Surveyor Project Newsletter

LUNAR LANDMARKS

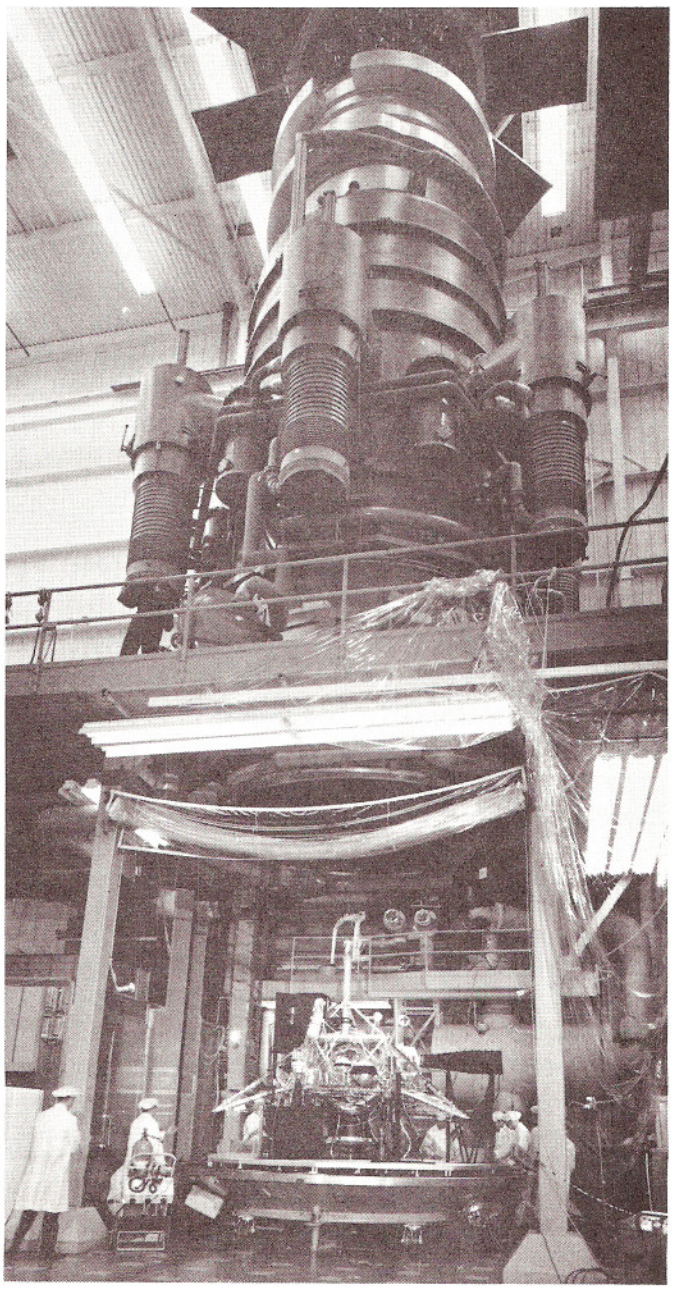
HUGHES AIRCRAFT COMPANY
SPACE SYSTEMS DIVISION

VOL. I February 19, 1965 NO. 4

PUBLISHED FOR MEMBERS OF THE SURVEYOR TEAM

T-21 COMPLETES FIRST TRANSIT SIMULATION

In continued testing in the solar thermal vacuum chamber (photo at right), the T-21 prototype spacecraft completed the first 66-hour simulation of transit to the moon. Minor functional and temperature problems were discovered, and modifications were made. A short mission sequence has been completed and improvements have been noted. Two additional tests, one at higher than nominal and one at lower than nominal solar intensity, will follow.



NBC SLATES DOCUMENTARY

NBC News Tuesday night conducted an interview with Dr. Roderick in Bldg. 350 in front of SC-1 for a documentary, soon to be shown on KNBC-TV, Channel 4.

SC-1 STAYS ON SCHEDULE

System group tests (except for antenna/solar panel positioner integration) on the first flight spacecraft, SC-1, have been

completed. In the following phase, integrated systems checkout, telecommunications inter-group testing was completed one week ahead of schedule.

SURVEYOR MAKES TIMES, POPULAR MECHANICS

Did you catch the big feature on the Surveyor program in the Los Angeles Times last Sunday? Times Aerospace Editor Marvin Miles did a bang-up job, through interviews with Surveyor Program Manager Bob Roderick and JPL Surveyor Project Manager Gene Giberson, in describing the missions, significance, and complexity of the Surveyor Program. Miles wrote, "Surveyor is the most difficult unmanned space operation yet undertaken by the United States..." Giberson was quoted as saying of each mission, "Time will be short and infinitely precious. We'll have to make every second count. And to do that, to balance both operational and scientific requirements, each flight will have to be conducted almost like a military mission." Now, everybody knows what we've known all along--we've got a BIG job to do. And for another excellent presentation on Surveyor, see the February 1965 issue of Popular Mechanics. It's still available on the newsstands.

JPL DELIVERS STANDARD CELLS

S. A. Friedlander reports that SSD Power Systems Department has received space-calibrated solar cells to be used as standards in determining performance of the Surveyor solar panel. JPL calibrated the cells in recent high altitude balloon flights. Standard cells are used in solar panel sunlight performance tests and as calibration devices for laboratory solar simulators.

TEAM 'TURNS' FCSG FOR T-21 PDQ

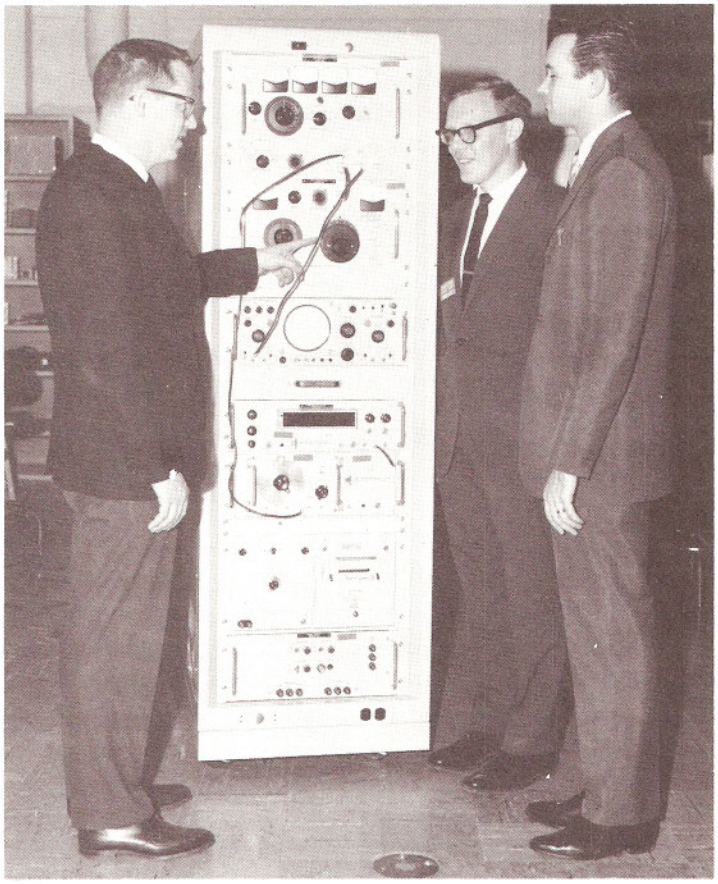
Top team effort resulted in the speedy "turn around" of the T-21 flight control sensor group after a problem developed during T-21 solar-thermal-vacuum tests. A computer study provided a proposed solution, the sensor group was removed, a new thermal paint finish was applied with a new pattern for the Canopus sensor, and the unit was functionally retested and returned to the spacecraft--in two days. Paint Shop, Surveyor Assembly area, and Flight Control Analysis Test and Planning teams rate kudos.

COST NEGOTIATIONS COMPLETED

Negotiations on Mod 28 (pre-December) program were completed Feb. 4, and Hughes was required to submit new cost estimates for the present "hardcore" program---a tremendous effort for all hands, but especially for Gene Young and his Cost Control group. They worked long hours for three months preparing data, answering auditor's questions, etc. Major contributions were made by Frank Jourdan, Lew White, and Wilson Winnek.

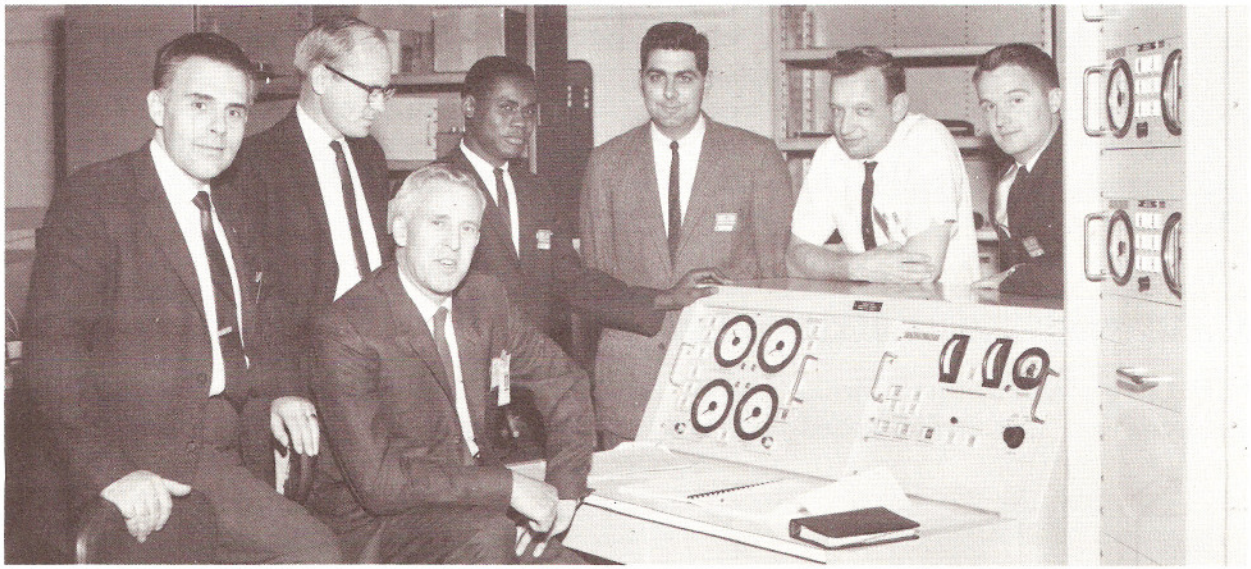
LISTENING STATION FOR SD-1

In photo at right, Rufus Yent, right, Surveyor Launch Operations, supervises final factory checkout of the Listening Station for Surveyor Dynamic Model SD-1, assisted by R. O. Hargrove, left, and W. H. Shirck. Listening Station, shipped Feb. 5 more than a week ahead of schedule, was installed in Spacecraft Checkout Facility at the Cape Feb. 9 under direction of Launch Operations ETR Base Manager Bob Carson and SD-1 Test Conductor Dave Newlands. Station consists of UHF receiver, frequency counter, digital recorder, and associated instrumentation which will monitor and record Dynamic Model transmitter frequency and static phase error during lift-off on Atlas/Centaur launch vehicle.



OPERATIONS CONSOLE, LAUNCH CONTROL RACK FOR CST

Launch Operations Department team members, with JPL personnel, (see photo below), on Feb. 5 successfully completed Factory Acceptance Test Demonstration of Surveyor Operations Console and the Launch Control Rack for



Surveyor Atlas/Centaur Combined Systems Test. Console and rack were shipped to GD/A San Diego Feb. 15, well ahead of schedule. In photo, Ted Wood of JPL is seated. Standing, from left, are Herb Philips and Darrell Ross, JPL; Bill Gregory and Ron Leva, Launch Operations; Jewel Beckert, JPL; Bob Mullen, Launch Operations. Jim Sack was responsible for equipment design; Gregory and Leva supervised fabrication and sell-off.

QUOTE FROM THE CAPE

Referring to the cavity amplifier shipment for the Dynamic Model program, Bob Carson wrote: "We wish to compliment the people handling this shipment, including M. J. Hicks and W. H. Shirck. This equipment was picked up in Melbourne within eight hours of our request...This has assured us of a reliable complement of test equipment for the final checkout of the SD-1 Spacecraft at Cape Kennedy."

TWO RETROS FIRE OK

Bill Dawson reports that two main retro rocket engines were fired at Thiokol, Elkton on Feb. 5 and 11--essentially on the schedule mentioned here four weeks ago. They were fired in thermal-gradient and simulated-altitude condition following sequential environmental exposure. Performance--satisfactory.

S-2A DROP PREPARATIONS

Reggi Jones and Bruce Stafford completed an analysis to determine conditions for drop testing S-2A structural test vehicle. Spacecraft responses under the earth-drop conditions simulated closely those predicted under lunar gravity.

ASPP OFF THE CRITICAL LIST

Lloyd Briggs, Mechanisms senior project engineer, reports that the antenna/solar panel positioner, which had been No. 1 on the hardware critical list, was delivered for assembly on SC-1 Feb. 15. This unit had received structural redesign because of deficiencies revealed in vibration testing on S-2A. An engineering unit of the new design already has performed satisfactorily in subsequent S-2A tests. Frank Meadows, Bud Browne, and Red Barry played major roles in toppling No. 1 from the list.

RESEARCH, DEVELOPMENT DIVISION WRAP-UP

R&D Division personnel have their eyes on April 24--just 45 days remain to deliver or retrofit SC-1 control items. Here's how they're doing:

T-21 upgrade units...
were repaired in record time. Ryan reworked the signal data converter and the klystron power supply/modulator in one day. TV approach camera was retrofitted overnight by John Todd, Ray Hawkins, George Yamamoto, Gloria Vigilante, Dewey Riggs (all in Warren Wynn's shop), and Hugh McNeela. Battery charge regulator went into rework at 4:15 p.m. Feb. 11 and cleared inspection control point at 9:30 a.m. Feb. 12. Bill Snedden, Victor Gearhart, and Marian Szewczyk rate raves.

Flight control electronics...
"parasite" oscillation problem on A-6 chassis was solved by Bernie Scherer's circuit designers and product engineer Dick Cook. T-21 upgrade unit was reworked overnight by Swing Shift Assembler Marian Szewczyk and delivery was made in three days (including Saturday and Sunday).

Pat Mallon's area...
still is providing excellent service to Division 27. Roger Harmon and Sel Weingart are rushing JPL shutters through Services Division, and delivery to assembly was scheduled for today.

Boost regulator for T-2...
was delivered to test on Feb. 5 by Tom Huckins on schedule though he received a redesign on the filter network Feb. 3. Jerry Laws and Marian Szewczyk (again!) were responsible for the quick assembly turn-around.

QUALITY ASSURANCE REMINDS...

That as Aug. 2 nears, greater emphasis is being put on protection of thermal surfaces. (See SQAD 2.1.56 for the "how-to-do" instructions on thermal surface protection). Personnel working in clean areas are reminded to observe regulations on changing soiled gloves--the first clothing to become contaminated.

...AND EXPLAINS

The different categories of hardware. Simply speaking, Class IV is for fully acceptable flight hardware; Class IV-A is acceptable for ambient functional testing, but not for flight or environ-

Surveyor Team "Captain" Bob Roderick presents team emblem, an attractive lapel pin, to the "Coach," Vice President and General Manager L. A. Hyland.

mental testing; Class IV-T is acceptable for environmental testing, but not for flight.

WHAT'S GNU IN GUIDANCE, CONTROLS

(Don't blame us; here's a verbatim report from one of those "cats" in G&C, inspired (?) by the KIT TEN Program.)

> "The Surveyor Planning and Controls Group don't MONKEY around when it comes to expediting. This group of TIGERS, headed by Pat J. Miller, a DOG fancier, is presently in the midst of shoving the everloving KIT TEN program, designed to produce a set of hardware without the excess solder problem. AHEAD OF SCHEDULE delivery to Division 22 is anticipated for this hardware. With several units left to be pushed, Pat and the other members of her group, Ray Aragon, John Acker, Wayne Robinson, and Al Wagner, are not letting any of the production areas HORSE around. Recently, Fred Kennedy, Division 29 project engineer, said of this group: 'The way they RAM things through, they sure help OCELOT.' Then, he DUCKED."

LOOKING TO THE FUTURE

As we concentrate on the present Block I Surveyor job and the Aug. 2 shipping date, perhaps some of us may overlook the possibilities of future lunar exploration projects and their potential. With these strong possibilities and potentials in mind, an Advanced Surveyor Laboratory managed by Dick Gunter was organized last September with the task of assuring continuity of the Surveyor Program and for development of future Surveyor applications. Among the lab's accomplishments to date are:

BLOCK II SURVEYOR--A Program Development Plan for Block II was prepared and presented to NASA. Program calls for an improved spacecraft with increased payload, greater landing accuracy, and extended lunar landing area capability. Block II follow-up continues and initiation of Block II Program Definition Phase by NASA/JPL is hoped for soon.

PASSIVE LUNAR MARKER--Passive Lunar Marker feasibility study is under way under NASA contract. Device is a passive beacon that may be landed on the moon by Surveyor and, once in place, would function as a navigational aid for Apollo for orbital determination and terminal descent guidance. V. Kordakis is the feasibility study project engineer.

LUNAR SURVEY PROBE--Feasibility study on adaption of Surveyor spacecraft as a system for soft landing Lunar Survey Probes is in progress under NASA contract. Survey probes would be launched from an orbiting manned Apollo spacecraft and would explore moon sites of interest and certify landing areas. If proved feasible, and if it has more desirable performance than competitive lunar probes, Surveyor may be adapted for this mission.

AUG. 2 IS JUST A LITTLE MORE THAN FIVE MONTHS AWAY