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Post Launch
Mission Operation Report
No. S-815-75-01

MEMORANDUM

August 28, 1975

TO: A/Administrator

FROM: SL/Viking Program Manager

SUBJECT: Viking-1 Post Launch Report #1

The first Viking spacecraft was successfully launched on August 20, 1975, at 5:22:00.6 p.m. EDT. When safely injected on its Trans-Mars trajectory, the spacecraft was designated Viking-1. The trajectory was within the designed 2 sigma limits. When this trajectory is translated into the Mars encounter geometry, the achieved injection point would miss the targeted point by 67,883 kilometers (see Figure 1). The targeted point was intentionally biased away from the planet to assure that the spacecraft or launch vehicle would not impact the planet due to injection errors and violate planetary quarantine restrictions.

On Wednesday, August 27, 1975, at 2:30 p.m. EDT, a trajectory maneuver of 4.684 meters per second was performed to target the spacecraft for its Mars Orbital Insertion (MOI) point. The accuracy of this maneuver will not be known for several days. However, the total uncertainty of the maneuver (i.e., orbit determination and execution errors) and orbit determination uncertainty are shown in Figure 2. A second and possibly third correction can be executed if required.

As of this report, the spacecraft is in excellent operating condition. All events were achieved as planned (see Table 1) and the spacecraft is operating in a cruise mode.

The first Viking launch was scheduled for August 11, 1975. During prelaunch tests of the Launch Vehicle's solid rocket motors thrust vector control valves, one valve was determined to be faulty. A decision was made to slip the launch to August 14 to provide time to remove the valve and perform diagnostic analyses and tests. During a scheduled orbiter battery check and recharge exercise on August 13 at 11:30 a.m., it was discovered that the orbiter had been unexplainably transferred to internal battery power and that the batteries had discharged to 9 volts, well below their safe limits. Since it was considered unsafe to attempt to recharge the batteries while on the spacecraft and since several of the subsystems were operated at voltages below their test and design limits, the project decided to remove the spacecraft from the launch vehicle and replace it with Spacecraft B. This action would require that the launch be slipped to August 24 if standard procedures were followed. After

(NASA-TM-X-74696) VIKING-1 POST LAUNCH REPORT NO. 1 (National Aeronautics and Space Administration) 5 p

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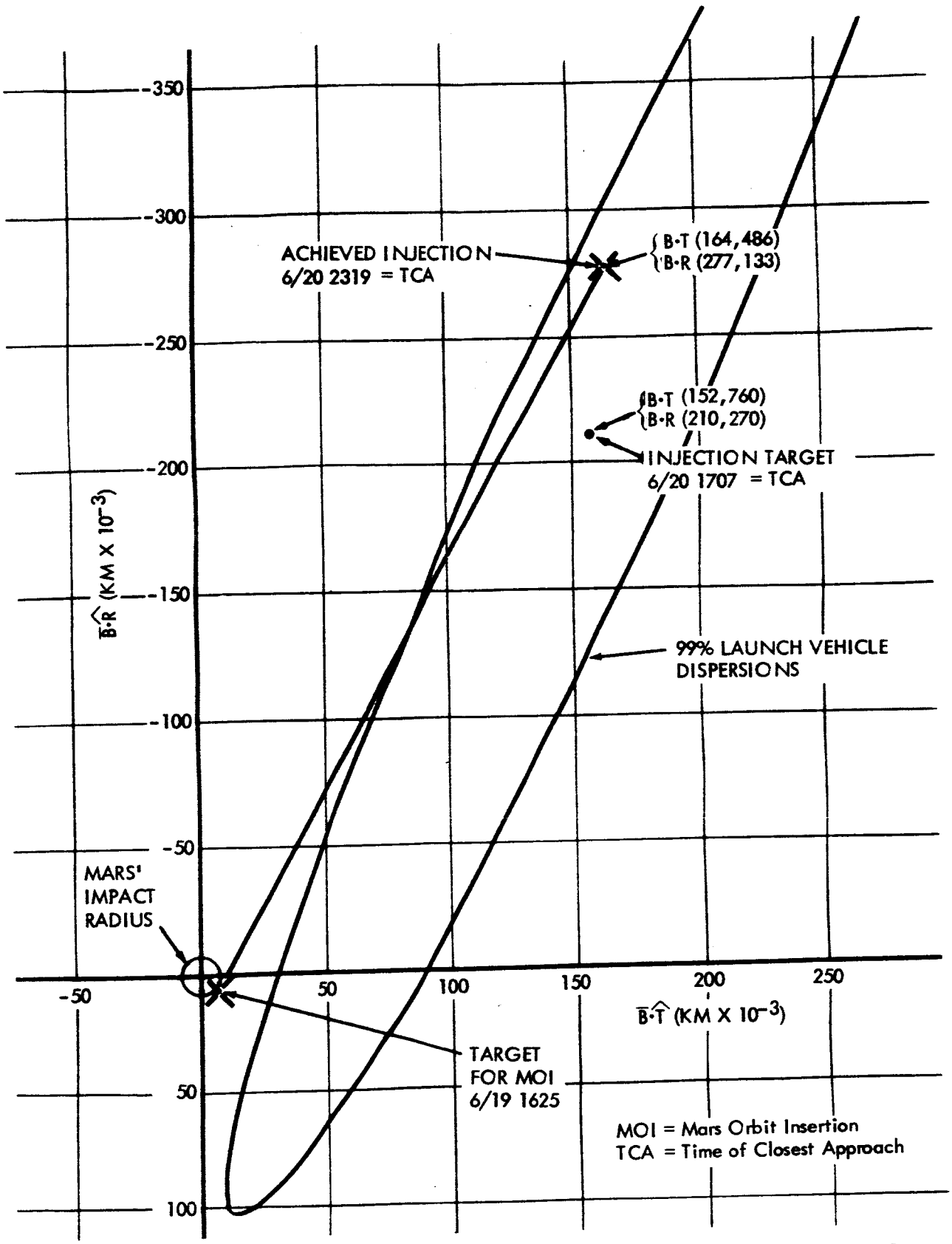
-350
-300
-250
-200
-150
-100
-50
50
100
-50
50
100
150
200
250
$\hat{B}\cdot\hat{R}$ (KM X 10^{-3})
$\hat{B}\cdot\hat{T}$ (KM X 10^{-3})
ACHIEVED INJECTION
6/20 2319 = TCA
B·T (164,486)
B·R (277,133)
B·T (152,760)
B·R (210,270)
INJECTION TARGET
6/20 1707 = TCA
99% LAUNCH VEHICLE
DISPERSIONS
MARS'
IMPACT
RADIUS
TARGET
FOR MOI
6/19 1625
MOI = Mars Orbit Insertion
TCA = Time of Closest Approach

Fig. 1

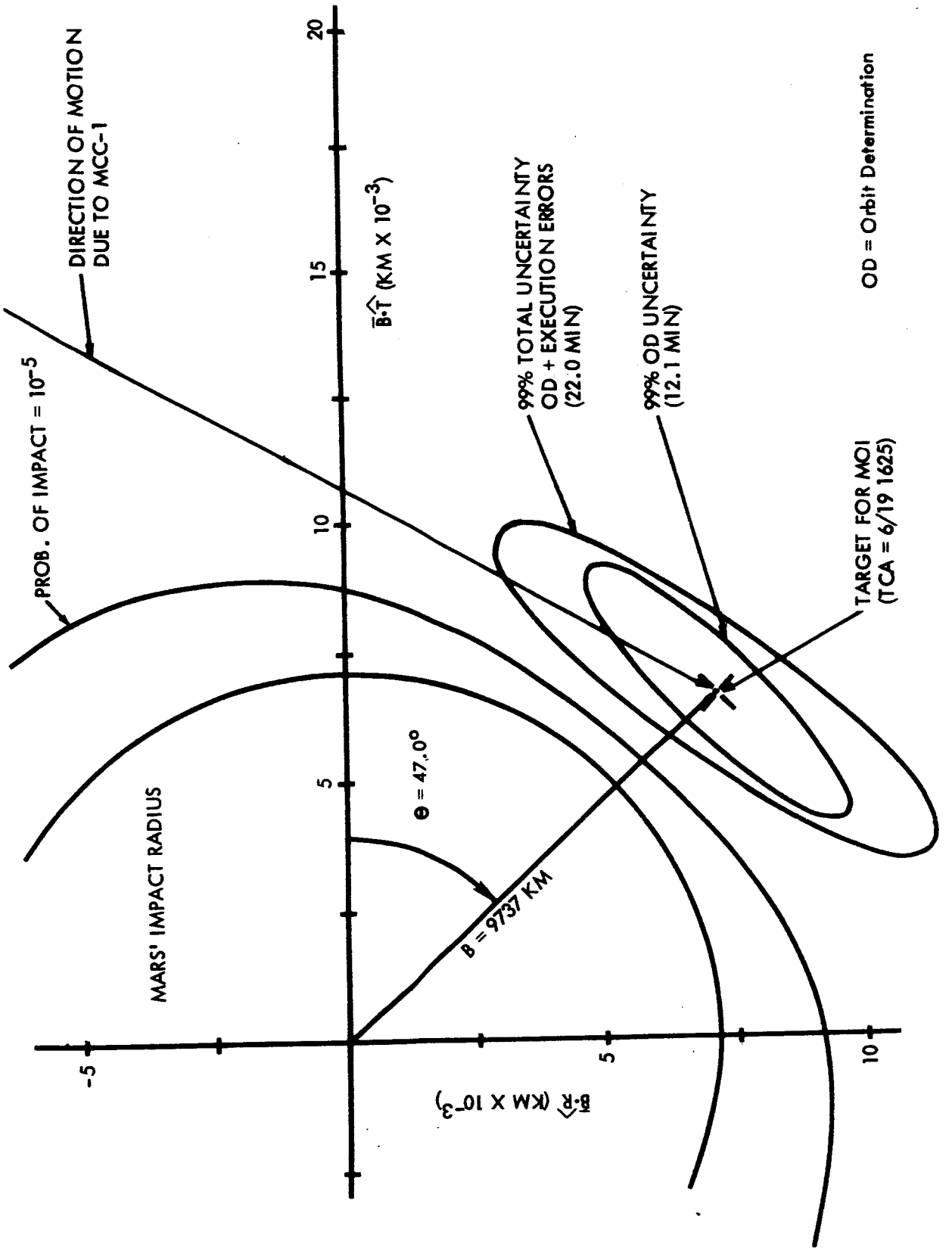
DIRECTION OF MOTION DUE TO MCC-1
PROB. OF IMPACT = 10^{-5}
$\hat{B}\cdot\hat{T}$ (KM X 10^{-3})
99% TOTAL UNCERTAINTY OD + EXECUTION ERRORS (22.0 MIN)
99% OD UNCERTAINTY (12.1 MIN)
OD = Orbit Determination
TARGET FOR MOI (TCA = 6/19 1625)
MARS' IMPACT RADIUS
θ = 47.0°
B = 9737 KM
$\hat{B}\cdot\hat{R}$ (KM X 10^{-3})
20
15
10
5
-5
5
10

Fig. 2

TABLE 1
VIKING 1 LAUNCH – MAJOR EVENTS

MARK NO.	EVENT	TIME (GMT)
	Liftoff	21:22:00.6
1	Heat Shield Jettison	21:23:40.2
2	Stage 1 Ignition	21:23:51.0
3	Stage 0/Stage 1 Separation	21:24:01.9
4	Stage 1 Shut Down	21:26:19.7
5	Stage 1 Jettison	21:26:20.4
6	Stage 2 Ignition	21:26:20.3
7	Centaur Standard Shroud Jettison	21:26:32.3
8	Stage 2 Shut Down	21:29:40.9
9	Stage 2 Jettison	21:29:54.65
10	Centaur Main Engine Start (MES) #1	21:30:05.9
11	Centaur Main Engine Cutoff (MECO) #1	21:32:11.6
12	MES #2	21:47:33.0
13	MECO #2	21:52:48.0
14	Centaur/Spacecraft Separation	21:56:31.0
15	Solar Panel Deployment	21:58:42.0
16	Centaur Retro Start	22:10:41.0
17	Centaur Retro End	22:14:52.0
	High Gain Antenna Unlatch	22:22:18.0
18	Bio Shield Jettison	23:29:00.0
	Sun Acquisition Command	23:40:18.0
	Canopus Acquisition	00:42:04.0

careful evaluation it was decided that the launch could take place on August 20 if a Range Safety waiver could be obtained for removal and installation of the spacecraft without detanking and depressurization of the launch vehicle. This waiver was granted and the launch occurred on August 20 at 05:22 p.m. EDT.

Walter Jakobowski