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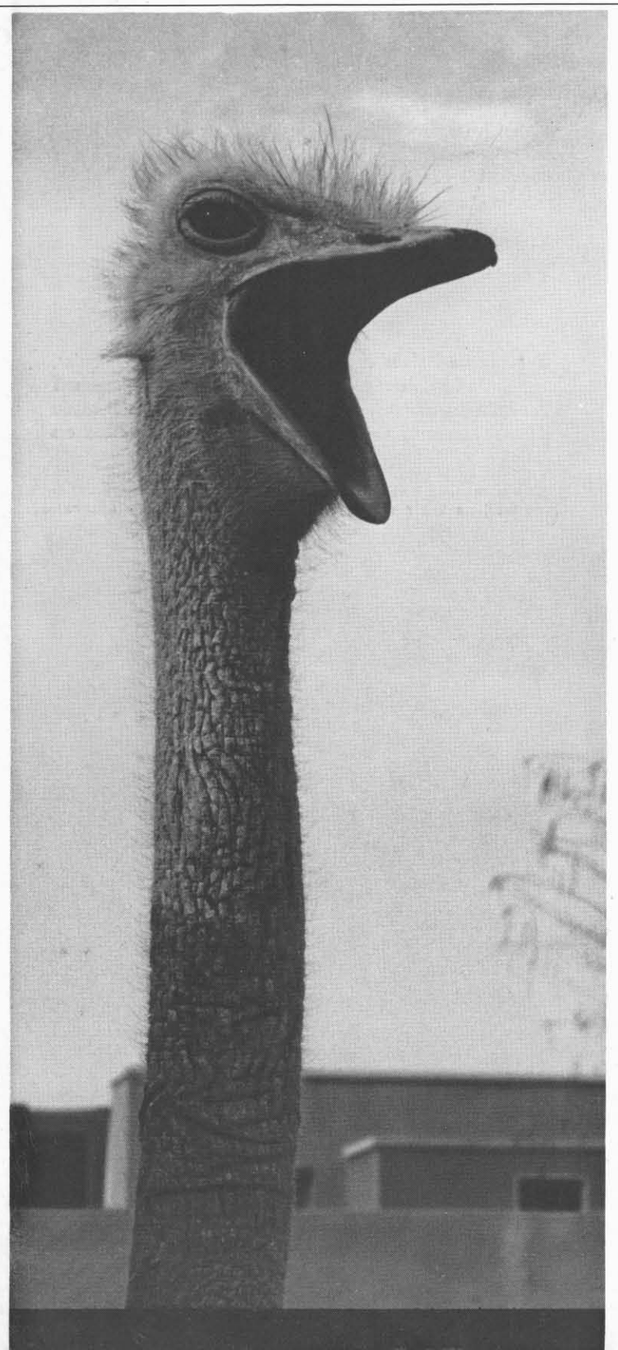

This six-foot-tall ostrich is one of the zoo's noisiest inhabitants.

A ZOO IS FOR LOOKING...AND LISTENING of his zoomates, his bawling tone can be ear shattering.

Another enormous but short-tempered beast is the rhinoceros that surprisingly enough makes mooing, cow-like sounds. Sometimes he just squeaks, much to the disappointment of zoo visitors who probably feel that such a powerful-looking beast would best show his might by charging about in a fit of anger. But he spends most of his waking hours placidly snuffling with vacuum-cleaner thoroughness over his patch of ground for leftover grass and alfalfa.

Whether it's feeding time or not, the hyena is probably the most inconsiderate animal in the zoo. Frequently, when all is quiet and even small boy visitors feel the need to talk in low tones, the hyena will let loose a hysterical, ghostly cackle that sounds so much like a human laugh out of control.

Strangely enough, it is a bird – the ostrich – that sounds quite fearsome and eerie to the zoo-goer who isn't familiar with his call. The male is particularly noisy. He will let out a long, bawling note similar to a lion's muffled roar and also thump his feet in a staccato-like "boom-boom-boom" that has all the power and reverberation of a bass drum. Another bird, the desert buzzard, usually stands around on one leg – according to his whim of the moment – surveying his audience with supercilious, beady eyes, occasionally grunting and emitting faint, reptilian hisses if disturbed.

As for the "quiet" zoo inhabitants, the giraffe, contrary to popular notion, has been known to make faint, mooing sounds, so is not entirely voiceless. The oryx, too, (a type of antelope) seldom makes a sound, but if in extreme pain or if fleeing for its life, can utter a piercing, bawling cry, much like the cry of the dainty, limpid-faced gazelle. At Riyadh Zoo they rarely make a sound at all other than that of a contented munching of leaves and twigs.

One animal not heard *or* seen at the zoo is the camel. There are no camels here: that honored and ancient beast has yet to change from a necessity to a curiosity in Arab life.

Actually, zoo animals neither act the same nor make as much noise as they might in their natural habitat; in the zoo there is no rule of survival of the fittest – no fear, no quick, violent death, no overwhelming pangs of hunger, no competition when seeking a mate to cause them to give vent to voice.

Since 1957 when the Riyadh Zoo was built by King Saud for the public, the most familiar zoo sounds of all are those of pleasure, of laughter, of excitement. Most of these sounds are made by wide-eyed children – the same the world over – who derive so much joy and knowledge from their trips to the Riyadh Zoo, where there is much to look at – and much to listen to. ■

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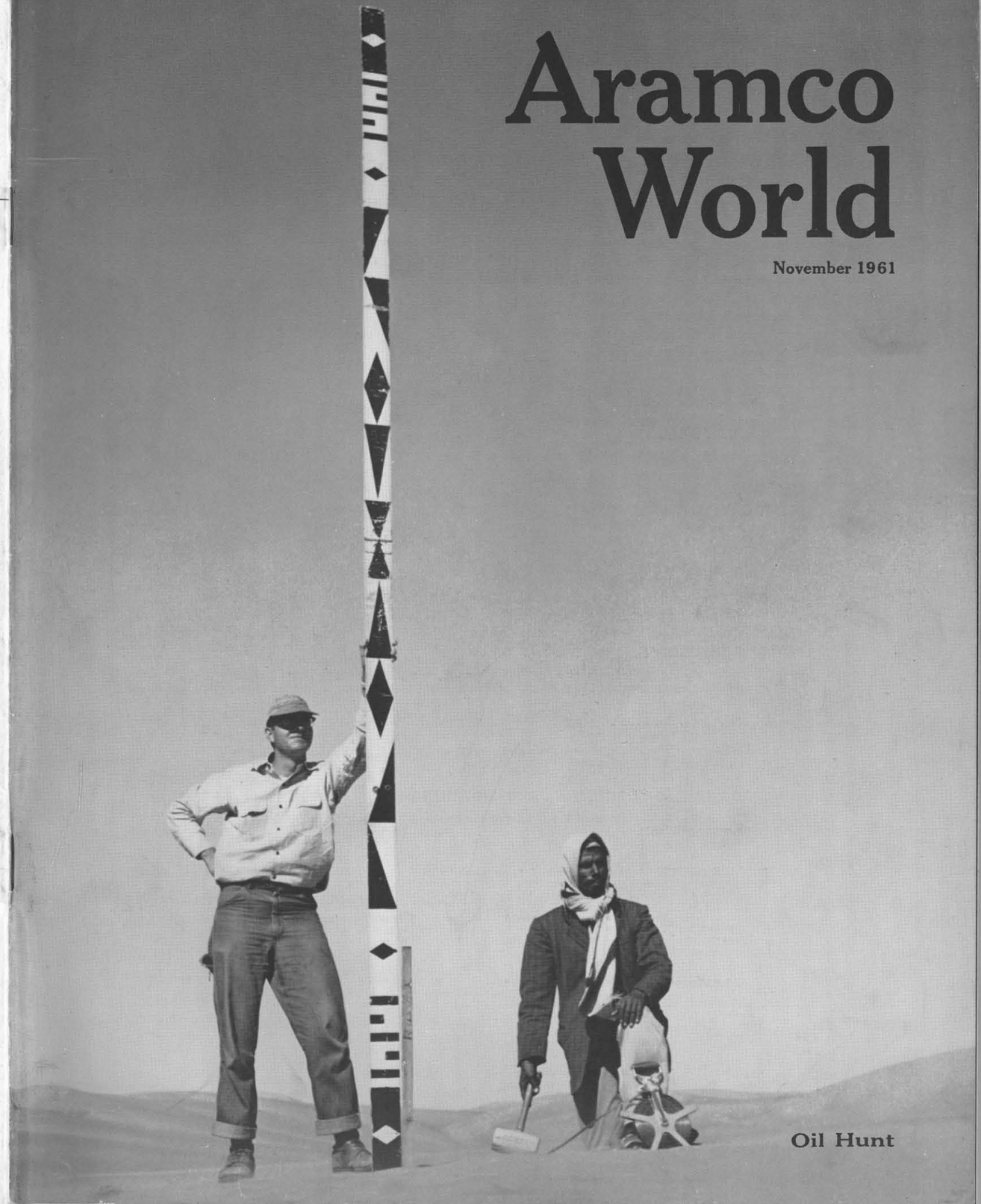
November 1961



Oil Hunt

Aramco World

NOVEMBER 1961 VOLUME 12 NO. 9

FRONT COVER: Surveying the "shot line" that determines explosion sites for seismic exploration calls for teamwork. Part of the team, shown on the cover, positions the stadia rod. Viewed through the telescope of a transit by other members of the team, shown on page 4, graduations (markings) on the stadia rod are used to map out the distance between the stadia rod and the transit.

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SEARCH BENEATH THE SANDS

Even though they sometimes compare their work with peering through a keyhole into a dark room, Aramco geologists accurately map Saudi Arabia's subsurface

THE pilot raised his right hand to the ceiling of the cockpit and turned a knob to adjust the trim tabs on the wings of the gently quivering Beaver. *Aramco N-730-A* seemed to hang suspended in the stillness of time and space at 9,000 feet.

Below the plane, the "sand mountains" – giant dunes stippled with iron-oxide-coated sand grains – rose to heights of 200, 400, even 500 feet. Here in the eastern Rub' al-Khali, the majestic dune complexes, their knife-edge crests moving slowly under the wind in long sinuous patterns, began to draw together to form linked islands.

Far ahead on the vast elongated floor of a *sabkhah* that suddenly hove into sight, a line of white cubes stood minute and gleaming in the sun. The pilot snapped a toggle switch and lifted a small microphone to his lips. His voice could not be heard above the roar of the engine over the VHF radiotelephone as he talked to the shiny, white island ahead. Slowly the white cubes on the salt flat assumed the shapes of big house trailers. A runway was clearly delineated by the lighter coloring of the pulverized *sabkhah* crust which had been powdered by vehicle and airplane tires.

An orange wind sock stood out limply, and to the right

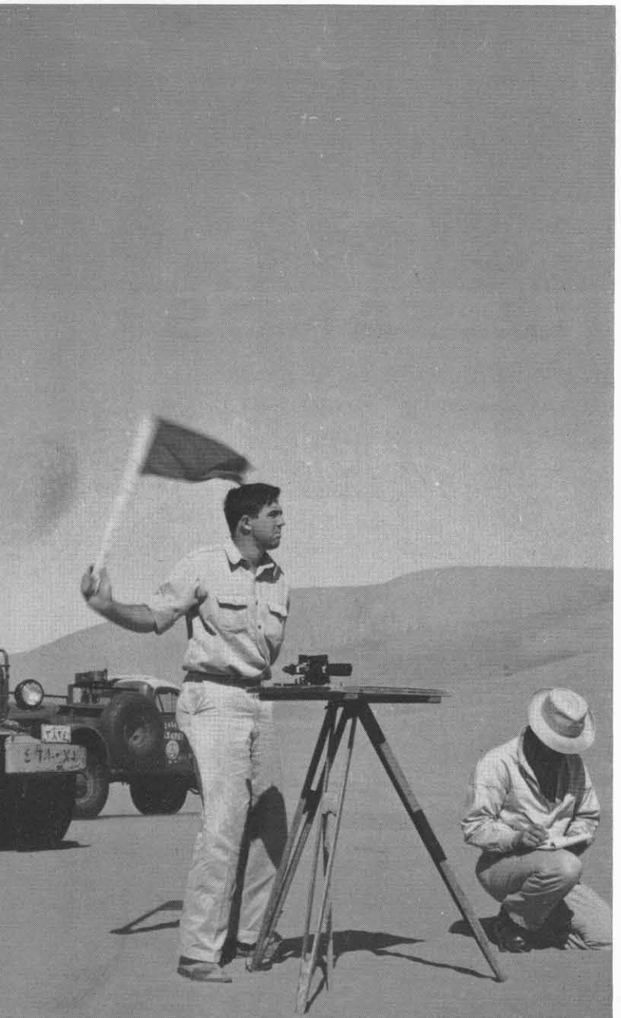
The vast sweep of the Rub' al-Khali desert (top) with its 500-foot-high sand mountains miniaturizes an Aramco exploration party. Trailers contain seismic equipment and provide crews with air-conditioned quarters for the 6-month season.

SEARCH BENEATH THE SANDS

of the runway a man waited, observing the landing and ready to take immediate safety action if necessary. The Beaver touched down and taxied to a parking place where the "party chief" of Aramco seismic exploration camp S-3 stood waiting.

In the small, self-contained world of S-3 – a world of Saudi Arabs and Americans, of tents, trailers, trucks and equipment – the mission is to map the subsurface structure of the eastern Rub' al-Khali by creating tiny, man-made earthquakes. The voice of S-3, an aircraft radio beacon, can be heard across the sandy wastes of the desert and through the airlanes. The camp depends entirely upon airlift for its food, its fuels and supplies, except utility water. Its heart-beat is a GM (a *Jimmy*) diesel that powers its generator. It is the base camp for a Geophysical Services, Inc. (GSI) seismic crew that commutes daily in the Beaver to and from the survey area where the exploration equipment is left behind overnight in what is known as a "spike camp."

Aramco surveyors control placement of charges by plotting a "shot line" — the line along which listening devices called geophones will detect and record shock waves from explosions.



The man in charge of the camp is an Aramco seismograph geologist. The GSI team works under its own party chief, and a Saudi Arab heads the camp's work crew.

The coffee pot at S-3 is kept hot from dawn until late evening. Although the camp is isolated, it has a steady daily traffic: the spike camp commuters leaving at sunrise and coming back in the late afternoon in the Beaver; the overnight man flown in each morning from his vigil at the spike camp landing strip; the silver DC-3 winging in nearly every day from the central supply base at Ubaila that serves all Aramco's Rub' al-Khali exploration operations; the radio servicemen who keep the desert voices audible; the man returning from a week off in Dhahran and the man heading for Dhahran after 21 consecutive days of duty; the exploration manager, a desert veteran, on a swing around the network of camps; and the inevitable unexpected visitor.

Barely has the visitor stepped down from the Beaver before he is drawn into an old oilfield custom – a hot cup of coffee. When the American oil man brought his always-hot coffee pot to the Arabian desert, he found that coffee hospitality was also an old ritual in Saudi Arabia.

In the diner the visitor stretches his legs beneath the common table that seats as many as 14 men. A door at one end of the dining trailer opens onto a metal ramp that leads to the kitchen trailer with its banks of stainless steel refrigerators and deep-freeze units, its electric stove, serving table, deep sinks and its day-long aromas. The diner is one of the camp's most popular sites.

The steel steps leading up to the side door of the diner had just been sprayed by Saudi Arab painters in the camp crew. Hub caps shone freshly blue on the trailer wheels. The compressor huffed rhythmically as the painters moved from trailer to trailer. Nearby, Saudi Arab mechanics nearly disappeared under the great hoods of the elephantine Kenworth prime movers that haul S-3's trailer caravan across the difficult dune country.

First in line in the parked caravan stands the power plant trailer. In its fore-part is the camp generator. Amidship in the trailer is the shop. In its stern are shower stalls and wash basins.

Next in line are the gangway-linked kitchen and air-conditioned dining trailers. Then come the air-conditioned camp headquarters, the office trailer with its desks, files, maps, drafting table, bulletin board, radio transmitters and receivers, and its nightly array of seismic "wet-wash" (the long, damp strips of photo-inscribed "traces" that provide the clues of S-3's underground mapping). Here the preliminary studies and computations are made that convert the records into useable knowledge: the substructure of a heretofore unmapped area of Saudi Arabia.

The office trailer is very near to the end of a long line of endeavor that starts in Dhahran, far to the north, and which involves a wide variety of professional and semi-professional expertise – geographical, geological, geophysical and logistical.

Three four-man sleeping trailers complete the straight-line caravan. They are air conditioned to ensure rest in the hot summer months after a day of work in the sun. And there are thick blankets for the cool, sometimes cold, winter nights.

S-3 sits near the middle of a *sabkhah* that is about ten miles long and three miles wide. It is closed in by sand mountains with entry and exit corridors through low dune passes at the far ends. Behind the seismic crew trailers, white pyramidal tents are deployed as additional personnel quarters.

Town hall, library, motion picture house, music hall, recreation center – such are the many uses of the dining trailer. On its shelves are pocket book detective stories crowded against *Taps at Reveille* by F. Scott Fitzgerald, and John Ciardi's *How Does A Poem Mean*. Magazines are read dog-eared. A tape recorder hums its electronically remembered music in the background.

The field season for S-3 begins September 15. By last mid-January it had surveyed 170 miles. Work started in a terrain where *sabkhahs* formed almost continuous salt flats. For a month the seismic crew was able to drive to and from camp, and S-3 moved its base at one to two-week intervals. As they moved on, they entered an area where travel, even with special vehicles, became virtually impossible. The sand mountains closed in around each *sabkhah*, and the seismic crew had to establish a daily spike camp away from its base. The Beaver was called into action. The trailer caravan of S-3 had to stay put.

An excellent steak was broiled outdoors over a savory fire of aromatic wood. "Absolutely the best steak I've ever eaten," the pilot said. The chef beamed. Dinner had ended.

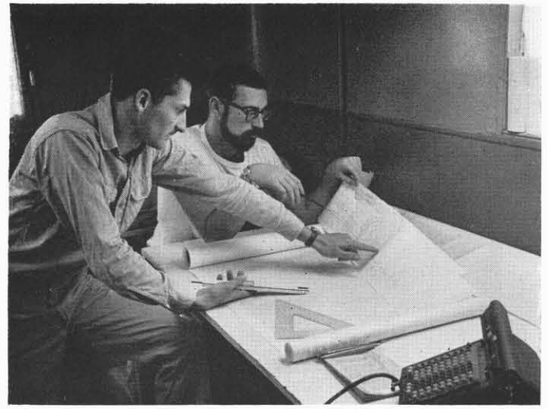
A young geologist hauled the 16-mm. movie projector from the shelf at the end of the dining trailer. Outside the side door of the diner a screen materialized against a power wagon. "What's the picture?" the surveyor asked.

"*The Rise and Fall of Legs Diamond.*"

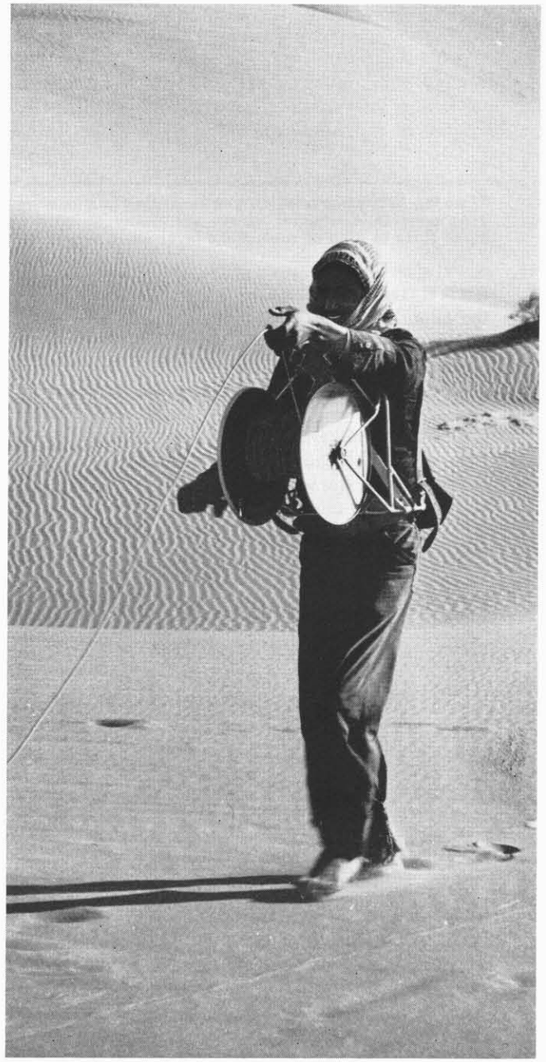
Chairs were put out on the sand. Lights were doused; the projector hummed and the speaker threw off some static. "Five . . . four . . . three . . . two . . . one," everyone counted along with the lead strip. Suddenly Bugs Bunny emerged in the desert night. And just as suddenly the cook was passing out popcorn. In a short while the saga of Legs Diamond spun and clicked – and ended. Critical voices murmured in the solemn desert quiet:

"I liked the night-club scenes," someone said. "All that 1920 stuff. And the old cars."

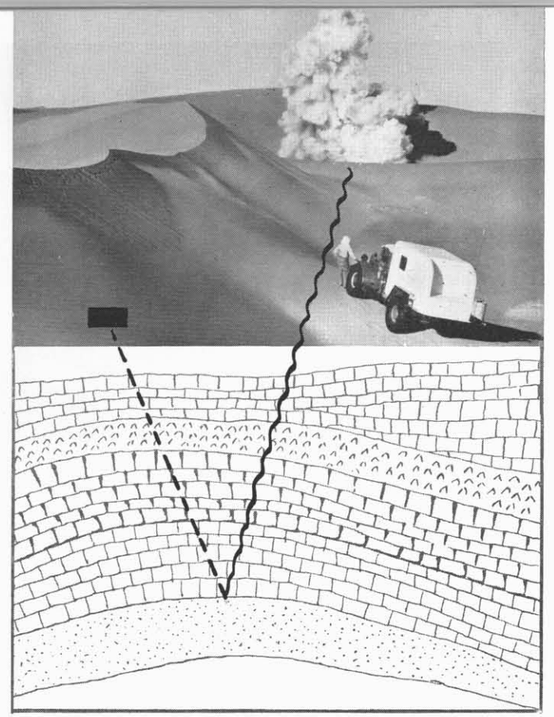
The floodlights along one side of the trailers gave S-3 the look of a desert "great white way." The seismic observer walked through the loose sand, a towel slung over his shoulder. At the foot of the office steps the party chief told



Inside a trailer away from the desert sun, crew members make a careful evaluation of the record of a seismograph shot.



A mile-long cable is stretched across the desert; every 200 feet a string of geophones is tapped into the cable.



Time lag between explosion and recording of shock wave by geophones tells whether strata are rising or dipping and gives clues to kind of subsurface layer wave passes through.

SEARCH BENEATH THE SANDS

the pilot, "The cook'll get you up a little before six."

About 80 yards from the sleeping trailers, the Beaver sat in the darkness. On one side of S-3's silent valley the graceful silhouette of the sand mountains rose against the moon; on the other side of the valley they were swathed in a milky mist.

At 6:15 A.M. the next morning the camp was awake; by 7 the Beaver was warming up and the camp went to work.

The surveyor and the assistant shooter stepped into the small cabin of the plane. The Beaver rolled out onto the runway, gathered speed and was suddenly airborne. In an hour the plane was back with the overnight man who had slept out at the spike camp landing strip (Aramco regulations require the presence of a senior staff man on the ground with a radio at all landings).

At 8:05 the Beaver was aloft once more with a geologist, the observer-shooter and the observer-recorder. As it climbed to cruising altitude its shadow raced away from the brick red light in the deep dunes. Minutes later the plane banked over a *sabkhah* where three power wagons were lined up (for radio repair), and two more were moving to opposite ends of the mile-long valley paying out a long orange seismic cable. Four day-glow markers stood at the corners of the runway.

This was the "spike camp" for S-3's seismograph survey party. (The origin of the term *spike camp* remains vague; some guess it's a remnant of the U.S. Cavalry's frontier days.) The seismograph survey party's spike camp is a day-by-day work site, always on the move, linked to S-3 by an aerial lifeline.

The spike camp team consists of a handful of men, assorted equipment and a few trucks. Each truck carries its own water supply, a compass, brown paper bags with sandwiches (in the bake-oven heat the men eat lightly through the day), a big insulated container for cold fruit juices and milk, and the ubiquitous radio transmitters and receivers. And no census would be complete without mention of the astonishing desert flies. "Lemme tell you," one of the shooters said, "these flies are really smart. They always know when you've got both hands busy. Then *zoom*."

The seismic team at the spike camp represents one of the most valuable tools in geophysical exploration. Geologists like to say that underground mapping is like looking through a keyhole into a dark room. Nevertheless, seismic exploration is based on the precise application of principles adapted in part from seismology (the study of earthquakes), optics, mathematics, radio, and kindred sciences and technologies. In itself, seismic exploration is a very complex technology. It enables the men at the S-3 spike camp to look through the keyhole of a *sabkhah* into the dark room that lies below.

S-3 was using a system of seismic exploration called *reflection*. With the help of Saudi Arab workmen, a cable was spread out almost the full length of the mile-long *sabkhah*. Every 200 feet a string of geophones was tapped into the cable. These geophones or "jugs," ultra-sensitive energy detectors, were spaced out 15 feet apart.

Small rotary drills were used to sink three holes about seven feet deep at one end of the cable. Then three holes were dug at the other end of the line and three in the middle. The charge of ammonium nitrate was lowered into each hole and tamped down; then lines were run from the first set of charges to a hand-blaster.

The observer-shooter tested the leads with fingertips and thumbs that were cross-hatched from twisting thousands of wire ends. He knelt in the sand above his box and gave the dynamo crank a couple of extra turns and read the voltage level.

"Ready anytime," he said.

"Okay," the observer-recorder called from his doghouse. The shooter pressed a button. The shots all went off as planned. The earth humped up over each hole. Shock waves rippled across the *sabkhah* as the elastic waves of the explosion drove into the earth and returned to the surface. The waves were picked up by the geophones, amplified and transmitted to the observation truck where they were recorded.

What happened underground was more complicated. It has been compared to mapping an ocean floor where sounds are bounced off the bottom and captured by a fathometer on the rebound. The seismic explosion created an elastic wave that drove almost straight into the earth. It struck various layers (strata) underground and was bounced (reflected) back to the surface. There it was picked up as a very weak ground movement by the "jugs."

How long does it take from the time of the explosion until the elastic energy wave bounces back to the surface and activates the geophones? *That's what the geologists want to know.* If an observer bouncing signals off the ocean floor gets them back in five seconds in one place and seven seconds in another, it stands to reason that the ocean floor is deeper at the second location. The "time lag" in seismic exploration tells the geologist whether the strata he is studying are rising or dipping, as well as providing clues helpful in identifying the kinds of material the energy wave passes through.

One more step remains.

The energy wave that returns to the surface is recorded both on a magnetic disc and on a continuous roll of photo-sensitive paper. The magnetic disc provides a permanent record of the character of the energy as it returns to the surface. The record can be played again and again through various filters. This is almost like re-shooting the area, under differing conditions. The record that is inscribed on the photo-sensitive paper by oscillographs ("light writers") shows a number of roughly parallel lines that wiggle. These are "traces" of the returning energy tremors, and they are the real clue to the underground terrain.

The foregoing description of S-3's geophysical work is an extreme simplification. Like all such reductions of complex technology and scientific theory, it runs the risk not so much of damaging the concepts involved but rather of minimizing the hard-won skills of the world fraternity of doodlebuggers, as the men in geophysical exploration are called. The nickname comes from *doodlebug*, a term used at one time to describe the many unscientific instruments used to devine metal, treasures, oil or water.

Aramco geologists have made extensive use of their own versatile adaptations of another seismic system, *refraction*. This system makes use of the same tools as *reflection*, but in a quite different way. Heavier charges of explosive are used — as much as 800 pounds, enabling one "shot" to cover up to ten miles. It permits relatively precise mapping of vast areas of subsurface structures in a short time. But surface and subsurface conditions both have to be right to use this method of seismic reconnaissance.

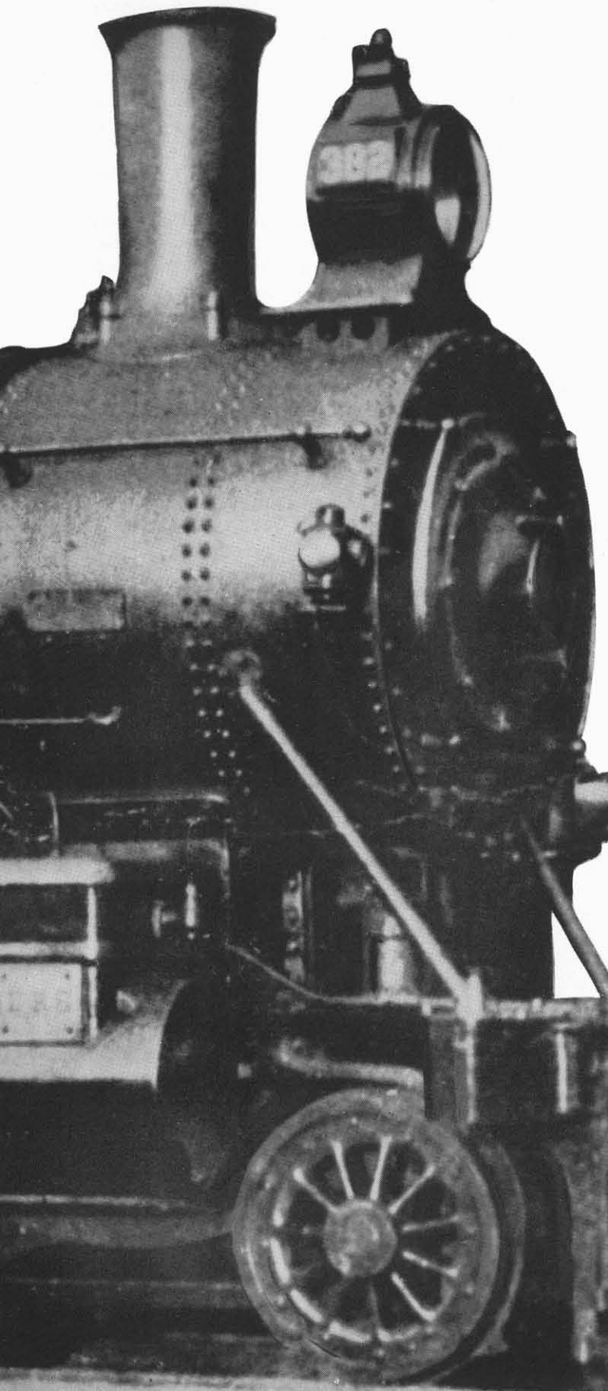
Seismic "maps" are coordinated with other underground information, such as actual samples of the earth cut by a structure drill, from various subsurface strata. Ultimately, of course, Aramco will have to decide whether or not to drill a deep test well in a specific area. Despite the increasing light that seismic methods throw on the "dark room" below the Saudi Arabian sands and *sabkhahs*, nature still yields her liquid treasure grudgingly — or not at all.

The exploration "hunting season" in the Rub' al-Khali ends about the first of June. Then all the camps (seismic reflection, seismic refraction, structure drilling, stratigraphic drilling) are called in from the vast reaches of the desert. During the months when the sun turns the Empty Quarter into an oven, the seismic data is interpreted, reports are written, all equipment is repaired, and the men are restored by vacations.

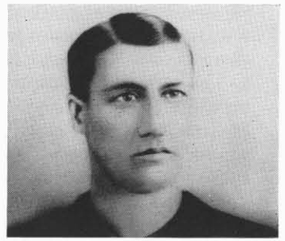
But until that time, the men of S-3 will continue with their desert colleagues the painstaking search for new knowledge about the hidden structures under the great sweeps of Arabian sand and dune.

Then the radios will cease. Ancient time will settle in. ■

Airplanes equipped with sand tires to permit desert landings play an important role in supplying seismic mapping parties.



Fate was at the throttle of No. 382 early that misty morning in 1900 when the Memphis-to-Canton run became the end of the line for



CASEY JONES

ENGINE NO. 382 began to roll. As its great pistons urged the eight driver wheels forward, jets of high pressure steam shrieked along the steel rails that lead out of the South Memphis yards. Slowly at first as the wheels strained to gain purchase against the rails and then with gathering momentum, the ponderous engine tugged at the snakelike length of the Illinois Central's *Cannonball Express*. From the cab window John Luther Jones peered down the right-of-way, his hand on the throttle that controlled the black, smoke-belching locomotive.

At that moment, early in the morning of April 30, 1900, Jones was a contented man. Known to his family and friends as "Casey," he was 37 years old, married and the father of three children. He had been driving locomotives since 1890 and was one of the most celebrated engineers on the Illinois Central line. His record showed that he had never been involved in an accident that cost the life of a fellow employee or a passenger. Already the modest beginnings of a legend had gathered about his name.

Those were the glory days of railroading, when competition for freight was at its height and speed was essential. The men who drove the trains up, down and across the continent were regarded as romantic heroes living in a separate world. Casey Jones fitted this role perfectly.

Brawny and colorful, the skill and daring of the 6-foot, 4-inch engineer had already inspired one railroad ballad: "The Flight of the Irish Mail." The ballad recounted his feat of outrunning a crack Limited Express while at the throttle of a supposedly slower-moving local. As they swung their hammers, the work-gangs often chanted:

Out of Water Valley yard rolled 82,
Says Casey Jones, I'll drive her through;
No. 24's steppin' right on our tail,
An' we got to keep ahead of the Limited Mail . . .

Another incident, although it never reached ballad form, further enhanced his reputation. When he was coming into the Memphis yards one morning, a little girl ran into the path of his train and froze with fright. Casey spotted her, shouted to his fireman to take the throttle and ran forward on the engine's catwalk. He dropped to the jutting cow-catcher and swept her up in one arm just as the train reached her. These incidents and especially his trademark – a six-toned calliope whistle – made Casey a familiar figure. In those days engineers decorated their locomotives with personal touches. Casey chose a calliope whistle that, in the dead of night, wailed out a long "Kaaa-Seee-Joooones" and told everyone along the right-of-way that the famous engineer was roaring across the countryside. But probably the supreme compliment had been paid to his prowess earlier, during the Chicago Columbian Exposition of 1893. Casey was assigned to drive the gleaming show-engine, which had been on display at the Chicago Fair, all the way to New Orleans – an unprecedented trip for one engineer in those times.

As he left Memphis, however, on that morning of April 30, he was on his way to even larger fame – a special niche in the folklore of America.

His destination was Canton, Mississippi – 188 miles and some three hours away. This was usually an uneventful run through open country, but he had been delayed in leaving and was determined to make up the time. It is a matter of record that when he pulled into Durant, Mississippi, he had regained most of the lost minutes. From Durant he had only another 30 miles to go to Canton. At this point, he had been roaring through the early morning at an average speed of 65 miles an hour.

Between Durant and Canton stood a small station named Vaughn, where a jam of trains had occurred. Two long freights had met and before passing each other were obliged to wait until three passenger trains had been waved through. The two freights took the siding in order to clear the track. Their combined length, however, was too long for the siding, and a caboose and two cars hung over on the main track. Those extra cars set the stage for tragedy.

While Casey Jones' train was charging through the predawn blackness and fog, having been cleared out of Durant, an air-hose suddenly burst on one of the freights at Vaughn. The wheels of the freight locked, stopping it dead – with the extra cars still far out on the main line. Men worked feverishly to repair the break while others ran up the track to flag down any approaching trains.

But it was too late. The one-in-a-million situation had taken shape too quickly.

Around a bend came engine No. 382, slowing down to caution speed but still slicing briskly through the swirling fog. Peering through the gloom, Casey suddenly spotted the glowing red eyes of a caboose's rear lights. Instantly, he recognized that, at his speed, a crash was inevitable.

"Jump, Sim," Casey shouted to his fireman. Sim Webb leaped headlong from the cab, landing in some bushes about 30 yards away from the freight. (Injured only slightly, Webb recovered and lived until 1957.)

At the same moment, Casey "dynamited" his engine. In virtually one motion, he thrust the throttle in, shifted the airbrake lever to "Emergency" and slammed open the sand dome to douse the fire in the boiler. Somehow he also found time to bear down on the whistle cord. There was no escape for him and he knew it. Like the captain of a ship, he had to stay with the train to diminish speed as much as possible before the impact.

With its whistle shrieking, No. 382 plowed into the caboose, sending wood and twisted metal flying, sheared into the next car from which erupted bales of hay, and exploded into the third car, showering tons of shelled corn into the air. Then the locomotive tore loose, leaped crazily from the track and came to rest with its smashed nose pointing back the way it had come.

Dead under his engine lay Casey Jones – the wreck's only casualty. Still intact was his record of never having been in an accident involving the loss of a fellow employee or a passenger.

The story does not end there, of course. Soon after, the work-gangs were chanting another song:

Come all you rounders, if you want to hear,
A story about a brave engineer.
Casey Jones was the rounder's name,
A high right-wheeler, boys, of mighty fame . . .

Composed by an aged railroad laborer who had long admired the big engineer, "The Ballad of Casey Jones" was by 1910 heard all across the nation as a popular song and a vaudeville favorite. Casey was dead, but his name had won a permanent niche in American folklore. ■

Steam locomotive No. 382 was hauling a six-car train when it pulled out of Memphis running 90 minutes behind schedule.

A Gallery of Portraits

"STOP!" commands the woman in black at Fenway Court, and visitors do stop to gaze at her: challenging face, dazzling arms and shoulders, ropes of baroque pearls circling an hourglass waist, a huge ruby shining at her throat. Without knowing her name – Isabella Stewart Gardner – we sense what novelist Henry James said of her: "She had everything, she did everything, and she enjoyed everything." Her magnetism draws us – yet she exists only in the paint and canvas of a portrait.

When John Singer Sargent painted this portrait of Boston's famed Mrs. "Jack" Gardner, he told her that if the canvas were cut into inch-square pieces and tossed into the Charles River, the finder of one square would know it to be part of a portrait of her. He exaggerated, no doubt, but he knew that in his painting Mrs. Gardner's proud spirit would be reflected in each square inch of the canvas.

Portraits bring men and women to life, make them as real as people we meet on the street. A helmeted soldier by Rembrandt, an old Scotswoman by Raeburn, a Spanish courtier by Velasquez can be friends or enemies; we feel that we know them.

Besides the value of portraits as art or history, they keep the past alive: heroes, beauties, tyrants, wits, ordinary men and women. For Thomas Carlyle, a portrait was the candle by which to read biography. A great portrait even can be biography itself.

A portrait can be fashioned of paint, stone, marble, clay, bronze, mosaic, enamel, tapestry, parchment, even stained glass. Ancient and medieval artists used some of these media. But portraiture as usually described means the life-like paintings that show individual features and character.

Such paintings did not develop until the fifteenth and sixteenth centuries, during the Renaissance.

In ancient Egypt, thousands of years B.C., a king or wealthy nobleman ordered one or more statues of himself and his family for his spacious tomb. He believed that a man's spirit could inhabit his likeness for eternity, and so his tomb portraits showed him always in the prime of life, the form he would choose for the hereafter. Kings were portrayed as regal, without imperfections; only Akenaten, during his short reign, insisted that portraits should show him as human, with the facial defects he had. Much ancient Egyptian sculpture shows great artistry, but portrait paintings, when they were used on tomb walls or coffins, were flat, conventional figures seen in profile.

Though early Greek artists were triumphant in sculpture, Greek painters, whose work has vanished, never mastered the problems of the third dimension. Polygnotus introduced individual portraits about 463 B.C., but his paintings were flat and limited in use of color.

Medieval portraits served as marks of status, chiefly for kings and church rulers. Resemblance was not important – a crown sufficed to indicate a king, a mitre for a bishop. Artists turned their creative talents to religious themes.

Yet the taste for portraits grew. What a king acquired, his nobles must have and, after them, wealthy merchants and bankers. During the early Renaissance, some of these powerful men bestowed new buildings or chapels, commissioning the best artists to paint murals and panels. Whether these donors aimed for earthly or heavenly credit, they began to appear in religious scenes. When Giotto, for example, painted frescoes for the Arena Chapel at Padua, he showed the chapel donor, the brutal and cruel Enrico Scrovegni, handing a model of the chapel to three angels at the Last Judgment.

The course of art changed entirely about the fifteenth century as painters discovered the techniques of perspective, anatomy, and realism, and developed the use of oil paints. These discoveries made realistic portraiture possible.

From mummy-case painting and up through the 1400s, artists had used tempera colors: pigments mixed with a binder of eggs, or various materials such as gums, milk and fish glue. In ancient Egypt the binder probably was acacia gum. In Italy it was eggs – white, yolk or both. Tempera was limited in color range and subject to decay from dampness and cold.

Even before the fifteenth century, painters had experimented with oils, blending them with drying elements to make varnishes. When they discovered that pigments mixed with linseed, poppy or walnut oil made a durable, radiant paint they found an almost endless range of color.

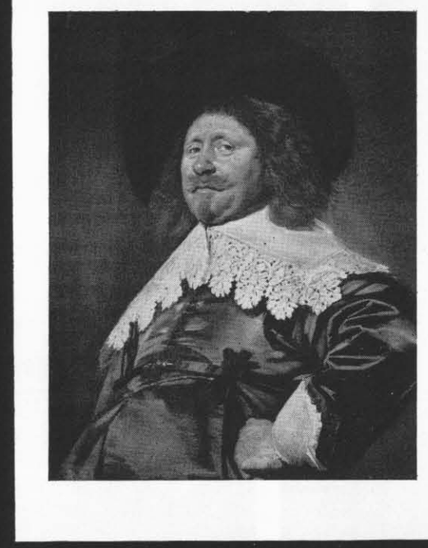
Oil techniques developed first in northern Europe, pioneered by the Flemish brothers, Hubert and Jan Van Eyck, who also painted some of the first truly individual portraits. One story says that Jan's patron, the Duke of Burgundy, sent the painter to Lisbon in 1428 to paint Isabella of Portugal; from this portrait the Duke made his decision to wed Isabella.

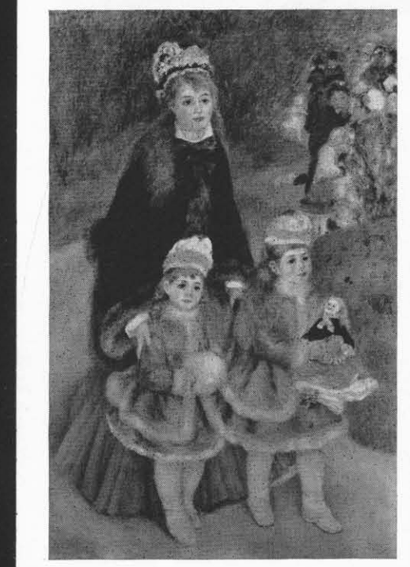
Italian artists quickly adopted oils, especially in Venice, opulent center of the Orient trade, where color was loved and used lavishly. Titian (Tiziano Vecellio), a true son of Venice, using oils with a sparing hand on rougher canvas than was usual, painted portraits which have never been surpassed in color, drawing and design, and in vivid reality. Titian was among the first artists to make portraits life-size. During his 99 years of life he painted popes, Italian nobles, including the great houses of d'Este, Scrozzi and Farnese, and most of the sixteenth-century rulers of Europe.

The new portraiture, revealing the subject's individuality, expressed the artist's as well. Hans Holbein portrayed Henry the Eighth's court with firm, calm lines and discreet flesh tones, while Rembrandt van Rijn heaped masses of paint on his canvases, subordinating his sitters to extreme contrasts of light and darkness. Jean Nattier employed delicate colors and fine detail to depict the decorative ladies of Louis XV's court, while Frans Hals boldly dashed off a laughing Dutch fishwife in heavy black garments.

Portraits can reflect a whole era. The "Windsor Beauties" of Sir Peter Lely sum up the wanton, pleasure-loving Restoration court of Charles II. Lely, who ruled English painting for 40 years, excelled in the painting of natural flesh – a useful talent since the royal favorites displayed a great deal. If Lely's portraits of women resemble each other, it may be because the court, from duchesses to Nell Gwyn,

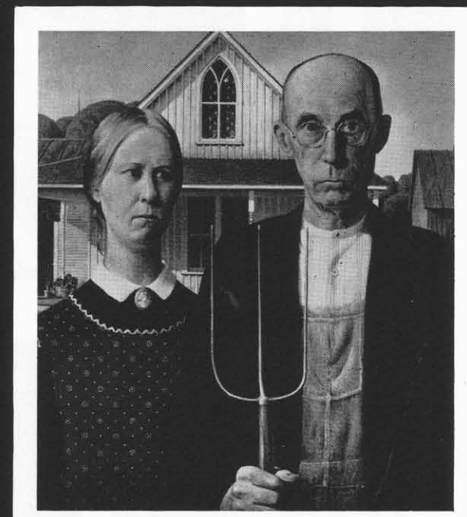
Great portraits have one thing in common: They keep the past alive with men and women on canvas who seem as real as the people we meet on the street

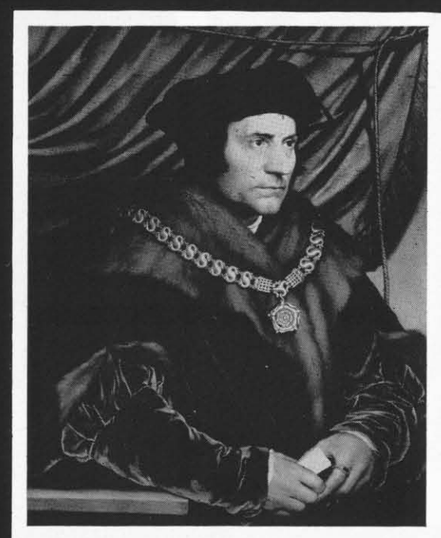


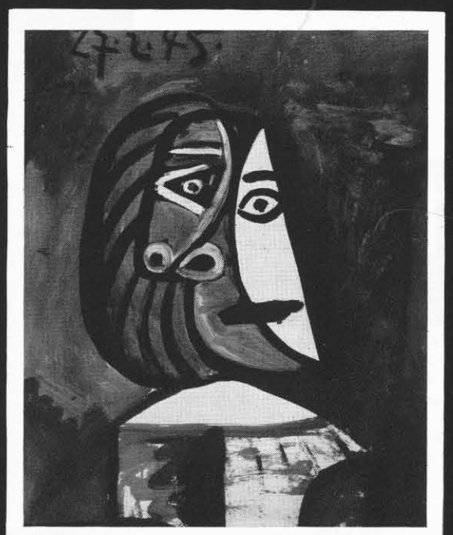


1 2 3

1. Portrait of Isabella Stewart Gardner was painted by the American artist **John Singer Sargent** (1856-1925). Around the turn of the century Sargent was the most popular portrait painter in England and America. In his later years, after painting more than 500 portraits, Sargent turned to landscapes. **2.** For 200 years after his death in 1666, **Frans Hals'** paintings, such as the portrait of Claes Duyst van Voorhout shown here, were sold at auction for a few pennies. Then, championed by artists such as Sargent, Whistler and Monet, the paintings of the robust Dutchman became masterpieces. His technical agility enabled him to finish many portraits at a single sitting. **3.** "Mother and Children" came from the gifted hand of **Pierre-Auguste Renoir** (1841-1919). Renoir's subjects reflected French life and people of his time, and his style utilized the manipulation of natural light to create a sense of fullness and mass.







A GALLERY OF PORTRAITS

followed the same fashions: sleepy eyes, languorous airs, full figures. And Lely, swamped with commissions, gave his sitters what they wanted.

The English air freshened in the eighteenth century, artists abounded and lords and ladies sat for portraits so charming that they command fantastic prices today. It was the "Age of Reason," the century of Dr. Samuel Johnson, James Boswell, Richard Sheridan, Horace Walpole, as well as Regency beauties. A galaxy of artists portrayed their world: Sir Joshua Reynolds, Thomas Gainsborough, John Hoppner, George Romney, Sir Thomas Lawrence, Sir Henry Raeburn. A group of lesser though talented artists worked at "conversation pieces" – detailed group portraits of aristocratic families at ease in their country parks, gardens or elegant drawing rooms.

An outdoor setting was a favorite background for eighteenth-century portraits, and it mattered not at all that artists painted the landscapes in their studios. In that way, clouds or sunshine could flatter a pretty sitter; trees could cast shadows and flowers bloom without any tiresome copying of nature. An artist might even brew a heavy storm if it served to set off the lady on his canvas.

It was the century, too, when children came into their own as portrait subjects; they were shown in comfortable, natural clothing instead of the formal stiff costumes of earlier eras.

Of all great eighteenth-century portraitists, perhaps the most popular was Sir Thomas Lawrence. Sir Thomas refused to picture any of his lady sitters as ugly or elderly –he sought the "beau ideal," the heroic spirit of each subject. Occasionally he may have gone too far, or so critics thought when he presented the heavy, aging Prince of Wales (later George IV) as a youthful, slimmish gentleman. About the same time, Francisco Goya was painting Spain's royal family with savage irony and realism.

When King Charles II saw his portrait by John Riley, he cried: "Is that like me? Then odd's fish, I'm an ugly fellow." Some early Americans must have felt the same way when they saw their finished portraits by the traveling artists, or "limners," who flourished in the early 1800's.

The limners, usually self-taught in art, often had started as coach or sign painters. They journeyed from village to village, farm to farm, working for modest fees, sometimes boarding with a family until all its members had been painted. A painter might carry with him ready-made canvases of male and female figures dressed in handsome attire, complete except for heads. When a customer had picked the costume he liked, the artist painted in his head!

Many of these "American primitive" portraits are harsh and unflattering, but they do have impact. Charles Dickens recalled his first sight of the style at an Ohio inn in 1842: "two oil portraits . . . representing the landlord and his infant son; both looking as bold as lions, and staring out of the canvas with an intensity that would have been cheap at any price."

As the 1800's bowed out, portraiture reached a lull. When even the middle classes had begun to order likenesses of themselves, portraits began to lose their snobbish appeal. Photography, invented in mid-nineteenth century, soon provided competition for painters. Artists generally became less interested in portrait work, glad when they could avoid the vexations of commissioned portraits.

Two great painters, however, did not lose their zest for painting people. No client was ever displeased with a portrait by Jean-Auguste-Dominique Ingres, it was said. Ingres gave dignity and style to his Parisian sitters and painted with such technical skill that every detail, from a lock of hair to a satin bow, reached photographic realism. On the other hand, Pierre-Auguste Renoir painted with rich, pure color and melting edges; his many portraits of women and children express the delight he took in painting them. A third world-famous painter, John Singer Sargent, made his reputation with his dashingly aristocratic portraits. He was besieged with commissions from the socially-elect of England and the United States. Despite his great success, in his later years Sargent refused to paint even one more portrait.

Artists have always experimented and twentieth-century art has been a series of explosive experiments which have left few painters untouched. Leaders in painting represent dozens of experimental periods and "schools," but the general trend has been toward non-objective art. Some modern painters may begin with real subjects but then work away from reality toward an expression of their own insights or emotions, expressed abstractly–perhaps in cubes, in symbols or simply in masses of paint.

In this artistic ferment, people who seek portraits from many modern painters must be prepared to accept the artists' interpretations, even if the portraits turn out to be combinations of planes, studies in tones of blue or faces with two heads.

But if some conservative clients are bewildered or amused by *avant garde* artists, on the other hand some traditional portraitists complain of modern sitters. No one today, these artists claim, wants to have an unusual and therefore interesting face. Modern women, they say, use make-up to convert their faces to the latest beauty fashion, and even men prefer to look like everyone else.

No doubt sitters have made objections to techniques since the first portraitist took brush in hand, and for just as long a time painters have suffered from critical or unpaintable sitters. Yet somehow the conflicts have been resolved, since portraiture has survived for more than five thousand years. It seems destined to live for as long as men respond to the emotions which prompt them to commission portraits – pride, vanity and affection, among others. ■

4 5 6 7 8

4. "Portrait of the Artist" is one of many self-studies by the Dutchman, **Rembrandt van Rijn** (1606-1669). No other artist was so much the master of tone. With few colors—rich reds and browns, golden yellows and olive greens—he created paintings of extraordinary luminosity. **5.** Dutch by birth but trained in Paris, **Vincent van Gogh** (1853-1890) usually expressed his disordered world in loose form and a riot of colors. But "L'Arlésienne," portrait of an innkeeper's wife shown here, represents van Gogh in a more restrained mood. **6.** "American Gothic" by **Grant Wood** (1892-1942) brought overnight fame to its creator. After searching unsuccessfully in Europe for a style of his own, Wood returned home to find his subjects in his native Iowa. **7. Hans Holbein** (1497-1543) is often called the most literal of all portrait painters. As seen here in his portrait of Sir Thomas More, the German artist caught each line in the face, each fold of cloth with optical exactness. **8.** "Head of a Woman" was painted by **Pablo Picasso** in 1945. Picasso produced works that reduced literal figures to assemblages of geometrical planes and angles.

ZER0123456789

KEY TO NUMBERS

PICTURE a hillside thousands upon thousands of years ago. A man emerges from a cave. His brow is heavy, his arms long and muscular; around his waist he wears a tattered animal skin. Below him a herd of wild horses passes. Back into the cave he rushes and, with grunts and gestures, excitedly tells his clan that "many, many" horses are passing. It's the best he can do. He has no way of telling them that 30, 40 or 50 horses are in the herd, for at best he knows three numbers – one, two, and "many." Civilizations will rise and fall and even his own form will change before he learns to count with the ease and exactness of numbers like 30, 40 or 50. Developing an easy-to-use, easy-to-learn system of numbers was, indeed, a milestone reached only after long struggle. In fact, man has had such a system only for about 1,000 years – and a form of man has been on earth for an estimated 1,750,000 years.

What took so long? What is so difficult about our numbering system – the system that everyone easily learns and then takes for granted? The answer to those questions is bound up in the larger meaning and application of *zero*. The difference between 5 and 50 is only a zero, but that little circle is actually one of the world's greatest inventions.

The decimal system (in which each unit is ten times greater than the preceding unit) is based on nine numbers and the zero. It makes calculations with infinitely large and infinitely small numbers possible by allowing numbers to expand to infinity on either side of a *decimal point* – numbers *greater than one* to the left of the point and numbers *less than one* to the right. Without such a system, modern astronomy, physics and chemistry would be impossible – or, for that matter, all science. Governments could not determine annual budgets, citizens could not figure out income taxes and even totaling the weekly grocery bill would be quite a chore.

Thus, while the zero is used as a symbol for *nothing,* it actually means *everything* in combination with our nine basic numbers, providing these numbers with an infinite variety of value. The zero's creation opened the way for the entire concept of algebraic *plus* and *minus* numbers, which we use not only to calculate with, but also to identify temperature, electrical charge and discharge and to navigate planes and ships. Speaking less practically and more poetically, the zero serves as a reference point around which man can talk confidently about infinity.

Most of the ancient civilizations had numbering systems and symbols to express their numbers in written form. But without the zero even the simplest arithmetic – addition or subtraction – was next to impossible. The earliest written symbols for numbers were probably lines scratched in soft clay: one line meant *one,* two lines meant *two* and so on. Then additional symbols were invented to represent larger quantities. Sumerian merchants in 3,000 B.C. used a system of number symbols on bills, notes and receipts. A 5,000-year-old Babylonian tablet records a payment by clay check. Permanent records of numbers were improved upon by the Egyptians, who used paint instead of clay.

The Greeks had to memorize 27 different symbols just to express the numbers 1 through 999. Each 8, for example, in 888 was represented by a different symbol. Just as unwieldy was the Roman system of using the first letter of the name of the number: 100, for example, was represented by the "C" of *centum* and 1,000 by the "M" of *mille*. The Roman who wanted to write down the quantity 1,000,000 had no choice other than writing a thousand M's. And to multiply his clumsy numerals was just about impossible: XLVII x IX x MCMXIV = ? When faced with such a problem, the Roman discarded his written symbols and turned to his counting board, or abacus. All of Europe, through its Dark Ages, followed Rome's example.

Far to the east, however, as early as 200 B.C., Hindu scholars were working with nine oddly shaped symbols and a dot that eventually would bring order out of a world of mathematical chaos. The dot and nine symbols were the earliest known forerunners of the numbers 0, 1, 2, 3, 4, 5, 6, 7, 8, 9. Comprised of only ten symbols and based on multiples of ten, the Hindu system was easily learned and easily used. It was the dot that made the system unique because with the dot came a written expression of the *place system* of numbers – the system that allows the nine basic numbers in different combinations to represent every possible quantity and assigns a different value to the nine numbers depending on their *place* or position in a series.

Who first thought of using a dot as the tenth number is not known. But it can be supposed that a Hindu, working on his abacus, wanted to keep a written record of the answers on his abacus. One day he used a symbol (•) which he called *sunya* to indicate a column on his counting board in which he had moved no beads. *Sunya* the dot was not zero the number. It was merely a mark to indicate empty space.

The abacus he was using had already been around a long time. On it, to represent 33, for example, he moved three beads on each of the bottom two rows to the right. For 303, he also moved three beads to the right on each of two rows – but between these rows he left an untouched, empty row. It was for the empty row that the unknown Hindu used the symbol (•). The word *sunya,* standing for the dot, means "empty" or "blank."

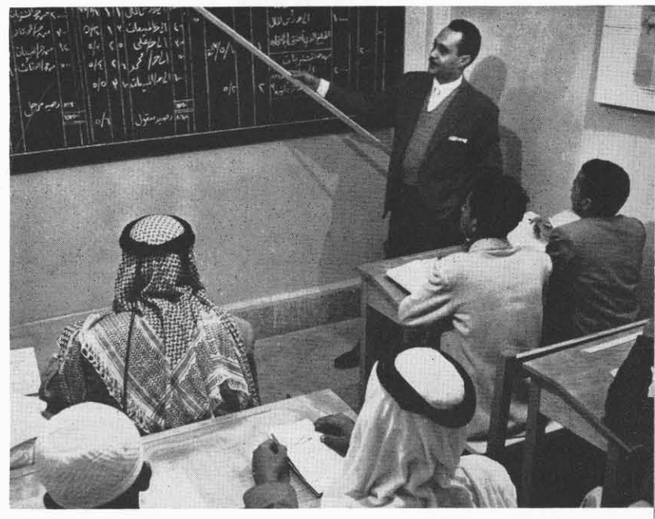
The concept of *sunya* was probably brought by traders from India to Baghdad in the ninth century, when that city was one of the world's greatest centers of learning. Arab merchants and mathematicians immediately recognized the versatility and uniqueness of *sunya* and further developed its concept. The modern word *cipher* comes from the Arabic *sifr,* which was derived from the Hindu *sunya.* Latin scholars translated *sifr* as *zephyrum,* which in Italian became *zepiro* and *zeuero* and in English was shortened to *zero.* The German world for zero – *ziffer* – and the French *chiffre* also derive from the Arabic *sifr.* All of these words came in time to mean much more than *zero. Cipher,* for example, took on at least a half dozen meanings. It can refer to *zero* or to any one of the Arabic numerals; it also can mean *to compute,* or it can mean a complex system of secret writing.

When the new numbering system made its way into Europe through the Moors and became known as Arabic notation, it was already the subject of thorough exploration by Arab scholars. As early as 825 A.D. Arab mathematician al-Khowarizmi had written a book on the zero, and in 976 the scholar Muhammad ibn Ahmad had noted in his *Keys of the Sciences* that if in a calculation no number appeared in the place of tens, a little circle should be used "to keep the rows." The first comprehensive European analysis of the zero and the nine other Arabic numerals was made in 1202 by Italian mathematician Leonardo Fibonacci, who had studied under an Arab tutor.

Despite the advantages of a numbering system with zeros "to keep the rows," it took Europeans a long time to give up Roman numerals and an even longer time to understand the Arabic numerals, especially the zero. "It seemed impossible for them to comprehend how 3 was three in the units place and 30 in a combination such as 35. Instead they wrote 305 for 35. If 30 was thirty and 5 was five, what could be more logical? Combinations with Roman numerals . . . produced such hybrids as X5 for 15, C35 for 135, and MCCC35 for 1335." Even those who accepted Arabic numerals didn't agree on what they should look like, and it was not until well after the invention of printing in the fifteenth century that Arabic numerals were standardized in design.

Since then, the decimal system with its numbers expanding in multitples of ten on both sides of a point has proved the wisdom of the Hindu who saw the need for a symbol "to keep the rows" and the Arab scholars who recognized *sunya's* immense significance, developed its concept even further, and then brought it to the attention of the world.

Since then, numbers really have been something you can count on. ■

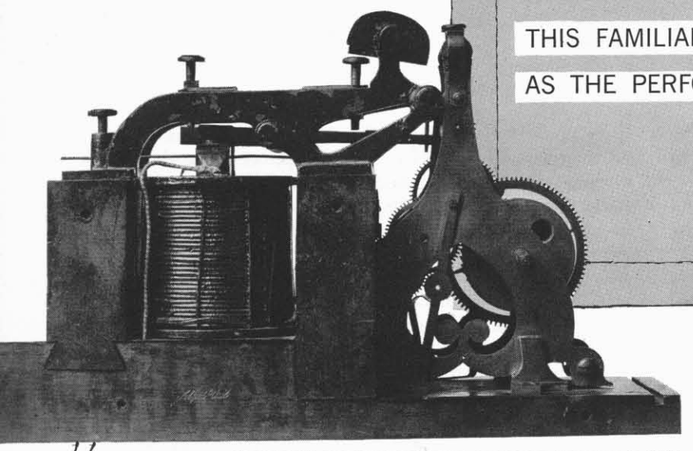


The familiar numbers running across the top of these two pages are called Arabic numerals and are direct descendants of the Arabic numerals ٠ ١ ٢ ٣ ٤ ٥ ٦ ٧ ٨ ٩ used by the instructor and students in this accounting class at the Arab School of Education, Dammam, Saudi Arabia.

It was once impossible to rely on numbers, even for counting, until Arab mathematicians showed the world how to use the zero

THE TELEGRAM

THIS FAMILIAR MESSENGER HAS COME OF AGE AS THE PERFORMER OF A WIDE VARIETY OF CHORES



Telegraph receiver patented by Samuel Morse in 1846.

A NIGHT desert wind hummed in the thin telegraph wire that linked Needles, California with the outside world. At 10.30 P.M. a message of anxiety throbbed over that lonely wire.

A hundred miles away in a shack at Ash Fork, Arizona Territory, a U. S. Army telegrapher heard the message coming in. Reading the dot-dash code that clicked from his receiver, he began to write: "INDIANS VERY THREATENING TONIGHT. . . ."

The message was from a solitary telegraph operator, working in the dark in the tiny railroad station at Needles. He had blown his lantern out to avoid attracting Indians. His message continued: ". . . FREIGHT CONDUCTOR REPORTS INDIANS HAVE DRIVEN PUMP MEN AT TRUXTON INTO HOUSES FOR PROTECTION I AM ALONE AND UNARMED . . . (signed) CONNELLY."

The Army man could only telegraph his sympathy. He well knew the loneliness in which that message was sent. The night freight had come and gone and the station operator had been left behind. There was no way to help him before tomorrow, and tomorrow might be too late.

All this was on a June night in 1866. Although history does not record what became of Connelly, his message still stands as a classic to telegraph men – for it represents the urgency with which their lives are filled.

Today telegraphy is taken as a matter of course. And yet it has become an incredible force. The whole world throbs with it. "Magnetic telegraph," as it was known then, is scarcely a century old (it was only 100 years ago last October that the first transcontinental wire was stretched). Yet in the United States alone there now are 21,000 telegraph offices laced together by *over 4,000,000 miles* of channels through which messages – always urgent – go flying day and night.

It should be remembered, however, that telegraphy isn't new. To telegraph means merely to write or send a message "far off." The means aren't important. One of man's first recorded telegrams was sent by an earlier "Connelly" one night in 1084 B.C. – all of 3,045 years ago. From 8,000-foot Mt. Ida (of Homeric fame) in Turkey, he flashed a message by beacon light. It went (by lights) from island to island, mountain to mountain, crossed Greece, the Ionian Sea and Italy – and finally was read by rooftop watchers in Rome.

This early telegram carried news of an event now known to every schoolchild: "TROY HAS FALLEN." It was the world's first news of the success of the Greeks and their wooden horse.

Over the centuries men have telegraphed with lights, drums, smoke, arm signals and by reflecting the sun in their shields. The Greeks worked out the first code system – with lights. Caesar's army sent telegrams 150 miles by shouting them from sentinel to sentinel. To send a short message even as much as 150 miles took several hours.

Today there are still a few old "Morse key" operators – mainly in railroad stations – tapping out messages by code as Connelly did. Otherwise, the key has all but disappeared. Messages now go by automatic machines over wires that can carry as many as 11,500 short messages an hour, or over microwave radio beams on which as many as 80,000 messages an hour can be "hung" for transmission.

Let's say a man from Denver is visiting the Empire State Building in New York and wishes to telegraph friends in San Francisco. He can, if he likes, have his message sent by "facsimile" in his own handwriting. The clerk wraps it on a spinning cylinder, an electric eye reads his handwriting – and in San Francisco a little spark jumping across the face of a special kind of telegraph blank copies the message for his friends.

But suppose he wants his message sent the usual way. He hands it to the clerk. She sits at a special electronic typewriter and "punches" it into a long flowing tape. Here it looks like many little holes arranged in groups. Each group represents a letter. The tape is gobbled up, letter by letter. From those holes, this machine is reading the man's message – and sending it, in a series of electric impulses, to San Francisco.

But what steers it to San Francisco? Why doesn't it end up in Boston – or Canada?

It could, were it not for the special "pilot" that goes out with it. Before the girl sends the message, she types a few code letters at the beginning. These are the pilot letters that will steer it accurately through the several busy "high speed message centers," which might be compared to the nation's great railroad yards.

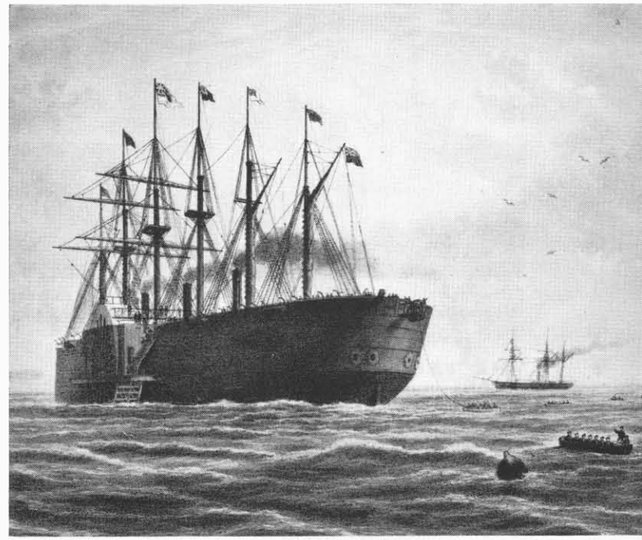
The pilot on the Denver man's message might look like this: SY-OK. These letters will automatically take it to (and through) the high speed centers at Syracuse, New York (SY) and Oakland, California (OK), and finally to San Francisco.

But circuits sometimes get too busy. And so the man's message, arriving in Syracuse, may get stalled in a traffic jam. Not for long: the pilot immediately seeks a detour. It may guide the message south through Philadelphia and Atlanta, Georgia – but it will get the message through.

A message from any place in the United States to, for example, Dhahran, Saudi Arabia will be "punched" in tape and telegraphed first to New York, where it emerges as another tape. This tape is handed to a cable clerk who feeds it into an overseas transmitter, and the message soon is flashing by cable across the bottom of the Atlantic to Portugal's Azores Islands.

At the Azores it again comes off the wire as tape which is given a clerk who works for a company called Italcable. He feeds the tape into still another machine that sends the message on to Rome, Beirut, Baghdad and Dhahran.

No matter where a telegram may be addressed, the telegraph companies make extraordinary efforts to deliver it –

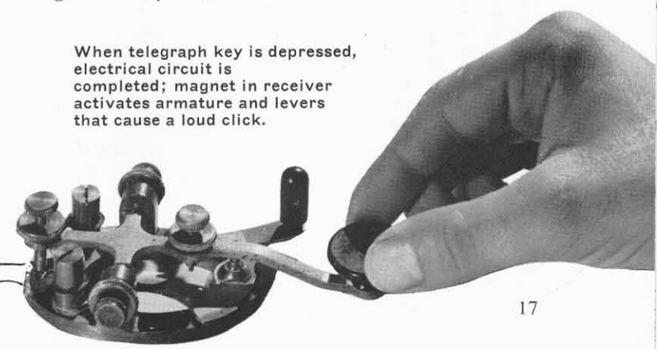


Cyrus W. Field laid first trans-Atlantic cable in 1858, but cable was quickly ruined by transmission of too much current. Field tried again and again, until finally eight years later the first permanently successful Europe-America cable was laid on the ocean bottom by the giant steamer "Great Eastern."

even sending it by dog sled or by a North Woods guide and canoe if emergency warrants. When a hurricane, several years ago, tore down lines between New York and Boston (229 miles), the telegraph company promised New York customers it would get messages through to Boston – and did. To do it, they were sent via undersea cable to London and automatically sent on to Boston via Newfoundland – a detour of 7,300 miles in a matter of minutes.

Today there is great variety in telegraph service. By telegram it's possible to get instant reports on style changes, football scores or weather. It's possible to receive stock market advice or buy a car a thousand miles away (with a "shopping order" telegram). Telegrams set clocks, procure theatre tickets, distribute cigars when a baby is born, or send candy (via a "candygram"). Anyone can even take his own public opinion poll by wiring his problem to the telegraph company. They will sample opinion in any suggested area, then wire the results.

No wonder Americans send hundreds of thousands of telegrams a day. Added to these are thousands of news-



When telegraph key is depressed, electrical circuit is completed; magnet in receiver activates armature and levers that cause a loud click.

Fifty-year-old photos show two familiar figures: railroad telegrapher at his key and boy who delivered the telegrams.

THE TELEGRAM

paper stories (most of which move over the newspapers' own leased wires). Added, too, are the big government and business "private lines." The world's largest private telegraph network, leased to the U. S. Air Force by Western Union, is 5,500,000 miles long, including military-owned and operated links overseas.

Telegraphy was introduced in 1837 by an American artist, Samuel Morse. Morse, experimenting with magnets, showed President Van Buren that he could tap a telegraph key, send a coded impulse over a wire, and have it come out as a visible mark and an audible "click" on the other end of the wire, where a magnet set a stylus and a "sounding bar" in action. An experimental line soon was built from Washington to Baltimore. It was over this line, in 1844, that Morse sent his triumphant telegram: "WHAT HATH GOD WROUGHT!"

Many telegraph lines sprang up after that. The famed Pony Express itself was a "telegraph line," initiated in April, 1860, not only to carry mail but to relay telegrams between Missouri and California – until a wire line could be built. It went out of business in October, 1861 – 100 years ago – when that line finally was stretched across the continent.

In most countries the telegraph system is part of the postal system and is government-owned. In America, however, it continues to be private business. Western Union, the only telegraph company serving the general public today, was formed of 540 separate telegraph companies.

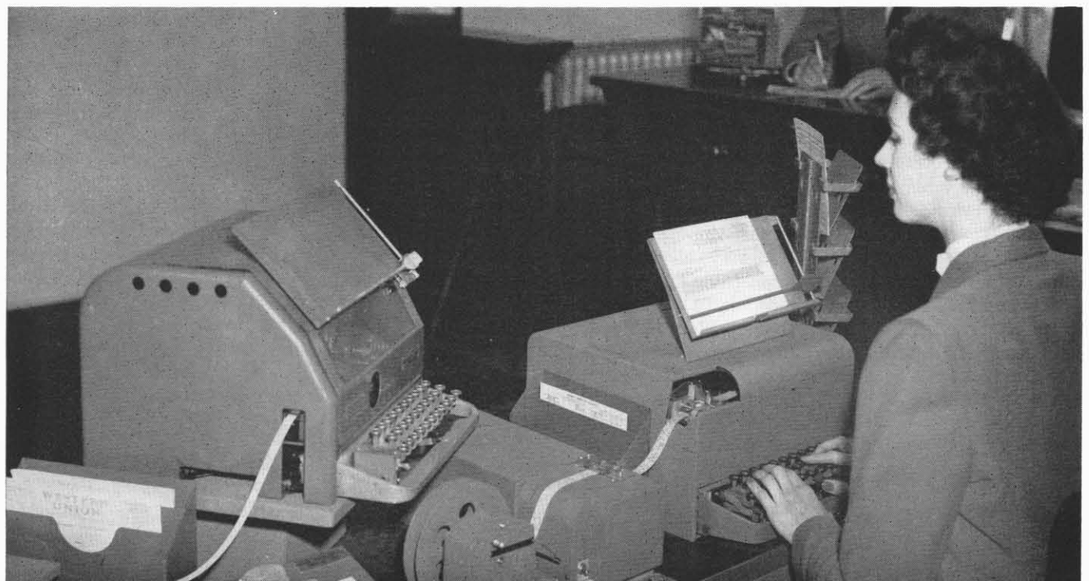
Even in these "sophisticated" days, the telegram still speaks with the voice of urgency. Telegrams still announce the start (and end) of border clashes, the onslaught of storms, the results of elections, the transfer of billions of dollars in bank funds – and millions of minor family crises. This inevitable note of urgency appears in a telegram sent one night recently by an Eastern college boy. As on the night Connelly sent his message from Needles, the time was 10:30 P.M. The college boy wrote what he wanted to say, paid the clerk and ordered: "Send this at 4:30 A.M. – sharp."

Then he went home to bed. Before daylight his phone rang noisily. He awoke, answered it – and heard the clerk read his telegram back to him. It said:

"THE TIME IS NOW FOUR THIRTY A.M. GET UP AND STUDY FOR EXAMS."

The signature at the end was his own. ■

After today's message is typed into teleprinter, a coded symbol causes electronic brain to route message to its destination.



Early Days Ashore

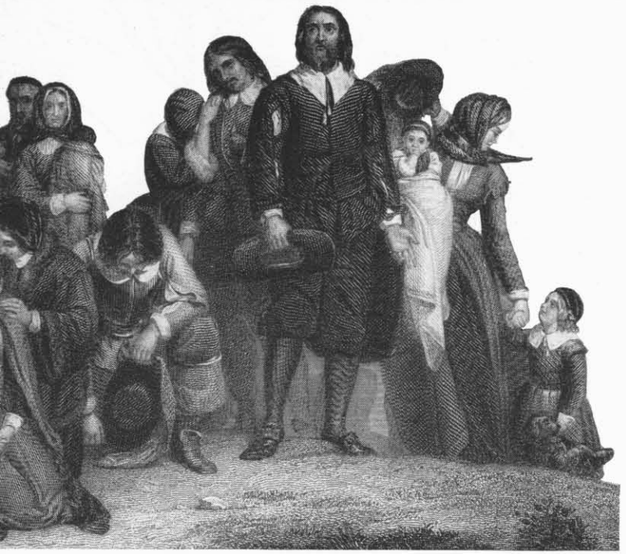
November 1620: 103 Pilgrims stepped ashore into a New World wilderness that was nothing more than a question mark on maps

"LAND HO!" These were the words that Captain Christopher Jones had anxiously awaited. Finally, on November 9, 1620, his crow's-nest lookout sang them out. Sure enough, there on the horizon was a faint tinge of green visible only to the sailor's eye, and the wind carried a hint of the earth's rich scent.

Captain Jones was a hardy man. He had made wearisome, hazardous voyages before, but on none of them had landfall been so welcome. This latest adventure, since its beginning 96 days earlier on August 6, had been truly an ordeal, enough to make a man think of giving up the sea. Never before had he carried such a cargo – 103 passengers counting the baby that was born in mid-Atlantic and the man who was buried at sea. The passengers had crowded his ship to such an extent that even he, Captain Jones, shared his cabin with some of them. The adults with their never-ending seasickness and interminable hymn-singing were bad enough, but the children – 31 of them – well, it was small wonder that his crew's nerves were on edge. They had swarmed over the ship, running and shouting, pestering the sailors with questions, raising a clatter the likes of which amazed the English seamen.

But now the voyage was almost over, and there ahead lay the land Captain Jones had promised to bring his passengers to. In higher spirits than he'd enjoyed for weeks the Captain hurried down from his poop deck to announce to his tired and grimy charges that the *Mayflower* at last had reached America.

As he passed among his passengers, most of whom were



When voyage was over and they stepped ashore at Plymouth, the Pilgrims faced the ordeal of a long New England winter.

EARLY DAYS ASHORE

strolling above-decks, Captain Jones wondered how they would prosper in this wilderness that lay on the horizon. They were certainly a various lot. The challenges of the New World would be a stern test of their many talents. Samuel Fuller was a doctor; he would be needed. John Alden, one of five hired men, was a cooper, taken along because English law required that when barrels were taken out of the country an equal number had to be returned. James Chilton, a tailor, at 57 was the oldest man aboard. Although William Bradford came from a landed family in England, he was an accomplished weaver. And there were others skilled in such needed trades as metal working, masonry, carpentry and wool combing, as well as 18 hired servants.

On hearing the news that their goal was in sight, the passengers themselves were "not a litle joyfull," according to Bradford, a leader of the group who from the beginning had been one of the organizers of the venture. It is his great *History of Plimouth Plantation* that relates much of what is known about the Pilgrims. In their own time, the Pilgrims were known as "Separatists" because they had detached themselves from the Church of England, an action that had displeased the English authorities. In 1608 a number of the Separatists fled to Holland, where they could work and worship in peace. But a desire for greater economic security, to be gained from land ownership, and a growing fear that with the termination of the twelve-year truce between Holland and Spain their own religious freedom might also come to an end, moved them to consider a drastic solution of their problems. The new and almost empty tract of the New World suggested itself, and by 1617 the Separatist congregation in Leyden was studying maps of America.

To get to America, however, the Separatists needed a ship. They also needed financial support and a guarantee from England's James I that even if he would not assist them, he would at least not oppose them.

After long and often discouraging negotiations, the Separatists completed their arrangements. On August 6, 1620 they at last set sail from England in the 60-ton *Speedwell,* which the Separatists owned outright, and the 180-ton *Mayflower,* owned by Captain Jones and three associates. The *Mayflower* sailed, however, under a charter agreement between the Pilgrims and a group of merchant-adventurers who were the financial backers of the Pilgrims and whose venture they supported as a long-range business enterprise. The *Speedwell* leaked so badly that both ships had to return to England, where the *Speedwell* was abandoned. Thus, after a month's delay, the *Mayflower* set out alone on September 6, further burdened with most of the *Speedwell's* passengers. Even the *Mayflower,* at one point in the crossing, began to leak and threatened to break up. The nervous crew and passengers seriously considered returning to England, but they had already risked so much that they decided to chance the rest. Their ordeal seemed worthwhile as the cry of "Land ho!" raced through the ship.

On this Thursday, November 9, the Cape Cod cliffs ranged before them. Too late in the day to attempt a landing, the *Mayflower* stood off the Cape overnight, and the next day Captain Jones took his ship south, looking for a harbor along the coastline. But he soon ran into dangerous waters, and it was all he could do to get the *Mayflower* out of the shoals and breakers. He took her back up to the head of the Cape, and at twilight the Pilgrims reconciled themselves to still another night at sea.

Saturday morning Jones sailed the *Mayflower* into Provincetown Harbor and dropped anchor inside Long Point. Before an exploring party went ashore to look for a site for the Pilgrims' new home, an important matter had to be dealt with first – the establishment of some kind of government. For this purpose the Pilgrims drew up that notable document, the "*Mayflower* Compact," which they signed in the ship's cabin. One of its provisions was that John Carver, a wealthy 54-year-old merchant, would be the first governor of the new "plantation."

With this done, the Pilgrims made a brief excursion ashore, delighted to find land under their feet for the first time in more than two months. But there was no time for a real exploration. The next day was Sunday, a day to be given over wholly to worship. Not even the Pilgrims' curiosity about their new country could be allowed to distract them from their Sabbath observance.

On Monday, November 13, the Pilgrim women were taken ashore, where they unknowingly began a tradition that has been carried on in New England ever since – that of the "Monday wash." For the first time since leaving England they could look forward to wearing clean clothes. On the *Mayflower* washing was almost impossible.

It was Wednesday before the Pilgrims could undertake any serious exploration of the land around them. Sixteen men, armed with matchlocks and wearing armor, set out on foot to map out the terrain. At their head was the military adviser of the *Mayflower* expedition, Captain Miles Standish, a short, red-haired and red-bearded professional soldier who had fought the Spanish in Holland. He was called "Captain Shrimp" by those who didn't like him, or "little chimney," because of his quick temper. But everyone admitted that when it came to fighting, Captain

Clotheswashing, nearly impossible at sea, was first job of "Mayflower" women when they went ashore, Mon., Nov. 13, 1620.

Miles Standish was an excellent man to have around.

Standish and his exploring party were met by five Indians and a dog. Startled as the Pilgrims were, the Indians were even more so. They turned and fled, and the Pilgrims, recovering from their shock, set out after them. But the Indians were used to running and the Pilgrims were not, and they lost their quarry. They gave up in the face of impenetrable brush that tore "their cloaths & armore to peeces," as William Bradford wrote. Bradford provided a bit of comic relief at one point. The explorers had come upon a tree with a bough bent down by Indians as the spring for a rope-noose deer trap. When Bradford came up to examine it, he accidentally triggered it and was caught firmly by the leg.

After extricating the embarrassed Bradford, the explorers pressed on, crossing the neck of the Cape to return to the *Mayflower* along the other shore. On their way they discovered caches of corn hidden by the Indians. The corn would be planted the next spring.

When the end of November came, the Pilgrims still had not found a suitable harbor and a place to start their settlement. On December 6 they set out on yet another exploration. Sailing in their shallop, a small boat, they landed on the beach at Nauset (later renamed Eastham), where they spent the night behind a log barricade with a sentry on guard, for in the vicinity were Patuxet and Wampanoag Indians. The next day brought more fruitless searching and another night behind the logs.

In the middle of the night they were startled out of their sleep by a wild cry and their sentry's shout of alarm. The Pilgrims seized their muskets and fired a few shots into the darkness around them. Then there was silence until morning, when a band of Indians broke out upon them and a shower of arrows came whistling into their midst. In a few moments the Pilgrim expeditionary force was engaged in its first battle with the New England Indians. It was clumsy matchlocks against arrows and war whoops, but the Indians soon turned and fled. Remarkably enough, there were no casualties on either side.

Still on the lookout for a place to settle, the exploring Pilgrims set sail in their shallop to return to the *Mayflower,* but stormy weather and rough seas overtook them. Half frozen with snow and icy rain, they battled to stay afloat, losing first their rudder and shortly afterwards their mast and sail. With the strength of desperation they pushed their craft ahead by oar and at last pulled onto the shore of an island just outside Plymouth Harbor. Here they spent a thoroughly uncomfortable night, but at least they were still alive. In honor of the ship's mate, the first man to set foot on it, the Pilgrims called the island Clark's Island, and it has borne this name ever since.

On Monday, December 11, they sounded the harbor into which they had come and found it deep enough for the *Mayflower.* On shore they found running brooks and fields suitable for corn. Here, they decided, was a place "fitt for situation; at least it was the best they could find."

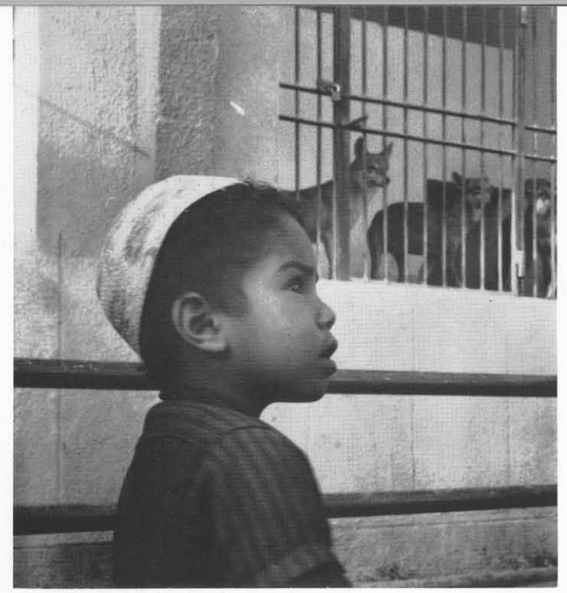
The place was Plymouth, explored six years earlier by Captain John Smith. Here was a site for their "plantation." Here they would put down their roots.

Quickly the explorers brought the good news to the *Mayflower.* But even after Captain Jones had brought the ship into Plymouth, the Pilgrims' trials were not over. No sooner had an advance party gone ashore to begin building than a wild New England winter storm descended on them, making work of any kind impossible. It raged for a week, drenching and freezing the party on shore, holding the others captive on the *Mayflower,* miserable with seasickness as the ship tossed at her anchor. Finally the storm abated. On Christmas Day the little band began at last the work of building rude homes in the new land whose stern tests of acceptance they had passed with all the fortitude the name of "Pilgrim" still calls to mind. ■

A ZOO

is for looking . . .

. . . and . . .



. . . listening

No doubt Riyadh Zoo is an eyeful, but it is also an earful when its pampered residents sound off

WATCHING Saudi Arab youngsters eagerly follow the antics of a monkey, the swift grace of a gazelle, the monolithic movement of an elephant, or the nervous, to-and-fro pace of the grey desert wolves, one is reminded of the little girl who described her first trip to a zoo in five concise words:

"A zoo is for looking."

It's true enough that zoos are among the most likely places that a youngster can really get to feast his eyes. But most zoos, and the one at Riyadh, Saudi Arabia, is no exception, are for *listening* too. The ears have their own field day. They can absorb a veritable "kaleidoscope" of sounds all orchestrated like background music in a movie, to make the *seeing* even more rewarding. Every sight has a sound all its own.

For example, it would be humorous enough when a solemn-faced baboon decides to do a handstand in order to attract the attention of two small boys watching the ostrich some distance away. But when that same simian in his upside-down position decides to add a little sound to his antics, the situation becomes a comedy. Mr. Monk gains everyone's attention in the near vicinity with his scream of scolding chatter that reverberates off tile and concrete in a great echoing surge.

Yes, the Riyadh Zoo is for listening too.

After a visitor has paid his entrance fee (about four cents) and bought some nuts to feed to the animals from a vendor near the gate, he's apt to walk a short distance through the attractively landscaped park setting and stop first to see the elephants. There are four of the mighty beasts, all gifts of Premier Nehru and the Indian people to King Saud of Saudi Arabia. Three of the mammoth creatures are of stolid personality, and they keep their audiences in awe with their size alone. Indian elephants generally give way in the size department to their wilder African cousins, but Indian elephants have been known to reach a height of 11 feet and a weight of almost eight tons.

Sultan, Riyadh's largest elephant, has great stained ivory tusks three and a half feet long. The huge beasts stand for hours swaying in their own ponderous rhythm that is turned into sound by the restless clanking of their leg chains. It's the lucky visitor who happens to hit the elephant shelter at the right moment, for he is treated to the highlight of zoo sound. In a flood of brassy, clarion tone that startles into respectful silence even the big cats, an elephant will lift his voice like a blasting trumpet as if to verify his high opinion of himself as the most powerful of the wild animals.

Another elephant, Rayyan, does more than trumpet. Rayyan is the zoo's scene-stealer. Rayyan makes very unelephantlike sounds. He plays a harmonica — to the utter delight of both children and grown-ups — and during "intermissions" tucks the mouth organ into the tip-end curl of his trunk. After each "concert" Rayyan curtsies to his audience, gets down on all four knees, rolls over and plays "dead." He gets a special bonus for his performance from appreciative fans in the form of peanuts, watermelon and sunflower seeds — all supplement to his regular daily allotment of alfalfa, served up to him by a doting Indian trainer. But Rayyan appears to be even more delighted with the incessant cries of "kamaan, kamaan" (more, more) that youngsters shout to this bulkiest of performers at the finish of one of his "numbers."

Not far from the high-fenced elephant shelter is the monkey house. This is a slow place to visit. Little hands tug at grownups to slow the pace of passing through this wonderworld of antics. And the hairy figures behind the bars swinging from their tails and flipping in a thousand tricks are just as interested in the humans as the humans in them. The building is filled with the circus noises of squealing, chattering monkeys and children mimicking them. Here, children, as they do all over the world, find a favorite simian, name it and bring their tidbits of food straight to this chattering little creature who usually shows its appreciation with a ludicrous smile.

Just before feeding time at Riyadh Zoo there is a tenseness that hangs over the grounds. Everyone feels it, animals and visitors alike. It can be seen especially in the restlessness of the big cats. And the more nervous the cats become, the more they pace and flick their tails and cough out their short growls, the more the other creatures are affected. It is a time for onlookers to keep a respectful distance. For they will receive nothing but baleful glares from these pairs of feline eyes which at feeding time seem to revert to memories of the jungle where life and death depended entirely on the alertness of the instincts. Great ringing roars rock the area as the cats scold hurrying keepers who are already doing their best to slip chunks of meat between the cage bars. A lion will snarl at a companion to contest ownership of the choicer piece of meat and then retreat as his cage mate cuffs him a good one to keep him in line. A tiger will poise snarling in spring position over a piece of food as though he suspects a plot underfoot to take it away from him. A lion often coughs, too, when he is hungry or just before he eats, much like a polite but hungry guest at a dinner party clearing his throat for attention. With each roar from the cats' quarters come answering calls from lesser beasts made irritable by the nagging, stentorian bellows.

In one cage constantly moving grey wolves snarl and snap in vexatious anger as the sounds of the wilderness set them on edge. Like mean, lean-looking great dogs they pace their cage, brushing each other as they pass. Only rarely do they howl in captivity, however, and almost never do jackals utter their high-pitched doglike yelps. These sounds are no longer necessary to their sheltered lives. In natural habitat, the howling and yelping is a way of broadcasting hunger or attracting a mate.

Beyond the wolves' cage, there's a bear, a normally quiet, shuffling fellow that grunts and growls softly to himself as he lumbers around. At feeding time, when he is made especially aware of an empty stomach, by the irritableness

The awesome size of the four well-trained Indian elephants, as well as their delightful antics, keeps crowds enthralled.