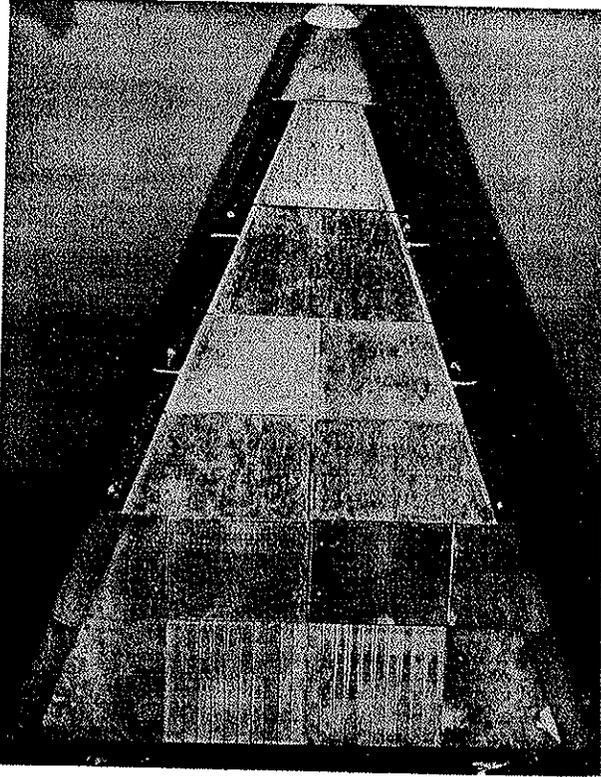
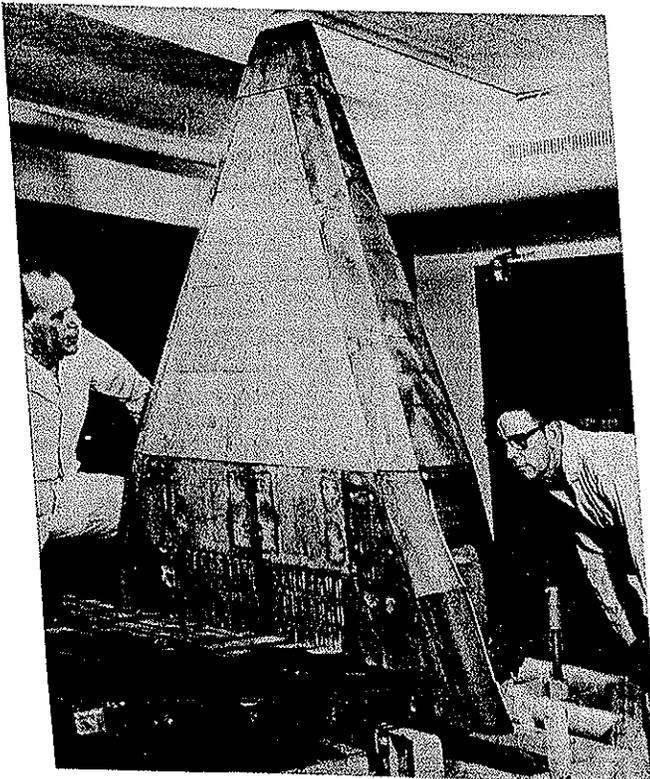


Coating Protects ASSET



RECENTLY RELEASED photos of first ASSET vehicle to be recovered for study following its glide re-entry show how it was preserved in re-usable condition by special diffusion alloy coating developed by Chromalloy Corp., of West Nyack, N.Y. Top photo shows lower glide surface of the McDonnell Aircraft-built ASSET, with its variety of "chromallized" molybdenum panels, before flight. Photo below shows same ASV-3 vehicle after completed flight and re-entry on July 22. Even after prolonged heating to almost 3,000°F, bottom glide panels are in "like-new" condition. Unscathed vehicle structure could be flown again, if desired.



of a pattern recognition control system. Consider the initial effort is four weeks.

s, which have been traditional electronic devices, variable linear element memory. If they increase in size by several orders of magnitude, their use in arrays of elements might lead to an example, in target recognition associated with data processing, in several post-processor applications, in speech recognition, and in speech recognition.

Communications—The Division advanced digital communications currently is centered on a capability to handle data in real-time through a key new subsystem, a very-high-speed video processor. Ability to process video data through a microelectronic system, give the Air Force capability for on-board processing of intelligence data.

Develop such a processor, logic and higher-speed logic will be needed. Entire latter requirement difficult to cope with. Engineers are interested to interrogate a 6-mc channel, for example, sampling rate, which requires systems to run at order of 100 mc with resolution and accuracy. Show the sampling rates, rates, and clock rates. Division will pursue new 100-mc logic with 10 times, new data-computing using integrated circuits to conserve bandwidth and use of passive thin-film resistors on top of larger-scale circuit arrays for timing and logic portions. Has worked on this latter for about three years, with effort performed under contract.

Air Force says it would like an advanced system operating in two years, and that it is the first step—development of a processor—through issuance in the next few months. Communications systems development would be initiated in

operation with such a system, they will also look for phase-lock requirements that these appear for redesign with in-

The Missile/Space Week

NERVA System Test Jumps Year

The first system configuration test of the *NERVA* nuclear rocket engine complete with reactor is now scheduled for fall, 1965, more than 12 months earlier than originally planned.

The decision by the joint NASA-AEC Space Nuclear Propulsion Office to update the test stemmed from the recent highly successful Kiwi-B-4E (Los Alamos Scientific Lab) and the NRX-A2 (Aerojet-General, Westinghouse Electric) full-power and restart reactor tests.

The test date acceleration will probably mean an expanded effort at Aerojet in component and subsystem development and testing.

RFP's Issued for Space Engine

Marshall Space Flight Center has requested proposals by Nov. 30 for the development of a 100-lb.-thrust rocket engine for manned space flight systems.

The multi-purpose engine—to be called the C-1—could be employed for spacecraft attitude control and maneuvering systems and launch vehicle ullage and attitude control systems.

The engine will be powered by monomethylhydrazine (MMH) and nitrogen tetroxide. Eight nozzle configurations will be needed for use in its various possible applications.

Interested firms must submit technical proposals by Nov. 30 and cost proposals must be submitted one week later.

Two firms will be selected to do parallel work during the six-month definition phase of the program. Phase I will be done under a fixed-price contract.

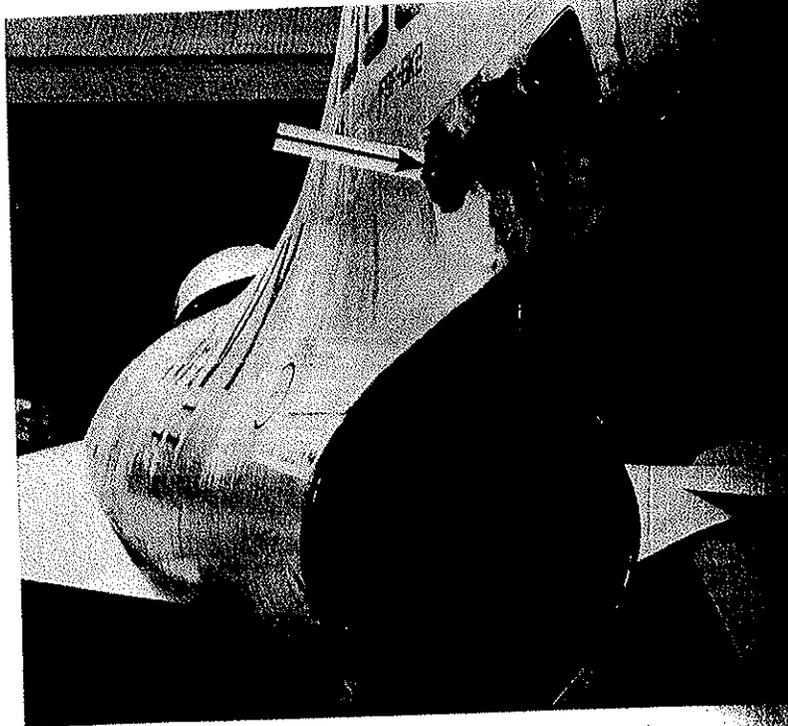
If the program is continued past the first phase, the development phase is expected to be with one of the original contractors under an incentive-type contract.

Detection Satellite Launch Set

NASA has scheduled a launch of its *S-55C* meteoroid detection satellite for no earlier than Nov. 5 from Wallops Station, Va.

If successful, it will be designated *Explorer 23*. Its planned orbit is 637 mi. high and 205 mi. at its closest point to Earth. Its orbital period is expected to be 99.6 minutes.

An earlier version of the satellite, *S-55B*, circled the Earth for seven



Positive Proof of Redeye Effectiveness

ARMY'S REDEYE air-defense missile successfully intercepted this Grumman target drone recently during a development test-firing at China Lake, Calif. (ENR 11/26, p. 10). The shoulder-fired missile was not carrying a warhead. Part of the missile can be seen imbedded in the tail section (arrow) of the plane, which was travelling faster than 420 knots. General Dynamics/Pomona is Redeye prime contractor.

months after its launch on Dec. 16, 1962, and provided the first sampling of meteoroids in near space.

Shots of the Week

The Air Force on Oct. 28 successfully launched the fourth in its series of *ASSET* lifting body experiments. The vehicle impacted some 900 miles from Cape Kennedy near Grand Turk Island after achieving a maximum altitude of more than 30 miles. The shot was termed "very successful" and data flow over the two VHF channels was said to have been good. No recovery of the craft was attempted. Two shots of *ASSET* remain in the series.

• The American Science & Engineering Corp. launched the 500th *Aerobee* sounding rocket on Oct. 26 from White Sands Missile Range, N.M.

• The Soviet Union last week launched two more satellites in the *Cosmos* series. *Cosmos 49* and *50* scientific satellites were sent into orbit on Oct. 24 and 27 respectively.

Phillips New Lunar Of

The space agency has named Gen. Samuel C. Phillips director of the *Apollo* lunar program.

Since Jan. 15 he has served as deputy director under Dr. James A. Mueller, associate administrator of the manned space flight program.

Before assignment to the *Apollo* program, Phillips was Vice Commander of the Air Force Ballistic System.

ComSat Hopeful of F

The Communications Commission is hoping for a quick ruling from the Federal Communications Commission of the U.S. ground station international satellite communications system.

ComSat filed its second application with the FCC last week. Several requests that the Commission deny ownership of the initial stations.

Arguments for ComSat included the fact that the

missiles and rockets, Nov.

TABLE VIII

TRAJECTORY DATA AS FUNCTIONS OF TIME
 THOR/DELTA/ASSET, DSV-2G, BOOSTER S/N 250

TIME (SECONDS)	VEHICLE WEIGHT (LBS)	MACH NO.	DYNAMIC PRESSURE (LBS/FT ²)	ALTITUDE FT)	FUEL REMAINING (LBS)	OXIDIZER REMAINING (LBS)
0	111,145	0.015	0.325	32	30,330	67,691
10	104,968	0.115	19.450	666	28,438	63,406
20	98,767	0.257	89.433	2,577	26,557	59,086
30	92,658	0.438	227.509	6,577	24,783	54,751
40	86,452	0.678	439.296	12,459	22,912	50,416
50	80,267	0.992	638.766	20,714	21,043	46,100
60	74,112	1.394	870.464	31,488	19,173	41,815
70	67,984	1.965	937.106	44,805	17,303	37,557
80	61,874	2.584	730.231	60,751	15,428	33,322
90	55,772	3.245	475.876	79,376	13,548	29,100
100	49,677	4.016	291.535	99,814	11,663	24,890
110	43,592	4.782	154.852	120,498	9,773	20,695
120	37,512	5.749	102.154	140,328	7,873	16,515
130	31,437	6.952	77.371	158,069	5,958	12,355
140	25,367	8.637	71.507	172,215	4,023	8,220
150	19,304	11.054	80.227	182,531	2,063	4,120
158.8 (MECO)	14,103	14.018	97.440	189,887	173	467
163 (Second Stage Start)		14.182	83.763	194,435	552	1,725
170		14.658	72.987	199,296	502	1,583
180		15.320	64.118	204,765	429	1,375
190		15.977	58.668	209,018	356	1,166
200		16.623	57.028	211,448	283	960
210		17.253	59.054	212,056	211	756
216.8		17.674	62.802	212,056	163	619

ACCELEROMETER LOCATIONS, THOR/DELTA/ASSET DSV-2G, BOOSTER S/N 250

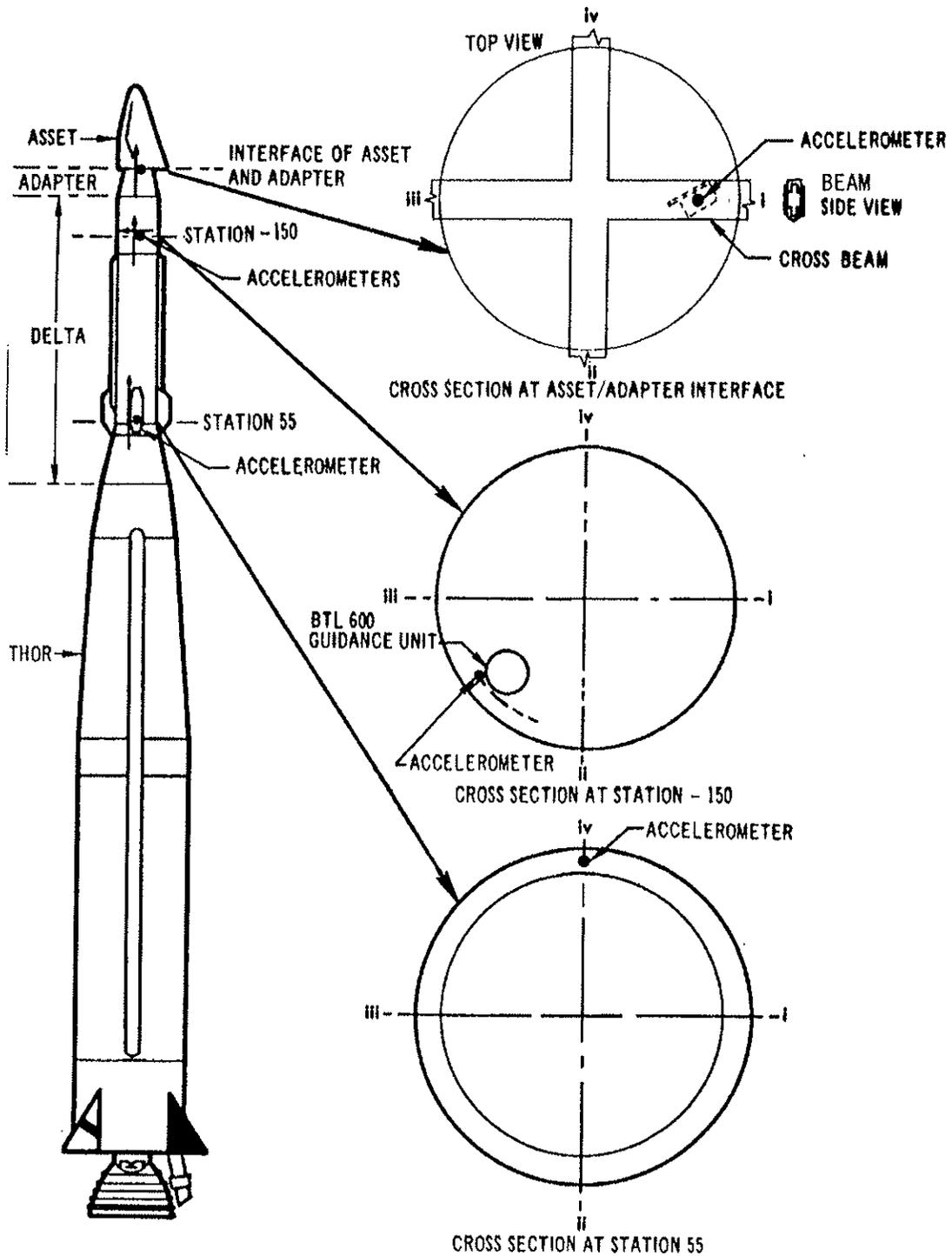


FIGURE 4

Valuable Data By Telemetry on All Experiments

ASSET No. 5 Flight Resounding Success

Fifth of the ASSET glide reentry vehicles, designed, developed and built by McDonnell for the Air Force, made a highly successful flight on the night of Tuesday, December 8. Blastoff at 8 p.m. (St. Louis time) was precisely to the second. Performance of the Thor single-stage booster was excellent; separation of the delta-shaped spacecraft was normal.

Boosted to a maximum altitude of more than 174,000 feet, from a launch pad at Florida's Cape Kennedy, the spacecraft reached a maximum velocity of 13,000 feet per second (Mach 11.8) during its 14.4-minute, 850-statute-mile glide down the Eastern Test Range. Impact was well within the impact zone off Grand Turk Island.

VHF Telemetry

The spacecraft plunged back through the earth's atmosphere at temperatures ranging up to 2000 degrees Fahrenheit. Telemetry and tracking coverage were excellent. Two VHF (very high frequency) telemetry systems relayed information on all experiments to ground stations.

This was the second AEV (aero-thermoelastic vehicle) to be successfully launched in the ASSET program. AEV-1 made a highly rewarding flight last October 27. Objectives of both flights of these 68.7-inch-long, 1200-pound spacecraft were similar, but the AEV-2 mission called for flying the vehicle

at a 26° angle as compared to 20° on the AEV-1 flight.

On the AEV vehicles, the flotation gear and recovery system were omitted to provide room for the installation of equipment for additional experiments.

Principal Experiments

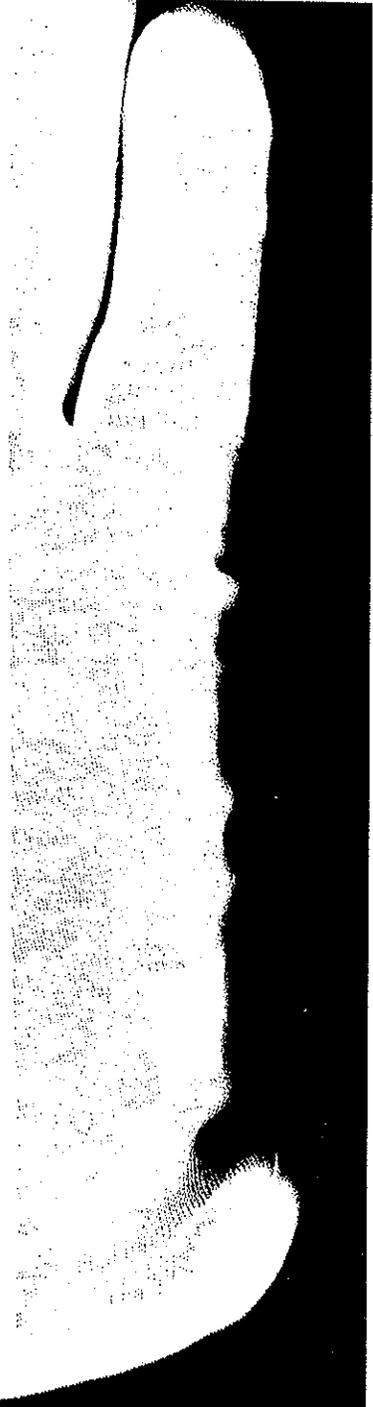
The three principal experiments with AEV-2 were:

(1) A rigid aerodynamic flap on the lower surface of the spacecraft was oscillated to obtain data for the design of control surface for future hypersonic glide vehicles. The panel was continuously forced 1¼ degrees into the airstream at rates from 10 to 20 cycles per second. Instruments recorded the force required to push the flap into the airstream, as well as pressure fluctuation on the flap and upper body.

(2) Flutter conditions were set up in flight to determine the characteristics of advanced structures under encountered conditions. An open face, corrugated flutter panel, located on the center underside of the vehicle and built of columbium refractory metal as thin as a sheet of paper, was alternately stretched and loosened every 10 seconds during hypersonic flight to determine flutter information at 100 checkpoints. (Information on the effects of flutter will be needed by designers of future aerospace vehicles because, under certain conditions, in-

(Continued on Page 2)

McDonnell was awarded in 1961 contract to design and build six of the vehicles.



Asset Flight

(Continued from Page 1)

tense flutter and vibration could destroy an aircraft or spacecraft.

(3) Acoustical microphones installed on the spacecraft's lower surface measured the boundary layer "noise" to determine the effect of acoustic vibrations on structures in a hypersonic environment.

Other Research Tests

In other research tests, the vehicle carried oscillatory pressure transducers on its upper surface to investigate separated airflow at hypersonic speeds; thermocouples in the nose cap and the right and left hand leading edges tested the feasibility of using temperature rate changes to safely control the reentry vehicle.

A sixth ASSET flight is scheduled for early 1965. This will be an AEV (aerothermoelastic vehicle) spacecraft of the type employed in ASSET flights that preceded the two ASV flights.

ASSET—acronym for Aerothermodynamic-elastic Structural Systems Environmental Tests—is a research program under technical direction of the Research and Technology Division's Air Force Flight Dynamics Laboratory, Wright-Patterson Air Force Base, Ohio. Management of the program was transferred last January from the Research and Technology Division, Washington, D. C., to the Space Systems Division, Los Angeles, Calif., under the Air Force Spacecraft and Advanced Reentry Tests (START) Program.

McDonnell was awarded in 1961 ~~contract~~ to design and build six ~~of the vehicles~~.