang words.

William C. Robinson (*KBH-2578 Evergreen*) Wallingford, Ct.

BIBLE MOUTH



They are a breed of CBer that use *only* CB slang words and the 10 code on the air. The Bible Mouth causes "mike fright" among many new CBers and confusion among old CBers who don't know what the heck the dang cottonpicker is talking about.

Robert S. Hylen (*Slide Show*) Needham Heights, Ma.

JAYHAWK

That's a police car that sits on a highway entrance ramp and waits for speeders. The Jayhawk is beneficial, in that it only feeds on turkeys of low intelligence that think an interstate highway is the Indy 500 Speedway.

HAVE YOU GOT A CB SLANG WORD THAT I DON'T HAVE? (You probably do!) Then send it to me and I'll put it in the next issue of S9 with your name and handle. In case of duplicate definitions the one postmarked first will be used. SEND postcards to: HAROLD PERRY c/o S9 Magazine 14 Vanderventer Ave. Port Washington, New York 11050

Build A High Power Dummy Load

by Jeff Bollettino KFZ-3141/CLI-927

A lot of the noise and interference heard across the CB band is caused by operators tuning up while still on the air. This usually produces tempers which are hotter than the rigs being tuned. This problem could be avoided if more CB'ers used dummy loads to tune up, rather than their antennas.

CB radios are designed to work into a 50 to 52 ohm impedance system. This means that your cable and antenna should show a 50 ohm resistance to alternating current. If this impedance is not maintained your transmitter output will be decreased or you will damage your equipment. Such is the case when the transmitter is operated without an antenna. The transmitter will quickly burn out because it is working into a non-existent load.

This impedance-loading system is one which all transmitters and amplifiers must use to work properly. Such devices must work into a certain pre-determined terminating load. On an audio amplifier the load is the speaker (usually 8 ohms). With CB radios the terminating load is 52 ohms. The dummy load provides the load, in place of the antenna, without transmitting the signal.

The dummy load described here is very simple to build and requires only a mini-box, SO-239 connector and two resistors to build a 40 watt load. The two resistors (see fig. 1) are 100 ohms and rated at twenty watts. They are connected in parallel. Basic theory tells us that two resistors of the same value, when connected in parallel yields half the resistance of just one. With the resistors shown this gives us 50 ohms at 40 watts. If a higher wattage is desired, then figure two may be used.

The circuit shown in figure two uses 8 resistors which will still yield a 50 ohm load but at 160 watts. Since R1 and R2 are in series the resistance is twice that of one (resistors in series are additive). This is then paralleled with R3 and R4 which yields 100 ohms at 80 watts. This is then wired in parallel with R5, 6, 7, 8 and gives 50 ohms at 160 watts.

The above formulas can be repeated in parallel and in series to obtain even higher wattages. For example, if two circuits of fig. 2 were put in series and then paralleled with an identical circuit the yield would be 50 ohms at 640 watts. The possibilities are unlimited.

CONSTRUCTION

Construction is very simple. Pick your resistor arrangement and solder it together. Check this assembly for shorts or resistor leads touching where they shouldn't.

A metal mini-box is suggested due to the shielding effects of the metal. Drill the proper hole for the SO-239 and mount it on the box. Solder one side of the resistor assembly to the SO-239 center and the other side to ground or to shield plate on the SO-239. Bolt the mini-box closed.

To check the load, measure across the SO-239 using an ohm meter. The load should read 50 ohms. If not check for shorts and see that the resistors are connected in the proper configurations. Once the measurement is correct the load is ready to use. Connect to your transmitter with a coaxial jumper with PL-259's on either end.

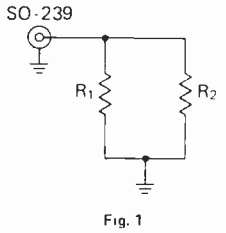


Fig. 1

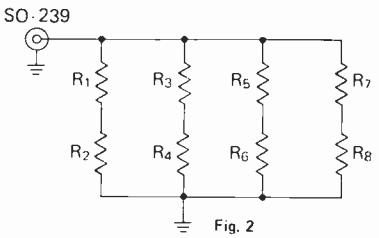


Fig. 2

PARTS LIST

R1-8 100 ohm 20 watt Non Inductive Resistors (available at most electronic supply outlets).

SO-239 RF Female connector.

Mini-box any suitable size, preferable metal.

Greater "Talk Power" Answer to Better CB Communications

by Robert Artigo, KJN-0580

President,
Communications Power, Inc.

THE main thrust of the material to follow is to show CB'ers how to improve communications by substantially increasing the "talk power" output of an existing CB transceiver. Amplitude modulation (AM) and speech processing will be discussed on a simple, informative basis and on a strictly non-technical level. The discourse will conclude with a description of a new lagarithmic speech processor of advanced design that has capability for high "talk power."

Today's CB communicator must be able to cope with crowded channels, with the whistles, shrieks and cat calls caused by AM carriers which vary slightly in frequency. Invariably, there are also on-channel voices at various levels than can distract the most attentive listener.

One way to cope with interference is to make certain that *your* signal is the loudest on the channel. But how? Not by an increase in output power since it is assumed that your AM transceiver is already delivering the 4 watt maximum carrier power permitted by F.C.X. regulations. Bear in mind also that output power would have to be *doubled* (3db) before the operator at the receiving end could even *notice* the difference. The logical practical approach to better transmission on crowded CB channels is to increase "talk power" by speech processing and by maintaining modulation at highest possible levels. Not exactly clear on the term, modulation? Let's quickly review.

In AM (amplitude modulation), the most widely used mode in CB transceivers, the transmitter *carrier* is a steady-state signal at radio frequency which serves as a "hat rack" for the upper and lower *sidebands* which carry the voice intelligence. In CB, the carrier frequency is *centered* within a particular channel in the 27 MHz range. In simplest terms, speech tones within the audible range are amplified, processed and ultimately added to, and subtracted from the steadv-state RF carrier. Example: A carrier frequency of 27 Megahertz is modulated by a single, audible tone of 1000 Hertz so that *two, new radio frequencies are produced*: 27 Megahertz *plus* 100 Hertz (27.001 MHz) and 27 MHz *minus* 1000 Hertz (26.999 MHz). These two, single-tone sidebands are transmitted at radio frequency (along with the carrier) and are *demoulated* at the receiver and the original 1000 Hertz tone recovered. Of course, each sideband may consist of any number of different frequencies instead of the single tone used in the simplified example.

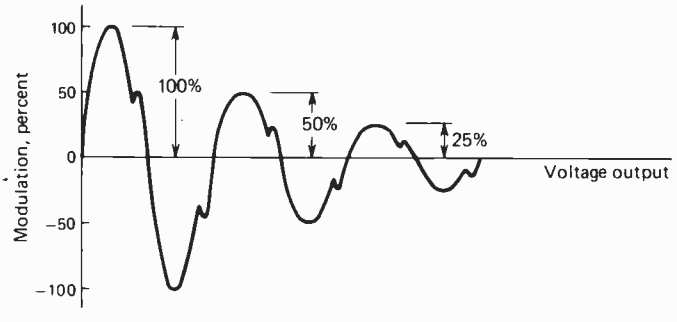


Fig. 1– Conventional microphone.

Speech, per-se, rarely involves a single tone but rather consists of a succession of complex tones of varying amplitude comprised of a fundamental frequency plus odd and/or even multiples (harmonics). It is this harmonic distribution and amplitude relationship that gives individual voices . . . and musical instruments . . . their characteristic, recognizable sound . . . their timbre . . . tonal "color." Depending upon how the original fundamental-to-harmonic relationship is altered, a particular voice may sound "different" . . . be higher or lower in overall pitch or be unpleasantly distorted. However, in communications reception, "noise" and interference always exists to some degree and this is reduced by decreasing the bandwidth of the receiver. So for highest intelligibility under on-the-air conditions, the *overall* speech frequency *band* of

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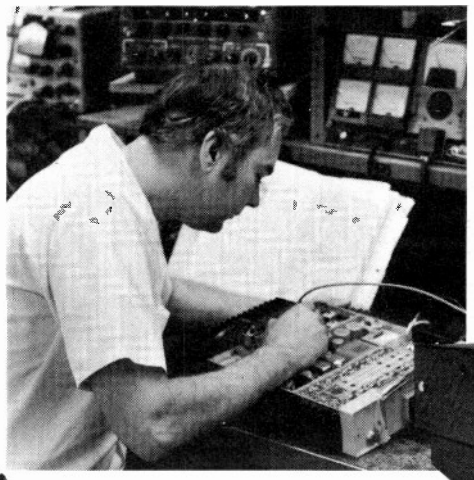

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transmitting equipment is often reduced rather drastically. Some of the higher and lower voice frequencies are eliminated but the individual tones *within the pass band* will not be altered. Now, let's back-track to modulation (AM).

In AM equipment, a properly designed audio system—the microphone, speech amplifier, modulator—will be capable of modulating the carrier to any degree from 0 to 100%. Now, the broad, generalized statement can be made: *both talk power and signal strength increase as modulation approaches 100%*. So then, why stop at *100%*—why not modulate *200%*, even more? Negative! First, because the microphone gain is usually pre-set internally to a level where over-modulation (beyond 100%) is unlikely. But most importantly, because severe speech distortion and "spillover" interference on adjacent channels will occur when the modulation level exceeds 100%. This points up why extreme care (and good judgment) must be exercised in setting controls on outboard devices like clippers and power microphones which provide adjustable gain. It is true overmodulation *will* increase the average talk power and so will make signals *louder* but it will also distort them severely, ultimately to the point of being virtually unintelligible in the presence of noise and interference.

As stated previously, speech consists of trains of fundamental-plus-harmonic frequencies which give it characteristic sound. But conventional speech also varies widely in *level* with high amplitude peaks and low level valleys; the ratio between them being 10 to 1 or greater. The degree of "talk power" that can be obtained is dependent upon the *average* of the two extremes and may be 20-30% of the peak value. As stated, both talk power and signal strength increase as modulation approaches 100%. Let's try to visualize this. Some particular word might look like Figure 1 when "frozen" on an oscilloscope. Here microphone gain has been adjusted so that the "peak" value is just at the 100% modulation point. It is plainly evident that the trailing portion of the wave form is very much lower in level than the peak, i.e., the *ratio* between the two is quite high. Under conditions of noise and interference an operator at the receive end might tend to miss low amplitude portion and so might not be able to understand the particular word. Now let's assume that we have a power microphone that can boost audio gain up to a point where the weaker, trailing part of the word of phrase is now 75% of the possible peak value as shown in Figure 2. Surely this will bring up the *average* level, give greater talk power, a *louder* signal. But unfortunately, power microphone *amplify all levels equally* so now the original "safe" peak value greatly exceeds 100%. The consequence is that the top is squared off . . . "clipped" if you will, thus distorting the signal and generating spurious, out-of-channel interference. One further example of the undesirable effects of "flat topping" caused by overmodulation or by a poorly designed peak "clipper" is shown in

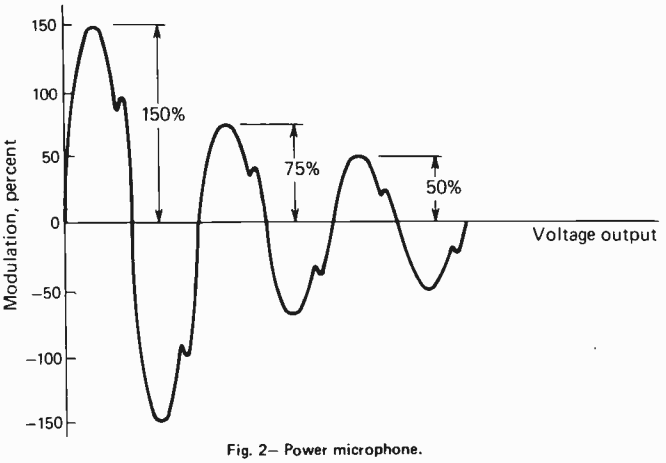


Fig. 2– Power microphone.

Figure 3, which depicts a single "pure" sine wave tone free from harmonics. Now if the amplitude of this tone is raised beyond the clipping point (see Figure 4), the shape of the original wave will be altered severely. With purely symmetrical clipping the altered wave will now contain a large number of frequencies which are odd multiples (3,5,7,9 etc., times) the fundamental tone. If, for example, the original tone represented a shrill whistle, it becomes quite evident that it won't *sound* the same after being severly clipped.

To reduce distortion, most speech clippers must be

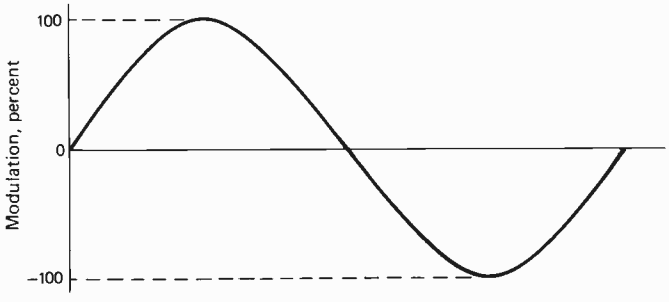


Fig. 3

followed by a "low pass" filter which attenuates harmonics of the higher speech frequencies that are generated by clipping. Such filters must necessarily attenuate harmonics of the higher speech frequencies that fall *outside* the speech pass band. Unfortunately such filters will have negligible effect upon harmonics produced by clipped, *lower* speech frequencies because most of these fall *within* the speech band. The effect is a reduction in speech intelligibility because of distortion and inter-modulation.

One clipping system divides the total speech pass band into three parts, each slightly under one octave in width so that harmonics generated by clipping will fall out of the pass band. The three, individually clipped segments are then recombined in a special mixing circuit. High cost and complexity will rule this system out for most CB'ers. It would appear then that speech clippers and power microphones may not offer the best means for obtaining higher average talk power. Enter, the speech *compressor*.

Communications Power, Inc. (CPI) has approached

the "higher average modulation/talk power" problem with a unique and very effective accessosy named, appropriately enough, "Talk power." This entirely American designed and manufactured accessory is a speech processor—a *logarithmic* speech processor—*not a clipper.* It can provide very substantial increases in average talk power/modulation with minimum distortion and without "spillover" interference on adjacent channels, an inevitable consequence when clipping is excessive.

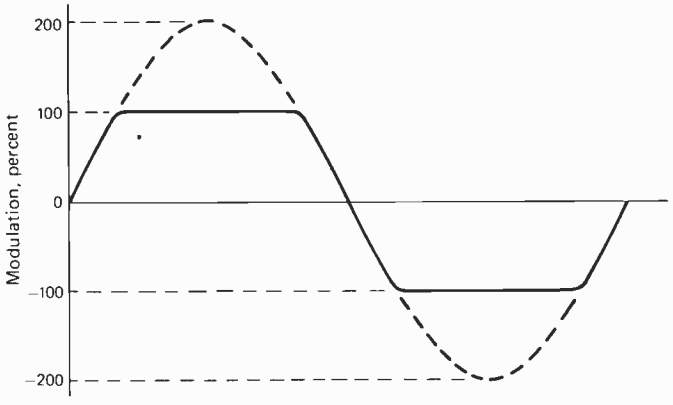
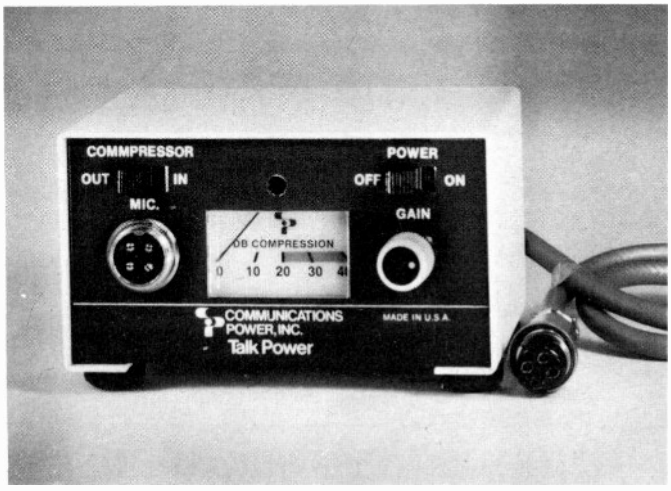


Fig. 4.

The input vs output curves in Figure 5 give a good comparison between power microphones and the CPI logarithmic compressor. Power microphones follow the "linear" response curve, i.e., the same degree of amplification is present *at all levels* including *peaks.* Thus when the lower spech levels are amplified sufficiently to bring up the *average* talk power, overmodulation occurs as shown in Figure 2.



By way of contrast, the CPI speech processor follows a *logarithmic* curve allowing high gain on the lower and intermediate audio levels (which contain much of the human speech information) but smoothly leveling off—*compressing* gain as the level increases (See Figure 6). Overshoot on the peaks is impossible. Incidentally, correct attack and delay times are essential and these are carefully controlled factors in the design of the CPI compressor. However, the writer does not wish to imply that this, or any other compressor is foolproof. *Excessive* compression can result

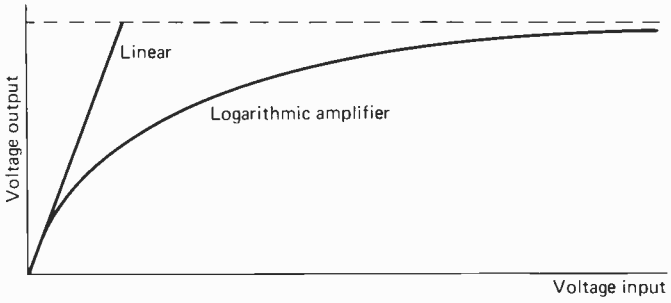


Fig. 5.

in distortion and an undesirable rise in any residual background noise that may exist. *Sensible* settings are indicated.

Observe in the block diagram in Figure 7 that speech from the microphone is first subjected to *pre-emphasis,* is thereby altered or "shaped" to ensure minimum distortion products at higher compression levels. The processed signal is then applied to the integrated circuit (I-C) compressor after which it passes through a low pass filter to remove possible higher order harmonics. The overall speech band is then *de-emphasized*

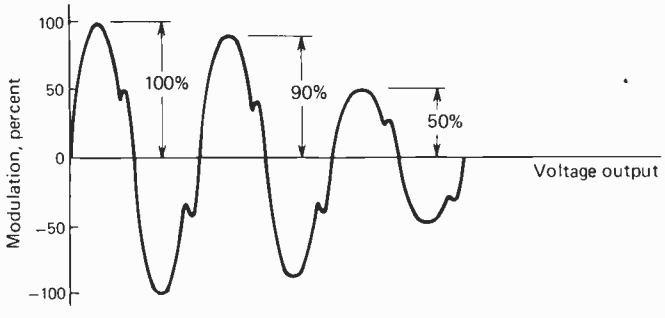


Fig. 6— Logarithmic speech processor in circuit.

to restore "timbre" and naturalness. "Talk Power" has *two* gain controls. One of these, the microphone input control, sets the degree of compression and hence the ratio between peaks and valleys which relates to talk power and intelligibility. This instrument has a back lighted panel meter which can be most helpful in establishing proper setting or optimum compression.

A second, set-and-forget gain control adjusts the audio level from the compressor to the input of the CB transceiver for 100% modulation. This level cannot be exceeded regardless of the speech compression setting.

"Talk Power" is an add-on accessory. A short cable from the compressor is terminated in a four conductor plug which plugs into the microphone receptacle on the transceiver; the actual microphone then plugging into a receptacle on the processor panel. An internal patch panel within the unit takes care of possible

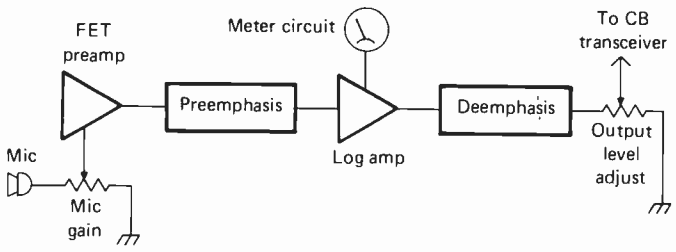


Fig. 7.

variations in connection of the 4-conductor microphone plug. No soldering is necessary. There are no internal connections to, or alterations on the CB transceiver. The instrument can operate either on 12VDC for mobile or 115VAC for fixed station service.

While this entire discussion has related to AM, it should be stated also that this particular logarithmic compressor is also highly effective on SSB. A recent happening points this up: Scientifically minded amateur radio enthusiasts recently shared use of a big, "satallite-tracking" dish to communicate with other amateurs world-wide by reflecting signals off the moon. CPI's "Talk Power" was an integral part of the 432 MHz SSB transmitting equipment. At round-trip distances exceeding a half million miles, an increase in talk power can often represent the difference between "solid" and no copy. Suffice it to say that here "Talk Power" lived up to its name.

CB RADIO/S9 FIX'M-UP

TAKE ADVANTAGE OF THESE USEFUL SERVICES:

HAVE TV INTERFERENCE HEADACHES?

A free TV interference instructional kit has been prepared which details how to tackle this tricky problem. Write to TVI, P.O. Box 21, Hartford, CT 06101.

DO YOU HAVE AN A.M. UNIT NUMBER ID YET?

Many AM operators are now using Unit Number ID's in addition to or instead of *"handles."* They have dozens of advantages. For more information and an application to receive your own personal Unit Number ID, send a self-addressed stamped envelope to Z-Tech, P.O. Box 70-FXM, Hauppauge, NY 11787.

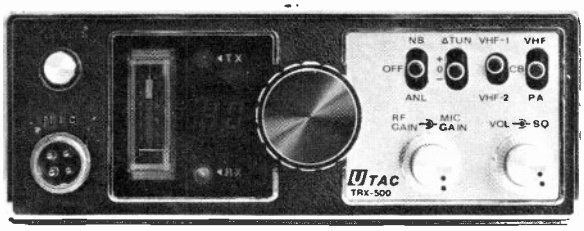
SIDEBAND ID NUMBERS?

They don't use "handles" to ID on the sideband channels, stations use "Sideband ID Numbers." If you're an active Sidebander you may already have several local or regional group ID numbers—if you're a newcomer or a future Sidebander, you may not have any Sideband ID numbers at all! Whether you have a dozen numbers or none at all, it's easy and important to you to get yourself a set of *national* ID numbers from the *SSB Network*, the oldest (1964) and most prominent national sideband group. Old timers, newcomers, and future Sidebanders should obtain information and an application for national *SSB Network* numbers by sending a self-addressed stamped envelope to: Sidebanders' Service Bureau, P.O. Box 381-XF, Smithtown, NY 11787.

You Asked For It
You Got It...

UTAC Design A CB Contest

TRX-400



TRX-500

FEATURES:

Digital Channel Readout • Phase Lock Loop Circuitry • Dual Conversion Superheterodyne Receiver with Ceramic Filters For Superior Sensitivity • Combination SWR/RF Power Meter • Variable Squelch • Variable RF Gain • Variable Mic Gain • Switchable NB • Switchable ANL • CB/PA Switch • External PA Speaker Jack • Remote Speaker Jack • Transmit/Receive Indicator Lights • Fused Circuits to Prevent Damage Caused by Improper Connections • Positive/Negative Ground Operation — 13.8Vdc • Two Position VHF Monitor Switch • Switchable Delta Tune

THE FOLLOWING NAMES WERE DRAWN AS PRIZE WINNERS FROM THE PARTICIPANTS WHO MAILED IN THEIR ENTRY FORMS BETWEEN 12/1/76–1/15/77.

FIRST PRIZE AWARDED TO: Reverend James A. Taylor, *1955 Jeanette Drive, Pleasant Hill,CA 94523*

SECOND PRIZE AWARDED TO: Alan Frame, *West Oak Lane CB Center, 1332 E. Weaver Street, Philadelphia, PA 19150*

OTHER PRIZE WINNERS:

Glenn R. Girup, *Chicago, IL;* Glenn Schabel, *Melville, NY;* William LeTourneau, *South Elgin, IL;* Michael A. Bruner. *Akron, OH;* Robert Potter, *Newport, OR;* M. Lutsko, *Whitehall, PA;* Carl D. Hurt, *De Soto, MO;* Ronald L. Maas, *Cortez, CO;* Roy Arnold, *Blakely, GA;* Jerome A. Spatz, *Wildwood, NJ;* Dean K. Dunn, *Eskridge, KS;* Emanuel Creekus, *Canton, OH;* Michael F. Putna, *Tallahassee, FL;* Garner W. Powers, Jr., *Lenoir, NC;* Robert G. Stineman Jr., *Newark, DE;* Dan Lundeen, *Minneapolis, MN;* Leonard March, *Chicago, IL;* Robert D. Retzlaff, *Gordon, NE;* Stephen A. Norrell, *Anchorage, AK;* Jerry Grice, *Gresham, OR;* David R. Chapman, *Sedro Wooley, WA;* James A. Hale, *Grants Pass, OR;* Rubert J. Sherman, *Bloomfield, NJ;* Fred W. Zender, *Milford, CT;* Richard Migota, *Washington, PA,* Michael B. Welty, *Glendale, CA;* James W. Snyder, *Cincinnati, OH;* Edgar Levine, *Scott AFB, IL;* Edward Hirsch, *Columbus, OH;* Nelson Moodie Jr., *Arlington, VA;* Dwayne Willems, *New Windsor, IL;* Richard Stensrud, *Eddystone, PA;* Thomas Sheehan Jr., *Foxborough, MA;* M. R. Fink, *Remsenburg, NY;* Albert J. Locke, *Waltham, MA;* Kenneth L. Sandoval, *Pacoima, CA;* Arleen Levine, *New York, NY;* Ed Weinstein, *Chicago, IL;* Bill Jones, *Greenville, MS* Robert Hart, *Lubbock, TX;* Jeff M. Switkin, *Skokie, IL;* Donald E. Duval, *Tundall AFB, FL;* Julian A. Williams, *Brooklyn, NY,* Levi Hess, *Prescott, AZ;* Larry Day, *Fort Morgan, CO;* Clyde Wallace, *Cheraw, SC;* D. W. Metz, *Mesa, AZ,* Jim Turney, *Spokane, WA;* Thomas D. Wall, *Crystal Lake, IL.*

We at UTAC wish to take this opportunity to thank all of the people who took the time to send in their entry forms and their comments. We will strive to give you what you asked for in communications equipment by offering only quality products.

UTAC Communications Equipment

766 Lakefield Road, Westlake Village, California 91361

805–497–3966 213–889–4774

The Taurus CB Personality

APRIL 20—MAY 20

by Paperdoll—KMI 4549

Taurus CB-ers are more than likely the majority of those modjitators transmitting from home bases, where they truly enjoy being—in comfort and convenience. "Home, sweet home" is their motto. Helpful, faithful and friendly—always ready to give a 10-5 or a 10-13. When tortoise Taurus does get out on the boulevard, you'll eyeball the dead-pedaller holding up a long convoy of traffic completely oblivious to the deadlines of others. A smokey's friend, for sure. Being very deliberate creatures, Taureans don't venture out on any unnecessary trips unless it's for a pleasure ride in the country—land which they love. Just give them a home where the buffalos roam, YL's too, for they are loving and loyal and you won't mind being stuck out on the farm with them. The most patient sign of the horoscope, they can put up with alot for a long time from even the most wily rascal—but—don't test your luck. Pushed too far, the bull sees red and then charges in a burst of temper the likes of which you've never seen. The sign Taurus rules over the greenstamps of the earth. In order to have life's extra comforts and luxuries, Taurus puts in long hard hours at the junkyard. They frequent the big piggybank constantly filling their own. Their "livestock" is not only of the barnyard variety. Earthy Taureans are some of the most pleasant transmitters because of their own beautiful vocal chords. They love to sing and can—very well. With an audience such as on Channel 19, you'll likely hear a few lilting bars from one of our throaty friends. Typical Taurus handles might be: Green Onion, Mother Earth, L'il Abner, Daisy Mae, Songbird, Old MacDonald, Holy Cow.

MAY STAR CHECK

TAURUS—Excellent planetary aspects prevail in general for earth sign Taurus for the month of May. The only foreseeable concern would be to curb activities that are too taxing on health and not get run down. All month secret negotiations produce a long awaited real estate transaction that turns over those big greenstamps—or you may invest in some income producing property. Bodacious business deals keep you busy.

GEMINI—Geminis keep the antenna wigglin' and the wee ones gigglin' as they entertain the playpen set who keep them on the run all month. 10-5's of an important nature are received throughout May in the forms of letters, landlines and radio waves. Keep the channels clear.

CANCER—A good buddy apologizes for hurting Cancer's feelings and begs forgiveness on the 14th. Superiors and coworkers at work 20 give long awaited and well deserved recognition of your dedicated efforts. You sure can use those extra greenstamps and that praise, 10-4! The 18th New Moon shines brightly on a dream you've had for the future—also introduces a new good buddy into your life.

LEO—Accusations that were misdirected toward you at work 20 last month are at last withdrawn on the 14th much to your relief. In laws, on the other hand, team up against you to create a family feud. Sunny Leos just continue to show their strength with a shrug and a smile and are revitalized by ignoring it. On the 26th your creativity overflows with ideas that could bring fame and fortune if followed up and acted upon.

VIRGO—Better half or business partner takes issue with you this month over piggybank account which may result in a deficit on the 11th. After the 14th you do a complete bouncearound and recoup your former position. On the 26th your innovations at work 20 not only saves greenstamps for the junkyard, but puts you in line for promotion.

LIBRA—You and other half work hand in hand all month to make those dreams a reality. After the 14th, that indecision that constantly plagues you clears up and away and you throttle down to booktown for some further educating, that will pave the way for that luxurious future. A faithful and long time good buddy stands by to support and aid your plans.

SCORPIO—Beginning of month is a good time to stay out of mate's way. Other half's irritability pegs a 10 on the mood meter, especially on the 1st and 3rd. After the 14th, you've got the green light at both home and work 20. You and a close business associate will be working closely together on a top secret project that should pull in the greenstamps.

SAGITARRIUS — Sportive Sagitarrians head for the greens early this season for a month full of recreational activity with best buddy. Co-workers are left to handle the brunt of work as Sag bites the dust. After the 14th, you decide to take work that has piled up home with you to avoid discord at work 20. Single YL's and buffalos are on the roam, but not alone, this month. For Sagitarrius, it's a great month for L-O-V-E.

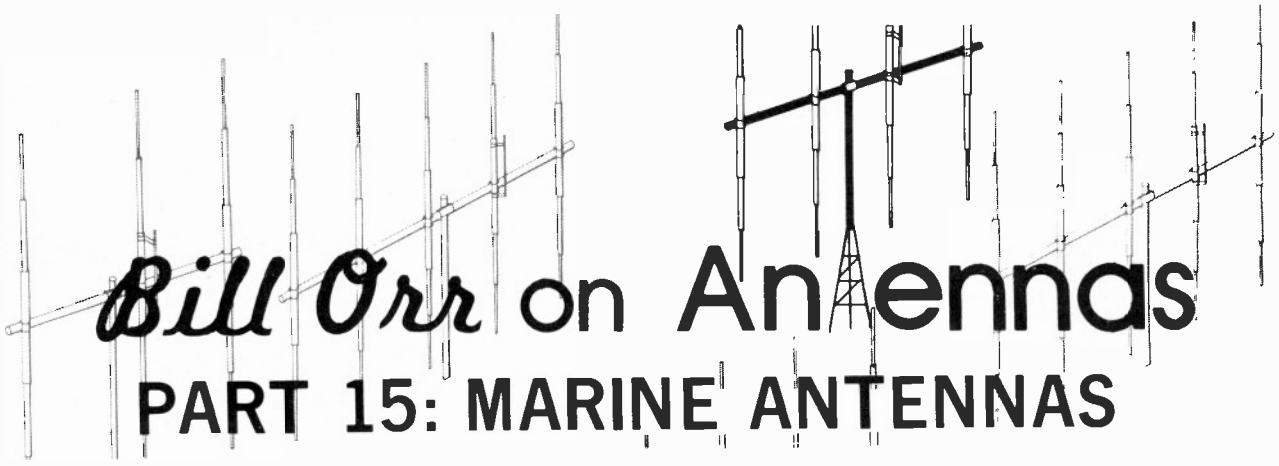
CAPRICORN—Home 20 continues to be scene of renovation or a flurry of activity. Children keep you tied down till the 14th when wheels begin to roll again. Single Capricorns find happy hunting at the in spots—and someone whose magnetism instantly attracts on the 24th. Usually staid Capricorn will not be able to resist the forces.

AQUARIUS—Close kin keep Aquarius the loner in good company all month. Other half and children also gather round to make this the merry month of May. The 1st, 3rd and 24th are days to guard against rash remarks that could hurt you at work 20. On the outside, you'd best stick to the double nickels as you'll constantly be trucking down the boulevard this month.

PISCES—Dual Pisceans have trouble juggling their greenstamps this month—deciding where to spend it first. Guard against reckless spending which could deplete the piggybank on the 11th. The static you've been getting from a close kin clears up on the 14th when your signal comes through strong as ever. On the 17th you muster up courage to transmit one of your ideas to superiors, who receive it well.

ARIES—Active Aries really put the throttle down this month as extra burst of energy is unleashed. Better half can't keep up with you and lets you know it. What you lost last month and have been searching for since then will probably turn up on the 14th. End of May keep the channels clear for a 10-5 from some terrific someone who brings sunshine to your life.

For Information About Our Advertisers . .



Bill Orr on Antennas

PART 15: MARINE ANTENNAS

LAST month's column discussed the CB "Truth Table" which classified gain antennas in a manner that provided at a glance the theoretical maximum power gain figure for the most popular antenna arrays. This summation helped you to sift out impossible advertising claims, inflated gain figures, and other delightful practices indulged in by some antenna manufacturers to confuse the buying public.

The Truth Table is a handy device since, if you are given a description of a gain antenna, the probable gain (talk power) of the antenna may be determined by looking the antenna type up on the Table. The Table, in other words, permits you to become an instant "antenna expert", at least as far as advertising claims go!

The Truth Table may also be expressed as a "Gain Ladder" on which the various popular CB antennas are placed in relation to a zero gain position. Such a ladder is shown in Figure 1. The left-hand vertical rail of the graph indicates antenna gain as compared against an isotropic reference antenna and the right-hand rail indicates antenna gain as compared against a half-wave dipole antenna. The antenna at the top of the ladder has the highest power gain, with gain decreasing the farther down the ladder a particular antenna is positioned.

Foremost in gain, and the occupant of the ladder top is the four element Quad antenna, the "King" of CB antennas. It outranks the popular three element Quad and four element Yagi beams by about two decibels and shows a power gain of about 14 decibels over a ground plane! (See left-hand rail). Those CBers used to ground plane antenna performance will be astounded at the dramatic improvement in results, both transmitting and receiving, when a four element Quad beam antenna is used. Even so, the smaller beams give a good account of themselves as far as power gain is concerned, and the gain ladder shows in dramatic fashion why even the smallest beam antenna outperforms the popular ground plane antenna.

Remember in comparing antennas, a good rule-of-thumb to use is that a change in signal level of one decibel is just noticeable, a change in signal level of two decibels is noticeable and worthwhile over the long run, and a change of three decibels is of immediate advantage to you and definitely worthwhile. A power gain of more than three decibels is very noticeable and will quickly "open up" a difficult communication circuit.

Referring to the Gain Ladder, it can be seen that going from a ground plane antenna to a two element Quad provides a boost in signal gain of about 8½ decibels, a very worthwhile improvement. But going from a two element Quad to a three element Yagi beam provides an improvement of only about one decibel—hardly worth the effort!

A change from a ground plane to a five-eighths wave vertical antenna shows a signal boost of about three decibels. That's about the best you can do with an omnidirectional vertical antenna. So, if you are starting out to buy a base station antenna, why not buy a five-eights wave vertical antenna to start with? They look like a ground plane, but are about 21 feet high instead of only eight-and-a-half feet high.

CB Antennas For Marine Service

Are you a Sea-B addict? Multiply the pleasure and safety of your boat by the addition of a CB radio! Thousands of week-end sailors on lakes and seas have installed CB radio for extra enjoyment and safety. Safety, of course, comes first and CB radio can provide you with an inexpensive, important communication link to shore or boat in case of an emergency.

In some areas, the Coast Guard monitors the emergency CB channel, but you cannot count that the Coast Guard would be listening for you in a real emergency. But there's a good chance that your call for help would be heard by other CBers, and there have been many cases of CBers assisting in emergencies afloat. However, a sizable pleasure craft which ventures far offshore should not rely only on CB radio for emergencies, but should have aboard marine radiotelephone equipment which can be switched to the regular marine distress frequencies; CB provides a useful adjunct to this equipment, and can be the only channel on which you can talk with a boat in distress equipped only with CB gear.

No boat is too small for CB radio—including a rowboat. Hand-held CB transceivers, with powers from 100 milliwatts up to 5 watts, have a range at sea from

a few miles up to possibly 10 miles or more if interference is not too heavy, and can be useful in summoning help when equipment for the normal distress frequencies is not aboard.

The 12-volt batteries used to start outboard engines, or the 12-volt electrical system of larger craft, can easily power a CB radio (if you make the proper connections) and when you are tied up at dockside, your CB radio will operate from the shore electric lines unless it is entirely operated by dry batteries, or has only a mobile-type power system. Larger boats, of course, have extensive electrical systems that will power your CB radio with ease.

Installation of CB radio equipment on a boat is usually covered in the general operating instructions for the equipment. Often left unanswered is the problem of installing an efficient and rugged Marine CB antenna on the boat. This column will provide you with suggestions for efficient antenna installations for CB radio on pleasure craft and work boats.

Your Marine Radio Range

CB marine radio is subject to the same Laws of Nature as land-based CB radio. The "Radio Horizon" is usually limited to about 3 to 30 miles at sea, principally because of the low overall height of the antenna which is restricted by boat size. In general, the CB radio range is considerably less than that of the more powerful and expensive high frequency (HF) or VHF marine radiotelephones. Even so, the CB radio range is great enough so that a marine installation can be a

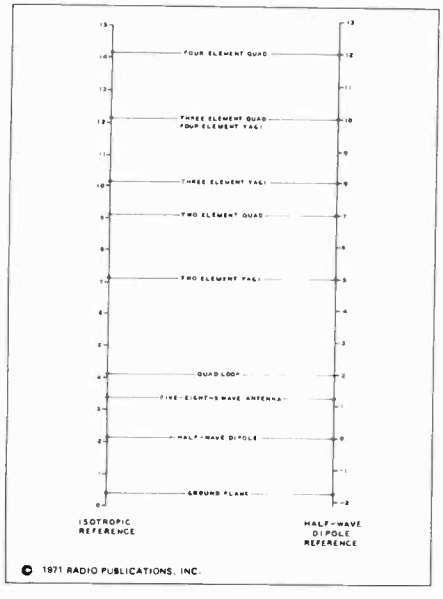


Fig. 1—This Gain Ladder shows relative power gain of the most popular CB antenna types compared against dipole and isotropic references. Left-hand vertical rail indicates antenna gain over the isotropic standard antenna and the right-hand rail indicates gain compared against a half-wave dipole antenna. Direct gain comparison between two antenna types may be achieved by reading up and down the rails. For example, a three element Yagi beam antenna has a power gain of about 8 dB (right-hand rail) and the ground plane has a power gain of −1.8 dB. Both antennas are compared to a dipole reference, and the gain of the ground plane is negative as it has less gain than the dipole. The gain comparison, then, between the ground plane and the three element Yagi beam is 8+ 1.8 = 9.8 dB. (Drawing courtesy of Radio Publications, Inc.).

. . . Use S9 READER SERVICE.

valuable accessory to your boat, and at a lower cost than a HF or VHF installation.

CB Marine Antenna Mounting Problems

As with land-based CB radio, the CB marine radio antenna system is the most critical element in the whole installation. It is imperative that the antenna be as efficient as possible, or the output power of your CB set will be wasted. Unlike land-based installations, it is usually impossible to install a beam antenna aboard most pleasure boats and the seagoing CB operator must satisfy himself with relatively simple antennas that will not interfere with the boat's rigging or operation. Sailboats, in particular, carry a mase of rigging which varies from boat to boat. Suspending a vertical CB antenna in the rigging can interfere with the sails and cause antenna detuning and loss of effective signal power unless precautions are taken.

The ideal location for a CB antenna aboard a sailboat is, of course, atop the tallest mast but this is seldom practicable because another antenna may already be there, and because it is a difficult spot to reach.

Some sailboat CB antennas are mounted on a small platform built out to one side of the mast; the antenna is parallel to the mast and 2 to 3 feet from it. It is also possible to use an insulated (sometimes called an *isolated*) shroud or stay as a CB antenna in conjunction with an *antenna tuner* mounted next to the CB transceiver, but this is somewhat complicated and is not recommended unless there is no alternative. Isolated stay antennas normally are used for the HF marine frequencies and work well when properly tuned.

The power boat, on the other hand, often has no major mast structure on which the CB antenna can be mounted. Both types of vessels, moreover, continually expose the CB antenna system to sea air and moisture that can quickly corrode it if the boat owner is not careful.

Basic Marine Antenna Rules

Regardless of the type or size of boat, or antenna, there are a few basic antenna rules that should be emphasized before you install your marine CB radio equipment.

1—The CB marine antenna should be examined for the possibility of its electrical continuity becoming intermittent or being destroyed by vibration or corrosion. Telescoping antennas, or sectional antennas, should be avoided because of their numerous joints unless they are used only for short periods of time afloat. Antenna joints and connections should, ideally, be bolted together. The use of self-tapping sheet metal screws (which sometimes loosen under vibration) should be avoided.

2—Salt air, spray and salt water have a corrosive effect on metals, including those used in antennas,

and special precautions should be taken to minimize the damage. Your CB marine antenna can be protected against rust and corrosion by painting it, making certain *not* to paint the insulators and antenna base connection. Many paints conduct electricity to an extent, and a painted insulator can easily short out your entire antenna system. Paint on the antenna element itself, however, does no harm. Antennas may be painted with any high quality marine paint. *Rustoleum* paint, in particular, does a good job of protecting your antenna.

After a particularly wet time afloat in salt water, it is a good idea to wash down all antennas with a fresh water hose. (and the boat, too, as experienced yachtsmen know).

The use of electronic equipment on fresh water lakes and rivers poses fewer problems since there is no salt to cause problems. Here, your principal interest is in making, and maintaining, solid, water-tight connections at all points, including the feedline to antenna base connector.

3—A particular source of potential trouble in marine antenna installations lies in fastening the transmission line, or lead-in, to the antenna. First, be sure to scrape bright with a knife the lug or wire to be fastened to the antenna base, also that portion of the base which makes contact with the lug, or wire. This removes oxidation and corrosion which can result in a poor, intermittent electrical contact. Second, fasten the transmission line to the antenna tightly with a bolt, lockwasher and nut. Third, waterproof this connection with two or three layers of tightly wound plastic electrical tape, or better yet, with the special waterproofing compound made by the large chemical companies, or with *General Electric's* RTV-102 silicone sealant which comes in small tubes. (Note: these sealants are difficult to remove and should be used primarily for permanent or semi-permanent installations).

4—The CB marine antenna should be mounted as high as possible on the boat and as far away from large metallic surfaces, rigging, engine, and other electrical wires as possible. Not only will this produce the greatest radio range, but it also prevents detuning and also means that the antenna receives less salt spray and green water.

5—CB marine antenna construction should be as light and sturdy as possible. A heavy antenna may break under continuous pounding and go over the side as a result of sea motion—often when it is needed most!

The antenna mounting base should be securely fastened to the boat with through-bolts rather than with wood screws, which may pull out under stress. Mounting hardware installed in areas exposed to sea spray should be coated with plastic or weather-resistant compound to prevent water seeping under the mount and causing dry rot or corrosion.

6—Do not attach flags, pennants, or clothing (to dry!) to your CB antenna—or to any other antenna; these

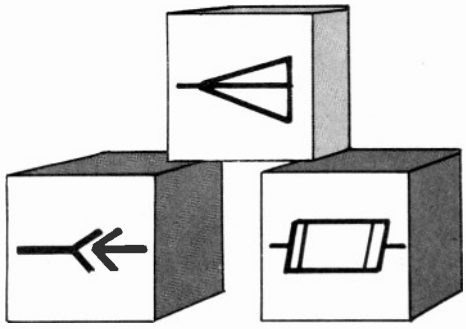
objects often become soaked with water and salt spray and seriously detune the antenna, with the result that your radio works poorly, if at all. (One power boat skipper whose 100 watt HF marine radiotelephone would not operate at all one wet afternoon on Nantucket Sound found that his trouble was a Race Committee pennant fastened to his antenna which was drenched with sea water all afternoon).

7—Do not fasten wires or lines to your CB antenna (or any other antenna) since they, too, detune the antenna and adversely affect its performance.

8—Antennas which must be lowered to pass under a bridge should be hinged and have a quick release "pelican hook" spliced into the forward guy. Guy wires, if any, must be insulated from the antenna itself by small ceramic insulators. Self-supporting whip antennas, moreover, will require a ball-and-socket mount for lowering purposes.

Next month's column will consider the effects of electrolytic and galvanic corrosion on antennas (and other radio gear), the ship's counterpoise ground and lightning protection aboard your boat. Stay on channel until then!

And finally, a belated thank you to the readers who took the time and trouble to write me their comments and criticisms of this column. Time prevents individual replies, but be assured that all letters were appreciated.



Basic Radio

by Irving Tepper

PART 15
Capacitance

EACH electronic circuit, no matter how simple or complex, will contain no more than three basic components, resistors, inductors and *capacitors*. Resistors, you will recall, are used to *limit current flow* in a circuit. Inductors are used to *oppose current change in a circuit* and are capable of storing energy in their magnetic field. *Capacitance* is the property of a capacitor which *opposes any change in voltage in a circuit and is capable of storing energy in its electrostatic field.*

In the early days of electronics capacitors were called *condensers* and they are occasionally called by that old name, even today. When you see the name, condenser, in any text or article, mentally convert it to capacitor and keep reading.

Capacitor Construction—A capacitor is formed from two conductors separated by an insulator; the insulator is called a *dielectric*. The simplest capacitor consists of two metal plates separated by air as shown in Fig. 4.25(A). The circuit symbol for the capacitor is shown in (B). The circuit designation for the capacitor is C and when more than one capacitor is used they are marked C_1, C_2, *etc.*

There are many ways of constructing capacitors other than that shown in Fig. 4.25 and these will be discussed and described later. Before reading the following section that deals with the operation of capacitors, it would be helpful to review the previous sections on electrostatics and insulators.*

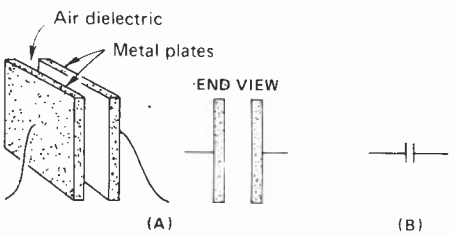


Fig. 4.25(A)—Structure of a simple capacitor. (B) Capacitor circuit symbol.

Part 2, Static Electricity, March, 1976, p. 116.
Part 5, The Basic Circuit, July, 1976, p. 125.

Capacitor Charging Action—In Fig. 4.26(A) we see the construction of a typical capacitor, two conductors separated by a dielectric such as ceramic or glass. Three typical atoms of the many millions in the dielectric are shown. Since the dielectric is an insulator, we know that the valence electrons which orbit the nucleus in a circular path are tightly bound and cannot be freed easily. Connected to this capacitor, through switch S_1 is a DC voltage obtained from a battery. The battery voltage will not appear across the capacitor until S_1 is closed.

When switch S_1 is closed (Fig. 4.26B), electrons leave the negative terminal of the battery and flow into the lower plate of the capacitor. Since the electrons cannot flow through the dielectric which is an insulator, they accumulate on the lower plate causing it to assume a negative charge. This negative charge repels the valence electrons of the atoms in the dielectric. Because the valence electrons are so tightly bound to the nucleus, they cannot be removed and they distort into an eliptical orbit as shown in Fig. 4.26(B).

The close proximity of eliptical orbiting electrons to the upper plate causes electrons in the upper plate to be repelled and flow to the positive terminal of the battery. For each electron that leaves the battery and enters the negative plate, one electron leaves the upper plate. The loss of electrons from the upper plate causes it to assume a positive charge thus creating a difference of potential across the capacitor plates.

As the electron flow continues, the difference of potential builds up across the capacitor with one plate having an excess of electrons (the negative plate) and one plate having a deficiency of electrons (the positive plate). When the charge on the capacitor is equal to the battery voltage, no more electrons

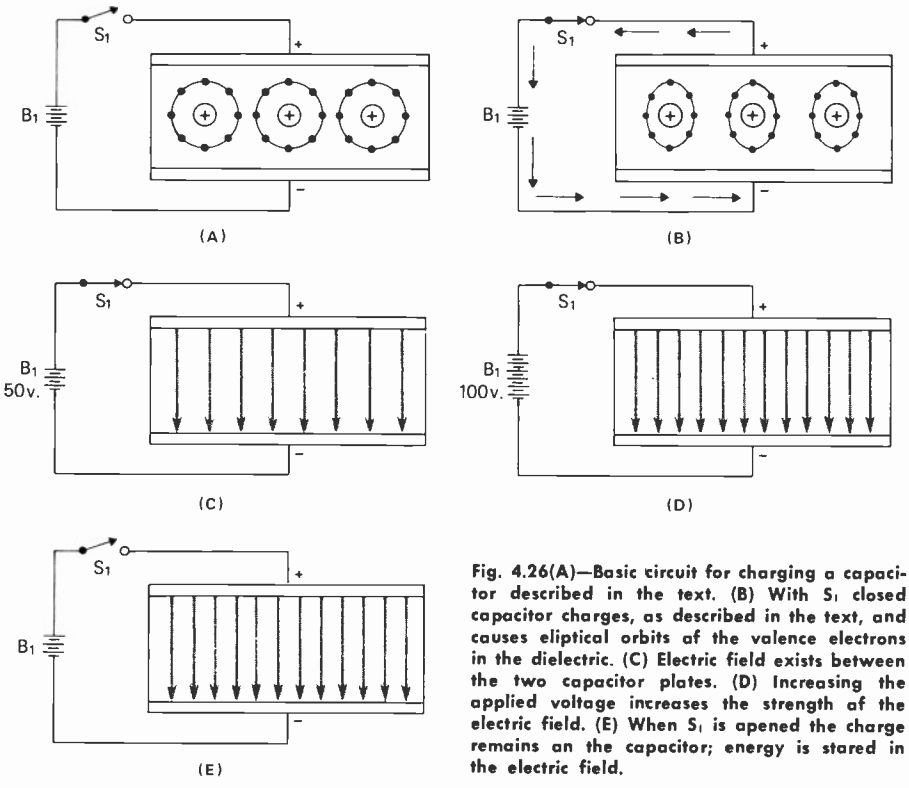


Fig. 4.26(A)—Basic circuit for charging a capacitor described in the text. (B) With S_1 closed capacitor charges, as described in the text, and causes eliptical orbits of the valence electrons in the dielectric. (C) Electric field exists between the two capacitor plates. (D) Increasing the applied voltage increases the strength of the electric field. (E) When S_1 is opened the charge remains on the capacitor; energy is stored in the electric field.

will flow. The circuit has reached a steady or static state and the capacitor is said to be *fully charged.*

Examining this static state we find that in a charged capacitor no current flows even though S_1 is closed. We find further that one plate has an excess of electrons and is thus charged negatively and that the other plate has a shortage of electrons and so is charged positively. Also, the orbiting electrons in the dielectric atoms are in a distorted eliptical orbit.

Because of the difference of potential across the capacitor an electrostatic field exists between the two plates and while it is not visible, it is generally presented in drawings as shown in Fig. 4.26(C). If we were able to increase the battery voltage, the result would be more electron flow into the lower plate, and an equal number of electrons leaving the upper plate. The increased voltage will produce a stronger electrostatic field as shown in Fig. 4.26(D).

When the battery is disconnected from the capacitor by opening switch S_1 (Fig. 4.26E), the capacitor *retains its charge.* The excess electrons remain on the negatively charged plate and the positively charged plate is still missing electrons. The energy supplied by the voltage source, B_1, is stored in the capacitor in the form of an electrostatic field.

Capacitor Discharging Action—A capacitor, in theory, could hold its charge forever. In practice, however, some capacitors may hold a charge for as long as a week and some for as little as a few minutes. The determining factor is the quality of the dielectric. Electrons gradually *leak* through the dielectric since none of them are perfect insulators. This effect is called *leakage.* In normal applications we do not charge a capacitor and wait for its charge to leak off; we discharge the capacitor through an external circuit. In Fig. 4.27(A) we show a capacitor that has been charged from a voltage source. When, as in Fig. 4.27(B), an external circuit is placed across the capacitor, all the electrons stored on the negative plate will flow through the external circuit and return to the positive plate. When all the excess electrons have returned to the positive plate and no difference of potential exists, the capacitor is said to have been *discharged.* When discharged, there are no missing or excess electrons on either plate.

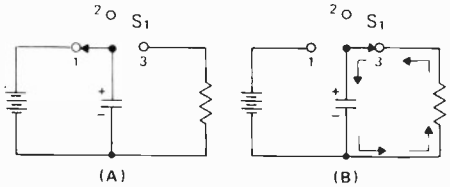


Fig. 4.27(A)—With S_1 in position #1, the capacitor charges. (B) Switching S_1, to position #3 causes the capacitor to discharge through the resistor.

Capacitive Units—Capacitance is measured in *Farads,* a unit named after Michael Faraday who experimented with electrostatics and magnetism in the early and mid 1800's. A capacitor has a capacitance of one farad (abbreviated 1f) when a change of one volt in one second causes a current of 1 ampere to flow into the capacitor. Stated another way, a capacitance of 1 farad exists if a change of 1 volt per second causes a charge of 6,000,000,000,000,000,000 electrons (6×10^{18} electrons or one coulomb). The farad is far too large a unit for electronics work and so *one millionth* of a farad, the microfarad, is used. The microfarad is abbreviated as $_{\mu}$f. Often, the microfarad is still too large a unit and so one millionth of a microfarad is used, the micromicrofarad, abbreviated as $_{\mu\mu}$f. The micromicrofarad is often referred to as the picofarad and abbreviated as pf.

To convert farads to $_{\mu}$f it is necessary to divide by one million. This is done by moving the decimal point six places to the right. For example, to convert 0.0007 f to $_{\mu}$f proceed as follows:

$$0.000{,}700. = 700\ {}_{\mu}\text{f}$$

For 0.001 f we have

$$0.001{,}000. = 1000\ {}_{\mu}\text{f}$$

To convert $_{\mu}$f to $_{\mu\mu}$f, again, divide by one million by moving the decimal point 6 places to the right.

$$0.00025\ {}_{\mu}\text{f} = 250\ {}_{\mu\mu}\text{f}$$

$$0.0033\ {}_{\mu}\text{f} = 3300\ {}_{\mu\mu}\text{f}$$

To convert from $_{\mu\mu}$f to $_{\mu}$f it is necessary to move the decimal point 6 places to the left. For example:

$$365\ {}_{\mu\mu}\text{f} = .000{,}365. = 0.000365\ {}_{\mu}\text{f}$$

$$2{,}200\ {}_{\mu\mu}\text{f} = .002{,}200. = 0.0022\ {}_{\mu}\text{f}$$

Energy Storage—When a capacitor is charged from a voltage source, work is being done and this work is stored in the capacitor as electrical energy. When the capacitor is discharged the stored energy is returned to the circuit. The charge held by the capacitor is determined by the number of electrons stored in the negative plate. This, in turn, is determined by the charging voltage and the capacitor plate area (or the capacity). This can be expressed mathematically as

$$Q = CE$$

where Q = the charge in coulombs
C = the capacitance in farads
E = the charging voltage

If a 55 μf capacitor is placed across a 150 volt source, the charge, in coulombs, will be

$$Q = CE$$
$$= 0.000055 \times 150$$
$$= 0.00825 \text{ coulombs}$$

Transposing the formula it can be shown that

$$E = Q/C$$

and

$$C = Q/E$$

If a capacitor of 25 μf has a charge of 0.01 coulombs, the charging voltage is

$$E = Q/C$$
$$= .01/0.000025$$
$$= 400 \text{ volts}$$

Given a capacitor charge of 0.005 coulombs for a charging voltage of 20 volts the capacitance is

$$C = Q/E$$
$$= 0.005/20$$
$$= 0.00025 \text{ f} = 250 \ \mu\text{f}$$

Factors Determining Capacity

There are three factors that influence the ability of a capacitor to store electrons and thus its capacity. These are, plate area, the distance between the plates and the type of dielectric used.

Plate Area—If a pair of plates 1" × 1" are positioned so that they provide a capacitance of 5 $\mu\mu$f (Fig. 4.28A), doubling the plate area will double the capacitance to 10 $\mu\mu$f (Fig. 4.28B). Because of the doubled plate area the capacitor will be able to accept twice as many electrons for the same charging voltage. Thus, based on the formula C = Q/E, if we double Q and keep the charging voltage, E, constant, C will double. We can see then that the capacitance is directly proportional to the plate area.

In order to increase the plate area without increasing the physical size of the capacitor, many manufacturers in-

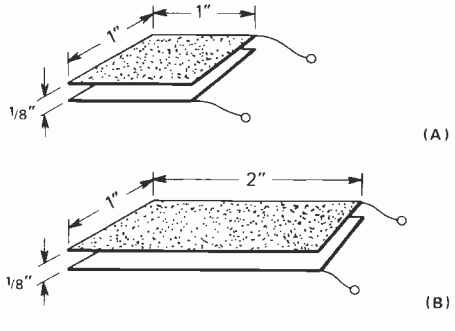


Fig. 4.28(A)—If a capacitor is formed with plates one square inch in size, doubling the plate area, (B) will double the capacity. (C) Another method to increase plate area that only increases the thickness of the capacitor.

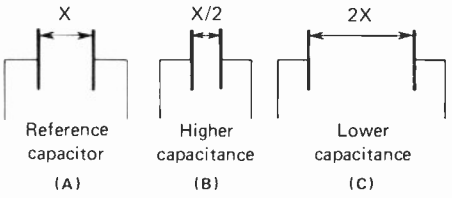


Fig. 4.29(A)—A capacitor with a spacing of X will produce a specific value of capacitance. Reducing the spacing (B) will increase capacitance while increasing the spacing (C) will decrease the capacitance.

terweave the plates as shown in Fig. 4.28(C). If each plate in the capacitor is 1" square and the spacing between the plates is the same as in (B) the two capacitors will have the same capacitance.

Spacing Between Plates—As the separation between the plates of a capacitor is *reduced* the capacitance *increases*. Conversely, as the separation *increases* the capacity *reduces*. This is illustrated in Fig. 4.29 and is known as an *inverse relationship*.

The reason for the increase in capacitance as the plates are brought closer together is that there is an increase in the strength of the electrostatic field for the same voltage. Because of the increased electrostatic field strength the charges on each plate are drawn to each other with greater strength. This results in concentrating the charges on the inner surfaces of the capacitor plates leaving more room for additional charges thus increasing Q. Again, if we increase Q with E held constant, we must increase C.

Dielectric Types—The material used for the dielectric in the capacitor has a major effect on the capacitive value. As shown earlier in Fig. 4.26, when the capacitor is charged, the valence electrons of the atoms in the dielectric form into an eliptical orbit. In some dielectric materials many of the valence electrons are so tightly bound that they resist and form only very small eliptical orbits and so do not produce a strong effect on the positive plate. In other materials, most or all of the valence electrons form an eliptical path and produce a very strong effect on the positive plate.

The ability of the valence electrons in the atoms of the material to form the eliptical orbit when in an electrostatic field is called the *dielectric constant*, and is indicated as *k*. The greater the eliptical orbit and the greater the molecular alignment in the dielectric material the higher the capacitance and the greater the constant, *k*.

The standard of comparison for k is the vacuum which has a dielectric constant of 1. Dry air has a constant of 1.00059 and is also considered to be 1. Table I lists the dielectric constants of some of the more common materials. Note that some materials show a range rather than a single value of k. This is

due to variations in quality, sources and temperatures of the material.

Material	Constant (k)
Air	1
Ceramic (Low k)	5-500
Ceramic (High k)	500-8000
Glass	5-10
Mica	2.5-10
Oil	2.2-4.7
Paper	2-3.5
Polyetheline	2.25
Teflon	2.1

Table I–Dielectric Constants

The effect of the dielectric constant on the capacity should be very apparent from Fig. 4.30. The capacitor with an air dielectric, shown in (A), has a capacitance of 10 $\mu\mu$f. Maintaining the same spacing and plate area but inserting a Teflon dielectric with a k of 2.1, results in an increase of capacitance to 21 $\mu\mu$f. The capacitance was increased by a factor of k, 2.1 in this case. If a ceramic dielectric with a k of 50 were used the capacitance would have increased to 500 $\mu\mu$f.

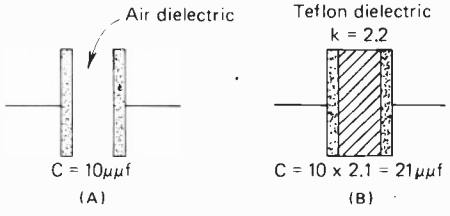


Fig. 4.30—Adding a dielectric to a capacitor increases the capacity by the factor of the dielectric constant.

It has been shown that the capacitance is related to plate area, spacing and dielectric constant. The mathematical relationship is

$$C = \frac{0.2245\ A\ k}{d}$$

where C = capacitance in $\mu\mu$f
A = area of a single plate in square inches
d = separation between plates in inches
k = dielectric constant

Examination of the above formula shows that as the plate area, A, or dielectric constant, k, increase, C increases, a direct relationship. As the plate separation, d, increases the capacitance decreases, an inverse relationship.

Capacitor Voltage Ratings

While the dielectric constant of the capacitor insulating material is most important, there is a second critical factor to consider, the dielectric *voltage rating*. Although the dielectric is an insulator, a very high voltage across the capacitor plates could tear electrons from the valence ring of the atoms in the dielectric. When this happens the dielectric *breaks down* and conducts, destroying the capacitor by forming a *short circuit* between the two plates. Because this can happen, it is necessary to pay strict attention to the strength or voltage rating of the dielectric. Some voltage ratings of typical dielectric materials are listed in Table II.

Material	Breakdown Voltage KV/millimeter
Air	3
Glass	20-60
Mica	50-250
Oil	15
Paper	35
Rubber	16
Plastic	16

Table II–Dielectric breakdown ratings.

When selecting a capacitor for use in a circuit the technician must specify the desired capacitance value *and* the necessary voltage rating. This voltage rating is the highest voltage that may be applied across the capacitor without breaking down the dielectric and is called the *working voltage, WV*. In order to increase the working voltage of a capacitor, the manufacturer must increase the thickness of the dielectric. The increased thickness increases the plate spacing, d, and results in reduced capacity. To raise the capacity back to the desired value the manufacturer must increase the plate area. Both of these increases, thickness and plate area, result in an increase in the physical size of the capacitor. Two capacitors with the same capacitance but different voltage ratings will be different in size.

Capacitors in Parallel

When capacitors are placed in parallel two factors are affected, capacitance and the voltage rating.

Capacitance–Capacitors are often connected in parallel to provide a specific desired value of capacitance. Two capacitors are shown connected in parallel in Fig. 4.31(A). In effect both positive plates are tied together as are

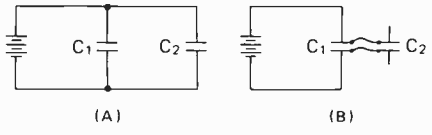


Fig. 4.31(A)—Two capacitors wired in parallel are the same as connecting the plates directly together as in (B) and produces larger plate area. The total capacitance is the sum of the two individual capacitances.

both negative plates. The equivalent of this arrangement is shown in Fig. 4.31(B) and (C). The effect of connecting capacitors in parallel is to increase the plate area and thus increase capacitance. The total capacitance can be shown as

$$C_T = C_1 + C_2 + C_3 \textit{ etc.}$$

Connecting a 22 μf and 50 μf capacitor in parallel produces 72 μf.

Voltage Ratings in Parallel—When capacitors are connected in parallel the voltage that appears across each capacitor is equal to the source voltage. Each capacitor in the parallel group must have a voltage rating at least as high as the source voltage. Fig. 4.32 shows three capacitors in parallel, 5 μf, 8 μf and 20 μf for a total of 33 μf. The highest voltage that can be applied to the network is 15 volts, limited by C_1. While C_2 and C_3 can withstand 25 volts, C_1 would break down after 15 volts is reached and short out the entire combination.

To summarize, in a parallel capacitor network the capacitance is additive and the voltage rating is that of the lowest voltage rating in the group.

Capacitors in Series

Capacitance—When capacitors are wired in series the total capacitance is *less* than the lowest capacitance value in the series circuit. Placing capacitors in series effectively adds the spacing between the plates together and C varies inversely with d, thus lowering the capacitance. This is illustrated in Fig. 4.33(A).

To determine the total capacitance for capacitors in series we use the formula

$$C_T = \frac{1}{\frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3}} \text{ etc.}$$

or for two capacitors in series

$$C_T = \frac{C_1 C_2}{C_1 + C_2}$$

You will recognize the form as the same used for parallel resistances.

If two capacitors, 8 μf and a 22 μf, are placed in series the total capacitance is

$$C_T = \frac{C_1 C_2}{C_1 + C_2}$$
$$= \frac{8 \times 22}{8 + 22}$$
$$= 5.866 \ \mu f$$

Voltage Rating—The voltage ratings of capacitors in series are additive. If two capacitors, each rated at 20 μf, 400 volts are connected in series the total rating would be 10 μf at 800

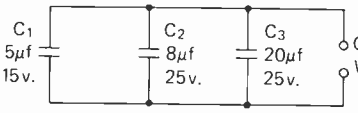


Fig. 4.32—When capacitors are placed in parallel the voltage rating of the network is equal to the lowest voltage rating in the group.

volts because we have, in effect, doubled the dielectric thickness.

A problem could exist when two capacitors with different capacities and different voltage ratings are placed in series. Consider a series circuit consisting of a 5 μf and a 20 μf capacitors both rated at 25 volts (Fig. 4.34). The total capacitance works out to 4 μf as shown. With each capacitor rated for 25 volts, the 50 volt source would not appear to be excessive. Actually, the 50 volts will not be shared equally between the two capacitors. The 5 μf capacitor will drop most of the voltage. As shown in Fig. 4.34, Q_T, the charge for the entire circuit is 0.0002 coulombs. Once Q_T is known, we know the charging current for both capacitors. They are the same since it is a series circuit.

Knowing Q, the voltage across each capacitor can be determined from E = Q/C. Note that in Fig. 4.34 C_1 has a 40 volt drop across it while C_2 only has a 10 volt drop. Capacitor C_1 rated at 5 μf, 25 volts would break down very quickly with 40 volts across it.

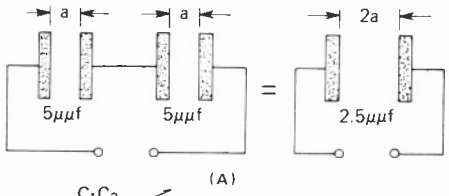
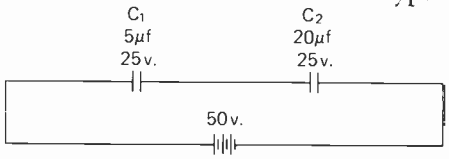


Fig. 4.33(A)—Capacitors placed in series effectively increases the plate separations thus lowering the total capacitance. (B) Formula for calculating the equivalent capacitance of a series circuit.

Capacitor Types

Capacitors are manufactured in a great variety of types and shapes. They can be divided into two basic types, fixed and variable. Each of these types



$$C_T = \frac{C_1 C_2}{C_1 + C_2} = \frac{5 \times 20}{5 + 20} = \frac{100}{25} = 4\mu f$$

$$Q_T = C_T E = 0.000004 \times 50 = 0.0002 \text{ coulombs}$$

$$E_{C1} = \frac{Q_T}{C_1} = \frac{0.0002}{0.000005} = 40v.$$

$$E_{C2} = \frac{Q_T}{C_2} = \frac{0.0002}{0.00002} = 10v.$$

Fig. 4.34—Method of calculating the distribution of voltage in a series capacitive circuit.

Experiment #17 Capacitance

Materials:
Chassis constructed in Experiment #16
1–VOM, Radio Shack #22-202A
1–9V Battery connector, Radio Shack #270-325
1–9V Battery
4–Fahnestock Clips, Radio Shack #271-1715
Assorted Hardware and hook up wire
1–0.01 μf capacitor, 250V, Radio Shack #272-1051
1–0.1 μf capacitor, 250V Radio Shack #272-1053
2–10 μf capacitors, 35V, Radio Shack #272-1013
1–1000 μf capacitor, 50V, Radio Shack #272-1047

Part I—Capacitor Action

1–To observe capacitor charging action set up the circuit shown in Fig. 1(A) and (B) using a 10 μf capacitor. Be sure to observe the polarity of the capacitor as shown.

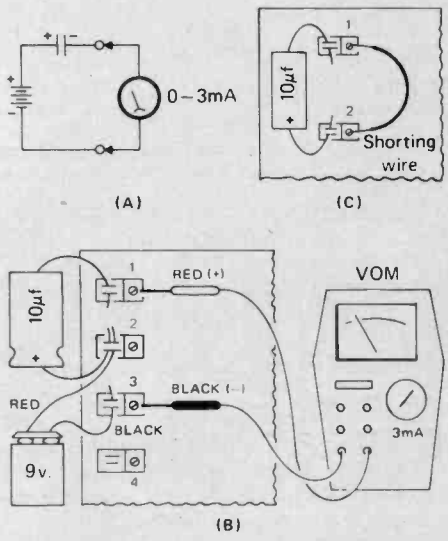


Fig. 1(A)–Circuit to test capacitor charging action. (B) Pictorial of test set up. (C) Jumper used to short circuit the capacitor.

2–Set up the VOM for the 3 mA range, connect the probes as shown in Fig. 1(B) and watch the meter. It will swing to slightly more than ⅓ scale and drop down rapidly as the capacitor charges.

3–Remove the positive test probe from clip #1 and reapply it. Note that there is no charging current because the capacitor still has a full charge.

4–Discharge the capacitor by shorting its terminals with a jumper wire as shown in Fig. 1(C) and recharge the capacitor by applying the positive meter probe to clip #1. Note that the capacitor recharges.

5–Connect the VOM (set on the 3 mA range) across the charged capacitor, clips 1 and 2 and observe the discharge action through the meter.

6–Replace the 10 μf capacitor with a 0.1 μf unit. This capacitor is a paper type and so has no polarity.

7–Measure the charging current using the same procedure used for the 10 μf. Note that it is necessary to lower the meter range to 60 μA to get a reading. There is a reduced charging current because of the smaller plate area.

8–Repeat the above procedure using the 0.01 μf capacitor. Note that the charging current is further reduced.

Part II—Electrolytic Capacitor Polarity

In Part I we observed how the 10 μf electrolytic capacitor charged when connected into a circuit properly. What is its behavior when the voltage applied to it has the wrong polarity?

1–Reconnect the 10 μf circuit as shown in Fig. 1(B) *except, reverse the polarity*. Connect the positive terminal to clip #1 and the negative to clip #2.

2–Set the VOM to the 30 mA range and connect it into the circuit as shown in Fig. 1(B). Observe how the current flow gradually rises and *continues to rise*. Disconnect the VOM before the current flow reaches 30 mA to prevent damage to the meter movement.

What is happening? The oxide is starting to deform and as the capacitor gradually loses the dielectric (the oxide) the leakage current starts to climb.

When using electrolytic capacitor you *must observe the polarity* or the capacitor will short circuit.

Part III—Capacitive Reactance

We can observe the reactance (opposition) offered by the various capacitors to the 60 Hertz current flow from the 12 volt secondary of the step down transformer on the chassis assembled in Experiment #16.

1–Wire the circuit shown in Fig. 2(A) using the layout of Fig. 2(B). It is not necessary to observe the polarity of the voltage applied to the capacitor as the AC constantly changes polarity. The 100K resistor will limit the current flow to a safe value.

2–Set the VOM to the 60 VAC range. Measure the voltage across the full secondary of the transformer and enter the reading in Chart I.

3–Measure the voltage across the 100K resistor and enter the reading in the appropriate column in Chart I.

Note the difference between the two readings. The

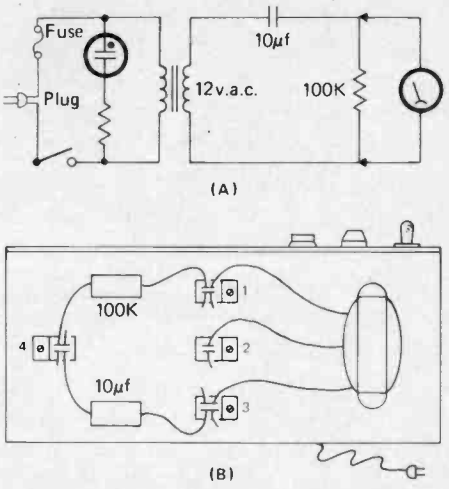


Fig. 2(A)—Circuit used to observe the effect of the reactance of a capacitor. (B) Pictorial set up of the circuit of (A).

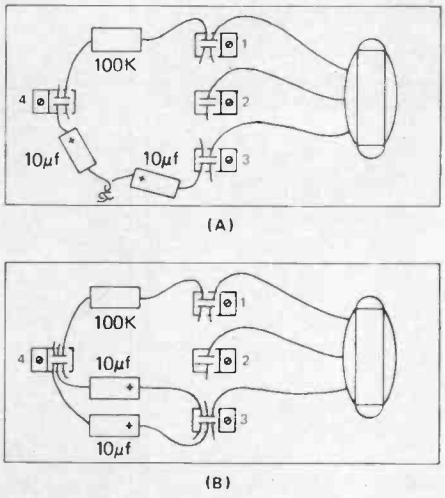


Fig. 3(A)—Set up for series capacitors. (B) Set up for parallel capacitors.

voltage drop has occurred across the capacitor due to its reactance.

4–Replace the 10 μf capacitor with the 0.1 μf capacitor and measure the two voltages again. Enter their values in Chart I on the appropriate line.

5–Repeat the procedure with the 0.01 μf capacitor.

What difference do you notice in the voltage readings? The voltage across the 100K is much less with the 0.01 and the 0.1 μf capacitors because they have a much higher reactance, X_C.

Part IV—Capacitors in Series and Parallel

As stated in the text when capacitors are placed in series the total capacitance is reduced. This also means that the total reactance is increased. With this in mind, if we substituted two 10 μf units in series for the single 10 μf in Fig. 3, we *should* reduce the voltage across the 100K resistance. Let's try it.

1–Place two capacitors in series as shown in Fig. 3(A). Observe the polarity shown.

2–Measure the output voltage across the 100K resistor and enter the reading in Chart II.

3–Rewire the circuit as shown in Fig. 3(B) so that both capacitors are in parallel (20 μf). Measure and enter the output voltage, across the 100K, in Chart II.

4–Remove one of the 10 μf capacitors from the parallel group. Measure the new output voltage across the 100K resistor and enter this reading in Chart II.

Capacitor	E_{sec} AC	E_{100K} AC
10 μf		
0.1 μf		
0.01 μf		

Chart I

From the readings in Chart II, how is capacitive reactance related to capacitance value?

Part V—Testing Capacitors

Since the dielectric of a capacitor is always under a strain it frequently breaks down causing either leakage or a short. When this happens the equipment malfunctions. A few simple tests will indicate the condition of a capacitor.

Ohmmeter Tests

1–Set the ohmmeter portion of the VOM to its highest range, R×1000.

2–Connect the test leads across the leads of a 0.1 μf capacitor. Note the quick charging action indicated by a sharp but brief movement of the pointer towards zero ohms.

3–Repeat the same test with a 10 μf capacitor. Note the longer charging period.

4–Repeat the same test with the 1000 μf capacitor and note how long it takes for the charge to build up.

Testing Under Voltage

Sometimes capacitors show leakage or shorts only when subject to voltage. Testing with an ohmmeter only subjects a capacitor to the voltage of the internal battery, in this meter 1.5V. When this happens it is best to test the capacitor under operating circuit conditions. This technique will be described later under "Troubleshooting Methods."

Capacitors	C_T	E_{100K}
2-10 μf in series	5 μf	
1-10 μf	10 μf	
2-10 μf in parallel	20 μf	

Chart II

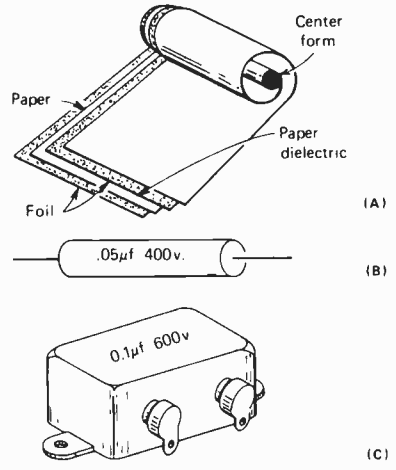


Fig. 4.35(A)—Method of forming a paper capacitor. (B) After the capacitor is rolled and leads attached it is dipped in a wax or plastic to insulate it. (C) A "bathtub" type capacitor.

can then be further divided. We will discuss fixed capacitors first.

Paper Capacitors—In order to provide large capacities without taking up too much space, the capacitor plates are made of two long strips of metal foil separated by a paper insulator. The paper insulator is often impregnated with wax, oil or plastic to increase its breakdown voltage rating as well as increase its dielectric constant. The sandwich (Fig. 4.35) of foil paper is then rolled tightly to reduce the size of the capacitor as much as possible. Connecting leads are added to each end, one connecting to each foil layer, and the entire package is wrapped with paper, metal or dipped in molten plastic or wax.

Tubular paper capacitors are available in values that range from as low as 0.0002 μf to 4 μf with voltage ratings as high as 10KV. Some standard voltage ratings, however, are 100V, 200V, 400V and 600V.

For more demanding applications some paper capacitors are placed in metal cans and hermetically sealed (air tight but no vacuum). These are known as *bathtub* capacitors (Fig. 4.35C).

Mica Capacitors—Mica dielectrics are used when higher voltage ratings are required. Mica provides a higher voltage rating than paper, for the same

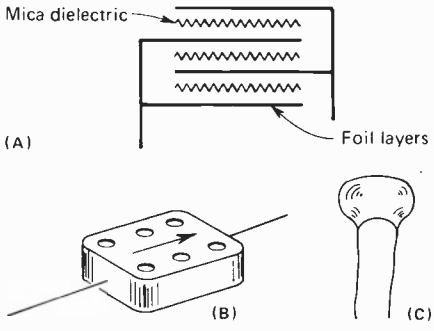


Fig. 4.36(A)—Construction of a mica capacitor. (B) Mica capacitor protected in plastic housing. (C) Dipped mica capacitor.

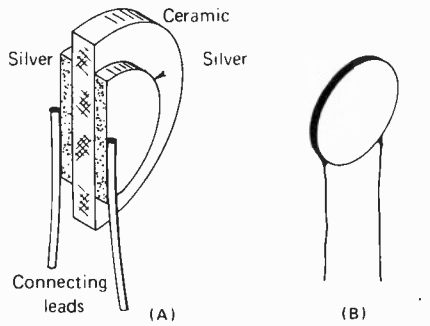


Fig. 4.37(A)—Cross section view of a disc ceramic capacitor. (B) Dipped and sealed ceramic capacitor.

thickness. This results in closer spacing and so a higher capacitance for a given plate size. The mica capacitor is made by using alternate sheets of mica and foil as shown in Fig. 4.36(A). The sandwich is then enclosed in a plastic case (B) or dipped in a molten plastic as in (C).

A better quality mica capacitor uses silver plating on each side of the mica; these types are called *silver micas.*

Ceramic Capacitors—The method of construction used for ceramic capacitors is to deposit a layer of silver or copper on both sides of a ceramic dielectric. The ceramic provides a dielectric constant between 500 to 800 depending on the type and grade of ceramic used. One popular form of ceramic capacitor is the disc shown in Fig. 4.37(A) and (B).

Another form of ceramic capacitor is the tubular shown in Fig. 4.38. A layer of silver is deposited on the inner surface of the ceramic tube. A second layer of silver is deposited on the outer surface and leads are then connected to each end. The capacitance is then a function of the length and diameter of the ceramic tube and the ceramic dielectric constant.

Electrolytic Capacitors—This type of capacitor is used when high values of capacitance are required and leakage current between the capacitor plates can be tolerated. The capacitance of an electrolytic can be as low as 3 μf up to 250 μf with 600 volt ratings. At lower voltage ratings it is possible to get capacitances as high as 5000 μf.

The electrolytic capacitor consists of an aluminum plate immersed in an electrolytic solution of ammonia, boric acid and water. The aluminum is the posi-

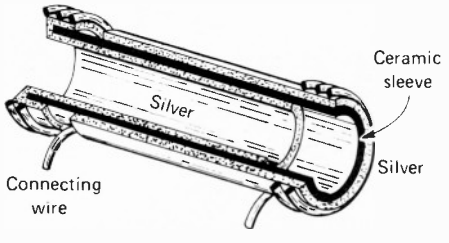


Fig. 4.38—Construction of a tubular ceramic capacitor shown in a cut-away view.

tive plate of the capacitor and the electrolytic solution, which can conduct current, acts as the negative plate. In order to make electrical connection to the solution, the entire assembly, positive plate and solution, is housed in an aluminum can (Fig. 4.39) and the can is the second connection, the negative terminal. The dielectric is an oxide film that forms on the surfaces of the positive plate when a voltage is applied and current flows through the capacitor. The thickness of the oxide film may be from 0.00001" to 0.000001". Because the dielectric is so thin it is possible to develop very high capacitances. In order to increase the plate area for still higher capacitances the positive plate is rolled or folded and in addition it may be etched for increased surface area.

Because the liquid electrolyte can cause problems (leakage, evaporation) most modern electrolytics use gauze (porous fabric) saturated with the electrolyte. The electrolyte is then placed between two electrodes as shown in Fig. 4.39(B). The positive aluminum plate develops the oxide coating while the negative aluminum plate acts as the connector to the electrolyte.

When electrolytic capacitors are connected into a circuit the aluminum plate (often called the *anode*) *must* be connected to the positive terminal of the voltage source and the metal can to the negative terminal of the voltage source. If the polarity of the voltage is applied to the capacitor is *reversed* the oxide will be stripped from the anode surface. With the dielectric gone the capacitor is short circuited and a high current will flow through the electrolyte. This high current heats the electrolyte, brings it to a boil, and then bursts the capacitor can.

The disadvantage of electrolytic capacitors other than the need to observe polarity, is that the electrolytic ages, dries up from the heat generated by the leakage current and causes a drop in

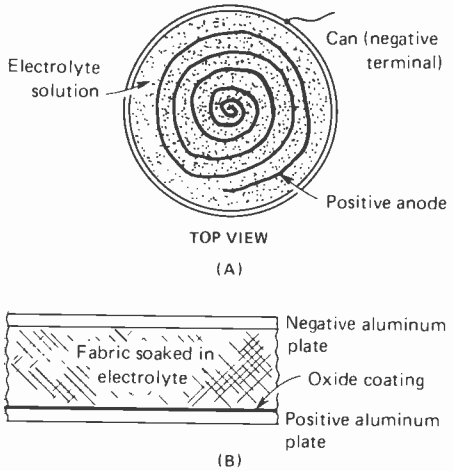


Fig. 4.39(A)—Cross-section view of a wet electrolytic capacitor. (B) Cross section view of a sector of a dry electrolytic capacitor.

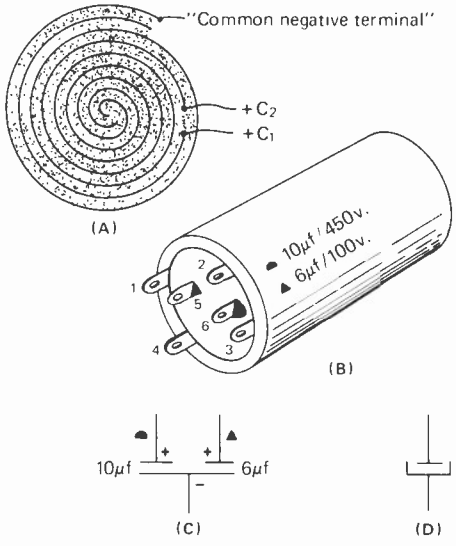


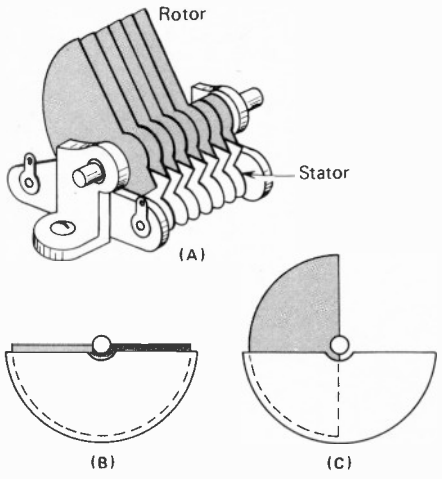
Fig. 4.40(A)—Cross section view of a dual capacitor dry electrolytic. (B) Typical aluminum can housing for the dual electrolytic capacitor. (C) Circuit symbol for the dual electrolytic capacitor housed in the can. (D) Symbol used to specifically indicate an electrolytic capacitor. The short line is the positive terminal.

capacitance value. Also, if the capacitor is not used for a long time the oxide coating deteriorates.

Since many circuits require more than one capacitor several are placed in one container. The assembly of a dual electrolytic, can type, is shown in Fig. 4.40(A). The external can structure is shown in (B) where the can itself is the negative terminal and connection can be made to the can by the four tabs on the bottom (1, 2, 3, 4). Connection is made to the positive anodes through the two center lugs 5 and 6. Since the two capacitors are different values the lugs have to be marked. The base cut outs next to the lugs are a diamond and half moon shape. Printed, etched or glued to the cases is a legend that identifies the capacitance and voltage rating available at each lug. The circuit symbol for the dual electrolytic is shown in Fig. 4.40(C).

A better type of electrolytic may be made using tantulum instead of aluminum, forming a tantulum pentoxide dielectric. The tantulum units do not dry out as readily and are physically smaller for equivalent capacitances but have lower voltage ratings and higher costs.

Variable Capacitors—Variable capacitors are used for circuits that require frequent changes in capacitance such as tuning circuits in radio receivers or transmitters. The type most often used is the air variable shown in Fig. 4.41(A). This capacitor consists of a group of fixed metal plates, connected in parallel and mounted on a frame but insulated from the frame so that there is no electrical connection. A second set of plates, the rotors, are set in a shaft which is mounted on the frame with the stators.



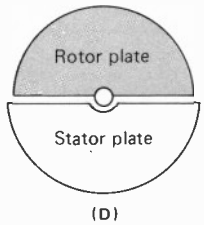


Fig. 4.41(A)—Construction of a variable capacitor. (B) Plates fully meshed provide maximum capacity. (C) Half meshed provide half capacity. (D) Fully unmeshed plates provides minimum capacity.

The rotor shaft is positioned so that the rotor plates interleave with the stators *but do not touch them*. The rotor shaft is made long enough so that a knob or dial mechanism can be attached.

Because the rotor shaft can be rotated it is possible to control the area of the rotor and stator plates that oppose each other and thus vary the capacitance. This is illustrated in Fig. 4.41(B), (C) and (D). In (B), when the plates are fully meshed, we develop maximum capacity. When the rotor shaft is repositioned as in (C), only half of the plate surface areas are opposing and whatever capacitance was developed in (B) is now *one-half*. Continuing the rotation, we have (D), the plates fully unmeshed, *minimum* capacitance. The capacitance never drops to zero as there is still an electric field developed between the ends of the plates. Variable capacitors of all type are rated by their *capacitance range*. A capacitor that develops a maximum of 100 $_{\mu}$f and a minimum capacitance of 10 $_{\mu\mu}$f is said to have a range of 10 to 100 $_{\mu\mu}$f. Very often the minimum is just understood to exist and it is referred to as a 100 $_{\mu\mu}$f variable.

Very often variable capacitors are used to tune several circuits at the same time and their shafts are coupled together mechanically. These are called *ganged* capacitors. The symbols for variable capacitors are shown in Fig. 4.42.

Adjustable Capacitors— This type of capacitor is used in circuits where a specific value of capacitance is required and is not available commercially, or it is not certain just what value will be

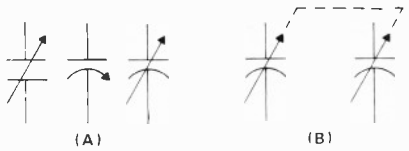


Fig. 4.42(A)—Three symbols used for variable capacitors. (B) Symbol for ganged variable capacitors.

required and has to be adjusted. The adjustable capacitor usually has a screwdriver slot for adjustment rather than a shaft on which a knob can be attached.

One type of adjustable capacitor is simply a miniature version of the full size air variable previously described. The capacitance is adjusted with a screwdriver rather than a knob.

Another type of adjustable is the *compression trimmer* shown in Fig. 4.43(A). The metal plates are made of a spring type material so they tend to spread apart. Each set of plates is separated by a sheet of mica and a screw passes through the entire combination as shown in (B). As the screw is tightened it compresses the plates, reducing the spacing and increasing the capacitance. Oversized holes are drilled in all the plates to prevent the screw from shorting the capacitor. This type of variable can produce ranges as low as 2-20 $_{\mu\mu}$f and by adding more plates a range of 360-1000 $_{\mu\mu}$f can be obtained.

A piston capacitor is shown in Fig. 4.43(C). As the metal slug is threaded closer to the silvered area on the plastic tube the capacitance is increased. One plate of the capacitor is the silver plating on the exterior of the plastic sleeve. The second plate is the metal slug on the inside of the plastic sleeve. Connection is made to this part through the threaded sleeve on the top. The plastic sleeve acts as the dielectric. This type of capacitor has a low range usually from 1 to 6 $_{\mu\mu}$f.

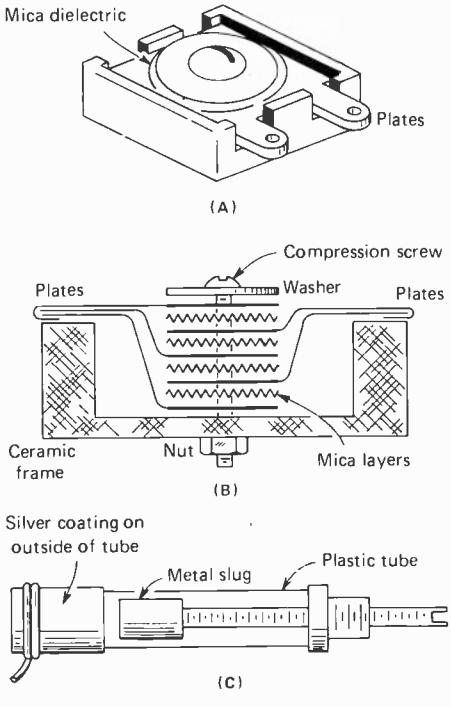
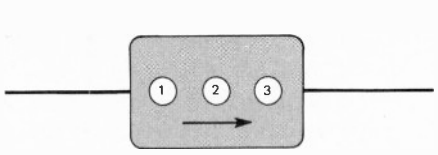


Fig. 4.43(A)—Appearance of a typical compression trimmer capacitor. (B) Construction of a compression trimmer capacitor. (C) Construction of a piston trimmer capacitor.



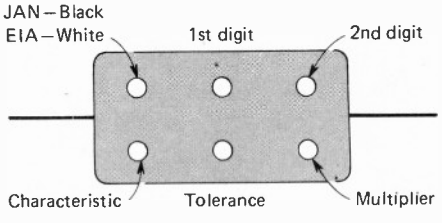
Color	Dots 1st digit	2nd digit	Multiplier
Black	0	0	x 1
Brown	1	1	x 10
Red	2	2	x 100
Orange	3	3	x 1000
Yellow	4	4	x 10,000
Green	5	5	x 100,000
Blue	6	6	x 1,000,000
Violet	7	7	x 10,000,000
Grey	8	8	x 100,000,000
White	9	9	x 1,000,000,000

Fig. 4.44—Three dot capacitor color code.

Capacitor Color Codes

While many capacitance values and voltage ratings are simply printed on the body of the capacitor, many others are indicated by color codes painted on the body. The colors used to represent the numerical values are the same as those used to identify resistance values.* Discussed below are the four often most used codes.

Three Dot System—The three dot color code system shown in Fig. 4.44 is one of the earliest codes and is still in use today. The three dots give the capacitance in $_{\mu\mu}$f and, while not indicated by the code, the capacitor is understood to have a voltage rating of 500V



Color	% tolerance Mica	Paper
Black		±20%
Brown		
Red	±2%	
Orange	±3%	±30%
Yellow		±40%
Green	±5%	±5%
Blue		
Violet		
Gray		
White		±10%
Gold	±5%	
Silver	±10%	
None	±20%	

Fig. 4.45—Six dot EIA and JAN color code. The first, second digit and the multiplier use the same color code as shown in Fig. 4.44.

*Part 6, Resistance and Ohm's Law, August, 1976, p. 62.

and a tolerance of ± 20%. The colors must be read in the direction of the arrow. If no arrow is shown on the body of the capacitor it should be held so any printing (manufacturer's name, etc.) can be read from left to right. Sometimes the dots are formed in the shape of arrowheads and they too must point to the right. A typical capacitor with the colors, Red, Black, Brown, would have a rating of:

2 - 0 - × 10 = 200 $\mu\mu$f ± 20% 500V.

Six Dot Color Code—The latest capacitor color code is used by both the *Electronics Industry Association* (EIA) and the *Joint Army And Navy* (JAN) group. If the first dot of the color code shown in Fig. 4.45 is white, the capacitor meets the EIA standards. A black dot in this position indicates that the capacitor meets the higher standards of JAN. The two digits and the multiplier are used to determine the capacitance in $\mu\mu$f using the standard color code values shown in Fig. 4.44. The tolerance is shown in the accompanying chart of Fig. 4.45.

The last color, the characteristics, is rarely used and indicates the temperature characteristics, the method of testing or some special feature of the capacitor. The manufacturer of the capacitor would have to be consulted to determine the precise meaning.

Paper Tubular Color Code—The color code shown in Fig. 4.46 is used for paper tubular capacitors. The first three bands indicate the capacitance in $\mu\mu$f. The fourth band indicates the tolerance. The last two bands represent the voltage rating of the capacitor and can be read by taking the values indicated by the colors and multiplying them by 100. For example, if the last two bands are colored Brown and Black, we have 10 × 100 = 1000V. For voltage ratings less than 1000V, the last band is omitted. Thus, if the fifth band is green and there is no sixth band the voltage rating is 500V.

Ceramic Capacitor Codes—The various methods used to color code ceramic capacitors are shown in Fig. 4.47. Axial lead type uses a four dot (or stripe) code based on the table and key shown. There are four points to note. These are:

1—If a four dot code is used it is dot A, Temperature Coefficient, that is omitted.

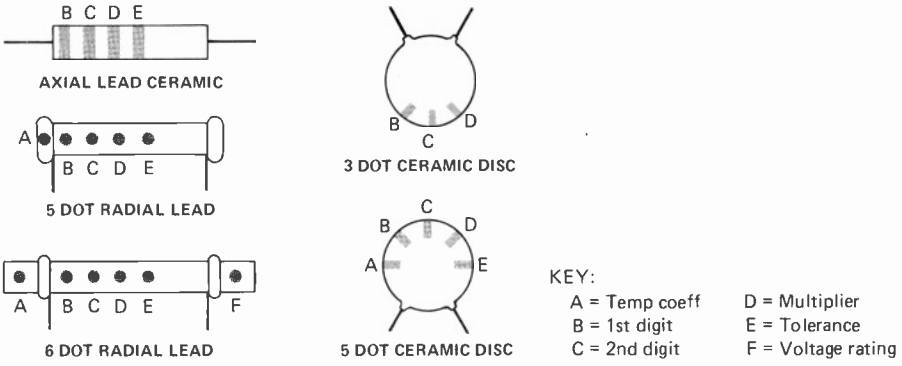
2—The voltage rating, not indicated in the code, is 500V.

3—There are two columns for the tolerance rating, one for capacitors above, 10 $\mu\mu$f and the other for capacitors 10 $\mu\mu$f and less. Note the different rating methods for each column.

4—Since ceramic capacitors are often used where heat generated by the circuit must be taken into account, the Temperature Coefficient is listed. This is a measure of how much and in which direction the capacitance will change with heat and it is rated in parts per million per degree centigrade (PPM/C°).

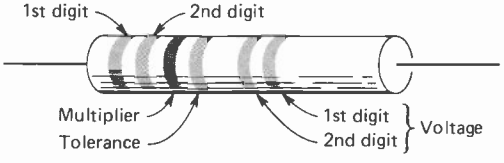
The radial lead capacitors shown have a five or six dot color code. Capacitors with the five dot color code are *all* manufactured with a 600 volt rating and so need not be marked. The second radial lead type with the six dot code can have one of three voltage ratings shown in the last column of the table.

For the disc ceramics the five dot code is read from left to right with the leads pointed down. The discs with the three dot code are read with the leads pointed *up*. Most disc ceramics, incidentally, have their value and voltage rating stamped on them.



Color	Capacitance 1st digit	2nd digit	Multiplier	Tolerance Above 10$\mu\mu$f	10$\mu\mu$f and less	Temperature coefficient PPM/C°	Voltage rating, volts
Black	0	0	1	±20%	±2$\mu\mu$f	0	
Brown	1	1	10	±1%		−30	150
Red	2	2	100	±2%		−80	
Orange	3	3	1000			−150	350
Yellow	4	4	10,000			−220	
Green	5	5		±5%	±0.5$\mu\mu$f	−330	500
Blue	6	6				−470	
Violet	7	7				−750	
Gray	8	8	0.01		±0.25$\mu\mu$f	+30	
White	9	9	0.1	±10%	±1.0$\mu\mu$f	+120 to −750 EIA	
Silver						+500 to −330 JAN	
Gold							

Fig. 4.47—Color code and key for the various ceramic capacitors.



Color	Capacitance 1st digit	2nd digit	Multiplier	% tolerance	Voltage rating 1st digit	2nd digit
Black	0	0	x 1	±20	0	0
Brown	1	1	x 10		1	1
Red	2	2	x 100		2	2
Orange	3	3	x 1000	±30	3	3
Yellow	4	4	x 10,000	±40	4	4
Green	5	5	x 100,000	±5	5	5
Blue	6	6	x 1,000,000		6	6
Violet	7	7	x 10,000,000		7	7
Gray	8	8	x 100,000,000		8	8
White	9	9	x 1,000,000,000		9	9

Fig. 4.46—Six band EIA color code for paper tubular capacitors.

Capacitor Blocking Action

Blocking DC—In the circuit shown in Fig. 4.48(A), when the switch is closed, the full battery voltage will appear across the load a current that is equal to E/R will flow. A plot of the current and voltage can be seen in (B). If we modify the circuit, as shown in (C), by adding the series capacitor, the circuit behavior changes greatly. When the switch, S_1, is closed electrons leave the negative terminal of the battery, flow through R_L and charge plate #1 of C_1 negative. Electrons are repelled from plate #2, charging it positive, and return to the positive terminal of the battery. The initial current flow is high, limited only by R_L, but as the charge on the capacitor grows, it opposes the battery voltage and gradually reduces the current flow. When E_C is equal to

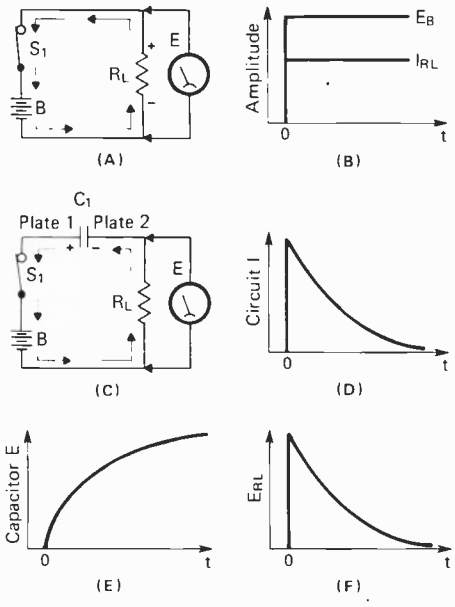


Fig. 4.48(A)—DC voltage is coupled directly to load through the switch and wires. (B) Plot of E and I VS. time. (C) Insertion of capacitor blocks DC from load. (D) Plot of circuit current shows no flow after capacitor charges. (E) Plot of capacitor charge VS. time. (E) Plot of output voltage versus time shows no voltage after capacitor charges.

E_B the current ceases to flow; we have a static state. A plot of the current flow in the circuit *versus* time would appear as in (D), rising to maximum at time zero and then gradually dropping to zero current. The charge on the capacitor is shown in (E) The amount of time it takes for the capacitor to charge fully and for the current to drop to zero depends upon the capacitance value of C and the resistance of R_L. The larger both their values, the longer it will take to reach a static state on charge or discharge.

Examination of the circuit of Fig. 4.48(C) shows all components in series. Thus, any current that flows through C_1 must also flow through R_L. Therefore, the instant the switch is closed and the current rises to maximum, all the voltage will appear across R_L and none across C_1. As the capacitor charges and the current drops the voltage across R_L drops until, when C_1 is fully charged, the current in the circuit drops to zero and E_{RL} is zero. A plot of the output voltage across R_L is shown in (F) where it can be seen to be an identical waveshape compared to (D), the circuit current. Except for the initial charging action, no current flows in the circuit and *there is no DC output across R_L because of the blocking action of the capacitor; it will not pass DC*. If, in this circuit, any DC voltage does appear across R_L it is due to leakage through the dielectric. This would indicate a defect in a mica or paper capacitor but could be normal for an electrolytic. Again, in a circuit of the type shown in Fig. 4.48(C) *the major function of the capacitor is to block the flow of DC*. To understand why this is important we must analyze the behavior of the circuit when AC is applied.

Passing AC—When, in Fig. 4.49(A), the switch is closed, the sine wave is applied to the circuit. As the input voltage rises from zero to the positive peak (B), the capacitor charges causing a current to flow through R_L. Before the capacitor is fully charged the first half of the cycle reaches its peak and drops back down to zero. This results in the charging current dropping down to zero and the waveform that appears across R_L is the positive half of the sine wave. Now, in (C), the input cycle reverses polarity; electrons leave the negative terminal of the generator and flow into the capacitor plate. Electrons leave the other capacitor plate, flow through R_L, produce the second half of the output cycle, and return to the positive terminal of the generator. As the next cycle appears at the input the sequence of events repeats itself. The result is that the AC input signal appears at the output load as if there were a wire in place of the capacitor even though *no electrons flow through the capacitor.* We may conclude from this that a *capacitor will pass AC but not DC*. This behavior can also be expressed as a *coupling action*, that is coupling of the AC from the input to the output has occurred. The capacitor is, therefore, called a *coupling capacitor.*

Coupling Pulsating DC Voltages—In Fig. 4.50(A) an AC voltage is placed in series with a DC voltage source. The resulting output, a pulsating DC voltage, is shown. When this type of signal is coupled through a capacitor as shown in (B), the DC portion of the signal is *blocked* by the capacitor action while

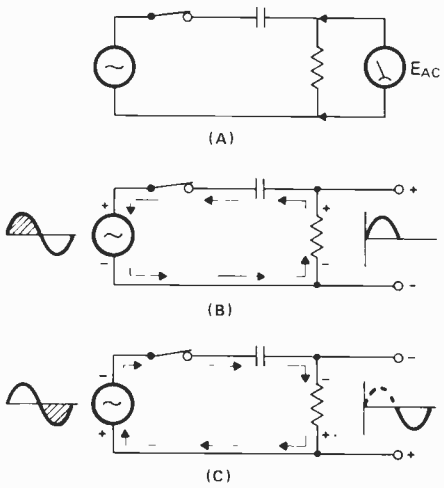


Fig.4.49(A)—Circuit used to couple AC to a load through a capacitor. (B) First half of the AC cycle charges the capacitor causing a current flow through the resistance. (C) The second half of the cycle causes the capacitor to charge to the opposite polarity and reverses the direction of the current flow in the circuit.

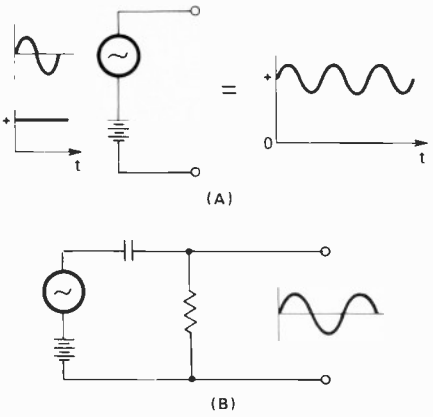


Fig. 4.50(A)—Placing an AC voltage and a DC voltage in series results in a pulsating DC voltage. (B) Coupling a pulsating DC through a capacitor permits only the AC to pass and appear as output across the resistance.

the AC signal is *passed* by the capacitor. This results in the AC signal appearing across R_L as the output, but without the DC portion of the input. This type of coupling circuit finds wide application in electronics and its operation should be well understood.

Capacitive Reactance

As a capacitor is charged it builds up a voltage that opposes the charging voltage. The greater the capacitance value the longer it takes for the charge to build up. The smaller the capacitance the quicker the charge will build up. Since the charge build up across the capacitor lowers the output voltage the smaller capacitor opposes the current flow in the circuit more than the larger capacitance and reduces the AC output voltage. The reaction of the capacitor is called *capacitive reactance* and abbreviated as X_C. Since X_C acts to limit or oppose the flow of alternating current its unit of measurement is the *ohm.*

As we vary the capacitance the reactance must vary. As the plate size increases (larger C) the capacitor will take longer to build up a counter charge and this results in a lower reactance. If we reduce the capacitance the countercharge will build up quickly and increase the reactance. Again, when capacitance is increased the reactance *decreases.* When the capacitance is decreased the reactance *increases.*

The reactance is also affected by the frequency applied to the capacitive circuit. As the frequency is lowered the time duration of a cycle *increases.* The

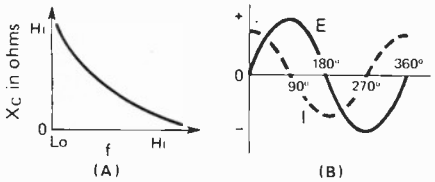


Fig. 4.51(A)—Plot of X_C versus frequency. (B) In a pure capacitive circuit the current leads the voltage on a capacitor by 90°.

capacitor thus has more time to build up a counter charge and so it reduces the current flow. This is an indication of increased X_C. Stated another way, as the frequency *decreases* the X_C of a capacitor *increases*. As the frequency *increases*, the X_C of a capacitor *decreases*. The relationship between X_C, frequency and capacitance is shown below.

$$X_C = \frac{1}{2\pi fc}$$

where X_C = capacitive reactance in ohms
f = frequency in Hz
C = capacitance in farads

The formula indicates that X_C is inversely related to frequency and capacitance. A plot of X_C versus frequency is shown in Fig. 4.51(A).

Capacitive Phase Shift

As shown earlier in Fig. 4.49, when a sine wave voltage is applied to a capacitive circuit, a sine wave current flows to produce a sine wave voltage output. When voltage is first applied to the circuit of Fig. 4.49 no voltage appears across the capacitor but a current flows. The voltage appears across the capacitor some time *after* the current flow; it is delayed. We can recall that in an AC waveform, time is measured in degrees, and so the delay would be indicated as a certain number of degrees. In a pure capacitive circuit, one with no resistance, the voltage will lag the current by 90° as shown in Fig. 4.51(B).

As resistance is added to the circuit the lag reduces. When X_C and the resistance are equal the current will lag the voltage by 45°. When *R is greater* than X_C the lag will be between 45° and 0°.

Self Check Questions

1—What is the difference between a condenser and a capacitor?

2—A capacitor opposes any change in voltage in a circuit and stores energy in its magnetic field. T or F.

3—A capacitor is formed from two conductors separated by an insulator. T or F.

4—When connected across a battery or any source of DC, a capacitor will charge up to slightly more than the source voltage. T or F.

5—Once a charged capacitor is removed from the source voltage it will lose its charge very quickly. T or F.

6—The basic unit of capacity is the _____, but it is found to be too large. Most frequently used units are the _____ and _____.

7—Convert the following capacitances to the unit indicated:
A) 50 $_\mu$f to farads
B) 0.047 $_\mu$f to pf
C) 25 pf to $_{\mu\mu}$f
D) 10,000 pf to $_\mu$f

8—The energy stored in a capacitor is measured in Q, coulombs. T or F.

9—The charge on a capacitor is a function of the capacitance and the applied voltage. T or F.

10—The smaller the capacitance the more rapid the charge and the higher the Q. T or F.

11—The capacity of a capacitor is directly proportional to the plate size and the space between the plates. T or F.

12—Capacitance is inversely proportional to the dielectric constant. T or F.

13—Two identical value capacitors are compared in physical size and one is much larger than the other. How can you account for this?

14—Two capacitors are connected in parallel. They are rated at 50 $_\mu$f/100V and 22 $_\mu$f/175V. What is the rating of the combination?

15—Two capacitors are connected in series one 20 $_\mu$f/450V and the other 45 $_\mu$f/450V. Calculate the rating of the combination.

16—Electrolytic capacitors are used when high values of capacitance are required. T or F.

17—The lower the working voltage the greater the capacitance value of an electrolytic can be. T or F.

18—Unlike papers and micas capacitors, electrolytics have a polarity that must be observed. T or F.

19—Reversal of the polarity of the applied voltage to an electrolytic capacitor is harmful because it thickens the dielectric layer. T or F.

20—Variable capacitors are used when

Suggested Reading

Schrader, R. L., Electronics Communications, Third Ed., New York: McGraw Hill, pp. 89 to 102.

Tepper, Marvin, Basic Radio, Second Ed., Vol. II, Rochelle Park, New Jersey: Hayden Book Co., pp. 2-61 to 2-84.

circuits require occasional adjustment of the capacitance. T or F.

21—A capacitor of the mica type has the following colors reading in the direction of the arrow: Red, Green, Brown. What is the capacity, tolerance and voltage rating?

22—A capacitor with the six dot color code has a black dot in the upper left position. What does this indicate?

23—A paper tubular capacitor is color coded so that the last three bands are Green, Red, Green. What is indicated?

24—When connected into a circuit a capacitor will block the flow of DC. T or F.

25—A capacitor when connected into a circuit will pass AC without any opposition if the frequency of the AC and the capacitance value have the proper relationship. T or F.

26—The opposition to the flow of DC through a capacitor is defined as reactance, X_C. T or F.

27—Reactance is measured in ohms per farad. T or F.

28—As frequency increases, the reactance of a capacitor decreases. T or F.

29—As capacitance decreases, with frequency constant, the reactance of a capacitor decreases. T or F.

30—In a pure capacitive circuit the current leads the voltage across a capacitor by 90°. T or F.

31—List five differences between the behavior of a capacitor as opposed to the behavior of an inductor.

Answer Key

1—None, both are the same component.
2—F. It stores energy in an electric field.
3—T.
4—F. The capacitor can charge to no more than the source voltage.
5—F. Some capacitors are capable of holding a charge for a considerable time.
6—Farad, microfarad and micromicrofarad. (f, μf, $\mu\mu$f).
7—A) 0.00005 f.
B) 47,000 pf.
C) 25 $\mu\mu$f; they are the same unit.
D) 0.01 μf.
8—T.
9—T.
10—F. A small value capacitor takes a small charge since Q=CE.
11—F. Directly proportional to plate size but inversely proportional to spacing and is defined as reactance.
27—F. Just ohms.
28—T.
29—F. X_C increases.
30—T.
31—A) Capacitor blocks DC, inductor does not.
B) Capacitor passes AC, inductor block AC.
C) Capacitive reactance is inversely related to frequency where inductive reactance is directly related to frequency.
D) Capacitors cause I to lead 90° and inductors cause I to lag 90°.
E) Capacitors store energy in their electric field while inductors store energy in their magnetic field.
12—F. Capacitance is directly proportional to the dielectric constant.
13—The larger of the two is likely to have a higher voltage rating.
14—72 μf/100V.
15—13.8 μf/900V.
16—T.
17—T.
18—T.
19—F. It depletes the layer.
20—F. They are used when circuits require constant adjustment such as receiver tuning circuits.
21—250 $\mu\mu$f, ± 20%, 500V.
22—JAN standard capacitor.
23—Tolerance of ± 5% and a voltage rating of 250V.
24—T.
25—T.
26—F. Opposition to the flow of AC

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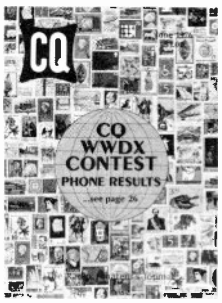

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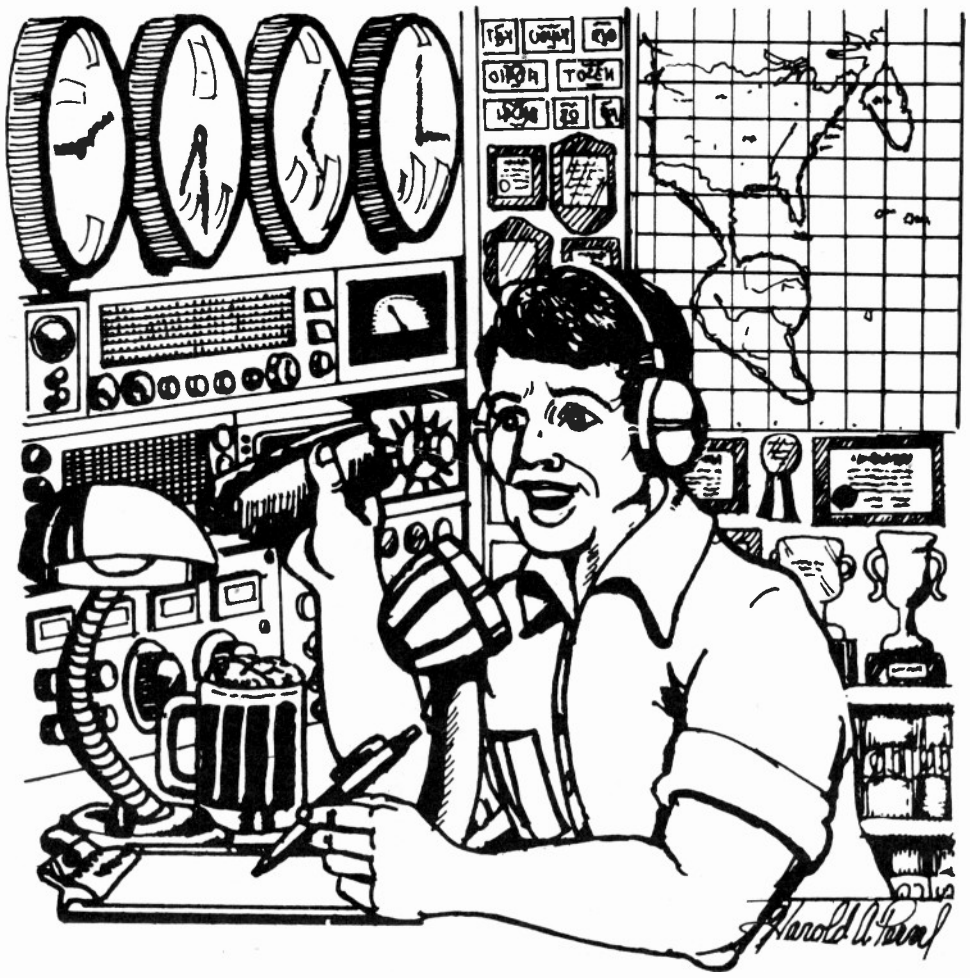

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WASHINGTON OUTLOOK

AMATEUR AND CITIZENS DIVISION RENAMED PERSONAL RADIO DIVISION

The FCC has changed the name of its Amateur and Citizens Division to the Personal Radio Division. The Division which is part of the Safety and Special Radio Services Bureau is responsible for policy, rule making and administration of the following radio services:

—The Personal Radio Services which include the
  General Mobile Radio Service
  Radio Control (R/C) Service
  Citizens Band (CB) Radio Service
—The Amateur Radio Service
—The Radio Amateur Civil Emergency Service (RACES)
—The Amateur—Satellite Service
—The Disaster Communications Service

The name of the Citizens Radio Service was changed to the Personal Radio Service; the Class A Citizens Radio Service was changed to the General Mobile Radio Service; the Class C Citizens Radio Service was changed to the Radio Control (RC) Service; and the Class D Citizens Radio Service was changed to the Citizens Band (CB) Radio Service. The Citizens Radio Service and subdesignation name changes became effective January 27.

FCC TO SEEK VIEWS ON PERSONAL RADIO FROM PUBLIC

The Commission's Personal Radio Planning Group (PRPG) has awarded a contract to the Advanced Research Resources Organization (ARRO), Silver Spring, Md., to ascertain the general public's need for personal radio services.

ARRO will be interviewing current and potential personal radio users in order to identify and establish the relative importance of such factors as desired usage, expected range, cost of equipment, and privacy.

In addition, ARRO will be developing a procedure for projecting demand for the various uses of personal radio, such as highway assistance, small or family business messages, pleasure or leisure communications, and other similar activities. The PRPG will use this information to evaluate new personal radio services and possible modifications to existing radio services, including the Citizens Radio Service.

With a knowledge of the public's radio communication needs and its willingness to invest in equipment, it is expected that the Commission will be in a better position to make a selection from the many new personal radio services that could be implemented.

POWER AND MODULATION REQUIREMENTS FOR 40 CHANNEL TRANSMITTERS

On July 29, 1976, the Commission released its Second Report and Order in Docket 20120, FCC 76-707, concerning the expansion of frequencies available in the Class D Citizens Band Radio Service. Since that time, there has been confusion over the allowable output power and modulation requirements. Rules and standards concerning these items have not changed with the advent of the permissibility of 40 channel operation. Transmitters in the CB service are still allowed up to 100 percent modulation and four watts of carrier power for double sideband or 12 watts peak envelope power for single-sideband operation. These values are the maximum permitted.

CB APPLICATION AND LICENSE STATISTICS, DECEMBER, 1976

Applications received during the month	452,883
Total licenses issued during the month	362,599
New licenses issued during the month	362,152
Licensed stations at the end of the month	7,668,457

CB OPERATOR FINED FOR ILLEGAL LINEAR AMPLIFIER

Dennis W. Sullivan of Birmingham,

Alabama on 30 December 1976 pled guilty to four counts of operating his CB radio station with an illegal overpower linear amplifier in U.S. Magistrate's Court, Northern District of Alabama, Birmingham, Alabama. Sullivan waived claim to possession of his illegal linear amplifier to the U.S. Government and was fined $100 by U.S. Magistrate Edwin L. Nelson.

The case was presented by Assistant U.S. Attorney Bill L. Barnett of the Birmingham, Alabama, U.S. Attorney's office following investigation by FCC Agents from the FCC Atlanta District Office and the Powder Springs, Georgia, Monitoring Station.

The investigation arose due to repeated complaints by one of Sullivan's neighbors who reported interference to television reception due to Sullivan's CB operation. Sullivan repeatedly assured the FCC Atlanta District Office over an approximate six month period that he was operating his CB station at his home with legal equipment and with legal transmitter power. (Maximum limit of transmitter power is 4.0 watts for AM transmitted and 12.0 watts peak envelope power for single sideband transmitters.) A search warrant was executed by U.S. Marshals accompanied by FCC Agents at Sullivan's residence on 23 September 1976 immediately after Sullivan's CB station was observed to be operating with illegal transmitter power. Forcible entry was required at Sullivan's residence at which time the U.S. Marshals and FCC Agents found Sullivan concealing an illegal linear amplifier. The amplifier and other CB equipment was seized. The measured output power of the amplifier was 100 watts.

FCC Regulations and the Communications Act of 1934, as amended, prohibit the installation and operation at a CB station of radio frequency devices that increase the transmitter power of a CB station beyond that authorized. Section 502 of the Communications Act provides a maximum fine of $500 per day for violations of an FCC Regulation.

NOTICES OF APPARENT MONETARY LIABILITY

The Commission issued Notices of Apparent Liability to Monetary Forfeiture on various dates to the following radio station licensees in the Citizens Radio Service for willful violation of various sections contained in Part 95 or a repeated violation of Section 1.89 of the Commission's Rules:

Oakland, Calif., Carl R. Ritzman, $100, KBN-6288.

Brandon, Fla., Moore Tappan, $50, KHY-7000.

(continued)

Inverness, Fla., John Z. McKenzie, $50, KIW-6689.
Jacksonville, Fla., Marvin N. Crick, $50, KJY-6468.
N. Panama City, Fla., Gerald T. Andrews, $50, KOV-8992.
Tampa, Fla., Frank L. Alfano, $50, KYK-1221.
Des Plaines, Ill., David A. Pomerantz, $50, KQN-7526.
Baton Rouge, La., Charles H. Krumholt, Sr., $50, KZA-7845.
Metairie, La., Donald G. Mutter, $100, KSW-2919.
New Orleans, La., George J. Fenasci, $100, KACI-6289.
Baltimore, Md., John J. Mueller, $50, KIQ-5248.
Aguadilla, Puerto Rico
Ruben C. Fernandez, $50, KRF-00603.
Nestor Cestero, $50, KAAL-9173.
Isabela, P.R., Rafael Machado, $50, KNE-4213.
Quebradillas, P.R., Victor L. Vives, $100, KAAA-6290.
Venus Gardens, Rio Piedras, P.R., Christian E. Rodriguez, $150, KWF-3944.
Brownsville, Texas
John R. Card, $100, KZX-5283.
Arturo Bodden, $50, KAB-78521.
Conroe, Tex., Harold J. Hebert, Jr., $100, KTD-7685.
Galveston, Tex., Thomas A. Newby, $50, KZA-7462.
Houston, Texas
Bob W. Bashaw, $50, KAAT-7234.
David G. Mihalov, $100, KXV-9422.
Norman W. Wilson, $50, KLG-5766.
San Benito, Tex., Jose N. Rubio, $50 KADO-4735.
Berkeley, Calif., James R. Foster, $50, KDI-7375.
Kenner, La., Joseph Winzy, $50, KMB-8585.
Metairie, La., Elliot I. Steinman, $50, KBS-7117.
Westwego, La., Leonard R. Abadie, Jr., $200, KEE-0375.
Dover, Del., Barry E. Resnick, $50, KABO-5811.
Pomfret, Md., Robert A. Mancer, $50, KYJ-5112.
Bayamon, P.R., Samuel Gonzalez Melendez, $50, KACR-2113.
Atlanta, Ga., Ulyses B. Elder, Jr., $50, KLX-2565.
Cockeysville, Md., Louis C. Madairy, $50, KTL-6282.
Savannah, Ga., National Gypsum Co., $50, KDT-3133.
Valley Center, Kansas
Ronald F. Nulph, $50, KML-5709.
Ronald K. Cole, $50, KZI-0897.
Wichita, Kansas
Henry B. Moriconi, $50, KDM-1495.
Wesley A. Torson, $100, KQR-0786.
Hollywood, Fla., Gary Kramer, $200, KPG-1348.

Miami, Fla., Randall G. Kessler, $150, KIQ-7054.
Guayama, P.R., Miguel A. Sosa Rodriguez, $50, KADD-4286.
Inglewood, Calif., Chickin Lickin 3, $100, KET-7786.
Arkansas City, Kan., Jimmie W. Denton, $100, KGS-7066.
Belleville, Kan., Cecil R. Hiatt, $50, KZG-5582.
Luverne, Minn., James J. Johannsen, $50, KFY-0760.
York, Neb., Mervin M. Kirkpatric, $50, KIR-2428.
Albuquerque, New Mexico
Leon J. Tate, $100, KHW-7355.
Edgar L. Friend, $100, KSL-6301.
Granite, Okla., Virgil F. Neece, $50, KSU-7651.
Lockney, Tex., Martha M. Davis, $50, KOQ-5745.
Lubbock, Tex., David A. Shadden, $100, KTS-7639.
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Garfield M. Wilson, $50, KBZ-0860.
Johnny Crump, $50, KXH-4659.
Jim Garrett, Jr., $50, KYN-8865.
Guy L. Williams, $50, KBT-5743.
Judge C. Crigler, $50, KHB-5336.
Freda M. Schrader, $50, KBV-7334.
Wilkie W. Berry, $50, KCF-2509.
Warren S. Yager, $50, KTA-8007.
Samuel L. Need, $50, KLL-5964.
Robert K. Kaneko, III, $50, KBS-5313.
You L. Wong, $50, KWA-6382.
Joseph E. Enslinger, $50, KXQ-2762.
James R. Haigh, $100, KYQ-3268.
Walter T. Chase, II, $100, KZB-1247.
Michael L. De Prospo, $100, KIJ-3511.
John P. Morgan, $100, KHZ-1138.
Douglas L. Mason, $100, KZM-9998.
Rex Armstrong, $100, KYH-7841.
Victor A. Ayers, $100, KZV-3073.
Allen Hopkins, $100, KOB-8036.
Harold C. Gorges, $100, KPI-1149.
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Paul A. Fiscus, Sr., $100, KCP-8442.
Knowles E. Pumphrey, $100, KNY-4715.
Leland R. Crabtree, $100, KCS-4371.
Rickey E. Hasty, $100, KEA-6972.
Tom J. Dennison, $100, KCT-3335.
David C. Day, $50, KNW-0665.
Thomas W. Debbrecht, $50, KJX-6472.
Pittsburg, Calif., Roy A. Beaty, $50, KLH-8504.
San Francisco, Calif., Alexander Rosa, $100, KQW-2162. *(continued)*

Pocomoke City, Md., Roy I. Crockett, Jr., $50, KIF-1358.

Broomall, Pa., Kenneth J. Salwitz, $50, KLB-5711.

Darby, Pa., Richard V. Souden, $50, KCH-4381.

Philadelphia, Pennsylvania
Morris Gold, $50, KWY-6224.
Helen M. Kustra, $50, KAAT-1559.
Frank Zimmerman, $100, KEB-1890.
Lou's Electronics TV Shop, $50, KZY-6486.

Ridley Park, Pa., Henry R. Amalitano, $50, KLW-1079.

Aguadila, P.R., Jose M. Sualez Sualez, $50, KACU-1686.

Fort Buchanan, P.R., David L. Rose, $100, KADP-6255.

Ponce, Puerto Rico
Julio C. Rodriguez, $50, KAFJ-0299.
Alberto Barriera Vazquez, $50, KABO-0731.

Tulsa, Oklahoma
Jim E. Burgess, $100, KTN-7013.
Lawrence V. Lawton, $100, KYZ-2293.

Dallas, Tex., Winston Dones, $150, KCV-2521.

Brownsville, Tex., Ventura R. Martinez, $50, KAFK-5679.

Ganado, Tex., Garry W. Kacer, $100, KYV-7383. For violation of Section 95.95(c) by failing to identify radio station by the assigned call sign and Section 95.83(b) by communicating, or attempting to communicate, with a unit of the same station or another station over a disance of more than 150 miles.

Normangee, Tex., Mary E. Gregory, $100, KKN-2859. For violation of Section 95.95(c) by failing to identify radio station by the assigned call sign and Section 95.83(b) by communicating, or attempting to communicate, with a unit of the same station or another station over a distance of more than 150 miles.

LICENSES REVOKED

Jasper, Tex., Paul L. Jones, KFK-6651. Ordered that the license be revoked for willful violation of various sections of Part 95 of the rules including Section 95.91(b) which limits communications between Citizens radio stations to a maximum of five consecutive minutes.

Victoria, Tex., Roger W. Worley, Sr., KZK-8858. Ordered that the license be revoked for willful violation of various sections of Part 95 of the rules including Section 95.83(a)(7) for the transmission of whistling, sound effects, or any material for amusement or entertainment purposes, or solely to attract attention.

Milwaukee, Wis., George C. Reik, KDQ-5007. Ordered that the license be

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revoked for willful violation of various sections of Part 95 of the rules including Section 95.91(b) which limits communications between Citizens radio stations to five consecutive minutes.

The Commission ordered that the following licenses be revoked for violation of Section 1.89 of the rules by failing to respond to official communications:

Anchorage, Alaska, Shianna L. Ham, KWG-6023.

Newark, Calif., Roger M. Nelson, KSM-9227.

Novato, Calif., Lester E. Denham, KWW-9240.

Rancho Cordova, Calif., Jerry L. Brown, KTE-1120.

Jacksonville, Fla., Kenneth M. Gray, KSR-0390.

Hyattsville, Md., David M. Anderson, KSU-2740.

Annapolis, Md., Coy M. Truelove, KDI-6032.

Rhonert Park, Calif., Richard L. Parks, KBI-5777.

Arlington, Va., Frank M. Fishburne, KFT-3462.

SHOW CAUSE NOTICES

The Commission ordered the following licensees to show cause why their licenses should not be revoked for violation of Section 1.89 of the rules by failing to respond to official communications:

Denver, Col., Howard M. Thomas, KNS-4829.

Bellingham, Mass., William J. Scanlon, Jr., KMA-9937.

Oakland, Calif., William B. Rivers, KSS-6331.

The Commission ordered the following licensees to show cause why their licenses should not be revoked for violation of Section 308(b) of the Communications Act of 1934 by failing to respond to official communications:

Saint Paul, Minn., Donald L. Freundl, KWS-8465.

Butler, Wis., Mark Lassanske, KJW-7592.

DISMISSED AND SET ASIDE

The Commission dismissed proceedings on orders to show cause for the following:

Sacramento, Calif., Kenneth K. Schutt, KFZ-0609.

San Leandro, Calif., Eugene J. Lopes, KGT-0840.

Redhook, N.Y., Lee A. Wasylchak, KFU-2963.

The Commission set aside orders to show cause and terminated the proceedings for the following:

Atlanta, Ga., Ralph K. Richards, KZA-2444.

CB Usage Tips From S9

(CUT OUT & PLACE AT OPERATING POSITION)

Preferred & Designated Channels
Channel 8 Agricultural operations
Channel 9 Emergencies only
Channel 13 Maritime
Channel 16 Single Sideband only
Channel 18 Single Sideband only
Channel 19 Trucks/Vehicles in transit*
Channels 36 thru 40 Single Sideband Only

*Note that in many areas there are also 1 or more additional channels designated and/or normally used for in-transit vehicles, most often Channels 10 and/or 12. This is especially true in metro areas and their suburbs where Interstate Highways are on 19 and secondary roads such as parkways are on alternate channels. It is not the practice for mobile units on such channels to request breaks. Base stations are requested to avoid using all area in-transit vehicle channels in order to permit their full, free, unobstructed and exclusive use by in-transit vehicles. "Channel Monitors" are neither required nor desired on in-transit channels and are requested to honor any in-transit channels which may have been so designated in local areas by the operators by means of their customary and general usage habits.

Those operators who feel the need to function in CB by establishing themselves as "Channel Monitors" should not expect to monitor or control distant stations which are being received at S-3 strength or lower. They should also be aware of the fact that even those local stations in their area may not wish to avail themselves of their services; all stations having free access to the channels may elect to bypass the monitor should they wish to do so. Those who attempt to pass themselves off as "Channel Monitors" as a ploy to hog the channel for their own purposes should expect to be ignored by most stations. Those monitors who are successful are those with a good signal and good ears, who earn the respect of other operators by keeping their own transmissions as brief as possible, by giving up their own rights to hold conversations while acting as monitor. ALL transmissions from the monitoring station should consist solely of acknowledging breakers who wish to use the channel, and NOTHING more. During busy periods monitors should deny requests for 10-36's and radio checks on their channel.

Those seeking 10-36's should be encouraged and instructed in the art of telling time by means of wristwatch, clock, or broadcast radio station. Those whose primary interest in CB is chucking carriers and/or playing music are requested to consider the pleasures and benefits to be derived from finger painting and shock therapy, respectively.

Stations using power mikes should be cautious that their audio levels are set to a level which will not cause voice distortion, over modulation, or splashover on adjacent channels.

Single Sideband stations generally operate on Channels 16, 18, 36, 37, 38, 39, and 40, although this may vary in specific areas. Stations using standard AM transmission are requested to avoid use of local Sideband channels, likewise Sidebanders are requested to confine their transmissions to those channels established locally for their use.

"SMATTER–OF–FACTS"
(continued from page 35)

For instance, in Chicago it would have been possible (in 1964) to hear local stations using callsigns from no less than 15 different FCC callsign numbering systems!

Eventually it was found to be impractical to attempt to issue callsigns to indicate the issue year and location of the licensees, so the same type callsigns were retained except that they no longer related to years or locations. But even those 3-letter/4-number callsigns became outdated, since there weren't enough of them to go around.

So in 1976 the FCC announced that it would henceforth issue callsigns consisting of 4-letters and 4 digits.

CBer's renewing or modifying their licenses now are able to retain their callsigns through the process, providing (of course) that they have a current type 4-letter/4-digit callsign. Those with old style callsigns will receive a new style callsign. In earlier times, CB'ers lost their old callsigns and received new ones every time they modified or renewed their licenses.

Despite all of this, the majority of CB'ers have been lax in using their FCC callsigns properly, seeming to prefer the use of handles or unit numbers for AM operation and sideband numbers for single sideband. FCC regulations do permit the use of such identification, however they specify that the FCC callsign must be given in addition to any other more personal identification method used.

FAMOUS CB MYTHS

You can improve your mobile operation by cutting the coaxial cable between the CB rig and the antenna to a certain specific length, usually stated as 8 feet, 9 feet, or 12 feet. (Nonsense!)

Running a power mike "wide open" will necessarily make you sound better than if it is adjusted at a lower setting. (Baloney!)

Running your CB rig with an SWR over 1.5:1 will damage the set. (Some people have an SWR of 3:1 and couldn't care less! Above 3:1 you can start wondering what's wrong and how to fix it.)

CB'ers are the cause of most of the interference to TV reception. (Actually, according to one FCC spokesman, 99% of TV interference complaints are the result of inadequate TV set design).

The new 40-channel sets run less power and modulation than the older 23-channel CB rigs. (FCC tech specks for output and modulation of 40-channel rigs are the same as they were for 23-channel rigs, 4 watts AM output, 100% modulation; 12 watts PEP for sideband.)

ON THE COUNTERS

(from page 58)

"SECURITY BUDDY"

Security Electronics introduced its new CB radio line designed specifically for the automotive aftermarket.

The "Security Buddy" line consists of a promotional 23-channel unit; a base station power unit; and a power retractable antenna. Security Electronics will also be introducing two 40-channel transceivers. The line has several special and unique features and was developed after extensive market research to determine consumer preferences in CB equipment.

The new CB line will be offered on an exclusive basis to distributors or jobbers in the top 100 U.S. automotive markets. Supported by national promotion, the "Security Buddy" CB line will be offered to distributors and jobbers with what Forde describes as "strong, saleswise cooperative advertising and promotion allowances" in a program which will be "one of the best" ever put behind an item in this price range for automotive aftermarket distribution. Mark number E19 on Reader Service Card.

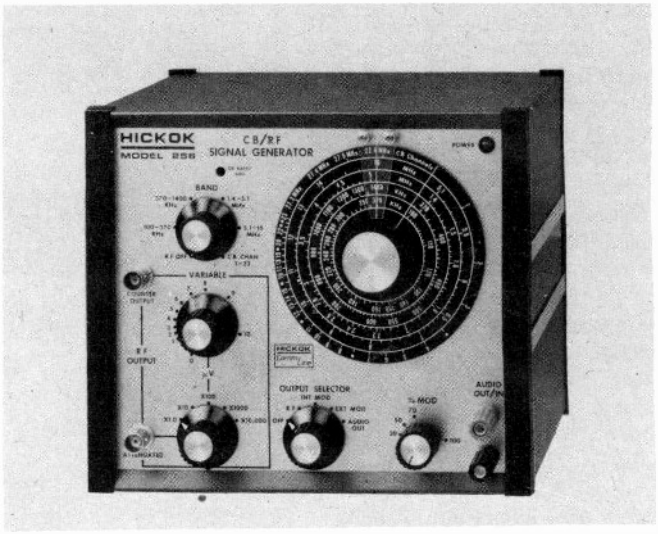
40 CHANNEL CB/RF GENERATOR

A RF Generator designed for 40-channel CB transceiver service is now available from the Hickok Electrical Instrument Company.

The RF Generator designated the Model 256 incorporates features of particular benefit to CB service technicians. Five-band frequency tuning covers channels 1 through 40 on an expanded tuning range for easy, precise channel selection. Frequencies of 100 kHz through 16 MHz are covered on the other four bands to provide all IF requirements including; 455 kHz, 10.7 MHz, and any other, current or future.

Precision frequency selection is accomplished by connecting the counter output jack to a frequency counter for continuous monitoring. By use of the counter output in conjunction with a frequency counter crystal-controlled accuracy is available without the usual high cost.

A calibrated/attenuated output control provides RF signal output of 100,000 uV down to less than 1 uV for



receiver sensitivity checks. The attenuated output is variable in 20 dB steps and by a 20 dB continuously-variable control calibrated in microvolts.

Internal modulation at a frequency of 1 kHz is variable from 0 to 100%, calibrated at 30%. Provision is also made for use of external modulation at frequencies from 20 Hz to 10 kHz through front-panel out/in jacks. When the Audio Output function is selected a 1 kHz audio signal is available at these same front-panel out/in jacks.

The Hickok Model 256 CB/RF Generator is available through Hickok distributors. Suggested retail price is $199.00.

For further information on the Hickok Model 256 CB/RF Generator or other Hickok CommLine equipment contact: Marketing Services Department, Hickok Electrical Instrument Company, 10514 Dupont Avenue, Cleveland, Ohio 44108, or mark number E20 on Reader Service Card.

SOX IT TO ME!

Citizens Band radio is sweeping the country and handles and code phrases are becoming a part of everyday language.

Now CB fans may wear some of their most popular sayings because *Interwoven* has come out with CB Socks.

These are tube socks in a variety of colors that have such CB phrases as "Hammer Down" and "Catch Ya On The Flip-Flop" printed in raised lettering along with drawings of the situations to which the phrases refer.

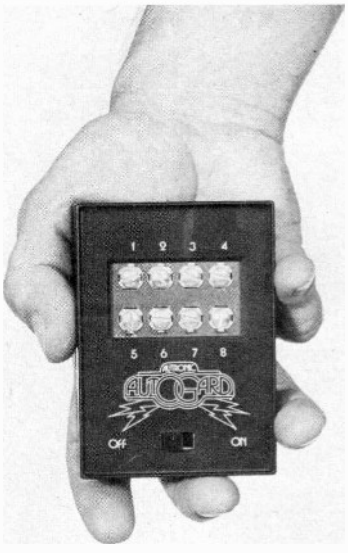
These one-size socks are cotton, polyester and stretch nylon and retail for $2.50 a pair.

Mark number E29 on Reader Service Card.

AUTRONIC AUTO GARD

A solid-state electronic auto alarm has been introduced by A. E. D. Industries, Phillipsburg, N.J. Called "Autronic Auto Gard", the alarm protects car owners against theft of valuable CB, tape decks, mobile phones, and other valuable items in the car . . . by blowing the horn if someone tampers with the car.

For Information About Our Advertisers . . .



Autronic Auto Gard features solid-state reliability . . . with six completely independent circuits. It provides full protection against theft or intrusion for up to six locations on an automobile—doors, hood, trunk, dash, etc. An external sensor for gas tanks—or for protecting such things as tool boxes in pick-up trucks—is included.

Compact in design (2⅞″ x 4″ x 1″), Autronic Auto Gard is well suited for all 12-Volt, negative ground cars . . . and for cars with compatible horn relay systems. Fully guaranteed, it is easy to install and comes with magnetic switch, connecting wire, wire connectors, mounting material, and step-by-step instructions.

For further information contact: A.E.D. Industries, Inc., 155 Howard Street, Phillipsburg, N.J. 08865 (201) 454-3333, or mark number E21 on Reader Service Card.

THE BOX

"The Box" is a padded enclosure which has plugs for external speakers, antennas and power supply coming from a vehicle cigarette lighter or battery pack. The portable configuration of the box utilizes a vehicle magnetic mount antenna or any right angle screw on antenna. It may be hung in a vehicle against the dash from special hooks that fit into the defroster slots. "The Box" is stabilized by another strap that attaches to "The Box" and hooks under the dash. "The Box" may also be placed on top of the dash, on the floor or the seat.

There are 2 sizes. The large box accommodating C.B.'s up to 10″ in depth 9″ in width 3″ in height. The small box accommodates 10″ in depth 7″ in width 3″ in height. "The Box" accepts radios with side or front mount mike cords.

"The Box" comes ready for installation with tooled leather combination hand and shoulder carrying strap, defroster hooks, cigarette lighter cord, stabilizer strap and mike holder making it possible to place the mike anywhere on "The Box" at a feather touch.

(continued)

Readers... We need your help!

In addition to S9, we also publish a trade magazine for CB dealers. It's very important to us to have this magazine reach every CB dealer in the country, no matter how large or small.

We'd like you to help us by filling in the names and addresses of every CB dealer that you know about. In return for your time and effort, we'll extend your subscription to S9 by one month for every new dealer name you send us that isn't already on our list.

If you're not a regular subscriber, or if the names you send us are already on the list, we'll still send you a gift in appreciation of your efforts.

The dealers names you send need not be exclusively CB stores. They can be department stores with CB departments, or any other type of store that retails CB equipment.

The accompanying card next to this message requires no postage. Be certain that you include your name and address fully so your gift will reach you properly.

Tnx and best 73's.

Dick Cowan

Dick Cowan
Publisher, CB Radio/S9

"The Box" has a unique lid that doubles as a pocket for excess antenna wire or carrying misc. items. Radios are mounted in "The Box" by special shock foam, giving the S.B. 360° ventilation and protecting it from road vibrations, hard knocks, etc. Installation requires a sharp knife and takes approximately 5 min. Accesories for "The Box" are a 12 Volt battery pack and antenna (magnetic) mount.

Contact Sunbird Co., Box 8451, Station C, Albuquerque, N.M. 87108, or mark number E22 on Reader Service Card.

NO ROB KNOB

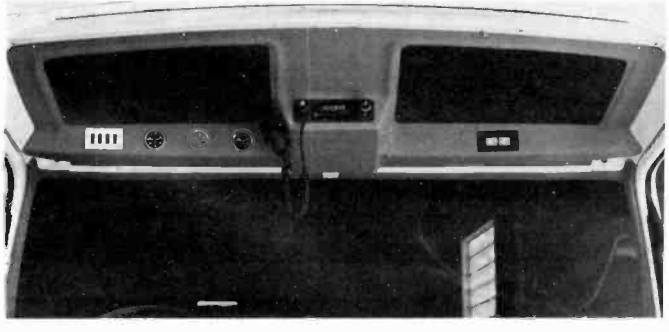
To theft proof your CB radio, New-Tronics introduces the No Rob Knob. Design is for instant installation, instant removal of your Hustler rain gutter mounted antenna for quick; out of sight storage. Retain the superior electrical performance and mechanical security of a permanently mounted antenna. No Rob Knob fits all Hustler rain gutter mounts and rain gutter mounted

antennas manufactured since 1962. Price: $1.95.

For additional information contact: New-Tronics Corporation, 15800 Commerce Park Drive, Brookpark, Ohio 44142, 216-267-3150, or mark number E23 on Reader Service Card.

CASSETTE TAPES AND BOOKS

A new series of children's "Know About" cassettes has been produced for retail sales by Soundex Distributing, Inc., Milwaukee, WI. The cassette tapes come packaged with a read along book for children to follow the story. Written and recorded for children and adults. Six tapes and books now available "Airports," "Shopping Centers," "Money," "Highways," "Skyscrapers" including one called "CB Radio". Cassettes and books are designed to help children learn about these subjects through both reading and hearing actual sounds. "Know About" cassette tapes and books are attractively packaged. From Soundex Distributing, Inc., 4307 W. Vliet Street, Milwaukee, WI 53208, or mark number E24 on Reader Service Card.



CONSOLINER

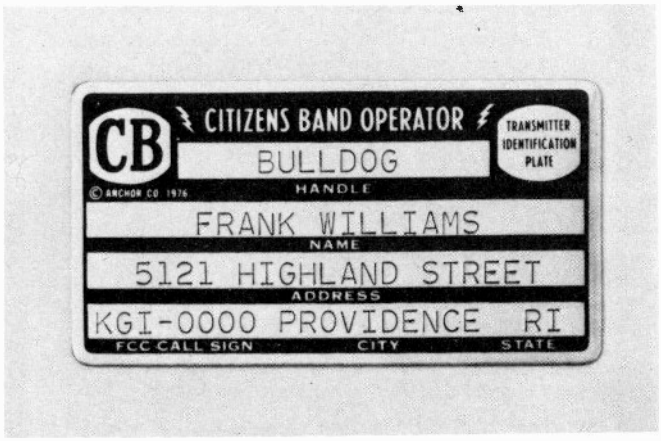
The Plastic Products Inc. "CONSOLINER" replaces the passenger portion of the factory headliner, and becomes a 'console' for installation of such items as "CB" Radios, Stereo Components, Gauges, Switches, Clocks, etc. Further, such installations afford increased security for accessories.

Construction is fiberglass reinforced plastic, white

in color, with contrasting smooth and textured surfaces. The "CONSOLINER" can be painted, trimmed with vinyl or carpeting—or combinations thereof.

Models are available for 1971-77 Dodge, Plymouth, Chevrolet and GMC Vans; 1969-77 Ford Vans; and 1973-77 Ford, Chevrolet and GMC Pick-ups.

For any additional information, please contact Donald R. Herpel at Plastic Products, Inc., 2800 John Daly Rd., Inkster MI 48141, or mark number E25 on Reader Service Card.



I.D. PLATE CAN ATTACH TO TRANSMITTER OR FIT IN WALLET!

Anchor Specialties has come out with a CITIZENS BAND IDENTIFICATION PLATE. It is a pocket size, 3¼" x 1¾" gold anodized aluminum plate that has the C.B. owners name, address, handle and FCC call sign permanently engraved into it.

A woodgrain pattern and a full adhesive back adds the finishing touch to this handsome plate. The permanent adhesive is provided so that the plate can be applied to transmitter if so desired.

Also included with each plate is a leather like vinyl, two pocket, carry case and a card to be filled in with necessary emergency medical information in case of an accident.

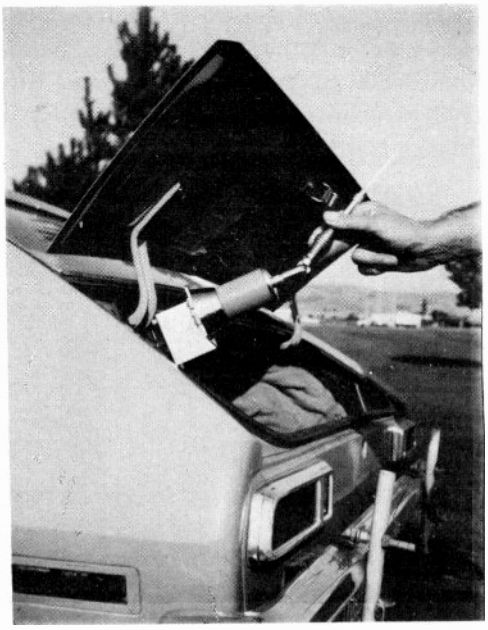
Contact ANCHOR SPECIALTIES CO., 1903 Mineral Spring Avenue, North Providence, R.I. 02904. or mark number E26 on Reader Service Card.

ANTI-THEFT MOBILE ANTENNA MOUNT

JODCO introduces the FLIPIT. This mount allows storage of antennas in the trunk of automobiles as a deterent to C. B., amature radio and mobile telephone theft. Even with a partially closed lid, without removal of the whip, base or FLIPIT mount this allows storage of the antenna in the trunk. FLIPIT rotates and swings into the trunk and with the lid closed leaves no sign of mounting hardware.

FLIPIT mounts to the car with a simple clamping device (no holes to drill) which will not damage the car finish and is either left or right side mounting, or even interchangeable between cars.

FLIPIT Model JD-1 has been engineered to fit General Motors and Ford automobiles and accepts lip or roof mount antennas. FLIPIT is quality built, exceptionally durable, made of heavy gauge steel, welded construction and plated for protection from the elements. FLIPIT does not affect SWR and provides an exceptionally rigid mounting for mobile antennas.



Further details are available from JODCO, Dept. M, 418 Pinefield Road, San Jose, Calif., 95134, or mark number E27 on Reader Service Card.

CB CARTOON PLAYING CARD DECK

The CB Playing Card Deck consists of 55 cards (52 cards plus 3 jokers), Citizens Band 10 code chart plus membership cards to enable CBers to form their own membership clubs. In addition, it is a regular deck of playing cards suitable for playing gin rummy, poker, bridge, etc.

The set has a suggested retail of $3/each.

Contact U.S. Games Systems Inc., 468 Park Avenue South, New York, N.Y. 10016, or mark number E28 on Reader Service Card.

Send SWL reports to:
Don Jensen
c/o CB Radio/S9 Magazine
14 Vanderventer Ave.
Port Washington, NY 11050

WHEN you mention Russian shortwave broadcasting, many SWLs think that Radio Moscow's nightly English language service is the whole story. It isn't, not by a long shot. The Soviets have a massive and elaborate broadcasting network operating a number of different services in dozens of different languages. To American SWLs, Radio Moscow's English programs are just the most obvious of these.

Just to clear the air, before I start, I should note for any Cold Warriors in the crowd that mentioning the shortwave services of the U.S.S.R., their schedules and frequencies is a completely non-political thing. And no one need feel in the least disloyal just because they tune in these programs. Now, in the 1970's, I suppose that sounds a bit out-of-date, but there are still some folks who think, mistakenly, that they will get into hot water with the FBI, the CIA or somebody if they write to Radio Moscow for a QSL card. That just isn't so, guys. Remember this SWLing thing is just for fun, okay?

The Radio Moscow most SWLs think of is the North American Service, which programs in English every night, especially to the eastern half of the U.S. and Canada between 2230 and 0400 GMT. A somewhat delayed version for the western states, known as the Pacific Coast Service is aired from 0330 and 0730 GMT.

The former North American Service itself is divided into two sections, one to East Coast areas, mostly on frequencies in the 41 and 49 meter bands from transmitters in European Russia. (A common misconception is that the Radio Moscow identification means the transmitter is located in Moscow. In fact, Radio Moscow, and all Soviet shortwave transmissions, utilize transmitters all across the Soviet Union.) The North American Service transmissions to western states and provinces are from transmitters located in the Soviet Far East and are aired these days on frequencies in the 31, 25 and 19 meter bands. Far Eastern sites, such as Vladivostok and Khabarovsk are also used for the later Pacific Coast Service in English, on frequencies from 49 to 31 meters.

Also directed to North America are the English programs of Radio Kiev (Ukraine) and Radio Vilnius (Lithuanian S.S.R.). However, as with Radio Moscow these broadcasts can and are aired by transmitters anywhere in the Soviet Union.

Radio Kiev's half hour English programs can be heard at 0030 and again at 0300 GMT on a number of frequencies in the 49, 41, 31, 25 and 19 meter bands. On Saturdays and Sundays, Radio Vilnius airs English broadcasts at 2300 and 0100 GMT in the same range of frequencies.

Radio Moscow has other programs directed to North America and elsewhere in the Russian language. These include the so-called "popular" Second Program, the "Mayak" service of news and popular music. The Mayak program is most easily identified, even though it is in Russian, by the ten-note interval signal, a fragment of a chime melody which Americans know as "Midnight in Moscow."

Radiostansya Atlantik is broadcast at 1300 GMT on many frequencies and is said to be primarily intended for Russian sailors and trawlermen. A general program for Russians abroad is Radiostansya Rodina. Atlantik features a 12-note interval chime signal. Rodina has an eight-note organ interval signal.

Also easily heard here are the programs of Radio Moscow's South American Service. These programs are presented in Spanish, Portuguese and the Indian languages of the areas, Quechua and Guarani. These are broadcast between 2200 and 0400 GMT in two networks.

English for other parts of the world? Certainly! There is Radio Peace and Progress, which is allegedly the voice of Russia's man in the street and is somewhat less restrained than Radio Moscow. Radio P&P is not beamed to North America, but you can hear the English service beamed to South East Asia at various times between 1030 and 1600 GMT.

Also airing English programs for Asia is Radio Tashkent in Soviet Asia. Its programs are heard at 1200

and 1400 GMT on 5,970, 6,025 and 9,540 kHz.

Radio Moscow has other English language services for various parts of the world. RM's programs to Australia and New Zealand are transmitted between 0800 and 1000; to Great Britain and Ireland at 1130, 1900, 2100 and 2200 GMT; to South Asia at 1000, 1100, 1500 and 1600 GMT.

These all have been external service programs, broadcasts intended for listeners outside the U.S.S.R., and there are many others in many other languages. But perhaps more of a challenge for DX listeners are the lower frequency home service transmissions for Soviet citizens. Among the home service transmissions heard in North America on occasion are the stations at Dushanbe, 4,635 kHz; Petrozavodsk on both 4,700 and 5,065 kHz; Vladivostok, 5,015 kHz; and Tbilisi on 5,040 kHz.

With so many Soviet broadcasting services on the air it is hard to keep tabs on them. One good way to do so is by subscribing to a special publication that features information about the Soviet Stations. The publication is called the U.S.S.R. High Frequency Broadcast Newsletter, edited by Roger Legge. A subscription for 12 issues is $3. The address to write is Box 232, McLean, VA 22101.

MEDIC-RADIO

If the thought of listening to a station transmitting in CW International Morse Code isn't a bit frightening, there is an interesting utility transmission you can log. Utility stations, as you'll recall are non-broadcasters and non-hams, that are involved in communications around the world.

This particular utility station is IRM, operated by the International Radio Medical Center in Rome, Italy.

It was back in 1935 that the late Dr. Guido Guida founded the International Radio Medical Center to serve sailors on the high seas around the world. Now, each year, the IRMC handles nearly 10,000 radio calls from ships at sea, seeking medical advice and help.

A ship in need of medical help radios a coded call, MEDRADCRIM, which takes priority over all other radio traffic except SOS. The ship's officer reports details and symptoms concerning a seaman's illness or injury. Physicians on duty at IRMC in Rome advise the skipper on medication or treatment. Since few merchant or fishing vessels carry doctors, this medical help by radio has proven invaluable during the past four decades.

Originally the International Radio Medical Center was used mostly by Italian vessels. But today it has been accepted by most maritime nations. The costs are underwritten by private and government sources around the world. Medical expertise is provided by teams of volunteer doctors.

The Morse station, IRM is most often heard while transmitting a repeated identification marker, consisting of the letter "V" (...-), sent in a series, followed by

the call letters, IRM (../.-/--). If your code speed isn't too fast, try recording the CW text on your reel-to-reel tape recorder at fast speed, then playing it back at slow speed. This should make the code easier to decipher. A couple of frequencies to try include 4,349, 6,384, 8,685 and 17,105 kHz.

WHAT'S NEW

CHANGE IN COMMAND—The Handicapped Aid Program (HAP) is a volunteer organization which offers a number of aids and services to handicapped persons. The volunteers in HAP work to acquaint these people, get started in the hobby of DXing and then assist them to discover the fun and enjoyment of listening. HAP Director Ted Polling of Mt. Sterling, IL, recently retired from actively heading this organization. He has turned over the reins to Wayne A. Davis, 27 Cleveland Ave., Trenton, NJ. If you're handicapped, or know someone who is, drop a line to Wayne and learn more about HAP.

PAIR HONORED—The American SWL Club (ASWLC) recently announced dual recipients of that club's annual August Balbi Award. Honored were Kenneth A. Earhart, Avonmore, PA, and Clayton T. Howard of HCJB, the Voice of the Andes, Quito, Ecuador. They were cited for their contributions to the club and to shortwave listening. The award is named for the late August Balbi who, until his death in 1976, was fondly known as the "Dean of DXing."

CLUB LIST—Thinking of joining a good DXer's Club? Then you need background information about what is available. ANARC, the Association of North American Radio Clubs, the umbrella organization of the major DX hobby clubs on this continent, has a free list of its affiliated member clubs. The list contains all the information you'll need to know about a club and how to become a member. The list is free, but please enclose a stamped, self-addressed envelope. Send your request to ANARC, c/o Dave Brown, Executive Secretary, 557 North Madison Avenue, Pasadena, CA 91101.

DIALING TARGETS

INDIA—An exotic target that seem to have an attraction to many DXers is All India Radio at Delhi, transmitting on 11,620 kHz. Look for this one at about 2130 GMT.

DOMINICAN REPUBLIC—Not often that one hears an English language program from this West Indian country. However, for some months Radio Clarin in Santo Domingo, which uses both 4,850 and 11,700 kHz at times, has had an English program, seemingly geared to tourists and potential tourists, at 2330 GMT.

COSTA RICA—One of several religious stations in Central America, TIFC airs English programs at 0300 GMT. In Spanish this station's slogan is Faro del Caribe, which, translated, means Lighthouse of the Caribbean. The frequency to try here is 9,645 kHz.

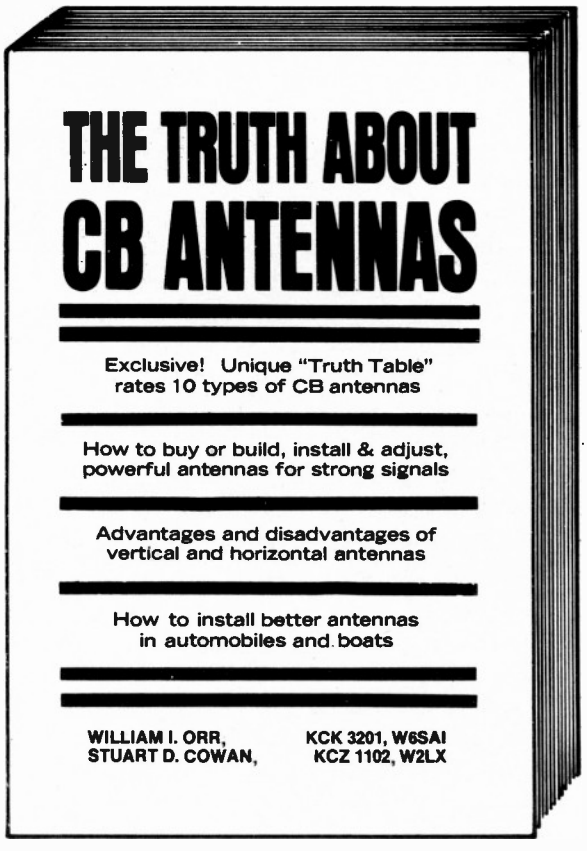
DOMINICA—Occasionally, for you medium wave broadcast band fans, I try to slip in a goodie. Most BCBers enjoy hearing AM stations from outside the U.S. and Canada. One to try for is Radio Jumbo, 545 kHz, at the low end of your AM radio dial. Jumbo is located on Dominica, one of the islands of the West Indies. Look for this one between about 0000 and 0215 sign off, GMT.

RUMANIA—Radio Bucharest has a reputation as something of a shortwave fixture. It doesn't move around too much in frequency and it has maintained about the same program schedule for quite a while. Programs in English to North America can be heard from 0130 to 0230, and from 0400 to 0430 GMT on the following frequencies: 5,990, 6,155, 6,190, 9,570, 9,690, 11,775, and 11,940 kHz.

(Credits: Bob Zilmer, WI; Timmy Williams, AR; Derek Lowe, AR; John Boyd, IL; American SWL Club, 16182 Ballard Lane, Huntington Beach, CA 92649.)

CORRECTION

In our February issue HAMBANDER column, a typographical error produced the info that a Ham Novice Class ticket was valid for 5 years. This should have read 2 years. By the way, we expect this column to resume shortly!



New Handbook Reveals

THE TRUTH ABOUT CB ANTENNAS

$5.95
*(postpaid)

* Exclusive "Truth Table" gives actual Db gain from 10 types of CB antennas.
* 240 pages — 146 illustrations — 18 chapters.
* "A great CB Antenna Handbook!" - George R. Wood, KBI-3274 - W1SR, RCA.

Your CB antenna is the key to clear, reliable communications. Most CB antennas are improperly installed and adjusted. They do not work anywhere near peak efficiency. Moreover, to impress buyers a barrage of non-facts about inferior antennas is used by some antenna manufacturers to gain quick sales. Now, for the first time, this new Antenna Handbook exposes false claims and gives you a unique "Truth Table" so you can determine for yourself the true power gain of any CB antennas!

Book Division, Cowan Publishing Corp.
14 Vanderventer Avenue
Port Washington, N.Y. 11050

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Sirs:

Please send me.....copies of **THE TRUTH ABOUT CB ANTENNAS**

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The Monitor Post

by Rick Maslau, KNY2GL

AMENDMENT OF MARITIME RADIO RULES

The FCC has proposed amending its rules to implement an Inter-Governmental Maritime Consultative Organization's resolution pertaining to the Safety of Life at Sea Convention and addressed the Queen City Yacht Club petition.

In a separate order it waived Section 83.132 of the rules to permit the continued use of double sideband (A3) emissions on 2182 kHz for distress and safety purposes pending final action in this docket case, provided the station was equipped with a VHF marine capability.

The Inter-Govermental Maritime Consultative Organization (IMCO) is a specialized agency of the United Nations concerned solely with maritime affairs. The organization's main objective is to facilitate cooperation among governments on technical matters affecting the safety of life at sea.

During its ninth session on November 12, 1975, IMCO adopted a resolution concerning carriage of radio operators, the normal range of main and reserve transmitters, the fitting of radiotelephone installations and the normal range of telephone transmitters.

The Commission noted that some of the IMCO recommendations were already incorporated in the FCC rules and said implementation of all the recommendations would be in the public interest.

In order to bring the FCC's rules into compliance with the IMCO resolution the Commission proposed amending its rules to require two radiotelephone operators on ships of between 500 and 1600 gross tons on international voyages. (Present rules require only one.) Only one operator would be required, however, if his sole responsibility was confined to radio communication, the FCC said. The Commission noted that this change would assure the availability of trained operators to perform necessary distress and safety related communications functions.

The FCC proposed permitting the use of existing A3 equipment on the international distress and calling frequency (2182 kHz) for distress and safety purposes. The Commission noted that its present rules prohibit use of A3 emissions on this frequency after January 1, 1977, and provide for the exclusive use of A3H emissions. The Commission noted that when it embarked on its program to eliminate use of A3 equipment in 1967 it fully expected that the international maritime community would rapidly convert to single sideband on all frequencies. It said this conversion has not materialized with regard to operation of 2182 kHz for a number of reasons and has caused the FCC to reevaluate its position concerning these rules.

The Commission proposed requiring an A3H transmitter to deliver a 60 watt peak envelope power to a dummy antenna instead of the 50 watt power now required. It said the impact of this change would be neglible since most, if not all, such equipment used on radiotelephone and radiotelegraph equipped vessels has a peak power capability in excess of 60 watts.

In a separate order the Queen City Yacht Club petition for rule making (RM-2760) to permit continued use of A3 emission in the 24 MHz band was denied. However, the Notice of Proposed Rule Making granted the petitioner's request with regard to use of A3 emissions for distress and safety purposes, provided the existing station was equipped with a VHF marine capability.

LAND MOBILE FREQUENCIES

The FCC has initiated a rulemaking proceeding to make new proposals for use of UHF television frequencies (470-512 MHz) in the Domestic Public Land Mobile Radio Service (DPLMRS) and to resolve the controversies that have prevented DPLMRS use of these frequencies.

(DPLMRS is a voice or signaling communications service between base stations and mobile units, either in vehicles or hand carried offered by radiotelephone common carriers.)

In 1970, the FCC adopted rules to provide for use of a maximum of two of the lower seven UHF TV channels, on a shared basis with television broadcasting, by land mobile stations within 50 miles of the center of the 10 largest urbanized areas in the U.S. However, it left open assignment principles and specific frequencies to be designated for each of the land mobile services.

In 1971, it assigned frequencies, adopted rules, and

set forth provisions for the DPLMRS, and decided in favor of "open entry"—that the frequencies would not be limited to existing carriers.

Subsequently, the Commission postponed the effective date of allocation of frequencies to the DPLMRS pending action on petitions for partial reconsideration, many of which asked that eligibility to the frequencies allocated the DPLMRS to be limited to existing licensees, i.e., "closed entry."

Those supporting "closed entry" contended that the non-wireline carriers (radio common carriers, or RCCs) now compete with the Bell System and other wireline carriers, as well as each other, and that competition in the major urbanized areas has reached the point that further fragmentation would reduce the visability of the RCC since "open entry" would distribute the new channels so widely that efficient use could not be made of them and because the RCCs would remain small with limited financial resources.

Further contentions were that a policy of "open entry" would almost certainly result in multiple competing applications and petitions to deny that would tie up the frequencies for a long time, delaying service to the public, and draining the resources of both the RCCs and the FCC. It was asserted that with "closed entry" existing carriers could, and in some instances already have, formulate plans for joint or coordinated use of the available channels.

In 1974, the National Association of Radio Telephone Systems (NARS) and a group of RCCs, requested that the FCC adopt policies that would accept joint applications from existing licensees in the affected markets for cooperative multi-channel operation; in cases where comparative hearings are necessary, favor applications proposing trunked, interconnected service; give top priority to applications filed in New Jersey, Texas and the District of Columbia where there is no regulation of radiotelephone common carrier service; and reaffirm its adherence to the requirements of the rules with respect to prior obtainment of a state authorization where required by law.

The Commission said adoption of "closed entry"—accepting applications only from existing DPLMRS licensees in the areas affected—would not ensure that competing applications would not be received. It said it was unconvinced that "closed entry" had sufficient merit to risk jeopardizing the rights of the public and potential new carriers.

Concerning joint applications, the Commission said when such applications promote more effective use of the spectrum and of authorized facilities, it would continue to encourage this approach.

It noted that trunking does offer advantages over single channel systems, because by making several channels available as a trunk group to each member of the using public, not only does the grade of service greatly improve, but the utilization of the channels also

will increase as a result. Therefore it said it agreed with NARS' recommendations on this point.

The FCC said there was no need to process applications in some cities before others, nor did it intend to require state certification prior to filing for these frequencies.

The Commission proposed to grant all timely filed applications for all frequencies on the condition that licensees coordinate operations so that there is no mutually exclusive interference.

Noting that in the cities where portions of the UHF spectrum have been set aside for DPLMRS use, one of the TV channels is generally usable with only minor restraints, while the other has many and severe restrictions because of protection criteria, the FCC proposed to have all base stations on the less-restricted channel and mobile units on the other.

The FCC also proposed, where an applicant can show his proposal will meet or exceed the TV protection criteria, although not in accordance with the general rules, the applicant may request a rule waiver and such waivers will be considered on a case-by-case basis.

VHF MARINE CHANNEL 17

The Commission has amended its rules to make marine VHF Channel 17 (156.850 MHz) available for ship to ship State Control communications, in addition to the previously authorized use for ship to coast State Control communications.

The action was proposed in a rulemaking notice released August 5, 1976. The only comments filed were by the California State Communications Division, which fully supported the proposal.

The Commission said it believed the rule amendment would provide for closer coordination among state boats and related shore stations resulting in an improvement to safety, law enforcement activities, and search and rescue operations in state waterways.

FREQUENCY FOR FIRE RADIO SERVICE DENIED

The Commission has denied a petition by the International Municipal Signal Association, Inc. (IMSA) requesting allocation of four pairs of 450 MHz band frequencies to the Fire Radio Service for use as voice fire radio call box channels.

IMSA sought allocation of the paired channels 453.025/458.025, 453.075/458.075, 453.125/458.125 and 453.175/458.175 MHz. These frequencies currently are allocated for highway radio call box voice and non-voice uses in the Local Government Radio Service. In addition, subsequent to the filing of IMSA's petition, these 458 MHz band frequencies were allocated to the Special Emergency Radio Service for bio-medical telemetry communications between portable units and medical-care facilities.

In support of its petition, IMSA contended that the use of voice fire alarm boxes would "maximize information as to the nature and extent of the fire, its location

THE MONITOR POST *(continued)*

and duration," and would provide "some kind of assurance to the caller that his message is being received." It also asserted that use of two-way voice fire alarm communications "may well reduce the amazing percentage of false alarms that are occurring throughout the country."

Several parties opposed the utilization of the highway call box frequencies for the fire call box function, arguing primarily that this additional use would place too great a demand on the few frequencies involved.

In examining the issue of whether use of the four frequency pairs at 450 MHz for the fire radio alarm function would be feasible, the Commission recognized that to date there had not been extensive development of the use of these frequencies for highway radio call box systems. This factor, it pointed out, had been one of the major considerations involved in its determination to permit additional use of these frequencies for bio-medical telemetry operations.

Although the problem of allocating these frequencies for highway call boxes might require re-examination, the Commission said it did not follow that the frequencies should be allocated for fire radio call box operations.

The FCC found that the limited spectrum involved would not be adequate to accommodate the proposed fire alarm voice functions, since the operation of fire call boxes in most communities that would likely employ such radio systems could be expected to involve many hundreds and even thousands, of call box installations. Obviously, it said, such two-way voice transmission requirements were beyond the capacity of the requested four frequency pairs.

In addition, the Commission noted that IMSA's proposal would cause a compatibility problem with respect to bio-medical telemetry operations.

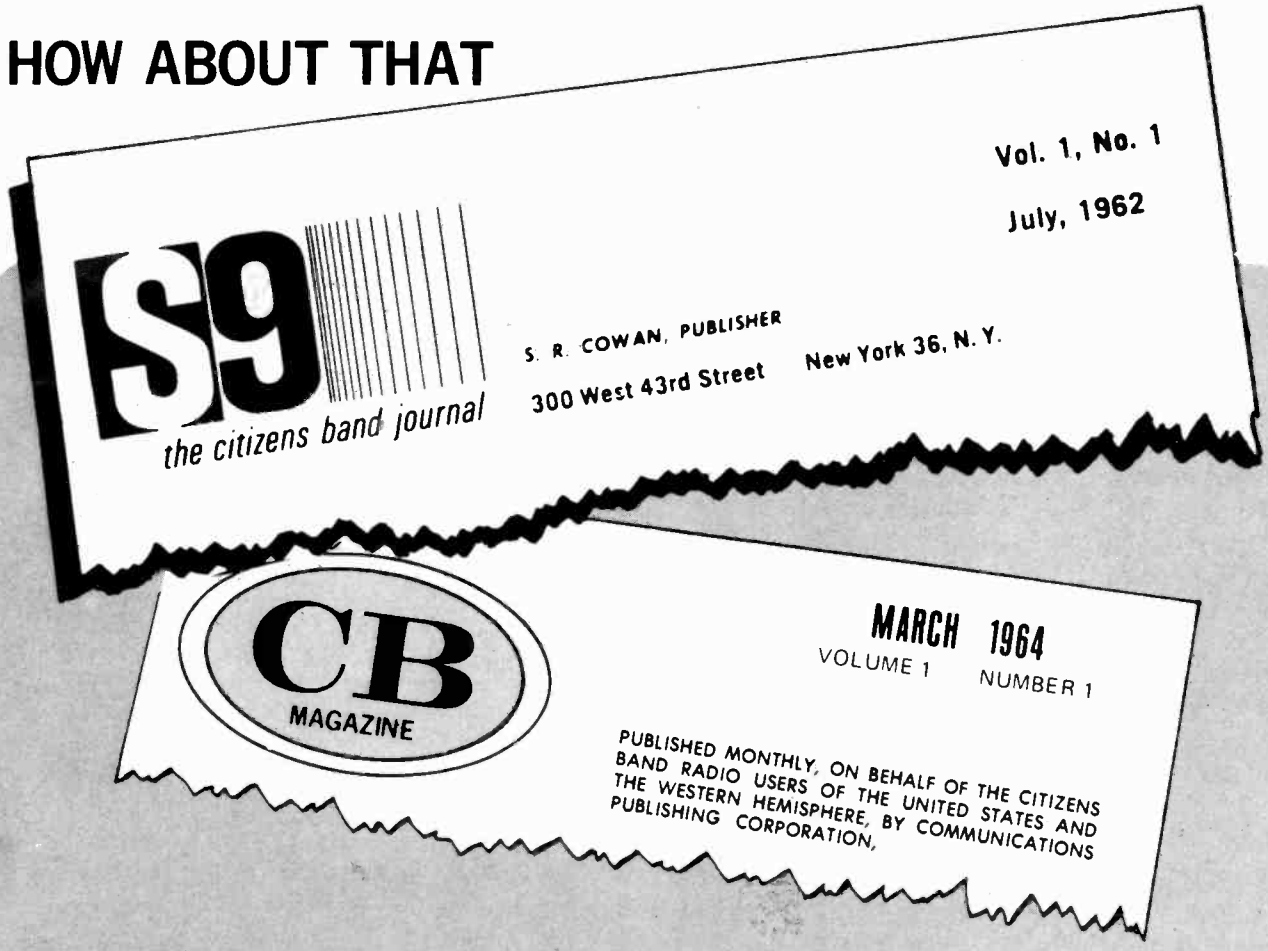
For these reasons, the Commission said it could not find that allowing use of the 450 MHz band frequencies for fire radio call box systems would be feasible, adding that it seriously doubted whether city governments ought to look to radio for replacement of existing fire call box systems because the amount of spectrum that would be needed for voice operations was very large and simply was not readily assignable.

THE 806-890 MHz BAND

By exchange of letters between the Commission and the Department of Communications of Canada, an interim arrangement has been agreed to for licensing U.S. land mobile systems in the 806-890 MHz band within 250 miles from the U.S./Canada border.

The interim arrangement had been worked out by a joint group of staff members from Canada's Department of Communications and from the Commission. This joint FCC/DOC working group has been exploring possible alternatives for sharing the use of the frequencies in the 806-890 MHz band by the two countries along the border. *(continued)*

HOW ABOUT THAT



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The interim arrangement provides for licensing U.S. land mobile radio stations so as to fully protect Canadian television assignments in the band and to preserve the opportunity for possible use of some of this spectrum for land mobile purposes closer to the border in Canada as well as in the United States.

The criteria for authorizing U.S. land mobile stations are as follows:

1. Base stations will not be authorized in areas closer than 100 miles from the U.S./Canadian border.

2. Within a zone 100 miles and 125 miles from the border, base stations will be authorized only after specific arrangements have been made between the Commission and the Department of Communications of Canada for the specific geographical areas.

3. Within the zone 125 miles and 145 miles from the border, base stations may be authorized with the maximum of 500 watts ERP at 500 feet effective antenna height, or the equivalent.

4. Beyond 145 miles from the border, base stations may be authorized with the power and antenna heights permitted by the rules (1000 watts ERP at 1000 feet effective antenna height, for "urban conventional" and "trunked" stations, and 500 watts ERP at 500 feet effective antenna height, or the equivalent, for "suburban conventional" stations).

5. Mobile stations will be authorized to operate at distances of 90 miles or more from the border. The maximum ERP for mobile units operating within the zone between 90 and 145 miles from the border must not exceed 200 watts. Land mobile systems will normally employ a duplex channeling plan so as to prevent mobile-to-mobile operations closer than 90 miles to the border.

6. Mobile units operating further than 145 miles from the border will be authorized to operate with powers prescribed by the rules.

7. All land mobile stations within 250 miles from the border will be authorized on condition that they cause no harmful interference to Canadian television stations operating in the 806-890 MHz band. Land mobile stations will not be afforded protection from interference from Canadian television stations.

8. For information purposes only, the Commission will notify the Department of Communications of land mobile radio assignments in the band within 250 miles from the border.

This is an interim arrangement between the Commission and the Department of Communications, and it is anticipated that discussions will continue looking towards a mutually beneficial, overall solution.

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PROTECT GEAR with bold burglar alarm warning stickers. Strong self-stick vinyl striking green/yellow design. Only $2 for 5. Enclose self-addressed stamped envelope. CRB Research, Inc., P.O. Box 56-XC, Commack, NY 11725.

FOR THE BEST IN CB & AMATEUR GEAR. Tempo One. Siltronix 1011B & Skipper 73. For immediate delivery, call or write: PALOMAR EAST LTD., Palomar Plaza, P.O. Box 148, Congers, NY 10920. (914)268-9258.

UNIT NUMBER ID'S! Everybody's using them these days! Don't you have yours yet? Your existing Unit Number registered or a new one assigned to you by the national registry for ALL Unit Number ID's; PLUS a 2-color official Certificate of Registration showing Unit Number, your name and/or handle, the date of registration; PLUS exclusive special report on how thousands of CB'ers are now getting more use and enjoyment from their hobby by using Unit Number ID's in addition to or instead of "handles." Everything for only $2.95, plus self-addressed stamped envelope. Z-Tech Enterprises, Box 70-W, Hauppauge, NY 11787.

OFFICIAL ID CARDS/CREDENTIALS for Police Dept./Deputy Sheriff/Highway Safety Patrol/Volunteer Ambulance Corps/Rescue Squad/Fire Dept.! Beautiful professional 2-color wallet size ID cards. Sent blank (we do not inscribe name). Available in large or small quantities. Sample set of all 6 cards only $3, ppd., PLUS FREE BONUS Official CB Operators ID Card. Civil Defense credentials also available to authorized CD units. Order now! CRB Research Inc., P.O. Box 56-X, Commack, NY 11725.

NASSAU COUNTY CB'ERS: Don't sit back... Join REACT!! Central Nassau County REACT, one of the first and largest teams in the nation would like you as a member. We are an independent, non-profit volunteer public service team dedicated to aiding you, our fellow CB'er in time of need. Send today for more information and a membership application to: Central Nassau County REACT, P.O. Box 406-S, Westbury, NY 11590.

WANT TO BUY: Will pay top dollars—hard cash—for old Lionel Trolleys in any condition. Also want Old Lionel or Ives Standard Gauge trains. Your old clunker may be a collector's dream. Don't be bashful. Write Dick Cowan, c/o S9 Magazine, 14 Vanderventer Ave., Port Washington, NY 11050. Phone: 516/883-6200.

SCANNER CRYSTALS from America's leading supplier—sent to you postpaid and factory fresh from an inventory stock of 100,000 crystals! $3.95 for multiple orders! Send postage stamp for free catalog and special order form! Z-Tech Enterprises, P.O. Box 70-A, Hauppauge, NY 11787.

UNIVERSAL QSL and DX Cards needed. Send QSL and DX cards to Philip Steven Kurland, 357 East 201 St., Apt. 1-F, Bronx, NY, 10458.

QSL-QSL-QSL-WORLDWIDE QSL Send QSL cards to Philip Steven Kurland, 357 East 201 St., Apt. 1-F, Bronx, NY, 10458.

GUARANTEED 100% QSL. Cards with call letters only. Extras appreciated., buddy packs to 100. KCO-2682, PO Box 8726, Boston, Mass., 02114.

QSL, QSL, QSL, 100% -Carnival QSL Club of the World. Write for Application - we have Patches, Rosters, Pins, and Stamps, 1124 High Bluff, Dubuque, IA., 52001.

SWISS EMBROIDERED PATCHES for your Club Exct., Low Minimum, 10, 1000. Chris Huston, 1124 High Bluff St., Dubuque, IA, 52001.

ATTENTION C.B. DEALERS: Having hard time getting C.B. sets? We carry a full line, including Pearce-Simpson, Robyn, Browning, Johnson, Royce, Police Monitors, Crystals, New-Tronics, Antenna Specialists (E& S CB Sale & Service) R4, Winchester, IN. 47394. Ph. 317/584-0343.

CB DEALERS-Send today for our price list, same day service. Reputable company in CB business for over 8 years. Over half-million dollar inventory. CB Distributors, Box 15883, Baton Rouge, LA, 70815.

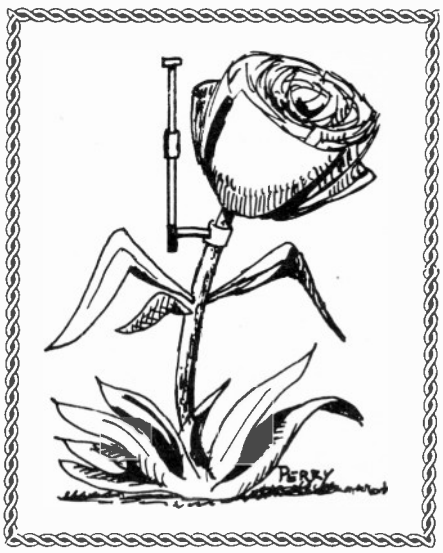
CBer's BIBLE Jason's Authentic Dictionary of CB slang. Jason's is the top authority in this field. Only $3.00 and money back if not satisfied. Frank Frye, Box 501, Bambert, sa S.C., 29003.

WEAR YOUR HANDLE on a beautiful Antique Bronze CB Belt Buckle. Up to 20 characters deep cut and hand finished. 2-3/8" x 3-5/8". Only $8.00 postpaid. Also available Silver Plated at $11.00 or 24 K Gold Plated at $14.00. Immediate delivery by U.P.S. Satisfaction Guaranteed. Money refunded if returned within 10 days. Send cash, check or Money Order along with Handle, Name and Address to S & M Buckle Company, PO Box 240, Monroe, Wis. 53566.

BEST PRICES On Johnson, SBE, Tram, Browning, Midland, Antenna Specialist, Avanti, Antenna, Inc., Shakespeare, Turner, Astatic, Mura, CDE, Para Dynamics, Vanco and Gold-Line. Write for free price list. CRS Communications, 1552 Central Park Avenue, Yonkers, NY, 10710.

QSL CARDS? Want to have QSL cards from all over the world? Join the Carnival QSL Club of the world, write for application. 1124 High Bluff, Dubuque, IA., 52001.

QSL 100% Join the Carnival QSL Club of the world. Membership $3.50, includes 81/2 certificate, your CLW unit number, and wallet size ID Card. Write for application, 1124 High Bluff, Dubuque, IA., 52001.



COMING EVENTS

(continued from page 51)

Logan, W. Virginia, Jamboree of Logan County Citizen Band Radio Club. August 6 & 7th, at Logan Memorial Fieldhouse. For more info write Chairman at P.O. Box 364, Logan, W. Virginia 25601.

Alexander, New York, 3rd Annual Coffee Break of the Friendly Group CB Club. August 14th at the Alexander Firemens Park, Rt. 98, ½ mile south U.S. 20. Proceeds go to Burn Treatment Center of Western New York. Contact Ann Cory—Secretary at 5849 Broadway, Lancaster, N.Y. 14086.

Morgantown, West Virginia, 5th Annual Jamboree of Mon-Valley React Club 2209. August 26-28th at Chestnut Ridge Camp Grounds. Cooper's Rock exit off U.S. Route 48 to Rt. 73 & follow jamboree signs. For more info contact Eugene Fullmer—President, P.O. Box 1005, Morgantown, W. Va. 26505.

ADVERTISER'S INDEX

Reader Service System

To speed information to you on products shown in S9 advertising a new computerized Reader Service system has been designed. For additional information on a particular ad in this issue, tear out the Reader Service postcard bound between pages 128 and 129, and circle the numbers on the card which correspond with the Reader Service numbers listed in the advertiser's index below. DON'T CIRCLE THE PAGE NUMBERS! Fill in your name and address, and mail. We'll have your information on the way in short order.

MANUFACTURERS

DISTRIBUTORS

MISCELLANEOUS

COWAN PUBLISHING ADS

BUYER BEWARE!

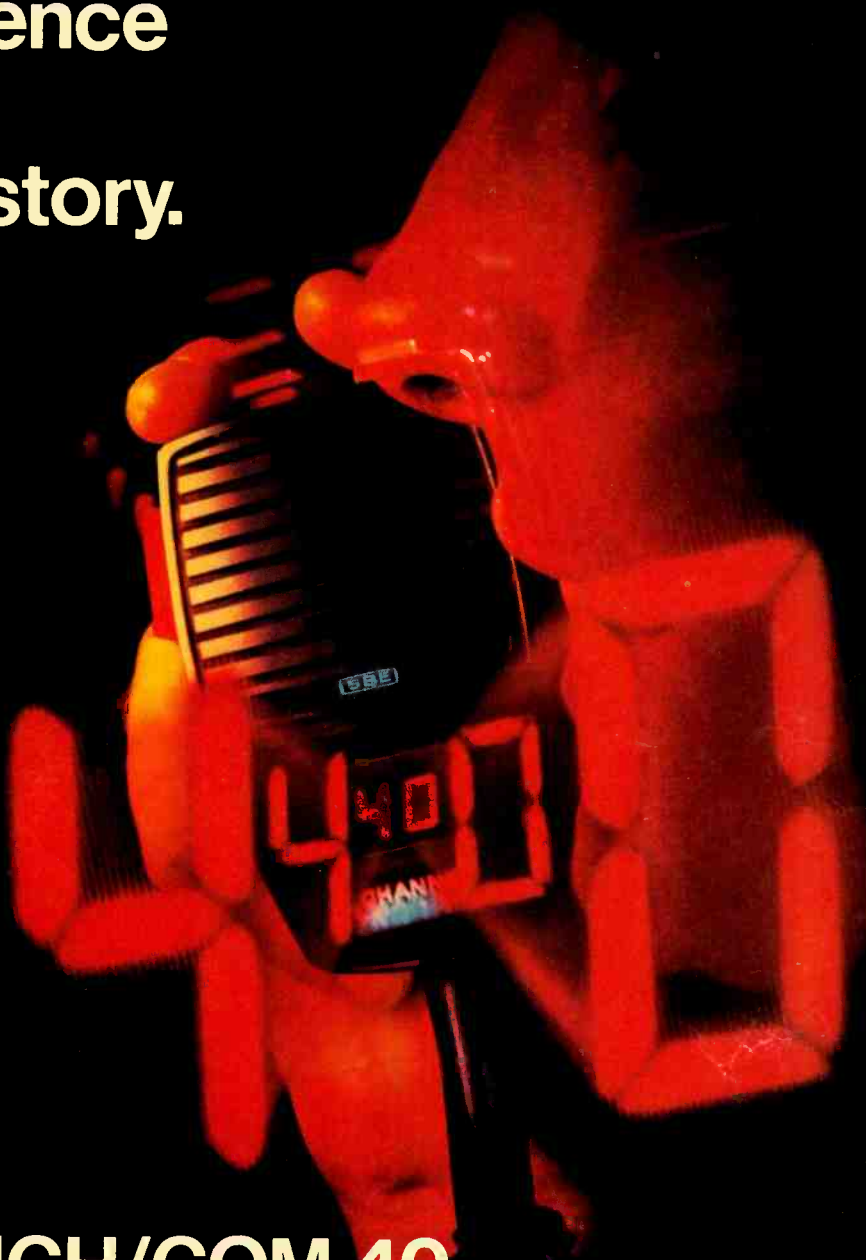
The publisher of S9 accepts advertising from manufacturers, dealers and distributors who, in our opinion, offer readers a high level of quality in products and/or service. Wherever possible we attempt to publish additional information on these products in the form of technical equipment evaluation reports.

Readers should be aware that, at the present time, the CB radio market is drastically backordered in almost every product category, but especially so in transceivers and antennas. We wish to remind our readers that we carefully screen all potential advertisers. In the event that a company's products do not appear within our advertising pages, there's a strong likelihood that it has not passed our minimum standards.

We strongly urge readers to purchase from those companies whose advertising appears in S9; by doing so, you will be assured that the company with whom you're doing business is a reputable one. You'll also be supporting those companies that help make S9 possible. Now, we recognize that many advertisers cannot advertise in every issue. If you don't see the company's ad in the current issue, check back two or three issues to be certain, since almost every major advertiser appears six or more times in one year. If you have doubts about the reliability of any particular product or company, feel free to contact our publisher for information. This service is offered as a safeguard to our readers.

For Information About Our Advertisers . . .

Convenience is only half the story.



SBE TOUCH/COM 40

SBE adds the ultimate luxury to 40-channel operation: the convenience of microphone control that puts all CB functions right in the palm of your hand.

Quickly scan up or down through all 40 channels, or move channel by channel with the 2-speed channel selector. Identify your channel with the extra-large, high-intensity LED readout, clearly visible even in bright daylight. Adjust volume and squelch with the flick of a finger. And to transmit, simply push the "Press-to-Talk" control. It's all on the microphone.

But the convenience of TOUCH/COM 40 is only half the story. With such sophisticated features as SBE's "Speech Spander" voice-operated modulation level control, "Anti-Blast" audio burst protection circuit, 4-pole IF filter, delta tune, and MIC gain control, Touch/Com 40 offers top performance under the toughest operating conditions, plus dependability backed by 100 per cent quality control.

And that's the half of the story that is the most important to you.

SBE-40CB

SBE 40 CHANNEL

SBE

Better Communications through Creative Technology

For complete information, visit your nearest SBE Dealer, or write SBE, Inc. 220 Airport Blvd., Watsonville, CA 95076

INTERNATIONAL OFFICES E S Gould Marketing Co Ltd., Montreal, Canada/Linear Systems S A Geneva 1, Switzerland

40 CHANNEL ENGINEERED

The CB antenna has as much to do with the performance of a CB installation as your radio. The majority of CB disappointment can be cured by a good antenna properly installed and tuned. This is why we cut a Racer 27 base in half to show why

AVANTI CB Antennas are Better!

HERE IS PROVEN QUALITY . . .

A.B.S. (Acrylonitrile-Butadiene-Styrene) — A tough material used to form the base of the antenna and cover the coil.

EXCLUSIVE HERMI-COIL (Hermetically Sealed Coil) — A special molding process provides a weather-proof coil environment. Helps maintain the characteristic antenna impedance, even in damp or salt water atmospheres. Hermi-Coil also helps eliminate internal surface leakage.

RIBBED BASE — Provides a long leakage path such as used in high voltage insulators, spark plugs, etc. This keeps external R.F. currents from leaking across the surface between the radiating element to ground, especially when moisture or grit accumulates on the base.

CONDUCTOR BRAID — Look inside the spring on our mobile, you'll find a tin plated copper braid directly connecting to the top and bottom. This assures a positive, constant value connection during spring flexure.

100% TESTING — Beside the regular mechanical inspection, each mobile antenna is tested for V.S.W.R. and "Q" before shipping.

SPECIFICATIONS — AV-327

Electrical
¼ Wave Length Unity Gain 27 MHz
Impedance — 50-52 ohms
Coil — Shunt Fed Hermi-Coil
Includes 17' RG58-U

Mechanical
Radiator — 17-7PH Stainless Steel
Spring — Stainless Steel
Whip Length — Max. 46"
Base Material — A.B.S. — Chrome Plated Brass

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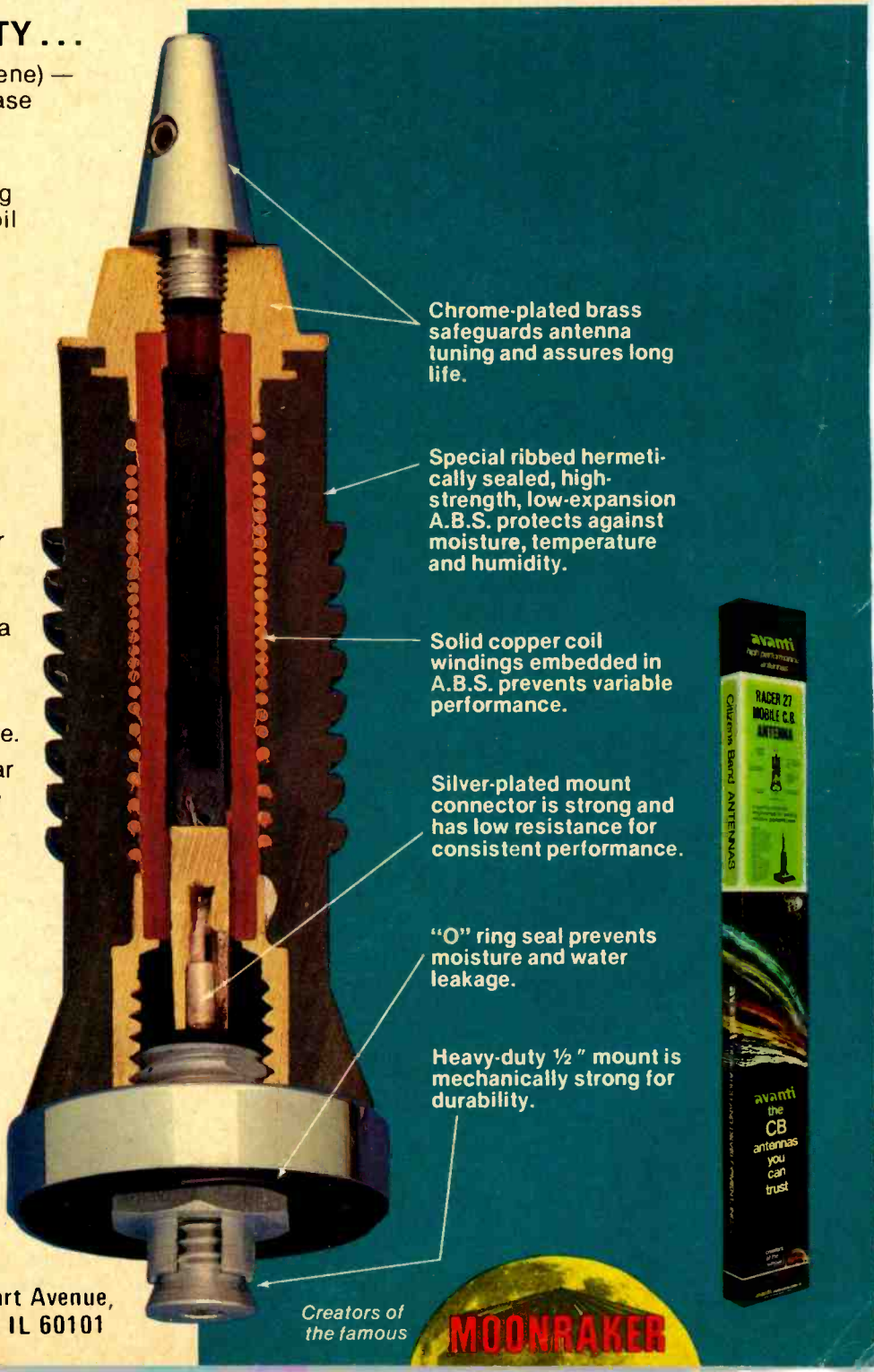

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