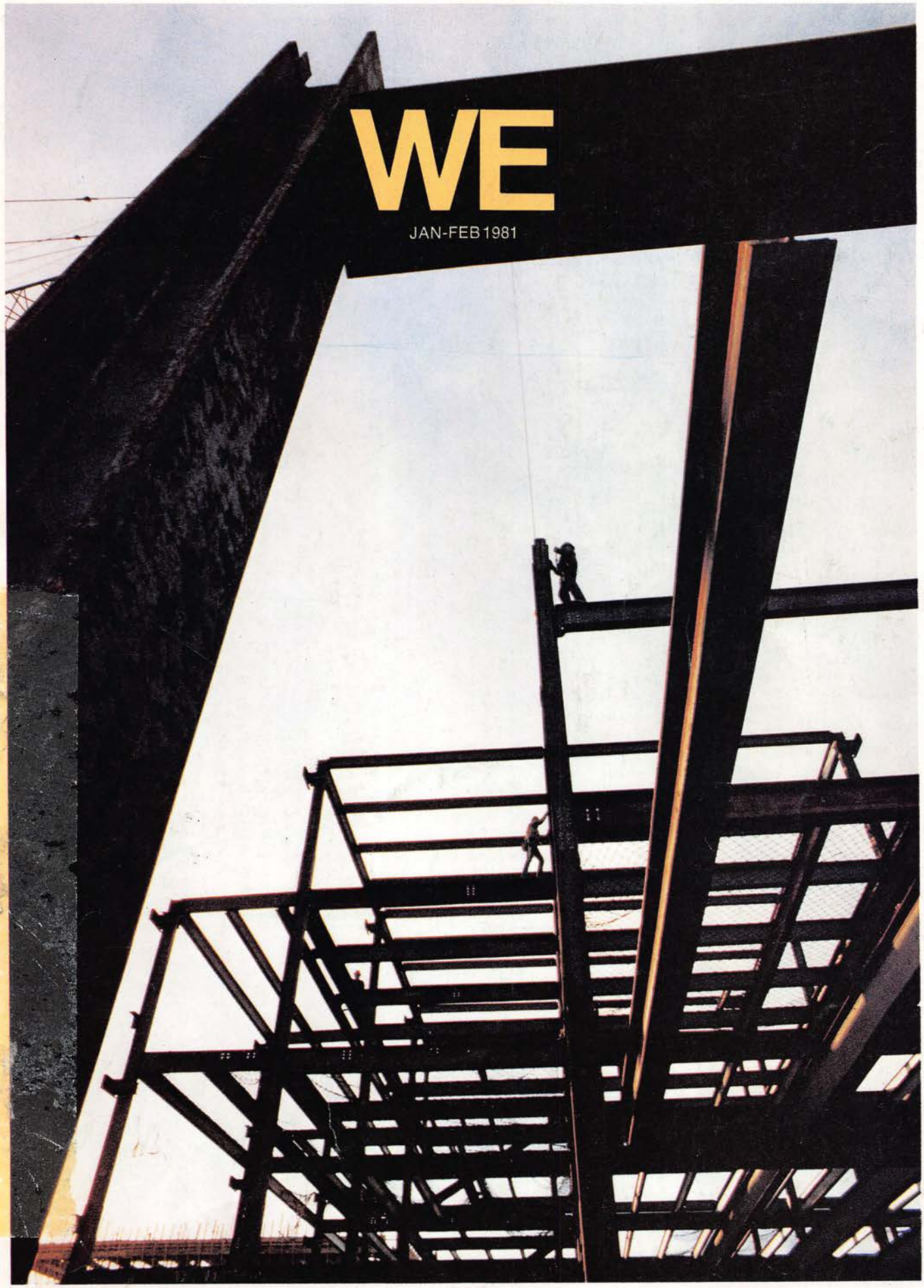
WE

JAN-FEB 1981



What's New

It's The WINNIE-THE-POOH* Phone, shown here during its assembly at Western Electric's Indianapolis Works.

This colorful addition to our popular character phones measures 14-and-a-half inches tall and weighs four pounds seven ounces. The body of the character is sunny yellow with a red jacket.

Winnie is poised in full stride on top of a rectangular simulated wood base. He holds a brown handset in his right paw. His ever-constant friend, a blue and white butterfly, rests on his left paw.

The new Bell System phone offers the convenience of Touch-Tone® calling and modular design for fast, easy installation.

Winnie the Pooh is the honey bear hero of English novelist A. A. Milne's near classical children's stories that date back to the 1920's. Famous for his poems and prose about his son, Christopher Robin, Milne created Winnie the Pooh as one of an imaginative cast of characters that includes Eeyore the Donkey, Tigger the Tiger and Piglet and Roo, a small kangaroo.

This year, a limited number of the new Design Line** telephone will be available for purchase through five telephone operating companies' PhoneCenter Stores throughout the country. Future distribution will be determined by customer response to this initial offering. WE

**Trademark of AT&T.

Alesia Kimbrough helps The WINNIE-THE-POOH Phone—the latest in WE's Design Line series—along the assembly line at Indianapolis.

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Western Electric

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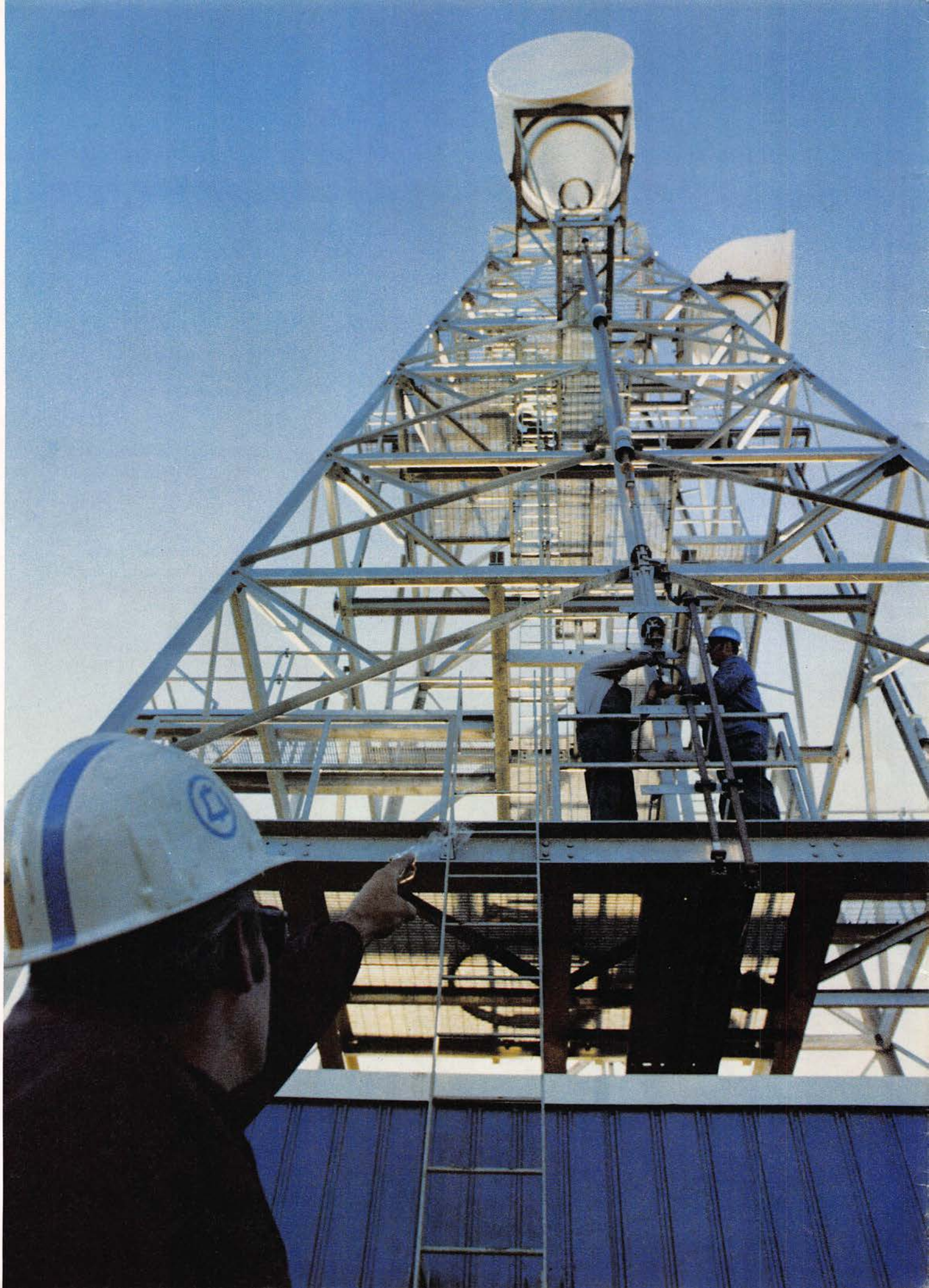
ON THE COVER: The steel is going up on the company's new Network Software Center in Lisle, Ill. The complex of six buildings will be the first company facility devoted to the production of computer programming. For more on this new type of plant, see page 18.

PHOTO BY JOE GAZDAK



DIGITAL, DIGITAL, DIGITAL

BY GEORGE GRAY

PHOTOS BY LEN STERN

Analog? Digital? What's it all about?

There's a digital tidal wave breaking over the electronics industry today. Every manufacturer seems to be climbing into the digital bandwagon, including bandwagon builders themselves. Detroit, for example, is gung ho on the use of digital microprocessors in its 1981 cars.

One impression gained from reading the trade press is that Bell System network planners are anti-digital, but a talk with people inside the System shows that this contention does not hold up. Much of Bell's transmission is already digital and more will be going digital in the near future. The questions are how much and how soon? The answers depend on factors both technical and economic.

When you talk over a traditional telephone line, the signals travel in continuous electric waves that are analogous (hence the word analog) to sound waves moving through air.

To transmit a voice signal digitally, the electric waves are sampled thousands of times a second. The samples are then converted to a stream of high-speed on-off pulses called *b*inary dig*its* or "bits." Digital coding results in a signal that is rugged in the face of crosstalk and noise. It can be regenerated many times without accumulating *quality* degradations over any trunk length required and can be combined (multiplexed) with other signals at much lower cost than equivalent analog multiplexing.

There is a transmission price to be paid, however. The standard digital transformation Bell uses requires an average of slightly more than 64,000 bits per second of transmission capacity for each telephone message circuit to be carried.

Engineers are hard at work crowding more bits per second into each Hertz of transmission bandwidth, but they are still short of parity with analog transmission. This means that digital line costs are greater than analog as a rule, if the same transmission medium is assumed. The technical challenge is to make competitive and economical digital systems which meet network needs and which are compatible with present facilities.

Digital voice circuits in the Bell System are not new. The T1 carrier system was developed in the 1950's to create additional capacity on existing exchange area paired cables. The paired cable medium could not be expanded with analog multiplexers due to crosstalk between parallel circuits. Today, these digital systems carry most intra-urban message trunks. Part of the pressure for longer-haul digital systems comes from the need to interconnect signals between these areas without conversion back to analog.

Modern toll switching machines like our No. 4 electronic switching system actually switch analog circuits by converting them to digital for connection through the equivalent of crosspoints. Digital transmission scores twice here; regeneration holds down point-to-point noise in the resulting longer trunks and the digital format is compatible with the switch inputs.

Beyond the push for digital voice message capacity is digital data. Whereas digital coding of voice generally requires an expansion of bandwidth, digital data can be transmitted by direct inclusion in the bit-stream. Depending on the data rate presented, many more digital data signals can be carried on facilities designed for digital voice transmission. For example, 10 data signals at 4,800 bits per second can fit within the capacity of a single digital voice message circuit. The ultimate data capacity of emerging digital transmission systems is astonishing; but, in the interim, the evolution with a few exceptions will depend on POTS. (Plain Old Telephone Service). →

Above—Bob Herring from the Denver Turnkey group unloads radio gear at West Harness. Left—he directs the antenna crew working on the tower.

With particular acknowledgement of the editorial assistance of Richard P. Slade of Bell Labs at Merrimack Valley.

RADIO, RADIO, RADIO

One of the transmission media undergoing digital treatment is microwave radio. The basic idea of digital radio is hardly new. It was used by Guglielmo Marconi when he demonstrated radio transmission across the English Channel in 1899.

Analog microwave radio relay has evolved over the years to the point of carrying several thousand telephone voice circuits per transmitter, tens of thousands of circuits per route, and about 60 percent of all toll transmission capacity nationwide. For 4,000-mile voice circuits it is virtually impossible to compete economically using digital radio, but for the 50 to 500 mile range, many of the advantages mentioned previously apply. The name of the game is to see how as many additional bits per second as possible can be put through a given bandwidth without jeopardizing the signal integrity.

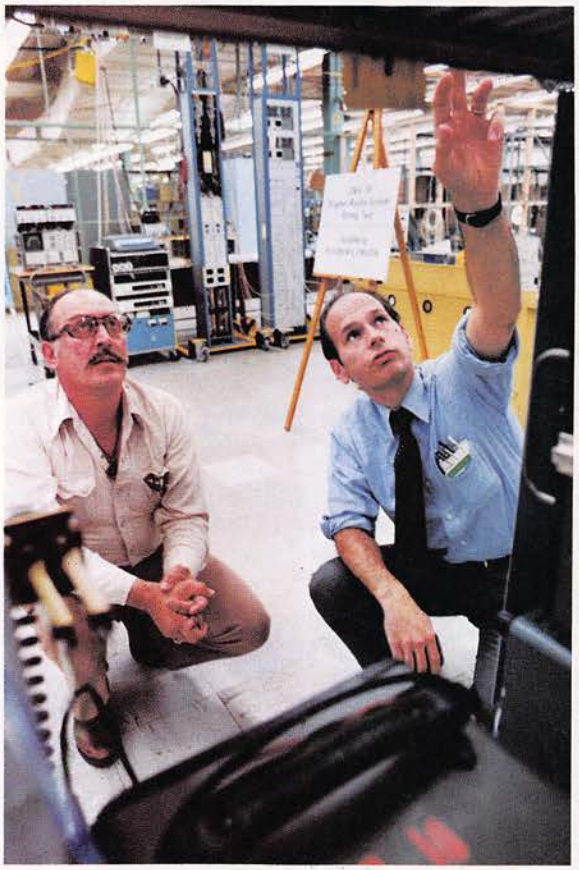
Analog radio is hard to beat, but here comes DR-6

DR-6-30 shown here being manufactured and tested at Merrimack Valley Works, is Western's newest entry in the growing digital parade. Designed by Bell Labs, it is an up-to-date microwave radio relay system which will find initial applications on Bell System intercity routes. It can carry 1,344 voice circuits.

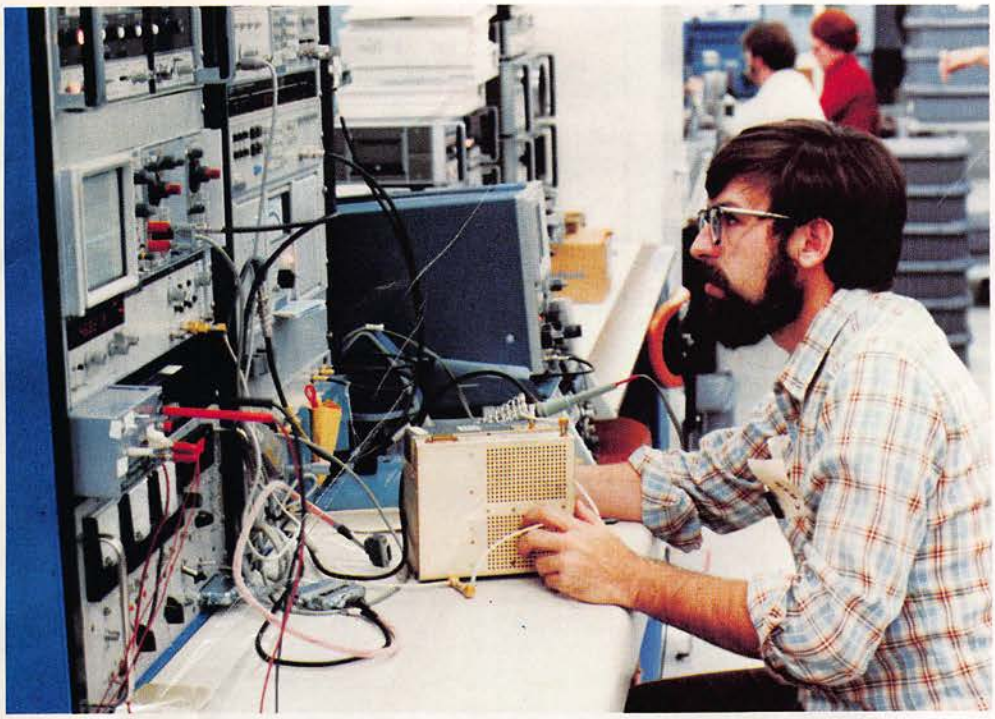
The electronic innards of DR-6 are solid-state and the bays of equipment look markedly different from traditional Bell System microwave radio equipment. The bays for the radio units have a footprint 10¼ inches (260mm) square. That's less than half the width of a TD or TH microwave bay and all servicing is done from the front. The physical layout was actually evolved to meet CCITT (International Telegraph and Telephone Consultive Committee) specifications.

A single DR-6 radio bay may include two complete radio transmitters and receivers housed side-by-side. Each operates at 90 megabits (millions of bits) a second. That is pretty fast. Actually it's twice the Bell System's standard DS-3 rate.

Some people at Bell Labs figured out that, at this rate, all the information in a 19-volume (Aalto to Zwingli) set of the Encyclopaedia



Top—at Merrimack Valley Chris Gannett troubleshoots a power amplifier. Left—John Strand from Pacific Region RTAC receives hands-on training from Bernie Sullivan. Below—Norma Alartosky assembles a power amplifier module.



Top—Bob Croteau tests generator power levels. Below—the Labs crew for the "string" test: Wyley Robinson, Joseph St. Onge and Siegfried Pirkau.

Britannica could be transmitted over the new system in 24 seconds.

Courtney Longton, Bell Labs project coordinator for DR-6, has been involved with digital radio since 1969 and with DR-6 since the project began about 18 months ago. "For a project of this scope," he said, "it has moved from design to manufacture in a remarkably short time.

"You have to look at DR-6 as an evolution of technology. It's the culmination of a number of ideas. There are many new operational and maintenance features. And we've made a real breakthrough in saving power. DR-6 draws 95 watts while TH-3 microwave, which is our current heavy-duty workhorse in the long distance plant, requires no less than 275 watts to operate.

"One breakthrough came with the GaAsFET (gallium arsenide field effect transistor) power amplifier. In effect, a few tiny silicon chips replace an expensive, fragile and relatively short-lived traveling wave tube that previously provided the radio output power for our microwave systems.

Longton continued: "We were able to reduce the number of steps in manufacturing and tuning. We are also using lots of hybrid integrated circuits in the regenerator and radio bays. I think this new system shows Western at its best.

"Generally, you improve reliability when you go to large-scale integrated circuitry as we've done here. There are fewer fragile connections. Input is closer to output. You don't have so many things to twiddle. In excess of 30 adjustments have been eliminated in manufacturing. Installation can be done in just a few hours — just long enough to bolt the frames in place and get the equipment powered up and running. It's a great product."

At Merrimack Valley Works, for several weeks before the equipment was shipped to the West Coast for the first commercial installation, Bell Labs systems engineers conducted a "string" or "proof" (full system) test. In this test, all of the equipment bays, destined for various sites in Oregon, were set up in a rectangle about 50 feet long and 25 feet wide. "Each corner is a mountaintop," quipped Siegfried Pirkau, one of the Labs crew conducting the systems test. "But here it takes us just six short steps to do what would take three hours of driving time out there."

"Every day of string test saves us a week of testing in the field," Longton added. The bays are hooked together with waveguide, attenuators and couplers to simulate appropriate transmission losses for the intervening distances. "By powering up the system, and running hot for several weeks," Longton said, "we can weed out those components destined for "infant mortality" and replace them immediately. Also, we have all kinds of specialized computer-based monitoring and test equipment here that would be inappropriate to haul up and down mountains. I'm hopeful that this sort of testing will become standard practice for all of our digital transmission products.

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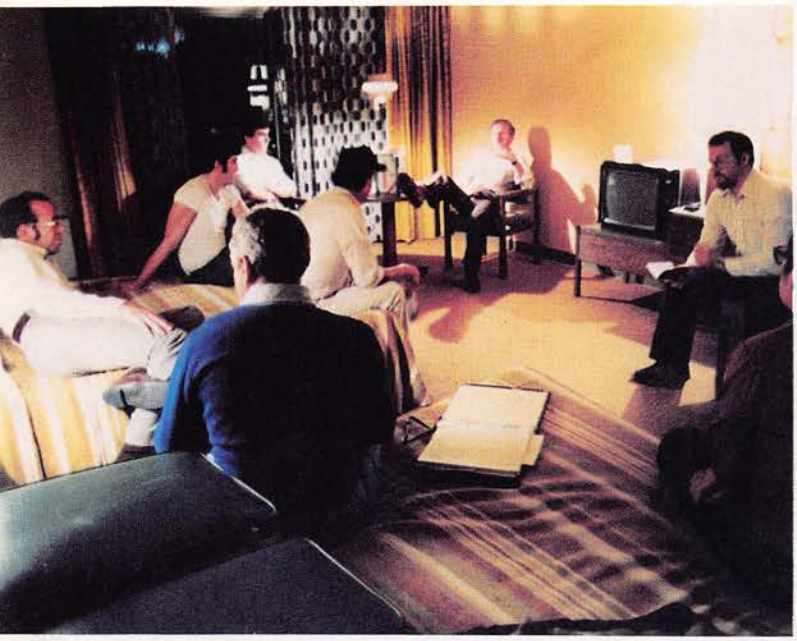


Top left—The work day is 10 hours. Then, it's back to the motel to compare notes. Above—George Gregoire from Bell Labs photographs Lane Mountain between showers. Below—Gregoire explains waveguide routing to installer Ted Crutchfield and Standards Engineer Armand Roy. Lower left—Project Manager Bob Helm (seated) reviews plans with Derrold Hopkins, installation supervisor, and Wayne Davis.

Teamwork on Lane Mountain, left to right, Armand Roy, George Gregoire, Herb Wolfe, Calvin Watkins, John Strand, Wayne Davis and new DR-6 bay.

PUTTING IT ALL TOGETHER

It rains a lot—sometimes for weeks on end

By Freeway, the distance from Eugene, Oregon, to Roseburg is 67 miles. Microwave radio makes it at the speed of light in four hops of about 20 miles each, from peak to peak in the Coastal Range which is fairly rugged in this area.

"It's not just those miles on the Freeway," says Bill Helm, project coordinator from Merrimack Valley, "it's the five miles up a logging road to the site. When those logging trucks come barreling around the curves, you just pull over and pray. There's no way those monsters can stop and there's practically no room to pass. It can get hairy."

It can also be spectacularly beautiful when the sun shines. The route traverses a sparsely settled forest area about 50 miles inland from the Pacific. It rains a lot—sometimes for weeks on end between September and May. No one with any sense ventures off the main highways in anything but a four-wheel-drive vehicle.

The Oregon job was originally scheduled for the relatively dry summer months. "The buildings were supposed to be ready June 16," says Derrold Hopkins, WE Installation supervisor in Eugene. "But there was a construction tie-up and we couldn't get started until September 1. The weather is now becoming critical. I just hope we get it done before snow hits. It's difficult getting in here through the mud, but in snow it's even worse."

There are two crews of two installers each, working 10 hours a day and they'll be involved in one way or another until Pacific Northwest Bell puts the route in service on March 1. "Our turnover date is January 1," Hopkins said, "but they need time for testing and training people."

The new route will replace an old coaxial cable. Since digital is the wave of the future, PNB opted for the new system rather than a larger coax system to handle increasing traffic. This is a typical intercity route as far as traffic goes, with no special data requirements.

One of Western's strong points with customers is documentation and it is on the first job that documentation has to be checked out. There are a number of things that can be simulated in a laboratory but others can only be verified when a system is running.

There were a number of people from all branches of the Bell System on site at various times during the installation phase. It represented teamwork of the first order.

There were Bell Labs people from Merrimack Valley collecting data to compare with data obtained from the string test; and quality assurance people checking on product as well as installation. There was a Standards Engineer and an RTAC representative from Pacific Regional headquarters in Sunnyvale. There were also some people from PNB, the customer, trying to glean as much information as possible from the assembled experts prior to cutover.

Installation went almost without a hitch. The frames rode up the dirt roads to the mountain tops on air mattresses to absorb jolts. "We had meters in all the cases," Bill Helm said, "to see if the equipment was exposed to rough handling anywhere on its trip across the country. It came through with a clean bill of health."

The equipment is considerably lighter than traditional microwave bays. Two strong men can lift a bay without too much trouble. A special crane was not needed for unloading the inside equipment.

A crane was needed, however, by the outside contractor to raise the antennas. Bob Herring from the Denver Microwave Turnkey group directed tower men to move the new plastic horns an inch this way or that to pick up optimum signals.

Probably the biggest problem at the sites at the outset was power. The large batteries needed 250 hours to charge. The power company had to run in a line 10 miles over very rough ground to one site. Mobile radio was not particularly useful because of the terrain; so, until they got the system on-stream, there was virtually no way for one site to communicate with the others or the district office. However, Bell System teamwork overcame all these problems, and all schedules were met. WE

"It all started last spring, at a meeting of our Pioneer Environmental Committee here at Guilford Center," Larry Shore recalled. I head the Committee, so I made the suggestion about pumpkins for the kids, and you know what that meant."

What it meant was that Shore—an engineering associate in Missile Guidance Engineering — was placed in charge of Project Pumpkin along with co-workers Len Devaney and L. M. "Monty" Montague. In fact, it was Monty, who generously gave his time last summer to take care of the pumpkins growing in the Victory Garden situated next to the parking lot.

"Gradually, a lot of other Pioneers got involved, largely through Betty Holt and her entertainment committee. She's a secretary here at the Center, and she's responsible for the clowns, the balloons, the decorations and the refreshments. The refreshments were real important, because the kids love to eat out."

At first, the Project Pumpkin people were going to invite only the children at nearby Central North Carolina School for the Deaf. The school's 60 or so children live in all week and go home on weekends. With so much time at school, they love to go on outings. Then Project Pumpkin got a call: Could they please invite some handi-

Above—Two members of the Pioneer Environmental Committee, Len Devaney and Monty Montague, compare notes.

capped preschoolers as well? The kids would get an awful lot of pleasure out of a Halloween party. Then word got around, and this call was followed by another one from Durham. Their handicapped preschoolers didn't have much opportunity to mingle with kids from other areas. Could they come, too?

Nobody on Project Pumpkin knew how to say no, or even wanted to. So, when this big day came, there was quite a turnout. It was unseasonably damp and gray — easily the coldest day of the year so far, but it didn't dampen the kids' enthusiasm. They loved it all: The friendly witch with a caldron full of candy; the balloons bobbing over their heads and occasionally disappearing into the low-hanging clouds and the pumpkins. Best of all, they loved the pumpkins.

Each youngster got one to take home to make into a jack o'lantern. The smaller kids couldn't even lift the ones they picked. But they sat on their choice until one of the instructors came by and put their name on it.

To be honest about it, the pumpkins weren't all home grown. A lot more kids turned up than originally planned and some of the early picked pumpkins rotted. So Guilford Council, Old North State Chapter bought some additional ones.

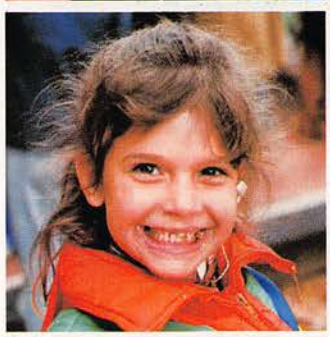
"Just look at those faces and listen to those shouts," Larry said. "They're having a ball. It makes it all worth while." WE

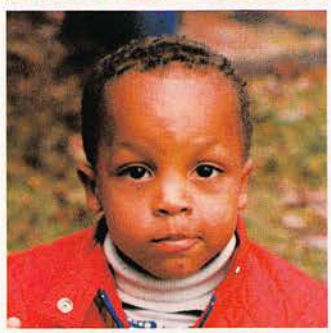
Left—School principal Susan Parkins and Larry Shore chat while one youngster stakes out his claim. Above—A teacher uses sign language to explain about jack o'lanterns.

PHOTOS BY BUDDY SPOON

Project Pumpkin

Happiness is a big ol' pumpkin





Happy faces on the students from the Central North Carolina School for the Deaf in Greensboro tell how they liked their outing to Guilford Center. The friendly witch, passing out candy, is Connie Grogan.

Why People Take Chances

BY PAUL CHANCE

Some people invite trouble. Why?

Officially the incident is recorded as accident 2871358 in the files of the Maryland State Police. The driver of the 1979 Yamaha motorcycle and his passenger were headed West on Madison Street in Baltimore. Suddenly the front wheel of the vehicle struck the median strip and the riders went flying. The driver was killed almost instantly; his passenger was treated for bruises and lacerations at a hospital and released later the same day.

Why did the passenger get off so easily? Perhaps because the passenger, unlike the driver, was wearing a helmet. Riding a motorcycle without a helmet is what safety specialists call an unsafe act, an act that unnecessarily increases the chances of an accidental injury. Many experts, including Cody Godman of the Maryland Safety Council, say that unsafe acts are responsible for 80-90 percent of all accident injuries. Others believe that the figure is closer to 50 percent. All experts seem to agree, however, that unsafe acts play a major role in accidental injuries both on and off the job. Sometimes people behave in an unsafe manner because they do not know any better. Sometimes they forget. But it is clear that many unsafe acts are committed deliberately and with full knowledge of the hazards involved. These are the *thoughtful mistakes.*

As a psychologist, I find such behavior fascinating. Why should anyone deliberately do something that increases his chances of getting hurt? Some think the answer has to do with a natural tendency to resist authority. If you tell people *not* to do something, they will go out of their way to do it. According to this theory, a person refuses to wear safety shoes, for example, because "Nobody's gonna tell *me* what to wear!"

Another theory holds that taking chances is masculine, so people take unnecessary risks to prove their manhood. This is the macho, "I-ain't-afraid-o'-nuthin'" school of risk-taking.

A particularly interesting explanation was first suggested by Sigmund Freud, who held that every conscious act has an unconscious motivation. The person who refuses to wear safety gear or who removes a safety guard is acting out an unconscious self-destructive impulse, a death-wish.

Yet another theory says that people commit unsafe acts with the hope of sustaining a minor injury and getting some time off from work or avoiding an unpleasant chore. If you strain your back, you don't have to paint the house.

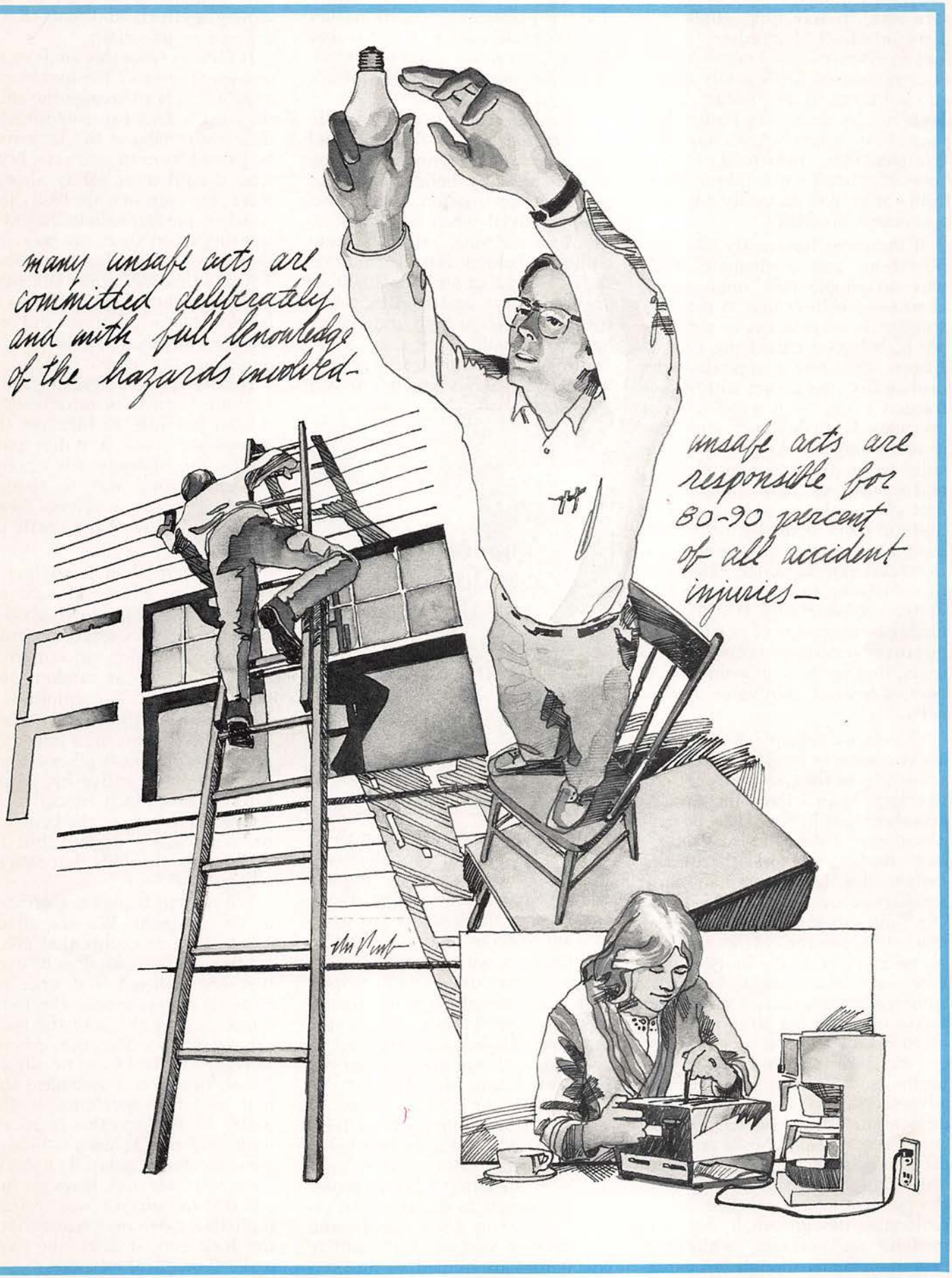
While each of these explanations contains a grain of truth, I do not believe that any of them accounts for very many thoughtful mistakes. If there is a natural tendency to resist authority, then why do we drive on the right side of the road? Why do we eat with knives and forks instead of with our fingers? Why do we leave through the door marked *Exit?* True, sometimes people violate these and other rules, but if there is a natural tendency toward perversity there would be few rules indeed.

The notion that adults eschew safety equipment or ignore safe practices because it would mar their macho image seems silly, but some men may try to prove their manhood in this way. But what, exactly, is macho about a person driving a loaded fork-lift recklessly? Is it macho to sabotage the fail-safe mechanism on a welding machine?

Psychiatrists like the death-wish explanation of risk-taking, but there is little hard evidence to support it. Some people do seem to go out of their way to get hurt, but if their behavior is motivated by an unconscious death-wish, why do they not "accidentally" drive their cars over a cliff and be done with it?

Malingering is an equally unsat-

Dr. Chance is a consulting psychologist who specializes in safety.


many unsafe acts are committed deliberately and with full knowledge of the hazards involved-
unsafe acts are responsible for 80-90 percent of all accident injuries—

isfactory explanation for most unsafe acts. In war time, some soldiers do shoot themselves in the foot in order to avoid combat, but injuring oneself deliberately is not an easy thing to do. Besides, accidents are by their very nature impossible to control. A person who lifts something incorrectly in the hope of sustaining a minor back injury may just as easily suffer a permanent disability.

If the most frequently cited explanations are inadequate, then why *do* people take unnecessary chances? I believe that in most instances the answer lies in a principle of behavior called the Law of Effect. This law states that the probability that an act will be performed varies with its effects. In everyday English this means that if something we do gets good results, we continue to do it; if it gets bad results, we stop doing it. At first glance, this would seem to be nothing more than the most obvious sort of common sense observation. But our behavior often has mixed effects, and this complicates matters considerably. It is the particular combination of positive and negative effects, of benefits and costs, that we must examine to understand what motivates unsafe acts.

The classic example of an unsafe act is cigarette smoking. Common sense tells us that people ought not to engage in an activity that endangers their health. Why, then, do people smoke? Take a look at the effects smoking has. First, there is the taste of the cigarette, which many smokers enjoy. Second, there is the "fix," the subtle physiological rush one gets as one replenishes the supply of nicotine in the body. Third, there are often social rewards: smoking gives a person something to do in awkward situations and often makes it easier to engage in conversation ("Got a light?"). Cigarette smoking can have serious adverse effects as well, but these unpleasant effects (which include emphysema, heart disease and cancer) are neither immediate nor certain. Thus, people smoke because the positive effects on them as individuals, though small, are immediate and certain, while the negative effects, though large, are delayed and uncertain. *I believe that it is precisely this combination of immediate, certain benefits and delayed, uncertain costs that motivates the great majority of unsafe acts.*

The motorcyclist who rides without a helmet gets to feel the wind in his face and does not have to lug around a bulky helmet when he gets to his destination. These benefits are trivial when compared to the injuries one might sustain without a helmet. But the small rewards for riding without a helmet are immediate and certain, while the price, though high, may never have to be paid.

Similarly, the worker who should wear safety shoes might tell you that he wears ordinary street shoes at work because they are more stylish, are easier to obtain, and are less expensive than safety shoes. Once again, the benefits are insignificant when compared to the cost that has to be paid when the worker drops a heavy object on an unprotected toe. But the benefits are immediate and certain, while the costs are delayed and uncertain.

One way to cut down on unsafe acts is to change their effects

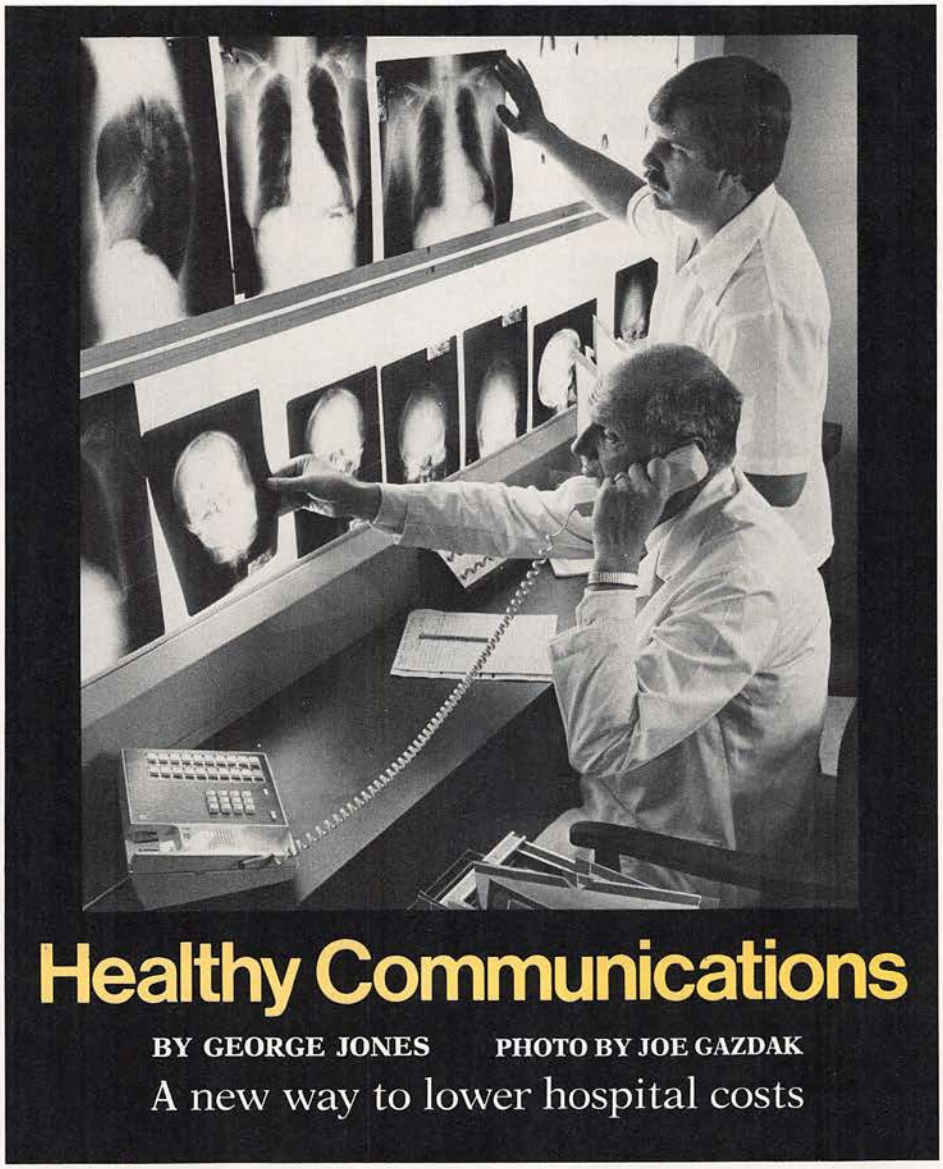
Consider the unsafe acts that you perform, despite the fact that you know better, or look at the unsafe acts of those around you: driving at high speeds; not using seat belts; circumventing safety devices on a machine; tackling a home repair job that ought to be left to an expert; and so on. Look closely, and in each case you will find positive effects that are immediate and certain (usually a savings in time, money or effort), and costs that are delayed or uncertain.

It follows from this analysis that one way to reduce the incidence of unsafe acts is to change the effects they have. This can sometimes be done by removing the benefits to be gained from unsafe acts. People who should wear safety shoes at work, for example, are likely to do so when the immediate benefits of wearing street shoes are no greater than those of wearing safety shoes. Toward this end, some WE plants have gone out of their way to find fashionable safety shoes and make them readily available to their employees at reasonable prices.

In addition to decreasing the immediate benefits of unsafe acts, it is also possible to increase their immediate costs. A police patrol car on the highway, for example, will go a long way to reducing speeding, because drivers, seeing the police, know that a costly ticket is likely.

Another method is to increase the positive effects of safe acts. This idea is being put to good use in many of WE's safety programs. At some locations, an employee's name is drawn at random about once a month. The employee selected wins a pair of safety shoes *if* he or she is wearing a pair at the time. This obviously gives everyone involved an incentive for wearing safety shoes. Such incentive programs do not make the benefits of behaving safely certain, but they do increase the odds that safe acts will pay off.

We human beings are creatures of the moment. We are affected much more by events that are immediate and certain than by events that are delayed and uncertain. Sometimes this prompts us to take unnecessary risks, and the results can be tragic. But not everyone falls prey to the lure of unsafe acts. People age 45 and over have about half as many accidents as those under 45. Perhaps this is because, with time, people learn to take cognizance of the delayed, uncertain costs of unsafe acts. If we are lucky enough to survive our youthful foolishness, we may learn that, in the long run, it does not pay to make thoughtful mistakes. WE



Healthy Communications

BY GEORGE JONES PHOTO BY JOE GAZDAK

A new way to lower hospital costs

Although no one looks forward to a stay in a hospital, when the need arises everyone wants that hospital to have space available, provide excellent care and not cost too much. Hospitals are having trouble meeting these requirements because they face some mammoth problems—including rising energy costs and increased administrative workloads.

To help hospitals cope with these problems while keeping costs down and providing all services, the Bell System has developed the Hospital Communications Management System. HCMS is much more than an efficient telecommunications system. In addition to featuring priority handling of emergency calls and the ability to enter data into a computer via telephone, its energy communications feature allows for more efficient use of heating, ventilating, air conditioning and lighting systems throughout the hospital.

At the heart of HCMS is the Dimension® 2000 PBX. The first installation was at Candler General Hospital in Savannah, Ga. Candler General opened a new 305-bed facility on October 4, 1980, to consolidate the functions of an older, three-unit complex that included a general hospital, a maternity hospital and an eye, ear, nose and throat center.

At Candler General Hospital in Savannah, Ga., Dr. Roy A. Wildey discusses X-rays over an electronic telephone set while Alvin Hinely displays additional X-rays.

HCMS can save energy by shutting down specific energy-consuming equipment during peak load periods. Thermostats can be automatically turned down in the cafeteria when everyone leaves or in office areas used only during the day. The time cycling of energy-hungry devices — such as heating and cooling systems — might be turned off for five minutes every half hour during the peak demand for power.

The energy conservation feature is significant, since government statistics indicate that hospitals consume 15 percent of all the energy used by commercial institutions in the United States. Moreover, in the last five years hospital energy expenditures have risen 400 percent —to a total of more than $2 billion.

According to Johnie Lynes, an account executive from Southern Bell, Candler is beginning to phase in HCMS' energy conservation feature, and hospital personnel are pleased with the initial functions of the system.

The data-entry feature provides valuable information for better management speedily and efficiently. For example, by using the buttons on a Touch-Tone® telephone set, a nurse can tell the dietary department about room changes and modifications or cancellations of meals. So the patient who's supposed to get a low-calorie supper doesn't get a plate of spaghetti.

Admission information, release of patients, housekeeping needs and a doctor's register are some of the vital statistics that can be updated instantly in the hospital's computer by using the data-entry feature. This feature can significantly ease the burden of handling a typical hospital's more than 4,600 daily telephone calls, including over 1,100 interdepartmental calls.

The third feature, emergency access, ensures that emergency messages within the hospital are routed more quickly to appropriate staff members. The system handles these calls before all others so emergency cases get priority treatment.

HCMS can help hospitals stretch their increasingly scarce budget dollars to help keep costs down and services up. And as the Bell System sees it, that's healthy communications. WE

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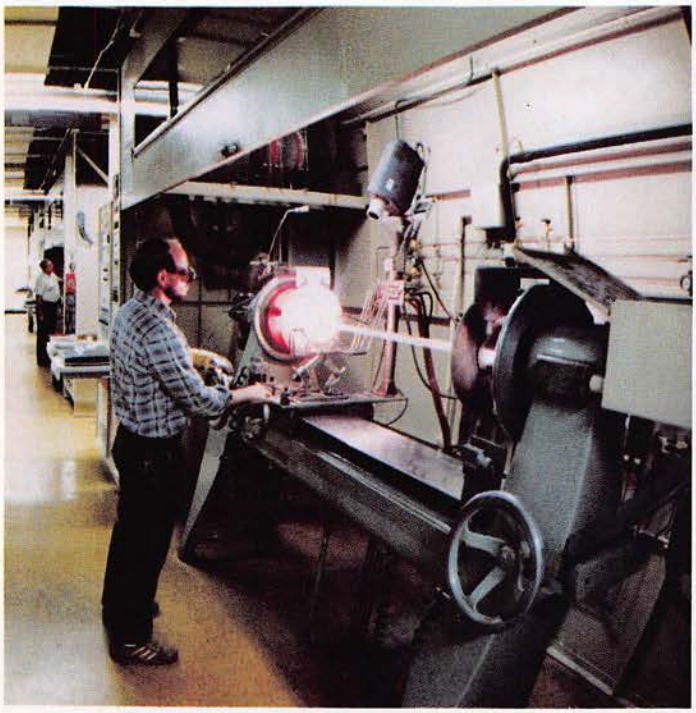
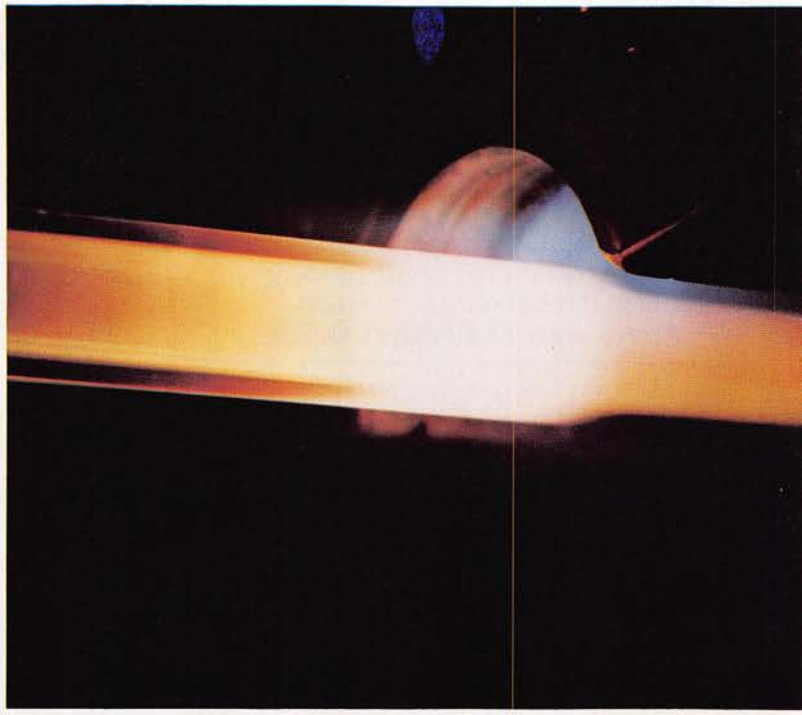
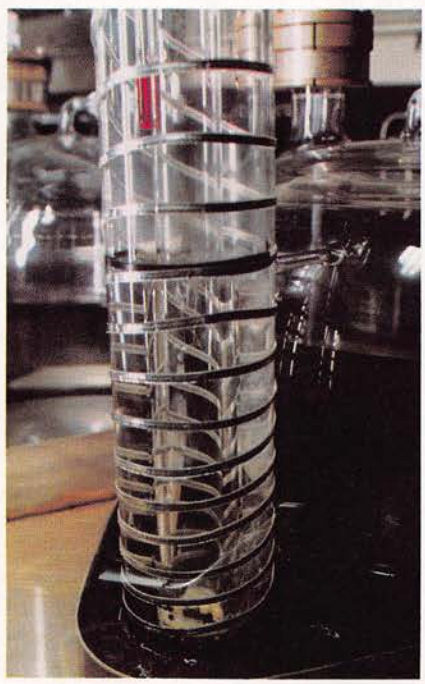
factory within a factory

PHOTOS BY LEN STERN AND JOE GAZDAK

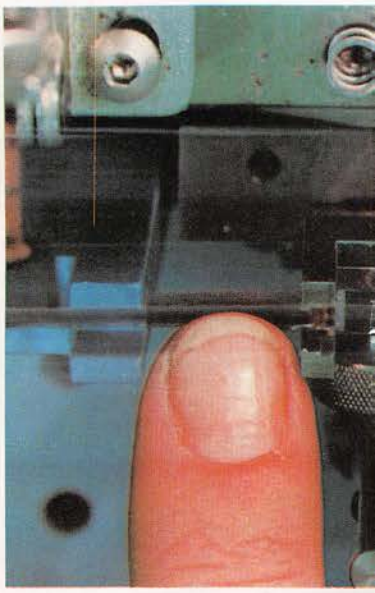




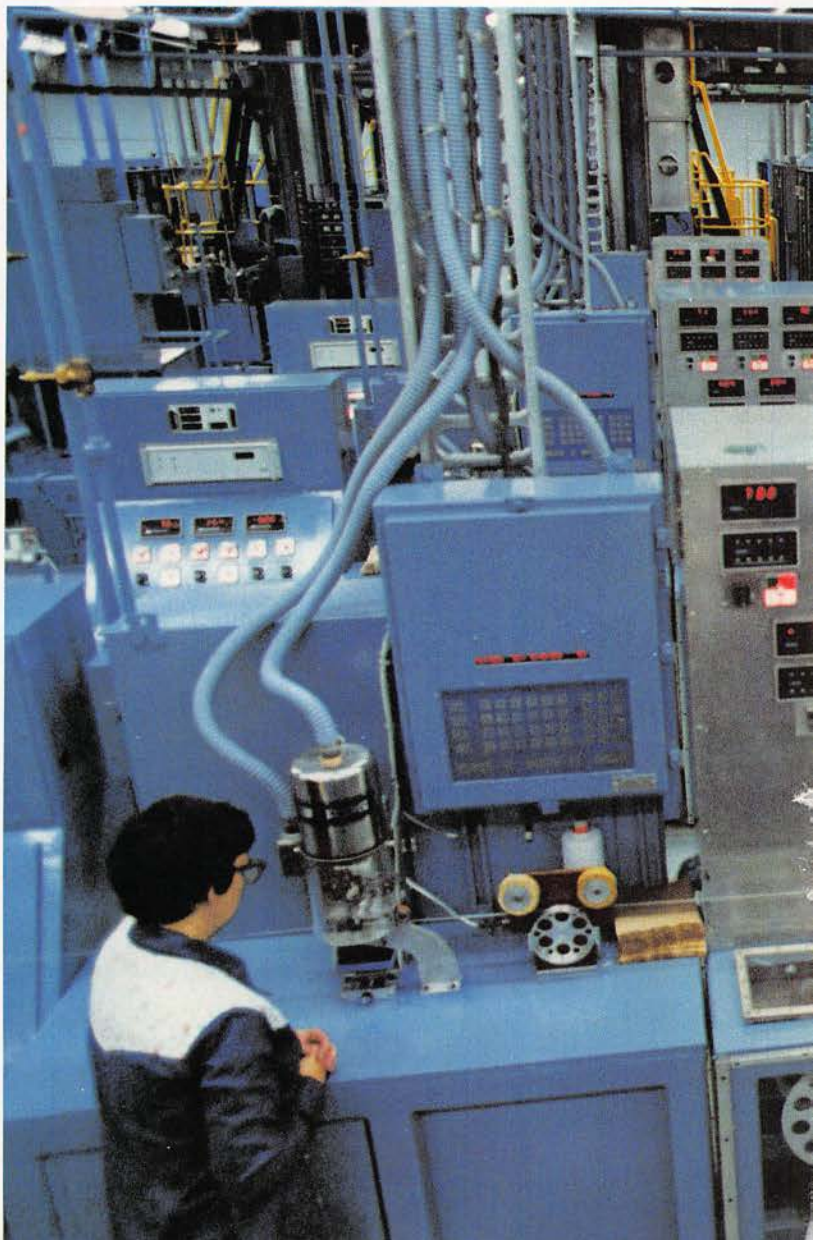
Just recently completed, the multi-million dollar facility for producing lightguide is literally a factory within a factory. Located on two levels in one end of our huge Atlanta Works, it is capable of producing tens of thousands of kilometers of the glistening fibers each year. While end use of lightguide is to provide a means of communicating by light, it is interesting to observe the part that light plays in its manufacture: the dazzling incandescence of a glass tube being chemically modified to attain the desired optical properties or the warm glow of a near-molten glass preform being pulled into miles of hair-thin filament.

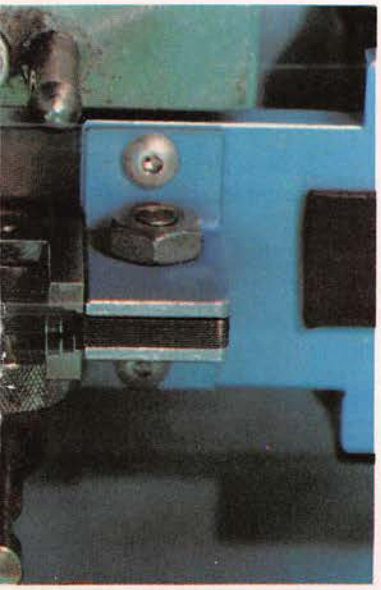


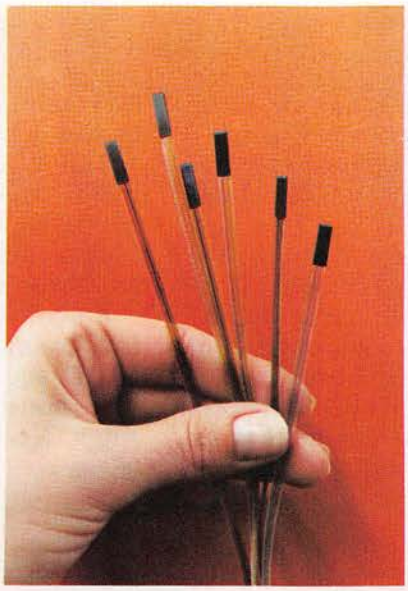
Top left—Francis Wilson operates a glass lathe, shown closer-up (above). Left—one of the containers that supply gases for chemically modifying the glass on the lathe. Right—Overview of the area where glass preforms are drawn into fiber. Bob Clack is on the ladder, Charlie West and Dennis Slaton at the controls below.

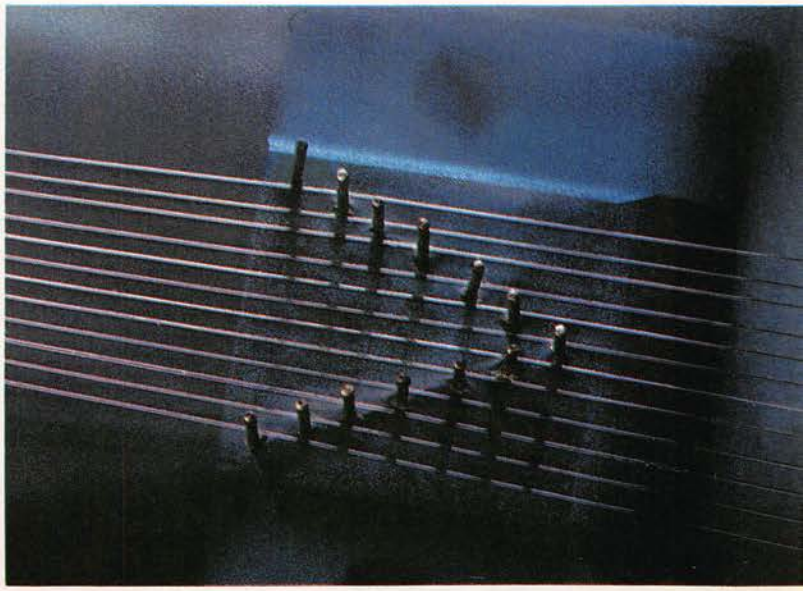


Embedded in our oldest product line, is our newest —lightguide. We have been selling cable and wire, with various types of insulation and jacketing for more than 100 years. Our new facility in Atlanta makes use of that vast experience in the layout of the lines shown here, but on a miniaturized scale. Where a reel of insulated wire feeding into a strander in a traditional wire plant might weigh 100 pounds, here a spool of fiber weighs two pounds. Similarly a reel of traditional cable might be eight feet in diameter, while a reel containing greater capacity and length in lightguide is only three feet in diameter.

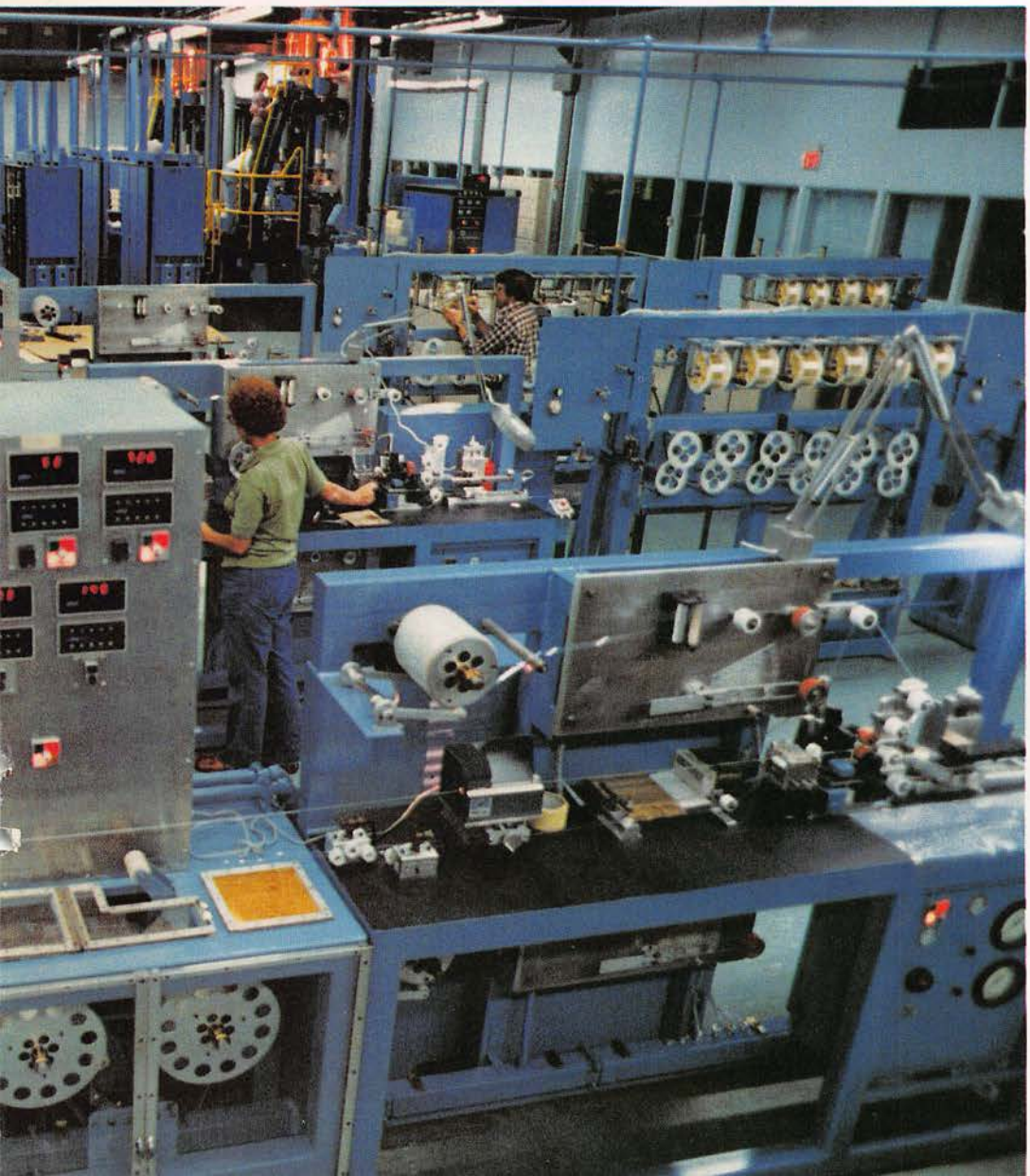








Top left—James Stroud checks controls on a lightguide insulating line. Center—the finger is positioning fibers on a grooved silicon chip, the bottom half of a connector used for butt splicing. Above—an array of several such connectors. Top right—single fibers approaching the point where they are laminated into ribbons in sets of 12. Below—an overview of the ribbon line. Lower right—reels of lightguide awaiting shipment.



The buildings are new and so is the product

Steelwork is rising in Lisle, Ill., for Western Electric's Network Software Center. NSC, close by Bell Labs at Indian Hill, will be a new kind of operation for Western, one devoted primarily to computer program design and implementation. It's also a departure in design from the typical Western Electric plant of red brick with ribbon windows across the front to a campus style. The architect is Holabird and Root of Chicago.

The NSC complex will contain five T-shaped buildings loosely connected in a large "C" around two 11-acre, man-made lakes that serve as storm water retention basins.

A sixth building, completely below ground, and containing about 50,000 square feet of floor space, will house the main computer room. No windows and plenty of

PROGRESS REPORT

insulation on the roof will improve security.

The groundbreaking for the new plant took place last September, and work went on through the winter of '79-'80. There was a great deal of earth to be moved to create the lower levels and the retention basins. The buildings will stand on 374 caissons, the last of which was drilled on May 23. Erection of steelwork, which will eventually total 3,500 tons, began the third week in April and will continue through the fall. Initial occupancy is tentatively set for November '81.

As with all major construction, Western Electric has a crew of engineers resident at the site to interpret the design if questions arise, to check to see that the work is done right, and to ensure that subcontractors and the construction manager hold to the schedule. Theirs is not your typical eight-to-four-thirty job. The hours are long. There's not much time spent at the desk, but there is always a stack of phone messages waiting whenever they do visit the office. The job involves a lot of walking, usually to the opposite end of the construction from where you are. In time, you become expert at threading your way through muddy areas and around the excavations. [*continued*]

Following official groundbreaking ceremonies in 1979, workmen began positioning steel framework (left and above) in April at the site of the company's new Software Center in Lisle, Ill.

Bill Angell, an assistant manager, is the WE man in charge at the Network Software Center. He's spent a good many years in hard hat and muddy boots. He's been with Western for 25 years, several in Defense Activities, but the last 20 have been in Plant Design and Construction. He worked on construction of the service center at King of Prussia, Pa., manufacturing plants at Reading, Pa., Shreveport, La., and Columbus, Ohio, as well as Bell Labs' huge facility at Indian Hill and the Nassau Recycle plant at Gaston, S.C. Angell was featured on our cover in March 1966 while working on Shreveport.

Working with Bill are three department chiefs: Vern Randle, Walter Schoellnast and Jim Hughes. Their backgrounds sound very much like Bill's, only some of the plant names are different. They helped build the Kansas City, Oklahoma City, and Denver plants.

The rest of the WE crew, who share space in an oversized field trailer with people from Ragnar-Benson, the construction manager, include senior engineer W. J. "Bud" Braham, plant engineer Pat Morrison, plant and factory engineering associate Chuck Gregorio and field representative Ernie Ritchie, on loan from Bell Labs.

While not as large as our major manufacturing facilities, the new Network Software Center will provide as much space as a material management center or one of our larger service centers. It's a good-sized building that will eventually be the work home for about 2,500 people, a number of whom are now located across the street in the Switching Software Center, two leased buildings in an industrial park. Others will come from Indian Hill, the Bell Labs' complex half a mile west, and from the Warrenville Data Center, several miles further down the same road.

And it is going to be a very attractive building. The walls will be constructed of precast concrete slabs in an off-white color that the architect describes as an "earth-tone tint." And there will be some 80,000 square feet of bronze tinted thermal windows.

A semicircular cafeteria, which will seat 640 persons, will provide a view of the man-made lakes as well as the upper stories of Indian Hill.

Landscaping plans call for a wide variety of native trees arranged in attractive clusters. WE

Top—An Artist's rendering depicts the cafeteria fronting one of the man-made lakes. Center—An architect's model shows configuration of the five above-ground buildings. Left—precast wall panels are being hoisted into position. Top right—Marc Barnhart slips in bolts that will hold the steel framework together. Right—Bill Angell and Pat Morrison, check drawings in the field office.


WESTERN ELECTRIC COMPANY, INC.
NETWORK SOFTWARE CENTER
LISLE, ILLINOIS

The Installation Supervisor

A Jack (Or Joe, Or Tony...) Of All Trades

BY JANE MOULTON PHOTOS BY CHUCK LEWIS

You have to know a little bit of everything to be an installation supervisor.

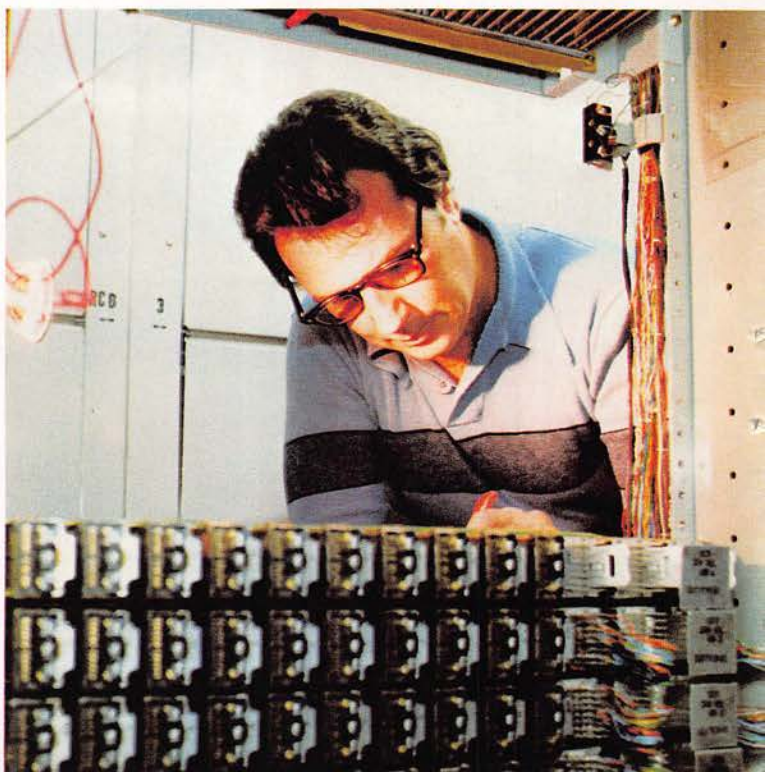
"It's a little bit of everything. You have to know telephone systems, but you're also doing everything from accounting and supplies inventory to personal and career counseling."

So says Tony Severini of his job with Western Electric. An installation supervisor in New Jersey for ten of his 27 years with the company, Tony is one of nearly 2,500 such WE supervisors throughout the country.

"We're really the end of the line in terms of responsibility to the customer," says Severini. "We're the people who deal directly with customers — who are responsible for installing the telephone system they want, by the time they want and making sure it can do everything they want."

Joe Roche, another installation supervisor in New Jersey agrees: "The hardest part of the job is just being in installation," he says. "Being the last connection in dealing with customers isn't always easy. Everyone down the line runs into problems occasionally—the plants have their headaches getting products out, accounting has theirs—and I appreciate that. But when push comes to shove, I have a date to meet, a commitment to the operating company customer."

For Western's installation supervisors, meeting those commitments involves multi-faceted work that has them constantly on their toes and on the move, but certainly never bored by routine.



Top, left — Supervisor Joe Roche, left, with Charlie Stackhouse, N.J. Bell's chief of operations at Mercerville. Below, left — Dennis Traynor works at Bound Brook while supervisor Tony Severini, above, center, reviews job at Dunellen with Ken Pavlick and Margie Boyd.

"There is no 'typical day' for an installation supervisor," says Roche. "I never know from one day to the next what might come up." Joe's largest job right now is at the Mercerville, N. J. central office. "We're putting in a 33 frame ESS addition to accommodate an eventual total cutover to ESS. I have people working three shifts a day, six days a week to get it done."

Mercerville is Roche's largest, but hardly his only project. "Right now I have nine people at four different locations. Mercerville is the biggest, so I spend a good deal of time there—that's where my desk currently is. But I have to visit those other jobs on a regular basis, too." For Roche, the farthest location he visits in his south-central New Jersey territory is a relatively quick 15 minutes away in Burlington. But combined with several shorter trips, the constant back and forth gives his small brown economy car a run for its money.

Severini does his traveling — a heavier route to fourteen employees at seven locations, in a prized 1966 Thunderbird* car. "I've thought about having it restored because it's taken quite a beating. On this job you feel like a real trucker sometimes. There's always something tossed in the back seat —materials or tools to be moved from one job to another. And I average 400 miles a week, so the wear and tear of mileage alone. . . ."

Even while he's on the road, between locations, Severini says he's still working. "Your mind is *never* a blank. While I'm driving, I'm always thinking ahead: What's going on at the next stop? How far along should the cabling be? What tools will they need for the next step? If the conduit isn't in yet, what else can I get done in the meantime?"

Nonetheless, mobility seems to

*Registered Trademark of Triumph Engineering Co., Ltd.

be one of the most attractive aspects of the job. "There are times it gets pretty hectic running back and forth between locations," says Severini, "but I've never wanted a desk job. It's too confining. Some people will probably think I'm crazy, but that's why I've always loved working in installation—it keeps you moving all the time."

"Not only are you on the move day to day," adds Roche, "but every nine months or so, it's likely you'll be given a different area altogether, be switched to a different part of the state. So things and people are constantly changing."

While the job's movement creates diversity and wards off boredom, it also has it's disadvantages. Roche and Severini find their administrative responsibilities, for example, more taxing than most. "Technically I have a desk," says Severini, "but it changes location depending on where we're working and I'm seldom at it anyway. So keeping on top of personnel records, progress reports, material orders, etc. is a real chore."

Says Roche of desk and paperwork: "Nobody *likes* paperwork. But I *do* like to be organized, so every once in a while I just make myself take the time to sit still and do it. Otherwise it can get ahead of you. Sometimes I'll set aside an entire day from location hopping just to do paperwork at my desk."

Like Severini, Joe Roche, who joined the company in 1965, has been a supervisor in installation for ten years. Whereas Tony handles largely crossbar and toll equipment jobs, Roche's specialty is ESS installations. Four years of training as a telephone technician in the Coast Guard and simple timing steered him in that direction.

"After the Coast Guard experience, I logically looked to the phone company for a job," he says. "I had somewhat of an advantage. I wasn't familiar with specific Bell System equipment, but I *did* know the telephone business. At that time, ESS was the coming thing. I worked on the installation of an ESS right here in Trenton, at the time the biggest such operation in the country. After that, I just stayed with it.

"For me, particularly because I'm working with ESS, much of the job is coordination. This week for example, I have a program at the Mercerville installation that needs testing. But it's a working office and I can't just interrupt regular service to test. So I've worked it out with New Jersey Bell's people and what we'll do is wait till the traffic slows down, usually after 8 p.m. But that means I have to take my test man off days and put him on midnights and use my day crew somewhere else to make up the time. In this case, it so happens my test man loves working nights," he adds with a grin, "but it's usually not that simple."

"If I don't understand a system, how am I going to explain it to my people?"

Both supervisors agree that the toughest part of the job is maintaining cost efficiency. "Are we cost conscious?!" says Roche. "You bet. That's our prime concern." Severini echoes that sentiment: "Getting good prices on materials, and largely just getting the most out of people, is the biggest task. It's keeping things going and people productive. If I'm waiting for cable to arrive and it doesn't, for instance, I have to make sure there's somewhere else I can put the cabling workers that week. And when I'm planning for those kind of assignment switches, I have to be sure I'm utilizing each individual's best skills. Different people can do different aspects of the job. They can't all do any job, so I have to give that serious consideration — look at their skills, their experience, what they've worked on most recently—and where they do their best work."

It goes even beyond that: "As a supervisor, you have to really know your people. Not only what they can and can't do in terms of technical ability, but who's responsible and efficient, who has initiative. Like any other business," says Joe Roche, "we have people who are top notch, who can and will do more than others and do it on their own. But you'll always have a few

Top — Tony Severini explains crossbar wiring procedure to newcomer Barbara Murphy. Below — Joe Roche checks modification of N.J. Bell operator's position with installer Bill Tharp.

who will goof off the first chance they get. That's a fact of life in any business."

That's where first-hand experience proves a distinct advantage to any supervisor, in Roche's opinion. "In many cases, I've done the same

work myself. Even if it was a different job and a few years ago, I basically know how it should be done and about how long it should take to do it. So even if I'm not at a job for a few days, I know when I get there if people have been working at the pace they should be."

During all of this, the phone never stops. "If I'm not near one, they track me down anyway," quips Severini. "I'm on the phone with Gateway alone a few times a day," says Roche, referring to back-up groups at the Northeastern Region headquarters in Newark, who are on hand for technical and administrative support.

"I spend a great deal of time studying schematics and the engineering of a job before we even start," says Roche. "I find it's easier in the long run if I can learn it thoroughly in the beginning, then I don't have to waste too much time referring back to it while the work's in progress." And even so, Roche says he's on the phone with Gateway daily, if not with a technical problem, straightening out any of a number of administrative details.

"With so many new systems and types of equipment coming along so fast," adds Severini, "it's hard to keep up. So supervisors have to do a lot of their own research. If *I* don't understand a system, how am I going to explain it to my people and direct them while they're installing it?"

With jobs going on at several different locations simultaneously — and sometimes there's more than one going on at each—just the logistics involved are sometimes frustrating and always time consuming.

"Every job is different," says Severini. "Even if you've installed the same type equipment before, it's never exactly the same. Right now I have a half dozen jobs totaling about a half million dollars worth of work going on. The size of the jobs varies, too. One job may be only $400 of installation billing and another is $160,000.

"Most of the work I have is crossbar frame additions and modifications in central offices. If a town has a new housing development in the works, for instance, they may need an additional 800 residence lines, or in many cases, we're accommodating small businesses that are new to an area."

For each installation, regardless of size, supervisors are responsible not only for what we tend to think of as the actual installation—cabling, wiring, testing lines—but everything associated with the job before and after. They have to order all the materials and tools, and account (in triplicate, no doubt) for every nut and bolt needed and used, borrowed or loaned; for every foot of wire and cable, every screwdriver.

While those details are often the most tedious and least interesting part of the job, in as much as they affect cost and deadlines—the installation supervisor's two top priorities—they are also a very important part of the job.

"Even after you're finished initial planning, scheduling and ordering of materials," says Tony Severini, "you never know what may happen. Recently for instance, I ordered two yokes — attachments that fit the tops of ladders to movable ceiling tracks. Instead of two yokes, I got two pushbutton phone plates. Turns out the order numbers were very similar and they got mixed up at the warehouse. That doesn't usually happen, but now I have work that can't be started till I fill out a form for the receipt of wrong material, reorder the yokes and wait for them to arrive. Meanwhile, I have a lot of work that depends on those ladders—and that's time and money I have to make up somewhere else."

"Mondays and Fridays are the worst—in the sense that they're the busiest," he adds. "Especially Mondays. You're reviewing what was done the week before and trying to lay out work for the week ahead. And if you have new people coming on, and installers are constantly rotating, they usually report on Mondays.

"Even if you get someone with a year or two of experience, you often have to train them from scratch for a specific assignment. If a person comes to me who's only worked on ESS installations, for example, they probably don't know anything about crossbar, so I may spend as much as two or three hours reviewing how we work things."

But that's really what it's all about. "The job has its good points and its bad, like any other," says Joe Roche, "but overall, I like the work. I really enjoy people and I think that's the key. If I didn't, it would just be another job." WE

"HANDS ON"

BY SAUL FINGERMAN
PHOTOS BY DOUG BYRUM

Students at our new Minicomputer Training Center spend more time working with real equipment than listening to lectures

John Devitto and Donna King discuss a new course she is developing. She will probably teach it as well, since many course developers double as teachers.

Dave Sackett is a man who really understands the value of "hands-on" training—and for the best of reasons: It saved his life.

Assistant Manager at the Bell System Training Center in Dublin, Ohio, Sackett learned during *the* war. (Like most WWII vets he calls it *the* war.) High over Germany on a bombing mission, he stretched his neck to get a better look at a line of flak punctuating its way toward him like a string of exploding firecrackers. After a few seconds, he began to feel strange, but it took only another second or two to realize why. He had pulled the feedline of his oxygen supply loose.

From left — John Devitto, Dave Sackett and Doyle Bearden hold a brainstorming session at the Dublin Technical Training Center. Right — Australian Peter Jones goes one-on-one with one of the many computer terminals at Westbelt.

Another half minute or so and he would have passed out—probably for good.

"I didn't," says Sackett, "because I had been trained in exactly that kind of situation. I acted fast, because I recognized the feeling. Thanks to my realistic, hands-on training, I had been there before."

"Hands on," of course, is pedagogic shorthand for training in real-life situations—getting your hands on authentic equipment with authentic problems. It could be and, according to Dave, who had a lot to do with its creation, probably should be the motto of Western's new Minicomputer Training Center in Columbus, Ohio.

Dubbed "Westbelt" for the part of town it's in, the Center has more than $4-million worth of equipment, and it's all there for students to get their hands on. The equipment is all OSS.

OSS??? Wasn't that America's top-secret spy outfit during *the* war? Well, yes, but now it stands for *O*perations *S*upport *S*ystems—a concept as vital to the future of the Bell System as the original OSS was to the security of this nation.

There are those who go glassy-eyed and turn off when somebody starts to talk about OSS—probably because the subject is quickly veiled in a thick scrim of tongue-twisting acronyms: EADAS, AMARC, CAROT, and AEMIS to name a few. Indeed, there are nearly 400 pages of them in the latest issue of "Bell System Information and Opera-

tions Systems," a handy little guide for people with a taste for saving time and money.

Even when spelled out, the names tend to elicit blank stares. Take AMARC, which stands for Automatic Message Accounting Recording Center. Does that help? Probably not. And, yet, the basic concept underlying the murky alphabet soup is as simple as it is inevitable in today's fast-moving world of high-tech. Operations Support Systems are computerized systems that do a host of repetitive tasks for the Bell System—and do them quickly, economically and accurately. The tasks support the operation of the Bell System network by helping out with such functions as engineering, traffic measurement, surveillance, maintenance and monitoring.

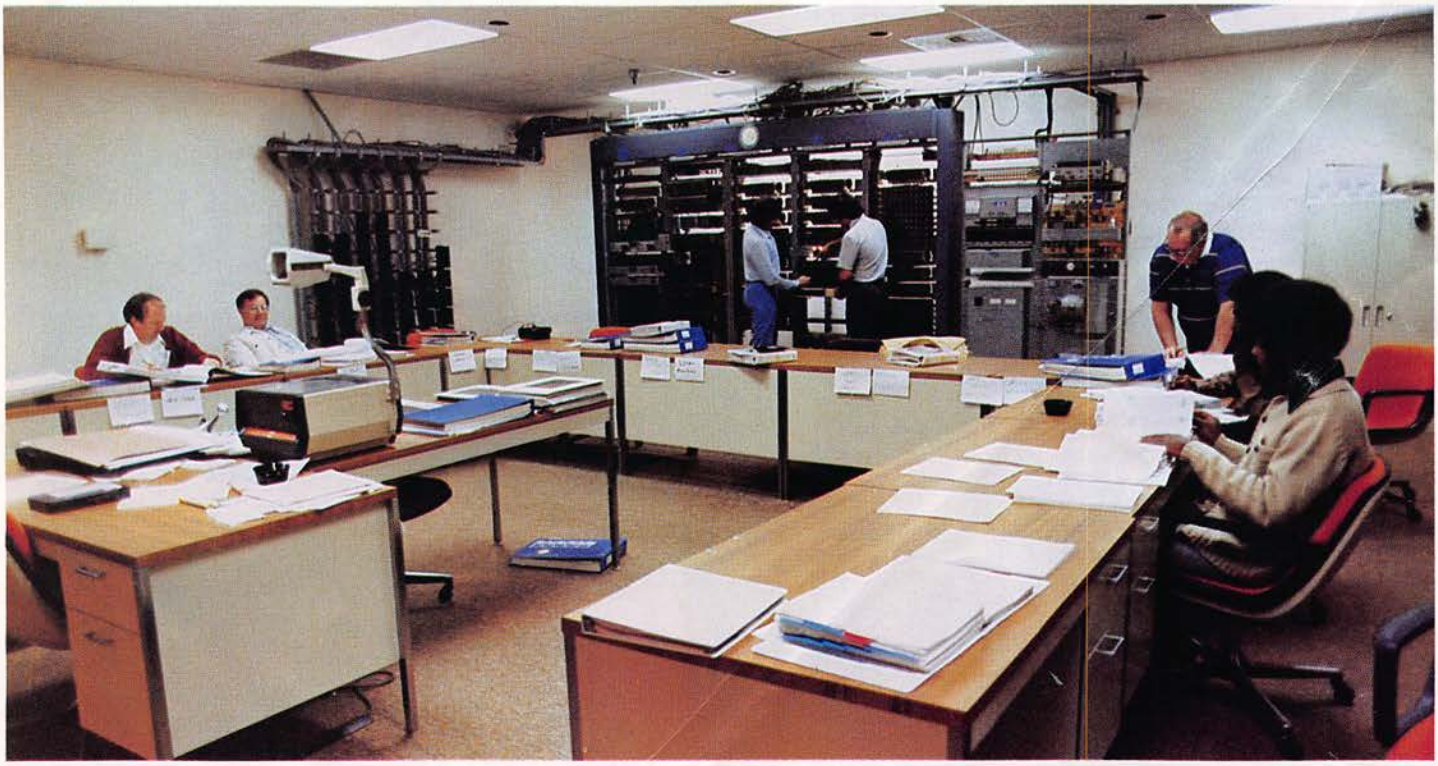
CAROT, for example, (Centralized Automatic Reporting on Trunks), checks central office trunks for transmission loss and noise. EADAS (Engineering and Data Acquisition System) collects traffic data from central offices and helps Bell Operating Companies determine what equipment they will need to keep up with demand. In short, if the operating companies have a need for it, there is an OSS ready now, or on the way.

An OSS consists of three main elements: a minicomputer, Bell Labs designed software to run it, and WE equipment for interfacing the OSS with the Bell System network.

It may be worthwhile digressing here to spell out just what OSS computers are and how they differ from the personal mini-computers you see advertised for as little as $500. The OSS minis go for as much as half a million dollars and bear as little resemblance to their game-playing cousins as limousines do to roller skates. They are larger, more reliable, faster—much faster—and their memories are measured in millions of bits compared to thousands for home computers. They stand midway between microcomputers (computers on a chip) and the giant mainframe computers that can cost upwards of $20-million.

Computer vendors offer courses in the use and maintenance of their equipment, but, until the advent of the Minicomputer Training Center, there was no place for Bell System craftspeople to learn entire OSS systems. Similarly, computer vendors offered maintenance contracts for their own equipment, but not for whole systems.

With thousands of OSS's already purchased and many more to come, the Bell Operating Companies asked AT&T to establish a school for their own craftspeople. AT&T, in turn, asked Western to set up such a school, and early in 1979, after much concerted effort, Westbelt opened its doors in 34,000 square feet of leased space.



Instructor Mike West (right) provides some useful tips as one of his students gets some "hands-on" experience.

It was an instant success, which is no surprise considering its thoroughbred origins. Progeny of the Dublin Technical Training Center and all of its many years of experience, Westbelt, in Dave Sackett's words, is "very now!" Visitors to its quiet computer-packed labs will agree, or, perhaps, even think Sackett's *now* looks just a little bit more like *tomorrow*. It's raised floors are thickly carpeted and all walls and partitions are covered with sound-soaking material. About the only noise you can hear is the low hum of cooling fans and air conditioning, immunizing the school against heat and humidity—the two major disease germs of computers.

Each lab has its own OSS, with identifying acronyms hanging from the ceiling like strings of dried alphabet soup. Student populations average 10 or 12 to a classroom, with no more than three to each

hands-on lab assignment. A unique patch panel enables instructors to connect any classroom with any piece of equipment. It was made possible by installing over two miles of cable before the walls went in.

Students—about 125 to each of two shifts—are housed at nearby motels and bussed in. They are predominantly Bell Operating Company personnel with a substantial mix of WE craftspeople, engineers, and account management types. Often, there are foreign nationals as well, representing such countries as mainland China, Korea, Saudi Arabia and Australia.

At the time of this writing, Peter Jones, a bearded giant with a down-under twinkle in his eye was studying a management information system called AEMIS. His enthusiasm is typical of most Westbelt students. "Everything here is fantastic," he says, "and the instructors are really quite good."

They are, too. A lot of people see to it. As Doyle Bearden, Manager, Training and the Bell System Training Center's top man in Dublin says, "It's in the long-term interests of the field to send us their best people to serve as instructors. By helping us, they help themselves, because we try to 'clone' their best people."

Bearden notes that most course developers and instructors are on rotational assignments, because "we need a continuing source of experience from the field to have a viable training organization." Pointing out the window to the world at large, he adds, "Things keep changing out there all the time." One indication of how much they change is that 50 percent of Bearden's investment goes toward keeping his equipment up to date. He usually gets the first or second unit of anything new coming off WE production lines, and he sees to it that his course material is kept up to date. Staying technologically *au courant* means keeping a few people permanently "on point" at locations producing new hardware, and software, too — locations like Denver, Lisle and Indian Hill. In addition, Bearden's instructors and course developers work with AT&T, Bell Labs and the WE PECC's to provide what he calls, "first user training." "We can't get into training too early," he adds. "If we wait too long, the technology gets away from us. To emphasize Dublin's and Westbelt's timeliness, he notes that his people are already developing course material on the upcoming No. 5 ESS.

One of Dublin's traditions, which Bearden has continued, is to assign total responsibility for a system to one person. Similarly, he has assigned responsibility for the Minicomputer Training Center to one Department Chief, John Devitto.

An amiable and energetic engineer, Devitto came to Dublin in 1974 by way of Installation in Philadelphia and has been looking after Westbelt since its opening. He sees the minicomputer school's mission as twofold: to seed the field with proper OSS operating, installation and maintenance skills and to support the OSS product line on a profitable basis. He is understandably proud of the fact that Westbelt is cheaper, better and more comprehensive than anything available outside Western Electric.

> OSS computers bear as little resemblance to their game-playing cousins as limousines do to roller skates

"We have 55 developers and instructors," he says, "and many can double at either function. They're really exceptional people."

When asked about the apparent youthfulness of the professional staff, he replied, "Sure they're young—they've all grown up with the new technologies."

Members of the teaching staff come from four walks of life—the operating companies, Western, the private business sector and campuses. The latter group are mostly graduates with education or computer science degrees. There are, however, no programmers, although Devitto is quick to point out that some of his people *can* create the labyrinth sequences of commands that animate computers with life and intelligence.

Donna King, one of Westbelt's course developers with a little less than two years service, typifies the off-the-street recruits. Attractive, serious and as carefully groomed as a fashion magazine editor, she is a former high school teacher and counselor. One of the school's few native Ohioans, she is developing a course in computer peripherals such as disk and tape units, which she will probably teach as well. In preparation for that big day, she sits in on other courses here every chance she gets—a mind-broadening habit shared by most Westbelt instructors and developers.

"I love it," she says with a wide grin, "I'm learning all the time."

Instructor, Mike West, a big, friendly Southerner with a WE installation background, knows Westbelt from both sides of the classroom, having previously taken courses at Dublin as part of the first wave of OSS students. In fact, he joined the teaching staff only three weeks after completing his last course two years ago. Like Donna King, he is learning-intoxicated. "I never stop learning," he says. "Minicomputers are so dynamic, there's always something new."

West puts his students at ease shortly after they arrive. "At first, they tend to be a little tense. They think they need a degree to be here, but they don't. If they have the prerequisites—things like reading schematic diagrams—they can almost always handle our courses." Pointing to a nearby computer, he adds, "We're very big on hands-on training, you know. Without it, you can lecture all day, and it's just so many words."

Charlie Harris, one of West's pupils from Pacific Region sums it all up as well as anybody can. "The good thing about this class," he says, "is what they call 'hands on.' I've worked on some of these OSS installations before, but, if I'd had this course before those jobs, I could have saved the company a lot of money."

And that, after all, is the bottom line.


FRAGILE
dimension

Our Top PBX Ships Out

BY RICHARD O'DONNELL PHOTOS BY LEN STERN

The Dimension® PBX has gone to sea

Even standing quietly at berth, the aircraft carrier *John F. Kennedy* is impressive. Nineteen stories tall, displacing 83,000 tons, and with a flight deck the length of four football fields, the ship can be described only in superlative terms. Inside, the sense of immensity is frequently lost in the honeycomb of the ship's compartments. There are some 2,000 of them, of varying sizes, all closely filled with men and equipment, accessible through narrow corridors, steep ladders, and low hatches.

The normal ship's complement is a crew of 2,800, but when the operating squadrons come aboard the total complement numbers 5,200.

With a ship of that size and that many people, internal communications is critical. Until recently,

Above—The Dimension 2000 PBX system brings up-to-date communications to carrier John F. Kennedy. Left—Loading the system aboard the carrier. (PHOTO BY J. M. SPOON, JR.)

however, the *Kennedy*, launched in 1968, had been operating with a telecommunications system built in 1943. Finally, obsolescence caught up with it. "There were no spare parts to be had," said Lt. (jg.) Rene Fry, the ship's electrical officer. "I had scrounged all I could."

The solution to Fry's problem was the Dimension® 2000 PBX system made at Western Electric's Denver Works. As described by Vince Scurria, the Government & Commercial Sales account representative responsible for the installation, the Dimension 2000 had the size, speed and dependability needed for the job.

The problem was getting the system installed within the time frame required. Ordinarily, it takes 16 weeks to manufacture the system, five weeks to install it. The Navy didn't have that much time.

"A lot of people told me it couldn't be done," Fry recalled. They said it wouldn't work and that we couldn't get it in on time. But Vince convinced us otherwise."

"The Denver Works did a great job," said Scurria. "They cut the manufacturing time to just 5½ weeks for this project. Then came the installation."

Right—WE's Walt Knapp, seated left, and Vince Scurria sit in as Lt. (j.g.) Rene Fry briefs operators on the Dimension system in the ship's electrical control center. Below—Crewmen in the boiler room feed status reports to the control center via the new communications system.

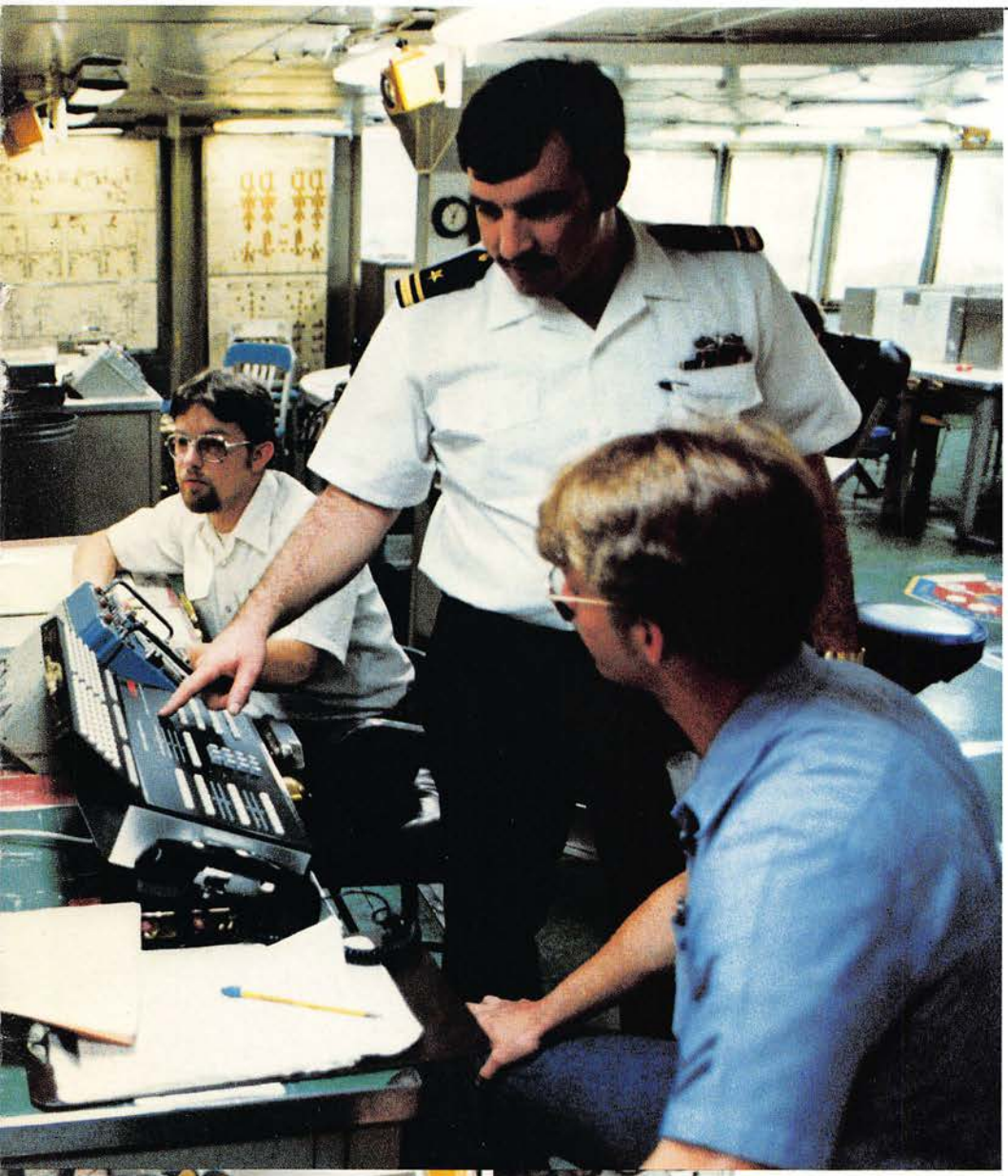
The system was installed during May and June by the Chesapeake and Potomac Telephone Company with Western's project engineer, Walt Knapp. It was a job done on the run in just 13 days while the ship was at sea.

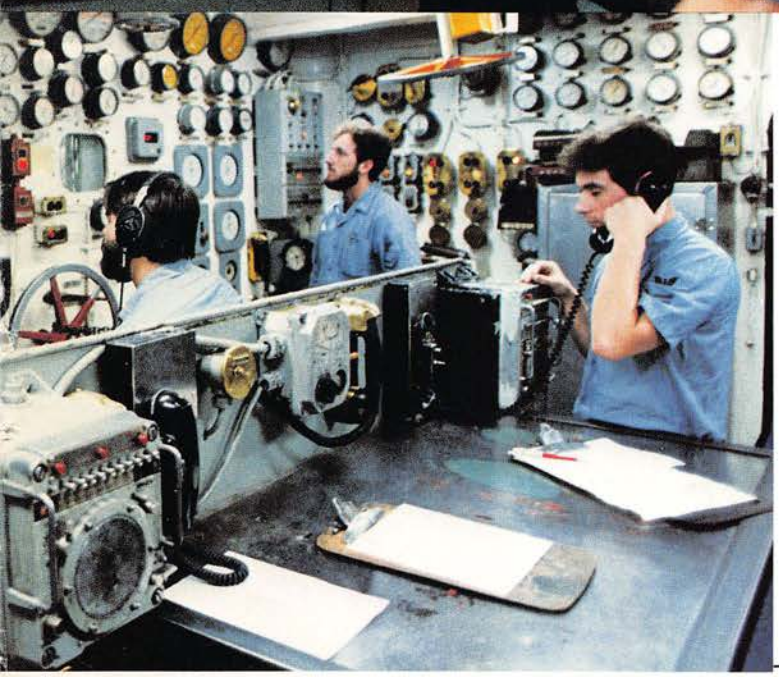
"We provided a temporary manual switchboard to maintain interim service," Scurria explained. "After 13 days, we had 500 telephone lines in service. The rest of the lines were operating 15 days after the installation began. When we put those first 500 lines into operation, the crew was delighted."

The crew was not alone in its enthusiastic response. When the 1,000-line system went operational, Lt. Fry wired the Naval Sea Systems Command, "In operation this date. Performance magnificent."

"In the Navy, that's a word we don't often use," Fry said. "When we do, people take notice."

Since the installation on the *John F. Kennedy*, a Dimension 2000 system has since been placed aboard a second carrier, the USS *Saratoga*, and again in an impressive record time. From the time Vince Scurria surveyed the ship's requirements to the time the system was cut over, just six weeks had elapsed. WE





It's hard to say who had the better time—the Guilford Center Pioneers or the hearing-impaired youngsters. Our happy story starts on page 6.

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