SPACE DIVISION
Skywriter

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cheduled For Lift-Off Monday

Flight To Test Lunar Module for Moon-Landing Mission

Apollo 9 is scheduled to lift-off Kennedy Space Center's Launch Complex 39A Monday morning at 8 o'clock California time in the start of what is called the nation's most ambitious space flight to date.

As of *Skywriter* press time Thursday, the flight was rescheduled for Monday. The change was made after crewmen developed cold symptoms.

Crewmen for the Earth orbital flight are Jim McDivitt, commander; Dave Scott, command module pilot, and Russell Schweickart, lunar module pilot. The Downey-built Apollo Spacecraft 104 command and service modules will be the payload for the flight, and home for the crewmen for their 10-day journey through space.

Boosting the spacecraft to orbital altitude will be the Seal Beach Saturn S-II-4 stage. The first of the new lightweight versions of the S-II, the stage also is the initial flight article equipped with the new Rocketdyne J-2 engines which develop up to 230,000 pounds thrust, versus the 225,000 pounds thrust of the third S-II flight stage.

Apollo 9's primary objective will be to forge the missing link for the planned moon landing mission — the first manned flight in the Grumman lunar module (LM). The ability of the command and service modules to operate at lunar distances was fully demonstrated in the Apollo 8 moon orbit mission.

The flight of Apollo 9 will be a thorough checkout in Earth orbit of the LM and its systems in a series of tests including maneuvers in which the LM is the active rendezvous vehicle — paralleling an actual lunar orbit rendezvous.

NASA officials said many more tests are packed into the flight, even exceeding those of Apollo 8, than any other to date and that most of them deal with the LM, which has had only one unmanned space test. Many of the planned tests will exceed the conditions that will exist in the lunar landing.

Apollo 9 also will include the only planned extra-vehicular activities (EVA) in the Apollo program until the first moon landing. Schweickart is scheduled to perform two hours of EVA in the fourth day of the Apollo 9 flight.

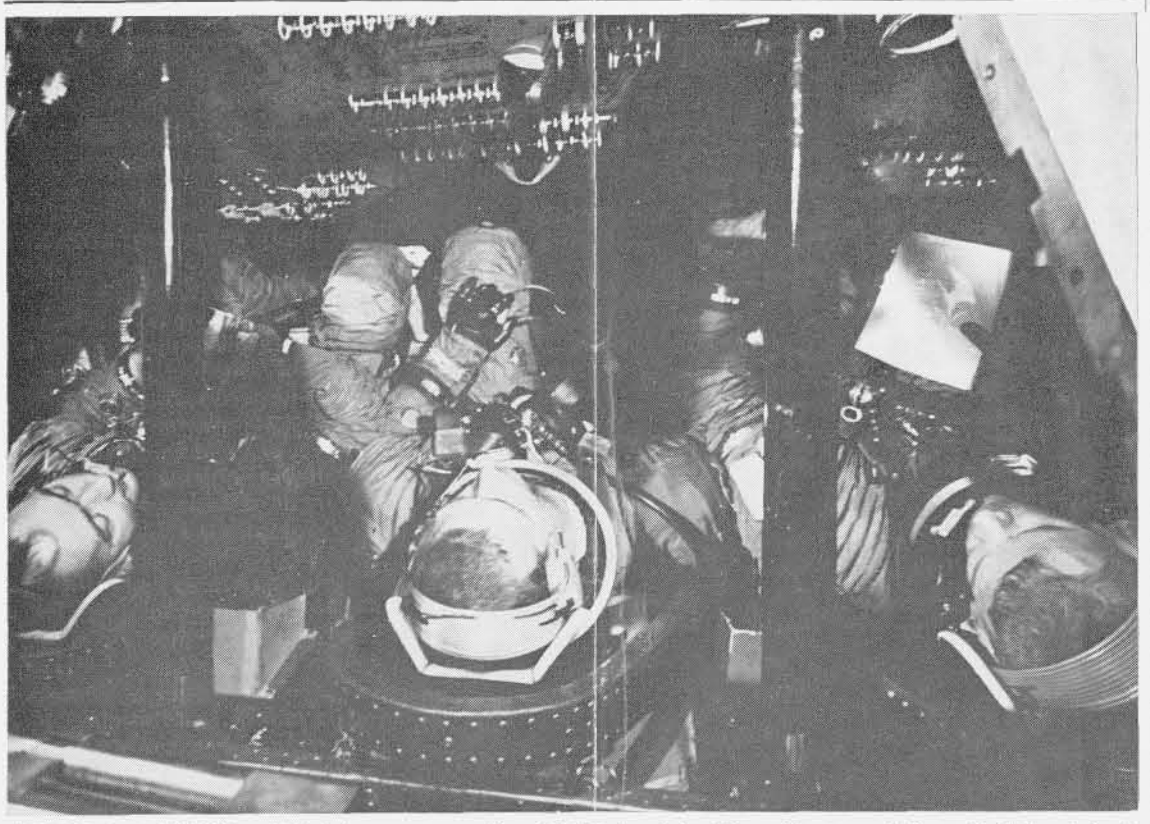
Initially, he will go from the lunar module to the command module, using handrails on the two spacecraft, to demonstrate that astronauts can transfer from one module to the other in this manner in the event of an emergency. On his way back, he will retrieve thermal samples from both craft and then photograph the two modules from various angles to test the new lunar surface television camera.

Rated as tops among mission priorities by NASA are the rendezvous and docking of the command module and LM which will occur twice — once when the LM is still attached to the Saturn V's S-IVB third stage, and again following a planned rendezvous sequence.

The dynamics of docking the spacecraft were likened by NASA engineers to coupling two freight cars in a railroad switching yard — but using a coupling mechanism built with the precision of a fine watch.

Major activities planned during the sixth through tenth day of the mission include landmark tracking exercises by the crew, command/service module systems tests, and a terrain pho-

(Continued on Page 2, Column 3)



APOLLO 9 CREW — NASA astronauts Jim McDivitt, left, Dave Scott and Russell Schweickart, prime crew for Apollo 9, are shown practicing for 10-day Earth orbital mission scheduled to begin Monday morning from Kennedy Space Center moonport. Prime goal of flight is to thoroughly checkout lunar module systems in preparation for lunar landing flight planned for later this year.

PRIDE WINNERS IN FLORIDA FOR APOLLO 9 LAUNCHING

Four division men will be on hand to watch Monday morning's launch of Apollo 9 at NASA's Kennedy Space Center as representatives of their fellow employees.

The quartet are Kelvit Shaw of Apollo Engineering; Robert Schoen, Research, Engineering and Test; Vic Diaco, Central Quality and Reliability Assurance, and Marvin Zeigel of Saturn S-11 Major S/A Welding and Bonding. Each was selected through the division PRIDE program on the basis of his outstanding workmanship.

The men will be feted at a special reception honoring them and other Apollo/Saturn V contractor representatives, and will be given a tour of the KSC moonport facilities. They will see the launch from a reserved VIP viewing stand.

Shaw, a member of the Technical Staff, has been closely associated with crew equipment and stowage for all Apollo Block II spacecraft. He has implemented a number of innovations in this area.

Schoen is responsible for the checkout, evaluation and operation of the flight software programs used in the division Apollo Mission Flight Simulation Complex. He was one of four men personally commended by Astronaut Dave Scott for their consistent and outstanding assistance in support of flight crew use of the facility, and is widely recognized for his vast knowledge of guidance computer software programs.

Commended for his consistent performance in his daily duties, Diaco also is credited with aiding in improving the division calibration program. In addition, he has received numerous letters of appreciation and commendation.

A leadman, Zeigel heads a team that was charged with only four errors in the past year. During this period, the crew took part in the production of 72 S-II major liquid hydrogen panel assemblies over a total of more than 13,000 hours, and consistently maintained an on-schedule condition.

'Space Shuttle' Contract Given Space by NASA

A six-month conceptual study contract to investigate a low-cost, manned logistics (space shuttle) system, has been awarded the division by NASA's Manned Spacecraft Center.

The contract is one of four issued by NASA to aerospace companies. In addition to the Manned Spacecraft Center, other project studies are being directed by NASA's Langley Research Center in Virginia and the Marshall Space Flight Center in Alabama.

Entitled Integral Launch and Reentry Vehicle (ILRV) studies, the contracts will concern different aspects of possible future space shuttle vehicles.

Division work on the study is being done by a team at the Seal Beach facility. John Sandford has over-all supervision; George Fraser is study manager.

All facets of division technology will be involved in the performance of the work. Representatives on the team are from Structures and Design, Central Manufacturing, Science and Technology, Management Planning and Control, and Contracts and Pricing.

S-II FLIGHT STAGE FOURTH IN SERIES BUILT FOR MSFC

The Saturn S-II flight stage for Monday's Apollo 9 mission is the fourth in a series of S-II flight stages produced by the division for NASA's Marshall Space Flight Center.

The stage is 81½ feet tall and 33 feet in diameter. It weighs 84,600 pounds—without interstage—prior to being fueled, and 1,082,600 pounds with its fuel aboard. The stage carries 986,100 pounds of fuel, including 158,900 pounds of liquid hydrogen and 827,000 pounds of liquid oxygen.

It is powered by five Rocketdyne-built J-2 engines, each developing 230,000 pounds of thrust at altitude. The stage also has four 22,700-pound thrust ullage motors. Burntime for the big engines is approximately 6 minutes and 11 seconds.

The following is the planned

(Continued on Page 2, Column 1)

HONORED EMPLOYEES — Division men named to represent their fellow employees at launch of Apollo 9 receive airline reservations from Executive Vice President Joe McNamara, right. From left are Marvin Zeigel, Robert Schoen and Victor Diaco. Kelvit Shaw, fourth representative, was not available for photo.

Company Teams with Northrop for AF F-15 Contract

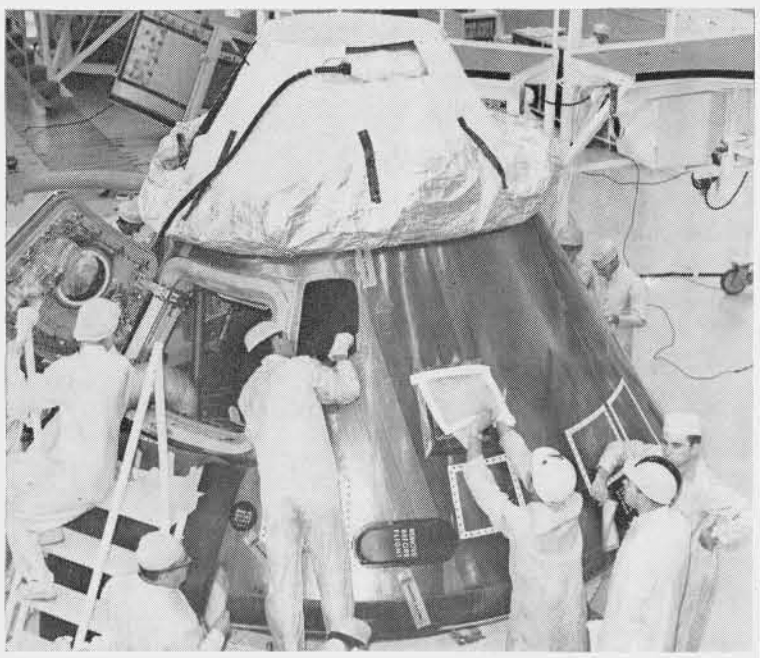
The company said Wednesday that Northrop Corp. has joined in the firm's bid for development and production of the Air Force's new F-15 air superiority fighter and will participate in design and manufacturing if NR wins the contract.

North American Rockwell president J. L. Atwood and Northrop president Thomas V. Jones announced the agreement to team the firms, which are among the nation's leading military aircraft producers.

NR is one of three companies in the contract definition phase of the advanced fighter program. The other firms are Fairchild-Hiller Corp. and McDonnell Douglas.

The definition phase will provide refined design, funding and production data on which the Air Force will base its selection of the company to design and produce the new aircraft. Initial proposals are to be submitted to the Air Force in June for start of evaluations.

NR's F-15 work is being performed by the company's North American Aviation Divisions Organization (NAADO) of which Los Angeles Division would be responsible for the development and production contracts. Northrop would design and manufacture portions of the airframe at its Norair Division, Hawthorne, Calif.



READY TO GO — Apollo Spacecraft 104 command module is buttoned up in Bldg. 290 clean room at Downey prior to its shipment to NASA's Kennedy Space Center last October. Apollo 9 astronauts Jim McDivitt, Dave Scott, and Russell Schweickart will make command module their home during 10-day mission.

Apollo 9 Mission Vital Test . . .

(Continued from Page 1, Column 5)

tography experiment for Earth resources studies.

In the photography experiment, the crew will use a multispectral camera — composed of four cameras with different filters — to photograph the Earth. The photos will aid in developing new methods for inspecting the Earth's natural resources.

Day-by-day mission highlights follow:

First Day — Docking of command/service modules (CSM) and LM, docked burn of service module service propulsion system (SPS) engine to improve orbital lifetime and test CSM digital autopilot during burns.

Second Day — Additional testing of digital autopilot in three more SPS engine firings.

Third Day — McDivitt and Schweickart transfer to LM and make thorough docked checkout of LM systems, including burn of LM descent stage engine. Fifth docked SPS engine burn to circularize orbit at about 152 miles above the Earth.

Fourth Day — Further checks of lunar module and extra-vehicular activity by Schweickart.

Fifth Day — McDivitt and Schweickart man the LM for separation from CSM and performance of a rendezvous maneuver sequence simulating the checkout of the LM for a lunar landing descent. Maximum range from LM to CSM during the sequence will be about 109 miles. The two craft then will dock, the crewmen will transfer back to the CSM, and the LM will be jettisoned and put into an orbit with an apogee, or high-point, estimated at more than 3,600 miles.

Sixth through Tenth Days — Major activities planned for the latter half of the mission include additional burns of the SPS engine, landmark tracking, the multispectral terrain photography, and further checkout of the CSM systems.

Eleventh Day — Preparation for entry. Splashdown is scheduled for 5:46 a.m. California time at a point in the West Atlantic some 250 miles east-southeast of Bermuda. Prime recovery ship is the USS *Guadalcanal,* a landing platform-helicopter (LPH). The astronaut crew will be airlifted the following morning to Norfolk, Va., and then to the Manned Spacecraft Center at Houston, Texas. The Apollo 9 command module will travel to Norfolk aboard the USS *Guadalcanal,* and flown from there to Downey for post-flight analysis.

Apollo Status To Be Beamed to Employees

Status reports on the Apollo 9 flight will be broadcast to division Southern California employees via closed-circuit television and the sound system throughout the 10-day Earth orbital flight.

The programs will be beamed periodically and are scheduled to coincide with key points in the mission. The division broadcasts begin today with a program highlighting the flight, and will continue on Monday with the lift-off.

Other scheduled coverages will include the extra vehicular activity (space walk) and recovery operations.

Two in-flight television transmissions are planned during the mission. The first is programmed for Wednesday, approximately 46½ hours into the flight at about 6:30 p.m. California time, and the other is scheduled for Thursday, about 75 hours into the flight, at approximately 9:10 a.m.

The initial telecast will be about seven minutes and will be after astronauts Jim McDivitt and Russell Schweickart transfer into the lunar module for the first time to begin systems checkout.

The second television transmission will be during the extra-vehicular activity by Schweickart.

S-II Series . . .

(Continued from Page 1, Column 3)

sequence of events for the S-II-4 during the Apollo 9 mission, with all times figures for a nominal mission:

Flight Time (Mins: Secs)	Event
2:39.6	S-II liquid hydrogen recirculation stop
2:40.0	S-IC/S-II separation
2:42.0	S-II engine ignition
3:10.0	S-II interstage separation
7:39.3	S-II liquid hydrogen step pressurization
8:53.2	S-II engine cutoff
8:54.0	S-II/S-IVB separation
20:16.0	S-II Atlantic splashdown (about 2,770 miles downrange)

S-II-4 STAGE — Bathed in night lights, fourth Saturn S-II flight stage rolls down roadway at Seal Beach on first leg of journey leading to launch pad at NASA's Kennedy Space Center. Stage will power Apollo 9 to orbital altitude in Monday's flight.

Meat and Potatoes Included on Apollo Bill-of-Space-Fare

Apollo 9 astronauts Jim McDivitt, Dave Scott and Russell Schweickart have a full and varied bill-of-space-fare for their 10-day Earth orbital flight.

The average daily intake from the three meals they will eat in space will be 2,500 calories per man. In addition to the regular rehydratable and bite-size food items, each man will have meat-and-potatoes entrees.

The extra food items, which can be eaten with a spoon, are five-ounce servings of beef and potatoes, ham and potatoes, and turkey and potatoes.

As an example, McDivitt's meals for the second, sixth, and tenth days of the flight will be:

Breakfast — Canadian bacon and applesauce, sugar-coated corn flakes, brownies, grapefruit drink, grape drink.

Lunch—Tuna salad, chicken and vegetables, cinnamon toasted bread cubes, pineapple fruitcake, pineapple-grapefruit drink.

Dinner—Spaghetti and meat sauce, beef bites, bacon squares, banana pudding, grapefruit drink.

SPACE DIVISION Skywriter

J. S. Elliott
Editor, *Skywriter*
Judy R. Brown
Assistant Editor

Space Division
Tony Longo, Ext. 6468

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FLORIDA PAPER TO SKIP WEEK

Due to Apollo 9 launch activities, the Florida *Skywriter* page will not be printed in next week's issue. Instead, the regular division issue will be distributed at Launch Operations.

Today's Florida page features a full-length NASA photograph of Apollo 9 on Pad A at Kennedy Space Center's Launch Complex 39, along with photos of the prime crew. The next regular Launch Operations page will be carried in the *Skywriter* issue of March 14.

STAGE 'WEIGHT WATCHERS' REDUCE S-II 3,900 POUNDS

The men who build rocket stages at Seal Beach are weight watchers — they shaved 3,900 pounds of the Apollo 9's 44-ton Saturn S-II second stage.

"In space flight, the waistline is all important," said Bob Greer, vice president and S-II program manager. "Any excess poundage that can come off allows extra equipment or cargo in the Apollo spacecraft, increased propellant loading, or an increase in velocity."

The largest and most powerful hydrogen-fueled vehicle ever produced, the S-II is scheduled to play a swift, but key role in Monday's Apollo 9 launch. Its five Rocketdyne-produced J-2 engines will roar to life about 2 minutes and 42 seconds into the flight, boosting the Saturn V's third stage and the Apollo spacecraft from about 40 miles altitude to orbital altitude of about 118 miles and approximately 960 miles downrange.

During their planned six-minute, 11-seconds burn time, the S-II's engines power the combined vehicle to a speed of more than 15,700 mph.

S-II engineers took 3,250 pounds off the stage by reducing the thickness of its basic structure. The tank sidewall thickness was reduced to save 1,650 pounds, and the longitudinal support of the tank walls were slimmed to save another 490 pounds. More than 500 pounds were cut by making reductions in a number of other areas, including reducing the gauge size of some wiring.

Greer said the campaign to take off pounds has brought the dry, or unfueled, weight down from 88,500 pounds for the third S-II flight stage used for Apollo 8, to 84,600 pounds for the S-II-4, the stage for Monday's Apollo 9 flight.

The 81½-feet tall, 33-feet diameter S-II stage weighs more than a million pounds when it is fueled. Its five J-2 engines produce approximately 230,000 pounds of thrust at altitude.

'Skyline' Will Discuss Apollo

"Prospecting from Space," a story outlining a National Earth Resources Satellite program, will be featured in the first 1969 issue of *Skyline* due out next week.

The article describes how instrumented satellites, orbiting 500 miles above Earth, will help man better manage his planet's resources.

Space Division personnel are involved in an extensive flight test program to check out equipment and techniques that might be used on these satellites of the future.

Also in *Skyline* is a words-and-pictures salute to Apollo 8.

Other stories include a close look at the North American Aviation Division's Organization; a study Autonetics' engineers have devised to store and use urban storm water; an inside view of a Sabreliner used in meteorological research, and a tour through the major laboratories of the Air Force Systems Command.

Manufacturing Relocation Set This Weekend

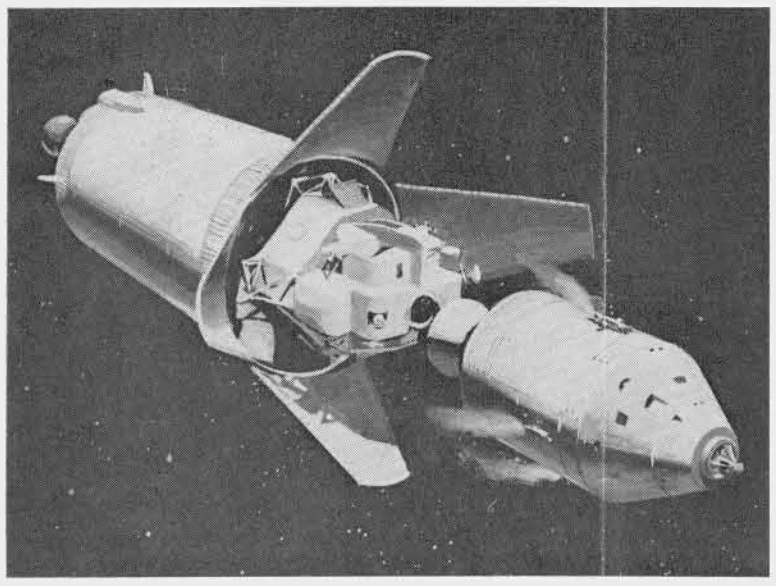
Relocation of Manufacturing functions from Bldg. 341 at Compton to Downey and Seal Beach will be completed this weekend.

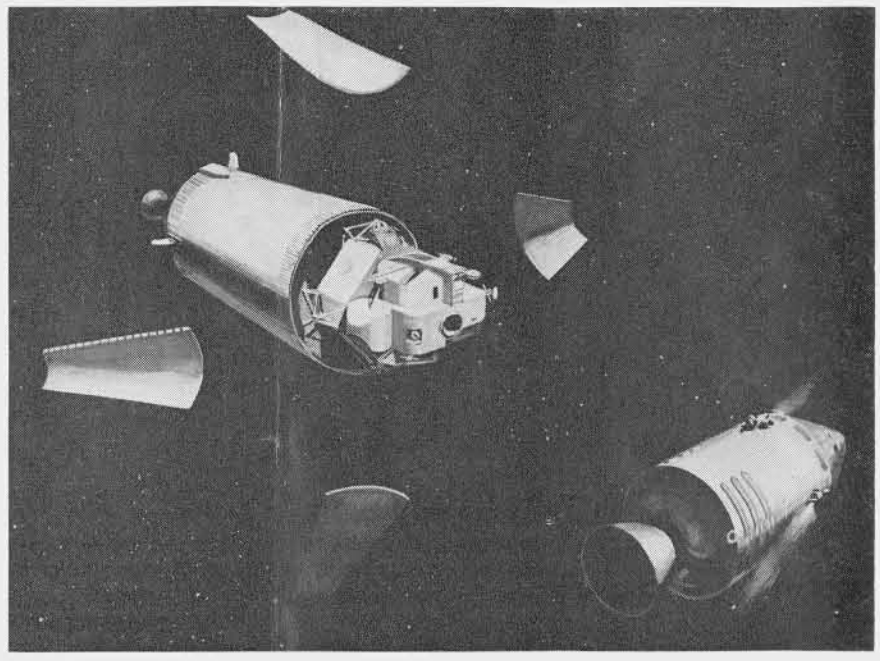
With the completion of the moves, the division will have only its Warehousing function and the Ocean Systems Operations water test tank in Bldgs. 343 and 344, respectively, said William J. Leseman, director of Facilities and Industrial Engineering.

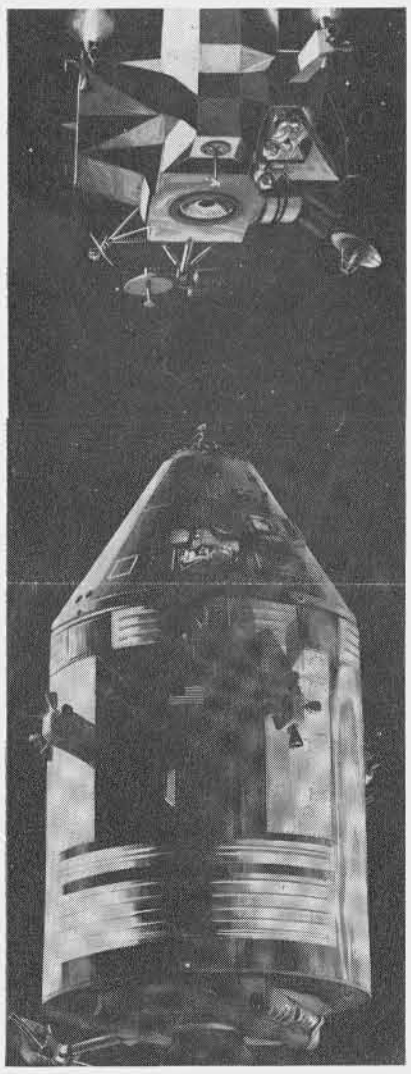
The GSE Drawer Fabrication, Cable Fabrication, Encaupsulation and Functional Checkout Operations were moved to Bldg. 302 at Downey over the weekend of Feb. 15. Relocated to Bldg. 302 was GSE Service Trailer Modification, while Gauge Cleaning and Calibration was moved to Bldg. 1 at Downey, both the weekend of Feb. 21.

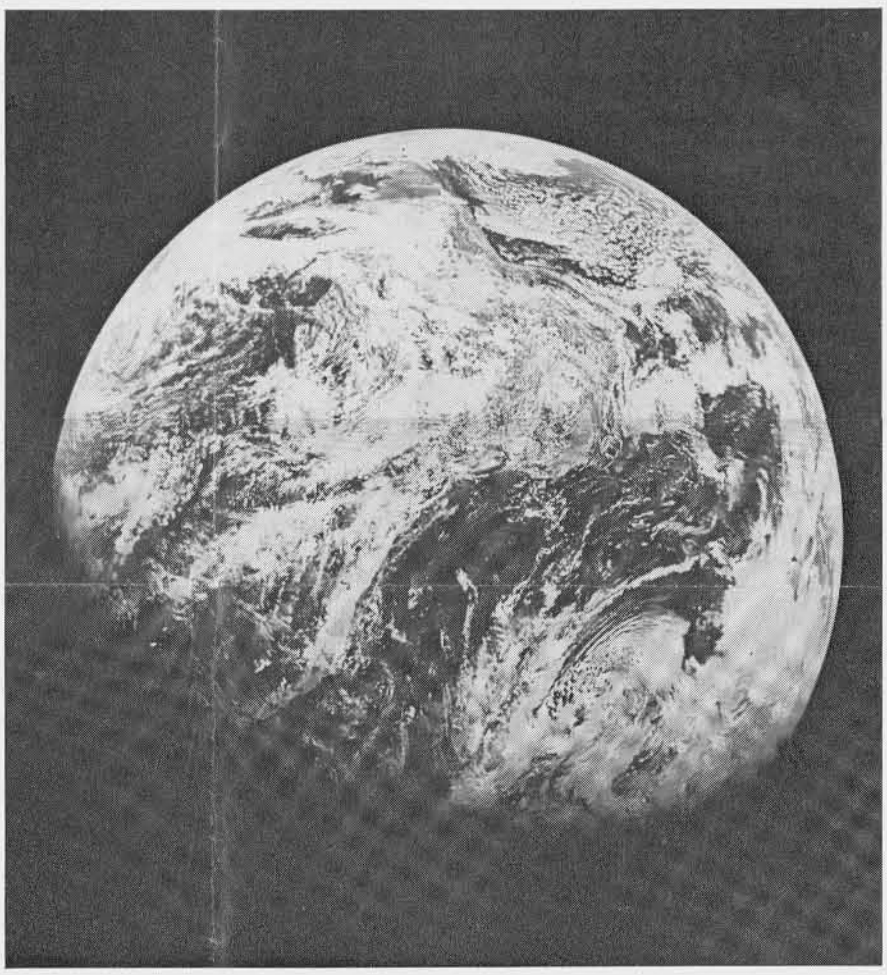
Relocated this weekend will be the Wire Preparation organization. The Saturn S-II operation will be transferred to Seal Beach, and the Apollo unit to Bldg. 1 at Downey.

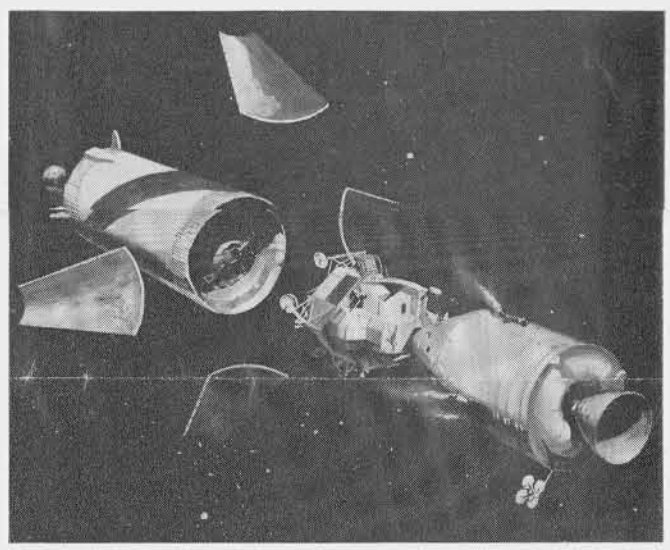
THE FLIGHT OF APOLLO 9



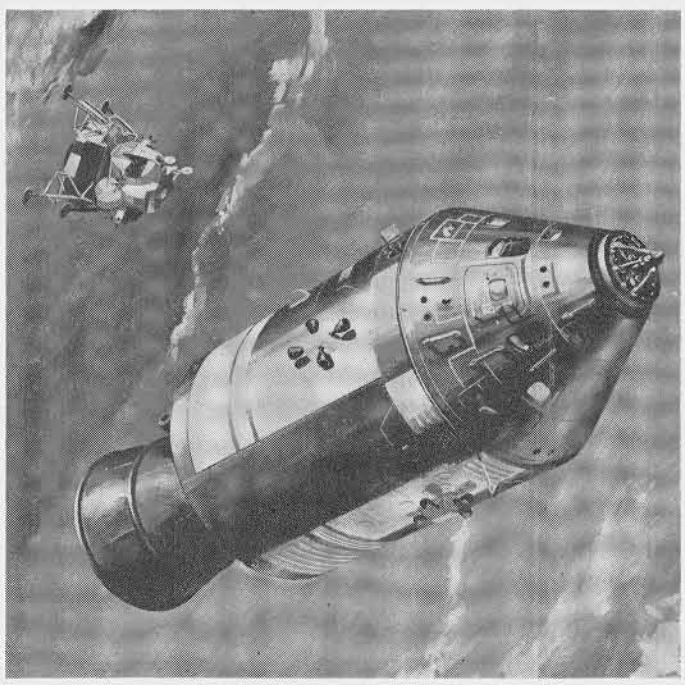


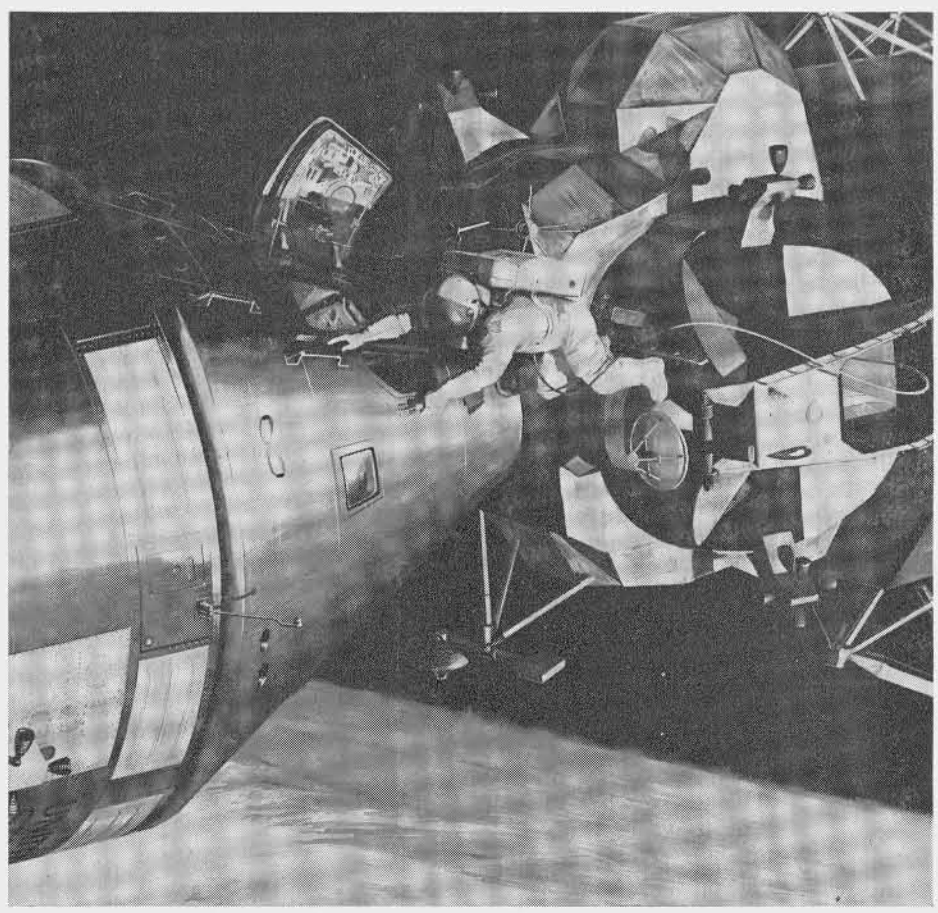






McDivitt, Scott, Schweickart . . . 10 Days in Space

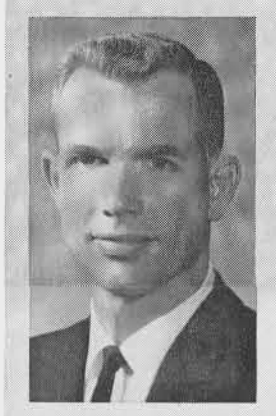




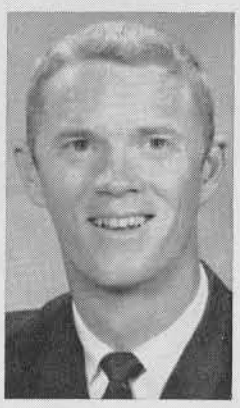
HIGHLIGHTS of the 10-day Earth orbital flight of Apollo 9 are shown in artist concepts, beginning with separation of command/service module craft from lunar module/third stage, top left and going clockwise through transposition and docking, extra-vehicular activity by Russell Schweickart, rendezvous and formation flying of two craft, and docking of craft prior to lunar module jettison in space.

SPACE DIVISION
Launch Operations
FLORIDA

Jim McDivitt
Commander



Dave Scott
Command Module Pilot



Russell Schweickart
Lunar Module Pilot

APOLLO 9 . . . . . Ready To Go