

Bell

TELEPHONE MAGAZINE

Special Commemorative Edition
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When one door closes, another opens.
But we so often look so long and so regretfully
upon the closed door that we do not see the one
which has been opened for us.

Alexander Graham Bell



I feel especially honored to salute the employees of the Bell System, who have shared so much of their time and talents with me during the 35 years I have spent in this business. I admit that I would prefer another occasion upon which to pay tribute, because divestiture has been a difficult and often painful process for all of us. At the same time, however, we have been building new enterprises, and I know each of us thrills to the prospect of working in them.

I think divestiture should be remembered for the new beginnings it brings us — and for the opportunity it provides to build upon our heritage. I, like so many of you, have deep roots in the Bell System. My father was a district traffic superintendent in Richmond, Virginia, at the time I was born; my mother was a supervisor in a Long Lines operating room in New York; and my sister worked as a service representative for New Jersey Bell. Each of us had the service ethic — that devotion to helping customers day by day and in times of crisis. As a matter of fact, my parents first met in Philadelphia, where they were both on loan to help with the very heavy emergency problems brought on by World War I. As I was growing up, I remember my father missing more than a few dinners in the course of his travels. He worked hard in helping to establish overseas telephony and rwx service, and he was very proud of the business.

His pride and dedication were two of the qualities that also impressed me about the Bell System people I came to work with. Whether they were the pole climbers who taught me that end of the business, or the hundreds of people at Long Lines and the operating companies whom I met in various jobs in various cities across the country, the employees of the Bell System have been distinguished by their integrity, their determination, their enthusiasm, and their devotion to excellence.

It has taken all these qualities and one more — what the French call *élan* — to make the vision of our forebears in this business become a reality: to link Americans to each other and to the world with direct and almost instantaneous communication. Today, we have made that vision a reality. In so doing, we also have given this country more than a century of continuous and systematic innovation — the transistor, di-

rect distance dialing, microwave transmission, satellite communications, electronic switching, and fiber optics, to name only a few. Day in and day out, Bell people have given selfless service, and they also have volunteered countless hours to better their communities.

The use of our technologies, coupled with the humanity of our work, has touched and fundamentally altered every aspect of our lives and livelihoods. The telephone transmits messages of compassion and calls to the moon. Taken for granted though it may be, there is nothing commonplace about this extraordinary system. Telephone service in this country deserves its reputation. It is, indeed, the best in the world.

We take pride in what we have accomplished. Our heritage is glorious — and our future ripe for further achievements. Divestiture has acted to put the destiny of the business back into the hands of those who know best how to run it — its employees. It was never primarily the organization of the Bell System that made the company work, though its organizational scheme certainly inspired and aided the business. It was, instead, those assets that have not been subject to the divestiture process: our Spirit of Service, our tradition of excellence, our sensitivity to people, our reputation as a responsible corporate citizen, and — above all — our ability to discern the expectations of the public and then conform the business to those expectations.

If we continue to display these qualities and to set them as examples for newcomers to our companies, then we will surely live up to the trust placed in us by our predecessors — and the Bell System's heritage truly will become an enduring one. From the standards we have lived by for more than 100 years, we can grow in confidence in our individual abilities and stand firm on the fundamentals that have made this business great: that it is an endeavor profitable to its owners, useful to its customers, and, to its employees, worth working for.

My wife Ann Lee and I plan to spend a quiet time on New Year's Eve this year, as we usually do, but we will more than likely raise a toast to the men and women of the Bell System as they begin their auspicious adventures. And we will say what we feel in our hearts and what my family felt before me: that we hold you, collectively and individually, in the highest regard.



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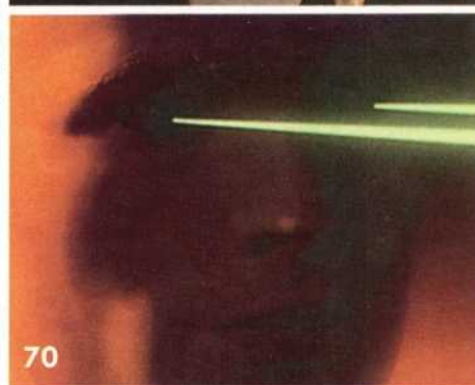
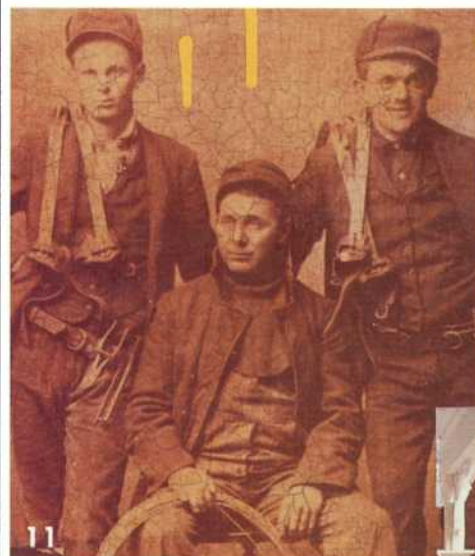
rites of passage

Cultivating a new culture to match new missions may be the most difficult task facing post-vestiture employees.

Illustrations by Ponder Goembel

COVER: The quotation on the cover of this Special Commemorative Edition — a variation on themes uttered in Irish and Hindu proverbs and recast by such writers as Cervantes and Fernando de Rojas — has, over the years, been attributed to Alexander Graham Bell. One story, perhaps apocryphal, has it that these are words of comfort Bell communicated to Helen Keller. Whatever their origin, however, the words are astonishingly appropriate for this particularly poignant moment in Bell System history. (The cover was designed by Tim Girvin of Seattle.)

PHOTO CREDITS: *Pages 4-5:* Nancy Rica-Schiff, Bell Labs, Eric Poggenpohl, C. Marshall Wilson, Ted Streshinsky, Elizabeth Pavey, Phoebe Spackman, Roy Stanek, James Karmrodt Lightner, Shirley Boettinger, Eric Dobbs, Roger Ressmeyer, Ponder Goembel, and Roger Rawlings. *Pages 43-44:* Library of Congress, M.I.T., Visual Promotions. *Pages 44-45:* Visual Promotions, AT&T Long Lines, Wagner International Photos, Bell Labs. *Pages 46-47:* Telephone Museum, Pacific Telephone, Norman Rockwell, Library of Congress, New England Telephone, Illinois Bell, AT&T Long Lines, Visual Promotions. *Pages 48-49:* Library of Congress, Bell Labs, Visual Promotions, NASA, AT&T Long Lines. *Pages 50-51:* Western Electric, Telephone Museum, Jim Lincoln, Mike Mitchell, Visual Promotions, AT&T Long Lines, Illinois Bell. *Pages 52-53:* The Bettmann Archive, Visual Promotions, Al Ramson, The New York Public Library. *Pages 54-55:* Folon, Bell Labs, Visual Promotions, Movie Star News, Walt Disney Productions, Ernest Hamlin Baker.





GISH

BOETTINGER

BERNSTEIN

WHITE



HAWKEN



SCANLON



KARCHIN



TCHEREVKOFF



CLEMENS



PLANK



GALAMBOS

CAVALCADE

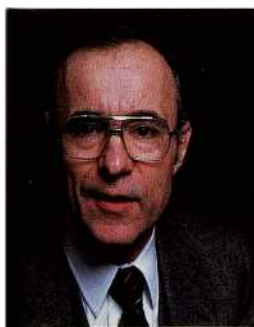
A cavalcade, the dictionaries tell us, is a colorful ceremonial procession. In history-telling terms, as Noel Coward so capably demonstrated in his play aptly called *Cavalcade*, the procession is made up of events. Those events are woven into a human saga, as opposed to a mere dramatized chronology, when episodes are constructed and linked together with zest and vigor — something the Italians call *brío*; the result is neither conventional history nor dramatized chronology but reflections and insights of the characters bearing witness to history and telling the story. In journalistic or literary terms, such a result can be called a *Zeitgeist* — an image of the spirit of the age, a recapitulation of the trend of thought and feeling in a particular period of history.

All of this is by way of suggesting to readers that they look upon this Special Commemorative Edition of the maga-

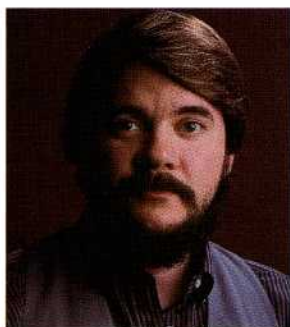
zine not as a conventional history of the Bell System but as a cavalcade of events, an image of the spirit of the Bell Telephone Age as perceived by the staff and by the writers, photographers, and illustrators invited to contribute their reflections and insights. Our guest artists for the edition, in order of appearance, are:

Theodore H. White, the historian-journalist and writer perhaps most noted for his "Making of the President" series of books; this is the first corporate magazine assignment he's accepted. **Alvin von Auw**, the prolific writer who participated in the drafting of numerous corporate policy statements; he retired as AT&T vice president-assistant to the chairman in 1981 and this year published his book *Heritage and Destiny: Reflections on the Bell System in Transition* (excerpts from which appear on page 16.) **Lillian Gish**, the revered actress whose career began when this century was young. **Steve Karchin**, the renowned illustrator whose work is a union of found objects, collage, and paint.

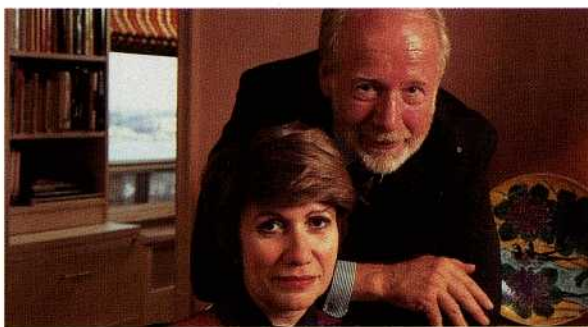
Henry M. Boettinger, the writer, consultant, and lecturer whose second edition of *The Telephone Book* will be published later this year; since his retirement as an AT&T assistant vice president in 1977, he has been living in England. **Bobbie Ann Mason**, the award-winning author of *Shiloh* and *Other Stories*; a native of Kentucky residing in rural Pennsylvania, Mason is at work on her first novel. **Alex Haley**, the author of *Roots*, which became the basis of the successful television miniseries and the inspiration for a renewal of Americans' interest in their own roots; he lives in Los Angeles and lectures extensively in the United States and abroad. **Michael Novak**, the writer who is at present resident scholar in religion and public policy at the American Enterprise Institute in Washington, D.C.; his most recent books are *Confession of a Catholic* and *The Spirit of Democratic Capitalism*. **Gregory Heisler**, the Chicago-bred photographer who lists among his choice work contributions to the book *A Day in the Life of Australia* and a *GEO* magazine photo essay on ballet.



PENZIAS



NELSON



DAVIS & AUCHINCLOSS



VON AUW



BROWN



GOEMBEL



NOVAK



MASON



TUNSTALL



HALEY



HEISLER

Rita Mae Brown, the author of eight books (among them the sleeper *Rubyfruit Jungle*), who is writing a ninth entitled *Red Hearts*; she lives in Charlottesville, Virginia, and wonders why anyone lives anywhere else. **Anne Davis** and **Gordon Auchincloss**, the team that writes collectively as *The Write People*; this is their fifth appearance in as many years in this magazine. (Auchincloss, by the way, was a writer for the televised *Bell Telephone Hour*.) **Betsy Plank**, the much-honored public-relations practitioner; she's assistant vice president for corporate communications at Illinois Bell. **Clint Clemens**, the distinguished Boston-based photo-journalist cum sailor and mathematician.

Arno A. Penzias, the 1978 Nobel Prize-winner in Physics; he is vice president of research at AT&T Bell Laboratories. (The sidebar to his article was written by **Steve Aaronson**, a member of Bell Labs' public relations staff.) **Jeremy Bernstein**, the writer for *The New Yorker* who happens to be a professor of physics; he's now at work on a book on Bell Labs. **Bill Nelson**, the Richmond,

Virginia, illustrator whose artwork for magazines, corporate clients, and cultural association has won more than 100 awards.

John J. Scanlon, the former AT&T executive vice president and treasurer who drew on his 40 years in the Bell System to recount highlights of the enterprise's financial story for this Special Commemorative Edition. **Louis Galambos**, the author of the current *America at Middle Age*; he is a professor of history at Johns Hopkins University, where he also edits the papers of the late President Eisenhower. **Paul Hawken**, the founder of the near-legendary Erewhon Trading Company and author of the current *The Next Economy*. **Michel Tcherevkoff**, the photographer whose use of special effects has made him a technical wizard in his field.

W. Brooke Tunstall, the AT&T assistant vice president and director of corporate planning who is chairman of AT&T's Restructure Implementation Board; he has written several articles on corporate culture for this magazine (the article in this edition is based on material he de-

veloped for *Sloan Management Review*). **Ponder Goembel**, the Philadelphia illustrator whose "fine arts" technique includes painstaking applications of thin coats of paint.

While this Special Commemorative Edition (more than half a million copies printed) closes a chapter in the magazine's publishing history, it may not be the last chapter. True, AT&T — no longer able to use the Bell name — will not be affiliated with the publication; but the magazine's name and mission have been bequeathed to the Central Services Organization.

I know I speak for all who have served as editor over the years when I say that this magazine has offered corporate journalists a rare, often rarefied, experience. It has been a privilege, really, to be able to speak for the Bell enterprise through a medium that has reached so many, many people.

I take my leave of the collective Bell System readership sadly and sincerely — but, I trust, *con brio*.

— **R.Z. Manna**

SO WE SAY GOODBYE —AND WELL DONE!

BY THEODORE H. WHITE

The telephone was contemporaneous with Tom Sawyer and the self-binding reaper; a charming part of America's mythic past, a vital component of our technological future.

The future was entirely invisible — but what a future that first telephone would introduce! The end-reach of the simple horned instrument was then, and still is, immeasurable. But the date of departure can be fixed with a certainty rare in any revolution. And so any thoughtful historian must start his story there.

The year was 1876, one full century since the 13 colonies had declared their independence as the United States of America. Life was not only changing in America, but speeding. That year, Thomas Edison had established America's first research laboratory at Menlo Park. In Baltimore, Johns Hopkins had just been founded as the first American university established primarily to offer postgraduate education to college men who wanted to pursue learning further. They were the future, but the past still cast its spell. Samuel Clemens, under his pen name Mark Twain, had just published a bestseller, *Tom Sawyer*. It was, unknown even to the author, a lyric farewell to an America already passing into myth. His America would never come again. But the celebration of America's first century of nationhood had been set: the Philadelphia Centennial Exhibition; its theme, America's technological progress.

It was hot and humid as the Exhibition opened. But the exuberance of the then-aborning American technology surpassed wonder. The first typewriters, self-binding reapers, web printing presses, duplex telegraphs all demonstrated an America just beginning a new era of pioneers — men probing technology's control over matter. Philadelphia was then still America's second largest city (population: 647,022), surpassed only by New York (population: 1,478,103); Los Angeles was a village

(population: 5,728). All would change, however, as all America was to change, by the display at the Exhibition in a little room on the second floor of the Massachusetts education section in the main building.

There, a sensitive and earnest young voice teacher from Boston, Alexander Graham Bell, was displaying a curious device. His mother had been deaf; the young lady he was soon to marry was deaf; his mission was to make the deaf able to lead a normal life. His inquisitive mind had tinkered with mechanisms that could control electric current and transform it from the dit-da-dit of the telegraph system into a new system that would control *sound waves* from the lips of a talker to the ear of a listener. That Spring, in a Boston electrical shop, he had perfected a cone-shaped instrument that carried a human voice. And then, with little pocket money and no change of clothing, he caught a train to Philadelphia to exhibit his invention.

WHO'S SNEERING NOW?

He might have been ignored, or even sneered at, as did the *Times* of London one year later, which called his telephone "the latest American humbug." But luck would have it otherwise. On June 25, 1876, Emperor Pedro II of Brazil visited the fair and, strolling through the exhibitions, came upon Alexander Graham Bell's room, where he paused to visit the newest American "magic-maker." Bell's device actually worked! You could *actually hear* voices, carried by modulated electric currents. Unlike the telegraph, which required trained operators and racing messengers, anybody at all could use a telephone. Lift the transmitter, speak into it, and the person on the other end could hear! It was what we would now call

"user friendly." But it was more than that: It was a pathway for ideas, a pathway of communication and information; it was what Ithiel de Sola Pool of MIT has called "the facilitator."

It would not by itself change the world — but the climate of human affairs would change. The first sound waves on Bell's telephone would lead to the slow recognition that we lived in a world of invisible waves. Some moved by wire, some soon would move without wire; yet later they would bounce back and forth from satellites far, far away in space. On these waves could move sound, talk, images, then television, then cascades of instantaneous data. In this new climate in the next century, new institutions would flourish; old systems would become as obsolete as the Pony Express. Time and distance would be erased. So manners, responses, styles, management of all human life would change. A revolution was on its way to reshape the world as completely as the Mosaic revolution or the Industrial Revolution in millennia and centuries past.

America, with its vast continental sweep, needed to talk to itself, although it did not yet recognize the need — to talk suburb to city, city to city, coast to coast, then continent to continent, earth to moon. The entire nerve system of society was to change. Others in this volume will follow with the wizardry of the scientists, the engineers, the craftsmen who put together what came to be called the Bell System. But few or none could then chart the effect of the System on human affairs and history itself.

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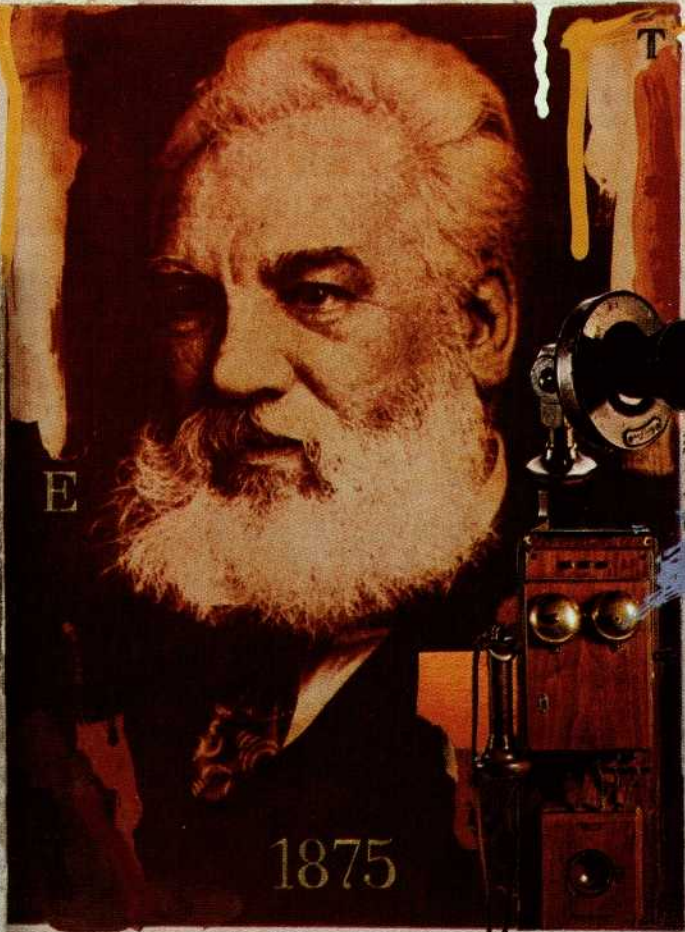
Historians largely focus on the great battles and wars that mark the rise and fall of empires. They delight in tracing the dates, episodes, and politics of nations as kings, queens, presidents, and



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chancellors succeed each other in authority. So, disciplined by history, we must start with war and politics.

Battle and war have been the preoccupation of men since the walls of Jericho fell to the sound of Joshua's horns. But one man must always command — must command not only the action but the instruments and the support. And there is a most convenient date for us to dramatize how war changed: that same day, June 25, 1876, when Dom Pedro visited Bell and his telephone in Philadelphia. Far away in the Montana Territory that day, George Armstrong Custer was fighting one of the last cavalry battles on American soil. And at the Little Big-horn River he and his men were massacred. No field telephone could reach command center at the nearest fort to call for reinforcements, so they died. Battle had always been fought thus — contact, communication, command ran only by line of sight or by swift courier. No signal system could save Custer.

BELL LABORATORIES: A HOUSE OF WONDERS

Distance and time response have always been the essential traps and problems of the battlefield commander. The Romans and Chinese of antiquity had tried to conquer distance and response by their great chains of fire towers, semaphoring messages by flame and smoke across their vast stretch. But America, as it spread its wings, needed even swifter and wider controls. And so, slowly, under the changing demands of modern war, the Bell System would change all battlefields, all global command, all reflex and response.

At this point, there is no way of describing war as it changed without a swift visit to that house of wonders called the Bell Laboratories. Founded in 1925, its headquarters now sits in a tan and terra cotta brick building on 200 green and gardenized acres in Murray Hill, New Jersey. Early in the century, telephone engineers and scientists had begun, seriously and methodically, to study the quality of sound and the materials of transmission. Their work had led them on into the nature and quality of waves, on into the basic and fundamental physics of nature, on into those mysteries which, by 1937, had brought them the first of their four Nobel Prizes.

But Bell Labs was, in the early 1930s, still far from war — until the quantum jump of national emergency as World War II approached America over the rim of two oceans. Bell scientists had already long been exploring the phenomenon of wireless transmission, had begun to putter with those invisible microwaves that now stitch the world into one. And thus, in the late '30s, they bent their research and manpower to the menace. From their scientists' research

emerged the wizardry that changed war. The Labs' research — and the application by its parent, Western Electric — underlay the work of MIT's great radiation laboratory, which made American radar the best of the warring nations'. The Labs' microwave research had a thousand applications: Bell designed the fire-control radar that let the gunners of the U.S. Navy wipe out the Japanese navy; the sonar system that came from their research tracked down and destroyed Nazi submarines. Einstein's equation $E = mc^2$ had been developed during the war into the Manhattan Project, which was planning a bomb of fissile uranium. By 1949, the Bell System and its Sandia Corporation, under a nonprofit contract with the Atomic Energy Commission, had picked up the burden of research, development, and prototype production of atomic ordnance. Bell did not create the bomb, but without Bell, America would not hold its lead in weaponry.

On and on one could go through the control of battlefields, the instant vision of movement beyond the horizon, the threat that may surface in seconds after diplomats bungle their job. But one must skip all other developments of war and wizardry and jump to the crown-piece of modern battle telecommunications — to headquarters of the Strategic Air Command outside Omaha, Nebraska. There, 40 feet underground and encased in concrete, is SAC command. Twelve armchairs ring the balcony above the dazzling operations floor, where display charts flash data from around the world, showing readiness status at each base, alerts, planes in the air, blips of unknown planes or missiles rising from the coastal waters or across the Arctic. Lift one of the simple telephones and press a button: You are in contact with Point Barrow in Alaska, with Thule on the outer fringes of Greenland, with Hawaii, the Pentagon command center, the White House, and all the submarines at sea. All instantly. SAC is triggered to go — controlled only by the command chain that runs from the base to the Pentagon to the White House, which also must respond by reflex. The Bell System installed this command system — for good or bad.

What has been removed, inevitably and inexorably, is the filter of time that lets thinking control reflex. It is a terrifying gift that Bell has given to the potential of world cataclysm. But it is better that science has given us this dreadful gift than we be at the mercy of an enemy.

Not only has war changed with the removal of time's filter. All else has changed — politics, business and management, and most of all, the quality of life.

Take politics. Time was, back in 1876, when politics was the business of professionals organizing neighborhoods into blocs. Door-knockers and precinct captains mobilized the votes; "bosses" put them together in the packages that

named senators, governors, presidents. Even as late as the 1930s, a Jim Farley had to travel the country to assemble delegate blocs that would make the majority that gave Franklin D. Roosevelt his Democratic nomination.

Those old politics are gone now. Television has dissolved the old machines, except in those local races and counties where, beneath the level of television, word of mouth still counts. New professionals control national politics; candidates choose their advisers from those professionals who know best what the airwaves can carry and where, precisely, its impact is felt.

Even here, in the unstable world of politics, one must go back to the work of Bell Laboratories and Western Electric. Their workforce had returned to civilian tasks after the war, and their microwave experience was to deliver to politicians giant boots that would let them leap the continent. In 1948, the Bell System had begun to string microwave towers — 25 or 30 miles apart — from ridge to ridge across the country, for microwave then carried only by line of sight. One hundred such towers could span the continent. So it was that Edward R. Murrow could swivel in his chair and display both the Golden Gate Bridge in San Francisco and the Brooklyn Bridge in New York — simultaneously, live — on the evening of November 18, 1951. But the microwave relay could be used for more than entertainment or news. It could be used for politics. By 1952, when Dwight D. Eisenhower faced off against Robert A. Taft in Chicago, television could carry the convention proceedings nationwide into the homes. Taft was destroyed by television; Eisenhower won. By 1968, 16 years later, television dominated conventions; Hubert Humphrey was destroyed by the violence and bloodshed that television showed attendant to his nomination.

Conventions have changed because television is there: No longer do partisans chant, stomp, wave their banners in interminable demonstration; no longer can bosses gather secretly in back rooms. Conventions are organized now for drama and impact on the tube: Speeches must occupy prime time; appearances must be timed to the minute. The old political organizations exist only as skeletons that move the bones; the flesh, the emotions, the passions are stirred by television.

AS THE WORLD SHRINKS

Politics at every level in America now move on the airwaves that still rely on "Telco" to move the spectacle. Politics are shaped by the paid commercials that experts cut and put into place. Politics move by the dramatic skills of other professionals who prick, prod, and provoke the attention of the networks and provide the prime prize — two minutes on the evening news. Politics rely on the

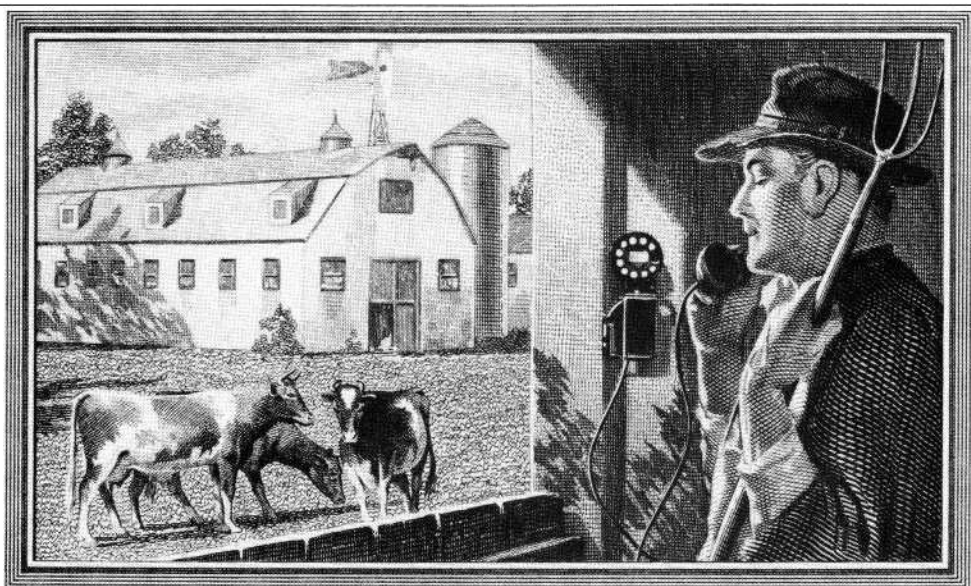
telephone banks that automatically dial, then redial computerized names by streets, neighborhoods, and the demographic slices that the candidates need to assemble a voting majority. Others have found a hundred uses for radio and television in politics, but "Telco" provides the service that makes all possible. There is, to be sure, danger in the erasure of time and distance. It is now technically possible for the Congress of the United States to telephone in its votes from anywhere in the world. Yet a Congress assembled by dial voting would no longer be a gathering of men and women, interacting, persuading, challenging each other; it would be a nose-count of faceless digits.

The reach of the Bell System into politics is global. In 1963, AT&T placed in space the first Telstar, a shimmering, many-paneled ball powered by solar energy. The device could pick up sound or images, then transpond them anywhere. Almost within months, the world contracted. Let American soldiers burn a Vietnamese village — the next night, instantly, America saw the scene; flesh pricked; the politics of war changed. Let satellites show a Poland in protest against its dictatorship; the world shouts back its anger. Let Walter Cronkite use his evening news, as he did, to bring Anwar Sadat and Menachem Begin together, live, in the same half-hour — and peace between Egypt and Israel is under way; the politics of the Middle East begin to change.

* * *

Move anywhere in this climate of the new world; in its atmosphere, all men and women of affairs breathe differently. Take finance. Within two years of Bell's 1876 demonstration, businessmen in New York, Boston, and Chicago had become the telephone's first large users. Today, one visits a New York banking house; there sit rows of palefaced people at banks of telephones, trading billions of dollars in notes, bonds, exchanges, as, from minute to minute, basis points go up or down a percentile of a percentile. The entire world quivers to their split-second decisions. One recalls: The Rothschild fortune took its great leap forward 168 years ago when Nathan Rothschild in London employed homing pigeons to bring first news of the outcome of the Battle of Waterloo; so he plunged, after due deliberation, on British "consols" (British government notes) and was the first to reap the harvest of Britain's victory. Today, a Rothschild can wake in New York and, while shaving, hear on the radio the price of gold in London or Zurich, or the ups and downs of the Hong Kong and Tokyo exchanges.

But ignore the financial exchanges and regard the making and selling of things. No airline could operate today without the telephonic data web that makes instant reservations for 10 thousand flights, tomorrow or three months hence



— and spits out the boarding pass as you wait at the counter. Tankers, heavily laden with oil, load up at the Persian Gulf, pass through the Strait of Hormuz, and do not know their destination until someone far away has bought or sold crude in Rotterdam's free market — and directed the tanker to the port of opportunity. Salespeople call in with a clutch of orders or the big deal closed — and production lines and investment planning must change with the next morning's conference.

On and on one could go with the atmospherics of this world that has been transformed as the Bell System pioneered and invited it to change.

But what intrigues one most is not so much what the System planned as what, by brilliance and service, it delivered to a world that outran its own planning. The Chinese, for example, had developed gunpowder as a happy noisemaker, useful for celebrating holidays. Centuries later, the Europeans learned to pack gunpowder into shells, then into artillery to command battlefields. Just so, in search of knowledge, did the Bell System come upon something to be called a "transistor." Back there when the war ended, the Bell System had recognized that the vacuum tubes in its transcontinental Long Lines system could not give the voice the purity or amplification required. So a team of scientists at Bell Labs, led by William B. Shockley, reached far out into the physics of the day to examine the quality of metals, conductors, materials — and in 1947 came up with a device made of germanium with precisely controlled impurities: the transistor. For this, Shockley and his team received a Nobel Prize. But, though the transistor and semiconductor served the telephone company well, they served the wide world better. Others learned to pack infinitely smaller transistors onto

a tiny chip, then onto an even tinier chip, while computers shrank from room size, to cabinet size, to hand-held size, and the new world of data processing came into being.

Historians will have their choice of many dates in tracing the impact of the telephone. 1876 — Bell or Custer? 1915 — the first transcontinental telephone call? 1945 — the uranium bomb, or Sandia in 1949? 1951 — the microwave relay, or Eisenhower's 1952 nomination and election? 1963 — Telstar bringing world events into the sitting room and kitchen? But they will be unable to describe the change in the quality of life or pinpoint the date when and how the telephone invaded the daily life of ordinary people. This, perhaps, is the greatest change of all.

* * *

It would be an impossible exercise to mark the firsts and lasts of the changes of climate in which ordinary families now live.

When, for example, did the last panting husband race to the doctor's door and scream, "Come quick, my wife is having a baby"? We know that druggists and doctors quickly followed businessmen and stockbrokers in installing early telephones. But when did one family first phone a doctor in an emergency? And when, many years later, did the first doctor install that desolating answering device that walls him off from all calls that invade his work?

Or, at the happier end of the change: What boy first called what girl to ask for a date? In the old days, boys married girls whom they met at church, or at the shop, or in the neighborhood. Harry Truman, for example, was a young man when the telephone was still a rarity. He wooed his Bess by mail, from his farm to Independence, Missouri, then back again — three days to make a date. Today, the young man lifts the phone,



her voice is there, and the date is set.

We accept all this today, as we expect the telephone to bring us the morning's weather, the instant time, the report of traffic clots on the highway, or the delay of the airplane.

But underneath this overlay of the web, something more important changed: the shape and character of American cities and the mobility of the American people. One no longer sets out from East to West Coast hugging dear ones in tearful farewell, never to hear their voices, except at intervals of years. In 1938, I left for China for the first time; mother and sister wept at Boston's old South Station knowing they would not hear my voice again for years. This year, in 1983, on another visit to China, my brother and I called Boston from Peking; there they were, both mother and sister, halfway across the world, answering immediately. And there we are, all of us, free to move around the world, released from the tether of distance. Girls leave from Westchester to go to school in Pomona, boys from Montana to go to school in Boston — and the calls come: "Mom, I've met the most wonderful girl. May I bring her home at Thanksgiving?" Or, sadly, a voice says, "She died last night ... can you make the funeral if we wait until the day after tomorrow?" Or, gleefully, a voice says: "Dad! Mom! ... It's a boy... seven pounds ... both well."

FROM SOAPS TO SUBURBS

I travel and see the changing, contradictory scenery of America. In New York, or Houston, or Chicago the towers reach to the sky. I know architects designed them, high-steel men bolted them together. But downtown America could not work if the coagulation were not wired into the telephone net; no elevator could carry a fraction of the to-and-fro messengers whom the PBX has replaced. I observe the penumbra of corporate headquarters in Connecticut, in New Jersey, in Westchester, in Orange County, set free by the telephone to abandon the city. The telephone concentrates cities, yet at the same time tugs them apart — so downtown centers thrive, inner cities die, suburbs boom. City planners, urban designers, architects all assume as nature this exemption from distance, congestion, and racial strife given by the telephone. So they change the map of America be-

cause the nerve system that connects America makes it possible for imagination to take wings.

Historians have as many problems deciphering the past as futurists have in blueprinting the future. But no subtle change will be as difficult, perhaps, to mark as the impact of the telephone on the imagination — in school, in drama, in literature. Shakespeare would have the ambassador from France strut on stage to fling defiance at the court of England. The playwright of today uses the telephone. It rings; the message is instant; so is the response. The telephone is the essential punctuation mark. No longer do spies eavesdrop as did the Scarlet Pimpernel; today, the spy wiretaps. From the White House, a hotline runs directly to Moscow. Western Electric designed the sound system that let Al Jolson ring out with *The Jazz Singer* in 1927, and soap opera has since invaded all American life.

Nor, finally, will historians be able to define what the telephone did to simple human loneliness. Loneliness, said Hubert Humphrey before he died, is the curse of modern times, the last great political problem after all other problems are solved. The telephone interconnects us, brings us close — yet invites us to travel and part. The Bell System may have solved all problems of communication — except the transmission of the kiss, the hug, the embrace, the touching together of two people who love. It might even have achieved that, had it survived. But it will not survive; it is under court order to come to its end. So, as we close a chapter of history, let us say farewell to the System.

* * *

"System" is the word to hang onto as we part — for the greatest invention of the Bell System was not the telephone, Long Lines, radar fire-control, or the Yellow Pages, but the system itself. Indeed, the phrase "systems engineering" was coined by the Bell System as it tried to fit the parts of what it was developing into a whole. Early in the 1890s, an undertaker in Kansas City, Almon B. Strowger, had devised a primitive dial system that could bypass the operator at the switchboard. The Bell System adopted it because switchboards could fit neighborhoods into cities; but then cities had to fit and reach other cities. It was not the mechanics of the parts that

were the problem but the concept of fitting the parts into a whole. So evolved the Bell System.

"Systems engineering" has now become a theology of giant business, of the Pentagon, of political, government, and geophysical control, copied at home and abroad by all institutions facing the problems of fitting people to machines, machines into a human pattern. Not the miracles of microwaves, nor the miracles of the transistor, nor the coming miracles of fiberglass carrying photons at the speed of light can compare to the achievement of making one system, responsive to the touch, reaching from the moon to warning of riptide.

It is to the System we say goodbye. The Bell System was not designed for philanthropic purposes, even though Alexander Graham Bell, an idealist, had set out to help the deaf to hear. Tough lawyers guarded the perimeter of its patents. Learned economists sparred with regulatory agencies. Dedicated scientists explored the fundamental particles and waves; from their research the engineers of Western Electric crafted their instrumentation. Psychologists explored behavior to train the whole range of Bell's workforce, of all races, colors, and origins, to work in a system.

But the Bell System was more than the sum of these parts. It did make huge profit by putting together the parts. But what ran through the System and held it together was the concept of service. It was the lineman called out of home in the sleet and snow who would be there, restringing the rime-broken wires. It was the operator at her post, hanging on as the hurricane blew in from shore, making her connections and hastening the warning. These people and countless others, toiling at unrecognized duties, made the Bell System, for its time and the state of the art, the best system of service in the world. So we should pay it honor as it divides and disappears — honor to all of them, the lineman, the scientist, the engineer, the operator.

One cannot cheer but one should not mourn the passing of the Bell System. It had become too useful, too efficient, and some felt, too large. Others felt it was approaching those limits of power and influence that government had to discipline by breaking the System into its component parts. That decision is, apparently, irreversible. But all of us Americans owe the Bell System a lasting debt for knitting us into a nation.

So we say goodbye — and well done! And hope that whatever next may happen, the Spirit of Service survives in its offspring. The markets will have one judgment on the offspring, the unions another, the customers yet another. But the spirit of the great Bell System was service. Let that be its heritage to those who follow. ■

THE UBIQUITOUS TELEPHONE

PARALLELS WITH THE PAST

BY BOB KINKEAD

The perception of historic tranquility and a stormy future for the Bell companies is mainly an illusion. It's just that hard times past tend to mellow in memory, and future unknowns loom larger than life.

Life has not been the same for Bell System managers since January 8, 1982. The announcement of the impending divestiture effected profound change for virtually every job, procedure, and practice in the Bell System. Looking ahead, through divestiture and beyond, many perceive a stormy transit fraught with novel problems. Looking back, they recall a tranquil, predictable past. But such a past never really existed.

While it's true that the challenges of divestiture will be new and different, they are not entirely without precedent. Past tranquility is, with respect to the Bell System, primarily an illusion. The same kinds of frustrations, uncertainties, and doubts about the future that now accompany divestiture have accompanied all major changes in the business — and were present even at its birth.

Alexander Graham Bell spent two exhausting years in pursuit of a workable telephone. Accustomed to a comfortable lifestyle, he found himself scrimping to finance his research, as well as sacrificing an active social life and his income as a teacher. During this time, Bell put in long hours almost every day, and although a recognized expert in linguistics and phonetics, he chose to work in an area for which he had little training, learning instead by trial and error.

Even after his brilliant success in creating the telephone, Bell and his associates had little precedent to follow in exploiting the technology. At one point they even sought to abandon the field, offering Bell's patents to the Western



Union Telegraph Company, which declined to buy them.

The problems and frustrations of the business continued to dog Bell. Even after the telephone was well established and he had withdrawn from active participation in developing the business, Bell was called on to defend his patents in federal court. Today's managers, discomfited by the number of judicial actions the company has been involved in and the degree of control the courts seem to be exerting over the business, may be surprised to learn that in its first dozen years the fledgling Bell company fought more than 600 separate court cases involving patent infringement. Bell himself spent much time testifying for the company in these suits; at one point, he and his associates

even were accused — and subsequently exonerated — of bribing a patent clerk.

Modern-day managers concerned about the increased risk and threat to job security brought on by divestiture could take a page from Theodore N. Vail's diary. Vail left an important, well-paid job with the U.S. Post Office and took a 40 percent pay cut to sign on with the Bell Telephone Company in 1878, when it was preparing to do battle with the largest and most successful communications company in the country, Western Union. On joining the Bell operation, Vail found a company with a huge market potential, but under tremendous financial stress and in the throes of major management changes. Within a year, the company would change its name, get a new chief executive, reshuf-

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fle its board of directors, and initiate a complex legal assault on Western Union. In the midst of this turmoil, Vail's job was to manage operations efficiently, develop relationships with licensee companies, and, of course, meet the company's day-to-day obligations.

The beginning of the telephone era, thus, seems very like the early days of the Information Age.

The flurry of name changes associated with divestiture mirrors the Bell company's early days, when it operated under six different names in just five years, from 1875 to 1880. The first was The Bell Patent Association (1875); then in succession came The Bell Telephone Company (a voluntary association, 1877), The Bell Telephone Company (Incorporated) and the New England Telephone Company (both 1878), The National Bell Telephone Company (1879), and finally The American Bell Telephone Company (1880). The American Telephone and Telegraph Company — AT&T — was organized in New York State in 1885 to provide intercity, long distance telephone service. AT&T did not become the parent company of the Bell System until 1899, when, because of the financial strictures imposed on corporations in Massachusetts, it was decided to reorganize the parent under the more liberal New York corporate laws. The easiest way of doing this was simply to transfer the assets of American Bell to AT&T.

A NETWORK BUILT

Before becoming AT&T's first president, Vail had served as general manager of American Bell. While his bosses in the executive suite fought patent wars, raised capital, and initiated reorganizations, Vail and AT&T general manager E.J. Hall were preoccupied with the more practical task of building a foundation for a nationwide network.

In its early days, the National Bell Company built telephone sets, switchboards, and similar gear and rented these to franchised licensee companies around the country. It was not then apparent that the licensee companies would someday be part of the Bell System. The national company manufactured and sold equipment and constructed and operated long distance telephone routes — much as AT&T will do after divestiture. Franchise holders were responsible for building local distribution networks (poles and wires) and drumming up business. Under Vail's stewardship, the number of telephones in service grew from about 3,000 in 1878 to about 380 thousand in 1887, a short nine years later.

Despite notable success, however, Vail did not find the kind of job security and lifetime employment that later generations of employees would come to expect. At the relatively young age of 42, im-

mediately after a new company president was installed in 1887, Vail left the employ of the Bell System. Although he departed for health reasons — at least officially — some writers have interpreted Vail's exit as a sign of dissatisfaction with management philosophy. As later developments suggest, Vail was an idealist with regard to service and the company's obligations to the public, but the Boston financiers who controlled the company at the time were practical capitalists, profit maximizers making the most of a patent monopoly. Unable to reconcile these contrasting views, Vail chose to leave the business.

The patents, however, had only a 17-year term; the expiration of the two basic Bell patents in 1893 and 1894 unloosed a blitz of competition. Partly because of the Bell company's conservative investment and pricing policies, vast areas of the country as yet had no phone service, and entrepreneurs rushed to fill the gaps left by American Bell. Even in those cities where the telephone already was firmly established, independent companies successfully recruited customers with offers of lower prices and promises of better service. Hungry, aggressive competitors rudely brushed shoulders with the somewhat complacent Bell licensees and vied with them for the most lucrative segments of the market.

Ironically, in light of today's equally vigorous telecommunications competition, local service was the most profitable market and intercity long distance was virtually ignored by the start-up telephone companies.

While there are interesting symmetries between the hotly competitive communications markets of the 1890s and those of the 1980s, wide contrasts mark the Bell managers of then and now who would cope with these markets. At the turn of the century, AT&T was tightly controlled by financial interests centered in Boston. Paying dividends to share owners was the company's primary goal, and some considered the management's style to be haughty. For example, the New Orleans Board of Trade in 1905 reported that "the officers of the company were inclined to assume an arbitrary and dictatorial tone and were lacking in honest courtesy." In retrospect, this assessment might be a bit harsh. After all, AT&T managers had built the business into a huge national service company in a remarkably short time. And they were constantly torn between the simultaneous demands for service improvements, dividends, and funds to expand the business — all competing for the same resources.

Into this intensely competitive corporate atmosphere came Theodore Vail, who was invited to rejoin the company in 1901. He declined to serve as presi-



dent under the aegis of the Boston financiers, but the following year he accepted a seat on the board of directors. Five years later, Vail was appointed president of the company. His appointment, which marked a significant turning point in the company's philosophy and direction, was brought about with the help of J.P. Morgan, a business ally of Vail's. Morgan had led a banking syndicate that helped underwrite a large issue of AT&T convertible bonds. Subsequently, Morgan was able to seat two new directors on the AT&T board, loosening the grip of the Boston investors and clearing the way for Vail to take effective control of the company. Under Vail, the company rapidly broad-



ened its share-owner base; within six years, no single individual or clique of investors owned as much as one percent of the outstanding common stock.

A PRAGMATIC VISIONARY TACKLES COMPETITION

Problems such as Vail inherited when he began his new job, at age 62, are eerily familiar to modern Bell managers. The market before him burgeoned with potential, and the array of competitors vying to serve the market was vast; they ranged from inconsequential to formidable in size and capability. The industry was in ferment. In certain areas, two, and sometimes three, companies competed for the same tele-

phone customers. But Vail also had to contend with certain financial problems unfamiliar to contemporary managers. Unlike the Bell System companies of 1983, which approach divestiture financially resilient and technologically robust, certain early Bell operating companies were in serious financial difficulty and offered poor service compared to their competitors. Vail determined to correct these problems through better planning and organization. As a director, he had proposed that the company adopt long-range financial planning; when he became chief executive officer, he insisted the operating companies prepare five-year and 25-year financial plans. He also centralized

technological research, laying the foundation for the future establishment of Bell Laboratories.

In addition to being an adroit manager, Vail was also a visionary of practical bent, a business philosopher who early recognized that the telephone would soon evolve from being viewed as a luxury and convenience to an everyday necessity. To accommodate this evolution and to meet his ambitious goals for the Bell System, he developed the theme: "One policy, one system, universal service." To later generations of Bell employees, the "universal service" goal seems most inspiring, but to his own contemporaries, the "one policy" and

"one system" goals were the most challenging.

Until Vail's time, Bell operating companies were quasi-autonomous fiefdoms; the Bell System was a loose federation of licensees in which AT&T held varying degrees of ownership. Vail demanded and got the cooperation of operating company managers in formalizing and coordinating policy and in creating uniform procedures and technical standards that would ensure high quality at reasonable prices. Said Vail, "It adds to the permanency and undisturbed enjoyment of business, as well as to the profit, if the prices create a maximum of consumption at a small percentage of profits."

With respect to "one system," Vail launched an aggressive campaign to eliminate dual telephone service, which he considered costly and inefficient, by either acquiring competitors or abandoning the field to them. His influence was quickly noted both inside and outside the business. The New Orleans Board of Trade, which had criticized Bell's former management, said the year 1907 "began a period marked by a change of spirit on the part of (AT&T) officials." Thomas Alva Edison said of Vail, "Until his day, the telephone was in the hands of men of little business capacity. Vail will encourage inventors — he's invented things himself. But beyond all that, he's square." It would, of course, be unfair and misleading to suggest that Vail's predecessors were anything less than "square" and, judged by the standards of the day, successful and competent as well. They suffer only in comparison to a remarkable individual, who has become something of a cult figure to his successors.

Between 1907 and 1913, through acquisitions, exchanges of stock, and the vigorous pursuit of competition, Vail constructed the nexus of the Bell System that was to last for the next 70 years. He expanded and coordinated a corps of professional, academically trained managers and imbued them — and through them, the entire company — with the same "spirit of service" he fostered as general manager of fledgling Bell in the 1880s. Walter S. Gifford, who would be the youngest president of AT&T, was one of these managers.

But, among his manifold talents, perhaps his acute ability to fathom the public mood was Vail's most valuable asset. Sensing the public's weariness with inefficiency and free-wheeling competition in the industry, Vail issued a call for an end to competition and the imposition of fair and progressive regulation as a substitute. In the Kingsbury Commitment of 1913, AT&T agreed to dispose of all its holdings in the Western Union Company — a massive divestiture in itself — and to cease acquisition of independent telephone companies except with federal approval; to interconnect with those independent companies not in direct competition with Bell companies; and to provide long distance capability for all independent phone companies.

In effect, Vail set a course for AT&T that was markedly different from the mainstream of American free enterprise. Seventy years later, in an article in *Telephony* magazine, AT&T chairman Charles L. Brown drew a parallel between the course Vail set and the impending divestiture of the Bell System: "Clearly [divestiture] represented the most significant discontinuity in the history of

this enterprise," Brown wrote. "However, in my view, it did not represent a significant discontinuity in the basic philosophy that has guided this business for most of its history. That philosophy, first stated by the organizational patriarch of the Bell System, Theodore Newton Vail, is that the major task of management is to conform the business to the desires of the public. As Vail stated it, the qualities that created the Bell System were self-interest subordinated to the public spirit.... It was that philosophy that led Theodore Vail to embrace regulation as a substitute for competition, so as to permit the development of an efficient nationwide communications system. And it was the same philosophy that led me, three-quarters of a century later, to embrace competition as a substitution for regulation — this time in response to the public's desire for diversity in communications services and suppliers."

Divestiture is surely the most significant discontinuity in AT&T's long history, but it was matched — for shock value and abruptness, if not for lasting effect — by a major discontinuity that coincided with the close of Vail's career.

America emerged from World War I a victor, a global power, an acknowledged industrial leader of the world. The hectic demands of the war had sharpened public appreciation for the critical importance of electronic communications and stimulated a restive demand for new service. Encouraged by public impatience and following a precedent set by most of the world's governments, the U.S. Postmaster General recommended that the Congress nationalize the country's telephone system. In July 1918, the government did assume control of operations of the Bell System network.

Government authorities, citing deteriorated service quality, explained the action as an emergency measure needed to guarantee continuity of service and security of the network. Of course, during the war years prior to the government takeover, the Bell System had subordinated the needs of residence and ordinary business customers to the government's heavy wartime demands. Moreover, the war had created a scarcity of the very materials the operating companies required to maintain high-quality service. In addition, thousands of skilled telephone employees had enlisted in the U.S. Army Signal Corps and other branches of military service to help supply critical battlefield communications overseas.

Within six months, in an inflationary postwar period, the government-operated telephone company had raised long distance rates by 20 percent. Within 13 months, the whole idea of running a national telephone system had lost its appeal, and the government returned the



Bell System to private management in August, 1919.

If the 1980s mark the opening of the Information Age, one could cite the 1920s as the start of the electronic-media age. The Bell System played a leading role in that age, helping to establish the foundation for commercial radio and television, the recording industry, and sound motion pictures. (See related article on page 34.) It was in the midst of this flurry of media development that AT&T elected a 40-year-old president, Walter S. Gifford.

At the same time, AT&T was becoming a force in overseas telecommunications markets; technological innovations were opening up an array of new, non-telephone domestic markets. Gifford was faced with the same kinds of choices that are facing Information Age managers: which of the numerous new technology-based markets to enter. There were almost limitless investment and growth possibilities to select from — but then, as now, only finite resources to support the expansion of the business. His challenge was to direct his resources toward those projects that best satisfied both corporate goals and public needs.

Gifford also had an unfulfilled obligation — the goal of universal service. To meet this obligation, he selected a course not available to present-day managers: he sold off the corporation's overseas operations; dramatically scaled back involvement in radio, tv, recordings, and film; and concentrated Bell System energies and resources on the telephone business. He would later recall, "As fast as we got out of one thing, the Labs would invent another." But he doggedly persisted, eventually divesting every non-telephone enterprise started in the 1920s.

Gifford and his predecessor, Harry B. Thayer, symbolized a new breed of senior managers who took over managing the Bell System after Vail. Before Thayer, every AT&T president, including Vail, had entered the business at the executive level and was beholden for his job to powerful financial interests that had invested in the company. By contrast, Gifford and Thayer were college hires, who began as clerks and spent their entire careers with the Bell System. They were beholden to no outside investment groups or special interests but owed their positions only to their own abilities and the confidence of the board of directors, their peers, and their subordinates. All their successors would follow a similar pattern.

The Bell System prospered under Gifford in the 1920s and entered the 1930s and the Great Depression in strong financial shape, able to maintain its dividends despite sharply reduced earnings. The System's financial strength was noted not just by investors but also by the New Deal government that took

office in 1933. By 1934, the Communications Act establishing the FCC was passed. The following year, the FCC launched a four-year investigation into the telephone industry, with the Bell System as the focus of its efforts.

GOVERNMENTAL SCRUTINY AS WAR AGAIN LOOMED

No scandalous revelations or congressional action accompanied the conclusion of the investigation in 1939, although the Bell System was branded large, powerful, and in need of careful and continuous scrutiny. By then, however, Congress and the country were turning their attention overseas, as the world slid inexorably toward another world war. The Bell System again began to redirect its resources and research efforts toward national defense.

After the war, another government agency, the U.S. Department of Justice, took an active interest in the conduct of the telephone business. In 1949, one year after Gifford retired as president and was succeeded by Leroy A. Wilson, the U.S. Attorney General filed an action against AT&T and Western Electric, alleging violation of the Sherman Antitrust Act.

In 1951, Wilson died and Cleo F. Craig was elected president. Like his predecessor, Craig was an engineer who understood the technical operations of a business that had by now established itself as a world leader in numerous areas of scientific research, applied science, and engineering. During Craig's tenure, Bell System researchers were setting the stage for the Information Age. By the time the first antitrust suit was settled with the 1956 Consent Decree, the Bell System had announced the formulation of information theory, the development of time-division switching, and a host of similar innovations that soon would combine to blur completely the distinctions between telecommunications and data processing.

Craig retired in 1956 and was succeeded as chief executive officer by Frederick R. Kappel. The recipient of some 15 honorary degrees during his years as chairman, Kappel was a prolific writer, served on a variety of committees and panels under two U.S. Presidents, and — along with John D. DeButts — was among the most public and publicized of AT&T chief executives. Throughout Kappel's chairmanship, the Bell System experienced rapid growth of the nationwide network and heavy demand for new and innovative services.

By the mid-1960s, the Bell System was closing in on its goal of universal service — making the telephone affordable to all — and its research was accelerating at a pace that would eventually produce more than one patent for every working day. Bell technology was making the telephone network more useful and flex-

ible, but it also was pointing the way to renewed competition, this time in the intercity and customer premises equipment markets — competition that would lead to a new antitrust suit.

H. I. Romnes, who became chairman in 1967, was the first and only chief executive of AT&T to begin his fulltime Bell career at Bell Labs. Holder of six patents, Romnes was heavily involved in the nationwide introduction of direct distance dialing during the 1950s, as chief engineer of AT&T's Long Lines Department and later as AT&T vice president-operations and engineering.

Before direct distance dialing, customers wishing to use the national long distance network had to place their calls through operators. In 1951, direct distance dialing (DDD) was introduced when the first DDD call was placed between New Jersey and California without operator assistance. By the time Romnes stepped down in 1972, the final stages of DDD dissemination had already been accomplished for the Bell System and were being completed for non-Bell customers in Alaska and Hawaii.

DeButts was elected chairman in 1972, as competition began to burgeon around the Bell System. Complex times turned into turbulent times when, in 1974, the U.S. Justice Department filed a second antitrust suit. DeButts' calls for congressional and regulatory action to settle major telecommunications issues went generally unheeded. The technical side of the business, however, made much smoother progress, so that when Charles L. Brown became chairman in 1979, it was possible to dial 64 countries around the world without operator assistance.

But while the Bell System was at the top of its form technically — the sixth and seventh Nobel laureates from the Bell System had been named a few months before — Brown took office aware that the judicial and regulatory environment surrounding the System had become almost Byzantine in its complexity. His most important task for the next three years would be to devise and implement a solution that would free it from a stranglehold of special interests; unequal, regulated competition; and the financial and administrative burdens of the ongoing antitrust suit.

Divestiture burst on the Bell System in January, 1982; doubtless its effects will continue to reverberate through the 1980s and beyond for AT&T and the seven regional companies created to manage the local telephone service portion of the business. In a sense, this is the renewal of a cycle begun in 1876. The balance of the decade crackles with entrepreneurial spirit, the years beyond are gravid with promise and challenge — and, one is tempted to say, unparalleled excitement. ■

LOOKING BACK TO SEE AHEAD

BY ALVIN VON AUW

The years leading to divestiture may provide guideposts for tomorrow.

One of the most persistent (because so often confirmed) notions in the mind of Western man is the inevitability of decline and fall. With advancing age, institutions — empires, dynasties, companies — lose their initial impetus to action. Success breeds conformity to the practices that produced success. Bureaucratization suppresses — and eventually supplants — venturesomeness. Imperceptibly over time and while still professing its initial commitment, the institution becomes an end in itself, unresponsive to its constituents, oblivious to change, incapable of adaptation. The dinosaur analogy...

If on January 8, 1982, there were those disposed to think that analogy applied to the American Telephone and Telegraph Company, they were that day served abrupt notice that it did not.

A PERENNIAL QUESTION

What may seem puzzling to future historians is that when AT&T at last abdicated its role as the biggest company on earth, it did so in the absence of any evidence of urgent public concern about its size. Moreover, it did so in an era in which populist agitation over "undue concentrations of economic power" was at its lowest ebb in decades. To all appearances, the public over the years had come to understand that large-scale, technologically oriented undertakings require large-scale aggregations of capital and comprehensive planning. Indeed, from time to time the Bell System — its integrated structure, its systematic approach to the management of resources — heard itself cited as a model for emulation by such troubled industries as the railroads and, after the massive blackouts and brownouts of the '60s, the power companies. And in this era it became a virtual fashion among

politicians to disavow any disposition on their part to equate bigness with badness.

Such reassurances were small comfort to AT&T's management. Indeed, that AT&T's bigness was not far from the minds of the government staffers who so largely rewrote national telecommunications policy over the past decade is apparent from their disposition, as they savored the satisfactions of what they perceived as victory, to characterize the confrontations of the era as a protracted drama in which an understaffed but dedicated agency, joined in time by no less dedicated public servants in the Justice Department and on the staffs of Congressional committees — all inevitably Davids — struggled against overwhelming odds to bring Goliath down. And did. In any event, again and again throughout the decade AT&T found its own opportunities constrained in the interest of affording opportunities to smaller rivals. Finally, as an emerging consensus on national telecommunications policy came to be embodied in proposed new "communications acts," it became apparent that the telecommunications industry would hereafter be governed not by one set of ground rules but two — one for AT&T, the other for everybody else. The only prospect of relief from the constraints applicable to "dominant carriers" — a classification with a population of one — lay in ceasing to be dominant.

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In short, for AT&T, there came a point at which realism required it explicitly to confront the question of whether its sheer size might not represent a sufficient hazard to the future of the business as to require deliberate management action. The only relief from the onus of bigness, it appeared, was acquiescence to becoming smaller.

THE PURPOSE OF PROFIT

To profess ideals, even to act on them, is in some business circles accounted unbusinesslike — if not downright

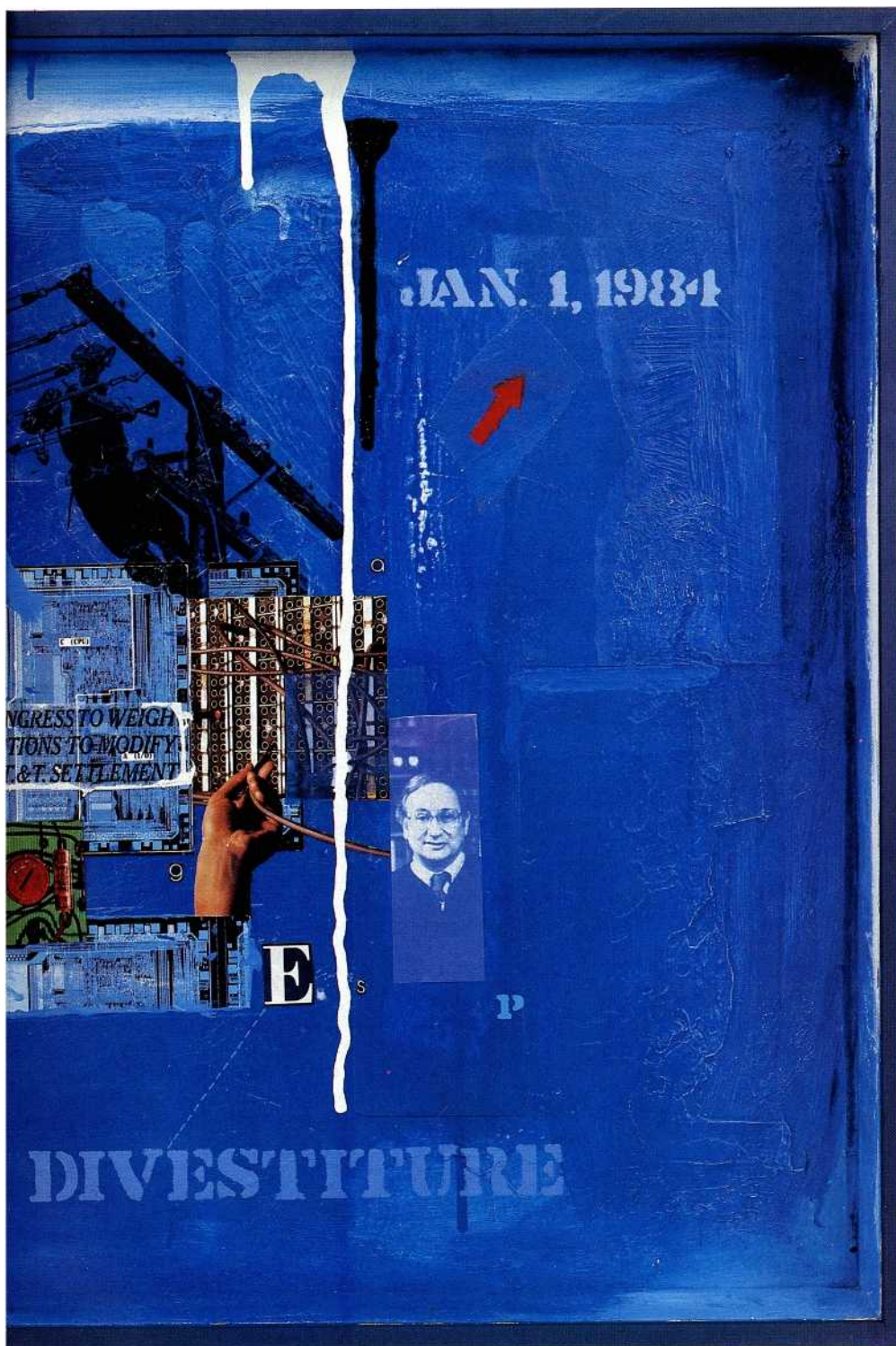


unmanly. Profit, plain and simple, is the sole purpose of those aggregations of humanity and capital we call corporations.

It is not the purpose here to quarrel with those who claim that idealism is simply a mask for the intelligence to defer immediate gratification for longer-term advantage. There is a measure of self-gratification, it is said, even in martyrdom. Accordingly, however high a business might fly some other standard — service, say — it is profit, and the more of it the better, to which in its heart of hearts it pledges allegiance. And to pretend otherwise is hypocrisy.

Perhaps so.

*Excerpted from **Heritage & Destiny** by Alvin von Auw, published by Praeger Publishers, New York, © 1983 by AT&T.*



Why, though, should it be denied to business what is admitted to nearly every other institution, and that is that its motives and standards may be mixed and various and changeable with time and circumstance? Why should it not be acknowledged that, though business may be Business, there are no two of them alike and that, more than anything else, it is the character of the people attracted to the ranks and ultimately to the leadership of each of them that determines what in the scale of things — profit or performance — it will put first?

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What has been troubling to a number of

the Bell System's managers who have been called upon to testify in defense of the Bell System's policies and conduct over the years is the apparently profound skepticism they have confronted as to whether there is actually any business on earth — much less one that has somehow managed to become the world's largest — that actually, as the Bell System says it does, puts service before profit and, again as the Bell System says it does, shapes its policies to conform to its best sense not of its own but of the public interest. Even more troubling is a gathering sense that public policy may no longer want the Bell System to be the kind of business — that is,

responsive to interests other than its own — that it had throughout most of its history assumed its unique responsibilities required it to be.

AN UNUSUAL OBLIGATION?

What accounts for the judicial indisposition to credit the Bell System's professions of concern for the public interest or to grant that, even if those professions were genuine, they were the proper business of a business? It is to that indisposition, once it was finally recognized, that history may one day assign as the single most important reason for AT&T's astonishing — and astonishingly sudden — consent to the divestiture of its local exchange business and thereby the dissolution of an organization structure it had professed itself confident would be found in the public interest and accordingly would end up in one piece.

What appears to have happened is that the leadership of American business and the leadership of the American intellectual community have exchanged viewpoints. Each has come around to the position the other occupied 40 years ago. Thus, The Business Roundtable must feel badly used at finding itself, for its statement asserting the "social responsibility" of business, the target of ridicule from academics (and even from *Fortune*) for presuming to mind anything but its proper business, which is profit. After all, it seems only yesterday that it was great intellectual sport to characterize business as a low calling contemptuous of any interests other than its own and indifferent to the finer things of life. After a generation of effort aimed at banishing that image, business was hopeful that at last it might be admitted to the parlor.

Admonished that it is beyond their province to do so, the managers of the "lean and mean" AT&T that is to be may look forward eagerly to the day when they will be relieved of an obligation that is in any wise unusual, a day when they will no longer need to ponder what the public interest may require of them. Considering, however, the cyclical nature of history and the prospect that one day it may once again no longer be reprehensible to think in terms of the public interest, they may in the interim not want to get altogether out of the habit of it.

WHAT WORDS TO LIVE BY?

Up till now, Bell System policy has for the most part been based on the assumption that the opportunities it has been afforded and those to which it aspires depend on its being perceived as an institution that pursues interests other than its own. Today it must confront the possibility that the public may not be ready to grant to any private institution the exercise of so priestly a function as stewardship of a public trust. Perhaps

the public has come around to the view that it would be much more comfortable operating on the assumption that the goal of private enterprise is private gain, and it is ready to count on competition to keep that objective reasonably congruent with its own. To the extent that an institution by its size or structure permits its management the exercise of discretion denied to its competitors, then that institution ought to be reduced to a size and condition that would permit its management the pursuit of no other objective than self-interest.

Should this be the public disposition, what ethic would then, should then, animate Bell System management? Put otherwise, freed of the responsibility to conduct the business as in some measure a public trust, will it nonetheless?

REGULATION AND FREEDOM

How long deregulation's day will last will depend not least of all upon the ideological ardor of its advocates and the pace at which by its blind pursuit they bring about its demise. At this writing, deregulation can claim no unequivocal victories, and it can only be surmised whether it will figure in retrospect as simply a transitory eddy interrupting the main current of history. Will it turn out... that the whole deregulatory spasm reflected a failure of nerve analogous to that of a patient who, because it didn't work as expeditiously or as miraculously as he had hoped, abandoned altogether the regimen prescribed for him? Surely in an era in which society has begun to recognize the limits of its resources, the fragility of the environment, the interconnectedness of things, it seems not altogether rational to look to the random interplay of self-interest to manage things sensibly.

How AT&T reads history will determine its future. What Vail saw as the occasion for regulation — the absence of competition — no longer prevails. Paradoxically, however, regulation — or something like it — may be a prerequisite to freedom, including the freedom to compete.

TECHNOPOLITICS

The parties to technopolitics are many. They include the Bell System's competitors and, depending on whether they see themselves advantaged or disadvantaged by the particular matter at issue, its larger customers. They include regulators, federal and state, and — as important as the regulators themselves — their staffs. For some in Washington, technopolitics is a career. Again and again in the record of the contentions over national telecommunications policy that marked the '70s, the same names recur, their bearers, though, appearing in various incarnations, now at the Justice Department, next at the FCC, thereafter on some Congressman's staff, and ultimately — and, it is assumed, remuneratively — in a law firm or con-

sulting group that makes a specialty out of ginning AT&T.

As interests clash in the process, so, too, do ideologies. Academicians have their say, as do (occasionally) self-designated consumerists. The White House is party to the process and so are, not always in concert, the Justice Department, the Department of Commerce, the Department of Defense and (the) General Accounting Office. At the heart of the process is Congress, 100 Senators and 435 Representatives who, depending on how they are persuaded and who persuades them, decide — not always by bringing it to a vote — what national telecommunications policy is.

Bell System managers would be less than human did they not feel that they had been somewhat abused by the process. Most of them remain convinced that the public is well served — and will continue to be best served — by a Bell System configured the way it is now. They view the Modified Final Judgment not as a "rational policy outcome" but as a sensible (because necessary) accommodation to political reality. It would not be surprising, then, if some of them from time to time did not give way to a feeling of resentment that the institution to which they have given their entire lives, an institution that embodies the earnest and sometimes inspired work of hundreds of thousands of people over the course of a hundred years, should have been undone by a coterie of envious bureaucrats, free-market zealots and glib politicians, not many of whom will be around to face the consequences. Surely those Bell System managers could not be blamed for feeling that there is something not quite right about a process that accords no more weight to the views of the people who designed and built what is arguably one of the technological wonders of the world, the nationwide switched network, than it does to the views of economists altogether untutored in technology.

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What began as an experiment in selective competition — to which competition the FCC assured the Bell System it would be permitted to respond to the extent of the advantages "inherent in its structure and operations" — seems unlikely to end short of elimination of what remains of those advantages. Even so drastic a remedy as the Modified Final Judgment appears to be insufficient expiation for whatever sins it may have committed. One of AT&T's top officers describes the experience as like being mugged on mean streets while the passersby pay not the least attention to the victim's outcries. Not unnaturally, Bell System people, according to their dispositions, have been variously bewildered, hurt, angry, resigned.

THE BELL REMNANT

... What makes the Bell System unique

and what will with the divestiture of the BOCs (Bell operating companies) be substantially lost is the integration of the organizations responsible for applying that technology to customer service.

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Surely there is no reason to doubt the earnestness of AT&T's leaders' declarations of their intent, although they don't quite know how, of maintaining support of the kind of research that is generally called "pure" but which the Laboratories prefers to call simply "research." Accordingly, so long as the present generation of AT&T management remains in command, it can be anticipated that pledge will be fulfilled. Looking ahead some years to a time when the inexorabilities the Modified Final Judgment has set afoot have worked their way and when perhaps the memories of some of the Laboratories' more spectacular — and profitable — achievements will have begun to fade, can the prospect be said to be that certain? Sol Buchsbaum, executive vice president of Bell Laboratories, says — and there is no reason to doubt him — that "if you come to Bell Laboratories three or four years from now, the lion's share of what we do will be the same." But 10 years hence or 20, who knows?

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One consideration, though, most of the instant analysts of the Modified Final Judgment failed to take into account — a consideration that may make its eventual impact, not only from Bell's perspective but the nation's, not negative but positive. That prospect is raised by the relief from the constraints of the 1956 Consent Decree that the MFJ affords AT&T. At last Bell Laboratories is free, as its president Ian Ross puts it, to "follow our technology." Accordingly, lamentations that a diminished research effort may diminish U.S. technological prestige may be contradicted by the Laboratories' ability to pursue lines of investigation and development that heretofore, seeing no prospect of applying them to serving customers or reaping the benefits of doing so, it might have abandoned. If the removal of this barrier to the Information Age cannot be asserted with complete assurance to offset the inhibition of research threatened by termination of the License Contract, it provides legitimate grounds for the hope that it might.

NEW STUDIES IN FEDERALISM

The Modified Final Judgment decided a great many things. Among them, it settled once and for all an issue to which, precisely because it remained undecided, history may credit the astonishing creative vitality of that unique venture in federalism that in the years 1904 through 1982 was called the Bell System. History, however, will have to be blind if it does not perceive that, in the latter years of that span, what had been a creative tension became a more

and more debilitating one. In those years, there developed what in retrospect appears to have been an acute mismatch between corporate strategy and corporate structure. The Modified Final Judgment, although that was not its purpose, averted what might have become a constitutional crisis. It rescued the business from the horrors of matrix management.

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"(T)he more one looks into AT&T, past and present, the more inexorably the feeling grows that its progress and preeminence for some decades to come are as certain as such things can be in an uncertain world."

Thus *Fortune* in 1965, in an article entitled "AT&T: A Study in Federalism," opined, "The key to understanding AT&T, is that it is not a monolith but a unique experiment in decentralization."

Doubtless it would have astonished the author of that article had some prophet apprised him that not two decades after its publication AT&T's management would reach the conclusion that the key to the company's longevity lay not in the unique experiment in decentralization *Fortune* so admired but in ending it.

How it was ended may turn out to be one of the most remarkable episodes in its history. Perhaps it never occurred to Bell System management that there was any other way to approach the matter. In any event, within weeks of the traumatic news of January 8, 1982, the officers of AT&T and the presidents of its associated companies set about breaking up the Bell System just as they would go about solving any other major System problem — together. And characteristically, when it came time for AT&T to tell the Bell operating companies precisely how the divestiture of their exchange business should be accomplished, what it promulgated it labeled not as directions, not even instructions, but as "guidelines."

"WHO ARE WE?"

Perhaps it is just as well that only at the end of a career spent mostly in one aspect or another of Bell System public relations is the realization fully brought home how quixotic an activity that is. Consider, for example, how implausible are some of the notions the Bell System has from time to time asked the public to believe of it:

— that it is a business that seeks profit only to serve;

— that in its address to regulatory commissions it seeks no higher rates than maintaining and improving its service require;

— that profit beyond that level it returns to customers in terms of lower rates or better service or both;

— that what principally motivates Bell System people is the Spirit of Service

and not the lesser incentives of other callings;

— that, although there is no record of a regulatory decision on rates of which it publicly approved, it believes — or believed — in regulation nonetheless;

— that in the conduct of its public affairs activities it seeks the resolution of public policy issues affecting its business on no other basis than their merits; — all it asks is what is every citizen's right, the right to be heard;

— and that it opposed "competition" in telecommunications not to protect its markets and the profits it derived from them but simply and only because it would harm service and increase the price the average customer pays for it.

Add to the above the transient burden of asserting that quarterly profits nearing two billion dollars, far from being excessive, are not quite enough, and it should readily appear why it should be no surprise that the Bell System's public relations practitioners have occasionally encountered evidences of skepticism with respect to these notions and the company's motives for forwarding them. If there is a basis for welcoming the Modified Final Judgment, it is because upon its becoming effective they will be relieved of the obligation of attempting to convince the public that there is any private institution on earth that honestly and actually pursues the objectives the Bell System professes.

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At such a juncture, of what use are words? If words are, as it has been suggested here they are, hostages to performance by no means assured, if words risk becoming, as from time to time in the past they have, an unwanted constraint on succeeding generations of management, and if words expose their sponsor to what experience suggests the public regards as the most unforgivable of sins — hypocrisy — then perhaps it were best to eschew words altogether for a while and wait for more certain times before asserting too boldly what words hereafter AT&T proposes to live by.

On the other hand, if words have their hazards, they have their uses, too. Words inform and instruct. Occasionally they inspire. Words direct action, define policy, set standards. What down through the years has guided the actions of the hundreds of thousands of people who made up the Bell System and focused their energies on a more or less common purpose, kept them heading in more or less the same direction? Answer: words. For it is words that embody an institution's idea of itself. It is words, even more than numbers, that provide the motive power of business. Words, if the Bell System ever needed them, it needs now.

Every organization needs goals worth striving for, a "sense of constituting together an association of historical

significance." For such a goal the Bell System at this uncertain interval has been provided — to supplant universal service — a vague commitment to leadership in the technologies of the Information Age. Beyond that, its management is pledged to a concept vaguer still but, depending on how earnestly it means it, perhaps more compelling. Declared to be its purpose is nothing less than "the highest and best use of the organizations and resources we call the Bell System." Surely it would not have been necessary to articulate such a goal were profitability a sufficient criterion of what it means. As a practical matter, what those words mean will be a product of the contesting urges, inhibitions, aspirations, frustrations, ideals and aggressions that go to make up the corporate psyche and that its management must somehow or other take into account in deciding not merely what their business is but who they are. The highest and best. For a certainty, those words mean nothing should they turn out to have been a season's slogan only. They mean nothing unless it is made clear that elegance is esteemed and will be rewarded and, as a corollary, all that is shoddy or tacky or tasteless, all that is meretricious or graceless or just plain dumb will be excoriated for the disservice to the business that it is. No generation of Bell System managers since the first, Mr. Brown has from time to time reminded his colleagues, has been in a position to so profoundly influence the future of a great enterprise. Upon decisions made now will depend whether the businesses that at this writing make up the Bell System will be — what is surely not unworthy — merely businesses or whether, because its managers will it so, they will be enterprises of historical significance. Confronting ends genuinely incompatible, it is for them to decide, in John Dewey's words, "what sort of character is most highly prized."

THE USES OF HISTORY

History is not what happened but what is remembered of it. History, then, may not always be fair. It may, for that matter, not even be true. Somehow, though, history must be reckoned with. For it is history that determines what people think about the past. And it is on the basis of what they think about the past that they decide the future.

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... History is heritage. It is from history that companies, like countries, derive their character, their ideals, their "sense of constituting together an association of...significance." Today AT&T confronts the most drastic discontinuity in its entire history. At risk is its people's sense of who they are. The essence, then, of management's task is this: it is somehow to reconcile their business' heritage with a destiny that is, unless they know it, unknown. ■

THE UBIQUITOUS TELEPHONE

ONE WORLD

BY LILLIAN GISH

A legend remembers when AT&T gave something more than her art a voice.

Back in the days of making silent films, the great director D.W. Griffith once needed a baby for one of his interior scenes. There were no laws at the time against children working in the movies, so a three-week-old boy was produced quickly from a nearby orphanage. Mr. Griffith took one look at the child through the camera lens and sent him back to the orphanage with a note pinned to his diaper. "Please send us a younger looking baby," it said. "This one photographs like an old man."

The camera was cruel and heartless in those days. It distorted and exaggerated everything. John Barrymore once said, "If you stay in front of the camera long enough, it will not only show what you had for breakfast but who your ancestors were." Fortunately, I was one of the lucky ones who photographed well. But there were other problems. One of the first major roles I played in a Griffith film was in *The Mothering Heart*. I was worried that I was overacting, but when I saw the rushes during a lunch break one afternoon, I asked Mr. Griffith why it didn't show up on the film. "The camera opens and shuts, opens and shuts with equal time," he said. "Half of what you do isn't seen. Take away the sound and you lose another quarter. Therefore, your expression must be four times as deep and true as it would be normally to come over with full effect."

Those were some of the drawbacks of working in an infant industry. We were practically children ourselves then. My sister Dorothy and I grew up with the film business, and we watched with amazement as the state of the art of technology so dramatically affected the state of the art of dramatic entertainment. We adapted and changed with it gladly as sound expanded the visual experience of enjoying movies and as high fidelity and other breakthroughs refined the final product, thanks to the research and discoveries made by AT&T and other pioneers.

In a sense, there never was such a thing as "silent films" — there was always at

least a piano playing even during the showing of newsreels — but with the introduction of each innovation in our field, change called for us to tap an inner reserve of what Dorothy, my mother, and I used to define as the only true formula for success: taste, talent, and temerity. Temerity was the most important ingredient, the ability to face change boldly, accept it, and adapt freely.

It was Christmas in 1920, and I was traveling through Pittsburgh to promote *Way Down East* when someone first asked me to do a radio interview.

"What's radio?" I asked. "What do I do?"

He indicated a microphone and said, "You just talk into it as if it were a telephone." I agreed on the spot. A few weeks later, I received a letter from someone who'd heard the program from Oklahoma, and I marveled at the new-fangled invention. Radio eventually became so popular that the train schedules in New York had to be arranged around the broadcasts of *Amos 'n' Andy*, so as not to interfere with one of the most successful programs in history.

Our work changed the world. Those early films reached a global audience of millions of people; for the first time in history, one could see how people of different nations were dressing the same, taking their lead from the "fashion" we wore in those backroom studios in Manhattan and California. International capitals began resembling New York.

When the talking picture arrived in the 1930s, it was heralded as a technological leap forward. To actors, it meant developing an entirely new technique from that used in silent films or theater, but it also freed us to some extent. Subtle changes in the tonal qualities of language could communicate what motion and gesture once had to. Again, I was fortunate. My theater background gave me experience using speech in drama and made my transition into the new medium somewhat easier. As Louis B. Mayer once said, using the film vernacular of the day, "You're lucky, Lillian. Your voice photographs."

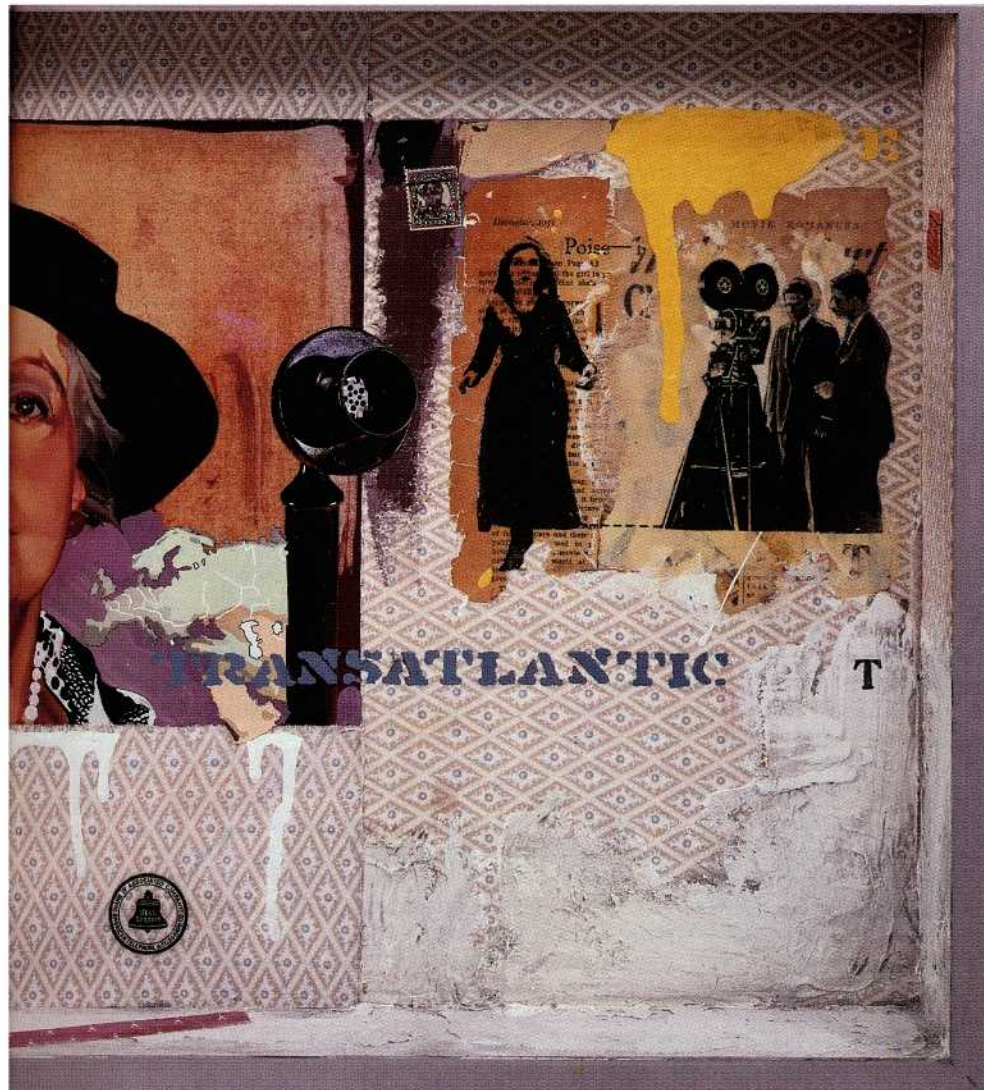


To the world, talking pictures opened up a whole new sensory experience. But strangely enough, Mr. Griffith was hesitant about this latest breakthrough.

In one sense, I imagine he must have mourned the loss of a highly personal adventure. Silent films, like radio dramas later on, made the viewer or listener work harder, made him engage his imagination more to make up for the loss of a visual image in the case of radio, or the spoken word in silent films. But in another sense, Mr. Griffith saw something even more far-reaching.

In 1921, Mr. Griffith premiered his own first talking picture, *Dream Street*, to a New York audience at the Town Hall. He told those around him, "We're committing suicide." They must have been startled to hear it. No doubt some of them even thought he was mad. But Mr. Griffith foresaw what others had not: Only five percent of the world speaks English. We were losing 95 percent of our audience. That night, he went back to his studio and took the sound out of *Dream Street*.

Change, I believe, always brings with it the forfeit of some great good. It was film, after all, that drew the final curtain on vaudeville. The advent of radio and television brought new losses. The



Roxy Theatre once was one of the great showcases for films in New York City. It seated more than 6,000 people and constantly was filled from 10 o'clock in the morning until 2 o'clock the next morning. But the Roxy, like so many of our cathedrals of film entertainment around the world, is gone now. Progress breeds loss . . . out of necessity.

But progress also breeds an exciting new challenge. When we narrowed our audience by making English-speaking movies, Hollywood reacted by making *better* movies.

Throughout it all, AT&T has been at the forefront. If the communications business has contributed to making the world smaller and better, then AT&T has been one of the great world leaders. It pioneered the telephone, of course, but the company also has long been devoted to an aim that has brought us enormous rewards in the film business: a perfection of sound that could duplicate exactly the timbre of an actor's trembling voice, or a magical note from a Stradivarius in the hands of an Isaac Stern, setting the mood in a musical score. When the sound of the sea wind blows through *The Wind* or *The French Lieutenant's Woman*, one can taste the dry or salt air. That's film at its finest, a seizing of reality that gives scope and

breadth to any story on the screen. AT&T has been a key contributor to the advancement of movies.

I know of no other invention that has saved more time, energy, and money than the telephone. I give hundreds of press interviews by phone every year, and I often wonder what they would cost to do any other way. I think of New York, and I marvel at how someone can make dozens of business and personal appointments within the space of an hour just by using the phone. The economy that has resulted from this invention can only be described as immense.

But the true value of anything is measured best in human terms, and it was the telephone that once played a profound role in my own life. It became the vital link in a too-real drama of life and death.

In 1926, I was working at Metro-Goldwyn-Mayer on *The Scarlet Letter* when I received a telegram from Dorothy. She was then in London filming *Nell Gwyn*, and Mother had been looking after her. The message said: "Mother has had a serious stroke. Please come quickly."

I left to board the train from Pasadena to New York still in costume and makeup. Word of my mother's condition must

have been picked up by the newspapers, because hundreds of people greeted me with sympathetic wishes at every station stop en route. Women held up their children and said they were praying for Mother. Others wept. It's just a side note in this traumatic story, but I remember that it was during that train ride across America that I first realized the power of motion pictures.

In London, I found Mother deep in a coma. She improved only slightly during the next few weeks, but enough for me to try to communicate with her. I took her by the hand and said, "Mother, I have to go back to California. If you want to go with me, squeeze my hand twice. If you want to stay here with Dorothy, squeeze it once." The response came faintly. It took every effort. She squeezed twice.

I brought Mother's London doctor and an Irish nurse along with us on the trip home and, once we arrived in New York, hired a private car attached to a fast, nonstop mail train. When we arrived in California, the doctor and nurse went back to England. A new doctor stepped in, examined Mother, and said sadly, "There's no hope."

In 1926, transatlantic telephone service was still a year away, but I heard that test calls were being made, so I asked to be one of the first to make such a call. I was told at the time that I placed the second phone call ever made between Los Angeles and London. I wired ahead so that Dorothy would be ready when the call came.

I remember my excitement when I heard her voice on the other end. "I can't believe we're talking to each other halfway across the world!" she said. I put the phone to Mother's ear so she could hear Dorothy's voice and be reassured.

In the weeks ahead, both Mother and I drew constant comfort from the nearness of Dorothy's voice, as we became three people held together by a precious thin wire linking all our lives at a desperate hour.

It's strange how we remember such little things so many years later, but as I recall, that first phone call to London cost 86 dollars for three minutes. To travel the same distance in person, and with the necessary medical entourage, had cost more than 100 thousand dollars. The difference was astounding.

But man's progress must be measured in invaluable human terms. Mother recovered from that devastating stroke and lived another 22 happy years. Ultimately, it is the gift of life that is progress' greatest gift of all.

Today, we are living longer than at any other time in the history of man. Who knows? It could be due to the energy we save by using the telephones that now reach around the world. ■

THE RIGHT SPIRIT

THIS HAPPY BREED

BY HENRY M. BOETTINGER

The people of the Bell System are fondly recalled in a tribute to their character and competence.

I remember the first time I met a Bell System employee. I was seven. In those Depression days, Mr. Seebold (he was always known as "Mister") was an aristocrat of labor to everyone on our street; most of our fathers suffered the agony of unemployment, so they watched with envy as Mr. Seebold went to important work each morning. Sometimes seen in the neighborhood with a splendid truck laden with first-class tools, he was held as a model of how hard work and education could make one a master craftsman practicing mysterious skills, with security and prestige for life.

We were told he was a cable splicer with "The Telephone Company," an awesome organization whose service was then enjoyed by only a few local families. When emergencies demanded the use of a phone, the supplicant was escorted to the magical instrument, alongside which was a receptacle for the five cents due for the call. Few of us thought we would ever have a telephone of our own, and to join Mr. Seebold's company was seen as far-reaching ambition, proper only for the brightest among us.

My next association with Bell employ-

ees came in Japan, where I was building radio and telephone systems at the end of World War II. As we put aside the techniques of combat communications (highly temporary and full of rickety improvisation) and began to construct permanent systems, we soon found our knowledge and experience too limited. An old sergeant told us, "For this kind of thing we need some Bell folks."

A friendly general, eager to make impossible schedules, approved our request, and a dozen quietly competent sergeants and lieutenants soon arrived. After inspecting our efforts with politely disguised disdain, they took over the telephone operations, training our raffish types, creating a reference shelf from personal books, setting up immaculate records, testing everything in sight, and getting new equipment to work with obsolete Japanese apparatus.

All the while, they talked about "customers" — something I did not know we had — and established repair bureaus and quality reports! Working round the clock, unperturbed by difficulties, they set new standards for us all. In talking with them, one sensed both shared vocabulary and codes of excellence,

though they had not met each other before. While eager to get home and resume their jobs, some stayed on longer than they had to, in order to see their projects through. I found them stiff in discussion, exuding technical superiority, amused by and tolerant of ignorance in others, but stirred to anger only when we proposed some half-baked, wasteful, or hazardous method.

A few months later, when ordered to effect transpacific communications, we were given Western Electric equipment of exquisite workmanship and told to contact several communications companies to establish service. The only one to show up on time was AT&T. I did not know then that it — and Western Electric — were part of the Bell System. When told so, I decided to pursue whatever opportunity there might be to work with these modern colleagues of Mr. Seebold after securing my engineering degree. My impressions of the Bell System were based entirely on its *employees* — the kind of people I wanted to join for the rest of my working life.

Financiers, engineers, politicians, and economists each see their own Bell System. But mine will always be a vision of

**NO JOB IS SO IMPORTANT
AND NO SERVICE IS SO URGENT
THAT WE CANNOT TAKE TIME
TO PERFORM OUR WORK SAFELY.**

its people. Individual efforts, talent, and beliefs formed a character and culture unique in American history.

Every Bell job, from the earliest days, was aimed toward a set of challenging goals for improvement unrealizable in a lifetime. The range and scope of necessary tasks were so great that nearly every kind of skill and personality could find some springboard for achievement and personal growth.

AN EXTENDED FAMILY OF ONE MILLION MEMBERS

Though the total number of employees reached more than a million, no one at work ever thought in terms of such statistical abstractions. Bell people saw themselves as members of crews, garages, exchanges, business offices, teams, districts, or, at most, departments. Everyone was important in these small, lively units. They would be missed if absent, and notice was taken of their return — from holiday or hospital — as in a family.

I came to see that the character and personalities of Bell, Watson, and Vail had stamped themselves on all employees and their working conditions. Broad vision, commitment to continuous learning, a faith that solutions to every problem could be found with enough energy and brains, a serene belief in the importance of what they were doing, technological know-how and eagerness to use it, hardheaded pragmatism, alertness for humbug, and an attitude that everything can be — and must be — improved, all mingled to produce the Bell temperament.

Oriented to concrete accomplishment, employees were realistic, more interested in people and things than in abstract ideas. (Some of their scientist colleagues brilliantly explored realms at the frontiers of thought, but even their work was justified by hope of ultimate practical application. They approached the theoretical problem of putting a man on the moon with the same deliberate competence their fellows used in repairing the damage inflicted by a tornado.) Like all human beings, Bell employees possessed two drives: the urge to belong to something larger than themselves and the urge to stand out. The service orientation and organization itself satisfied their first drive; to fulfill the second, they had to meet the test of really doing something useful better than others.

They had little time — and even contempt — for those who expected distinction based solely on birth, education, wealth, or social background. “Don’t tell us about your paper qualifications, *show* us what you can do” expressed their test of true merit.

In the interview for my first job, Sid Miller, a legendary transmission engineer for the Chesapeake & Potomac

Company of Maryland, spent five minutes with the facts of my application. Brushing it aside, he propelled me to a large drafting board holding detailed maps of the Chesapeake Bay bottom. “We have to move our underwater cables to make way for the new Bay Bridge. How should we do it?” he asked. Four hours later, exhausted by his pace and mental energy, I saw him still making calculations and notes. Since the clock stood at seven, I gulped and inquired about the job. He looked up impatiently. “*Of course* you’re hired. Would I waste all this time on someone who couldn’t help on this sort of thing?”

Years later, all kinds of tests and procedures were used in recruiting, but I learned that many older employees had similar experiences. Jim Dingman, who rose to be a vice chairman of AT&T, recounted how he had been hired on a train trip (returning from a racetrack!), where his seat companion examined his qualifications as the countryside rolled by.

Rapid decisions based on face-to-face contact with a person or a problem were characteristic of Bell people since Watson hired Vail on a side trip to Washington in 1878. Bell people have never liked delay in anything. “Get on with it” was a lesson learned very early.

From the turn of the century until the last decade or so, most employees worked in the three great departments of traffic, plant, and commercial. Switchboard operators handled calls, plant folks installed and repaired lines and equipment, and business-office people dealt with customers’ orders, problems, and billing. Nearly all were recruited directly for work in their home towns.

The company, through its employees, was deeply rooted in each local community; mutual destinies were linked. Any lapses in service would be noticed by one’s neighbors — very direct feedback indeed.

The three local heads — chief operator, wire chief, and local manager — were persons of prestige, looked to as responsible for a service vital to all. In many towns throughout the nation, they did the hiring and supervised the training. This made them powerful figures to parents whose children aimed for a telephone career. They usually were people who came up through the ranks. Capable and hardworking, today they would probably have gone on to college from high school. But for them, the company was their educational institution, and no alumnus or alumna held fiercer loyalties than those who felt themselves lucky in the chances their organization gave them.

Such teams and the people they trained were the bedrock for the company’s reputation. All the rest of the enterprise existed to make their functions more

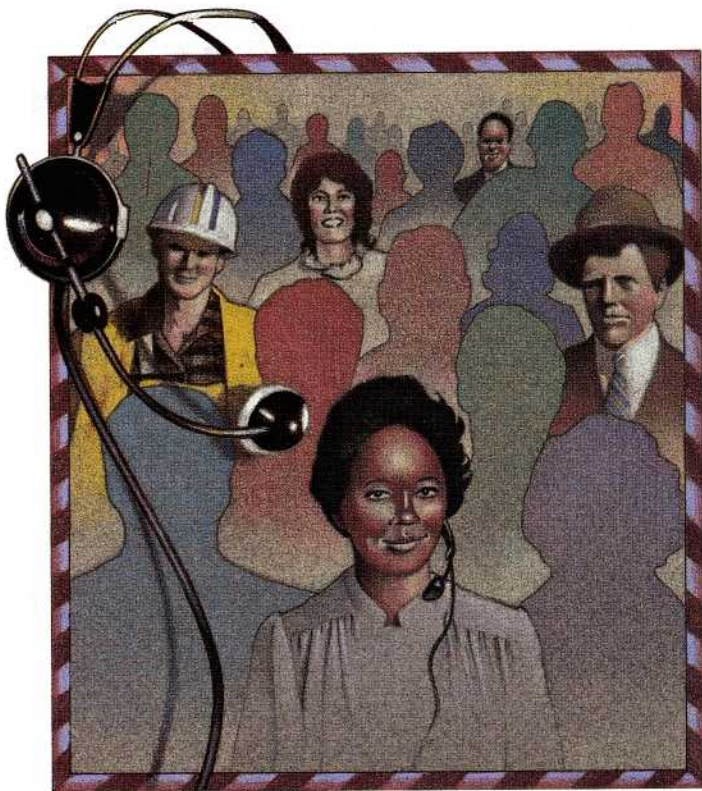
effective. Whether they were engineer or chairman, clerk or factory manager, comptroller or lawyer, scientist or financier, their contributions came to focus on the crucial contact points between customer and company — which were in the hands of local operations people. No person without firsthand experience in this fundamental work of the business could hope for promotion to the highest positions. Common experience made for common understanding of what was important at all levels. In this way, Bell people felt secure because they would be backed up on any decision congruent with the great service goals, and they knew that any deviation from them would not be tolerated.

In historical terms, the major contributions of employees were found in those billions of acts necessary to tie society together. For more than four generations, employees produced a vital service — available on demand, any-time day or night — that the nation’s population could take for granted.

The network’s reliability and speed of response created a form of “social insurance” for life and property that expanded the choices by which people could live their lives and do their work, thus enhancing individual freedom. But the technology and physical plant of communications, however marvelous, furnished only the skeleton and muscle of the Bell System. Its soul and mind, which gave life and spirit, came totally from employees. Were all the plant destroyed, they could rebuild it. Without them, the proud arrays of ingenious equipment and machinery would be artifacts, silent and useless; instead, they were wonderful instruments used by skilled human beings for the benefit of customers. While managers strived to get more and better tools for employees, the crucial test was how well they selected, trained, nurtured, developed, and made effective the people in their charge. *Those* were the precious, indispensable resources, and anyone careless of such responsibility was judged unfit.

REGULATION NOTWITHSTANDING

Though the Bell System was a regulated monopoly, it was also an American institution, which made life inside briskly competitive. This aspect continually eluded observers, who were baffled by the enormous efforts to excel in everything from science to service. “Why do you do it when you don’t have competition?” they would ask. The answer was simple — and complex. On an individual level, the “urge to stand out” as an indicator of personal achievement was powerful; performance reports for every organizational unit were widely published and studied. Those lagging behind the leaders were stimulated to find ways to advance. Managers visited those who had shown the way with new methods or techniques, and head-



quarters experts provided advice and information on ideas for improvement.

On major, shared problems, organized experiments under field conditions were undertaken, with results and lessons made available to all concerned for application in their own areas. This wasn't a competition in which you tried to put down your fellows, but a rivalry among friends that lifted the performance of all. In technology, "cable people" tried to outdistance "radio people"; in offices, innovations in scheduling, transport, and layout produced constant improvements; in construction, new vehicles and tools were designed by collaboration between field personnel and engineers — and so, on and on, in every nook and cranny of the business. Employees knew that next year things should be better — no matter what the task.

Cynics may sneer at this simple faith in the idea of progress, but its results speak for themselves: World leadership in telephony was built on it.

Accompanying such internal competition, great surges of cooperation were required, and never more so than in emergencies of every kind. During natural disasters, employees expected to be called on for help, and forces were mobilized from Bell units across the nation to restore service quickly. Opportunities for true heroism could come at any time, and the nearly 2,400 Gold, Silver, and Bronze Vail Medals bestowed by the Bell System on its men and women over the past 63 years attest to the selflessness and bravery among employees.

In the early years of this century, contests in the telephone crafts, similar to competitions found at county fairs, were held throughout the country. To win was

an honor sought by all. Such contests tapped native ingenuity and encouraged people in the same field to emulate the winners. Bell's constant preoccupation with working conditions produced such innovations as cafeterias and lounges (some equipped with billiard tables!) for the refreshment of Bell workers. Telephone people had these amenities far in advance of people employed by other industries. Pension plans and loans for family emergencies were aspects of continuing concern for employees off the job, a concern introduced by Vail himself.

In 1924, the Hawthorne Experiments led to profound insights about the social nature of workplaces. Fifty years later, scholars from all over the world assembled in Chicago to assess the impact of this pioneer effort by Western Electric. The investigations analyzed the connection between working conditions and productivity and were named for Western Electric's Hawthorne (Illinois) Works, where the experiments were conducted. They remain a vital force in the world of work and its academic study.

In the 1920s, another study — this one correlating scholastic and extracurricular leadership with subsequent success in business — evoked wide attention when published by AT&T's president, Walter S. Gifford. The results had great influence on Bell recruiting and were validated again in the 1950s.

During World War II, Bell employees wrote many of the field manuals used in training defense-communications personnel and performed prodigious services of invention and productivity; 70 thousand of them joined the armed forces. Participation in U.S. Savings Bond drives, which began then, has continued undiminished ever since, with organizations set up to run internal fund-raising campaigns during enrollment periods.

Bloodmobile programs have evoked similar responses in every work location. (One AT&T supervisor, whose low blood pressure would have prevented him from contributing, was so embarrassed to face his staff that he ran around Lower Manhattan's Trinity Churchyard to elevate his pressure and then jumped to the front of the testing line so that he'd be examined before his pressure dropped.)

True concern for employees recognizes that the greatest influence on quality of life at work is the quality of immediate management. This realization focuses attention on how those placed in charge of others can have their qualifications suitably matched with their responsibilities. A host of training ventures, from those for newly appointed supervisors to seminars for company presidents, attests to the belief in constant learning as essential for quality management.

The Bell System was one of the world's largest private educational institutions — with a potential "student body" of one million, offering 13 thousand courses, employing 10 thousand permanent staff members, and spending two billion dollars a year on the effort. The training was devoted to keeping employee knowledge, skills, and competence abreast of a business environment changing in every dimension. Such training represents an investment in human potential unique in corporate life. Company-sponsored programs, in endeavors ranging from the basic telephone crafts to Ph.D. studies at Bell Labs, provided employees the opportunity to convert talent into ability.

In 1949, a corporate human relations program enhanced the effectiveness of work groups by exposing managers to the psychological principles of personal behavior and conflict resolution, which were increasingly necessary to handle the unprecedented growth in the workforce at the time.

By 1956, landmark research that appears to constitute the most extensive study of adult lives ever undertaken was begun by AT&T's Doug Bray. Among its results are a firm understanding of the nature of management potential and the changes in managers' motivations and values as they live out their lives in a large corporation. *Formative Years in Business*, published in 1974, is the first book in a series that sets out the findings. (It is dedicated to Bob Greenleaf, AT&T's personnel-research pioneer of worldwide reputation.)

This work led to the establishment of management assessment centers, where 300 thousand Bell employees have been tested and appraised. The assessment technique was adopted on a global scale, and an international congress on the method is held annually. This selection process is a major contributor to opening opportunities for people with real ability, regardless of their race, sex, color, or any other attribute not related to potential competence for supervising others. The centers played a vital part in Affirmative Action programs to make equality of opportunity a reality for all. In addition, the assessment process has helped prevent tragic failures in later life for those with little aptitude for managing others.

Several programs have sprung from the

original effort — for example, initial training for newly hired or promoted first-level managers, and studies to discern the differences in attitudes and values among young people joining the business. Major explorations abound in every sphere affecting employees, from organizational design to validation of tests used in recruiting. This search for sound knowledge in the care and development of employees has been spearheaded over the years by a human resources research unit unlike any other in the world.

Another significant project aimed at employees' personal growth came to be known as The Work Itself. Under Bob Ford's direction, all kinds of jobs, including many that people considered boring, limited, or repetitive, were examined closely to find ways of enriching them — to make those jobs interesting and open-ended as a person's experience grew. Widespread use of this process, and its remarkable success, made Bell the recognized leader in job-enrichment research and applications.

The Bell System's evolution has been marked by a succession of major changes — social, technological, political, and economic — that had to be faced and accepted by its people in meeting their responsibilities. As soon as a new problem area was discerned, attention was turned toward consideration of how employees could be prepared to deal effectively with the new conditions.

In technology, a data communications school was established in Cooperstown, New York, to seed System competence in that emerging art. The same site was used for computer courses attended by all System managers, including company presidents. A large training complex for advanced engineering skills was set up at Lisle, Illinois, and another for plant maintenance in Atlanta.

Social problems of the '60s triggered many programs to acquaint Bell people with emerging legislation as well as with the actual conditions existing in disadvantaged urban areas. Many Bell executives took prominent roles — and risks — in assisting their communities to make the enormous social transformations required.

The need to deal with the total environment in which the business operated led to month-long courses at Asbury Park, New Jersey, in the '50s and '60s. Corporate Policy Seminars at Princeton, New Jersey, and at Buck Hill Falls, Pennsylvania, immersed managers in the bewildering issues of the last decade, assisting them in preparing their people for the turbulence of those years. Regulatory and legislative conferences, as well as public relations, marketing, personnel, and economics courses, were held continuously as events unfolded and

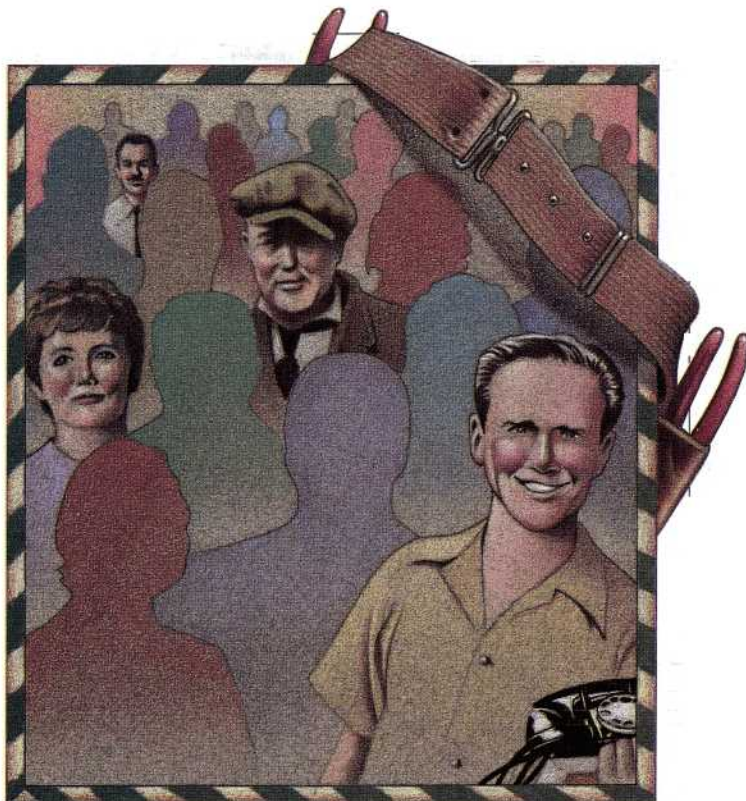
pressures arose in the national telecommunications-policy revolution. Throughout the uproar and controversies of the day, certain essentials remained unchanged. The primacy of customer satisfaction never declined. Though a slogan like "the voice with a smile" became dated as dial tone replaced a cheerful "Number, please," the belief in friendly concern for each customer as an individual remained an ideal for operations people.

An aspect of telephone culture that forever baffled skeptics was that complex of attitudes known as the Spirit of Service. Few employees could define it in the abstract and, when pressed, they always used examples of extraordinary efforts to assist customers in need. Though ineffable, this ethic was real — found among the young and the veteran, operators and installers, economists and construction crews — a spirit that was ready to express itself whenever the circumstances demanded.

Its source is mysterious but perhaps rooted in the fact that the business is a person-to-person function, not an arid, paper-shuffling bureaucracy. What employees do for customers is filled with emotion, affecting everyone involved in a specific incident or personal crisis requiring Bell's services.

This person-to-person orientation has permeated all relationships. Trust in the intelligence of employees who had been carefully recruited meant sharing as much information as possible, so that they could make their own judgments. Since Vail's time, it was felt to be far better for actions to flow from true understanding rather than from blind obedience to orders, with no reasons given. Any employee with a question was entitled to an authentic answer.

Belief in balancing the interests of employees, customers, and share owners was fundamental. Only by keeping prices low for customers, wages competitive, and earnings in line with alternative investment opportunities could the business function efficiently. Understanding of this philosophy made employees unusually receptive to technical improvements. In fact, surveys of employee and customer attitudes showed that how *customers* felt about the company was nearly identical with how *employees* felt about it. Conse-



quently, corrective programs based on early awareness of customer or employee dissatisfaction kept the enterprise responsive to changing expectations and concerns.

The Bell System's safety record has been remarkable by any standard and reflects top-to-bottom concern with safe working methods and conditions. There is constant inspection for safety hazards by employee committees in every workplace. All employees learned this motto early in business life: "No job is so important and no service is so urgent that we cannot take time to perform our work safely." It is rare where a plaque carrying this message is not within daily view.

With the end of the Bell System, employees will be deployed to subsequent and independent entities. Those who travel the avenues of tomorrow must make a new culture for *their* time. As they press on, they can be sustained by the century of traditions that brought them to the crossroads. The long road reaching back to Bell, Watson, and Vail, along which great numbers have made journeys of contribution, now diverges toward routes and destinations no one can foresee. All who trod that earlier path created a culture, though they did not do it consciously.

Most of them — like Mr. Seebold — took pride in "working for the phone company" and enjoyed a purposeful serenity about the usefulness of their work. They not only believed progress *was* possible but also proved it every day, every year, and every decade. They demonstrated what knowledge coupled with vision could achieve, and *that* was their real contribution. ■

THE RIGHT SPIRIT

THE MIRACLE OF TELEPHONE SERVICE

BY BOBBIE ANN MASON

The miracle may seem magical, a writer discovers, but it's wrought by telephone people every day.

PITTSBURGH



I can no more imagine how voices travel on wires than I can understand how birds fly. You may as well talk to me about traveling at the speed of light — stuff from *Star Trek*. I write fiction. Writers celebrate mystery, keeping one foot in childhood and their eyes on the future. But some of us are notorious klutzes when it comes to something practical, like splicing a cable. We stand around and watch in awe while geniuses like Alexander Graham Bell fiddle with the mysteries of nature. Why not change lead into gold? Or teach cats to sing? Maybe we could dig to China. It all sounds plausible.

It occurs to me that Bell employees have felt the same sense of wonder all along. After all, they have been participating in something magic that is at the heart of the way the modern world works. It's big and it's important, and there is pride in being in on it.

A *New Yorker* cartoon gently mocked such belief in the Spirit of Service once, showing an installer saying, "To me, it isn't just installing a phone, Lou. It's giving one human being a means of reaching out to other human beings." In a way, the portrayal has the correct ring of caricature, for I doubt that employees go around reciting in such a lofty manner day after day. On the other hand, there's nothing trivial about connecting one human voice to another. It's a profound thing — amazing, really — and it simply has become routine. But that's like taking sunsets for granted.

And the miracle of flight. For that matter, it seems to me no accident that Alexander Graham Bell got mixed up in the early development of the airplane. The giant telecommunications industry — radiotelephony, microwaves, satellites, the whole works — has been linked to space travel, trips to the unknown.

The mysteries of nature are bigger than we. Bigger even than AT&T. And I don't doubt that it's with an almost mystical awareness that Bell employees know, in some corner of their minds, that what they are doing has profound significance, beyond restoring service after a hurricane or helping everyone have a phone at low rates. It's a long way from the cosmos to the service rep handling a disgruntled customer (neither of whom is likely to be taking much of a cosmic view of things at that moment), yet I imagine that underlying day-to-day work, there is a feeling among employees that what they're doing is connected to deep mysteries.

One of the most amazing things I ever did in my life was make a transatlantic phone call to my publisher in England. Our voices, I'm told, were broken up into bits, and other voices were shooting along the ocean floor in the gaps between them. Perhaps the voice-bits even zoomed up to a satellite and back. Here's sort of what happened from the beginning. (I'm a little fuzzy on the details.) Some people manufactured my telephone out of clapper balls and carbon granules and magnets and mylar and modular jack springs and governor studs and a whole lot of other stuff, including gold. Some other people made copper cable, and some others spliced it and hooked it up. (There are a lot of wires all over the place — enough conductor-feet to go to the moon and back 100 times a year.)

The call probably went through a local telephone office first and then to a regional office, where the operator punched some numbers on her Traffic Service Position System (TSPS) console (88 keys, same as a piano), and then my call got routed somewhere — no one will ever know — but wherever it was, I think there may be a lot of computer terminals there, and people monitoring flashing lights on an enormous traffic board.

I forgot to mention dial tone. I had thought dial tone was a sort of genie in a bottle, popping out when I picked up the phone, but instead I've learned that it's always there. The phone-company equipment is constantly checking my phone — and thousands of other phones simultaneously — just to see if I've lifted the receiver. This goes on night and day, even when I'm not home. And when I'm dialing, a scanner is running around wildly, interpreting and remembering the numbers I'm dialing and alerting the next operation so that the connection can be made.

After I dialed my call, some very swift electronic switching systems got into the act. In the frame room of the central office, where the first connections are

made, it's all silent, and there are masses of wires — amazingly tangle-free. But the switching room sounds like an aviary, with a lot of deep-throated birds practicing their morning songs. These are the sounds of calls being processed. Thousands of people are involved in these complex behind-the-scenes steps in what seems to be mostly an invisible operation (this is, after all, a tale of the unseen — voices traveling through the night, like spirits, the stuff of fairy tales). There are people who install all my wires and plant my telephone pole, and there are the testing and maintenance people, not to mention all the folks who help run the organization. (I'm leaving out a lot because I'm getting lost in the maze.)

Anyway, I'm exhausted, just thinking about all the jobs contributing to one simple call to my publisher. It would probably take the vast New York Public

Library filled with Bell binders to explain how it all works and to detail every employee's contribution to the smooth working of "universal service." (I've been told that if automated switching hadn't been invented, everybody on earth would have to work the switchboard just to handle all the calls — which makes me wonder who would do the calling.)

I haven't even touched on the Long Lines people, who are the masterminds of long distance traffic. Imagine being on a plane bound from New York to Atlanta and being routed through Pittsburgh and Kansas City. A telephone call can go that route without missing a beat and without anyone knowing or complaining about the inconvenience.

Each Bell System employee has a story to tell, and I wish I could hear them all. The installers, for instance, never know what sort of adventure their day is going to bring. Ocelots in a home, for instance. "You can go from the sublime to the ridiculous," an installer told me. "You never know who's going to answer the door or how they'll be dressed." Operators face a daily routine but nevertheless find joy in the unexpected ("Can you tell me the name of the store that's giving double coupons this week?").

Communications technology requires a leap of the imagination, what Samuel Taylor Coleridge called a willing suspension of disbelief. He was talking about poetry, but when you get into bubble memory, fiber optics, microwave radio relay — even the phenomena of coaxial-cable transmission, direct distance dialing, electronic switching, and how to keep squirrels from chewing up telephone wire — you're beyond poetry. You're into fantasy. One installer I

talked to said, "I'm not circuitry-minded. I'm a ring-and-tip man. I don't pretend to understand the whole network, but when I stop and think about it, the technology is just unbelievable."

People I've talked to in all kinds of jobs were quick to share their sense that the world of communications they're responsible for is close to science fiction. A long distance operator told me, "It's mind-boggling — all these electrons! If I stop to think about it, I get confused. The TSPS is amazing. Underneath, it has all these wires, and we know it's all recorded on tape, but most of us don't really know how it works. It's amazing that people can dial their own calls or make credit-card calls. Now, even overseas calls are routine." A man at Bell Labs told me his mind still gets blown away every day by the stuff they're into there. A Labs engineer told me how proud he was to have worked on Telstar. Another said the device he worked on years ago was still lying on the ocean floor, doing its job; he thinks of it now and then, with mingled pride and astonishment. A central office manager said, "The technology has become so complex and varied you can't remember how it all works, so you have to know *where* to find out. That's the key to service today."

Imagine the whole Bell System as a giant computer. Everything people do to make telephones work — all the manufacturing, installation, servicing, management. If you could look at the United States from just the right distance in space, the Bell System might resemble an integrated circuit. The employees would be at the gates — the switching points in the design — each one necessary to the whole, each one as important as the next. There'd be people scurrying down all those pathways. You'd see frame attendants connecting wires and looking for trouble, construction people digging holes and laying cable, other employees collecting coins from pay phones, others recycling copper and old telephones, and you'd even see all the people who are hired just to keep track of things — cable, light bulbs, telephone numbers — people who supervise the electronic switching systems. I could go on. But you get the idea.

Times change. Things speed up. Things get bigger, or they grow smaller. A laser is so small that scientists joke about inhaling it by mistake. The future is wild. It's filled with risk and adventure and undreamed-of frontiers. There are two buttons on my telephone (* and #) that are reserved, I suppose, for whatever is coming along next. My guess is that someday I'll be able to travel from New York to California just by pushing the #. Perhaps the other button will be for time travel. I wouldn't be surprised if the telephone people come up with something that far out, when the time is right, of course. When it happens, I hope we can count on the Spirit of Service to get us there and back, because we'd sure as hell need it on a trip like that. And if the public-interest spirit of Theodore N. Vail still prevails, the trip shouldn't cost much, either. ■



TELLING TALES

BY ALEX HALEY

The Bell System can be kept alive through the "living memories" of its people.

The major television mogul was absolutely serious. "You develop that idea into a strong family series," he said, "and we'll try to make it as big as *Roots*." So I began wracking my brain, hard. It's tough enough to create a nifty two-hour special, let alone a powerhouse weekly series.

I had shared with the pinnacle-level exec my experience of four afternoons earlier, which went something like this: I was stopped in traffic for a red light and spotted a telephone installer's truck. A sudden awareness came that the truck and driver were accepted as familiarly as a cottontail rabbit throughout the United States — in city, town, and hamlet. That night, I wrote to AT&T in New York my idea for a "Telephone Man" series: The Bell System's ubiquitous repair and installation folks, meeting and interacting with all sorts of people, could fill no end of one-hour episodes with emotions from anger to laughter for millions of viewers. Very shortly, AT&T was helping me interview scores of Bell veterans, active and retired, who related their memories — some routine, some dramatic, all highly personal. I had no question that I'd found the perfect all-American family series.

So why isn't this great show now counting its Emmys? In discussions farther along the creative road, the production company's high panjandrum agreed that he loved the show, "but it simply can't compete with others in vital ingredients. The bad guys have got to be chased, cornered, and fought by the heroes, who maybe also have sex with the pretty babe. Your phone guys would get fired for doing that on the job — you know what I mean?"

A great series died in the fetal stage, that's what I think. But so much for that. It's hardly a jot alongside what the million or so members of the largest industrial family in the United States — which is Ma Bell and her brood — are



experiencing. It scarcely helps that all the upset was generated by a word, "divestiture," which most folks never heard of before, myself included — and my business is supposed to be words.

Put another way, the American people — for generations — have learned to depend on the Bell System, now being transformed into what must to a confused public seem as something akin to a jigsaw puzzle. Of course, within the Bell corporate viscera, there probably are persons skilled in figures who could tell us to the nearest dollar the gargantuan value of the whole corporate megillah. But I believe that of a greater non-measurable value is the warm feeling of maternalistic endearment the two words "Ma Bell" evoke wherever they're uttered; they symbolize the largest continuous family in industrial history.

I think that warm feeling should by no means be permitted to be lost as another

casualty of the dissolution of the System. Its glow should be carried within each worker into whatever is his or her new area of employment.

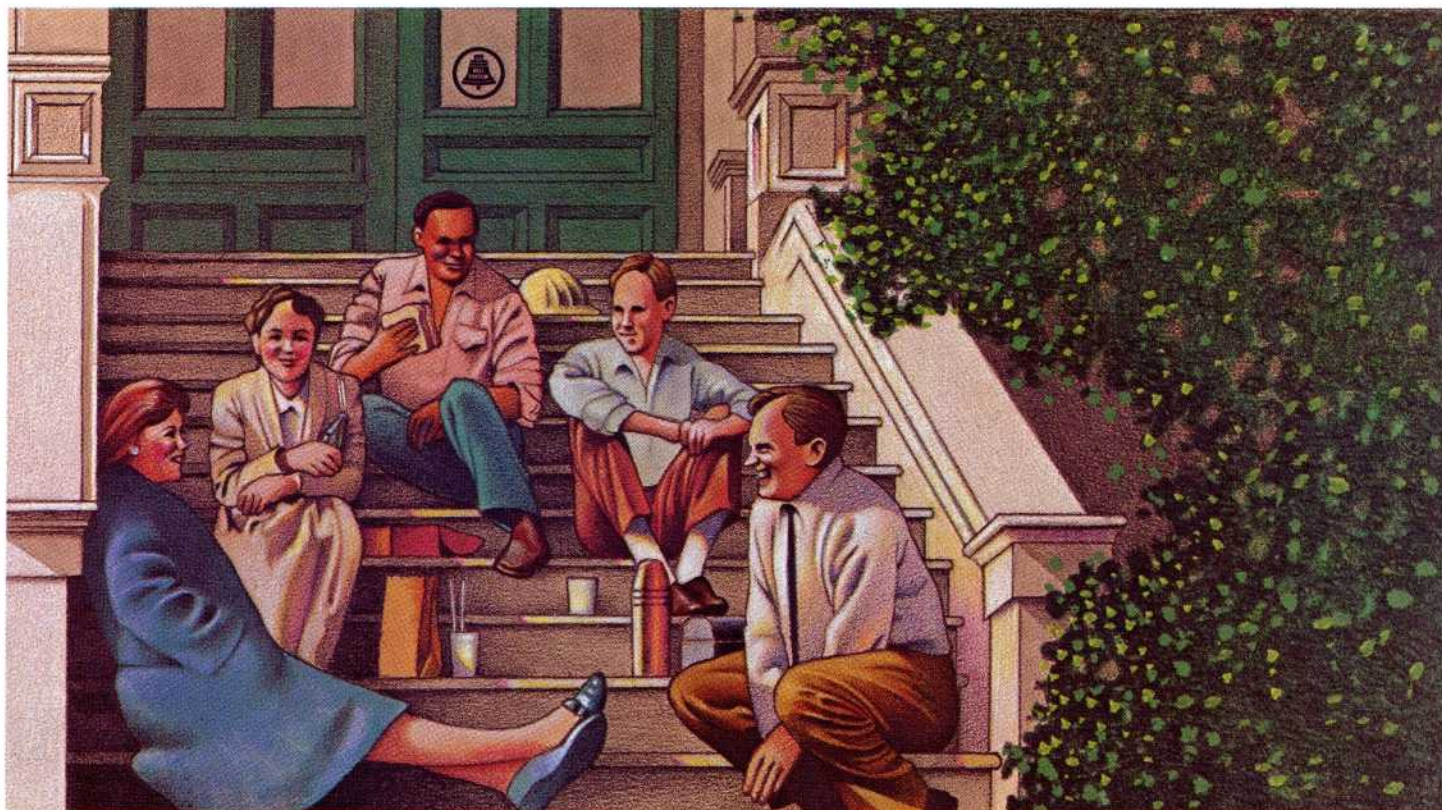
If my experiences in the genealogical realm can offer any useful suggestion, it is that all who are involved become active oral collectors of the long, rich Bell history. There is not another drama to match it within U.S. industry.

Let me try and approach this another way in my effort to underscore its importance. What I am trying to stress is that the Bell System drama — from Alexander Graham Bell and Theodore Newton Vail on to divestiture — represents an American national treasure. Its preservation needs to be active, ongoing, oral — derived from the living memories of the millions of proud "Ma Bell people," active and retired and share-owning. Schools, religious congregations, civic and social and fraternal groups, and any other audiences in our communities should hear the Bell story.

Today, according to my friend Alvin Tofler (he of *Future Shock* and *The Third Wave*), nearly 25 percent of U.S. residences are occupied by a single individual. It is but one among a plethora of new family forms to which we've had to adjust — including single parents, teenaged parents, working wives, and housekeeping husbands.

In relation to what is happening in U.S. families, it is generally becoming accepted that change is inevitable, that we should expect it, and cope with it. I believe, ultimately, that same perspective should apply to corporate changes.

But I also believe that as we embark on the adventure of the Information Age, each post-divestiture company must have not only vigorous state-of-the-art technology but also the legendary "Ma Bell" caliber of people to continue pioneering in excellent communications — communications for America and the world community. ■



THE RIGHT SPIRIT

CORPORATE BONDS

BY MICHAEL NOVAK

Though not based on blood and genes, a corporate community nonetheless possesses strong familial ties.

No one who has read *Bell Telephone Magazine* over the years can fail to be impressed by three qualities possessed by the Bell System and its people: the paramount ideal of service; the stability of Bell's service and employment; and the ubiquitous sense of familial pride, personal involvement, and employee-to-employee loyalty. No organization could have succeeded without such characteristic temperament, emotions, and strengths.

What must it be like, then, to face the family's breakup? What must it be like to head into new technologies, new market conditions, new philosophies of work, new uncertainties? Numerous Bell publications across the nation recount the stress, the anger, the anxiety.

To a theologian, the human story at Bell offers fascinating material for two reasons. First, corporations have, in humanistic literature, a reputation

for being anti-community: they are characterized as large, impersonal, bureaucratic, alienating, coldly oriented toward profit only. Second, the form of community created by corporations like the Bell System is relatively new in history — and as such, inordinately interesting.

When theologians write about "community," most of them seem to be imagining, unconsciously, the community of the small village, the medieval guilds, the other homogeneous, close-knit communities of the premodern era. Extrapolating from this image, theologians see modern life as pluralistic, anarchic, fragmentary, impersonal, cold, lonely. Obviously, there is some truth in this view. Not very long ago, in such countries as Germany, England, and France, village life did dominate the popular consciousness. Seven or eight generations ago, great cities like Jerusalem, Rome, and Cologne were contained largely within relatively small, walled

areas; they were almost villages.

The great historical transformation from what the sociologists call *Gemeinschaft* (the sense of close belonging) to *Gesellschaft* (the sense of mere association and contiguity) is recent enough to have left vivid traces on our memories. Americans lived through this transformation during and after World War II as they moved from small towns and rural areas to big cities. Recent advertising campaigns — "Reach out and touch someone," for example — play vibrantly upon Americans' recovered sense of nostalgia, as people strive to reach across distances of space and memory to "re-create" the old community.

By comparison with the intense community of the older type, the new communities we live in are clearly different. Are they in all ways inferior? Close analysis will not allow us to say so. After all, who — really — would want to go back?

To be sure, we miss the old closeness. But we also have experienced several gains. There is, first, the gain in self-discovery and self-realization, which has brought us new challenges, stimulation, options, rewards. Even our families can enjoy, vicariously, new discoveries made by members who have left home, scattered as if by the winds.

Second, new forms of community have been invented. Most Americans already are the children of an historical uprooting from the ancient *Gemeinschaft*. Someone, somewhere, long ago, left family, kin, friends, and neighbors to "go to America." But what did they do when they arrived? They built communities, associations, families, friendships — and a new nation. And something else.

Many of us have been misled in our thinking about the foundation of American life. Quite a few of us think in terms of the lonesome cowboy, or the solitary pioneer family, alone in the great vastness of the Plains. No doubt, this empty land — empty of Europe's traditions, of laws and customs, and empty perhaps, some feared, of the familiar God — impressed imaginations. But the truth is that *community* was, from the first, the reality of American life.

One of the new forms of community built in America was the business corporation. Even by the year 1800, when America was home to barely four million people, there were more business corporations here than in all the rest of the world.

The great corporations, of course, came into being only after the Civil War, with the new systems of transport and communication. Their economic task was to tie the continent together, to provide goods and services to an increasingly self-reliant nation. Most were born as the result of a new idea or a new invention; goods and services were produced as never before. Thus it was with the telephone company, the railroads, and the automobile companies. And so it is today with the advent of computers and microprocessors.

NO MORE MR. COWBOY

Business corporations demonstrate that the great invention of democratic capitalism is *not* the individual entrepreneur. But the myth of the lone individual, like all myths, dies hard. That myth masks the pervasive reality of American — and corporate — life. No business corporation is, or can be, a collection of lonesome cowboys or rugged individualists indifferent to the needs and opinions of others. On the contrary, when undiscerning critics of American life are not busy telling us we are lonely and alienated, they describe us with such rubrics as the "organization man," suffering from "conformism" and "an excess of corporate loyalty."

The reality is that building community

— and a *voluntary* community at that — is a never-ending effort. Human community is so high and perfect an ideal that there are always new horizons to march toward together.

Community in a business corporation is not based on blood and genes and kinship. It is not based on proximity. It is not homogeneous in belief, spirit, and sensibility. It is voluntary, partial, task-oriented, and cooperative, but not all-absorbing, not a 24-hour-a-day pursuit or endeavor. Most workers "go home" to communities more intimate and involving. Although life at work captures in every lifetime an enormous proportion of hours in one's social life, this is not and does not pretend to be the whole of it. But it is immensely social nonetheless. Typically, some of one's best friends are found on the job. Some of one's best laughs, deepest anxieties, and wrenching griefs occur there.

People at work are thoroughly human. The *subjective* character of their work has perhaps, until recently, been too long neglected. Theologians do relatively little thinking about the virtues demanded of people in their work, about the special vices to which they are prey there, about the whole spiritual and religious *vocation* exercised in every dimension of work's demands. The highest ethical and religious exercises can be called into play there: compassion, concern, concentration, service, and prayer itself.

Another point: One of the highest forms of community experienced by humans is community under fire — cooperative effort put to the test of competition. Soldiers often recall their days of military service as the highest form of community they had ever experienced; athletes, in terms of their days in the sports arena, feel the same. And so do multitudes of workers — certainly in the Bell System — recalling times of hurricane, flood, or even a particularly intense campaign or crisis on the job. The competitive fires of technological change and of the contemporary marketplace occasionally arouse an entire company to the sense that it is fighting for its survival. The flow of teamwork is quite beautiful then.

Is this not the case currently in the Bell System? A technological revolution has raced into your midst. Who knows how it will end? Simultaneously, the government has decided not only to end your quasi-monopoly but also to rupture your huge national family. At the same time, a rapidly developing technology makes possible — and demands (under the pressures of the marketplace) — a new type of relationship between managers and subordinates. What sort of human community can absorb all of these blows in good spirit and emerge intact, and even stronger for it? How many thousands must fear for their futures, the pattern

of their friendships, the resources of their own temperaments and emotions? Bell has been one of the most stable, secure companies in the world. Suddenly, many of its employees will be working for new companies. Many will be sundered from old friends and old ways. I was touched when I read in *Bell Telephone Magazine* of one technician who said how sad it will be to receive a call for service he can no longer respond to under the new arrangements; to tell people he no longer handles the phones his company has leased during all of his work life; to leave old friends and to work with new colleagues under a new regime. Yet the times demand such changes.

PEER PLEASURE

But it is not enough to know *that* cognitively, because there is, for instance, nothing like the friendship that comes from weathering a storm together. The kind of community higher than any other is not necessarily the sort that is emotionally intense, where individuals look into each other's eyes with the intimacy of love, but the kind where all eyes are aimed ahead, meeting the demands of the task at hand and beating off all foes and threats. In this context, the discipline of the marketplace — the task, under fierce competition, of keeping profit centers up — teaches us a great deal about community. It is a mistake to hold that the discipline of profit invariably must injure community; this is not necessarily the case. Typically, it is not at all the case.

The corporation affords a new model of community. It is filled with grist for learning what community is — and for exercising it. Every act of social virtue strengthens the whole; every incivility rends it a little. This world is not intended for saints, but it makes demands on everyone just the same.

I am glad not to be presiding over the Bell System's gargantuan change, trying to make sure the many are kept informed, their anxieties lowered, their spirits kept high; and at the same time, seeing to it that service is not only continued but also improved, profits are sustained to guarantee long-term survival, and sound decisions about technology are made. The skills required of those presiding would, in my view, combine the talents of a Margaret Thatcher, Willie Mays, Paul Samuelson, Dan Rather, Bob Hope, Peter Drucker, Katharine Hepburn, and Alexander Graham Bell. By the same token, if the team is up and the inventiveness strong and the willingness high and the tolerance of all on even keel, the captain of the ship doesn't have to be a Lord Nelson. Community does it.

This corporate transformation is a great human adventure. Some of our churches might do well to experience it. Theologians could do well to study it. ■

BLACK-CORD FEVER

BY RITA MAE BROWN

As seen by a child, the telephone was a device into which grown women shouted. For an adult, it's an addiction.

Mother only dialed a telephone number if she was seated, her legs crossed at the knee, lipstick freshly splashed across her mouth, cigarette in her right hand. Mother took Bette Davis seriously. This morning began like every other morning. At 6:30 a.m., her pose intact, she rang up her sister, Louise.

"Hi, Wheezie. What's on for today?"

This was followed by whatever Wheezie planned.

"Ha, that's nothing. You should have—" Mother paused, then exploded. "Orrie Tadia, quit hanging on that line like a blowfly!"

Click.

This was my introduction to the telephone — a device into which grown women shouted. We were on a party line and Orrie was sincere about party. Your news was her news. No sooner had you hung up than Orrie hovered at the back door to help you celebrate, mourn, find a bargain, or dish whoever fell into dispute that day. The time was the late 1940s, and Mother, Louise, and Orrie coasted into their late 40s with the century. Not that this fact was ever openly discussed, but as Orrie's makeup preceded her into the room by five minutes, you figured the clock was ticking.

Orrie suffered no remorse over eavesdropping. That's why the telephone was invented, to save Orrie Tadia the trial of walking to the town square for dirt. Thanks to this communications miracle, she could listen in the comfort of her overstuffed home. Listen she did, because Mother and Aunt Louise knew everybody who amounted to everything. Personal news preceded national news, except for the bombing of Pearl Harbor, when Mother actually called Orrie to tell her. I don't believe it myself, but the family swears it on a stack of Bibles. We've always kept plenty of Bibles around for this purpose.

Louise, born in 1900, and Mother and Orrie, born in 1905, grew up during the glory years of American technology. Mechanical marvels astonished their generation and their parents' gener-

ation. When Grandma first got a telephone in her farmhouse sometime before World War I, her friends gathered to witness the event. The object was a wooden box, a black mouthpiece sticking out like a beak, with a wooden receiver that hung on a small hook; you stood up while using it. When Grandma picked up her receiver and wound up the current, the operator, Henrietta Falkenroth, was supposed to come on the line and say, "Hello, Central." This she never did, because she prided herself on recognizing every voice in Runnymede, a town of about 3,000, although many did not own a telephone. When Grandma died in 1949, she was still served by the same telephone, as she saw no reason for improvement.

PARTY-LINE PRATFALLS

Henrietta's relief, Martha Molyneux, provoked the townspeople to amazement because she had a beautiful head without benefit of brains in it. Martha was dreading at the switchboard more fiercely than Henrietta. From the time you told Martha whom you wanted to reach or gave her the number, to the time she would plug in the call, she'd forget and stick the line anywhere. Once Grandma found herself engaged in conversation with Jason Leader, the undertaker.

"Mrs. Hunsenmeir, the Lord calls those whom he needs most.

"Mr. Leader, I'm sure he does, but I don't have the Lord's telephone number."

"I beg your pardon?"

"Jason, Martha struck again."

"You mean no one kin to you is dead?"

"No, we're healthy as ticks but don't worry, you'll get us in time." Grandma laughed and continued to laugh as she repeated the story over the years.

Finally Martha had to go and none other than Orrie Tadia replaced her. Orrie mastered her duties rapidly and was an enthusiastic employee — a little too enthusiastic. Everyone knew that Henrietta and Orrie listened in. At first, Orrie only blabbed to Mother and Louise the scandal too good to be true. While that was unwise, what followed

was worse. Being an operator gave Orrie the big head, and one day she quite forgot herself and intruded into other people's conversations. At least Henrietta had the good taste to be quiet. Orrie lost her job over that and Beadle Shellenberger took over. Orrie never got over it.

If Henrietta's and Orrie's eavesdropping focused on sex and sin — the two being synonymous — Beadle's target was finance. She made money in the stock market hand over fist. Before Beadle died, she built a new library for Runnymede and people felt a gold telephone should be installed on the checkout desk.

Nosey as Henrietta and Beadle were, they could pitch in and help when needed. One hot Saturday afternoon, Henrietta was on her shift. The movie house was full, the square enjoyed the usual traffic, and Mother, Louise, Orrie, and Beadle were in the drugstore because that's where the young men gathered. Orrie wouldn't talk to Beadle. Mother didn't have time to fully appreciate the foolishness of the situation because the sky darkened suddenly and turned greenish. An ominous howl startled everyone. Orrie ducked behind the counter. Mother looked out the window just in time to see a small tornado touch down on the movie house, destroy the roof, then pick up its skirts like a hula dancer and roar out of town.

High-button shoes notwithstanding, Beadle flew over to the telephone office, which was untouched. Henrietta tried to get help from the nearest town, which lay to the west. Then, realizing the storm had come from that direction, because the lines were dead, she rang the fire departments of the towns to the east. Throughout the night, Henrietta and Beadle took calls and delivered messages on foot to anyone whose phone was knocked out, and they sent out calls for anyone who came into the office. Beadle's exemplary behavior only further inflamed Orrie, but her revenge came years later when Beadle married Orrie's ex-husband.

Louise, too, got married and set up housekeeping. Notoriously impressionable, Louise saw one too many white-telephone movies. Whether it was

Dinner at Eight or *Top Hat*, the movie stars used white telephones. Louise determined to be the first with this luxury item. When Henrietta, informed of Louise's ambition, tittered with derision, Louise stomped back home and painted her phone white. Use later made it look as though it suffered the heartbreak of psoriasis. Louise, now plagued with the twin emotions of anger and embarrassment, yanked the phone out of the wall. Mother, a fountain of emotional support, laughed, and Louise had a running fit and threw the phone at her.

"Look what you've done!" Louise wailed.

As Louise desperately scanned the horizon searching for someone to blame for her troubles, this outburst rolled off Mother's back. Logically, she offered to clean off the white paint. That was a good idea until the paint remover ate up the phone surface. Psoriasis turned to leprosy. Distraught, Louise sobbed that she'd have to return to the horror of writing letters because the telephone company would not replace an object she'd wantonly destroyed. Well, they might replace it, but she'd have to pay for it, and Louise squeezed a nickel until the Indian rode the buffalo.

Mother picked up the telephone without explanation. Louise followed her out the door.

"Gimme that telephone."

"I'm taking it to Henrietta. She'll give you a new one."

"Don't you dare tell that woman what happened. I'd sooner die. This is all her fault to begin with!"

"Write out your will then, because you can't live without a telephone."

"Oh, yes I can. Now gimme that phone, you little _____. Oh hello, Mrs. Flannery, I was just telling Julia it's so hot. Terrible weather, isn't it?" Keeping up her good face with Mrs. Flannery cost Louise time, and Mother was in the telephone office before Louise could catch her.

Louise blasted through the door.

"Thief!"

Beadle was on duty — a break for Louise. The fights between Louise and Mother were legendary for their lack of restraint. But Beadle went about her business, probably praying that Orrie wouldn't show up to compound the mess.

Mother continued, "As I was saying, Beadle —"

"Stole my telephone, my own sister!"

"Calm yourself, Louise, you'll wind up with your bowels in an uproar."

"Is that any way to talk, you little ____!"

The abuse escalated. The sisters had been known to slug, smash, and savage entire rooms. Wisely, Beadle snatched the instrument from Mother's hands and shouted above the vilification: "Of course, you should have a new telephone, Louise. We're here to serve you. Why don't you let me send a man over to your house this afternoon?"

"What?" Louise appeared confused.

"This afternoon all right with you, Louise?"

"Fine," Mom answered, grabbed Louise under the elbow, and ushered her out of the office.

Lulled by her sister's intercession, Louise soon discovered when Mother called her on her new telephone that the price was a loan-out of Louise's brand-new sparkling earrings. The news nearly killed Louise. A strong heart pulled her through, as well as the use of her telephone, while she informed Orrie of yet another betrayal by Julia. Mother, earrings dazzling, traipsed off to

York, Pennsylvania, and the Valencia Ballroom. There she met her future husband, thanks to a white telephone. Somewhat later I arrived, another telephone customer.

Unlike Mother, Louise, and Orrie, I don't know what it's like to live without a telephone. Well, that's not entirely true, because my father once built a wooden box with a lock and key to keep me away from the telephone. It wasn't my fault. Such disgrace and social isolation began when my cousin, Leroy, spilled Coca-Cola over my carefully organized collection of Captain Marvel comic books. He wrecked some of the Mary Marvel ones, too. Okay, that's not so terrible, but the day before he'd demolished my set of Lincoln logs and I'd had it. We were the same age and a fight was a fight, no holds barred.

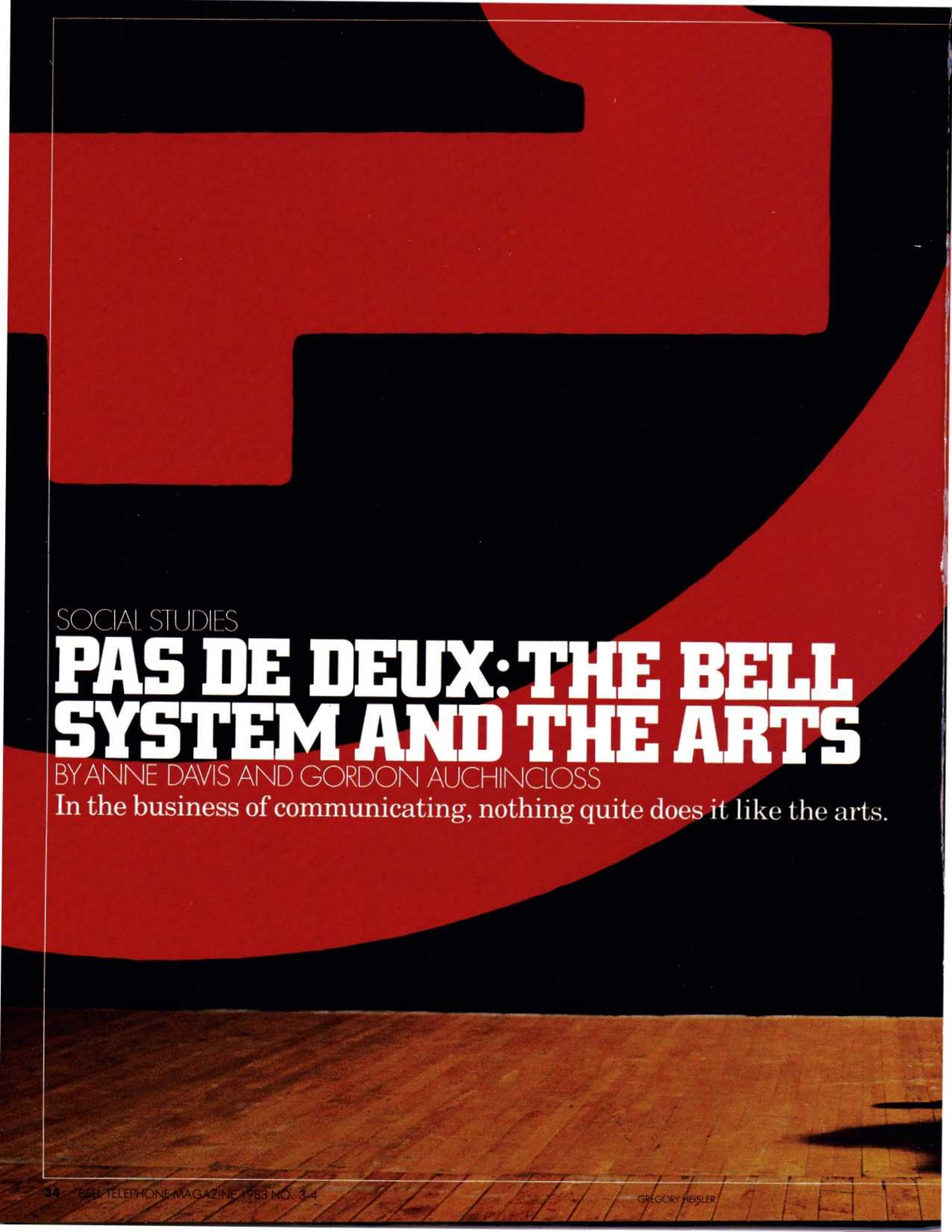
CUTTING THE CORD

I hit him first, and he picked up the telephone and knocked me over the head with it after I referred to him in an unpleasant but accurate manner. I grabbed the phone and wrapped the coiled black cord around his neck. Those cords are wonderfully sturdy. Just about the time his eyes bulged from their sockets, Mother came in and blamed me for trying to dispatch my beloved cousin. I was not trying to dispatch him; I was trying to teach him a lesson. Naturally, he choked in an exaggerated fashion and bawled. Mother couldn't resist a boy in tears. I got a hiding plus she told Orrie, who told everyone. Adults versus children is not fair.

So I thought I'd get even. When the telephone rang, I raced to grab the receiver and said in a deep voice, trying to sound like Tallulah Bankhead, my idol, "Hi there, daahling, this is Julia's House of Pleasure." Mother's color changed dangerously. Empurpled, she pried the phone out of my hand and said in a sweet voice that belied her evil look, "Why, hi there, Florence. Oh, that Rita Mae, she's such a card... Uh-huh..." I really don't know where they pick up such ideas — Florence, we certainly do not discuss such things in this house!" She slammed down the phone. How was I to know it was Florence Regenbogen, head of Mother's Sunday School class? That's when Dad built the box around the telephone, and when I learned there is no justice in this world. Nothing happened to Leroy.

Today, Mother, Louise, Dad, Orrie, Henrietta, Grandma, and Beadle are gone and their party lines with them. When Orrie died, everyone exercised restraint; there is no telephone on the grave with the inscription "Jesus Called." I live on, however, to suffer black-cord fever and burn the wires. I even call Leroy — direct dial, long distance — from time to time. He is alive and well. I told you there was no justice in this world. ■





SOCIAL STUDIES

PAS DE DEUX: THE BELL SYSTEM AND THE ARTS

BY ANNE DAVIS AND GORDON AUCHINCLOSS

In the business of communicating, nothing quite does it like the arts.



Support of the arts has always made good business sense to the Bell System. To prove the point, the Bell System has chalked up an impressive record of championing the arts by putting its money where its corporate mouth is. As striking as that record is, however, the sum of the System's involvement in the arts isn't limited to a matter of philanthropy; through the years, Bell technology and the arts have crossed paths — with spectacular, often revolutionary, results.

In tracing the Bell/arts alliance historically, first evidence of a cultural commitment on the part of the company dates from the period 1913-1924, when 195 Broadway — headquarters and citadel of the Bell System, located in New York City's

Lower Manhattan — was being built and embellished. In the manner of the age, the managers of that day undoubtedly were interested in impressing their corporate peers, and must have welcomed the encomiums the then-new headquarters earned in the press. The building was hailed as "New York's link to the Golden Age of Pericles," "a telephone temple" with its lobby "pervaded by an almost holy calm."

The exterior of 195 Broadway most assuredly ranks as art, being a succession of Greek temples stacked eight high. The *Architectural Record* of January, 1924, rhapsodized about the intermingled design of ancient Asia Minor's "Temple of Sardis and the Library of Pergamum," executed in marble from homespun Bethel, Vermont.

Paul Manship, perhaps best known for his mammoth statue of Prometheus at the Rockefeller Center skating rink in New York, was responsible for numerous artistic touches at 195: the unique sculptural drinking fountains, details in the lobby, and particularly the four bronze friezes that dominate the Broadway entrances. Again from *Architectural Record*: "It remains for a future age to place them where they belong, in some museum." Today, as 195 passes to other ownership, the prophecy has been fulfilled. Copies of the sculptured decoration have now been placed on the building's facade, and the originals have become welcome donations to the Metropolitan Museum of Art.

The winged Golden Boy, sculpted by Evelyn Beatrice Longman to top off the 195 building, is another art legacy left by the founding fathers. From 1916 until 1980, the 15-ton, 24-foot statue — originally called the Genius of Electricity; later, the Spirit of Communication; and now, less formally, Golden Boy — balanced on tiptoe atop 195 and brandished his lightning bolts 434 feet above the street. Removed from its lofty perch three years ago, the statue has been refurbished; given a fresh coating of gold leaf, it now stands as the centerpiece of the lobby at 550 Madison Avenue, AT&T's new corporate headquarters.

The art of architecture has figured prominently throughout Bell System history, with the new corporate headquarters as only the most recent achievement. Stanley W. Smith, president of the 195 Broadway Corporation and chairman of the AT&T art committee, recalls the gist of his briefing session six years ago with the architects of the new Madison Avenue building, Philip Johnson and John Burgee: "We have rich traditions in every aspect of our business, but in spite of that, we're as modern and up-to-date and in front of technology today as we have ever been."

The Johnson/Burgess visual response to this and other general guidelines was a lean, elegant office tower — arresting in



Evelyn Beatrice Longman created Golden Boy, a 15-ton statue that has become an AT&T art legacy.

grandeur, compelling in grace of line. The creation has intrigued and exhilarated those in architectural circles as well as the man and the woman on the street ever since the morning of March 31, 1978, when the world first caught sight of the structure on the front page of *The New York Times*.

A test for design success that often is applied to Bell buildings is this: Does it fit its surroundings well? Certainly on that score, the 550 building emerges with top-of-the-class marks. Rising amid the Midtown Manhattan skyline, the new structure bespeaks quality, distinction, and dignity. To the same end, a telephone building at a beach resort will most likely resemble a shingled summer cottage; another in Phoenix will be executed in pueblo adobe style. The Bell System has, prior to divestiture, an inventory of more than 32 thousand buildings all over the United States — so the range of styles represented is extraordinarily wide. And the architectural level has been kept exceptionally high. Some of these structures, dating from half a century ago, include fine examples of Art Deco. Buildings in Denver and St. Louis stand out in this respect. As do the lobby mural of New England Telephone's Boston headquarters and the dozen frescoes on the entrance-hall ceiling of New York Telephone's West Street building in Lower Manhattan.

But art — deco or otherwise — doesn't stop in the lobby; painting, sculpture, and tapestries adorn offices and interior public spaces as well. These works of art come under the supervision of the art committee chaired by Smith. Consultants are employed to purchase art; most acquisitions are the work of young artists of both representational and abstract persuasions. And the works are made available to employees through

two AT&T galleries that operate like lending libraries; there, employees faced with a blank wall or the yen for a creative change of pace can choose something to suit their taste.

Smith's expression of company philosophy behind this artistic outreach is precise: Art is not purchased to create a prestige-laden "collection"; that is a gambit sometimes used by companies in search of an image. AT&T's purpose is "to provide a stimulating environment for employees," where they can "work creatively." Through judicious purchase of the works of rising artists early in their careers, the non-collection is valued in the millions of dollars. Individual pieces are not for sale, so the market value of the art is mostly undetermined. Only an insurance assessor could hazard a guess.

Memories of encounters between the Bell System and the Muses include the troupe of ghosts haunting 195 Broadway's fourth floor, where the studios of the telephone company's pioneer radio station were located. Though the radio station was initially undertaken as a technical demonstration of a new communications medium, the tail soon was wagging the dog as entertainment quality became more important than grids, rectifiers, and wavelengths.

At the outset, programs were not so demanding of talent as would be the case later. Witness the radio log of August 3, 1922, the first evening on the air: "After some Victor recordings and a selection of rolls on the player piano, George W. Peck (Long Lines) spoke a few words of greeting. Then Helen Graves (Plant Dept.) sang *Just a Song at Twilight* accompanied by Mrs. Swayze (Commercial Dept.); Edna Cunningham (Traffic Dept.) recited a poem by James Whitcomb Riley; Joseph Koznick (Drafting Dept.) played *Träumerei* on the violin, accompanied by William Schmidt (N.Y. Telco)."

Harry B. Thayer, AT&T president at the time, listened to the broadcast at his home in Stamford, Connecticut, and his critique the next day was distinctly downbeat. Overlooking the artistic side of the evening, he commented that the radio signal kept fading and was considerably weaker than that of competing station WJZ. To correct this, Bell engineers switched to a transmitter and antenna atop Western Electric's West Street lab in New York, and reception improved in Stamford as well as the rest of the metropolitan area. The new antenna had the assigned call letters WEAf, which, as one eagle-eyed employee noted, formed an acronym for the themes of Paul Manship's just-completed friezes at 195 — Water, Earth, Air, and Fire — chosen because they were the basic elements of the ancient world. But the happy, if esoteric, coincidence didn't even merit a press release.

Using its spreading web of land lines, Bell was the first to establish networks of radio stations that, by 1924, could reach a substantial nationwide audience. A dramatic demonstration of this Bell capability was staged by "General John J. Carty of the R&D Department" in front of the prestigious Bond Club in Chicago. Listeners across the country were treated to a speech from the general, the *Meditation* from *Thaïs* performed by a violin soloist in Havana, and *Home, Sweet Home* played on a set of chimes in San Francisco. The feat of linking performers almost 5,000 miles apart may have been primarily technical, but art was served.

Technology also was responsible for Bell's entry into the movie business as a pioneer. That interest started with the refinement of Lee De Forest's "audion" into the high-vacuum tube used in relay stations to make long distance telephony more efficient. As a side effect, electronics made reproduction of the expanded audio spectrum technically possible. Before 1916, Bell technicians had recorded sound on film and developed improved reproducers for the wax-disk phonograph. And in a key step, Bell researchers created a "condenser" microphone capable of picking up frequency and intensity ranges almost equal to those audible by the human ear. Building on this technology after World War I, Western Electric in 1924 had advanced well along the path to commercially acceptable sound motion pictures. But the Hollywood moguls were unanimous in rejecting the sound system, their decision being predicated on the industry's sizable inventory of silent films and heavy investment in moviemaking equipment, rather than

on any shortcomings of the Western Electric system.

By 1925, when Bell's research and development division had become the autonomous Bell Laboratories, Sam Warner and his brothers Harry, Albert, and Jack were convinced by their own chief technologists to witness another demonstration of the sound system. Not long after, the Warner brothers decided to make the leap. After some experimental trials at the Vitagraph Studios in Brooklyn — where Bell technicians found out about actors and actors adjusted to emerging technology — the Vitaphone Corporation was born.

The problem was not so much one of synchronizing sound and screen action as one of acoustics; the early soundtracks seemed very artificial, so the illusion of unity between actors' voices or sound effects and screen images simply wasn't believable. Eventually, Bell Labs acoustic engineers achieved a breakthrough, and the first result was the filming of *Don Juan* that starred John Barrymore. This impressive compatibility between art and science was proclaimed by the billboard over the Warner Theater on Times Square — *Warner Brothers in association with The Western Electric Co. and Bell Telephone Laboratories present* — all prominently billed above the title. The sound of this first epic consisted mainly of the musical score performed by the New York Philharmonic; but a later Vitaphone production was the celebrated "all-talking, all-singing" *Jazz Singer*, released in 1927 and generally considered the first milestone in "talking" movies.

Art tagged along as Bell experimented with expanded uses of long distance

technology. In April of 1927, electronic moving pictures were transmitted between New York and Washington, D.C., demonstrating the feasibility of sending images via wire. With the art of television and Picturephone® service still 20 and 40 years in the future, respectively, the coming technological feats were to cast artistic shadows before them. Philadelphia and Washington, D.C., were the anchor points in a demonstration of high-fidelity sound transmission and reproduction in April '33. This involved the famed conductor Leopold Stokowski, in Washington, directing the Philadelphia Orchestra in its home city's Academy of Music via a phone circuit linking him with a surrogate conductor. Stokowski himself was at the back of Washington's Constitution Hall, where by remote control he mixed the orchestral passages and solo instruments as they came over the line and were reproduced stereophonically through speakers set up at stage left and right. For an assemblage of dignitaries, he conjured the delicate whispers of Debussy's *Afternoon of a Faun* and thunderous excerpts from Wagner's *Twilight of the Gods*.

According to a contemporary account, the sound system was unique for its day, involving what would be labeled a "three-way crossover network of band-pass filters with a flat response of 40 to 15,000 cps." The output had a potential of 150 watts per speaker — high even by modern standards. A curious sidelight to this event: Someone from Bell Labs also whipped up a demonstration of musically pulsed colored light at the Washington end, but nothing much came of the technique artistically until disco proprietors and rock-show entrepreneurs rediscovered it in the 1960s. Possibly as a preliminary to this sound spectacular, Bell Labs was involved in some early adventures in stereo during 1931 and 1932, when a number of Stokowski concerts with the Philadelphia Orchestra were recorded experimentally on 16-inch disks.

All this discussion of matters musical brings us, quite naturally, to the *Bell Telephone Hour*, artistically and statistically Bell's most notable foray into the performing arts since the impromptu paging of Mr. Watson by Alexander Graham Bell. During its 18 years as a weekly half hour on radio, *The Telephone Hour* was showered with awards and critical acclaim, and its subsequent 10 years on television brought two Peabodys, three Emmys, five additional Emmy nominations, and three dozen other citations.

The memorable radio version presented a lion's share of the renowned classical musicians and singers of its time: Fritz Kreisler, Artur Schnabel, Jascha Heifetz, Lily Pons, and Ezio Pinza were among them. Later, numerous world-class classical and popular performers



This work by William T. Williams is among numerous pieces of art that adorn AT&T offices and interior public spaces.

made their tv debuts under Bell sponsorship. The roster of guest stars for the first television season provides a gifted cross section typical of this applauded series: Harry Belafonte, Van Cliburn, Jacques d'Amboise, Alfred Drake, Duke Ellington, Ella Fitzgerald, Benny Goodman, Melissa Hayden, Helen Hayes, Ethel Merman, Patrice Munsel, Andre Previn, Isaac Stern, Joan Sutherland. Mention might also be made of a rehearsal pianist who toiled behind the scenes that year named Marvin Hamlisch.

A controversy of artistic freedom and human rights also landed in Ma Bell's lap that first tv season. The fur began to fly even before the first show when it was announced that Harry Belafonte would be the principal performer. Almost unbelievable today, but sadly not completely unexpected in the late 1950s, certain regional interests objected to the appearance of a black principal artist in a network broadcast. When Bell management sternly rebuffed these objections, some TV affiliates actually refused to air the broadcast.

The same issue arose again in connection with the appearance of black ballet dancer Arthur Mitchell, subsequently founder of the Dance Theater of Harlem, but Bell held its ground despite an outpouring of mail. And when Carl Sandburg was engaged to appear on a Lincoln's Day program, there was an outcry from the self-appointed Red Channels censors who sprang up in the post-McCarthy years. Again, management stood firm.

On a few other occasions, however, such

clear corporate vision was slightly clouded, at least temporarily. For instance, it was said that one or more executive wives blushed a bit over the "revealing" costumes worn by some female chorus dancers, male folk singers, and certain buxom opera stars. Husbands were rumored to have been pestered to get things changed, but few such edicts actually got sent down from on high. In another case, in the throes of the restless 1960s, the well-known baritone Earl Wrightson was scheduled to appear when word did come down from the executive floor at 195 Broadway that the singer's beard, a lifelong trademark, was "too hippie" and that he should be told to shave it before the telecast. When the word reached Wrightson, he responded that inasmuch as Alexander Graham Bell had worn *his* beard with dignity, Earl Wrightson would do the same. Nothing more was heard on the matter.

Although at this writing *The Telephone Hour* has been off the air for 15 years, it is fondly remembered by a large segment of the American public. And it is assured now that many of the performances will outlive the generation that viewed them live. This step toward immortality started with a 1972 call for help to AT&T from ballet superstar Rudolf Nureyev. In a *Telephone Hour* appearance some years earlier, Nureyev had made his U.S. television debut only weeks after his defection from the Soviet Union. And in that notable telecast, he had performed a certain ballet, the choreography of which had never been preserved in the "language" of dance, a system known as Labanotation.

Bell System American Orchestras on Tour



Bell support enabled many orchestras to expand their tours and their scope.

Nureyev was at a loss to recapture the choreography for another performance, but his problem was solved when AT&T was able to respond to Nureyev's plea with a videotape of the original *Telephone Hour* performance.

That gesture led to a request from the Library of the Performing Arts at New York's Lincoln Center for a complete videotaped set of the series. Compiled after a year of diligent file research, the reconstructed series was given to the library for the exclusive use of scholars, historians, and others who, like Nureyev, may have let a precious moment slip by unrecorded. Another complete set of *Telephone Hour* videotapes now resides in New York's Museum of Broadcasting, where it is in continual demand.

The Telephone Hour was charged as advertising on the company books, but its commercials often were the softest of sells. Mention of the "product" sometimes was limited to a suggestion, voiced over the closing *Bell Waltz* theme, that "Perhaps there is someone somewhere who would like to hear your voice tonight." (Somewhat the same subdued commercial policy was followed on Bell's presentation of Leonard Bernstein's *Young People's Concerts* on television. But a decidedly more explicit commercial approach was employed on *The Bell System Family Theatre*, which succeeded *The Telephone Hour*.)



Western Electric and Bell Labs shared above-title credits for 1926 motion picture production of *Don Juan*.

"It was good business, and it was good art" is the way Edward M. Block, AT&T vice president-public relations and employee information, looks on *The Telephone Hour*. "We were trying to make a statement about the company, trying to reach an influential audience, trying to identify with excellence. This is what we've always tried to do, and it fits in with support of the arts."

Though the Bell System's more recent approaches to an influential audience still identify with quality and excellence, they have taken a strikingly different direction. A prime example is the *American Orchestras on Tour* program, which over the past five years benefited from more than 12 million dollars in underwriting by the Bell System. Initially, seven major symphonic organizations were involved: the orchestras of Boston, Chicago, Cleveland, Los Angeles, New York, Philadelphia, and Pittsburgh. Eventually, the program was expanded to embrace 23 additional American orchestras. While touring has long been an activity of all the groups, this extra financial support enabled them not only to extend their reach beyond the beaten track of major cities but also to enlarge the scope of their visits in each community. Chamber ensembles from among the orchestral musicians on tour gave added performances of quintets, quartets, and trios. Principal and first-desk players conducted master classes for aspiring young musicians along the route.

The Bell operating companies have followed this cultural outreach effort in hundreds of ways in every part of the country. It would be impossible to list all the local dance companies, smaller orchestras and chamber groups, museums, regional theaters, and summer-theater programs that have been the recipients of this support, or to discuss all the local architects and artists whose work is displayed in buildings, on the covers of directories, and in sponsored exhibits to which members of the Bell System have contributed generously. Indeed, it was the local telephone companies that gave major organizational support to the touring orchestra program. The strong identification of individual Bell companies as well as the entire Bell System with this program has been important in making Bell's presence known to national, regional, and local audiences.

The national tours came to an end this year. Block comments on the termination of this highly successful program: "We reluctantly abandoned the orchestra tours because the program was conceived with the business interests of the telephone companies in mind. And a 'funny' thing has happened — we don't have any more telephone companies, so it doesn't make sense for us to continue on that basis. But AT&T is seeking equally vital programs in the perform-

ing arts that are in step with our new business interests."

Over the years, the arts in America have been the beneficiary of substantial philanthropic gifts from the corporation. Here are just two recent examples:

— When a drama produced by New York's Negro Ensemble Company won the Pulitzer Prize, a special contribution was made to publicize the award, thus helping to earn the play an extended run, amounting eventually to 62 weeks and a national tour.

— A joint venture with the Academy of Motion Picture Arts and Sciences instituted annual student film awards. This seven-year-old program has served as encouragement for the young filmmaking students honored. Today, the names of early award winners appear with increasing frequency and prominence in the credits of major motion pictures.

A recent reorganization of AT&T's corporate philanthropic funding has resulted in the establishment of a new foundation. Proceeds from the sale of the 195 Broadway building will be placed in trust — with the income, together with subsequent donations, devoted to contributions on behalf of the new AT&T. Substantial funds are earmarked for the arts. The new foundation will consolidate the giving formerly handled separately by the AT&T General Departments, AT&T Long Lines, Bell Labs, and Western Electric.

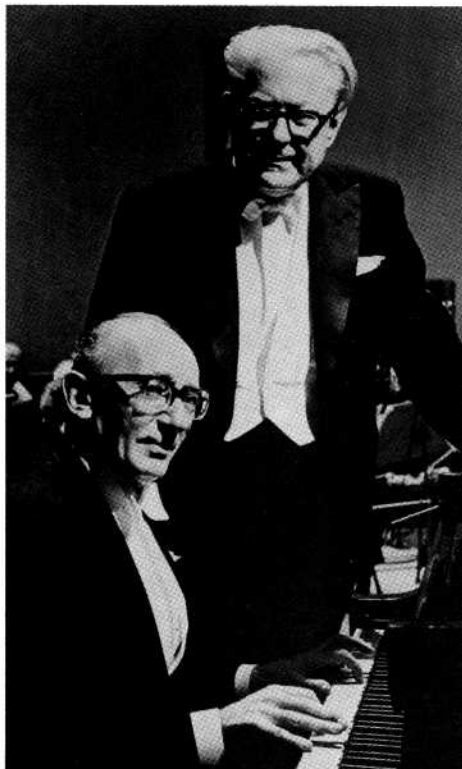
AT&T currently is making the largest single arts grant in its corporate-giving history: 350 thousand dollars over five

years to the Metropolitan Opera Centennial Fund. And AT&T chairman C.L. Brown is personally involved in helping the Met campaign for funds. The chairman, by the way, is just one of countless Bell System representatives who devote some of their time to the arts cause. Virtually every arts institution in the country can count among its prime movers a Bell employee or two.

As the company recognizes the achievements of great institutions like the Met, it also pointedly understands the importance of artists who are creating new works today. This year, AT&T took the lead in putting together a consortium of supporters for the Next Wave Festival Production and Touring Fund, sponsored by the Brooklyn (New York) Academy of Music. This unprecedented program will serve as the forum for large-scale works by proven younger American composers, choreographers, and theatrical artists and will take them on tour to other arts centers.

Philanthropic and promotional funds occasionally join forces on a single project. An example in prospect is a major James McNeill Whistler exhibit at the Freer Gallery in Washington, D.C. Promotional funding brought about the world premiere of composer Richard Adler's *Wilderness Suite* by the Utah Symphony in conjunction with the *American Orchestras on Tour* program. The new work was recorded by RCA Victor under a partial grant; then, 5,000 copies of the recording were made available to conservation groups for use in conjunction with their own fund-raising activities. Promotional funds also are involved in a projected Carnegie Hall radio program for next year (a one-hour weekly series featuring orchestras and artists appearing at Carnegie Hall, to be broadcast on Public Radio as well as a special network of commercial stations) and in a major New York art exhibit on the occasion of the opening next Spring of the Museum of Modern Art's new wing.

In any overview of the Bell System that was and the companies that are about to be, the continuing commitment to the arts must be judged as substantial, sincere, and far-reaching. But vice president Block has no illusions that corporate involvement with the arts could be used as a smokescreen or apology for operational shortcomings. In his own words: "If all the phones in the United States went out of service tomorrow for just an hour, it wouldn't make any difference if we funded every symphony orchestra from here to eternity. Our business is phones. If we get that more or less straight, we'll be tolerated. Then, presumably, we'll have enough money in the treasury to do some of the other things that are expected of the modern corporate institution. That's what it's all about." ■



Famed Telephone Hour conductor Donald Voorhees, shown here with pianist Clifford Curzon.

O! PIONEERS!

BY BETSY PLANK

The Telephone Pioneers of America face a future in which they will be needed more than ever.



It's obviously a name tag because it says "Hello." Hanging from it on a faded blue ribbon is the familiar Pioneer triangle. Below, the dates: Nov. 2-3-1911. Typewritten on the tag is the conventioneer's name: A.G. Bell. Today, they keep that modest treasure under glass at Pioneer Association headquarters in New York, but for years it was stuffed in a manila envelope with other leftovers from that first annual meeting of the Telephone Pioneers of America in Boston.

Bell was the star of the meeting, of course. The main speaker. The industry's pioneer. The Pioneers' first honorary member. Attending that first annual event were 244 men, each with 21 years of service in the industry. While none of the 12 women Pioneers made the trip, the men's wives came. Some even bolted from their special poetry

program to go to the main meeting.

Though AT&T's president, Theodore N. Vail, wasn't there, the idea for the convention was his. He already had blessed the plan to organize telephone veterans, bringing together several local groups of "old-timers" throughout the country. In the beginning, friendship and fellowship were what it was all about: industry people "recalling the facts, traditions, and memories attaching to the early history of the telephone," they said. Not really different from a lot of industry groups proud of their heritage — promoting fellowship, loyalty, and service to their members.

But those who wrote the original Pioneer statement of purpose were prescient in adding that the organization also would encourage "such other meritorious objects consistent with the fore-

going as may be desirable." That became the "elastic clause" that would be stretched to make the Pioneers unique.

One of those "other meritorious objects" was translated to mean community service. Chapters, councils, and clubs began working on their own initiative, mostly with children's groups — the Boy Scouts, the Girl Scouts, the underprivileged, the handicapped. By 1958, community service was established as the Pioneers' "New Tradition." And today, the association is the world's largest voluntary group of industrial employees dedicated to community service.

The current score is more than 2,000 projects, receiving more than 480 thousand hours of time monthly. The litany includes raising funds and volunteering in homes for the elderly, therapy centers, hospitals, Head Start programs,

child-care centers, and centers for troubled teens. Pioneers distribute food to the hungry, help the mentally disabled, equip "Vision Vans" for eye tests, and donate electric wheelchairs. Using technical skills honed in telecommunications, the Pioneers equip "beep balls" so blind children can play baseball. They repair tape recorders, Braillewriters, and talking-book machines for the blind. They design smoke detectors for the deaf and "talking" stuffed animals for withdrawn and retarded children. Scarcely a national or local welfare organization has escaped Pioneer attention.

The environment claims that attention, too. Pioneers build nature trails, clear dumps, restore parks and historical markers, work with wildlife federations, spearhead neighborhood beautification, transplant trees, campaign to weatherize homes, build urban forests, and clean up rivers.

PIONEERS: A SLEEPING GIANT

Beyond meeting human and environmental needs, such community service is becoming increasingly significant for operating companies that sponsor Pioneers in their territories. As companies apply the wonders of technology and the economies of consolidation, more and more customers are served from locations hundreds of miles from where they live. The troublesome fallout, of course, is that the telephone companies' "community presence" diminishes. But often the Pioneers are still there.

And, more and more, they are inheriting the corporate tradition of commitment to the community. Not all companies have yet recognized this for the priceless asset it can become. Neither have all Pioneer chapters yet made the case strongly enough with their sponsors. But they will. As Joe Healey, association executive director, puts it: "Even with all its accomplishments, the Pioneer organization is a sleeping giant. There is no end to the things it could do."

Clearly, one of the first mutual efforts of Pioneer chapters and their sponsoring companies should be to make public knowledge about Pioneering more widespread. The general public knows little or not enough about this army of volunteers, despite its membership of 583 thousand and the appreciation of the thousands whom Pioneers help. The association's profile has been high inside the industry but too low in the outside world. Or at least not as high as it deserves.

Two national service programs may help remedy the situation. Pioneers are working with AT&T Communications to organize and put the 1984 Olympic Torch Relay on the road from New York to Los Angeles. They also are involved in the national fund-raising campaign to restore New York's Statue of Liberty and Ellis Island. But as important as

these national efforts are, the Pioneers will continue to make their mark on the local scene. That's the place where it counts the most.

Word of divestiture came hard to the Pioneers. While employees of Rochester Telephone Corporation and certain Canadian telephone companies are Pioneers, most of the membership — by far — is rooted in the Bell System family. Pioneers are veterans of and with the System, so the prospect of divorce was — and is — personally traumatic. On the practical side, there were disturbing first thoughts about the organization's future finances. Most of the support for the Pioneers has come from AT&T and its companies. Would that continue? Would a strong, unified corporate commitment still exist?

In typical System style, the Pioneer Association formed a task force. As a result of its recommendations and other discussions, some of the association's 13 regions were realigned to conform more directly to the future regional companies. Now there will be 12 regions with 98 chapters. An advisory group of executives from supporting companies will replace the single parentage of AT&T. The commitment still will be strong, and multiple corporate support for the Pioneers won't be jeopardized. However, divestiture has accelerated the association's efforts to become more self-sustaining. Membership dues of Pioneers who are active employees have been increased. A fund-raising program is well under way.

Healey, retiring this year as association executive director (Art Galipeau, of New Jersey Bell, is his successor), points to that effort as one of the major recent achievements of Pioneers. "As an attempt to be less dependent on our supporting companies," he says, "this fund-raising program has been a spectacular success. Our 1982 goal was one million dollars, and we made it. In 1983, the goal was two million dollars, and we passed that. In 1984, we're going for four million dollars, and we hope to build up to ten million dollars eventually. At that time, we'll be paying a lot of our expenses ourselves without having to go to supporting companies at budget time every year."

Delbert C. (Bud) Staley, association president and chairman-designate of NYNEX, introduced the current year's theme at the 1983 Pioneer General Assembly in Chicago. "That theme — 'Pioneering: Today More Than Ever' — says where our thrust must be," he declared. "We're not only in a period of transition and change in our industry but also of transition and change in our country with the move toward more voluntarism. Pioneering goes right along with that."

President Reagan thinks so as well. When he saluted the Pioneers on their

72nd anniversary this year, he wrote, "Our nation benefits immeasurably from the efforts of volunteers who continue to lend their time and support to those in need and to those less fortunate than themselves. The Telephone Pioneers of America exemplify this.... They are an example of what is best in the American tradition of voluntarism."

KEEPING FRIENDSHIPS INTACT

Yet, despite the significance of its community-service role, the role that Pioneering inherits as a result of divestiture will be even more significant. Pioneering will be the established ground on which former Bell System colleagues will continue to meet, to enjoy memories and fellowship, and to engage in efforts to give vitality to the organization and its work.

AT&T chairman Charles L. Brown has assured Pioneer leaders that regardless of new working relationships after divestiture, Pioneering still will be the primary force behind the "humanism and idealism that have come to typify the Bell System." He has been unequivocal in his confidence in the future of the Pioneer Association: "It will continue to be a national organization — divestiture or not, restructuring or not, One Bell System or not — with common purposes. And I hope one of those purposes is to keep us together — personally."

He has asked the Pioneers to accept the responsibility of solidifying old friendships among the people of the industry and to build new ones, "even as we splinter into different organizations. It is a friendship, pure and simple, that will keep a right spirit alive in each of our companies. It is friendship that will keep our character intact as we break our organizational bonds. It is friendships like ours, rooted deep in this good Pioneer ground, that will help keep our companies great when they are no longer one."

This year, at the conclusion of the final General Assembly occurring during the history of the Bell System, Brown raised a toast as the 1,400 delegates and Pioneer spouses and officers of the Bell System stood together:

"May Pioneering keep alive the heritage that has made our industry great. May it continue to enrich the traditions of fellowship, loyalty, and service. May it help us to remember who we are, what we believe in, where we've been, and where we're going. And whatever the future holds, may Pioneering always bring us together as friends. Ladies and gentlemen, here's to the Telephone Pioneers of America!"

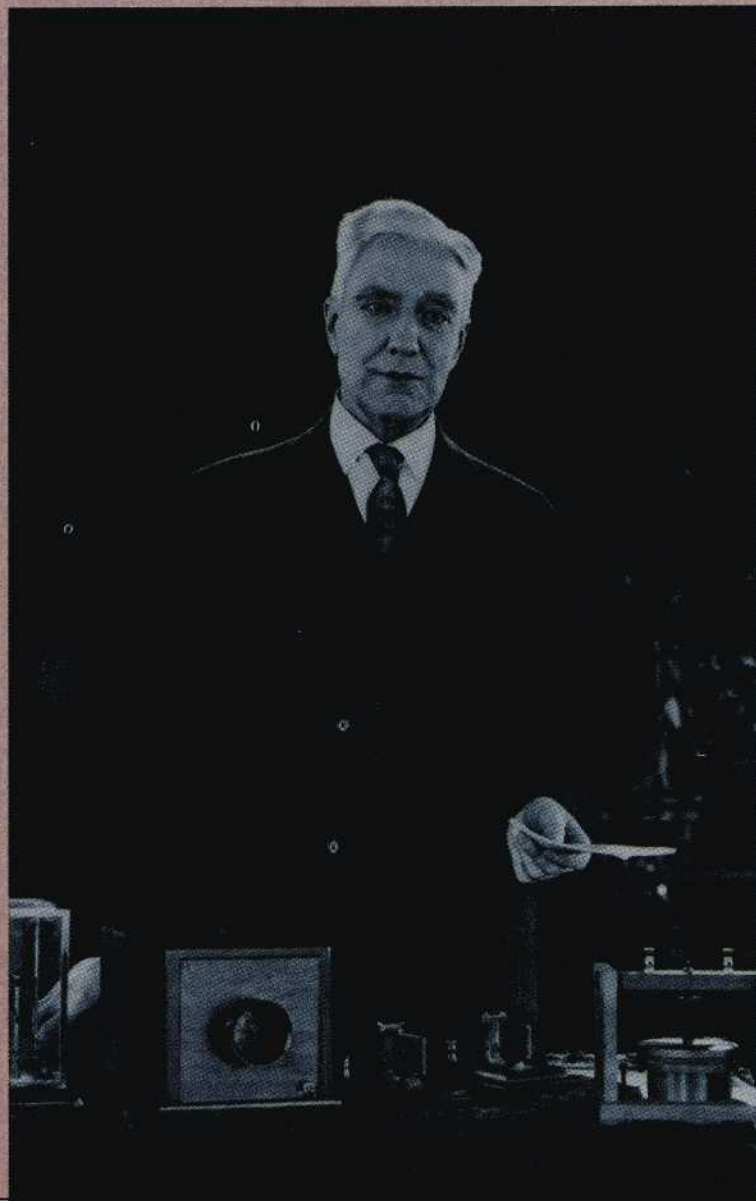
It was more than a ceremonial. It was a Special Moment, celebrating the past and — most of all — the promise of the future.

All of us should have been there. And somehow we were. ■

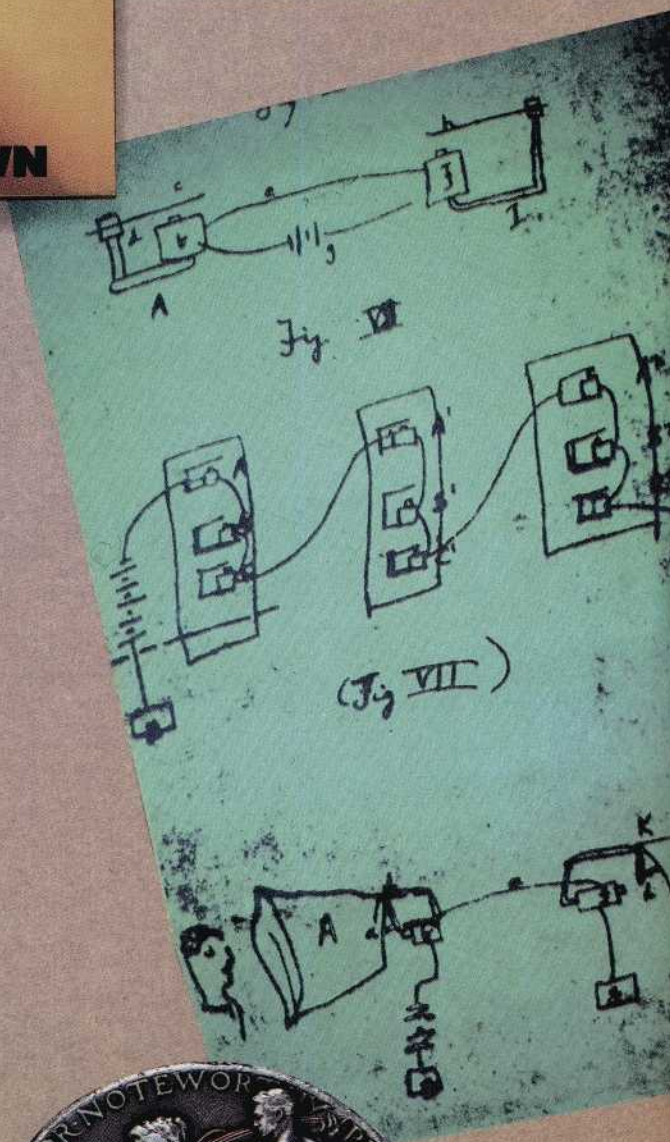
1984 will be the year Bell employees will find hard to forget. It is a milestone, a starting point that — now that the initial shock of divestiture has waned — many eagerly await. Yet we will not start anew stripped of a past. Indeed, the legacy of the Bell System ensures a lineage for the future.

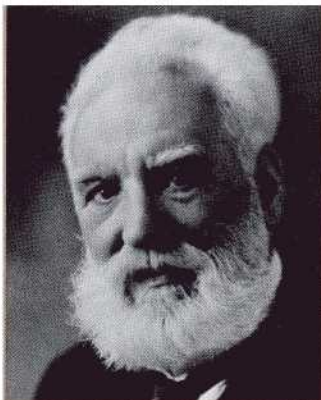
The company's heritage, portrayed in a selection of photographs in the following pages, is reflected best by the people of the business, people who for more than a century looked to their work more as a noble calling than a job. They worked for a company that came of age with a country. And in many ways, our future still rests with what they built and what we choose to learn from them.

THE LEADERS: BELL TO BROWN

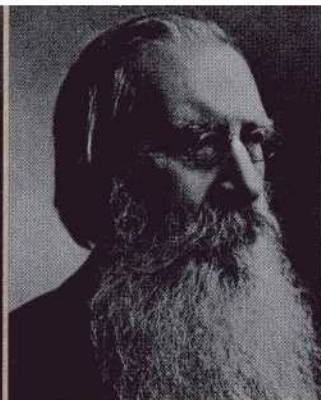


Thomas A. Watson, left, as he appeared in a 1926 Vitaphone movie short discussing the invention of the telephone. In front of Watson are early telephone devices he helped build, including a box telephone and a gallows-type telephone.





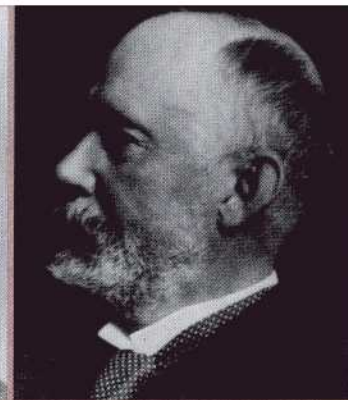
Alexander Graham Bell



Gardiner G. Hubbard
1877-1879



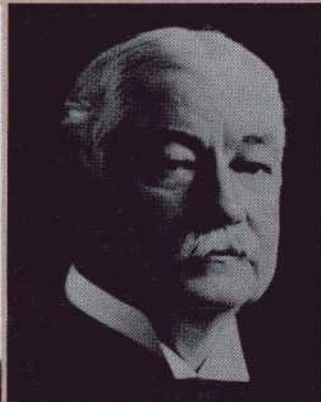
William H. Forbes
1879-1887



Howard Stockton
1887-1889



John E. Hudson
1889-1900



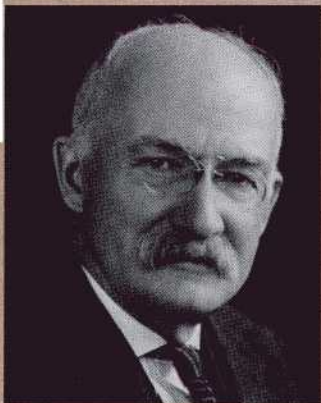
Alexander Cochrane
1900-1901



Frederick P. Fish
1901-1907



Theodore N. Vail
1907-1919



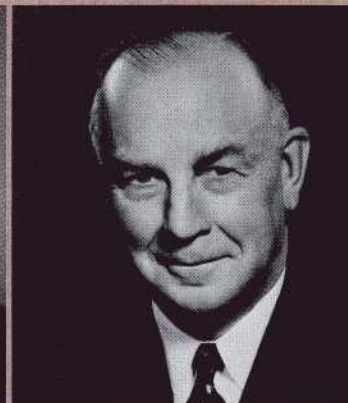
Harry B. Thayer
1919-1925



Walter S. Gifford
1925-1948



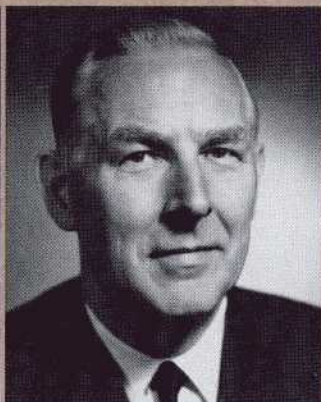
Leroy A. Wilson
1948-1951



Cleo F. Craig
1951-1956



Frederick R. Kappel
1956-1967



H.I. Romnes
1967-1972



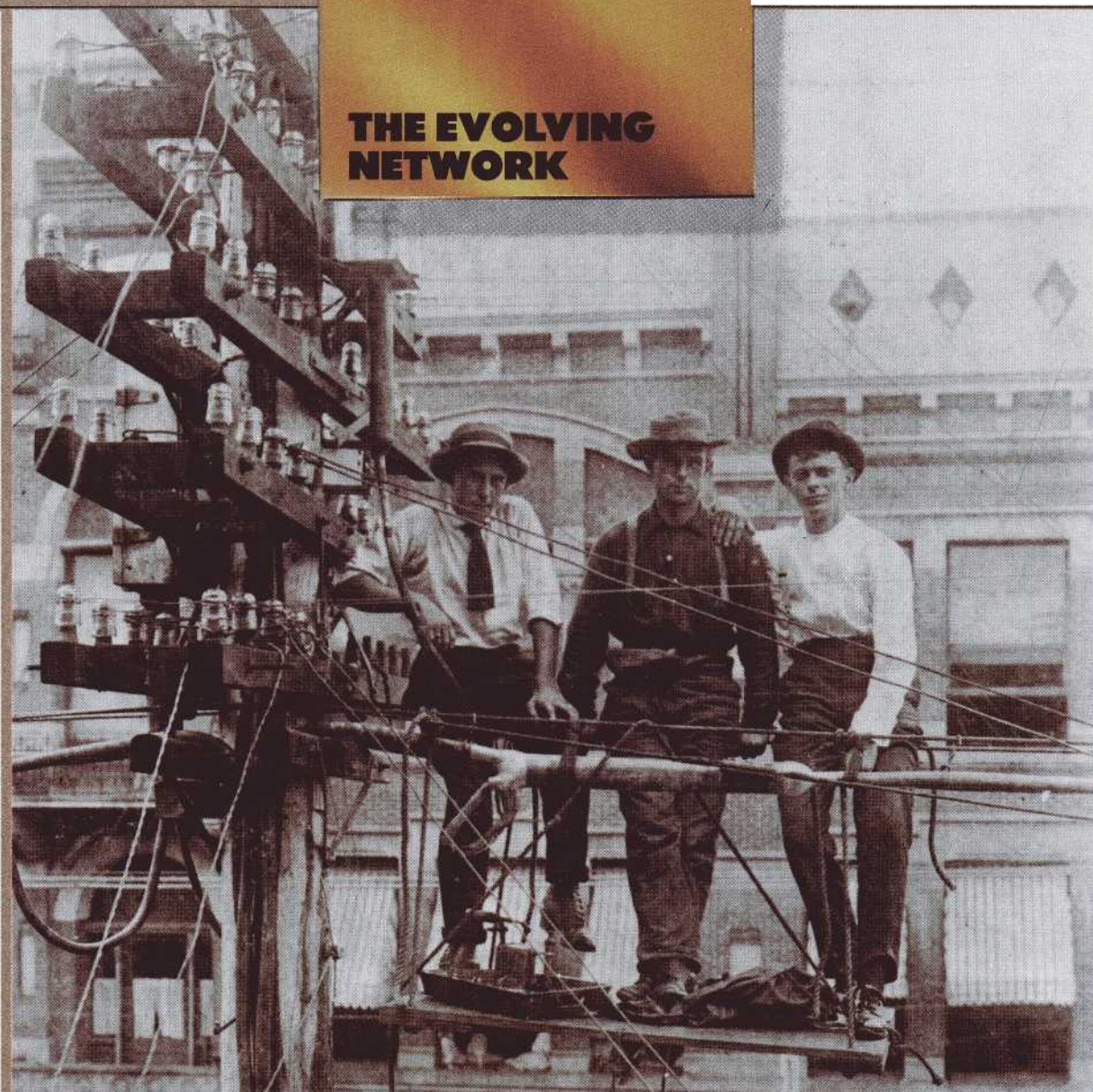
John D. deButts
1972-1979



Charles L. Brown
1979-1983

The sketches above were the basis for drawings used in the first of two fundamental telephone patents obtained by Alexander Graham Bell. Those patents were the underpinning of the Bell enterprise from 1876 to 1893. The Vail Medal, at left, was established in 1920 and is awarded for acts of noteworthy public service that reflect the highest traditions of loyalty and devotion to duty. The photographs on the facing page, starting at top left, show Alexander Graham Bell and the chief executive officers of the Bell System during its 107-year history.

THE EVOLVING NETWORK



The lead-sheathed cable these linemen are installing, above, circa 1900, would reduce and virtually eliminate the use of open wire for aerial telephone lines.





The "Weavers of Speech" illustration at left first appeared in a national magazine advertisement for the Bell System in 1915.

Bottom row from left: the last splice on the first transcontinental telephone line was made on the Nevada-Utah state line in 1914; open wire on a turn-of-the-century urban street; the development of insulated cable made it possible to span rivers and eventually oceans; the entrance to the FCC building in Washington, D.C.; the network control center in Bedminster, New Jersey.



KEEPING THE TELEPHONE RINGING



The most physically taxing, power-consuming part of the telephone business was, and still is, installing outside plant. Early crews made use of a variety of power sources to get the job done. Clockwise from top left: Manpower, a line gang takes a breather to pose for their picture while stringing line on a street in Atlanta, Georgia, about 1910; Truckpower, from Pacific Telephone and Telegraph, circa 1925: a forebear of the dangle digger (a modern post-hole digger), this early post-hole digger featured four-wheel drive and solid rubber tires; Trainpower, a view of a Pacific Telephone construction train used to house crews setting up long distance lines along the Southern Pacific route in California; Oxpower, this team was used to haul heavy equipment during construction of a toll route between Fort Worth, Texas, and Little Rock, Arkansas, in 1896.



Modern technology gives plant crews a lot more options regarding when and where to extend and improve the network. From far left, the Cable Ship Long Lines, which has laid some 47 thousand nautical miles of undersea cable; an Illinois Bell crew works the night shift in Downtown Chicago; and a New England Telephone team descends below street level to work on underground cable.

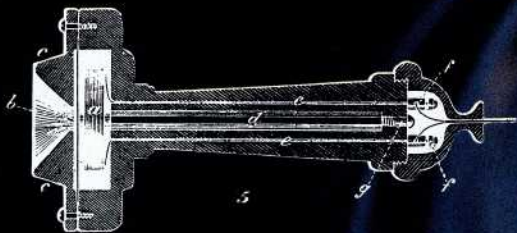


Right, a Norman Rockwell illustration of John J. Toolan, a New England Telephone lineman. The illustration appeared nationally in LIFE magazine as part of a Bell System advertisement and generated a flood of reprint requests from the public and Bell employees. Toolan, who died in Berkshire, Massachusetts, earlier this year, was selected by Rockwell because the artist said he best represented "the man who helps get the message through" in the tradition of service.

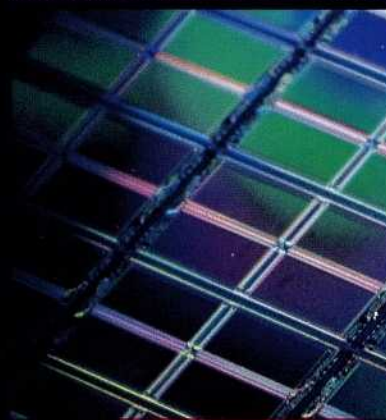


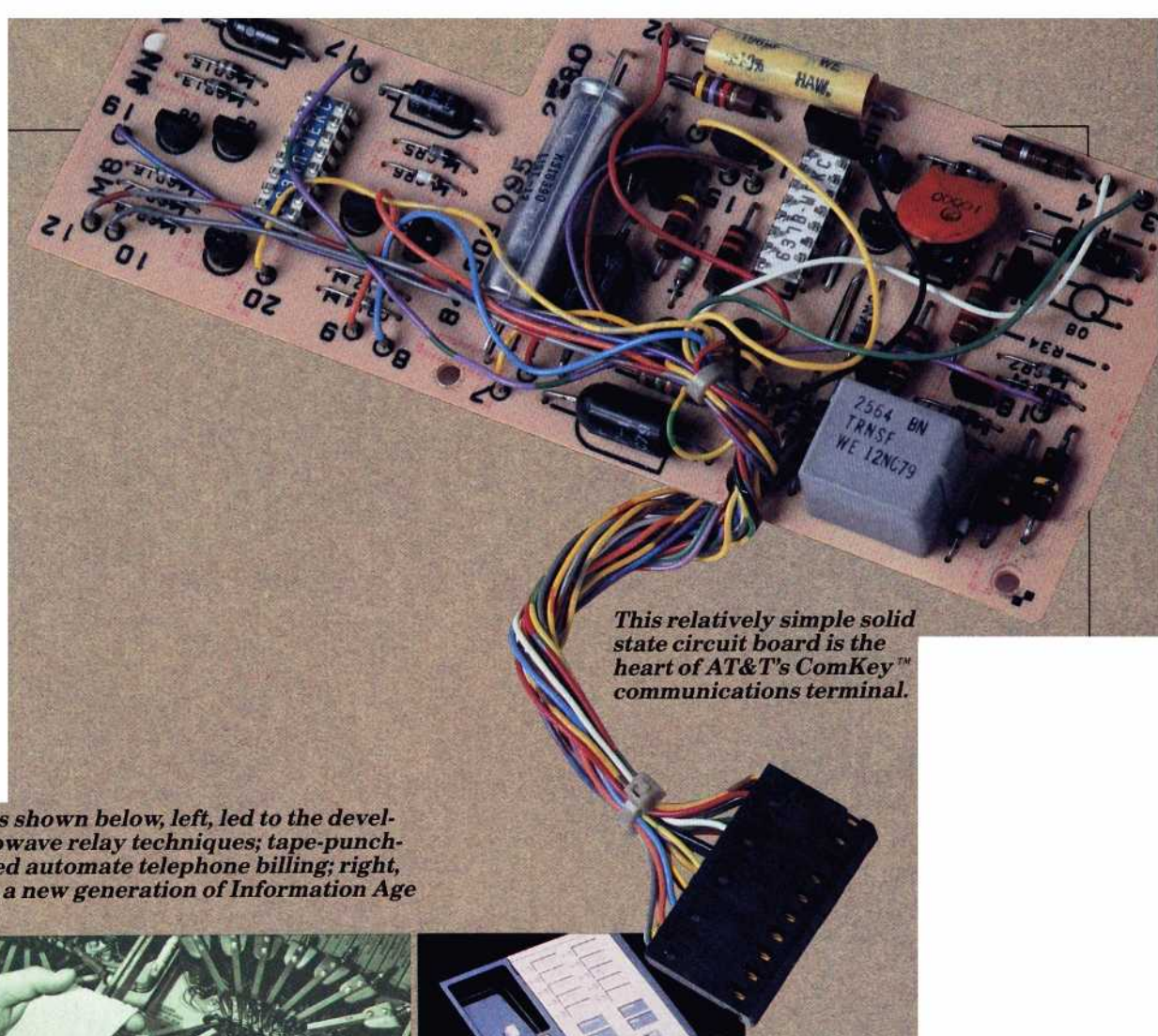
Left, an idealized portrait of a long-distance operator from a print advertisement in LIFE magazine in 1942. The portrait appeared over a sentimental and patriotic poem entitled "We Are the Unseen" by Long Lines operator Eleanora Dayton Surry.

A LEG UP FROM TECHNOLOGY



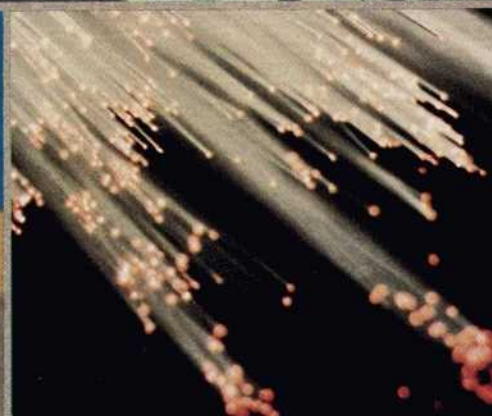
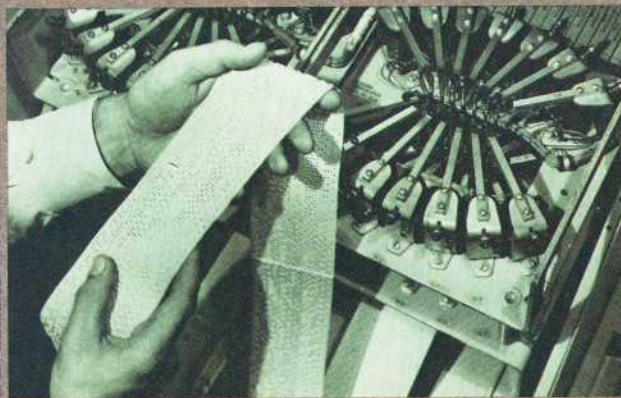
Bell System technology has led telecommunications from the crude wood-and-wire hand-set illustrated above to the completely automated production of complex integrated circuits shown at right.





This relatively simple solid state circuit board is the heart of AT&T's ComKey™ communications terminal.

Early antenna experiments shown below, left, led to the development of radar and microwave relay techniques; tape-punching machines, center, helped automate telephone billing; right, Merlin™ phone represents a new generation of Information Age electronic terminals.

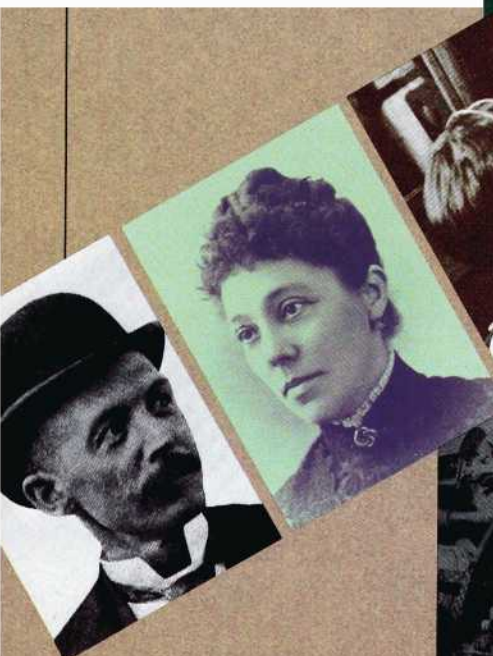


From the left, bottom row: 256 kilobit random access memory devices; the first transistor, a Bell Labs development that spawned the new world of data processing; a cascade of light shed by fiber-optic lightguides, innovated by Bell Labs; Telstar, the world's first commercial telecommunications satellite.

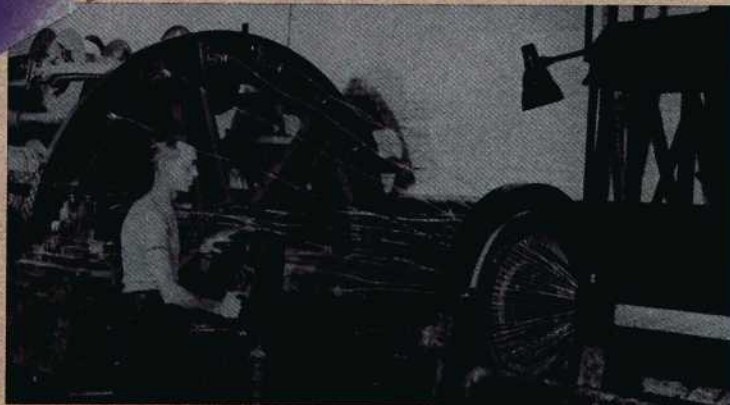
**YOU'RE ONE
IN A MILLION**



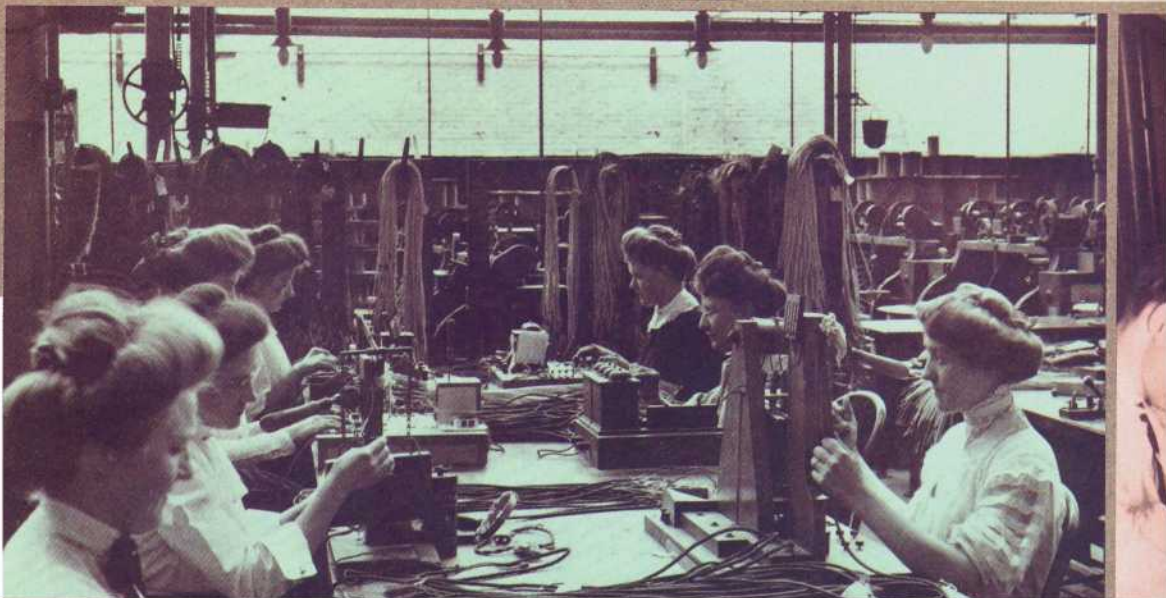
Above: A 1933 photo shows a scribe handlettering the master copy for Pacific Telephone's handpainted telephone book listing 2,300 San Francisco Chinatown subscribers.

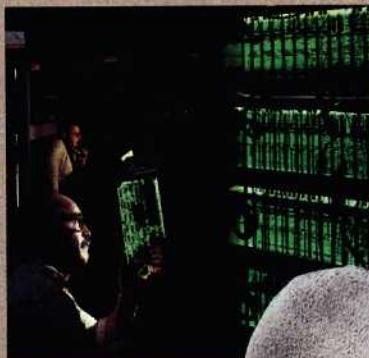


Above: Charles G. Brady, left, was the first Bell System installer; Emma Nutt, center, the first female employee; and, right, the operator station for CAthedral 8000, the first time-of-day service in Illinois, which began in 1927.



Right bottom: Photo at near right shows cable testing at Western Electric's Hawthorne Works about 1909, and photo at far right, a splicing operation in a cable vault about 1914.





Above: Left, operators Elaine Black and Margie Youngblood at the Austin, Texas, TSPS office. Right, New Jersey Bell technicians Ray Bourgeois, foreground, and Rudolf Stivala reconditioning a Dimension® system at a retrofit center in Elizabeth, New Jersey.



Top left: From left, submarine cable gets wrapped in a double layer of wire armor at Western Electric's Breeze Point Works in Maryland; an installation crew places modern lightguide cable underground; Illinois Bell industry manager Vicki Hudspeath and account executive Larry Doyle discuss service with Abbot Laboratories' Jim Christensen. Telephone installers, like Virginia E. Boyd of New England Telephone, are mainstays of a community landscape, whether that community is a rural outpost or a metropolitan thoroughfare.



**IN SICKNESS
AND IN HEALTH**



Above: Thousands of Bell employees enlisted in the U.S. Army Signal Corps in World War I.

Above, signalmen prepare to ascend in an observation balloon to test air-to-ground wire communications. Tens of thousands of Bell employees served in all branches of service during World War II and returned to their jobs in 1945 with hard-won victory medals like the one at right.

Right: This illustration of a World War II sailor using a shipboard communicator was used in a 1944 LIFE magazine ad to symbolize Western Electric's wartime commitment to serve the United States as its "arsenal of communications equipment." Far right is a photo taken in France of the first contingent of telephone operators trained by the Bell System for foreign service in World War I.

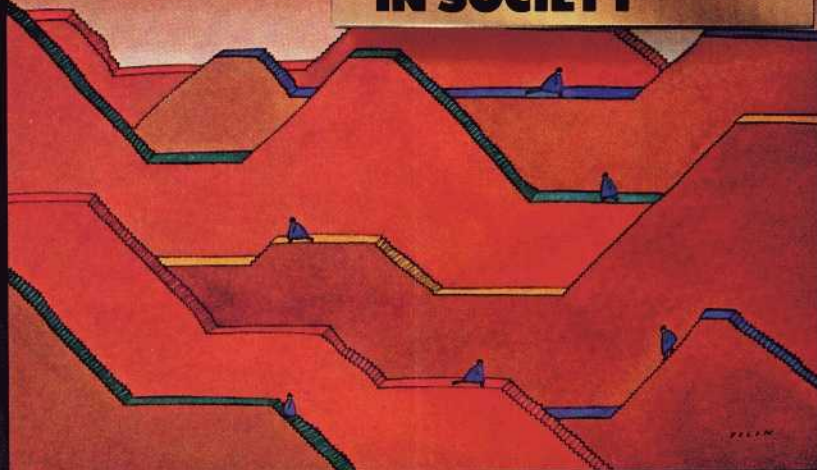




This page: The Bell System has a long history of grace under pressure while coping with calamity. Clockwise from the top: A splicer prepares to restore service amid debris strewn by a 1980 Texas flood; operators inspect the charred ruins of their switchboard following a fire in River Grove, Illinois, in 1947; with 18 inches of water on the second floor, the switchboard at Point Pleasant, West Virginia, was raised on a platform and operators continued to put calls through under these conditions for a week in 1936 until the water receded; toppled like tenpins, this photo shows just a few of the 2,000 poles felled by a New England winter storm in 1924. Linemen braved ice, cold, and wind to restore service during the storm. Since it was adopted in 1968, "911", right, has become the emergency telephone number used nationwide to summon police, fire, ambulance, and other kinds of emergency aid.



BELL'S NICHE IN SOCIETY



Meet someone halfway.
To communicate is the beginning of understanding. © AT&T



The Bell System enjoys the distinction of having employed eight men who won the Nobel Prize: Philip W. Anderson, John Bardeen, Walter H. Brattain, Clinton J. Davisson, Arno A. Penzias, William Shockley, Charles H. Townes, and Robert W. Wilson.



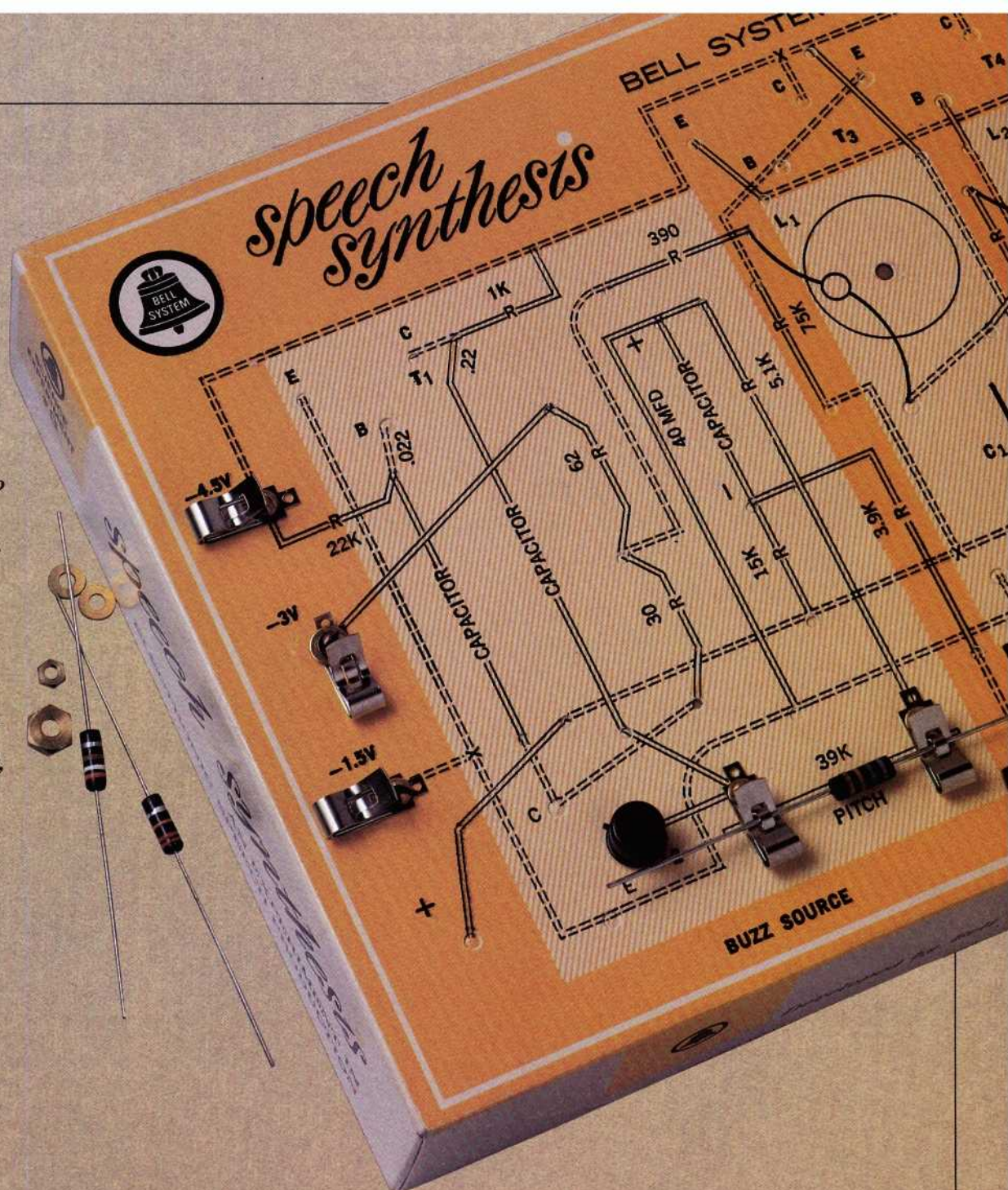
Fashions, Bill Bliss... "Trimline" phone, your Bell Telephone business office.

Bell System customers have always represented the broadest range of tastes and interests and Bell advertising has, of necessity, been equally broad in its attempts to reach the diverse audience. Examples here range from the coolly intellectual at top, through hot pink/high fashion, to the cute Betsy Bell at left.



Bell System educational activities spanned the gamut from programs to help teachers instruct primary students to dial the phone to sophisticated aids, such as the one at right, for high school and college students.

Telecommunications has blended into the social and cultural fabric so thoroughly that virtually no one questions its use as theme material for song, visual art, theater, and cinema. Examples below from the left: a songsheet of the sentimental, late 1800s tune "Hello Central Give Me Heaven," an oil painting commissioned by the Bell System, originally titled "A Commemoration of the Great Blizzard of 1888" (now popularly known as "The Spirit of Service," the rendering was that of lineman Angus MacDonald who worked the Boston-New York trunk line during the blizzard); Spaceship Earth, AT&T's showcase of information technology and the featured exhibit at Walt Disney World's EPCOT Center in Florida; and Barbara Stanwyck "co-stars" with telephone in the 1948 film "Sorry, Wrong Number."



WHERE R MEETS D

BY ARNO A. PENZIAS

At that juncture, as Bell Labs has found, freedom and focus undergird the road to success.

— A short time ago, AT&T Bell Laboratories lost the world's long-distance lightwave record to the Japanese — for a total of six weeks. That's how long it took before we set a new record by sending 420 million bits of information per second through 100 miles of the world's finest glass fiber.

— Today, two state-of-the-art silicon chips are flowing from AT&T Western Electric factories in Pennsylvania: one is the 256K RAM, the first quarter-million-bit memory chip in production in the world; the other is the WE-32, the first true 32-bit microprocessor in the world.

— The UNIX™ operating system is now emerging as the de facto standard for the high-performance microprocessors that will become the engines of the Information Age.

— The No. 5 Electronic Switching System is the world's most advanced local digital switch. It's one of the few items anywhere that — by adding or taking away modular pieces — lets you change your mind after you've bought it.

These examples show that Bell Labs and Western Electric are among the world leaders in each of the key Information Age technologies: photonics, microelectronics, software, and digital systems. It's been said that the Battle of Waterloo was won on the playing fields of Eton. In the future, it may be just as apt to say that the Battle of the Information Age — society's struggle to improve the quality of life amid scarce energy sources and materials — was won at Western and the Labs.

Our technological history is so rich that many of our achievements — the transistor, laser, communications satellite, as well as our 20 thousand patents and numerous awards — are taken for granted, almost like a law of nature. People are not surprised when we *do* invent something; they're surprised when we *don't*. Throughout our 58-year history, we have taken the knowledge resulting from scientific research and, with few exceptions, have turned it into useful and profitable developments.

The people who have made this possible are an unusually curious and skeptical bunch, so much so that people talk about a recognizable "Bell Labs type." Furniture salespeople, I'm told, can spot us by the way we pull out drawers to see what's on the inside. We do the same with each other's ideas. In fact, our suc-

cess in turning the R of research into the D of development is largely the result of our unique corporate culture that values ingenuity over brute force.

In order to find out how light is scattered by raindrops, for instance, a friend named Morton J. Saunders had to figure out how to capture and hold raindrops long enough to make measurements. Recalling the drops of water clinging to spiderwebs, he set about stealing threads from some unsuspecting spiders and spraying them with water. His scattering-and-absorption data is still the accepted standard in the field.

Before I began to work for Bell Labs in 1961, I thought the Labs' awesome accomplishments were produced by armies of Ph.D.s marching in lockstep at a giant institution. But my first encounter with Labs people quickly changed that notion. This occurred while I was a graduate student in physics and needed to know something about ferrite switches. I was referred to a *Bell System Technical Journal* article written by three Bell Labs scientists.

Technically, the paper was just what I needed. But more importantly, it gave me a glimpse of what life at Bell Labs was really like. I remember that the authors specified the length of a special ferrite material they had used in one experiment, going on to explain that they'd adapted their design because that

was all the material they had left from the prior experiment. I was under the impression that Bell Labs had infinite resources, but here were these three engineers doing the best experiment they could with a left-over piece of ferrite — and not trying to hide the fact. That has stayed with me.

At Bell Labs, we always have more opportunities than resources, so we must use these resources to work on what's best and most important.

The Labs has often been described as a great national resource. That's been said so often by so many people that we should remember that the *primary* beneficiaries of our work have been the Bell System and its customers, the telecommunications users. For instance, I spent the early years of my Bell Labs career in the radio research laboratory, where the basic principles and components of microwave radio were conceived and combined into prototype communications systems. These systems, which emerged following World War II to fill an important Bell System need, form the backbone of today's long-haul network. They testify to the synergy of research and systems engineering with development and operations. Certainly, the whole country benefited from this synergy; but the benefits were brought to the nation by the Bell System, which grew and prospered in the process.

Our Bell Labs culture began taking shape before Bell Labs existed. Around 1910 — at a time when "electrons" were laboratory curiosities studied by a handful of physicists — Frank B. Jewett (who later became the first president of Bell Labs) asked Robert A. Millikan of the University of Chicago to recommend someone who could conduct research into an electronic means of signal amplification. This step launched our tradition of applying *fundamental* science to provide a base for communications technology. Millikan recommended a Ph.D. candidate named

Harold D. Arnold, whose investigations subsequently led to the first reliable vacuum-tube amplifiers. This one invention made transcontinental telephony a reality and laid much of the groundwork for the electronic age that soon followed.

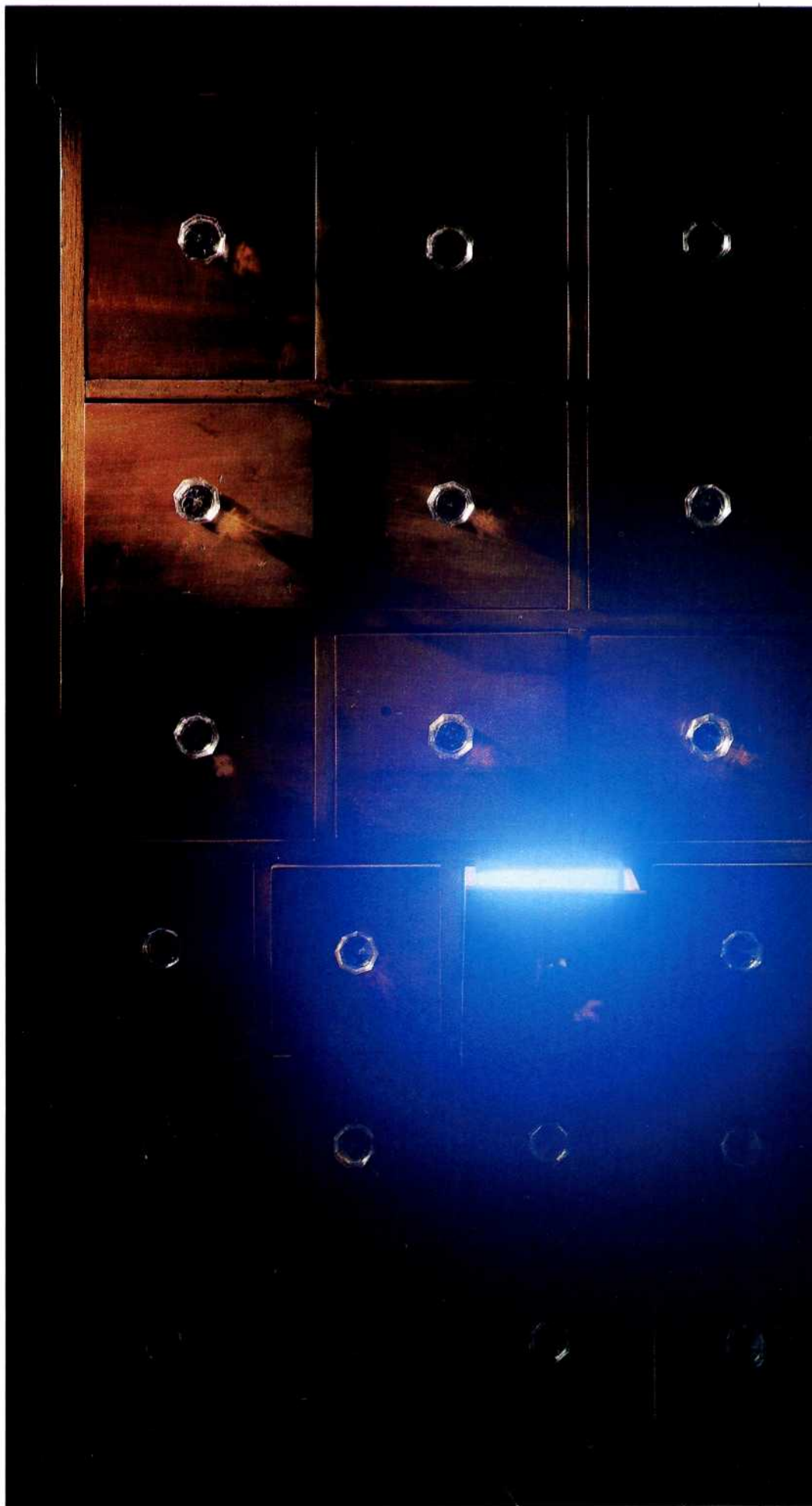
As our first director of research, Arnold left his imprint on the culture of Bell Labs: "Invention," he said, "is not to be scheduled or coerced. It follows research through the operation of genius. The best that any department can do to promote it is to provide a suitable environment."

That environment, it seems to me, combines two essential elements: freedom and focus. Our most precious asset is the freedom to pursue ideas across the entrenched frontiers of established disciplines, and past the persistent lures of short-term payoffs. My favorite rationale for this high-sounding policy is simply this: *It works!*

Try to imagine, for example, what Bell System software would be like if all our computer scientists had merely kept their noses to the grindstone. Fortunately, a couple of them used their freedom to set up shop in an attic and commandeer an unused minicomputer — and came up with a novel operating-systems approach they called UNIX. They and their colleagues contributed ideas and improvements that spread the UNIX system throughout the Labs and the Bell System. The UNIX-based programming environment growing out of these research concepts have helped the Bell operating companies to make efficient use of computerized systems in increasing their productivity. Today, the UNIX operating system is fast becoming a standard of American computer technology.

My favorite story about the power and utility of the UNIX system comes from an informal survey that one of my friends took. He asked people, "How many lines would it take you to write a computer program that would list, in descending order, the number of times each word was used in an English text?" The underlying notion was that the fewer lines the programmers estimated, the more powerful and versatile their own programming environment probably was. Their range of answers was startling. Senior software managers at large, well-known computer companies gave answers ranging between 5,000 and 20 thousand lines. Experienced COBOL, FORTRAN, and PL-1 programmers typically estimated the job at about 1,000 lines. I guessed 50 lines. The punch line is that my friend figured out how to do it in a single line — by linking together existing UNIX utility programs.

Still, we try not to become complacent about the success of the UNIX operating system. We constantly test the power of the UNIX system philosophy against alternatives. One excellent way to mea-



sure the success of software approaches is to use them to play well-studied games. So it wasn't accidental that two Bell Labs scientists, Ken Thompson and Joe Condon, built a chess-playing machine (named BELLE) that was entered in — and won — a number of world-class chess tournaments. Nor was it a coincidence that Thompson, one of BELLE's inventors, started the UNIX revolution.

One alternative to current software approaches is a more complex approach known as "artificial intelligence," which supplements our conventional computer-science efforts as we prepare for the era of "smart" computers. An important recent development in the field has been in learning to devise a way of encapsulating human expertise in an easily accessible computerized form. One of the most exciting of these new "expert systems" was conceived, and is being implemented, by a Bell Labs operations/support-system/development group. An experimental model of this system, called ACE (automated cable expert), already is helping trou-

bleshoot almost a million customer lines at Southwestern Bell.

This brings me to the other half of our successful research environment — focus. Our researchers benefit by keeping in touch with real-world needs, thus exploiting the synergy between research and development. Our development people benefit from having research scientists down the hall. And both groups have benefited from their contact and involvement with Bell operating companies and with Long Lines, now known as AT&T Communications.

The most important single reason our researchers are so successful is the problem-rich environment at Bell Labs. Whenever I sit on a university tenure committee or am asked to evaluate the research potential of a candidate for a senior faculty position, the same question always comes up: "Will Dr. X seek important problems to work on?" Problem-solving ability is taken for granted; problem selection is the rarer and more valuable skill. At Bell Labs,

finding tough problems is almost as easy as keeping the door to your office open. For instance, when our graph theorists want to exercise their skills and enhance their knowledge, they can get their axioms from the topology of private-line networks or integrated-circuit layouts. Furthermore, they don't have the luxury of changing their axioms when the going gets rough, as their more theoretically motivated peers might be tempted to do. This extra discipline of working in the real world has paid off in practical results and in professional recognition as well.

Not every problem requires a mathematical solution. One of the most elegant fixes I know came from a member of our technical staff who worked in a group responsible for improving coin phones. Some years ago, many public telephones in New York City began to be robbed, seemingly systematically. It was a plague, like Dutch elm disease. Sadly, the phones most often vandalized were in neighborhoods where they were most vitally needed. People unwittingly left

SOME OF BELL LABS' GREATEST HITS

▲ As Harold S. Black rode a Hudson River ferryboat to work in 1927, he filled the margins of his morning *New York Times* with a diagram and a few equations — his conception for the negative-feedback amplifier that helped make long distance communications possible and now is used in every sort of electronic equipment.

▲ In a classic 1927 experiment, Clinton J. Davisson demonstrated that electrons behave not only as particles but also as waves. For this, he shared the 1937 Nobel Prize in Physics.

▲ Walter A. Shewhart, who coined the term "quality control" and invented the "Shewhart control chart" in 1931, was the first to advocate statistical sampling of production line output rather than testing of each item. Later, the U.S. State Department recruited one of Shewhart's disciples, W. Edwards Deming, to teach the Japanese how to control quality.

▲ While listening to radio static that interfered with transatlantic radiotelephone circuits in 1933, Karl G. Jansky deduced that the "star noise" he kept hearing was in fact coming from the center of our own Milky Way galaxy. Thus he founded the science of radio astronomy.

▲ As a weekend project in 1937, George R. Stibitz used spare telephone relays to create a binary adder on his kitchen table. He applied the basic theory of the adder to design the complex number calculator — the world's



first electrically operated digital computer and the first with remote terminals.

▲ An experimental microwave radio system carried both telephone and television signals in 1947. Four years later, microwave radio systems were carrying TV coast-to-coast. Improvements have since doubled and redoubled channel capacity, and microwave radio now carries 70 percent of long distance calls.

▲ The search for a reliable solid-state amplifier paid off in 1947 with the invention of the transistor, which began a global electronics revolution. The three inventors — John Bardeen, Walter H. Brattain, and William B. Shockley — won the Nobel Prize for Physics.

▲ Claude E. Shannon made telecommunications a science in 1948 with his mathematical model of the commu-

nication process. A simple idea — that whatever resolves uncertainty is information — gave the world a way to measure both the complexity of messages and the capability of circuits to transmit information digitally, in terms of simple yes-no choices. John W. Tukey later named these choices "bits" — a contraction of "binary digits."

▲ Philip W. Anderson brought order to disorder in 1958 by explaining why electrons move differently in glassy (disordered) materials than in crystalline (highly ordered) materials — an important contribution to solid-state physics. Anderson won the 1977 Nobel Prize in Physics for this work.

▲ The Bell System sent up a trial balloon — a 100-foot satellite named Echo — and for the first time bounced signals back to Earth in 1960. In 1954 — three years before Sputnik — John R. Pierce had made the first proposal for a communications satellite based on achievable technology.

▲ The age of the modern communications satellite arrived in 1962 with the launch of Telstar, a 170-pound satellite that demonstrated transatlantic telephony, data transmission, and television.

▲ Arno A. Penzias and Robert W. Wilson couldn't get rid of a small but persistent noise in the ultra-sensitive antenna they were using to identify galactic radio sources. Finally, in 1964, they interpreted the noise as the cosmic background radiation remaining

their money to someone who had stuffed the coin-return mechanism for later harvest. This was a serious problem — and someone at Bell Labs solved it. All it took was a small tab of sheet metal, less than an inch square, added to an existing part. Installed in a few minutes, it closed the coin slot whenever the coin return chute was opened or jammed. The plague was cured.

On another occasion, an operating company came to Bell Labs because a particular run of outdoor telephone lines was under siege by grizzly bears. Did we have a zoologist who could help them? The closest we had was a human-factors specialist, who noted that when the wind blew, the wires began humming like bees. The bears would climb the poles looking for bees and their honey, and would pull the wires down. The solution was to put springs on the wires to adjust their tension so they would hum a less "beelike" tune.

Some of the high technology applied in telephone plant may appear deceptively

simple. The fact that today's telephone wire, for example, is coated with brightly colored plastic is almost as well accepted as the fact that tuna fish comes in little round cans. But it took a lot of science to make the plastic coating work. The same ultraviolet rays that cause people to get sunburned also cause chemical reactions in plastic, in combination with ozone, moisture, and local contaminants. Telephone wire must *last* — almost forever. So before we leaped from pulp to plastic, we had to ask, "What holds a polymer together in the first place?" It turned out that polymers are long molecules hooked together in particular ways. Very long, heavily entangled chains don't come apart easily. That's a lot easier to say now than it was to prove and to learn how to make such suitable materials.

Our concern about electrical insulation in the outside plant could someday become a thing of the past, as light supplants electricity as the primary vehicle of telecommunications. Yet the success of photonic communications is another example of the partnership between science and technology at Bell Labs.

It started in 1961 with the invention of the laser. Suddenly, that invention had created new opportunities for understanding the properties of matter — opportunities that quickly attracted many of our scientists. Those who went into laser work weren't thinking primarily about communications systems, although the original laser patent had mentioned communications. They were simply furthering science, searching for fundamental understanding. Technological change — the laser invention — had an impact on overall scientific as well as telecommunications opportunities. The scientists bought optical benches and modern spectrometers. They worked on making better light detectors, light sources, and other new devices; from these devices, they soon created components and subsystems. They became adept at dealing with optical technology even as they were contributing to it. The result was that in the early 1960s, before the term "lightwave" was invented, Bell Labs already had a corps of lightwave scientists.

Of course, no one could be sure then that lightwave technology would lead to a practical system. Inasmuch as early experiments confirmed that light doesn't travel well through fog, reliable lightwave communications needed some sort of enclosed medium. Because solid glass cut down the amount of light too much, someone thought of guiding the light through pipes. The pipes were filled with gas and heated on the outside, so that the gas would form a "lens," bending the light rays toward the denser, unheated gas flowing in the middle.

Although these gas lenses worked after a fashion, they turned out to be the

wrong answer. Much more important, however, was the fact that we were working on the right problem. As Richard W. Hamming, the Bell Labs scientist who devised error-correcting codes, once said, "It is better to do the right problem the wrong way than the wrong problem the right way." We were learning to put together the components of a lightwave system using whatever pieces our ingenuity could find available at the time.

By the early 1970s, a better transmission medium had been found: very pure glass fibers that carried the pulses of laser light. Of course, it took more than glass fibers to make lightwave communications systems work. The early lasers were too unreliable, and even the continuously operating gas lasers invented at Bell Labs wouldn't work for communications (although they are now widely used in medicine and industry). What was needed was a solid-state laser that could pulse rapidly, last a long time at room temperature, and be manufactured at reasonable cost. And in 1970, that laser was invented at Bell Labs.

We don't always invent the first of something, but we do try to invent the best. We didn't invent the first optical fiber, but we did invent the process that Western Electric and others use to produce the finest fiber in the world. We don't have a monopoly on good ideas and inventions, but we do have a knack for combining our own ideas with the best from a wide range of others and turning it all into practical results. Our freedom gives us insight into what is *possible*; our focus gives us insight into what is *needed*.

Even though the lightwave revolution is barely upon us, it's still not too early to peer beyond it. Powerful as today's technology looks by yesterday's standards, how crude and puny it will look by tomorrow's! We have only to look at the technology that nature displays all around us to glimpse the vast opportunities for invention that beg to be explored. Two examples: the number of bits of information contained in a single strand of DNA, and the subtle complexity of the pattern-recognition system every one of us is born with.

Together with these endless vistas for innovation comes an equally imposing agenda of unmet human needs that call for imaginative solutions. The Information Age we've brought into being is not just a slogan — it's the best hope of mankind. If we continue to deplete the limited material resources of our planet, our species will doom itself to inexorable scarcity. We have a chance to use our ingenuity to create information-based alternatives for scarce material resources — to provide new markets, create jobs, and improve the quality of life. Bell Labs has pledged to do its part to make this happen. ■

from the "big bang" — the explosion by which the universe was born about 20 billion years ago. Penzias and Wilson won the 1978 Nobel Prize in Physics for this work.

▲ The No. 1 Electronic Switching System, introduced in 1965, brought new Custom Calling Services to customers and demonstrated the success of the stored-program software concept incorporated in all subsequent switching systems. Today, more than half of all subscriber lines are served by electronic switching systems.

▲ The first digital electronic switching system, the No. 4 ESS, began handling half a million long distance calls per hour in Chicago in 1976. Built into the system was the ability to separate call-handling information from the voice circuit, allowing faster call set-up and new, flexible services. Today, the No. 5 ESS extends state-of-the-art digital switching technology to smaller cities and towns.

▲ The world's first lightwave communications system to carry a full range of information — voice, data, and video — was installed in 1977 under the streets of downtown Chicago, where it demonstrated that lightwave technology could meet customer needs.

▲ To measure the duration of a burst of laser light, Bell Labs scientists in 1982 created the shortest slice of time ever — 30 femtoseconds (millionths of a billionth of a second). ■

AN EXALTATION OF DISCOVERIES

LEARNING FROM SCRATCH

BY JEREMY BERNSTEIN

A writer, unschooled in Bell Laboratories, finds an enterprise worthy of a book — and preservation.

Although I am a practicing physicist, I did not know, and very likely would not have gotten to know the Bell System, let alone Bell Telephone Laboratories, through my physics. My interest in physics has always been in the theory of elementary particles — one of the least practical disciplines imaginable — while most of the physics done in the Bell System has to do with aspects of the solid state.

Only rarely does someone like Philip W. Anderson, the Bell solid-state-theory Nobel Prize winner, come across something in solid-state physics that turns out to have ramifications in elementary-particle theory. There is, of course, only one nature, but the American Physical Society nevertheless lists 12 disciplinary divisions, under which there are innumerable subspecialties. Be that as it may, I came to Bell Labs wearing my other hat — namely, that of science writer. For more than 20 years, I have been on the staff of *The New Yorker* magazine. And most of the nearly two million words I must have written for that magazine have concerned science.

The idea of writing about Bell Labs came to me from the aforementioned Philip Anderson. We were hav-

ing a casual conversation at the Aspen Center for Physics in Colorado, where we

both were working in the Summer of 1982, when he asked, laconically, if I'd ever

thought of writing about Bell Labs. I confessed that I hadn't and gave, as at least a partial explanation, the fact that my area of science seemed so far removed from those areas practiced at the Labs. However, I did promise to ask William Shawn, editor of *The New Yorker*, whether or not he'd be interested in an article on Bell Labs.

As it turned out, Shawn was intrigued — but I don't think he expected what he got. Instead of one piece, I turned in 15 — a book.

I want to describe something of the process of converting into a piece of litera-



ture a laboratory that, at the time I began my work in the Fall of 1982, had some 25 thousand people in 20 different locations around the country. As I do this, it will, perhaps, give readers an idea of how Bell Labs appears from the perspective of an informed outsider.

I began my job with a *tabula rasa*. I had read next to nothing about Bell Labs, and what I had read I found very difficult to keep straight. I knew, of course, that the transistor had been invented at the Labs and that the cosmic photon radiation we all are bathed in had also been discovered there by Arno Penzias and Robert Wilson. I knew, too, that the communications satellite had been developed there, because my friend Arthur C. Clarke, who proposed it, often told me of his admiration for John Pierce, the man who really made the thing work. But that was about it.

I explained this to Anderson, and he set about thinking of a group of representative people I might meet. He called them the "troops," inasmuch as they were people on the front lines of research and development. On my first visit to Bell Labs' headquarters at Murray Hill, New Jersey, Anderson managed to assemble those troops for lunch in a smart dining room near Arno Penzias' office. There were perhaps 15 people there. One thing that struck me immediately was that several of the people did not appear to know one another. For example, Ronald Graham, who is now the director of Bell Labs' mathematics center, was, to some of the theoretical physicists, a sort of mythic figure they were pleased to meet in-the-flesh, so to speak. What intrigued them, and me, was that Graham is not only a first-class mathematician but also a professional juggler and acrobat. He was the first person I interviewed.

While I was certainly interested in his remarkable acrobatic skills, I have been at my present craft long enough to know those skills by themselves are neither necessary nor sufficient to form the nucleus of a profile of several thousand words. What did form the nucleus was Graham's explanation of how the Bell System is able to make use of the relatively arcane kind of pure mathematics he is involved in. This comes about because the System has an arrangement with so-called "private line" customers — large-business customers — to charge them for costs of service based on the shortest route that a long distance phone call could possibly take.



When someone with a mathematical background hears about a problem like this, the first thing that comes to mind is "traveling salesman." To the mathematical *cognoscenti*, this is the infamous problem of finding the minimum route a salesman might take between various cities; it is a problem that, in general, has no simple solution. It is somewhat the same with how one arrives at the private-line tariff, although it has been shown that the optimal solution can differ no more than 18 percent from an arbitrary solution. Finding approximate solutions to problems like this is a major activity at the mathematics center, and I made this the centerpiece of what I wrote about Graham.

Graham is a Californian. Bela Julesz is a Hungarian. Each has been at Bell Labs for more than 20 years, but I am not sure they'd met before that lunch.

Julesz, who recently won a MacArthur Foundation fellowship, is head of Bell Labs' visual perception research department. He was the second person I interviewed. He told me how he had come upon the notion of "random dot stereograms" — strange visual displays, usually in two colors, that look like sandpaper until you put on special colored glasses and a selection of those visual symbols appear to pop up off the page and hover over it in three dimensions. These stereograms now are used to test almost-newborn children for normal three-dimensional vision. If it turns out that the child does not have normal vision, this abnormality can, in many cases, be corrected by an operation done in the first few months of life. Because of his interest in the deaf, Alexander Graham Bell himself began the tradition of applying the latest in telephone technology to health-related problems. So Julesz was simply following this enviable tradition when he used current telecommunications technology to design a process that might discover vision deficiencies.

As often happens with these things, once I actually began interviewing people, one thing — as they say — led to another. For example, I learned from one of my subjects that Bell physicist Joe Condon was the son of physicist E.U. Condon. From this, I cleverly deduced at once that Joe was the brother of physicist Paul E. Condon, who had once saved me from failing a lab course in modern physics. This emboldened me to ask Joe if I could play BELLE, the best chess-playing machine in the world. It weighs about 133 pounds and can beat 99 out of every 100 chess players who are willing to play it. It is the joint work of Condon and Ken Thompson. Thompson also helped to design the UNIX™ operating system that keeps order among computers.

A date for the combat was arranged. And under the watchful eyes of Condon and Thompson, the machine beat me in 27 moves, though it did make a strange castling maneuver that at first seemed to have been a mistake. (It wasn't.) I discovered that the *human* chess players at Murray Hill have a special warren not far from the cafeteria where they can do battle after lunch.

During the time I was interviewing people at Murray Hill, I was reminded that less than 10 percent of Bell Labs' activity was in undirected basic research and that if it were to be my intention to give a balanced account of the work, I needed to interview people doing things that had more immediate applications to telephony. To this end, I spent time in the company of Hutch Loony and Norwood Long at Chester, New Jersey, approximately 50 miles from New York City, where there is a 210-acre site devoted to testing facilities involved in what the Bell System calls "outside

plant." Among other things, I learned that the people at the Chester facility test the readability of Bell service manuals by placing an order with New Jersey Bell and then standing around when the repairperson comes, to see if he or she can readily follow the directions in the manual. One only wonders what can be going through the mind of the repairperson while being studied by a group of Bell engineers. Incidentally, at the end of my visit to Chester, I was invited to place a telephone call over a fiber-optics line that connects with New Jersey Bell. I phoned a friend in New York, with the intention of explaining that I was calling via glass. The line was busy, which proves, I suppose, that *plus ça change...*

INVENTIVE COLLABORATION

The learning process I am describing very, very briefly here went on for nearly a year. By the time I finished, I thought I had some idea not only of what makes Bell Labs *Bell Labs*, but also of how it got that way. Louis Pasteur (no, he never worked for Bell) once said that in scientific discovery "chance favors the prepared mind." There is, Pasteur would have said, an element of chance in the transistor having been discovered at Bell Labs. The people at Purdue University were very close. But it wasn't chance that Bell Labs and the Bell System were looking for something *like* the transistor to replace vacuum tube repeaters. After all, it was Bell Labs' own John Pierce who used to say that "nature abhors a vacuum tube." It also wasn't chance that Mervin Kelly and his associates had the wisdom in the 1930s to turn loose a small group of people — solid-state physicists — who had a chance to come up with something. One of the secrets of Bell Labs has been the right kind of management.

It also is not accidental that collaboration of all kinds is encouraged in the strongest possible way at Bell Labs. It has been an open society, unlike many universities where scientists sometimes feel they must cling to their ideas for dear life. One common theme ran through the interviews I had; that was a sense of community, of collaboration, and of sharing. Bela Julesz told me about a description of Bell Labs he once read: "It is like a big baroque organ. If you are interested in playing one-finger accompaniments on a baroque organ, then you shouldn't be at Bell. But if you have something to do where you have to pull out every register, then this is the place to do it."

As an example of what industrial science can be at its best — a role model, if you will — it is important to continue the tradition of Bell Labs. Bell Labs is a national treasure — a unique entity, like a great university or a great concert hall. We all have an interest in making sure it continues to prosper. ■

AN EXALTATION OF DISCOVERIES

THE BIG SKILL

BY C. ANNE PRESCOTT

Time may march on, but Western Electric has no trouble staying in step.

By some accounts, it was the only drawing card in Bryant Pond, Maine. The "old crank," it was called — not to be confused with the man of the same nickname. But minutes after 2 p.m. on Tuesday, October 11, 1983, the last hand-cranked telephone system in the nation was cut over to dial service. Fittingly, it was Elden Hathaway who pulled the plug on the past. He had run the Bryant Pond telephone company for 24 years before he sold it in 1981 to enjoy a leisurely retirement amid the foothills of the White Mountains, where Bryant Pond nestles just 35 miles from the New Hampshire border.

The old system may be gone, he points out, but it lives on in the name he is known by on CB radio: Old Crank. And the telephones themselves live on — those model 202s, 207s, and 302s, sitting black and sleek in their antiquity. They were bought by many of Bryant Pond's 435 customers, because it's hard to part with a friend. At three dollars apiece, the phones sold, ironically, for a dollar a pound. They had been in service for 50 years and could handle another 50, Hathaway swears. After all, they were made by Western Electric.

About a thousand miles down the mountain range that sweeps up the Eastern Seaboard — in the foothills of the Appalachian Mountains in Greensboro, North Carolina — Bill Opdyke listens to the Bryant Pond story with amusement. But not surprise. Though his career with Western spanned 43 years before he retired in 1979 as vice president of personnel and labor relations, he still remembers the three criteria that were "burned into the head of every Western

employee from the first day they set foot in the door": schedule, quality, and cost. The product had to be delivered on time, be reliable, and offer the best value for the price.

Time, in some ways, changes nothing. Sewing machines of Western Electric manufacture still stitch hems as precisely as they did when they were new — at the turn of the century. And Western's fireplace equipment, though made during the Depression, still rests on the hearth in Midwestern homes. Even Western's wringer washing machines still work — though they're hell on lingerie.

What is gone is the Western-made electric stove and the panoply of other electrical equipment — light fixtures, electric fans, burglar alarms, irons — that made Western Electric the nation's largest supplier of electric appliances in the 1890s. The company that began as a small model-making shop in Cleveland in 1869 grew to become the nation's largest manufacturer of telecommunications equipment, ranking 22nd on the *Fortune* 500, with sales of 12.6 billion dollars in 1982.

FROM MODEL-MAKING TO UNPREDICTED EXOTICA

Yet time, in some ways, changes everything. Who could have predicted in 1881, when Theodore N. Vail bought Western Electric, that the company would play a pivotal role in sinking Japanese ships during World War II and in putting a man on the moon a quarter-century later? Or that it would get out of the international business — and then re-enter it? Or that Western people in the early 1950s would trudge across Arctic tundra in sub-zero cold to install an 8,000-mile network of radar and microwave stations for the Distant Early Warning (DEW) Line and the White Alice project — and, 30 years later, fight

120-degree heat and vicious sandstorms to install 6,000 miles of microwave towers in Saudi Arabia?

Or, closer to the commonplace, who could have imagined that from that first supply contract would eventually come more than 320 million telephones, literally *trillions* of conductor-feet of cable, and countless numbers of components, which Western Electric has engineered and produced for everything from the 1882 magneto wall set to the 256K dynamic random access memory, whose immense computing power fits on a chip half the size of an aspirin tablet? And who could have foreseen that Western employees would recondition more than 30 million telephone instruments a year (more than twice the number they manufacture each year) or recycle scrap to extract copper that is 99.99 percent pure?

Opdyke doesn't pretend to have had that kind of vision. Joining the company in 1936, he was looking for a job with security. During his first week, he was handed a copy of "The 10 Commandments" — 10 employee-relations policies the company drafted in 1924 and has lived by since. When he read the policies, Opdyke mused, "Western Electric certainly is a good place to work."

In his first job, Opdyke was an office boy. The long buildings of the Kearny Works in New Jersey often echoed only the sound of his feet; many of those buildings were empty and bare. The Depression had slowed the manufacture of panel switches at Western facilities, and the crossbar switch was still a few years away. Some Western sites, notably the Hawthorne Works, were producing furniture and other home furnishings just to keep employees on the payroll. Opdyke himself was "short-timed" — asked to take every other Friday off without pay. Western's one busy location during those years was its ERPI subsidi-

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ary (Electric Research Products, Inc.), the corporation that installed sound systems in theaters. Everyone went to the movies to forget their troubles.

Despite the somewhat tenuous circumstances, Opdyke sensed that the people of Western were special. "I got the feeling that they were eager to be part of the hum and rhythm of production," he recalls. And they soon got their chance. World War II erupted, and workers streamed into Western's factories. War-time employment doubled; more than half the workforce was female.

The company shifted 80 percent of its production capabilities to military needs. Many military systems were tooled at the Kearny Works, where Opdyke had risen to temporary assistant subforeman on the second shift. Western people worked in shifts around the clock during the war, turning out hundreds of defense projects — from sophisticated fire-control systems to fungus-proof phones.

Chief among these projects were the radar systems that aimed the big guns of battleships and went aloft with Army Air Corps night fighters. Western Electric employees manufactured half the radar produced in the United States — nearly a billion dollars' worth. It was the only company in the country big enough to do the job, and it had nearly 75 years' experience in precision electrical manufacture. Moreover, the cooperation between Bell Labs as researcher and Western Electric as manufacturer yielded advances in telecommunications and command guidance systems that laid the foundation for space travel two decades later.

When the war ended, the Bell System faced a boggling task: filling two million back orders for telephone service. Working in Kearny's engineering department, Opdyke helped develop the first

automatic test center for switchboard circuits. The Kearny cable shop, where he later worked, produced 600 million conductor-feet of cable per week. And by the early '50s, when Opdyke moved to the manual switchboard shop, 80 toll switchboards were being turned out weekly, and dial service was coming to homes and businesses across the country. Then, in 1954, a major milestone was achieved: telephones in decorator colors. Basic black became a thing of the past.

COLD-WAR CATCH UP

As the Western people scurried to catch up with telephone demand, they also became involved in cold-war communications and defense projects. And at the request of President Truman in 1949, Western agreed to operate Sandia National Laboratories under a no-profit, no-fee contract.

Western's work for the government culminated in the generations of Nike missiles and tracking systems that followed U.S. satellites into space. Opdyke was one among many who took special pleasure in the success, in 1962, of the Nike-Zeus missile, the first to intercept an intercontinental ballistic missile. The Zeus success followed on the heels of Project Mercury, a globe-encircling chain of communications stations that kept ground controllers in touch with the astronauts. And in 1962, AT&T and Western established the Bellcomm subsidiary, which, with technical assistance from Bell Labs, performed systems engineering for Project Apollo moon landings.

Closer to earth, astounding leaps in telephone technology also occurred in the 1960s. Western began producing electronic switching machines, now being installed at the rate of more than one a day. Trimline® telephones with Touch-Tone® dialing made for faster,

easier communications. Western was changing internally, too. Seven regional service centers were formed to bring Western operations closer to their customers — the operating companies — and to give the companies a single point of contact with Western. Opdyke ended a 28-year association with the factory workers when he was promoted into the service division.

Western's sales and marketing activity blossomed in the '70s as technology exploded. Solid-state circuitry produced everything from Touch-A-Matic® telephones to Dimension® communications systems with energy-saving features, from bubble-memory chips with voice-storage capacity to microprocessors with the power of room-size computers. Production of computer software to manufacture, install, and test systems became a business all its own. Light-guide fibers transmitted voices, data, and images in digital form over glass wires the thickness of human hair. With Design Line® sets, even the telephones got new looks. Western's products and services received worldwide attention, and its forays into the international market eventually helped launch AT&T International as a separate subsidiary.

And what of the future? Well, some traditions just "stick to the walls," Opdyke observes, and the passage of time and technology don't make much difference. Traditions like the Spirit of Service. Like the pursuit of excellence in the goals of schedule, quality, and cost. Delivering reliable products and services on time at the least cost. "The people of Western will go on to find new ways to use state-of-the-art technology in communication, medicine, transportation — you name it," he says. "And many of those innovations will still be around in a hundred years, just like the phones in Bryant Pond, Maine." ■

*Trademark of AT&T

THE BUSINESS OF BUSINESS "T" AND WALL STREET

BY JOHN J. SCANLON

The stodgy old "widows' and orphans" stock has been one of the market's liveliest players for more than 100 years.

As 1983 draws to a close, Wall Street brokerage houses, banking interests, the financial press, and investment scholars around the world have focused on a financial event unprecedented in size and scope — the historic Bell System divestiture set for New Year's Eve, 1983. At the time of divestiture, the total capital of the consolidated System will approximate 120 billion dollars, undoubtedly the world's largest commitment of investors' funds to a single enterprise. The System's parent, AT&T, has some 3.2 million share owners, representing by far the broadest dispersion of equity ownership in corporate annals. AT&T shares — designated by the stock ticker symbol T — are consistently among those most heavily traded on the nation's stock exchanges. The Bell System has long been foremost among corporations drawing on the capital markets for new investment funds — in both equity and debt form. An enterprise of such superlatives of size necessarily has a unique and forceful presence in the financial markets.

It is no wonder, then, that the approaching divestiture commands the attention of investors and the investment community. A multitude of studies assessing the likely operating and financial effects of this unprecedented event have been published. Several major investment firms also have established special funds in which AT&T's present share owners may concentrate their holdings emanating from the divestiture. And Wall Street is preparing for the greatly expanded trading activity expected to result. With the formation of seven new regional corporate entities, AT&T's 3.2 million share owner accounts, holding nearly one billion shares, will form about 22 million accounts, holding about 1.7 billion shares of the eight successor companies.

The singular character of the occasion prompts some reflections on the unique financial history of the Bell System. Although we conventionally number its



years from 1876, when the telephone was first introduced at the nation's Centennial celebration, the early years were a hectic period of acquisition, consolidation, and the gradual elimination of duplicate local telephone service. In 1879, the stock price of National Bell Telephone Company — one of the Bell System's forebears — rose from 50 dollars a share to about 1,000 dollars a share in an eight-month period. This suggests an early high-tech performance of the sort seen recently in the bullish equity market of the 1980s. And, in 1905, there was a coup resulting in the transfer of control of AT&T from Boston to New York City and the return of Theodore N. Vail as president of AT&T, an episode somewhat analogous to contests for control evidenced in the modern corporate world.

THE STRUCTURE THAT STOOD FOR 60 YEARS

The Bell System, and its relationship with the public, emerged in its present form in the years following World War I. The corporate structure that evolved at that time remained much the same for the next 60 years. Regulation at the state level was pervasive, although interstate telephone traffic was then under the jurisdiction of the Interstate Commerce Commission. Universal telephone service was a common objective of the System and its regulators. It was during the 1920s that the basic foundations of Bell System financial policies were set down.

The specific financial policies of an enterprise must derive from its basic operating philosophy. For the Bell Sys-

tem, the enduring statement of its fundamental policy was succinctly stated by AT&T president Walter S. Gifford in an oft-quoted speech delivered to the National Association of Railroad and Utilities Commissioners in 1927: "the best possible telephone service at the lowest cost consistent with financial safety." For the Bell System, a highly capital-intensive enterprise responsible for a major portion of the nation's telephone service, this statement implies a special obligation to assure its ability to raise the capital needed to finance its growth on sound terms.

This statement of fundamental operating policy has given rise to three cardinal elements of financial policy for the Bell System. The first is a dedication to a conservative financial structure. Most businesses find it advantageous to employ some measure of debt in their capital structures, not only to draw on a substantial source of investment capital but also because of the associated cost and income-tax benefits inherent in the use of debt. Excessive use of debt, however, will inevitably erode investor confidence and severely diminish a firm's ability to attract new capital. The Bell System has consistently sought to keep the proportion of debt in its capital structure at a reasonable level in order to preserve a high-grade credit rating. This assures access to the broadest range of investors in debt securities and provides a margin of borrowing power for periods when it is impracticable to raise equity capital.

The second major element of the Bell System's financial policy is an unswerving commitment to fair treatment of its equity investors. Essentially, this means earning a return on equity investment that is competitive with alternative equity investments, risks considered. Fair treatment also includes the payment of reasonable dividends. Because its earnings characteristically have been less volatile than those of manufacturing companies, AT&T's dividend rate as a percentage of earnings per

share has tended to be higher than is typical of manufacturing companies.

The third element is recognition of the need to be flexible in using various modes of financing. Conditions in the economy and in the financial markets are changing continually, and investor preferences vary from period to period. Moreover, internal forces affecting the financing of an enterprise also are likely to fluctuate. The seeker of capital must adapt to such changes as they occur. It has been said aptly that the history of organizations and nations is littered with the corpses of enterprises that failed to respond adequately to the demands of the environment for change.

These centerpiece policies have governed the Bell System's financial operations throughout the nearly six decades of its modern form.

After a brief spurt of postwar inflation, the 1920s became a period of remarkably stable prices and interest rates, increasing corporate earnings, and a dramatically rising stock market — culminating in a spectacular blow-off at the end of the decade. Early in this period, the Bell System successfully completed a rate-increase program to restore its earnings from the low level reached at the end of World War I. The historic nine-dollar dividend was established, and a policy of maintaining debt at one-third of total capital was adopted.

AT&T's earnings per share improved over these years to competitive levels, but the dividend was held at nine dollars to build a substantial surplus. The company's bylaws provided for preemptive rights; share owners were periodically afforded an opportunity to acquire new shares at favorable prices — thus improving their return. In these years, despite a tripling of its total capital, the System was able to bring its debt ratio down from 46 percent to about the one-third objective, and to treat its share owners fairly as well. The number of AT&T share owners grew from 140 thousand to 470 thousand during this period.

The 1930s were ushered in by a precipitous decline in stock prices and the Great Depression. While Bell System revenues did not suffer the drastic drop experienced in the manufacturing sector, they nonetheless fell by 40 percent, compared to a decline of only 16 percent for the electric-utility industry as a whole. The price of AT&T stock fell from a high of 310 dollars in 1929 to 70 dollars in 1932.

In this environment, two aspects of the Bell System experience stand out. First, because of its modest debt burden, it was able to survive. In contrast, many over-leveraged electric utilities and railroads went bankrupt, wiping out whole classes of investors. Second, the nine-dollar dividend was continued throughout the Depression years — giving T its

reputation as the bluest of blue chips and a "widows' and orphans'" stock. Earnings during these years, however, did not cover the dividend requirements, and the surplus built up during the '20s was drawn upon. Cash flow was adequate to maintain the dividends because of the sharply reduced construction requirements during the period.

The World War II period was marked largely by restraints imposed by the nation's dedicating its resources to the war effort. Backlogs of demand for civilian goods and services built up, including almost two million unfilled orders for telephone service. Despite wartime wage and price controls, inflationary pressures became manifest. Interest rates, however, were kept artificially low through government intervention.

A ROCK AND A HARD PLACE

In the early post-World War II years, interest rates continued to be held at artificially low levels but, with the cessation of wage and price controls, previously suppressed inflationary pressures erupted with full force. Nonregulated industries raised prices to meet the increased costs of labor and material, and the reported earnings of such industries soared. In contrast, the Bell System was unable to raise its rates without the approval of regulators, who were tortuously slow in recognizing the 40-to-60-percent increase in costs over the prewar levels. As a result, the Bell System's rate of return on investment fell to Depression-era levels, and this was reflected in the market price of its stock. Yet there was the huge need for new capital to meet the large backlog of unfilled orders for telephone service.

In these circumstances, AT&T could not mount a rights offering of common stock to meet its capital needs without pricing stock so low that the company's earnings per share would be diluted severely. Instead, AT&T chose to offer straight debt interspersed with offers of convertible debentures through pre-emptive rights to share owners. These convertibles had distinctive features. They required additional payment upon conversion — thus increasing the ultimate amount of equity capital raised. They could be converted in a relatively short period after issuance. And there was an unusual provision that set the conversion price per share below the market price prevailing at the time of the offer — but not so much below current market as would have been required in a direct offer of common aimed at generating an equivalent amount of new equity capital. Indeed, it is questionable whether direct common-stock offers of equivalent size in the environment in which these post-World War II convertibles were offered could have been absorbed without disastrous discounts from existing market prices. In contrast, the debentures were subsequently converted as the price and

demand for the stock manifested itself. Thus, new stock resulting from the use of convertibles was absorbed gradually rather than through large and possibly indigestible bursts.

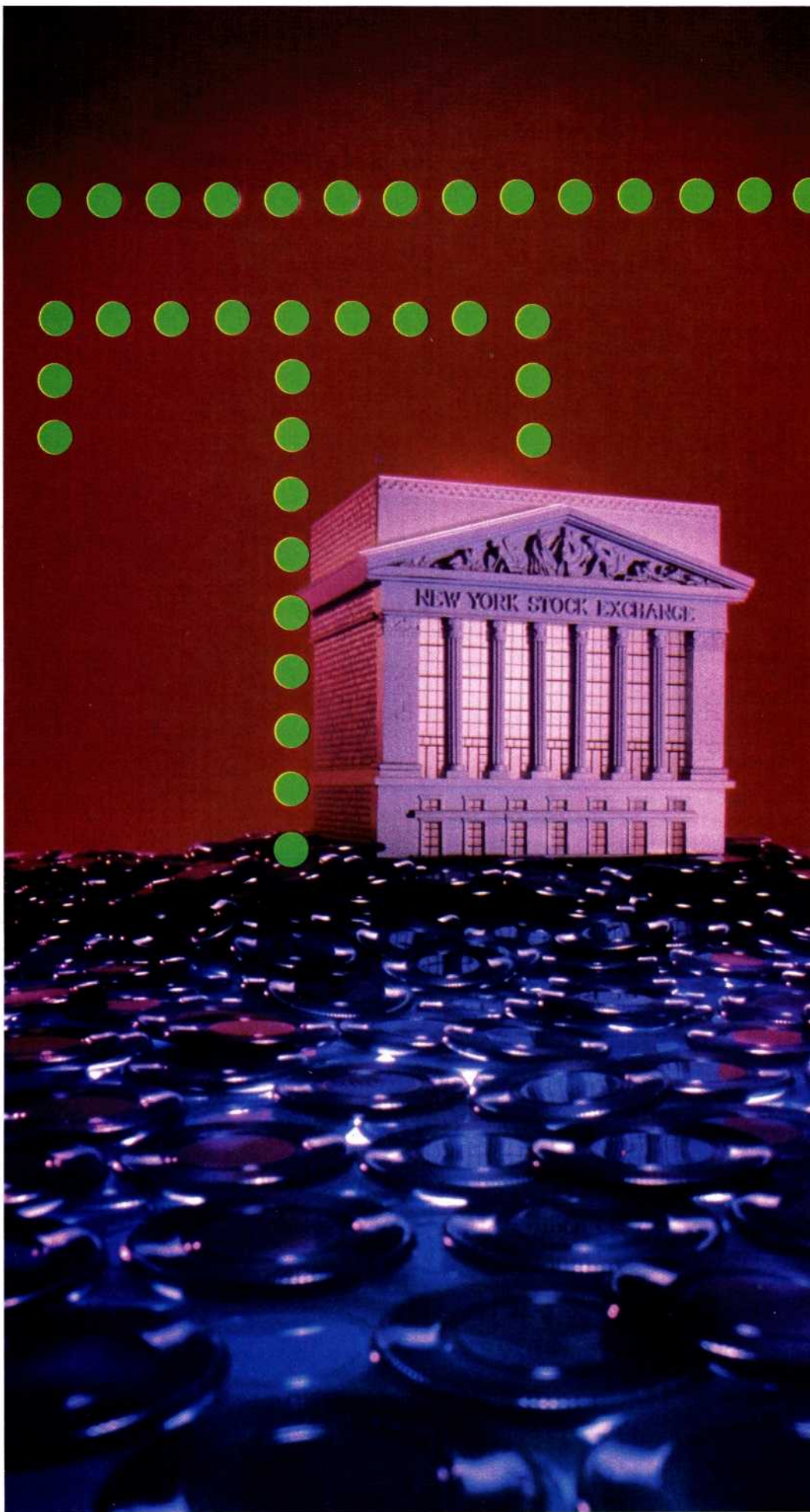
In those early postwar years, the System also resumed an earlier practice of making periodic offers of shares to employees for subscription under payroll deductions at a price 15 percent below market. Employees became a significant source of equity funds, and the discount from market, approved in advance by share owners, approximated that which would be required for a straight stock offering.

By the late 1940s, as a consequence of the straight debt/convertible debt financing program, the System's debt ratio was in the neighborhood of 50 percent, compared to the range of 30-to-40 percent that was then the System's objective. A significant portion of this debt, however, was in convertible form, so there was the prospect that the debt ratio eventually could be brought down to the objective range.

Into the early 1950s, the System aggressively sought rate relief, but the regulatory authorities again were slow in granting the increases required. And it was well into the 1950s before this rate activity, in combination with the effects of rapid technological improvements, produced acceptable earnings. Better earnings brought about conversions of the appropriate debentures; the debt ratio was reduced to the middle of its objective range, setting the stage for a balanced program of debt/equity financing during the years 1955 through 1965.

In the latter 1950s, a pervasive change in investor preferences became evident. By 1958, the concept of total return on equity investment — both dividend yield and market appreciation — had gained wide acceptance. For the first time, the expectation of growth in both per-share earnings and in market price drove common-stock dividend yields below those available on high-grade bonds. AT&T at that time — with its vaunted and long-continued nine-dollar dividend — was almost alone among major stocks not showing a record of both dividend increases and substantial price appreciation. Clearly, a change in stance was required if AT&T was to remain competitive in the equity market. By that time, fortunately, its earnings had improved, its surplus position had been restored, and the debt ratio was near its objective level. Accordingly, the company decided to split the stock three-for-one and to increase the dividend for the first time since the nine-dollar dividend was established in the early 1920s.

Investors responded enthusiastically, and the market price of AT&T's stock surged upward. By 1961, AT&T's shareholder list had grown to two million. Two



large direct-stock offerings through pre-emptive rights to share owners also were mounted in 1961 and 1964. Demand for AT&T stock was strong enough to permit setting the offering price in each case at a significant premium above book value, thus enhancing the per-share earnings growth so desired by investors.

It is axiomatic that the time to issue equity is when conditions are favorable, and such conditions did prevail in abundant measure at the time of AT&T's 1961 and 1964 offerings. The Bell System's debt ratio after the 1964 offering, however, was in the lower portion of its objective range. By that time, the corporate community generally accepted the proposition that dramatic Depression/boom swings in our economy could be prevented, or at least mitigated, and that corporations might therefore safely carry a higher level of debt than was previously considered appropriate. The Bell System accordingly concluded that it might employ debt financing almost exclusively for a period, with the intention of testing for the appropriate debt ratio under what it perceived to be altered economic circumstances. The appropriate level, the company decided, might be found to be in the range of 40-to-45 percent.

In the late 1960s, however, events occurred that put considerable pressure on the System's financing program. Fueled by the escalating conflict in Vietnam and massive federal social programs, the inflation rate began a long rise, accompanied by increasing interest rates. The System's capital needs to finance its building program rose markedly because of increased construction and higher prices. System construction requirements were further increased as service problems surfaced in the late 1960s, notably in New York City but elsewhere as well. Operating costs were increased — again by inflationary pressures and by the need to restore service levels — with the result that the System's return on investment declined. It was once again necessary to mount a rate-increase program aimed at restoring adequate earnings.

DEBT-MARKET MANAGEMENT

Large capital requirements, high interest rates, and lowered earnings — combined with an investor perception that regulatory lag impeded the restoration of adequate earnings levels — forced the price of T into a decline. Although its share owner list had grown to three million, AT&T stock in 1970 was selling below its book value, making it impracticable to consider straight stock offerings through pre-emptive rights as a means of meeting the System's mounting capital requirements.

In these circumstances, the System was forced to rely heavily on the debt market — no longer voluntarily to "test" the

appropriate debt ratio, but as a matter of sheer necessity. Debt issues of Bell's constituent companies were offered in size and at intervals that were deemed close to the ability of the debt market to absorb. Even so, the amounts raised in the conventional debt market were insufficient to meet the System's capital needs. Because the market price of T was depressed — which effectively barred entering the equity market with common-stock issues — alternative financing measures were necessary.

In 1968, the System initiated a program by which the operating companies would begin borrowing in the short-term debt market through bank loans and the issuance of commercial paper. Previously, it had been System policy to finance construction expenditures in advance and to maintain a pool of funds at AT&T on which the operating companies could draw, pending their periodic, permanent financing issues. This short-term financing program served to supplement the System's borrowing in the long-term market, but it was necessarily a one-time measure. By 1970, the level of System short-term debt was up to that considered prudent by reasonable tests; further increases in the amount of such short-term borrowings were no longer available as a source of meeting ongoing capital needs.

In 1970, the System again faced the need for a significant amount of new capital (approximately 1.5 billion dollars) to supplement the amount that might be raised in the conventional long-term debt market. Various alternatives were considered. One possibility was especially interesting: selling small-denomination debentures to the public. But the Bell System's financial influence soon became evident. When word got out that such a move was being considered, U.S. Treasury Department representatives expressed concern that it might have an adverse effect on the sale of Savings Bonds. Furthermore, the thrift industry feared the sale would cause a serious drain on savings deposits. Finally, the idea was abandoned because it was uncertain that 1.5 billion dollars could be raised in this fashion. Moreover, there might be an overlap with sales in the straight debt market, and the offering would cost the company more than conventional debenture issues.

Though the company deemed a straight offering of common stock impracticable in 1970, the share owners nonetheless represented a prospective source of new capital that would not impinge on the System's continuing heavy sales in the straight debt market — sales that were being absorbed largely by institutional investors. So, in a rather novel approach, share owners were offered an opportunity to subscribe through pre-emptive rights to an offering of 1.5 billion dollars of debentures with war-

rants. Every 100 dollars of debentures was accompanied by two warrants, each permitting the purchase of a share of AT&T at 52 dollars at any time in the ensuing five years. The market value of AT&T shares was about 47 dollars when the offer was made. The debentures provided a going market rate of interest, and the rights value was set by the market estimate of the likelihood that T's price would exceed 52 dollars a share at any time in the next five years. In that event, the company also would have a prospective source of substantial additional equity capital.

DEBENTURES WITH WARRANTS

The sale was a success, and the System raised the additional funds required. Unfortunately, the equity market in the following five years did not carry T's price materially above 52 dollars. The warrants expired largely unexercised. Nonetheless, share owners were treated fairly. Those who subscribed obtained debentures at a then-going rate of interest. Those who sold their rights or the warrants obtained through subscription gained additional benefits. Another interesting aspect of this financing is that the volume of warrants involved — some 30 million — prompted the New York Stock Exchange, for the first time, to authorize the trading of warrants on the Exchange.

The following years saw further extraordinary measures to supplement the capital raised, because the System continued to issue large sums of straight debt. In 1971, concern about the rising debt ratio and its effect on the System's credit standing persuaded the company to sell preferred stock. The amount required, however — again, about 1.5 billion dollars — was much larger than the estimated market for this class of security. This time an offering of convertible preferred stock was selected. Some 1.37 billion dollars — then the largest stock sale on record — was successfully raised by this device. And in 1972 — still faced with needs greater than the straight debt market could supply and still unable to issue straight stock at a satisfactory price — the System was able to negotiate a large private placement with major insurance companies for the sale of 375 million dollars in long-term debt and 625 million dollars in nonconvertible preferred stock.

The Bell System's debt ratio at the end of 1972 had risen to about 47 percent; it was approaching or exceeding the limit that could be maintained prudently. Some relief from the persistent heavy capital needs was gained in the ensuing years by the restoration of service standards; by the advent of investment tax incentives that reduced external capital requirements; and by the substantial amounts of equity capital supplied by the Dividend Reinvestment Stock and Purchase Plan and the portion of the

Bell System Savings Plans devoted to the purchase of AT&T stock. Also, in 1973, share owners approved the waiver of pre-emptive rights. Considering the scale of modern-day equity financing, this provision had become something of an anachronism. Its elimination permitted the subsequent offerings of straight stock on much better terms, facilitating the System's financing and benefiting the share owners as well.

Since then, stock offerings combined with equity raised through the dividend reinvestment plan and the savings plan, have reduced the System's debt ratio to a level of about 41 percent.

Earnings have improved in the past 10 years, permitting a succession of dividend increases that have treated share owners fairly in a highly inflationary period. The market price of T also has improved enough to allow two billion-dollar stock sales — one in December 1982, and another shortly after, in March 1983. Both issues were record setters in terms of size — the first raised about 1.04 billion and the second 1.14 billion dollars — and both sold almost immediately. At about the same time as the second AT&T stock issue, a number of operating companies successfully returned to the debt market for the first time since the divestiture was announced. Despite the success of these capital-raising activities, the prolonged debate in the regulatory arena, in Congress, and in the courts concerning the System's future structure and permitted spheres of operations has likely moderated the price of T. Wall Street is not comfortable with uncertainty.

And the uncertainties concerning structure and spheres of operations — addressed by the Modified Final Judgment — have been replaced by new uncertainties arising from the monumentally complex task of implementing divestiture. How will it all turn out? In due course, the uncertainties will be resolved as the successor companies begin operations and evidence their investment worth. Meanwhile, it must be concluded that the System approaches divestiture in reasonably sound condition — certainly much more sound than some 10 years earlier.

These, then, are some of the highlights of the financial heritage to which the separate entities emerging from the divestiture fall heir. Each of these companies, in time, will shape its own character, its own fundamental policy, and its own financial objectives. This writer can hardly doubt, however, that the cardinal elements that have marked Bell System financial history — sound financial structure, fair treatment of investors, and adaptability to changing conditions — will figure prominently in the formulation of the tenets by which these new and exciting entities will guide themselves. ■

A CAPITAL MOTIF

BY LOUIS GALAMBOS

The rise of giant corporations, technological innovation, and government oversight played major roles in shaping the Bell System during its first century.

Gardiner G. Hubbard was a shrewd man with a knack for promotion. His conservative appearance — those wire-rimmed glasses and the long, full beard — might have made you think he was just another cautious New Englander with his eyes turned to the past. But you would have been wrong.

Hubbard was a man of vision who put his confidence and cash on the line to support Alexander Graham Bell when the telephone was still just a dream. In the late 1870s, after the invention was successfully patented, Hubbard helped his son-in-law get the original enterprise off the ground. He had grand plans for the future of the telephone.

But even Hubbard would find it difficult to understand the Bell System after its century of rapid economic growth. As we look back over those 100 years, three dramatic developments stand out: the rise of giant corporations staffed by professional managers; the increasing importance of technological and organizational innovation in business; and the expanding role of government in every aspect of economic life.

When Hubbard was helping Bell get started, most businesses in the United States were small and controlled by an owner-operator. Few of those businesses were incorporated. Most — like the early Bell enterprise — had little capital, especially working capital. They had a small workforce and usually specialized in one product or function. While the bankruptcy rate for these companies was high, this style of small, specialized business was responsible for the longest phase of U.S. economic expansion.

Of course, a few companies were different. Some of the country's railroads grew in the late 19th century into very large corporate combines. There were, as well, large companies in manufacturing and in communications scattered around the country. In fact, the nation's

largest firm was in communications — the Western Union Company, a formidable Bell competitor in the late 1870s.

In the years that followed the successful establishment of the Bell System, the exception became the rule in American business. Great corporations came to dominate the nation's industries. These giant enterprises were, increasingly, run by professional managers who were specialists; they created elaborate controls in order to monitor their firms' operations. New forms of competition emerged — through large-scale advertising campaigns, for example. Mass distribution was the necessary complement to mass production, and both became hallmarks of the American style of enterprise.

In this 20th-century setting, technological and organizational innovation replaced the acquisition of new resources as the key element in the country's economic development. To promote growth, U.S. businesses had to come up with new and better products, improve their productivity, and manage change efficiently. Major firms began investing substantial sums in research and development. Business entered the age of highly organized science and engineering and a new age in business-government relations.

In Hubbard's day (when neither he nor any other American had to pay income taxes), the government seldom figured very heavily in business decision making. If it did, it was most often when either the federal or a state government provided some help for those entrepreneurs taking advantage of America's great store of natural resources. Some of the railroads, for instance, were partly subsidized by the federal government. But, clearly, the government's most important roles were protecting private property, and ensuring that the world's largest free market — the market we had here at home — remained open to U.S. business interests.

However, Americans began to change their local, state, and federal govern-

ments to give them a more active role in the nation's economy. New regulations were passed, for example, in an effort to control the country's railroads. State legislatures and the U.S. Congress imposed new controls on banks and insurance companies. Conservation laws were introduced. Antitrust became public policy. While many of the new laws were passed at the behest of liberal reformers, some were in answer to demands from business itself: shippers wanting railroads controlled; oil producers wanting prices stabilized; bankers seeking monetary policies that would eliminate wild fluctuations in the economy.

By the end of the 1930s, the government was an important factor in most major business decisions, especially those made by the largest, most visible firms. By the end of the 1970s, the United States had a very large administrative state that directly controlled about 20 percent of the nation's gross national product and had a substantial degree of influence on how the rest was used.

The Bell System played a major role in all three of these revolutionary changes. The tiny, capital-poor telephone venture of the late 1870s grew into the largest corporation in the world. And it did so in an unusual way. Most other corporations became highly centralized as top management consolidated its control and brought the entire organization under its oversight. This phase of centralized operations usually lasted for several decades. Then, however, after the companies began to diversify their operations and to extend their business into new areas at home and abroad, the centralized firm ran into trouble. Managers were forced to decentralize authority so that the business could continue to be run efficiently and innovation could be managed successfully.

The Bell System was different. It started out as a highly decentralized organization. From the very beginning, the Bell companies were encouraged to develop

business in their areas. Later, when long distance transmission became possible, a separate firm, the original American Telephone and Telegraph Company, was organized to operate this part of the business. Western Electric, the manufacturing organization, was also a separate firm. This type of decentralized system let Bell managers adjust to local conditions and promote their business without always waiting on directives from some distant headquarters.

As the industry's early expansive phase ended and a higher degree of coordination became technologically desirable and administratively feasible, the Bell System began to change. In the early years of the 20th century, under the leadership of Theodore N. Vail, the Bell

enterprise acquired its modern organizational structure.

One crucial part of the Vail agenda involved tightening the central control of certain essential activities — in finance and technology, for instance — without sacrificing the advantages of a decentralized and, hence, flexible system. AT&T had by then been transformed into the central command post of the Bell operations. Under Vail's direction, AT&T began to provide more leadership and to develop better fiscal controls for the System. But the change was a matter of degree; even when Vail had completed his work, the Bell enterprise still was more decentralized than most American industrial corporations of that day. Other firms left few decisions in the

hands of managers down the line. The Bell System did. Local, statewide, and regional operating companies had degrees of autonomy and could continue to adjust to local conditions — a most unusual policy for that era of business history. This distinctive style of organization let the Bell System operate efficiently over a vast geographical area without experiencing the kinds of managerial problems that more centralized firms encountered.

Vail also led the Bell companies into the era of government regulation. By 1907, the states had begun to create regulatory commissions, and the federal government also was becoming involved with the industry. By recasting the company's mission, Vail embraced rather than fought reasonable state and federal regulations. The Bell System learned to coexist with a more active government without sacrificing its efficiency as a source of vital public services or as a private, profit-making enterprise.

Government regulation in this case did not inhibit technological innovation — in part, it seems, because AT&T's corporate leaders did not squander energy by blindly resisting the new government presence. Nor did they ignore their responsibilities to the public. Vail's concept of universal service dovetailed with the precepts of regulation, easing the Bell System through a transition that was very difficult for many other American businesses.

To keep the Bell System ahead of its competitors, Vail actively promoted technological innovation. Under his leadership, the company not only consolidated its research efforts but also laid the foundation for Bell Telephone Laboratories. After World War I had attracted attention to the need for technological development, many other American corporations began to organize their own laboratories — sometimes using the telephone company's as a model. Thus did the Bell companies help move the nation into a time of technologically centered economic growth. Without the growth achieved through technological change, the United States surely would have been unable, in the decades that followed, to maintain its high standard of living and its strong position in world markets.

The Bell System that Vail helped reorganize remained intact — though certainly not unchanged — for more than half a century. Now, of course, technological developments, the rise of competition, and changes in public policy have set the stage for AT&T to devise a new business strategy and a new structure for the industry. A new type of communications system — the third one in the past century — is being created for a nation long accustomed to universal service and newly attentive to the need for technological progress. ■



MINDS INTO MATTER

BY PAUL HAWKEN

Working smarter is the key in an economy increasingly geared to information.

Think of the American economy as *two* economies, not one. The first is the economy of the Industrial Age, a *mass* economy that produced in the last hundred years an overwhelming proliferation of manufactured products, cities, transport and communications systems, houses, and factories. The second economy is not so easily defined. It has been called the Information Age, an era in which the majority of the American workforce is engaged in the production, distribution, and dissemination of information in contradistinction to the production of goods. I prefer the term "informative economy." This transition has been occurring for decades, but became most obvious and rapid during the past decade.

The question for the Bell System is what role will the post-divestiture companies play in this transformation of the U.S. economy? The fact that the Bell System is undergoing the divestiture process during this transition in the economy may be more than mere coincidence. The role of the new companies in the economy will not be their role of yore, just as the economy of the next century will bear faint resemblance to the economy of the past.

The century-long period of industrial development parallels the birth and growth of the phone system. For example, in 1870, the United States had no steel industry to speak of. We imported our steel from Europe. Twenty years later, we were the world's leading supplier. This pattern was repeated in textiles, railroads, automobiles, housing, construction, energy, and machine tools. There wasn't a major industry in which America did not emerge as the largest producer. The rise of industrial civilization required of a communications system to interconnect all aspects of an expanding world of material civilization. Because growth produces differentiation, it requires increasing amounts of knowledge and information to coordinate and manage such growth. Beginning with Alexander Graham Bell's first transmission, the Bell System produced

a system wherein 182 million Bell and non-Bell phones can complete more than 60 quadrillion possible connections. In biology, that would be called a nervous system.

Seeing the economy as changing from an Industrial Age to an Information Age is not entirely revealing. After all, we need durable goods to survive. What we have learned, however, is that we cannot automatically dip into resources to supply our material needs without regard to the earth's physical capacity to supply those needs. Some call this the Age of Limits.

Many studies document the finiteness of natural resources and the seeming infiniteness of our wants. The Age of Limits exists *only* to the extent that we do not change how we produce, live, work, and function. We are moving to an Information Age not merely because of new technologies, but because only through the use of more information can we continue to grow, prosper, and thrive. The Bell System companies, whose function is to transmit, promote, and produce information, are critical to this transformation.

It is important to understand the root word: inform. To inform means to inspire or imbue an object with a higher quality or value. And why do we now need more information than ever before? Simple: Either we work smarter or we get poorer. To be smart requires knowledge. We are going into a profoundly more materialistic economy, an economy of radical scrutiny of time, energy, material. This scrutiny means that in the coming decades, virtually every product, manufacturing method, and service will be completely redesigned or newly constituted.

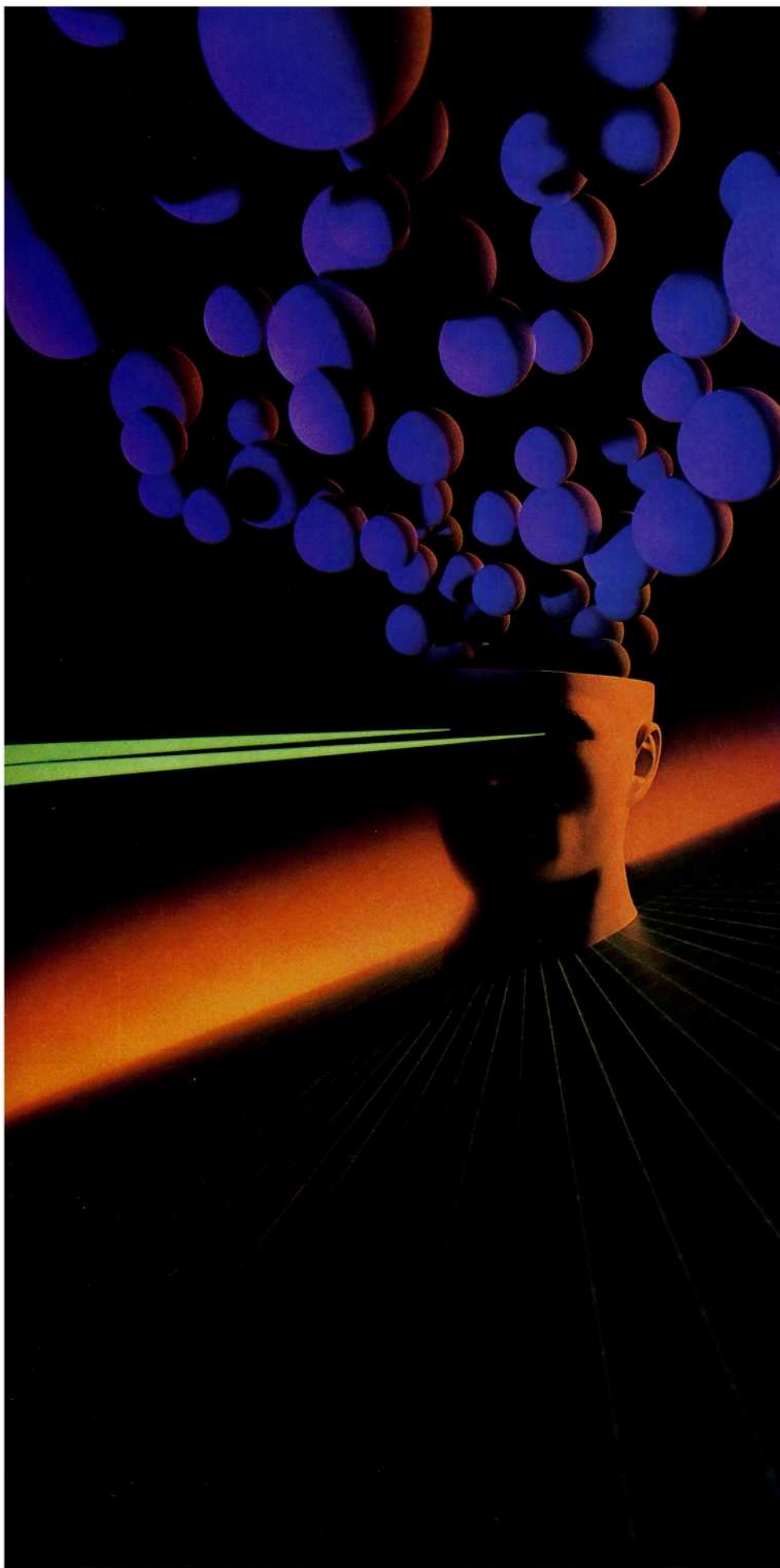
Because using more energy and resources makes our goods and services more expensive — and, therefore, less available — we will have to use fewer resources to produce and deliver the same or better goods *if* we are to maintain or improve our standard of living. Likewise, the amount of information per unit of production must increase. Manu-

facturers must seek ways to make a better product using fewer resources. This means using computers to process information, to keep inventories at a minimum, to monitor the flow of work or robots, or to design components.

Just as we did in the Industrial Revolution, we are completely remaking our work — only this time, the purpose is to make society information-rich so that it will work more effectively, efficiently, economically. In the Industrial Age, we put muscle into matter through the extensive use of fossil-fuel energy. In the Information Age, we are extending our minds into matter. If the old Bell System was akin to a nervous system, the new companies will resemble the mind.

The work environment of the United States will be permeated by machines that think; machines that formerly only did work will soon be fitted with chips that will monitor and adjust their function while relaying information to other machines. The rapidity of this change is unparalleled. In 1982, there were more computers than people on the planet (if you count the chips used in watches, microprocessors, and mainframes). By 1990, there will be nearly 80 million computer terminals in use every day. By the year 2000, I wouldn't be surprised to see the number of computer terminals redouble to 160 million — one for every adult in the country. By the end of the century, we'll regard computer illiteracy the way we regard English illiteracy today. The job of the Bell companies is simple and enormous — to connect these extensions of the human mind so that they can freely exchange information, imagery, data, and intelligence.

The Industrial Age was hooked together with copper wires. One billion circuit miles of cables created a communicating system that is the most complex mechanical system on earth. The old communications system was devised to transmit voice and words, by telephone, telegraph, telex. But the Information Age requires that same system to be able to do much more. Information must be coded, bundled, packeted, and trans-



MICHEL TCHEREVKOFF

lated into languages that will allow it to pass through the burgeoning diversity of technologies that are arising to meet the demand for this information.

I can sit at my desk and call any other phone on earth. Within 20 years, I expect my desktop computer to reach in seconds any other computer. It will exchange, ask for, and retrieve information, and relay it around the earth using laser bursts that will send a billion bits of data per second. It will be cheap, effective, reliable.

Because industry, banking, and commerce are busy, full, fast-moving, and complex, one might assume that we live in an efficient world. But that is far from the case. The greatest efficiencies are yet to come. Just as we look at the 1880s as a relatively somnolent period in terms of human efficiency, we will, a century hence, see the 1980s as quaint and curious. The key to progress lies almost completely in our ability to redesign every human function in the economy through the use of radically improved communications and information-generating systems.

For the economy to prosper and grow, Bell companies will need to continuously increase their productivity as they did during the first century of the System's existence. As resources become increasingly expensive, it will be the lessening costs of transmitting, developing, and disseminating information that will keep costs down, wages high, and economic growth possible. The amazing and constant flow of technologies developed by Bell Labs is critical because it will result in continued reductions in the cost of information. Since 1965, Bell System productivity has increased at an average rate of four percent per year; overall productivity of the economy has been growing at just one percent per year during the past decade. While the latter is disappointing, this differential is crucial to the health of the informative economy.

The companies that issue from the Bell System can no longer be mere distributors of information. They produce, market, and service the end user with the hardware and software necessary to generate and process the large increments of data and information that businesses and individuals will require. The fact that the Bell System companies are entering a market that is unregulated, feistily competitive, and quick changing, spells difficulty and opportunity. New technology alone cannot win the day for any company. The opportunity for the future rests with some very old virtues coupled with some very new technologies.

These qualities, embedded deeply into the ethics and values of the Bell System decades ago, are precisely the ones that will decide the winners and losers of the technology race. ■

RITES OF PASSAGE

BY W. BROOKE TUNSTALL

Cultivating a new culture to match new missions may be the most difficult task facing post-divestiture employees.

At AT&T operational headquarters in Basking Ridge, New Jersey, a remote 20-by-32-foot room serves as the status control center for the staggering job of disaggregating the Bell System — a job whose magnitude and complexity are only suggested by the component divestiture of 125 billion dollars in operating telephone company assets from the parent, AT&T. The walls of this “Corporate Divestiture Management Center” are adorned with timeline charts, schedules, and graphic representations of critical issues. A computer terminal in one corner instantly displays any one of the 300 corporate assumptions, 2,000 work activities, and/or 150 major events underlying divestiture planning. Yet nowhere in this room or in the computer’s memory can be found the single element that may ultimately be most critical to the enterprise’s success through divestiture and beyond. That element: corporate culture.

Clearly, the culture must be reshaped, adapted, reoriented to bring the value systems and expectations of Bell people into congruence with new missions — and to prepare employees for the competitive telecommunications battles looming ahead. No manager is charged specifically with the management of corporate culture. No task force is studying its dimensions. No committee is planning approaches to altering its underlying aspects.

The reason is that culture is as broad as the enterprise itself; as pervasive as a value system evolved over a century of service; as amorphous as the attitudes and expectations of one million employees. Thus, managing the required changes in culture is not an event underlying divestiture; rather, divestiture is one of the causal factors underlying change in culture. No one manager is assigned responsibility for managing the change because all managers must be responsible for it.

The road to such responsibility is nei-

ther broad nor well marked. The idea of managing corporate culture has only recently surfaced and is still considered an unknown art. No disciplined analytic method exists for an objective assessment of cultural attributes and their proportionate influence on corporate performance. No accepted conceptual model of corporate culture exists for diagnosis and orderly change of corporate culture requirements.

AN AMORPHOUS ELEMENT IN CORPORATE SUCCESS

In fact, there is not, as yet, even a clear consensus on how to define culture. Indeed, there appear to be almost as many definitions as definers. *Most definitions, however, might be summarized as descriptions of a general constellation of beliefs, mores, customs, value systems, behavioral norms, and ways of doing business that are unique to each corporation.* Taken together, the elements in a company’s culture encompass the very meaning of the organization, and increasingly, they are recognized as virtually a *sine qua non* for ultimate success. In fact, it has been observed that culture can play an equally significant role as either strategy or structure in the long-term performance of a company — most especially the large corporate organization experiencing significant changes in its markets and/or business environment.

In the fullness of time, this may be the Bell System’s greatest challenge. Corporate culture is, therefore, a concept that holds the fascinated attentions of Bell employees charged with helping steer the corporate ship through the stormy seas of divestiture.

The root causes for the Bell System’s impending transition lie in a decade of extended debate on whether or not — and how — the nation’s telecommunications industry should be opened to competition. Throughout the ’70s, scores of FCC dockets, dozens of private anti-trust suits, several proposed legislative

bills, and a Justice Department anti-trust suit combined in an avalanche of change. Decision after decision by governmental bodies moved the industry incrementally toward greater competition. Finally, in late 1981 and early 1982, the FCC’s Computer Inquiry II order and the divestiture agreement with the Department of Justice opened the floodgates of change.

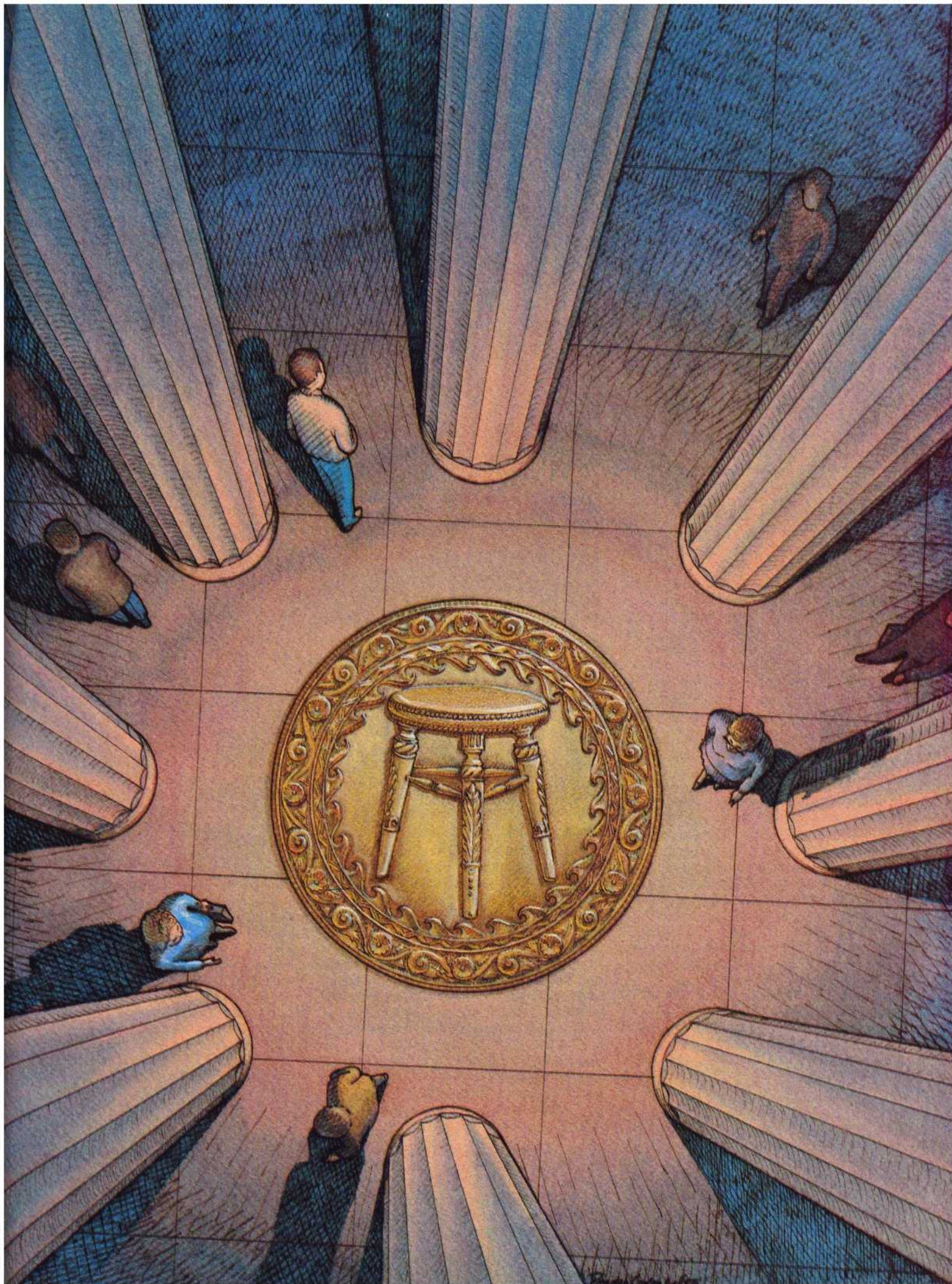
The magnitude of the structural changes flowing from these mandates can hardly be overstated. In simplest terms, the two government mandates call for the *disintegration* of the Bell System as the nation has known it. This, of course, strikes at the heart of Bell’s historical legacy — *its sense of unification* over the course of a century.

The culture shock created by these changes is difficult to exaggerate. In fact, when Bell System people began to verbalize their feelings on January 8, 1982 — the day the agreement to divest was announced — they spoke in metaphors of personal grief, almost as if they had been deserted, or as if there had been a death in the family. Gradually, the shock abated, helped along by occasional flashes of grim humor. “My initial reaction,” one company president said, “was that my best horse had just been shot out from under me.”

Every one of the Bell System’s employees knew that the world would be forever changed; that they would be working for new companies requiring new skills and new ways of doing things.

Of course, all of this is happening at the precise moment when the American business community is experiencing a virtual explosion of interest in corporate culture. “Corporate culture,” *The New York Times* has reported, “is the magic phrase that management consultants are breathing into the ears of American executives.”

Corporate culture appears to be an idea whose time has come. Yet no one seems to be doing much about it. Among the



reasons: Culture within the corporation is difficult to pin down, nearly impossible to quantify or measure, and remarkably resistant to change. However, culture can be influenced positively by consistent, thoughtful managerial action.

To be sure, no cookbook recipes for change are possible because each corporation's culture is made up of elements unique unto itself. But certain concepts will not change from corporation to corporation. The most basic of these is that managing cultural change is a three-step process:

— Management must understand the meaning and influence of corporate culture and must ascertain — largely through empirical methods — precisely the elements of its own culture.

— Cultural wheat must be separated from the chaff. Decisions must be made as to which elements are supportive of future goals and strategies and are to be retained, and which elements no longer are appropriate and must be changed.

— Appropriate actions must be taken to effect the required changes — in a way that leaves the desirable elements unaffected.

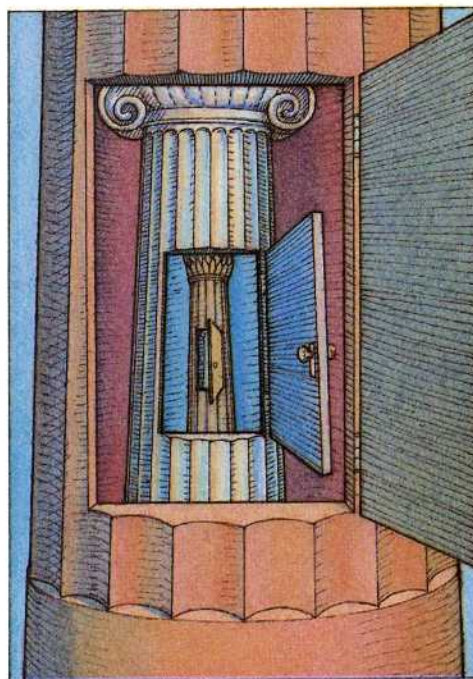
ASCERTAINING BELL'S CORPORATE CULTURE

It has been said of the Bell System that it contained all the necessary attributes of a nation: territory, idiomatic language, history, culture, and government. The assertion may have been slightly exaggerated, but its cultural component was unarguably accurate. That culture, in fact, generated the energy to drive the enterprise as it became the world's largest in terms of both assets and employees.

To understand Bell's culture, it is necessary to understand that it evolved in a precious way, to be directly supportive of the corporate mission. That mission: *to achieve universal service in a regulated environment*. Everything related to culture flowed accordingly: the kind of people Bell companies hired, their shared value system, and the infrastructure of processes to run the business. For most of this century, Bell System people were persuaded that the surest way to achieve universal service was to manage the entire telecommunications system "end-to-end" as a single entity, with both vertical and horizontal integration.

These two driving forces — the goal of universal service and the concept of end-to-end responsibility — shaped the network, guided Bell Laboratories' technology, permeated Western Electric manufacturing, forged operational methods and practices, even influenced depreciation schedules. Equally important, these forces fashioned a corporate culture entirely congruent with the

corporate mission. Significantly, neither the mission nor the culture evolved accidentally. They were molded successively by two historic Bell System leaders — Theodore N. Vail and Walter S. Gifford. It has been said of the former that if Alexander Graham Bell invented the telephone, then Vail invented the Bell System. Interestingly, Vail patterned the structure of the Bell System after



the U.S. government in its local/federal division of responsibilities. He then coined a six-word mission statement that would provide singular direction for the enterprise for more than 70 years: "One System, One Policy, Universal Service."

This doctrine became the driving force behind the integrated telephone network, pricing of products and services, and unified administrative systems — from Vail's day to the present.

Just as Vail provided the structural blueprint and mission, AT&T president Gifford in 1927 provided the "value system" to realize them. Gifford stated that the Bell System's goal was to strike a fair balance in the treatment of employees, customers, and shareholders. His philosophy was to "furnish the best possible service at the lowest possible cost, consistent with fair treatment of employees and share owners." This simple yet profound guideline, which permeated the Bell System's decision-making process, soon became symbolized as "the three-legged stool" — Gifford's vision of balanced responsibilities to customers, share owners, and employees.

Thus, Vail provided Bell employees with a *clarity of mission* and a *sense of unification* — and Gifford, a *sense of fairness* — that would establish patterns of managerial actions and employee relations up to the present day.

It is difficult to exaggerate the impact of Vail's "oneness" and Gifford's "fairness" doctrines on the attitudes of millions of employees through the years. Vail's ideal of universal service provided the common purpose that would unite and motivate generations of management and craftspeople alike. Gifford's concept of balancing the interests of employees, customers, and shareholders further defined that purpose. And in the interests of both ideal and concept, a mutual reinforcing set of elements evolved into the intrinsic descriptors of Bell's culture. What are these elements? The first involves treatment of employees — employees representing, of course, one leg of Gifford's stool — and a prominent part of the psychological contract between company and employee.

Lifetime careers, for example, are an essential aspect of the Bell culture. A high proportion of employees have spent all of their working lives within the corporate boundaries of the Bell System — many, especially among managerial ranks, in as many as 15 different assignments in a variety of departments and territories.

Career longevity is accompanied by *intense loyalty* to the company. Almost nationalistic in its fervor, corporate loyalty extends even into retirement when former Bell System employees are united as Telephone Pioneers of America.

A *quid pro quo* for their dedication and loyalty is Bell employees' *perception of fair treatment by the company*.

Employment security, good salary and benefit treatment, and enormous emphasis on employee safety are not constructs honored in the breach; they are facts of life under the benevolent protection of "Ma Bell." Over time, employee perception of fair treatment gradually crystallized into a sense that senior management cared — really cared — about each employee's welfare.

Concomitant with all of the foregoing cultural attributes has been Bell's policy of *up-from-the-ranks management succession*. Promotion from within is a deeply ingrained aspect of Bell System culture: One veteran manager wryly observed that if faced with the need for a troop of ballerinas, the company would reassign and retrain a group of telephone operators.

For all its strengths, such a self-contained employee-development system gives rise to mores which may, over time, tend to become less than completely productive. For example, there is throughout the Bell System a powerful *level consciousness* — that is, an extreme deference to the status inherent in each level of the managerial hierarchy. There is, as well, a powerful bias toward *consensus management* — a tendency exacerbated in years past by a functional organization structure that

required a high degree of coordination between and among departments.

Another cluster of cultural attributes relates to the second leg of the three-legged stool — customers. *Dedication to the service ethos* is an especially powerful, shared value among Bell System people. The importance of quality service is instilled early in every employee's career, with constant reinforcement by senior management along the way. The quality-of-service measurement system used in evaluating managerial performance, the anxiety attending publication of the "Green Book" of service indices each month, and the familiar prints of Angus MacDonald fighting a blizzard to keep the lines open — all of these were reminders of the System's emphasis on service.

Finally, the third of the stool's three legs — accountability to shareholders — is safeguarded by those elements of corporate culture that foster productivity and sound financial management.

Emphasis on productivity measurements and on customer service perhaps has been the most powerful shaper of the Bell value system. In fact, the competition among Bell companies for ever greater *operational efficiencies* has been so intense that redirecting this internal competition toward the external environment is now seen to be one of the post-divestiture companies' major managerial challenges in the 1980s. Already, however, the transferral of this internally competitive spirit to the marketplace can be witnessed in each of the regional companies and AT&T. *Fortune Magazine* recognized this shift when it quoted one of AT&T's consultants as saying, "I've never seen managers so willing to change."

Another dominant aspect of Bell's culture has been its *predisposition toward operational and technical skills*. Because management of the network has been the central core of the Bell System's historic mission, managers with technical/operational skills have tended to predominate — a fact borne out by the System's senior management profile.

From a strategic standpoint, senior officers in the operating companies and at AT&T have necessarily maintained a *strong focus on regulatory matters*. Former chairman John D. deButts once quoted a colleague as asking, "Wouldn't it be nice if on coming to work some morning we found ourselves thinking not about the FCC or the Justice Department or the state commissions or even the Congress, but thinking first about the customer?" In the absence of external competition, Bell management performance focused high-level attention on the industry's regulators, working assiduously to create a favorable regulatory climate in Bell territories.

These then are some of the most out-

standing Bell System cultural attributes. Taken together, they explain a great deal about the patterns of behavior and the expectations of generations of Bell System people. They resulted in extraordinary and extended success in protecting the well-being of employees, the investments of shareholders, and the quality of service to customers — in sum, a unified and universal service. Corporate mission and corporate culture have rarely been so well matched — a match that was sustained for decades, primarily because the environment remained largely unchanged. Then suddenly, as 1981 faded into 1982, it became clear that one enduring principle, universal service, had essentially been achieved, and the second, end-to-end responsibility, would have to be abandoned. As the regulated environment gave way to a competitive one, many of the bedrock philosophical doctrines of the Bell System would have to be overhauled to fit new realities.

SEPARATING CULTURAL WHEAT FROM CHAFF

Sensing such change in the wind, a conferee at an AT&T management seminar asked a senior manager if "in its ardor to become a successful competitive enterprise, the Bell System would become a 'shlock' outfit?" The question strikes at the very heart of what many employees fear most about the loss of cherished and still-valuable aspects of an idealistic cultural heritage.

Clearly, any tampering with the corporate value system must be executed with great care in order not to throw out the baby with the bath water.

It is recognized throughout the Bell System that any loss of faith among employees that the corporation has their best interests at heart would represent a severe setback, one not easily repaired. Thus, as this family of one million is broken apart and as hundreds of thousands of people are reassigned, Bell management must demonstrate consistently that the process is being undertaken with no lessened sense of caring about each employee as an individual. Obviously, the new companies will no longer be able to follow Vail's historic vision of oneness. But it is imperative that they not lose sight of Gifford's vision of fairness. AT&T recognizes, too, that in a competitive arena where service quality may provide the edge, it must continue to foster as a strong corporate value the service doctrine — buttressed even more than in the past by Western Electric's production skills and Bell Laboratories' technological innovativeness.

Efficiency of operations, so long enshrined in the corporate value system, also must be preserved in importance. Productivity rates in Bell companies have exceeded those of other industries because efficiency has been a

way of life permeating every job, and a primary element used in evaluating employee performance. It must remain that way for each of the new companies.

Other cultural characteristics need to be changed. These begin with the way people think about doing business on a daily basis, and extend to broadening the paths of managerial succession, as described in the following paragraphs.

Adapting the Managerial Mindset

As AT&T and the regional companies move more and more toward a fully competitive environment, the mindset of their management, up and down the line, will of necessity shift toward a market orientation — unquestionably a welcome change to senior managers long embroiled in a quagmire of regulatory, legal, and legislative matters.

Clearly, such a shift will affect not only the ways people think about doing business day to day, but also the way business is done. For instance, strategic planning will employ competitive-analysis techniques for the first time; a functional organizational structure will move further toward market-segmented lines-of-business structures; costing and pricing methodologies will move from a basis of cross subsidies and national price averaging to product-by-product and service-by-service computation schemes; capital-recovery formulas will be overhauled to recognize the shorter product life inherent in competitive products. Such changes already are reverberating intensely throughout all of the companies.

Conforming to a More "Risk-Oriented" Management

In a move toward a more competitive environment, management style must be adapted accordingly. In the process managers will recognize that marketplace uncertainty will replace regulatory uncertainty, and that cultural mores soon will change to value entrepreneurial types of managers more than in the past. In competitive industries that experience sharp shifts in market share and economic conditions, conservatism is tantamount to default in the marketplace. Unquestionably, managers of the future will be more inclined to risk-taking than to caretaking.

Accepting Organizational Change as a Continual Phenomenon

The "steady state" organizational structure, once part and parcel of the corporate culture in the Bell System, must continue — into the foreseeable future — to adapt and readapt to meet changing needs.

For a half century, the Bell System enjoyed a stable structure; one ideally suited to its regulated world. But in the past 10 years, two major reorganizations have been implemented, and now the System is poised for the third and by far the most far-reaching restructuring of

all. As strategies change to meet changing market conditions, so must organizations adapt to implement these strategies. Such adaptation will be a continuing phenomenon — one that must become a part of every employee's system of expectations.

Broadening the Routes to Power

Under regulation, operational and technical skills were held to be paramount. Line operating jobs were the seed-bed developmental assignments for high-potential managers to progress first to the coveted operating vice president spot in the operating companies and then beyond to levels of even higher responsibility at AT&T. In the future, with a substantial portion of the operating units divested, and with the success of competitive strategies highly dependent on technological development, marketing prowess, manufacturing know-how, and financial acumen, new patterns of executive succession may be more appropriate. This is not to say that operating line experience in the surviving regulated sector will no longer be a path to the top. It is to say that it may not be the only path.

MANAGEMENT ACTIONS TO EFFECT CHANGE IN CORPORATE CULTURE

Can a company deliberately change its culture, as it can its strategy or structure? As noted earlier, there are no cookbook recipes. But once a corporation's culture is defined, and its cultural attributes are analyzed to determine which should be preserved and which modified, actions can be taken to effect changes. Such actions are now under way in the Bell System.

Cultural changes cannot be delegated to the employee communications staff. They must begin at the top of the organization, with the chief executive officer and his inner circle of officers.

Chairman C. L. Brown began to set the stage for cultural change in a speech before the Commercial Club in Chicago — several years before the process of divestiture began. In that speech, Brown asserted, "There is a new telephone company in town...a high-technology business applying advanced marketing strategies to the satisfaction of highly sophisticated customer requirements." He questioned how apt a label "Ma Bell" was to describe such a business. He then asked his audience to pass the word that "Mother doesn't live here anymore."

For Bell employees, the statement carried strong signals about their culture, not least among them that symbols of the past — even so venerable a symbol as *Ma Bell* — should be set aside.

That the Bell System companies have a clear vision of their new mission is demonstrably evident. The process of strategic change already has begun with a striking effect on the employee

body. Managers and craftpeople are beginning to think of themselves as competitors. And, as the focus continues to shift from regulators to the marketplace, so too will the culture reflect this shift in outlook.

Of course, even the influence of leadership has its limits, particularly in large corporations where the principal management is far removed from day-to-day middle- and lower-management functions. Cultural norms, then, must be reoriented by changing the system of management — the many management processes, the organizational structure, and management style that form the engines that make the corporation go. In changing reward systems, in reorienting the resource allocation processes, in restructuring the organization and establishing its new identity, Bell is communicating clearly the patterns of values and behaviors it wants to achieve.

It is critically important to communicate to all employees in quite specific terms precisely what the corporate value system is — most especially in periods of change. In AT&T's case, a carefully recast document — "A Statement of Policy" — sets forth the corporation's evolving goals. From the first day of the divestiture announcement, key Bell officers have voiced clear messages of corporate positions and expectations. For example, when asked how he wanted the business to be viewed five years hence, chairman Brown replied: "I really want the business to be regarded as one that adapted itself to what the public expected of it, was not a prisoner of embedded thinking, was alert to opportunities, and was able to take its place in a different setting with the same high regard for ethical conduct in a well-managed business that it has always had."

To adapt appropriately, to think and act creatively, to maximize opportunities, to continue as a highly ethical, well-managed, powerful business are goals out of which behavioral norms and ways of doing business will be shaped in the future.

Another mechanism for effecting change in the corporate culture is management training that is explicitly geared to modifying behavior in support of new corporate values. The Bell Advanced Management Program — a developmental experience for high-performance fourth- and fifth-level managers — exemplified such training. It sought to prepare participants to create and implement strategies that would keep the company at the leading edge of change, and to anticipate and respond to strategic issues of the future in a rapidly changing environment. It emphasized entrepreneurship. Other examples abound, not the least being AT&T's Corporate Policy Seminars.

Professor Wickham Skinner of the

Harvard Business School has written: "Acquiring and developing the right talents for the business as it changes strategy, technology, and products requires more shrewd, wise, long-range planning than any other corporate endeavor." He might have added that recruiting the talent is a powerful if indirect means of influencing the corporate culture. In addition, problems of "culture clash" can be avoided by making certain that the individual value systems, personalities, and educational backgrounds of younger managers coming aboard are in harmony with the corporation's aims.

Anthropologist Emile Durkheim has proclaimed that shared symbols are necessary for cultural cohesion. By the same token, modification of symbols is a necessary component of change.

In AT&T's case, for example, the loss of the Bell name and logo is a serious loss. However, by continuing to use AT&T as a trade name, the corporation capitalizes on its longstanding reputation throughout the world. And in replacing the familiar Bell Seal with a globe girdled by graphic representations of electronic communications, AT&T has a new symbol which, as has been noted, "suggests new dimensions — of our business and our future."

Of course, not all symbology changes. The operating companies have been allowed by the presiding court to retain their names and the Bell Seal. And another long-standing symbol, a 1917-vintage 16-foot bronze statue personifying the Spirit of Communication, has been taken from atop AT&T's headquarters building at 195 Broadway in New York, refurbished, and placed in the lobby of the new headquarters building at 550 Madison Avenue. This statue, affectionately known to generations as Golden Boy, will continue to symbolize excellence in providing service — this time, around the world — in the years that follow divestiture.

With divestiture, the Bell System will experience a metamorphosis that would challenge the most boastful caterpillar. The organizational, technological, and operational complexities to be faced are without parallel. Yet, changing the corporate culture may well be the most difficult task facing management.

The fact that corporate culture has yet to be quantified makes it no less real, no less important as an ingredient in a corporation's fortunes than return on investment, market-share percentage, hurdle rates, or debt ratios. Chairman Brown summed up both the objective and the importance of the cultural transition when he said, "If we are able to adapt our marvelous culture to a different environment — and if we remember that the business in the '80s cannot be run by memory — we can set the course for the next century." ■

