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DEPARTMENT OF THE AIR FORCE
HQ AIR FORCE SATELLITE CONTROL FACILITY (AFSC)
SUNNYVALE AIR FORCE STATION, CALIFORNIA 94086

REPLY TO ATTN OF: DO

13 June 1973

SUBJECT: SCF Operations Evaluation Report

TO: HQ AFSCF/CC

The attached Operations Evaluation Report is forwarded in accordance with established procedures.

(b)(1)
(b)(3)

Director for Test Operations

1 Atch
OER for IRON 8410

Distribution:

See page 12 of attached OER.

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AIR FORCE SATELLITE CONTROL FACILITY

OPERATIONS EVALUATION REPORT

IRONS

8410

DIRECTORATE OF TEST OPERATIONS
SUNNYVALE AIR FORCE STATION, CALIFORNIA

DEPARTMENT OF THE AIR FORCE

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SCF OPERATIONS EVALUATION REPORT

1. SUMMARY

1.1 ~~(S-LIMDIS)~~ Operation Summary

Satellite Vehicle (SV) 8005 (IRON 8410) was launched from Vandenberg AFB on 9 March 1973 into a nominal orbit. The SV contained four Mark 8 (Mk 8) recovery vehicles, one Mark 5 (Mk 5) recovery vehicle, and a Doppler Beacon payload. The planned duration of the primary (recovery) phase of the mission was 70 days; the planned duration of the solo phase was 5 days.

The solar arrays were deployed on Rev 1 and the Doppler Beacon payload was activated on Rev 12. The Mk 8 capsules were air-recovered on Revs 196, 424, 651, and 1024. The Mk 5 capsule was air-recovered on Rev 683. Solo-phase tests were conducted from 11 May to 18 May, and the vehicle was deboosted on Rev 1139 (Day 71). Thirty-six orbit adjusts (OAs) were performed during the operation.

1.2 Mission Data

1.2.1 ~~(S-LIMDIS)~~ Launch

Date	9 March 1973
Time (Z)	2100:01.9
Launch window (Z)	2030 – 2100
Location	SLC-4 East, Vandenberg AFB

Classified by SAFUS Memo dated 17 July 1972 Exempt from GDS of EO 11652 Exemption Category 3 Declassify on Indefinite
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1.2.2 ~~(S)~~ Ascent*

Event	Time After Launch (sec) Nominal	Actual
Injection (Stage II shutdown)	476.8	Not observed
Booster/SV separation	476.9	479.0

*Ascent-event data are not contained in telemetry processed by the SCF.

1.2.3 (U) Orbit. Orbital data for Revs 196, 424, 651, 683, and 1024 are listed in Table 1.

1.2.3.1 ~~(C)~~ Orbit Adjust System. Below are the Computer Area Specialist (CAS)-computed values for each OA:

OA No.	Rev	Duration (sec)	Impulse (lb-sec)	Delta Velocity (fps)
1	30	21.9	5,247.9	8.04
2	62	61.9	14,905.3	22.90
3	94	82.6	19,867.3	30.6
4	96	61.7	12,307.9	-19.0
5	127	44.3	10,292.5	16.0
6	159	42.9	9,758.8	15.2
7	198	95.0	21,458.3	36.2
8	257	47.4	10,636.4	18.02
9	287	52.3	11,398.4	19.35
10	322	48.6	10,425.6	17.76
11	354	87.0	18,626.3	31.83
12	356	41.2	8,840.5	-15.1
13	387	68.5	14,345.9	24.66
14	426	58.1	11,911.1	22.36
15	452	30.5	6,249.4	11.79
16	484	50.7	10,197.3	19.29
17	516	55.6	11,200.1	21.25
18	549	57.4	11,431.4	21.75

OA No.	Rev	Duration (sec)	Impulse (lb-sec)	Delta Velocity (fps)
19	581	57.9	11,283.4	21.53
20	614	45.2	8,633.4	16.53
21	653	111.9	21,234.3	40.83
22	695	52.0	9,799.7	20.76
23	727	62.0	11,414.1	25.06
24	760	47.7	8,895.8	19.61
25	792	66.8	12,507.8	27.68
26	841	118.0	21,856.9	48.64
27	890	70.1	12,735.5	28.51
28	938	77.3	13,784.5	30.88
29	987	100.9	17,863.3	40.38
30	1027	41.0	7,267.4	18.49
31	1027	41.0	7,352.4	18.75
32	1071	20.0	3,315.5	8.47
33	1073	51.3	8,768.5	-22.50
34	1101	38.9	6,589.0	16.92
35	1105	190.0	32,538.9	84.20
36	1124	21.3	3,668.7	-9.55

1.2.4 ~~(S)~~ Recovery. The recovery data are listed in Table 2.

1.2.5 ~~(S)~~ Deboost

Impact (date/time/rev)	19 May/0115:46Z/1139
Burn time (sec)	705
Velocity increment (fps)	301.09
Predicted impact coordinates	44° 07.8'N, 170° 07.8'E
Actual impact coordinates	44° 30'N, 170° 13.2'E

Table 1

(U) ORBITAL DATA

Parameter	Planned Values	Injection (Rev 0)	Actual Values				
			Rev 196	Rev 424	Rev 651	Rev 683	Rev 1024
Period (min)	88.77	88.83	88.57	88.61	88.52	88.71	88.66
Perigee (nm)	85.27	85.25	86.06	85.61	85.98	83.59	86.38
Apogee (nm)	153.98	158.01	145.41	146.54	144.34	151.80	149.17
Inclination (deg)	95.7	95.7	95.7	95.7	95.7	95.7	95.6
Eccentricity	0.0098	0.0104	0.0085	0.0087	0.0084	0.0094	0.0090
Argument of perigee (deg)	140.86	133.58	131.18	131.18	122.30	128.97	129.10
Predicted lifetime (revs)	177	173	112	112	87	97	91

Table 2

(U) RECOVERY DATA

Parameter	Recovery 1	Recovery 2	Recovery 3	Recovery 4*	Recovery 5
Date/time/rev	21 March/2313Z/196	5 April/0029Z/424	19 April/0004Z/651	20 April/2330Z/683	11 May/2341Z/1024
Aircraft/altitude/attempt	Hess 1/11,000 ft/2	Venue 1/7,700 ft/3	Vela 1/14,200 ft/1	Jaggy 1/12,400 ft/1	Beast 1/10,300 ft/2
Indicated airspeed (knots)	125	120	124	125	120
Predicted impact coordinates	29° 1.8'N, 150° 51'W	23° 29.2'N, 171° 02.3'W	22° 16.2'N, 167° 39.8'W	16° 09.3'N, 159° 23.8'W	26° 0'N, 163° 48'W
Recovery coordinates	28° 50'N, 150° 55'W	23° 35'N**, 171° 0.5'W**	22° 23'N, 167° 27'W	16° 38'N, 159° 03'W	26° 08'N, 163° 32'W

*Mk 5 capsule recovery, all others are Mk 8 capsule recoveries.
**Estimated position – LORAN failed just prior to recovery.

2. DISCUSSION

2.1 Planning

2.1.1 (U) Documentation. The Test Operations Order (TOO) was republished (less Annexes E and R) on 31 December 1972. Annex E was issued as Revision Change Notice (RCN) 01 on 24 January 1973, and Annex R was republished on 8 December 1972. The TOO was republished to reflect the additional operations requirements imposed by the use of a new recovery vehicle (the Mk 5).

2.1.2 (U) Readiness. The SCF was prepared to support this operation on 1 March 1973.

2.1.2.1 (U) Rehearsals. Rehearsals were held as follows:

Type	Date	Duration
Development rehearsal	12 Feb 1973	64 revs
Dress rehearsal	28 Feb 1973	16 revs

All rehearsals tested the Field Test Force's response to various anomalies; included in the rehearsals were simulations of all significant events (OAs, recoveries, etc.).

2.1.2.2 (U) Hardware. The following hardware modifications were implemented:

a. Preliminary Engineering Change (PEC) STC-263: Digital Television Installation for MCC-4 and TA Area.

b. Temporary Engineering Change Proposal (ECP) AF-741: Recording of Special Data for IRON 8410.

2.1.2.3 (U) Software. Twelve Discrepancy Report Forms (DRFs) and four Design Change Requests (DCRs) were generated before the flight. Eight DRFs and two DCRs were open at the time of the launch. None of them was flight-limiting.

2.2 (U) Prelaunch

The SGLS-46 antenna at VTS was used to support prelaunch pad tests. The SCF joined the countdown at 1230Z on 9 March. Several "holds" were imposed, and the launch was delayed until the close of the launch window.

2.3 (U) Launch and Ascent

Liftoff occurred 1.9 sec after the nominal close of the launch window. The SGLS-60 antenna was used to autotrack the vehicle continuously from liftoff to fade (liftoff +475 sec).

2.4 Orbit Operations

Operations support was generally good, although the incidence of data-system anomalies was higher than that for the last operation.

2.4.1 (U) Scheduling. No major scheduling problems occurred during the operation.

2.4.1.1 (U) CDC 3800 Computer Usage. One dedicated computer was used throughout the operation; a second computer was used for 629 hr, yielding a computer-usage rate of 1.410 computers per day.

2.4.2 (U) Tracking. The quality and quantity of tracking data obtained were adequate for determining orbit ephemerides.

Problem 1:	VTS, Rev 406. Data received from the vehicle tape recorder were noisy because the SGLS-46 antenna operator inadvertently locked the antenna onto a sidelobe.
Action:	The operator made several unsuccessful attempts to acquire the mainlobe, and the Test Controller turned the vehicle tape recorder OFF.

Impact: Some telemetry data were lost.

Problem 2: KTS, Rev 650. The SGLS-14 transmitter could not be activated because of arcing in the 21.5-kv cable.

Action: An outage (JCN 31082205) was opened. The cable was repaired and the outage was closed on the following day.

Impact: The vehicle could not be commanded into the desired telemetry configuration.

2.4.3 (U) Telemetry. The reception and processing of telemetry data were adequate to support the operation.

2.4.4 (U) Data Collection. The following software were utilized during the primary mission phase:

Software Model	Computer
13.1 BA	CDC 160A
13.1 RD with Correction Set 1	1230 mTc
13.1 E with Corrector Tape 13.1E-5	CDC 3800

2.4.4.1 (U) RTS/STC Data-System Anomalies. The following is a summary of the data-system anomalies that occurred during this operation:

Equipment	GTS	HTS	IOS	KTS	NHS	OL 5	VTS	STC
1230 mTc	0	2	0	4	1	5	0	--
CDC 160A*	3	4	0	8	4	21	1	41
1200-bps dataline	0	5	0	1	2	63	1	--
Microwave system (VTS to STC)	--	--	--	--	--	--	1	--

*Indicates station associated with bird-buffer problem.

2.4.5 (U) Commanding. All commanding required to meet mission objectives was accomplished. Below is a breakout of commanding activities and problems:

Activities/Problems	Mission Phase	Solo Phase
Messages loaded at primary station	739	56
Messages loaded at backup station	1	0
Messages not loaded	80	6
– Not required	79	6
– Vehicle	1	0

The following commanding problems occurred:

Problem 3: NHS, Rev 573. The command modulation index of the SGLS-60 transmitter was incorrectly adjusted.

Action: Support was provided by using the SGLS-46 transmitter. After Rev 590, the incorrect modulation index was discovered and corrected.

Impact: Transmission of the desired commands was delayed until Rev 574 at NHS.

Problem 4: OL 5, Rev 1054. A failed driver unit in the SGLS-14 transmitter prevented the activation of the transmitter.

Action: The station utilized the helix-antenna transmitter to complete as much of the command plan as was possible.

Impact: Some of the planned commanding could not be accomplished.

2.4.6 (U) Performance Evaluation Incentive Scoring

	GTS	HTS	IOS	KTS	NHS	OL 5	VTS	Total
Number of station contacts	99	119	17	144	125	614	182	1300
Number of passes scored	77	92	14	120	104	551	127	1085
Total possible score	308	368	44	472	412	2204	505	4309
Total achieved score	308	368	44	469	410	2202	503	4300
Score (%)	100	100	100	99.36	99.51	99.91	99.60	99.79*

*This is the highest score ever achieved by the SCF on this program.

2.5 (U) Recovery Operations

The repositioning of the SRU was directed by the Commander, 6594th Test Group. To prevent the battery from damaging the contents of the capsule, a battery discharge unit (BDU) was used after each recovery.

2.5.1 (S) Recovery 1. The first capsule was air-recovered on the second recovery attempt, performed after the pilot of Hess I had intentionally aborted the first recovery attempt because the capsule's parachute had a high rate of oscillation, and the system was moving rapidly 25 deg to either side of the vertical.

2.5.2 (S) Recovery 2 (S). The second capsule was air-recovered by Venue 1 on the third recovery attempt. Two intentional pulloffs were made because of capsule parachute oscillations of up to 30 deg. Visual acquisition of the parachute was made by Venue 2 at 0009Z at 26,500 ft and by Venue 1 at 0011Z at 22,500 ft. Helicopters were not deployed because the sea was too rough.

2.5.3 ~~(S)~~ Recovery 3 ~~(S)~~. Vela 2 had visual contact with the capsule at 2350Z at 28,000 ft. Vela 1 performed the recovery. The parachute excursions were similar to those experienced with other Mk 8 capsules, although the parachute was reasonably stable during the recovery pass of Vela 1. The strobe light was ON when the capsule was reeled in, but it had not been observed to be ON before the capsule was engaged by the recovery aircraft.

2.5.4 ~~(S)~~ Recovery 4 ~~(S)~~. The Mk 5 capsule was recovered by the crew of Jaggy 1 after it had made the first visual contact with the capsule at 2317Z at 22,500 ft. The reporting of recovery events by the recovery-aircraft crew was impeded by poor HF reception; the recovery was otherwise normal.

2.5.5 ~~(S)~~ Recovery 5 ~~(S)~~. The Beast 1 crew had visual contact with the capsule at 2325Z at 26,000 ft and performed the recovery on its second recovery attempt. Parachute and cone oscillations caused the pilot to abort the first recovery attempt. Prior to the recovery, the crew observed a 3-ft hole in the parachute's cone skirt.

2.6 (U) Special Support and Evaluation

The SCF managed a special test that was directed by the System Program Director. Details of this test are contained in a supplementary letter for this report.

3. (U) CONCLUSIONS

The SCF provided excellent support for this operation. The quality of SCF support has steadily improved during the past several operations; SCF scores have increased, and the number of points lost per pass has decreased. It will be interesting to see if this trend continues during future operations.

4. (U) SUMMARY OF ACTIONS TAKEN

Not applicable.

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DO

27 JUN 1973

Supplement to OER for IRON 8A10

AFSCF/CC

A Vehicle Atmospheric Survivability Program (VASP) was initiated on this flight by direction of OSAF (SAFSS). The purpose of the first test was to determine the breakup and reentry trajectory characteristics of the satellite vehicle components during deboost. The SCF obtained and coordinated the simultaneous support of four organizations; Air Defense Command (ADC), Space and Missile Test Center (SAMTEC), Defense Strategic Missile and Astronautical Center (DEFSMAC), and Air Force Eastern Test Range (AFETR). Initial planning was based on the use of seven sensors: the ADC's 12th Missile Warning Squadron and 16th Surveillance Squadron, AFETR's TRAP and ARIA (2) aircraft and ARIS ship; and a classified DEFSMAC sensor. The TRAP aircraft was not available for the test because of a scheduling conflict. All other sensors provided excellent support. Preliminary reports of the reduced data should be available approximately four weeks after the 8A10 test, the final reports will be available approximately eight weeks after the test. The analysis is being performed by the Aerospace Corporation and the results are to be provided to the System Program Director.

[redacted]
Director for Test Operations

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