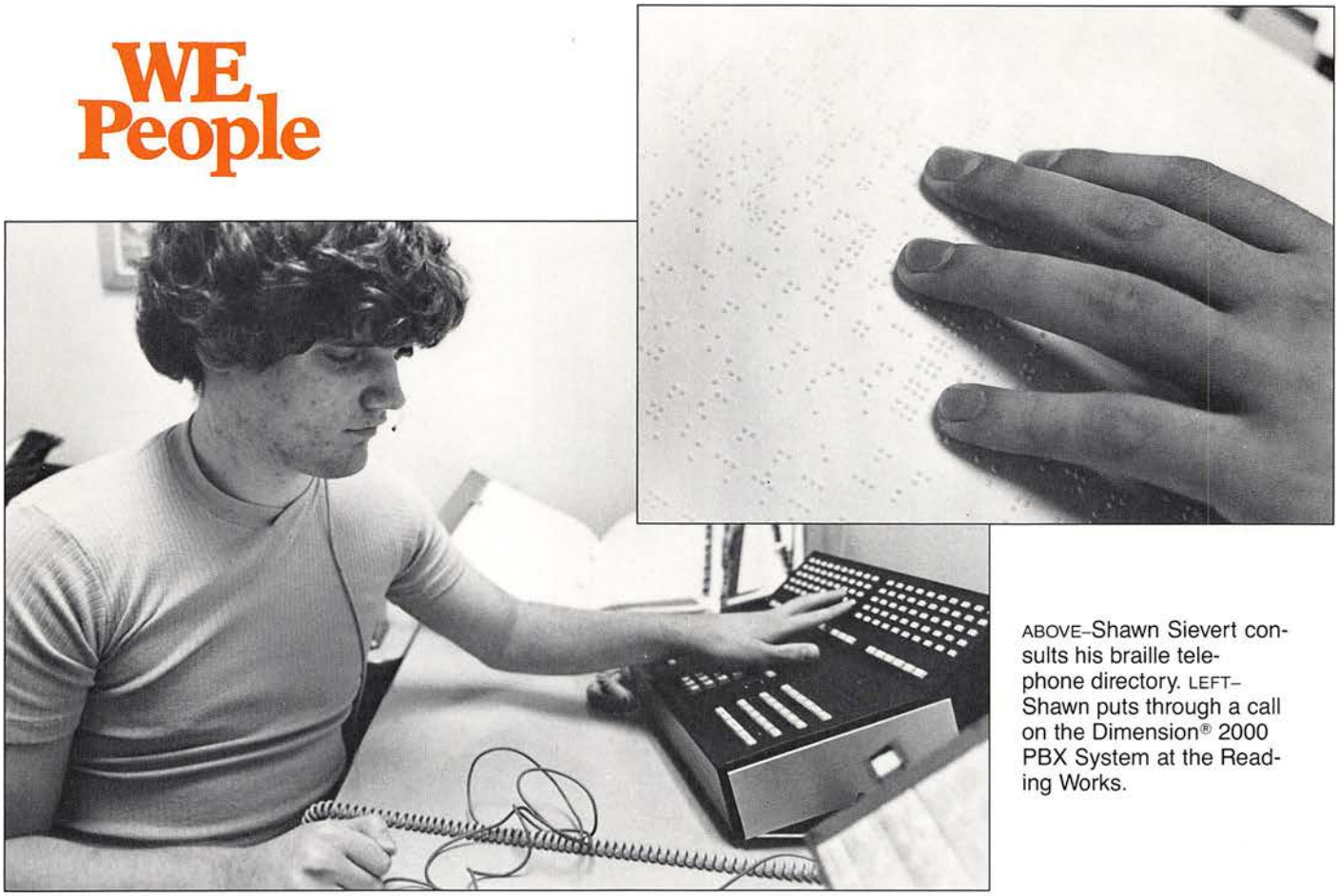
WE

FIRST QUARTER 1982

Installation Today

WE People



ABOVE–Shawn Sievert consults his braille telephone directory. LEFT–Shawn puts through a call on the Dimension® 2000 PBX System at the Reading Works.

He prepared for the job *before the job existed*

A beeping tone rather than a blinking light alerts Shawn Sievert, switchboard operator at the Reading Works, to incoming calls. Shawn, who is blind, operates the console of the Dimension® 2000 PBX System on which an impaired-vision feature is a standard offering. The Dimension PBX is manufactured at Western's Denver Works.

Reading's PBX console emits various tones to announce a call. Shawn explains, "I can tell by the type of beep whether a call is coming from someone in the plant, from the outside, or through CORNET — and answer accordingly."

In 1978, just a year out of high school, Shawn began looking for a job. His father, Dave, a 23-year veteran toolmaker at the Reading Works brought home news that the Works might be installing a new Dimension PBX. Switchboard operator was on Shawn's list of job choices, so he acted on a hunch and took classes to learn to operate the Dimension PBX system — without knowing for sure if it would indeed be installed or if he could get such a job. When he applied for the job at the Reading Works, Shawn had an edge because he already had the skills for the job. He started working there in February 1979.

A day's work for Shawn may include putting together four-, five-, or six-way conference calls, placing long distance calls, transferring calls, clearing call-forwarded numbers, and verifying numbers if they are busy to see if there is a problem on the line or if the phone is just off the hook.

Shawn attended a school for the blind through high school. When he was younger his parents would drive 120 miles each weekend to bring Shawn home. But, as he got older, Shawn acquired a taste for traveling by train — and came and went by himself. He also attended some special classes at the Greater Pittsburgh Guild for the Blind in 1977. "Besides learning how to cook and clean, we were given mobility training. I learned there that you have to speak up and ask questions," says Shawn. "No matter where you go, there's always someone who will help."

The transition from school to work is only one of many that Shawn has undertaken in the past few years. He was recently married to a woman he met at school. They moved to an area that is within the range of public transportation so that Shawn could ride the bus to work. He is fiercely independent — and optimistic about his future. "This job, my new home, and of course, my wife, are aspects of my ability to get along on my own. I feel confident and capable — and more sure of myself than ever." WE

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Western Electric

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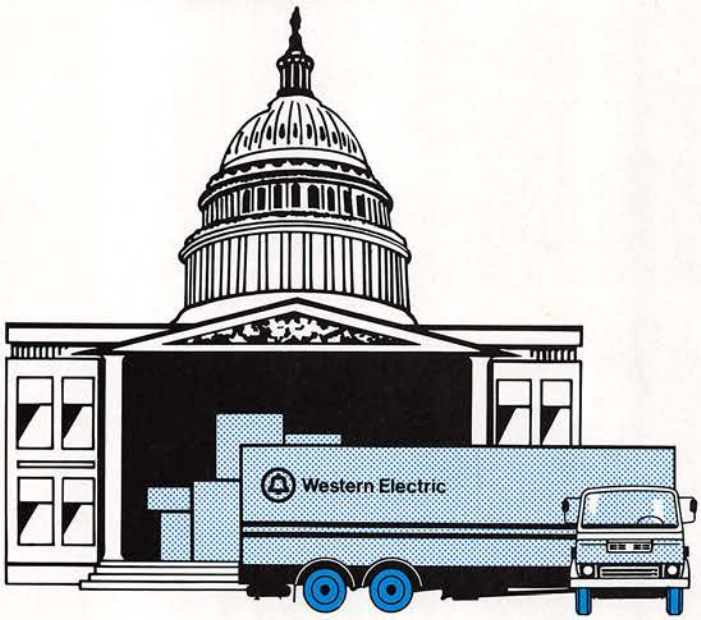
ON THE COVER: A painting created by Ed Acuña, a free-lance artist in Connecticut. It focuses on the new look in installation, and the greater emphasis on testing and electronic components. Our story on the new look begins on page 18.

WHAT'S HAPPENING IN GOVERNMENT SALES?



Defense business has doubled in two years

For the past two years, Government Sales has been the fastest growing part of Western Electric's business. Although the totals are still relatively small compared to our Bell business, we are again moving up into the big leagues of government contractors. We now rank about number 25. In the DEW Line days and Nike Hercules era we were in the top five.

To get some insight into why and how, we talked with Warren Corgan, Vice President, Government and Commercial Sales, as well as many other Government Sales people who are headquartered at the Guilford Center in North Carolina.

"Our division was formed in 1979," Corgan said, "for the purpose of revitalizing our government business. We're trying to do that by making use of technology developed on the Bell side and appliqueing it to military projects.

Photos by Buddy Spoon

"Our objective is to build a business base that doesn't rely on one big project—the SAFEGUARD sort of thing—but rather one that provides sales to government agencies on a continuing basis—a business that can grow and have longevity."

The strategy is obviously working. Government sales in 1981 were up about 30 percent over 1980. In 1980 they were up 50 percent over 1979. This means that in two years' time, Western sales to the U.S. government just about doubled.

"We're trying to increase business on three fronts," Corgan explained:

1) "By taking advantage of projects we worked on previously, such as SOSUS (Sound Surveillance System) for the Navy and Nike Hercules for the Army—to enhance those systems using current technology.

2) "By getting into new areas, making use of new Bell technology, such as bubble memories, very large scale integrated circuits, and lightguide.

3) "By aggressively selling WE communication systems to the military and civil agencies. We have always provided WE products on request, but that's different from actively selling systems."

The government communications-related market is huge and with the Reagan administration proposals for further defense spending it may get bigger. Currently the figure is about $23 billion. However, every piece of that huge market is already spoken for, and you have to compete vigorously every inch of the way. Bell System policy enunciated by John deButts a few years ago is that we "will positively and actively seek communications business and other projects from the

government—with the exception of offensive weapons."

WE asked Ed Dillberger, General Manager, Government Operations, where do you get leads so that you can compete vigorously. "We have our name on bidders' lists at major government purchasing offices so that we automatically get a request for a quotation in any of the areas in which we have indicated an interest. However, if we just sat back and waited for such formal requests we might as well close up shop and forget it. You've got to be running and pretty well up to speed before that formal request arrives.

"What we do is analyze the defense budget, looking for opportunities. We have Government Systems Account Management people at the Washington Service Center who visit the Pentagon and the Navy offices in Arlington daily looking for leads. We read the trade press and the *Commerce Business Daily*. It's not unusual to track some of these things for a year and a half before something develops.

"On the other side, it takes a lot of time and thought to develop a good, solid quotation, and we're getting better at it all the time. It's a highly competitive business. In 1980 we won about 40 percent of the jobs we bid on. In 1981 that percentage was up to around 80. We go head to head with some of the biggest names on the *Fortune* 500 list—in fact, with a good many of them."

An example of one such project is a new Enhanced Modular Signal Processor for the Navy. It goes by the short title of EMSP, and, in fact, many WE people don't recognize it by the full name. When developed, it is going to be the Navy's standard signal processor and as such will be used in a wide variety of Navy and other military programs. Western has been awarded a Phase I contract to provide and demonstrate our systems design for it. Our team also includes Bell Labs and Sperry Univac. However, four other corporate teams have been awarded identical contracts. The final award to one of the five teams, calling for full-scale engineering development and the initial production of up to 75 processors, is due to be announced sometime this spring and will be a major achievement for the winner. Western Electric's proposal is a good one which has received favorable comment from representatives of our Navy customer. If we win, we will be established as a leading competitor in the field.

ABOVE–Warren Corgan, VP Government & Commercial Sales. RIGHT–Work for the Navy on undersea sound detection.

Currently, our largest effort with the armed forces involves sonar (acoustic listening) systems for the U.S. Navy. We've been working on it for 29 years; in fact, a number of people have spent entire careers working on just one project. These systems use concepts stemming from fundamental work that Bell Labs did on acoustics for the telephone system a long time ago. While the basic principles of sonar have remained about the same, Bell Labs and Western have assisted the Navy in a continuous program to improve these systems. Four generations of sonar systems have been provided over the years.

We asked Lew Bain, Director of Government Systems, in whose bailiwick these continuing programs fall, why the project has continued so long. "Since World War II," he explained, "the U.S. Navy has used fixed and mobile sonars to detect ships and submarines. As sea warfare has become more sophisticated the surveillance job has become more important and more complicated. Consequently, the Navy has sought to increase its knowledge of the ocean environment and information concerning oceanographic and acoustic conditions off the continental coasts and has contracted with Western Electric and Bell Laboratories to conduct a continuing program of oceanographic surveys and research designed to pro-

vide more detailed information on the oceanic environment and the transmission of sound in sea water. In addition, we have been given the job of design, manufacture and installation of fixed and shipborne sonar systems.

"Much of the underwater equipment and shore-based equipment that we use is manufactured at our Burlington Shops. The coordination of our worldwide efforts is provided by a project management group at the Guilford Center.

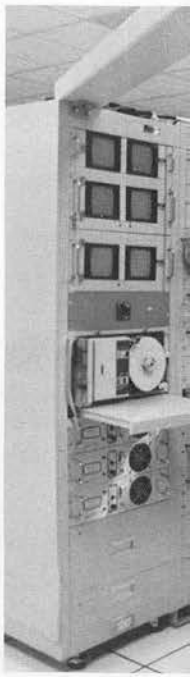
"One of the outgrowths of our work with the Navy all these years," Bain continued, "is that we have developed probably the best ocean operations group anywhere. Altogether there are over a hundred people, and at various times as many as eight ships involved. Our people are experts at doing all kinds of oceanographic work under all kinds of conditions. As a result of this experience we've been involved in the design of new ships, particularly with respect to the mission equipment that goes on the ship—the special navigation, test and towing equipment."

Another major project that involves many of Bain's people as well as the Burlington Shops is Nike Hercules. "We're modernizing a 20-year-old system," Bain said, "to make it more maintainable and easier to operate. We're taking out vacuum tubes and substituting solid-state technology and a digital computer.

"The work is being done for six NATO countries in Europe, plus Korea and Taiwan, under a foreign military sales contract with the U.S. Army. We are supplying a complete package including not only the hardware and installation for the system modifications, but also field engineers, spare parts and troop training on how to maintain and operate the updated system. I have a number of people working in Europe and the Far East—about 50 in all, but in small groups. Usually the work involves two or three engineers, an installation supervisor, and some key installation personnel some of whom are on loan from our Navy programs. The bulk of the installation work is done by local troops.

"We have had very few language problems," Bain said, anticipating our question. "English is the language of the system, just as English is the airways language. Then too people abroad have always seemed much more interested in learning English than we are in learning their languages."

Another long-term missile guidance program involves still another branch of the armed forces. Our facility at Vandenberg AFB is approaching its 23rd anniversary, and the Air Force has signed the contract extending the operation for at least another two years. It began as a Bell Labs branch that transferred to Western as an entire unit in 1964. Its



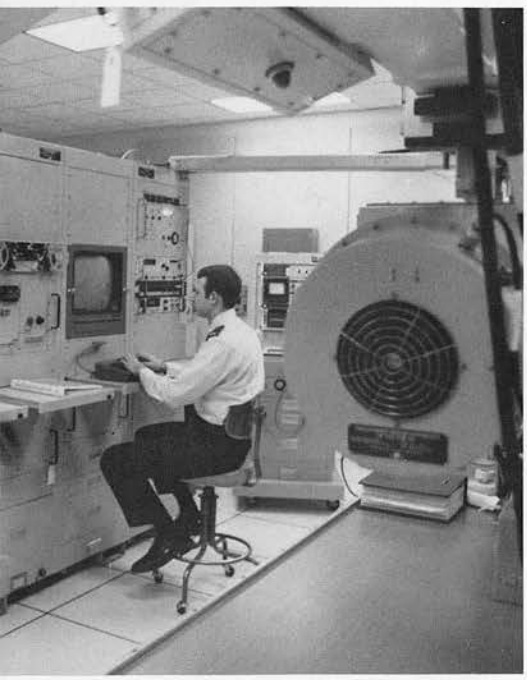
RIGHT–The Bell Labs' bubble memory is being used by the U.S. Air Force in this test set which checks out electronic countermeasures pod for combat aircraft.

ABOVE–The heavily shrouded equipment on trailers outside the test building at Burlington were Nike Hercules radars on the way to a test in Sardinia last summer. RIGHT–Care and feeding of the new solid-state Nike Hercules system is taught to officers of U.S. Allies in Europe and the Far East. These absorbed young men are German.

function is to guide satellites into orbit using the Bell System's command guidance system. It has been incredibly successful.

The third prong of the new thrust in Government Sales that Corgan mentioned is the aggressive selling of systems and services using Bell System technology modified to meet specific government needs. This effort is headed by Chuck Geiger, Director of Marketing.

Geiger's people work with both the Department of Defense and civilian agency officials in an attempt to sell these specific Bell System capabilities. This is in contrast to Lew Bain's people who are concerned with the development of more specialized systems which are still generally based on Bell System technology, but are even more tailored to meet unique military requirements. Both the Bain and Geiger groups increasingly sell their systems and services to the U.S. government for use in foreign countries. The local telephone company or Long Lines generally handles the government's domestic communications needs, although we may bid on such work in some competitive situations.



The equipment for overseas projects is shipped from Western Electric factories to a staging area—for consolidation with other items and containerization if necessary. Increasingly, Burlington is performing this job for the Division. "Our experience to date in having support operations performed at Burlington has been excellent," Chuck Geiger said. "We anticipate continued fine support to our marketing efforts from that location."

Since we market all across our product lines, almost anything can turn up in the staging area from individual telephone sets to room-sized switching systems to microwave transmission gear for a whole route. One of the big projects of 1981, in fact, was a TD3D microwave system for Kuwait, the oil-rich sheikdom on the Arabian Gulf.

We have reported in the past in WE® Magazine about the installation of Dimension® PBXs aboard U.S. Navy ships. The first was installed aboard the aircraft carrier *John F. Kennedy* (WE, Jan-Feb 1981). There have been 26 more Dimension PBXs installed on other large ships since then and the expectation is that there will be another 20 this year.

A somewhat similar program has been underway with the Department of State. We have been installing Dimension PBXs in major embassies around the world—Paris, London, Bangkok and Mexico City, for example. A total of 13 were completed last year and 28 more are scheduled for this year. There's more to it than installing a PBX as we might do in any factory or motel in the United States.

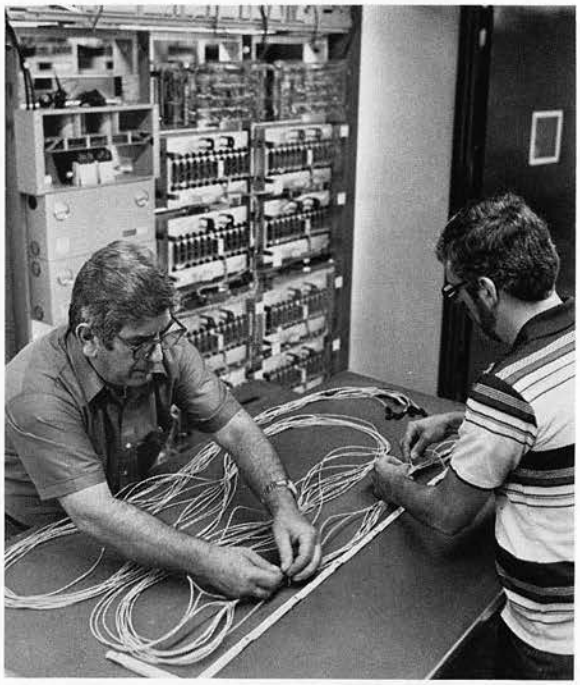
Another major GCS project, recently completed in Central America, was the installation of eight Dimension PBXs in a tandem network serving our American forces in the Panama Canal Zone. Five of the bases were on the Pacific coast and three on the Atlantic side. It is the first time outside the continental United States that Dimension PBXs have been linked together in this fashion, and the possibility of setting up similar arrangements in other parts of the world is very good.

"While we are now well organized to sell our standard products to the government and are proud of our success," Corgan said, "our record shouldn't be a surprise to anyone. After all, we have the best line of telecommunications products in the world and first-class manufacturing and service groups to support us.

"When it comes to special designs, we're supported by the best R&D organization in the world and have a very highly motivated group at BTL–Whippany who gives us direct support.

"With that kind of backing, we expect to be successful." WE

Even lightguide must be "cabled." Bill Brown and Phil Werner do the honors.



Branching off the Corridor

Photos by Len Stern

The Northeast Corridor is the biggest lightwave project in the world. Part of this enormous undertaking occurred in a small central office in Metuchen, NJ

In-charge installer Phil Werner points lightguide cable at the camera. A flashlight was beamed into the other end.

An ancient Chinese proverb says that even a journey of a thousand miles begins with a single step. As far as the world is concerned, the first step of the Bell System's latest journey into lightwave communications, the epic 611-mile Northeast Corridor, was taken on January 23, 1980, when AT&T and eight Bell companies announced plans to construct the world's largest lightwave telecommunications network.

Scheduled for completion in 1984, the $100-million system will link the Washington, Philadelphia, New York and Boston metropolitan areas, providing ultramodern communications for some of the most densely populated areas in the country. The cable will also pass through the populous cities of Baltimore, Wilmington, Trenton and Newark.

Initially, the system's main route and branch extensions will carry up to 80,000 simultaneous calls over dozens of hair-thin glass fibers or *lightguides*. The digital light pulses carrying these calls will be transmitted at a rate of 90 million bits per second. Later improvements are expected to double and then triple even these enormous speeds and capacities.

The Northeast Corridor's first step — the announcement — was largely ceremonial, but the many rapid-pace steps taken since have been more concrete. For one thing, Western Electric became supplier of Phase I—the New York-to-Washington portion. Part of that phase is illustrated here. This particular step was the installation of repeaters in a Metuchen, N.J. central office for a New Jersey Bell branch that will tie into the Corridor.

Actually, as "in-charge" installer, Phil Werner pointed out, the proper name for the units his group is putting in is not *repeaters*, but *regenerators*. This is because the light pulses reaching one of these units after being weakened by four miles of travel through lightguides are recreated or regenerated by tiny lasers. This capacity for regeneration, incidentally, is one of the advantages of digital circuits. It means that voice, data or picture signals start fresh at every repeater point so that, even after journeys of hundreds of miles, the signals are as strong and "clean" as new.

Werner, who joined Western Electric in 1970 right after coming back from Viet Nam, has been an installer for most of that time. "I like the title of 'installer'," he says emphatically, "but the job sure is changing. Everything is becoming smaller and faster. Technology is exploding all around us, and you have to learn to think differently.

"For example," he adds, "the days of the big one-to-one-and-a-half year jobs with massive installation crews are gone forever. Jobs are much shorter now. We get intervals nowadays like 58 hours to put in a frame. That's because, as the equipment gets more and more modularized, installation gets more and more efficient."

Interestingly enough, Metuchen is Werner's first lightwave job. Emulating Johnny Carson's straight man, we asked, "How different is it?"

"Plenty," said Werner. "For one thing, the frames are only seven feet high compared to the 11 feet, 6 inches for most of the other equipment in here." And, sure enough, looking around the neat New Jersey Bell office, we could see that the two frames Werner was working on were dwarfed by the No. 5 crossbar and carrier equipment frames towering over them on all sides.

Another big difference is in the cable forming of the bright orange lightguides. "You can't handle lightguide fiber and cable the way you do copper wire," says Werner. "The radii of bends and turns have to be exact. If you make too extreme a turn, you can cause optical loss. What's more, the requirements for single fibers and for cables are completely different."

There were other differences as Werner pointed out, but, still, watching him and his two-person crew of Bill Brown and Jackie Viviano at work, it was clear the job was in good hands and going well. Nor was it any surprise a couple of weeks later to hear it had been finished in top-notch fashion and right on schedule. WE

Lightguide cables are made up of ribbons like the ones Bill Brown is installing here.

On Your Mark

By Elizabeth M. Perlman

Kris Bankes gets to see a lot of the world – most of it when she's running in marathons

Reading, Pennsylvania provides the back ground for Kris Bankes, who trains for races by running after work each evening in and around her hometown.

When Kris Bankes says she's going to run right home from work, she's not talking figuratively. Kris, a mechanical engineer in the laser-package assembly department of the Reading Works, runs home every evening. It's eight or nine miles, depending on her route, and some of it is uphill.

When she's not running home or working at Western, Kris is often racing—and placing. She's a world-class runner. Unlike people who jog to sweat off a few pounds, Kris is invited, on the basis of her speed, to compete in international races. She has competed in Reading, New York, Boston, San Francisco, Los Angeles, England, and Germany. She uses her vacation days for racing and is sponsored by a sporting-goods company so that she can run, so to speak, around the world.

Her specialty is 10-mile races, but she's run several marathons and finished in competitive positions. In 1980, Kris ran a 10-mile race in just over 56 minutes. In the 1981 Boston Marathon, she ran the course in 2:51:37 and placed 33rd among the women. That's roughly 6.5 minutes a mile for 26 miles, 385 yards.

The subdued manner Kris has, the way she hardly flexes her muscles when she talks or smiles, the compact motions she makes with her hands as she adjusts a laser package, all bespeak an economy of movement that becomes striking when you see her run. Her stride is long—especially for someone who is not quite five foot five—she's off the ground a good deal of the time. She places her arms close to her body and clenches her fists to lengthen and improve her stride, not fight it. She moves from the torso, head up, all four limbs working together. Her whole frame is one forward-moving force.

Like many competitors, Kris speaks of racing in terms of personal achievement. "I'm usually concentrating on my own time and on the clock, and it's more fun to be with people. I'm not always trying to be the 'best'—I don't have to win every race. But, if I feel good and relaxed and am running a good race, I'll go after people who are ahead. That's the fun of racing—running a good run while running for a reason."

Kris started running when she was in high school and joined the track and cross country team in college. "There wasn't a cross country team for women until 1974 when I started at Penn State," Kris explains, "so I joined the team and we competed against clubs in the area."

Kris thought of majoring in math at Penn State, but her father suggested majoring in engineering. "He convinced me that there would be greater opportunity in engineering and that I'd be able to do more with that degree. I worked at Western during the summer before my senior year and liked it, so here I am three years later, a mechanical engineer."

Kris is a member of a "Western Electric family." Her father, Bob, has worked at the Reading plant for 25 years, and her sister works there too. Bob Bankes drives Kris to work each morning so that she doesn't have to bother with her car in the evening when she runs.

With characteristic modesty, Kris says, "I guess I'm lucky to have found something I like to be good at." She adds, "I'm also lucky to work with people who encourage me—on the job and before a race. I've found a good balance between my job and running. I get to see a lot of the country and I like my job at Western. I guess I'm just lucky." WE

As Pat Gift looks on, Kris examines a laser package to ensure that it will be a high-quality product.

Saving Energy

By Patrick Barr

Talking about saving energy is one thing. Doing something is another. These three WE employees did something

Energy is a popular topic these days, but to paraphrase Mark Twain, everybody is talking about it, but not enough people are doing anything.

We described in the May-June 1981 issue of WE our company's successful programs. This issue we focus on some individual employees who are doing things on their own to come up with unique ways to ease the drain on this country's financial and natural resources.

Burning Wood Instead of Oil

In Howell, Michigan, for example, the oil truck doesn't stop at Hal Pepin's home anymore. The driver knows he's no longer needed — since Hal and his family realized their search for fuel independence. It was a search sparked by necessity.

"We used to average 2,000 gallons per year," Hal recalls. "When I realized that oil had jumped to 60 cents from 14 cents, that was the turning point."

Winters can be severe in Howell, near Plymouth. Hal remembers a bitterly cold month a few years ago when the temperature went to minus 15°F a few times, and he had to burn 600 gallons of oil in just that one month.

That's when he shut off the two-sided fireplace they had been using to supplement the oil heater, and installed a Franklin stove in the living room. In no time his fuel bill was cut in half.

"The fireplace was only heating one end of the house," he says. "Once we put in the stove and realized how warm we could be and not burn so much oil, we said 'Gee, why didn't we do that several years ago?' "

But still they weren't satisfied. There was the nagging thought that if he could only get something to help the furnace heat the water, he could heat the entire house without oil.

He found something to fit the bill in a town 20 miles away. It was a regular wood-burning stove. Inside, a cylinder of circulating water was hooked up to the boiler. Water circulates through the cylinder where it is heated and then stored in the boiler. It is a more efficient method of heating their 3,500-square-foot home. What's more, they wouldn't need the Franklin stove anymore.

"Now, we burn no oil at all," Hal says proudly.

Hal, who has worked at our Michigan Service Center for the past 28 years, lives with his wife Mary Ann, and son, Bob, on a heavily wooded 20-acre parcel of land. They all cut wood — oak, maple, beech — and strive to keep a two-year supply. "It's a lot of work," he says, "and it isn't easy."

Having a large supply of wood is not enough for the Pepins. They keep trying to make their heating system even more efficient. They sealed windows, installed a storm door over the patio door, and added another six inches of insulation in the attic — and they're still looking for more energy-saving ideas.

No More Garbage

One chore that Doug Woodward has eliminated is taking out the garbage. There just isn't any. He recycles it all.

"Recycling is a matter of awareness and establishing practical habits that can be maintained beyond the first surge of enthusiasm," he says.

Not only are Doug's recycling habits many, but they have been sustained over the years.

Organic garbage goes into the garden as compost.

Paper is sold.

Glass is crushed, stored in galvanized garbage cans and sold to Owens-Corning at 1½ cents per pound.

Aluminum cans are flattened and sold to Reynolds at 33 cents per pound.

"Saving up for a practical load may take me a couple of years," he says. "This is largely a result of my buying habits which are directed toward reusable, rather than one-way containers."

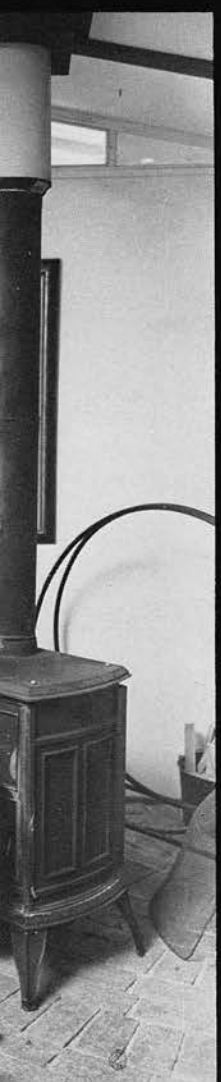
Doug lives in Lilburn, and is a development engineer at our Atlanta Works, with 20 years of company service.

"For me," he says, "personal energy-saving measures tie into my lifestyle and philosophy. What makes good sense in assuring that my children and society have a reasonable future, is also a benefit to my pocketbook in day-to-day living."

Too Much Glass

Seven years ago, when Don Pote had his ranch-style house built in Watch-

Hal Pepin gathers an armful of logs from his two-year supply. It required a lot more work than a squirrel hiding away nuts, but for Hal and his family it spells energy independence.



RIGHT—Don Pote designed the fireplace and installed the stone facing himself. Some heat from the fireplace dries the logs which he stores in the space to his right. Heat enters the room through the vents just above the storage.

LEFT—If it will burn, Doug Woodward will feed it into the stove he installed in his living room. He designed and built the brickwork on which the stove stands. Everything gets recycled.

ung, New Jersey, energy conservation was not a major consideration in the design. The esthetic appeal of large windows and high ceilings was more important — and therein lies the problem.

"It is not the most energy-efficient type of construction," Don admits, "because of high heat losses through the large window and roof areas."

When the price of fuel escalated Don knew it was time to do something. "For me it became a challenge to see what could be done to reduce energy consumption on a personal level," he said. "Not only could this help reduce an increasing expense, but I would like to believe that in some small way it would also help to limit U.S. dependence on imported oil and its attendant impact on inflation."

It wasn't difficult for Don to get into the energy-saving frame of mind. "Since I was born and raised at the tail end of the Great Depression," he said, "it was natural for me to expect that one should conserve and not be wasteful. For the most part, this philosophy has carried over into my own family life."

Don, who has been with Western Electric for 22 years, is a Product Planning and Engineering Manager in the Product Line Planning and Engineering organization for purchased products in Springfield, New Jersey, about seven miles from home. He lives with his wife, Joan, and their three children, Jeffrey, Stephen and Deborah.

Using his engineering background, Don conducted a methodical study of energy conservation devices and procedures currently available, weeding out those he didn't consider practical or cost effective.

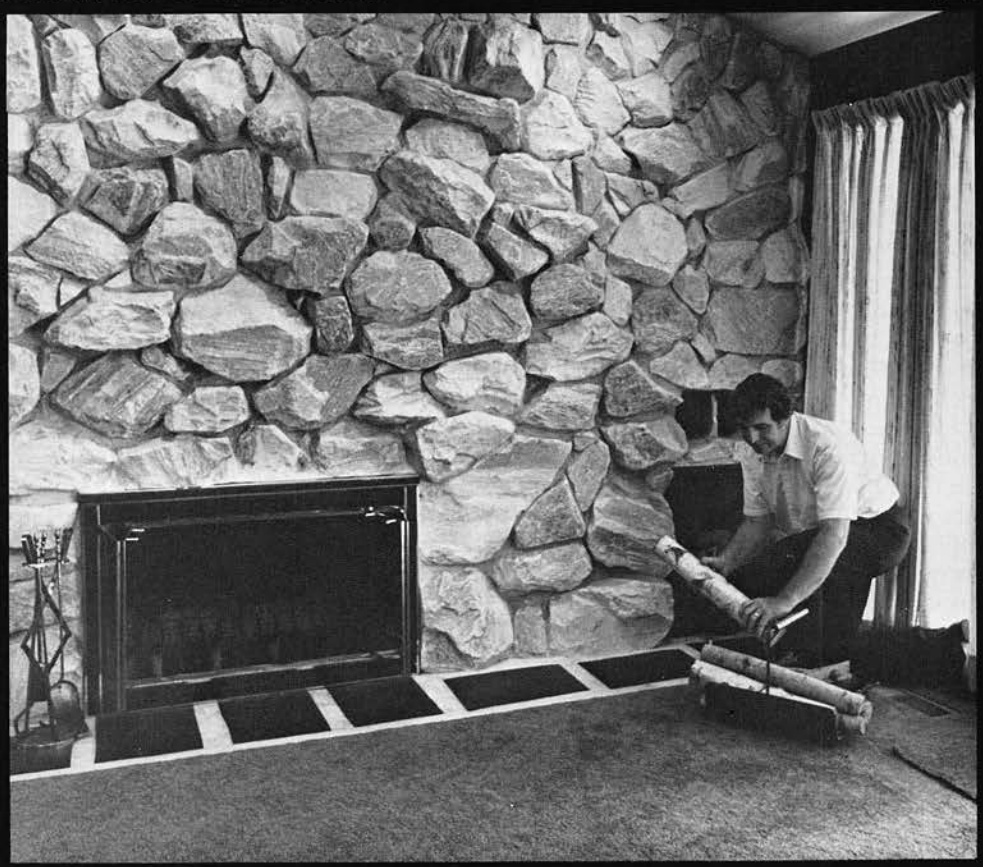
He installed additional attic insulation; gradually adjusted the thermostat down; installed a night/day thermostat timer; installed furnace flue dampers and insulated hot air ducts. He also had the benefit of a "Heat-O-Lator" fireplace which, unlike regular fireplaces, captures a portion of the heat that would normally escape up the chimney.

In addition he had all the doors sealed, insulated water lines and the hot water tank, kept drapes open during sunny winter days and closed them during the evenings and on hot summer days.

Don admits that not every device installed nor every procedure followed was a resounding success. "Nevertheless, overall results are what count and, judging from these, I would say that it was definitely worth the cost and effort."

And Don isn't finished yet. "I'm considering a host of other possibilities, including solar heating, all of which will come at the proper time when economically feasible," he said.

"With the cost of natural gas destined to rise in the near future, that time may be sooner than we think," he said. WE



Defensive Driving

A lot of people–including some Pioneers–teach defensive driving courses. Taking one could save your life

I decided on a frontal approach: "Why should I take a defensive driving course? I've been driving for more than 40 years without an accident. I've driven in all kinds of weather, in every state in the union and some foreign countries, on every kind of road surface imaginable, even in some places where there were no roads at all. What's it going to do for me?"

"Obviously, you're a defensive driver already. Nobody can survive very long on today's highways without driving defensively. But that doesn't mean you have nothing to learn."

I was talking with Paul Sonntag, senior engineer in the Environmental Health and Safety organization at Atlanta Works. For the last two years, Paul has been chairman of a Pioneer Educational Committee and in that capacity has been the mainspring of the Chapter's Defensive Driving Program.

"I've been teaching the course in various places for about 10 years," Paul continued, "and every time I give it, I learn something or my memory is refreshed on something that was beginning to fade. That's the main thing. It's not so much that people don't know or haven't been taught. It's more that they've become sloppy in their driving. When they first start out or when they take a course like this, they're very alert and gung ho for six or eight months afterwards. Then, if they haven't had an accident, they begin to get sloppy. Every time I pull out on the highway, I'm amazed at how sloppy most drivers are."

When people talk about accidents, they usually talk in terms of who's to blame. But after the accident has happened, it's really too late. A much more practical approach is to look at accidents in terms of "How can I prevent the next one?" The best way to learn about safe driving is by studying accidents.

The Defensive Driving Course is part of a national program designed to prevent accidents. It is built around two key ideas:

- A preventable accident is one in which you failed to do everything you reasonably could have done to prevent it.
- Defensive driving is driving to prevent accidents in spite of the incorrect actions of others and adverse conditions.

Over the years, some 12 million people have taken the Defensive Driving Course—in this country and abroad. There are more than 30,000 authorized instructors. You can put those figures up against what they are combatting: 52,000 deaths involving motor vehicles in a typical recent year and more than 2 million injuries.

A number of Pioneers at Atlanta Works have been certified by the National Safety Council to teach the Defensive Driving Course (a few Future Pioneers, too). There are similar programs in many other Pioneer chapters around the country. In fact, the Atlanta Works picked up the idea from the Southern Region whose program goes back many years.

Initially, a group of WE people were trained as safe-driving instructors and they in turn conducted classes for several hundred people at the plant. "We'd like to have everyone authorized to use a company vehicle—not only take the course, but go through it again every two years as a refresher," says Paul. "In view of the personal cost and heartbreak involved in a serious accident, the time and money invested in the Defensive Driving Program is well worth it."

Besides Paul, others from the Works who frequently serve as instructors include Aubrey Duke (the future Pioneer), Dick Eier, Dan "Jake" Jakubowski, Bill Leonard (current Chapter President), Bob Light, Jim Luerssen and Dave Mitchell (BTL).

A course consists of eight sessions of one hour each. It is entirely a classroom situation. There is no actual "behind-the-wheel" driving involved.

The Atlanta Pioneer course uses materials developed by the National Safe-

Bus driver supervisors listen attentively as Paul Sonntag lectures on defensive driving.

ty Council and purchased through the Georgia State Council.

These materials provide the bare bones. Local incidents and driving conditions and the experiences of the participants all help fill in the flesh of the program.

In addition to the defensive driving classes conducted at the plant, the Pioneers have also been giving the course at local schools.

"The first two sessions are always the roughest," Paul says. "We get a lot of referrals. These are people who have been caught breaking the driving laws and as part of their sentence the judge has ordered that they must take a defensive driving course.

"They're often very resentful and it's not easy to bring them into the mainstream of the group.

"Another problem is the show off. We usually have one of those in every high school group, and his main purpose is to impress the girl friend he's brought along with him.

"Most of the kids in a high school program do not yet have their driver's licenses," Paul said, "so the motivation to learn is strong. Also, completing the program can mean reduced insurance premiums, which is another major incentive."

"What's the breakdown between men and women?" I asked.

"I'd say it's close to 50-50," Paul said. "I think women are still a little more prone to listen to ideas, but since everybody drives nowadays, the old image of the macho driver is no longer exclusively male. We get some aggressive female drivers, too.

"Very often the mild retiring person in the classroom becomes a tiger out on the road."

"What can you do to prevent that?" I asked.

"You prevent it from causing you difficulty by being aware of it—and by driving defensively.

"Take tailgating, for example. That's clearly an aggressive act. What we say is: 'slow down.' This opens up the interval between you and the car ahead in case you have to stop in a hurry. It also gives that character behind you an opportunity to pass, which is probably what he wants to do anyway.

"We used to talk about maintaining so many car lengths between you and the vehicle ahead," Paul said, warming up to his subject. "Now we talk about the two-second rule. You try to keep at least two seconds behind the car ahead. Once you get the hang of it, you can figure out quickly and correctly where you should be. What I do is look for a definite marker for the car ahead to cross, like the shadow from an overpass. As soon as he crosses that line, I start counting one thousand and one, one thousand and two. If I haven't finished counting by the time I cross the same shadow line or pass the same marker, I'm too close and I slow down."

"What are some other hazards?" I asked.

"We do get into the danger of drugs —the predominant one is alcohol, of course. But a lot of people tend to forget about medications that can cause drowsiness or slowed reactions. They think of them as innocuous, but they aren't always when you're driving. Cough syrup, antihistamines and pain relievers are examples.

The photos with this story were taken during a rather unusual class in Lawrenceville, Ga., about 15 miles northeast of the Works. Lawrenceville is in the center of Gwinnett County, home to many hundreds of WE families. The Pioneers had given the driving course to a number of students at Parkview H.S. in Snellville and Jim Steele, Superintendent of Transportation, asked that they put on a program for the maintenance and bus-driver supervisors. The county has 376 vehicles and hundreds of drivers, for whom it conducts very extensive training programs. But according to Steele, a driver is never too well trained. He was looking at the films, visual aids and various handouts with an eye to adapting them for the county's own programs. The response from such a professional group was considerably different from the response in a high school class.

Snow is not normally a major driving problem in Atlanta, as it might be in Minneapolis, but it came up in one of the defensive driving discussions. One of the transportation supervisors recalled, "We'd gone up to Indiana a few years back to pick up some new buses. On the way home, we ran into a blinding snowstorm in Kentucky that put the fear of the hereafter in all of us. I could have converted the whole bunch, if we had stopped to hold a prayer meeting." G.G. WE

Let's call them the Rhodes family. That's not their real name, although the story is based on fact. Let's call the place Pleasanton. That's not the real name either; it could be anywhere in the continental United States. None of the people involved was employed by Western Electric. But several could have been. That's the point of this whole piece.

It was five A.M. on a Saturday morning in the late fall when the accident occurred. Nine persons were killed. The car in which they were traveling crossed the median strip, tore through an overpass guardrail and hurtled 60 feet through the air. It landed upside down on the ground below.

None of the car's occupants survived to explain what happened, but highway police and local newspaper reporters reconstructed the final hours of the family.

They had set out on their vacation trip at midnight in a rented car. Barney, the father, had hoped to get a much earlier start, but his oldest daughter (13) was playing in a championship basketball game and it would have broken her heart to miss her moment in the limelight. So, they had to wait until the game and ceremonies were over. Also, Barney was tired from having worked all day.

Barney, Jr. (21) said, "No sweat." He claimed he was in tip-top condition, able to drive all night. Besides he had two buddies with him in the front seat, Jack (19) and Don (21) who'd keep him company. His parents and the four kids could all tune out.

They'd been traveling for five hours and had less than an hour to go to their destination when the accident happened. The officers estimated that the car had been traveling between 80 and 85 when it ran off the road. They concluded that the driver had dozed off because the car traveled 330 feet on the grass median before the brakes were applied. The skid marks ran right through the guardrail.

Could that tragic accident on the interstate have been prevented? Possibly. Probably. What did they do wrong? Just about everything.

If you've taken a Defensive Driving Course, you may recognize this case history. It's a discussion starter from Lesson 3. It's designed to elicit comments on do's and don't's, such as:

Don't start on a long trip late at night, after putting in a full day's work—especially in an unfamiliar vehicle. Start early when the driver or drivers are fresh. Don't cram people in. Hold the speed down. Almost half of all highway accidents involve automobiles traveling at speeds in excess of posted limits. Almost half of all fatalities occur after sunset.

Untitled

"Interesting composition. Compeling mood. Not your typical stiff landscape. Muted tones show sensitivity. An intimate approach to a bend in the road, which gives it a certain charm."

Mary Cornelius
Kansas City Works

A PERSONAL VISION

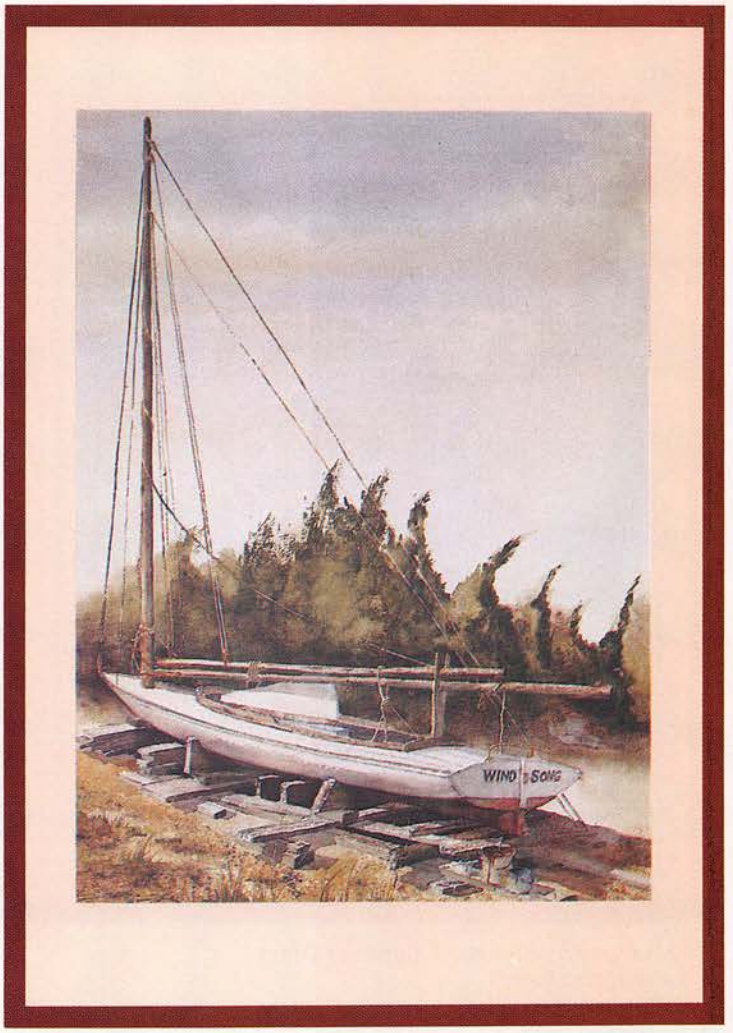
Almost anything can be brushed up on canvas

When we sent out a call to all locations last fall for pictures painted by WE employees, we thought we might get a dozen, maybe 20 at the outside. We actually received several hundred, most of which were of exhibition quality. We had to select seven, and it was obvious we needed professional help. The old cliché: "I like what I like" was inappropriate.

We gathered together the Polaroid® prints and color slides we had received from around the circuit and took them to Robert Raphael, himself an artist and professor of art at Pace University, who let us know that photographs were not the best way to judge original paintings. Which we knew. But there was also no way we could get to all the locations either. Which he conceded.

Prof. Raphael makes a determined effort to avoid the trite. He also speaks very rapidly, in bursts of thoughts as our captions indicate. The criteria he used in narrowing down the collection to the few shown here were evidence of a "personal vision and personal style." After spending a day with Prof. Raphael we understood what Amy Lowell meant many years ago when she said: "Art is the desire of a man to express himself, to record the reaction of his personality to the world he lives in."

Wally Kain
Guilford Center

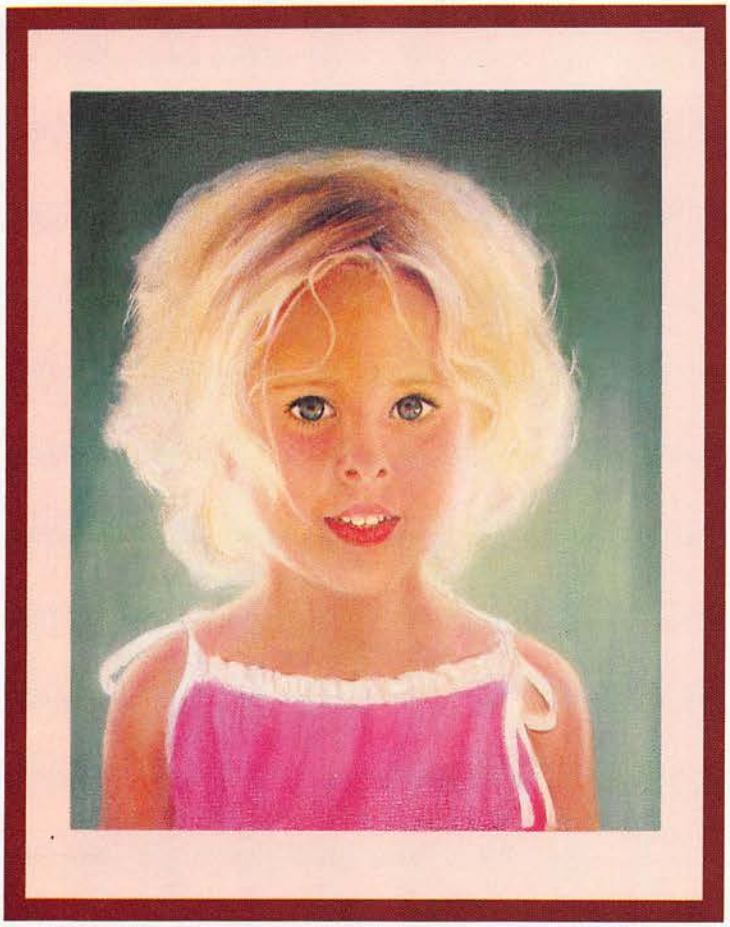


Drydocked *"Realistic, but not the cliché calendar picture of a sailboat. It is the personally observed perspective that I find attractive."*

Kay Behlert
New Jersey Service Center

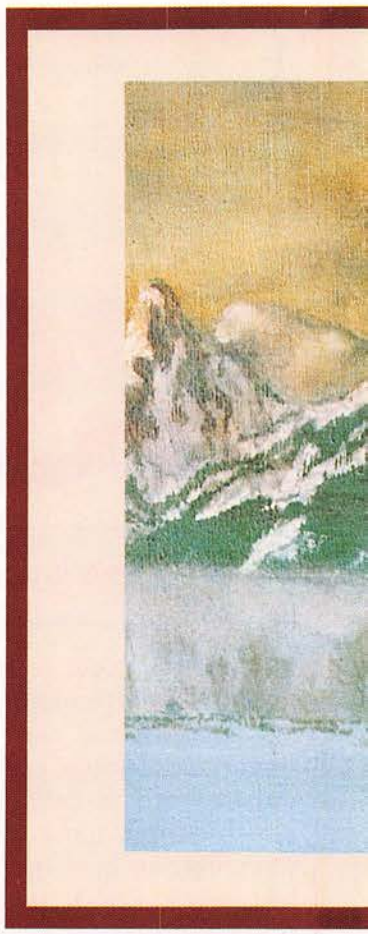
Andy Warhol and His Girls

"Provides a strong emotional statement about American society today —rather frightening. Shows how certain people feel about themselves. They seem stylish and yet bewildered at the same time."



Summer Glow

Celeste Bryant
Merrimack Valley Works

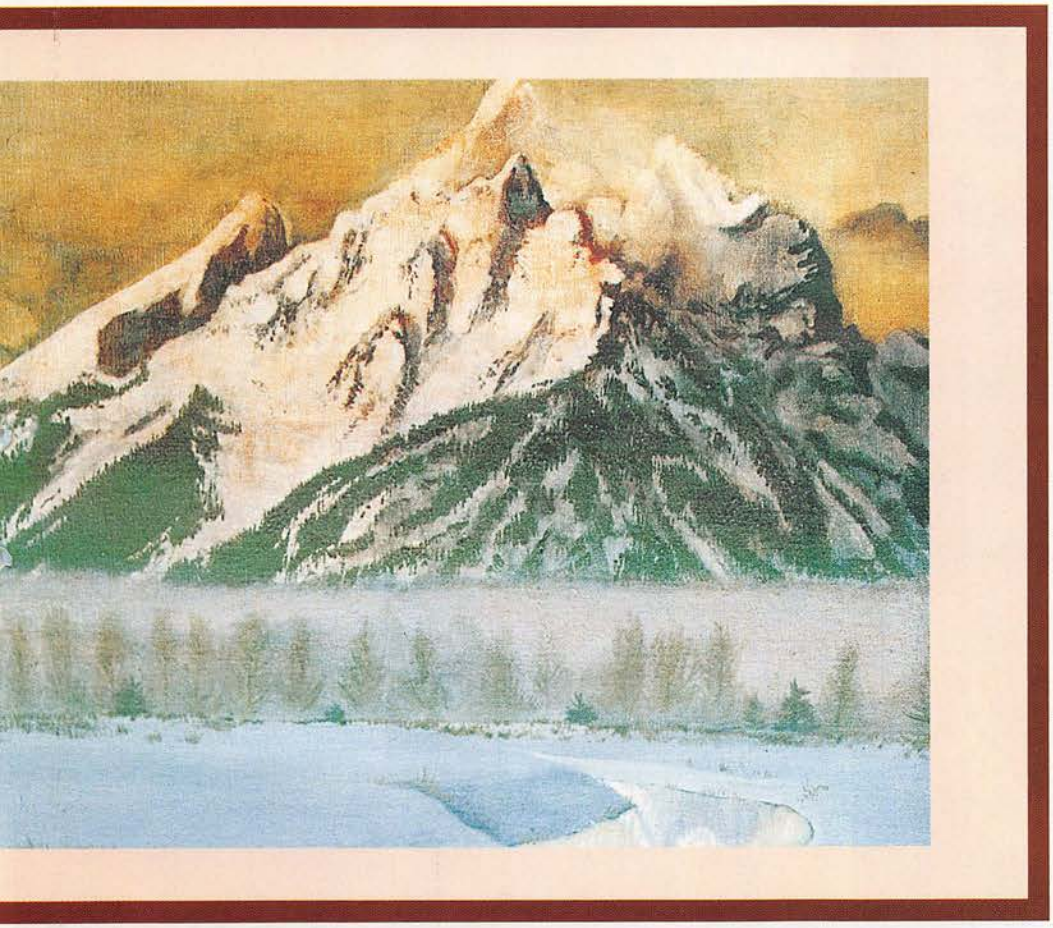


"This is nice and honest. It is a realistic head —not pretentious. The artist tries to faithfully reproduce a person's face."

Robert L. Bennett
Cincinnati Service Center

Glendale

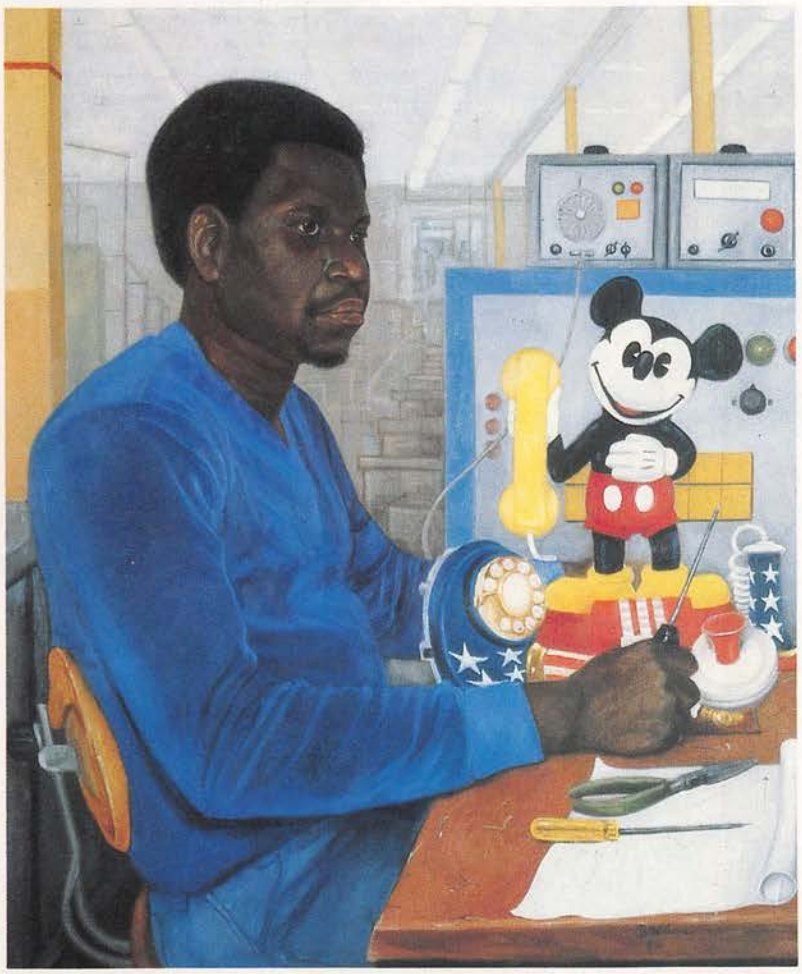
"This is expressionistic, as contrasted with realistic. The windswept railway station has a psychological coldness. The artist is not a slave to the way a thing looks, but shows how it feels. Confident brushwork. Judicious use of color."



Charles L. Cecil
Nashville Service Center

Grand Teton Range

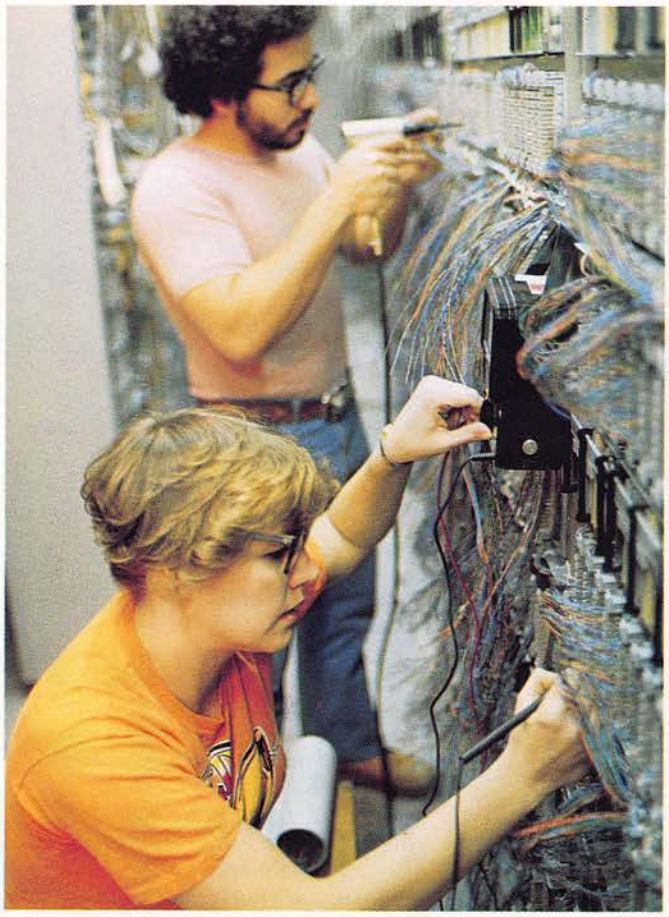
"He's made an attempt to do mountains in a very personal style, for which I give him credit. A strong effort to reconcile objective reality. He's confronted an actual mountain and tried to be faithful, but he uses color subjectively. Not a slave to what he saw, but he has also not violated the finite reality of the mountain."



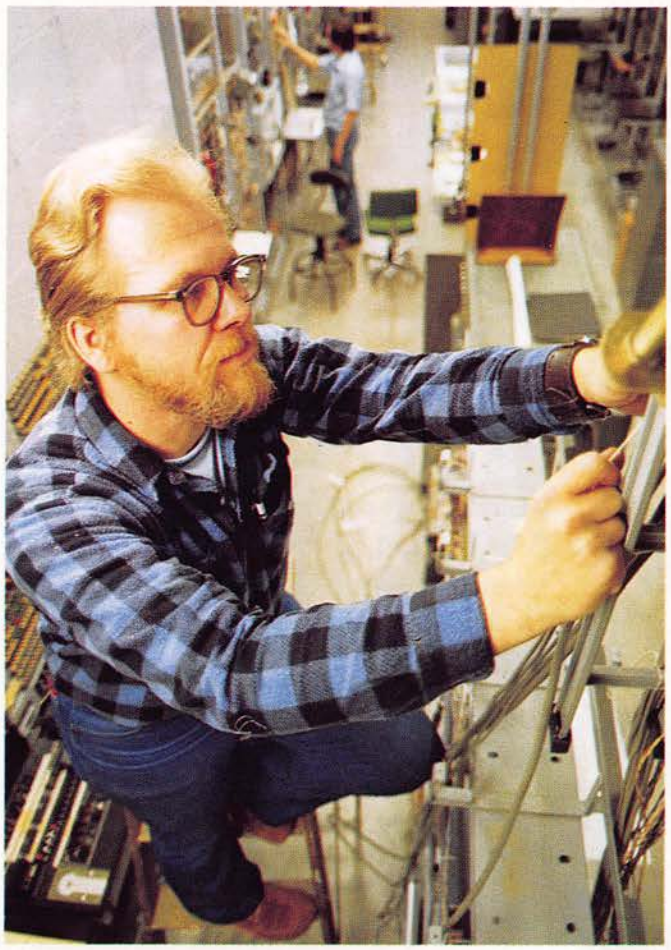
Bass Wilson
Nashville Service Center

Telephone Repair Technician

"This is a serious statement. Shows a lot of thought. Color is thought out, composition is thought out. A combination of skill and personal vision. The contrast between the man's serious expression and Mickey Mouse is startling and original. Something to think about."



LEFT—At O'Hare WE Installer Joann Musial is buzzing out cables and Luis Rivera, wiring connectors. RIGHT—Rich Kennedy is checking cable color codes for a frame being worked on. BELOW—Ted Gittings is fanning wires.



ABOVE—Charlie Weinschenk contacting the Installation Test Center while Dan Gaffney has them on the phone. Installer Paul Villringer is at master control in the rear. LEFT—In-charge Joe Zelinski is sewing power leads for a 24-volt converter. At the counter is IBT's Jim Sikora.

Installation

By George Gray
Photos by Joseph Gazdak

Installers are the final link in the long chain of supply that brings new equipment on line for Bell Operating Companies

On a typical day last fall, Western Electric's nearly 19,000 installers were at work at 3,500 different job locations, almost all of which were at Bell operating company sites. Some were working in downtown skyscraper telephone buildings, others were in one or two-story commercial buildings in the suburbs or small towns, and a few were working in remote mountaintop microwave repeater stations. Nationwide, WE installers work out of 329 base locations—which makes for some complicated logistics planning.

Some installation jobs are simple circuit modifications requiring only a few hours' work. Others, like the one shown in these photos, are major central office replacements which can require 40,000 hours or more to complete. Here, the frames are in. Wiring and cable is well along. Testing, which can account for 50 percent of an ESS job, has already begun.

There have been WE installers as long as there has been a Western Electric Company (see page 22). Their jobs are a very clear reflection of the times and the changing product needs of the Bell System. Although installers still skin wires, sew cables and buzz out connections as they have been doing for 100 years, the emphasis on activities has shifted dramatically, particularly since 1965, when the Bell System's first electronic switching system was cut over at Succasunna, N.J.

Today's installers are increasingly concerned with things like software, lightguide and digital data. There's a lot more electronics, which means somewhat less heavy physical effort. Although there are still a great many connections to be made at the site, much of the wiring is done at the factory, and increasing amounts of testing, even the all-inclusive systems tests, are now being conducted by installers from centralized locations.

Although we would have guessed that the figure was even higher from our recent travels, we're told that one third of all installation work is now electronic. That still leaves a great deal of work on common systems, crossbar, toll, carrier, radio and other installation services.

Almost all installation work is performed in "live" facilities, and activity is vulnerable to the potential of interrupting service to tele-

Customers don't want to hear about problems. They look to the installers to get these straightened out

phone subscribers. Even trivial errors can lead to service outages. Installers have to be trained and vigilantly alert to possible dangers.

No two installation jobs are ever exactly alike, so there's no such thing as a typical job. The one shown here, however, does reflect some of the trends. It's a major job recently completed at the Illinois Bell Office at O'Hare Airport, about 18 miles from the downtown Chicago loop. On a clear day you can pick out the Sears tower and other skyscrapers on the horizon.

The new #1A ESS office replaced a #5 Crossbar switching machine that was installed when the airport was under construction 20 years ago. There were 139 equipment frames in the package. The job started on November 10, 1980 and was completed on August 9, 1981.

The crew under the supervision of Dan Gaffney, who celebrated 28 years of installation service just about the time that the job was finished, included 16 men and one woman. Three were away on the day we stopped by early last summer; one at a training program, and two working at another location. Installers do a lot of moving around on short-term assignments. Many have specialized skills and they are moved where they can do the most good. As for training, it is a vital ingredient. To become a tester at the top indices 4 and 5, can require 10 years or more experience plus

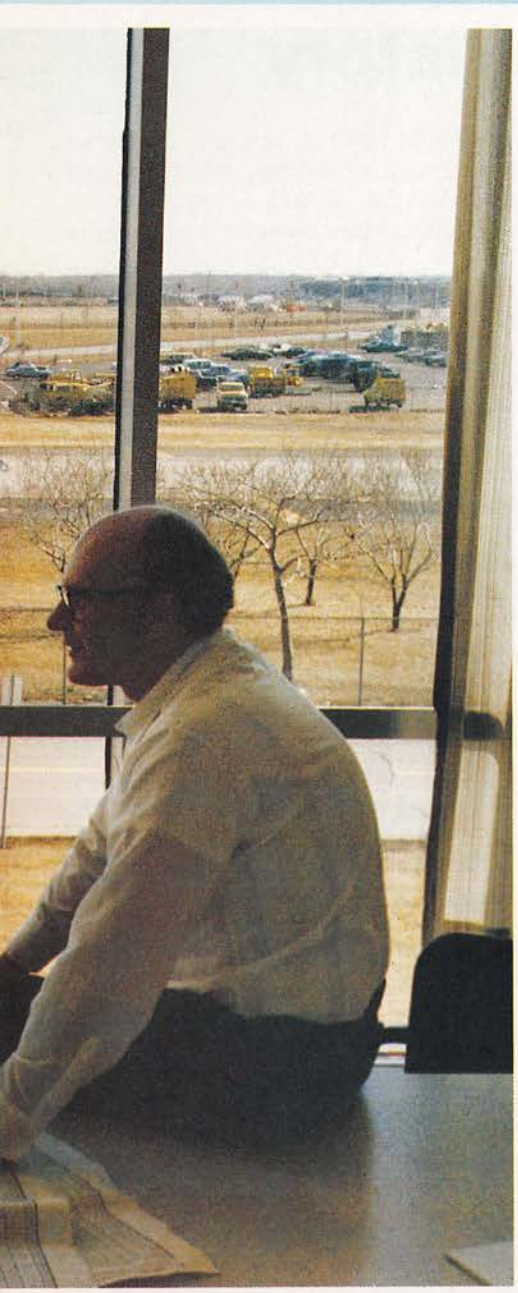
ABOVE—In the central office at O'Hare Airport, WE Installation Supervisor Dan Gaffney (left) discusses progress with Rich Raven (center), a foreman in charge of the IBT cutover crew, and Wade Henrichsen IBT Assistant Manager Crossbar. RIGHT—In the Installation Test Center at Rolling Meadows, Installer Dave Bryant talks on the phone about a job while Tech Supervisor Bill Hrody checks the CRT. Don Lundy in the rear is working with an entirely different installation. The center can service up to eight jobs at the same time.

classroom training.

At O'Hare, the 14 people actually on site at the time of our visit represented 202 years of installation experience; 60 percent of that experience was provided by five old timers —all completely committed to turning over a quality job to the phone company on time.

The determination, so obvious in the attitude of an experienced installer, derives in large measure from being the final link in the long chain of supply, starting with Bell Labs research, development and design, followed by WE purchasing and manufacture, that brings a new piece of equipment on line for Bell operating companies.

The WE installer is the person on



Centralized testing is a case of necessity being the mother of invention

the spot answerable to the "telco guys and gals" who often work in the next aisle. They couldn't care less that a supplier sent a gross of the wrong sized widgets or that a trucker dropped a crate and knocked everything out of whack. The customers at the working level —the telco technicians—look to the WE installer to get it all straightened out and working according to the book before turn over—and they have a memory like an elephant for anything less than perfect.

The quality of Bell Labs' design and the manufacturing expertise of our factories are two steps in the process. The installer's personal concern is a third vital ingredient in making the Bell System's switched network one of the true wonders of the modern world.

Installation testing has been undergoing profound changes in recent years. There was, of course, a major change with the advent of stored program control, when we went from simple buzzing out of connections to load testing offices—in effect simulating the total operation of a switching machine at its busiest time. The latest innovation is centralized testing; that is, locating the systems' testers in one centralized spot miles removed from the office being tested.

The centralized test idea is a case of necessity being the mother of invention. First of all, there is a national shortage of qualified systems' testers. It takes a great deal of time to train a systems' tester. Next, the equipment needed for conducting a systems' test is expensive and, while

"portable," requires considerable care in moving. Third, reference materials are constantly changing and very difficult to keep current in the field, and fourth, it helps avoid transferring some testers away from their home locations.

The trial of the centralized test concept began in the summer of 1979. A new 1A ESS office was being installed in Los Angeles. It was system tested by two installers working 2,000 miles away at Rolling Meadows, Ill. Access was provided by the regular telephone network with two lines: one for data and the other for voice. The data line hooked into the ESS office, which was to conduct the tests, and into a Dataspeed® 40 terminal which provided printed copy as well as a means for inputting data. The voice line was used for consulting with the installers on site.

The test procedures proved highly successful. It made possible a centralization of expertise as well as a reduction in travel time and expenses.

As many as eight jobs could be tested simultaneously in a centralized location. Testers could readily consult with each other on the basis of up-to-the-minute documentation.

The ITC (Installation Test Center) at Rolling Meadows became the prototype for centers in all regions. At present, there are 102 positions fully operational in the test centers.

In the same ITCs, another profound change is shaping up under the acronym SCANS (Software Change Administration). In effect it is now possible for installation to update the generic computer program of an electronic switching system office remotely. Generic programs for ESS machines provide basic intelligence for setting up switching paths through the telephone central office. The necessary information is fed into a data line and monitored on a Dataspeed 40. At the telephone central office the change information goes into the ESS memory banks and updates it as required. It is truly a case of one computer telling another computer how to "get with it." WE

Installation History

More than 100 years ago, in 1880, a young man named Charles G. Brady began work as Western Electric's first telephone switchboard installer. In fact, for his first five or so years with the company, Brady was *the* switchboard department.

Literally a one-man operation, the installation job in those early days had Charlie based in a small room in the Clinton Street plant in Chicago where he built and wired the first switchboards. Then he would pack up himself and his materials and head for the job site to install the equipment.

In the century since, installation at Western, like the rest of the Bell System and all of industry, has undergone rather drastic changes and growth. Today, there are thousands of Charles Bradys installing hundreds of new communication systems across the country every day; Western Electric installers who put our products to work for the operating companies with the same dedication, if different job descriptions, as Brady and his eventual handful of colleagues did during the 80s and 90s.

But despite the incredible technological sophistication that distinguishes Western Electric's products and services in 1982, installers today face many of the same basic problems that Brady did a century ago. The volume of work has indeed increased phenomenally, and the equipment is installed quite differently from the first standard switchboard. But has the job really changed all that much?

Maintaining quality, meeting operating company deadlines without sacrificing that quality, keeping costs low, dealing with material shortages and late shipments are some of the major problems and concerns facing today's installation supervisors. These concerns are not terribly different from those expressed by Enos Barton (then WE Vice President and chief operating officer of the company) in a letter to Brady dated 1886. (See opposite page).

Other aspects of that job, however, have changed considerably. Much of the actual installation in the early days was done by "locals" hired by WE's road foremen when they arrived at a given installation site. When George Hopf, one of the three men who joined Brady on the WE installation force in 1886, supervised the installation of the first big switchboard in the West, the bulk of his crew was from St. Paul, Minnesota, where the board was installed. A local man was hired to hoist sections of the switchboard to its third floor destination and a town cabinet maker was commissioned to fasten and fit the switchboard panels to the floor. Another 20 "local boys" were hired and trained to cut and butt cable, and skin and solder wire to jacks.

Road foremen like Hopf were very much on their own. In addition to hiring local teams of workers, they usually devised—and improvised—their own methods and poli-

cies. After installing, testing and inspecting the job, they were required to get a letter of acceptance from the telephone company approving the work. The competence and integrity of most of these pioneer installation supervisors was such that this was usually just a formality.

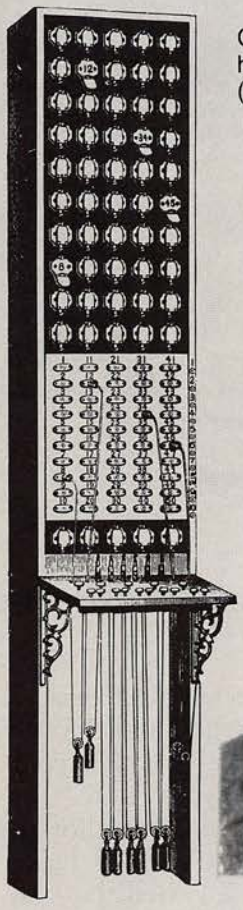
During the next 10 years, installation began to take on a size and character probably never anticipated by Charles Brady and his colleagues just two decades before. By 1903 there were 580 men in the installation organization, split between its New York and Chicago main offices. A short three years later, the Chicago side of the organization alone had more than 1,000 men working simultaneously on approximately 150 installation projects.

After a severe business decline that accompanied World War I, demand mushroomed. A personnel and training division was organized and schools were established in several major cities throughout the country to meet the needs of a rapidly expanding installation workforce. In fact, the telephone industry had expanded to such an extent that, by the early 1920s, WE's installation force totalled 12,000 people. Some 7,045 of those employees were located in the East and nearly 83 percent of that eastern contingent had less than one year's service.

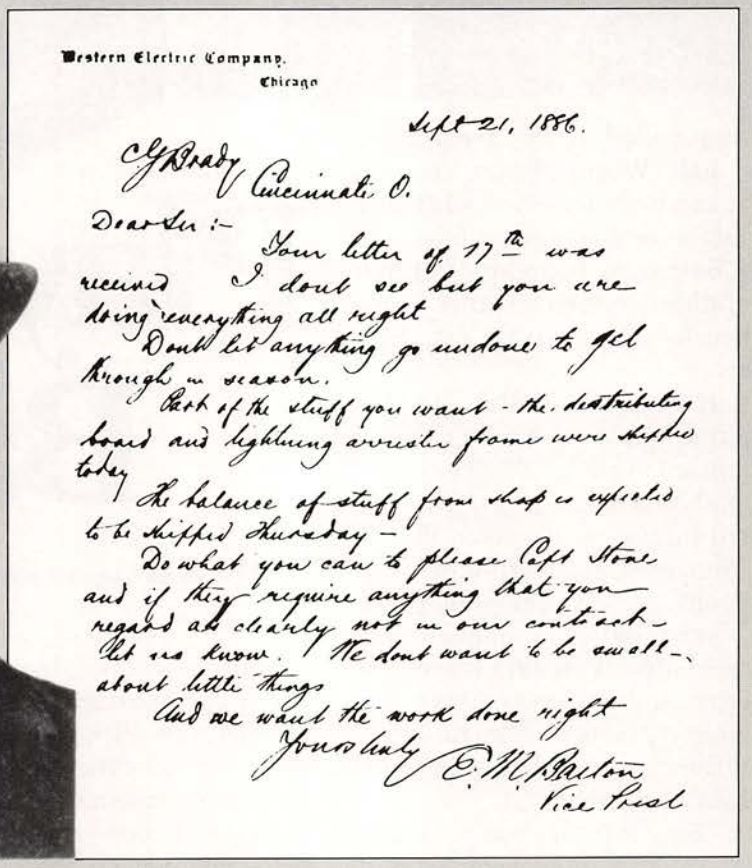
To provide the training, supervision, planning and engineering necessary to accommodate this expansion, installation was officially separated from manufacturing in December 1922 to become a separate department.

Today, highly trained WE installers across the country are putting in telecommunications systems that can do thousands of times the amount of work, in literally a fraction of the time as the switchboards of Charles Brady's day.

The pace at which this technologically advanced equipment can be installed is drastically changed as well. And its capabilities seem limitless. But no matter the changing times, our installers are still performing the same fundamentally valuable service that they always have—getting the products we make to Bell operating companies as efficiently and inexpensively as possible.



Charles Brady (BELOW) about the time he began installing WE switchboards (LEFT) and Barton's policy (RIGHT).



Western Electric Company.
Chicago

Sept 21, 1886.

C.J. Brady Cincinnati O.

Dear Sir:-

Your letter of 17th was received I dont see but you are doing everything all right

Dont let anything go undone to get through in season.

Part of the stuff you want - the distributing board and lightning arrester frame were shipped today

The balance of stuff from shop is expected to be shipped Thursday -

Do what you can to please Capt Stone and if they require anything that you regard as clearly not in our contract - let us know. We dont want to be small - about little things

And we want the work done right

Yours truly E.M. Barton
Vice Pres

Play Ball

Photos by Chuck Lewis

They called it the Beep Baseball World Series. It was sponsored by the Lighthouse of Houston under a grant from the Shell Companies Foundation. Eight outstanding regional teams came together for the playoffs last September.

Our team — the Dallas Bandits sponsored by the Mesquite Club of the Pioneers at Dallas Works—came in second by a whisker. They lost in the final inning on the third day 33 to 32 to a team from Albuquerque, also sponsored by Telephone Pioneers. One of our guys, Sal Guzman, was voted Most Valuable Player for the Series, and with two others, Joe Moraga and Johnny Guzman, made All Tournament, which is akin to All American in football.

Beep Baseball, if you've never seen it, or if you haven't seen it played in the past few years since "new" rules have been in effect, is a highly competitive sport. All of the elements of a thrilling contest are there—"the thrill of victory and the agony of defeat" as they say on "Wide World of Sports." But if anything, the concentration and determination of the blind athletes is more apparent than with sighted ones. The umpire keeps yelling at the fans to keep it quiet. Background noise can really louse up a play that wouldn't be easy to pull off even with 20-20 vision.

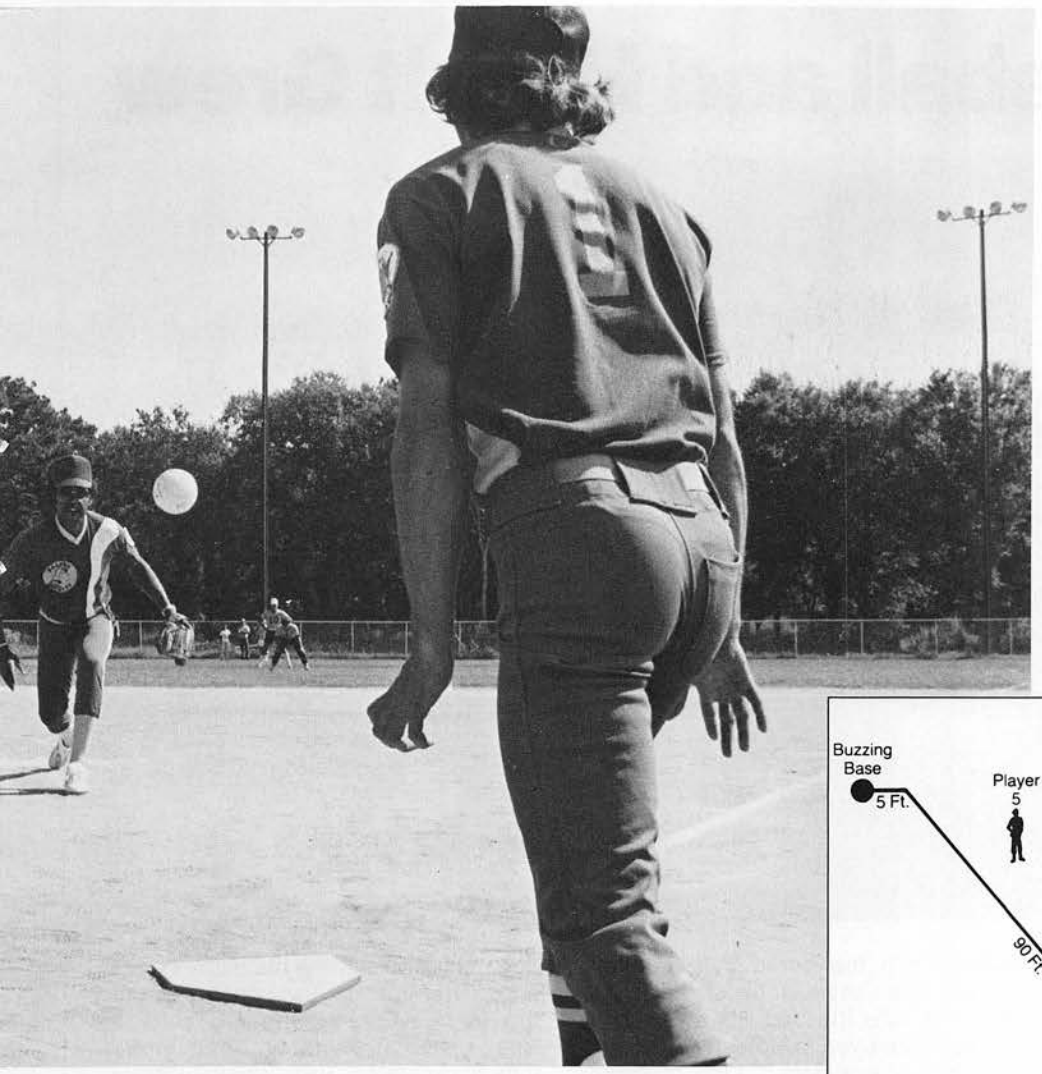
Abner Doubleday never dreamed of

Blindness comes in degrees. While the players, except the pitcher and catcher, are all legally blind and in daily life use canes and dogs to find their way around, some can distinguish shapes—except on the ball field. There, everyone wears a mask so that no one player has a sight advantage over any other.

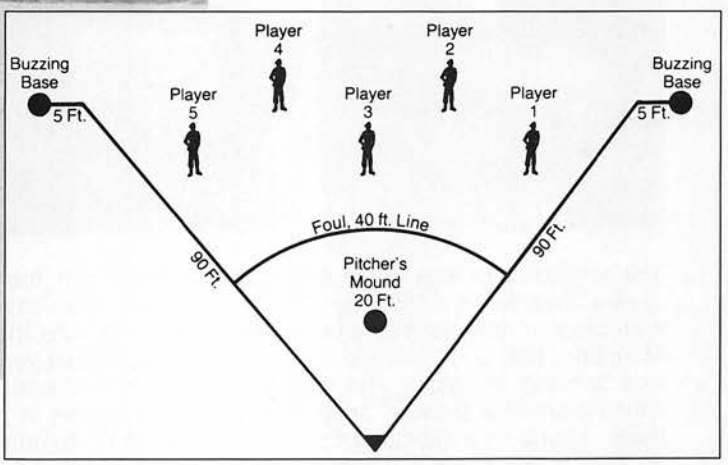
Try putting a sleeping mask over your eyes and then go outdoors and play ball. We've been involved with sandlot ball since we were barely able to walk and we were always blessed with good eyesight. Still we can't always hit the ball. Golf and tennis are the same thing. Keep your eye on the ball, they say. How do you do it when you're wearing a mask?

You do it by sound, but even more by timing and confidence that the pitcher will put the ball where you like it. One of the main differences between Beep Baseball and the Abner Doubleday variety, is that your pitcher throws to your team—for obvious reasons. A batter is allowed five strikes and two passed balls. There were very few strikeouts in the World Series, which is largely evidence of good pitching and a lot of batting practice.

The Bandits' pitcher is Ken Lucas, a programmer/analyst at Dallas Works. Ken was recruited by the team coach Ray Wiora, department chief in Information Systems. "When Ray mentioned it," Ken recalls, "I figured it would be some exercise maybe once a week. I went out for just one practice and I was hooked. It's fun and the guys get such a charge out of it. We normally practice three times a week—two or



LEFT—Dallas Bandits' pitcher Ken Lucas tosses underhand to masked batter Sal Guzman. As he throws, Ken says briskly, "Ready Ball," and if the ball is placed correctly and the swing is timed correctly, you have a hit. Catcher is Dave Herron.



Beep Baseball, but he would have loved it

three hours each time—at Spence Junior High in East Dallas."

According to our guide at the World Series Bill Kelley, president of the Mesquite Club, Pioneers provided the team's snappy blue uniforms. And Pioneers provide transportation. The team this year played in four tournaments plus a number of games with arch-rival Fort Worth, which meant quite a bit of driving.

Beep Baseball is not a kid's game as played by the Dallas Bandits. It's big league sports. The players range in age from Johnny Guzman (16) to Gilbert Cruz (58), who incidentally hit the winning run in the second game of the World Series.

Gilbert and Eddie Sanderson (37) are the only surviving members of the original Dallas team that became the Bandits when the Mesquite Club took up sponsorship in the spring of 1980. While they are not quite as fast runners as some of the players in their twenties, they are both sluggers. We've seen them hit the oversize softball 100 feet in the air and have it roll all the way to the outfield fence 250 feet away. Not too many sighted people in top shape can do as well.

Hitting the ball is mostly timing and practice. The pitcher stands 20 feet in front of home plate and tosses the ball underhand. He says "Ready. Ball," briskly as he throws and, if he's put the ball in the right place, and, if you started your swing at precisely the right instant, you connect. And the pitcher better duck because the ball is apt to come straight at him like a plastic-covered beeping cannonball. In the first game, Johnny Guzman caught Ken with a blast. If you hit the pitcher, it's a dead ball and the pitch is replayed. "I don't mind getting hit," Ken said. "What's tough is trying to pitch at the same speed and at the right height. After a couple of hours your arm feels ready to drop off."

Normally a game lasts about two hours. But the World Series, which brings together top teams from all over the country, lasts longer—four to five hours. And the scores sound more like basketball than baseball —68 to 57, 49 to 40. Coach Ray Wiora told us confidentially at the start of the first game, "If we can't get 15 runs ahead in the first inning, we're in trouble." They were 18 ahead at the end of the first, so we didn't see trouble. For their first round, Dallas had drawn the Braille Sports Foun-

Beep Baseball and How It Grew

At Merrimack Valley, Life Member Fred Jones discusses a design improvement for the audio ball with WE Toolmaker Jerry Garand. Other members of the crew shown here are Celia Russell, Julie Levesque, Winnie Bearce and Mary Reaney.

The original title was audio ball and it was invented in 1951 by Charlie Fairbanks, a telephone engineer with Mountain Bell in Colorado. Charlie had a blind daughter and the ball which emitted a steady "beep, beep, beep" sound was designed for her — so that she'd have a game to play with others.

It was a unique plaything but did not get widespread use until 1964 when the principal of the Colorado Springs School for the Blind came to the Telephone Pioneers with a request for an audio softball for preschoolers. Fairbanks' ball was brought out of storage and more work was done on it. Vernon Grimes of Colorado Springs inserted rubber potting compound into the ball with a hypodermic needle to provide durability.

In 1971, the Telephone Pioneers in San Francisco picked up the ball, so to speak, and invented a game it could be used in. Ralph Rock is generally credited as the game's creator. He devised a scale model of a baseball diamond where blind people could feel or "see" with their hands the location of the bases and where the players were to stand.

In 1972 a committee was formed in San Francisco to teach the new baseball game to the blind. Previous games with the audio ball had not exactly been show stoppers. In a matter of months the first Beep Baseball game was played in Golden Gate Park and a new era began. One of those early games in San Francisco led to national recognition. Hank Ketchum, creator of "Dennis the Menace," watched it and was so impressed that he drew a cartoon strip in which Dennis played the game.

The following year the game made it to the Baseball Hall of Fame in Cooperstown, N.Y. If you visit the museum, you can see a beep ball, a model of the playing field and listen to a recorded spiel.

In 1976, the National Beep Baseball Association (NBBA) was formed and from this group have come the new official rules. Until the new rules came out, no running was allowed in the game, for fear a player might get hurt. This made the game, in basic English, a pantywaist activity and not too popular with either players or spectators.

A team in Saint Paul, Minn., sponsored by the Braille Sports Foundation (BSF) brought about the change. While there may be a shortage of sight on blind teams, there is no shortage of will to win — in fact, that is the one thing you have in superabundance. Watching the expressions and listening to the cheers from the team when the umpire calls a runner safe have to be seen to be fully appreciated. BSF, anyway, made Beep Baseball a competitive sport.

The Telephone Pioneers who have been involved since the beginning serve as sponsors of many of the 100 or so adult teams now playing. And there are more than 55 chapters involved in the supply and distribution of the balls.

The balls themselves are assembled by life members of the Merrimack Valley Chapter of the Pioneers, and they can't turn them out fast enough. Last year they made some 1,700, which sounds like a lot until you consider the pounding that the transmitter has to withstand and the number of teams clamoring for them. Even an established team like the Dallas Bandits practices hitting with a regular softball. While some balls have lasted through an entire season, others need repairs after only one game. The same is true of the bases. Some that had worked perfectly all season needed repairs during the first inning of the World Series. The blind play to win — which is, after all, the only way to play any game.

dation (BSF) team, national champions for three years running. It was like drawing Notre Dame in the first round of a playoff. But our guys won.

You score a run in Beep Ball if you make it to a base located 90 feet from home plate. The base beeps also and you have to run to either first or third depending on which the umpire has activated. The base is a 4½-foot high beacon stuffed with foam rubber. You race toward it full steam ahead with arms spread out like a kid playing airplane. If you heard right and the crowd didn't make too much noise you knock it over with your arm. More than likely you'll run smack into it and go sprawling head over tea kettles.

"When I first started," a player told us, "I went out and bought gloves and knee pads and elbow pads. Everybody wears them. You learn to get by without the gloves but the other pads are vital."

While offense and scoring runs are interesting from a spectator point of view, the secret of a championship team is defense. The outfield is divided into five sections with one fielder assigned to each section. There are also one or two sighted spotters who can yell to position the players to go after the ball. The ball must travel more than 40 feet from home. A blooper that doesn't make it out of the infield is a foul.

In fielding the ball, the players run and dive toward the beeping ball. The idea is to trap it against their bodies. The ball is 16 inches in circumference and not all that easy to grasp with one hand. It scoots away easily, like trying to grab the ball in water polo. Usually the player traps the ball against his stomach while scrambling on the grass and then rolls over on his back to hold the ball upright with both hands. It's an "out" if you hold the ball up before the runner hits the base.

A grassy field is vital when you're scrambling to locate the beeping ball.

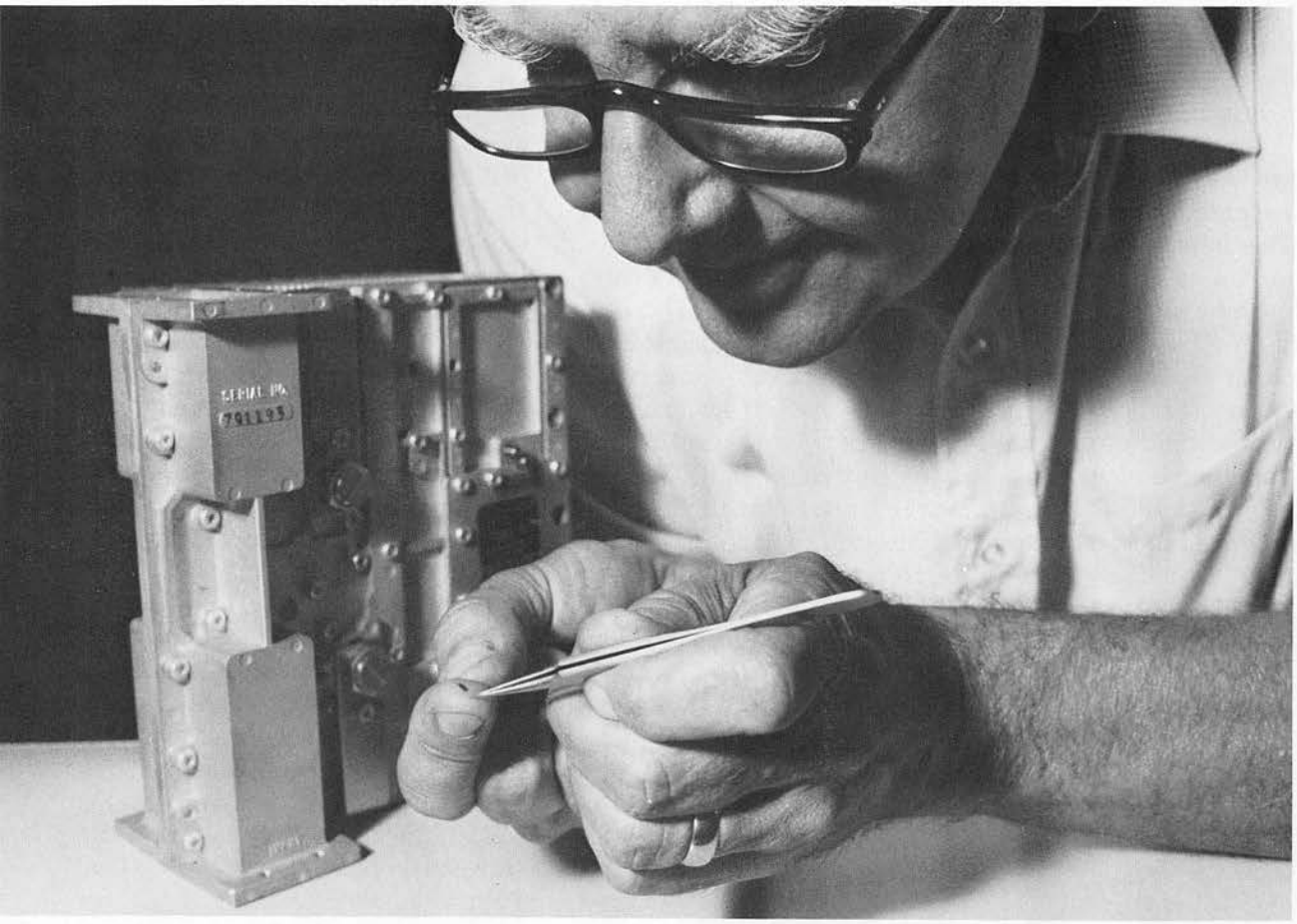
LEFT—Coach Ray Wiora outlines a strategy move with Johnny Guzman.
RIGHT—Charles Lott demonstrates the tricky art of blind base-running.

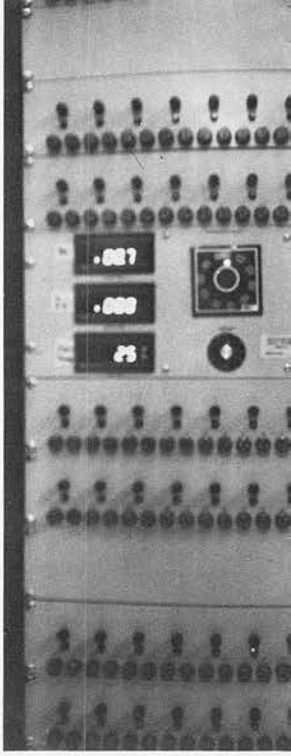
You definitely need a grassy field for Beep Ball—and dry weather. We were told about one game played on a dirt field after a shower. It was as close to mayhem as any of the players ever want to come.

The spotter tries to keep the fielders from crashing into each other, but in the heat of the contest they don't always succeed. Gary Odom, an engineering associate at the Works, is normally a spotter for the Bandits, but he was away on two weeks duty with the Marine Reserves. His place was taken by Leah Tubbs and Valesta Jones. Leah, formerly with the Lighthouse, was the person largely responsible for initially recruiting players for a Dallas team.

It's the little things that make the game interesting, however. We watched one player from an opposing team hit a magnificent line drive that rolled almost to the fence. But in his run he missed the base—perhaps it was the roar of the crowd—but our team had retrieved the ball before he could stop and make his way back. He was on the verge of tears, punching his leg in frustration, as he walked back, for having let his team down.

The coach wanted to pull Johnny Guzman out of the second game in Houston when he got the wind knocked out of him in the third inning. Johnny reacted as if the coach had suddenly abolished Christmas. The other players created a little diversion that gave Johnny a chance to get his breath back, and he stayed in. For Johnny, the game is more than fun—it's what golf is to the weekend golf nut, what tennis is to a hacker, bridge to a fiend and chess to a master. It's *the* game. WE





AT LEFT–Tiny chip on Engineer Dave Deysher's fingertip is the key ingredient in new solid-state microwave radio amplifiers.

Microwave Booster

Photos by Len Stern

Millions of telephone calls are carried as microwave signals. Tiny chips can now generate these signals

The tiny black speck that looks like a splinter in the finger of Reading Engineer Dave Deysher, above, is at the heart of a major re-do of the nation's long distance network.

The speck is a gallium arsenide chip which is used in devices called GaAs FETs (gallium arsenide field effect transistor). These devices replace expensive power amplification devices such as traveling wave tubes and planar triodes in microwave transmission systems. The big metal package (at left in the photo above) is a solid-state microwave amplifier which uses up to five GaAs FETs. It's designed to readily dissipate heat. Heat is a natural enemy of all electronic devices; so the cooler the operating environment the longer a device will last.

"We've been under considerable customer pressure to produce GaAs FETs in ever-increasing quantities," says Dick Feicht, Manager Development and Manufacturing Engineering at Reading. "We started introducing them in 1978 and by 1979 we built about 10,000 a year, but they whetted the phone companies' appetite for more. As a result, in 1980, we doubled our output, and in 1981, we expect to triple 1980's output.

"They are cost effective. We're talking in terms of years of continuous operation, where tubes operating at five watts have to be replaced every six or nine months. Also, GaAs FETs consume less power.

"We have been working three shifts on the microwave GaAs FET line. Demand has just about tripled in the past year, and we're getting a lot of inquiries from outside firms who want to use our GaAs FETs in satellites and other critical applications. There is no question that we make the most reliable GaAs FETs in the world."

"Actually we're making two different kinds of GaAs FETs," says engineer Dave Deysher. "The 131

ABOVE–At Reading, John Sepko (foreground) checks a loose wire in a heat chamber where sample chips of gallium arsenide undergo extensive tests before the rest of a wafer is processed. In the rear, Linda Feick is taking readings.

Surrounded by reactors in a newly completed clean-air building at Reading Works, Don Hartman shows a tray of substrates used for making GaAs Fets (gallium arsenide field effect transistors).

types are power devices and the 103s are low noise types. They're very difficult to make—especially in the chip stage.

"Chips come in several sizes, but the average is about 10 mils square, and the features on them are measured in microns. While the micron-sized dimensions are incredibly small, this geometry is critical. For the device to work at high frequencies, the features have to be very close together—in one case the separation between features is eight tenths of a micron. One micron is 39 millionths of an inch. A human hair at roughly 100 microns is enormous by comparison."

A GaAs FET chip is a miniscule three-dimensional structure produced by a combination of epitaxial layer growth, etching, and the formation of metallization patterns. Operators start with a wafer of gallium arsenide about two inches in diameter and a few mils thick. In a series of passes through a reactor, the heated wafer is placed in streams of gases containing gallium and arsenic compounds, and gallium arsenide layers having special properties form on the surface.

At Reading this process, known as epitaxial layer growth, is performed in a separate clean room type building. It contains four epitaxial reactors or processing lines on the second floor, which use an inert atmosphere to minimize contamination from stray atoms. Since the devices are so tiny, impurity levels of a few parts in a million can mean rejection.

Also since the parts are so tiny, looking at them with the unaided eye is futile. When a wafer is cut up into chips and dumped in a plastic container, the result looks as if someone spilled pepper while overseasoning his lunch. One wafer can yield thousands of chips.

In order to minimize spending a lot of time working on chips where the epitaxial growth or subsequent processing may be slightly off, a sample is taken from each wafer and sent through the entire process. It must pass extensive reliability tests before the rest of the wafer is committed for use in the production area. This means that very exact reliability histories have to be kept on each wafer. WE

It was a simple handwritten sign hanging on the door, and all it said was, "CKL Reunion." As they passed the sign on their way upstairs to register, they remembered that CKL stood for Cape Kennedy Laboratories. They remembered, because, for many, it had been the best and most important period of their lives.

Memories. They've all got them, and good ones, too. John D'Albora's favorite goes back to those tense moments on July 10, 1962, when he and his men at Cape Kennedy literally held the fate of Bell System satellite communications in their fingers. Those well-trained fingers were on the controls of the BTL-designed and WE-built equipment that had already guided many scientific and weather satellites into precision orbits and was now about to do the same for the world's first communications satellite—Telstar.

With AT&T Chairman of the Board Fred Kappel looking over his shoulder and "more Bell System brass than I'd ever seen in my life," D'Albora says he held his breath for the whole five minutes it took to get Telstar into orbit.

"When it was over, Kappel shook hands with all the guys and told us we had just done him the greatest favor that anybody could."

D'Albora was doing his remembering at the Quality Inn in Cocoa Beach, Florida, where he and 50 other veterans of the Cape Kennedy Laboratory along with 52 spouses and guests had reunited to celebrate the tenth anniversary of the facility's closing down in October 1971.

Like many of the guests at the reunion, D'Albora is retired now, having left the company in 1973 after 32 years with the Bell System. He was at CKL in 1957, the year it opened its doors, and, from 1961 until it closed down after guiding 125 military and scientific missiles, he was resident manager of the facility; yet, ironically, he never got to see a single missile leave the ground. Like most of the CKL crew, he had to stay inside the small, windowless building during the guidance operation.

D'Albora now lives in Altamonte Springs, Florida with his wife, Rosalie. Not one to slow down in retirement, he stays active in church affairs, spends a lot of time visiting hospitals and shut-ins, and goes to see his daughter and grandchildren in Palermo, Italy every year. He's also very active in Pioneer activities. It was, in fact, at a Pioneer function almost two years ago that he briefed Earl Lauber on the 10th anniversary reunion idea which he and Neal Glerum had dreamed up. Lauber liked the idea and assumed the responsibility for putting it all together.

Lauber retired in July of 1981 after 33 years of AT&T, BTL and WE service. A department chief in guidance operations at CKL, he participated in all of its missions. Since retirement, he's been ". . . playing golf and setting up this reunion. In fact, I've been working on it since the spring of 1980."

He started by corresponding with D'Albora and Glerum and making a list of all the CKL people they could remember, including those who worked at the Cape and those in direct support at Headquarters, the Burlington Shops and with outside suppliers. Lauber started calling people who were still working, and they, in turn, provided him with other names and addresses. Before he was through, he had 352 names, addresses for 233, and promises to come from 63. On the big day, 50 showed up—some from as far away as Seattle, Washington.

He remembers the Telstar launching, too. "I got to shake Kappel's hand, and he told me, 'You fellows have just taken me off the hot seat, because I just came down from telling a bunch of Washington politicians that industry could and should be doing this.'"

But his favorite memory is of an earlier and more primitive satellite—the giant Echo. "I liked it best because you could see it from the ground. It lasted 10 years, and I kept records all that time. I used to ask guests if they wanted to see *my* satellite and then take them out at night for a look. It appeared as a medium-bright, slowly moving star. It was fascinating to know you were looking at the reflected light of the sun coming from a 100-foot diameter aluminized mylar balloon."

Aerial view of our building at the Cape circa 1962. Gantries at the launch pads are just barely visible on the horizon.

For Neal Glerum, the third member of the reunion team, Echo and Telstar were also his favorites. "It was a real thrill," he says, "to see the first TV broadcast from Europe via Telstar—to see what was happening in Paris and London as it happened and know we helped make it possible."

Like D'Albora and Lauber, Glerum transferred from BTL to WE in 1964. The dates are the same, because all three go back to the program's beginnings in the early fifties, and all three were part of the group that was transferred *en masse* from Bell Labs to Western when the Labs was asked to concentrate on SAFEGUARD and WE took over existing guidance programs.

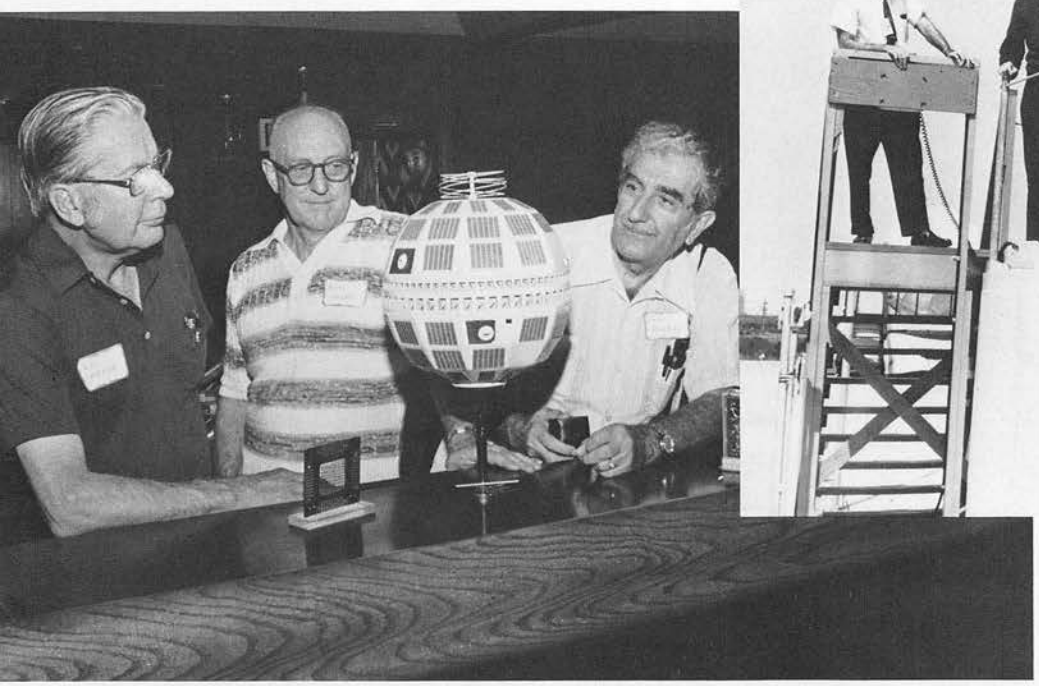
The early fifties were those exciting years in which, at the government's request, a Bell Labs-WE team designed

ABOVE LEFT–Dot and Gus Peyman look over some memorabilia gathered for the Cape Kennedy Laboratory reunion. RIGHT–Ruth Bright, Rosalie D'Albora and Bob Bright share a post prandial laugh. Over 100 CKL vets and spouses attended the reunion.

Reunion at the Cape

By Saul Fingerman

They had been great days, and, now, ten years later, they were here to remember



ABOVE–Reminiscing over a model of the Bell System's Telstar satellite are three men who guided the original into orbit: Ed Felch (left), Earl Lauber (center) and John D'Albora.

INSET–Checking the radar antenna twenty years ago are John D'Albora (atop step), Bill Johnson (standing) and Ken Weaver (squatting).

and built systems that could track and guide missiles from the ground. Systems were installed at Cape Kennedy and at Vandenberg Air Force Base, Ca., where one is still guiding advanced Titan missiles for the Air Force.

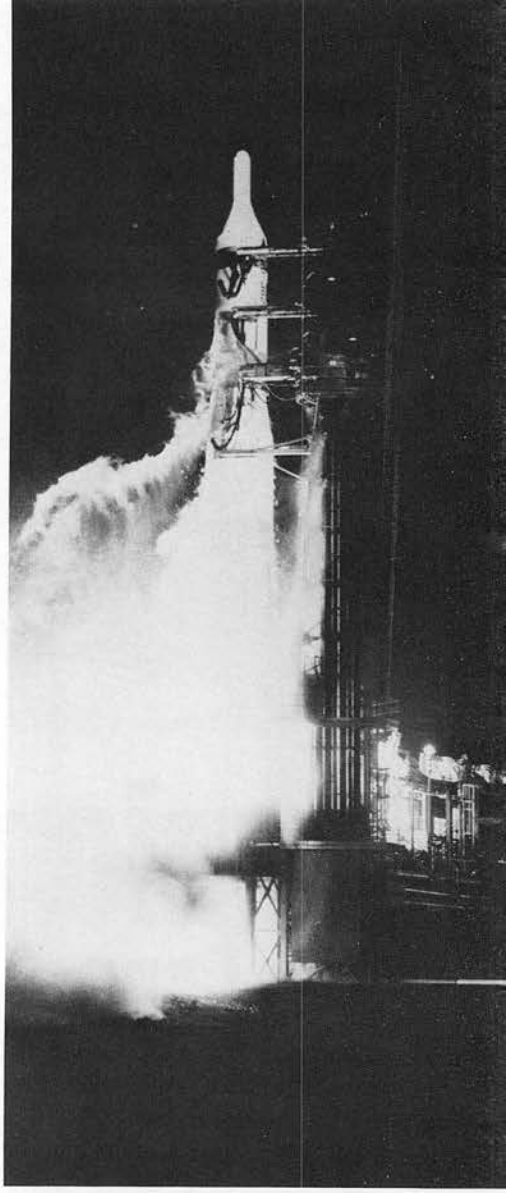
For all its complexity, the system is fairly simple in principle. Basically, it consists of a combined radar and computer installation on the ground and a small, relatively inexpensive electronics package on the missile. The ground radar continuously tracks the airborne package and supplies the computer with all the data it needs to determine where the missile is, how it is oriented and how fast it is going at any instant. The computer compares this data with information about the missile's desired path and, if there is any difference, generates correction signals which are transmitted by the radar. The guidance package on the missile decodes these signals and transfers them to the missile's autopilot, providing precision control by swiveling the engine to pitch the missile's nose up or down, or to yaw it left or right.

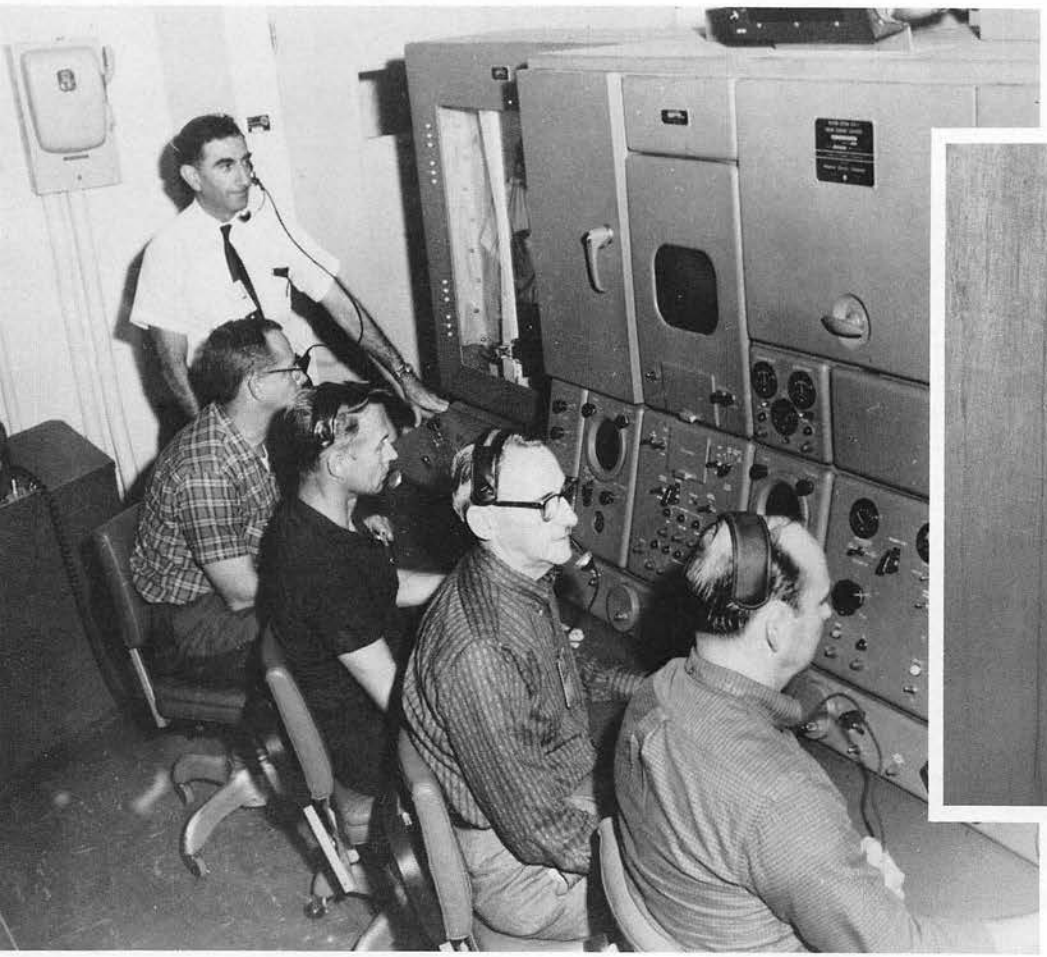
In addition to high-precision control, the system offered substantial economic advantages, because 99 percent of its equipment stays on the ground and can be used over and over again—which is why, in spite of the inroads of inertial guidance systems, the Vandenberg system is still hard at work.

Appropriately enough, Vandenberg was represented at the CKL reunion in the person of its former resident manager, Dave Briggs. Also retired and living in Florida with his wife Terry, Briggs is as enthusiastic as ever about his years with the guidance program. "Above all," he says, "I enjoyed being associated with some of the most remarkable minds you could come into contact with. It was a new frontier, and much of their thinking was original."

As an example, he cites the problem they were having in the early days with satellites somehow or other being pushed slightly out of their proper orbits. Most people thought it was being caused by the spent rocket bumping the satellite after separation. But with nobody to see it happen, how could they be sure?

With obvious pleasure, Briggs tells how: "What they did was hook up a roll-up tape measure between the rocket and a satellite with telemetry connected. Just as the satellite went into orbit, the telemetry showed that the





LEFT–In the Labs/WE control room during a launch way back when are (back to front) John D'Albora, Don Sueverkruepp, Roy Gant, Neal Glerum and John Shirley.

tape measure stretched out and then rolled back up—proving that the rocket had in fact bumped the satellite. Once we knew for sure what the problem was, we were able to compensate for it, and it never happened again."

Not all the memories were serious. Ken Schenck, another retiree who was in charge of one of the CKL guidance systems (naturally, there was a back-up), remembers the time a wide-eyed BTL man came running into the guidance building in wild panic. "He'd gone outside to check out some telescopic bore sighting equipment, and he'd been looking through his scope at a distant target, when he discovered a snake staring back at him through the instrument. It could have been a Martian for all he knew, but he sure didn't wait to find out. He just took himself off in a large hurry." Schenck's face develops that half smile and faraway look that comes with remembering. "You know, there are a lot of rattlers down here," he adds.

Another kind of snake story came from Jim Lantz, a veteran of Sperry Univac, which provided the guidance computer. He tells of the day he and a co-worker went out to watch a Titan missile lifting off. "It no sooner got off the ground," he remembers, "when it pitched over and began flying parallel to the ground. For one ghastly moment as we saw it end on, we thought it was coming straight for us. Now, there's a cardinal rule of missile guidance that says the missile should be going *away* from you. I won't say we were scared, but my friend seriously considered taking refuge in a cable pit that was known to be a haven for rattlesnakes. In fact, once a fellow working down there handed another guy a hunk of cable, and it wriggled right out of his hand.

"Incidentally," he adds, "the missile, which turned out to be going the other way, considerably reduced the snake population when it was blown up about a quarter of a mile away from the missile pad."

Not all of the people at the reunion were retirees. At least two—Ed Baldwin and Roy Harris—are still active with the company, though in areas far removed from missile guidance. Coincidentally, both were managers of the missile guidance program. In fact, Baldwin, who is currently Director of Patent Licensing in Guilford Center, was appointed the first manager when the group came over from Bell Labs in 1964. "We had to put the whole thing together for WE, including CKL, Vandenberg and Burlington—and we had to do it in a month," he says. "And we did, too."

He remembers Telstar from a slightly different point of view from everyone else. "We were under a lot of pressure to make Telstar our best launch ever," he says, "but we didn't know how, because *every* launch was our best." He says the most memorable part of the program was watching the "birds" taking off. "Being boss, I was able to go outside and actually see them blast off—unlike John D'Albora."

A 25-year veteran, Roy Harris' present efforts are aimed in the opposite direction from those he directed after replacing Ed Baldwin as the guidance program's manager. As Manager, Military Systems Engineering at the Guilford Center, he is engaged in Navy underwater work. He says the toughest part of his former job was explaining to NASA the why's and wherefore's of those few launches that weren't 100 percent successful. "It happened only six times in the entire history of the program, so it was kind of traumatic when it did."

His fondest memories are of the people in the program. With evident nostalgia, he tells of the anniversary parties they used to hold every year at Burlington. "The parties were on April first—the day of the transfer from Bell Labs," he says. "They were dinner dances, and everybody, wives included, felt a great comaraderie for the program. And, here at the Cape, being a smaller group, we were even more tightly knit—as you can see by this reunion."

As if compelled to make his point, to make sure the outsider understands, he gestures toward the display room, in which four tables are crammed full of photos and other memorabilia placed there by many of the guests. "You know," he concludes, "all that stuff shows you how important the CKL episode was in these people's lives."

After dinner, Dr. Robert H. Gray of NASA brought everyone up to date on America's newest venture into space, and there was none of the condescension so often heard when hi-tech officials speak to the lay public. He was talking to his peers, one-on-one, and there were a lot of knowing nods as he described the agonies and the ecstasies of his project. He was followed to the podium by Colonel Charles A. Kuhlman (son of CKL engineer A. H. Kuhlman) who's in charge of all Air Force satellite launch activity at the Cape and whose speech graciously closed with the words, "It all began with you guys."

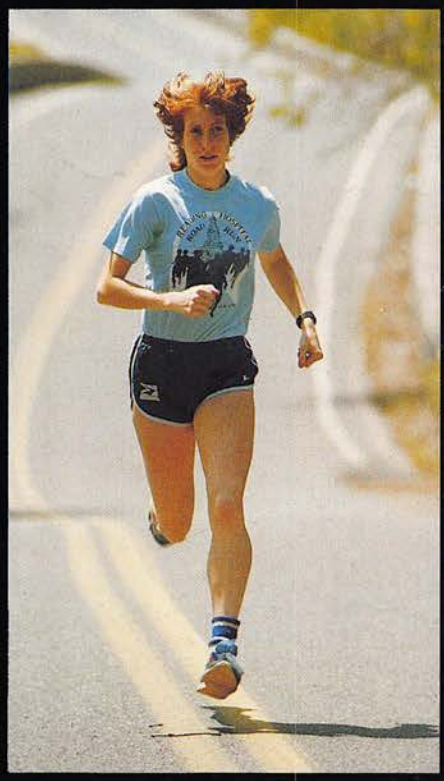
Then, there were lots of laughs for the obligatory gag gifts presented to Earl Lauber for having worked so hard to put the reunion together, but the applause was serious and so were the people who kept shouting, "Let's do it again in five years."

And, somehow, you know they will.

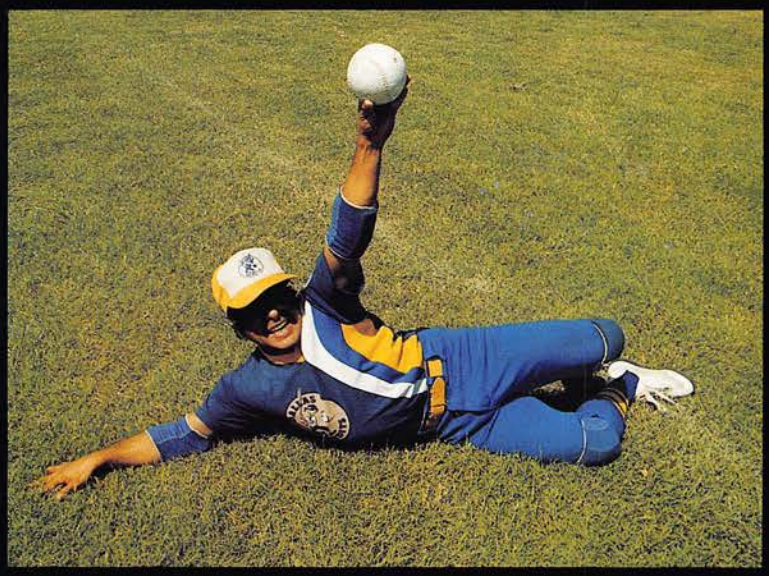
WE

LEFT–A Titan I missile heads into the wild blue yonder in the early 1960s.
BELOW–At the reunion dinner recently held at the Cape, Earl Lauber (in dark jacket) laughs as he receives one of many gag gifts. The other men are Neal Glerum (seated) and Jack Harrison at the mike.

New radio relay booster
28



Running home after work **8**



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