



Mission Planning and Analysis Division
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
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HOUSTON, TEXAS 77058

2-35

REPLY TO
ATTN OF: 71-FM22-36

FEB 12 1971

MEMORANDUM TO: Informal Distribution

FROM : FM2/Landing Analysis Branch

SUBJECT : Preliminary postflight of Apollo 14 LM descent

Enclosed is a preliminary look at the Apollo 14 LM powered descent. Table I is a listing of actual events related to time and PGNCS indicated altitude. Figures 1 and 2 illustrate the trajectory characteristics of the landing phase during P-66 operation. Notice that the automatic landing point was approximately 1300 ft short of the actual landing point. The correction of this range difference accounts for the major portion of the flight time in P-66 as is illustrated in figure 3. Figure 3 also illustrates the altitude time history of previous landings for comparison. The actual maneuver took 70 seconds longer than the automatic nominal (12:42 compared to 11:32). The vertical descent profile closely matches the nominal, beginning at approximately 100 ft altitude at an altitude rate of approximately 3 fps. The 3 fps rate of descent was maintained to touchdown. The time remaining till BINGO was 46 seconds which indicates a usable propellant remaining of approximately 614 lbs.

The data will be updated and expanded as more flight data becomes available.

Willis M Bolt

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APPROVED BY:

Floyd V. Bennett

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Chief, Landing Analysis Branch

Enclosures

Distribution:
(See attached page)

FM2/WMBolt:djr 2/12/71

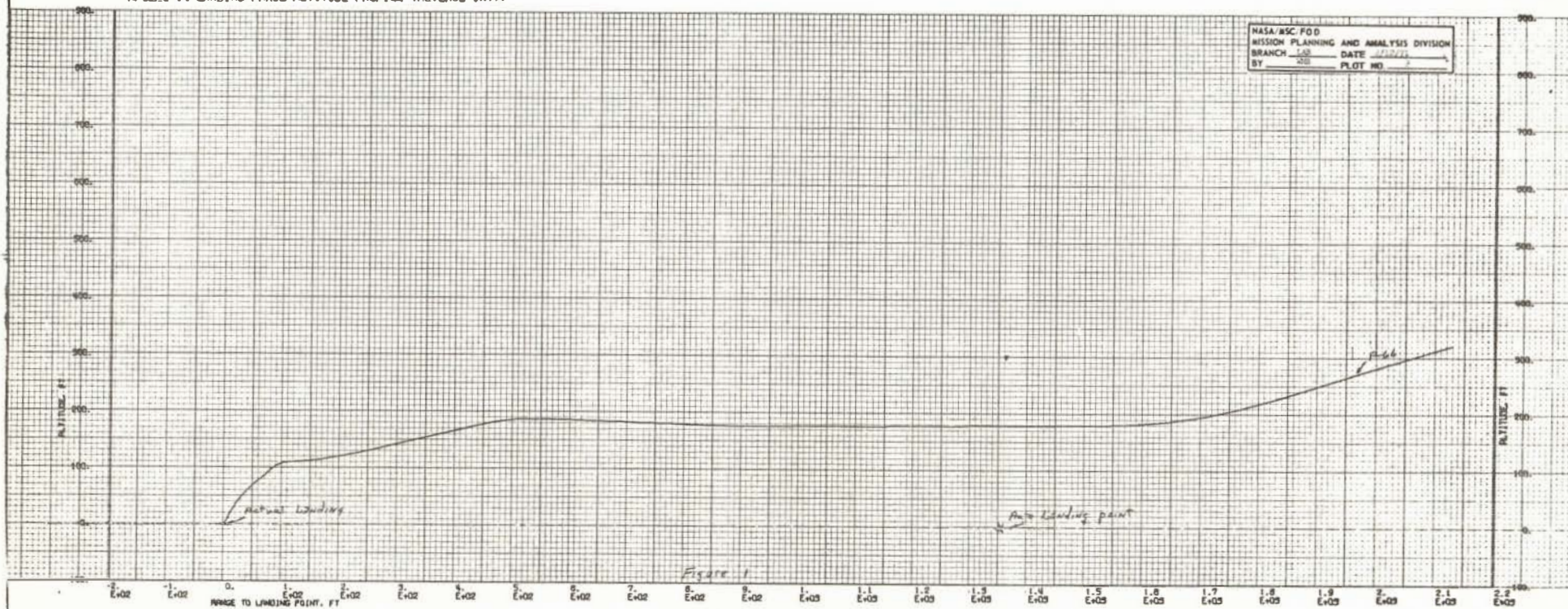
INDEXING DATA			T	PGM	SUBJECT	SIGNATOR	LOC
DATE	OPR	#					
02-12-71	MSC	71-FM22-36	m	MPA	(AL-00X)	BOLT	023-25

TABLE I
APOLLO 14 POWERED DESCENT EVENT TIMES AND ALTITUDES

Events	Computer*	Actual	Nominal	h _{PGNCS} , ft
	AET hr:min:sec	TFI, min:sec		
IR low scale	107:57:35			
AVG G-on	108:1:57	-30	-30	
Engine arm	:2:15			
Ullage	:2:19	0:08		
Ignition	:2:25	0:00	0:00	47355
FTP	:2:52	0:27	0:26	47537
Enable guidance steering	:3:11	0:46		47503
Disable P-70 - P-71	:3:33	1:08		46996
P-63 mode reg	:3:47	1:22		46459
Noun 69 initiated	:4:21	1:56		44809
Noun 69 entered	:4:49	2:24		
PGNCS altitude < 30K	:7:33	4:68		30015
Throttle recovery	:8:47	6:22	6:34	
IR high scale	:8:49	6:24		
IR-V data good	:9:09	6:44		22657
IR-H data good	:9:11	6:46		22486
Enable altitude updates	:9:35	7:10		20331
P-64	:11:09	8:44	8:34	8190
Redesignation enable	:11:51	9:26		2850
IR low scale	:11:51	9:26		
IR ant pos 2	:11:51	9:26		
LPD redesignation (350 ft left)	:11:53	9:28		2699
Low gate (500 ft)	:12:57	10:32	10:20	507
Att hold	:13:07	10:42		360
P-66	:13:09	10:44		333
A priori terrain termination	:13:09	10:44		
Rate of descent	:13:09	10:44		
Low level signal	:14:18	11:53		
Velocity reasonability test failed	:14:19	11:54		154
Velocity Reasonability test passed	:14:21	11:56		147
Z component of velocity failed reasonability test	:14:33	12:08		99
Z component of velocity passed reasonability test	:14:37	12:12		95
Terminate IR altitude data	:14:59	12:34		39
Landing	:15:09	12:44	11:32	8
Engine disarm	:15:15	12:50		
AVG G-off	:17:19	14:54		

*Computer AET time = LGC time - 40 min 2 sec.

APOLLO 14 LANDING PHASE ALTITUDE PROFILE (REVERSE INT.)



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Figure 1

APOLLO 14 ALTITUDE VERSUS ALTITUDE RATE (REVERSE INT.)

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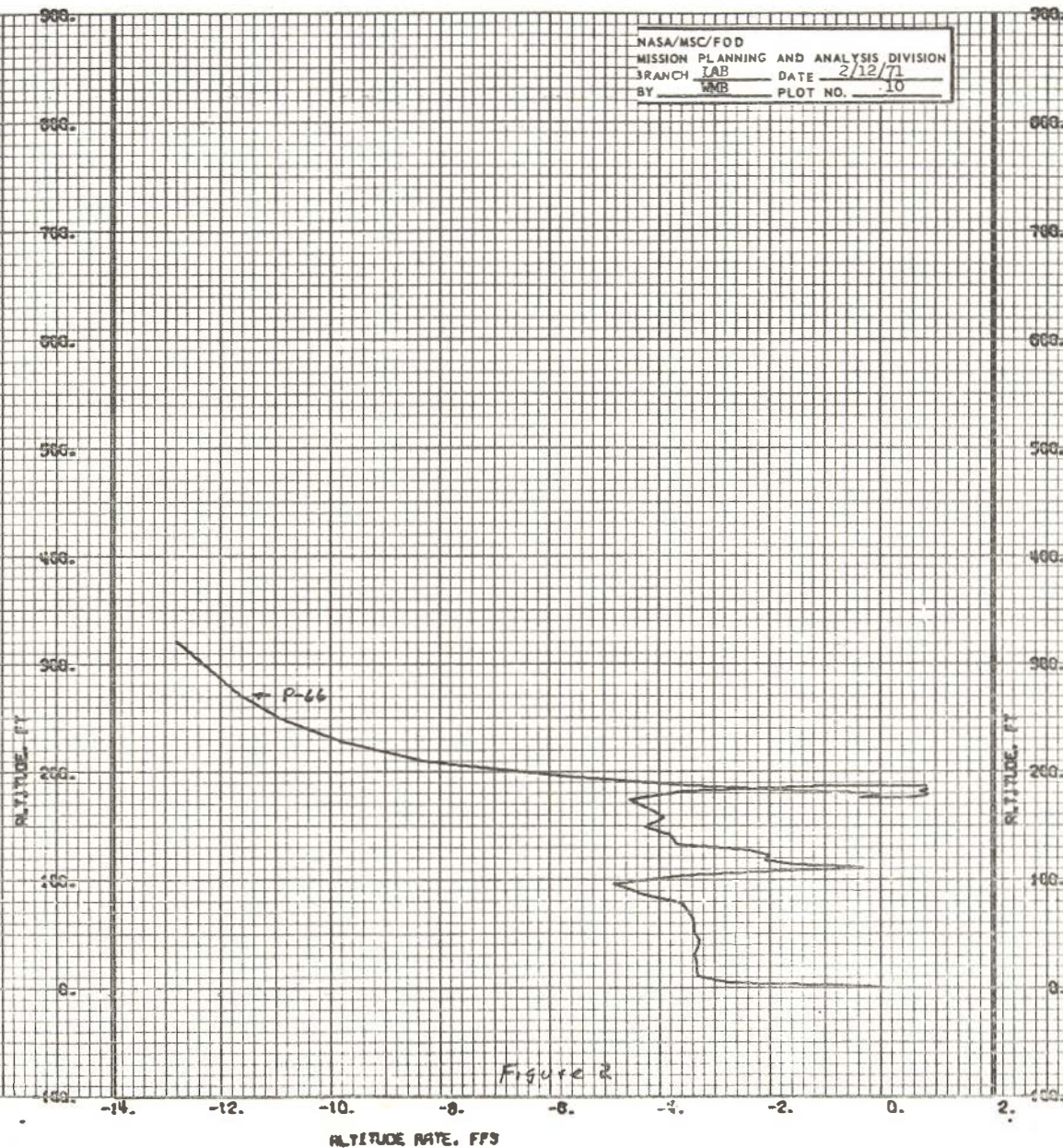


Figure 2

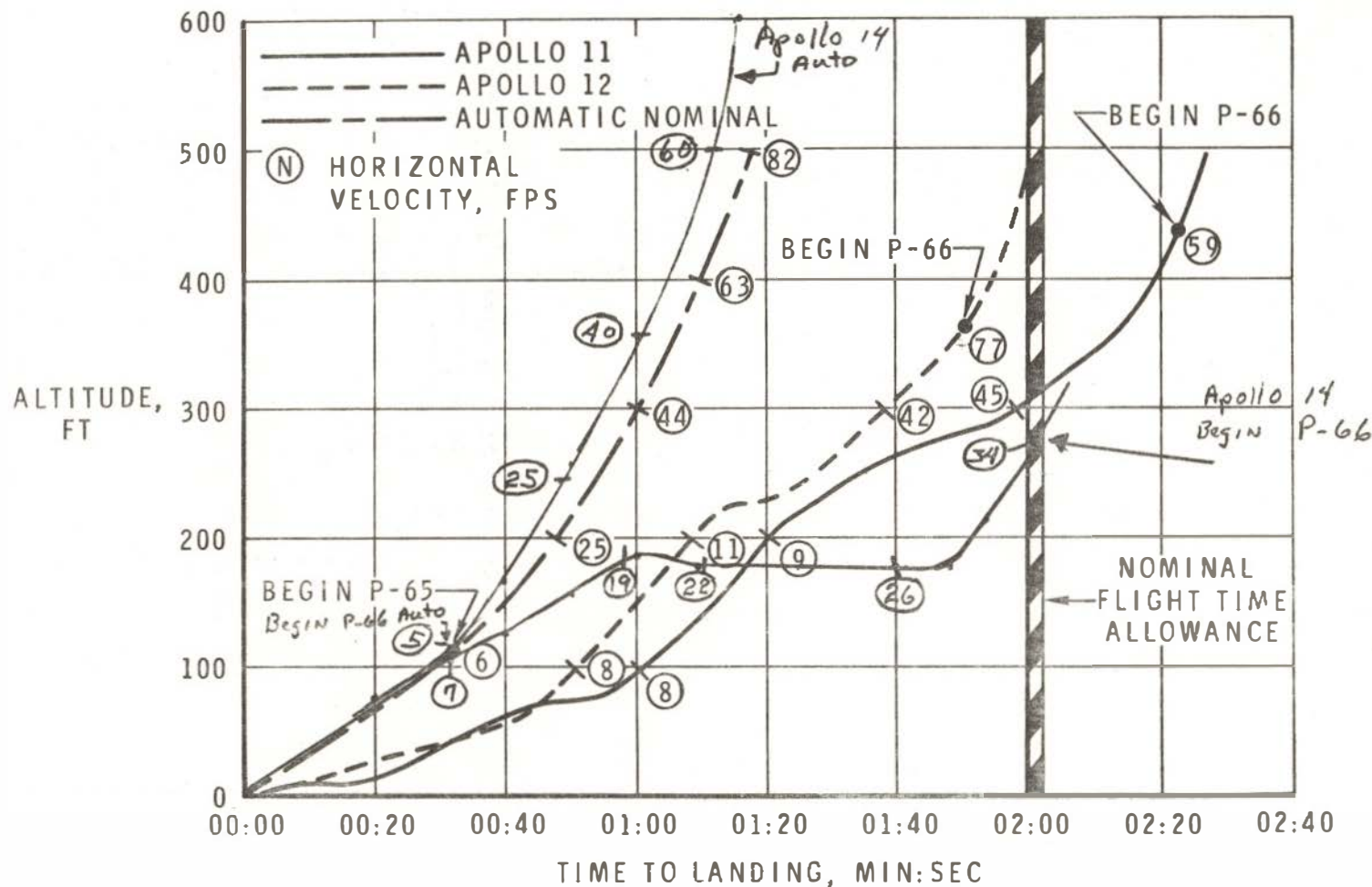


Figure 3.- LM altitude time histories for the landing phase.

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