RADIATION INK

RADIATION INCORPORATED MELBOURNE, FLORIDA SEPTEMBER, 1969

Apollo Equipment Performs Flawlessly Throughout Historic Moon Mission

Radiation-built equipment aboard the Command Module and Lunar Module functioned flawlessly during the entire Apollo 11 moon-landing mission, according to reports received from our contractors, Collins Radio Company and Grumman Aerospace Corporation.

A Radiation product made the headlines in Alaskan newspapers when it helped bring live television coverage of the Apollo 11 moon mission to residents of that state.

Known as an AN/TSC 54, or Mark V, the satellite communications terminal was airlifted to Alaska by the Army's Satellite Communications Agency (SATCOM). There it received TV signals relayed by the Air Force's TACSAT I satellite from Fort Monmouth, N. J.

This marked the first time Alaskans were able to watch live television coverage of a major news event.

The **Command Module** carried a Radiation telemetry package containing 21,400 components which collected information on the status of the spacecraft, the equipment on board and the physical condition of the astronauts.

Data handled by this unit included temperature of the heat shield, flow rate of water and oxygen to fuel cells, status of the guidance computer, and even which of the two fans in each astronaut's suit is operating at a particular time.

The package measures less than one cubic foot and weighs only 45 pounds.

The **Lunar Module** also contained a Radiation-built telemetry system. This unit packs 9100 components into a space 20 inches long, five

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Gates Radio Enters TV Broadcasting

Gates Radio Company, one of Radiation's sister divisions in the Harris Electronics Group, is expanding into the television broadcasting equipment market.

The announcement was made by Vice President–General Manager Lawrence J. Cervone in his message appearing in the Company's employee newspaper.

Cervone said, "With only about 850 TV stations on the air in the U.S., the industry today has about the same number of stations that radio had in 1939. Television offers a natural sphere of activity for Gates and a major avenue for future growth. We have a commonality of customers, the same trade shows, the same trade journals,

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Building 16 Is Completed and Occupied

Building 16, a 42,000 square-foot structure located west of Building 15, was completed and occupied July 21–25.

The sparkling new structure houses the Components Engineering and Quality Control Departments, Shipping and Receiving, and Aerospace Quality Engineering.

No More Trucks

The most far-reaching effect of the new building is the relocation of Shipping and Receiving, which are housed on the west side of the facility, facing Troutman Boulevard. No longer will trucks making pick-ups or deliveries have to check in at the security gate and drive

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11 Named To Key MED Posts

The appointment of 11 men to key positions in the Microelectronics Division was announced recently by Donald R. Sorchych, Vice President and General Manager. In alphabetical order, they are as follows:

B. Skip Bliss was promoted to **Manager of Materiel.** Employed as Expeditor in January 1960, Bliss advanced to Senior Expeditor in August 1960, Buyer in November 1961, Senior Buyer in March 1966 and Purchasing Agent in June 1968. He holds a BS degree from the University of Florida.

William J. Boecklen transferred from Manager of (Corporate) Cost Accounting to **Manager of (MED) Cost Accounting.** He joined Radiation as Manager of I/O Control in September 1968 and was named Manager of Cost Accounting in May 1969. Boecklen received a BS degree in Financial Management from Florida Atlantic University.

Peter J. Brooks joined the Division as **Manager of Manufacturing**

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Apollo Equipment Perform Flawlessly . . .

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inches wide and six inches high. It weighs 23 pounds. During the moon landing phase, the system served as the primary communications link between the lunar module, processing and relaying vital data on all aspects of the craft and its crew. Information processed by this unit included the attitude of the lunar vehicle – pitch, roll and yaw – temperature readings from the outside skin, cabin and engine and data on the descent/ascent propulsion system.

Other Radiation-built equipment employed during the eight-day voyage – described as "the greatest technological achievement of all times" – included:

Antennas around the world – More than 50 antennas built by Radiation for civilian and military space programs are in operation throughout the world. These antennas, and other units modified by the company for improved performance, range in size up to a "big dish" antenna 150 feet in diameter. Several of the antennas tracked the Saturn V rocket and its space voyagers during the early moments following liftoff. Other units stood ready to support NASA's tracking and command network. These antennas handle voice, television and telemetry communications. Landline and microwave relays link them to mission control centers and support sites.

Decommutators which unscrambled data received by the antennas and routed it to computers or display consoles. Radiation has designed and built 11 of these high speed ground units, which are located at various sites in NASA's Space Tracking and Data Acquisition Network and Automatic Checkout Equipment sites.

Data acquisition and processing systems – performance of the command module and the second stage of the Saturn rocket was evaluated both before and after the flight by computer-controlled data acquisition and processing systems developed by Radiation.

Digital–to–tone–converter – A specialized unit to study digital command communications techniques was developed by Radiation for the Apollo program. Called the Apollo Digital–to–Tone–Converter (ADTOC), it received coded commands (converted telemetry signals) at extremely high speed, checked them for accuracy and decoded them. It then provided separate outputs of the information-sending it to computers, print-out units, visual display consoles or tone encoders. The new techniques developed with the aid of ADTOC enabled scientists to receive from space the complete and accurate information they needed during mission and post-flight analyses.

Lunar Module Test Equipment – Exhaustive pre-launch testing of the sensor network on the Lunar Module was conducted under simulated space conditions.

So important are the sensors and so precise their function that a special computer system was required to perform the pre-launch tests. The system and its auxiliaries, collectively known as the LM Automatic Test Station, were produced by Radiation.

In addition, other divisions of the Harris Electronics Group designed and produced equipment used in the moon flight.

Because the safety of the astronauts is of prime consideration in the Apollo program, testing of mission equipment is continuous, repetitive, rigorous and thorough. The astronauts devoted hundreds of hours to familiarizing themselves with their craft, practicing maneuvers with facsimilies of the actual Command Module and the Lunar Module.

Part of the complex testing system was supplied by PRD Electronics, called the Descent and Ascent Stage Simulator, this intricate electronic system simulated signals similar to those transmitted between the Lunar Module and the moon-orbiting Command Module during the manned lunar landing.

Gates Radio Company manufactured the compact mobile radio transmitter over which the splashdown of the astronauts upon their return to earth was broadcasted to the world. Anchored to the deck of the prime recovery vessel U.S.S. Hornet, the equipment transmitted all voice signals for the television and radio network pool.

RF Communications, Inc. has outfitted more than 1200 ships in the U.S. Navy with single-sideband two-way radio systems. Many of these vessels were engaged in various support activities, while others were given back-up assignments, ready to move into position at a moment's notice.

Although designed for other purposes, the Radiation-built AN/TSC-54 transportable satellite communication terminal was used to relay live television of the moon landing to Alaska. It was the first time residents of that state were provided live TV coverage of a major news event.

Moon Program Is Boon To All Mankind

A by-product of the moon program eventually will bring hope to millions of the world's farm poor and save untold suffering for the thousands each year who lose much of what they have in floods.

The potential annual savings in agriculture, shipping, fishing, forestry, flood control, mining, hydroelectric power costs and urban planning run into billions of dollars and tens of thousands of lives.

The program calls for launching a series of satellites capable of monitoring, with a variety of sensors, what is happening on the oceans, under shallow waters and on and beneath the surface of the earth.

The satellites will:

Check on quick-spreading plant diseases on the farms, making possible quick action to save millions of dollars in crops each year.

Make possible early estimates of crop failures and bumper harvests in time for effective emergency marketing plans or for the hurried planting of substitute crops.

Keep track of the depth of snow in vital areas, and the rate of melting, foretelling floods in time for emergency corrective action. Long range, the data will make possible the more efficient location and design of flood-control projects.

Provide more information needed for accurately forecasting storms on land or sea.

Map ocean characteristics that will enable commercial ocean fishermen to more accurately determine where schools of fish are running.

Make possible cheaper, safer and more pleasant travel by sea through the continual charting of areas with heavy waves.

Map shoals dangerous to navigation, point to areas potentially rich in mineral deposits, make it possible through snow depth and water runoff reporting for hydroelectric utilities to use more efficiently the water available, with savings that seem fantastic.

Monitor the spread of underground coal mine fires, thus aid in preventing the spread of dangerous gases in urban areas.

Provide relatively cheap and accurate land use maps of large areas for urban planning.

Give great amounts of precise data on air and water pollution, the necessary first step in bringing these evils under control.

The first experimental satellite in this program is due to orbit in 1972. If all goes well and the bugs in the system are no greater than anticipated, by 1975 this country could have a satellite in operation feeding data into vast computer complexes which would automatically record the information and spew it out in usable form.

The initial satellites would collect data only for the United States itself. There is no reason an expanded system could not cover the world, once the program proves itself technically.

These earth services satellites could thus provide a sort of technical aid program of great value to both developed and developing countries at a relatively modest cost for the United States or for a cooperating group of the technically advanced nations.

It must be emphasized that this program would not have been possible without the satellite know-how, instruments, sensors and most importantly, the precision, reliability, miniaturization and computer techniques developed for getting a man on the moon.

This belies those who maintain that this space adventure has been a stunt of little use in solving man's basic problems.

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Radiation's first winner of the NASA Snoopy Award, Robert E. Clark (center) was formally presented an award pin and this colorful Snoopy drawing by Vice President-Assistant General Manager A. W. Vernon (right) and Vice President-Manufacturing Operations John LaCapra recently. Clark was cited for the reliability of his work in performing final assembly operations on Apollo telemetry units during the past five years.