

A New 'Gold Rush' for Space, Defense Billions

EDITOR'S NOTE—This is the ninth in the Associated Press series analyzing California's population boom and its new position as the nation's number one state.

By LEIF ERICKSON
SAN FRANCISCO (AP)—In the California gold rush of the 1960s, research and development laboratories are mining billions from the mother lode of federal defense and space budgets.

And long term commitments for missile weapons and space exploration do not indicate any sudden busting of the bonanza.

The electronics and space sector of fantastic growth tops a substantial California economy of more ordinary enterprises based on farming, and food processing. The state's \$3.25 billion annual crop of farm products ranks first in the nation.

The original discovery veins of scientific knowledge, which started the westward stampede of Ph. D. prospectors, are centered at Stanford University in Palo Alto and California Institute of Technology at Pasadena.

The mushrooming California concentrations of research in electronics, missile fuels, and missile and space vehicle design are the dynamic elements which propelled the state to the nation's first rank in population.

Between 1950 and 1962 the State's population surged from 10.5 million to 17.2 million in a phenomenal growth rocketed by advanced technology apyrills financed largely by Defense and National Aeronautics and Space Administration budgets.

Among economists concerned with projecting California's future, estimates on 1970 population range from 19 million on the low side, 20.8 million in the middle, and 22 million on the high side.

Each guess on population growth is based in large part on a judgment of how large a share California research and development minds can continue digging from the long-range dollar commit-

ments of the Defense and NASA budgets.

The middle road guest estimates that Defense and NASA spending in California will reach \$10 billion by 1970. The middle road estimate of total personal income in the state by 1970 is \$65 billion.

NASA Payrolls
In 1962, Defense and NASA spending in California amounted to \$7 billion and accounted for a substantial part of the state's total personal income of \$50 billion. A great share of Defense and NASA spending goes into payrolls and other immediate personal income.

One staff economist guiding the decision-making of one of the state's biggest corporations judges that each job on a missile of electronics payroll creates three more jobs in every day enterprises such as shopping centers, dry cleaning, banking and building trades.

The multiplied impact of the ability of California scientists and engineers to win defense and space contracts has made the state's population grow more than twice as fast as the rest of the country.

Forty-one per cent of the government's research and development money went to California in the last fiscal year. In space and missile work, research gets 54 cents of every dollar spent, and experts expect the research share will go even higher.

The link between college campus and industry in this growth pattern has been significantly direct and close.

A ceremony on the Stanford campus today dedicating the new \$2.5 million Russell H. Varian physics laboratory testifies to the important talent scouting role of Dr. Frederick E. Terman, Stanford's provost and vice president and former engineering dean.

Back in 1937 Dr. Terman helped grubstake the late Russell Varian with \$100 worth of materials and laboratory space for research which developed the klystron tube. The klystron turned out to be a basic breakthrough in building the power and range of microwaves.

Today the firm, Varian Associates, organized by the late Varian brothers, Russell and Sigurd, is the world's largest manufacturer of giant klystrons which provided power great enough to bounce microwave signals back from the planet Venus.

Stanford Center
Varian Associates occupies a 70-acre site in the Stanford Industrial Park of 450 acres. Around the center are clustered some 150 San Francisco Peninsula electronics companies with an annual business of more than 700 million.

Grubstake Returns
Stanford's original grubstake in Russell Varian's discovery has produced royalty income of \$1,731,780. Gifts contributing to the

new physics laboratory building also have come from the National Science Foundation and the firm of Eitel-McCullough at San Carlos, a vigorous competitor in the microwave tube business.

Another example of Dr. Terman's talent scouting bent is the firm of Hewlett-Packard, now the world's largest manufacturer of electronic measuring instruments.

Bill Hewlett and Dave Packard started out with \$538 in scratched-together capital. Now their company, headquartered in Stanford Industrial Park, sells more than a \$100 million a year worth of measuring tools the electronics industry needs for itself.

Predictions of several years ago were that the electronics industry would absorb and concentrate into a few giant companies. Instead, the industry's business volume still is produced by hundreds of relatively small enterprises. These grow around individual minds able to produce salable advanced ideas for the giant prime contractor budgets common to the space and missiles industry.

Dr. William T. Shockley, who shared in the 1956 Nobel physics prize for discovery of the transistor eight years earlier as a Bell Laboratory researcher, is an example of California's attraction for the electronic mind.

The transistor discovery founded the science of solid state physics which now seems to be outdating itself day by day. New advances in such areas as integrated circuits and thin film semiconductor materials will cut down drastically the number of components needed in the miniaturization that transistors and diodes first made possible as substitutes for vacuum tube technology.

Dr. Shockley now is the director of the Shockley Transistor research unit of Cleveite Corp., which chose to center its research operation in the Stanford Industrial Park for an enterprise that headquarters its production capacity in Cleveland, Ohio, and Waltham, Mass.

quickly assigned one traffic expert in research the mind taken is the key.

The simple arithmetic of big-business in space industry is simpler in understanding for a layman's mind than the language of solid state physics. This language speaks of increasing the speed and capacity of computer systems with neuristors.

Stanford Research Institute's young Hugh Crane is credited with discovery of the neuristor concept which expects development of participation by the connecting circuitry in electronic brain function. The idea is that it is possible to back up an electronic brain with an electronic nervous system.

Big numbers arithmetic is simpler to fathom.

The biggest California employer

is North American Aviation Corp. with 80,452 workers employed in developing \$1,262,000,000 in sales last year.

North American is a prime example of the jolts and rebounds in the aerospace industry. In 1957 the cancellation of North American's Navaho missile contract meant the drying up to 24,000 jobs in a couple of months.

In 1962 North American won the prime contract in NASA's \$20 billion Apollo program to land American Astronauts on the moon. Much of the program money will be subcontracted but North American's job producing capacity seems assured for some years ahead.

Lockheed Aircraft Corp., builder of the Polaris missile and the Agena Satellite, ranked tops among Defense Department contractors in 1962 with \$1,419,800,000 in contract business. The Lockheed payroll counted 70,250 people.

In the field of launching power for rockets and space vehicles the nation's No. 1 performer is Aerojet-General, a California firm that started out in Azusa building tanks of JATO (jet assisted take-off) to help heavily loaded flying

boats get off the water in World War II.

Aerojet-General has organized a development complex in the Sacramento area employing 17,000 workers and expects to keep growing as the number one firm in rocket fuels.

But United Aircraft Corp., which acknowledges being a little late in the shift from aircraft engines to rocket power, set up its United Technology Corp. in Sunnyvale, Calif., just four years ago. This year it won the Air Force contract for development of 120-inch solid propellant first stage boosters producing 1 million pounds of thrust for the Titan III.

United Technology's solid fuel engine contract expected to run more than \$100 million will mean an expansion of its payroll from 1700 to an expected 5000 or more.

This is an example of the simple big numbers arithmetic in the space and missiles industry.

There is natural concern among California's industrial leaders over the heavy reliance on space and missile spending for the state's economic and population growth. The pressures of space and missile spending now are too great

to allow much thinking or major moon and beyond seems now to effort toward diversification.

The prospect for any sudden or unexpected disarmament agreement with the Communists unlikely anyway.

The exploration of space to the Therefore, California's continued

will depend on the continued competence of its scientific and engineering talent to lead the way in space.

Tomorrow: An official look into the future.

Cat, Mouse Day for S.M. Police

It was a cat and mouse day for the San Mateo police department yesterday—literally.

At 9:30 a.m. Officer Rinaldo R. Viri responded to a call for help in the corner of Thirty-eighth avenue and Pacific boulevard.

George Brunker, assistant superintendent of the Twenty-fifth avenue postal station, said he had received a call reporting a cat had been stuffed into the mail box at the corner.

When he got there, the owner, who refused to identify himself, was standing by. The cat (which had not been properly stamped or addressed) was released by Brunker and given to the owner.

Police were trying to solve the mystery of how the cat got into the box. Officer Viri was investigating a report a youth in the area had been responsible.

At 2:26 a.m. today Officer Bill Hurley was called to the home of Mrs. Gloria L. Rothhammer at 702 Fiesta drive. The agitated lady reported she had set a mouse trap and a mouse had been caught. However, the mouse was still alive and making all kinds of noises in the kitchen. Hurley located the mouse, removed it from the trap and flushed it down the water closet.

Lights for San Carlos

Installation of a total of eight street lights on some dimly lighted portions of El Camino Real and Old County road at a cost of \$3000 was authorized last night by the San Carlos city council.

The council decided to proceed with the installation as a safety measure pending completion of a study of the possibility of relighting the entire length of El Camino through the city.

Public Works Director John Cristich recommended lights on El Camino at Oak, Arroyo, Belmont, Eaton avenues and White Oak way. "All the corners are bus stops," he said, "and should be well lighted. He noted that San Carlos is flirting with possibility of pedestrian fatalities such as recently have occurred in Belmont and Redwood City, if the lighting isn't improved.

New lights also will be installed on Old County road at Howard and East San Carlos avenues and at Holly street.

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February	6	13	20 27
March	6	13	20 27
April	3	10	17

Save these days for bridge at Stanford:			
January	3	10	17 31
February	7	14	21 28
March	7	21	28
April	4	11	18 25

Save these days for bridge at Stevens Creek:			
January	4	11	18 25
February	1	15	22
March	1	8	15 22 29
April	5	12	19

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