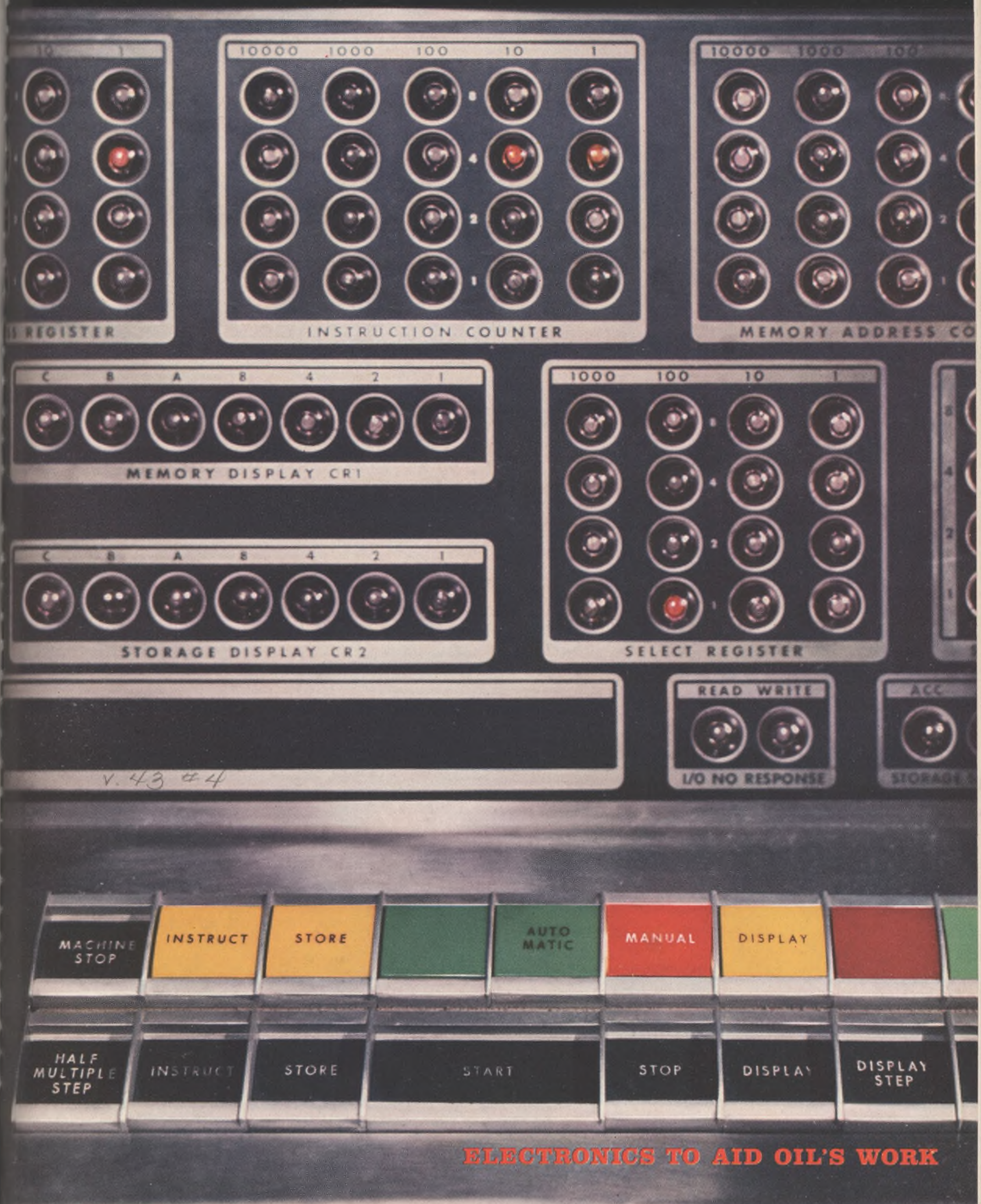
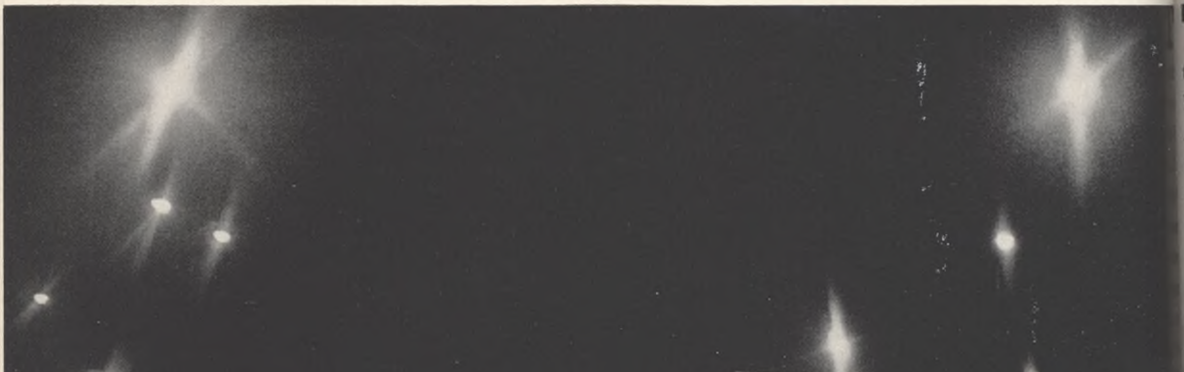
THE TEXACO STAR

WINTER 1956-1957



ELECTRONICS TO AID OIL'S WORK

Rollingight



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There's drama in the job of a man who highballs a huge truck across the nation at night that is heightened by the cruel weather of Midwinter. *Fashion Express,* beginning on Page 12, pictures the demands an express haul over wintry highways makes on man and machine. The January night was cold and clear when our photographer-writer team left Manhattan to record the lonely, grinding journey of two truck drivers rolling 'round the clock to Chicago. But just outside New York, across the Hudson River, heavy snow began pelting the truck—loaded with dresses for Chicago shoppers. The photo at left shows the 45-foot carrier moving across New Jersey on snow-covered U. S. Highway 22. Ice slicks on the highways were constant threats during much of the 27-hour journey. To get his pictures, the photographer followed the mammoth tractor-trailer in his own tiny sports car. The writer, for most of the trip, rode in the tractor's cab. To picture the rig on the roll, the photographer often would drive ahead, pull off the road, and jump out of his car—then click off his portraits of 16 tons of power roaring by.

THE TEXACO STAR

CONTENTS OF VOLUME XLIII · NUMBER 4 · WINTER 1956-1957

THE COVER: Crisp logic is the forte of the new electronic computing system to be installed soon in the Company's Houston headquarters. This close-up of the system's control console shows part of the maze of electronic elements brought into play when the system sets out to solve a computing problem. In spite of its awesome complexity, the system arrives at its conclusions simply by adding l's. The story beginning on Page 8 tells of Company plans for its use.

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THE SANCTITY O

International trade depends almost entirely upon the good faith of individuals, organizations, and governments. Seizure of the Suez Canal and its aftermath bring this basic principle into focus with almost shocking clarity

by Augustus C. Long
CHAIRMAN OF THE BOARD OF DIRECTORS, THE TEXAS COMPANY

Not since the so-called "nationalization" of the Anglo-Iranian Oil Company properties in Iran in 1951 has an event occurred of more far-reaching consequence to the petroleum industry and to world trade than the seizure of the Suez Canal by the Egyptian Government.

In the light of the current volatile situation in the Middle East, it is impossible to make any valid prediction as to how this problem will be worked out. But, whatever the solution, it must provide answers to certain basic questions regarding international relations.

Chief among these questions is that of sanctity of contracts.

The United States has taken the position that any state has the sovereign right to nationalize private property within its territory provided that fair, prompt, and adequate compensation is paid, including consideration for future earnings.

It must be made clear, however, that it is one thing to nationalize the assets of a company operating in a country without a written agreement, and quite another thing to repudiate a formal contract freely entered into for the purpose of developing that country's natural resources and industrial capacity.

In the first instance, a government merely takes over private properties for the general welfare of the state.

Where this does not constitute a violation of either a contract or a treaty entered into by the government concerned, the right to nationalize is universally recognized. This is what the British Labor Government did after World War II with several of England's industries.

While some Americans were not in agreement with these actions on political and economic grounds, there never was the slightest question as to their legality. In each instance, a democratically elected government was taking steps it deemed necessary to bolster the national economy. Only the property of British citizens was involved and proper compensation was made.

The second type of "nationalization" is altogether different, however. The government, in the exercise of its sovereign powers, has freely entered into a contractual obligation for a term of years.

It has done so with full knowledge that huge investments would be made in reliance upon that contract, and that other sovereign nations would build their economies on the assumption that the relation-

TY OF CONTRACTS

As we go to press, *a "plan of action" is in effect to help relieve Western Europe's oil shortage—brought on by the Suez seizure. Through the Middle East Emergency Committee, composed of The Texas Company and 14 other U. S. oil companies with foreign operations, petroleum is moving from the Western Hemisphere to oil-hungry Western Europeans in substantial volume. It is expected that the coordinated flow of petroleum from this hemisphere, combined with the volume it should be possible to move from the Middle East, will give Western Europeans at least enough petroleum for their essential requirements.*

ships so created would be stable and that the promises made would be kept.

Is it too much to say that in this situation the contracting government must be deemed to have voluntarily given up its right to nationalize? The unilateral breach of such an obligation is unjustifiable on any grounds. It is not "nationalization"; it is violation of the contractual obligation of a government.

The petroleum industry is particularly concerned about the Suez situation for reasons that go beyond the fact that the Canal is a principal waterway for the transportation of Middle East crude oil to European and Western Hemisphere markets. The tremendous growth in the energy requirements of the free world has pushed the search for new petroleum sources to the farthest corners of the earth.

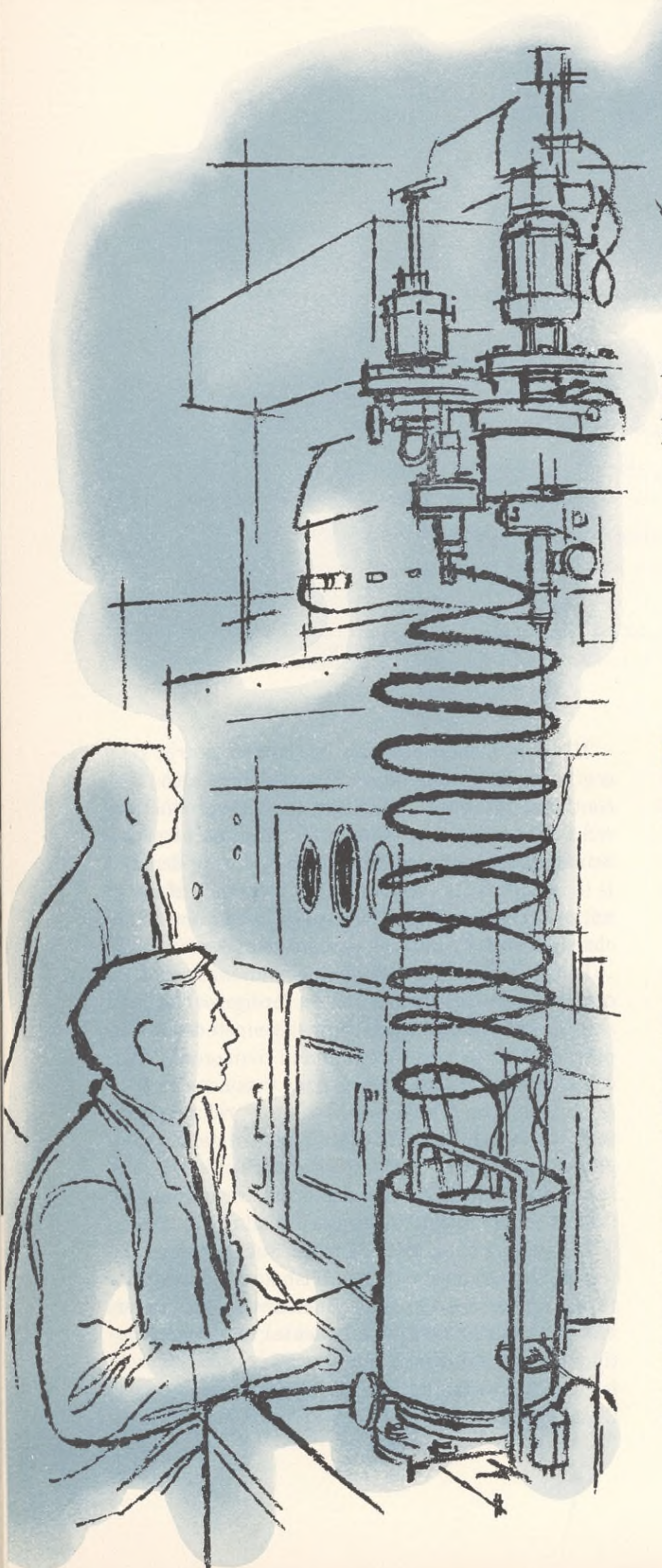
As a result, United States oil companies at the end of 1955 had a direct investment abroad of some $6.5 billion—about one-third of American industry's total such investment.

In recent years, moreover, the petroleum industry has stepped up its overseas operations to such an extent that it now ranks as the largest foreign investor among all United States industries.

If the economic progress of the free world is to continue, the global search for petroleum also must continue. Adequate facilities for the production, refining, transportation, and distribution of petroleum must be made available if the growing demand is to be met. This is possible, however, only if international business can be carried on in an atmosphere characterized by mutual confidence and good faith.

In order to raise their living standards, underdeveloped countries must attract foreign capital and skilled personnel whose technical competence can be passed along to local workers and managers. Obviously, potential investors can do business only in those countries which are absolutely reliable with regard to the fulfillment of their contracts. No competent management can afford to risk stockholders' funds in countries whose records are stained by broken contracts and instances of bad faith.

In working out a solution to the Suez problem, the free governments should establish a sound basis for future operations by making it clear that law, order, and principle are still fundamental to human relations and that faith in the observance of contracts is essential to the further development of international commerce. •



More than 66,000 samples were tested at the Center in the past year. At left a grease sample is checked for its viscosity.

Theirs to

Answering questions is a major industry in the Hudson River Valley city of Beacon, a few miles south of Poughkeepsie.

Almost 1,200 citizens of Beacon and nearby communities work 'round the clock, seven days a week, at finding the answers to countless questions about petroleum and petroleum products.

What they learn contributes enormously to the steady advances made by The Texas Company, for Beacon is the home of the Texaco Research Center—largest single unit of Texaco research and technical activity. For a quarter of a century, the Company has maintained laboratories here.

Occupying more than 187 acres on the outskirts of Beacon, the Center's many buildings are the scene of an astonishing variety of research work. In a typical year, the Center tests more than 66,000 samples; prepares more than 10,000 experimental formulations; writes nearly 1,000 technical reports.

Sixty-five miles up the Hudson from Manhattan,

at the Texaco Research Center, new petroleum knowledge comes

from questioning, checking, experimenting, testing

Reason—"Why?"

Some of the equipment the Center's scientists and technicians work with would make a spellbinding magic show:

- An electron microscope able to magnify tiny grease specimens by 30,000 diameters.
- A drill so fine it has been used to bore holes in human hair.
- A scale delicate enough to record differences in the weight of a paper scrap before and after you jot your initials on it.

Other research tools the staff uses are more familiar. But most visitors are plainly surprised to find a complete Diesel locomotive engine in one building, a full-scale combustor for jet aircraft engines in another.

Behind these spectacular features of the Center lies thoughtful purpose: to improve the quality of existing products, and develop new ones.

More knowledge through research is the key to both goals. Dogged examination, testing, probing, checking are the techniques of research the Center's staff constantly use to add to their knowledge.

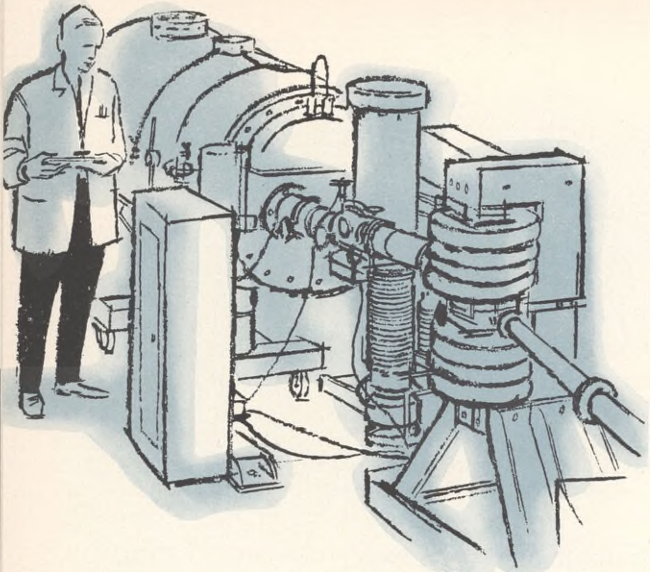
What has research done for Texaco, the petroleum industry, the public?

Questions like these often are put to members of the staff by visitors to the Center.

Answers are easy to find because the immense importance of continuing research is well-documented.

Over the years it has produced such industry revolutions as continuous thermal cracking, sulphuric acid alkylation, solvent dewaxing. Each represents a huge forward step in refining, and each has been translated into benefits for the consumer.

Out of petroleum laboratories also comes a steady flow of new basic materials to improve the clothes we wear, the food we eat. Dramatic new detergents, better fabrics, finer paints and plastics, more effective preservatives steadily turn up as the products of research.



In Beacon's new radiation studies, this generator makes materials radioactive for test and analysis.

Other research results just as important are not so well known to the average consumer.

New hydraulic fluids, for example. More efficient cutting oils. Better quenching oils, grinding fluids, greases. All these keep industry's machinery running smoothly, turning out the vast variety of products the public needs and enjoys.

But one of the most obvious jobs at Beacon is the constant improvement of fuels and lubricants serving the nation's travelers.

These products are the backbone of a nation-on-the-move. Coming up with better ones is a major assignment at the Center.

Not too many years ago it took hot water and a strong cranking arm to get the family car going on a frosty morning. No more.

Today's driver just steps on the starter, the engine swiftly responds, and he is on his way.

Time was, too, when a trip to Europe meant a 10-day boat ride. But leave New York tonight by plane, and you can breakfast in Paris tomorrow.

Oil research is a tremendous spark behind transportation improvements like these.

At Beacon, one group of scientists has the full-time job of developing new fuels. The rate at which they work shows on the records of the Center—where each week almost 500 samples of experimental fuels are put to tests which help determine their potential value.

Imagination often is a large part of resultful research. Beacon fuel specialists use educated imagination to develop new processes for fuel production.

One result of this constant experiment and test: a scant five years ago, the octane rating of Texaco Sky Chief Gasoline was the rating Fire Chief has today.

Laboratory testing, science knows, must be buttressed by actual operating tests—and at Beacon, 68 engine test stands are used to prove out laboratory findings.

Two Diesel locomotive engines are kept at the Center for fuel and lubricant testing; and its gas turbine laboratory regularly evaluates new jet fuels in jet engine combustors on loan from manufacturers.

More new cars are bought each year by the Center than the average auto dealer stocks.

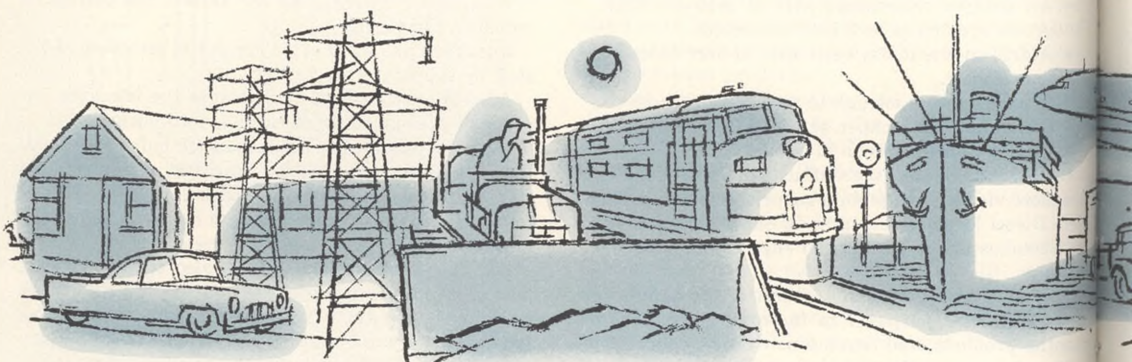
Representing the full range of new models, they are put through their paces on chassis dynamometers as well as on the road.

During one recent two-and-a-half year period, Beacon drivers wheeled test cars more than 3 million miles. That's equal to 1,000 transcontinental trips.

To obtain the finest products in the most economical way, Texaco constantly strives to improve processing techniques.

Here, too, work done at Beacon contributes significantly to the Company's progress.

The average housewife provides a good comparison with one long-time processing problem. When she wants to do some canning, she knows she can cook only one batch at a time. Oil companies used to face the same batch-at-a-time headache.



Texaco research found the solution to this problem with one of the historic improvements in petroleum refining: *continuous* thermal cracking.

Today the slender towers and huge pressure vessels of a refinery are kept busy day and night, month after month, producing a steady flow of products.

If elsewhere in research an experimental product looks promising, the process men may have to find a new method for turning it out.

Among the tools at their disposal are miniature pilot plants, in glass, that simulate the refinery facilities the proposed process would require.

These models are made in the Center's glass-blowing laboratory, where an art developed in ancient Venice is put to work for modern science.

Fundamental research—the work of learning new scientific truths whether or not there is an immediate practical goal in sight—is one function of the Center that provides the huge storehouse of basic information needed to develop new processes.

Scientists involved in this abstract kind of study deal with ideas and formulas and equations to arrive at new knowledge that may some day be translated into an important new product or process.

Chemistry brings many changes to our lives, including changes in our vocabularies.

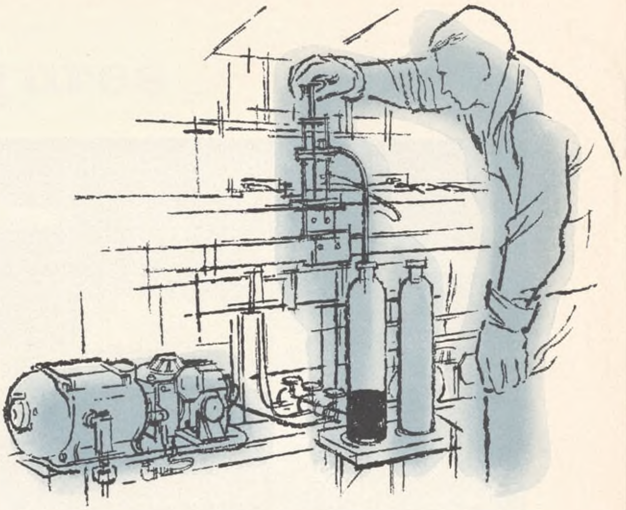
Oil chemists have recently given us an intriguing new word: petrochemicals. It has outdated at least one once-familiar expression—"the silk stocking set." Nylons mean ladies' hosiery now.

Several decades ago no one looking at crude oil would have thought it held in its molecules the building blocks of pharmaceuticals, wash-and-wear fabrics, or the additives which have resulted in a whole new family of fortified lubricants and fuels.

From the beakers and retorts of the Center's chemistry labs come new petrochemicals that open the door wider on petroleum progress.

Early in 1957, a whole new set of research apparatus will be moved into the Texaco Research Center, tagged for delivery to an exciting new research unit: the radiation laboratory.

Here the very latest techniques of nuclear chemistry will be applied to decades-old problems of petroleum research.



This miniature extraction unit, used to check experimental processing methods, speeds development work.

A broad program of radiation studies will be undertaken in the new laboratory. It is hoped these studies will lead to new products and new ways to produce and test them (already radioactive materials are used at the Center to make amazingly precise measurements and evaluations).

The most advanced nucleonic equipment will be available to give Texaco researchers the means of looking into radiation's usefulness in petroleum.

After more than 60 centuries of using petroleum, men still don't know all they want to know about it. The number and nature of the hydrocarbons found in crude oil still are undetermined, with exactness.

Through research we come closer to the exact truth —and continue to make more and more use of the mysterious substance called petroleum. •

Working Smartein

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Texaco's electronic computer program opens new fact-gathering opportunities, speeds management decisions

by H. E. Schnur, Assistant Comptroller
Chairman, Large-Scale Electronic Computing Systems Committee

Test data are scanned by Programmer A. H. Wammel.

Early this Spring, Texaco will put to work a new tool which management specialists feel is one of the most powerful ever developed to help industry work out its problems.

The intriguing new equipment is an IBM 705 electronic data processing system.

One of the latest additions to a growing list of high-speed computers designed for industrial applications since War II, the 705 is an enormous electronic brain with a memory.

With its special control equipment and operating staff, the giant computing system will occupy some 4,000 square feet of ground floor space in the Company's Houston office building.

It will be set up behind huge Thermopane windows, in full view of Houstonians who want to watch as it ticks out, in minutes, answers to questions which formerly took months to solve.

Questions like these:

How can we pinpoint the geological structures most favorable for productive drilling?

What is the most profitable production rate of oil from our different reservoirs?

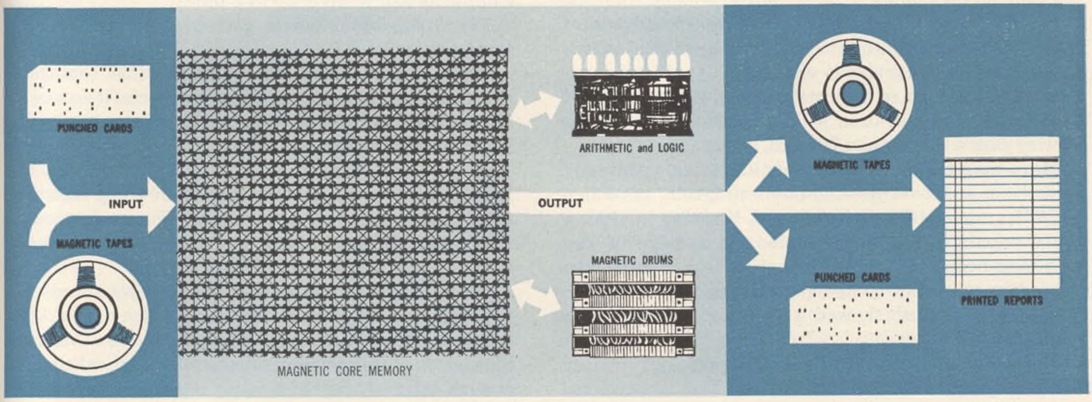
What is the day-to-day status of Texaco's crude oil reserves?

Which mix of available crudes, and rate of operation of various refining units, will yield optimum type and volume of products?

These are typical questions, and they are four of the most important the new system will *ultimately* answer. But not right away.

The hundreds of variables involved in such questions take months to "program," which is the job of translating them into the only language the machine understands: mathematics.

What the 705 actually does, at terrific speeds, is per-



Basic functions of new system are shown in diagram above. (Left) *A typical 705 installation. Floor space required is more than that of Manhattan's Radio City Music Hall stage.*

Circuit panel which controls card-to-tape conversion is wired at start of a test run.

Wired panel is inserted in the "card reader" unit. Unit puts card data on magnetic tape.

Electronic Processing Methods Supervisor J. F. Summers (left) *watches as tape is loaded for card-to-tape conversion step.*

Loading reels of tape used to store information, Texaco specialists begin the actual processing of an oil operations problem.

"Brain" users trained in test sessions: *Company specialists who will be working with the electronic computer must first be carefully familiarized with its use. Photos here show one Company group becoming conversant with the system by running test problems through it at IBM Test Center in Chicago.*

Months of programming are needed to translate problems into the only language the system understands: mathematics

form calculations in a very rudimentary way—by adding long strings of 1's.

Before it can start adding, however, hundreds of man-hours may go into setting up mathematical values to represent the problem's elements.

Best estimates are that more than *60 man-years* of planning and preparation will be needed before all the new system's talents can be used.

More than three years of study and training already have been spent on the computer program, of which the 705 system will be a focal point. Starting in 1953, a top Company committee assisted by a cadre of key employes began surveying the entire Texaco operation to see how electronic computing systems might be used. What they learned showed a definite need for such equipment.

However, systems like the 705 are not simply ordered, plugged in, and switched on. They are so complex, demand such sweeping changes in existing procedures, that a staggering amount of preparatory work must be done.

But once the preparation has been completed, the system begins paying off impressively.

In the present handling of crude oil and gas accounting, for instance, one chore now takes 30 man-days to complete. When a procedure has been worked out that allows the 705 to take on this job, it will produce the same information in just six hours.

Another recurring job, this one in production alone, might be done by an accountant with pencil and paper in a week. Using a mechanical calculator, he may complete it in two days. With a medium-size electronic calculator he can wrap it up in a minute.

The 705 system would give him his answer in a single second.

These comparisons show the possible savings in time. In terms of dollars, if the system could reduce the cost of refining oil by just two cents a barrel, we would save $4 million annually.

Actually, say the manufacturers of these electronic computers, they are no more than a further development of punch card accounting and tabulating machines—with three great refinements.

First, they work at almost unbelievable speeds.

The 705 operates on an electronic pulse rate of 1 million pulses a second. That, of course, is one of the main reasons it is able to complete complicated calculations at such incredible speeds.

Testing a reservoir engineering problem, future "brain" users man the control console.

An error in programming has caused a halt in processing of gas and gasoline accounting problem. Group is trouble-shooting.

At midpoint in progress of a test, processing analysts and programmers check the results.

Final evaluations of processed data are made by the training group. IBM technicians help.

Machine memory is the second sweeping improvement the 705 offers, over older equipment.

It is able to take in at one time all the basic data surrounding a problem along with all the necessary instructions for solving it.

It can then automatically go through the problem—selecting data when needed, moving to each computing step in proper sequence without help. And it is able to compare results of its work as the problem unfolds. Depending on its own comparisons, it can select from its memory the instructions it needs for alternate procedures.

An ingenious unit in the system composed of hundreds of thousands of "magnetic cores" gives the 705 its memory.

These elements are tiny doughnut-shaped objects made of a ferromagnetic material. They are arranged in a battery of memory frames. Each frame is made up of a complex crosswork of tiny wires with the magnetic cores strung along the wires. Through this system of wires, numbers, letters, and symbols are placed into memory or recalled from memory at electronic speeds.

Finally, the 705 system has a very high input and output capacity. It can be prepared and loaded with problems very quickly, and provide answers at dizzying rates.

Magnetic tapes are the key here.

Using tapes on which problem data (transferred from ordinary punch cards) have been recorded, the system's operators can feed material into it at the rate of 15,000 characters a second. When the machine has finished computing, it can place the results on another magnetic tape for reproduction by high-speed printers that turn out 1,000 lines of data a minute.

Most management experts agree on two important points when they discuss systems like the 705. They concur, for one thing, that the new high-speed computers won't change management principles. They simply will cut down or eliminate management's reliance on intuition. And this, they agree, is a real boon. Mathematics is a precise science; intuition is a highly fallible personal talent.

The specialists also agree that, far from eliminating the need for people, these new systems will make people more important than ever to industry.

As evidence of this, they point to history.

The history of mechanization—both of office work and actual manufacturing—shows a steady upgrading of human skills and responsibilities as one of its most significant results.

Higher production rates that mechanization brings invariably lead to higher living standards and lower unit costs. The petroleum industry's increasing use of electronic "brains" promises to have these same salutary effects on petroleum workers and the nation's economy.

By working on the eventual development of a full-scale computer program designed ultimately to take in all the phases of petroleum operation, The Texas Company hopes to help its people work smarter with figures in the years ahead. •

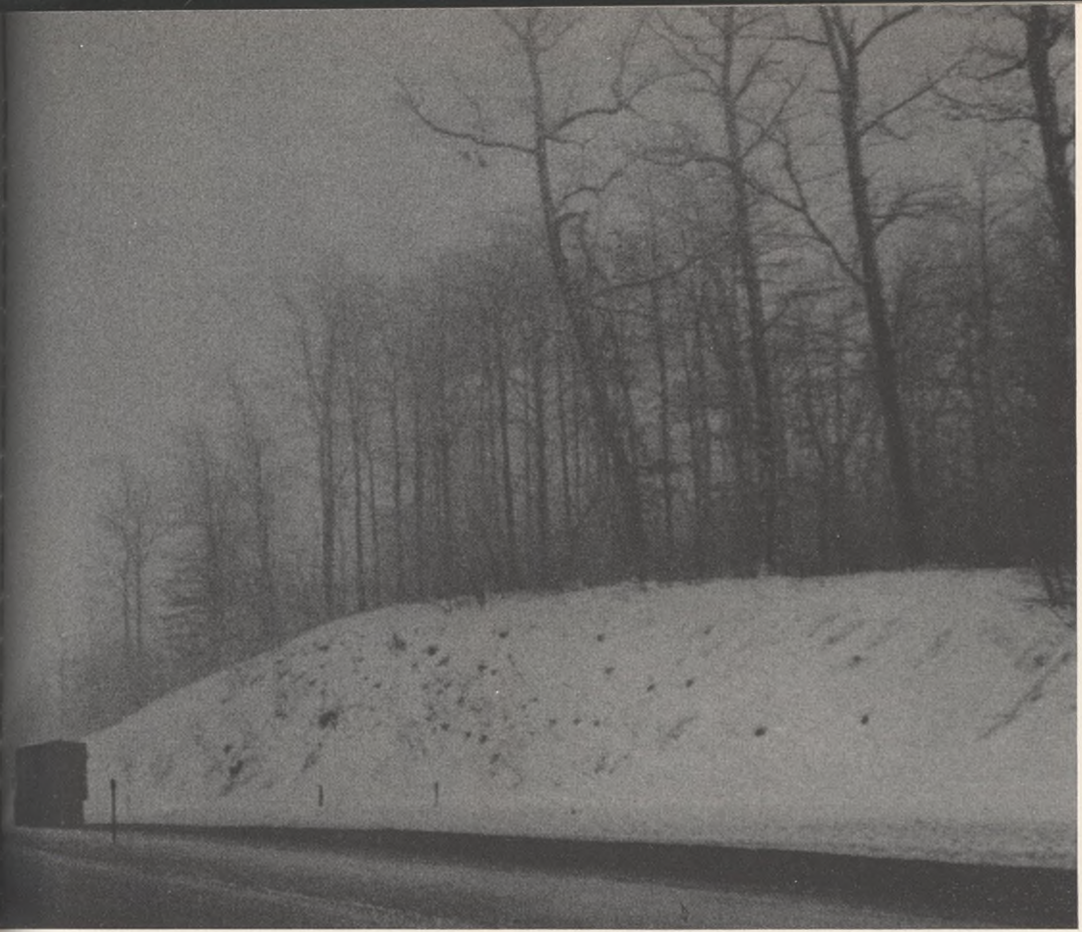
Rumbling up over the rim of a long hill on the Pennsylvania Turnpike, two big rigs pass in the gray and lonely half-light of a Winter dawn.

Fashion Express

Drivers Reade and Kelley (glasses) stop only for meals and truck service on the haul that provides one-day delivery of 6,000 dresses.

"Swinging" loads from Manhattan to the Windy City

is grueling when the weather's against you



At exactly five minutes after ten on an icy January night, Don Reade turns up the collar of his alpaca-lined jacket, reaches out to nudge his rear-view mirror to just the right angle—and begins coaxing 45 feet of trailer-truck out of a Manhattan terminal and into West 40th Street.

Within minutes Reade is nosing into the glow of the Lincoln Tunnel, humming along on the first leg of a 27-hour haul he and side-kick Jim Kelley make once weekly for Gilbert Carrier Corporation.

Reade and Kelley are trucking 6,000 dresses to Chicago, this trip.

They'll push their big rig straight through, taking time out only to have it checked and serviced and to duck into diners at mealtime.

Fashion merchandise dates quickly: getting it to retailers fast is important.

The Gilbert fleet represents 115 of the 10.5 million trucks which annually roll over billions of miles of highway to deliver the nation's goods and provisions.

Texaco helps fuel and lubricate these carriers, which form one of the nation's most important supply lines. Before the Gilbert rig shoved off, 150 gallons of Texaco Fire Chief were pumped into the tractor's tanks at the carrier's maintenance shop. Havoline Motor Oil went into its crankcase.

The high quality of Texaco products and service is behind the departure of every Gilbert truck. One of Texaco's industrial salesmen regularly calls on Gilbert, offering technical assistance on matters concerning fueling and lubricating over-the-road equipment.

As Reade eases his truck over tricky ice patches along U.S. 22 in New Jersey, an hour out of New York, he keeps a sharp eye on headlights and tail lamps of other vehicles. Occasionally he uses a special apparatus installed on the rig to spew showers of sand on the road and give his tires more traction.

Near Harrisburg, snow begins racing and dancing at the windshield, and he slows down to widen the gap between the truck ahead and his own. Kelley is asleep in the bunk behind the driver's seat.

Climbing into the Appalachians on the Pennsylvania

Oncoming headlights sequin the bleak Turnpike scene.

Hot food, black coffee, and kidding with a friendly waitress are a welcome relief from long hours on the road.

Rackload of dresses ticketed for Chicago is received at New York terminal.

A tight schedule keeps you pushing ahead, allows only an occasional brief stop at a diner or service station

Turnpike, Reade urges his rig up a steep grade at 10 miles an hour in high second gear; 12 tons is a lot of trailer to pull.

Strong headwinds are driving snow in whirling abstractions against the windshield now.

A little before three, Kelley swings slowly down from his bunk to take over the wheel and Reade pulls into an apron on the side of the pike so they can make the switch. Then back on the road again, this time with Reade resting while his partner drives.

The garment-laden truck is a hulking phantom as it rolls on through the swirling snow.

Rounding a bend, Kelley spots the warning red flares every trucker fears. He fans his air brakes to avoid locking and skidding, and moves at a crawl past a huge trailer lying upside down in a ditch.

As the first eerie light of daybreak etches the trees bordering the Turnpike into stark silhouettes, the storm loses its force. In minutes the air clears, and the last traces of wet snow are lazily swept from the windshield by the wipers.

Kelley and Reade have been on the road 14 hours.

Their first fuel stop is at a Texaco service station on the Ohio Turnpike near Akron—a 30-pump station with five lanes for vehicles. The meter clicks off 40 gallons of Fire Chief. As the two men amble out of their cab to stretch, the station attendant puts in two quarts of Havoline, then washes sludge-streaked windshield and headlights with warm water. He checks the tires, battery, and radiator.

Crossing Ohio on drying pavement, the Gilbert rig makes better time than it had during the night in spite of heavier traffic.

At nine that evening, it pulls into "Bob's Place," a Texaco station at Ligonier, Indiana. Another 50 gallons are pumped into the tanks.

Reade and Kelley have their last meal ("Two sausage dinners with French fries and easy on the gravy. Coffee now. Black.") at the café near the station, then climb back into the cab for the final lap to Chicago.

At midnight Jim snakes the trailer into the receiving dock of a cavernous warehouse on Washington Boulevard. Right on schedule, after 822 miles of highballing.

Terminal crews unload the garments, and get them ready for early morning delivery to Chicago specialty shops and department stores.

Wearily, the two drivers head for a hotel to catch a few hours rest before heading back to Manhattan in the afternoon with a load of mixed commodities.

"Rough trip," Kelley allows.

"Yeah, plenty rough!" Reade agrees. •

In the bunk behind driver's seat, Reade catnaps after a five-hour vigil at the wheel.

Kelley and Reade have the streets of a sleeping Ohio town to themselves in early morning.

Wheeling through Midwest farmland, temperature drops to 10 above.

Texaco service stations along the way keep trucks rolling.

Midnight in Chicago, and dresses are unloaded at terminal.

Next morning, smart Loop shops have new creations on display.

What you should know about gasoline prices

"Don't kid me," some people say, "gasoline prices are masterminded by the big oil companies." The facts plainly prove an entirely different story—one with which you as a stockholder or employe should be familiar.

Although you may not be aware of it, the price of gasoline behaves in much the same manner as the price of an automobile, a dozen eggs, or a television set—in direct response to local conditions.

Actually, what governs the rise and fall in the price of gasoline—and a lot of other everyday necessities—is competition. Particularly local competition. It's like Gimbels following Macy's and Macy's following Gimbels.

Gasoline prices result from competitive forces of the keenest sort—in the place where the demand exists—the local community. The following five elements (*the first four of which supplying companies have nothing whatever to do with*) enter into the price you pay for gasoline at the service station pump:

1. Federal taxes.
2. State taxes.
3. Any local taxes.
4. The dealer's markup or profit.
5. The price the dealer pays his supplier for the product, the "tank wagon price."

The dealer's markup is the margin over the wholesale price your service station man must have to operate profitably.

Your Texaco dealer – let's call him Harry Appleton—is an independent businessman. He may own his station or lease it from an owner, or he may lease his station from The Texas Company, which built it and whose brand he sells. He operates at his own risk.

Harry buys Texaco gasoline in bulk, that is, at wholesale. To the wholesale price, he must add an amount he considers adequate to pay his operating expenses and show a profit. His markup, of course, must be within what he feels his customers will pay for his product and services. It must cover such items as rent, advertising, and other operating expenses, including wages.

Because local conditions, including the cost of living and the cost of doing business, are not the same everywhere, the dealer's markup or margin can vary appreciably in different states and localities.

Moreover, because Harry is in a very competitive business, prices fluctuate.

For instance, on the opposite corner, Phil Tracy sells a competing brand of gasoline. Now, suppose Phil raises his price . . . and Harry does not follow. What happens? Phil finds some of his customers trading across the street. He'll soon lower his price or find himself operating unprofitably.

Service stations at the junction of U.S. Highways 10 and 91 in Helena, Montana, typify the keen local competition that is a vital determinant of gasoline prices.

Millions of gallons of gasoline move daily from refineries to the wholesale markets. Among the sellers are more than 200 oil companies owning about 350 refineries that manufacture gasoline. Among the buyers are tens of thousands of brokers, jobbers, and bulk customers, as well as several hundred thousand dealers.

The wholesale prices of gasolines are always changing. For the wholesale price structure probably is the best example of "living competition" in any industry. It is the result of daily activities and decisions of hundreds of skilled buyers, coping with equally skilled sellers.

Like Harry and Phil, large sellers have to keep their customers. They can't afford to make too many mistakes.

A change in price by one seller usually is followed almost immediately by others. This is something that is true in all business and is not peculiar to the oil business. It is true of automobiles, steel, and all other industries.

How consumers actually get a good break in the price of gasoline as compared with other commodities has been demonstrated during investigations in Michigan and Montana. Comparative prices for Detroit, for instance, showed that since 1941 most other articles had risen far more than motor fuel.

But that's only part of the story. From many products in everyday use you get about the same service as you used to get.

Gasoline today looks and smells the same as it did years ago, but what a difference! Two gallons of today's motor fuel provide as much energy as more than three gallons did in 1926.

The table shows how gasoline prices vary in several principal cities.

You will note that Michigan and Montana have higher state taxes than most states. The dealer markup of these states is higher than the national average, but for different reasons.

Michigan is a state where the bulk of gasoline consumption is concentrated in one area—Detroit. It is a state where wages, construction, and day-to-day cost of living are higher than in most states.

Montana, a large state, has a small population, thinly scattered over a wide area. The costs of transportation and handling of gasoline are high. The seasonal fluctuations in sales are extreme. The risks are great.

These local conditions affect two important elements of the price structure—the dealer's markup and the refiner's selling price. They are factors in why prices vary as local conditions vary.

In general, over-all costs influence prices, but local competition determines the final price.

However, because motorists in some places like Michigan and Montana pay more than those in neighboring states, some opponents of the industry have attempted to argue that competition does not exist.

It has been suggested that the price of gasoline in Michigan and Montana be controlled by the state and subjected to public utility regulation.

In certain circumstances, public utility control has been accepted by government, by industry, and by consumer groups as a legitimate feature of our economy. However, industries subject to public utility control have characteristics that differ fundamentally from the petroleum industry. For example, a light and power company is invariably a natural or inherent monopoly. Competition in the same area with another similar company would not serve the public interest. Therefore, in recognition of a situation where competition would be wasteful and annoying (as it would be, for instance, if competing companies were to tear up the streets of a city), the public utility receives an exclusive franchise.

The public utility concept certainly is not applicable to the oil industry in Michigan or Montana or anywhere else. To serve the needs of the public, more than a score of companies market gasoline in Michigan. More than 500 independent distributors and about 12,000 independent dealers serve the public there.

They are all competing for the motorist's business—on the basis of quality, service, and price.

The petroleum industry, characterized by consumer demand for a wide choice of brands and service facilities, has a record of demonstrable public service through keen competition.

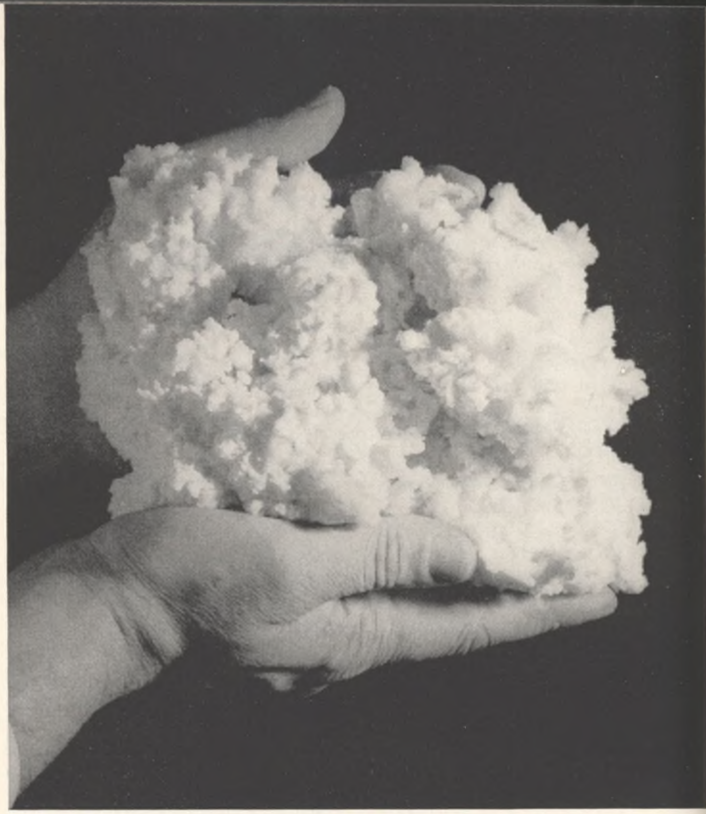
Utility-type control of oil operations would eliminate the very characteristic of the petroleum industry—competition—which accounts for its splendid record of service.

Competition can't be had by price ukase. Wholesale and retail gasoline prices have traditionally been determined by competition, the best guarantee of fairness the motorist has whenever he says "fill 'er up." •

HOW GASOLINE PRICES VARY IN SEVERAL PRINCIPAL CITIES

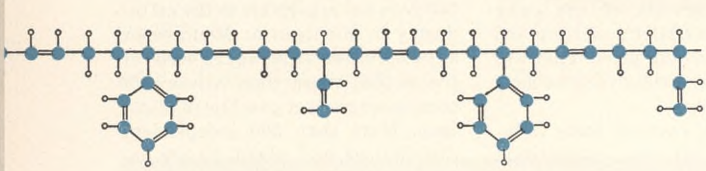
CITY	TANK WAGON PRICE*	CITY TAX	FEDERAL TAX	STATE TAX	SALES TAX	DEALER MARKUP	EXCLUDING TAX RETAIL PRICE**	INCLUDING TAX RETAIL PRICE**
DETROIT *Michigan*	$.163	$—	$.03	$.06	$.0091	$.0599	$.2229	$.3220
CHICAGO *Illinois*	.163	—	.03	.05	.0076	.0584	.2214	.3090
CLEVELAND *Ohio*	.168	—	.03	.05	—	.0460	.2140	.2940
MILWAUKEE *Wisconsin*	.168	—	.03	.06	—	.0610	.2290	.3190
CHEYENNE *Wyoming*	.174	.01	.03	.05	—	.0710	.2450	.3350
GREAT FALLS *Montana*	.185	—	.03	.07	—	.0700	.2550	.3550

**Texaco Fire Chief, December 1, 1956* ***Posted by dealers*



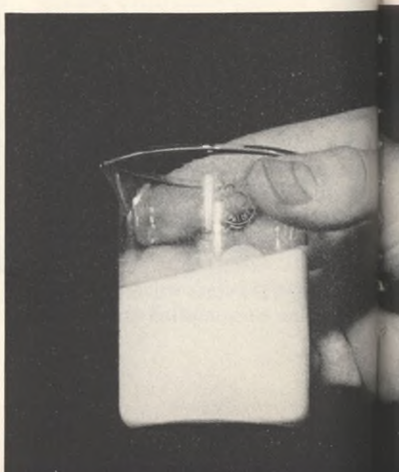
Synthetic rubber of the butadiene-styrene copolymer type is called "crumb" at this stage, just before being compressed into bales for shipment to fabricators and processors. It has chain-like molecular structure.

Burgeoning Partners:



Oil and Rubber

Through Texas-U.S. Chemical Company, Texaco has an important stake in one of the fastest-moving new growth industries—synthetic rubber



In the wondrous galaxy of new products and industries which emerged from World War II, none glows with a steadier, brighter, or more appealing light than synthetic rubber.

Stepchild of the rubber family before the war, regarded largely as a plaything of chemists, synthetic rubber ranks today as one of the great success stories of modern free enterprise. Born almost overnight of necessity when the Japanese overran the Far East rubber plantations and shut the Allies off from that entire vital supply of natural rubber, the new "test tube" industry soon was performing almost unbelievable miracles of engineering and production in satisfying the voracious needs of a military machine stretched across a world-wide battle front.

This wartime achievement under Government sponsorship and ownership is already overshadowed by the synthetic rubber industry's spectacular growth in the less than two years it has been under private management—and by the promising prospects advanced for its future.

Management foresight, coupled with long operating experience, has enabled The Texas Company already to construct a solid foundation in this healthy growth field, and today Texaco stands as a recognized leader of the burgeoning billion-dollar industry.

Texaco's part in this industrial adventure is carried out by the Texas-U.S. Chemical Company (TEXUS), whose stock is owned 50 per cent by The Texas Company and 50 per cent by United States Rubber Company.

When the Government set up machinery in mid-1954 to dispose of its wartime synthetic rubber facilities to private business, Texas-U.S. Chemical was formed to bid on—and then operate—certain plants. There is good reason for this dual parentage. The basic raw material for the most widely used type of synthetic rubber, GR-S, is butadiene made from butylene, a normally gaseous by-product of refinery operations. Texaco was an important supplier of this vital material during wartime and later Government operation, and wanted to maintain this outlet for butylene.

In turn, the United States Rubber Company anticipated increasing need for synthetic rubber in its manufacturing operations, and had long experience in operating copolymer plants making finished synthetic rubber. It desired an assured, continued supply.

A $38.5-million check, paid to the Government on April 29, 1955, bought Texas-U.S. one of the biggest single segments of the entire synthetic rubber complex—a "one-half undivided interest" in the world's largest butadiene plant and full ownership of an adjacent copolymer rubber plant, one of the country's largest.

Both of these facilities are located on a 610-acre tract at Port Neches, Texas, 15 miles north of Texaco's largest refinery at Port Arthur.

The Texas Company was no stranger to either of these plants, having been one of the original companies selected to operate the sprawling Port Neches facilities during the war. Texaco's Port Arthur refinery long had pushed millions of barrels of butane-butylene feed stock through pipe lines to Port Neches, and many of the butadiene plant's key operating personnel were former Texaco employes.

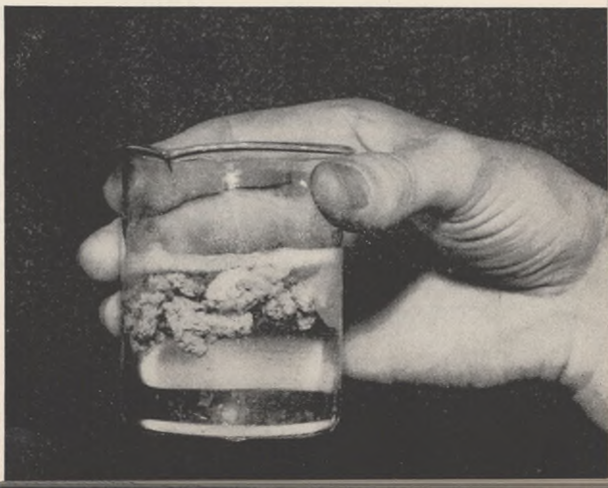
World War II and subsequent peacetime applications proved the many advantages of synthetic over natural rubber, and the most ultraconservative forecasts showed nothing but steadily increasing consumption for synthetic.

Since 1941, for example, the total world consumption of natural rubber has increased one-and-a-half times, but synthetic consumption jumped 15 times. U.S. consumption of natural rubber is at about the same level as in '41, while synthetic zoomed 150-fold.

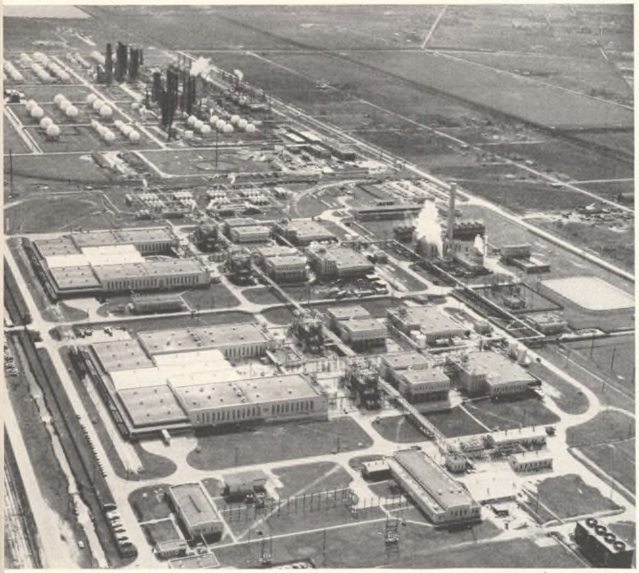
In 1948, synthetic rubber was supplying 40 per cent of total U.S. needs, and some experts predict that by 1960, 75 per cent of the rubber used in this country will be synthetic. Texas-U.S. estimates that synthetic will account for about 50 per cent of the total world consumption by 1960, as compared with 38 per cent at the present time.

A number of factors can account for the popularity of synthetic rubber. It has a current price advantage over natural rubber. Furthermore, its price is stable,

(Left) *This milky liquid—synthetic rubber latex—has been created out of by-product gases of petroleum refineries. The minute particles of rubber are suspended in water.* (Right) *Rubber forms in chunks that float in watery residue like curdled milk after acid and salt solutions are added to latex.*



COURTESY OF FORTUNE MAGAZINE



Facilities of Texas-U. S. are in the foreground; beyond are another rubber-making facility and the butadiene plant.

whereas natural rubber prices fluctuate widely. In addition, the natural rubber supply is uncertain from year to year—a condition governed by vagaries of climate, weather, labor, market conditions . . . and wars.

Synthetic rubber can also be tailored to do many things natural rubber cannot do and also made to do many things natural rubber does—and do them better. Today's passenger tires are made almost entirely from synthetic. Although very large and heavy-duty truck tires continue to be made entirely from natural rubber, increasing quantities of synthetic are being used in the smaller truck sizes. Among other advantages, synthetic rubbers can be made brightly colored, flame-resistant, and resistant to swelling in oil. They can be made more resistant to air permeation than natural, maintain physical properties over twice as wide a temperature range, have greater resistance to tearing, can be compounded to be tougher than natural rubber for tire treads.

What has its nearly two years of operation looked like for the young but already well-developed TEXUS?

William P. Gee, a former executive of The Texas Company, who is now president and chief executive officer of the new company, will tell you that it has been a restless, hectic period, involving an almost continuous whirl of expansion planning, breaking production bottlenecks, analyzing new markets, exploring new product applications.

There can certainly be no doubt that it has been a time of expansion.

The capacity of the butadiene plant (half of which is owned by Texas-U.S. and half by Goodrich-Gulf Chemicals, Inc.), which processes butane-butylene feed stock from Texaco and Gulf refineries at Port Arthur into butadiene, was increased from approximately 190,000 short tons a year early in 1955, to more than 220,000 tons by the end of 1956. In August, 1956, another multimillion-dollar expansion program was announced, which will send the output to over 300,000 tons a year by 1958.

Thus, in three years, this world's largest butadiene plant will have expanded its already enormous capacity by more than 50 per cent.

The huge butadiene plant jointly owned by Texas-U.S. and Goodrich-Gulf Chemicals, Inc., is operated by Neches Butane Products Company. Neches Butane, now jointly owned, was set up during the war with a number of Texaco men in its management to operate this facility.

A similar expansion is taking place at the Texas-U.S. copolymer plant, which copolymerizes butadiene with styrene in an emulsion to make SYNPOL, a butadiene-styrene type copolymer rubber. In the first year, elimination of production bottlenecks and introduction of more efficient manufacturing procedures increased the plant's original capacity from 88,000 tons to 113,000 tons. Equipment added in 1956 brought the capacity to about 127,000 tons a year—a 45-per-cent increase, as compared with an industry growth of about 30 per cent. Further planned expansion will more than double the original output.

So much for the present. It is apparent that with the strong resources of its two parents behind it, plus an experienced management and employe group of its own, Texas-U.S. Chemical Company has established and will maintain leadership in this fast-moving new growth industry.

What does the future hold—for the industry and for TEXUS?

One fact seems plain—research will play an important part in the future planning of Texas-U.S.

"To the company with research advantages will also go sales and profit advantages," Mr. Gee says. "We have our physical plants in good shape, our production methods improved, and our manpower selected and trained. Good research—laboratory, production, and market—must now help us keep those plants operating at their capacities."

During the last several years it operated the synthetic rubber plants, the Government spent about $5 million a year on research—but this is slight compared with the expenditures planned by private owners.

Texas-U.S. is building a strong research organization. Its staff includes several scientists with international recognition.

Recently, the company purchased a 25-acre estate near Morristown, New Jersey, where it will soon begin building a research center.

Research into what?

Mr. Gee points to four major areas:

1. *Theory.* The molecular composition of natural rubber has been determined and, in fact, synthetic rubber has been made with exactly the same structure. However, data are meager on the correlation of molecular structure and polymer properties in end uses. More exploration into this area and into new catalyst systems and polymerization media may uncover better ways to produce synthetic rubber or to use different raw materials.

2. *New products.* American economic and social progress has been built by resourceful experimenters developing new products, new uses for existing products. Wide as its application is today—from tires to toys—synthetic rubber is only scratching the surface of its potential uses, industry experts believe. More products and more uses naturally increase sales volume. In this field, Texas-U.S.'s market analysts will work hand-in-glove with their own and their customers' research scientists and technicians in adapting better rubbers to new uses.

"We not only plan to look for new synthetic rubber products, but we are particularly interested in developing new uses for butadiene," Mr. Gee says. "Right now, its prime use is in making rubber, but we are charting this raw material for use in other petrochemical processes. For example, butadiene is being used in making nylon and other plastics."

Government-owned styrene plants had been disposed of a number of years before the disposal of the butadiene and copolymer plants. As soon as they were in the hands of private industry many new non-rubber uses developed, greatly expanding styrene markets. A similar pattern is foreseen for butadiene, now that it is being produced by private industry.

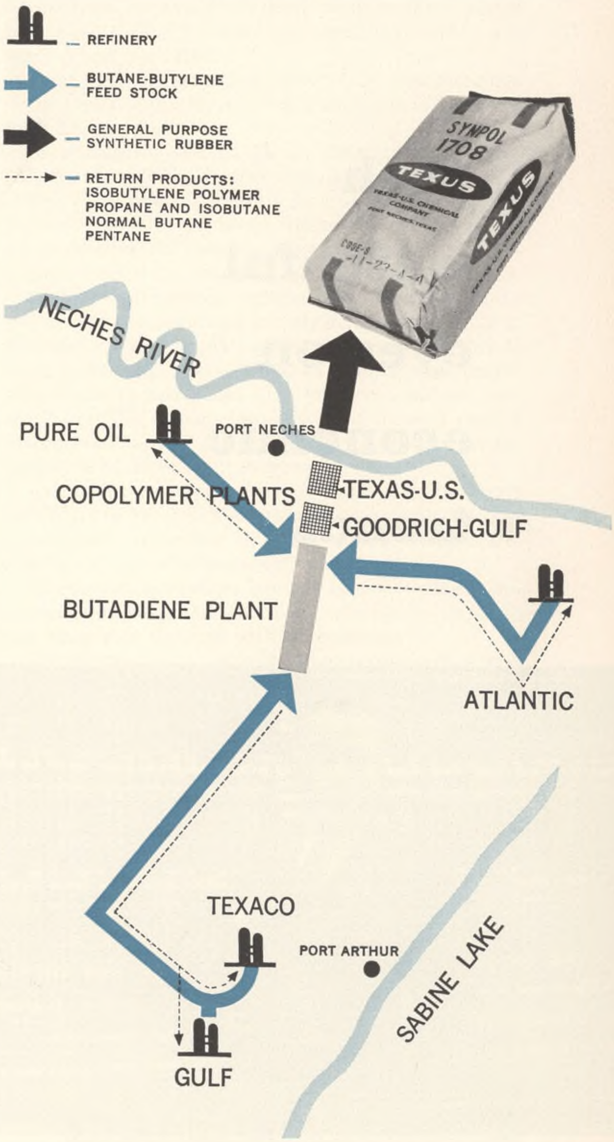
Since butadiene is a direct petroleum derivative, expansion of its usage will have important sales advantages to The Texas Company.

3. *New sources.* Perhaps butadiene is not the best, or only, basic raw material for producing synthetic rubber. Texas-U.S. chemists plan to test a variety of other materials as to availability, cost, product qualities, and so forth.

4. *New processes.* Manufacturing efficiencies and production techniques can have as great a competitive advantage as new products, and Texas-U.S. already has made encouraging progress in this area.

Presently, Texas-U.S. supplies a large share of its SYNPOL to the United States Rubber Company. An experienced sales organization backed by advertising in domestic and foreign industrial consumer magazines is also marketing SYNPOL to an increasing number of other rubber fabricators both here and in export markets.

The large investments being made in and planned for research and new production facilities are viewed as heartening for both the near and longer-term future of the synthetic rubber industry. It is a picture of an industry soundly building to take its place as a vital force in our country's economy. •



A 75-pound bale of synthetic rubber, sacked and ready for shipment, is result at one end of complex series of manufacturing steps. Butylenes, which are catalytically cracked to butadiene, are extracted from butane-butylene feed stocks brought in from adjacent refineries. The unused components of the feed stream are returned to be used in petroleum processing.

...with watchful eyes on economic trends

(Above) *Seated at left at end of table, Henry U. Harris, senior partner of Harris, Upham & Co., in New York, confers with his firm's research experts.* (Left) *Senior partner W. H. Mitchell of Mitchell, Hutchins & Co., Chicago, in front of "big board."*

Texaco Directors Henry U. Harris in New York and William H. Mitchell in Chicago

help provide the Board with insight into the financial community's thinking

What's the situation on Wall Street this week? What's happening on La Salle Street?

A corporation with The Texas Company's wide interests and dynamic plans for growth needs constant access to the thinking in these financial nerve centers. It must keep itself abreast of financial trends—ahead of them, if possible.

Texaco is fortunate to have on its Board of Directors two of the financial community's most respected analysts and two of its most skillful reporters and interpreters: Henry U. Harris and William H. Mitchell.

Mr. Harris is a senior partner of Harris, Upham & Co., in New York. Mr. Mitchell is a senior partner in Chicago's Mitchell, Hutchins & Co.

Both men are long-time Directors (Mr. Harris has been a Board member 21 years, Mr. Mitchell for 23), and both literally grew up with Texaco. Their fathers were early investors in The Texas Company, and later became Directors.

The similarities do not end there. Messrs. Harris and Mitchell both were born in Chicago, schooled at Harvard. They share an investment philosophy which places solid, long-term growth above all other objectives. Finally, they share a record of outstanding loyalty to and support of the Company.

"From my earliest days in the investment business," says Mr. Harris, "I have been primarily concerned with growth possibilities of companies. This interest probably was handed down from my father. He had the vision to see that with the industrial advancement of our country, the petroleum industry was bound to grow."

Henry Harris is the son of John F. Harris, a member of the stock brokerage firm of Harris, Gates and Company which subscribed to large holdings of Texaco stock in 1902 and 1903. The elder Harris was a Director from 1908 to 1911, serving one of those years as Vice President.

Young Henry, following his graduation from Harvard in 1923, began his career as a messenger on Wall Street. He has been on the go "down on Wall" ever since. He has been a Director since 1935 and a member of the Executive Committee since 1949.

Bill Mitchell is the son of John J. Mitchell, who invested $25,000 in Texaco at the time of its formation—an impressive expression of confidence for those days.

A man who rose from messenger to president of the Illinois Trust and Savings Bank at 27, John J. was elected to Texaco's Board in 1910 and served until his death in 1927.

"Father believed our natural resources were certain to be developed as the country grew," explains William Mitchell, himself a Director since 1933. "He interested many other Chicago men in Texaco's potential early in the life of the Company."

How does today's alert investment brokerage firm stay in touch with the shifting business scene? The Harris, Upham operation is typical.

Once a week, Mr. Harris and his research experts meet at the firm's headquarters (*see cut*). At these sessions, national and global events that affect any industry are discussed and dissected by the firm's security analysts. Reports from the 34 branch offices, which form a network of listening posts over the country, are studied and evaluated.

Much of the information turned up in these meetings is the result of intensive investigation and is exclusive with Harris, Upham.

Says research-minded Henry Harris: "Facts and only facts guide the destiny of today's investor."

The facts might furnish a clue to forthcoming expansion plans; the strategy behind the marketing of a new product; the extent of a company's research program; a hint at the reasons for a puzzling sales slump.

Such sound research guides large institutions as well as large corporations in their investment planning. Whether a corporation's current surplus cash is invested in Government obligations, in municipal or corporate bonds, in mortgages or in preferred and common stocks, or in a combination of any of these—a careful interpretation of all factors bearing on the market for each type of investment is essential.

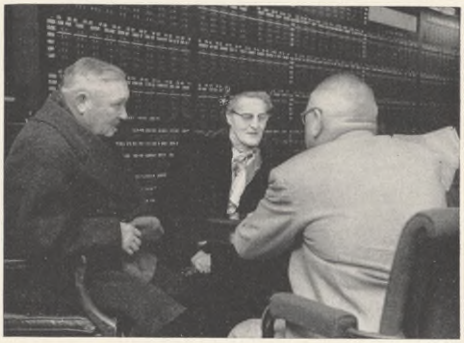
As close observers of economic trends, Henry Harris and William Mitchell also provide the Board with vital information regarding dividend action, stock splits and issues, and other basic actions and policies.

Investment counselors provide an increasingly important service to the individual citizen who wants to put his money to work with investments.

The number of private investors grows every day. Latest estimates by the New York Stock Exchange put their total at 8.6 million—most of them in the $5,000-$10,000 income range.

For these people, investment advice such as that offered by the firms of Messrs. Harris and Mitchell means the best possible use of their money to achieve thoughtfully planned investment goals.

Thus, as their financier fathers before them, Henry Harris and William Mitchell are making a major contribution both to Texaco and to the public at large. •



Investment brokerage firms provide counseling that is important to individuals (above—in the Mitchell, Hutchins offices, Chicago) *as well as corporations.*

★ BRIEF AND POINTED ★

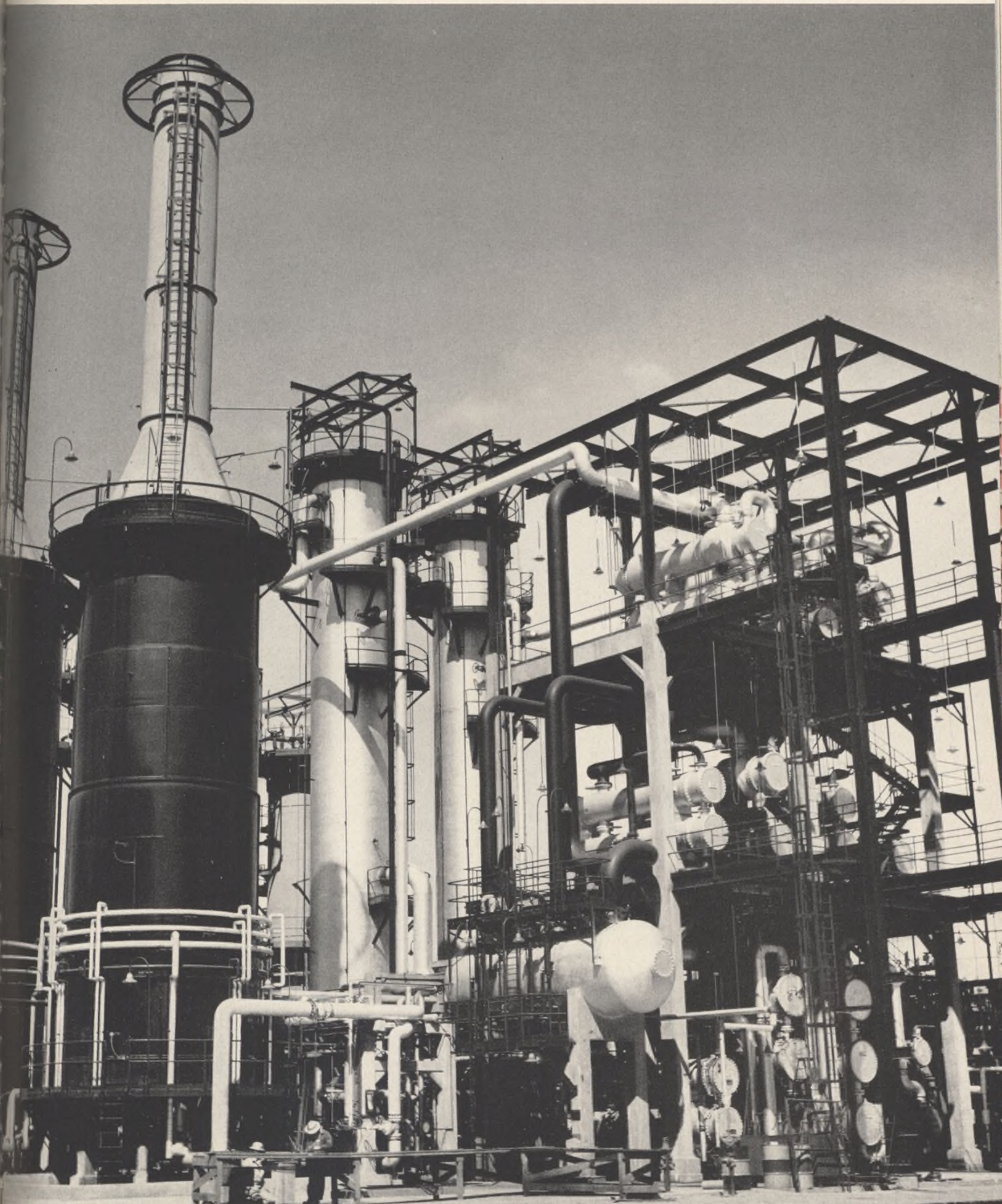
A first-hand look at the Texaco Research Center in Beacon, New York, was taken recently by 40 members of the New York Society of Security Analysts. Here the group watches a new car being run on a chassis dynamometer during a fuel rating test. The visit enabled members of this important Society to observe many of the research and technical activities that help The Texas Company to progress.

Sky Chief Su-preme, introduced by the Company in December in selected markets, is the newest member of the Texaco auto fuel family. A premium gasoline designed eventually to supplant the Company's present premium, Sky Chief Su-preme was developed to meet increased octane requirements of the most advanced high-compression auto engines being manufactured, and to deliver improved performance for all older models requiring a premium fuel. But the new fuel offers more than just higher octane rating. One major advance in Sky Chief Su-preme is improved volatility. This feature means faster starting, quicker warm-up, smoother acceleration, and improved economy for the motorist. And, like all Texaco gasolines, it is climate-controlled: specially blended every month for weather and altitude conditions in different regions. The new premium, like its predecessor, contains Petrox—Texaco's exclusive all-petroleum additive. Petrox was developed to prevent auto engine wear and stop harmful deposits. This combination of higher octane rating, improved volatility, climate-control, and the use of Petrox in Sky Chief Su-preme makes possible the full utilization of the power of all of today's engines. Marketing of Sky Chief Su-preme will be broadened gradually. Currently it is available in 36 markets. The photo shows a New Jersey dealer about to "fill 'er up" with the new Texaco product.

A major expansion program *is under way at Jefferson Chemical Company, Inc., petrochemical-manufacturing affiliate 50 per cent owned by Texaco. In its Port Neches, Texas, plant Jefferson plans to triple facilities for making ethylene; double its ethylene glycol capacity; increase by 50 per cent its ethylene oxide facilities (ethylene is a basic building block for making numerous other chemicals; ethylene oxide is used in making detergents and as a starting material for synthetic fibers; ethylene glycol is the major ingredient of non-volatile antifreezes). Expansion plans also call for stepped-up output of a number of other chemicals, including specialties such as morpholine—an emulsifier for rubless waxes and polishes as well as a versatile intermediate—and ethylene oxide specialty products.*

One of the largest fluid catalytic cracking units in the world will be under construction at the Company's Port Arthur, Texas, refinery this Spring. The new unit will have a rated throughput capacity of 90,000 barrels a day, including 30,000 barrels of recycle stock. It will cover three acres, and its tallest tower will rise to a 13-story height. This giant "cat cracker" is scheduled for completion early in 1958. Also slated for construction at Port Arthur beginning this Spring is an 80,000-barrels-a-day vacuum pipe still. Completion of this new unit is expected late in 1957. The new still will result in a net increase of 20,000 barrels a day in Port Arthur's crude capacity.

Now "on stream" *at our Los Angeles Works is the first furfural refining unit in the world for treating virgin gas oil cracking stock. The furfural process (developed by The Texas Company; licensed by Texaco Development Corporation; long used in making lubricating oils) is now being used to decrease the sulphur content, extract metal contaminants, and reduce the aromatics content of gas oil in preparation for fluid-type catalytic cracking. Result: improved quality and yield of "cat"-cracked gasoline; reduced operating costs through increased catalyst life. The new unit has a gas oil charge capacity of 25,000 barrels per operating day.*



LEAP IN THE DEEP

To keep pace with constantly growing demands for oil, The Texas Company sometimes finds it necessary to probe promising areas in unorthodox ways.

The frogman in these photos, for instance, is one of a team of underwater geologists retained by the Company to dive beneath California's offshore waters for a goggled look at possible oil-bearing rock fingering out from the proven oil fields on the mainland.

His mask, Aqua-Lung, foot fins, and diving suit are standard equipment for skin-diving enthusiasts. Not at all standard—with those who dive for fun—are the hammer, writing slate, depth gauge, clinometer, and compass he carries strapped to his waist as tools of his very special profession.

Lowered to his watery working site, he wiggles his way from one rock formation to the next—chipping off samples for above-deck inspection, noting the "strike" and "dip" of the rock and jotting down other significant information on his slate. Back at deckside (*below*), the scientist is immediately interviewed by his associates to make sure his impressions are recorded while they are still fresh.

Clutching his face mask to keep it from shifting when he hits surface, diving geologist takes the plunge. Depth of dives ranges from 20 to 150 feet. ▸