

COURIER...

World's First Advanced Communications Satellite  
... Designed and Built by

**PHILCO**



*Voice message from the  
Secretary of the Army,  
Wilbur M. Brucker,  
relayed via Courier . . .*

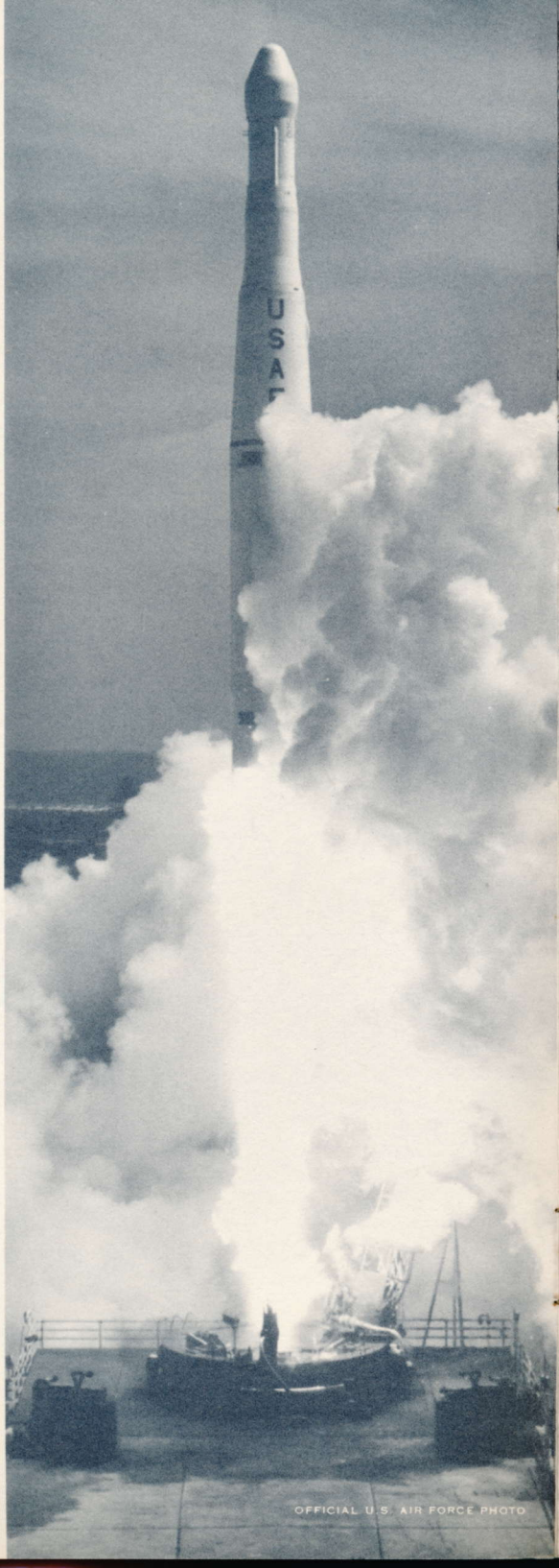
“This accomplishment is another important step in the area of space communications that will contribute immeasurably to modern military needs, as well as to the general improvement of communications between all peoples of the world. I wish to congratulate everyone who had a part in this significant achievement.”

JAMES M. SKINNER, JR.  
PRESIDENT PHILCO CORP.  
TIOGA & C STREETS, PHILADELPHIA

I CONGRATULATE YOU AND THE PERSONNEL OF YOUR ORGANIZATION WHO HAVE CONTRIBUTED SO IMPORTANTLY TO THE SUCCESSFUL OUTCOME OF PROJECT COURIER. THE CLOSE COOPERATION OF ALL CONCERNED, WHICH MADE THIS HISTORIC ADVANCE IN THE SCIENCE OF COMMUNICATION POSSIBLE PRESAGES GREATER ACCOMPLISHMENT FOR THE FUTURE.

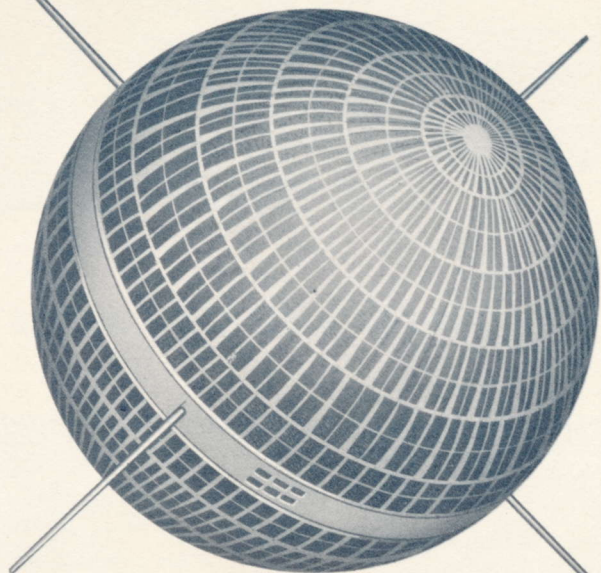
MAJOR GENERAL R. T. NELSON,  
CHIEF SIGNAL OFFICER OF THE ARMY  
821P EDT OCTOBER 6-60

*Historic firing of U.S. Air Force Thor-Able-Star Missile at Cape Canaveral, which propelled the Courier satellite into orbit around the earth on October 4, 1960.*



OFFICIAL U.S. AIR FORCE PHOTO

U.S. ARMY'S COURIER BY PHILCO



## Global Communications through Space ... a major Philco achievement in Space Technology

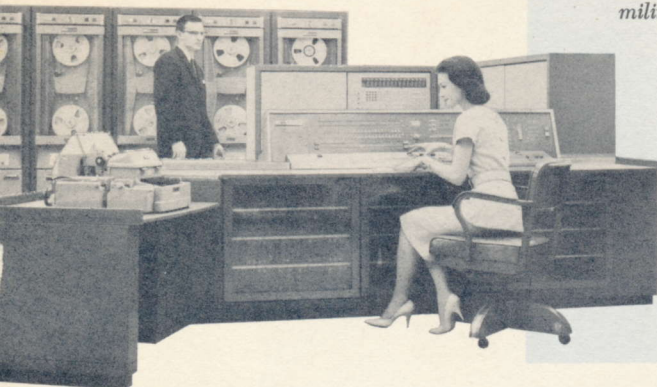
COURIER, the 500-pound satellite launched into space by the United States on October 4, is the world's first advanced communications satellite. It is the forerunner of a vast, global communications network of unprecedented speed and reliability, that will link together all of the Nation's far-flung military services. Conceived by the U.S. Army Signal Research and Development Laboratories, the Courier satellite was designed and developed by Philco at its Western Development Laboratories in Palo Alto, California.

The primary purpose of Courier is to relay military messages between ground stations by means of microwave radio. It will accept and store coded messages from one station and, on command, deliver them to another. Recording and transmitting simultaneously, Courier has a capacity of 3,400,000 words a day—enough to fill 465 standard newspaper pages.

Ground stations are located at Fort Monmouth, New Jersey and Puerto Rico—and others may be established later. In its orbit 700 miles above the earth, traveling at a speed in excess of 14,000 miles per hour, Courier circles the globe nearly 14 times a day and is expected to be operational for almost a year.

*Communications equipment became  
operable on 20 October 1960. Bill Schane*

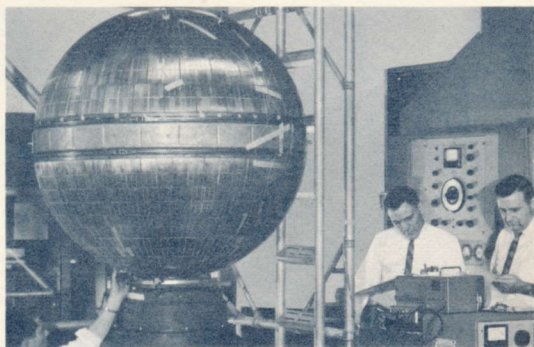
*Philco 2000 Computer, the same system in use today by many of the major military and commercial establishments, played an important part in the Courier program.*



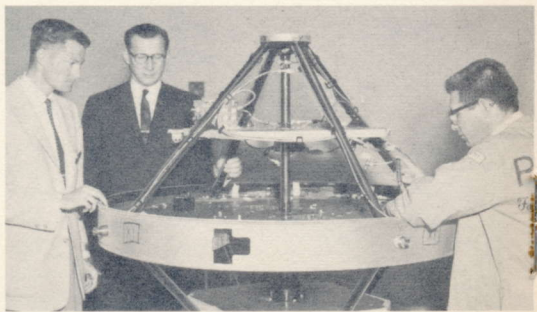
## Teamwork built the Courier

Design, development and construction of Courier and its intricate communications system have demanded smooth teamwork by more than 800 Philco scientists, engineers and technicians . . . working in close collaboration with the Signal Corps laboratory. Successful completion of this huge project has required the resources of many divisions of the Philco Corporation, as well as those of 43 subcontractors and over 200 suppliers.

A Philco 2000 Electronic Data Processing System, the world's first transistorized large scale computer, was used to perform the tremendous volume of scientific computations needed. Many individual electronic equipments were produced by the Philco Communications and Weapons Division in Philadelphia. The Lansdale Division of Philco developed the transistors used throughout Courier's circuitry . . . and engineers from the Philco TechRep Division assisted in tests and final check-out of the satellite.



*Balanced model of Courier is tested under conditions encountered during blast-off.*



*Engineers inspect internal structure of the satellite on which electronic equipment will be mounted.*



*Epoxy fiberglass shells of the Courier are mounted on dummy structure to check the fit of all parts.*

**THE COURIER TAKES SHAPE** Courier's structure was designed to protect its electronic equipment against the terrific stresses of blast-off and to shield it from severe environmental conditions. This structure combines great strength, rigidity and light weight . . . with an outer shell of honeycomb plastic sandwiched between two thin skins of fiberglass epoxy, and an inner frame of aluminum tubing.

**POWER FROM THE SUN** 60% of Courier's outer surface is covered by a glittering network of almost 20,000 solar cells, which convert energy from the sun into electric power to operate Courier's entire electronic system. This complicated assembly is wired into separate solar cell arrays, utilizing the sun's rays on each side as exposed by the rotation of the satellite.

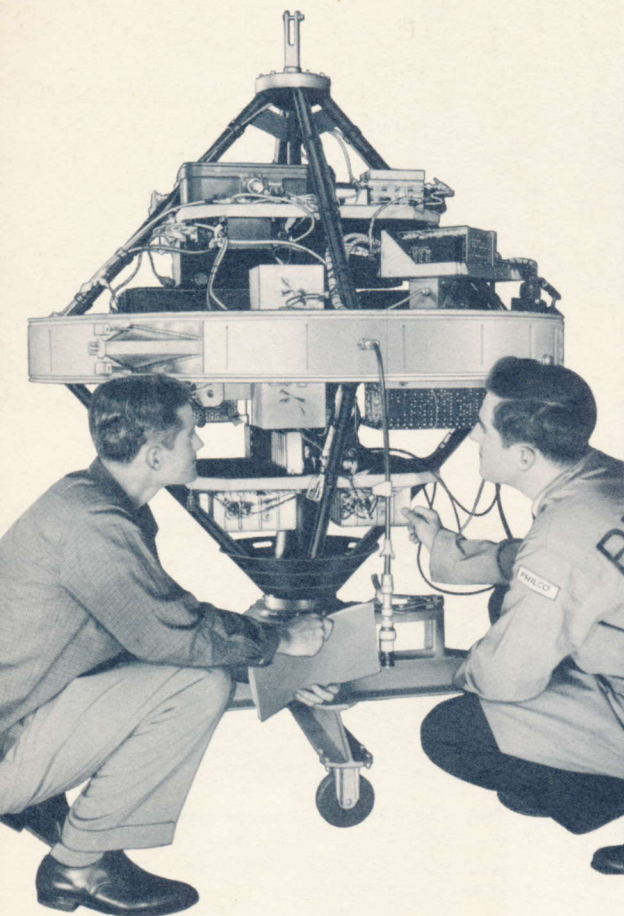


*Philco laboratory technician puts finishing touches on a solar cell array module, containing 84 solar cells. A total of 228 such modules are used.*

*Polystrip cable is installed on inside surface of satellite's shell. This connects the solar cell modules fastened on the shell's outer surface.*

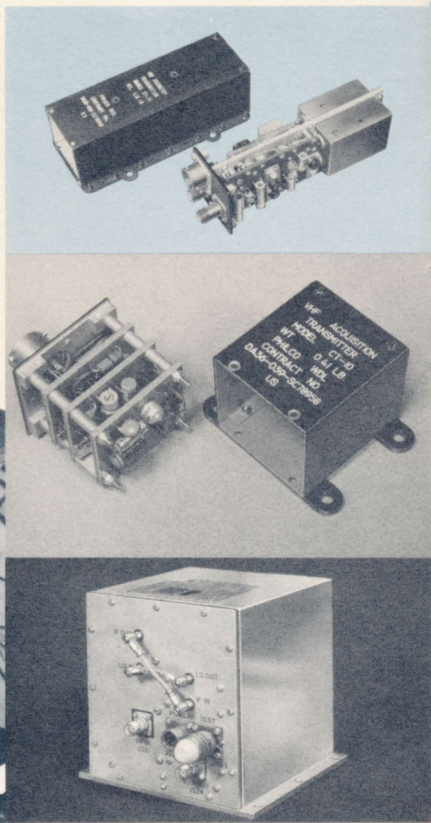


(Left)—Just before final tests, Philco engineers examine the complex of electronic equipment mounted in position on the satellite's inner structure.



### A COMPLETE COMMUNICATIONS SPACE STATION

The 500-pound Courier carries a 300-pound payload of complex electronic gear, including 38 individual miniature units such as microwave receivers and transmitters, data storage tape recorders and telemetry transmitters. Most units have a "standby," which is automatically switched into the system in the event of failure. Precision control of the entire system is provided by the command decoder . . . the Courier's "brain." This checks all incoming signals, rejects erroneous commands, routes acceptable commands to the proper equipment and initiates a coded acknowledgement to the ground station.



(Above)—VHF telemetry transmitter reports operation conditions within the satellite to the ground stations. It is a miniature FM broadcasting station, measuring only 2" x 2" x 6", weighing less than a pound.

(Center)—VHF acquisition transmitter sends a continuous signal which permits tracking of satellite by ground stations. It uses less than  $\frac{1}{4}$  watt of power, is only 2" x 2" x 2½" and weighs under  $\frac{1}{2}$  pound.

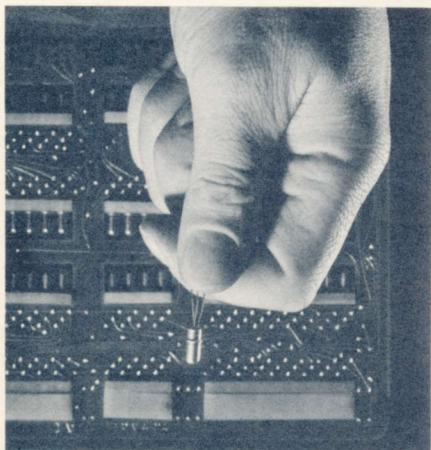
(Below)—One of the most important devices in the Courier is this microwave receiver, built at Philco's plant in Philadelphia. It is one of the "ears" of the satellite, receiving messages to be relayed around the world.

The Courier is dramatic evidence of Philco's ability to integrate its extensive resources to the design and production of intricate military and industrial electronic systems.

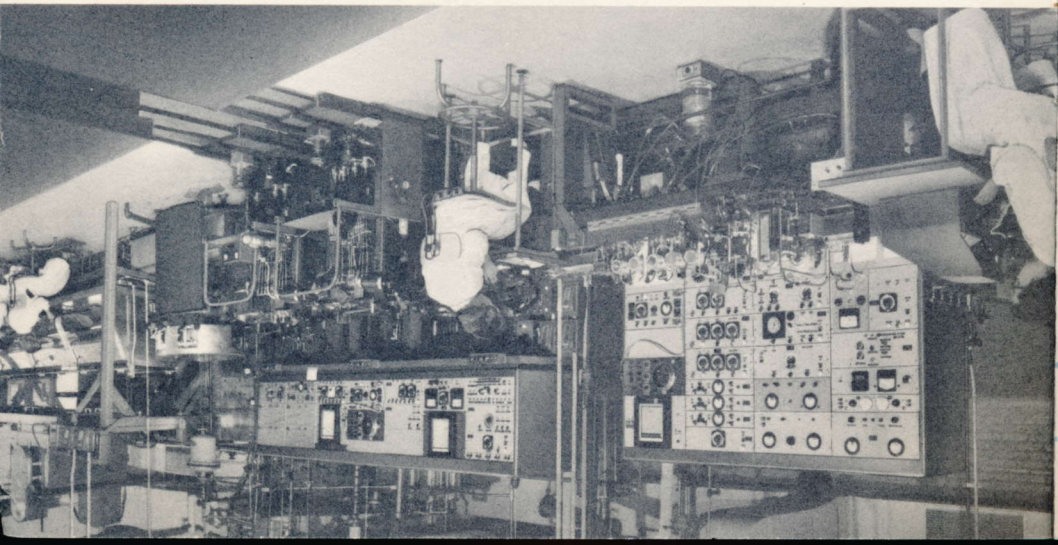
*\*Fast Automatic Semi-conductor Transfer*

“SOLID STATE” ELECTRONIC SYSTEM  
One of the unique features of the Courier is the fact that its electronic circuits utilize transistors and other “solid state” components almost exclusively. There are only four vacuum tubes aboard the satellite, while there are nearly 1300 semiconductor. Transistors, the miniature marvels of electronics, are unbelievably rugged and provide a degree of reliability never possible before. 90% of the transistors used in the Courier were especially developed and manufactured for this application by Philco's Lansdale Division. One of the leading producers of transistors in the world, this division has pioneered the Precision-Etch process of transistor manufacture, which permitted the close control of electrical characteristics to meet the rigid specifications for the Courier.

*This tiny transistor is one of those developed and produced by Philco for use in the Courier's “solid state” circuitry.*



*This is one of the famous FAST\* lines, developed by Philco for automatic production of transistors at its Lansdale Division, Lansdale, Pa.*



Some of the many  
**PHILCO**  
Contributions to National Defense

**DEFENSE COMMUNICATIONS CONTROL SYSTEM** . . . major communications project for the Defense Communications Agency

**SIDEWINDER** . . . air-to-air infrared guided missile

**SATELLITE TRACKING, COMMAND and COMMUNICATIONS** . . . for Discoverer, Midas and Samos programs

**GLOBAL COMMUNICATIONS** . . . Air Force world-wide communications modernization program

**COMPUTERS** . . . Philco 2000 large-scale system, Airborne Computers, Basicpac mobile field computers

**MISSILE FUZING** . . . for many missiles, including Corporal, Sergeant, Little John, Falcon, Talos, Tartar and Terrier

**ANTENNA SYSTEMS** . . . including world's largest 3-axis satellite tracking antenna

**RADAR** . . . for the Army, Navy and Air Force, including ALRI the Airborne Long Range Input system

**PHILCO**  
Consumer Products

Television • Refrigerators and Freezers

Home Laundry Equipment

Radio • Stereophonic High Fidelity • Phonographs

Air Conditioners • Electric Ranges

Built-in Home Appliances

**PHILCO**  
 *Famous for Quality the World Over*