Schlumberger

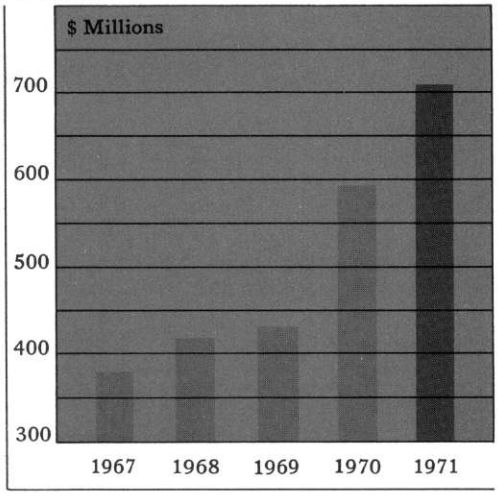
Annual Report 1971

In Brief

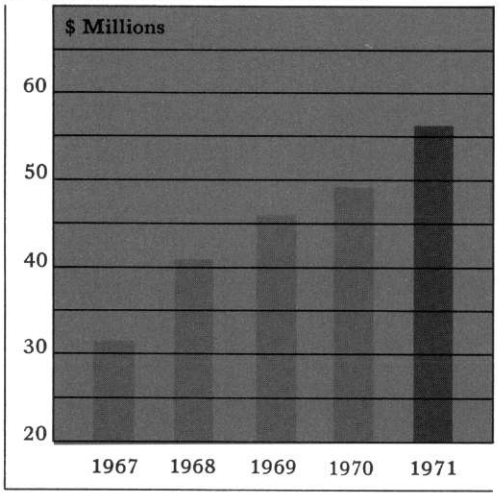
	1971	1970	1969
Revenues	$710,423,000	$591,770,000	$434,503,000
Income:			
Income before extraordinary items	56,235,000	49,449,000	46,274,000
Extraordinary items – net, after income taxes	1,249,000	–	–
Net income	57,484,000	49,449,000	46,274,000
Per share*:			
Income before extraordinary items	$4.75	$4.22	$4.00
Extraordinary items – net, after income taxes	.11	–	–
Net income	4.86	4.22	4.00
Dividends paid	1.40	1.40	1.28

*Adjusted for three-for-two stock split in May, 1969.

Revenues



Income (before extraordinary items)



To the Shareholders

Revenues and net income of Schlumberger for 1971 were on target. Earnings per share, before extraordinary items, increased 12.6%. The progression was consistent in each quarter of the year. Revenues increased 20%. However, Compteurs' revenues were included only for the last nine months in 1970, and some revenues from other acquisitions were included in 1971. On a comparable basis, revenues increased 12% in 1971.

YEAR'S EVENTS

As expected, the improvement in our traditional oilfield operations — logging and completion of oil wells — was not evenly distributed throughout the world or throughout the year. North America had a slow start but picked up in the last quarter. Currently the number of land drilling rigs is up but the offshore rigs will likely remain at the present level pending a lease sale in Louisiana. In South America the trend was just the reverse — revenues and net were up for the first part of the year. In the last quarter a decline took place mainly in Argentina and Venezuela. Eastern Hemisphere revenues and net increased steadily throughout the year. All regions contributed — North Sea, West Africa, the Middle East and Far East.

In other oilfield services, Schlumberger made a substantial investment in our drilling subsidiary Forex-Neptune. During the year a total of $6.8 million was invested or committed to acquire 100% in Forex and Neptune and $45 million for new equipment both on land and offshore. The largest commitment is for a new semisubmersible of the Pentagone type at an estimated cost of $20 million.

The Schlumberger acquisition of Compteurs, the fit with our business objectives, our plans, have been explained in previous reports. Midway in a four year plan to modernize and strengthen Compteurs, we are pursuing our policy to dispose of unrelated businesses or assets, to eliminate wherever possible minority interests in subsidiaries, to strengthen the management, to reduce costs. The results of the year were good for the first three quarters. The last quarter showed some slowdown in orders as the European economy in general felt the impact of the international monetary crisis.

Electronics and instrumentation results were generally below expectations, except for the Heath Company.

PROSPECTS

In 1972 we plan to aggressively pursue the programs which were undertaken in the past two years.

☐ In electronic operations we will scrutinize attentively each product line and eliminate systematically unprofitable or marginal operations. The first two months of 1972 in the U.S. show an upturn in orders for the first time in three years at Weston.

☐ We will build around Compteurs a worldwide business to expand the main Compteurs product lines.

☐ We will invest more money in research and development. Do read in this report (page 21) an account of certain problems which a technically oriented company such as Schlumberger is faced with in research and engineering.

☐ Oilfield services, worldwide, whether in traditional wireline operation, offshore and land drilling, testing, and other services will remain the backbone of our profits. No other undertakings will divert us from maintaining our leadership in oilfield services.

The word "multinational" is in fashion. Schlumberger has been multinational from the very beginning. Its French origin, its large U.S. operations, its worldwide services, the diverse nationalities of its engineers and managers made us this way before the word multinational was coined. We will not stop here. We will hire and promote more men from Asia, Africa and Latin America. We will continue to expand our operations in more countries. We will welcome a wider ownership of our stock in every country where we operate.

March 6, 1972

Jean Riboud, Chairman

Jean Riboud, Chairman and
Chief Executive Officer, and
Ame Vennema, Chairman of the
Executive Committee

Paced by a strong Eastern Hemisphere oilfield performance, Schlumberger set records for both revenues and earnings in 1971; gains were made in all business categories except electronics and instrumentation, where results were off moderately from 1970.

EARNINGS

Before extraordinary items, consolidated income of $56.2 million for 1971 compares to $49.4 million for 1970; earnings per share of $4.75 compare to $4.22, an increase of 12.6%.

The above 1971 income and earnings per share are before a net extraordinary credit of $1.7 million ($.11 per share) details of which are explained in the notes to the financial statements.

Earnings per share in both 1971 and 1970 have been calculated by adding back to income interest on the convertible debentures Schlumberger exchanged for Compteurs stock in the spring of 1970 and dividing the result by the sum of the average shares outstanding during the respective years plus shares issuable on conversion of the debentures into Schlumberger common stock and on the exercise of stock options.

REVENUES

Revenues for 1971 were $710 million compared to $592 million for 1970, an increase of 20%. Part of this increase is due to the fact that in 1970 revenues of Compteurs and Neptune were included only from April 1, the effective date of these acquisitions. Revenue growth on a comparable basis was about 12%.

Following is a summary of revenues by business category:

	Millions	
	1971	1970
Oilfield	$289	$251
Electronics & Instrumentation	157	159
Compteurs	228	140*
	674	550
All other, including interest income	36	42
	$710	$592

*Nine months only

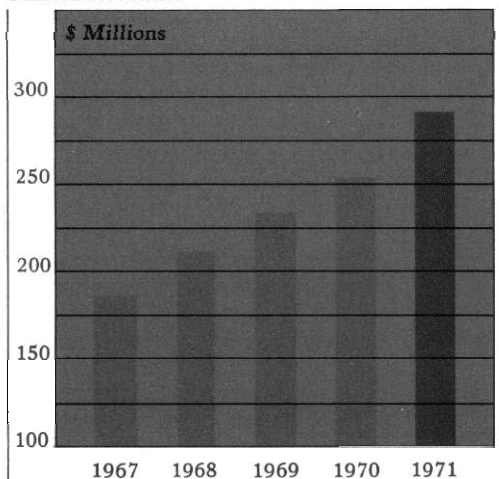
ACTIVITIES

The oilfield companies offer technical services and products to the oil industry in more than 70 countries. Wireline services provide measurements of physical properties of underground formations which help locate and define reservoirs and assist in completion, development and production phases of oil wells. Contract drilling, cementing, acidizing, fracturing, well testing, pipe inspection, fishing, are among other services provided to oil companies.

Schlumberger also supplies products such as electrical geophysical cables, drilling jars, squeeze tools, packers, bridge plugs and others.

William J. Gillingham, Executive Vice President.

Oilfield Revenues



New Compensated Neutron Log combined with a Gamma-ray log offers two services on a single logging run.

Forex-Neptune's "Belle Isle" on its first assignment in Nigeria.

Oilfield Services

Schlumberger oilfield service revenues rose to $289 million from $251 million in 1970. While revenue in the United States was slightly higher, revenue increased substantially in the rest of the world. Impressive gains were made by Forex-Neptune, a drilling subsidiary, by Dowell-Schlumberger (50% owned), and by wireline service operations in the Eastern Hemisphere and South America.

NORTH AMERICAN OPERATIONS

Wireline revenue increased 2% in spite of decreased rig activity of 5%. During the last quarter of the year the number of rigs operating reached the same level as the last quarter of 1970, an encouraging sign.

In spite of a decrease in total offshore rig activity of 12%, wireline revenue increased 7% because of a switch to exploration drilling in Louisiana offshore and an increase in exploration activity off the eastern seaboard of Canada. Schlumberger revenues are usually higher in the exploration phase of an area than they are in the later development phase.

Wireline radioactivity services were strong. Client acceptance of the new Compensated Neutron Log introduced during the year was good. This tool gives every indication of becoming a major service.

Revenue from the Thermal Decay Tool doubled. It is now a major cased hole service because of its ability to identify hydrocarbon zones through the tubing in workover wells.

Cased hole activity is growing because of our ability to provide well evaluation through the casing. More wells are being worked over each year to improve production, so we can expect continued growth in this phase of our activity.

Excluding sales to associated companies, Johnston revenues increased; a decrease in testing revenues was offset by increased revenues from squeeze tools, jar rentals, and product sales. During the year Johnston introduced in Louisiana the "Giant Burner" developed by Flopetrol. Customer acceptance has been excellent.

Plastic Applicators revenue in 1971 equaled that of 1970. A substantial increase in inspection service revenue was offset by a decline in oilfield tubular coating revenues because of decreased development drilling in Louisiana offshore.

Vector sales continued to decline because of increased competition in the depressed geophysical cable market and because of a reduction in wireline cable orders from affiliated companies. Orders showed a marked increase during the last two months of 1971; Vector revenues should improve in 1972.

PROSPECTS FOR 1972 IN NORTH AMERICA

During the last several years the U.S. oil industry has faced many perplexing economic and political problems. These problems are not solved, but better recognition of them in Washington is having a favorable effect.

Excluding the North Slope of Alaska, the year's supplies of oil and gas in the U.S. over the past 15 years have shown a dramatic decline. For example, from 1956 to 1970 oil reserves fell from 11.9 to 8.9 years' supply and natural gas reserves from 21.8 to 12.1 years' supply. Figures for 1971 almost certainly will be lower. The Federal Power Commission has approved higher prices for interstate gas. Intrastate gas prices already are substantially higher, and these improved prices have caused increased drilling in some areas. Increased prices of imported oil should make the drilling of U.S. reserves more attractive.

Offsetting these favorable developments is the continued delay of the Alaska pipeline and the recent delay in the sale of offshore Louisiana leases. However, considering the vital need for energy in the United States, we are sure that solutions to these problems will be found.

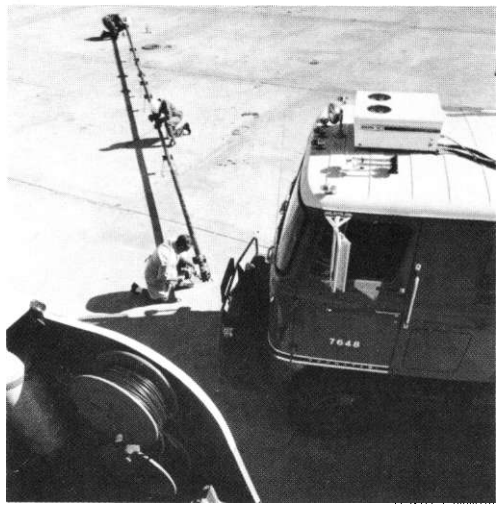
SOUTH AMERICAN OPERATIONS

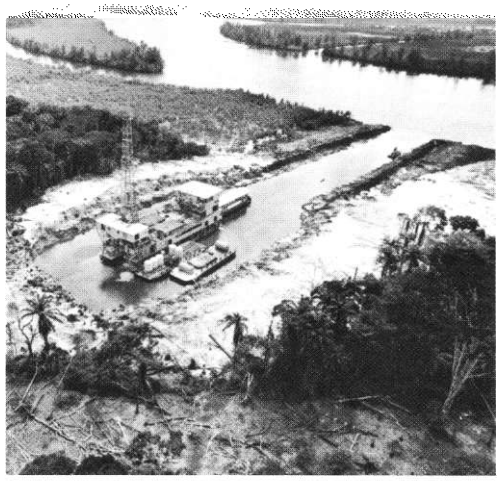
Service revenues in South America increased 6% over 1970 to a new record high. The bulk of this increase occurred in the first six months. In the latter half of the year revenues declined because of decreased activity in Venezuela and Argentina.

Drilling declined in Venezuela during the second half because of uncertainty over the effects of the newly enacted "gas nationalization" and "reversion" laws, and a slowdown in demand for heating oils in the U.S. Late in the fourth quarter, exploration commenced in south Lake Maracaibo. This area is the first significant new exploration acreage opened in over 14 years.

Drilling in Argentina declined in the last six months because of economic conditions and because results of offshore exploration were disappointing.

Activity in Brazil did not reach the record 1970 level. There was a decline in land activity which was not offset by an increase off-





Nigeria is a major growth area for Schlumberger; here maintenance engineer Sadaji Itoh and assistant are busy in the Port Harcourt shop.

shore. However, 1972 should see significant gains in Brazilian waters.

Revenue increased in Trinidad as a result of important offshore discoveries.

Two tools were introduced very successfully, the Compensated Neutron Tool in Eastern Venezuela, and the High Resolution Dipmeter in Trinidad.

EASTERN HEMISPHERE OPERATIONS

Wireline revenues increased substantially in most Eastern Hemisphere areas. Revenues were 24% greater than last year.

Offshore rig activity in 1971 was up 10%. Land rigs equalled 1970 and total rigs operating were 3% higher. Our revenue gain of 24% is impressive when gauged in terms of rig activity. The higher revenue resulted from increased offshore drilling, greater sales of newer, higher priced services, and more logs per well drilled. Offshore accounted for 45% of wireline revenues in 1971.

Major areas of revenue growth included the North Sea, Nigeria, and Indonesia. The North Sea, up 30%, has been the scene of important oil and gas discoveries. Because of proximity to the huge European market, it will continue to grow in the several years ahead. Revenues in Nigeria doubled as a direct consequence of the end of the war with rapid increase in development and exploration drilling. Indonesian revenue increased as a result of large exploration activity both on land and offshore. Substantial gains were also registered in the Middle East and in other West Africa countries.

Revenues decreased in Libya and Algeria as a result of curtailment of production owing to difficulties in setting crude oil prices.

Several tools had outstanding revenue growth in Eastern Hemisphere operations in 1971. The High Resolution Dipmeter grew by 85% as additional tools became available. Formation Density and Sidewall Neutron were 38% higher; Sidewall Sample Taker was up 43%; cased hole tools, especially the Cement Bond Log and the Scallop Gun Perforator, also had substantial gains.

Forex-Neptune, our drilling subsidiaries, had a very successful year. High utilization of rigs, both land and offshore, plus the acquisition of the rigs of a French land drilling company, resulted in a revenue increase of over 35%.

The distribution of revenues by major geographic areas was: Europe-North Africa 30%, West Africa 30%, Middle East 22%, Far East 8%, and other countries 10%. This worldwide distribution makes for more efficient use of men and equipment. A decline in drilling in one area is usually offset by an increase in another.

Offshore revenues were the same in 1971 as 1970 because no new rigs were added. Two additional offshore rigs are now under construction: a "Jumbo" tender scheduled for mid-1972 delivery for Brunei, and the Pentagone 82 semisubmersible scheduled for delivery at the end of 1972 for use in Hudson Bay, Canada.

Dowell-Schlumberger (50% owned) had revenues more than 10% higher than 1970. The largest gains occurred in the Far East and West Africa. Good results were also achieved in Brazil. Directional drilling increased and today Dowell-Schlumberger has the largest directional drilling business outside the U.S.

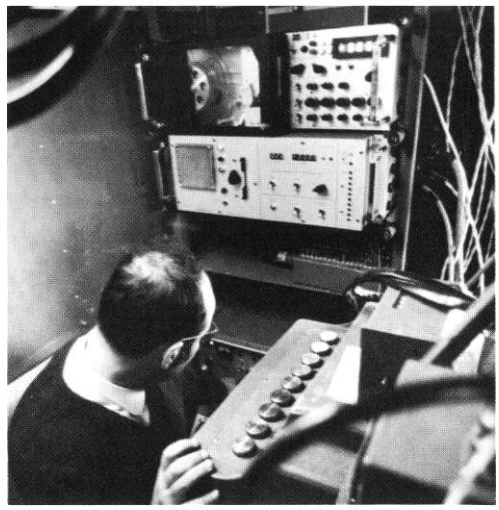
Flopetrol, a production testing service company, was acquired as of October 1, 1971. The company, headquartered in Paris and operating largely in the Eastern Hemisphere, had revenues of over $15 million in 1971 up 33% from the prior year. One of Flopetrol's newer services is the "Giant Burner" which is used for the safe disposal of crude oil while testing an offshore well. The burner is leased to the oil company on either a short or long-term basis. At year end 80 burners were on rental outside the United States.

FUTURE PROSPECTS

Worldwide energy demands continue to increase. Oil and gas will supply the bulk of this energy. By 1980 world oil consumption will reach a level of 85 million barrels per day, up from 46 million in 1970.

To supply these energy requirements the oil industry must continue to expand. A current gauge of this expansion is in the offshore. At the end of 1971 about 250 offshore drilling rigs were at work on continental shelves of the free world. Over 50 additional mobile rigs presently are under construction, deliveries occurring over a two-year span. This means the offshore drilling fleet will grow at the rate of at least 10% per year.

Land drilling in the Eastern Hemisphere should increase also, particularly in Indonesia, the Middle East, and Nigeria.



Experimental digital memory panel under test.

Heathkit parts packaging assembly.

The AR-1500 is the best quality stereo receiver in the Heathkit line.

Weston 4440 battery operated multimeter is light weight and accurate under field conditions.

Audio consoles of French TV studios were produced by Schlumberger Instruments and Systems.

Electronics and Instrumentation

ACTIVITIES

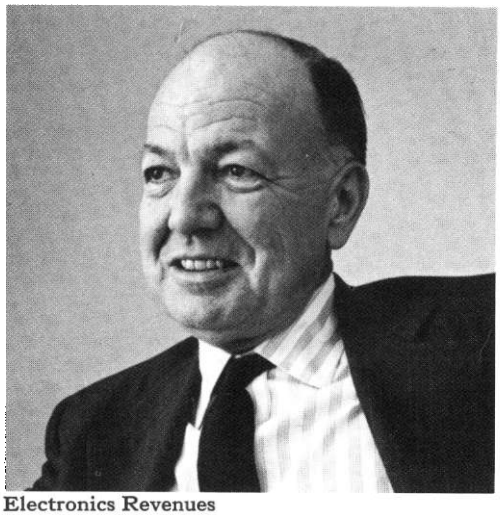
The electronics division of Schlumberger produces measurement instruments, systems, computers and components principally for large industrial accounts and governmental agencies in Europe and the United States.

Measuring instruments such as digital and analog meters, oscilloscopes or electronic counters are for analysis of electrical signals.

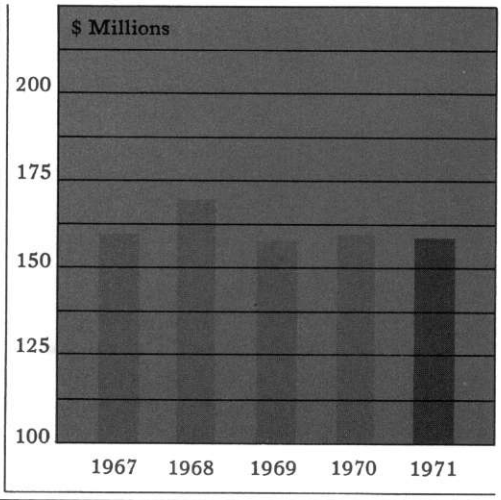
Transducers, data loggers, telemetry equipment, recorders and dynamic analysis devices acquire and process data in complex installations.

Heath offers more than 300 different electronic kits for home entertainment, communication, outdoor sporting activity, laboratory testing and educational purposes.

John E. Rhodes, Executive Vice President.



Electronics Revenues



Revenues in 1971 were $157 million, slightly lower than the previous year. European and U.S. electronic sales were lower, particularly at Weston Components, mainly attributable to lagging industrial investment and reduced government spending in the U.S. and the U.K.

However, the impact was offset substantially by record sales of $57 million at Heath —an increase of 10% due mainly to new retail outlets and heavy demand for solid state color TV models.

Overall profitability of electronics was down more than $2 million due primarily to deterioration in the United States, particularly at Newark and Archbald.

In Europe, results were improved at Villacoublay (instruments and systems), Rueil (broadcasting equipment) and SOMV (frequency synthesizers) — but this was offset by decreased profit at Solartron and higher selling costs in continental Europe.

REALIGNMENT OF OPERATIONS

During the year 1971 further progress was made on our program of consolidation and disposal of operations or product lines which are unprofitable or otherwise do not fit our business objectives.

The Hatboro, Pennsylvania plant was closed and Weston sold the business and assets of Transicoil at Worcester, Pennsylvania.

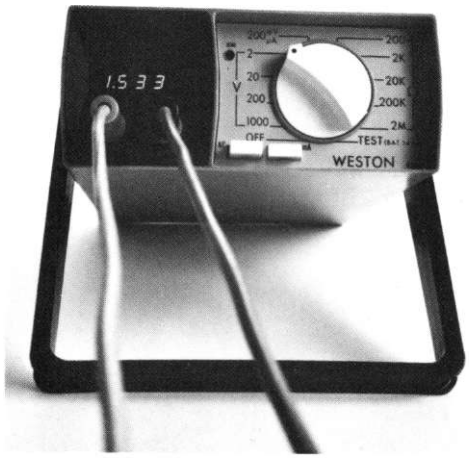
Our program also includes further elimination of other electronic operations which are not generating satisfactory profits; reserves have been set up to cover anticipated disposition losses.

Late in the year, industrial gauges in Europe were placed under a single management; the factories at Gloucester, England and Leverkusen, Germany, previously branches of Weston, have been placed under the management of the European Nuclear Instruments Center, thus consolidating these SIS products in the European market.

PRODUCT DEVELOPMENT

Several new products, introduced in 1971, will strengthen our position in the industrial, government and consumer markets in the United States and Europe.

Weston Newark is getting good response to a new drop-proof voltohmmeter designed for the professional service technician, a previously unexploited market. Also, Weston is providing a digital multimeter for the lower cost market, with a battery operated instrument, model 4440.



At EMR-Telemetry, an adaptation of aerospace techniques in low cost telemetry equipment allows any vehicle manufacturer to test his products to all required standards including destruction.

A unique optical analysis system, developed at the Princeton facility of EMR, was introduced early in the year. By means of a television camera the device scans an image and converts the optical data into a form acceptable to a computer. Applications are in medical diagnosis, astronomy and spectrography; initial reaction has been favorable.

In Europe, CRC marketed a memory oscilloscope that displays and holds an electrical signal on its screen until erased. This new main frame is compatible with existing plug-ins of a conventional main frame. The Solartron weapons simulator, first introduced in 1969, has been improved and is now creating active interest of the military in several countries; significant orders have been received. With the development of a new "master series" of digital voltmeters Solartron continues to maintain a strong market position for this product line in Europe. Villacoublay has designed a new competitive line of frequency meters with built-in provision to accept programming instructions directly from a computer and 500 MHz direct counting capability. These new major developments will strengthen our market position and should improve operating results in 1972 and beyond.

Heath introduced many kits: new marine equipment including a fish spotter that really does what the name implies; several new solid state color TV models; an AM/FM Receiver Tuner (Model AR-1500) that exceeds the performance of the highly successful predecessor Model AR-15.

OUTLOOK

During the past year, our electronic business has been strengthened by several management changes, good progress in new product development, expanded marketing outlets and elimination of several misfit or unprofitable operations. We are now in a better position to concentrate on main stream interests—instruments and systems for measurement and electronic kits—and to contribute to future earnings of Schlumberger.

ACTIVITIES

Compteurs produces electricity, gas, water, and other liquids meters for domestic and industrial use.

It also manufactures electrical equipment such as transformers, relays, power grid distribution equipment, circuit breakers and industrial closed circuit TV.

Compteurs manufactures industrial control equipment; it is also a supplier of industrial and high pressure steam valves, and valves for the oil industry.

Jérôme Seydoux, Executive Vice President.

Compteurs

In 1971, revenues of Compteurs were $228 million against $181 million for the full year 1970. Excluding acquisitions by Compteurs in 1971, on a comparable basis, revenues increased 12%. Net income for the last nine months of 1971 was up moderately compared with the nine months of 1970 following acquisition. However, net income was lower than budgeted mainly due to slackening of the European economy in the last quarter as a result of the international monetary uncertainty in this period.

Contributing to the revenue and net income increases were the petroleum valve business which had increased volume and improved profit over the previous year, and the International Division where earnings rose more than 40%. Conversely, results of the industrial valve business and of the mechanical division were disappointing.

ACQUISITIONS

During the year, the company strengthened its main product lines through acquisitions.

In the second quarter, Compteurs increased its equity in Continentale and Garnier from 46% to more than 90% at a cost of approximately $1.4 million. Continentale and Garnier is a French manufacturer of electricity and gas meters, and gas distribution equipment. The sales of this company were $11 million for 1971, an increase of 10% over 1970. Electricity and gas meter manufacturing of Continentale and Garnier will be combined with that of Compteurs at its Poitiers and Reims plants; Continentale and Garnier will concentrate on the development of gas distribution and regulation equipment at its Paris plant.

To enlarge its European meter business, ownership was increased from 33% to 80% in Contigea, the leading Belgium manufacturer of domestic meters with sales of $12 million in 1971.

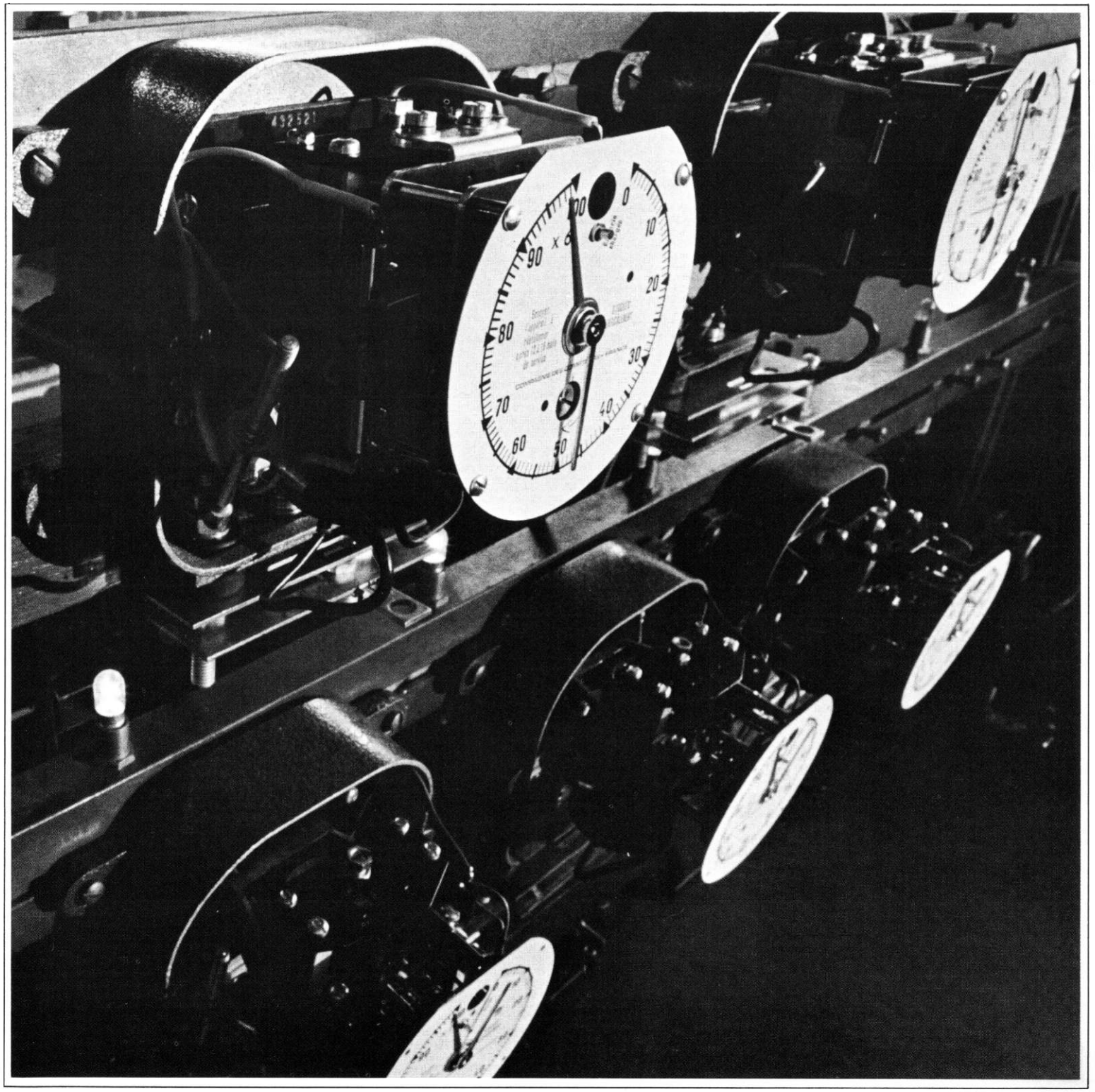
DISPOSALS

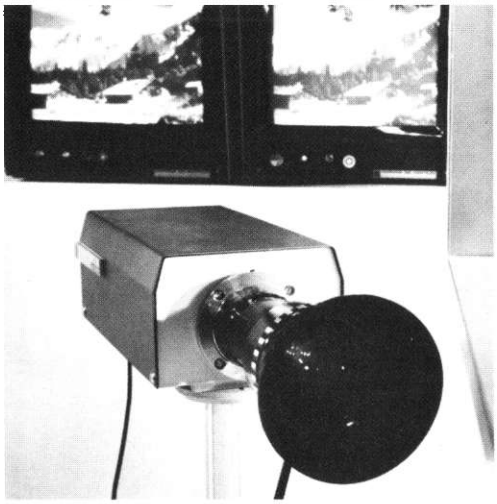
During the year, Compteurs disposed of a 51% participation in GEGI, an engineering firm whose activities were not connected with Compteurs' principal line of business. Compteurs also sold a 44% interest in Jules Richard, a company specializing in meteorological and regulation equipment.

ORGANIZATION

Pursuing the plan to reorganize the operations of Compteurs the following steps were taken:

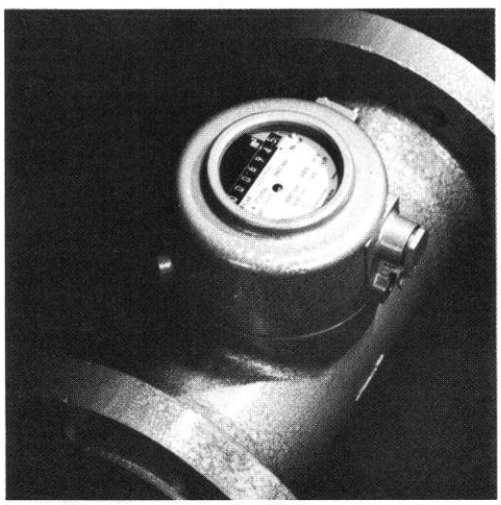
Electric-power meters under
production line test at Compteurs.





Closed-circuit black-and-white TV camera.

Unattended free-passage subway gates are installed in some Paris stations.



FLUXI volumetric gas flow meter.

☐ Gas, electricity meter, and related equipment activities, including those of Continentale and Garnier, were consolidated under a single management in the newly formed Energy Division.

☐ The industrial valve subsidiary, SERSEG, and the petroleum valve subsidiary, Malbranque, were regrouped into the Valve Division under a single management. Steps are in progress to reorganize the SERSEG business.

☐ The liquids and gasoline pump activities were regrouped into the Liquids Division. The main products of this division are water meters, industrial fluid meters and gasoline pumps.

The operations of Compteurs are now organized into six divisions: Energy Division, Industrial Control Division, Liquids Division, Mechanical Division, Valve Division, and International Division.

NEW PRODUCTS

A substantial program has been implemented to reduce cost, to improve quality of existing products, and to develop new product lines. In 1971, Compteurs' research and development budget was increased by 10% to achieve this purpose. It will be further increased by another 38% in 1972, from $7.7 million in 1971 to $10.6 million. Some of the products developed during 1971 include:

☐ The Energy Division has developed a new low-priced Ripple Control Receiver AIT 100 for the automatic switching of remote multiple tariff meter installations. The AIT 100 completes a range of similar equipment manufactured by Compteurs for automatic switching of street lighting as well as dual tariff metering purposes. Initial market reception of this new model is very favorable.

☐ The Industrial Television department has introduced a new black and white closed-circuit TV camera. This is the lowest priced and highest performance model now produced in Europe. A prototype of a color TV camera also has been completed. Although this equipment was designed for industrial use and for teaching, its performance is comparable to that of broadcasting equipment.

☐ The Valve Division completed a new valve prototype for use in enriched uranium nuclear reactors.

☐ The Industrial Control Division launched a new automatic valve, the Maxflo, which can be used to control the flow of any fluid in industrial facilities. The Maxflo has received good initial customer acceptance.

☐ The Mechanical Division has introduced a parking meter and 600 units have already been supplied to the Paris municipality for their pilot project.

NEW MARKET AREAS

Significant export contracts were obtained in 1971, particularly in the field of gas and electricity equipment:

☐ A $4 million order was received from Greece for the supply and installation of ripple control equipment to modernize distribution of electricity.

☐ In the valve business, four significant orders, each exceeding $1 million, were received for the supply of petro-chemical equipment to new refineries in France and Rumania.

☐ The Industrial Television department received an order to equip with closed circuit TV cameras, 11 tankers presently being built in France for Japanese and British clients; 150 cameras will also equip the new Paris subway. Another order was received from the French air force to renew the equipment for landing control in all military air bases.

☐ The Mechanical Division has received an order for 200 free-passage gates for the Paris subway. These gates are based on a new design that restricts entrance to a passenger only if he presents a nonvalid ticket.

OUTLOOK

The overall economic environment for Compteurs in 1972 will be less favorable than in 1971 due to the reduced rate of growth of the European economy.

However, many steps have been taken since the Schlumberger acquisition to strengthen management, to regroup product lines on a more rational basis, to decentralize operations into profit centers, and to obtain faster and more accurate management accounting. Many further steps are being introduced to utilize existing plant capacity more efficiently, and to decrease overhead ratio. Concurrently, a program has been launched to reduce the indebtedness of Compteurs by means of improved inventory control and accelerated collection of receivables.

The first results of this program should begin to be felt in 1972 but should have a much greater impact on profitability starting in 1973.

Seydoux

RESEARCH & ENGINEERING

Research & Engineering expense was $31.3 million for 1971 compared to $26.7 million for 1970. The 1971 expenditure represents about 4% of operating revenues; this included $13.8 million for oilfield activities, $9.8 million for electronics and instrumentation and $7.7 million for Compteurs.

TAXES ON INCOME

In 1971, there was a continuation of the shift in the geographic sources of Schlumberger's earnings away from the U.S. to relatively lower tax rate areas. As a result the effective tax rate decreased from 35.4% in 1970 to 34.4% in 1971.

CAPITAL EXPENDITURES

Including $8 million of plant and equipment received in business acquisitions, additions of fixed assets in 1971 aggregated $87 million. This includes $30 million by the Forex-Neptune drilling group. 1971 capital expenditures by business category were as follows (in millions):

Oilfield	$59
Electronics & Instrumentation	8
Compteurs	18
All other	2
	$87

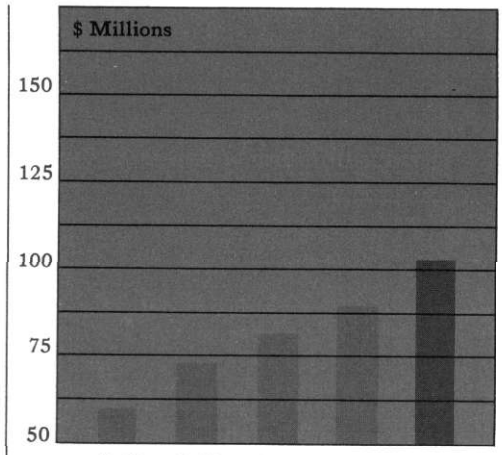
Depreciation expense for 1971 was $45.7 million compared to $37.7 million for 1970.

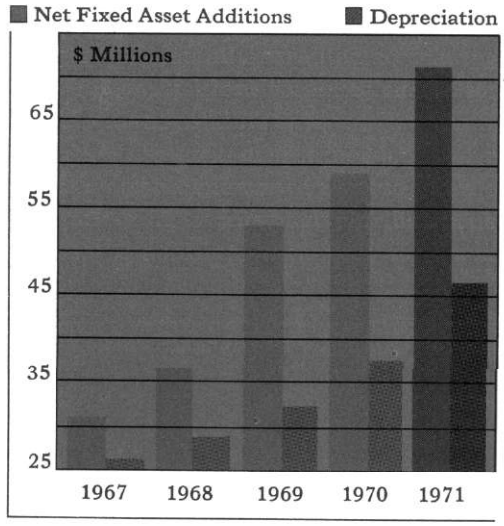
COMMON STOCK AND DIVIDENDS

During the year, 93,500 shares of treasury stock were purchased while 55,159 shares were sold to employees under stock option plans and 21,326 shares were issued for the remaining minority interest in Forex. Also, the parent company issued 292,628 new shares to a subsidiary as part of an internal reorganization; these shares can be used for future acquisitions or other corporate purposes but are not available for conversion of the debentures issued to acquire Compteurs. At year end 808,958 shares remained in the treasury, of which 516,330 were for unrestricted use.

Purchases of treasury stock have been and may continue to be made for general corporate purposes, including sale under employees' stock options and conversion of the debentures issued in connection with the Compteurs acquisition. Cash dividends on common stock were maintained at an annual rate of $1.40 per share during 1971 but were increased by the Board of Directors on March 2, 1972 to an annual rate of $1.46.

Cash Flow





SCHLUMBERGER LIMITED
(Schlumberger N.V., Incorporated in the Netherlands Antilles)
And Subsidiary Companies

Consolidated Balance Sheet

ASSETS	December 31, 1971	1970
	(Stated in thousands)	
CURRENT ASSETS:		
Cash	$ 18,334	$ 17,057
Short-term investments, at cost (approximately market)	71,483	59,752
Receivables, less allowance for doubtful accounts (1971—$5,656; 1970—$4,600)	217,104	188,329
Inventories, at cost or less	177,379	168,559
Other current assets	17,662	9,730
	501,962	443,427
LONG-TERM INVESTMENTS AND RECEIVABLES	55,300	50,588
FIXED ASSETS, at cost less accumulated depreciation	267,028	237,221
INTANGIBLE ASSETS, at cost less amortization	25,999	21,894
OTHER ASSETS	10,910	10,719
	$861,199	$763,849

See notes to financial statements.

LIABILITIES AND STOCKHOLDERS' EQUITY	December 31, 1971	1970
	(Stated in thousands)	
CURRENT LIABILITIES:		
Accounts payable and accrued liabilities	$135,074	$117,613
Estimated liability for taxes on income	45,720	31,301
Bank loans	88,188	74,581
Dividend payable	4,064	4,063
Long-term debt due within one year	11,941	9,628
	284,987	237,186
CONVERTIBLE DEBENTURES	62,037	61,034
OTHER LONG-TERM DEBT	49,102	46,788
OTHER LIABILITIES AND RESERVES	38,612	21,740
MINORITY INTEREST IN SUBSIDIARIES	15,213	20,102
	449,951	386,850
STOCKHOLDERS' EQUITY:		
Common stock	75,283	71,619
Income retained for use in the business	335,965	305,380
	411,248	376,999
	$861,199	$763,849

See notes to financial statements

SCHLUMBERGER LIMITED
(Schlumberger N.V., Incorporated in the Netherlands Antilles)
and Subsidiary Companies

Consolidated Statement of Income

	Year Ended December 31, 1971	1970
	(Stated in thousands)	
REVENUES:		
Sales and services	$695,866	$578,514
Interest and other income	14,557	13,256
	710,423	591,770
EXPENSES:		
Cost of goods sold and services	461,686	376,942
Research and engineering	31,313	26,688
Marketing	53,256	46,633
General	62,185	51,255
Interest	14,555	11,839
Taxes on income	30,067	27,776
Minority interest in net income of subsidiaries	1,126	1,188
	654,188	542,321
Income before extraordinary items	56,235	49,449
Extraordinary items—net, after income taxes	1,249	—
Net income	$ 57,484	$ 49,449
Per common share and common equivalent share:		
Income before extraordinary items	$ 4.75	$ 4.22
Extraordinary items	.11	—
Net income	$ 4.86	$ 4.22

Consolidated Statement of Stockholders' Equity

	Common stock		Income retained for use in the business	
	1971	1970	1971	1970
	(Stated in thousands)			
Balance at beginning of year	$71,619	$60,819	$305,380	$283,459
Cost of shares (1971—93,500; 1970—167,000) reacquired	(594)	(971)	(10,679)	(11,269)
Value assigned to 129,817 shares exchanged for shares of Compteurs	—	9,087	—	—
Value assigned to 21,326 shares exchanged for shares of Forex	1,904	—	—	—
Proceeds from sale of shares (1971—55,159; 1970—75,761) to optionees	2,354	2,684	—	—
Net income	—	—	57,484	49,449
Dividends declared (1971—$1.40; 1970—$1.40 per share)	—	—	(16,220)	(16,259)
Balance at end of year	$75,283	$71,619	$335,965	$305,380

See notes to financial statements.

Consolidated Statement of Changes in Financial Position

	Year Ended December 31, 1971	1970*
	(Stated in thousands)	
SOURCE OF WORKING CAPITAL		
Income before extraordinary items	$ 56,235	$ 49,449
Add (deduct) amounts not affecting working capital:		
Depreciation	45,664	37,657
Amortization of intangibles	1,627	1,649
Other—net	(1,183)	2,165
Working capital provided from operations	102,343	90,920
Extraordinary items—net, after income taxes	1,249	—
Add portion of extraordinary items not affecting working capital	13,885	—
Exchange of debentures and treasury stock for:		
Compteurs shares	—	70,121
Forex shares	2,609	—
Increase in other long-term debt	16,615	7,896
Retirement of fixed assets	6,988	9,032
Proceeds from exercise of stock options	2,354	2,684
Total working capital provided	146,043	180,653
APPLICATION OF WORKING CAPITAL		
Interests acquired in consolidated companies, less net working capital acquired:		
Compteurs (1971—1%; 1970—89%)	950	32,799
Other	13,912	8,283
Additions to fixed assets	78,692	68,298
Dividends declared	16,220	16,259
Reduction of long-term debt	15,696	6,099
Purchases of treasury stock	11,273	12,240
Increase in investments and long-term receivables	2,241	4,429
Other—net	(3,675)	5,662
Total working capital applied	135,309	154,069
NET INCREASE IN WORKING CAPITAL	$ 10,734	$ 26,584
INCREASE IN WORKING CAPITAL CONSISTS OF:		
Increase (decrease) in current assets:		
Cash and short-term investments	$ 13,008	$(14,163)
Receivables	28,775	94,868
Inventories	8,820	66,402
Other current assets	7,932	5,086
(Increase) decrease in current liabilities:		
Accounts and dividends payable	(17,462)	(70,302)
Estimated liability for taxes on income	(14,419)	(5,709)
Bank loans and debt due within one year	(15,920)	(49,598)
NET INCREASE IN WORKING CAPITAL	$ 10,734	$ 26,584

*Certain 1970 amounts have been restated for comparative purposes.

See notes to financial statements.

PRINCIPLES OF CONSOLIDATION AND MAJOR ACQUISITIONS

The consolidated financial statements include all significant majority-owned subsidiaries. Fifty percent owned companies are carried in long-term investments at Schlumberger's share of net assets; a pro-rata share of the after-tax earnings of these companies is included in "other income." Compagnie des Compteurs, its continuing subsidiaries and Neptune were acquired on April 1, 1970 and are included in the consolidated financial statements as from that date. For the nine months ended December 31, 1970, these companies' total revenues were $154.1 million.

Balance sheet items recorded in currencies other than U.S. dollars are translated at current exchange rates, except for oilfield inventories, fixed and intangible assets, long-term investments and debentures convertible into common stock, which are translated at historical rates.

Prior to 1971, inventories were translated generally at historical rates of exchange. In 1971 inventories, other than those for oilfield activities, were translated at current rather than historical rates in order to treat uniformly within the same fiscal period the effects of changes in currency parities on inventories and relatable liabilities. Had the new method been used prior to 1971, there would have been no material change from previously reported earnings or financial position, since the effects of changes in parities arose mainly from Compagnie des Compteurs which was acquired in 1970 when rate changes were minimal. See the following note.

EXTRAORDINARY ITEMS

In light of two substantial acquisitions made in 1970 — Compteurs and Neptune — Schlumberger re-examined its long range objectives and initiated a program for the sale or discontinuance of operations which are not compatible with those objectives. As part of this program, the Daystrom Furniture subsidiary was sold during 1971 for $18 million cash at a gain, and provision was made for estimated losses on sale or other disposition of certain operations, principally electronics, and investments. The combined result of these items was that income for 1971 was credited with $916,000 (including anticipated tax benefits of $9.0 million) which has been treated as an extraordinary item in the consolidated statement of income.

As explained under "Principles of Consolidation," in 1971 the Company changed its method of translating certain non-U.S. dollar inventories. This change resulted in an increase of $6.9 million in inventories, which amount has been credited as an extraordinary item in the consolidated statement of income.

An extraordinary charge of $6.6 million arose from the translation, as applicable, of certain non-U.S. dollar assets and liabilities at current rates of exchange.

GEOGRAPHICAL DISTRIBUTION OF REVENUES AND NET ASSETS

The geographical distribution of revenues in 1971 and 1970 and net assets at December 31, 1971 was approximately as follows:

	Revenues		Net Assets Dec. 31,
	1971	1970	1971
United States and Canada	31%	41%	42%
France	32	24	14
Other	37	35	44
	100%	100%	100%

FIXED ASSETS

A summary of fixed assets follows:

	December 31, 1971	1970
	(Stated in millions)	
Land	$ 19.8	$ 16.9
Buildings and improvements	108.6	100.9
Machinery and equipment	383.1	340.6
Total cost	511.5	458.4
Less—accumulated depreciation	244.5	221.2
	$267.0	$237.2

Depreciation of fixed assets is recorded by straight-line methods over the estimated useful lives of the assets. Accelerated depreciation methods are utilized for income tax purposes, and appropriate provision for deferred taxes is made in the financial statements.

TAXES ON INCOME

A material portion of consolidated income retained for use in the business at December 31, 1971 is composed of undistributed earnings of subsidiary companies. No provision has been made for income taxes which may be payable at rates of 3% to 10% on most of these earnings if they were to be remitted to the parent company.

Operating loss carryforwards available to certain foreign subsidiaries as deductions from their future income, if earned, amounted to $25 million at December 31, 1971, excluding those attributable to unrecorded future income tax benefits of Compteurs and its subsidiaries existing at date of acquisition. Of this amount, $0.2 million expires in 1972, $3.7 million in 1973, $4.8 million in 1974, $4.5 million in 1975 and $6.7 million in 1976. Substantially all of the remainder can be carried forward indefinitely.

LONG-TERM DEBT

At December 31, 1971, the companies' long-term debt, excluding amounts maturing within one year, consisted of the following:

		(Stated in millions)
Payable in French francs:		
Schlumberger Limited 4%-6% convertible debentures due 1973-1980		$ 62.0
Compagnie des Compteurs and its subsidiaries:		
Debentures, 5%-6.5% due 1973-1984	$13.8	
Loans from Crédit National, 6%-7.25% due 1973-1979	12.1	
Other loans	5.8	
	31.7	
Other consolidated companies	6.9	
	38.6	
Payable in U.S. dollars	8.7	
Payable in other currencies	1.8	49.1
		$111.1

The debentures of Schlumberger Limited, which have a par value of 260 francs each, bear interest at 4% per annum to March 31, 1972 and 6% thereafter. After March 31, 1972 they will be convertible into Schlumberger common stock in the ratio of two debentures for one share of common stock (663,058 shares). Mandatory redemptions are to be made in annual amounts drawn by lot as of March 31, 1973-1980 at redemption prices which increase annually from 101.9% to 115.4% of face amount. In addition, voluntary redemptions may be made on April 1, 1972 at par or at any time thereafter at mandatory redemption prices. Conversions and voluntary redemptions reduce the mandatory redemptions. Debentures amounting to $2.0 million held by subsidiaries have been deducted in arriving at debentures payable at December 31, 1971.

The other long-term debt will be due $12.8 million in 1973, $8.2 million in 1974, $8.2 million in 1975 and $3.5 million in 1976.

STOCK OPTIONS

Transactions under stock option plans during 1971 were as follows:

	Number of shares	
	Under option	Available for option
At January 1, 1971	244,924	252,574
Options granted at $98.375 to $143.25 per share (100% of market value):		
For five years	25,300	(25,300)
For ten years	2,000	(2,000)
Options exercised at $26.89 to $90.375 per share	(55,159)	
Options lapsed or terminated	(5,239)	5,239
At December 31, 1971	211,826	230,513

The 211,826 shares under option at December 31, 1971 were held by 199 officers and key employees at option prices ranging from $26.89 to $143.25; options for 84,004 shares were exercisable at that date.

COMMON STOCK

Common stock is carried at the stated value of issued shares increased by proceeds from sales of treasury shares and reduced pro-rata for shares reacquired. Any excess of cost of reacquired shares over the pro-rata amount is treated as a reduction of income retained for use in the business.

At December 31, 1971 and 1970 there were 20,000,000 authorized shares of U.S. $1 par value. At these respective dates, there were 11,587,364 and 11,604,379 shares outstanding, excluding 516,330 and 469,116 reacquired shares held in treasury and 292,628 shares issued to a subsidiary in 1971. During 1971 and 1970, 30,199 and 72,925 previously unissued shares, respectively, were sold upon exercise of stock options.

EARNINGS PER SHARE

Earnings per share for 1971 and 1970 were computed by dividing net income plus interest on the convertible debentures by the average number of common shares and common equivalent shares outstanding during the year. In computing the average shares, the number of shares outstanding was increased by those issuable after March 31, 1970 on conversion of debentures and assumed exercise of stock options.

SUPPLEMENTARY INFORMATION

Short-term investments are collectible mainly in U.S. dollars and included time deposits of $57.6 million and $50.3 million at December 31, 1971 and 1970, respectively. Interest income was $6.9 million in 1971 and $7.0 million in 1970.

Inventories are stated primarily at average or standard cost, less allowance for obsolescence. At December 31, 1971, they comprised $28.8 million of operating materials and supplies for oilfield services and $148.6 million applicable to other operations — principally electronic equipment and gas, water and electricity meters.

Long-term investments included $19.1 million representing interest in 50% owned companies which are carried at Schlumberger's share of net assets. The other long-term investments are stated at cost.

Intangible assets represent largely the excess of purchase prices over fair values of net tangible assets of businesses acquired. Intangibles related to acquisitions made prior to 1966 are being amortized over 10 year periods; most of the subsequent acquisitions (the principal amounts having been acquired in 1970) are not to be amortized unless a diminution in value takes place.

The Company and its subsidiaries have several voluntary pension and other deferred benefit plans covering substantially all officers and employees, including those in countries other than the U.S.A. The expense of such plans was $8.4 million in 1971 and $7.7 million in 1970. These plans are fully funded with trustees in respect of past and current services.

In France, the principal pensions are provided for by union agreements negotiated by all employers within an industry on a nationwide basis. Rights to future retirement benefits vest currently, but monetary amounts are not assigned to these rights until year of payment. Benefits when paid are not identified with particular employers, but are made from funds obtained through concurrent compulsory contributions from all employers within each industry, based on employee salaries. The expense of these plans amounted to $4.7 million in 1971 and $2.6 million in 1970.

Opinion of Independent Accountants

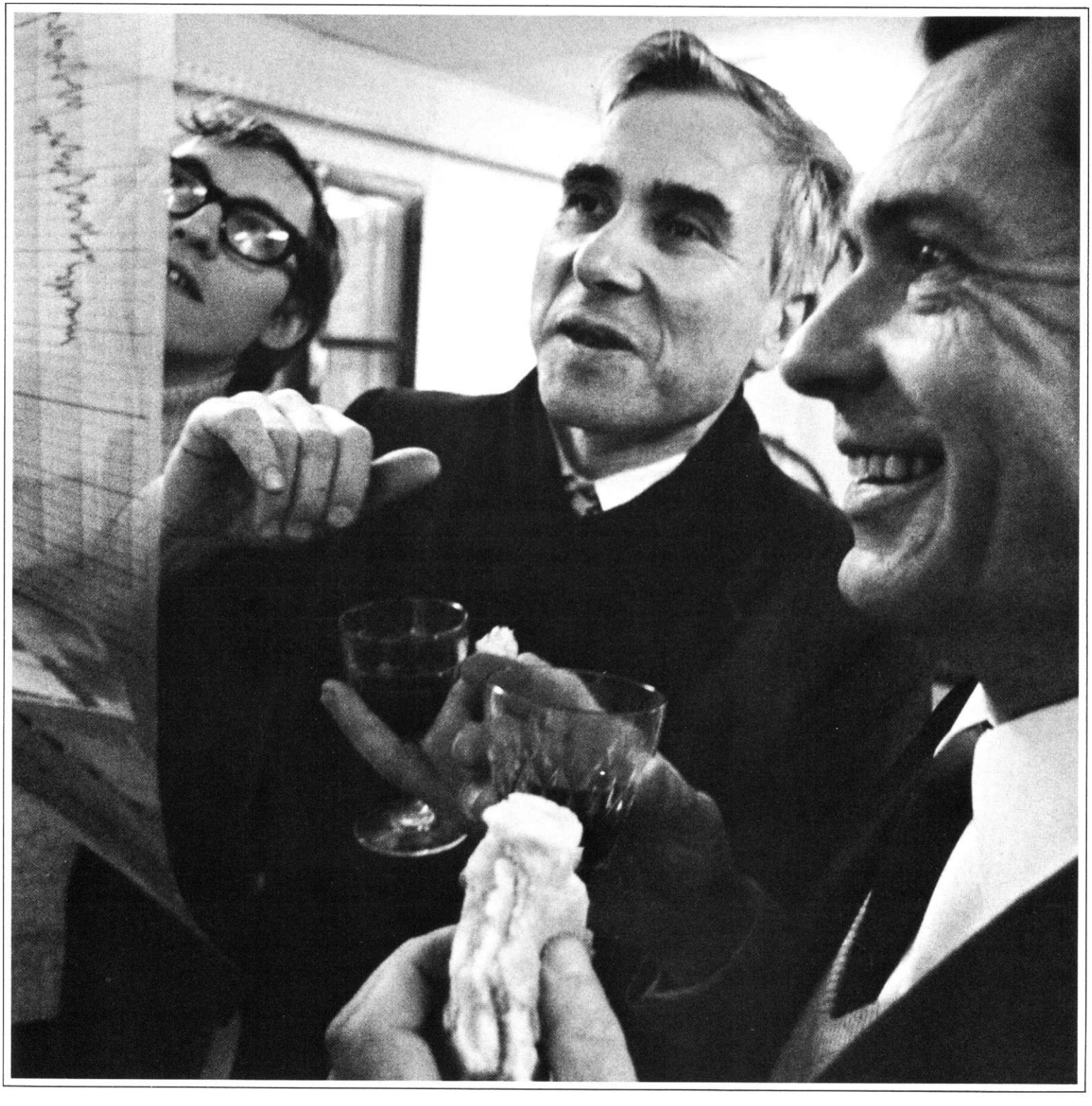
PRICE WATERHOUSE & CO.

60 Broad Street
New York 10004
February 24, 1972

To the Board of Directors and Stockholders of Schlumberger Limited:

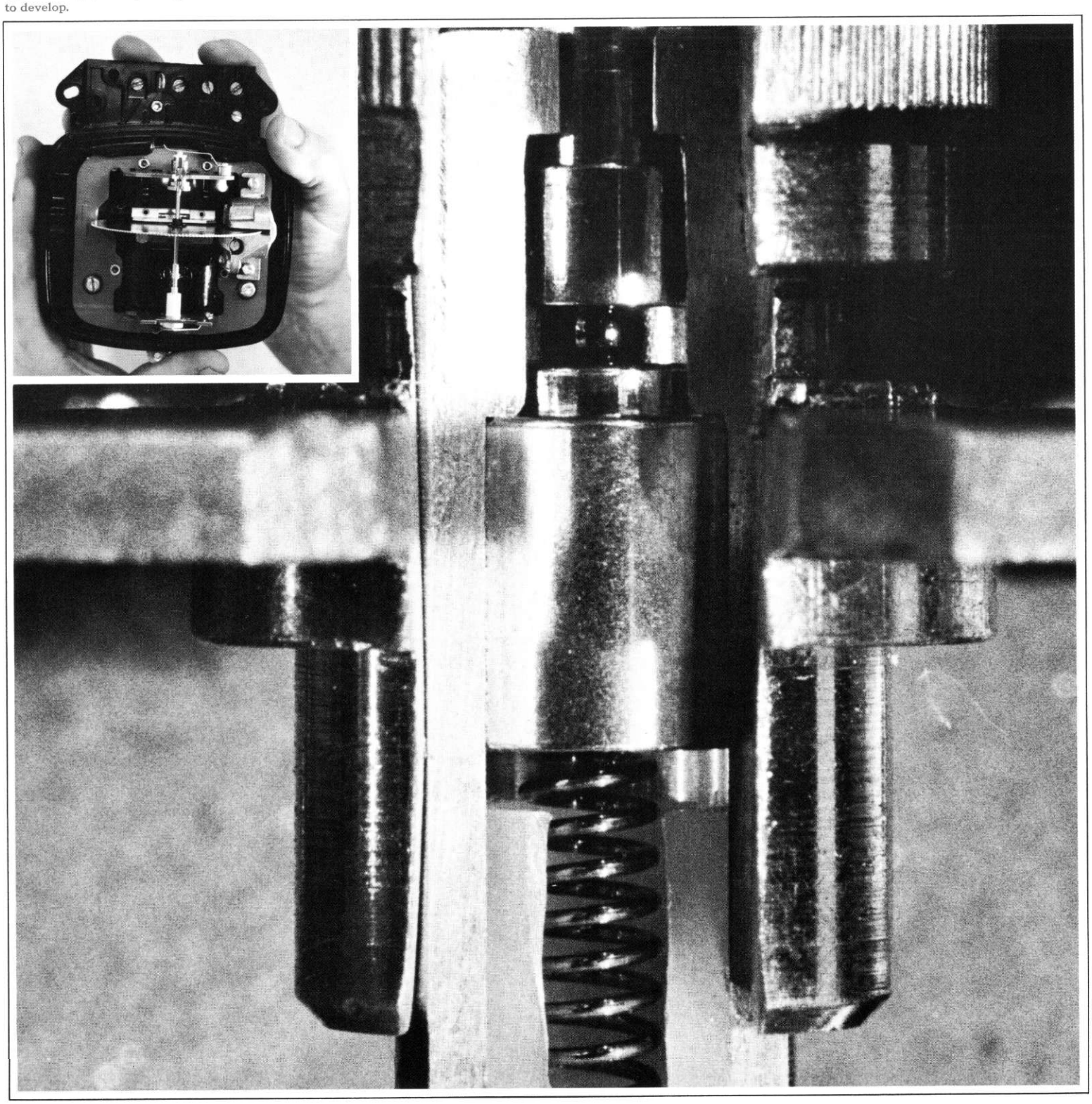
In our opinion, the accompanying consolidated balance sheet and related consolidated statements of income, stockholders' equity and changes in financial position present fairly the financial position of Schlumberger Limited and its subsidiaries at December 31, 1971 and 1970, the results of their operations and the changes in financial position for the years then ended, in conformity with generally accepted accounting principles. These principles have been consistently applied except for the change, which we approve, in the method of translating inventories recorded in currencies other than United States dollars, as explained in notes to the financial statements. Our examinations of these statements were made in accordance with generally accepted auditing standards and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

During lunch break near a test well Schlumberger engineers Pierre Ghys, Jean Ringot, and Jean Delabachelerie examine experimental data from a new log.



Upper left—single-phase domestic electricity meter.

Lower—This simple steel and sapphire meter bearing (center) took years to develop.



In 1971, Schlumberger spent over $31 million on research and development. In more than a dozen widely scattered research centers in the United States and Europe, in laboratories and testing centers covering 650,000 square feet, more than 1550 men and women work to improve the products of today and to design and test new tools, new instruments and new systems. More than 740 are graduate engineers, Ph.D's or the equivalent.

From Sarasota, Florida to Montrouge, a suburb of Paris, from Ridgefield, Connecticut to Farnborough, England, the research and development units of Schlumberger present complex organizational and management problems.

Research and development are essential to Schlumberger, a technically oriented company. New ideas, new tools and new instruments require an investment in money and manpower if the company is to maintain its success and to grow. But the management of research and development is perhaps the most complex of all phases of management, for the efficiency of research is difficult to measure. Costs of production and marketing can be cost accounted with accuracy; field operations can be budgeted and assayed within one percent; but the allocation of money and manpower to research and development involves a long-term commitment the results of which may not be known for years.

Apart from time, and the costs of time, the management of research and development involves a permanent series of compromises:

☐ Since research includes not only the overnight breakthrough of an act of genius but also the steady but slow improvement of existing products, allocation must be made to include both.

☐ In some product lines, the increasing gap between the advance of technology and the general knowledge of the layman must be bridged.

☐ A decision must be made whether to centralize research efforts in one location or to pursue independent efforts at several laboratories, almost in competition among one another.

☐ Finally, the scientist's ideal of research for the sake of discovery alone must compromise daily with limits imposed by the marketplace and the budget, if we are to remain profitable.

Schlumberger has not the largest nor the smallest research organization; its problems are comparable to those of other companies; and our solutions, as those of other companies, have not always been successful. Yet we believe the future of Schlumberger depends in large part on our understanding of the complex problems of managing research and development programs, on the realization that there are no theoretical yardsticks to gauge their performance, and on our ability to foresee the options which lie ahead.

Some actual problems that Schlumberger is facing may illustrate this point.

Electric Meters

The problem of advancing by small steps.

The realization of revolutionary new products aimed at a widespread consumer market should be an attractive challenge for any research team. In some cases, it is not, particularly when a product has outstanding qualities which have won it strong market endorsement. A new, radical design may make obsolete an entire framework of related products. In such a case, the focus of research is to improve the existing product line by a series of small changes within the same basic design. The sum of such developments will improve the product significantly, in dependability, durability and, not least, profitability.

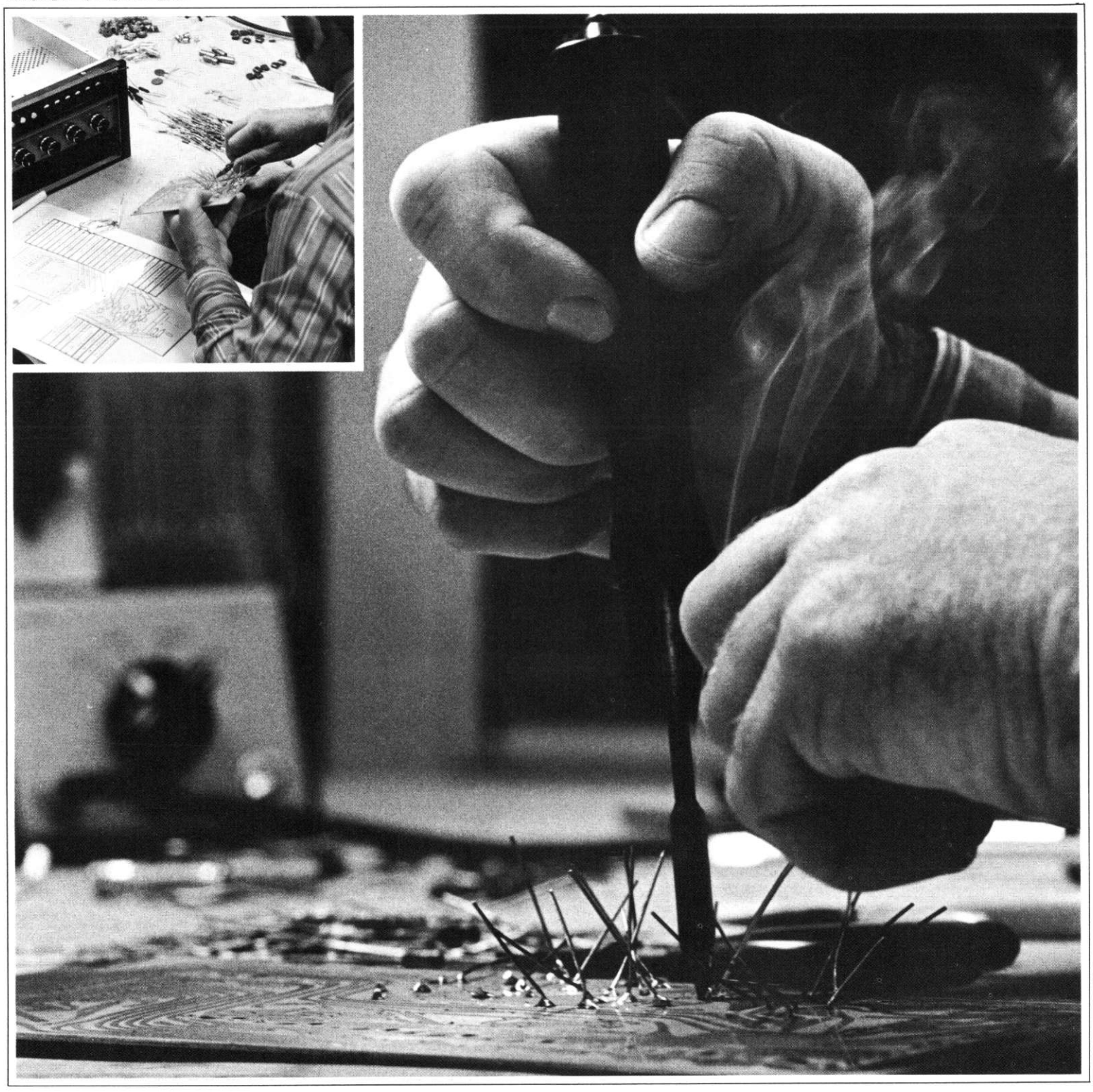
This research in detail does not mean that the study of revolutionary new approaches is set aside. It does mean that a large portion of research and development must be allocated to small yet concrete advances.

Electric meters manufactured by Compteurs and its affiliates have not changed their basic design for several decades. Yet this simple product is built today to work for the next 20 years without maintenance, to have a maximum error of 2%, and to sell by the carload for ten dollars apiece at a profit. Inserted into the power line at a point between the generator and the household or industrial user of electric power, the meter taps an insignificant amount of the power used by the consumer to drive a small motor, of which the rotor is a disc. The number of turns of the disc, like the number of turns of the wheels of a taxi, determines the meter reading and thus the bill. A consumption 10,000 times lower than the maximum load must start this disc. The friction caused by the suspension, therefore, must be very low. Research at Compteurs developed a new type of bearing consisting of a steel ball, moving between sapphire rotor and stator seats, to minimize friction between the moving disc and its mount. The choice and design of these materials and parts evolved over a period of time as a gradual improvement of the overall meter. This improvement in a bearing may not appear to be a major breakthrough, but it has taken years of work to bring this design to a point of total dependability.

Yet, Compteurs' researchers envision completely new systems of monitoring electric power consumption, using solid-state measuring devices with no moving parts, a higher accuracy and a longer life. These units could

Upper left—Robert Gast, Senior Writer checks out the instruction manual for the Heathkit AA—2004 Quadraphonic Amplifier.

Lower—Checking his instruction manual the author builds the kit himself, verifying every step as he goes.



be connected directly to a central billing computer, avoiding the physical reading of meters. The central computer could also control or effect a more economic distribution of power, either by preferential billing for high power use at offpeak hours or by direct control of the load. Some of these more revolutionary developments are ready for use.

Electronic Instruments

The problem of maintaining multiple research centers.

In the course of natural development, or by acquisition, a company may find itself with research facilities in different countries working on the development of similar product lines. The problem exists whether to concentrate all such development in a single centralized facility, or to allow separate and potentially competing, establishments to proceed on their own.

Obvious savings may be gained by concentration in that floor space, personnel and test instruments are likely to be less costly in sum. But important arguments may be made for maintaining competing development centers. Sometimes it is a case of subtle differences in one country's market preferences for nuances of product design; sometimes it is as blunt as a government's "buy national" policy. Sometimes it is a matter of inches vs. centimeters.

Maintenance of more than one research center must not, however, be allowed to become an inefficient luxury. There must be constant communication between them, not only to disseminate progress made at one center for the benefit of all, but to disclose just as quickly the results of fruitless avenues of exploration. Schlumberger has faced this problem in connection with several product lines of electronic instruments:

☐ Frequency response analyzers, made by Solartron in England and by EMR—Telemetry in Sarasota, Florida.

☐ Oscilloscopes, made also at Solartron and by the St-Etienne plant of Schlumberger Instruments and Systems (SIS), formerly the CRC subsidiary of Compagnie des Compteurs, and by Heath in the United States.

☐ Digital voltmeters, made by Weston Instruments in the United States, by Solartron, and at the Villacoublay plant of SIS.

Frequency response analyzers are sophisticated and relatively expensive instruments which are used for a wide variety of laboratory and industrial purposes. They may, for instance, measure the performance of a device being tested by comparing its response (output) to a stimulus (input). Schlumberger has decided to maintain separate research centers at several locations to foster advanced development of these products in different countries. Management must therefore guide these multiple research teams along a path which fosters competitive initiative but which leads to a concerted development program.

In the case of the other two product lines, Schlumberger has taken a different approach. Because these products are more standard shelf items, it is essential that their manufactured cost per unit be reduced.

Oscilloscopes, long familiar in laboratory and research centers alike as a common diagnostic tool presenting an electronic signal in visual form on the face of a cathode-ray tube, are now required to deal with signals of increasingly high frequency and correspondingly smaller increments of time. While production of oscilloscopes will be maintained at various locations, long-term research and planning for Europe has been assigned to the St-Etienne research group of SIS with, moreover, a transfer of personnel from Solartron to concentrate research talent.

Similarly, in the case of digital voltmeters, which present various measurements of electrical parameters such as voltage, current and resistance in digital, or numerical, form rather than by reference to a moving needle on a meter face, basic long-term planning in Europe will be the responsibility of the research group at Solartron.

As a result of each of these latter two decisions, it will be the responsibility of the centralized research group to communicate its findings to the various production centers, bearing in mind the possibilities of concentrating production of less accurate and expensive models in one plant, of more accurate and versatile models in another.

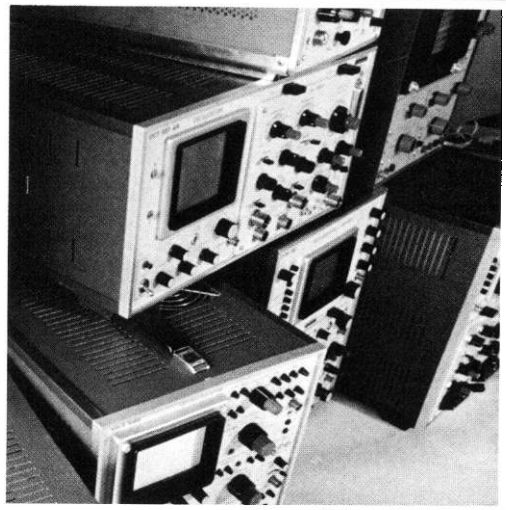
In these three examples of the problem of centralization or separation of research efforts, we believe the decisions were correct. But the decisions were neither easy nor obvious at the time, and whether we were correct in one, or all three, remains to be seen.

Kit manuals

The problem of making technology understandable.

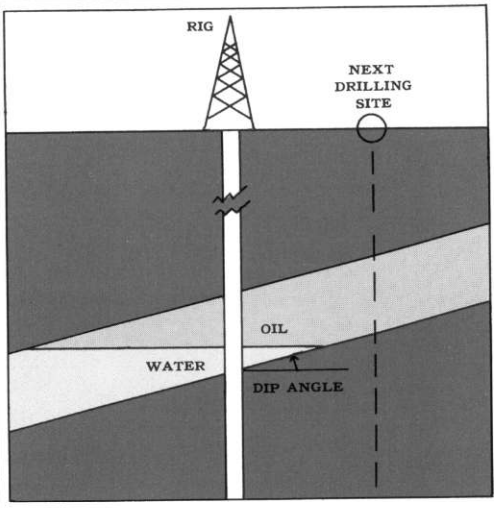
There exists today a wide gap between the level of general education of the layman and

Some of the oscilloscopes designed and produced by Schlumberger companies in Europe.



Top—Dipmeter tool being readied for high-pressure test.

Bottom—Dipmeter measures the angle of dip of underground formations, from which a geologist can deduce the best sites for future wells.



the specialized technology of the scientist. How to explain sophisticated circuits unknown a few years ago, even to technologists, is a problem encountered by many sellers of consumer-oriented products.

Kits manufactured by Heath are sold to the general public as fully designed but unassembled electronic instruments or consumer products: a box of parts and a manual. The manual tells the builder how to assemble the kit step-by-step and, once assembled, how it works and what to do "in case of difficulty." These products are bought by people from all walks of life who take pride in building high-quality custom-made products which they can repair without costly service calls.

In recent years, it has been getting easier to build a Heathkit product but less easy to understand how it works. Twenty years ago, an electronic circuit was a bulky group of sockets, tubes, and other components connected by varying lengths of multicolored wires. Today, most circuits are mounted on a printed circuit board, where each component is placed above its pictorial description and soldered into place on the rear of the board; etched strips of foil have replaced the web of wires. Even more sophisticated components are increasingly available, such as integrated circuit modules, where a part half the size of a postage stamp may contain a dozen amplifiers or logic circuits manufactured out of one wafer of treated silicon.

A major effort at Heath is thus focused on the instruction manual.

A manual for an underwater thermometer for fishing is a plain folder. The manual for a color television set comes in four volumes which allows anybody to put together, in a few weekends, a set which twenty years ago was a feat that few specialists would have attempted.

The preparation of the manual calls for 25 steps of development. In the course of preparation, and in order to verify all instructions, more than a dozen kits are really constructed by the authors of the manual, by technicians of the customer service department, and by entirely inexperienced persons. But a manual also must teach the builder what he has actually done by mounting a sophisticated electronic part with a push of a thumb. To assure that the kit builder is educated to understand how his finished instrument works, the manual writer must bridge a gap of years of technology to which the builder has not been exposed.

Dipmeters

The problem of deciding when to suspend improving current models in favor of radical redesign.

Every technological product reaches a stage when it is necessary to redesign rather than to effect a series of modifications to the original model. Deciding when the time to redesign has arrived is an important question for research and development managers, but perhaps more difficult is the problem of how much better the new model is going to be.

A decision to press forward with a newly-designed product which is measurably, rather than reasonably, better than the present model assumes certain risks:

☐ that the significantly improved results will in fact be obtained, and within a reasonable time;

☐ that market acceptance will assure recovery of the research investment within an acceptable period of time;

☐ that competitors will not come out with a sufficiently improved product to capture a greater share of the market during the necessarily greater time lag of development.

Schlumberger wireline tools for many years have included one form or another of dipmeter. This tool measures the relationship between adjacent layers of different geological composition in a borehole. More particularly, it indicates the angle and the direction of dip of underground formations (see sketch).

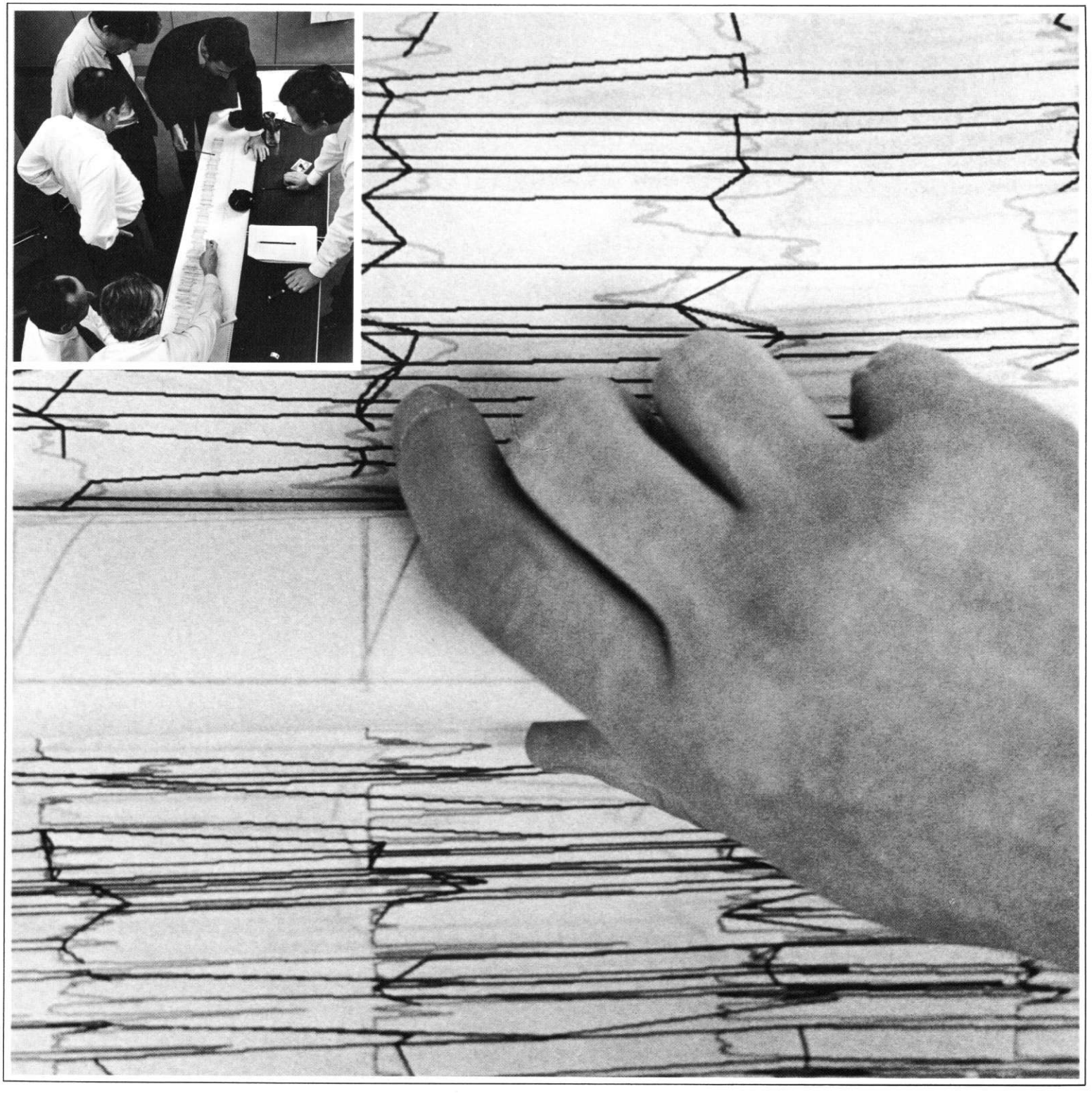
Knowledge of the dip angles of formations is of great value to the seeker of oil. From a dipmeter log there can be derived indications of where to drill other wells. As the number of wells in a field increases, the correlation of dip measurements gives an increasingly accurate three-dimensional picture of the formation. Since the daily cost of drilling a well ranges from $7,000 on land to $35,000 offshore, the value of such information is evident.

Some years ago, a Schlumberger dipmeter with three probes was yielding moderately successful analyses of formation structure. Clarity of data needed improvement, in part because of uneven contact of the probes with the borehole wall. Accuracy was uneven because signals from the different probes had to be compared by laborious manual computation. Some improvement was clearly necessary.

It was decided to redesign this system from a radically new point of view to yield im-

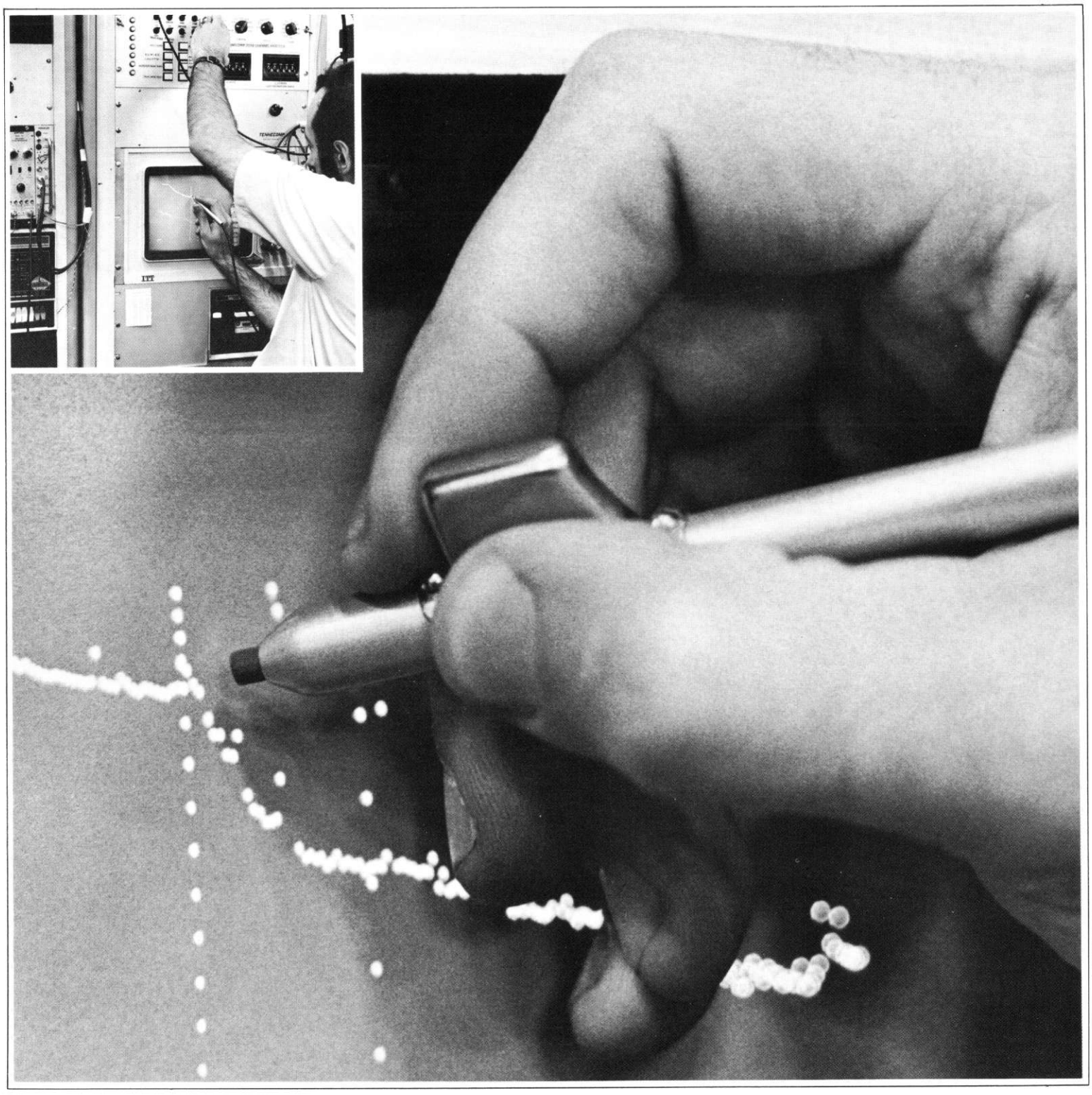
Upper left—Engineering group at Clamart analyzes computer-produced graph of a dipmeter log.

Lower—Detail of dipmeter log.



Upper left—Leonard Goldman, Engineer at a computer console in the Ridgefield Research Center during spectroscopy experiments.

Lower—By means of a "pen" the operator can instruct the computer directly from the display.



pressively better results rather than moderately better ones. Over a period of years, a fourth probe was added; a new improved method of holding the probes against the wall was invented; and new and more powerful method of transmitting the signals to the surface was designed. Finally, a method was devised to digitize and record signals on a magnetic tape at the well site, enabling rapid and accurate computer analysis of the vastly multiplied amounts of data thus recorded.

Log interpretation computer centers now have been set up, both in the United States and France, with the growing availability of satellite communications, speedy dipmeter computations are becoming more available to remote parts of the world.

The decision to develop, not just a better dipmeter, but a new generation of dipmeters, involved taking gambles, including reliance on the parallel development of computer and communications technology. In this case, the gamble was successful, and the high-resolution dipmeter is proving to be a major wireline service.

Capture Gamma-ray Spectroscopy

The problem of getting from the laboratory to the field.

The success of an idea in theory, or of the fulfillment of that idea in a laboratory, does not complete the process of research and development. That is attained only when a product capable of meeting the customer requirements is produced in quantity at a reasonable profit.

Until now, a great deal of Schlumberger technology has consisted of measuring the physical characteristics of underground formations, and deducing the existence of petroleum reservoirs from these measurements. The advantages of identifying accurately the actual chemical elements comprising the borehole wall are evident, in that petroleum deposits are generally associated with certain types of geologic formations. Borehole spectroscopy provides in theory accurate identification of chemical elements themselves, and thus a direct indication of the existence of petroleum deposits.

Borehole capture gamma-ray spectroscopy is an exciting new research frontier at Schlumberger. This measurement technique relies on a phenomenon of nuclear physics. Neutrons, emitted from a neutron source such as a capsule of naturally radioactive californium, strike individual atoms of elements in an underground geological formation. As a consequence, energy is released in the form of gamma rays. The amount of energy and frequency of the gamma rays varies according to the characteristics of the various elements. Accordingly, accurate determination of the spectrum of gamma rays resulting from the capture indicates the elemental composition of the formation.

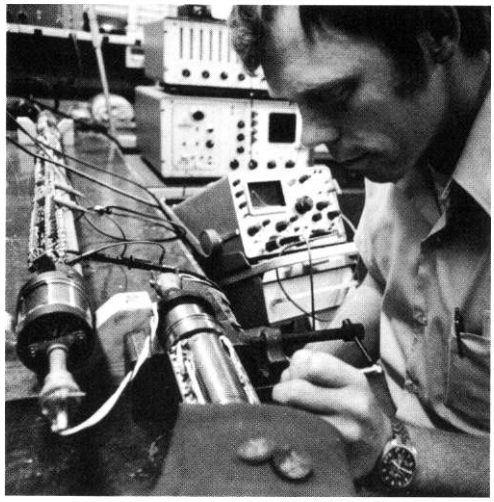
The term "spectroscopy" is used by analogy to a similar process of identifying elements by examining the frequency or spectrum of emitted light waves.

Capture gamma-ray spectroscopy in the laboratory today requires several cubic yards of equipment. At the well site, borehole temperatures and pressures of 350°F and 15,000 p.s.i. are not uncommon. Adaptation of capture gamma-ray spectroscopy to the borehole environment requires a working sonde not greater than 3⅝ inches in diameter, capable of withstanding such pressures and temperatures. This may require years to develop. Clearly, compromises will have to be made in selecting components which endure under environmental conditions yet are sensitive enough to measure the gamma rays accurately. The design of the downhole tool will be focussed on the need to identify certain key elements, rather than each member of the periodic table. The problems of recognizing and determining such compromises are inherent in moving the tool from the laboratory to the field.

In 1971, Schlumberger spent more than $31 million on research and development. A greater amount will be spent in 1972 and future years.

This brief report has not meant to stress either success or failure in any research program, rather to explain how important and varied are the problems of managing research and development. And that solutions of those problems are at the heart of Schlumberger's progress in future years.

An experimental sonde undergoes electrical bench tests by technician Doug Berntsen.



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Five-Year Financial Summary

	1971	1970	1969	1968	1967
			(Stated in millions)		
FOR THE YEAR—					
Revenues					
Sales and services	$695.9	$578.5	$420.6	$409.1	$369.2
Interest and other income	14.5	13.3	13.9	9.5	8.0
	710.4	591.8	434.5	418.6	377.2
Research and engineering	31.3	26.7	21.1	20.4	20.6
Taxes on income	30.1	27.8	28.5	27.3	20.5
Net income	56.2*	49.4	46.3	41.0	31.5
Depreciation of fixed assets	45.7	37.7	32.0	29.1	26.8
Amortization of intangible assets	1.6	1.6	2.1	2.6	2.5
Net income plus depreciation and amortization	103.5*	88.7	80.4	72.7	60.8
Fixed asset additions, less retirements	71.7	59.3	53.6	35.6	30.7
AT DECEMBER 31—					
Cash and short-term investments	89.8	76.8	91.0	106.8	74.7
Inventories	177.4	168.6	102.2	84.1	77.2
Working capital	217.0	206.2	179.7	183.6	165.6
Current ratio	1.8	1.9	2.6	2.9	3.4
Fixed assets:					
Cost	511.5	458.4	333.0	298.8	275.6
Accumulated depreciation	244.5	221.2	185.0	172.4	155.6
Cost, less depreciation	267.0	237.2	148.0	126.4	120.0
Stockholders' equity	411.2	377.0	344.3	321.3	293.6
Total assets	861.2	763.8	473.7	436.5	384.8
SHARE DATA** –					
Average shares and equivalent shares outstanding (thousands)	12,348	12,128	11,573	11,579	11,486
Net income per share	$4.75*	$4.22	$4.00	$3.55	$2.75
Dividends paid per share	$1.40	$1.40	$1.28	$0.95	$0.80

*Before extraordinary items—see notes to financial statements
**Adjusted for three-for-two stock split in May, 1969

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